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PIONEER

RG DYNAMIC PROCESSOR

RG-2

S
S/G

OPERATING INSTRUCTIONS

Before turning on the power, please confirm the setting of the line VOLTAGE SELECTOR switch on the rear panel. If it is not set properly, change the setting of it according to the LINE VOLTAGE SELECTOR SWITCH on page 3.

NOTE:
These operating instructions apply to two versions of the RG-2. The RG-2/S/G model is supplied with the rack mount adaptors as an accessory, while RG-2/S model is not supplied with it. How to install the rack mount adaptors is described on page 8.

SPECIFICATIONS

Semiconductors

ICs 4
Transistors 29
Diodes 30

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 . . . . . 110V/120V/220V/240V (switchable), 50/60Hz
Power Consumption 10W
Dimensions . . . . . 420(W)x99(H)x336(D)mm
16-9/16(W)x3-7/8(H)x13-1/4(D)in
Weight (without package) 4.4kg (9lb 11oz)

Furnished Parts

Connection cord with pin plugs 2
Operating instructions 1
Rack mount adaptors (S/G model only) 2

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

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-2 will correct dynamic distrotion 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-2 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.

Design Oriented toward High S/N and Low Distortion

The gain control amplifier adopts low-noise differential transistors and low-noise ICs for a signal-to-noise ratio of 100dB and a total harmonic distortion of 0.05%. Furthermore, the sensor section is also equipped with low-noise transistors in order to keep the noise in the control current down to the bare minimum.

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.

Dynamic Expansion with Fluroscan Display

Fluroscan is incorporated for the meter which indicates the degree of the dynamic range's expansion. This new kind of display accurately tracks the processing action and it allows readout of the expansion at each instant in dB.

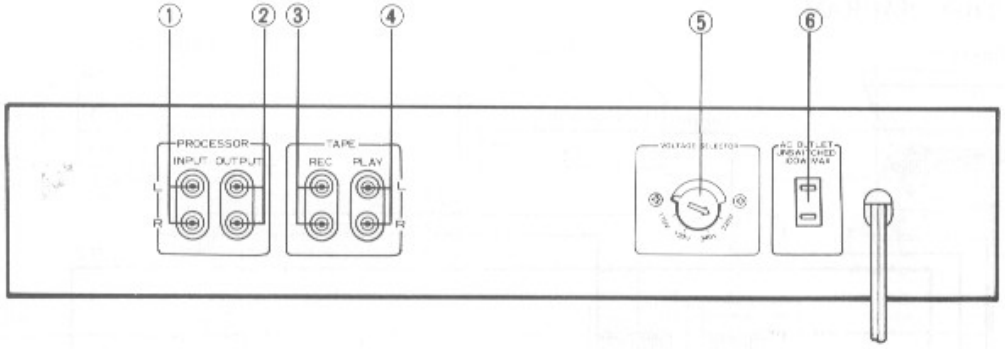
Smart, Slimly Designed Styling

The processor has been slimly designed with the dynamic expansion meter, which employs a Fluroscan display, in the center for a clean, fresh look. The height dimension of the front panel conforms to the EIA* standard 2U size format. Using the optional rack mount adaptors (JA-R104), the processor can be installed in a rack conforming to EIA specifications.

NOTE:
The rack mount adaptors are equipped with S/G model as an accessory.

*EIA: Electronic Industries Association

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.

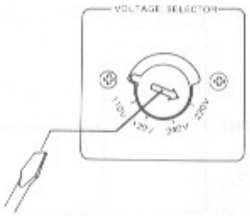
④ TAPE PLAY JACKS

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

⑤ LINE VOLTAGE SELECTOR SWITCH

Check that the indication of the switch is same as your residence before plugging the power cord into the outlet. If it isn't or if you move to an area where the voltage requirements differ, change the switch setting as follows. Before adjusting, disconnect the power cord.

1. Prepare a medium size screwdriver.
2. Insert the screwdriver into the arrow on the voltage selector and adjust so that the tip of the arrow points to the voltage value of your area as shown below.



Screwdriver

⑥ 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-2 (UNSWITCHED). The maximum power capacity is 100W and so do not connect electrical appliances with a power capacity exceeding this value.

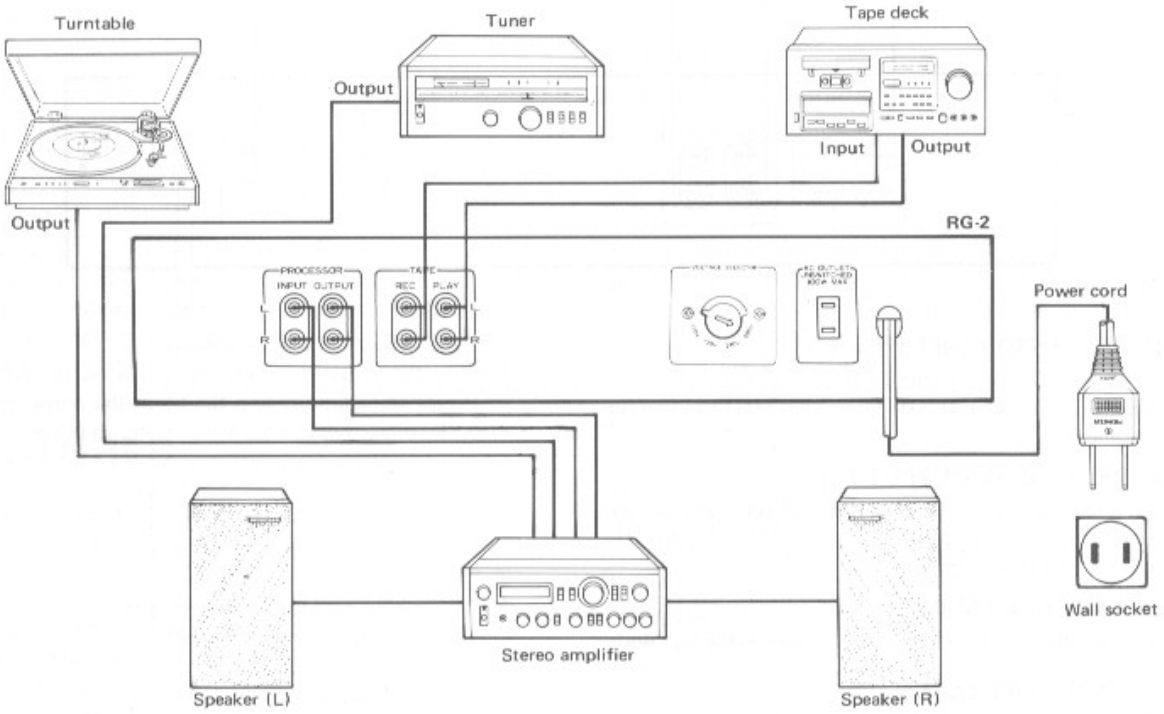
INSTALLATION PRECAUTIONS

To ensure the best sound quality and trouble-free operation, avoid setting up the RG dynamic processor in any of the locations described below:

Locations liable to downgrade performance and result in breakdowns	Resulting trouble
1. Locations exposed to direct sunlight, or near heaters.	1. External heat causes the performance of the electronic parts to deteriorate, and operation becomes unstable.
2. Locations with poor ventilation, with high humidity or moisture contents, or dusty locations.	2. Cause of faulty contact in input-output terminals, and rust. High humidity and a high moisture content cause deterioration in insulation. There is also the danger of current leakage and heat generation in the circuit parts. Dust or grease in the rotating parts causes them to deteriorate.
3. Locations susceptible to vibration.	3. These locations affect the precision parts adversely.

CONNECTIONS

CONNECTION DIAGRAM



CONNECTIONS TO STEREO AMPLIFIER

Use the accessory connecting cords to connect the PROCESSOR INPUT and PROCESSOR OUTPUT jacks on the RG-2 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.

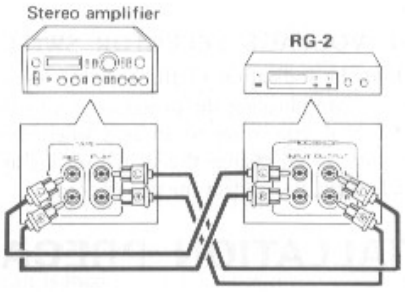


Fig. 1

TAPE DECK CONNECTIONS

Since the RG-2 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-2.

Connections for recording

Connect the recording input jacks (INPUT) on the tape deck to the TAPE REC jacks on the RG-2.

Connections for playback

Connect the playback output jacks (OUTPUT) on the tape deck to the TAPE PLAY jacks on the RG-2.

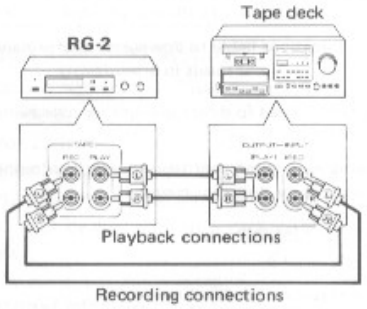
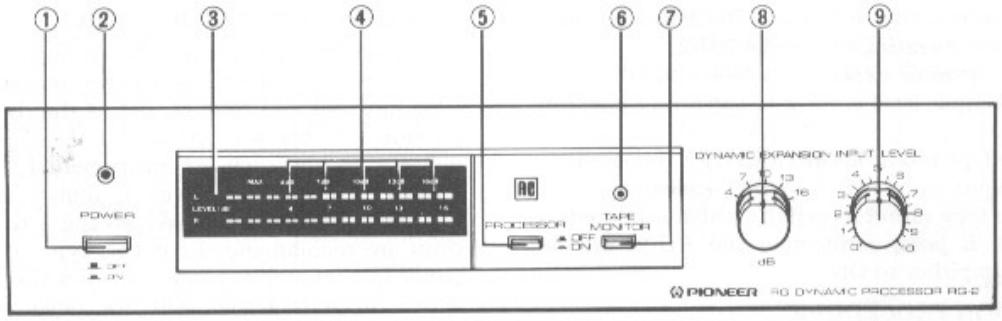


Fig. 2

FRONT PANEL FACILITIES



① POWER SWITCH

Power is supplied to the model RG-2 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-2'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-2's OUTPUT jacks. In the OFF position, the RG-2 circuitry is bypassed. This position allows for instant comparison between the expanded and the unprocessed signals.

NOTE:
When the RG-2'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-2'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-2.

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-2) 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.

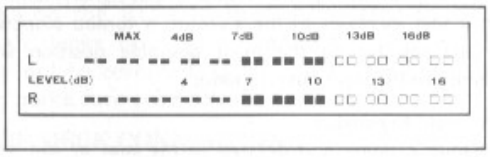


Fig. 3

USING A TAPE DECK

By setting the tape monitor switch on the stereo amplifier to ON, and the processor switch on the RG-2 to OFF, the tape monitor switch on the RG-2 can be operated in place of that on the stereo amplifier. The signal at the RG-2 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-2 EFFECT ON MUSIC SOURCE

The RG-2 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-2 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. 3, 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).

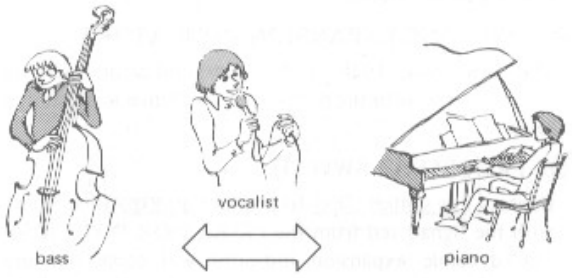


Fig. 4

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.

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.

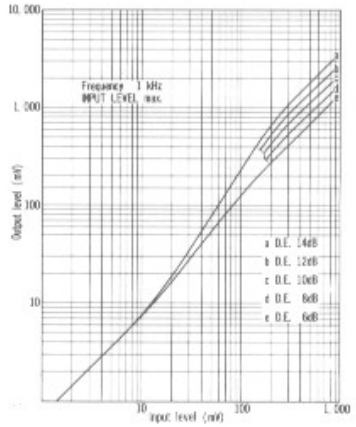


Fig. 8 — RG processor input-output transfer characteristics

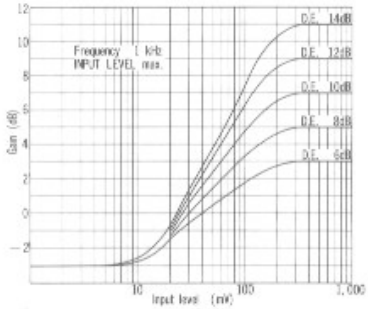


Fig. 9 — RG processor input-gain characteristics

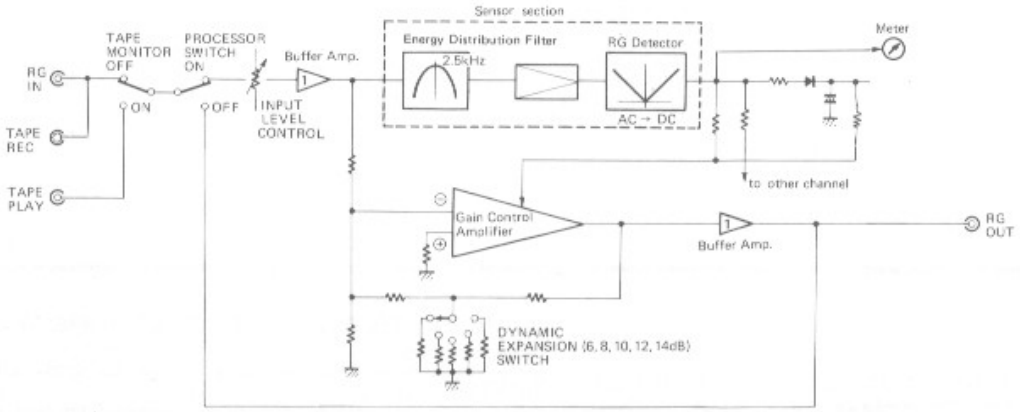
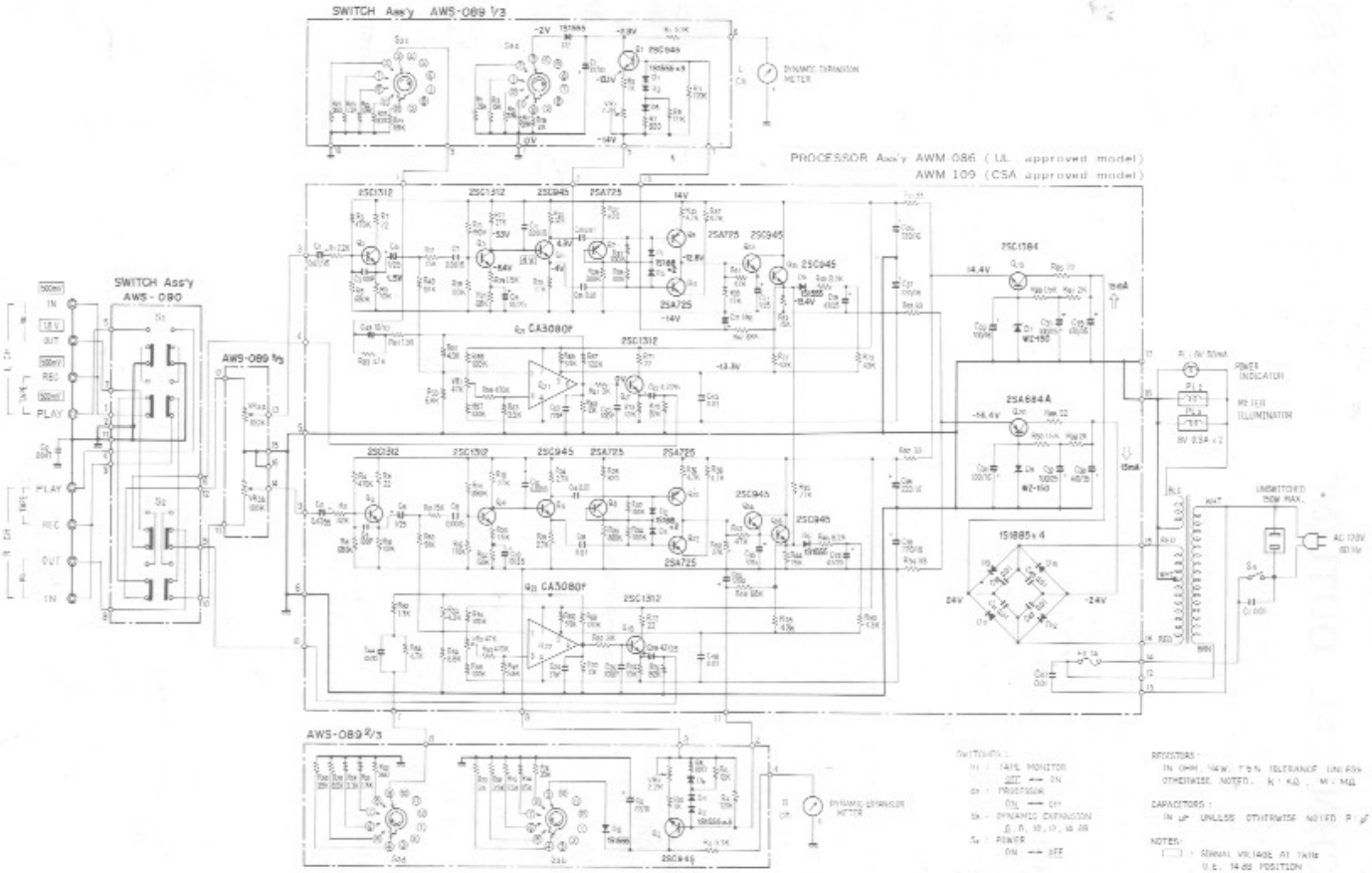


Fig. 10

SCHEMATIC DIAGRAM



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

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178-184 Boundary Road, Braeside, Victoria 3195, Australia

Printed in Japan
<ARB158-C>
<77A01Y8B14>

PIONEER