Double-tuned front end easily handles high signal levels
Revolutionary DDS principle for local oscillator
Variable bandwidth
IF filter prevents interference
Multipath reduction function
Digital FM detector keeps distortion and noise to a minimum
DS-DC achieves ideal stereo demodulation with DSP technology
MDS plus type D/A converter
20-station memories also store function settings
The ultimate FM stereo tuner — Latest RF technology and advanced digital processing techniques come together on the highest plane. All functions after the intermediate frequency (IF) stage are performed by DSP software, including the variable bandwidth IF filter, multipath reduction (MPR) function, digital FM detector and DS-DC stereo demodulator. Pulse tuning principle allows manual tuning and 20-station memory tuning. Digital output increases connection options.

The range of available program sources is getting ever more varied: Compact Discs, analog records, and net based music distribution, to name but a few. But the FM tuner still has a special role to play, since broadcasts cover the entire spectrum from live performances of time-honored classical works to the latest hits. The FM band provides a rich choice of music all day long. In addition, many local stations have recently come onto stage using the live broadcast medium to best advantage.

The T-1100 is a successor model to the highly praised T-1000. Thanks to a blend of latest RF circuit design with sophisticated digital signal processing implemented by a high-speed, high-precision DSP chip, it has become possible to move most major functions of the tuner into the digital domain without sacrificing performance or sound quality. Audiophiles and music lovers can now enjoy FM stereo at its best.

The newly developed front end features a double-tuned circuit that optimizes sensitivity and selectivity, as well as the revolutionary DDS (Direct Digital Synthesis) principle for the local oscillator. All functions after the intermediate frequency (IF) stage are implemented using digital signal processing in completely new and innovative ways. This comprises the variable bandwidth IF filter, multipath reduction function, digital FM detector and DS-DC stereo demodulator. The result is an FM tuner unlike any other, offering further enhanced performance and sound quality. Other attractive features include a 20-station memory, a coaxial output for digital signal connection, two sets of line and balanced analog outputs, and a supplied Remote Commander for operation convenience. In sum, this is a lavishly designed FM tuner that will meet and surpass even the highest expectations.

Coils used in double-tuned circuits

### Variable Bandwidth IF Filter Improves Interference Performance

The IF BANDWIDTH selector of the T-1100 provides a choice of six settings (50, 75, 100, 150, 250, 500 kHz). Normally, a wider bandwidth setting is preferable in terms of performance characteristics, but by restricting the bandwidth, noise can be reduced in certain situations, making it easier to obtain a good quality signal from a station affected by interference from a strong adjacent station.

The variable bandwidth IF filter is implemented using a FIR (Finite Impulse Response) type digital filter with perfectly linear phase characteristics, thereby eliminating the phase shift that can occur with conventional IF bandwidth filters.

### DDS (Direct Digital Synthesis)

The signal from the antenna input is routed to an RF amplifier and then mixed with the signal from a local oscillator for conversion into the intermediate frequency (IF). The local oscillator here is a highly advanced DDS (Direct Digital Synthesis) circuit.

- The output of a quartz oscillator is supplied to the frequency divider to create the timing (namely the sampling frequency) with which the sine wave data are read out.
- Using this sampling frequency, the sine wave data are read in the D/A converter to create the analog waveform output.
- Because there is no feedback loop, the frequency purity of the D/A converter output can be kept identical to that of the quartz oscillator.

### Double-Tuned Front End Eliminates Problems With High Input Signal Levels

- An attenuator in the input stage enables the tuner to operate at its optimum point also when input levels are extremely high, such as in the vicinity of a broadcast tower or when using a cable network.
- Two-stage double-tuned front end eliminates intermodulation distortion with strong signals.
- Dual-gate MOS-FETs in the RF amplifier stage ensure excellent third-order intermodulation characteristics.
- Two-stage double-balanced mixer suppresses undesired signal components.
- Revolutionary DDS local oscillator achieves amazing S/N ratio.

### Multipath Reduction Function (MPR) Minimizes Reflections

Multipath reception refers to a condition where the same broadcast signal reaches the antenna via several different propagation routes. In the case of FM, this occurs when the signal travels to the antenna in a straight line, but is also reflected and therefore slightly delayed by buildings, mountains or other tall obstructions. When the direct waves and reflected waves are received together, distortion and noise occur.

The high-speed, high-precision DSP chip in the T-1100 makes it possible to perform multipath reduction (MPR) through signal processing that effectively suppresses the harmful reflected components. This technique which is based on adaptive filtering principles ensures that only the desirable direct wave components are received, resulting in high-quality audio output.

### Ideal Digital FM Demodulator Principle

The FM demodulator circuit is a crucial component that has a significant effect on distortion and noise characteristics of the tuner’s audio output. In the T-1100, the imaginary part of the digitized FM signal is divided by the real part to extract the tangent of the phase angle ($\theta$). By calculating the arctangent from this, the phase angle can be determined. Differentiation is then used to obtain the time variation resulting in the FM demodulated output (audio output).
DS-DC (Direct Synthesis ▸ Double Cancellation)

DS-DC principle with DSP ensures ideal stereo demodulation for amazing channel separation

The stereo demodulator in the T-1100 features another Accuphase innovation called DS-DC (Direct Synthesis – Double Cancellation). The demodulator comprises the two technologies described below. Since all operations are carried out through software-based algorithms in Digital Signal Processor, ideal demodulation performance can be achieved, resulting in previously unheard-of channel separation.

1. **Pilot Tone Direct Synthesis**
   A conventional FM tuner uses a PLL circuit to extract the pilot tone and obtain the frequency and phase components from the input signal (stereo-modulated signal). If the level of the pilot tone decreases, noise will be heard and stereo separation becomes extremely poor.
   With DS-DC, the waveform of the pilot tone in the input signal is identified as is* and generated directly by the DSP arithmetic. Therefore the pilot tone can be extracted reliably even when a high level of noise is present. Impressive stereo separation can be achieved even when the pilot tone level is low.

2. **Crosstalk Double Cancellation**
   After the input signal has been separated into the left and right components, the circuit eliminates crosstalk using a dual approach that also takes phase components into consideration. The result is extremely thorough left/right separation.

Supplied Remote Commander RC-410
Provides access to all functions of the tuner (except power switching), as well as (Accuphase) amplifier volume control.

Intermediate frequency (IF) signal from front end is digitized by high-precision A/D converter

Functions after intermediate frequency (IF) stage (variable bandwidth IF filter, multipath reduction, digital FM detector, DS-DC stereo demodulator) are performed through fully digital signal processing by a high-speed, high-accuracy DSP chip, providing drastically improved performance. The end result is an FM tuner of the highest order.

DS-DC Type Stereo Demodulator Circuit
Versatile Array of Functions

- 20-station memory with all function settings
- Accuphase original pulse tuning system provides traditional manual tuning feel
- Confirmation beep when operating tuning knob and function buttons
- High-quality digital output connector (coaxial)
- MUTE button allows turning muting ON or OFF during tuning
- MODE button allows selection of desired reception mode
  1. STEREO: Normal stereo reception
  2. BLEND: Left and right signals are mixed, to reduce noise particularly in the upper frequency range
  3. MONO: Stereo broadcast reception forced to monophonic

Attenuator function for reducing input level
- LOCAL: Attenuator ON

Meter for monitoring signal status
- Signal strength as well as multipath condition and effect of multipath reduction (MPR) can be verified.

Frequency range and tuning step width

- Model for Europe: 87.50 MHz - 108.00 MHz (in 50-kHz steps)
- Model for USA: 87.5 MHz - 108.00 MHz (in 100-kHz steps)

Monophonic

- Sensitivity
  - Usable sensitivity: 11 dB
  - S/N 50 dB quieting sensitivity: 17 dB
- S/N ratio (80 dB input, A-weighted): 90 dB
- Total harmonic distortion
  - (80 dB input, ±75 kHz deviation): 0.02 %
  - 1 kHz: 0.02 %
  - 10 kHz: 0.02 %
- Intermodulation distortion
  - (80 dB input, ±75 kHz deviation): 0.01 %
- Frequency response: 10~15,000 Hz +0 ~ -2.0 dB
- Capture ratio: 1.5 dB
- RF intermodulation: 80 dB
- Spurious response rejection: 120 dB
- Image rejection: 100 dB

Stereo

- Sensitivity
  - S/N 40 dB quieting sensitivity: 29 dB
  - S/N 50 dB quieting sensitivity: 37 dB
- S/N ratio (80 dB input, A-weighted): 85 dB
- Total harmonic distortion (80 dB input, ±75 kHz deviation)
  - 20 Hz: 0.04 %
  - 1 kHz: 0.04 %
  - 10 kHz: 0.04 %
- Intermodulation distortion (80 dB input, ±75 kHz deviation): 0.03 %
- Frequency response: 10~15,000 Hz +0 ~ -2.0 dB
- Stereo separation: 100 Hz 60 dB
  - 1 kHz: 60 dB
  - 10 kHz: 50 dB
- Stereo trigger level: 21 dB
- Subcarrier suppression ratio: 70 dB

Alternate channel selectivity

- Intermediate signal
  - Selectivity
    - 600 Hz: 70 dB
    - 300 kHz: 30 dB
    - 200 kHz: 10 dB
- AM suppression (65 dB input): 80 dB
- Output voltage (±75 kHz deviation): 1.0 V

Antenna input
- 75-ohm coaxial (F type connector)
- Standing wave ratio: 1.5
- Tuning principle: DDS synthesizer tuning
- FM detection principle: Digital FM demodulation principle
- Stereo demodulation principle: DS-DC
- Digital output (IEC60958): COAXIAL: 0.5 V±p-p 75 ohms
- Sampling frequency: 48 kHz/24 bits
- Output impedance
  - BALANCED (XLR type connector): 100 ohms (50 ohms/50 ohms)
  - LINE (unbalanced): 50 ohms
- Meter
  - Signal strength/multipath switchable
- Power requirements
  - AC 120 V/230 V, 50/60 Hz
  - (Voltage as indicated on rear panel)
- Power consumption: 20 W
- Maximum Dimensions
  - Width: 465 mm (18-5/16”)
  - Height: 140 mm (5-1/2”)
  - Depth: 406 mm (16-0”)
- Weight: 13.0 kg (28.7 lbs) net
  - 19.0 kg (41.9 lbs) in shipping carton

Notes
- An FM antenna is required to use the T-1100. Please consult your dealer regarding antenna installation.
- In residences with shared antenna systems, confirm that the antenna outlet carries FM signals.
- A 75-ohm coaxial cable with F type plug for the antenna connection.
- The specifications and appearance of this product are subject to change without notice.

Supplied accessories:
- AC power cord
- Audio cable with plugs (1 m)
- Remote Commander RC-410

Front panel

- LED indicators
  - METER MPR IF BAND WIDTH
  - STEREO/BLEND/MONO
  - LOCAL/DISTANCE
  - STEREO/BLEND/MONO
  - Memory set button
  - Station buttons (20 stations)
  - Antenna input connector (F type)
  - Phase selector for balanced output
  - Analog output connectors BALANCED LINE
  - Digital output connector COAXIAL
  - AC power connector (for supplied power cord)

Rear panel

- Power switch
- Antenna input connector (F type)
- Meter
- Memory set button
- Multipath reduction (MPR) ON/OFF button
- RF intermodulation
- Subcarrier suppression ratio

Remarks
- This product is available in versions for 120/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.
- The shape of the AC inlet and plug of the supplied power cord depends on the voltage rating and destination country.
- The reception frequency range, number of display digits, and tuning frequency steps differ in models for different countries. The antenna connector may also be an IEC type or F type connector. Please verify that you have the correct model for your area.

T-1100 Guaranteed Specifications

[Guaranteed specifications are measured according to EIA standard RS-496]