

HEATHKIT TRANSISTORIZED AM/FM TUNER, MODEL AJ-43

High-quality tuners suitable for home music systems are increasingly expensive, particularly when they combine AM and FM facilities. In this transitional period between tube and transistor equipment, most purchasers of new equipment—either factory-built or in kit form—lean toward solid-state units, particularly for amplifiers. It has really only been during the last year that comparable transistorized tuners have appeared on the market, and there are still relatively few of them.

The Heathkit AJ-43 satisfies all of these criteria—it is both AM and FM-Stereo, it is fully transistorized, and still is not prohibitively expensive. Furthermore, it fulfills the desire of the experimentally inclined kit-builder enthusiast who prefers to build his own equipment, yet insists on good performance, attractive appearance, and assurance that his completed product will perform to his satisfaction.

While it is true that AM is not now as much in demand as FM, there are some areas where AM is the principal source of radio programs, and the additional cost of the AM section is not an appreciable amount, particularly in a kit.

Circuit Description

The AJ-43 is built up from four separate units—the FM “front end,” the FM

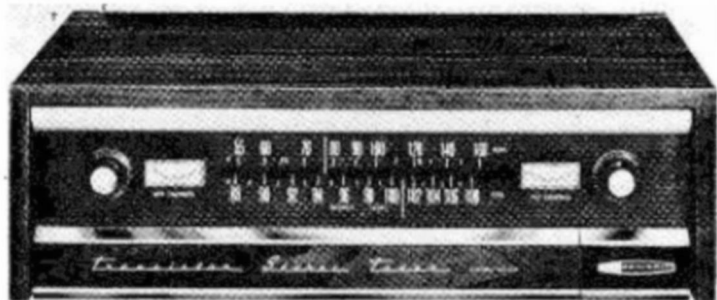


Fig. 3. Heathkit Transistorized AM/FM Tuner, Model AJ-43.

i.f. amplifier and detector, the multiplex circuit, and the AM section. The FM tuning unit is an assembled device employing three transistors, a 2N2495 as a grounded-base amplifier, tuned-circuit coupled to a 2N2654 mixer, and a 2N2671 oscillator, with a.f.c. being supplied by a voltage-variable diode capacitance which derives its controlling voltage from the detector circuit.

The i.f. section employs four AF114 transistors, three as amplifiers and the fourth as a limiter, with a.g.c. voltage being supplied by the latter. The ratio detector consists of two diodes in a conventional circuit. The varying emitter voltage of the limiter is used to actuate the FM tuning indicator. Like the tuning unit, the i.f. section comes already assembled.

The multiplex circuit must be assembled by the builder on the printed-wiring board furnished. It employs thirteen 2N2712's and one 2N408, the latter serving as the squelch amplifier. The signal from the detector is first amplified by one stage, then fed to an emitter-follower/tuned-collector in which the audio signal comes off at the emitter and the 19-ke pilot from the tuned circuit in the collector circuit. The 19-ke signal is amplified by the next stage and fed to the indicator light driver which actuates another transistor that turns on the 38-ke oscillator in the presence of the 19-ke pilot, which also synchronizes the oscillator. A switch on the rear apron removes the synchronizing signal to permit adjustment of the free-running 38-ke during alignment. The function of sub-carrier detection, which is actually a switching process, is provided by a pair of transistors with their bases fed by a 38-ke push-pull signal while the audio is fed to their emitters by an emitter-follower. The right and left signals appear on the respective collectors, and are amplified by a pair of conventional stages and fed to a pair of emitter-followers from which the output signals are derived. An SCA filter and a noise filter, both switchable, are provided in this circuit, and a switch ahead of the output stages connects them parallel and to the AM signal to provide outputs to both right and left amplifiers, thus avoiding the need for switch-

ing to mono in the control amplifier when listening to AM. A separate jack is provided for the AM output, however, so that both AM and FM programs may be received simultaneously.

The AM section consists of a tuned r.f. amplifier employing a 35070 transistor, followed by two T1364's as oscillator-mixer and i.f. amplifier. A diode serves as detector and a.v.c., and the resulting audio signal is fed through a 10-ke filter to a 2N2712 audio amplifier stage.

Power is furnished by two silicon rectifiers feeding an RC filter circuit, followed by a 9.1-volt zener diode, which stabilizes the voltage supplied to the entire tuner. A power-line FM antenna is provided by an r.f. transformer with one winding in series with the power transformer and the other winding being led to the FM signal switch, which has three positions—local, in which the only pick-up is from internal wiring; medium, which employs the power-line pick-up; and distant, which connects to an external antenna. A built-in ferrite rod serves as the AM antenna, although a terminal is also provided for an external AM antenna.

In appearance, the AJ-43 seems to be the essence of simplicity to the operator. At first glance, one sees only two knobs—the AM and FM tuning controls. The dial scales are separate, and a tuning meter is provided for each section. The power switch is actuated by pressing a short section of the sub-panel door. Four dial lights are located behind a plastic bezel above the dials, giving the general impression of a fluorescent-tube lighting strip. Upon opening the remainder of the hinged sub-panel, one encounters a number of controls and switches in this order: left channel level-set, right channel level-set, AM level-set, stereo balance control, stereo separation control, squelch control, stereo phasing control and switch, stereo noise switch and SCA filter switches, AM/FM selector switch, antenna switch, stereo converter switch (automatic or off), and a.f.c. defeat switch. On the rear apron are the two meter adjusting pots, the antenna terminal strip, the three output jacks, and the 38-ke alignment switch.

With all of this flexibility, this makes an ideal tuner for the home builder, since it is easily possible for all adjustments to be made with no additional equipment—which has long been one of the virtues of Heath kits. Nearly every one of their kits can be assembled and calibrated with no additional equipment whatsoever. (We can think of only one exception—an audio oscillator is needed to calibrate the IM distortion meter in the Audio Analyzer, in addition to the ones in the unit itself.)

Construction

Construction is comparatively simple, since the FM i.f. strip and the FM tuner are factory assembled, and the AM and MX sections are on printed-wiring boards which are well marked. We found that approximately 23 hours time brought us to the end of the construction, and another three hours sufficed to complete the adjustments, mainly in the multiplex circuitry. The instructions are exceptionally clear and accurate, and are well illustrated. A large part of the wiring is by an already-prepared cable harness which is simply dropped into place and the 62 wire ends soldered to the correct points. This saves a lot of time, and reasonable accuracy on the part of the builder is practically ensured.

Performance

Once the tuner is completed and aligned, it is a good performer, more than adequately sensitive for the majority of locations, and excellent in sound quality. FM sensitivity is rated at 1.5 μ V for 20 db of quieting on mono signals, and capture ratio is rated at 3 db. Channel separation is rated at 40 db up to 2000 cps, 30 db at 10,000 cps, and 20 db at 15,000. Hum and noise was measured as 54 db below 1 volt output, the rated value for both AM and FM sections.

Listening tests showed clean quality on both AM and FM, and the automatic stereo switching "turned on" stereo just as effectively as a switch, and also lighted up the stereo indicator light just under the dial scale. Recording stereo on a conventional tape machine showed no interference from the 38-ke switching frequency nor from its harmonics, which makes this a good choice when one plans to do any stereo recording off the air.

On the whole, the AJ-43 fills the bill for a reasonably-priced all-transistor tuner, with the saving in outlay which usually goes with kit construction. Equivalent factory-built tuners should most likely cost twice as much, and many do not have the extreme flexibility this one does.

The AJ-43 comes with a vinyl-covered steel case, but is also available as the AJ-43C with walnut cabinet at a small additional cost.

Circle 210

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