Accuphase

DDS FM STEREO TUNER

T-1300

● Double-tuned front end easily handles high level interference signals ● High-precision DDS principle for local oscillator ● Variable bandwidth IF filter prevents interference ● Multipath reduction function ● Digital FM demodulator keeps distortion and noise to a minimum ● DS-DC achieves ideal stereo demodulation with DSP technology ● MDS type D/A converter ● Memory buttons give quick access to 20 stations

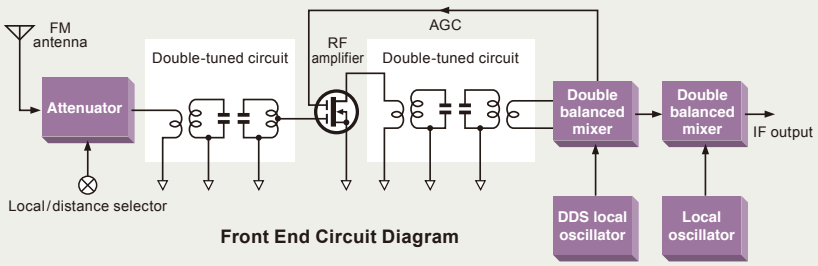
Experience peace of mind with the T-1300 FM stereo tuner

The T-1300 blends the latest in RF circuit design with sophisticated digital signal processing to create an exceptional FM stereo tuner. The DSP applies a variable bandwidth IF filter, multipath reduction, digital FM demodulator, and DS-DC stereo demodulation after the intermediate frequency stage to achieve unprecedented reception characteristics. The large-size tuning knob offers manual station selection to compliment the 20 station memory slots. Enjoy effortless FM broadcast reception and high quality sound with the T-1300.

Innovation – At the leading edge of technology

Double-tuned front end easily handles high level interference signals

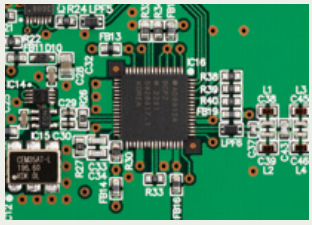
The front end not only must provide selectivity for weak radio signals, it also needs to competently handle broadcast stations with strong field strength and convert the signal to the intermediate frequency (IF) while suppressing interference and distortion. The T-1300 performs these tasks brilliantly, thanks to a double-tuned circuit with excellent selectivity characteristics, placed before the RF amplification stage. This proactively prevents intermodulation distortion and blocking which can otherwise occur with strong input signals. The circuit's two-stage design further bolsters performance, resulting in excellent sensitivity and selectivity. The double-balanced mixer with differential input also employs a two-stage topology, forming a double superheterodyne circuit that reliably blocks any type of interference signal before IF conversion.

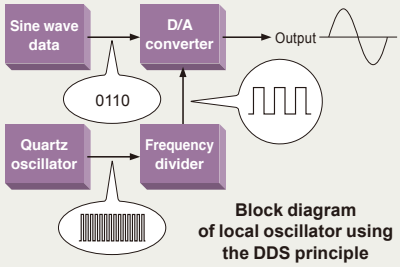


Front End Circuit Diagram

Revolutionary DDS (Direct Digital Synthesis) principle in the local oscillator

The mixer combines the signal from the antenna input with the signal from a local oscillator for conversion into the intermediate frequency (IF). The local oscillator in the T-1300 is a DDS (Direct Digital Synthesis) circuit. Conventional PLL (Phase Locked Loop) circuits use feedback to stabilize the frequency, but this produces frequency modulation components that tend to degrade the S/N ratio. With DDS, however, the output of a quartz oscillator is divided to create the digital signal timing that governs the readout of sine wave data and the operation of the D/A converter, which then produces the analog waveform output. Because there are no frequency modulation components, this revolutionary circuit configuration creates an extremely pure signal with an outstanding S/N ratio.

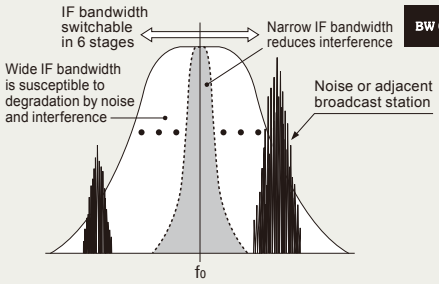

DDS local oscillator



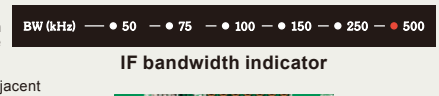
Block diagram of local oscillator using the DDS principle

Variable bandwidth IF filter prevents interference

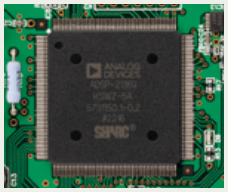
The T-1300's bandwidth selector provides a choice of six settings (50, 75, 100, 150, 250, 500 kHz). Normally, a wider bandwidth setting is preferable in terms of performance characteristics, but restricting the bandwidth can reduce noise in certain situations, making it easier to obtain a quality signal from a station highly affected by interference from an 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.



Variable bandwidth IF filter

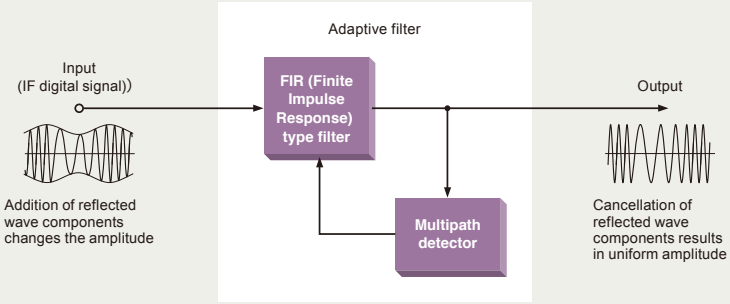


IF bandwidth indicator


Floating point digital signal processor (DSP) chip

Multipath reduction (MPR) function minimizes reflections

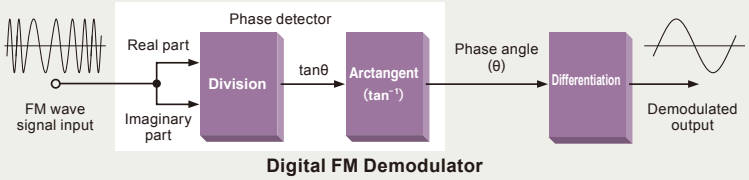
Multipath reception refers to a condition where the same broadcast signal reaches the antenna via several different propagation routes. With FM broadcasts, this occurs when the signal travels to the antenna in a straight line, but is also reflected and therefore slightly delayed by buildings, mountains, 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-1300 makes it possible to perform highly accurate multipath reduction (MPR) through signal processing that effectively suppresses the harmful reflected components. This technique, which is based on adaptive filtering principles, greatly reduces reflected wave components and ensures that only the desirable direct wave components are received, resulting in high-quality audio output.



Multipath reduction function

Digital FM demodulator keeps distortion and noise to a minimum

The FM demodulator circuit is a crucial component that significantly affects the distortion and noise characteristics of the tuner's audio output. In the T-1300, the imaginary part of the digitized FM signal is divided by the real part to extract the tangent of the phase angle (θ). By calculating the arctangent from this, the phase angle can be determined. Differentiation is then used to obtain the time variation of the phase angle resulting in the FM demodulated output (audio output).



Digital FM Demodulator

Memory slots for 20 stations

The station buttons make it easy to store and recall up to 20 broadcast stations. The settings for MUTE, MODE, LOCAL, MPR and BANDWIDTH are also stored at the same time, making it possible for example to memorize different settings for various reception conditions and instantly access them as needed.

Functionality – Convenience that makes sense

❶ MUTE button eliminates inter-station noise.
❷ MODE button allows selection of Stereo / Blend / Mono.
❸ LOCAL button enables attenuation of excessive antenna input levels.
❹ MULTIPATH REDUCTION button improves reception of direct waves by suppressing reflected waves.
❺ METER button switches between signal indication and multipath indication.
❻ MEMORY button assigns stations to the STATION buttons.
❼ STATION buttons provide direct access for up to 20 stations.
❽ BANDWIDTH knob helps reduce interference from adjacent stations.

DS-DC achieves ideal stereo demodulation with DSP technology

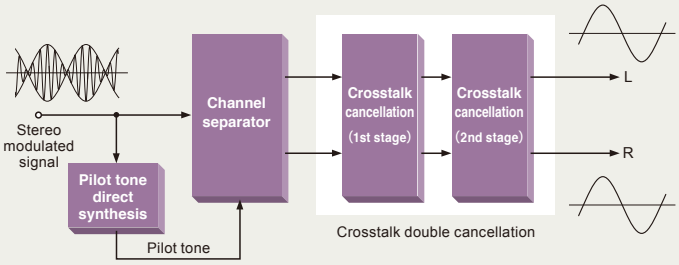
The stereo demodulator in the T-1300 features a principle called DS-DC (Direct Synthesis – Double Cancellation). The demodulator comprises the two technologies described below. Since all operations are carried out in the digital domain through software-based algorithms in the DSP chip, ideal stereo demodulation performance can be achieved, resulting in amazingly high channel separation.

❶ 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 in the presence of high noise levels.

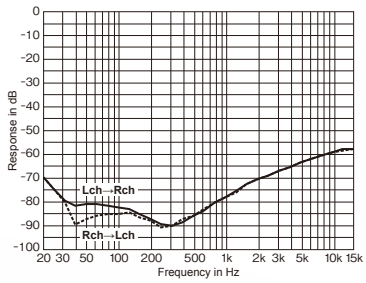
❷ Crosstalk Double Cancellation

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.



DS-DC type stereo demodulator circuit

DSP chip for DS-DC



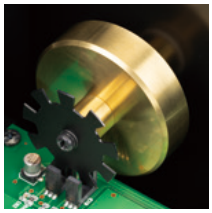
Crosstalk characteristics

Supplied Remote Commander RC-440

Can also operate preamplifiers and integrated stereo amplifiers.

- **MDS type D/A converter**
- **Station buttons give quick access to 20 broadcast stations**
- **Accuphase original pulse tuning system provides the feel of traditional manual tuning**
- **Confirmation beep when operating tuning knob and function buttons**
- **High-quality digital output connector (coaxial)**
- **Attenuator function for reducing antenna input level**
- **Muting circuit eliminates inter-station noise**
- **Balanced and Line analog outputs using Direct Balanced Filter circuit**
- **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 mode



Pulse tuning system

Digital output connector

MODE indicator

Meter for monitoring signal status

The meter provides a clear visual indication of the signal (signal strength) and multipath distortion (reflected wave amplitude).

Signal strength indication ⟷ Multipath indication

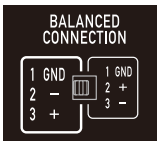
Multipath reduction function

This sophisticated function effectively suppresses problems caused by multipath reception.

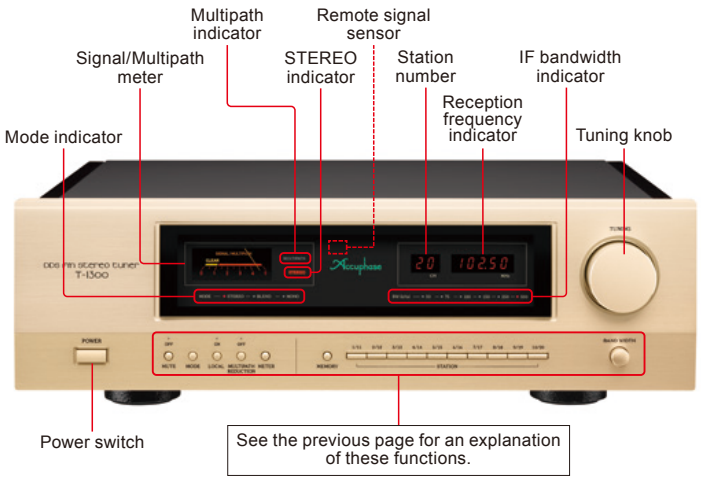
Multipath reduction OFF ⟷ Multipath reduction ON

Balanced output polarity selector

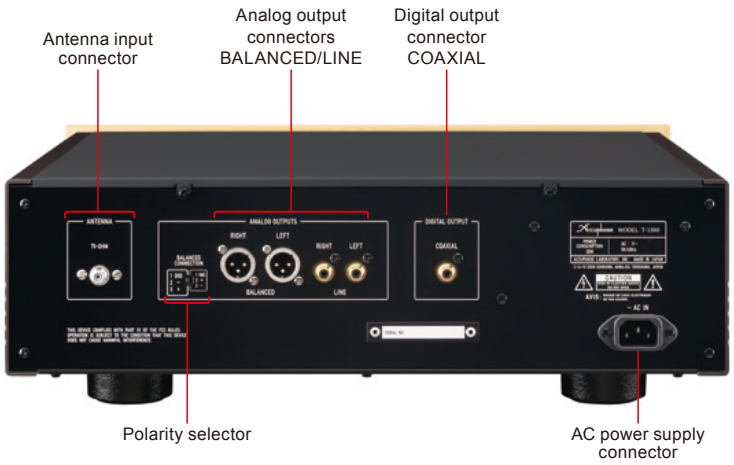
- The default switch position at the time of shipment is as shown here (pin 3 +).
- Sliding the switch to the right selects the "pin 2 +" position.



Front Panel



Rear Panel



T-1300 Guaranteed Specifications

Monophonic		
Sensitivity	Usable sensitivity	5 dBμV
	S/N 50 dB quieting sensitivity	9 dBμV
S/N Ratio (85 dBμV input, A-weighted)	94 dB	
Total Harmonic Distortion (85 dBμV input, ±75 kHz deviation)	20 Hz	0.02 %
	1 kHz	0.02 %
	10 kHz	0.02 %
Frequency Response (10 to 15,000 Hz)	+0, –1.0 dB	
Alternate Channel Selectivity (IF bandwidth 250 kHz)	Interference signal	Selectivity
	300 kHz	50 dB
Capture Ratio	1.5 dB	
RF Intermodulation	80 dB	
Spurious Response Rejection	120 dB	
Image Rejection	100 dB	
AM Suppression (70 dBμV input)	80 dB	
Rated Output Voltage (±75 kHz deviation)	1.0 V	

Stereo		
Sensitivity	S/N 40 dB quieting sensitivity	18 dBμV
	S/N 50 dB quieting sensitivity	30 dBμV
S/N Ratio (85 dBμV input, A-weighted)	78 dB	
Total Harmonic Distortion (85 dBμV input, ±75 kHz deviation)	20 Hz	0.04 %
	1 kHz	0.04 %
	10 kHz	0.04 %
Frequency Response (10 to 15,000 Hz)	+0, –1.0 dB	
Stereo Separation	100 Hz	65 dB
	1 kHz	65 dB
	10 kHz	50 dB
Stereo Trigger Level	9 dBμV	
Subcarrier Suppression Ratio	70 dB	

General		
Reception frequency range	87.5 to 108.0 MHz The tuning step width depends on the destination country.	
Antenna Input	75-ohm coaxial (F-type connector)	
Standing Wave Ratio	1.5	
Tuning Principle	DDS synthesizer tuning	
	20-station random memory tuning	
Variable Bandwidth IF Filter	50 kHz, 75 kHz, 100 kHz, 150 kHz, 250 kHz, 500 kHz switchable	
FM Detection Principle	Digital FM demodulator	
Stereo Demodulation Principle	DS-DC	
Digital Output (75-ohm coaxial)	IEC 60958/AES-3 compliant	
	Sampling Frequency: 48 kHz/24-bit	
Output Impedance	BALANCED	50 ohms
	LINE	50 ohms
Meter	Signal/Multipath switching	
Power Requirements	120 V, 220 V, 230 V AC (voltage as indicated on rear panel), 50/60 Hz	
Power Consumption	20 W	
Maximum Dimensions	Width 465 mm (18.30") × Height 151 mm (5.96") × Depth 406 mm (16.00")	
Mass	13.1 kg (28.9 lbs) net	
	19 kg (42 lbs) in shipping carton	

● Measurements for Guaranteed Specifications were obtained in accordance with JEITA CP-1301A and JIS C 6102-3 standards.

Supplied accessories

● **AC power cord (2 m)** ● **Audio cable AL-10 (1 m)** ● **Remote Commander RC-440**

- An FM antenna is required to use the T-1300. Please consult with your dealer about antenna installation.
- Residences with shared antenna systems should confirm that the antenna outlet carries FM signals.
- Use a 75-ohm coaxial cable with an F-type plug for the antenna connection.

Remarks

★ *This product is available in versions for 120/220/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.*
★ *The 230 V version has an Eco Mode that switches power off after 120 minutes of inactivity.*
★ *The shape of the plug of the supplied AC 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.*

● The specifications and appearance of this product are subject to change without notice.

https://www.accuphase.com/

Accuphase
ACCUPHASE LABORATORY, INC.

F2503Y 850-2247-00(B1) PRINTED IN JAPAN