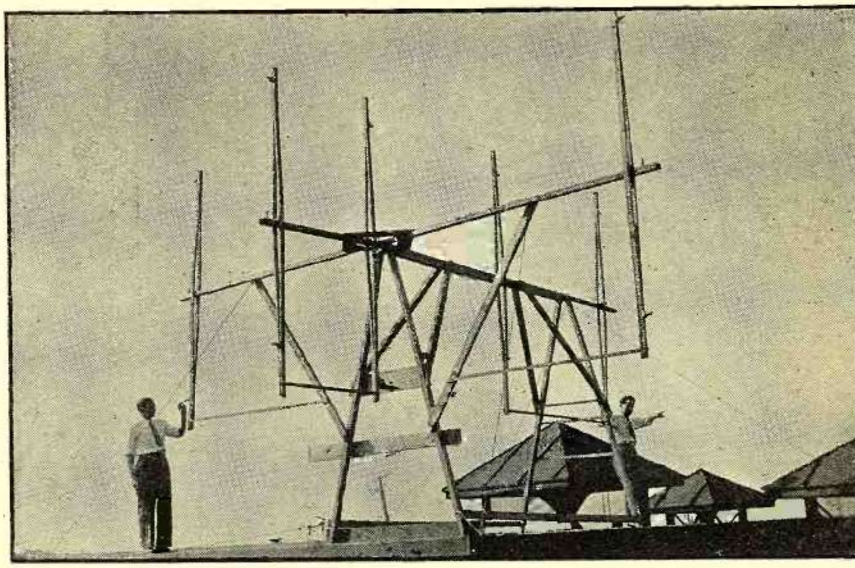
A LIFE-SIZE PICTURE

On the opposite page is shown a home scene where Peck's television receiver, operating in an illuminated room, pictures a television subject's head in full size with a sound accompaniment. The top photograph on this page shows the 6-meter special television beam antenna which projected the pictures over a distance of over 70 miles.



Reporting Progress ....

TELEVISION

TELEVISION has arrived in Canada. It is not "still in the laboratory"; it is not "just around the corner" or the familiar "two or three years off." It is actually on the air daily over the Peck Television Corporation station, VE9AK, located in the Dominion Square Building, Montreal. And Canadian radio manufacturers are preparing to put a low-cost radio-and-television receiver on the market.

Nor is it the "flickering" television such as has been broadcast formerly in America; both transmitter and receiver differ greatly from apparatus which has heretofore been shown. The transmitter uses an *entirely gearless* scanner and with a 300-watt antenna input is sending a strong signal *more than seventy miles* on the 5 to 6 meter channel. Twenty miles had previously been considered the practical limit for this 5-6 meter television prior to Peck's experiments.

The receiver, too, is different. It projects a 14 inch by 16 inch picture on a screen with enough brilliance to be readily visible in a normally-lighted room. It uses no costly cathode-ray tubes; its only elements which need replacement are a $1.50 light-valve tube and a 10-cent automobile headlight bulb (the light source). Both of these elements give 5000 hours service.

VE9AK was erected in the middle of May, 1935, as a 20-watt station. It then had a service radius of about ten miles. As the engineers under the personal direction of William Hoyt Peck, president and chief engineer of the corporation, furthered their experiments, the power was gradually increased to 300 watts and the range for an R9 signal was increased to 75 miles easily.

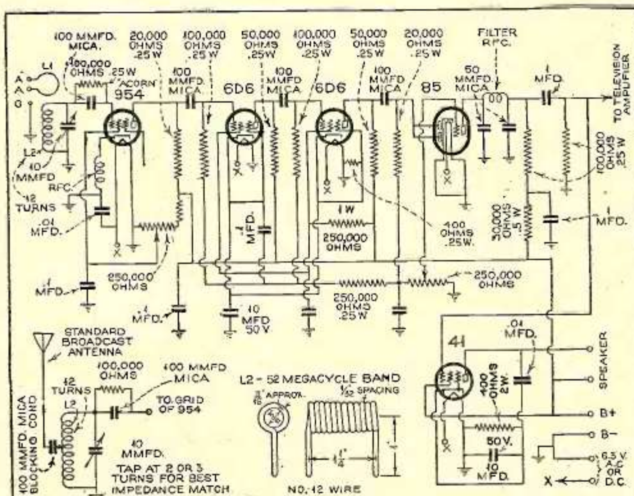
DURING A FIELD TEST

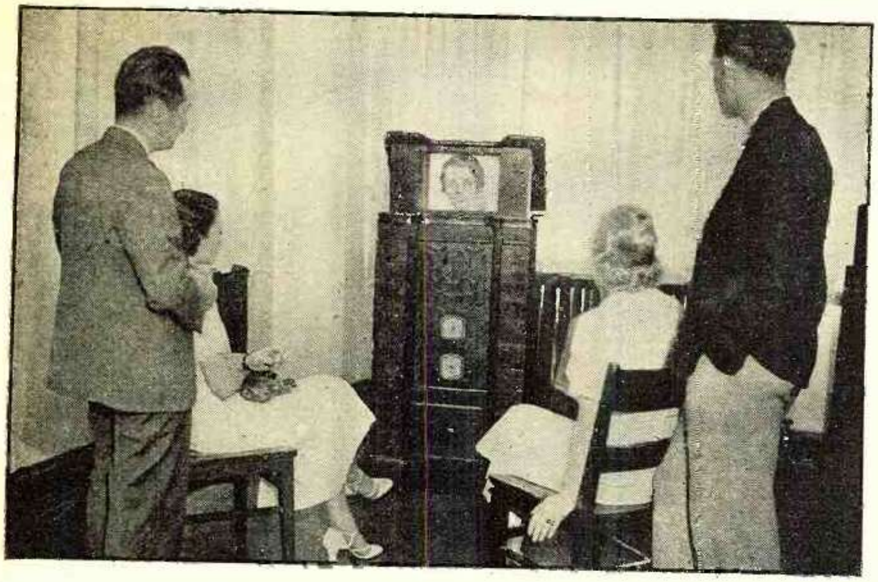
An engineer and his assistants checking the strength of the new Canadian television transmitter, atop the Dominion Square Building in Montreal, from a distant field. At right, the schematic diagram of Peck's television receiver.

To understand how Peck has more than trebled the range formerly believed possible for ultra-short waves, it is necessary to know something of his background. Briefly, he is one of America's foremost experts in the field of optics, and sprang into international prominence during the World War, when he devised a means of making sextant mirrors that had hitherto been obtainable only from Germany.

Phenomena Studied

Knowing the familiar fact that ultra-short waves are in many of their characteristics similar to light waves, Mr. Peck brought his years of optical training to bear upon the problems which they presented. He understood the refraction of light by the earth's atmosphere, which enables us to see the sunset some twenty-eight minutes after the sun has sunk below the horizon and decided that the same phenomenon might hold for similar radio waves.





71 MILES *on* 6 *Meters* *in* CANADA

By
Rupert Oakille

Peck likewise, from long study of light reflectors, developed a theory for directional antennas, which has worked out in practise. "If you set up an automobile headlight bulb with no reflector behind it," says he, in explaining his theory, "it will illuminate only a small area. But if you add a *correctly designed* reflector, the beam may be projected a mile or more in a single direction. We are now applying this principle to the propagation of ultra-short radio waves."

The Reflector Antenna

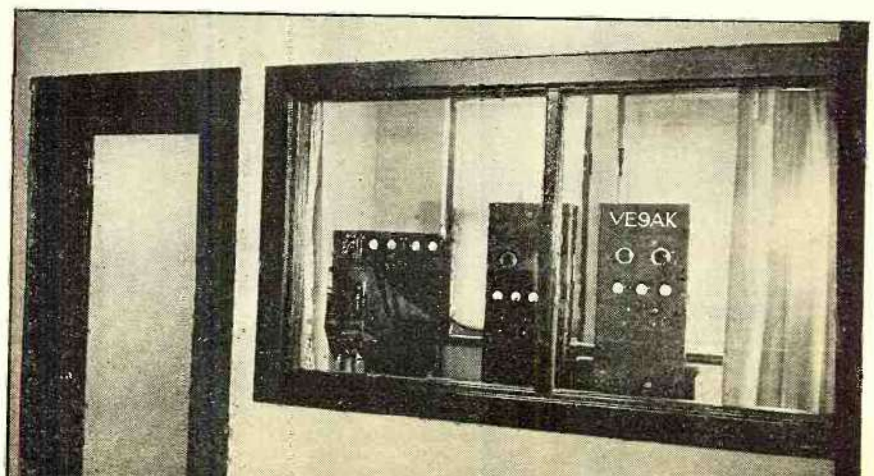
The output of the Peck Television Corporation's transmitter is fed into a single upright antenna—a small copper rod atop the Dominion Square Building. On three sides of this antenna are similar rods, tuned to the requisite frequency and placed ½-wavelength away. These are the reflectors, each collecting the energy radiated into its quadrant and reflecting it back to the antenna proper. By adjusting the length of the reflector rods, their resonance and therefore their efficiency may be controlled, so that it is possible to tune them in such a way that signals can still be heard on the "dead" sides of the antenna as well as along the path of the beam. In this manner, it is possible for the one transmitter to serve two areas; i.e., the area immediately surrounding the transmitter (in this case the city of Montreal), and the area traversed by the beam, which at present lies between Montreal and the outskirts of Trois Rivieres, Quebec.

At the side of the antenna from which the beam emanates, two upright metal rods are arranged. These, however, are placed in line at correct distances from the antenna and consequently act, not as reflectors, but as "electrical lenses," for their effect is to *concentrate* the beam along the predetermined course, and to keep it from spreading.

The receiving antenna for these waves is also an upright rod and Peck has discovered that as little as five feet difference in the placement of a receiving aerial which is seventy-five miles from the transmitter may mean the difference between an adequate signal and total lack of reception. He explains this by pointing out that it is possible for a reflected wave, out of phase with the direct wave, to cancel out, but that by moving the receiving antenna a quarter wavelength, the phase shift problem is overcome.

Approximately 1,000,000 persons are within the area in which J. L. Cassell, Joseph Dusek and other Peck engineers have conducted tests during the past three months. Their figures show that signals of sufficient strength to over-ride local interference are heard throughout this entire territory. The engineers have established field headquarters at the Hotel Lafleur, Louisville, Quebec, where Roland Lefleur, manager of the hotel, had been acting as an unofficial observer, making nightly checks on the signal strength of VE9AK. Later a complete receiving installation was made here as a permanent test station. The hotel, one of the largest in that part of Quebec, was thus the scene of Canada's first major television demonstration.

Nor is the Peck optical antenna system the only new development of this organization, which has steadfastly adhered to mechanical scanning in preference to the much-publicised cathode—ray equipment. "There is no need to use more than 180 lines unless you want to watch television (*Turn to page* 186)



TELEVISION STATION VE9AK
Looking into the control room of the Canadian television station VE9AK, showing the short-wave transmitter, the control panel, and at the extreme left, the pick-up apparatus.

Servicemen's Profits

(Continued from page 153)

the mere sum of seventy-five dollars. The result was simply this: He installed a photo-electric cell and relay near the door in such a way (Figure 1) that when the truck drivers backed up to the building to unload, the rear end of the truck would interrupt a beam of light and ring a "loud" bell at a critical distance. The man who made the installation did not buy a complete photo-electric unit but rather only the components that he could not himself assemble. The job (with cell) cost him only $25.00. The light source was made from an automobile light reflector, a bell ringing transformer and an auto light.

This is the kind of electronic equipment that these small manufacturers can buy and the radio man can sell at a reasonable price with some margin of profit. And there are plenty of other little jobs that can be done with such equipment about small plants. Automatic counters can be placed on punch presses (Figures 2) and conveyor machinery, burglar alarms can be installed, elevators can be prevented from starting until the gates are closed and many, many other chores that only photo-electric equipment can do, *can be done!* But this business is not available to fellows who sit in their places of business and recall the "good old days" when sets were sold with seventy-dollars margin and tubes brought a dollar profit for each sale. *Get out and get busy—get that brain working along the lines pointed out here and you also can cash in!*

Testing the HRO

(Continued from page 150)

crystal filter circuit arranged so that it can be used in this fashion for c.w. reception or, by a phasing adjustment, for radio telephone reception where a somewhat lesser degree of selectivity can be utilized. The set employs 9-tubes (without the power pack) using a 58 or a 6D6 in the first and second pre-selector short-wave stages. A 57 or 6C6 tube is used for the first detector and, coupled electronically to this, the oscillator tube is of similar type. A 58 or a 6D6 is used in each of the two i.f. stages followed by a 2B7 or a 6B7 for the second detector, with a 2A5 or a 42 tube used as the output. The c.w. oscillator tube is a 57 or a 6D6, also coupled to the second detector. The schematic circuit is shown herewith.

The rack-and-panel mounted job consists of this receiver, together with the power supply (which is the bottom unit); and the speaker and coil case units. The unit just above the speaker is the coil case for the calibrated band-spread, ganged, plug-in coils.

The front of the receiver contains the main tuning dial, center, and at left, the S-meter (for determining signal strength) underneath which appears its push button and a jack for headphones. Just below this is the audio-frequency volume control. Below this is the snap switch for turning "on-or-off" the a.v.c. and the bottom control knob turns "on" the oscillator and gives a small frequency variation for adjusting beat note. Below the main tuning dial there is the drawer of four tuning circuits for a given frequency band, that can be inserted in a jiffy merely by pulling out on the two handles. At the right, the top control is marked "selectivity" and below that is the control for "phasing" in the crystal circuit. The snap switch, next below, cuts the B power "on-and-off" and the bottom control of all is the r.f. gain (which we formed a habit of keeping fully on most of the time and controlling volume of reception almost entirely with the audio control). We could go on talking about this receiver for many thousands of words but as space is limited and as the HRO Instruction Manual goes into this matter in profuse detail, we will simply state some of the results we have obtained with the receiver. We think that for c.w. reception the crystal circuit really afforded the sharpest and most reliable non-interfering reception that we have so far had the pleasure of experiencing. Signals from all over the world were tuned in and, in many cases, when and if interference cropped up, an adjustment of the phasing control and the oscillator setting, as well as the selectivity control, cut it out in every case we tried. This was true of both amateur c.w. reception from 10 meters all the way up to the broadcast frequencies. It was really a pleasure to be able to control the heterodyne frequency without having to change the tuning or putting it "off frequency".

On the 20-, 80- and 160-meter amateur phone bands the receiver well demonstrated its exceptional sensitivity and selectivity (especially when the phasing adjustment of the crystal was used) and many hundreds of amateur stations were actually logged on my log sheets. To cut a long matter as short as possible, I am listing some of the American and foreign call letters from the 20-meter band log. These calls were written down, as heard, during the station announcements: W1AHI, W1DIO, W1AUC, W1CHG, W1CAV, W1BBN, W1GBE, W1FZO; W2HQY, W2EUG, W2HFS, W2AIT, W2FLG, W2UEP, W2EEN, W2ICU, W2AN, W2CFU, W2ART, W2MB, W2DVU, W2AAK, W2KIZ, W2CLS, W2FKL, W2KX, W2CQK, W2KR; W3AXT, W3AIR, W3DHM, W3BSY, W3BLO, W3IX; W4FQ, W4BLH (portable), W4AAK, W4BDD, W4DCK, W4DUX, W4AXO, W4KH, W4ALG; W5ZS, W5BDB, W5DND, W5LA, W5DCP, W5ECL, W5AEB, W5LAR, W5BGT, W5CCB, W5AXU, W5DG, W5BIN, W5BGW, W5PP, W5ZA, W5UN, W5AHJ; W6BGY, W6AQV, W6ZH, W6LR, W6EBJ, W6IZB; W7BCF, W7BCI, W7DNP; W8FSA, W8IGO, W8FA, W8AMY, W8KAZ, W8CDW, W8JTW, W8HTV, W8JVR, W8KJE; W9NLP, W9BJW, W9DHF, W9GBG, W9GJY (portable), W9PIY, W9CET, W9OJC, W9DEF, W9APP, W9ARK, W9DTP, W9GF, W9TPC, W9BJ, W9FQ, W9DHC, W9GXE, W9BFC, W9JEZ, W9BIF, W9RGF, W9QC, W9LBX, W9JNG, W9WX, W9LAI; VE1CR, VE2CA, VE2FG, VE2BD, VE2EE, VE3LL, VE3IX, VE3DB, VE3DF, VE3KW, VE4HQ, VE4NI, VE4BF, VE4GD, VE5HN; TI3AV, TI2RC; COfRY, CO6OM, CO2HY, CO6WW, CO2LL, CO2RA; HJ5ABE (must be a harmonic), HC1FG, HI7G, HP1A, HH5PA, X1G, X1W, X1T, VP3BG, VP5PA, VP5PZ, VP6YB, VP6PS, PY1VB, PY1BB; LU6AP, VK2EP, VK2YW, ZL2KI, ZE1JO (?) LAIG, ON4AU, ON4AC, OK2AK, K4SA, K6BAZ, VO1I, VO8A, CT1BY, EA4AO. The total list of 20-meter amateurs (when their mileage was figured up from New York) total 262,125 miles. I plotted these distances in some spare time from airline maps. The log on 80 meters and 160 meters gave 72,850 miles for the total distance. The log of c.w. stations both amateur and commercial gave a total of 480,645 miles. During these tests I made a habit of tuning in some local amateur with a stand-by receiver and then tuning the HRO to a distant station he was trying to QSO. In many cases the HRO brought in the complete return message without interference while at the same time the local amateur would report QRM.

The receiver also proved its worth as a very efficient short-wave broadcast receiver and one that I would heartily recommend for any Short Wave Listening Post Observer. The log shows reception and identification of over 100 short-wave DX stations, received from 41 foreign countries, outside the United States. The total mileage of these stations from New York was 324,660 miles. The calculation for the total mileage of all short-wave stations logged during the week's period is 1,140,280 miles (if I have not made a mistake in addition). I consider this a very excellent record for any receiver.

I did not do much on the broadcast band with this receiver as the static on these bands was heavy. However, I did identify a few West Coast stations and many at lesser distances throughout the United States. The tone quality on broadcast reception was all that could be desired. Next month I will point out some of the technical features of the receiver.

Canadian Television

(Continued from page 143)

programs with your chin resting on the receiver," says Mr. Peck. "The average radio listener sits from 10 to 15 feet from his set while he receives broadcast programs and it is unlikely that he will change his habits for television. Both theory and experiment prove that a 16-inch picture scanned by 180 lines contains all the detail that it is possible for the human eye to see at a distance of 10 feet or more. In other words, any detail in excess of 180 lines would be wasted unless the observer wanted to sit almost on top of his receiving set. Home movies can offer no more usable detail than can 180-line television, when viewed under similar conditions. We have consistently adhered to mechanical scanning because of its inherent superiority over other forms. In the first place, a cathode-ray tube which lasts about 1000 to 2000 hours before growing dim, costs approximately $75.00 in a size large enough to produce even a nine-inch picture. Then, too, our system requires a maximum voltage no greater than that used in the power stage of ordinary receivers. We use 350 volts, as compared to the cathode-ray tube's 1000 to 5000 volts. Our only elements which wear out are the light-valve tube and the light-source bulb, both of which last some 5000 hours and have a combined cost well under two dollars.

"We are now completing a new scanning system which is smaller and lighter than any heretofore constructed. It is driven by a 1/100 horsepower motor—smaller and cheaper to operate than many electric fans. And our light-valve is operated by only 1/20 watt; it cannot overheat! Add to this the fact that our picture is in black-and-white, as compared with the cathode-ray tube's varying shades of pea-soup green and you have several good reasons why we believe the mechanical scanner, with its low initial cost and its freedom from trouble, to be the only answer to the problems which have previously confronted television."

It has consistently and repeatedly been stated that television is still several years away. Peck, on the other hand, claims he has produced a system which the press and the public have pronounced satisfactory. So Peck readily admits that television has arrived. You can look for announcements by leading Canadian radio manufacturers, in the very near future, stating the appearance of Peck receivers on the market—and at a surprisingly low price. The Federal Communications Commission in the United States has, in all good faith, been guided in some measure by the statements of leading radiomen in making its estimate of the status of television, according to general rumors. Consequently, the Commission has made it rather difficult for the independent television companies to secure broadcasting licenses here. But when Mr. Peck went to the Radio Commissioners of Canada, explained his system to them and showed them evidences of performance, a Canadian license was promptly granted, and VE9AK came into being.

A diagram of the receiving apparatus which will soon be commercially available in Canada is shown on these pages, together with a brief description. There are, however, two features of the commercial job, full size working models of which have been produced by Peck, which will be of interest to every radio-minded reader.

First, the cabinet is entirely different from the earlier odd-appearing television receivers which have been produced in the past. With the top closed, it looks like any handsome console radio receiver. But when television images are being received, the top of the cabinet is lifted, like the lid of a phono-radio combination, and the 14-inch by 16-inch ground-glass screen, upon which the picture is reproduced, automatically swings into place. This screen is removable, however, so that a larger picture, up to five feet wide, may be projected onto the wall.

Second, the same cabinet that contains the television receiver equipment also houses an all-wave radio broadcast receiver and high-fidelity loudspeaking system. In this way, the set owner is assured not only of the sight-and-sound programs being sent out by the Peck station, but of all the sound broadcasts any other radio set will receive, as well.

Programs, long a bugaboo of television companies, present no particular problem to the Peck Corporation, which uses films and is now opening negotiations with the leading producers to make comedies, animated cartoons, features, shorts and musicals available on the air. This, it is expected, will give the "looker-in" the greatest stars of the screen as ordinary entertainment.

Besides this, Peck is planning to use his direct pick-up for sports, dramatic, educational and musical broadcasting. He does not worry about where the talent is coming from, but points to the precedent of radio, which simply went ahead and did the job. The Peck organization will, until television stations are permitted to sell time, defray the costs of talent, being reimbursed by income from the sale of Peck television receivers by companies licensed to manufacture them. After television stations are permitted to sell time, as do broadcasting stations, the talent bill will be defrayed by sponsors.

Mr. Peck is also planning to open a station in the United States some time before the coming winter. Other than stating that it will be located in the New York area, and will operate with sufficient power to bring his broadcasts to some 10,000,000 people, he refuses to comment until final arrangements have been completed.

Ten Meters Active Again

Several months ago we had a department devoted to 10-meter activity. It seems as though our plea for activity has been answered, as during the late spring and early summer a number of new stations appeared on the band, supplementing the number of pioneers who have stuck by the band during periods of good and bad activity.

During the last spring the band seemed to open up for some real DX. Increased activity may be partly responsible for this. A number of stations have put exceptionally fine transmitters on the band, and it is not uncommon during favorable conditions to hear out-of-district stations and even some out-of-country signals.

One of the most active pioneers on the band is W2TP. 2TP's present layout uses a 203-A in the final amplifier with about 200 watts input. He may be heard almost every Sunday afternoon working DX with good reliability. W2TP has been on the band since 1928 and still sticks by it, alternating his activity with 20-meter operation. He was heard recently working a ninth district station using only 3 watts input. The 9, despite the low input, was R8 in New York.

On the other hand, a number have put high power on 10 meters. Several are using as high as 500 watts, but the average is far less. Most of the "boys" on 10 are using less than 100 watts and are doing excellent work.

The chief obstacle in 10-meter transmission and reception is the antenna. It requires much experimentation and care in its erection. It is desirable to make field-strength measurements and adjustments until low-angle radiation is obtained. A vertical antenna, of course, is best. If a horizontal antenna must be used, a full-wave Zeppelin gives better radiation characteristics than a half-wave horizontal.

Ten meters is ideal for summer work, due to the almost complete absence of static. However, if you are unfortunate in being located on a much-traveled highway, it is not so good. Ignition QRM is the chief source of interference—Packards and Fords being the most serious offenders!

100 Miles on 5 Meters

NEW YORK, N. Y.—About a year ago, Mr. James Millen (W1HRX) of Malden, Mass., and the headquarters of the American Relay League (W1AL) at West Hartford attempted to form a chain of ultra-short-wave stations which would link Malden, Hartford, New York, Baltimore and Washington. Now a report comes from amateur station W3AZG at Riverton, N. J. (across the river from Philadelphia) that a conversation between Station W2DLG, the Hotel New Yorker and station W2AMJ in Bergenfield, New Jersey, was picked up at Riverton. This establishes a 100-mile communication on 5 meters which is something of a record. The station at the Hotel New Yorker, was operated by Mr. Arthur H. Lynch and the station at W2AMJ is owned and operated by Mr. Frank Lester. This event has given new hope among the amateurs for the possibility of covering larger distances with ultra-short-waves. A new series of tests is being organized in order to try to better this record.

The New 6B5 Tube

PROVIDENCE, R. I.—The Triad Mfg. Co. of Pawtucket, R. I., has put on the market a new tube designated as 6B5, which represents a radical departure in tube construction. The 6B5 is an improvement on the former 2B6, or triple-twin tube, but the cathode of the input section is internally connected to the grid of the output section and not to any prong on the tube base. To all appearances the plate circuit of this first plate section is not closed. However, the output section is a tube with a very high amplification factor which is so designed that the grid circuit impedance serves as the output impedance of the first section. In this way it is possible to eliminate a great number of parts and accessories which otherwise would have been necessary. For instance, it is possible to replace a 42 pentode by a 6B5 and have a few parts left over. For such a replacement the bias resistor should be short-circuited; no other changes are necessary. The 6B5 in such a circuit will deliver approximately 4 watts.

It should be understood that the 6B5 tube is not a Class B tube, but it is a triode tube designed and employed for Class A reproduction. The filament requires a potential of 6.3 volts and a current of .8 amperes. When used as a single ended amplifier the ratings are as follows: output plate, 300 volts; input plate, 300 volts; grid bias, 0 volts; output plate current, 45 m.a.; input plate current 8 m.a.; amplification factor, 58; plate resistance,