Construction Continued

A NEW B ELIMINATOR

THE new RCA "B" eliminator is a decided improvement over all previous types in that it meets the popular demand for one which will operate with a minimum of attention and maintenance expense. The unusual features of the new RCA "B" eliminator are to be summarised as follows: The operating mechanism is enclosed and sealed in permanent steel containers. No acid or liquids to be replenished. No mechanical parts or tubes to be replaced.

Its compactness is shown by the dimensions—Height 6¼in., width 7¾in., length 10¾in. The small size makes it particularly convenient for installation in radio cabinets.

Once connected to a power main and the radio set the RCA "B" eliminator will need no further care or attention.

A device employing the same type of rectifying unit as that used in the RCA "B" eliminator has been tested in the RCA technical and test department for 4600 hours continuous operation, or approximately four years of ordinary use in the home. During that time the device required no adjustment or replacement and the voltage and current output remained constant.

Under average load the eliminator draws only 22 watts from the mains, and supplies sufficient current for any type of receiver up to eight valves. The voltages available are as follow:—

2 milliamperes from the 45 volt terminal.
15 milliamperes from the 67 or 90 volt terminal.
15 milliamperes from the 135 volt terminal.

For all practical purposes in the average home the loudspeaker volume of a UX-171 or UX 171-A radiotron when used with a plate voltage of 135 volts will give the same satisfactory results as are obtainable when the maximum allowable potential of 180 volts is applied. Furthermore, at the lower plate voltage the life of the radiotron is prolonged.

The above information is given to correct the popular belief that radio sets using UX-171 or UX 171-A radiotrons in the second audio stage will not give a completely satisfactory performance unless the maximum allowable plate voltage is used.

WOOD STAINS

THE following recipes for stains will be useful to those who construct their own cabinets:—

Oak.—Dissolve ½oz. of permanganate of potash in ½ pint of rainwater. Two or three applications may be needed.

Mahogany.—Dissolve ½oz. of Bismarck brown in ½ pint of methylated spirit.

Walnut.—Dissolve a handful of common washing soda in a quart of water, adding brown umber until the desired colour is obtained.

Black.—Dissolve ½oz. of black aniline dye in ½ pint of methylated spirit.

NEW GRAMOPHONE PICK-UP

THE Amalgamated Wireless Co. has just landed an initial shipment of a gramophone pick-up of extraordinarily high quality. This accessory, manufactured by the General Electric Co. of America, should appeal to those in search of a really high-grade instrument.

GRID BIAS WITHOUT A BATTERY

HOW IT IS OBTAINED

WHERE the required grid bias is not high, it may sometimes be obtained by utilising the "drop" in voltage of the A battery across the filament resistance. For the purpose of illustration we will assume that the usual six-volt A battery is in use. Reference to Fig. 1 shows that the filament rheostat is placed in the positive filament lead, and that there is no negative bias on the grid. In Fig. 2, with a five-volt filament in the circuit and the resistance in the negative lead, we get a negative bias on the grid of 1 volt, which is the voltage drop, or difference between the voltage of the battery and the voltage required by the filament.

In Fig 3 we have the same circuit as in the previous one, except that a 4½-volt grid bias battery has been added. Then the negative bias is the drop of one volt plus the battery voltage, which gives a total of 5½ volts negative on the grid.

IF the resistance is in the positive lead and the grid return connected to the positive A terminal of the battery as in Fig. 4, a positive grid bias of 6 volts is obtained, and if the grid return is connected to the other end of the resistance, then the volt dropped across the resistance is cut out, and the grid bias is then equal to the voltage drop in the filament, or 5 volts positive.

Figure 5 shows how a potentiometer may be connected in order to give a variable bias from 1 volt negative in the left-hand position to 5 volts positive in the extreme right-hand position.

When working with valves requiring four volts or less, still using a six-volt battery, higher values of negative grid bias can be obtained on account of the larger amount of resistance utilised and the consequent greater drop across it.

Tracking Distortion.

A MILLIAMMETER connected in the plate circuit of the last valve is of great help when adjusting the grid bias and anode voltage. Tune the set to receive signals of normal strength, and notice whether the needle of the milliammeter moves. If it kicks upwards the grid of the valve has too large a negative bias, and the valve is rectifying because of the curvature of the lower part of the characteristic.

Reset the grid bias an again watch the needle of the milliammeter. If it kicks downwards there is insufficient grid bias; probably grid current is flowing.

When the needle appears to move above and below its normal reading the valve is being overloaded, and the input should be reduced. It will be noticed that the effect of low notes is to cause the needle of the milliammeter to move violently, whereas notes of higher frequency, and of apparently equal strength, do not affect the milliameter. It is assumed, of course, that the earlier valves of the receiver are not distorting; this is almost invariably the case.

The UX222 Valve.

The new valve at least offers an escape from the bug-bear of plate-to-grid capacity inside the valve, and for this important reason we get very large gains per stage of R.F. amplification, freedom from the necessity of neutralising, large gains per stage of A.F. amplification, and the ability to amplify successfully at wave-lengths as low as 3 metres. "Radio Broadcast" considers that this valve is as yet only in its experimental stage, and that a good amount of trial and adjustment is necessary to get an amplifier to function satisfactorily. Results have already shown that the trouble is well repaid.

Power Tubes.

For an increase from the 112 power-valve, when only moderate plate voltages are available (not in excess of 200 volts), a 171 is capable of giving greater output than can be obtained from a 210 under similar conditions of plate voltage.

(End of construction).

CRYSTAL CONTROL

ABSOLUTELY CONSTANT VOLTAGE & TEMPERATURE NECESSARY

The successful operation of crystal-control at a broadcast station is not such an easy matters as some people suppose, according to the New York "Radio Broadcast." The object of crystal-control is to prevent a broadcast station from swinging off its allotted wavelength while transmitting, a not uncommon trouble in this quarter of the globe.

The zero-beat method, employing crystal control oscillators, is now widely used (writes Edgar H. Felix in the "Radio Broadcast"). The station operator wears a headphone through which courses the output of the crystal oscillator and also the station's radiated carrier frequency. The frequency of the station is adjusted until the two are in exact synchronism so that no heterodyne whistle is heard.

In preparing to write this article, t author maintained a broadcasting station on its frequency by the zero-beat method for several programmes. When utilizing a crystal oscillator, installed at the station, the comparison signal is constant and powerful. The amount of skill required and the cost of maintainance of the equipment needed are within the reach of any broadcasting station.

Trouble Can Be Cured.

Independent crystal control, however, has been described as too inaccurate and too unstable to permit the perfect synchronization of two carriers. (This refers to the plan proposed in America by which two stations broadcasting the same programme by the "chain" method may use exactly the same wavelength.—Editor, "Radio Record.") As a matter of fact, there is no inherent fault in the crystal oscillator which cannot be corrected. What are needed are perfected means of supplying crystal oscillators with absolutely constant voltages and means of maintaining the crystal as an absolutely constant temperature.

A change of one degree centigrade varies the frequency of a crystal oscillator by sixty to a hundred cycles. The crystal oscillator is usually installed in a penthouse on the roof of a building where the transmitter is installed. Heat supply is often uncertain in such exposed locations and temperature variations of twenty degrees, during operating hours, are not uncommon. Such a change is sufficient to cause a 2000-cycle variation in the frequency of a crystal oscillator.

Inefficient Crystals.

Crystals have been submitted to laboratories by broadcasting station owners with a view to finding out why they do not hold the station to its assigned frequency. Among these are ordinary quartz lenses, crudely scratched and insecurely mounted in contacting clamps. These worse-than-useless crystals have been sold to broadcasting stations with the expectation that they will stabilize carrier frequencies. The fact that a station uses a crystal control is no guarantee whatever that it will remain accurately on its frequency any more than providing an aviator with a compass assures that he will arrive safely at a distant destination.

Accurate Control Necessary.

Proponents of the crystal oscillator method have sometimes proved their case by setting up two such oscillators in the laboratory, both using a slab from the same quartz crystal. Such demonstrations, however, prove nothing, because both oscillators are then working under exactly the same conditions. When one of the oscillators is shipped to a distant station to control its carrier, varying temperature conditions cause sufficient deviation to produce annoying heterodynes. With equipment now commercially available, the crystal oscillator does not possess sufficient stability to eliminate the heterodyne whistle between two stations operating on the same channel. Nevertheless, development of precision oscillators, with accurate temperature control, is a most promising line of research.

4QG, BRISBANE

BACK TO THE FOLD.

FOR over a year the Queensland Government broadcast station, 4QG, Brisbane, has been received in New Zealand with so much distortion that it has been not worth listening to for more than a few minutes each evening. Lately, however, the Brisbane station has cleared its voice, and is now coming in with splendid clarity and volume. The other night, after broadcasting hours in Brisbane, a Wellington listener heard 4QG carrying out modulation tests with a distant listener who was to telegraph the results to the station. Gramophone items were run for about an hour.

IT is estimated that for the year ending March next the British Broadcasting Corporation's gross income, apart from the results of any investments they may have made, will be about £880,000.

AUCKLAND DIRECTORY

What to Buy and Where

ATWATER-KENT RADIO ..	Frank Wiseman, Ltd. 170-172 Queen Street.
ALTONA & HAMMARLUND-ROBERTS SETS.	Johns, Ltd. Chancery Street.
AMPLION LOUDSPEAKERS .	All Radio Dealers.
BREMER-TULLY RADIO	Superadio, Ltd., 147 Queen Street.
BURGESS RADIO BATTERIES,	All Radio Dealers.
CE-CO VALVES	All Radio Dealers.
FADA RADIO	Radio Supplies, 251 Symonds Street.
FEDERAL, MOHAWK, GLOBE	Federal Radio House, 8 Darby Street.
GAROD, CROSLEY, RADIO AND ACCESSORIES	The Hector Jones Electrical Co. King and Queen Streets, Hastings.
GILFILLAN AND KELLOGG..	Harrington's, Ltd., 138-140 Queen Street.
GREBE RADIO	Howie's, Dilworth Building., Custom St. E.
MARCONI ECONOMY VALVES	All Radio Dealers.
MULLARD VALVES	All Radio Dealers.
RADIOLA RECEIVERS	Farmers' Trading Co., Ltd., Hobson Street.
RADIOTRON VALVES	All Radio Dealers.
RELIANCE BATTERIES .... N.Z. Made.	Reliance Battery Mfg. Co., Ltd., 96 Albert Street.
PHILIPS VALVES AND APPARATUS	All Good Radio Dealers,

IS YOUR VALVE HOWLING?

A SIMPLE TEST.

It is possible for a radio set to oscillate without it making this condition known to its owner by means of howls or squeals, as an oscillating set often only squeals or whistles or chirps when its tuning dial is being adjusted.

If the tuning dial is not adjusted whilst it is oscillating it is quite possible that there will be no chirp, whistle, etc., but nevertheless the owner should be able to tell whether it is oscillating, because the quality is generally decidedly poor, speech inevitably being indistinct, and the music being rather harsh.

On the other hand, it is quite possible for a set which is not oscillating to have a marked effect upon a neighbour's receiver if the two aerials happen to run very close to one another. Even sets which cannot possibly oscillate, such as crystal sets, can have a marked effect upon one another in this way, owing to interaction across the space between the two aerials.

The only remedy is to increase this space as far as possible. In other words, to separate the two aerials, not merely getting them the greatest distance apart but, if possible, making one cross underneath or above the other, and run at an angle to it instead of running parallel with it. If the aerials must run in the same direction, i.e., perhaps both north and south, it will be advantageous to have one aerial pretty high and the other pretty low, so that the distance between them is at a maximum.

If you have a friend who has had a little experience in wireless, he can easily tell you whether your set is oscillating or not from a brief inspection of it, or you can made a rough-and-ready test for yourself by wetting your finger and tapping the aerial terminal with it when the set is in action.

If, then, you can hear very loud clicks corresponding in the telephones or loudspeaker, it is probable that you are using a little too much reaction and either oscillating or getting very near to it; but if the tapping is inaudible, or only just audible, you can be pretty sure that your set is not oscillating and is not causing interference with neighbouring listeners.

THE British Postmaster-General, in a written Parliamentary reply reported recently that the number of persons prosecuted during the twelve months ended January 31 last, for the use of wireless receiving apparatus without a license was 1046. Convictions were obtained in 1043 cases, the remaining three being dismissed.