

THE TEST

Philips FT-144 (£100), Marantz ST-440L (£105)  
and Denon TU-710 (£105)



FINE TUNING

*If you're serious about listening to FM radio, you'll need to have an external aerial and spend £100 or more on a stereo tuner. Noel Keywood tests nine models up to £260 and discovers that for £180 you can get outstanding FM digital/control circuits, push-button station selection and decent AM into the bargain*

Most tuners these days work on what is known as a 'synthesiser' principle. This has been made possible solely due to the advent of microchips, which have been specially designed for high-quality VHF/FM radios. They offer the immediacy and convenience of push-button station selection, plus improved sound quality that comes from a high degree of tune accuracy.

Manufacturers are eager to associate such tuners with the magic word 'digital', but in fact they are ordinary analogue tuners operated by digital-control circuits. Proper digital tuners are only feasible when we have digital transmissions — and none are planned yet!

Stringent tests applied to all nine tuners in this report show

that performance has continued to improve the breed and that sound-quality differences get smaller and smaller. As they do, facilities may become a more important differentiating factor for many people.

For example, the upper part of the VHF band (above 97MHz) is being cleared of police and ambulance transmissions, and the like, to make way for more domestic broadcasting. Radio 1 is due to go out on VHF. Community broadcasting is being considered to serve even smaller areas than local radio stations do. Pirate stations are proliferating. All these stations mean that in the near future tuners will have ten or even 20 push-buttons. Most current models have eight!

Having an aerial installed may be costly (£40-£60), but if you are

concerned about sound quality it will be worthwhile. Throwing money on a tuner and then running it from a piece of wire indoors is not a sensible thing to do. A competent budget tuner, allied to a good aerial installation, gives better results. Aerials have a big effect on tuner performance and their value should not be underestimated. A good tuner cannot make up for a poor aerial. In fact, the best tuners these days are only a little more sensitive and selective than budget models. (Compare sensitivity and selectivity figures published in the test results here to see how small such differences can be.)

Never ignore medium wave sound quality. It has been substandard for too long because inherent limitations mean that

hi-fi is not possible in Europe's crowded wavebands. Consequently, hi-fi snobs brush it off. But even within existing limitations, sound quality should be better than it usually is. Some stations could do a lot better.

All medium-wave sections were properly tested for this report and comparative listening tests carried out. Differences were large, as the unique frequency response analyses (Figs 1b-9b) show. Luckily, manufacturers are now taking AM quality seriously. No fewer than four of the tuners had variable IF bandwidth options on AM, and the frequency response analyses clearly show what effect this had. Wide IF gives more treble on AM, improving clarity but sometimes at the expense of interference.

THE TEST

Pioneer F-70L (£160), Proton 440 (£189)  
and Hitachi FT-5500 MkII (£180)

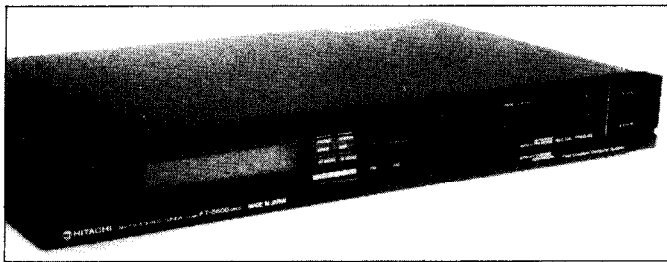


FINE TUNING



Akai AT-S7L (£230), JVC TX-900LB (£260),  
and Sansui TU-D99X (£229)

## HITACHI FT-5500 Mk II



The original FT-5500 offered a very high level of performance — on both VHF and AM wavebands. It was innovative but not gimmicky. All its novel features, like a wide-ranging signal-strength meter and switchable IF and RF modes, contributed to the achievement of good results under difficult reception conditions. It

was also one of the first tuners to have a decent medium-wave section — by design, and not by accident, I must add.

I always had fun trying to get the Field Conditioning Computer to switch the RF stage to narrow band working. But even in the face of ludicrously difficult and artificial reception conditions, simu-

lated by signal generators, it wouldn't do so.

Anyway, Hitachi have incorporated manual over-ride switching so you now don't have to abide by the FCCS computer's decision! Whatever RF and IF settings are finally decided upon go into memory, as before, to be instantly re-established when a station is selected.

This is a synthesiser tuner, of course, so it has an array of push-buttons for station selection. Eight are provided, but a change-over switch doubles the total number of stations that can be stored. They can be freely allocated to any waveband so that, for instance, 15 VHF/FM stations can be memorised, plus one AM station, like Radio 1. Manual and automatic tuning modes are provided, too.

Hitachi have replaced the

attractive and easily read signal-strength meter of the 5500 with one calibrated in dB. — not very helpful for non-technical users. The handbook doesn't explain dB calibration.

For this tuner to deliver minimum hiss, which will sink to virtual inaudibility at  $-77\text{dB}$ , a signal of  $1\text{mV}$  or more is required, equivalent to  $60\text{dB}$  or higher. To hear this tuner at its best, I would advise a signal of at least  $50\text{dB}$  for each station on VHF.

Measured performance of the FT-5500 MkII was exemplary in every area. There was negligible harmonic distortion right across the audio band (wide IF); negligible intermodulation at high audio frequencies; minimal spurious output; little supersonic intermodulation distortion above  $20\text{kHz}$ ; perfectly flat frequency response on VHF; selectable

bandwidth/frequency response on medium wave; very wide channel separation; negligible hiss; super sensitivity and selectivity (narrow band). No other tuner at the price can boast such a performance. The FT-550 MkII remains as stunningly impressive as ever in its measured performance and crucifies its rivals.

Sound quality, too, is as impressive as ever. Under critical conditions, such as being fed high-quality music from a lab stereo generator, it does slightly flatten the soundstage.

The FT-500 MkII is accurate. It can also handle difficult reception conditions and still sound good. These are real and valuable strengths.

I was amused to find, in my battle with the FCCS computer, that it is reluctant to set narrow-band RF, even when audibly

necessary, so manual switching is preferable.

Finally, there's the medium-wave section. With characteristic thoroughness, Hitachi have doctored performance here too. Selectivity affects treble response, narrow IF reducing treble, but interference too. However, I noticed that even in this mode, speech (in particular) was clearer than usual and sound quality better than that of the rival tuners. Wideband mode gives extended treble response (see Fig 6b) and far greater clarity.

The FT-500 MkII remains one of the most impressive tuners available. At £180, it is exceptional value for money.

## TEST RESULTS

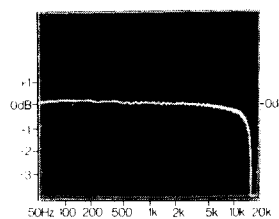


Fig 6a: Very flat VHF frequency response

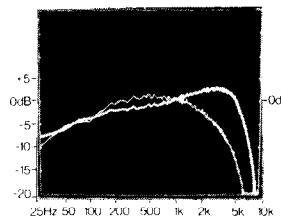


Fig 6b: MW response shows rising treble with wide IF

<b>Frequency response VHF/FM</b>	11Hz-15kHz
<b>AM narrow</b>	130Hz-2.3kHz
<b>wide</b>	150Hz-5.8kHz
<b>Stereo separation (1kHz)</b>	-56dB
<b>Distortion (50% mod, stereo)</b>	0.1%
<b>Noise (minimum)</b>	-77dB
<b>Aerial signal for minimum noise</b>	1000uV
<b>Sensitivity (-50dB) mono/stereo</b>	2uV/20uV
<b>Selectivity (alternate channel) N/W</b>	56/82dB
<b>Pilot tone (19kHz)</b>	-64dB
<b>Signal-strength meter calibration:</b>	10dB-
<b>digital readout</b>	10dB-99dB(3uV-100mV)

**PHILIPS FT144**

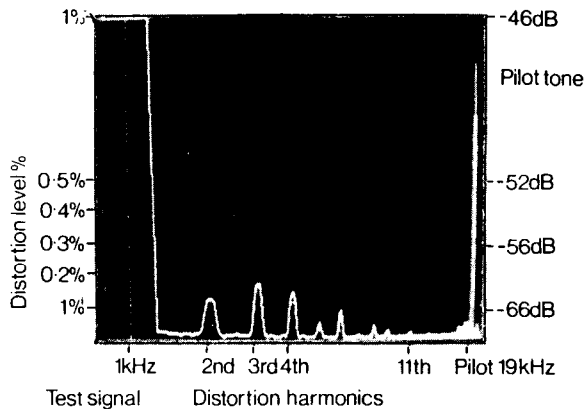


Fig 10: 0.3% distortion up to 4th harmonic

**MARANTZ ST40L**

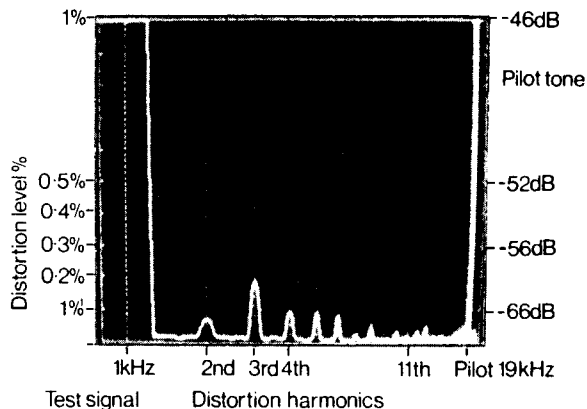


Fig 11: 0.26% distortion in 3rd harmonic

**PROTON 440**

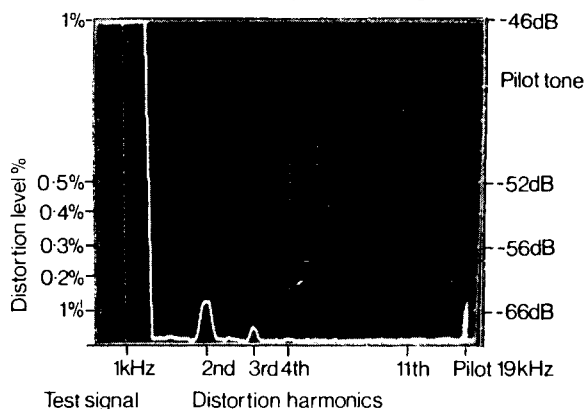


Fig 13: 0.1% distortion in 2nd harmonic

**PIONEER F-70L**

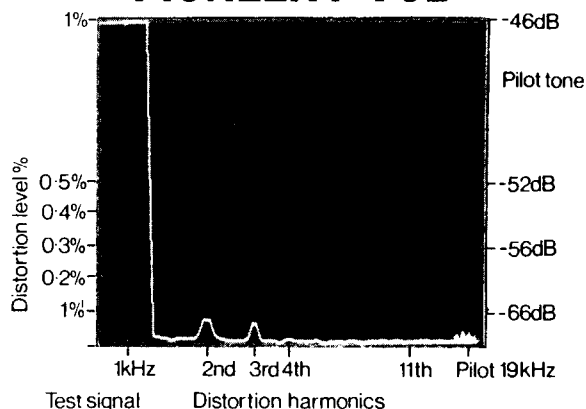


Fig 14: Very low distortion at 0.1%

**HOW THE TEST WAS DONE**

Frequency response on VHF and medium wave is shown in Figs 1a-9a and 1b-9b respectively. These are spectral analyses obtained using periodic noise — a technique that allows rapid and accurate inspection of 'real time' performance under a wide range of conditions. Scales are (horizontal/vertical):

FM: 50Hz-20kHz/1dB per div  
AM: 25Hz-10kHz/5dB per div

Quoted response limits are 1dB for VHF/FM and 3dB for AM. Quoted distortion (VHF) is for 50

percent modulation (stereo) at 1kHz; this better represents average music level than the more common 100 percent value, which is only applicable to short-term music peaks. The distortion spectra obtained during this measurement can be seen in Figs 10-18. Since they run up to 20kHz, pilot tone (19kHz) can be seen at extreme right.

The 100 percent modulation-distortion value was checked in all cases (usually double the 50 percent figure), as was harmonic

distortion at 5kHz and intermodulation distortion against the pilot tone. These latter problems are more serious than mid-band Total Harmonica Distortion.

Tuners produce unwanted signals above 20kHz that can, through intermodulation within a hi-fi system, become audible. It is not so much the pilot tone and sub-carrier that are a headache as the intermodulation products around them. Intermodulation spectra up to 100kHz were checked as a result.

Quoted noise is that at full quieting, measured using CCIR weighting and pilot-tone/sub-carrier filtering. It is the minimum noise figure a tuner can achieve. Also quoted is the aerial signal needed for full quieting.

Selectivity is the average value for alternate channel spacing (400kHz) above and below a wanted signal of 10uV (mono). Sensitivity is for -50dB noise level — mono and stereo. Both measurements follow IHF T200.

Listening tests were carried out off-air and from a high-quality stereo VHF generator, so direct comparisons with the original source could be made.

**THE CONCLUSION**

The budget tuners all performed relatively well on VHF/FM. Differences between them were most significant on medium-wave sound quality and on the number of stations they were capable of storing.

The Philips FT-144 had poor

medium and long wave performance but sounded very respectable on VHF. It also has the benefit of push-button selection of no fewer than 37 different stations. This was substantially more than any other tuner in the group. I feel the FT-144 is very good value for

money and cannot be ignored.

For a really easy-going, clear and dynamic sound on VHF, Denon's TU-710 is the one. It also has respectable AM quality. However, this is an analogue tuner, and tuning it seems very tedious and antiquated after the convenience of instant push-button selection. Choose the Denon if you value sound quality very highly and are likely to spend more time listening to one

favourite station. Otherwise, its benefits are too small to outweigh operational disadvantages.

The Marantz represents a compromise between the Denon and the Philips. It has a good, if not exceptional, all-round performance, combined with the convenience of push-button station selection for FM and AM.

In the mid-price range, Pioneer's F-70L offers very satisfactory results for around £160. It

## DENON TU-710

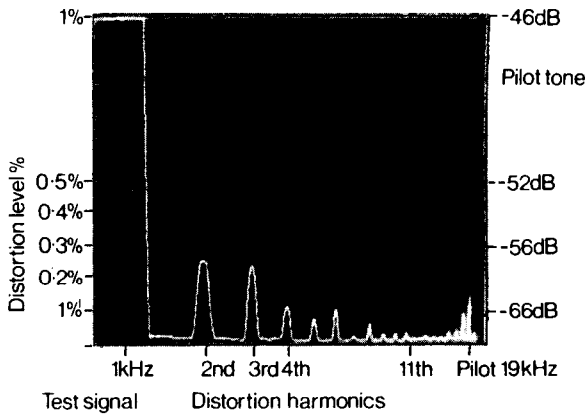


Fig 12: 0.4% distortion in 2nd and 3rd harmonic

## HITACHI FT-5500 Mk II

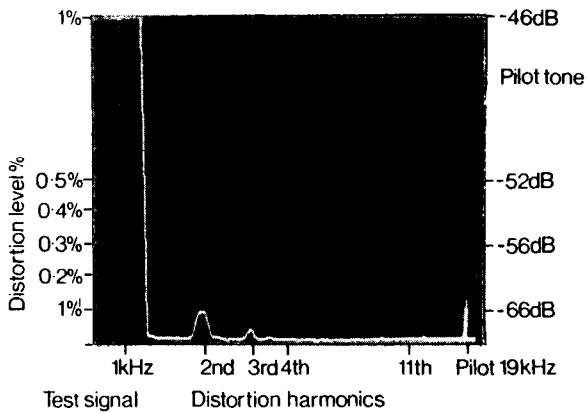


Fig 15: Little 2nd harmonic distortion

## AKAI AT-S7L

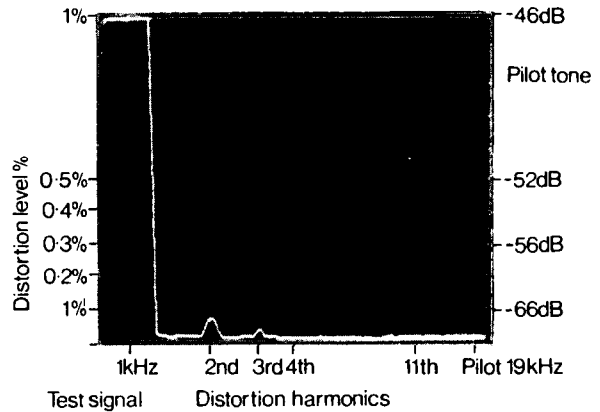


Fig 16: Negligible 2nd harmonic distortion at 0.08%

## JVC T-X900L

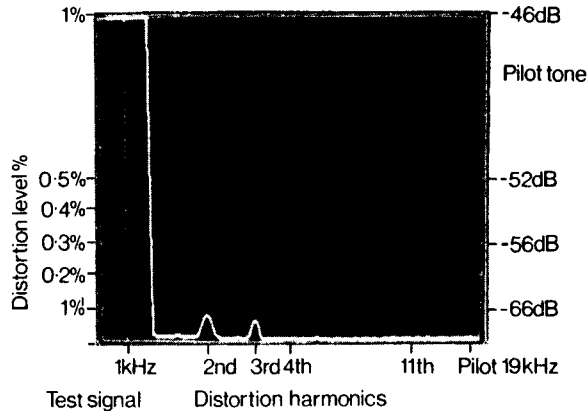


Fig 17: Very little distortion

## SANSUI TU-D99X

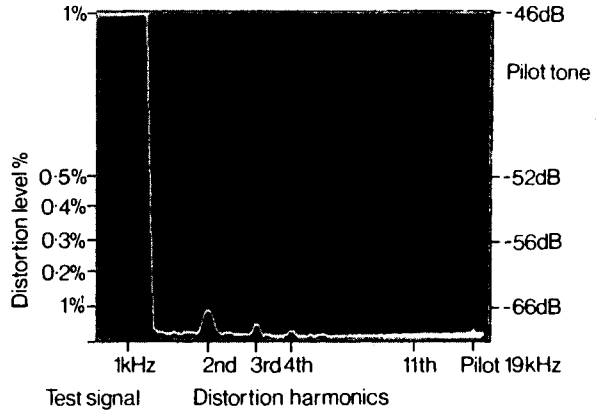


Fig 18: Very little distortion

doesn't have the slightly coarse and edgy treble of the two budget synthesiser tuners. However, it is significantly upstaged by Hitachi's FT-5500MkII, which costs only £20 more.

Proton's 440 is well designed; however, it neither looks nor feels like a £190 tuner and, worse still, VHF sound quality just wasn't up to scratch at this price.

At the top end of the price scale, there were again sound-quality

problems. Neither the Akai nor the Sansui tuners could be called particularly impressive, although the Sansui had its own sort of warm and somewhat 'thick' sound that some may find attractive. However, comparison with the source proved that this sound was inaccurate.

Only the Hitachi FT-5500MkII and the JVC T-X900LB came through as top-quality tuners with little to criticise in any

particular area. As I have already observed, the JVC has a brighter and — at times — sharper sound, but both display the sort of open clarity and precision that other tuners fail to provide. And neither suffer the treble coarseness that is so common in inferior VHF tuners due to a variety of high-frequency distortions.

Of these two tuners, Hitachi's FT-5500MkII is more accurate in tonal balance and £80 cheaper, so

it has to be a bargain. And this is precisely why the FT-5500MkII dominates the tuner market. It's well styled and built, offers impeccable reception ability under the most difficult conditions, and sound quality on VHF and medium wave is exemplary. It is still the tuner to beat.

In the top price group, honours go to JVC. In the middle price group, Hitachi come out on top. At £100, it's horses for courses.