Accuphase

DUAL CHANNEL POWER AMPLIFIER

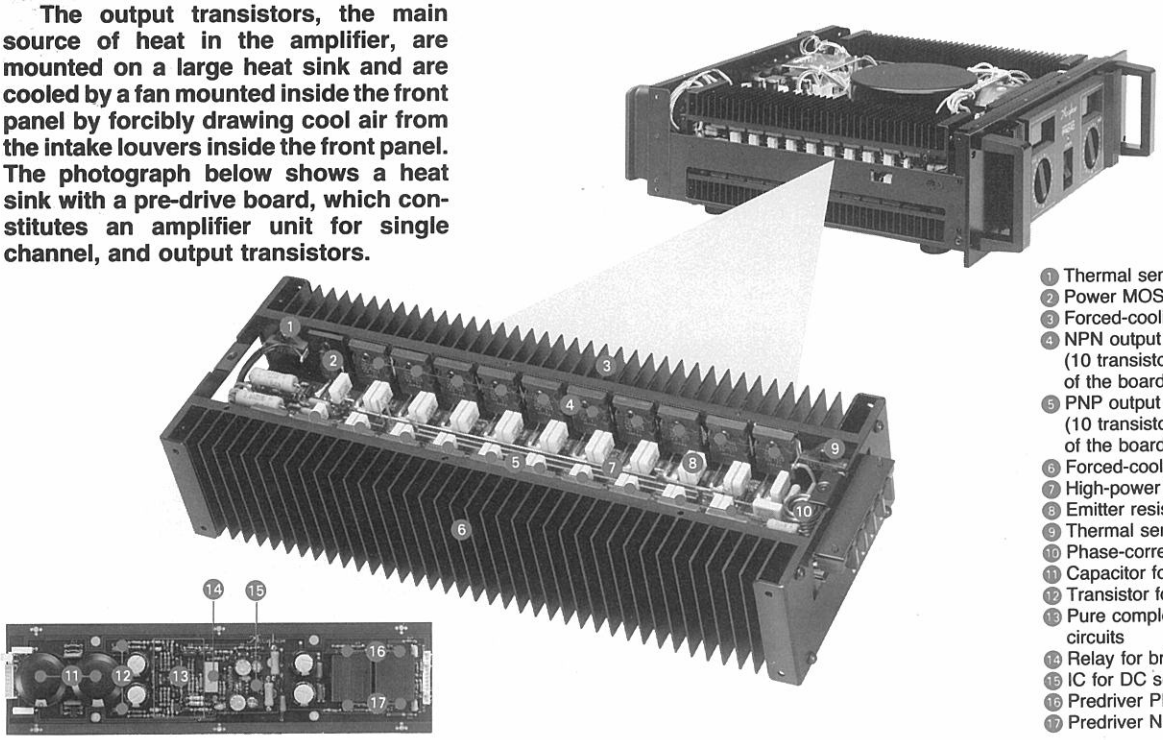
PRO-10

- 20-Parallel Push-Pull Output Stage
- Low-Impedance Setting
- Front-Intake and Side-Exhaust Forced-Air Cooling System for Overheat Protection
- 2,000W (at 4 ohms) Monophonic Operation

Professional Series

All stages push-pull configuration. 20-parallel push-pull power stages guarantee stereo=500W/
By using the low impedance setting, even an extremely low impedance speaker of 0.5 ohm (st

The output transistors, the main source of heat in the amplifier, are mounted on a large heat sink and are cooled by a fan mounted inside the front panel by forcibly drawing cool air from the intake louvers inside the front panel. The photograph below shows a heat sink with a pre-drive board, which constitutes an amplifier unit for single channel, and output transistors.



1. Thermal sensor
2. Power MOS FET for driver
3. Forced-cooling heat sink for NPN transistors
4. NPN output transistors for 20 parallel push-pulls (10 transistors are also located underside of the board.)
5. PNP output transistors for 20 parallel push-pulls (10 transistors are also located underside of the board.)
6. Forced-cooling heat sink for PNP transistors
7. High-power bus bar for output
8. Emitter resistor array for final transistors
9. Thermal sensor
10. Phase-correcting inductor
11. Capacitor for filter of driver stage
12. Transistor for ripple filter
13. Pure complementary push-pull input amp circuits
14. Relay for bridge connection switching
15. IC for DC servo amp
16. Predriver PNP transistor
17. Predriver NPN transistor

Accuphase PRO-10 is the third product in the PRO series amplifiers and has been developed in the pursuit of a relatively compact amplifier of 3U. It is an epoch-making power amplifier in that it can supply a power of as high as 500W/ch to the standard, 8-ohm loads, 800W/ch to 4-ohm loads, and 1,000W/ch to 2-ohm loads.

The output stage of this new amplifier consists of 20 parallel push-pull circuits per channel, each made up of bipolar transistors having a maximum heat dissipation (Pc) of 150W. This is why the power amplifier is capable of sending out so high energy to even low-impedance loads. In addition, the PRO-10 can also be used as a monophonic amplifier, supplying 2,000W to 4-ohm loads and 1,400W to 2-ohm loads. Furthermore, even loads having an impedance of 1-ohm or less can be efficiently driven, because the PRO-10 is equipped with an Accuphase's original "low load selector switch", which enables the amplifier to supply 850W/ch to 0.5-ohm loads when the amplifier operates in stereophonic mode. A power of 1,700W can also be supplied to 1-ohm loads when the PRO-10 is used as a monophonic amplifier.

Of course, the circuit technology Accuphase is so proud of, "all stage push-pull direct coupling", is also adopted in the PRO-10, so that the upper-limit performances and natural, rich sound quality can be realized.

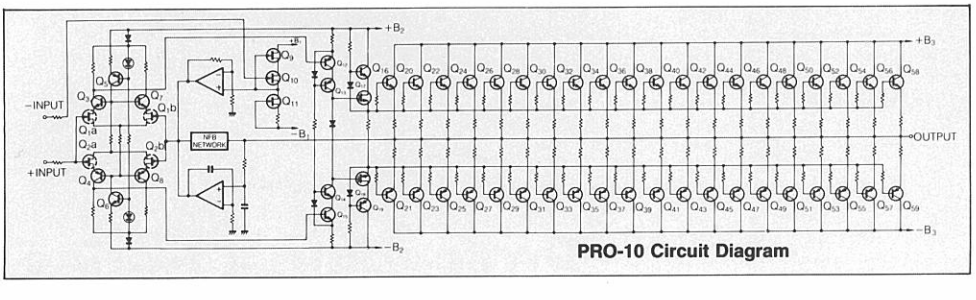
The internal circuits are cooled by the air drawn into the PRO-10 through the intake louvers on the front panel, and expelled through the exhausts on the side panels. This forced air cooling system is very effective. Moreover, the temperature inside the PRO-10 is always monitored and, according to which, the number of revolutions of the cooling fan is automatically changed in three steps.

As the input terminals, XLR-3-31 and XLR-3-32 connectors, and balanced phone jacks are provided. So that an external input filter circuit can be freely incorporated, an optional circuit board is equipped.

Accuphase is convinced that all these features of the PRO-10 can fully satisfy the high quality sound requirements of professional use.

POWERFUL OUTPUT STAGE CONSISTING OF 20 PARALLEL PUSH-PULL CIRCUITS PER CHANNEL, AND DISSIPATING A TOTAL HEAT OF 6,000W

The driving capacity of an amplifier is evaluated by how much energy the amplifier can send out to its loads, i.e., loudspeakers, which are heavily affected by changes in frequency. In other words, it is important that the output impedance of the amplifier be as close to zero as possible, and that the amplifier be capable of supplying adequate energy to even low-impedance loads. For these purposes, the output stage of an amplifier must be so designed as to produce as high a current as possible. The output stage of the PRO-10 is formed by 20 parallel push-pull circuits per channel, each circuit consisting of large-scale, bipolar transistors with a maximum heat dissipation of 150W. This output stage dissipates a total heat of as high as 6,000W. The PRO-10 can consequently supply 500W per channel into an 8-ohm load, 800W/ch into a 4-ohm load, and 1,000W/ch into a 2-ohm load. The PRO-10 can also be used as a monophonic amplifier supplying 1,600W into an 8-ohm load, and 2,000W into a 4-ohm load, when the OPERATION selector switch on the rear panel is set to the MONO position.



PRO-10 Circuit Diagram

LOAD IMPEDANCE SELECTOR SWITCH SELECTING 850W/CH AT 0.5-OHM STEREO OUTPUT OR 1,700W MONOPHONIC OUTPUT INTO 1-OHM LOADS

So that the PRO-10 can supply sufficient powe to even low-impedance loads, the power amplifie is equipped with a load impedance selector switch

If the impedance of the load is as low as 1 to 2 ohm, the power amplifier is not required to suppl so high a voltage to the load. Instead, the capabilit to supply a large current is demanded from th amplifier. The output stage of the PRO-10 operate on a high DC voltage so that the power amplifier ca supply adequate power to loads having a relativel high impedance of 4-ohm or higher. Ho er, loads having an impedance as low as 1-oh or s are connected to the PRO-10, a large current i allowed to flow through the loads and, consequent ly, the output transistors of the power amplifier itse are damaged. The LOAD IMPEDANCE switch pro vided on the rear panel is to reduce the direc current to be applied on the output elements and, a the same time, to supply a sufficient amount c current to the loads. This switch has made it poss ble to supply 850W/ch into 0.5-ohm loads. In add tion, 1,700W can be supplied into 1-ohm load when the PRO-10 is used as a monophonic am plifier.

A LARGE HEAT-SINK AND FORCED-AIR SIDE-VENT SYSTE ARE COMBINED FOR PROTECTI AGAINST OVERHEATING

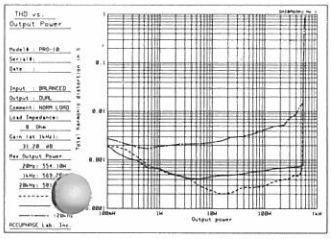
In professional amplifiers, countermeasure against overheating are indispensable. In the PRO 10, these have been provided by mounting th output transistors (the main source of heat) on large, flow-through heat sink. Cooling air is draw into the heat sink by a fan on the back of the fro panel through intake louvers on the front panel an expelled from exhaust vents at the sides. The fa monitors the temperature of the heat sink and auto matically changes the number of revolutions i three steps.

8 ohms), monophonic=1,600W (8 ohms).
=850W/ch) can be fully driven.

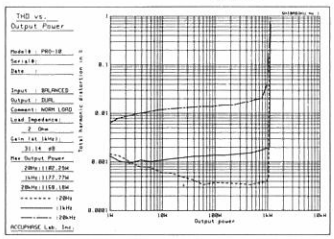
Accuphase PRO-10

GUARANTY SPECIFICATIONS

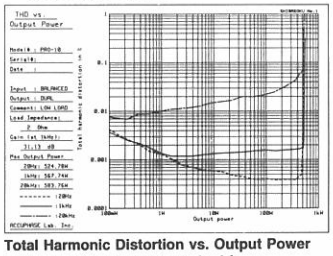
- **PERFORMANCE GUARANTY**
  All Accuphase product specifications are guaranteed as stated.
- **Rated output (20 to 20,000Hz)**
  Stereophonic operation (both channels driven)
  850W/ch — 0.5-ohm load (when low-impedance load is driven)
  700W/ch — 1-ohm load (when low-impedance load is driven)
  1,000W/ch — 2-ohm load
  800W/ch — 4-ohm load
  500W/ch — 8-ohm load
  Monophonic operation (bridge connection)
  1,700W — 1-ohm load (when low-impedance load is driven)
  1,400W — 2-ohm load (when low-impedance load is driven)
  2,000W — 4-ohm load
  1,600W — 8-ohm load
- **Total harmonic distortion**
  Stereophonic operation (both channels driven)
  0.2% — 0.5-ohm load
  0.1% — 1- to 2-ohm load
  0.05% — 4- to 16-ohm load
  Monophonic operation (bridge connection)
  0.2% — 1- to 2-ohm load
  0.05% — 4- to 16-ohm load
- **IM distortion (SMPTE-IM)**
  0.005%
- **Frequency response**
  20 to 20,000Hz +0, −0.2dB
  (Rated output, input attenuator at MAX)
  0.5 to 150,000Hz +0, −3.0dB
  (1 W output, input attenuator at MAX)
  0.5 to 120,000Hz +0, −3.0dB
  (1 W output, input attenuator at −6dB)
- **Gain**
  31.2dB — Stereophonic operation
  37.2dB — Monophonic operation
- **Load impedance**
  0.5 to 16 ohms — Stereophonic operation
  1 to 16 ohms — Monophonic operation
- **Damping factor (8-ohm load at 50Hz)**
  200 — Stereophonic operation
  100 — Monophonic operation
- **Input sensitivity (8-ohm load)**
  0.775V 100W output (stereophonic operation)
  0.338V 100W output (monophonic operation)
  1.742V Rated output (during both stereophonic/monophonic operations)
- **Input impedance**
  20k ohms — Unbalanced
  40k ohms — Balanced
- **S/N ratio (A-weighted, input-shorted)**
  115dB — Rated output
- **Output meters**
  LED display — (−13, −8, −3, 0, +3dB) 8-ohm load, 250W = 0dB
- **Input attenuator**
  0 to −20dB in 1dB steps, −∞
- **Input terminals**
  Phone jacks — For both Channels A and B, balanced
  XLR (cannon) connector — XLR-3-31 and XLR-3-32 for Channels A and B
  Pins: ① ground, ② non-inverted, ③ inverted
- **Output terminals**
  Two-pole banana jacks
  Can be adapted for XLR-type or phone jacks by installing optional board
- **Cooling method**
  Forced-air cooling method (front panel air intake louvers, side panel exhaust)
  Three-speed cooling fan (automatically operates at high speed when temperature exceeds 80°C in heat sink)
- **Semiconductors**
  122 transistors, 18 FETs, 10 ICs, 98 diodes
- **Power requirements and consumption**
  100V, 117V, 200V, 220V, 240V, 50/60Hz
  200W — no signal (NORMAL operation)
  145W — no signal (LOW operation)
  1,650W — at rated output into 8-ohm load
- **Dimensions and weight**
  482.5mm (19 inches) (W) × 148mm (6 inches) (max. height) × 449mm (17-1/2 inches) (D)
  Refer to dimensional diagram.
  Panel height — Three units
  Panel size — 482.5(W) x 132(H) mm
  Rack mounting — Can be mounted on standard 19-inch rack
  Weight — 30.0 kg (66lb) net
  35.3 kg (77.7lb) in shipping carton



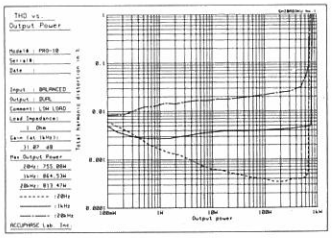
Total Harmonic Distortion vs. Output Power
Load: 8 ohms, Both channels driven



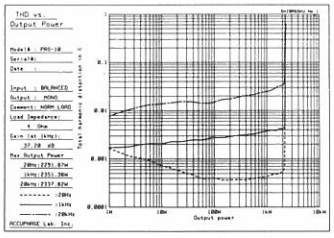
Total Harmonic Distortion vs. Output Power
Load: 2 ohms, Both channels driven



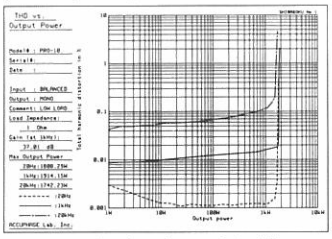
Total Harmonic Distortion vs. Output Power
Load: 2 ohms, Both channels driven
(at low impedance)



Total Harmonic Distortion vs. Output Power
Load: 1 ohm, Both channels driven
(at low impedance)



Total Harmonic Distortion vs. Output Power
Load: 4 ohms, Bridge connection



Total Harmonic Distortion vs. Output Power
Load: 1 ohm, Bridge connection
(at low impedance)

DRIVING STAGE OF MOS FET CASCODE PUSH-PULLS IMPROVING MAJOR PERFORMANCES

The circuit stage preceding to the final stage is an important determinant of the quality of the reproduced sound, and calls for high swing voltage and power. The driving stage of the PRO-10 is configured of MOS FET cascode push-pull circuits, which are Accuphase's original circuit technique, and hence has performances equivalent to a class A non-switching driver. The cascode configuration has been adopted to make a substantial improvement in the high-frequency characteristics. Consequently, the PRO-10's stable operations are assured over a wide output range – from extremely low to high.

DC SERVO, DIRECT-COUPLING AMPLIFIER

The input signals are directly coupled. Therefore, if equipment causing a DC drift was connected, the drift would be amplified and output, consequently damaging the speakers. However, this does not occur with the PRO-10, because this amplifier employs Accuphase's original "DC servo system" and effectively cuts off the DC components. Moreover, the DC drift of the amplifier itself, which may be caused by temperature fluctuation, is stabilized.

THREE PAIRS OF INPUT TERMINALS: PHONE, XLR-3-31, XLR-3-32 PHONE JACKS ARE ALSO FOR UNBALANCED INPUT

A balanced phone input jack is provided for each channel. In addition, XLR-3-31 and XLR-3-32 connectors are available for each channel. Therefore, four input functions are available from the three pairs of input terminals. The polarity of the XLR-type connectors are ① ground, ② non-inverted signal, and ③ inverted signal. The standard output terminal is a banana jack. However, connection of an XLR-type connector or phone jack is possible by replacing the mounting board with an optional conversion board.

INPUT ATTENUATORS INCREMENTING IN 1-dB UNITS

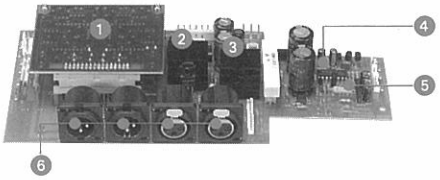
The input attenuators can adjust the gains from 0 to 20dB in units of 1dB, assuring accurate level control. The control knob of these attenuators are embedded in thick mold and does not project from the surface of the front panel, so that the settings of the control know will not be changed by accident.

5-LED OUTPUT METERS

Each of the bar graph type output meters consists of five LED indicators having excellent environmental durability. Two scales are provided on the output meters: one in dBs and the other in watts (at 8-ohm load). The indicator at the least significant digit position can also be used as an input signal indicator to check the presence or absence of the input signal.

OPTIONAL CIRCUIT BOARD PROVIDING ANCILLARY INPUT CIRCUIT

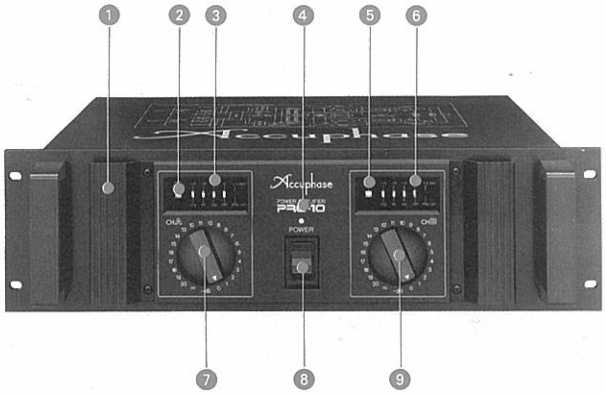
An optional circuit board can be incorporated in the PRO-10 to create a lowpass, highpass, or bandpass filter as you like. This circuit board can be equipped with optional parts and plugged into the PRO-10. Therefore, you can provide your PRO-10 with, say, balanced, feedback type 18dB/octave filter.

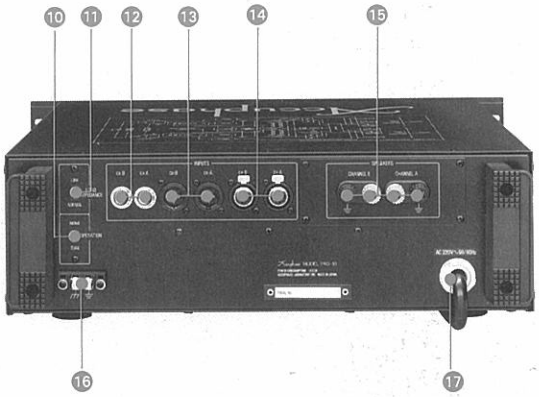


① Optional circuit board
② ±15V voltage regulator for option circuit
③ Transistor for controlling fan
④ Timer/counter IC for power supply control
⑤ Protection IC
⑥ Input cannon connector

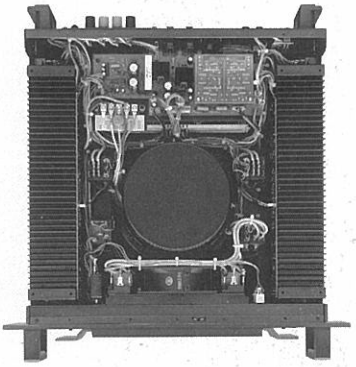
Accuphase PRO-10

Panel control

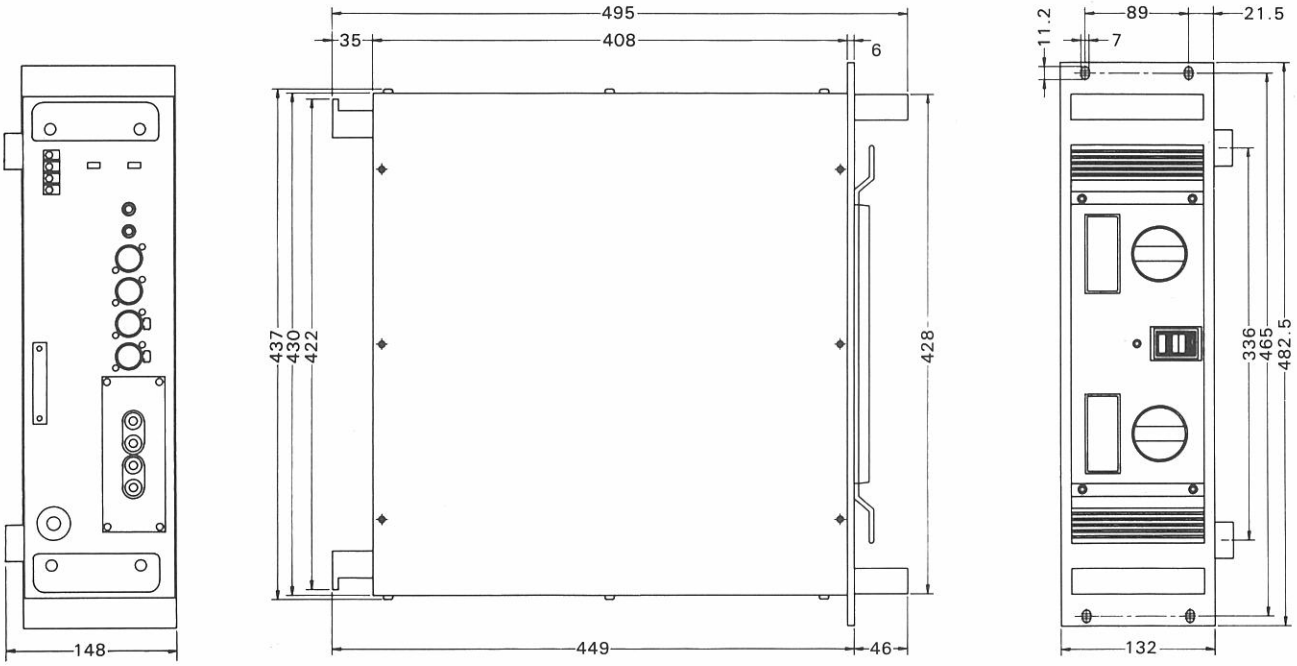




1. **Cool air intake louvers** (rear view)
2. **Input signal indicator for channel A**
3. **LED output meters for channel A** (LED at the most significant digit position lights when overheating occurs in PRO-10)
4. **POWER LED which lights in red on power application or with LOAD IMPEDANCE switch at NORMAL position, and in green with LOAD IMPEDANCE switch at LOW position**
5. **Input signal indicator for channel B**
6. **LED output meter for channel B**
7. **Input attenuator for channel A** (use this attenuator for monophonic operation)
8. **POWER switch**
9. **Input attenuator for channel B**
10. **OPERATION MONO-DUAL switch**
11. **LOAD IMPEDANCE selector switch**
12. **Phone stereo jacks** (balanced/unbalanced input)
13. **XLR-3-32 input connectors** (equivalent to XLR-3-11C)
14. **XLR-3-31 input connectors** (equivalent to SLR-3-12C)
15. **Speaker output terminals; 2-pole banana jacks as standard. Phone jacks or XLR-type connectors available by installing an optional board**
16. **Ground terminal board** (ground line selectable)
17. **AC power cord**



■ Simple internal layout



Unit: mm

ACCUPHASE LABORATORY INC.