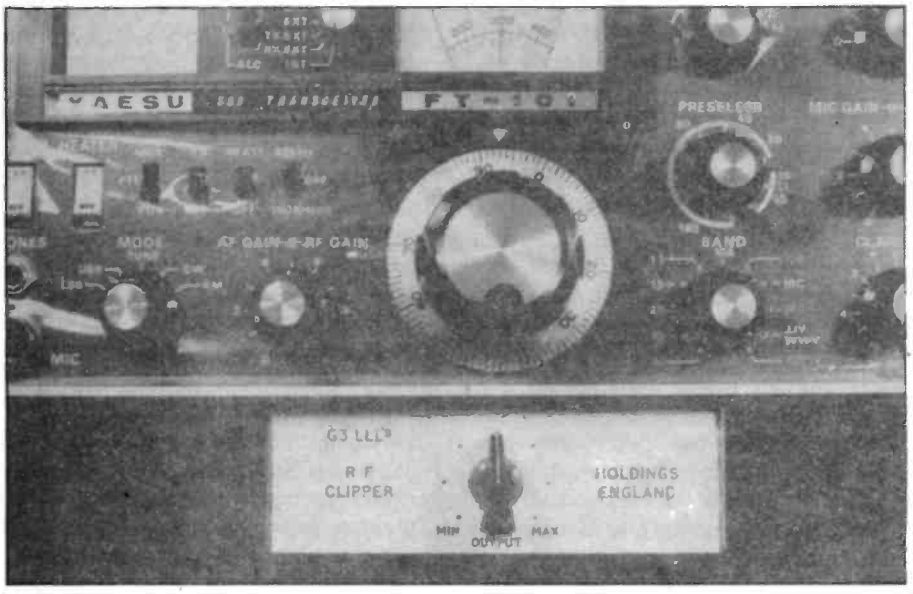
Taking apart the FT101 Part 4

RF SPEECH PROCESSING

Initially the G3LLL RF Speech Clipper was developed to aid my own signals, but very encouraging results led to commercialisation. The circuit of the unit is shown in Fig.A. whilst Fig.B. (printed as Fig.2. in August issue) shows how RF speech processing functions in block diagram form. In the case of the G3LLL Clipper, which is only made for the FT101, input and output connections are made by plugging the unit into the VFO socket, after attaching 3 jumper leads to spare pins.

Harry Leeming, G3LLL, describes two methods of RF Speech Processing and gives simplified alignment details.



Circuit Description

On transmit, the double band suppressed carier signal from the FT101 is applied to Q1, amplified slightly, and then converted to SSB by the SSB filter. As with any SSB signal, each voice frequency then represents one (and only one) radio frequency, and this signal is further amplified by Q2 and Q3. As the mic gain is advanced the signal eventually becomes strong enough for the peaks to be clipped by the second set of clipping diodes. Q3 has a gain of about 8-10dB so that if the mic gain is advanced to give a total of around 20dB of clipping this is shared by the two sets of diodes ensuring that neither of the stages can be overloaded. Q4 provides isolation from the clipping diodes, and passes the signal back to the transmitter via the output control. The clipped signal is then processed by the transceiver's SSB filter, thus ensuring that any out-of-channel intermodulation products are removed, giving a clean signal free from splatter.

On receive, the signal path is the same, but the gain is reduced and the output control is disconnected. This is achieved by wiring the clipper to the FT101 Tx/Rx switching circuits, resulting in 13 volts being applied to pin 7 in the transmit mode only. R8 is available so that the receive gain can be adjusted to suit the operator's preference. Concern has been expressed in some quarters that the clipping diodes are still in circuit on receive, but this is of no consequence as only a colossal local signal could cause them to conduct. In any case, as they are after the SSB filter, this would not matter. The extra gain provided by the clipper is within the automatic gain control loop, which results in better AGC action. The FT101 therefore has less tendency to overload on strong local signals when the Clipper is fitted. Leaving the Clipper in the circuit on receive produces a noticeable improvement in skirt selectivity. At the time I was told that cascading filters was something that "wasn't done". Now it is a common way of improving selectivity in commercial ham gear.

Yaesu's RF Processor

A few years' later with the FT101E came Yaesu's RF speech processor which was not a great success at first, particularly as it was necessary to open the lid and adjust an internal pre-set level control with a screwdriver every time a band change was made! The processor was quickly re-designed and a level control (concentric with the clarifier) fitted — the circuit is shown in **Fig.C.** Yaesu's processor takes the SSB signal after the IF unit, amplifies it by Q1, and clips it in the integrated circuit Q2. Q3 matches the clipped signal to the SSB filter, which removes out of channel intermodulation products. Then the clipped and filtered signal is returned to the transmit chain via Q6 and T3. Q5 acts as a variable resistor in the level control circuit and avoids RF having to be piped direct on the level control on the front panel. When the clipper is switched off, the signal is re-routed via Q4 instead of via the clipping and filtering circuits. Initially, some FT101E speech processors functioned better on one sideband than the other, depending upon the setting of a non-clipped pre-set gain control VR1. The writer traced this to unclipped signals leaking via the inter-