

SCOTT



NEWS

NEWS OF LATEST DEVELOPMENTS IN THE SCOTT RESEARCH LABORATORIES

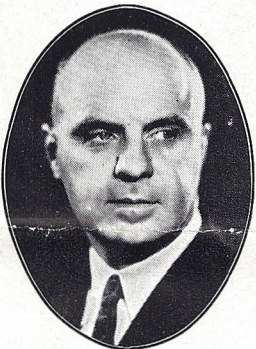
VOL. 13

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No. 2

YOUR LAST CHANCE TO BUY THE WORLD'S FINEST RADIO UNTIL AFTER THE WAR

A GREAT many people are under the impression that no more radio receivers can be bought today for the reason that all civilian radio production was halted by the War Production Board on April 22nd. Fortunately, we were able to build a limited number of Scott Laureates before



E. H. SCOTT

this deadline, and they are now available for civilian use. *After this small supply has been exhausted, however, it will be impossible to buy a Scott until after the war.* If the war should last several years or more—as it might—those who failed to purchase a new radio while they had the opportunity will find themselves greatly handicapped.

I had hopes that we would be able to keep our civilian sales at such low levels that the sets now

on hand here at the Laboratories would last for some time, but the demand has been so heavy I doubt whether a single instrument will be available after about six weeks.

During times of war a good radio in the home is imperative for a number of reasons. First of all, radio is the one dependable means for instant contact with all the people when a government wants to issue important instructions during an unforeseen emergency that might arise at any time.

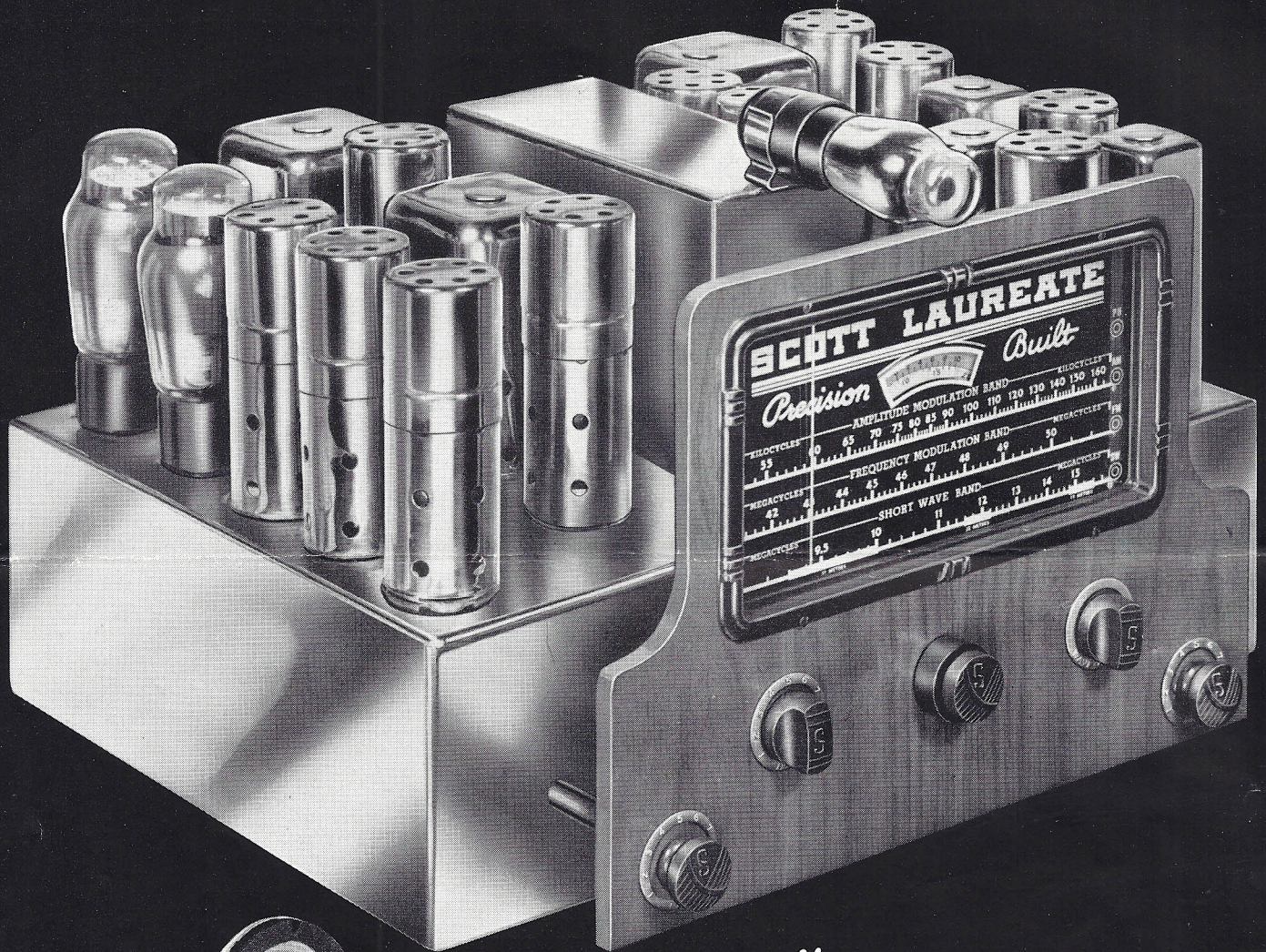
Second, with automobiles disappearing from the streets daily in increasing numbers, many families will be spending more and more time at home. While a cheap radio is satisfactory as a noisy background for a game of bridge, I believe you will agree that such a set is intolerable for serious listening to fine musical broadcasts or the reproduction of high quality recordings. Even in the case of lighter radio programs, most of us want to relax and enjoy them in comfort rather than assume a

cramped position with our ear glued to the loudspeaker.

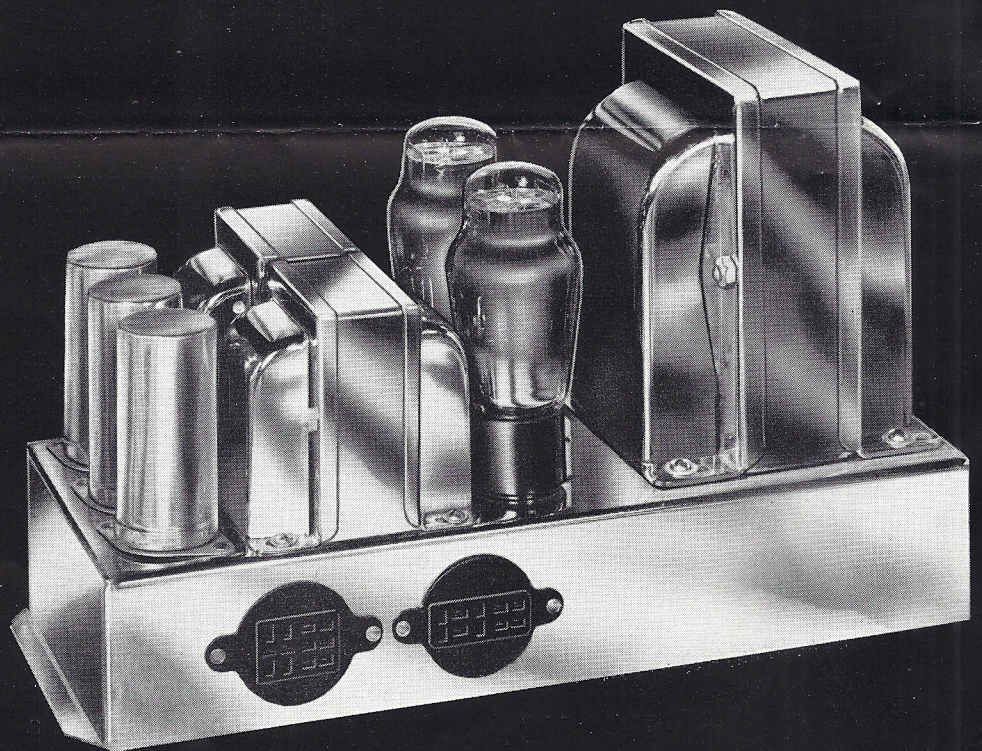
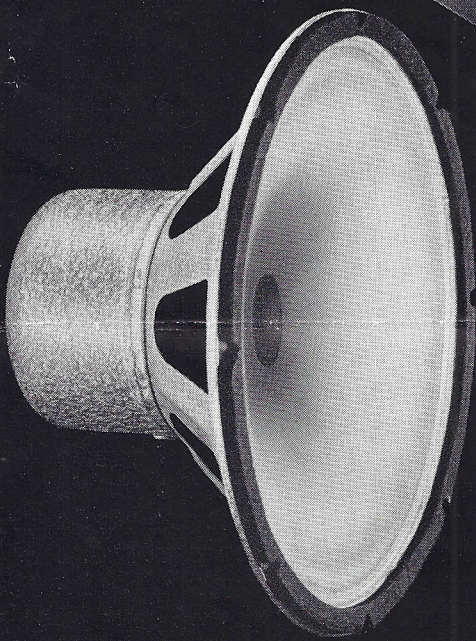
A fine radio, then, has become practically a necessity in times like these when we must remain keyed up and at a high point of efficiency during the working day. The strain of long hours and hard work must be offset during the evening if we are to do a good job tomorrow.

No matter whether you buy a Scott or not, be sure to make an investment in a *good* radio. And the word "investment" is used advisedly, as the purchase of a radio now is just that, for the simple reason that when present stocks are exhausted, and no more radios are to be had at any price, the instrument you purchased may be worth actually more than you paid for it.

Delivery can be made in short order, now a matter of only about a week or ten days.



The Scott FM-AM Laureate



★ The Scott Laureate ★

For Finest High Fidelity Reproduction of Broadcasts and Records

THE new Scott Laureate using 18 tubes (including tuning eye and rectifiers) is an entirely new design built for a specific purpose—the finest high fidelity reproduction of records and local or semi-distant AM broadcast and FM stations.

It incorporates every feature that provides the quality of tonal reproduction for which a Scott is famous in all parts of the civilized world, and has been designed for those who want the ultimate in radio and record reproduction, *but who are not particularly interested in distant foreign reception of weak stations.*

While it is true that the Scott Laureate is capable of bringing in, with good loud-speaker volume, programs from broadcasting stations in all parts of the country and from short wave stations thousands of miles distant, *it has not been designed as a long distance receiver*

Designed for 99% of Listening Public

A recent survey among radio listeners shows that only a small fraction of 1% regularly tune in the experimental and short wave stations below 19 meters or the commercial long wave bands, but that

about 95% of all tuning is on the regular broadcast band. About 4% listen regularly on the 19, 20, 25, and 31 meter bands where the principal short wave stations of the world are located. Undoubtedly, as more of the new high fidelity FM stations go into operation, this ratio will change, and ultimately more listeners will tune the FM band where the tonal range is nearly twice that of our present broadcast band.

The new Scott Laureate is designed not merely for today's broadcasting conditions but for those of the future, and covers the following wave bands:

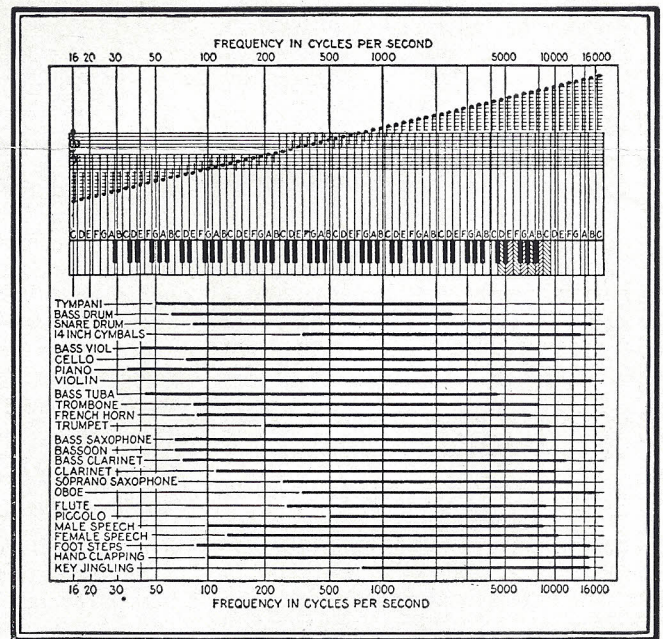
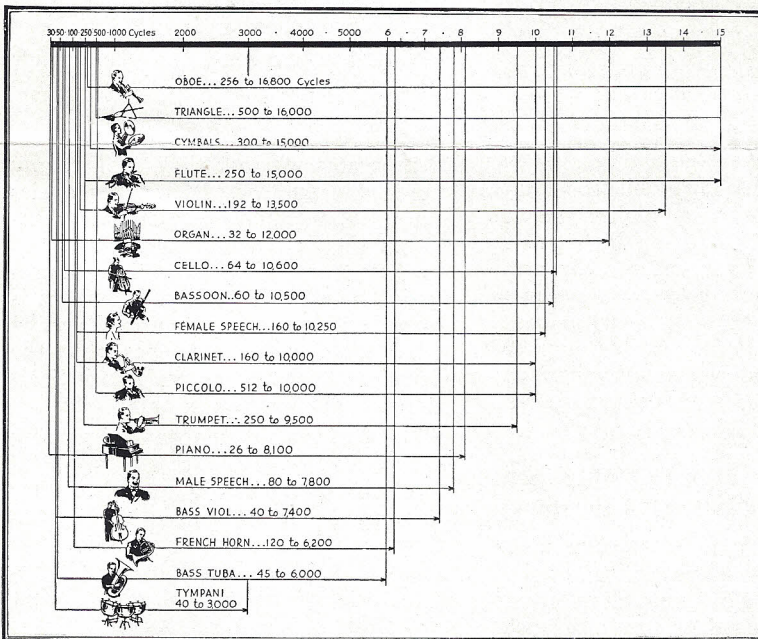
- (1) The regular AM broadcast band (540 Kc to 1,600 Kc) including all High Fidelity stations at the high end of the band.
- (2) The new FM or Frequency Modulation band (42 Mc to 50 Mc) covering the complete authorized spectrum for FM broadcasts
- (3) The standard short wave band (9.2 Mc to 15.6 Mc) which includes the 19, the 20, the 25, and the 31 meter bands on which the major short wave programs of the world are transmitted.

FM or Frequency Modulation

There are few radio listeners who have not heard something about the new system of FM (Frequency Modulation) broadcasting, which transmits all programs with greatly increased fidelity. The Scott Laboratories were among the first to design FM receivers and have long passed beyond the stage where the FM section is merely an external or separate FM tuner.

When short wave listening first became public, listeners bought a small short wave converter which was connected to their regular receiver. Later, when interest in short wave listening became general, *the short wave section was engineered into the receiver as an integral part of the chassis*, and from the Scott Research Laboratory came one of the first "all wave" receivers that *eliminated the external short wave tuner.*

Once again the Scott Laboratories are leading the way in the design of receivers for FM reception, *for in the Scott Laureate you will find a highly efficient and advanced FM section engineered into the receiver as an integral part of the chassis rather than an external or sep-*



Charts showing the complete frequency range (fundamentals and overtones) of the principal musical instruments and the human voice. The new Scott Laureate is one of the few high fidelity instruments in the world today that has an audio amplifier (30 to 15,000 cycles with 25 watts undistorted output) which when used with the new Scott Co-Axial Speaker, is capable of reproducing—without distorting—the complete range of every tone and overtone shown in these charts.

arate tuner, enabling you to tune in FM, standard broadcast, and short wave programs on the one dial.

Superb Tone Most Outstanding Feature of New Scott Laureate

For many years Scott receivers have been a treasured possession of many of the outstanding figures in the world of music including Arturo Toscanini, Jascha Heifetz, Lily Pons, Lawrence Tibbett, and many others. Incorporated in the new Scott Laureate is one of the most highly developed audio systems ever built into a radio receiver, capable of reproducing all frequencies from as low as 30 cycles up to as high as 15,000 cycles, and when used with the new Scott Coaxial Speaker System, reproduces every single tone and overtone the human ear is capable of hearing.

This simply means that when you listen to a station transmitting the full band of audio frequencies or to high fidelity records, you hear every tone and overtone just as clearly and beautifully as you would hear them if you were in the concert hall itself with the actual artists or instrumentalists.

Few musicians or lovers of good music are radio engineers or have the training to interpret the laboratory curves shown on page 8 which show scientifically just how perfectly an instrument will reproduce musical frequencies, but every musician knows that if all the tones and overtones of musical instruments or voices are not fully reproduced, the reproduction will not sound natural.

You may often have wondered why radio programs or records heard on one radio sound so much finer, clearer, more natural than they do on another. The answer is very simple: *The instrument on which the reproduction is so much better has a more highly developed audio and speaker system.* In the final analysis, the perfection of reproduction obtained from any radio receiver or record reproducer depends largely on these two units. On the previous page you will find two charts giving the overtone range of various musical instruments and voice, and they show clearly why reproduction is so perfect on the Scott Laureate with its ability to reproduce every overtone from 30 to 15,000 cycles.

Complete Volume Range Reproduced Without Distortion

Most music lovers, never having heard the phrase "power output" or "power handling capacity" do not realize its tremendous importance in securing the finest and purest tonal reproduction from either records or broadcast programs.

If an audio amplifier does not have sufficient "power output," you will notice that certain passages of a fine musical program or record sound slightly dis-

torted or fuzzy. You may perhaps have blamed this effect on the station to which you are listening, on the record itself, or even on the loudspeaker, never realizing that it is because the "power output" of the audio amplifier incorporated in your instrument is simply too small to "handle" the louder passages.

Perhaps the following illustration will clarify just what we mean by lack of "power output." Some years back automobile engines were of comparatively low power and not particularly efficient. When you were driving on a flat level road they ran quite smoothly, but when you started uphill they would labor and jerk to such an extent that you had to shift into a lower gear.

Today all automobile engines have much higher power, not necessarily to enable you to travel at 90 or 100 miles per hour, but to provide a sufficient reserve power so that their operation is smooth at all speeds, uphill or down.

The low powered automobile engines of a few years back may be compared to radio receivers or record reproducers having a power handling capacity of from five to six watts (the power of the



THE SHERATON

The classic lines of this beautiful 18th Century English design enables it to blend ideally with any type of home furnishings. It will accommodate both the Laureate and an Automatic Record Changer. Available in mahogany only.

average radio sold today) while the modern automobile with its high powered engine is comparable to an instrument such as the Scott Laureate. Its 25 watts undistorted power output reproduces every shade of expression or volume range from the softest to the loudest passage—exactly as you would hear them played or sung were the artists before you.

Why Four Stage Push Pull Amplifier Is Incorporated in Scott Laureate

The fidelity of a radio receiver may cover the complete audible range of the human ear, but if a fine musical program or record is distorted or fuzzy because of insufficient "power output" in the receiver, this fidelity range is of little value. Inasmuch as the Scott Laureate is designed to give the finest possible repro-

duction of programs on the broadcast or FM band, as well as on records, no expense has been spared to make it as perfectly toned an instrument as skilled, advanced engineering can make it.

Incorporated in its design is every basic circuit and feature that is used to secure the marvelous tone in the Scott Philharmonic, the instrument that is today generally recognized as the ultimate in tonal perfection.

In the inexpensive type of receiver, a single stage of audio amplification is used, but a serious disadvantage is the great amount of distortion which occurs on programs having wide volume variations, such as symphonic broadcasts. The average medium priced radio receiver incorporates two audio stages, while a few of the very high priced models employ three stages of audio amplification.

However, in the Scott Laureate, four stages of audio amplification are used, to develop a power output rating of 25 to 40 watts, approximately five times the power output of the average radio receiver or record player combination.

New Type Bass Control System

The fidelity of all radio stations, or records, is not the same. On some programs or records you will notice that the bass is very heavy and boomy, while at other times you miss it entirely. To secure the most natural reproduction the bass response should be natural, neither too heavy nor too light.

In the Scott Laureate is incorporated a new and highly efficient bass control which is the result of extensive research in our Laboratories. It amplifies or reproduces only the bass or lower tones, having no effect on the middle and higher tones or overtones.

When the bass control on the average radio receiver is operated, the reproduction often becomes very boomy, giving merely the impression of more bass on all programs whether they contain any appreciable number of bass frequencies or not. When you operate the Bass Control on the Scott Laureate it builds up the bass tones only, giving the reproduction a full rich quality. However, if the program or record you are listening to has little or no bass tones, then the operation of the bass control on the Scott Laureate will have little or no effect.

This fact is a simple means of proving that the new Scott Laureate bass system amplifies only the bass frequencies. After all, what the critical music lover wants is not an artificial bass quality, but rather a complete accurate reproduction of the original and that is exactly what we provide in the Scott Laureate.

An examination of the Laboratory fidelity curves shown on page 8 will give some idea of the wide range of this new Bass Control System.

Perfected Treble Control

On direct studio programs the fidelity on most broadcast band stations is practically flat out to 8,500 cycles, the limit of fidelity allowed by the FCC for stations on the broadcast band. On FM stations, however, approximately twice this range, or frequencies up to 15,000 cycles, can be transmitted.

Built into the Scott Laureate is a variable Treble Control which is available not only on programs received over the air but also on records as well. This control enables the listener to compensate for certain deficiencies in broadcasting and recording.

For example, when listening to a chain program, the higher frequencies are generally reduced to less than 6,000 cycles by the telephone lines over which the program comes to your local station. In this case, by advancing the Treble Control, the higher frequencies that do come thru can be amplified so that the naturalness of reproduction is greatly improved.

New Standards of Record Reproduction

One of the chief reasons why many of the world's leading symphony orchestra conductors, celebrated instrumentalists, and vocal artists have chosen a Scott for their own personal use is for its marvelous reproduction of records. These artists listen critically to their own recorded works, and it is absolutely necessary that the reproduction be as near as possible an exact duplicate of the original so that every minute detail of the performance may be checked and studied.

This means that not only must the reproduction of all tones and overtones be perfect, but what is equally important, the delicate shadings, the wide dynamic variations in volume, the details of expression and interpretation must be reproduced clearly and without the slightest distortion. In the Scott Laureate the record enthusiast will find the kind of reproduction that will bring him untold pleasure for many years to come.

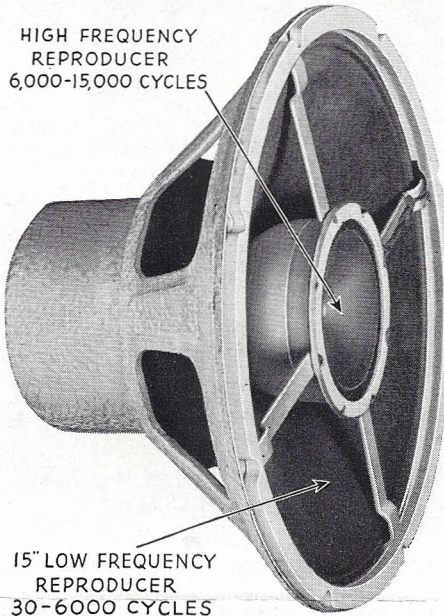
Highly Developed Inverse Feed-Back System Further Improves Quality of Reproduction

Theoretically, the response of the perfect loudspeaker when measured electrically would take the form of a straight horizontal line on a graph. In practice, however, the response curve of even the finest loudspeaker available today deviates considerably from this ideal straight line. Every "peak" in the curve indicates that the speaker falsely accentuates tones at this frequency, while every "dip" or valley means that tones in this register are attenuated or made softer than the original. Such variations in the reproduction are, of course, forms of distortion which can never be countenanced by keen judges of musical values.

In the Scott Laureate, an improved system of Inverse Feed-Back is used which automatically smooths out the "peaks" and "dips" in the speaker response, restoring the unduly accentuated or attenuated tones to their original proportions so that they are heard just as naturally as when they entered the loudspeaker.

Heavy Duty High Fidelity 15" Speaker Reproduces All Degrees of Volume Without Overloading

The large, heavy duty, High Fidelity 15" speaker of the Scott Laureate, is probably one of the most highly developed speakers incorporated in any radio receiver available today, reproducing frequencies up to 9,000 cycles, a fidelity range far beyond that of the ordinary type of loud speaker. It incorporates the very latest developments in loudspeaker design with a curvilinear cone and heavy voice coil which enables it to handle without distortion even the loudest passages.



HIGH FREQUENCY REPRODUCER
6,000-15,000 CYCLES

15" LOW FREQUENCY REPRODUCER
30-6000 CYCLES

The New Three Unit Co-Axial High Fidelity Speaker—with 15" Low Frequency combined with High Frequency Reproducer (dividing network not shown)

Special Scott Co-axial Speaker Available for Reproduction Up to 15,000 Cycles

If you are interested primarily in securing the finest reproduction possible from regular AM broadcasting stations, the new FM stations which transmit frequencies up to 15,000 cycles, and the latest high fidelity records, the Special Scott Co-axial Three Unit Speaker System is recommended. This is a special system that consists of a low frequency speaker, a high frequency reproducer and a special dividing network. The latter unit shunts frequencies from 30 to 6,000 cycles to the large 15" speaker, and those from 6,000 to 15,000 cycles to the high

frequency reproducer providing uniform fidelity thruout the entire tonal range. This new speaker system especially designed for the high fidelity characteristics of the Scott Laureate, can be furnished at an additional cost of \$19.50. Its fidelity range is shown in figure 6, page 8.

No Outdoor Antenna Required With Scott Laureate For Local Station Reception

Prospective purchasers who find it impossible to erect an outside antenna will be glad to know that the new Scott Laureate is designed so that it will provide excellent results on the special Scott Duplex Antenna which is an integral part of the receiver.

This highly specialized loop antenna should not be confused with the conventional type generally furnished with most receivers using a loop antenna, for there are several major differences. Instead of only one simple loop as is usually the case, the Scott Duplex Loop Antenna is actually *two separately tuned loops*. One of these loops is specially designed for reception on the broadcast band, while the other is especially designed for shortwave reception. This provides not only finer local reception with a minimum of interference from other stations, but also much greater signal pickup when tuning foreign short wave stations.

While the Scott Duplex Antenna System furnished with the Scott Laureate is much more efficient than the conventional loop, connections are provided for connecting a conventional outside antenna, so that distant stations can be brought in with good volume. Binding posts are also provided to which can be connected a specially designed dipole antenna for FM broadcasts if you require additional pickup for FM programs.

Tuned RF Amplifier Provides Finer Local Reception

The new Scott Laureate incorporates one of the most highly efficient tuned RF stages ever built into a receiver, for its design is such that it develops a gain twice as great as two ordinary RF stages.

The less expensive receivers use no RF stage at all on account of the cost involved. The average high grade radio employs only a two-gang condenser, which makes it necessary to use an *untuned* RF stage. In the Scott Laureate a three-gang variable condenser is used so that the RF stage may be tuned, and in addition *the full gain of the RF tube is available, as the RF coil is shielded, instead of exposed and unshielded, as is usually the case.*

Many people may wonder why we use a Tuned RF stage in a receiver designed specially for the reception of local and semi-distant stations. There are three

reasons for this. First, because it provides an increase in signal strength *without a corresponding increase in receiver noise*, thus contributing to a better Signal-To-Noise Ratio.

Second, an efficient tuned RF stage increases receiver selectivity, a very important point for the local-station listener. Naturally, when listening to a fine musical broadcast you do not want the reception marred by another station which can be heard in the background. The extra selectivity provided by the highly developed Scott RF stage makes it possible to eliminate such adjacent station interference entirely, or at least to reduce it to a level where it is virtually imperceptible.

Third, the highly developed tuned RF stage provides much smoother reproduction of all broadcasts inasmuch as it does not cause fuzziness, whistling, or distortion which is often caused by powerful stations on adjacent channels.

Two Precision Engineered IF Stages Incorporated In Scott Laureate

In a fine receiver designed for local and semi-distant station listening, an IF amplifier is required with sufficient Sensitivity and Selectivity to prevent the overloading and distortion which often mars an otherwise beautiful program on ordinary receivers. The use of a two stage Iron Core IF Amplifier, incorporating two tubes, is an ideal solution, and this is the system employed in the new Scott Laureate. It not only provides ample Sensitivity and Selectivity for the reception of local or semi-distant stations, but also eliminates the overloading and distortion present in a receiver having only one stage of IF Amplification.

Variable Selectivity Provided for Either Local Station or Distant Reception

The chief purpose of a variable Selectivity Control is to enable the listener to select a distant station which is adjacent in frequency to a powerful local, and receive it without interference.

If a receiver does not incorporate a variable Selectivity Control, the design of the set must be a compromise on (1) the broad degree of Selectivity that is required for the most desirable high fidelity reception on local stations, and (2) the sharp degree of Selectivity for the reception of distant stations.

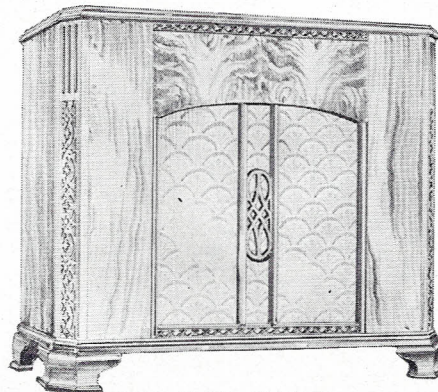
As a result of this compromise the tuning is too "sharp" to provide the full fidelity the receiver is capable of giving, yet too "broad" in certain cases when extreme selectivity is necessary. The variable Selectivity Control enables the listener to change the band width to obtain the finest possible reception from either local or distant stations.

Each section of the radio receiver acts

as a sort of highway or channel through which the incoming broadcasts must pass. Obviously, if these channels are not wide enough, as in the case where no variable Selectivity Control is provided to adjust the band width, some of the tones of the broadcast are chopped off, and the result is that you do not hear the important characteristic overtones which give timbre and individuality to voice and music.

By means of the Variable Selectivity Control incorporated in the Scott Laureate, the Selectivity may be varied so that in the minimum or sharp position only a very narrow channel of frequencies is admitted, whereas in the broad position the full band width is admitted, allowing the complete overtone range of a high fidelity broadcast to pass thru.

This means that it is possible to adjust the receiver so that the maximum fidelity can be secured on every program.



THE NEW OXFORD

Our newest console, designed for the Laureate with Automatic Record Changer. A Chippendale period cabinet of unusual beauty. Available in walnut only.

Short Wave Band Brings the News of the World Direct

While the Scott Laureate has not been designed as a long distance receiver, we have incorporated one short wave band which enables you to tune in the major short wave stations in all parts of the world. While few people today spend any great length of time listening to foreign short wave broadcasts, everyone will find it extremely interesting to listen for a short time each evening to the news broadcasts as they come *direct* from Europe.

The reason so many owners of radio receivers with short wave sections do not spend much time tuning in foreign short wave stations is *because of the difficulty in locating them on the dial*. But once a short wave station has been tuned in on the Scott Laureate it can be logged *then tuned in again just as easily and accurately as any station on the broadcast band*. Incorporated in the dial is a separate micrometer logging scale. Once you have tuned in a station you simply make a note of the num-

ber on the logging scale, then any time you wish to tune in this particular short wave station again all you do is set it to that particular number, turn up the volume, (provided of course the station is actually on the air and a signal is reaching your antenna) and in it will come. This makes it just about as easy to tune in a short wave station on the Scott Laureate as it is to read the time on your watch.

Strict Precision Construction

In all respects the new Laureate is a Scott in every sense of the word. The Tuner and Power Supply, beautifully chromium plated, are mounted on two separate 14 gauge steel chassis in order to avoid the objectionable hum experienced with many commercially available instruments which combine the two units on one base. Every part is of exactly the same high quality found in the larger Scott instruments. It is built by the same highly skilled technicians, and is identical down to the finest detail of adjusting, checking and testing. Each vital section of the instrument is hermetically sealed and impregnated so that the instrument will give continuous trouble-free service for many years.

Fine Scott Cabinetry

Two beautifully designed and acoustically correct consoles are available for housing both the Scott Laureate and an automatic record changer if desired. These two luxurious cabinets, the Sheraton and the Oxford, are illustrated on pages 4 and 6.

In the construction of these pieces, only proven precision methods are employed. The use of tenons, dowels, cross-grained tongues, and perfectly fitted joints are found to be far superior to the use of nails and blocks as in the cheaper class of consoles. In the finishing process, especial care is taken to dramatize the inherent beauty of the natural woods.

Such careful work takes time and patience and it is only necessary to compare the beautiful surfaces and interior construction of Scott consoles with those of the usual commercial type in order to recognize the value of the extra cost and effort.

30-Day Trial

You have 30 days in which to convince yourself that the Scott Laureate is the finest instrument of its kind available today. *There are no strings or hidden conditions to this offer. If the new Scott Laureate does not give you the kind of performance we describe—or even the kind of results we have led you to expect—then merely return it to the Laboratories within 30 days and we will refund the complete purchase price.*

Technical Description of New SCOTT LAUREATE

THE Scott Laureate is an 18 tube superheterodyne receiver providing for AM reception in the broadcast band of 540 to 1600 kilocycles, the short wave range of 9.2 to 15.6 megacycles which includes the 19, 25 and 31 meter bands, and for FM reception in the assigned band of 41 to 50 megacycles.

Completely separate tuning sections are employed for the AM and FM reception. The AM section consists of one r.f. stage, one combination mixer-oscillator, two stages of i.f. amplification and 2nd detector—AVC. The FM section consists of one r.f. stage, one combination mixer-oscillator, two stages of i.f. amplification, one limiter stage and a discriminator frequency detector. Either of these tuner sections may be switched to the input of the four stage 25 watt audio amplifier.

A block diagram of the basic circuit functions is shown below.

THE AM SECTION

To simplify the problem of antenna installation the Scott Laureate is equipped with a built-in duplex loop aerial capable of good signal pickup in both the broadcast and shortwave bands. Each of these loops form a part of the input tuned circuit in their respective bands and, therefore, a maximum amount of the available signal is fed to the grid of the r.f. amplifier tube. A high Q, consistent with stability, also contributes to the most efficient utilization of the incoming signal. Provision is made for the connection of an external or outside aerial to the receiver, so that satisfactory results may be obtained in remote locations or where optimum results on the short wave bands are desired.

Radio Frequency Amplifier

R. F. amplification is provided by a 6SK7GT tube employing a tuned plate circuit in both AM bands. By this arrangement an image and spurious signal rejection ratio comparable to that of the Phantom Deluxe

is obtained. The sensitivity in both bands is also brought up to the point where optimum results from the built-in aerials may be realized.

Greater gain and ease of tuning is provided in the short wave range by switching small fixed condensers in series with the main variable condenser to reduce the tuning range to that of the principal foreign shortwave broadcast bands.

Mixer Oscillator Stage

A 7J7 loctal type tube serves as a combined mixer and oscillator. The mixer characteristics of this tube are almost identical with those of the 6L7G type which has been used in other Scott

models for several years. The combination mixer oscillator feature is applied in its most efficient and stable form by using a mixer tube designed for minimum reaction between the signal and oscillator circuits. The mixer and oscillator sections of the 7J7 are in reality separate tubes in one envelope with an internal connection similar to that used externally between the 6L7G and the 6J5G.

The components associated with the oscillator have been designed to reduce possibilities for frequency drift to a minimum.

The Intermediate Frequency AM Amplifier

The I.F. stages tuned to 455 K.C. employ a 6K7G tube in the first amplifying stage and a 6B8G tube in the second amplifier, second detector and AVC circuit.

Four degrees of variable selectivity are provided for combination with an audio treble control to provide seven steps of audio high frequency variation. The selectivity and bandwidth data is shown in Figure No. 2. It will be noted that adequate selectivity is available for separating closely spaced short wave signals, with a degree of variation which allows for maximum high fidelity performance in the broadcast band.

2nd Detector and AVC

The 6B8G, which functions as the 2nd i.f. amplifier, also contains diodes which are used to rectify the incoming AM signal, producing audio voltage and a D.C. voltage suitable for automatic volume control. The latter is accomplished by applying the d.c. diode voltage back to the grid circuits of the r.f. mixer and 1st I.F. tubes all of which have variable gain characteristics.

The audio voltage appearing across the 2nd detector load is fed to a resistance capacity network which equalizes the attenuation of the i.f. stages at the higher modulation frequencies and restores them to a level satisfactory for application to the

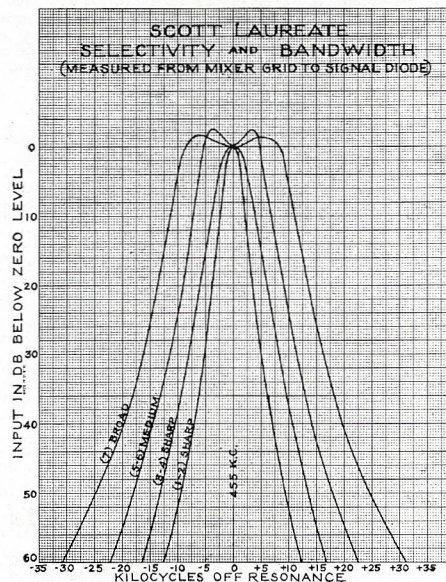
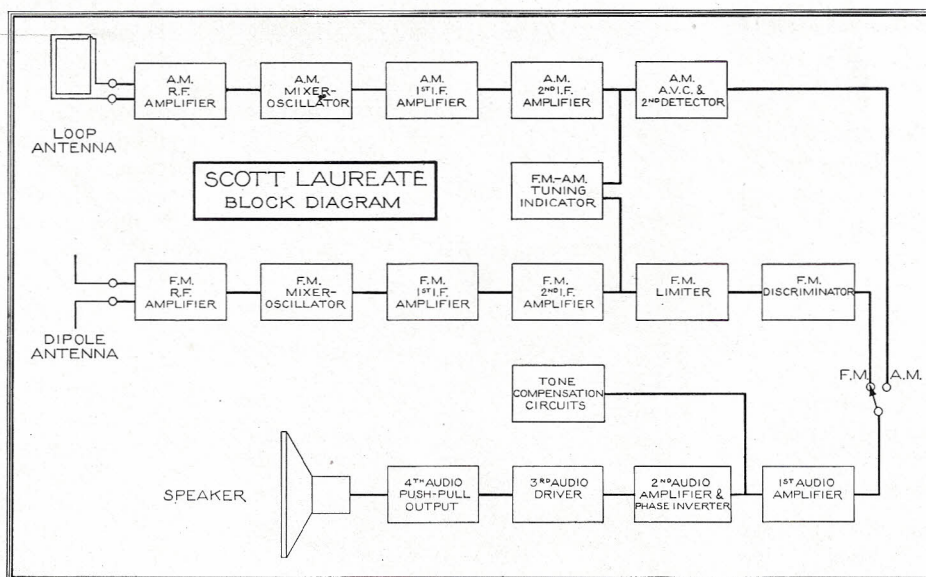


Fig. 2



grid circuit of the first audio tube.

THE FM SECTION

Antenna terminals are provided so that either an indoor or outdoor dipole aerial may be attached. If the listener is located within a 5 or 10 mile radius of a commercial FM station, he may find that satisfactory noise-free reception is possible with a short indoor single wire or a two wire aerial consisting of 6 foot lengths of conductor.

The R. F. Amplifier

A 6AB7 high mutual conductance pentode provides an efficient gain in the ultra high frequency range. It is also preferable to certain other types which load the antenna circuit excessively. The combined aerial circuit and r.f. stage gain is adequate for an optimum signal-to-noise ratio on weak FM signals.

The FM Mixer-Oscillator

The 6SA7 tube employed as a mixer and oscillator in combination functions to permit maximum r.f. stage gain because of its reduced loading effect on the signal input circuit. The use of a composite oscillator also results in the introduction of sufficient oscillator voltage for optimum conversion ratio without resort to coupling methods conducive to frequency instability.

The oscillator circuit is temperature compensated for frequency drift by a special resistance-capacity combination which responds to temperature variations within the receiver.

The Intermediate Frequency FM Amplifier

Two stages of IF tuned to 5.25 megacycles are equipped with 6AC7 type tubes, which furnish the maximum stage gain obtainable at this frequency for FM reception. Each circuit is properly loaded to provide the correct degree of bandpass for the wide band signal, which swings over a maximum of 150 K.C.

The Limiter Stage

Limiter operation is essential in an FM receiver if minimum distortion and minimum noise are to be obtained under all conditions. This action also serves to provide the equivalent of an almost perfect AVC system.

A 6SJ7 tube operating as a combination grid and plate circuit limiter holds the i.f. voltage input to the frequency detector constant above a predetermined level.

The Frequency Detector

A balanced diode type discriminator detector recreates a linear high fidelity audio signal from the wide band FM

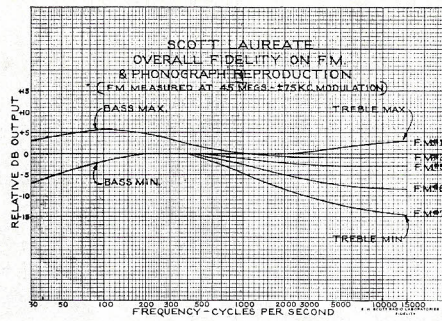


Fig. 3

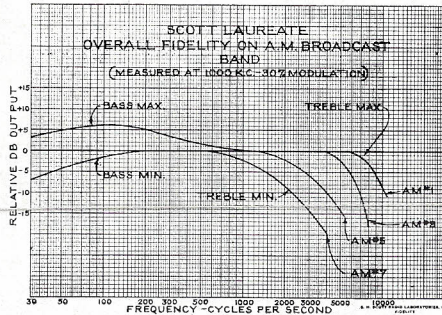


Fig. 4

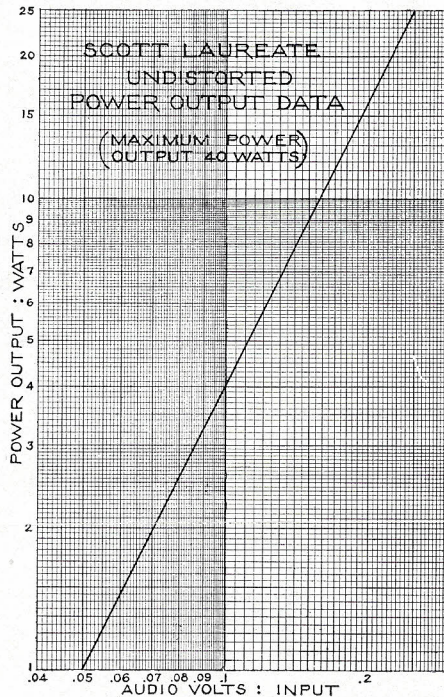


Fig. 5

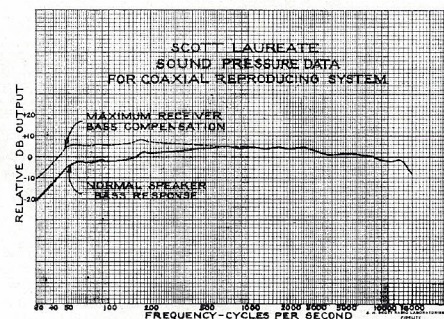


Fig. 6

signal. Maximum audio output and optimum balance to noise disturbances result from the circuit arrangement.

A 100 micro-second de-emphasis circuit follows the audio diode load and restores the audio frequency level to the high fidelity characteristics of the FM station program.

The First Audio Stage

The chief function of the 1st audio stage is to provide amplification with a wide degree of possible variation at both ends of the audio frequency spectrum, so that a practical degree of bass and treble control may be realized.

The bass compensation is effected by means of a resistance-capacity combination in the plate circuit of the first audio tube. The degree of bass response is regulated by varying the amount of resistance in the bass load circuit. The effect of the electrical bass compensation is shown in Figures Nos. 3 and 4.

A 6J5G tube is used in this stage.

The Second Audio Stage

The second audio stage employs a 6J5G tube as a plate-cathode type of phase inverter. This circuit is the most reliable one from the standpoint of maintaining balanced conditions. Low resistance loads in both the cathode and plate circuits supply the audio input voltage for the following audio driver stage, without loss of high frequency response.

The Audio Driver Stage

A 6C8G tube (two triodes in one envelope) acts as a high gain push-pull driver stage preceding the 6L6G output tubes. Since it consists of two balanced high gain triodes, its output circuit is most suitable for a balanced negative feedback from the plate circuits of the 6L6G tubes.

The Output Power Amplifiers

Two 6L6G tubes operate in push-pull with about 20% of their respective output voltage fed back from the plate to the grid circuit for the reduction of audio distortion and hum voltages. This feedback arrangement is the type which increases the damping in the plate circuit and consequently reduces transient distortion in the loudspeaker system.

Two 6L6G tubes operated in this manner provide an undistorted audio output of approximately 25 watts and a maximum audio output of approximately 40 watts. In Figure No. 5, the curve of power output vs. audio input voltage at the phonograph terminals is shown. It will be noted that the linearity indicates negligible distortion and the high power sensitivity assures satisfactory operation with low level crystal phonograph pickups.