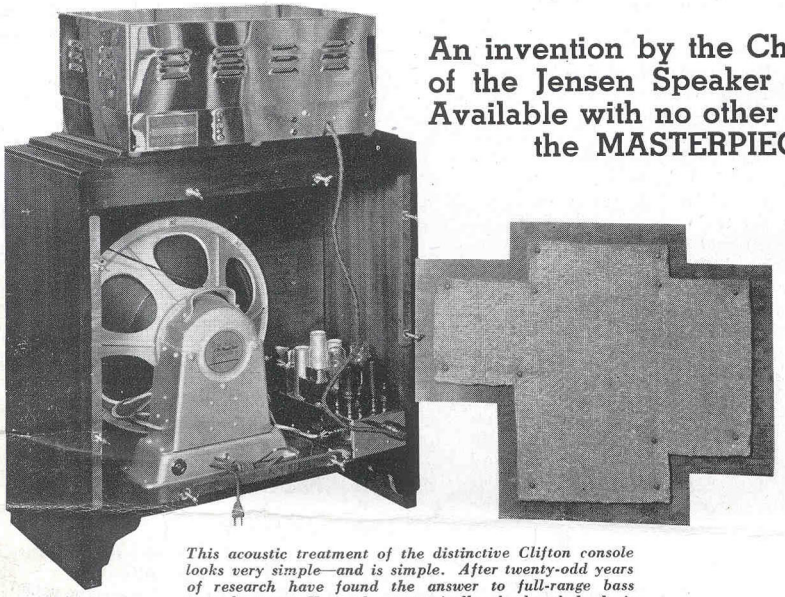
"THE WORLD'S ONLY TRULY CUSTOM-BUILT RADIO"

The McMURDO SILVER TIMES

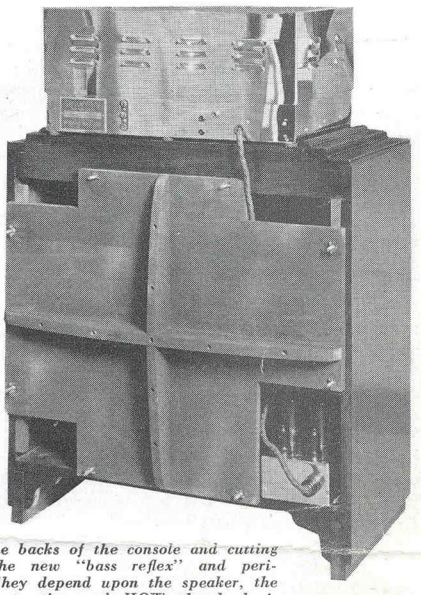
Vol. 4 JANUARY, 1937 No. 8

Full Range Bass Reproduction Achieved for First Time in History!

An invention by the Chief Engineer of the Jensen Speaker Company — Available with no other radio except the MASTERPIECE V.



This acoustic treatment of the distinctive Clifton console looks very simple—and is simple. After twenty-odd years of research have found the answer to full-range bass reproduction. Here the acoustically deadened back is shown removed to give access to the 18" 44 pound, super-giant speaker.



No, just closing in the backs of the console and cutting slots doesn't give the new "bass reflex" and peri-dynamic" benefits. They depend upon the speaker, the console size and construction and HOW the back is closed and the SIZE and ARRANGEMENT of the "bass reflex" parts.

Radio users have never heard real bass notes from any radio. The average quite large radio cabinet acting as a baffle for the loud-speaker it contains, cuts off usually at about 130 cycles. True, some notes below 130 cycles are partially reproduced where the speaker cone itself is quite large, and by virtue of cabinet resonance. The vertical, horizontal and depth dimensions of the cabinet, if different, will contribute resonance peaks which may often aid bass reproduction. Except in very heavy and solid cabinets, these resonances usually are so sharp as to cause annoying "boominess", and not true natural bass reproduction. In customary thin veneer cabinets they are very troublesome, as witness the use of "acoustic clarifiers" to absorb these annoying cabinet resonances in recent thin veneer cabinets.

For a loud speaker to actually reproduce down to 20 cycles, it would have to be mounted in the center of a 28.25 foot square baffle—the side of a house conveys a good idea of such an "infinite baffle", but is hardly ideal for one's living room. The mechanical design of the loud-speaker itself would have to be most unusual to get down below 30 cycles, even in such an ideal case.

Of late much study has been given to baffles, as evidenced by the labyrinthine folding back of a rear air-path on itself and the boxing in with tin vent pipes of loud speakers. Realizing that the true baffle is not the small board behind the grille in a cabinet to which a loud speaker is usually fastened, but is any means providing a long air path from front to back of the loud speaker (see ALL WAVE RADIO, January, 1937, issue, page 26), is the first requisite for understanding what follows. The longer this front to back air-path, the lower down in the musical register will the loud-speaker reproduce. In one widely advertised construction this path is made long by folding it back on itself inside the back of the cabinet through an acoustic network or lengthened air-path. It is a considerable step in the right direction, even though it is mechanically difficult in the limited space available to fold the front to back air-path sufficiently upon itself to extend the bass response down to the deeep fundamental bass tone.

In another case the usually open cabinet back is tightly sealed in. But, as something must happen to the air alternately compressed and rarefied inside the relatively small sealed cabinet as the speaker cone moves forward and backard in reproduction, tin vent pipes are placed over holes in the cabinet floor. These tubes may be proportioned to substantially resonate at several low frequencies, and coupled to the speaker diaphragm (cone) through the air in the cabinet, somewhat augment bass response.

Both the above developments are excellent steps forward toward true and not synthetic (if any) bass reproduction, but there has now been developed a more simple and completely effective solution on these stepping stones of engineering development.

The fundamental problem in finally attaining true and not synthetic reproduction of all bass tones below the unbelievable but never-the-less actual, average 130 cycle radio cabinet cut-off, and to extend the true tone range down to below the lowest 40 to 50 cycle notes handled by broadcast stations or

The reproducer exceeding the performance possibilities of an infinite baffle, herein described in print for the first time, is a very major contribution to sound reproduction. Developed by Hugh S. Knowles, Chief Engineer of Jensen Radio Mfg. Co., and formerly of McMurdo Silver's engineering staff, it at last surmounts the barrier which has always stood between the listener and true full range reproduction of fundamental bass tones.

In line with the policy of being first in giving to our clients every worthwhile engineering development, we take pride in being first to offer radio consoles designed by Hugh S. Knowles and McMurdo Silver to give to MASTERPIECE owners the full benefits of the startling new "bass-reflex" and "peri-dynamic" principles which culminate in sound reproduction *exceeding* that possible from an "infinite baffle."

It is unnecessary for us to say that this is revolutionary — five papers already delivered by Mr. Knowles at the request of different chapters of the Institute of Radio Engineers and The Engineering Institute of Canada will prove conclusively that it is the most important single sound reproducing development since Peter Jensen's invention of the dynamic loud speaker.

Full range sound reproduction from 30 to 9000 cycles has never been heard before, even with a MASTERPIECE V. Through Silver pioneering it may now be anyone's pleasure.

phonograph records, is to provide the loud-speaker with an infinite baffle. This is an obvious physical impossibility in terms of a flat baffle but actual performance in *excess* of that theoretically possible to an infinite baffle can be had if a large enough and heavy enough cabinet is had as a starting point.

It is vitally important that this cabinet have ample internal space. This will be eight cubic feet or more if, for example, it is to house the 18 inch Super-Giant loud speaker of the MASTERPIECE V, which it *must* if the combination is to get down to 30 cycles. It is equally important that this cabinet be non-vibratory, which means that it must be unusually solidly constructed of heavy well-seasoned and dried lumber from ⅞ inch to 1½ inch thick. Even such a solid assembly, which no *ordinary* radio cabinet even approaches, must have its own resonance further deadened by having discreet amounts of sound deadening material attached to its inside flat surfaces, for the cabinet absolutely must not vibrate when the speaker is in operation and the natural vibration of the air contained in it must be deadened. Side, top and bottom panel resonance must be eliminated by heavy construction, or spurious sound radiation will occur from these sources (of a tone-quality ruinous nature) in the form of transients from these secondary sound sources. Such a loud-speaker cabinet obtained, it is still only somewhat better than ordinary, and still reproduces little below the usual 130 cycle cut-off frequency, but performance not equalling, but exceeding, that possible to an infinite baffle is now within reach, thanks to the genius of Jensen loud-speaker engineers.

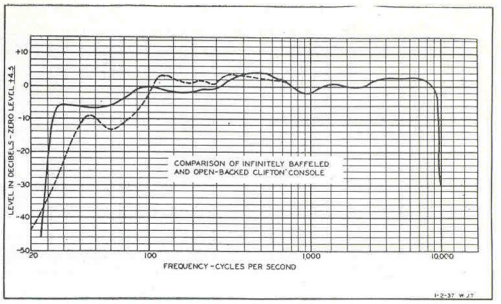
The long engineering story of how this was discovered, and the formulae governing every step of the specific designs is probably of little interest to the reader whose appetite has been whetted for this first ear-ful of true bass reproduction, so the engineering details will be skipped (they were contained in five papers delivered by Hugh S. Knowles before Rochester, Toronto, Cleveland and Chicago meetings of the Institute of Radio Engineers and the Engineering Institute of Canada quite recently). Assuming the reader now has a *solid* cabinet, the front of which is braced and deadened by a more than usually heavy speaker "baffle board", and the top, bottom and sides are so relatively small and thick that internal resonance can be deadened by tacked-on jute, the tight and firm attaching of a solid back to enclose and seal his cabinet will give the reader reproduction exceeding that of the theoretically ideal "infinite baffle."

But in the italicized word "solid" above will lie the success or failure of the endeavor. Since this cabinet back will be relatively large, and supported along only its edges, it *must be solid.* This means that it should be made of ⅞ inch solid lumber, but as this isn't solid enough, and as the cabinet back must be a minimum distance away from any wall, the back must be cross-braced by ⅞ inch x 2½ inch bracing beams, glued and screwed to the outside of the back. Placed from top to bottom and from side to side, and notched to cross in the middle, these cross braces are set on edge to completely stiffen the removable back, and to insure its being placed the required minimum distance away from the nearest wall.

Since the loud-speaker field, consuming appreciable power when in operation, will get warm, and since it would get hot if it were tightly enclosed, needed ventilation as well as basically new and important acoustic considerations, involving phase reversal of opposed front and back speaker sound radiation, so that both front and rear sound radiation *now add instead of cancel,* dictate the need for vent holes or cutouts in the cabinet back. These cut-outs may not be of haphazard size or placement, but must be of carefully determined size and location for acoustic reasons. Good ventilation dictates that at least one aperture be at the top and another at the bottom, since air heated by the speaker and power amplifier contained in the cabinet will rise. Thus a bottom port hole and another at the top will form a draft to conduct off heat generated in operation and so avoid excessive heating of the cabinet interior.

The improvement which these consoles, incorporating the new "bass reflex" (addition rather than usual opposition and cancellation of opposed front and back sound radiation) and "peri-dynamic" (enclosed speaker) principles, bring to sound reproduction cannot be visualized from the simple statement that, with a fine loud speaker, they only extend the tone range from an averaged 130 down to 30 cycles, for this does not describe an almost equally valuable distortion eliminating benefit. In the ordinary radio cabinet, used with a good loud speaker and amplifier which may go down to as low as 30 cycles if of unusually high quality, the bass notes such a system is called upon to reproduce will load up the amplifier and loud speaker, even though they are not heard as sound at their fundamental tones. They are not heard because of the inability of the small baffle to properly load the loud speaker cone, which results in its overload, or excessive excursions of the speaker cone even though the small baffle does not permit it to do any useful work at these low fundamental frequencies. This results in the strengthening (through distortion) of the harmonics of the low notes, and these are what the listener hears and has had to be satisfied with in place of fundamental bass notes every reproducer has lost.

The "bass reflex" principle properly loading the speaker cone at low frequencies, actually reproduces such low frequencies, and completely eliminates the usual excessively strong harmonies and their distortion. This results in a "cleaning up" of reproduced sound that is as startling in itself as is the new and at last natural concept of full range bass reproduction completely free of "boominess" which the cabinets illustrated now provide for the first time, bringing as they do to sound reproduction full, deep and round bass without customary "boominess" and barrel-like tone. Speech is as clear as music—full, complete, and without distorting emphasis employed to synthetically simulate previously missing bass tones.



The tremendous improvement in musical perfection which the principles herein described for the first time bring to radio reception is graphically shown by these curves. The dotted line shows the commercially unusually excellent response range of the Masterpiece V in its open backed Clifton, Oxford, Bristol or Norwich consoles. The solid line, run upon these same consoles after acoustic treatment, tells the story of the final attainment that radio and sound engineers have been working for ever since broadcasting began, and which Jensen-Silver engineering finally makes possible.

The response curves herewith are for the CLIFTON, OXFORD, BRISTOL and NORWICH consoles. The dotted line shows the antenna to ear frequency response of the regular consoles with their open backs 2½" away from a wall. The tremendous improvement resulting from the acoustic treatment giving them the benefits of the "bass reflex" and "peri-dynamic" principles are shown by the solid line-tone quality never before obtainable from any radio—and tone today obtainable *only* from the MASTERPIECE V in one of these beautiful and now acoustically perfect consoles. Any one of them will bring to its user two or three octaves of deep, vibrant bass tones, between 30 and 130 to 180 cycles which he has never heard through any radio before. As such they are a most remarkable and beautifully simple contribution to the art of sound reproduction.

EVIDENCE

Further evidence of the superiority of the MASTERPIECE radios in use all over the world by every type of user from individuals to governments (Federal Communication Commission, for example) and engineering universities is hardly necessary, so widespread is their reputation.

Besides the many comments of owners published in every issue of the TIMES, unmatched "evidence" of their daily performance all over the world is published monthly in the FORUM, a free reception service to owners. If you want evidence, fresh from satisfied owners, and none of it old or out of date, we will be glad to mail you a copy of the FORUM. It is most convincing evidence of the wisdom of buying only the finest radio—the MASTERPIECE V.

A MASTERPIECE V AND CASH JUST FOR A NAME

The sound reproducing development described for the first time in this TIMES is so new and revolutionary that we can't think of a name to describe it.

So we are offering as first prize a MASTERPIECE V complete with acoustically treated CLIFTON console, $50.00 as a second prize, $25.00 as a third, $15.00 as a fourth and $10.00 as a fifth prize for names for it. Anyone except our employees is qualified to submit names, ties will each receive equal prizes, and decisions of the judges will be final. Judges are Lieut. Commander R. H. G. Mathews, co-founder of Zenith Radio Corporation and Central Division Director of the Amateur Radio Relay League, and McMurdo Silver.

In attempting to choose a name, don't start with "infinite baffle" for this development does *more* than an infinite baffle through *adding* previously wasted bass rear radiation to front radiation, and don't select "super infinite baffle", for while this is fairly descriptive, this new reproducer is not truly a baffle, which does not *add* front and back sound radiation for greater efficiency, but only kills and so loses the benefits of the back radiation which this new reproducer for the first time uses.

We've already thought of these two names, and want better ones, so put on your thinking cap and win a prize—it ought to be easy for you, for you're not so close to the forest that you can only see the trees, as are we who have worked day and night on the perfection of this revolutionary reproducer.

The cash prizes are waiting, the MASTERPIECE V will be custom-built for the winner, so mail your names to the editor of the TIMES. The contest closes midnight of March 31st.