

FM/AM Tuner

Eddystone Model 820 Embodying a Foster-Seeley Discriminator

Met dank aan John Koster



The large scale window with controls below characterizes the Model 820 f.m./a.m. tuner as an Eddystone product.

WITH so many f.m. tuner units and receivers having almost standardized circuitry it is refreshing to encounter one that is in any way different. The Eddystone Model 820 tuner can perhaps claim this distinction on two counts. In the first case it has a Foster-Seeley discriminator, and secondly it provides the choice of two pre-selected stations in the medium waveband and one in the long. A further distinction is that provision is made also for feeding-in a gramophone output, although there is no actual audio amplification provided.

All three forms of entertainment, f.m. and a.m. broadcasting and records are selected by a single five-position switch.

The tuner has exceptionally high sensitivity and is capable of giving a very satisfactory performance outside the normal service area of a v.h.f. broadcast station.

Following accepted practice the "820" has an r.f. amplifier and all the three associated r.f. circuits, aerial, inter-valve coupling and oscillator, are tuned by a tiny three-gang capacitor designed especially for this unit. It is fitted with a single glass ball-bearing at the rear end of the rotor shaft and this novel innovation has been adopted in order to eliminate loop couplings in the capacitor.

The r.f. valve, (V1), is a 6AM6 r.f. pentode choke-capacitance coupled to the tuned intervalve circuit and followed by a double-triode 12AT7, (V2), functioning as mixer and local oscillator for f.m. reception. The i.f. output from the mixer, which is at

10.7 Mc/s, is fed *via* the f.m./a.m. switch to the grid of the hexode section in an ECH42, (V3), normal frequency changer. For f.m. reception this section functions as the first i.f. amplifier and its accompanying triode is inoperative.

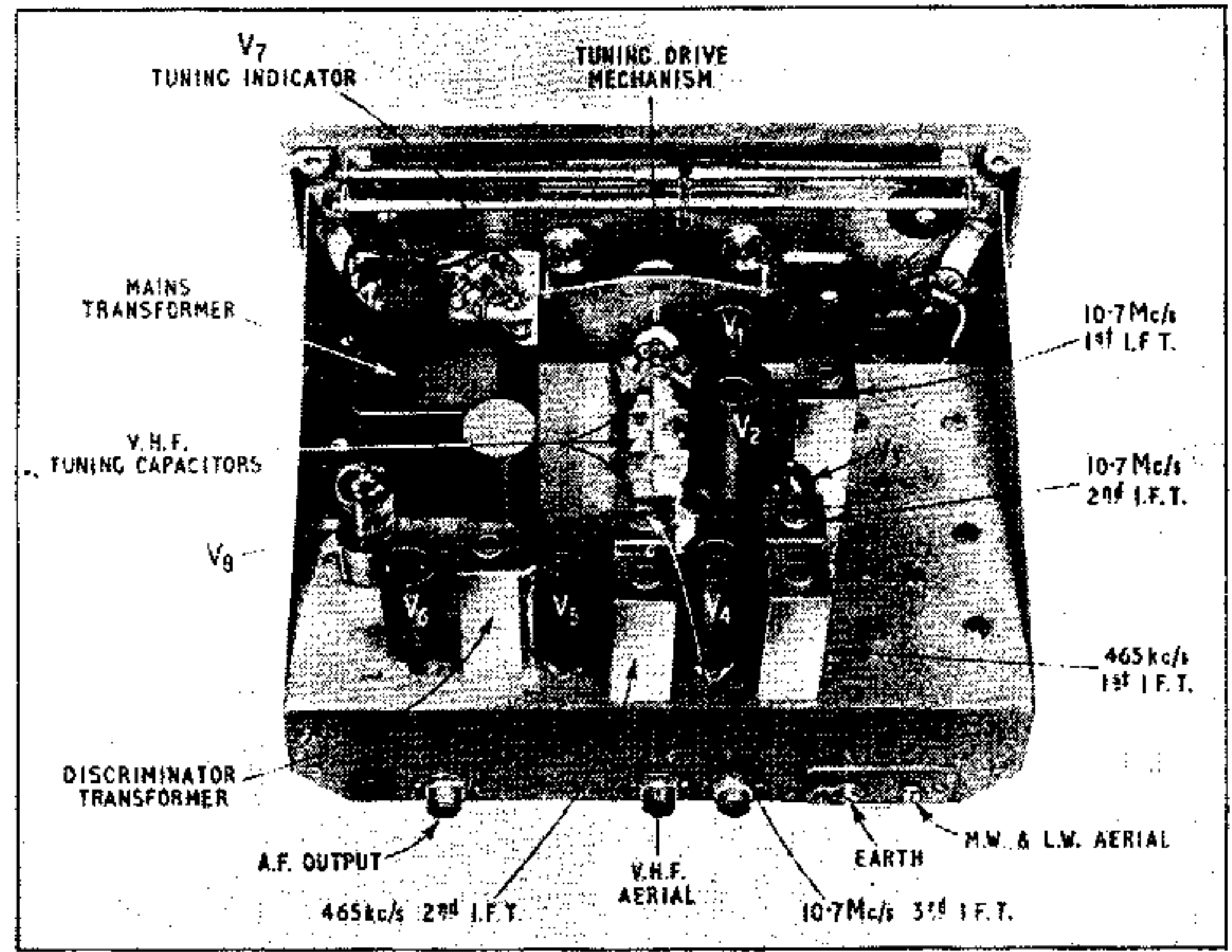
For a.m. reception the hexode section of the ECH42 becomes the mixer with its triode functioning in the usual way as a local oscillator. For this condition of operation an i.f. of 465 kc/s is employed. I.F. transformers of 10.7 Mc/s and 465 kc/s are connected in series in the anode circuit and automatically select, without switching, the correct i.f. signal according to the mode of operation, e.g., as first i.f. at 10.7 Mc/s or mixer at 465 kc/s. Following the ECH42 is another 6AM6, (V4), functioning as second i.f. on 10.7 Mc/s or first i.f. on 465 kc/s as required.

The 10.7-Mc/s signal passes from V4 to another 6AM6, (V5), which is operated at relatively low anode and screen voltages, and behaves as a limiter. Under working conditions the limiter stage has quite an appreciable amount of grid bias derived from a 0.27-MΩ grid resistor. This negative d.c. voltage is used also to operate an EM80 magic-eye tuning indicator, (V7), on f.m. and supplies an a.g.c. voltage to the input grids of V3 and V4.

The 10.7-Mc/s discriminator transformer is in the anode circuit of the limiter, (V5), and is followed by a double diode 6AL5, (V6), arranged as a typical Foster-Seeley discriminator, its a.f. output going *via* a de-emphasis network and f.m./a.m. switch to an output volume control.

For a.m. reception the i.f. signal stops short at the anode of the 6AM6, (V4), following the ECH42, (V3), and is there rectified by a crystal diode and the audio output taken, *via* the f.m./a.m. switch to the aforementioned output volume control. The d.c. voltage derived from the

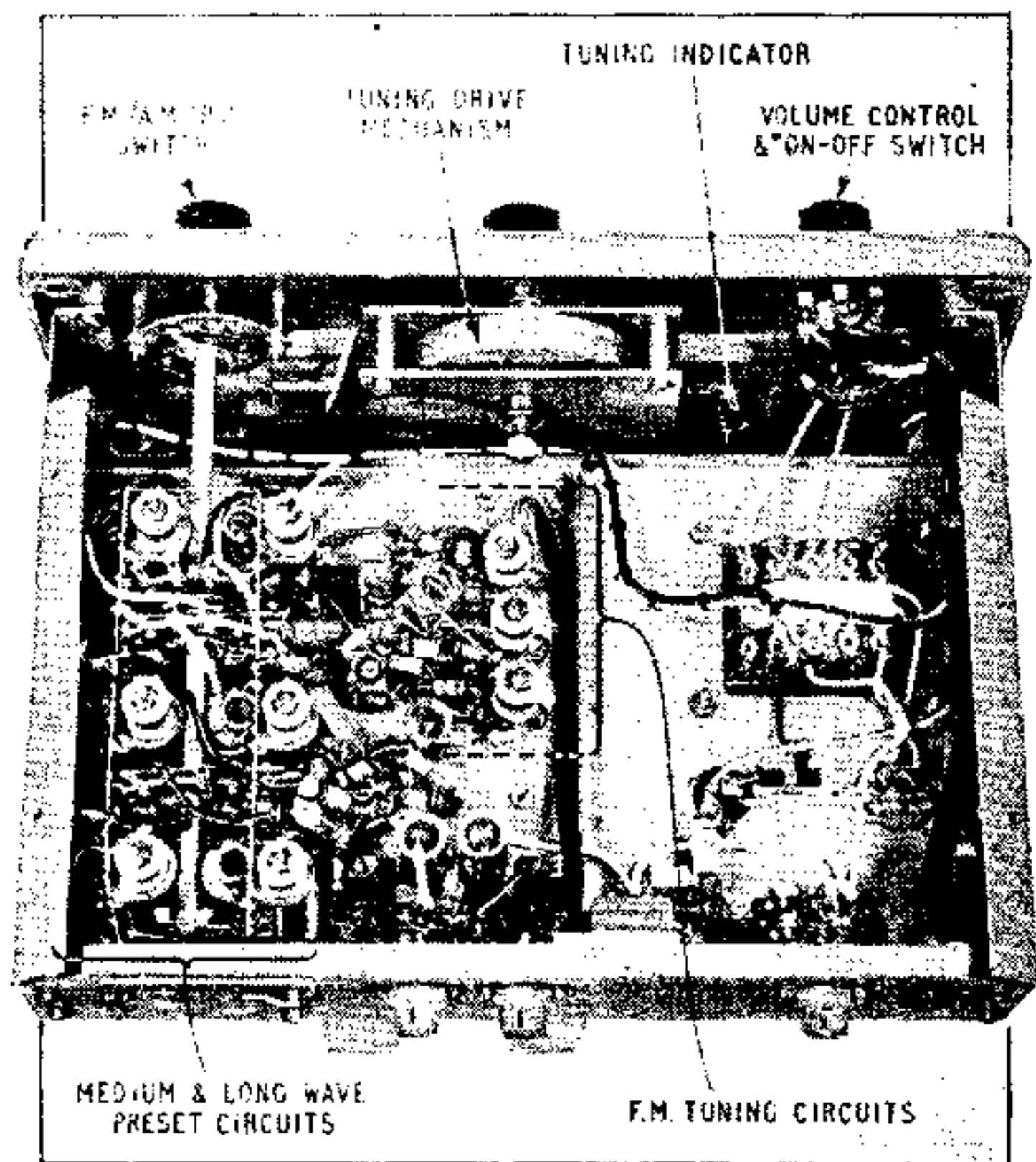
Viewed from the back the positions of the valves, i.f. and mains transformers are clearly seen. Also seen is the tuning mechanism.



crystal current is used for a.g.c. This a.m. grid-bias (or a.g.c. voltage) is not applied to the tuning indicator which is not operative on the pre-set a.m. stations.

The tuner has its own a.c. power supply unit and this comprises a double-wound mains transformer, an EZ41 full-wave h.t. rectifier, (V8), a 500-ohm smoothing resistor and two 32- μ F smoothing capacitors.

A coaxial socket is provided at the back of the unit for a 70-ohm feeder from the v.h.f. aerial and a screw terminal for a random-length aerial for a.m. reception. Two other coaxial sockets are included at the back; one is the a.f. output, the other is for a gramophone input. There is also an earth terminal.



The chassis has a metal base plate which when removed gives access to the tuning circuits, small components and wiring.

In view of the potential high sensitivity of the tuner, tests were carried out at some distance from Wrotham and in a rather poor location from the point of v.h.f. reception on the south coast. As the tuner was designed in Birmingham and reputed to put up a good performance there it was felt this would be a good way of testing its merits.

A further handicap was imposed by using a loft aerial, since no other of the right type was available at the time. It was a single dipole and the direct "line-of-sight" to Wrotham was interrupted by high ground up to 600 to 700ft about 3 miles away. The receiving aerial was just under 200ft above sea level.

The tuner put up a most satisfactory performance, signals being strong enough to give good limiting and entirely suppress the background and all but the most severe interference from passing motor cars.

Aircraft flying in the vicinity of the receiving site are a great nuisance on the v.h.f. bands and while the "820" put up a stout effort in resisting the greater part of the signal flutter they produced it could not cope with the worst kind. So severe can this be at times that it is doubtful if any f.m. receiver would cope with it under all conditions; however, it is possible a better aerial would make a great deal of dif-

ference. Provided the signal is maintained above the limiting level the audio output remains quite steady, despite quite violent "throbbing" of the magic-eye.

Used with a good amplifier and loudspeaker there is a crispness in the reproduction that is rarely possible on other bands owing to the necessity to restrict the receiver's bandwidth in order to keep out interference from stations on nearby wavelengths. Apart from this the most impressive thing about the reception, especially to anyone continuously plagued by whistles, "monkey chatter," and crackles of many kinds, that prevail almost anywhere south of London in the U.K., is the delightfully quiet background.

First impressions may be that not enough de-emphasis is provided, but this will generally prove groundless as greater familiarity is gained with f.m. reception. However, a little tone-correction can generally be applied in the audio amplifier if thought desirable.

The tuning control is delightfully smooth and free of backlash and the "sponginess" sometimes associated with cord drives. Actually the cord drive in the "820" tuner operates the pointer only and the gang capacitor is driven through a combination of spring-loaded gears and friction discs giving an overall reduction of about 76 to 1. A heavy flywheel smooths out any little irregularities in the system.

The tuning scale is just over 6in long and is traversed by a long pendant pointer. It is directly calibrated and covers 85 to 101 Mc/s with points at every megacycle and figures every 5 Mc/s. Viewing is made easy by employing white for figure markings and the pointer and a chocolate-coloured background. The tuning indicator is viewed through a cut-out in the background plate and is enclosed by the scale window. This measures $8\frac{1}{2} \times 2\frac{3}{8}$ in and takes up the whole of the top half of the front panel. The three controls: AM/FM/PU switch, tuning and volume/on-off, in this order from left to right, are spaced out equidistant below.

The a.m. side of the tuner has been rather ignored so far, but it is well up to the performance of a mixer-i.f.-detector combination. In the MW1 position of the switch any station between 960 and 1,550 kc/s can be set up and in MW2 position the range is 610 to 960 kc/s. The range on long waves is 150 to 250 kc/s.

Since the f.m. side provides the three main programmes, Light, Home and Third, the stations set up on the pre-tuned circuits could with advantage be a regional which sometimes has a programme of local interest, or one's favourite Continental stations.

The tuner is supplied in chassis form as illustrated and measures $11 \times 6\frac{1}{4} \times 8\frac{1}{4}$ in. The front is a sturdy light-alloy casting and forms a rigid support for the chassis which is braced by side members giving good mechanical rigidity; this rigidity is essential for good frequency stability. High praise can be given to the "820" tuner in this respect as the drift from cold to working temperature is comparatively small for v.h.f. equipment, while the long-term stability is very good indeed. After any initial correction has been made—and this is only necessary if the station is tuned-in immediately the set is switched on—no further attention is needed unless one wants another programme.

The tuner is supplied with all necessary fixing screws, coaxial sockets and trimming tools, and the price is £28 10s, plus £9 10s U.K. purchase tax.

The makers are Stratton and Co., Ltd., Eddystone Works, Alvechurch Road, West Heath, Birmingham, 31.