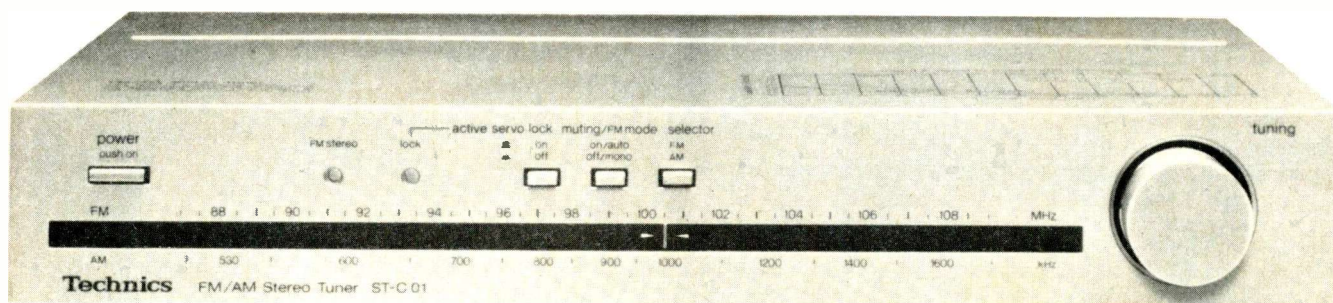


## Technics Model ST-C01 Stereo FM-AM Tuner



### Manufacturer's Specifications

#### FM Tuner Section

**Usable Sensitivity:** Mono, 10.8 dBf (1.8  $\mu$ V).

**50-dB Quieting Sensitivity:** Mono, 17.0 dBf (3.9  $\mu$ V); stereo, 38.3 dBf (45  $\mu$ V).

**S/N:** Mono, 75 dB; stereo, 70 dB.

**Total Harmonic Distortion:** Mono, 0.1 percent at 100 Hz and 1 kHz, 0.15 percent at 6 kHz; stereo, 0.25 percent at 100 Hz and 6 kHz, 0.15 percent at 1 kHz.

**Frequency Response:** 20 Hz to 15 kHz, +0.5, -1.5 dB.

**Selectivity:** 75 dB.

**Capture Ratio:** 1.0 dB.

**Image Rejection:** 50 dB.

**I.f. Rejection:** 85 dB.

**Spurious Rejection:** 75 dB.

**AM Suppression:** 55 dB.

**Stereo Separation:** 45 dB at 1 kHz, 35 dB at 10 kHz.

**Sub-Carrier Rejection:** 40 dB.

#### AM Tuner Section

**Sensitivity:** 30  $\mu$ V (250  $\mu$ V/M, internal antenna).

**Selectivity:** 30 dB.

**Image Rejection:** 50 dB.

**I.f. Rejection:** 40 dB.

#### General Specifications

**Output Voltage Level:** 0.5 V.

**Power Requirements:** 120 V, 60 Hz, 8 W.

**Dimensions:** 11-<sup>11</sup>/<sub>16</sub> in. (29.69 cm) W x 1-<sup>15</sup>/<sub>16</sub> in. (4.92 cm) H x 10 in. (25.4 cm) D.

**Weight:** 6.4 lbs. (2.91 kg).

**Price:** \$260.00.

If ever there was a single high-fidelity component that lends itself to the "mini" or "micro-component" approach, it is the separate tuner. FM-AM tuners, by their very nature and function, generate virtually no heat and no great effort is involved in compressing tuner circuitry into the small cubic volume as is called for in the "mini component" format. Indeed, if one examines the internal layout of most conventionally sized FM-AM tuners (with the exception of those fancy digital-readout, frequency synthesizing types), one will generally find that there is a good deal of empty space inside. So, while this reviewer has not exactly been captivated (so far) by the proliferation of minis and micros in general, I have no quarrel with manufacturers who elect to package their tuner products in tiny boxes. So long as the price/performance ratio is not compromised and ease of use is retained, I don't care if they want to put AM-FM tuners in a matchbox.

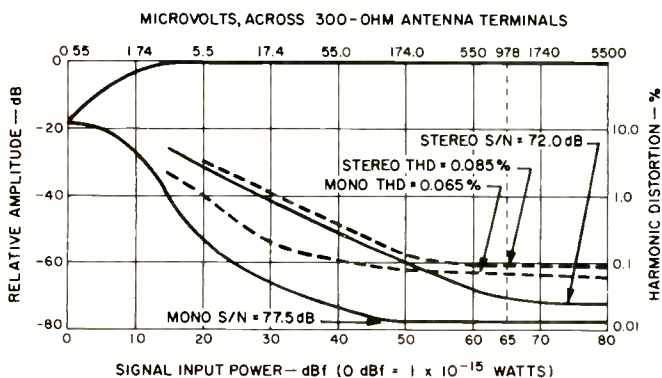
Happily, the Technics ST-C01 is an example of good, basic tuner design which has not in any way suffered because of its miniaturization. The minuscule chassis of this unit has even been equipped with tiny swing-out feet which tilt up the front panel for easier viewing and tuning. Front panel layout is simple and clean, devoid of any unnecessary frills. At the

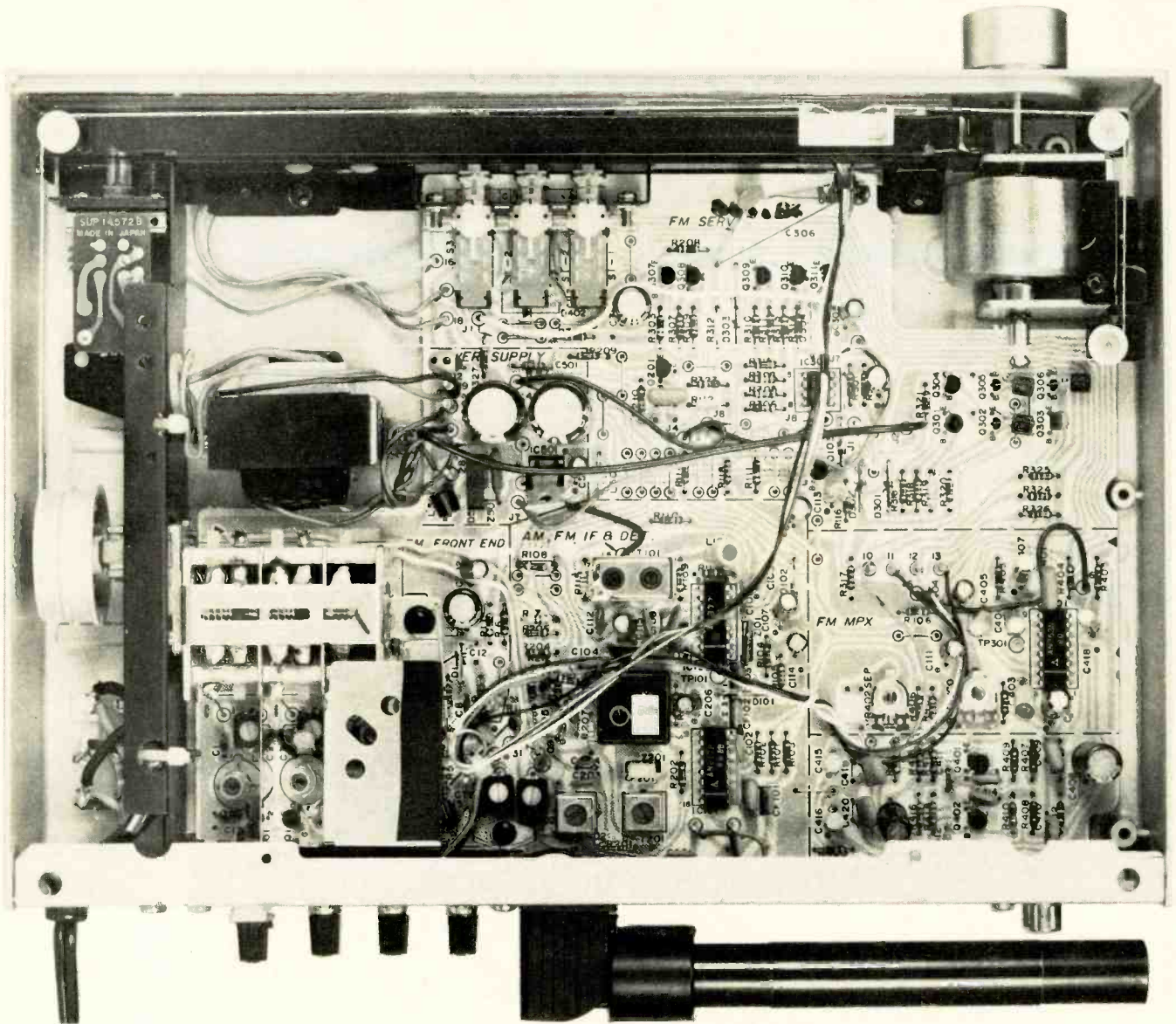
right is a large (relatively speaking) tuning knob which manages to retain a fairly effective flywheel action for smooth, effortless dial spinning. Both AM and FM frequency notations are etched on the panel proper, with FM numerals linearly spaced above a narrow, long cut-out slit, behind which rides an illuminated dial pointer, and with AM frequency numerals etched below this slit. There are no conventional meters on the ST-C01. When tuning to FM frequencies, a pair of tiny illuminated arrows flanking the dial pointer illuminate between stations. As a signal frequency is approached, first one of these arrows is extinguished, with the remaining illuminated arrow telling the user in which direction to fine-tune the dial. When center-of-channel tuning has been achieved, the other arrow is extinguished, indicating that proper tuning has been achieved. In the case of AM tuning, both arrows are extinguished simultaneously when accurate center-tuning has been accomplished.

Push buttons atop the frequency dial area include a Power switch, an AM/FM Selector button, a Muting/FM Mode selector button, and a servo-lock switch. The servo-lock circuit is a sensitive form of automatic frequency control which "locks onto" the tuned-to frequency. It should be noted that the previously described arrows function whether or not the servo-lock circuit is activated. When this tuning-assist circuit is employed, a tiny light flashes near the Active Servo Lock switch whenever precise tuning has been achieved. There is a delay in the "grab" action of the servo lock to allow the user more time to tune to the center of the FM channel. An FM Stereo indicator light is located adjacent to this servo-lock indicator light.

The rear panel of the ST-C01 is equipped with a pair of output jacks at the left and the usual antenna input terminals at the right. Included are terminals for an external AM antenna and for 300-ohm or 75-ohm FM antenna transmission lines, the latter including a grounding clamp for the outer shield of coaxial cable, if that type of transmission line is employed. A pivotable AM ferrite bar antenna is folded down against the chassis for shipment but should be rotated away from the rear surface of the chassis for best reception. Rotating the ferrite bar so that it is perpendicular to the rear

**Fig. 1 — Mono and stereo quieting and distortion characteristics for the FM section.**





surface of the chassis adds about six inches to the shelf depth required for this micro component, but in most cases it should not be necessary to rotate the AM antenna that much.

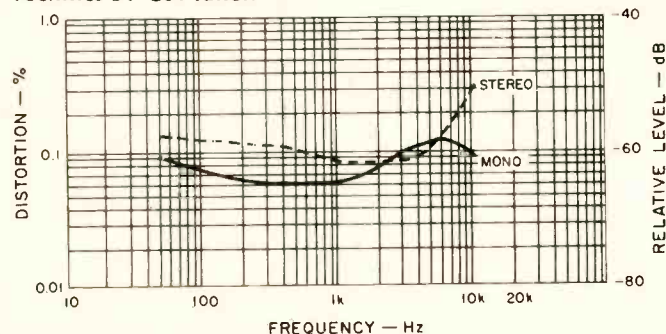
While no schematic diagram or circuit details concerning the ST-C01 were provided with the tuner, an examination of the inside of this small chassis discloses a neatly laid out circuit board onto which all parts are mounted, including the front end but with the exception of the small power transformer, a.c. switch, and a.c. line bypass components. As we suspected, parts density is no greater than might be expected in a conventionally sized tuner. The main p.c. board is

adequately labelled as to parts locations to facilitate servicing, if required. A three-gang tuning capacitor is used for FM, while the AM tuning function is accomplished by means of a two-section variable capacitor.

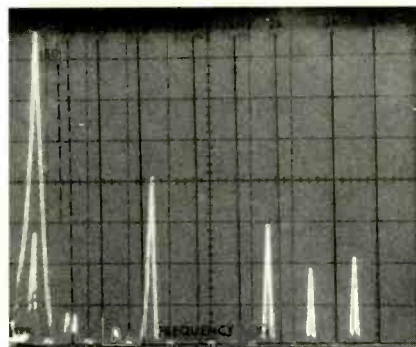
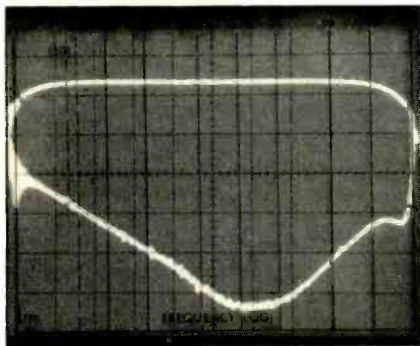
### Performance Measurements

Usable FM sensitivity in mono measured 14.1 dBf ( $2.8 \mu\text{V}$ ) as opposed to 10.8 dBf ( $1.8 \mu\text{V}$ ) claimed by Technics. 50-dB quieting, in mono, was  $3.9 \mu\text{V}$  (17.0 dBf), exactly as claimed. In stereo, usable sensitivity measured  $6.0 \mu\text{V}$  (20.8 dBf), while 50-dB quieting required input signal strengths of  $50 \mu\text{V}$  (39.2 dBf) as against  $45 \mu\text{V}$  (38.3 dBf) claimed by the manufacturer. In all probability, a minor bit of FM front-end alignment might have brought all of these sensitivity measurements into spec. With strong signals, signal-to-noise ratio in both mono and stereo exceeded the manufacturer's claims, with readings of 77.5 dB in mono and 72 dB in stereo—both very good figures for a tuner in this price category. Distortion readings (at 1 kHz) were also much better than claimed, measuring 0.065 percent in mono and 0.085 percent in stereo. Quieting and distortion characteristics of the FM tuner section are shown in the graphs of Fig. 1. It was interesting to find similar noise-quieting curves actually screened onto the metal top cover of the tuner itself. Recently, manufacturers of separates have taken to presenting performance graphs, block diagrams, and the like right on the metal top

Fig. 2 — Distortion vs. frequency response in the Technics ST-C01 tuner.



**Fig. 3 — Stereo FM frequency response and separation.**



**Fig. 4 — 5-kHz crosstalk components.**

covers of their products and Technics has gone along with the trend. I suppose that for the serious audiophile these graphic presentations provide some useful information; for the public at large they make the product look very "technical...."

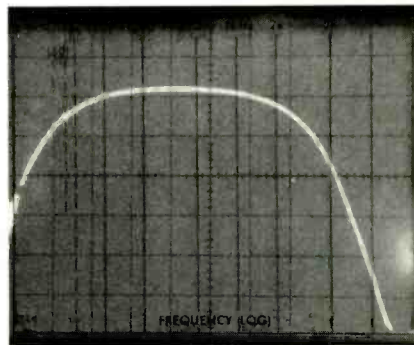
We plotted distortion versus frequency for both mono and stereo reception, and the results are shown in Fig. 2. At the other IHF-required test frequencies, distortion measured 0.075 percent at 100 Hz and 0.14 percent at 6 kHz for mono, while in stereo the THD figures were 0.13 percent at 100 Hz and 0.15 percent at 6 kHz, all very acceptable for a tuner in this category. Selectivity measured exactly 75 dB as claimed, and capture ratio was close enough to the claimed figure of 1.0 dB with observed readings of 1.1 dB. AM suppression measured 57 dB while image, i.f., and spurious rejection all exceeded published figures with readings of 53 dB, 86 dB, and 80 dB respectively.

We must mention the fact that the ultra-low distortion figures we read were obtained with the active-servo-lock feature defeated. With these variations on automatic frequency control, unless the set is absolutely perfectly aligned they can de-tune the unit by minute amounts instead of pulling it in to perfect center tuning. In the case of the sample Technics ST-C01 we tested, the error (with the automatic servo circuit on) was minimal, but did exist. For example, using that convenience circuit, THD at 1 kHz in mono rose from its excellent value of 0.065 percent to 0.1 percent—just at published specification.

With the aid of our spectrum analyzer, we plotted frequency response in the stereo mode, as well as stereo separation. Results are shown in the 'scope photo of Fig. 3. Response was well within specified limits from 30 Hz to 10 kHz but was down some 3 dB at 15 kHz. Stereo separation (represented by the lower trace in Fig. 3) measured 33 dB at 100 Hz, 52.5 dB at 1 kHz, and 35 dB at 10 kHz. Crosstalk was measured in accordance with the technique which we have developed and used during the past year or so. In Fig. 4, a 5-kHz "left-only" signal, at 100 percent modulation, is represented by the tall spike at the left of the screen, obtained by sweeping the spectrum analyzer while its input was connected to the left output jack. A second trace, obtained with the analyzer's input connected to the right-channel output, shows actual separation at 5 kHz (the lower-amplitude spike contained within the tall 5-kHz spike at left) to be around 45 dB. Additional spikes to the right clearly depict some crosstalk harmonic distortion components at 10 kHz and 15 kHz (sweep is linear, at 5 kHz per division, while vertical sensitivity is 10 dB per box), an unusually large 19-kHz pilot-carrier output (down approximately 40 dB compared to 100 percent modulation level), and, to the right of the screen, 33-kHz and 43-kHz sideband components, as well as a 38-kHz sub-carrier component nestled between them at a level of around 58 dB below 100 percent modulation level. The rather high sub-carrier output products, though not included in our earlier harmonic distortion readings (we use a bandpass filter with a cut-off at 15 kHz, as prescribed in the IHF Tuner Measurement Standards for THD, might have audible consequences

when trying to record FM programs onto a cassette recorder that utilizes relatively low bias frequencies or is not equipped with an MPX filter.

Frequency response of the AM tuner section was also plotted by means of the spectrum analyzer, swept logarithmically this time from 20 Hz to 20 kHz; results are reproduced in the 'scope photo of Fig. 5. As is true of most minimum-circuitry AM tuners found in high-fidelity tuners and receivers, response begins to roll off above 2 kHz.



**Fig. 5 — Frequency response in the AM section.**

### Summary and Listening Tests

Technics has managed to come up with a small tuner package which provides basic and adequate FM and stereo FM reception at a cost that does not penalize purchasers who crave the miniaturized format for their components. Reception using a directional outdoor FM antenna was more than adequate in our listening area, with quality of received programs limited primarily by program material being broadcast. Even 72 dB of signal-to-noise ratio is more effective dynamic range than is usually needed when tuning into current FM radio fare. I have only two minor criticisms of the ST-C01. First, I feel that some sort of signal-strength indicating device (be it a meter or even a series of LEDs) would have been helpful. Second (and this is my pet peeve with lower cost tuners and receivers), I do not care for the coupling of the muting function on the same switch with the mono/stereo selection function. I feel one should be able to enjoy (or defeat) the muting circuitry whether one is listening to stereo or mono. In the case of the ST-C01, I must admit that this last objection is not serious, since muting threshold was set at a nice low level (3.0  $\mu$ V, or 14.7 dBf), while stereo switching threshold occurs at approximately 6  $\mu$ V (20.8 dBf). Thus, in this case, my criticism is not related to inability to receive usable stereo signals while employing the muting feature, but rather the inability to utilize the muting feature when tuning for weak (or strong) mono FM signals.

In summary, the Technics ST-C01 is a quite competently designed tuner which offers good value for its price. Its performance compares favorably with standard-sized tuners costing as much — a characteristic which does not necessarily apply to all micro component categories that I have seen thus far.

Leonard Feldman

Enter No. 93 on Reader Service Card