

TRIO TS-830

Three new bands and extra facilities are
"a lot of radio for your money"
By our Technical Editor

AS we said in the review of the Icom IC-4E elsewhere in this magazine, we're still in two (only two?) minds about how best to do our reviews. We feel we have a duty to discuss the equipment we review as honestly as possible bearing in mind what it's intended to do, and from the point of view of the average amateur who is going to buy the thing. So when we decided to review an upper-middle class radio such as the Trio TS-830, there was a bit of head-scratching in the office. Should we bombard everyone with spectrum analyser traces, IF filter plots and the like, or should we just say whether or not we think it's a good rig. We've decided, as a first effort, to evaluate it in the middle of the extremes, rather as we have done with the IC-4E, although obviously the TS-830 is rather more complicated.

Good reputation

So — what about the TS-830? We thought we'd like to review it because it's the sort of radio you might buy if you were coming to the hobby and had enough of the folding stuff available to invest in a good piece of gear which would last you a long time and which will do the job. The TS-830 is made by Trio — Japanese, of course — and is the lineal descendant of the popular TS-820 with the addition of the three new bands which the amateurs obtained at the World Administrative Radio

Conference in 1979 (three cheers for the RSGB) and one or two extra odds and ends. In terms of facilities it's the Volvo of HF transceivers; in terms of price it's somewhere about the same. Trio equipment has had a good reputation for reliability for a long time now, and you often hear people on the air who've had a TS-520 (another popular Trio model) for years and years. Just to digress a bit, Japanese equipment in general seems to be extremely well put together from the reliability point of view — we don't know of the Japanese equivalent of a "Friday car" and we've only ever come across one instance in about the last five years of a Japanese rig being faulty when bought. Trio equipment is, as we've said, highly regarded by amateurs, and the TS-830 itself is the second-in-line from the top-of-the-line TS-930.

So we were smacking our lips when Mr Securicor brought the big packet into the office, and it was unpacked with great expectations. It was well protected in about three layers of cardboard and some expanded polystyrene, and there was a natty polythene dust cover-cum-packing material stretched over it. When we got our strength together to get it out of the box (it weighs about 30 pounds, so the carrying handle on the side is a great benefit) and put it on the editorial table, the first impression was of a good-looking radio with a well laid-out front panel and an

air of nice design about it.

The first job, of course, was to sit down and have a thorough read of the instruction book. We don't subscribe to the "if all else fails read the instructions" school of thought, because a transceiver is a fairly complicated animal and it is possible to cause damage if you haven't got the operation of it sorted out. This applies particularly to the transmitter side of things. The TS-830 uses a pair of valves in its final amplifier, driven by another one actually, so there are three of those splendid glass devices in the transmitter. Now valves are several times more rugged than transistors, but you can still inflict various nasties on the power amplifier stage if you don't tune it up correctly, for instance. Since it uses valves, the TS-830 has tuning and loading controls for the final amplifier stage, unlike its cousins which use transistors and which have "broadband" output stages. As we've discussed elsewhere in these pages, this isn't a disadvantage since broadband transistor final amplifiers aren't the whole story, and you'll find in practice — as we were to — that a valve final amplifier will cope with various forms of mismatching as far as the antenna is concerned rather better than the solid-state equivalent. It's swings and roundabouts really — you're 99 per cent certain to need an ATU anyway, even with a broadband output stage, and the extra two controls don't



really make a significant difference in practice. The only point is that you need to follow the instructions carefully so that you don't knock hours off the life of the valves when tuning up.

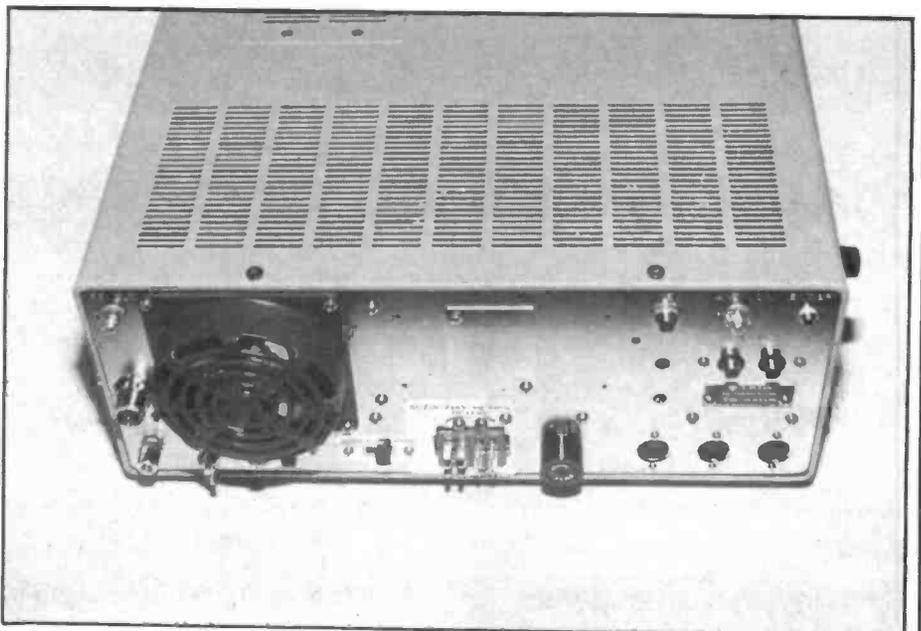
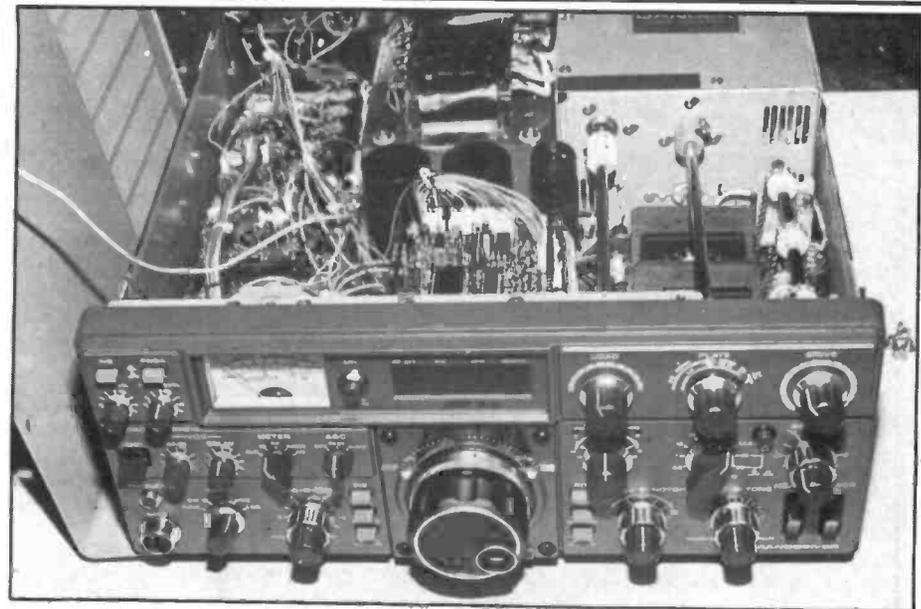
The handbook goes into it all very well, and we found that in practice tuning up became second nature. The handbook in general is very well done, with comprehensive instructions and all sorts of helpful operating hints thrown into it.

There's no trace of the strange "Japanese-English" which used to afflict handbooks from the Orient until relatively recently, and there are clear explanations of what goes where and which control does what. The section on maintenance and troubleshooting is good enough for basic maintenance although it isn't a workshop manual — here again, we'd hesitate to do major work on equipment such as this without access to some pretty decent test gear. The main distributors, who are Lowe Electronics up at Matlock, have an excellent reputation for servicing, and have a hundred thousand quids-worth of test gear for fixing Trio equipment — from what we hear they're very good at it and offer a pretty quick turnaround if your rig has gone horribly sick on you. There's a full circuit diagram right at the back of the handbook and, in common with every Japanese circuit diagram we've ever seen, you'll need a good magnifying glass to get much out of it! Mind you, this one is better than some others we've seen . . . We liked the block diagram a lot, and our technical bod spent a good half-hour poring over it whilst warming-up the test gear for his torture tests later on.

Get the feel

So — before we let him loose on it, it was time to connect the TS-830 up to our tri-band antenna and have a listen round 15 metres to get the feel of the receiver side. The main tuning was a delight; it felt very smooth and stable, and it was no surprise to find some nice precision mechanical work in that side of things. As far as the receiver side is concerned, the TS-830 has all the usual controls — RF gain, RF attenuator, S-meter, etc — but what makes this rig an absolute delight from the handling point of view are some features that you don't find on all receivers by any means. We'll take them in the order in which we found them.

The first nice thing was the noise blanker. The idea of a noise blanker is to help the operator copy signals through interference which comes from such things as car ignition systems, faulty electrical equipment and the dreaded Russian "Woodpecker" over-the-horizon radar system which sometimes makes life extremely difficult on 14MHz. Several rigs have some form of this, but that in the TS-830 is a rather superior sort which has a variable threshold. This means that you can set up the precise amount of noise blanking that you need without losing too much of the signal, and we found in practice that it worked very well indeed. If it was wound all the way in, we found that the Woodpecker completely disappeared, which is no mean feat — no other rig we've tried can do that. The only slight thing here was that our technical wizard reported that the intermodulation performance of the receiver (that's a concept which describes how well it handles weak signals in the presence of strong ones, to simplify about 50 pages



into two lines) was a bit worse with the noise blanker all the way in, but you'll find that most rigs suffer from rather degraded intermod. performance when the noise blanker is switched on because of the way it works. Since on most rigs you can't vary the blanking threshold you're stuck with it, but we discovered that the noise blanker barely affected the IM performance until it was almost fully wound up. We liked Trio's blanking circuitry — it's quite complex but it works very well indeed, so the devout 14MHz DX chaser will do well with this rig. While we're on the subject of signal handling, we evaluated the TS-830 on 7MHz, since this is the band you're most likely to need a good front-end on. The "third-order intercept" on the review sample came out as +1 dbm; if that doesn't mean a thing to you, don't worry about it! In the real world of radio waves, it's a reasonable performance; it's not super-outstanding but in practice it's very adequate to do the job. You tend to have to use rather exotic devices to get a really good front-end on any receiver, and in some ways it's more important that a VHF and UHF receiver has a high third-order intercept point than an HF machine. So we were quite happy with the TS-830's

Top: the innards of the TS-830. Above: a look at the rear, showing the PA cooling fan and the plethora (disgusting!) of connectors.

performance. We appreciated the S-meter calibration as well; it was a good deal more linear than several rigs we've seen and a reading of S9 on the review sample required exactly 50 microvolts on the 7MHz band.

The filtering arrangements are what make the TS-830 outstanding on receive, however. As well as both an IF shift control and a facility to adjust the IF bandwidth — which is doing the job properly, in our opinion, unlike some rigs which simply have a passband tune control — there's a notch filter for removing whistles from those idiots who will insist on tuning up 1KHz away from the frequency you've been on for the last half-hour. This works well, and we measured the depth of the null on ours as a whopping 40 dB down. This means that you could reduce the amplitude of an interfering tone by about 6S points! From an S9 signal to an S3 is extremely good, and in using the TS-830 on 7MHz during the daytime we found it extremely easy to use the notch control to zap the interfering

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nitwit who was tuning up. A little LED comes on to remind you that it's in circuit.

We could write heaps of words about the receive side of the TS-830, but there isn't the space — suffice it to say that we were highly impressed with it and, unlike some rigs, it *felt* nice to use. We found that it took about two hours to get the feel of the beast and sort out what the filters and so on could do for us, and we worked just over 80 stations with it during the review period. The best DX, by the way was an 8P6 on 7MHz and TYA11 in Benin (what an odd callsign he has — the story goes that the authorities thought he was applying for a commercial licence instead of an amateur one, and issued him with that distinctly odd callsign. He's perfectly legal, and pretty rare), as well as miscellaneous VKs and ZLs. One gotaway was an XT2 — grrr. Ah well — it wasn't the rig's fault, we just couldn't crack the pile-up before having to go to work!

So — how about the transmitter? First off, we measured the output power on all the bands, and it came out at between 110 and 120 watts when switched to CW. This, of course, is more than you're allowed in this mode, but you can use the "carrier" control on the rig to set it up to the magic figure of 20 dBW (or 100 watts in ordinary language). On Top Band, indeed, you're supposed to use 9 dBW, or 8 watts, and you can indeed set up the legal level very nicely with the carrier pot. It's important to stick to the rules on Top Band, since it's shared with all sorts of other services and we don't want to cause problems for signals which might be a little bit more important than the fact that your mate is S9 plus 20 with you and that it's a nice day in Bridlington or whatever. Various coastal and maritime stations use Top Band, and indeed they're the primary users, so always play the game and don't run more power than you're licensed for — it could just be someone's life you're messing about with.

The harmonics

Anyhow — our next step was to have a look at harmonics and other odds and ends which transmitters can produce. Our TS-830 was pretty sanitary on all bands bar 18MHz, and the reason for that is bound up with the design of the set. The final intermediate frequency in the TS-830, as it is in several other rigs, is around 9MHz and you can't really get good rejection of the second harmonic of it. We measured the spurious output on this band at -43 dB, which our king of the test gear thought wasn't too bad under the circumstances, and when he saw the circuit initially there was much head-shaking and dire prophecies of terrible things on 18MHz but it wasn't so. The part of the circuit in question is called the "balanced modulator" and Mr Trio seems to have done his homework all right. One suspects that when we get the 18MHz band the power limit will be pretty low anyway, so there'll be microwatts coming out as a spurious. (We're getting it from October 1 — Ed.)

Anyhow, back to the salt mine. The classic test for an SSB transmitter is known as a "two-tone" test (something

tells me we'll have to do an article on what all these things mean) and we applied said test to our TS-830. Basically, this test tells you something about how linear the final amplifier stages are, and you often find that a valve PA stage is rather better than a transistor one. The Trio was no exception, and its intermod. performance on a two-tone test was really good. It's rather interesting that the RSGB's magazine, *Radio Communication*, reviewed the TS-830 a couple of months ago, and they found that the transmitter's performance under two-tone conditions got markedly worse after an extended period. We didn't find this at all with our one, and the figures on the analyser stayed pretty much the same throughout the transmitter tests. We also got rather more power from our sample at the same intermod. level so we imagine that there was something a bit odd about the one they tested. Their man Peter Hart, certainly knows what he's doing — don't get us wrong — so we think that the one the RSGB reviewed was something of a rogue. It must be the London air!

Good audio

Anyway, enough of the figures — how did it perform on the air? Very well we found, and everyone we asked told us that the audio sounded very good and that the transmission was extremely clean and narrow. A "narrow" SSB signal implies good intermod. performance in the PA (please don't confuse this with the intermod. performance of the receive side, by the way — it's a rather different use of the term, although it means almost the same insofar as both are to do with the linearity of whatever stage it happens to be), and it also means that you don't cause trouble to your fellows on the band. The speech processor worked well, and we found that all the DX we worked preferred the signal with the processor in and that all the locals on 80 metres with S9+ signals preferred it out. Which is just about what you'd expect. We found ours very easy to

load and tune up — here again, the RSGB found their one a bit odd in tuning up on the HF bands but ours was no problem at all, so we'd guess that something was amiss in the PA of their one.

Verdict

So what's the overall verdict? You can have one for £694, and you certainly get a lot of radio for your money. The filtering arrangements on the receiver are second to none except professional receivers costing about ten times more, and they work extremely well; in fact, we'd much rather have a rig like this than some which cost twice as much because you don't get a receiver which performs twice as well for the bread. The TS-830 spends the money where it matters — there isn't a superfluous control on the front panel, and it does all the things an HF transceiver should do very well indeed. By absolute standards, the receiver's front-end performance could bear some improvement — you tend to find that you have to switch the attenuator in on 7MHz rather a lot — but in fairness we didn't come anywhere near losing any signals because of that! It's always interesting to compare what you measure in the lab. with what you actually find when you use the wireless, and we feel that nice handling and a feeling that the rig will do anything we ask of it is worth several dbm in the "third-order intercept" stakes! The nicest compliment we can think of for the TS-830 is that we'd like one ourselves — which certainly isn't the case with many rigs we've used in the last few years.

A good look at what's inside the grey box (did we say Volvo? Should have been Mercedes . . .) of the TS-830. The PA compartment is at top right, and the mains transformer on the left of that. The main smoothing capacitors for the HT rails sit below.

