RG DYNAMIC PROCESSOR

3609169

RG-1

OPERATING INSTRUCTIONS

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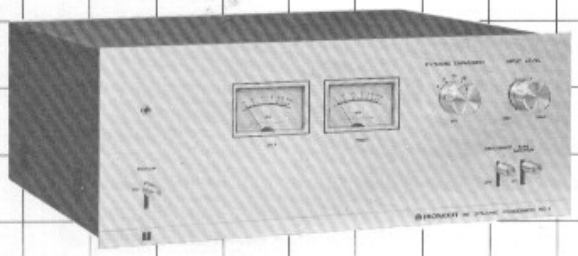


WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

PIONEER

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 manupulation of soft levels. The RG-1 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.

CONTENTS

RG-1 FEATURES

Broadens Dynamic Range

The dynamic range of the music source can be expanded by employing the RG-1 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 expanded by making large signals larger (while low signals remain unchanged), 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.

Expansion is Selectable

The expansion can be switched in 2dB steps from 6dB to 14dB by the front panel DYNAMIC EXPANSION switch. The optimum position can thus be selected according to the music source and your personal taste.

Meters Display Expansion Amount

The degree of expansion can be determined instant by instant from the left and right channel DYNAMIC EXPANSION meters on the front panel.

CONNECTION DIAGRAM

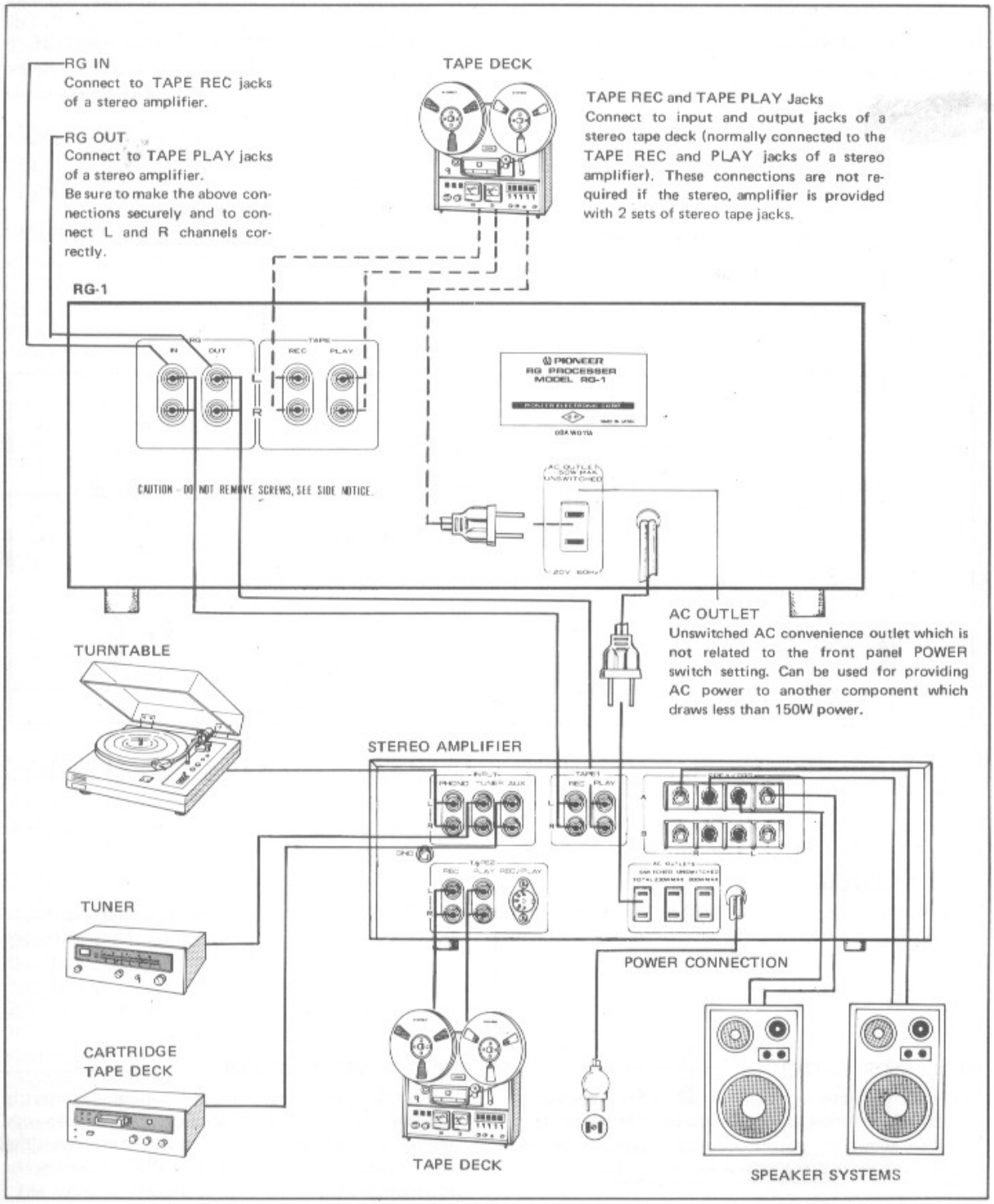


Fig. 1

FRONT PANEL FACILITIES

DYNAMIC EXPANSION METERS

Gain boost with respect to the input signal is indicated in decibels. (See additional description on Page 6.)

PILOT LAMP

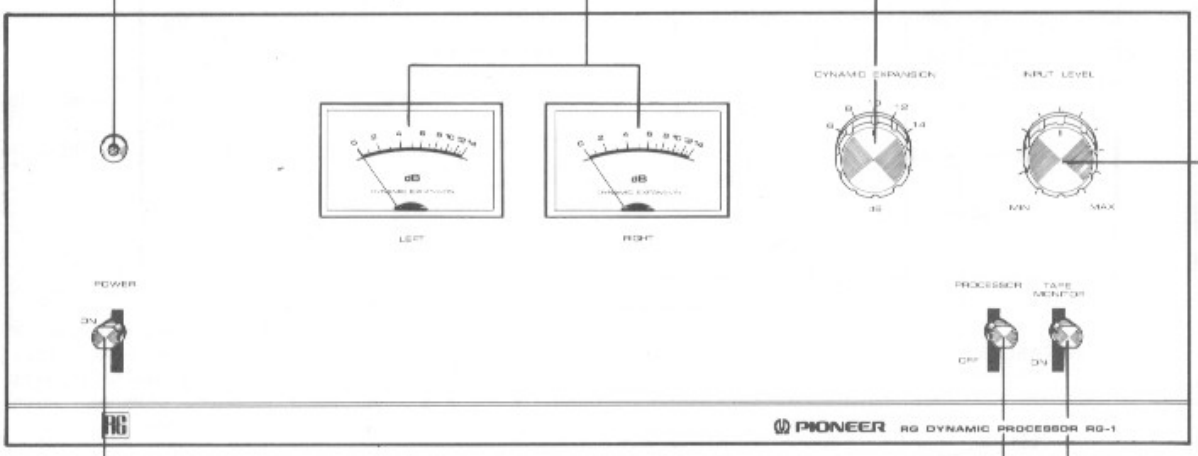
Lights when RG-1 power supply is switched on.

DYNAMIC EXPANSION SELECTOR SWITCH

Dynamic Expansion is defined as the degree by which the gain is increased at high input levels with respect to the fixed gain at low input levels.

Selects maximum gain boost value with respect to input level, i.e.: ratio of gain increase between large input signal and small input signal (fixed gain). Maximum gain boost increases as switch is turned clockwise.

Set the switch to the most desirable position while listening to the reproduced sound.



POWER SWITCH

Set switch to ON to energize the RG-1 (pilot lamp will light).

TAPE MONITOR SWITCH

Set to ON to play tape or monitor a recording with a tape deck connected to the rear panel TAPE jacks. Set switch to off (upper) position when not in use.

PROCESSOR SWITCH

Set switch to upper position for normal RG-1 operation. In the OFF position, the RG-1 circuitry is bypassed. This position allows for instant comparison between the expanded and the unprocessed signals.

INPUT LEVEL CONTROL

Adjusts 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 control for desired effect according to program source.

CONNECTION TO STEREO AMPLIFIER

Use the accessory connecting cords to connect the RG IN and RG OUT jacks of the RG-1 to the TAPE REC and TAPE PLAY jacks of a stereo amplifier (Fig. 2). Take care not to reverse L and R channels, and make connections securely.

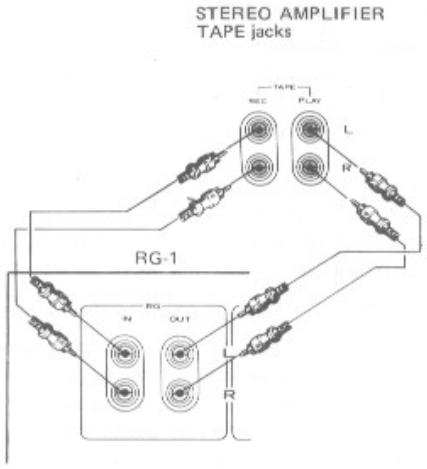


Fig. 2

OPERATION

Before operating the RG-1, set the controls and switches as follows.

- DYNAMIC EXPANSION control to 10.
- INPUT LEVEL control to MIN.
- TAPE MONITOR switch to upper (off) position.
- PROCESSOR switch to OFF (lower position).

After completing the above settings, set the POWER switch to ON.

1. Set the TAPE MONITOR switch of the stereo amplifier to ON. With the PROCESSOR switch OFF, check the volume and tone of the playback sound without the RG Processor effect.
2. Set the PROCESSOR switch to ON (upper position), advance the input level control to where the meters read 9 to 10dB on loud level passages. See Fig. 3. (If playing a record, a setting around 2 o'clock is generally correct.).
3. Adjust the VOLUME control of the stereo amplifier for suitable volume.
4. Operate the DYNAMIC EXPANSION switch and set it to the position (6, 8, 10, 12, 14) where the desired expansion is obtained.
5. Adjust VOLUME, BASS and TREBLE controls of the stereo amplifier for desired volume and tone.

Fig. 3

EMPLOYING TAPE JACKS

Since the RG-1 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 1 set of tape jacks.

In this case, connect the input and output jacks of the tape deck to the TAPE REC and TAPE PLAY jacks on the RG-1 rear panel (Fig. 4). By setting the TAPE MONITOR switch of the stereo amplifier to ON, and the PROCESSOR switch of the RG-1 to OFF, the TAPE MONITOR switch of the RG-1 can be operated in place of that on the stereo amplifier. To employ the processor for tape playback, set both the TAPE MONITOR and PROCESSOR switches to ON (Fig. 5). Other operations are the same as described in "OPERATION".

NOTE:
The signal at the RG-1 TAPE REC jacks bypasses the processor.

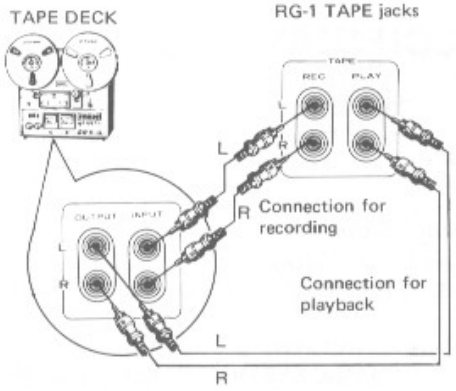


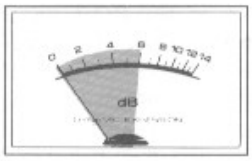
Fig. 4

Fig. 5

FOR MAXIMUM ENJOYMENT

METER INTERPRETATION

The meters indicate the instantaneous dynamic expansion amount in dB. Maximum meter deflections are 6, 8, 10, 12 or 14dB according to the DYNAMIC EXPANSION switch setting (Fig. 6). Partial mixing of L and R channel signals causes both meters to deflect even with only one channel input (for example, with 14dB L channel indication and no signal at the R channel, the R channel meter indicates 9dB).



D.E. 6dB

D.E. 14dB

Fig. 6

RG-1 EFFECT ON MUSIC SOURCE

The RG-1 increases the level variations in the music source. High level and percussive material such as jazz and rock are best played at expansion switch settings of 10, 12 and 14dB, while delicate music such as instrumental solos and chamber music can be given an unnatural effect if too much expansion is used, so the 6 to 8dB settings are recommended for this type of program. Other factors such as room accoustics 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.

Fig. 7

With certain types of music, such as some vocal accompaniments, an interesting effect can be produced in which the central singer appears to shift toward the left and right.

SPECIFICATIONS

Semiconductors

ICs	2
Transistors	22
Diodes	20

Processor Section

Maximum Output Voltage	6.5V
(1kHz, T.H.D. 1% R_L 47kΩ DYNAMIC EXPANSION 14dB)	
Total Harmonic Distortion	0.1%
(1kHz, DYNAMIC EXPANSION 14dB, Output 1V)	
Dynamic Expantion	6, 8, 10, 12, 14dB
Impulse Response	
Attack Time	0.5 msec
Release Time	80 msec
Input Impedance (1kHz)	70kΩ
Output Impedance (1kHz)	300Ω
Constant Loss	−3dB
Residual Noise	65μV
Signal to Noise Ratio (IHF, Short-circuited)	100dB
(1kHz, DYNAMIC EXPANSION 14dB)	

Miscellaneous

Power Requirements	AC 120V, 60Hz
Power Comsumption	15W
Dimensions	350(W) x 137(H) x 320(D) mm
	13-3/4(W) x 5-3/8(H) x 12-5/8(D) in
Weight	5.3kg (11 lb 10 oz)

Furnished Parts

Pin plug cord	2
Operating Instructions	1

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

RG-1 TECHNICAL OUTLINE

The basic function of the RG-1 is to expand the level variations of the input signal (see Fig. 8: 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 gain control amplifier, while the remainder passes through the sensor section.

At the sensor section, the signal first passes through an energy distribution filter, which possesses a slope of −6 dB/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. A fixed gain (−3dB) is applied to small input signals (0 — 5mV), while expansion begins in the area of 10mV. At more than 300mV, a fixed gain is again obtained. (See input-gain characteristics, Fig. 9).

To provide the above characteristics, an NFB (negative feedback) circuit returns a portion of the GCA output to the input, and the DYNAMIC EXPANSION switch selects the NFB elements to control the feedback ratio, thereby determining the gain at high input levels (Fig. 9).

The GCA output is obtained through a buffer amplifier. Left and right channels are mixed by a blending resistor at the sensor section output, to prevent excessive gain difference between the channels from producing an unnatural effect during stereo playback.

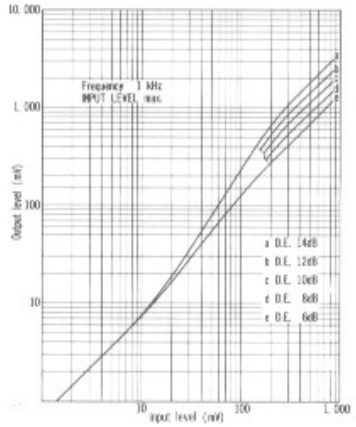


Fig. 8 — RG processor input-output transfer characteristics

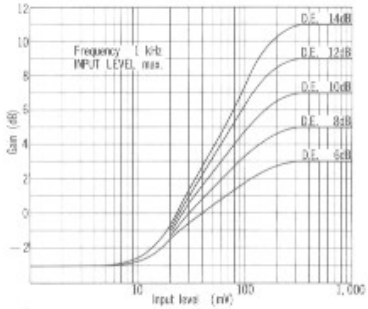


Fig. 9 — RG processor input-gain characteristics

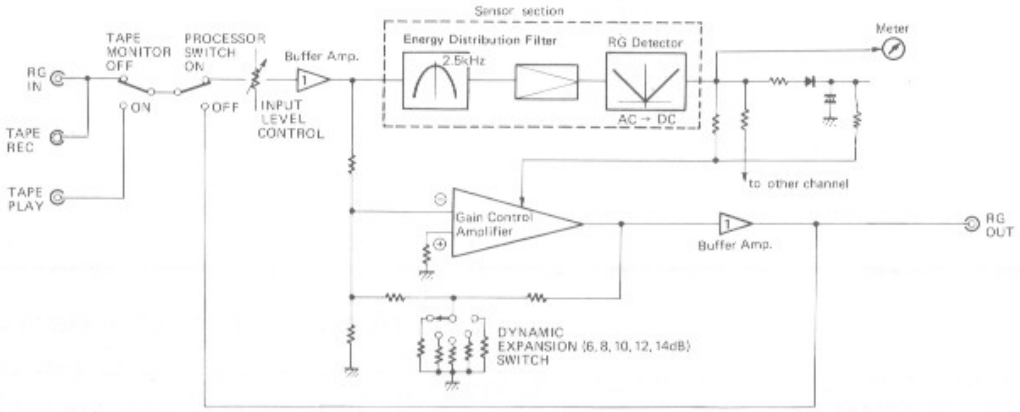
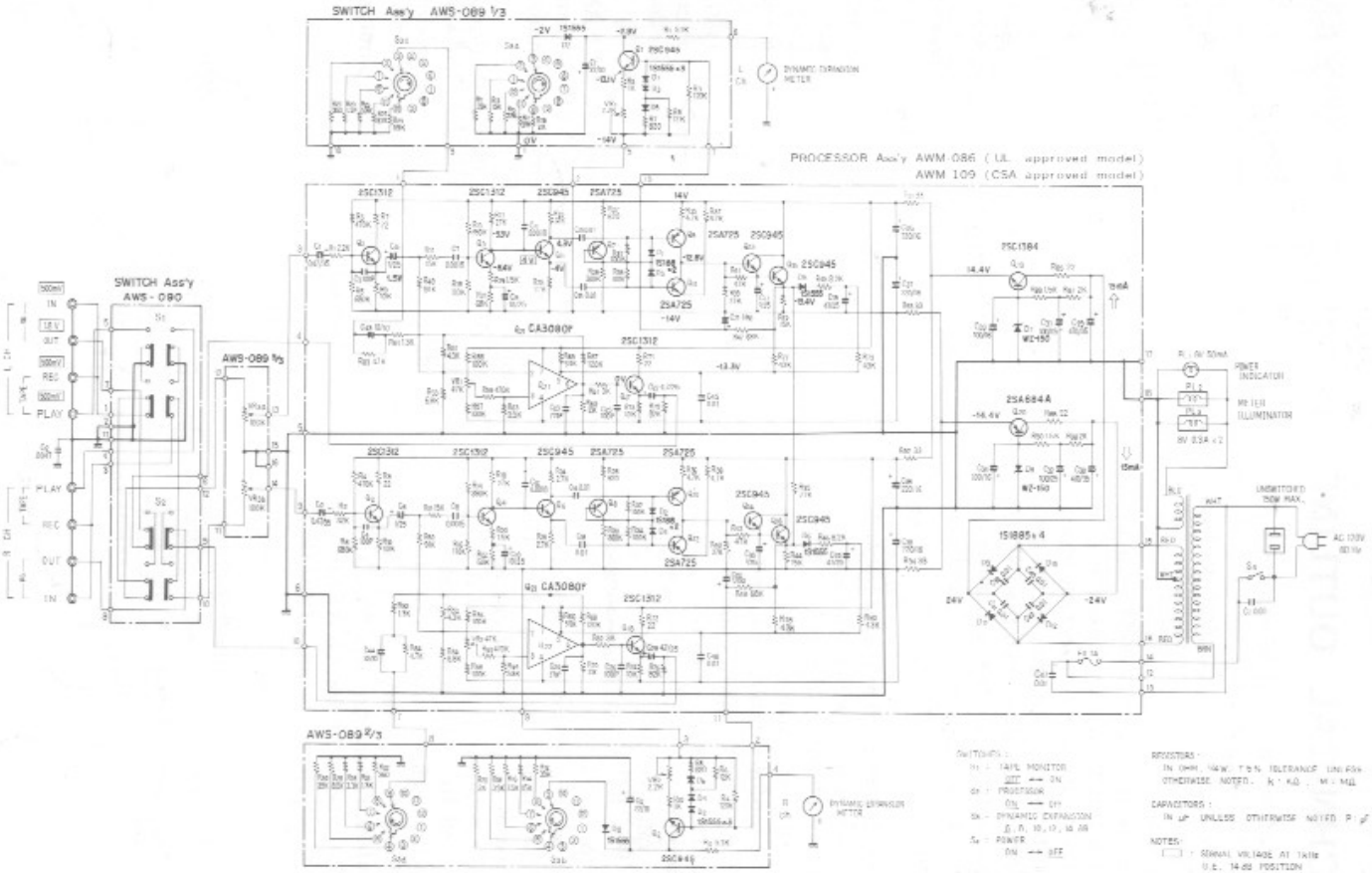


Fig. 10

SCHEMATIC DIAGRAM



NOTE:
This circuit is licensed under US Patent No. 3 760 255 and other patents are pending.

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