

comes into action and prevents the succeeding audio peaks from reaching a level that is high enough to operate the peak-limiters. Thus, the distortion that would be caused by the limiters alone is eliminated, while there is still no possibility of overmodulation.

### CHANGING THE DELAY VOLTAGE

Although the delay voltage has been shown fixed, there is no reason why individual constructors cannot make the delay variable by substituting for the 10k. resistor in the cathode circuit of the EB34 a potentiometer of, say, 100k., used as a rheostat. The control could then be brought out to the front panel of the speech amplifier, or else made pre-set after the best setting has been found.

### HOW TO CONNECT THE COMPRESSOR

Since the EF39 controlled stage has high gain, the compressor circuit can be used to replace the existing pre-amplifier stage, where a low-level microphone is used. In this case, output would be taken from the plate circuit of the EF39. An extra coupling condenser need not be used, as the grid of the following

audio stage can simply be connected directly to that of the EF37, if the circuit of Fig. 1 is being used. If the circuit used is that of Fig. 2, the grid of the next stage can be connected to the top of the voltage divider in the EF37 grid circuit, as in this case, the latter tube is fed with only a portion of the total output of the EF39. It will be noted that on both circuit diagrams no output terminal has been indicated. This is because the output can be taken either from the EF39 or from the EF37, according to requirements. If the extra gain of the EF37 is desirable in the whole audio chain, its gain may be made use of. If not, output can be taken from the EF39, as suggested above. In either case, the compression characteristics will not be affected, since there is no gain control on the EF37. Which course is followed is merely a matter of convenience.

### PREVENTION OF OVERLOADING

If a low-level microphone is used, there will be no possibility of overloading the EF39 controlled stage. Consequently, an input potentiometer need not be provided at the grid of this tube. However, if a high-

## BEACON TECHNICAL TOPICS

### High Quality Audio Transformers



Where large power necessitates a number of similar speakers being employed, the best solution, and the one most frequently used, is to design the output transformer to suit the combined parallel impedance of all the speakers. For example, if there are four 15-ohm speakers in use, the secondary would be wound for 3.75 ohms.

In this case, when using fewer speakers, a 15-ohm resistance of suitable wattage rating should be switched in, to replace each speaker removed. The advantages of this scheme are:—

- (a) Constant load is maintained on the tubes;
- (b) The full amplifier output can never be accidentally fed into one speaker, thus ruining the suspension;
- (c) Each speaker receives constant power;
- (d) When fewer than the maximum number of speakers is used, the load phase angle is improved due to the added resistance. This lowers the distortion due to the speaker load being a reactive one. (See *Radiotronics*, No. 124, page 25.)

Whenever possible, the use of two transformers in cascade, such as plate-to-line and line-to-voice coil, should be avoided. This causes an additional power loss and unless the two transformers are both of very high quality, distortion will increase noticeably and the frequent response will fall off appreciably. It will become exceedingly difficult to achieve stability with an inverse feedback loop that includes both transformers due to the decrease in shunt inductance, and the increase in leakage inductance.

To meet the demand for output transformers possessing a wide frequency range with low distortion Beacon has produced the following standard line in three power ratings to meet all normal requirements. These are for use with push-pull triode amplifiers either with or without feedback and have a 15-ohm secondary. They are not supplied as general purpose multi-match units, another series being available to meet this need. Tetrodes and pentodes are not recommended where the highest quality performance from an amplifier is required. Information on loud-speaker dividing networks for use with these transformers will be presented next month.

Load Transformer				Load Transformer				Load Transformer			
P.P. Tubes as Triodes	Resistance Ohms	Rating Watts	No. Cat.	P.P. Tubes as Triodes	Resistance Ohms	Rating Watts	No. Cat.	P.P. Tubes as Triodes	Resistance Ohms	Rating Watts	No. Cat.
PX4	3,000	10	48 S 01	PX4 & EL37	4,000	15	48 S 04	EL37	4,000	20	48 S 08
2A3	5,000	10	48 S 02	PX25	5,000	15	48 S 05	DA30	9,000	20	48 S 07
2A3	3,000	15	48 S 03	KT66 & 807	10,000	15	48 S 06	PX25	10,000	20	48 S 09

IAN C. HANSEN.

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**SOA and XOA.—A.C. Oscillators.**

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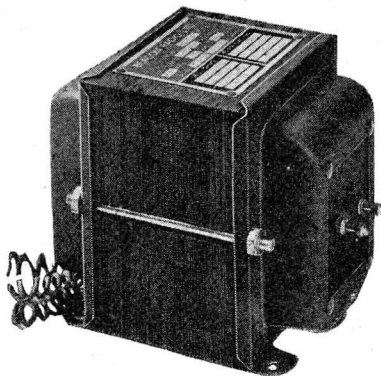
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## Good Speakers Need Good TRANSFORMERS



Performance figures show that Beacon Output Transformers give superior results.

Characteristics of a typical Beacon Transformer (Cat. No. 48S06) designed to suit the *Radiotronics* A515 807 Amplifier compare more than favourably with the overseas specifications.

When tested in an identical 807 amplifier, this outstanding transformer had a flat response from below 10 cycles to above 20 kilocycles, and proved capable of handling full power output at 20 cycles with less than 1 per cent. distortion. Secondary impedances are tapped for 1, 4, 9, and 16 ohms.

### Measured Beacon Performance

125 Henries—Primary Induct.  
10 mH.—Leakage Induct.  
270 ohms—Primary Resis.

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time-keeping, leading up to a description of the molecular clock. Although the quartz crystal clock history goes to only as far back as 1940, stable oscillators had been in use many years before it was realized they could be used as time-keepers. It will come as a surprise to many to know that the crystal oscillator has only recently exceeded in accuracy the pendulum clocks used as time standards by the astronomers.

The results of the election of officers for the ensuing year conducted at the annual general meeting of the Wellington branch are as under:

*Chairman:* W. D. Foster.

*Vice-Chairman:* L. W. Hurrell.

*Secretary:* R. G. Currie.

*Treasurer:* J. D. McCormick.

*Management Committee:* The above officers, D. L. Rushworth and J. P. Senior.

Our new meeting room has been found to be most satisfactory and for the benefit of those who do not know its location: Conference Room, Air Department Building, Bunny Street, Wellington.

#### Dunedin Branch:

At the annual meeting of the Dunedin branch the following officers were elected for the ensuing year:

*Chairman:* W. L. Shiel.

*Vice Chairman:* H. F. Symonds.

*Councillors:* W. L. Shiel, H. F. Symonds.

*Secretary-Treasurer:* W. A. McInnes.

*Committee:* E. Anderson, W. Collett, J. Coombs.

*Social Committee:* J. Stone, T. G. R. McGregor, L. W. Clarke.

#### Christchurch Branch:

At the annual meeting of the Christchurch branch the following officers were elected for the ensuing year:

*Chairman:* Mr. Withers.

*Vice-Chairman:* T. R. Pollard.

*Treasurer:* Mr. Lee.

*Secretary:* A. V. Butcher.

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# Beacon Technical Topics No. 25



## HIGH FIDELITY OUTPUT TRANSFORMERS

The BEACON line of super-quality output transformers possesses true high-fidelity characteristics. Minimum distortion and a flat frequency response are provided over the entire audio frequency spectrum. Feedback may be taken from the secondary winding, the transformers being particularly suited for use with the "Williamson" Amplifier.

The same style of winding is available on Radio Metal, Super Silcor, or Silicon Steel cores. Transformers with Super Silcor or Silicon Steel cores have not quite as good a low-frequency response as those with Radio Metal cores, but give the same outstanding performance at high frequencies. The primary is wound in equal sections and is balanced electrically and physically. The secondary consists of four windings that may be placed in series or parallel or a combination of the two modes of connection to give output impedances of 1, 4, 9, or 16 ohms.

The transformers may be used with push-pull triodes or with push-pull pentodes or beam tetrodes.

When used in amplifiers operating under class AB conditions, the transformers give excellent performance with or without feedback. No breaking-up of frequencies in the upper audio register occurs. This is in great contrast to the performance of some so-called high-fidelity transformers at present on the market.

BEACON high-fidelity transformers such as the Cat. No. 48 S 02, 5000 ohms plate-to-plate, and Cat. No. 48 S 06, 10,000 ohms plate-to-plate, are designed for use with push-pull Class A triodes, but if you wish to use them with push-pull pentodes or beam power valves, do so by all means. We are sure that you will have every reason to be pleased with the result. Of course, we do not expect that a 15-watt transformer will be required to deliver more than, say, 20 watts to the load, otherwise distortion may be introduced.

*If required, special output transformers are made to order.*

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# LABORATORY NOTES

from

## BEACON RADIO LIMITED

### ULTRALINEAR OUTPUT TRANSFORMER

Considerable interest has recently been taken in the American ultralinear version of the famous Williamson amplifier. A reduction in distortion and a considerable increase in power output over that of the Williamson amplifier has been claimed by the originators of the circuit. As in the Williamson amplifier, a major part is played by the design and construction of the output transformer. BEACON make a transformer rated at 30 watts which will work well when used in an ultralinear circuit. Screen taps are available so that pushpull KT66 valves,

or similar types, may be used as pentodes with a sharing of load between screens and plates. The frequency response over the audio frequency band is excellent. We recommend this transformer for use in amplifiers where greater power output than that obtainable from the normal Williamson amplifier is required.

Cat. No. 53 S 66, 30-watt ultralinear output transformer

6,600 ohms P to P to 1-4-9-16 ohms



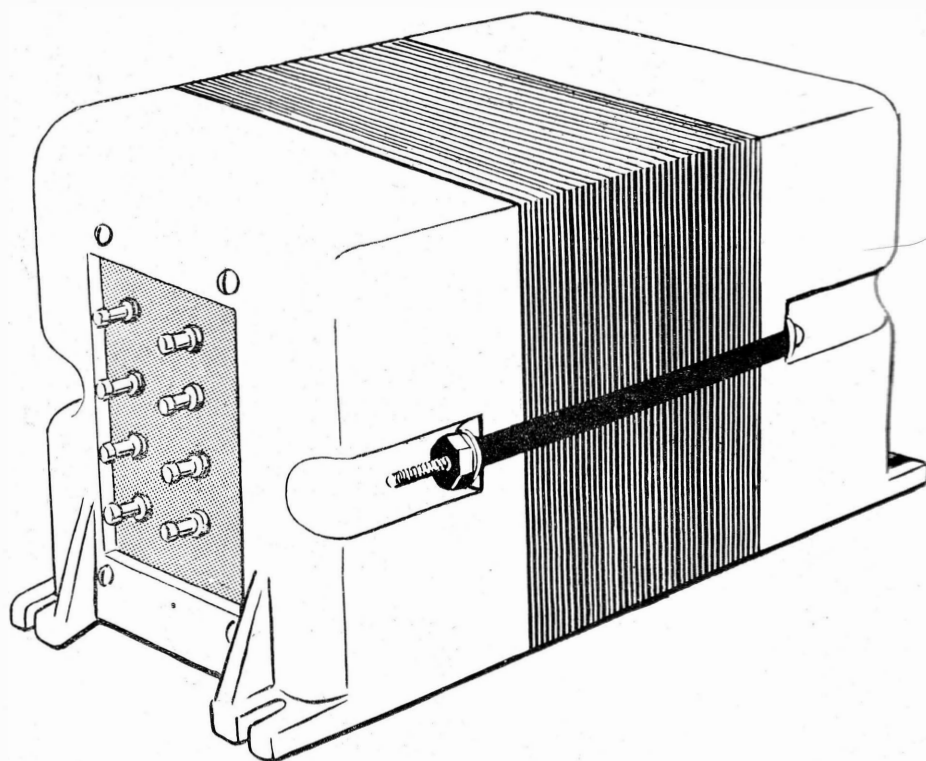
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# ULTRALINEAR Output TRANSFORMERS



Considerable interest has recently been taken in the American ultralinear version of the famous Williamson Amplifier. A reduction in distortion and an increase in power output over that of the Williamson Amplifier has been claimed by the originators of the circuit. As in the Williamson Amplifier, a major part is played by the design and construction of the output transformer. BEACON makes a transformer rated at 30 watts which will work well when used in an ultralinear circuit. Screen taps are available so that push-pull KT66 valves, or similar types, may be used as pentodes with a sharing of load between screens and plates. The frequency response over the audio frequency band is excellent. We recommend this transformer for use in amplifiers where greater power output than that obtainable from the normal Williamson Amplifier is required. Cat. No. 53S66, 30-watt ultralinear output transformer, 6,600 ohms P to P to 1.4-9-16 ohms.

## PHYSICAL DIMENSIONS

Width	Length	Height
3 $\frac{3}{4}$ in.	7 in.	4 $\frac{5}{8}$ in.

Mounting Centres	Weight
6 $\frac{3}{8}$ in. x 3 in.	12 lb.

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