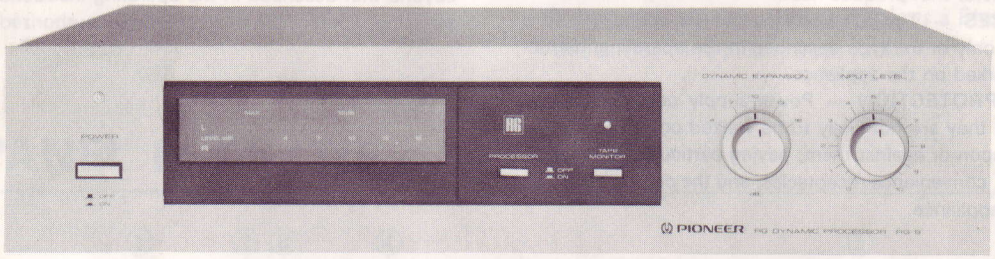
Operating Instructions

RG DYNAMIC PROCESSOR

RG-9

KU

CH2909818S



IMPORTANT NOTICE

The serial number for this equipment is located on the rear panel. Please write this serial number on your enclosed warranty card and keep in a secure area.
This is for your security.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

PIONEER®

SAFETY INSTRUCTIONS

READ INSTRUCTIONS — All the safety and operating instructions should be read before the appliance is operated.

RETAIN INSTRUCTIONS — The operating instructions should be retained for future reference.

HEED WARNING — All warnings on the appliance and in the operating instructions should be adhered to.

FOLLOW INSTRUCTIONS — All operating and use instructions should be followed.

WATER AND MOISTURE — The appliance should not be used near water — for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.

LOCATION — The appliance should be installed in a stable location.

WALL OR CEILING MOUNTING — The appliance should not be mounted to a wall or ceiling.

VENTILATION — The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

HEAT — The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.

POWER SOURCES — The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

POWER-CORD PROTECTION — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

CLEANING — The appliance should be cleaned only with a polishing cloth or a soft dry cloth. Never clean with furniture wax, benzine, insecticides or other volatile liquids since they may corrode the cabinet.

POWER LINES — An outdoor antenna should be located away from power lines.

NONUSE PERIODS — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

OBJECT AND LIQUID ENTRY — Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

DAMAGE REQUIRING SERVICE — The appliance should be serviced by Pioneer authorized service center or qualified service personnel when:

- The power-supply cord or the plug has been damaged; or
- Objects have fallen, or liquid has been spilled into the appliance; or
- The appliance has been exposed to rain; or
- The appliance does not appear to operate normally or exhibits a marked change in performance; or
- The appliance has been dropped; or the enclosure damaged.

SERVICING — The user should not attempt to service the appliance beyond that described in the operating instructions. For all other servicing, contact the nearest Pioneer authorized service center.

CONTENTS

Modern recording uses three dynamic control techniques which may detract from the original dynamic range; reduction of transient peaks, overall compression of loud levels and upward manipulation of soft levels. The RG-9 will correct dynamic distortion in each of these areas, increasing the contrast and virtually restoring the original live program. In order to obtain maximum benefit from this unit, please read the following instructions carefully.

FEATURES

Broadens Dynamic Range

The dynamic range of the music source can be expanded by employing the RG-9 as a stereo system adaptor unit. No preprocessing is needed and only ordinary program sources, such as records, FM broadcasts or tape music, are required. The dynamic range is broadened by upward and downward expansion, resulting in a powerful and sharp rendition of the source. This has the effect of bringing performers right into the listening room, and especially pulsive sources such as rock and soul are given a broad new dimension.

Preserves Natural Impression

Attack and release characteristics of the audio signal are preserved by a fast and slow response (mixed) double action control signal that prevents unnatural impressions in the reproduced sound.

Noise Reduction Effect

A noise reduction effect is also included which reduces underlying source noise. Tape hiss, motor rumble and other background noises are reduced by the circuit properties of this unit, so that low noise, exciting stereo sound can be enjoyed.

Faithful Reproduction Function

The sensor section which produces the control signal is provided with an energy distribution filter, to ensure that the expansion function is not trigged by noise components. However, expansion is not limited to instruments, whose fundamental frequency is close to the center frequency of the energy distribution filter, since all musical instruments produce harmonics which are strongest when the instrument is played hard. Hence these harmonics activate the sensing circuit and control the degree of expansion, so that lower frequency instruments are also enhanced.

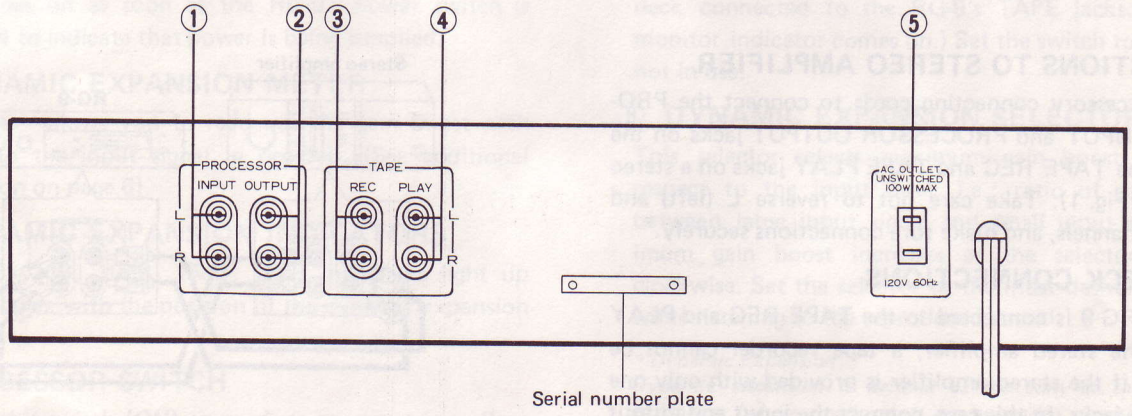
5-Stage Dynamic Expansion Selector

The expansion in the dynamic range can be switched in 3dB steps from 4dB to 16dB with this 5-setting selector. By combining the upward and downward expansion, it is possible to produce the optimum expansion in the dynamic range and also to select the expansion according to the music source and your individual taste.

Smart, Slimly Designed Styling

The processor has been slimly designed with the dynamic expansion meter, which employs a Fluoroscan display, in the center for a clean, fresh look.

REAR PANEL FACILITIES



① PROCESSOR INPUT JACKS

Connect these jacks to the TAPE REC jacks on the stereo amplifier or to the PREAMP OUT (OUTPUT) jacks on the preamplifier.

② PROCESSOR OUTPUT JACKS

Connect these jacks to the TAPE PLAY jacks on the stereo amplifier or to the POWER AMP IN (INPUT) jacks on the power amplifier.

③ TAPE REC JACKS

Connect these to the INPUT (REC) jacks on the tape deck.

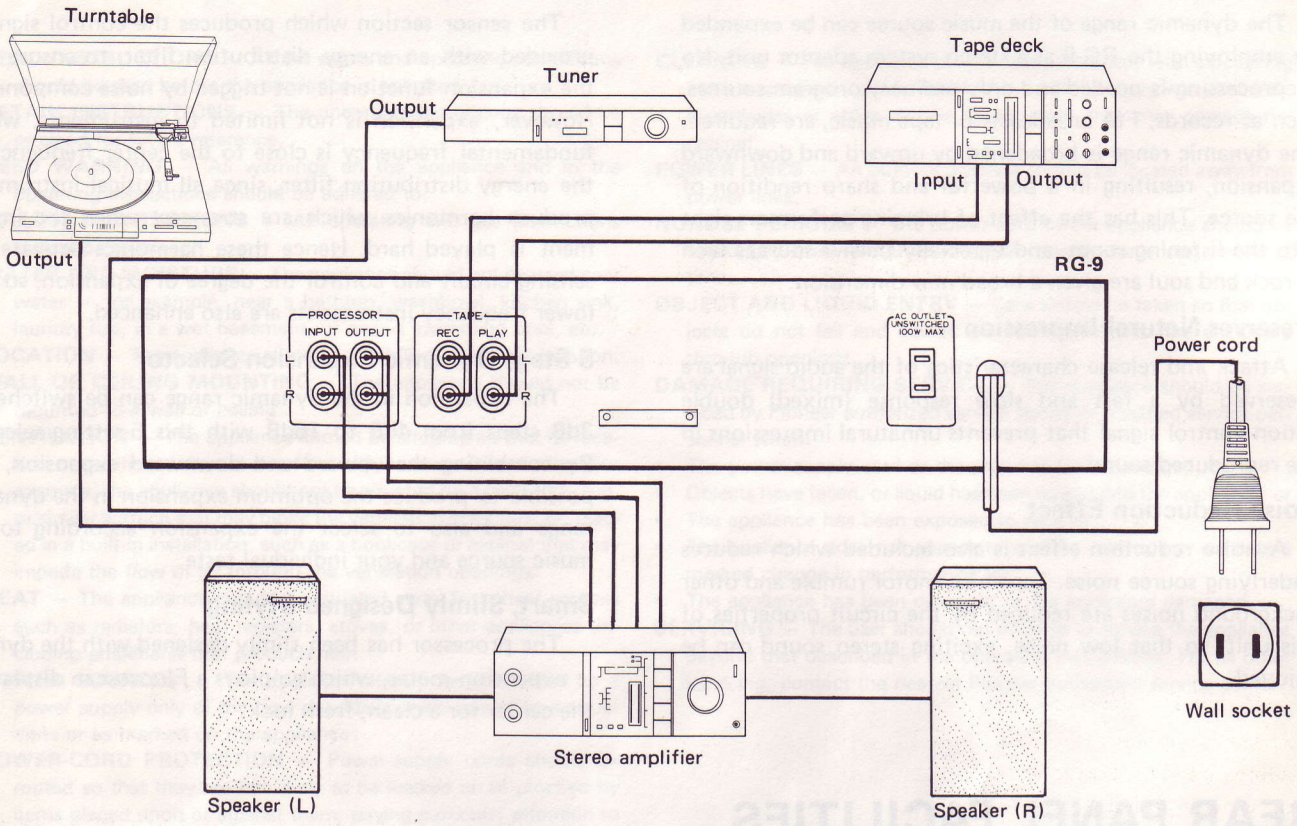
④ TAPE PLAY JACKS

Connect these to the OUTPUT (PLAY) jacks on the tape deck.

⑤ AC OUTLET

This is an auxiliary power outlet. Connect the power plug of your tape deck or other stereo hi-fi component to this outlet. It is not coupled with the power switch on the model RG-9 (UNSWITCHED). The maximum power capacity is 100W and so do not connect electrical appliances with a power capacity exceeding this value.

CONNECTION



CONNECTIONS TO STEREO AMPLIFIER

Use the accessory connecting cords to connect the PROCESSOR INPUT and PROCESSOR OUTPUT jacks on the RG-9 to the TAPE REC and TAPE PLAY jacks on a stereo amplifier (Fig. 1). Take care not to reverse L (left) and R (right) channels, and make sure connections securely.

TAPE DECK CONNECTIONS

Since the RG-9 is connected to the TAPE REC and PLAY jacks of the stereo amplifier, a tape recorder cannot be connected if the stereo amplifier is provided with only one set of tape jacks. In this case, connect the input and output jacks of the tape deck to the TAPE REC and PLAY jacks of the RG-9.

Connections for recording

Connect the recording input jacks (INPUT) on the tape deck to the TAPE REC jacks on the RG-9.

Connections for playback

Connect the playback output jacks (OUTPUT) on the tape deck to the TAPE PLAY jacks on the RG-9.

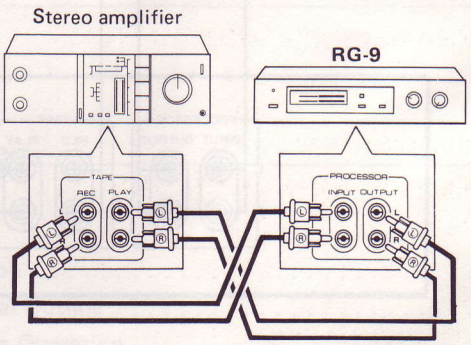


Fig. 1

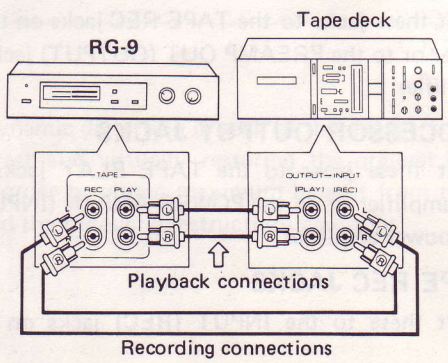
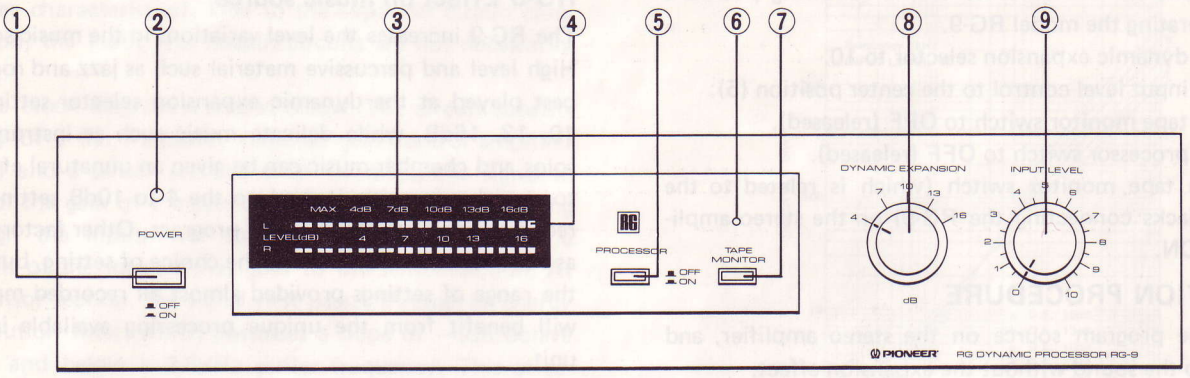


Fig. 2

FRONT PANEL FACILITIES



① POWER SWITCH

Power is supplied to the model RG-9 when this switch is depressed. The power indicator comes on as soon as the power is supplied.

② POWER INDICATOR

This comes on as soon as the RG-9's power switch is set to ON to indicate that power is being supplied.

③ DYNAMIC EXPANSION METER

This meter allows you to read out the gain boost with respect to the input signal in decibels. (See additional description on page 6).

④ DYNAMIC EXPANSION INDICATORS

The 4dB, 7dB, 10dB, 13dB, 16dB indicators light up in accordance with the position of the dynamic expansion selector.

⑤ PROCESSOR SWITCH

Depress this switch (ON) to produce an expansion effect with the signals fed from the PROCESSOR INPUT jacks. The dynamic expansion indicator will come on, and signals featuring an expansion effect only will be fed out from the model RG-9's OUTPUT jacks. In the OFF position, the RG-9 circuitry is bypassed. This position allows for instant comparison between the expanded and the unprocessed signals.

NOTE:
When the RG-9's power switch is set to the OFF position and the processor switch is also set to OFF, the signal which has bypassed the processor circuitry is made available at the OUTPUT jacks. There will, however, be no output if the input level control is set to the '0' position. Make sure that this control is set to the '10' position.

⑥ TAPE MONITOR INDICATOR

This comes on when the tape monitor switch is depressed.

⑦ TAPE MONITOR SWITCH

Depress this switch to monitor the sound on the tape as it is being recorded or when playing back a tape using a tape deck connected to the RG-9's TAPE jacks. (The tape monitor indicator comes on.) Set the switch to OFF when not in use.

⑧ DYNAMIC EXPANSION SELECTOR

This selector selects maximum gain boost value with respect to the input level, i.e.: ratio of gain increase between large input signal and small input signal. Maximum gain boost increases as the selector is turned clockwise. Set the selector to the most desirable position while listening to the reproduced sound.

** Dynamic Expansion*
Dynamic expansion is defined as the sum of the downward expansion (where small inputs are expanded down) and upward expansion (where large inputs are expanded up). For details, refer to "Technical Outline" on page 7.

⑨ INPUT LEVEL CONTROL

Use this control to adjust the input level at which the expansion effect is initiated. Clockwise rotation increases the expansion with respect to small signal levels (increases expansion sensitivity). Adjust the control for desired effect according to program source.

OPERATION

PRIOR TO SWITCHING POWER ON

Set the controls and switches to the following positions before operating the model RG-9.

1. Set the dynamic expansion selector to 10.
2. Set the input level control to the center position (5).
3. Set the tape monitor switch to OFF (released).
4. Set the processor switch to OFF (released).
5. Set the tape monitor switch (which is related to the TAPE jacks connecting the RG-9) on the stereo amplifier to ON.

OPERATION PROCEDURE

1. Play the program source on the stereo amplifier, and listen to the sound without the expansion effect.
2. Depress the processor switch (ON).
3. Rotate the input level control and set it so that the indication on the dynamic expansion meter is brought to its widest.
   For instance, when the dynamic expansion selector is set to the '10" position, adjust so that the display indicates up to 10 when a high input signal is fed in (See Fig. 3).
4. Adjust the volume control on the stereo amplifier for suitable volume.
5. Operate the dynamic expansion selector and set it to the position (4, 7, 10, 13, 16) where the desired expansion is obtained.
6. Adjust the volume and tone controls on the stereo amplifier for desired volume and tone.

Dynamic Expansion Meter

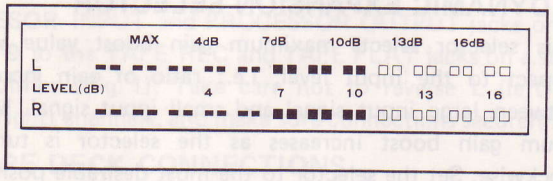


Fig. 3

USING A TAPE DECK

By setting the tape monitor switch on the stereo amplifier to ON, and the processor switch on the RG-9 to OFF, the tape monitor switch on the RG-9 can be operated in place of that on the stereo amplifier. The signal at the RG-9 TAPE REC jacks bypasses the processor.

When Employing the Processor for Tape Playback

1. Depress the tape monitor switch (ON).
2. Depress the processor switch (ON).
3. Other operations are the same as described in "OPERATION".

FOR MAXIMUM ENJOYMENT

RG-9 Effect on music source

The RG-9 increases the level variations in the music source. High level and percussive material such as jazz and rock are best played at the dynamic expansion selector settings of 10, 13, 16dB, while delicate music such as instrumental solos and chamber music can be given an unnatural effect if too much expansion is used, so the 4 to 10dB settings are recommended for this type of program. Other factors such as room acoustics also affect the choice of setting, but with the range of settings provided almost all recorded material will benefit from the unique processing available in this unit.

Changes in the ambience

The RG-9 serves to expand the dynamic range of the music source. Whenever there is a difference between the levels of the left and right channel input signals, this difference is expanded.

Say, for instance, the difference between the left and right levels is 2dB. This is expanded to 4dB or 6dB. This in turn translates into a change in the ambience of the sound as heard by the listener. With a music source arranged like that in Fig. 4, an interesting effect is obtained whereby the position of the vocalist at the center moves to the left and right along with the fluctuations in the difference between the left channel (bass) and right channel (piano).

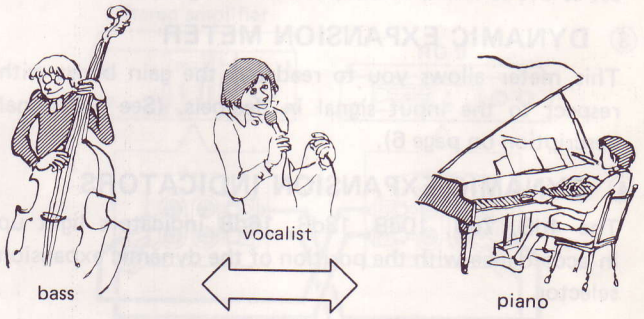


Fig. 4

METER INTERPRETATION

The meter indicates the instantaneous maximum dynamic expansion amount in dB. Maximum meter deflections are 4, 7, 10, 13, 16dB according to the dynamic expansion selector setting. Partial mixing of L and R channel signals causes both meters to deflect even with only one channel input. However, the separation does not change with stereo reproduction.

TECHNICAL OUTLINE

The basic function of the RG-9 is to expand the level variations of the input signal (see Fig. 5: input-output transfer characteristics). Due to the expander circuit composition, the input and output circuits are not necessarily linear.

The block diagram is shown below. The circuit consists mainly of a flat frequency response gain control amplifier (GCA) and a sensor section which produces the signal to control the gain of the gain control amplifier. After passing through the input level control and buffer amplifier, a portion of the input signal goes to the sensor section. At the sensor section, the signal first passes through an energy distribution filter, which possesses a slope of −6dB/octave above and below a 2.5kHz center frequency. This effectively reduces noise components, such as motor rumble, hum and tape hiss, yielding only the center frequency component. At the RG detector, a peak detector (ripple cancelling type) produces a DC output proportional to the peak values of the AC input signal. The output from this RG detector becomes the gain control signal for the GCA.

Current from the sensor section determines the open-loop gain of the gain control amplifier. The gain therefore increases as the control current increases in accordance with the input signal. The characteristics of this signal undergo changes such as those in Fig. 6: input-gain characteristics. To provide this characteristics, an NFB (negative feedback) circuit returns a portion of the GCA output to the input, and the dynamic expansion selector selects the NFB elements to control the feedback ratio, thereby determining the total gain (Fig. 6).

Left and right channels are mixed by a blending resistor at the sensor section input, to prevent excessive gain difference between the channels from producing an unnatural effect during stereo playback.

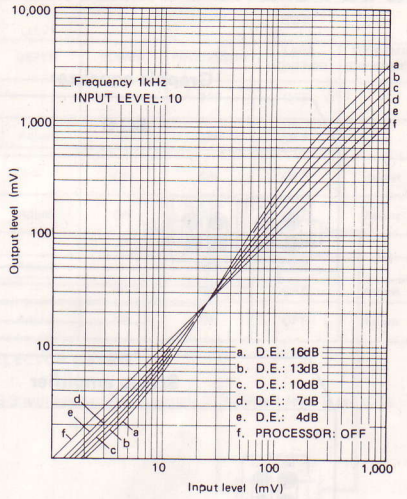


Fig. 5: RG processor input-output transfer characteristics

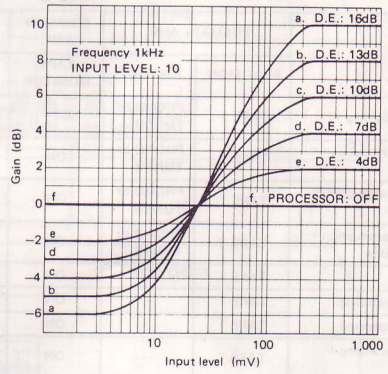


Fig. 6: RG processor input-gain characteristics

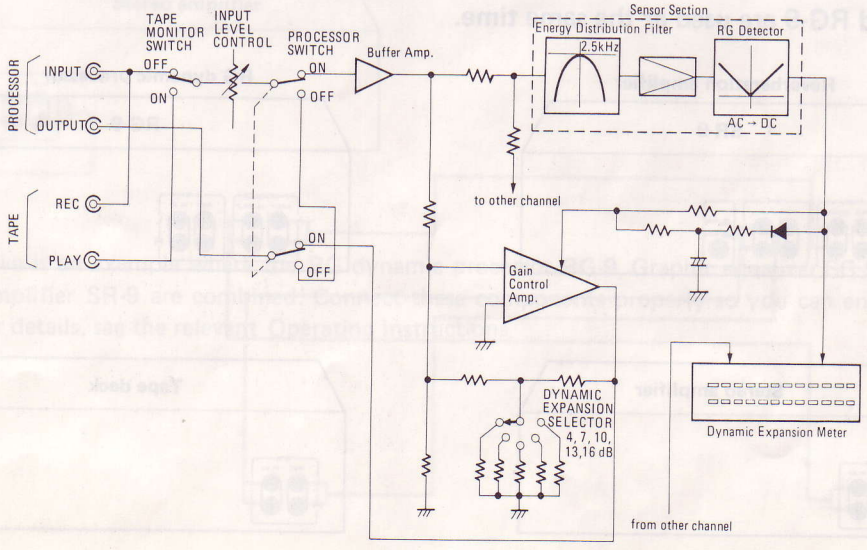
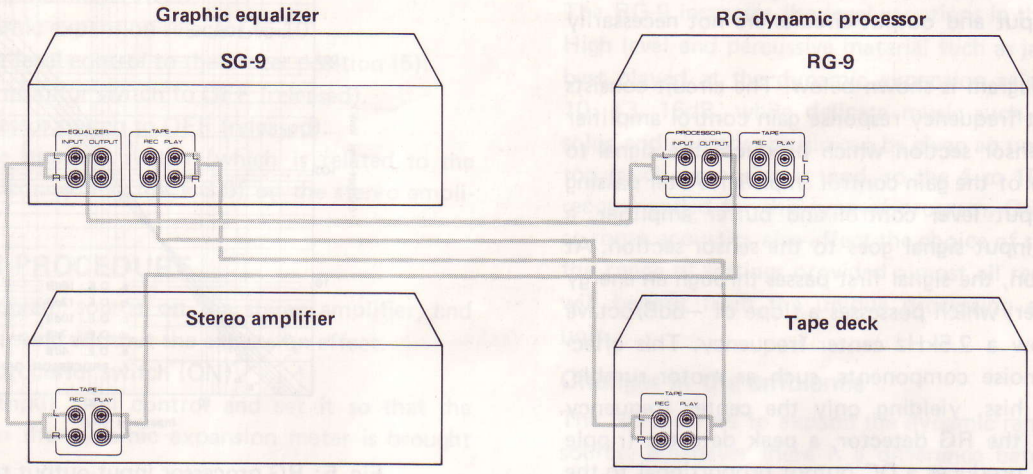


Fig. 7

EFFECTIVE OPERATION

1. When the SG-9 and RG-9 are used at the same time.

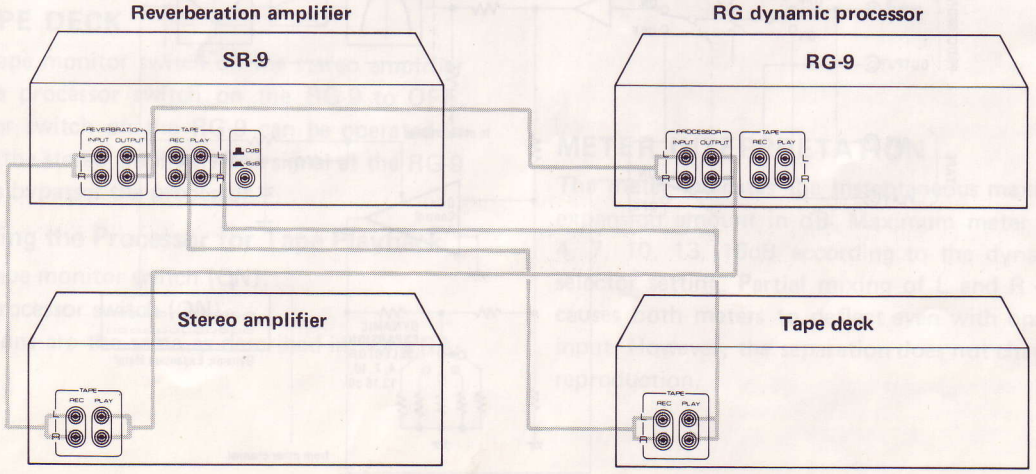


Note 1 Note 2 Note 3

	PREMAIN AMP.		PREMAIN AMP.	RG-9					SG-9			
	FUNCTION	REC OUT	TAPE MONITOR	POWER	TAPE MONITOR	PROCESSOR	DYNAMIC EXPANSION	INPUT LEVEL	POWER	EQUALIZER	TAPE MONITOR	OCTAVE CONTROLS
Record, AM, FM recording	TAPE 1	PHONO or TUNER	OFF	–	OFF	OFF	–	Adjust	–	OFF	OFF	–
Record, AM, FM reproduction + Equalizing	TAPE 1	PHONO or TUNER	ON	–	OFF	OFF	–	Adjust	ON	ON	OFF	Adjust
Record, AM, FM reproduction + Expansion	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	OFF	–
Record, AM, FM reproduction + Equalizing + Expansion	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	OFF	Adjust
Tape playback	TAPE 1	–	ON	–	OFF	OFF	–	Adjust	–	OFF	ON	–
Tape playback + Equalizing	TAPE 1	–	ON	–	OFF	OFF	–	Adjust	ON	ON	ON	Adjust
Tape playback + Expansion	TAPE 1	–	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	ON	–
Tape playback + Equalizing + Expansion	TAPE 1	–	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	ON	Adjust

NOTES:
1. When premain amplifiers (A-9, A-8, A-7, A-6, A-5, etc.) equipped with a REC OUT SELECTOR are used.
2. When other premain amplifiers, receivers, etc. are used.
3. When the TAPE MONITOR of the premain amplifier is set to ON (or TAPE 1), the RG-9 will not produce a sound if the input level is set to 0. Be sure to adjust the input level control.

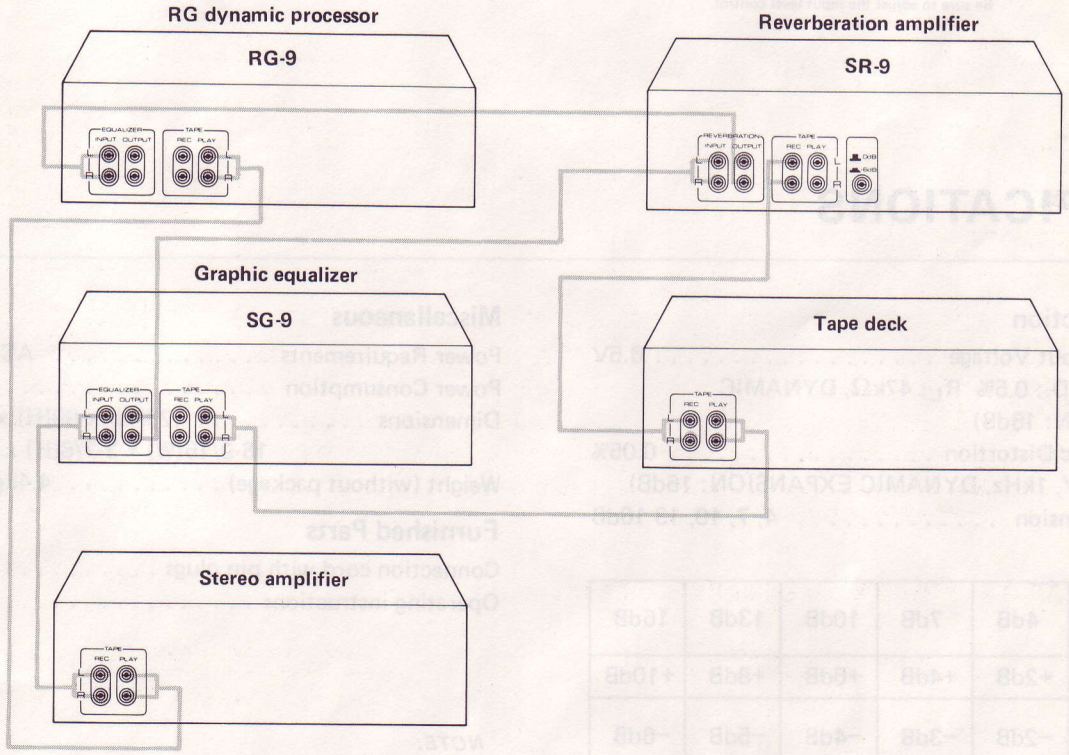
2. When the SR-9 and RG-9 are used at the same time.



	Note 1		Note 2						Note 3				
	PREMAIN AMP.		PREMAIN AMP.	SR-9					RG-9				
	FUNCTION	REC OUT	TAPE MONITOR	POWER	TAPE MONITOR	REVERBE-RATION	REVERB. TIME	DEPTH	POWER	PROCESSOR	TAPE MONITOR	DYNAMIC EXPANSION	INPUT LEVEL
Record, AM, FM recording	TAPE 1	PHONO or TUNER	OFF	–	OFF	OFF	–	–	–	OFF	OFF	–	Adjust
Record, AM, FM reproduction + Reverberation	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	OFF	–	Adjust
Record, AM, FM reproduction + Expansion	TAPE 1	PHONO or MONITOR	ON	–	OFF	OFF	–	–	ON	ON	OFF	Adjust	Adjust
Record, AM, FM reproduction + Reverberation + Expansion	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	OFF	Adjust	Adjust
Tape playback	TAPE 1	–	ON	–	ON	OFF	–	–	–	OFF	OFF	–	Adjust
Tape playback + Reverberation	TAPE 1	–	ON	ON	ON	ON	Adjust	Adjust	–	OFF	OFF	–	Adjust
Tape playback + Expansion	TAPE 1	–	ON	–	ON	OFF	–	–	ON	ON	OFF	Adjust	Adjust
Tape playback + Expansion + Reverberation	TAPE 1	–	ON	ON	ON	ON	Adjust	Adjust	ON	ON	OFF	Adjust	Adjust

NOTES: 1. When premain amplifiers (A-9, A-8, A-7, A-6, A-5, etc.) equipped with a REC OUT SELECTOR are used.
2. When other premain amplifiers, receivers, etc. are used.
3. When the TAPE MONITOR of the premain amplifier is set to ON (or TAPE 1), the RG-9 will not produce a sound if the input level is set to 0. Be sure to adjust the input level control.

3. When the SR-9, SG-9 and RG-9 are used at the same time.



- Shown above is an example where the RG dynamic processor RG-9, Graphic equalizer SG-9 and Reverberation amplifier SR-9 are combined. Connect these components properly so you can enjoy the best sounds. For details, see the relevant Operating Instructions.

EFFECTIVE OPERATION

	Note 1		Note 2						Note 3								
	PREMAIN AMP.		PREMAIN AMP.	SR-9					RG-9					SG-9			
	FUNCTION	REC OUT	TAPE MONITOR	POWER	TAPE MONITOR	REVERBE-RATION	REVERB. TIME	DEPTH	POWER	PROCESSOR	TAPE MONITOR	DYNAMIC EXPANSION	INPUT LEVEL	POWER	EQUALIZER	TAPE MONITOR	OCTAVE CONTROLS
Record, AM, FM recording	TAPE 1	PHONO or TUNER	OFF	–	OFF	OFF	–	–	–	OFF	OFF	–	Adjust	–	OFF	OFF	–
Record, AM, FM reproduction + Equalizing	TAPE 1	PHONO or TUNER	ON	–	OFF	OFF	–	–	–	OFF	OFF	–	Adjust	ON	ON	OFF	Adjust
Record, AM, FM reproduction + Reverberation	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	OFF	–	Adjust	–	OFF	OFF	–
Record, AM, FM reproduction + Expansion	TAPE 1	PHONO or TUNER	ON	–	OFF	OFF	–	–	ON	ON	OFF	Adjust	Adjust	–	OFF	OFF	–
Record, AM, FM reproduction + Equalizing + Reverberation	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	OFF	–	Adjust	ON	ON	OFF	Adjust
Record, AM, FM reproduction + Equalizing + Expansion	TAPE 1	PHONO or TUNER	ON	–	OFF	OFF	–	–	ON	ON	OFF	Adjust	Adjust	ON	ON	OFF	Adjust
Record, AM, FM reproduction + Reverberation + Expansion	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	OFF	Adjust	Adjust	–	OFF	OFF	–
Record, AM, FM reproduction + Equalizing + Reverberation + Expansion	TAPE 1	PHONO or TUNER	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	OFF	Adjust	Adjust	ON	ON	OFF	Adjust
Tape playback	TAPE 1	–	ON	–	OFF	OFF	–	–	–	OFF	OFF	–	Adjust	–	OFF	ON	–
Tape playback + Equalizing	TAPE 1	–	ON	–	OFF	OFF	–	–	–	OFF	OFF	–	Adjust	ON	ON	ON	Adjust
Tape playback + Reverberation	TAPE 1	–	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	OFF	–	Adjust	–	OFF	ON	–
Tape playback + Expansion	TAPE 1	–	ON	–	OFF	OFF	–	–	ON	ON	OFF	Adjust	Adjust	–	OFF	ON	–
Tape playback + Reverberation + Equalizing	TAPE 1	–	ON	ON	OFF	ON	Adjust	Adjust	–	OFF	OFF	–	Adjust	ON	ON	ON	Adjust
Tape playback + Equalizing + Expansion	TAPE 1	–	ON	–	OFF	OFF	–	–	ON	ON	OFF	Adjust	Adjust	ON	ON	ON	Adjust
Tape playback + Reverberation + Expansion	TAPE 1	–	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	OFF	Adjust	Adjust	–	OFF	ON	–
Tape playback + Reverberation + Expansion + Equalizing	TAPE 1	–	ON	ON	OFF	ON	Adjust	Adjust	ON	ON	OFF	Adjust	Adjust	ON	ON	ON	Adjust

NOTES:
1. When premain amplifiers (A-9, A-8, A-7, A-6, A-5, etc.) equipped with a REC OUT SELECTOR are used.
2. When other premain amplifiers, receivers, etc. are used.
3. When the TAPE MONITOR of the premain amplifier is set to ON (or TAPE 1), the RG-9 will not produce a sound if the input level is set to 0. Be sure to adjust the input level control.

SPECIFICATIONS

Processor Section

Maximum Output Voltage 6.5V
(1kHz, T.H.D.: 0.5% R_L: 47kΩ, DYNAMIC EXPANSION: 16dB)

Total Harmonic Distortion 0.05%
(Output: 1V, 1kHz, DYNAMIC EXPANSION: 16dB)

Dynamic Expansion 4, 7, 10, 13 16dB

Gain

DYNAMIC EXPANSION	4dB	7dB	10dB	13dB	16dB
Upward Gain	+2dB	+4dB	+6dB	+8dB	+10dB
Downward Gain	−2dB	−3dB	−4dB	−5dB	−6dB

Impulse Response
Attack Time 0.3msec
Release Time 120msec

Input Impedance . . . . . 50kΩ (20Hz to 20kHz)

Output Impedance 300Ω (1kHz)

Residual Noise 10μV
(IHF A, DYNAMIC EXPANSION: 16dB)

Signal to Noise Ratio (IHF A, Short-circuited, DYNAMIC EXPANSION: 16dB) . . . . . 100dB (at 1V)
116dB (at 6.5V)

Miscellaneous

Power Requirements . . . . . AC 120V, 60Hz

Power Consumption 10W

Dimensions . . . . . 420(W) x 99(H) x 336(D) mm
16-9/16(W) x 3-7/8(H) x 13-1/4(D) in

Weight (without package) 4.4kg (9lb 11oz)

Furnished Parts

Connection cord with pin plugs 2

Operating instructions 1

NOTE:
Specifications and the design subject to possible modification without notice due to improvements.