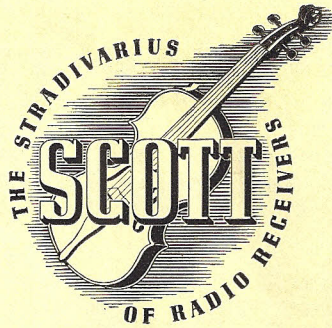


# SCOTT



# NEWS

NEWS OF LATEST DEVELOPMENTS IN THE SCOTT RESEARCH LABORATORIES

Vol. 12

New York

Detroit

Chicago

Los Angeles

Buffalo

London

No. 1

## We Complete the Most Successful Year in Our History



E. H. SCOTT

Designer and Builder of Super Powerful High Fidelity Radio Receivers

THE year 1939, which has just closed, has been one of the most successful of the 16 years I have been designing and building fine radio receivers. This success is due to one very simple fact, and that is, that here at the SCOTT Laboratories we are only interested in building an instrument that is as nearly perfect as skilled human hands and advanced engineering can make it. Actually, they are built in very limited numbers so that each one may have my personal supervision, for I believe it is impossible to turn out such instruments on a mass production basis. The SCOTT PHILHARMONIC, PHANTOM DE LUXE and MASTERPIECE are the finest receivers we have ever built and are, I sincerely believe, the finest radio receiving instruments in the world today.

I would like to offer my sincere regrets to those who placed their orders for a SCOTT receiver during the last weeks of

December and were disappointed in not receiving their instrument for Christmas. It was only by our working day and night during the weeks before Christmas that a much larger number were not disappointed.

Many do not realize that SCOTT receivers are custom built to order and that it takes approximately three weeks after the order is placed to build, test, and calibrate each receiver. I am sure those who did not receive their sets until after Christmas will agree that it is far better to take sufficient time in building and testing their receivers, instead of trying to rush them through and running the risk of not having a perfect instrument. SCOTT receivers are so advanced in design and are constructed with such precision, that it is not possible to build them in large numbers, and have each one the superlative instrument it is.

An indication of the esteem in which our receivers are held throughout the musical world is the fact that during the past twelve months we have added to our already long list of distinguished owners, a score of world famous musicians including Jascha Heifetz and Yehudi Menuhin, internationally known violinists; Deems Taylor, Music Consultant of the Columbia Broadcasting Company; Eugene Ormandy, Conductor of the famous Philadelphia Orchestra; Frederick Stock, Conductor of the Chicago Symphony Orchestra; Fritz Reiner, Conductor of the Pittsburgh Symphony Orchestra; Artur Rodzinski, Conductor of the Cleveland Symphony Orchestra; Vladimir Horowitz and José Iturbi, internationally famous pianists; Harl MacDonald, noted composer and Musical Director of the University of Pennsylvania; Kirsten Flagstad, the famous Wagnerian soprano; Richard Crooks, internationally known tenor; Ezio Pinza, distinguished basso; Elisabeth Rethberg, noted operatic soprano; Lawrence Tibbett, world famous baritone, and many other leaders in the musical world whose names you would recognize instantly.

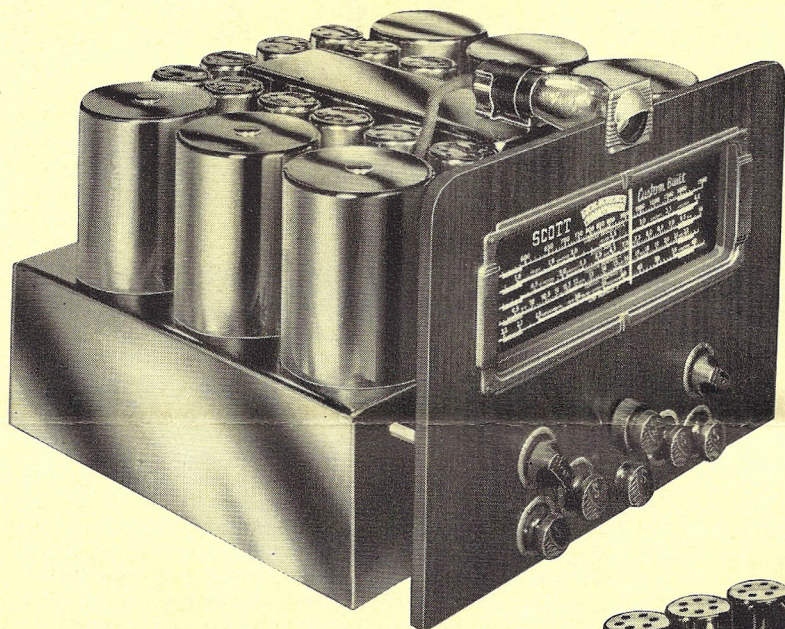
It has been my conviction for a long time that many radio programs on the air today would build up more good will for their sponsors and their product if they offered more entertainment and less advertising, and I am sure there are many thousands who will agree with me. To prove this theory, we are now sponsoring a full hour each night of the world's finest recorded music over station WCFL, one of Chicago's finest high fidelity stations. This program, which has now been on the air for approximately six weeks, has already proved quite conclusively that this theory is correct. On our program you hear approximately 59 minutes of fine music, *but only one short 60 second commercial message*. We have called it the SCOTT MUSIC LOVER'S HOUR and you can hear it every night from 10:30 to 11:30 P.M. CST except Sunday.

In closing, I especially want to thank all SCOTT owners who have so enthusiastically recommended a SCOTT to their friends. Our records show that over 80% of our receivers are sold indirectly by word-of-mouth advertising of our owners. I know many people have wondered why we do not advertise more extensively in the usual way. The answer is that the recommendations of SCOTT owners all over the world result in so many orders coming to us that a large amount of advertising is not necessary to keep our laboratories busy all through the year. I know that the recommendations of SCOTT owners will keep us just as busy during 1940 doing the thing we like to do best—building the WORLD'S FINEST RADIO RECEIVER—as it did in 1939.

With best wishes for a Very Happy and Prosperous New Year, I am sincerely yours,

# NOW—GREATER THAN EVER

## *The World's Finest Radio Receivers*

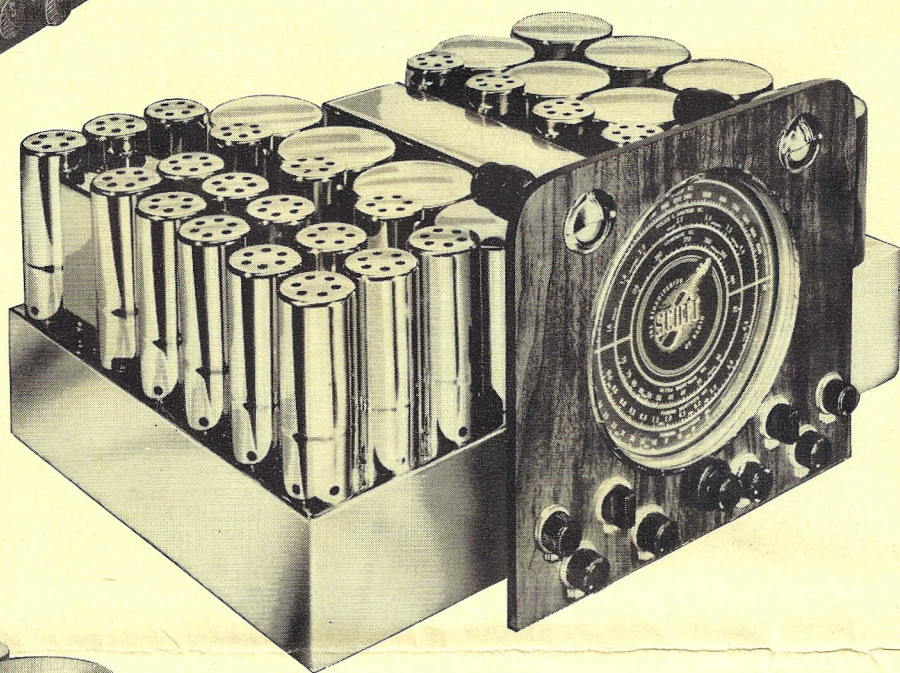


**THE 1940 SCOTT PHANTOM DELUXE  
(Left)**

An advanced instrument designed for those whose chief interest is in the enjoyment of fine music. The 15" high fidelity speaker and undistorted power output of 25 watts assure reproduction free from mushing or vibration. Inasmuch as controlled broadcasts and records frequently reach peaks of 20 watts, the larger speaker and power output are essential to faithful reproduction. The automatic Needle Scratch Suppressor does away with the only objection to recorded music, for it so reduces record surface noise, that it is practically impossible to distinguish a recording from an actual broadcast. A full tabulation of PHANTOM DELUXE features will be found on page four.

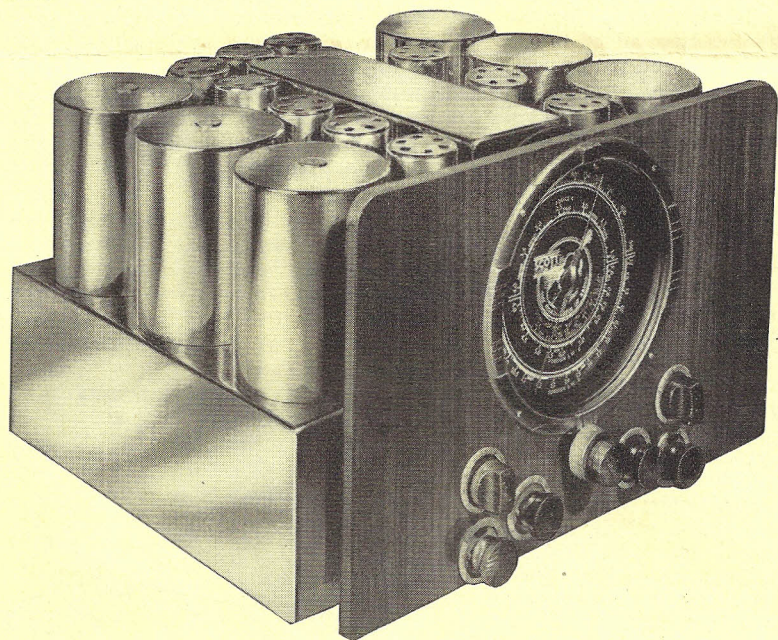
**THE 1940 SCOTT PHILHARMONIC  
(Right)**

An instrument which we believe represents the nearest approach to perfection that has, up to this time, been achieved in radio and record reproduction. It has been developed for those who demand the ultimate in every phase of radio operation, incorporating every advanced feature necessary to obtain the finest performance possible. Volume Range Expansion restores recorded and broadcast music to its original scope and interpretation, making necessary the increased power output and special speaker development. Entertainment is increased by its complete coverage of transmissions from 5 to 2,000 meters. Remarkably efficient noise limiters and perfected dual automatic volume control assure enjoyable shortwave reception. A complete resumé of its features will be found on page four.



**THE 1940 SCOTT MASTERPIECE (Left)**

The ideal instrument for those who wish to enjoy SCOTT performance at a reasonable price. Every detail of design and construction conforms to the rigid standards of SCOTT quality. It is more than capable of maintaining the famous 30 day trial during which its performance can be tested against any other make radio built today. Its greater wave length coverage, higher fidelity, greater power output, and control of both low and high tones are some of the many factors which combine to make its performance so outstanding. For a complete tabulation of its features see the table on page four.



# Tuning Flexibility

## THE PART IT PLAYS IN SECURING FINEST PERFORMANCE

### An Important Point to Investigate When Selecting Your Next Radio

ONE of the most delightful features of a SCOTT is the comparative ease with which you can operate it. The printed instructions furnished every SCOTT owner are extremely short and simple—they can be easily grasped by the average man who knows nothing whatever about the technicalities of radio. Only one knob is used to tune in stations either on the broadcast band or shortwaves. On the average program the other controls are set at their normal positions and left there without further adjustment for the entire evening.

After a few days you will become thoroughly acquainted with your receiver, and a great many of the operations described below will be entirely automatic, just as they are when you drive an automobile. Many people do not realize that there are actually 16 controls and indicators on the average car, and 20 or more on the higher priced automobiles. You don't use all of them *all* the time, but when they are necessary you have them at your finger tips.

While the regular type of radio receiver may give satisfactory performance under normal conditions without all of the controls incorporated in a SCOTT, *it is never possible to adjust it for maximum performance under all reception conditions*, in the same way. While we know it is quite possible to operate an automobile with only a *single* forward speed, we also know that to secure maximum performance under *all* road conditions the *three* forward speeds are necessary.

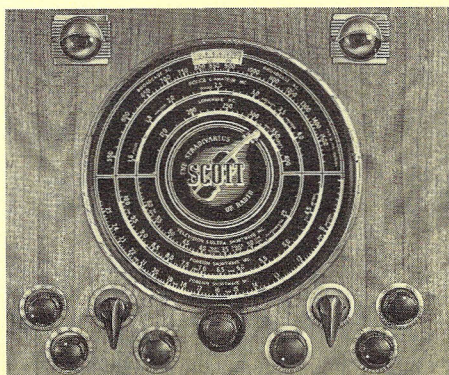
You will find several controls on a SCOTT receiver that are not found on the ordinary home type radio. They enable you to secure reception and musical reproduction which are a continual source of amazement to those who are familiar with only the average receiver having two or three controls. This tuning flexibility makes it possible to secure maximum reception under all conditions. A few examples of what the controls in a SCOTT accomplish may be interesting.

Perhaps in shopping for a new radio you heard some whose tone you liked particularly well, but which were comparatively poor performers on distant stations. On the other hand, you may have seen some receivers whose distance getting ability was very good, but whose tone quality did not measure up to what you thought it should be. Again, you may have listened to an exceptionally "sharp" receiver which tuned out stations on a hairline, but was unable to produce anything better than a shrill rasp-

ing tone, entirely lacking in the higher overtones.

It is comparatively simple to build a radio receiver for the reception of distant stations, *if fine tone quality is only a minor consideration*. It is also easy to design and build a receiver with exceptional tone quality, but you may find that it tunes so "broadly" that stations overlap and interfere with each other all over the dial. *To build a radio that combines the finest possible tone quality, extreme selectivity, and exceptional distance getting ability is a feat which has not, to the best of our knowledge, been accomplished up to this time in the factories of mass production manufacturers.*

On custombuilt SCOTT receivers, this problem is solved in a practical and simple manner by means of convenient controls mounted on the instrument panel. When you want to spend an evening reaching out all over the world for many distant stations,



Instrument Panel of the New 1940  
Scott Philharmonic

a Variable Sensitivity control on the panel enables you to utilize the almost incredible sensitivity of these custombuilt instruments to the fullest extent. If your program is marred by interference from another station on an adjacent wavelength, a Selectivity control enables you to reduce or eliminate it.

If the noise level in your location is high at the time you are tuning, and if there is a great deal of atmospheric static, the operation of the Fidelity and Sensitivity controls will greatly reduce this noise and in some cases eliminate it entirely.

Or, if you wish to tune in a program of good music, and want the finest possible tone, simply turn the Fidelity and Bass controls which will bring to the fore the full range high fidelity characteristics of the receiver.

When you are listening to a recorded

broadcast you can even cut out the needle scratch by means of a Scratch Suppressor control. Then, by slightly increasing the fidelity, it is almost impossible to distinguish the quality of a recorded broadcast from that of a fine high fidelity studio program.

These are only a few improvements you can effect in reception and reproduction with the additional controls on a SCOTT. There are many more.

In the matter of tone quality there is a degree of flexibility in a SCOTT not found in any other radio, for its Fidelity control enables you to obtain practically any balance of tone quality you desire. For example, on some broadcasts and records, the bass is deficient. In such a case, you merely advance the Bass control provided for this purpose until the bass tones come through clearly. As this control amplifies no frequencies higher than 150 cycles, the crisp clear quality of the spoken voice or the higher overtones are not impaired.

If a chain broadcast, or one from a poor quality local station is lacking in treble brilliance, you can rotate the Fidelity control and amplify the higher harmonics and overtones to a point where the over-all quality is immeasurably improved.

Oftentimes, an announcer or artist will stand too near the microphone, causing the spoken voice to sound unnatural and boomy. When this happens you can retard the Bass control to a point below its normal position, and immediately all boominess is taken out of the voice, leaving it clear, crisp, and natural just as if the announcer or artist were directly before you.

The operation of these controls does not, in any way, affect the tonal accuracy of the broadcast or recording; advancing the Bass control produces much the same effect as if you were to choose a seat nearer the bass instruments, while advancing the Fidelity control gives the illusion of gradually raising a curtain over the artists or orchestra. When this control is in minimum position, the tone quality is quite good, and compares favorably with that of the average radio receiver, but as it is advanced each instrument becomes clear, distinct, and natural, just as if the entire orchestra was slowly moving toward you.

*The simple, effective, tuning flexibility of a SCOTT is just another reason why SCOTT owners are securing reception and record reproduction that is almost unbelievable to those who have never tuned this remarkable custom built instrument.*



# COMPARATIVE ANALYSIS OF FEATURES IN SCOTT RECEIVERS



Below you will find a tabulation of the various features incorporated in the SCOTT PHILHARMONIC, PHANTOM DELUXE, and MASTERPIECE. It is only when you carefully study the very advanced features incorporated in a SCOTT with those of any other type of radio do you realize why the performance of a SCOTT is so superior.

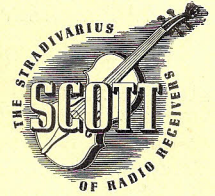
Today, with each radio manufacturer claiming superiority for his particular set, the average man finds it extremely difficult to know just which one to choose. To enable you to make your decision, we have set out clearly each of the features incorporated in SCOTT receivers, with a blank column at the right which can be used to note the same features in other receivers.

However, I believe there is an even better way to settle this question to your satisfaction, and that is by an actual performance comparison test in your home. Your order for a SCOTT will be taken with the understanding you are to have 30 days in your own home to make an actual side by side test of the SCOTT against any other receiver—regardless of price or number of tubes, and if the SCOTT does not outperform any set with which it may be tested—AND YOU ARE TO BE THE SOLE JUDGE—you can return it any time within 30 days (you to pay the transportation charges) and the purchase price will be promptly refunded. We believe a comparison test of a SCOTT against any other receiver being sold today will quickly show why today it is generally recognized as The World's Finest Radio Receiver.

FEATURE	MASTERPIECE	PHANTOM DELUXE	PHILHARMONIC	ANY OTHER RADIO
Overall Fidelity	30-7,500 Cycles	30-8,500 Cycles	30-16,000 Cycles	
Power Output	10-15 Watts	25-40 Watts	40-60 Watts	
Number of Vacuum Tubes	14	20	30	
Wave Length Range	5-550 Meters	5-550 Meters	5-2,000 Meters	
RF Amplification	One Stage	One Stage	Two Stages	
Type of Fidelity Control	Two-Position	Continuously Variable	Continuously Variable	
Type of Base Control	Continuously Variable	Continuously Variable	Continuously Variable	
Degree of Selectivity	5 Kc to 12.5 Kc	3.5 Kc to 12.5 Kc	2 Kc to 16 Kc	
IF Amplification	3 Stages	3 Stages	4 Stages	
Noise Reducing Systems	3	5	6	
Connections for Two Antennae	Yes	Yes	Yes	
Type of Loudspeaker	12' High Fidelity	15' High Fidelity	15' High Fidelity	
Needle Scratch Suppression	No	Yes	Yes	
Supershield Antenna Coupling	Yes	Yes	Yes	
AF Amplification	3 Stages	3 Stages	4 Stages	
Voltage Regulator	No	Yes	Yes	
Stabilized Oscillator	Yes	Yes	Yes	
Type of Sensitivity Control	Continuously Variable	Continuously Variable	Continuously Variable	
Local Service and Installation	Yes	Yes	Yes	
Type of Tuning Dial	Airplane	European Slide Rule	Laboratory-Type	
Number of Tuning Speeds	Two	Two	Two	
Scott Super Double Doublet Antenna	Optional at extra cost	Optional at extra cost	Optional at extra cost	
Degree of Sensitivity	0.8 to 9 Microvolts	0.6 to 10 Microvolts	0.5 to 20 Microvolts	
Automatic Volume Control	Single	Two Systems	Two Systems	
Inverse Feed Back	Yes	Yes	Yes	
Dickert Automatic Noise Limiter	No	Yes	Yes	
Aging Test	16 Hours	16 Hours	16 Hours	
Electron Ray Tuning	Yes	Yes	Yes	
Calibration Drift	Less than .002	Less than .002	Less than .002	
Micrometer Logging Scale	No	Laboratory Type	Laboratory Type	
Silent Tuning Between Stations	Yes—Does Not Affect AVC	Yes—Does Not Affect AVC	Yes—Does Not Affect AVC	
Shielding	Complete	Complete	Complete	
Standard Chassis Finish	Chromium	Chromium	Chromium	
Type of Tuning Chassis Base	14-Gauge Steel	14-Gauge Steel	14-Gauge Steel	
Separate Power Amplifier	Yes	Yes	Yes	
Record Reproduction	30-9,000 Cycles	30-10,000 Cycles	30-16,000 Cycles	
Parts Guarantee	5 Years (Except Tubes)	5 Years (Except Tubes)	5 Years (Except Tubes)	
Trial Period	30 Days	30 Days	30 Days	
Volume Range Expansion	No	No	Yes	
Headphone Connections	Optional at extra cost	Optional at extra cost	Yes	
Construction	Custom Built	Custom Built	Custom Built	
Cabinets Available	8 Styles	8 Styles	8 Styles	
Tuning of I.F. Transformers	Air Condensers	Air Condensers	Air Condensers	
Protective Fuses	Yes	Yes	Yes	
Signal to Noise Ratio at 1 MV Input	2-1	3-1	4-1	
Does Bass Control Impair Voice Reproduction?	No	No	No	
Automatic Sensitivity Compensation	No	No	Yes	
Are All Tubes Used when Tuning Short Waves as Well as Broadcast Band?	Yes	Yes	Yes	
Weakest Signal Providing Good Tuning Indication	Under 1 Microvolt	Under 1 Microvolt	Under 1 Microvolt	
Provision for Extension Speakers	Yes	Yes	Yes	
Is Receiver Adjustable to Difficult Receiving Locations?	Yes	Yes	Yes	



# A BRIEF STUDY OF TUBE FUNCTIONS IN A MODERN SUPERHETERODYNE



WITH AN ANALYSIS OF THE NUMBER AND TYPE OF TUBES  
USED IN SCOTT RECEIVERS

THE most frequent comment we hear is in regard to the number of tubes used in SCOTT receivers. Why do we use so many? Could not some of them be eliminated? Just what useful purpose does each tube serve?

Most people believe that any radio having more than about 8 tubes is designed primarily as a super-distance receiver. While it is quite true that additional tubes do increase a receiver's distance getting ability slightly, modern vacuum tubes perform many other important functions which are of vital interest to the discriminating music lover as well as the seasoned distance fan.

No matter what make of receiver you ultimately purchase, I am sure that the information which follows will prove of tremendous value in helping you make your selection. Before learning the actual tube functions and what they contribute to greater listening pleasure, let us begin with the program as it is transmitted over the air from the broadcasting studio.

The purpose of a radio transmitter is merely to convert voice, music, and other sound waves into *electrical* waves or impulses. The reason for this conversion is because such waves travel great distances and can be received thousands of miles away, whereas the audibility range of the original voice and music is but a few hundred feet.

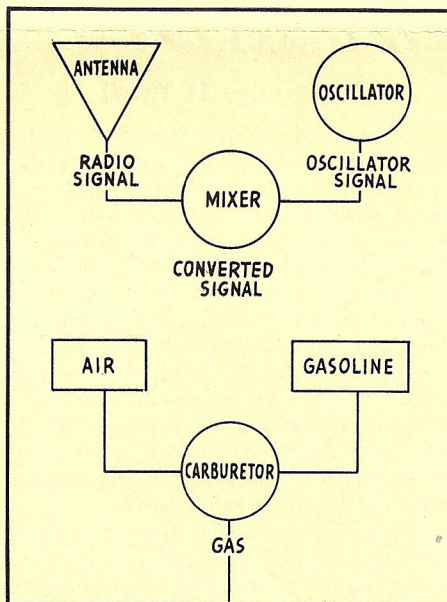
## Converter or Mixer, and Oscillator (2 Tubes)

In a Superheterodyne receiver, the electrical waves from the broadcasting station strike your antenna, pass through an amplifier, and enter what is termed the Mixer tube. Another tube, the Oscillator, is a miniature transmitter located in the Superheterodyne, and it generates an electrical wave of its own which is also fed into the Mixer. Now, the Mixer tube (commonly known as the Converter) combines these two different signals and converts them into what may be called a common denominator or a third signal which is different in frequency than the two original signals.

The principle involved is very similar to the action of a carburetor in an automobile. That is, gasoline and air, two entirely dif-

ferent elements, are combined in the carburetor to form an explosive mixture or gas. The gasoline corresponds to the electrical waves from the broadcasting station, the air may be compared with the signal generated by the Oscillator, and the carburetor is analogous to the Converter tube.

Some receivers combine the Oscillator with the Converter in order to save the cost



Analogous Diagram of Superheterodyne Converter and a Carburetor

of one tube, but this causes what is known as "instability," which simply means that the receiver will not maintain its calibration, and nothing is more annoying than to log a station and then be unable to tune it in later on the same dial reading. While it is not possible to calibrate a receiver to 100% accuracy, the use of a separate Oscillator is one of the reasons why SCOTT radio receivers closely approach this ideal.

*Double-purpose tubes are highly desirable in some cases, and as a matter of fact they are used in all SCOTT receivers, but our tests have shown that a double-purpose tube cannot be efficiently used in the Oscillator circuit of a Superheterodyne.*

## RF Amplifier (1 or 2 Tubes)

The fact that there are such a great number of radio transmitters on the air today makes extreme selectivity necessary so that

you will hear only one station at a time. To secure adequate selectivity, every fine Superheterodyne should have at least one "stage" of RF amplification, and for extreme selectivity two RF stages may be incorporated. By the word "stage" is meant a circuit consisting of one tube, a tuning condenser, a coil, and the connecting wires. The SCOTT MASTERPIECE and SCOTT PHANTOM DE LUXE each incorporate a highly developed stage of RF amplification while the SCOTT PHILHARMONIC incorporates two stages.

RF amplification also has an important bearing on the distance getting ability of a Superheterodyne. In one sense, it may be compared to a Supercharger in an automobile whereby gasoline is forced into the cylinders at tremendous pressure in order to greatly increase the power of the engine. In addition, RF amplification is used to minimize the circuit noise of a Superheterodyne receiver. We could reduce the number of tubes in a SCOTT by eliminating the RF stages, but this would obviously reduce the receiver's selectivity, sensitivity, and quietness of operation.

Thus far, we have at least three absolutely essential tubes in the Superheterodyne circuit, and as just mentioned, four will give even better results.

## Detector (1 Tube)

It should be remembered that the converted signal we have been tracing is still an electrical wave or voltage; it must be transformed back again into voice and music by means of a tube known as the Detector.

This voltage or electrical current is very weak and must be "built up" or amplified before it can be heard through the loudspeaker. There are three forms of amplification in a Superheterodyne: (1) RF or Radio Frequency amplification, whereby electrical waves from a broadcasting station are amplified *before* they reach the Converter tube; (2) IF or Intermediate Frequency amplification, whereby the "mixed" or converted impulses are amplified, and (3) AF or Audio Frequency amplification, whereby you secure amplification *after* the signals have passed through the Detector tube and have been transformed back to voice frequency.

## IF Amplifier (3 or 4 Tubes)

Intermediate Frequency Amplification (generally abbreviated IF) is called "intermediate" because it is between RF amplification and AF amplification, and it is the intermediate frequency amplifier which makes a Superheterodyne so selective. Every stage of IF consists of a transformer and one tube. Cheaper receivers use one stage of IF amplification. The SCOTT MASTERPIECE and PHANTOM DE LUXE incorporate *three* stages, *four* are used in the SCOTT PHILHARMONIC. You could save up to three tubes (in a receiver having four stages of IF), but by taking away each tube you decrease the selectivity proportionately, and there are innumerable times when these extra IF stages make all the difference in the world in receiving a distant station clearly and cleanly if it is near in frequency to a powerful local.

## Automatic Volume Control (1 or 2 Tubes)

On poorly designed receivers, programs fade in and out with annoying regularity. To counteract this fading, the Automatic Volume Control system was developed. This is a circuit within the receiver which, when a signal begins to fade, automatically *increases* the receiver's sensitivity. When the signal "fades in" and gets louder the Automatic Volume Control automatically *decreases* the sensitivity. Thus a comparatively even volume level is maintained. The principle of Automatic Volume Control is much like that of a governor on an engine.

The Automatic Volume Control system used in the SCOTT MASTERPIECE requires one tube. In the SCOTT PHILHARMONIC and SCOTT PHANTOM DE

LUXE two tubes are used for even greater control of fading.

The Scott Automatic Volume Control provides the following important advantages not obtained by the system used in many mass-production radio receivers: (1) It does NOT reduce sensitivity or distance-getting ability of the receiver; (2) it has no adverse effect on tone quality; (3) it avoids overloading the RF stages, and gives a much smoother action than ordinary Automatic Volume Control systems; and (4) the actual control of fading is about 25% to 50% more effective.

The use of this highly developed system also makes it possible for you to tune from a local station to one at a distance—and receive both at about the same degree of strength—without re-setting the Volume Control knob. The value of this system in providing easy tuning is obvious, for it is never necessary to raise or lower the volume by hand to conform with the power of different stations.

## Tuning Eye (1 Tube)

The Cathode Ray Tuning Indicator (sometimes called Magic Eye) is nothing more or less than a special vacuum tube which enables you to tune in any given station accurately. A program not tuned in exactly "on the head" will be distorted, and one has only to detune a station slightly in order to realize the truth of this statement. Some people have the knack of tuning in a station very accurately by ear, just as some people have a sense of absolute pitch, but I assure you that it is quite rare, especially among women, and therefore some simple accurate device such as a tuning eye is necessary for finest tone quality.

The tuning eye is also of great value in locating comparatively weak stations which you might easily pass over when tuning by

ear alone, and in locating shortwave stations which "stand by" for a considerable length of time without broadcasting.

Some receivers use a tuning meter to accomplish the same purpose, but this also requires one tube in order to amplify the swing of the indicator needle sufficiently.

## AF Amplifier (6 or 8 Tubes)

A sufficient Power Output is absolutely essential in the reproduction of fine musical programs or records, for a receiver with too low a Power Output will distort heavy fortissimo passages *even when the receiver is played at low or normal volumes. The term "Power Output" concerns the receiver's Handling Capacity and has nothing to do with the amount of volume or speaker output.*

Of course, if the buyer of a radio receiver seldom listens to symphonic or operatic music (either recorded or broadcast), then a receiver with comparatively low Power Output is quite satisfactory. The average radio receiver has a Power Output of about 5 or 6 watts. (The term "watts" is merely a measure of the amount of power broadcast.) Some programs, especially those with wide variations in volume such as symphonic music, or even dance music as rendered by the finer orchestras, may rise to a height of about 25 watts, and it is obvious that a 25 watt crescendo will be distorted if it must be reproduced through a receiver having a handling capacity of say only 5 watts. It is much like trying to force a 5 inch stream of water through a pipe only 1 inch in diameter.

In order to secure a Power Output of 25 watts or more we use 8 tubes in the SCOTT PHILHARMONIC, that is, four stages of Audio Amplification (requiring 4 tubes) and 4 Power Output tubes in the Power Amplifier. A total of 6 tubes for this purpose are used in the SCOTT MASTERPIECE and SCOTT PHANTOM DE LUXE.

You could eliminate all but two of these tubes in a Superheterodyne, but the Power Output would be reduced accordingly.

## Inverter (1 Tube)

The Inverter tube is roughly approximate, in function, to the fly wheel on an engine. The fly wheel makes possible a smoother flow of power, for it equalizes or co-ordinates the alternating impulses of the cylinders. The function of the Inverter can be performed by a transformer, thus making it possible to save another tube, but when a transformer is used, a certain amount of distortion results.

## Needle Scratch Suppressor (2 Tubes)

Our system for the elimination of needle scratch from records requires two tubes. It is used only in the SCOTT PHANTOM DE LUXE and SCOTT PHILHARMONIC. If

TUBE FUNCTION	MASTERPIECE	PHANTOM	PHILHARMONIC
Converter	1	1	1
Oscillator	1	1	1
RF Amplification	1	1	2
Detector	1	1	1
IF Amplification	3	3	4
Automatic Volume Control	1	2	2
Tuning Eye	1	1	1
AF Amplification	6	6	8
Inverter	1	1	1
Scratch Suppressor	0	2	2
Volume Range Expander	0	0	5
Voltage Regulator	0	1	1
Rectifier	1	2	2
Noise Limiter	0	1	1
Total Tube Functions	17	23	32
Functions Performed by Double-Purpose Tubes	3	3	2
Net Number of Tubes	14	20	30

The Above Table of Tube Functions Forms a Complete Summary of the Points Covered in This Article

a prospective purchaser does not own a record playing device, and does not intend to purchase one, then these two tubes are not so important. However, this highly developed suppression system is very valuable for reducing atmospheric static on short-wave reception. It can also be used to remove the needle scratch from recorded radio broadcasts.

### Double-Channel Volume Range Expander (5 Tubes)

Scott Volume Range Expansion (used only in the SCOTT PHILHARMONIC) employs another 5 tubes. This circuit makes heavy passages somewhat louder than they would be otherwise, and soft passages somewhat lower. This action, in effect, counteracts the monitoring which is done on symphonic broadcasts and recordings. A monitoring engineer at the studio has the musical score directly before him during such a broadcast or recording, and when the music calls for a crashing fortissimo, he gradually turns a knob similar to a Volume Control which reduces the strength of the passage. When the score calls for a soft passage, he rotates the control in the opposite direction so that it will be transmitted with more volume. Therefore, on a receiver without an Expander, you do not hear the broadcast as the composer and conductor would have you hear it, but rather as it was interpreted by a monitoring engineer who may not always be an acceptable music critic.

The reason programs are "monitored" is so that costly transmitter tubes will not be overloaded on tremendous crashes of sound, and so that pianissimo passages will not be drowned out in the noise and hum of the transmitter tubes. Recordings are monitored so that the loud passages will not overcut the record grooves, and so that the soft passages will be audible above the record "scratch."

It is possible to build a Single-Channel Volume Range Expander using only two tubes, but the result is distortion of the louder passages. We use more tubes to eliminate such distortion.

### Voltage Regulator (1 Tube)

The electric current coming from a house line often varies a great deal, and in some localities where the fluctuation is particularly severe, dial readings will shift, drift, or "creep." By this is meant the tendency of a receiver to detune itself after a short while, making it necessary for you to frequently re-tune the station. To stabilize this electric current, that is keep it constant regardless of fluctuations, a Voltage Regulator tube is used in the SCOTT PHILHARMONIC and SCOTT PHANTOM DE LUXE. The result is that dial readings will not vary more than 2 tenths of 1 per cent once a station has been tuned in. The use of a separate Oscillator tube, as already explained, in addition to the Voltage Regulator provides the greatest degree of sta-

bility it is possible to attain at the present stage of radio science.

This Voltage Regulator is another tube which could be taken out of a Superheterodyne completely, but for those who do a great deal of tuning on distant stations, its efficiency is well worth the small extra cost.

### Rectifiers (1 or 2 Tubes)

Two more tubes, called Rectifiers—both located in the Power Amplifier of the SCOTT PHILHARMONIC and SCOTT PHANTOM DE LUXE—are necessary for the following reason: Your electrical house current is Alternating Current, but before it can be used in a Superterodyne it must be converted into Direct Current. As the Alternating Current comes into your receiver, it is "stepped up" (that is, the voltage is increased) by the Power Transformer, and then passes through the Rectifier tubes where it is converted into Direct Current. *These two Rectifier tubes and their function are roughly comparable to the crankshaft of an automobile engine which changes the power from useless reciprocating motion to the necessary rotary motion.* Only one Rectifier tube is necessary in the SCOTT MASTERPIECE on account of its lower Power Output.

### Noise Limiter (1 Tube)

If you care nothing whatsoever about shortwave reception (or if you live in a location free from all kinds of electrical interference) this tube could be eliminated without noticeable effect. This feature is incorporated in the SCOTT PHILHARMONIC and the SCOTT PHANTOM DE LUXE only. On the other hand, if you occasionally wish to hear the many fine musical programs now being broadcast from the capitals of the world, then this tube is

of great value, for it greatly reduces intermittent types of electrical interference experienced by owners of the conventional shortwave receiver.

### Summary

In the SCOTT PHILHARMONIC, 18 tubes (2 of them double-purpose) are used for the Detection, Amplification, and Rectification of radio signals; 4 tubes for Program Volume Range Expansion; 1 tube for Volume Range Expansion Indication; 2 tubes for Record Scratch and Static Suppression; 2 tubes for Rectifiers; 1 tube for Voltage Regulation of Oscillator; 1 tube for Station Tuning Indicator; and 1 tube for the Automatic Noise Limiter, a total of 30 tubes.

In the SCOTT PHANTOM DE LUXE, 13 tubes (3 of them double-purpose) are used for the Detection, Amplification, and Rectification of radio signals; 2 tubes for Record Scratch Suppression; 2 tubes for Rectifiers; 1 tube for Voltage Regulation of Oscillator; 1 tube for Automatic Noise Limiter; and 1 tube for Tuning Indication, a total of 20 tubes.

In the SCOTT MASTERPIECE, 12 tubes (3 of them double-purpose) are used for the Detection, Amplification, and Rectification of radio signals; 1 tube as a Rectifier; and 1 tube as the Tuning Indicator, a total of 14 tubes.

### The World's Finest Radio Receivers

Thus, we have seen that every tube used in SCOTT receivers performs a distinct and useful purpose. In designing a SCOTT, the only consideration is to perfect a super-efficient instrument that is capable of giving maximum performance and to obtain this, we require every one of the tubes specified.

NO.	TYPE TUBE	MASTER-PIECE	PHANTOM DELUXE	PHIL-HARMONIC
6J5G	Super Triode Amplifier	4	4	6
6B8G	Duo Diode High Gain Pentode	1	3	4
6L6G	Beam Power Amplifier	0	2	4
6K7G	Triple Grid Amplifier	3	3	3
6H6G	Duo Diode	0	1	2
6U7G	RF Pentode	1	1	2
5Z3	Full Wave High Vacuum Rectifier	0	0	2
5U4G	Full Wave Rectifier	1	2	0
6E5	Tuning Indicator	1	1	1
6G5	Expansion Indicator	0	0	1
6J7	Triple Grid Amplifier	0	1	1
VR150	Voltage Regulator	0	1	1
6L7G	Pentagrid Mixer Amplifier	1	1	3
6V6	Beam Power Amplifier	2	0	0
	<b>Total Number of Tubes</b>	<b>14</b>	<b>20</b>	<b>30</b>

**For Those Who Are Technically Trained, the Above Tube Complement of Scott Receivers Will Be of Interest**

# SHORT WAVE RECEPTION

## and the Music Lover

### AN IMPORTANT MESSAGE TO LISTENERS DESIRING SUPERLATIVE MUSICAL ENTERTAINMENT

IN the early days of radio we all listened eagerly for "signals" and were tremendously excited when we were fortunate enough to actually hear a voice. In a remarkably short time radio passed this stage, and we found a wonderful new field of entertainment in regular programs offered on the "long waves," or broadcast band. Short-wave transmission was principally a medium for amateur transmissions for some time, but now it has "come of age" and we have a rapidly increasing use of the short-waves for regular commercial programs.

There are many reasons why shortwave stations will continue their remarkable growth in popularity. First, the coverage of shortwave transmissions is worldwide at all times, for they are not affected, as are broadcast band waves, by daylight hours. With a powerful shortwave receiver, those living in isolated rural areas, or in towns where only one or two small broadcasting stations are operating, can have continuous shortwave reception of every type program. This range of entertainment is not available during the day on a radio that is capable of bringing in broadcast band reception only, nor is it available, we believe, with the usual production type radio. During the daylight hours the longer waves of the standard broadcast band are unable to travel very far and the noise level is high—it is only at night that any great distance is possible. However, even when the radio user can bring in long-distance broadcast band stations at night, reception of the same program is more often than not better on the shortwaves.

All "chain" programs are "piped" through local stations by means of telephone wires. Only on very special occasions are wires arranged so that they can carry a fidelity over about 5,500 cycles, whereas the transmission from the originating station runs between 8,000 and 8,500 cycles. Those who are in the receiving area of the local relay stations can obtain this 5,500 cycle fidelity if the local station is capable of transmitting a tonal range that great. Sometimes the local stations transmit at only 4,000 to

4,500 cycles, the usual fidelity range of the ordinary radio. With the shortwave adaptability of a SCOTT you can usually go directly to the original shortwave transmission of the same program, hear the program with its beauty of fidelity ranging from 8,000 to 8,500 cycles—and the noise level is generally so low that, under anywhere normal conditions, a person walking into your room cannot distinguish the reception from that of a local transmitter.

Another discouraging situation frequently encountered in the relaying of chain pro-

grams through local stations, is that often only a part of the desired program is broadcast, the other part of it often having to be eliminated because of previous commercial commitments on the part of the local station that cannot be avoided. In those localities where daytime listening is confined to one station, or where one of several local stations are not handling the desired program, it is often impossible for the listener to have full enjoyment of the desired radio program unless his receiver is capable of bringing him satisfactory short-wave performance direct from the key station where the chain program originates.

It is difficult to describe the excellence of the shortwave reception made possible with a SCOTT. Most people have become accustomed to the noisy and badly "twisted" shortwave performance of the ordinary radio and cannot conceive that such programs can often be heard with a clarity and tone quality superior to ordinary broadcast band reception from the average station. With the custombuilt SCOTT your shortwave reception is not confined to the excellent programs offered by the United States shortwave stations, for you have a constant choice of programs from all over the world, and the powerful stations of England, France, Italy, Germany and many other South American countries offer superb symphonic music, popular programs of folk music in the lighter vein, bringing a most welcome diversity to your listening pleasure. It is this remarkable shortwave reception that is largely responsible for the fact that today SCOTT receivers are in use in 153 foreign countries.

Once you have become accustomed to the versatility of a SCOTT you would find it impossible to go back to the old way of radio enjoyment. Your pleasure would be as much curtailed as if you were to be suddenly relegated to the necessity of using a 1914 automobile after driving the latest model of today. You double, and in many instances much more than double, your listening enjoyment. With the custombuilt SCOTT you not only have the world at your finger tips, but a world of entertainment in a most enjoyable form.

At the present time there are a number of excellent shortwave stations combining to give continuous entertainment from 6:30 in the morning until 2:00 the following morning. These stations are: WCAB at Philadelphia; WCBS at Wayne, N. J.; WNBI, Boundbrook, N. J.; WGEO at Schenectady, N. Y.; WIXK, Millis, Mass.; WGEA at Schenectady, N. Y.; WPIT in Pittsburgh, Pa.; WRCA, Boundbrook, N. J., and WSLR of Boston, Mass. The broadcasting schedules of these stations are easily obtainable, and you will be absolutely amazed at the wealth of symphonic, operatic, chamber music, and other entertainment that is offered throughout each day. The commercial advertising is at a minimum, frequently being entirely absent.

The coming year promises an expansion of shortwave entertainment to a remarkable degree. I am sure you would find that the SCOTT, with its superb combination of shortwave and broadcast band ability, will bring you a new joy in radio, and an opportunity to fully realize the benefits of man's most modern servant.

<b>CLASS OF SERVICE</b> This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.	<b>WESTERN UNION</b> R. B. WHITE PRESIDENT NEWCOMB CARLTON CHAIRMAN OF THE BOARD J. C. WILLEVER FIRST VICE-PRESIDENT	<b>SYMBOLS</b> DL - Day Letter NL - Night Letter LC - Deferred Cable NLT - Cable Night Letter Ship Radiogram
<small>The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination. Received at 1918 Montrose Ave., Chicago, Ill. . . TELEPHONE</small>		
CAA87 25-PHOENIX ARIZ 25 1035A		1939 DEC 25 PM 12 08
E H SCOTT= RADIO LABORATORIES INC 4450 RAVENSWOOD AVE=  WE ARE HERE IN ARIZONA DESERT LISTENING TO NEWYORK SYMPHONY ON YOUR PHILHARMONIC FIDELITY AMAZING IN YOUR HANDS RADIO IS SOMETHING ELSE AND A MIRACLE= FRANK LLOYD WRIGHT.		

## THE E. H. SCOTT RADIO LABORATORIES, INC.

4450 RAVENSWOOD AVENUE, CHICAGO, ILLINOIS

NEW YORK

DETROIT

BUFFALO

LOS ANGELES