Accuphase

INTEGRATED STEREO AMPLIFIER

E-302

• Parallel push-pull output stage: 120W × 2 (8Ω) • Low impedance speaker can be fully driven • DC servo-controlled throughout • Signal path controlled by logic circuit • Equipped with peak power meter

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All unit amplifiers directly coupled in DC servo configuration. Signal purity preserved from disc input to output. Design to ensure stable characteristics even at low load impedance

In recent years, an audio system is increasingly required to have the capability to cope with not only conventional LP records but also a variety of other program sources such as CDs (Compact Discs), digital recorders, broadcasting satellites, and so on. In addition, this diversification of program sources has made it inevitable that the audio system must be able to reproduce from VTRs and video discs. Accordingly, an amplifier – an important part of an audio system – must be provided with the ability to amplify the signals from these various program sources.

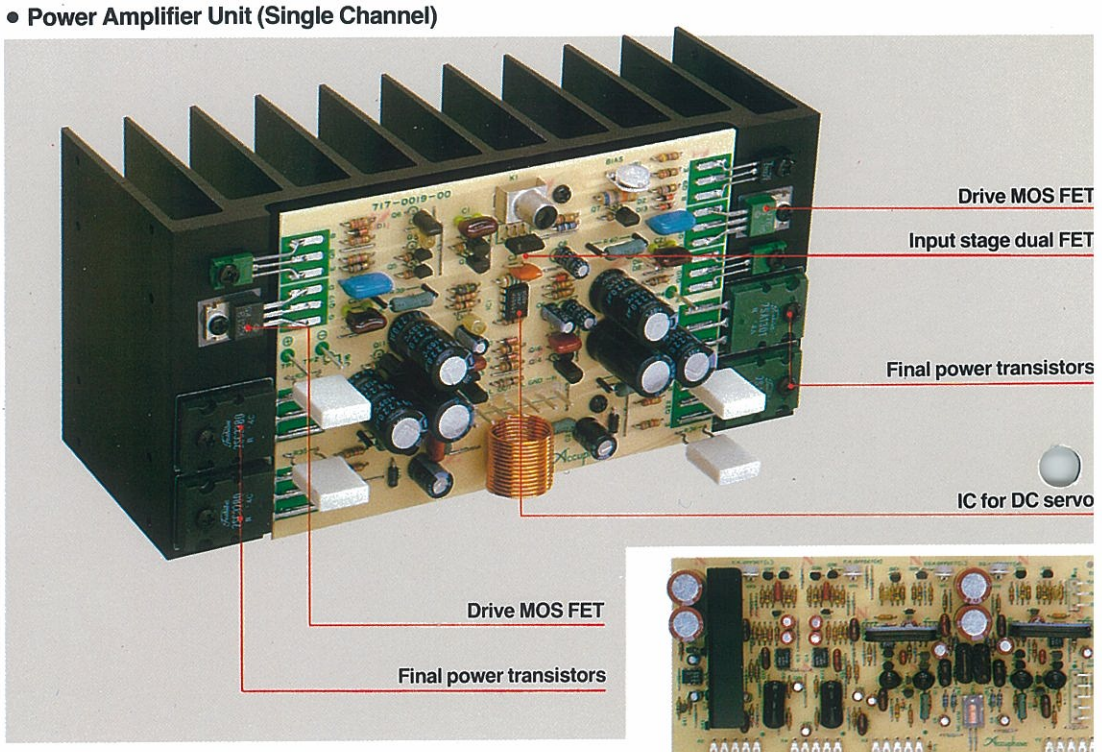
The requisites an amplifier must meet in this "age of multi-program sources" are: the ability of amplifying signals received from an excellent program source without degrading their quality, the function to receive signals from various program sources, and excellent operability with due consideration given to human engineering factors. The E-302 is an integrated stereo amplifier capable of fulfilling these requirements, whose specially important characteristics Accuphase over the years has polished to their upper limits through its exclusive, sophisticated development technology and by carefully selecting the circuit elements.

The power output stage of the E-302 employs wide-band, high- power transistors in parallel push-pull configuration and can produce as high an output as 120 watts per channel (into 8 ohms, from 20 to 20,000Hz, with no more than 0.01% THD). Moreover, adequate consideration is given to the driving of low-impedance loads and therefore, a sufficient power can be output into, for example, a 2-ohm load. Hence, the E-302 is able to deliver adequate energy to any type of speakers with the highest stability and fidelity.

To make perfection more perfect, so to speak, our utmost attention was paid to the use of conventional analog discs. As a result, the E-302 is provided with a high-gain equalizer and a selector switch for MC (Moving Coil) cartridge input impedance that realize the optimum control of signals input from a wide range of MC cartridges with excellent sound quality. In addition to analog discs, tuners, and CDs, three pairs of line inputs and two pairs of tape inputs can be connected. Thus a total of eight program sources are connectable.

The overall configuration is simple and straight, without tone control. Based on human engineering factors, the front panel when it has the subpanel closed, only exposes the volume control, input selector switches, and attenuator, to simplify in appearance the front panel layout.

● **Power Amplifier Unit (Single Channel)**



● **High-Gain Equalizer Amplifier Circuit Boar**

1 A high-quality power of 120 watts per channel is delivered by parallel push-pull circuitry driven by a MOS FET driver stage.

The circuit diagram for the power amplifier section is shown in Fig. 1. The power output stage employs a parallel push-pull configuration comprising four transistors having a Pc (maximum power dissipation) of 120 watts so that an adequate power is output (into 8 ohms, 20 to 20,000Hz, with no more than 0.01% THD). The advantage of the E-302 lies in the driver stage that is the preceding stage to the power output stage. As can be seen from Fig. 1, the driver stage consists of MOS FETs. A MOS FET is an ideal element for the driver stage from which a low output impedance and a high driving voltage are required. This driver stage, along with the low emitter resistance in the output stage, provides extremely high-quality output, free of notching distortion.

The input stage of power amplifier constitutes a bootstrap cascode differential amplifier that makes it possible to obtain excellent high-frequency characteristics and stability.

2 Large power supply and powerful output stage drive even low-impedance loads.

The actual impedance of a speaker fluctuates a lot across the speaker's frequency range. Consequently, the actual impedance of a speaker system having a nominal impedance of 4 ohms may drop to as low as 2 ohms or below for some frequency ranges. On the other hand, an increasingly large current flows through a solid-state amplifier in proportion to decreases in the load impedance, which may result in destruction of output transistors. Hence, the output level for low impedance is severely restricted. Nevertheless, as digital equipment and devices are increasingly used in recent years, the demand for amplifiers that can supply sufficient power to low-impedance loads is growing.

The power amplifier of the E-302 has a high-power output stage having a Pc of about 500 watts and is provided with a large-capacity transformer rated at 700VA, which is quite a high capacity to be employed in an amplifier of E-302's class. Thus, an output power as high as 180 watts per channel has been realized at a 4-ohm load. Even when the load impedance is 2 ohms, sufficient output can be obtained.

3 Directly coupled circuitry with DC servo preserves signal purity from disc inp to output.

The E-302 employs a virtually id configuration in which unit amplifier all stages are directly coupled. T construction guarantees that the or nal signal is amplified and outp virtually unaltered state to pr extremely high level of fidelity. To el inate DC drift completely, a probl that exists in all directly coupled a plifiers, a powerful DC servo is use stabilize each unit amplifier.

4 High-gain equalizer with high signal-to-noise ratio and MC input impedance selector switch ensure th best use of analog discs.

The equalizer amplifier for analog d employs, as shown in Fig. 2, a sing amplifier system in which the gain the high-gain equalizer amplifier changed over according to that quired by an MM (moving magnet MC (moving coil) cartridge. In this s tem, the provision of an amplifying cuit that can stably operate irrespec of any quantitative change in N (negative feedback) and the takin proper countermeasures against idual noise that may occur when an cartridge is used are important.

To ensure high stability, the in stage of the equalizer amplifier ploys a bootstrap cascode differe

amplifier consisting of transistors and FETs, thereby significantly improving the high-frequency characteristics, the key to high stability. In the next stage is a high-performance operational amplifier followed by a complementary push-pull circuit in the final stage. Thus, the amplifying circuit having such a fundamentally pure and simple configuration excels in stability.

Regarding the signal-to-noise ratio when an MC cartridge is used for the input, the residual noise is significantly reduced by employing in the input stage six FETs connected in parallel. When an MC cartridge is used, a gain of 60 dB can be obtained at the high-gain equalizer amplifier, which is 30 dB up from the 30-dB gain obtainable when an MM cartridge is used. This feature allows use of any type of MC cartridge. Moreover, the optimum load impedance (10, 30, or 100 ohms) best suited to the cartridge to be used can be selected by the input impedance selector switch.

5 Logic controlled relays keeps the signal path as straight and short as possible.

The roundabout signal paths necessitated by switching connections for the input source may degrade high-frequency characteristics and lead to an unstable operation. In the E-302, relays are located on the signal path which are controlled by a logic circuit so that the signal is routed over the shortest possible path according to orders from the logic circuit.

The relays employed are highly reliable crossbar-twin type relays developed especially for use with low-level audio signals. Their contact points are gold-plated silver palladium alloy. The relays are sealed in airtight containers to guarantee outstanding durability and reliability.

6 A wide variety of program sources can be used.

The advent of digital audio equipment and video equipment has diversified program sources and therefore, as earlier mentioned, the capability to reproduce signals from a wide range of program sources is increasingly required of an audio system. The E-302 is provided with input jacks for a total of eight input systems: an analog disc, a tuner, a CD, three line inputs, and two tape inputs. Therefore, in addition to an analog record player, a tuner, a CD player, and two tape recorders, a VTR, a video disc, and a digital recorder can be connected to the integrated stereo amplifier and the desired program source can be selected by one touch.

Furthermore, the E-302 has a switch and input/output terminals with which the preamplifier output and power amplifier input can be separated from one another so that each of the amplifiers can be upgraded or a graphic equalizer can be connected.

7 3-step loudness compensator provides well-balanced low-volume sound.

At low-volume level, very low and very high frequencies are more difficult to hear than the frequencies in between. Consequently, some degree of compensation, or boost, in these ranges is required to preserve a feeling of flat response at low-volume level. Furthermore, the amount of compensation must vary automatically with the volume setting to maintain the feeling of flat, balance response.

To do this, the E-302 has a 3-step loudness compensator that allows you to adjust the response according to the acoustics of the listening room, speaker system characteristics, and personal preferences.

8 Direct readout peak power meters

The power meters use a logarithmic peak scale to permit direct readout of peak power outputs. The soft-white transparent illumination adds an extra touch of elegance to the front panel and your listening room.

9 Tape monitor and dubbing switches

Two tape decks can be connected to the E-302 at once for convenience and versatility. The tape monitor switch permits monitoring the signal being recorded, and the dubbing switch permits copying (dubbing) a tape from one deck to the other regardless of the input selector's position.

10 Other functions and facilities

The E-302 is also equipped with many other useful features. A subsonic filter is used to eliminate subsonic noise generated by record warps. An attenuator allows lowering the volume level without disturbing the volume control. A speaker switch lets you switch between two speaker systems or use both at once. A stereo/mono mode switch permits switching to monophonic reproduction to check for correct phase response between the left and right speaker systems. These and many more controls mean the E-302 is fully prepared to handle any listening or recording need.

11 Two colors are available for the front panel: champagne gold and black

The color of the front panel is champagne gold, the traditional color of Accuphase products. In addition, a black front panel is available as Type E-302B.

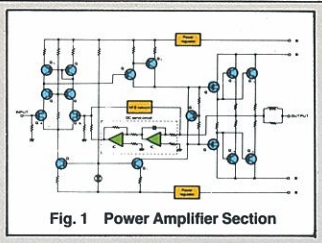


Fig. 1 Power Amplifier Section

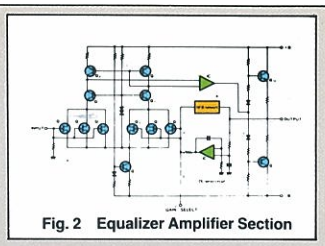
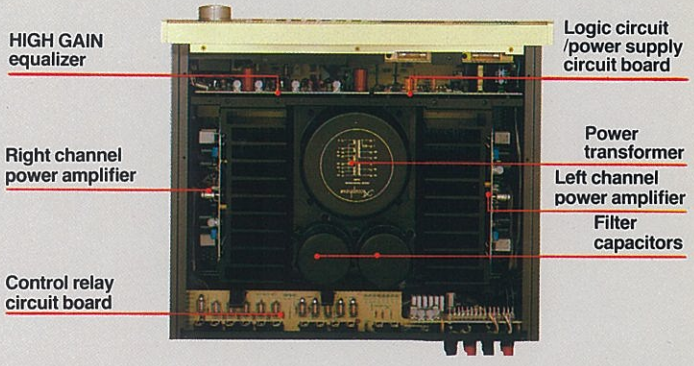
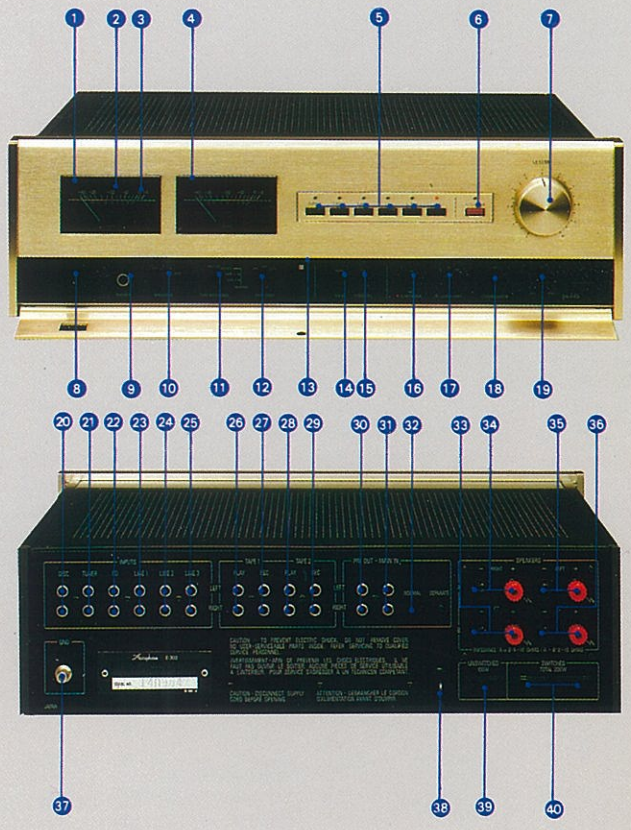


Fig. 2 Equalizer Amplifier Section



• Top View of Layout



1. Power level meter for left channel
2. dB scale
3. Wattage scale
4. Power level meter for right channel
5. Input selector
6. ATTenuator
7. VOLUME cotnrol
8. POWER switch
9. Stereo headPHONES jack
10. SPEAKERS selector switch
11. Tape monitor/recording output ON/OFF selector switch
12. TAPE COPYing control
13. Magnetic catch for subpanel
14. MODE selector switch
15. SUBSONIC filter
16. Equalizer gain selector switch
17. MC cartridge LOAD impedance selector switch
18. COMPENSATOR switch
19. BALANCE control
20. DISC input jacks
21. TUNER input jacks
22. CD input jacks
23. LINE 1 input jacks
24. LINE 2 input jacks
25. LINE 3 input jacks
26. TAPE 1 input jacks
27. TAPE 1 recording output jacks
28. TAPE 2 input jacks
29. TAPE 2 recording output jacks
30. Preamplifier output jacks
31. Power amplifier input jacks
32. Preamplifier/power amplifier separation switch
33. RIGHT channel output terminals for speaker B
34. RIGHT channel output terminals for speaker A
35. LEFT channel output terminals for speaker A
36. LEFT channel output terminals for speaker B
37. GND terminals
38. AC power cord
39. AC unswitched outlet
40. AC switched outlets

REMARKS:
These SWITCHED and UNSWITCHED outlets may not be supplied depending on the Safety Standards or Regulations applicable in the particular country to where the unit is destined.

INTEGRATED STEREO AMPLIFIER

E-302B

BLACK TYPE

GUARANTY SPECIFICATIONS

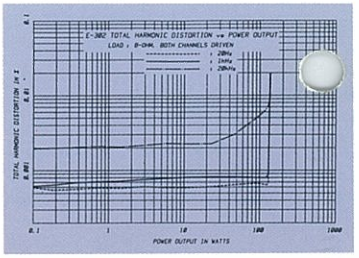
- **POWER OUTPUT: (EIA)**
  Both channels driven, from 20 to 20,000Hz with no more than 0.02% total harmonic distortion
  180 watts per channel min. RMS, at 4 ohms
  120 watts per channel min. RMS, at 8 ohms
  60 watts per channel min. RMS, at 16 ohms
- **TOTAL HARMONIC DISTORTION: (EIA)**
  Both channels driven from 20 Hz to 20,000 Hz at any power output from 0.25 W to rated power
  0.02% max., at 4 ohms
  0.01% max., at 8 ohms
  0.01% max., at 16 ohms
- **INTERMODULATION DISTORTION: (EIA)**
  Will not exceed 0.01% at rated power output
- **FREQUENCY CHARACTERISTICS: (EIA)**
  Main Amp Input: 20 to 20,000Hz; +0, −0.2dB at rated power output
  0.5 to 200,000Hz; +0, −3.0dB at 1-watt power output
  High Level Input: 20 to 20,000Hz; +0, −0.2dB at rated power output
  Low Level Input: 20 to 20,000Hz; +0.2, −0.5dB at rated power output
- **DAMPING FACTOR: (EIA)**
  120, 8-ohm load at 50Hz
- **INPUT SENSITIVITY AND IMPEDANCE:**

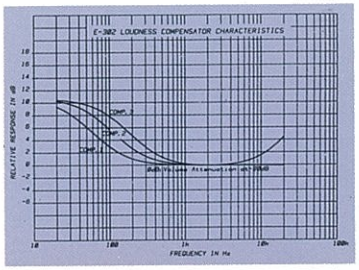
Input terminal	Sensitivity		Impedance
	At rated output	EIA At 1W output	
DISC INPUT (MC)	0.08mV	0.007mV	10Ω, 30Ω, 100Ω
DISC INPUT (MM)	2.5mV	0.22mV	47kΩ
HIGH-LEVEL INPUT	76mV	7.1mV	40kΩ
MAIN AMP INPUT	1.23V	113mV	20kΩ

- **MAXIMUM INPUT FOR DISC:**
  MM input: 300mV RMS at 1kHz, 0.005% THD (REC OUT)
  MC input: 9.5mV RMS at 1kHz, 0.005% THD (REC OUT)
- **OUTPUT LEVEL AND IMPEDANCE:**
  PRE OUT: 1.23V, 200 ohms
  TAPE REC OUTPUT: 76mV, 200 ohms (from DISC)
  HEADPHONES: 0.4V with low impedance (4 to 100 ohms)
- **GAIN:**
  MAIN INPUT–OUTPUT: 28dB
  HIGH LEVEL INPUT–PREOUTPUT: 24dB
  DISC INPUT (MM)–TAPE REC OUTPUT: 30dB
  DISC INPUT (MC) - TAPE REC OUTPUT: 60dB
- **SIGNAL-TO-NOISE RATIO:**

Input terminal	Inputs shorted, A-Weighted	EIA S/N
MAIN AMP INPUT	122dB	102dB
HIGH-LEVEL INPUT	104dB	82dB
DISC INPUT (MM)	86dB	80dB
DISC INPUT (MC)	66dB	75dB

- **LOUDNESS COMPENSATOR:**
  COMP1: +3dB at 100Hz
  COMP2: +6dB at 100Hz
  COMP3: +8dB at 100Hz, +6dB at 20kHz
- **SUBSONIC FILTER:** 17Hz, −12dB/oct
- **ATTENUATOR:** −20dB
- **POWER LEVEL METER:**
  Logarithmic-scaled peak level indication calibrated to read 0dB when amplifier produces 120 watts into 8-ohm load.
- **OUTPUT LOAD IMPEDANCE:** 4 to 16 ohms
- **SEMICONDUCTOR COMPLEMENT:** 86 Tr's, 14 IC's, 24 FET's, 86 Di's
- **POWER REQUIREMENT:**
  Voltage selection by rewiring for 100, 117, 220, 240V 50/60Hz operation
- **CONSUMPTION:**
  55 watts at zero signal output, 450 watts at rated power output into 8-ohm load
- **DIMENSIONS:**
  445mm (17-1/2 inches) width, 145mm (5-12/16 inches) max. height, 370mm (14-9/16 inches) depth
- **WEIGHT:** 16.2 kg (35.6 lb.) net, 20.1 kg (44.2 lb.) in shipping carton.





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