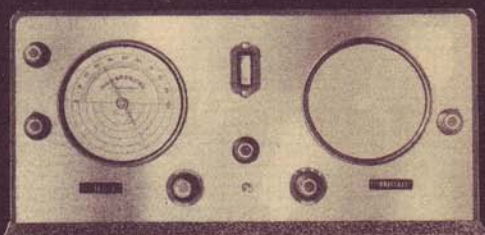


The New
Super
SKYRIDER



**SHORT WAVE
RECEIVER**



NEW 5-SEGMENT BAND SEPARATOR
• ELECTRICAL BAND SPREAD •

**A PROFESSIONAL
SUPERHETEROC.
DYNE**

by the **hallicrafters** *Price 10c*

HALLICRAFTERS PRESENT the New Super SKYRIDER

A Precision Short Wave Receiver for the Amateur and Advanced Fan Listener

WHEN Hallicrafters engineers attacked the problem of producing a distinctively up-to-the-minute short wave receiver to be offered at a reasonable price, they proceeded with a ripe experience and a comprehensive knowledge of the requirements of the modern amateur, prospective amateur and the advanced fan listener.

We are essentially an organization of "hams" ourselves—pioneer amateurs. We had seen this type of receiver undergo rapid and constructive development in the feverish activities of a depression-stimulated industry. Many distinctive, worth while features and characteristics had been brought forth in our own and other laboratories.

Yet an analysis of existing receivers in this chosen class, including our own, disclosed many surprising facts. Some receivers presented excellent features, others performed well, but almost all of them in operation suffered from three dominating shortcomings:

- (1)—"Spotty" efficiency; good on some bands, poor on others.
- (2)—Noisy to an annoyingly disagreeable degree on the busy 20-meter and other popular bands.
- (3)—Inadequate band spread.

Well, we had something to shoot at! Transmission congestion and the spread of amateur and short wave broadcast activity to world wide scope demanded the selectivity and sensitivity adequately provided only by the superheterodyne circuit. But, could a superheterodyne be designed and built to provide maximum efficiency in these first two respects and yet overcome the inherent noise and sags in pick-up strength at vital ranges on the dial, apparently unavoidable attributes of this circuit arrangement?

That in this new Super SKYRIDER these faults have been decisively overcome, that increased sensitivity and effective selectivity for all reception conditions have been accomplished to a very high degree of perfection is eloquently proven to the skeptic by the expressions of praise from the recognized authorities as well as laymen users quoted throughout the pages of this book.

You will see in this presentation how this extremely high order of sensitivity—usable sensitivity—has been attained. How the faintest signals are delivered through an advanced impedance coupled high gain RF pre-selection stage into a specially designed first detector-oscillator combination, thence to the heart of the receiver, the intermediate frequency amplifier. You will observe the use of entirely new methods of RF and IF amplification, by the employment of an advanced system of band segregation, the departure from ordinary condenser capacities, a new perfected type of cellulose acetate insulated wiring and precision construction throughout.

The result? An instrument that takes its distinctive place in the short wave world to provide an all-purpose receiver decisively devoid of the shortcomings enumerated. A lower noise-to-signal ratio than we have ever known before. Operating characteristics that adapt it readily to any and all location difficulties. Ease of control that makes for the rapid, unflinching reception requirements of today faced by professional, amateur or layman operator. A receiver reflecting highly skilled engineering and construction ingenuity to bring all these desirable properties at a price well within the reach of the most modest means.



THE HALLICRAFTERS, INC.

W. J. Halligan, President

3001 Southport Ave. Chicago, USA



to do each task a little better than it has ever been done before. . . .

to be meticulously prompt, courteous and respectful in all our contacts. . . .

to be thorough rather than hurried. . . .

never to be satisfied with things as we find them, ever striving to set new standards, content only with perfection itself. . . .

to put our hearts as well as our minds and hands into each job as we discharge it. . . .

That is the Hallicrafters' creed and we abide by it!

We earnestly hope that all who purchase Hallicrafters products will look behind their mechanical structure and capture in the realization of their ownership this spirit we have tried to instill in their conception, building and distribution.



THE PERFECTED CIRCUIT ARRANGEMENT SETS NEW STANDARDS IN ADVANCED ENGINEERING DEVELOPMENTS

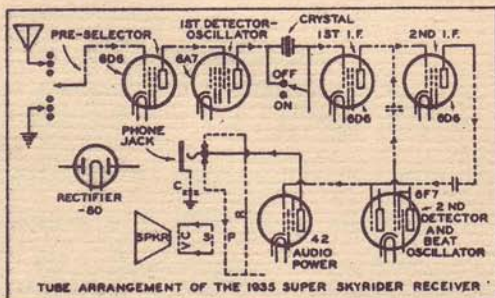
The inclusion of an RF amplifier between the antenna and first detector of the superheterodyne—commonly called pre-selector—is now an accepted practice in all good short wave receivers of this type. While this stage might seem simple, such is not the case. Its proper function demands the most careful engineering, design and precision construction. For on its action depends correct tracking of tuning, uniform gain, high frequency oscillation stability and satisfactorily calibrated band spreading. This is especially true on frequencies above 10 mc.

Referring to the diagram on the next page, you will see the general arrangement of this RF pre-amplifier, employing a 6D6 tube in an impedance coupled circuit. What cannot be shown is the absolute precision required in the design and placement of the separate inductances over the various bands. This system contributes a very high order of overall RF gain. Practical elimination of r.f. image-interference and "repeat spots," definite suppression of background noises by blocking the passage of low frequency noises to the IF amplifier and a sharp increase in selectivity.

A type 6A7 First Detector-Oscillator in a specially designed high frequency oscillator circuit which is very stable even at extreme high frequencies, follows. It will be seen that the intermediate frequency output of this stage is passed into the crystal filter circuit, when crystal is used. Here are two special Litzendraht wire wound coils as described in detail later in this presentation.

The extremely high overall gain of the Super SKYRIDER is traced to the highly developed, precisely constructed Intermediate Frequency 2-stage Amplifier, using 6D6 tubes and four special air-tuned Litzendraht wire wound IF transformers, peaked at 465 KC, dual tuned. Tests show this type of unit to be fully 50% more efficient than conventional IF transformers. Coupled with the special Super SKYRIDER system of band separation and tuning condensers having negligible RF losses, uniform sensitivity is constantly maintained over the entire short wave range from 1.5 to 20 mc. Measurement shows the usable sensitivity to be less than one microvolt per meter.

Under present transmission and reception conditions in the amateur bands, the extreme selectivity required in the receiver is supplied by the inclusion



Shows graphically the tube arrangement of the New Super SKYRIDER. The tube complement is seen to be: 3 6D6, 1-6A7, 1-6F7, 1-42, and 1-80.

of a crystal filter which is incorporated in the Super SKYRIDER as shown in the illustrations on pages 3 and 4 and employing a Piezo-electric quartz crystal in a special bridge circuit.

The Second Detector-Oscillator stage employs the new 6F7 multi-purpose tube—a combination triode and tetrode with but a common cathode. The triode portion of the tube is used as a diode detector, furnishing ample voltage to drive the output tube. The tetrode section is used as a triode beat oscillator, with capacity coupling between the grids of the oscillator and the last IF tube.

A type 42 output tube, delivering better than 4 watts output, coupled with the inbuilt full flux dynamic speaker, provides a surprisingly fine quality of reproduction.

A Headphone Jack is conveniently located on the front panel. Phones are connected in the plate circuit of the 42 tube, with limiting resistor and capacity, blocking voltage from the phone circuit.

The Power Pack is also an integral part of the receiver, employing a type 80 full wave rectifier.

A Famous Authority Speaks

Editor of Short Wave Radio; formerly technical editor of Radio News; says in the Dec. 29th issue of the New York Sun:

"This receiver is recommended for its simplicity and utter reliability. It requires no delicate internal adjustments or balancing, and in the hands of the patient operator it will bring in most everything worth hearing on the short waves."—Robert Hertzberg.



THE HIGH GAIN RF PRE-SELECTOR

Providing extreme sensitivity and selectivity,
low noise-to-signal ratio--new wiring system

While all really modern professional short wave receivers are now being equipped with an r.f. amplifier stage between antenna and the first detector, it seems that the importance and function of this development is not generally understood. Pre-amplification actually performs two definite functions, namely sharply increasing the overall gain or sensitivity of the receiver and at the same time providing a marked improvement in selectivity. It is simply a process whereby relatively weak signals may be greatly amplified before detection and by virtue of the highly resonant circuits, provides another characteristic of definitely selecting any desired signal to the discrimination of all others. In actual operation, many other benefits accrue and all of these desirable results of pre-amplification may be enumerated as follows:

- 1st—Rejection of image frequency or repeat spots.
- 2nd—Substantial increase in signal gain or overall sensitivity.
- 3rd—A marked increase in selectivity.
- 4th—Sharp reduction of noise-to-signal ratio.

Let us first consider image-frequency. What is it? It is taken for granted that the superheterodyne principle involving frequency conversion of all incoming signals to a fixed-tune frequency of the IF amplifier, is understood. General practice is to peak the IF at around 500 KC. The Super SKYRIDER is peaked at 465 KC.

For illustration, then, let us say that we are operating a super, peaked at 500 KC and without pre-selection. Since the IF frequency is the difference between the oscillator and signal frequencies and since the oscillator may be either 500 KC lower or 500 KC higher than the signal, you will find that it is possible to get the same IF frequency from two different signals simultaneously!

Say you are working a ham signal on 7,000 KC—the oscillator tuned higher or 7500 KC. Transmitting at the same time, there is a strong commercial station on 8000 KC. Bang! In he comes, almost completely shutting out the desired signal. Why? Simple; the oscillator frequency is exactly 500 KC lower than his frequency and there is insufficient selectivity ahead of the detector to keep his signal from getting in along with the ham originally tuned. That is what is known as radio-frequency image interference.

All operators of superheterodyne short wave receivers not equipped with pre-selection know full well what a nuisance is this phenomena, as well as that also of "repeat spots" from transmission harmonics. It is an intolerable condition that no modern operator will endure. Efficient pre-selection, such as that in the Super SKYRIDER definitely eliminates r.f. image-frequency and there are no "repeat spots" except in rare locations where the operator's antenna is close by a strong station.

Precision Demanded

The Super SKYRIDER pre-selector is a single stage of tuned radio frequency, operating on all bands, which materially increases the overall sensitivity of the receiver as well as contributing the higher degree of selectivity as explained above. But, the true measure of this highly desired extra sensitivity is the signal-to-noise ratio and it is here that the precision methods employed in the Super SKYRIDER find their most striking effect.

Inclusion of this tuned r. f. pre-stage would seem a simple task, but in practice this is certainly not the case, especially on frequencies above 10 mc. A very high degree of precision in design, assembly and construction is demanded. For, it must be remembered that many operating factors are involved such as tracking of tuning, uniform gain, high frequency oscillator stability and accurate calibration in band spreading. If the r. f. coil in this circuit does not track absolutely with the first detector and oscillator coil, the selectivity at these points suffers impairment and consequently the benefits described above will have been lost.

Absolutely Uniform Sensitivity

It will be observed, by reference to the circuit diagram, that no primaries are used in the r. f. circuits of the Super SKYRIDER. This results in absolute avoidance of all absorption effects with attendant "dead spots" or lack of sensitivity throughout any tuning range. In conventional production type short wave receivers employing separate primaries for each range covered, the inter-coupled relation of the self-resonance of the primaries falling in the higher frequencies disastrously results in definite "dead spots" or sensitivity failure at these portions of each of the high frequency bands. Con-

trasted is the Super SKYRIDER system of no primaries, a special design band switch and proper placement of the coils with respect to each other. Great care and precision is brought to bear to effectively isolate each coil, one from the other, and in switch connections to avoid all dead end effects and resonance points. This results in absolutely uniform overall sensitivity on all bands and throughout the entire range of each band.

Greatly Extends Reception Range

By the provision of this precisely designed and constructed pre-amplifier, we find it possible to decrease the sensitivity of the intermediate frequency amplifier to such a point that all tube hiss and inherent tube noises are completely eliminated. Thus, we arrive as near to the ideal signal-to-noise ratio as is possible in any superheterodyne receiver. It brings to the amateur and ambitious DX fan opportunity to tune at great distances comparatively weak signals, both of cw and phone, that must be passed up when operating the ordinary short wave receiver, due to attendant noise and lack of sensitivity.

Special Wire Employed

Another important feature of the Super SKYRIDER pre-selector is the special wiring employed. This is a special cellulose acetate insulated wire which provides the highest known high insulation resistance, low radio frequency phase difference with increased humidity, high voltage breakdown strength and low moisture absorption.

Tests run on this type insulation in comparison with ordinary cotton or silk insulation are shown in the following three tables.

Table No. 1

Insulation: 2 Cotton Braids Waxed

At 74° F. 90% R. H. for 100 Hours	At 120° F. 38% R. H. for 100 Hours
Insulation Res. 0.29 Megs. Per Ft.	Insulation Res. 8.8 Megs. Per Ft.
Moisture Absorption 0.94%	Moisture Absorption Infinity
Power Factor 6.63%	Power Factor 0.08%

Average voltage breakdown at room temperature:
1925 volts.

Table No. 2

Insulation: 2 Silk Wraps Plus 1 Cotton Braid Waxed

At 74° F. 90% R. H. for 100 Hours	At 120° F. 38% R. H. for 100 Hours
Insulation Res. 515 Megs. Per Ft.	Insulation Res. 557 Megs. Per Ft.

Moisture Absorption 0.94%	Moisture Absorption Infinity
Power Factor 6.93%	Power Factor 0.17%

Average voltage breakdown at room temperature:
2100 volts.

Table No. 3

Insulation: 2 Wraps Cellulose-Acetate-Treated
Textile Plus 1 Cotton Braid Waxed

At 74° F. 90% R. H. for 100 Hours	At 120° F. 38% R. H. for 100 Hours
Insulation Res. 1792 Megs. Per Ft.	Insulation Res. 2083 Megs. Per Ft.
Moisture Absorption 0.94%	Moisture Absorption Infinity
Power Factor 6.68%	Power Factor 0.15%

Average voltage breakdown at room temperature:
2800 volts.

Note: In each of the three tables, insulation and voltage breakdown was measured on one-foot samples immersed in mercury. Moisture absorption by weight. Power factor measured at 1000 KC. These tests were made for us by A. R. McLellan, Consulting Engineer.

It will be seen, then that every step known to the radio art has been taken to the end that the Super SKYRIDER will provide the absolute perfection of pre-amplification, insofar as engineering skill, experience and high purpose may permit. No expense or care has been spared, no compromise whatever has been made in producing this most important stage in this fine receiver.

Pioneer Amateur Says Superior

"Remarkable enunciation, making it ideal for phone, as well as c. w. . . . Sensitivity and band-spreading superior to any set I've seen. . . . The Super SKYRIDER certainly has IT!"—G. A. Joyce (W9RA), President Chicago Radio Apparatus Co. Pioneer amateur since 1909 and short-wave distributor.

Distinguished Editor Likes Stability

"General operation very good. . . . Valuable special features. . . . The set is mechanically solid. . . . Unlike many short-wave receivers, the Super SKYRIDER does not permit c. w. tones to change every time any control is touched."—R. S. Kruse, Technical Editor of R/9, and for Years Technical Editor of Q. S. T.

5-BAND SEPARATION of the SHORTWAVE SPECTRUM

An Important Innovation by
Hallicrafters Engineers that
Brings New Order of
Performance to the Short
Wave Receiver

Judging from an analysis of practically all existing short-wave and all-wave receivers, it would seem that every effort had been made to cover the greatest possible range with the fewest coils. And, the range of the individual coils apparently have been governed solely by the size of the tuning condenser employed, with slight attention to the compromises in efficiency thus resulting. Where cost factors are of primary concern, this is natural, but it is surprising to find that even in the so-called better class receivers this compromising practice is exercised.

In approaching the problem of just how to divide the broadcasting and amateur spectrum, where cost and production tolerances are not concerned, the aim should be to attain:

- 1st—a near ideal ratio between capacity and inductance on all frequencies covered.
- 2nd—ease and accuracy of tuning.
- 3rd—the best possible placement of most frequently used ranges in relation to maximum sensitivity and noise level.

It is obvious, of course, that in a quality professional type short wave receiver, especially for amateur work, where uniform band spread and accurate calibration is essential, the objectives must be largely attained. Extensive research and intensive experiment over a period of more than a year in the Super SKYRIDER there has been produced what we feel is the ideal solution of this problem for all ranges, covering both the amateur and broadcast frequencies.

It will be observed that these frequency ranges of 550 kc. to 22 mc. have been segregated into five divisions. Employing a much lower capacity condenser than is used in ordinary all-wave receivers,



operating in conjunction with the advanced pre-amplifier already described, a much higher order of efficiency in the r. f. stages is a logical consequence. Translated into operating results, this means higher sensitivity and substantially lower noise ratio than can be had with the ordinary 3 or 4-band receivers. Those far-away stations that simply whispered or were ridden down by a barrage of noise now come through clear, defined and in good volume.

In the Super SKYRIDER the entire short wave and broadcast spectrum is divided into these five separate bands.

- 1st—10.50 to 22 mc.—28 to 13.5 meters.
- 2nd—5.70 to 12.5 mc.—52.5 to 24 meters.
- 3rd—2.8 to 6.5 mc.—110 to 46 meters.
- 4th—2.8 to 1.25 mc.—110 to 240 meters.
- 5th*—550 to 1500 kc. or 10-meter band.

*Optional.

It is seen that the important 6,000 and 12,000 kc. bands are at the extreme low capacity end of the circuit. In fact, all coil ranges are so allocated that each covers one amateur and at least one popular international broadcast band at the maximum point of sensitivity in the circuit.

Built to exacting specifications and not to be confused with conventional devices of this nature, the Super SKYRIDER band-selector switch is absolutely positive and unflinching in action. It has heavy silver plated contact points and self-wiping arms. At no time will high resistance joints develop from corrosion, dirt, etc. Unique design provides short, no-loss leads between coils and switch contacts.

This system of splitting the short wave spectrum into an extra division marks another milestone in the development of receivers of this type. It permits you on all bands and on all ranges on that band to take full advantage of the extreme high order of sensitivity, selectivity and low noise ratio this fine receiver provides.

High Gain RF Pre-Selection

Effective rejection of image frequency and "repeat spots," substantial increase in overall sensitivity; marked increase in selectivity and sharp reduction of noise ratio.

Completely Self-Contained

Built-in speaker and power pack.

5-Band Separation

Brings new standard of brilliant performance to operation on short waves.

Crystal Filter

Optional. For both c. w. and phone work.

Calibrated Dial

Exclusive. Accurate calibration all ranges on dial.

Accurate Electrical Band Spread

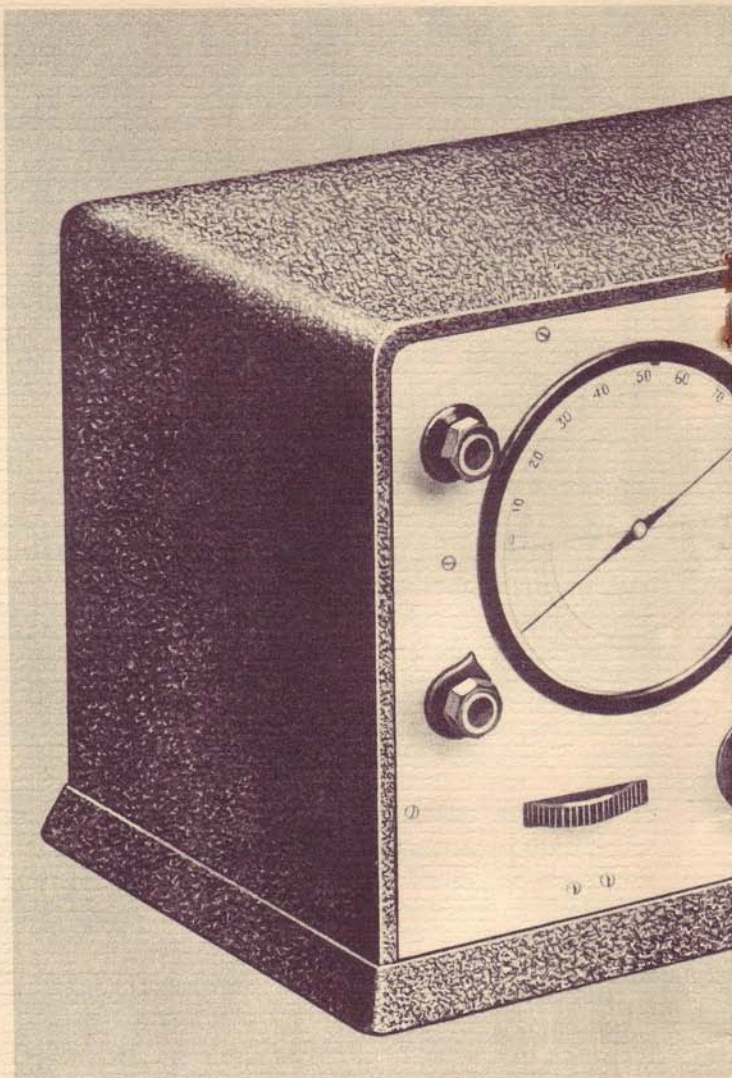
Continuous—a most highly developed feature.

Selectivity

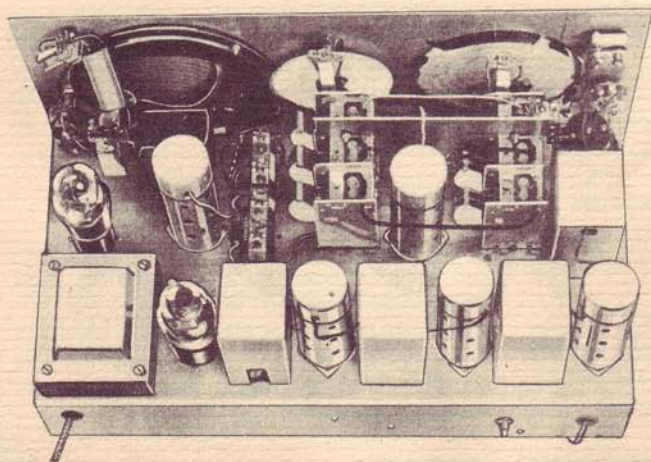
Single signal with crystal, single channel without.

Sensitivity

Less than 3 microvolts at 50 milliwatts output; fractional microvolt on c. w.



Top view of receiver with shielding case removed.



The New Super

Here is a "close-up" of the new Super SKYRIDER. The controls are as follows: left top corner, Crystal Phasing Condenser; below this is Crystal Switch; exact center with dial window above it, main Tuning Control; upper right corner, Phone Jack; below this Transmit-Receiver Switch; across bottom, reading left to right, Band Spread Thumb Control, AC Switch-Tone Con-



Built-in Frequency Meter and Monitor

An invaluable aid to the amateur.

Transmit-Receive Switch

Cuts out plate voltage only, leaving heaters lighted for instant operation.

Phone Jack

Mutes speaker; mounted on front panel.

Output

Better than 4 watts.

Tone Control

Affords manual control against atmospherics.

Coverage

Five bands—13 to 240 meters—fifth band optional, either broadcast or 10-meter ham band.

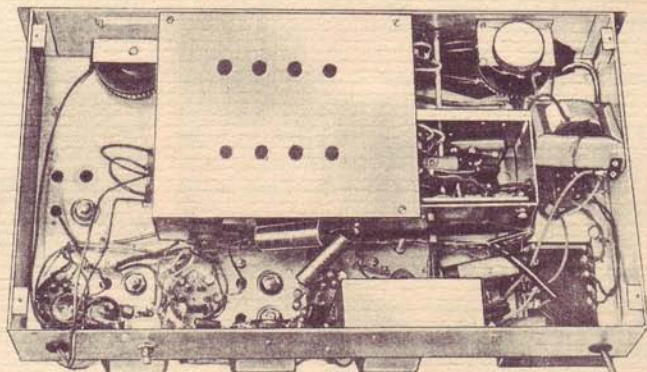
GUARANTEED 2 YEARS

The Super SKYRIDER is guaranteed against mechanical defects for two years. Any parts which may become defective within this period will be replaced or repaired free of charge, provided such defect has not developed through misuse or tampering. This guarantee does not cover tubes, which carry the manufacturer's guarantee of 90 days.

er SKYRIDER

ontrol, Beat Oscillator Switch, Wave Band Switch and Volume Thumb Control. On the left top can be seen large Band Spread Dial, and opposite the Speaker Grille.

Completely self contained in black crackle finish steel cabinet 19 $\frac{1}{4}$ in. long, 10 in. high, 10 in. deep. The front panel is of Eurado metal with a silver-like finish. Net weight 38 lbs.



Shows underside of chassis, disclosing placement of units and neatness of wiring and construction.

ACCURATE ELECTRICAL BAND SPREAD

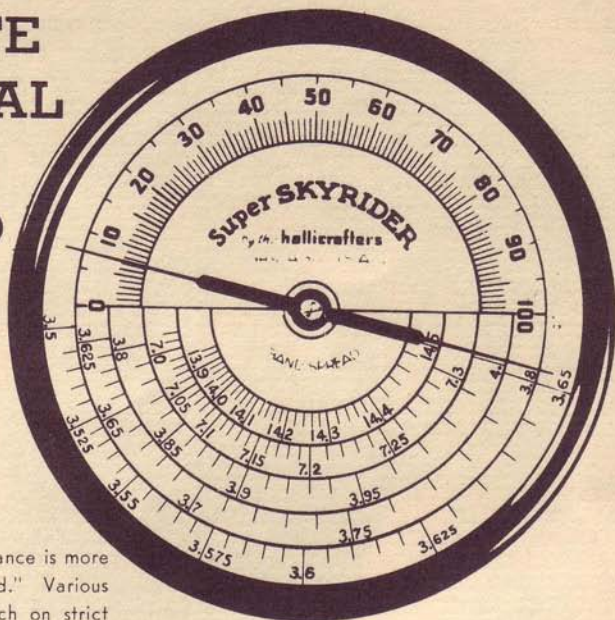
A unique, Exclusive
Feature of Immeasur-
able Convenience
to Both Amateur and
Layman Operator

PERHAPS no term in short wave parlance is more abused today than "band spread." Various methods are in use, some of which on strict analysis prove only optical illusions. Exaggerated claims are made by many manufacturers to imply "amazing improvement" in receiver operating efficiency which is certainly not borne out in actual performance.

The necessity for some kind of band spread when operating on extremely high frequencies is readily understood. Anyone who has tuned even a broadcast receiver knows that the stations from 1000 to 1500 kc. are crowded into a much smaller space on the dial than is afforded for the 550 to 1000 kc. spectrum. This relative ratio continues, of course—the higher the frequency, so that on the highest bands 1000 kc. (or about 100 channels) occupy but about one-half inch on the dial! Obviously, some system of spreading these stations must be provided to insure any tolerable degree of tuning ease.

Band spread methods now in use fall into two general classifications: mechanical and electrical. The mechanical type takes the form of staggered gear ratios employing gears or cords on pulleys. The electrical methods may be divided into three different types: tapped coil; series (two different capacity condensers in series); and last by a smaller capacity condenser shunted across the main tuning condenser.

In any and all of these systems, the band spread has nothing to do with the inherent selectivity of the receivers, claims to the contrary notwithstanding. It merely takes a certain part of any frequency range or band and spreads it over a greater distance with respect to the indicator device or pointer traveling over the dial.



In a professional type receiver, such as the Super SKYRIDER, the purely mechanical method of variance of tuning dial ratios presents many objections; namely, possible slippage, back lash, troublesome mechanism, and withal only a haphazard degree of accuracy. The tapped coil and the plug-in coil system offer drawbacks that are not acceptable in the speed and accuracy of operation demanded in the modern receiver.

In the Super SKYRIDER, a smooth, accurate, un-failing band spread action is attained by the use of an extremely low capacity condenser operating in conjunction with a large, open-face dial, calibrated in degrees 0 to 100 at the top and left bank at the bottom for individual calibration of all chosen bands, either by the operator himself or optionally as a service from our laboratory. The condenser employed is about one-twelfth the capacity of the main tuning control, thus giving a spread in the ratio of 12 to 1. But, since we split the principal short wave spectrum into four separate units, this ratio is a bit misleading. Stating it in another way, these bands are afforded 55 inches of space on the dial!

By this system the receiver may definitely and accurately be logged with a reasonable degree of permanency for ready turning back again and again to any station at will. Employing a minimum number of mechanical components in its design, the losses and inaccuracies due to wear and failure are entirely avoided. Its refinement represents another Hallcrafters engineering achievement.



SPECIAL BEAT OSCILLATOR AND SECOND DETECTOR

absolute stability--adequate voltages

THE Beat Oscillator-Second Detector stage employs a 6F7—a combination triode and tetrode with but a common cathode. This tube was selected for this stage in preference to the more commonly used 6A7 for the reason that the latter type presents certain difficulties. Among these is first that unless it is followed by a stage of amplification preceding the output tube, not enough output can be secured without distortion. It is also impossible to keep the oscillator voltage sufficiently low to avoid blocking the detector tube, resulting in frequency drag. Since this circuit includes a crystal filter, frequency drag could not be tolerated. Therefore, the 6F7 was chosen in place of the 6A7 tube for this stage.

A triode detector is somewhat critical as to changing loads. This condition would exist if the bias were to be varied to any great degree—therefore, it would be obligatory to keep the cathode at ground potential. Using any form of conventional cathode bias circuit, the value of the bias would change considerably with the action of the oscillator circuit. It was found possible to develop enough voltage to drive the 42 output tube when using the triode portion of the 6F7 as a diode detector. This will, of course, slightly decrease selectivity in this portion of the circuit, due to the reflected load into the primary of the IF transformer, but this effect is considerably lessened by using only the grid terminal as the high side of the diode and grounding the plate terminal. This method of connection doubles the reflected load to reduce the impairment of selectivity and also provides an internal shield between the elements of the tube. The tetrode portion of the 6F7 is then used as the beat oscillator, the conventional method of connection being followed.

Since two frequencies cannot be mixed in a diode, a method of coupling to the preceding IF tube was necessitated. This is accomplished by a wire from the grid terminal of the oscillator coupled very loosely to the grid of the preceding IF tube. The optimum coupling value is readily determined for each receiver by special tests in the laboratory.

With these arrangements, frequency drift has been entirely eliminated and sufficient voltage is always delivered to drive the output stage to its

maximum undistorted output. Again, an important engineering refinement has been brought to bear in the building of the Super Skyriders!

Beyond All Expectations!

"Some time ago, I received one of your Skyriders SW sets to be used by an ambulance Company for the sole purpose of receiving calls on auto accidents and it is serving the purpose far beyond all expectations. . . . It is the finest piece of radio engineering that I have ever had my fingers on and it seems there is nothing it will not pick out of the air."—Clyde N. Wait, Operator Police Radio KG2U, Police Headquarters, Lincoln, Nebr.

14 Stations First Hour!

"Have given it a thorough trial. The first 10 minutes at the dials, I logged five foreign stations and in less than an hour I had a string of 14 stations. Have had VK3ME two mornings around 6:20." Frank B. Freeze, Box 267, Mooresville, N. C.

Good Results on Makeshift Aerial

"The Skyriders is performing wonderful now and I am very pleased. Have heard Italy, England, Colombia, Peru, Ecuador, Cuba, Mexico and all districts in the United States and Canada, using radiphone. On CW I have received Russia, Germany, Spain, France, Portugal, Rhodesia, Brazil, Chile, Argentina, New Zealand and all U. S. and Canadian districts. All of these stations come in with only a 14-foot antenna, vertical and no ground."—Walter L. Babcock, 407 Sales St., Oneida, N. Y.

Amateur Likes It

"I have listened to a Super Skyriders at W2DZ and was surprised with its hum free performance."—Michael Jackowski, W2GOJ, 5 Picton Ave., Westfield, N. J.

THE CRYSTAL FILTER CIRCUIT

for both Phone and CW reception

**Absolute Single Signal Selectivity on CW Work
Wider Range on Phone and Broadcast Services**

While of comparatively recent adoption, the use of a crystal filter connected in the IF amplifier is now standard practice in fine amateur receivers. Present transmission congestion demands receiver provision of single signal selectivity for cw work at all times and phone reception frequently. The properly designed and adjusted filter connected in series with the input of the IF amplifier, will pass only a very narrow band that may be measured in cycles rather than kilocycles. Since all that is desired is the pure r.f. carriers of a single signal frequency (cw signals), this system may approach the ideal method of acquirement of perfect selectivity for this branch of short wave practice.

In the Super SKYRIDER special crystal filter circuit, employing the standard Piezo-electric quartz crystal, the capacity of the crystal holder switch and wiring is kept at an absolute minimum, resulting in thorough filter action with absolutely no by-pass of energy around the crystal. The shifting from off to the series position will not vary the alignment of the transformer, placing complete control in the operator's hands through the phasing condenser which is connected across the secondary coils and tunes the circuit at resonance. It is in one side of the balanced bridge circuit and allows the crystal dip to be shifted a few hundred cycles back and forth through resonance, thereby becoming of great advantage in completely eliminating interference from nearby stations which are beating with the signal being tuned.

Blocks Out Unwanted Signals

This control therefore acts as a highly effective wave trap. When you have tuned the desired station to exact resonance with the main tuning controls of the receiver and you find it assailed with interference, simply rotate the phasing condenser and you will find a certain sharp point of adjustment where the interfering signal drops out. It will be found that the interference will come in on either side of this critical point indicating that the action accomplished is that of tuning the undesired signal to anti-resonance and thus blocking it out.

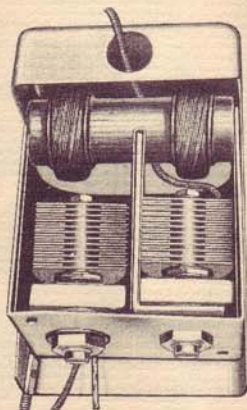
Both the off-series crystal filter switch and the phasing condenser controls are on the front panel for convenience of operation. So, simply by the flip of this switch the crystal can be cut in or out of the circuit.

The Super SKYRIDER special filter circuit is unique in that it is not only effective in cw work but on amateur phone and broadcast as well. Moreover, the arrangement is such that the receiver's extremely high order of overall sensitivity is not attenuated when the filter is in series.

A pardonable skepticism may arise in the mind of the experienced operator against the claim that phone

Air Tuned IF Transformers

This shows part of shield cut away to disclose the special Super SKYRIDER air-tuned IF unit. The windings are of genuine Litzendraht wire—a great number of strands, each finer than a human hair, but thoroughly insulated one from the other with high dielectric enamel insulation. Thus is afforded minimum resistance. Two air dielectric tuning condensers on Isolantite mountings. Sharper selectivity and permanent alignment is the result.



and broadcast modulated signals may be heard with the crystal in series. But, by detuning the phasing condenser to minimum capacity, quite acceptable results are obtained with the super SKYRIDER. It is not claimed, however, that the fidelity is not somewhat compromised; but, actually it is only to a surprisingly slight degree. When it is considered that because of the extremely sharp selectivity afforded by this crystal filter circuit that the background noises from local interference, heterodyning signals and atmospheric are practically eliminated, then this sacrifice in audio quality is more than compensated. Often on weak distant signals on the phone bands, this interference is so great as to make intelligible reception entirely impossible without the use of the crystal filter.

Actually Extends Reception Range

This marks an important forward step in the development of the short wave receiver. It establishes a system that has generally been considered impossible of attainment. It is of particular value to the modern amateur operator who, it appears, is turning more and more toward the use of phone in preference to cw. The layman listener, ambitious for an impressive DX log and a record beating collection of verifications, will find this system a long sought boon. Intelligibility on interference-harrassed distant signals becomes such as to place all broadcast within his control.

These decisively advanced and desirable operating characteristics of the Super SKYRIDER are due in no small measure to the special design and precision construction of the intermediate amplifier. Two stages, using 6D6 tubes and four special air-tuned transformers, are employed. Each of these transformers, designed and built complete in our laboratories, consist of two coils (primary and secondary) and two separate tuning condensers, entirely enclosed, painstakingly insulated and sealed. The coils are precision wound of Litzendraht wire, a medium known to provide the maximum selectivity and freedom from inherent noise. Each of the tuning condensers is mounted upon Isolantite insulation which will not warp, cold flow or absorb moisture. Extremely rigid mounting is provided—once aligned properly, they remain constant indefinitely in any climate. Thus variance in sensitivity, selectivity and dial calibration is entirely eliminated.

TRANSMIT-RECEIVE SWITCH

Frequency Meter and Monitor

For the use of the amateur, the Super SKYRIDER provides a transmit-receive switch mounted on the front panel. This switch breaks the plate lead of the RF unit and in conjunction with a special adjustable potentiometer, varies the bias on the intermediate stages so that the receiver may be used as a monitor for any transmitter regardless of the power involved. The potentiometer, of the screw driver shaft variety, is located on the rear of the chassis and when once set for a given transmitter, its adjustment remains fixed.

It is quite possible to calibrate the band spread scale to the amateur frequencies with as good frequency stability as the average frequency meter on the market. Using any oscillator circuit which will



cover the broadcast band and any broadcast receiver, the harmonics of the oscillator can be used to calibrate the band. For instance, setting the oscillator to beat with WOC at 1000 KC, the second harmonic will be 2000, the 4th 4000 and so on up to the high frequency ends of the amateur bands. Then by choosing other points on the b. c. band whose harmonics fall in the bands to be calibrated, the entire scale can be calibrated. The reference point, in each case, of course, will have to be located on the main tuning dial.

These are exclusive Hallicrafter features, indicating again to what degree every measure of engineering ingenuity was brought to bear in the design and construction of the Super SKYRIDER.

Super SKYRIDER Special Design Features

Reference to pages 8 and 9 will show you the compact, trim professional appearance of this fine receiver. The front panel is of Eurado metal (a rich silver-like finish) with a moderne black crackle finish shielding cabinet and ventilated back.

SPEAKER—The full flux dynamic speaker is built with light wire mesh grille.

POWER PACK—The power pack is also inbuilt, providing a completely contained unit of striking beauty and portability.

VOLUME CONTROL—This unit incorporates a

specially tapered resistance which permits signals to be increased or decreased gradually—no "jumps"—smooth, positive, unflinching, "noise free."

TONE CONTROL—Provides manual manipulation of the speaker response in decreasing the annoyance of atmospheric when necessity occurs. A highly desirable refinement.

Standard equipment is for 105-120 volts, 50-60 cycle A. C. Also furnished with universal transformer for 25-, 50- and 60- cycle A. C. in voltages of 110, 125, 200, 220 and 230 volts.

THESE MEN KNOW WHEREOF THEY SPEAK

Finest Ever Known!

"Received my Super SKYRIDER. . . . Am delighted with it. . . . Have only had time to try it out a couple of nights so far, but can truthfully say it is the finest short-wave set I have ever owned. . . ."—T. P. Jordan, Prominent Short-Wave Enthusiast of 1523 No. Main Ave., Scranton, Pa.

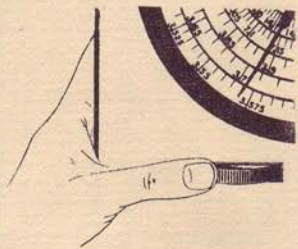
Another Pioneer Ham Pleased

"Congratulations. . . . Received the first Super SKYRIDER and immediately took it home. . . . Tried it on a couple of QSO's that I had on 75 meter phone band at the time. . . . To say I was pleased with the performance is putting it mildly. . . . I consider the Super SKYRIDER to be as fine a performing radio as I have run across and I feel sure that our enthusiasm is going to result in a good number of sales for you. . . ."—Rex Munger, Pioneer Amateur and Sales Director of Lew Bonn Co., W9LIP, Minneapolis, Short-Wave Distributors.

Famous Engineer Says Performance Excellent

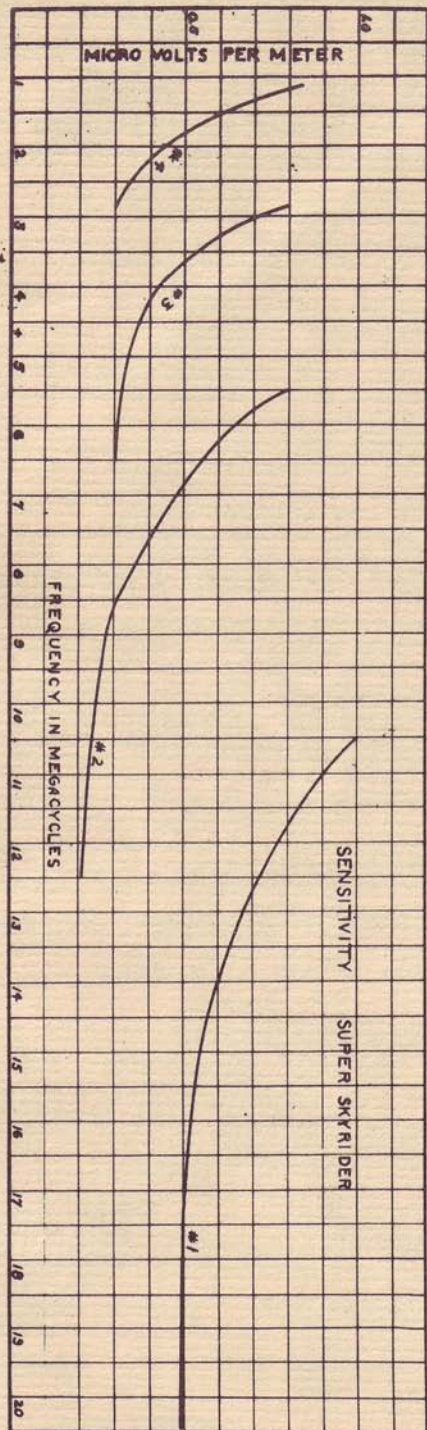
"The Super SKYRIDER like a fine automobile covers "distance" smoothly . . . effortlessly. Any good radio receiver will bring in distant stations but the test of a really fine receiver such as the Super SKYRIDER lies in the ease with which it accomplishes this excellent performance."—Lt. Com. R. H. G. Mathews, Famous "Matty" of W9ZN.

THUMB CONTROL—A horizontal control for the bandspread dial and volume control are provided. This eliminates wrist fatigue when operating actively over long periods of time. A very popular feature.



THE OPERATING RESULTS AS

Frequency Coverage



Reference to Fig. 2 will indicate the Frequency Range on the five band segregation system as arranged in the Super SKYRIDER.

The straight line tuning results clearly indicated by this curve tell the story of precision in design and construction of the receiver. While in each band the values of inductances and capacities in the oscillator and signal circuits vary, yet by strict adherence to a precision standard we arrive at a single control receiver producing the flat tuning curves as shown. The curves are accurate and indicate that the receiver may be precisely logged, permitting the operator to tune and retune any stations over the entire rotation of the dial on any of the ranges covered.

It must be borne in mind that the action of the band spread dial does not in any way affect the inbuilt electrical selectivity of the receiver. Therefore, it can be seen that once the receiver is logged and the band spread dial is calibrated (as described previously), tuning is reduced practically to setting the dials to the readings of the stations selected. This affords an ease of operation that is not provided by any other receiver available today, of which we know.

Selectivity

When equipped with Crystal Filter, we have in the Super SKYRIDER virtually two receivers—one, with the crystal in "off" position, a straight superheterodyne; the other, with the crystal in "series" position, maximum or single signal receiver for cw reception and for phone under certain conditions and limitations as explained in previous pages. In the series position, the circuit performs to accept very sharply the one frequency to be tuned and very definite rejection of all other adjacent or interfering channels.

Reference to Fig. 3 shows the actual selectivity curve of the receiver. The large shaded portion indicates the action when the crystal is in series position, employing the full selectivity of the entire receiver including the R. F. and I. F. No audio filter was used in taking this measurement.

The two inverted humps shown in the shaded portion of this curve, one on either side of the zero beat, indicates the action of the phasing condenser in adjusting the filtering crystal to resonance or off resonance. The small shaded portion at the left top indicates the use of this feature of the crystal circuit in tuning to off-resonance an interfering unwanted signal. It is by this de-tuning effect on the unwanted signal that actually blots out the interference.

"I wouldn't take anything for my Super Sky rider now. There were 17 Hams and Prospective Hams in my radio room last Sunday and all were carried away with the set."
—Dr. Hassell O. Phillips, Realty Bldg., Bessemer, Ala.

"I really believe it is as good a receiver as I could have gotten. It is certainly well worth the price."
—Ray L. Martin, Div. 5 E., U. S. S. Vestal, San Pedro, Calif.

Fig. 1

SHOWN by LAB. MEASUREMENTS

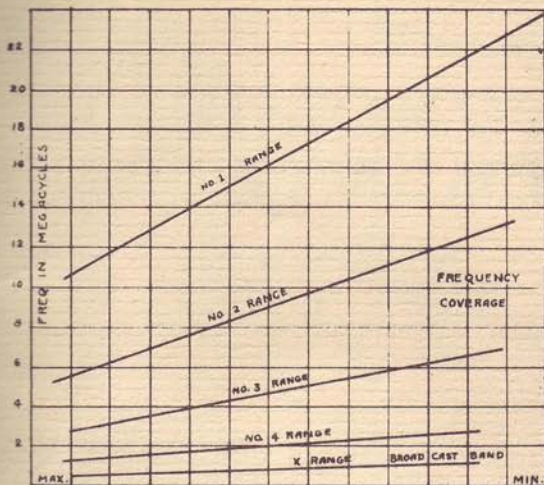


Fig. II

This is the feature of control, with beat oscillator off, that permits of substantially single signal selectivity on phone reception with slight sacrifice of audio quality. When the crystal filter so functions, of course, you have actually a dual control of tuning; namely, the crystal for blocking out interference and the main tuning control for bringing the signal desired to peak resonance and to maximum audio response.

The curve designated as "A" indicates selectivity performance of the Super SKYRIDER with crystal in the "off" position, the receiver then functioning as an efficient "straight" superheterodyne. This measurement was taken with 30% modulation at 400 cycles, 50 milliwatts output.

It will be seen, therefore, that substantially 2 kc separation may effectively realize with the added opportunity to block out an unwanted signal even of the same frequency as the one tuned if with slightly less strength.

Sensitivity

Fig. I shows the poorest sensitivity of any Super SKYRIDER receiver permitted to leave the laboratory. It will be observed that in all cases the sensitivity is better than 1.0 microvolt per meter. These curves were taken at the usual arbitrary standard of 50 milliwatt output, which in everyday terms means audi-

bility through the speaker to ordinary background music level.

When it is considered that the average short wave receiver goes down only to 2.0 or 3.0 microvolts per meter, the extraordinary power of the Super SKYRIDER may be appreciated.

In consideration of sensitivity or power of a receiver, however, we rather choose to treat only of **usable** sensitivity—that is the power that may be used reasonably free of noise to produce acceptably pleasurable reception of a given transmission. It is well here to counsel you to read again the chapter in this book treating of the highly efficient pre-selection stage and the specially designed IF amplifier. The true measure of worth of any receiver is its overall performance in relation to selectivity, usable sensitivity and reasonably good fidelity. Here the precision methods brought to bear in the design and construction and balancing of the Super SKYRIDER finds its most spectacular results. That this ideal overall performance has been attained to a high degree is eloquently proven not alone by these performance curves, but perhaps even more convincingly by the unusual reports of the unquestioned radio authorities as shown throughout the pages of this book.

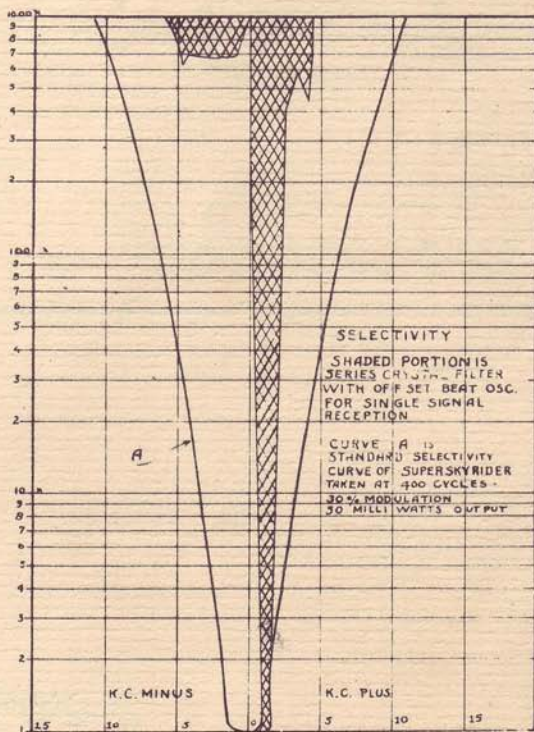
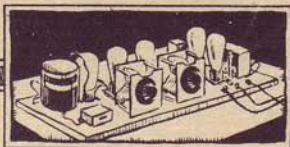


Fig. III



A FITTING CONCLUSION TO THIS PRESENTATION

Ordinarily, on this page, we should make a summary of the points set out in previous pages, to give you a sort of birds-eye view of the Super SKYRIDER, and its performance.

It seems more fittingly done, however, in this remarkable expression by one of radio's most outstanding authorities and distinguished editors. We, therefore, rest our case, so to speak, with this:

Distinguished Editor Enthusiastic!

"I have been using the set since its arrival, at W2TY, and it is positively a revelation even to a hardboiled critic of current shortwave equipment. No receiver could be letter-perfect for every purpose and every type of user, but this job comes nearer to perfection than anything I have so far used. I shall have no hesitancy in recommending it to both amateurs and shortwave listening 'fans'.

"There are several design features that should be described in 'Radio Retailing's' Technical Section. Particularly, I want to mention your unique standby switch arrangement which permits the use of the receiver as a monitor on transmission. Also, the band-changing mechanism and the crystal filter circuit will be of interest . . .

"These are the good things to be said about the receiver:

1.—An r. f. stage, included, does give the job particularly fine signal to noise ratio. Many so-called shortwave sets now on the market suffer from omission of such a stage, bringing in much interference through the intermediates. The SKYRIDER seems particularly free of such trouble,

2.—Sensitivity is certainly ample for every conceivable purpose.

3.—Selectivity is excellent and, while I don't think the crystal is of vital importance, (the receiver is amply selective without it) it does make a noticeable improvement when in the parallel position for 'phone' work and in the single-signal position for code. I think you are wise in offering the job without or with crystal for this reason. Many prospects, particularly among the amateurs, are sold on crystal selectivity and may be willing to pay extra for the slight improvement obtained. Personally, I don't need the 'extra'.

4.—The band-spread arrangement makes it possible to spread amateur and other channel assignments nicely and is still susceptible to calibration. This is a rare combination.

5.—The tone of the receiver is surprisingly good, considering the fact that it uses a pentode, a small speaker and an all-metal cabinet. You have, obviously, put most of your design and production money into the r. f. end and wasted little developing complicated audio. This is a 'heady' move for no shortwave receiver needs high-fidelity response. The transmissions are not good enough to warrant much a. f. expenditure."

"The Super SKYRIDER, I repeat, is the best thing of its kind on the market . . ."

—W. MacDONALD, Technical Editor, Radio Retailing McGraw-Hill Publishing Co., McGraw-Hill Bldg., New York, N. Y.

