

the adjustment! A few hours were spent on 10MHz and 18MHz with satisfactory results.

The usual facilities of VOX, RIT, RF attenuator, selectable AGC, RF processor, full metering, noise blanker (2 actually) and a sort of passband tuning are included. In addition, the TS-930S is one of, I believe, only two readily available rigs that feature full break-in (QSK) operation on CW. Other useful extras are variable CW bandwidth tuning, CW audio filter, 100kHz calibrator (for setting up the display), CW pitch control, and an IF notch filter.

Modes of operation are SSB, CW, FSK and AM. There is no FM facility even as an add-on. The transmitter uses a solid-state PA (2 x Motorola MRF-422 in push-pull) running at 250 watts input on all modes except AM where it is 80 watts. The output power can be monitored on an automatic VSWR/power meter built into the rig. An aerial matching unit can be correctly adjusted using the VSWR bridge. There is no RF output power adjustment other than by varying the mic gain or carrier injection.

Caution!

One point to note. The manual warns against operating the transmitter into a VSWR of greater than 1.5:1, which is to be expected with a solid state PA, and like most solid state designs, power reduction/protection circuitry for the final is built in if you exceed these limits. However, an additional leaflet comes with the manual repeating the warning that "the power transistors might be damaged if the final stage is adjusted poorly" — by "final stage" it is assumed they mean the matching to the final stage. So it is reasonable to assume that some rigs have been returned with blown PAs — you have been warned — watch the VSWR (do your initial tuning at the lowest power possible).

Front panel

Keeping up with modern traditions, there are some 50 controls to play with on the front panel. However, they seem to be sensibly arranged and proved easy to get the hang of. Especially the frequency changing arrangements — if you have battled with the controls on an FT-ONE, then this rig is child's play by comparison.

The most impressive thing is the pleasant off-white fluorescent 6-digit display, which doesn't glare like LEDs, and shows up well in bright light. An additional smaller display alongside the main one shows the RIT status in kHz/100Hz.

There is also a digital analogue display, if such a thing is not a contradiction in terms. It comprises a

fluorescent analogue type scale with a moving red bar graphic type vertical bar underneath which increments at 20kHz intervals, and is very useful when tuning rapidly across the band (the VFO also speeds up at fast knob tuning rates so this is quite easy).

Metering

A range of metering functions are provided — processing level (in dB), ALC level, power output (only of real use on AM or CW), SWR (from the automatic device provided, so no calibration is required), PA current (12A max) and PA voltage (nominally 28V). Plus of course S-meter on receive, calibrated to S9+60dB.

Moving to the top left of the panel, we find pushbutton switches for VOX/MANUAL, FULL or SEMI break-in (for CW), MONITOR ON/OFF (for listening to your transmit audio (this one works well), and a brightness control (2 levels) for the display, the latter being useful at night.

Underneath these are rocker switches for SEND/RECEIVE, AUTO/THRU (for automatic antenna matching control if fitted, otherwise inoperative), PROCESSOR ON/OFF, and NARROW/WIDE if extra filters are fitted. To the right of these are the METER switch and AGC control (OFF/FAST/SLOW).

The benefits of switching the AGC off may not be immediately apparent. If a very strong signal appears in the passband when listening to a weak station, it will activate the AGC and cause unwanted gain reduction. If you then turn the RF GAIN down, until the meter reading just starts to increase, then turn off the AGC, you should find that the wanted signal is then much easier to copy.

The remaining controls on this side are the PROCESSOR IN/OUT levels, MIC/CARRIER level, and mode selection switch (TUNE/CW USB/-LSB/AM/FSK).

Frequency control

The main tuning knob is pleasant to use with a rubber surface, and can be spun easily (one MHz in about 5-6 seconds) for rapid QSYing — as you spin in excess of about 5 revs per second the VCO step rate increases. The standard tuning rate is 10kHz per revolution. One note for any blind operators who are considering this transceiver — there is no way of resetting to the band edge for reference, other than switching off all power to the rig. Nor are there any markings on the main tuning knob to identify one complete revolution.

To change bands, there are two choices. You can either select an amateur band of interest from a set of 10 momentary push buttons, or move up or

down in 1MHz steps from the STEP UP/DOWN buttons (these are also accessible from the mic socket). This seems a much easier arrangement than keying in via a keypad, unless you prefer it.

There are in fact two VFOs (A and B) with facilities for transfer of frequencies between the two (A=B). Because of the broadband tuning, it is possible to instantly change from Top Band to 10 metres if you wish (always assuming that your antenna also switches, or is a good match on all the bands you want). Used in conjunction with the memory facilities, this feature could be very helpful in contests.

Eight memories are provided, and transferring frequencies to and from these is just a matter of using three pushbuttons (VFO/MEMO, M IN and MR (recall), plus the MEMORY CHANNEL switch. A further switch is provided which allows the VFOs to be mixed for transmit and receive, ie. you can receive on VFO A and transmit on VFO B, or vice-versa. Memory backup facilities are provided by a battery, and the rig will store all the memory and last VFO frequencies until next switched on. If you don't have the battery fitted, then you still retain everything provided the AC power plug is not removed.

Which reminds me — the rig comes with a European type mains plug which needs changing for UK use.

The remainder

An RF attenuator is provided (0/10/20/30dB) should you need it. The dynamic range of the TS930S seems good enough not to require much use of this, even on 40 metres at night. Either the calibration of this control, or the S-meter is adrift however, as they do not agree. Inserting 10dB on the attenuator reduces the S meter by about 18 — 20dB, if it is calibrated at 6dB per S-point as would be expected.

Noise blankers

There are two types fitted — the first (NB1) suppresses impulse noise such as ignition interference, and is fairly effective. A variable blanking level control sets the threshold for this. The other blanker (NB2) is intended to cope with the 'woodpecker' radar pulses and provides a longer blanking pulse (also switching in NB1 at the same time).

NB2 is reasonably effective providing the woodpecker is fairly strong (above about S7) which is when you really need it. The effectiveness of this blanking does depend on the type of woodpecker being received, being much better on the one pulse type than the multiple pulse version.

Both blankers reduce the dynamic range of the receiver considerably if ad-