DDS FM STEREO TUNER
T-1300

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Accuphase has been continuously producing FM tuners for more than 50 years since the T-100 was introduced in 1973. This new ”DDS FM Stereo tuner T-1300” is the successor model of T-1200 launched in 2018.

Using a blend of Accuphase traditional RF circuit design with sophisticated digital signal processing, ”Variable bandwidth IF filter”, “Multipath reduction”, “Digital FM detector”, and “DS-DC stereo demodulator” have been moved to software on the DSP chip.

Combining outstanding high-frequency analog technology with the latest digital technology, the new products dramatically improve sensitivity and noise characteristics across all models.

Enjoy the reality that makes you feel as if a broadcasting station has appeared right in front of your eyes, and the immersive feeling that only analog broadcasting can provide.

Front View

- New panel design brings gorgeous looking

Long and Heavy
Bridge for quietness

Front View

Signal / Multipath Meter

Gold Ring

Digital Output

Rear View

Analog Outputs

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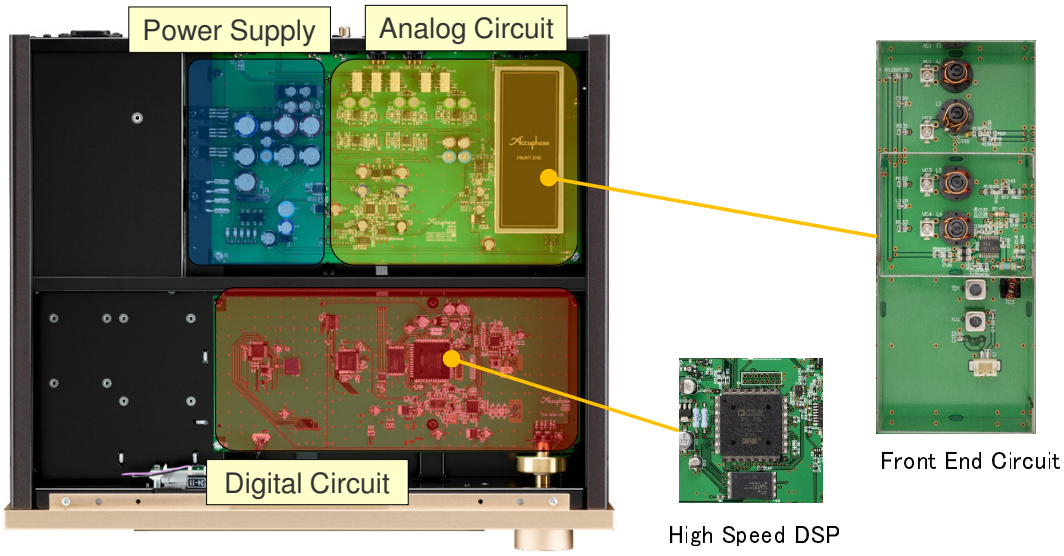
The basic design follows that of the T-1200, but the S-meter and various indicators have been greatly improved in terms of visibility. In addition, gold rings around the tuning knob and button layout designed for ease of use create an elegant atmosphere.

In addition to the antenna input, the rear panel has one balanced output, one line output, and one digital output each, providing all the inputs and outputs necessary for FM reception.

Internal view

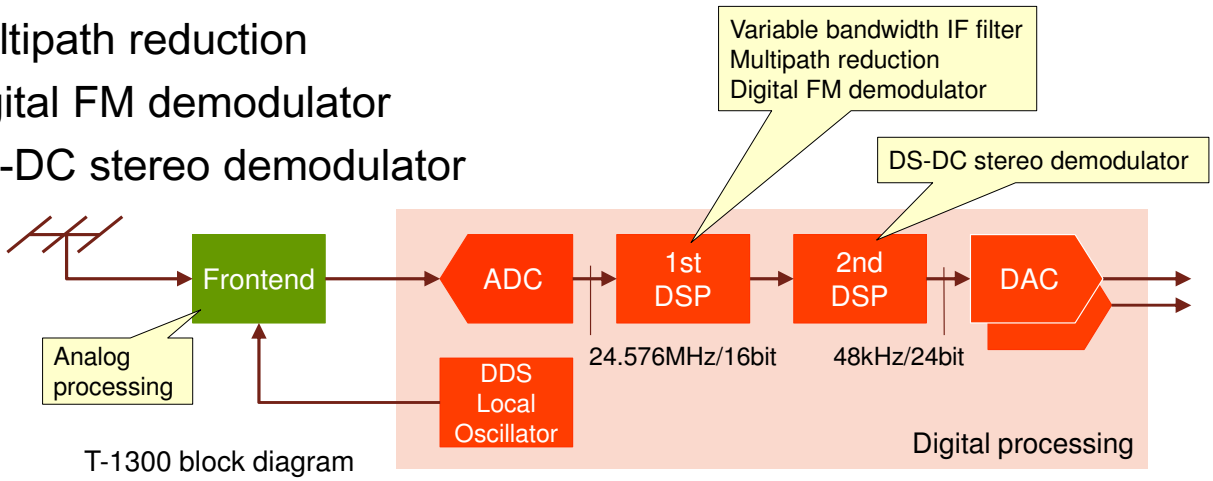
- Completely separated circuit layout & solid construction



The internal structure is completely independent of the digital and analog sections to prevent mutual interference. Grounding, which is an important element of high-frequency circuits, is carefully patterned to suppress not only mutual interference with external devices but also interference between circuits within the equipment.

Technical features

- Full digital processing after Front End Circuit
  - Variable bandwidth IF filter
  - Multipath reduction
  - Digital FM demodulator
  - DS-DC stereo demodulator



T-1300 block diagram

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Only the front end is an analog circuit, and it selects and amplifies the weak radio signals is analog circuit. After the front end, all circuits including local Oscillator are digital signal processing.

Digital signal processing section consists of 2 pcs of DSP. 40bit floating- point processor ADSP-21369(Analog Devices) is used as 1st DSP, and it performs “Variable bandwidth IF filter”, “Multipath reduction”, “Digital FM demodulator”.
2nd DSP is TMS320F2810(TI), and it is used as a ”DS-DC stereo demodulator”.

High sensitivity & High S/N ratio (Monophonic)

- Low noise receiving quality in weak radio waves

Performance comparison (Actual usable sensitivity and S/N in Monophonic)

	T-1300	T-1200
Usable sensitivity	1.5dBμV	6.5dBμV
S/N ratio	95dB	93dB

As a result of a thorough review of the high-frequency front-end circuit, the most sensitive part for improving electrical performance, the sensitivity was improved by more than 4 dB, and the noise index, S/N, by 2 dB compared to T-1200.

High sensitivity & High S/N ratio (Stereo)

- Low noise receiving quality in weak radio waves

Performance comparison (Actual S/N 50dB quieting sensitivity in STEREO)

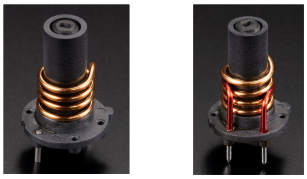
	T-1300	T-1200
S/N 50dB quieting sensitivity	27.5dBμV	30.0dBμV
S/N ratio	79.5dB	76.5dB

The T-1300's superiority remains unchanged when receiving stereo broadcasts.
The sensitivity in 50dB S/N is improved by 4 dB, and the S/N, by 3 dB compared to T-1200 models.

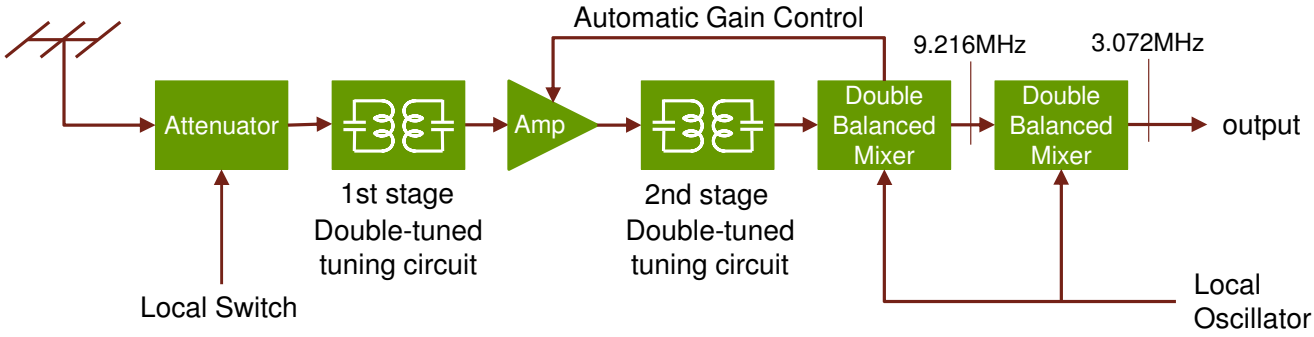
This enables clear listening to broadcast stations that could not be received in the past because they were buried in noise.

Front end circuit

- RF attenuator
- Two-stage Double-tuned turning circuit
- Automatic Gain Control
- Double Super-heterodyne



Space Winded Coils



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The front end in FM tuner just picks out and amplifies the desired station signal from many others coming from the antenna, and converts it to the intermediate frequency.

It is very important to decide the characteristics like receiving sensitivity or selectivity.

・RF attenuator
It works to handle the broadcast stations with strong electric intensity while suppressing interference or cross-modulation.

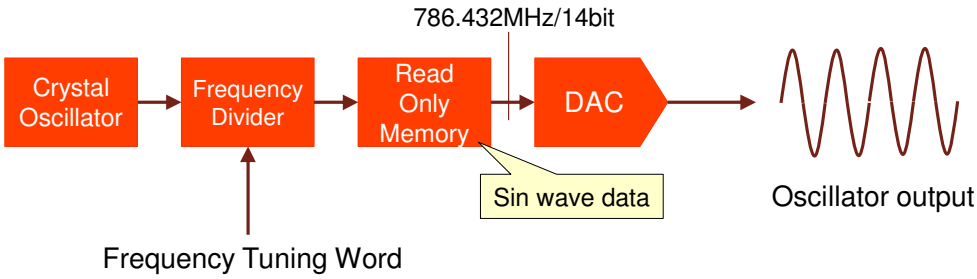
・Two-stage double-tuned turning circuit
It achieves both excellent selectivity and low cross-modulation distortion.

・Automatic Gain Control
It optimizes the RF Amplifier gain according to antenna input level.

・Double Super heterodyne
With 2-step frequencies conversion, it blocks the interference signal and optimally converts the frequencies for the A/D converter at next stage.

DDS(Direct Digital Synthesis) local oscillator

- The high purity signal is provided than PLL
  - DDS oscillator has no feedback loop, therefore, highly pure oscillator output can be obtained



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Generally, PLL(Phase Locked Loop) circuit is used for a local oscillator. In a conventional PLL circuit, feedback is used to stabilize the frequency, but this produces frequency modulation components that tend to degrade tuner's noise characteristics.

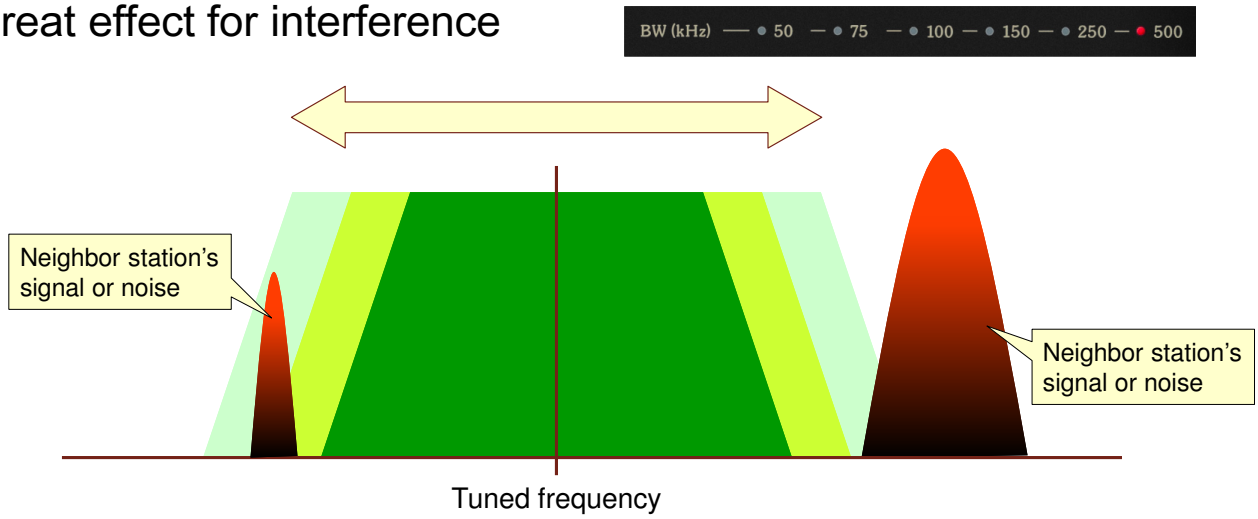
The local oscillator in the T-1300 is a DDS(Direct Digital Synthesis) circuit.

With DDS, the output of a quartz oscillator is divided to adjust the timing that governs the readout of data, and creates the sine wave. There is no feedback loop, the frequency purity of the quartz oscillator is maintained as it is until the output.

T-1300's outstanding low noise characteristic is created by this revolutionary circuit.

Variable bandwidth IF filter

- 6 selectable bandwidth IF filter
  - Great effect for interference



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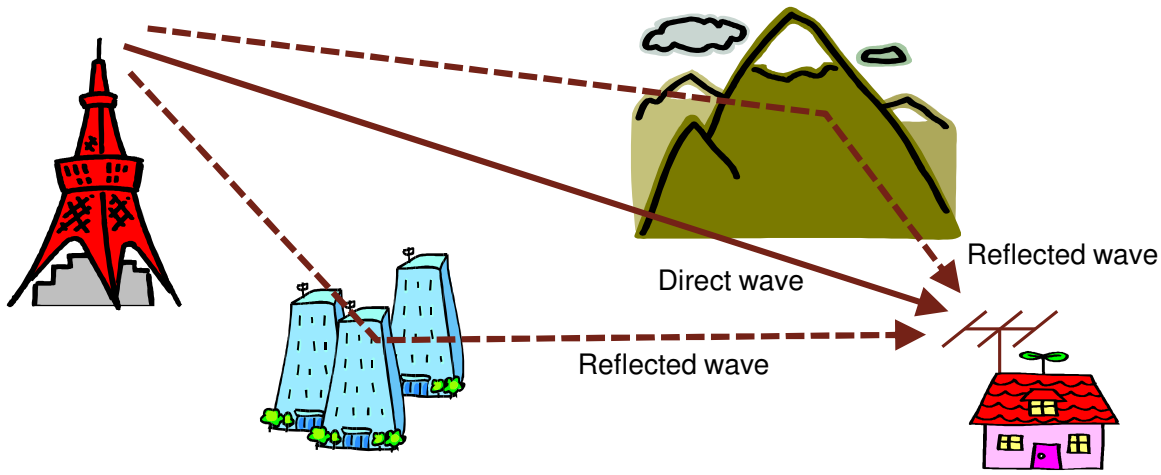
Variable bandwidth IF filter reduces the influence of noise or neighbor station's signal.
It allows the user to obtain a good quality signal from a station affected by interference from a strong adjacent station.

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

MPR: Multipath Reduction

- MPR reduces the distortion and noise by reflection waves
  - Great effect for interference



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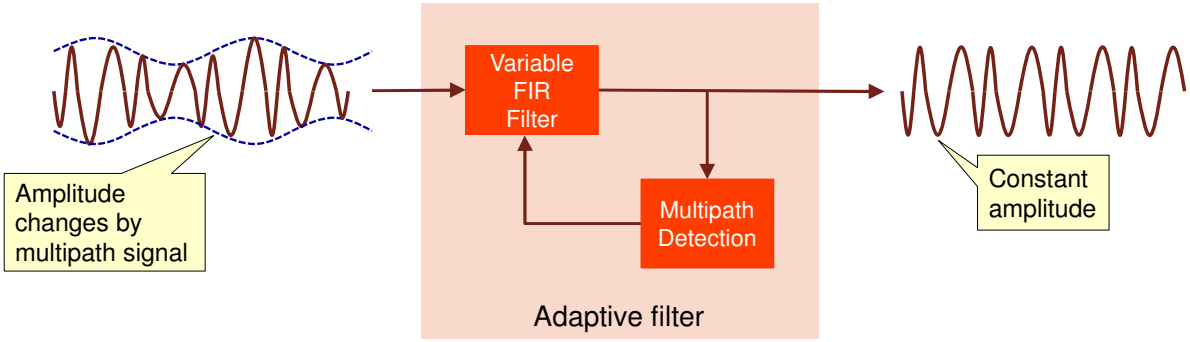
Multipath reception refers to a condition where the same broadcast signal reaches the antenna via several different propagation routes.

When the direct wave and reflected waves are received together, distortion and noise occur.

MPR(Multipath Reduction) is an innovative technology that effectively suppresses the harmful reflected waves, and resulting in high-quality audio output without multipath.

Block diagram of MPR

- MPR applies Adaptive Filter technology

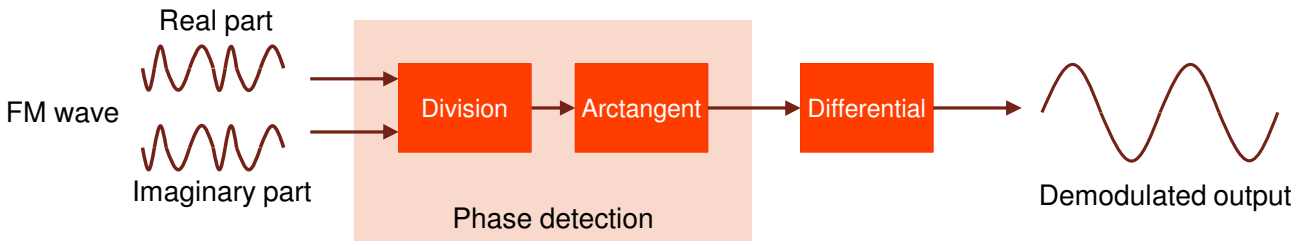


MPR applies the adaptive filter technology that transforms the filter shape to minimize multipath.

MPR function is based on high-speed, high-precision signal processing by 40bit floating point DSP chip.

Digital FM demodulation

- FM demodulation by numerical processing
  - Keeps distortion and noise to a minimum

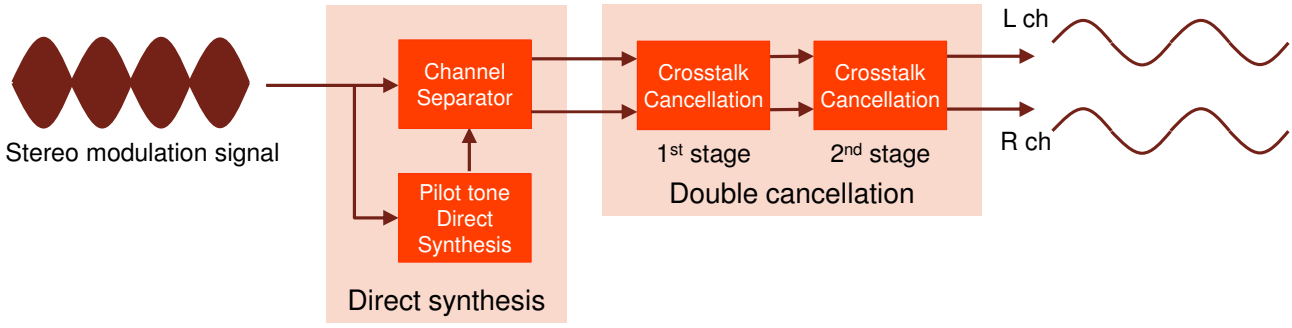


FM demodulator circuit is also based on 40bit floating point DSP chip precisely calculating the theoretical formula to demodulate the FM signal.

Therefore, it enables the ideal FM demodulation with no distortion and noise.

DS-DC stereo demodulator

- DS-DC: Direct Synthesis – Double Cancellation
  – amazing stereo separation



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DS-DC is an Accuphase original stereo demodulation technology which achieves amazing stereo separation.

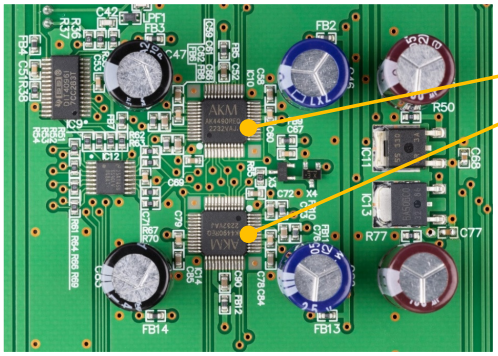
DS-DC comprises the two technologies described below.

・Pilot Tone Direct Synthesis
With DS-DC, 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.

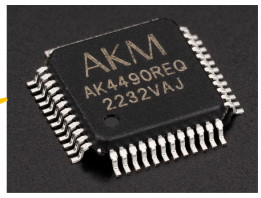
・Crosstalk Double Cancellation
After the input signal has been separated into the left and right components, the circuit eliminates crosstalk using a dual approach that also takes phase shift into consideration.
The result is extremely thorough left/right separation.

D/A converter

- Paralleled D/A converters per channel
  - Featured AK4490REQ(AKM Corporation)
  - MDS(Multiple Delta Sigma) architecture



D/A Conversion circuit



AK4490REQ
D/A Converter

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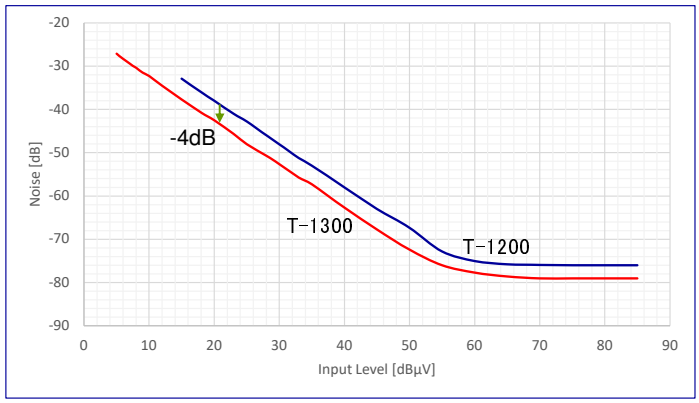
For the D/A converter section, Accuphase updates the DAC chip to Asahi Kasei Micro Electronics' Premium DAC AK4490REQ for T-1300.
This is AKM's latest chip, which converts the demodulated digital signal from the DSP to an analog signal with high accuracy.

AK4490REQ has 2 DACs inside, and T-1300 contains 2 DACs connected in parallel per channel with Accuphase's unique technology, MDS (Multiple Delta Sigma) conversion system.

Ultra low noise performance

- Approximately 4dB higher S/N at the same input level
  – S/N : 92dB guarantee



SN Ratio in stereo

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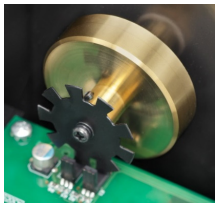
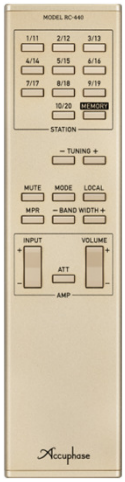
Ultra Low Noise is one of the main technical features of T-1300.

Compared to the T-1200 in stereo receiving, the T-1200 provides approximately 4 dB higher S/N at the same field strength. The low noise performance, independent of radio field strength, allows the user to concentrate on music with virtually no background noise.

Further more …

- Pulse tuning system
  - Traditional manual tuning feel
- High-quality remote commander





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Accuphase original pulse tuning system provides traditional manual tuning feel.

T-1300 is equipped with a digital output connector to output the high-quality broadcasts before D/A conversion.

It also comes with a newly developed remote commander that focuses on the feel of the buttons.