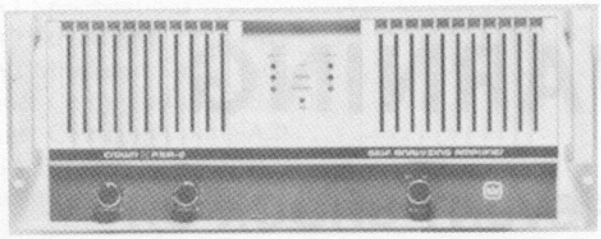
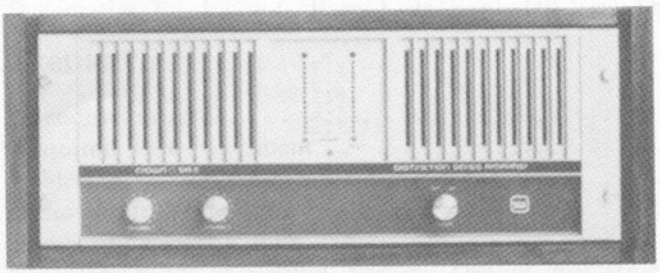
crown

SERVICE MANUAL





PSA-2/SA2

PSA-2D/PSA-2DX/PSA-2X

SELF-ANALYZING AMPLIFIER

K80024-1

12/87

The information furnished in this manual does not include all of the details of design, production, or variations of the equipment. It does not cover all the possible contingencies which may arise during operation, installation, or maintenance. Should special problems arise, or further information be desired, please contact the Crown International Customer Services Department.

Crown International
1718 W. Mishawaka Rd.
Elkhart, Indiana 46514
Ph: (219) 294-5571

WARNING

TO PREVENT SHOCK OR FIRE HAZARD DO NOT EXPOSE TO RAIN OR MOISTURE!

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

REVIEW SECTION

I. Introduction

This manual contains complete service information on the Crown PSA-2/SA2/PSA-2D/PSA-2DX/PSA-2X amplifiers. It is designed to be used in conjunction with the PSA-2/SA2 Instruction Manual. However, some important information is duplicated in this Service Manual in case the Instruction Manuals are not readily available.

NOTE: THE INFORMATION IN THIS MANUAL IS INTENDED FOR USE BY AN EXPERIENCED TECHNICIAN ONLY!

II. Warranty

As a Crown Warranty Service Station, you should be familiar with Crown warranty policies. Each Instruction Manual contains basic policies as related to the customer. However, under questionable circumstances, please contact the Technical Service Department or Director of Customer Service at: Crown International, Inc., 1718 W. Mishawaka Road, Elkhart, IN 46514.

III. PSA-2 Specifications

General Protection: Protection circuitry limits the output level to protect the output transistor stage, even in the case of elevated temperature. Transformer overheating results in shutdown (STANDBY) of that particular channel. Controlled slewing rate voltage amplifiers protect the unit against RF burnouts. Input overload protection is furnished by a resistor at the input of the amplifier to limit current.

DC Output Offset: (Shorted input) ±10 millivolts.

Phase Response: +0, -15 degrees DC-20KHz at 1 watt.

Input Impedance: (XLR balanced) 20K ohms. (phone jack unbalanced) 25K ohms ±30%.

High Voltage Power Supply: Two 800VA transformers with computer grade capacitors powered through 10A relays.

Low Voltage Power Supply: ±15V DC supplies are provided by a current limited shortproof regulator.

Power Requirements: 50-60Hz AC with adjustable taps for 100, 120, 200, 220, and 240 ±10% operation. Draws 90 watts or less on idle 800W at 250W channel output into 8 ohms.

Turn On: May be switch selected for instantaneous or four second delay after applying power. No dangerous transients.

Low Frequency Load Protect.: May be switch selected to produce shutdown (STANDBY) of high voltage power supply for DC outputs greater than 26V or low frequency outputs greater than 26V at 5Hz (see Graph RVW.15).

Controls: Two position ON/OFF rotary switch.
Ch. 1 and Ch. 2 input level controls.
The LOW FREQ PROTECT, DELAY and STEREO/MONO slide switches are located on the rear panel.

Displays: A yellow LED indicates STANDBY mode activated for that respective channel.
A pair of green LED's indicate SIGNAL presence at the output of that respective channel.
A pair of red LED's (IOC) indicate amplifier OVERLOAD conditions for that respective channel.
An amber LED POWER indicator driven by low power control supply.

Connectors: Unbalanced Input - ¼" phone jacks.
Output-color coded dual binding posts on standard ¾" centers; spaced ¾" apart for mono (balanced) output connection.
AC Line - Three wire 20A, 120V male connector with 5 ft. cable.
Ground Selectivity - 2 lug terminal block with removable shorting strap.

Module Plug-ins: Standard rear-panel balanced input module (module replacement information available upon request).

Dimensions: 19″ standard rack mount (EIA Standard RS-310-B) 7″ height, 14¾″ behind mounting surface. Handles extend 2⅛″ in front of mounting surface. Center of gravity is 5.4″ behind the front panel.

Weight: 57 pounds (25.8Kg) net weight.

Finish: Satinized aluminum front panel with gray suede Lexan insert and black adonized aluminum chassis and covers.

Construction: Aluminum chassis, specially designed "flow-through" ventalation top front and side panels. Heavy duty handles to ease transport. Plug in rear panel balanced input module.

Heat Sinking: Forced air with high efficiency coolers. A two speed fan with an intake filter (washable) mounted on the back (rear) of the amplifier forces air through coolers and out both the top and sides of the amplifier.

IV. PSA-2 Stereo Specifications
(Exclusive of Balanced Input Module)

Output Power: 220 watts per channel minimum RMS (both channels operating) into an 8 ohm load, 20Hz-20KHz at a rated RMS sum total harmonic distortion of 0.05% of the fundamental output voltage (tested per FTC specifications). 250 watts ±1dB per channel, 20Hz- 20KHz into 8 ohms with no more than 1.0% THD (EIA Std. SE-101-A).

Output Power (4 ohms): 400 watts ±1dB per channel, 20Hz-20KHz into 4 ohms with no more than 1.0% THD (EIA Std. SE 101-A).

Output Power (2 ohms): 685 watts ±1dB at 1KHz per channel into 2 ohms with no more than 1.0% THD.

Hum and Noise: 115dB below rated output "A" weighted 110dB below rated output (20Hz-20KHz).

Response: ±0.1dB 20Hz-20KHz at 1 watt into 8 ohms +0 -1.5dB DC-80KHz.

Harmonic Distortion: Less than 0.002% from 20Hz-1KHz and increasing linearly to 0.05% at 20KHz at 220 watts into 8 ohms, per channel.

IM Distortion: Less than 0.01% from 0.25 watts to 220 watts into 8 ohms per channel.

Slewing Rate: Greater than 30 volts per microsecond.

Damping Factor: Greater than 700, DC to 400Hz into 8 ohms.

Output Impedance: Less than 12 milliohms in series with less than 1.2 microhenries.

Load Impedance: Rated for 16, 8, and 4 ohm usage, safe with all loads.

Voltage Gain: 20±2% or 26dB±.2dB at maximum gain.

Input Sensitivity: 2.1 volts for 220 watts into 8 ohms.

Output Signal: Unbalanced, dual channel.

V. PSA-2 Monaural Specifications
(Exclusive of Balanced Input Module)

Output Power (8 ohms): 800 watts±1dB; 20Hz-20KHz into 8 ohms with no more than 1.0% THD (EIA std. SE101-A).

Output Power (16 ohms): 500 watts±1dB; 20Hz-20KHz into 16 ohms with no more than 1.0% THD (EIA Std. SE-101-A).

Output Power (4 ohms): 1370 watts±1dB at 1KHz into 4 ohms with no more than 1.0% THD.

Frequency Response: ±0.2dB, DC-20KHz at 1 watt into 16 ohms.

Harmonic Distortion: Less than 0.003% from 20Hz to 1KHz and increasing linearly to 0.08% at 20KHz, 500 watts into 16 ohms.
Less than 0.005% from 20Hz to 1KHz and increasingly linearly to 0.12% at 20KHz, 800 watts into 8 ohms.

IM Distortion: Less than 0.015% from 0.25 watts to 500 watts into 16 ohms.
Less than 0.015% from 0.25 watts to 700 watts into 8 ohms.

Slewing Rate: Greater than 60 volts per microsecond.

Damping Factor: Greater than 700, DC-400Hz into 16 ohms.

Output Impedance: Less than 24 milliohms in series with less than 2.4 microhenries.

Load Impedance: Rated for 16 and 8 ohm usage, safe with all loads.

Voltage Gain: 40±2% or 32dB±.2dB at maximum gain.

Input Sensitivity: 2.2 volts for 500 watts into 16 ohms.

Output Signal: Balanced, single channel. Channel 1 controls are active; Channel 2 inactive but not removed from operation.

VI. PSA-2 Balanced Input Module Specifications

Controls: Channel 1 and Channel 2 input gain adjust with the AGC Threshold, is accessible from the rear on the Balanced Input Module.

Hum and Noise: -85dBm equivalent input noise 20Hz-20KHz, 600 ohm source, gain set at unity.

Frequency Response: Flat ±0.2dB 20Hz to 20KHz.

High and Low Pass Filters: 3 pole Butterworth 18dB/octave; 50Hz and 15KHz standard frequencies. (Other roll-off points available; see Sec. 7.10 for details.) Slide switch activated.

Compressor Action: Range of compression restricted to 13dB by design (wider range would aggravate feedback in live performance). Threshold adjustable from overload level of main amplifier to 12dB lower.

Balanced Input Voltage Gain: Variable 0-10 ±30%.

Test Tone: Switch activated wide spectrum 50Hz-20KHz tone.

Common Mode Rejection: 70dB 5HZ-3KHz
55dB 20KHz (see Graph RVW.13).

VII. SA2 Specifications

General Protection: Protection circuitry limits the output level to protect the output transistor stage, even in the case of elevated temperature. Transformer overheating results in shutdown (STANDBY) of that particular channel. Controlled slewing rate voltage amplifiers protect the unit against RF burnouts. Input overload protection is furnished by a resistor at the input of the amplifier to limit current.

DC Output Offset: (Shorted input) ±10 millivolts.

Hum and Noise: 115dB below rated output "A" weighted 110dB below rated output (20Hz-20KHz).

Phase Response: +0, -15 degrees DC-20KHz at 1 watt.

Input Impedance: 25K ohms ±30%.

High Voltage Power Supply: Two 800VA tranformers with computer grade capacitors powered through 10A relays.

Low Voltage Power Supply: ±15V DC supplies are provided by a current limited shortproof regulator.

Power Requirements: 50-60Hz AC with adjustable taps for 100, 120, 200, 220, and 240±10% operation. Draws 90 watts or less on idle; 800W at 220W channel into 8 ohms.

Turn On: May be switch selected for instantaneous or four second delay after applying power. No dangerous transients.

Low Freqency Load Protect: May be switch selected to produce shutdown (STANDBY) of high voltage power supply for DC outputs greater than 26V or low frequency outputs greater than 26V peak at 5Hz into 8 ohms.

Controls: Two position ON/OFF rotary switch. Right and Left Input Level controls. The LOW FREQ PROTECT, DELAY and STEREO/MONO slide switches are located on the rear panel.

Displays: An amber LED indicates power on. A pair of yellow LED's indicate STANDBY mode activated for that respective channel. Two sets of fifteen green LED's form a display ladder that indicate by peak-hold and running peak simultaneously, the amplifier's output level over a 42dB range. A pair of red LED's, IOC (Input Output Comparator), indicate amplifier overload for that respective channel.

Connectors: Unbalanced Input - pin jacks. OutputColor coded dual binding posts on standard ¾" centers; spaced ¾" apart for MONO (Balanced) output connection. AC Line - Three wire 20A, 120V male connector with 5 ft. cable. Ground Selectivity - 2 lug terminal block with removable shorting strap.

Dimensions: 19" standard rack mount (EIA Standard RS-310B) 7" height, 14¾" behind mounting surface. Center of gravity is 5.4" behind front panel. Extends 2⅛" in front of mounting surface with optional handles.

Construction: Aluminum chassis, specially designed "flow-through" ventilation top and side panels.

Heat Sinking: Forced air with high efficiency coolers. A two speed fan with an intake filter (washable) mounted on the rear of the amplifier forces air thru coolers and out both the top and sides of the amplifier.

Weight: 57 pounds (25.8Kg) new weight.

Finish: Satinized aluminum front panel with gray suede Lexan insert and black anodized aluminum chassis and covers.

VIII. SA2 Stereo Specifications

Output Power: 220 watts per channel minimum RMS (both channels operating) into an 8 ohm load, 20Hz-20KHz at a rated RMS sum total harmonic distortion of 0.5% of the fundamental output voltage.
350 watts per channel minimum RMS (both channels

operating) into a 4 ohm load, 20Hz-20KHz at a rated RMS sum total harmonic distortion of 0.08% of the fundamental output voltage.
600 watts per channel minimum RMS (both channels operating) into a 2 ohm load, at 1KHz; rated RMS sum total harmonic distortion of 1.0% of the fundamental output voltage.

Frequency Response: ±0.1dB 20Hz-20KHz at 1 watt into 8 ohms +0 -1.5dB DC-80KHz.

Harmonic Distortion: Less than 0.002% from 20Hz-1KHz and increasing linearly to 0.05% at 20KHz, 220 watts into 8 ohms, per channel.

IM Distortion: Less than 0.01% from 0.25 watts to 220 watts into 8 ohms per channel.

Slewing Rate: Greater than 30 volts per microsecond.

Damping Factor: Greater than 700, DC-400Hz into 8 ohms.

Output Impedance: Less than 12 milliohms in series with less than 1.2 microhenries.

Load Impedance: Rated for 16, 8, and 4 ohm usage, safe with all loads.

Voltage Gain: 20 ± 2% or 26dB ±.2dB at maximum gain.

Input Sensitivity: 2.1 volts for 220 watts into 8 ohms.

Output Signal: Unbalanced, dual channel.

IX. SA2 Monaural Specifications

Output Power: 700 watts minimum RMS into an 8 ohm load, 20Hz-20KHz at a rated RMS sum total harmonic distortion of 0.12% of the fundamental output voltage.
440 watts minimum RMS into a 16 ohm load, 20Hz-20KHz at a rated RMS sum total harmonic distortion of 0.08% of the fundamental output voltage.
1200 watts at 1KHz into a 4 ohm load, at a rated sum total harmonic distortion of 1.0% of the fundamental output voltage.

Frequency Response: ±0.2dB, DC-20KHz at 1 watt into 16 ohms.

Harmonic Distortion: Less than 0.003% from 20Hz to 1KHz and increasing linearly to 0.08% at 20KHz, 440 watts into 16 ohms.
Less than 0.005% from 20Hz to 1KHz and increasingly linearly to 0.12% at 20KHz, 700 watts into 8 ohms.

IM Distortion: Less than 0.015% from 0.25 watts to 440 watts into 16 ohms.
Less than 0.015% from 0.25 watts to 700 watts into 8 ohms.

Slewing Rate: Greater than 60 volts per microsecond.

Damping Factor: Greater than 700, DC-400Hz into 16 ohms.

Output Impedance: Less than 24 milliohms in series with less than 2.4 microhenries.

Load Impedance: Rated for 16 and 8 ohm usage.

Voltage Gain: 40 ± 2% or 32dB ±.2dB at maximum gain.

Input Sensitivity: 2.1 volts for 440 watts into 16 ohms.

Output Signal: Balanced, single channel. Channel 1 controls are active; Channel 2 inactive but not removed from operation.

X. Panel Configuration

A. IOC INDICATORS
B. SIGNAL PRESENCE INDICATORS
C. INPUT LEVEL CONTROLS
D. STANDBY INDICATORS
E. ON/OFF INDICATOR
F. POWER CONTROL

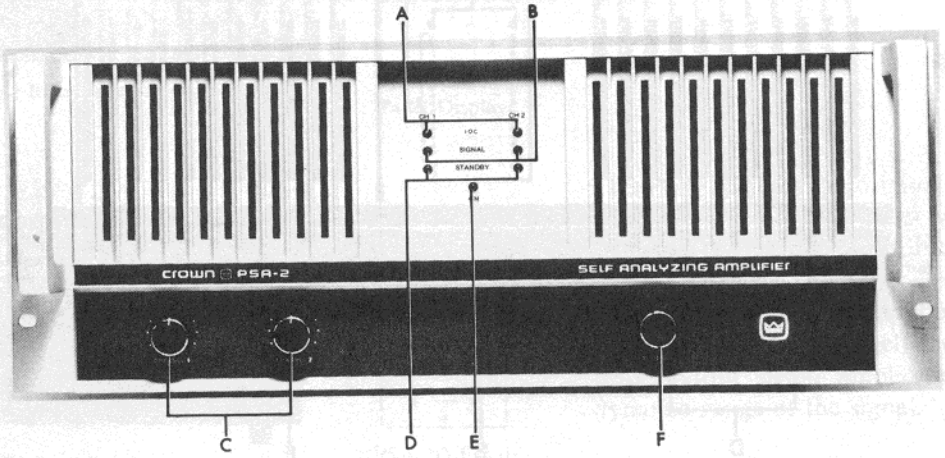
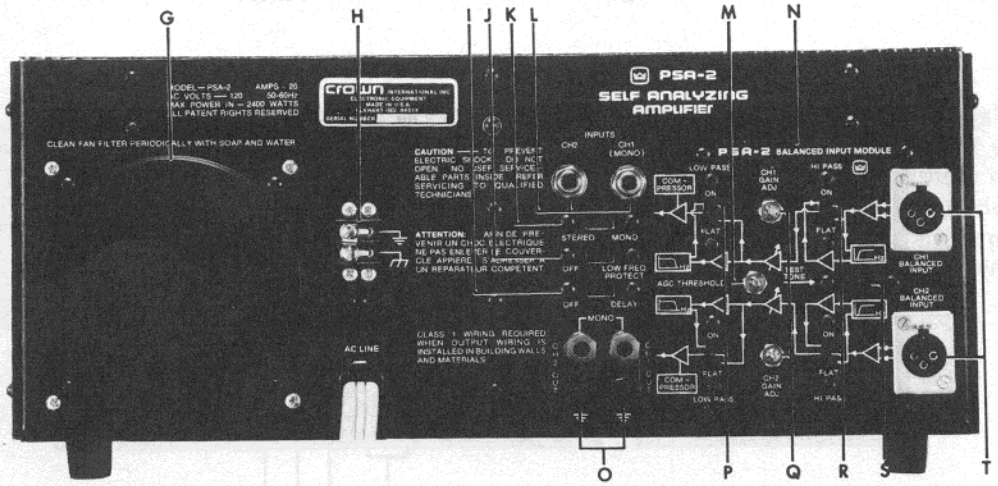


Fig. RVW.1 PSA-2 Front Panel



G. FAN FILTER COVER
H. GROUND TERMINAL STRIP
I. DELAY SWITCH
J. LOW FREQ. PROTECT SWITCH
K. STEREO/MONO SWITCH
L. UNBALANCED INPUT JACKS
M. AGC THRESHOLD CONTROL
N. BALANCED INPUT MODULE
O. OUTPUT BANANA JACKS
P. LOW PASS FILTER SWITCHES
Q. GAIN ADJUST CONTROLS
R. HIGH PASS FILTER SWITCHES
S. TEST TONE GENERATOR SWITCH
T. BALANCED XLR INPUT JACKS

Fig. RVW.2 PSA-2 Back Panel

A. STANDBY INDICATORS
B. IOC INDICATORS
C. LED LADDER DISPLAY
D. INPUT LEVEL CONTROLS
E. ON/OFF INDICATOR
F. POWER CONTROL

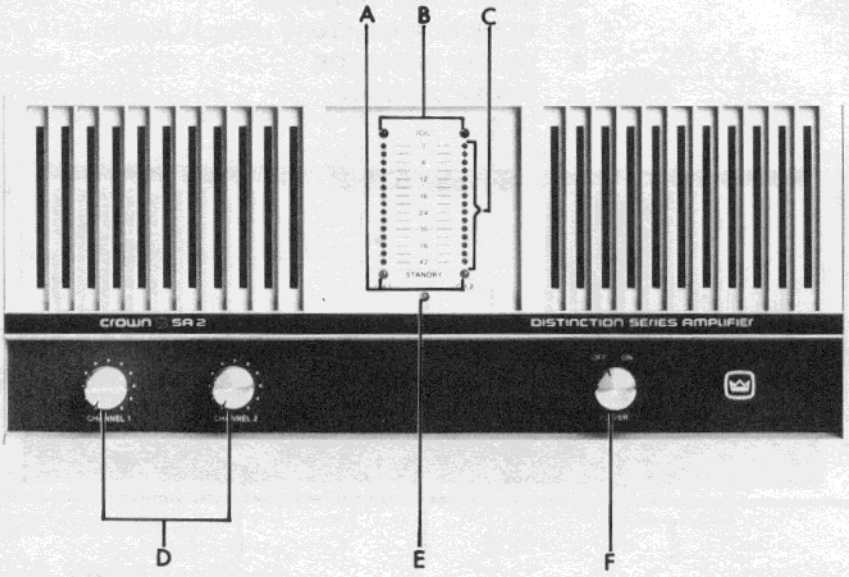
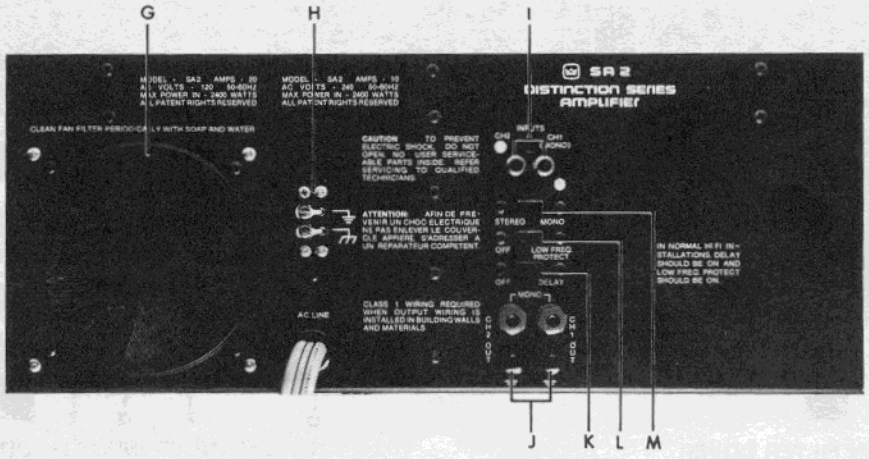


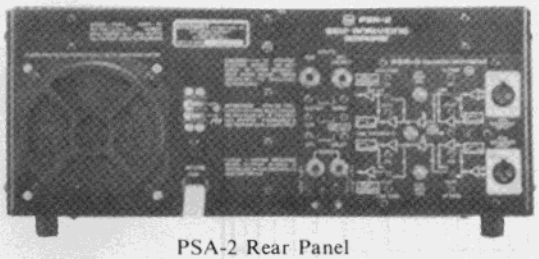
Fig. RVW.3 SA2 Front Panel



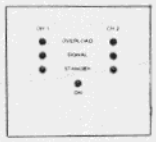
G. FAN FILTER
H. GROUND TERMINAL STRIP
I. UNBALANCED INPUT PIN JACKS
J. OUTPUT BANANA JACKS
K. DELAY SWITCH
L. LOW FREQUENCY PROTECT SWITCH
M. STEREO/MONO SWITCH

Fig. RVW.4 Back Panel

PSA-2 AVAILABLE FORMATS

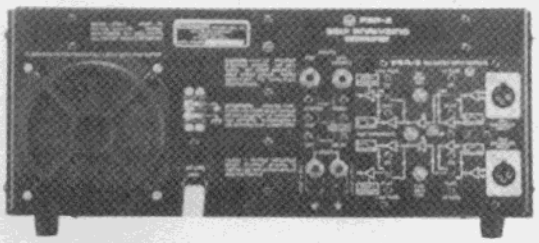


PSA-2 Rear Panel

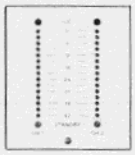


PSA-2 Front Panel Display

The PSA-2 is the forerunner for each of the other PSA models. Its straight-forward front panel as well as its standard feature-laden input module, make it the most widely accepted version in the PSA family.

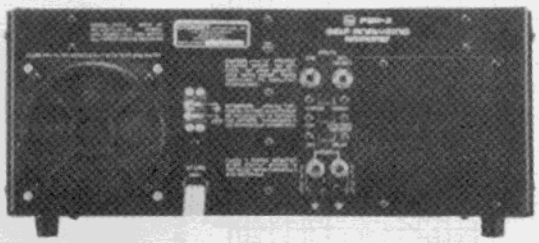


PSA-2D Rear Panel

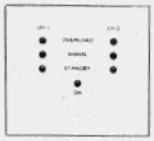


PSA-2D Front Panel Display

The PSA-2D, like the original PSA-2, incorporates the balanced input module which provides many professional features. In addition, the standard display is replaced with the "Dynamic Range Indicator" offered on the Crown SA2 power amplifier. This display consists of fifteen LED's (per channel) that indicate the amplifier's peak output signal amplitude as well as the overall dynamic range of the signal.

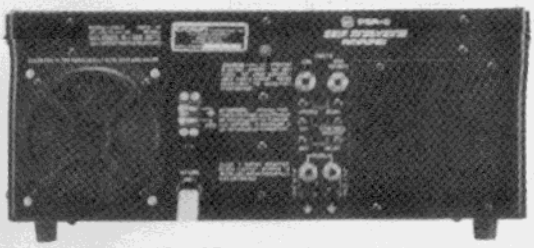


PSA-2X Rear Panel

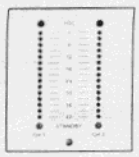


PSA-2X Front Panel Display

The PSA-2X provides the same high quality performance and display as the PSA-2, but does not include the balanced input module for those who do not require its features or for those who wish to design an input module of their own. This model will accept the standard PSA-2 balanced input module (PSA-2MOD) if so desired.



PSA-2DX Rear Panel



PSA-2DX Front Panel Display

The PSA-2DX features the sophisticated "Dynamic Range Indicator" display as used on the Crown SA2 amplifier, but excludes the balanced input module. As with the PSA-2X, the PSA-2MOD may be added later.

Fig. RVW.5 PSA-2 Available Formats

XI. Performance Graphs

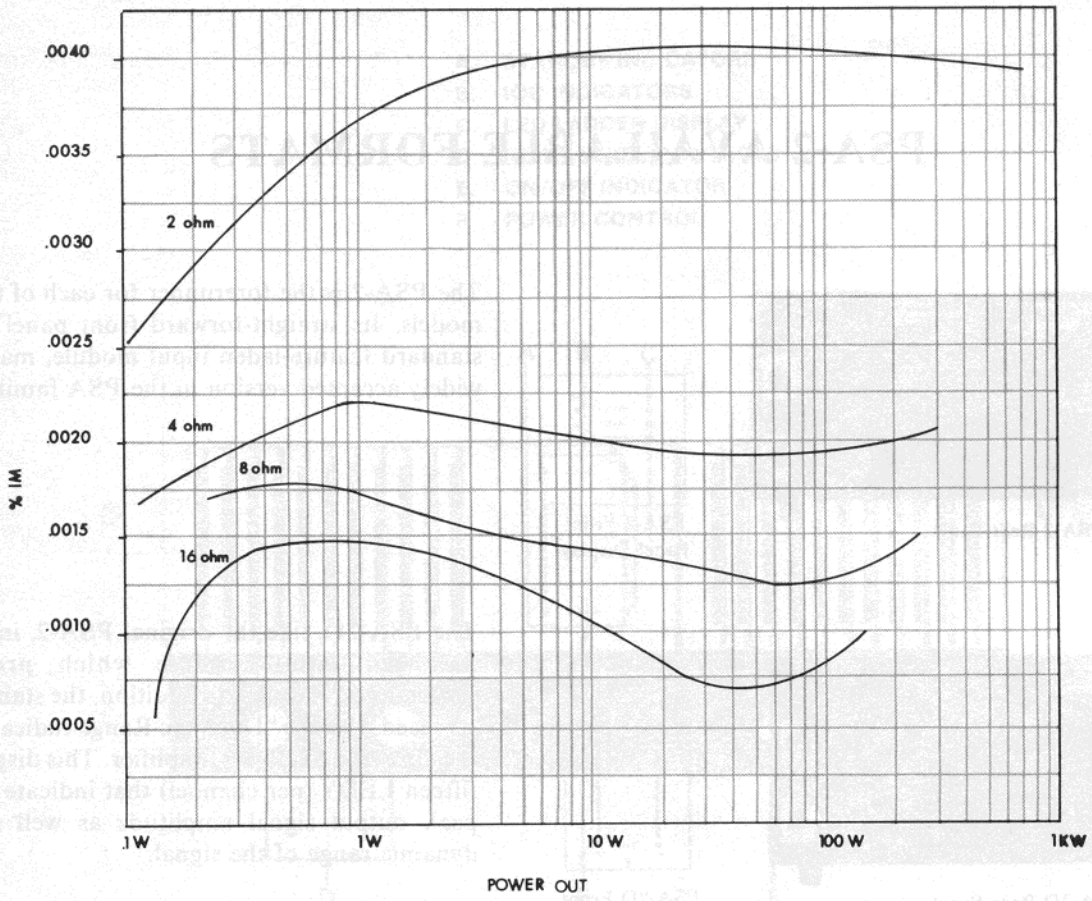


Fig. RVW.6 Typical IM Distortion

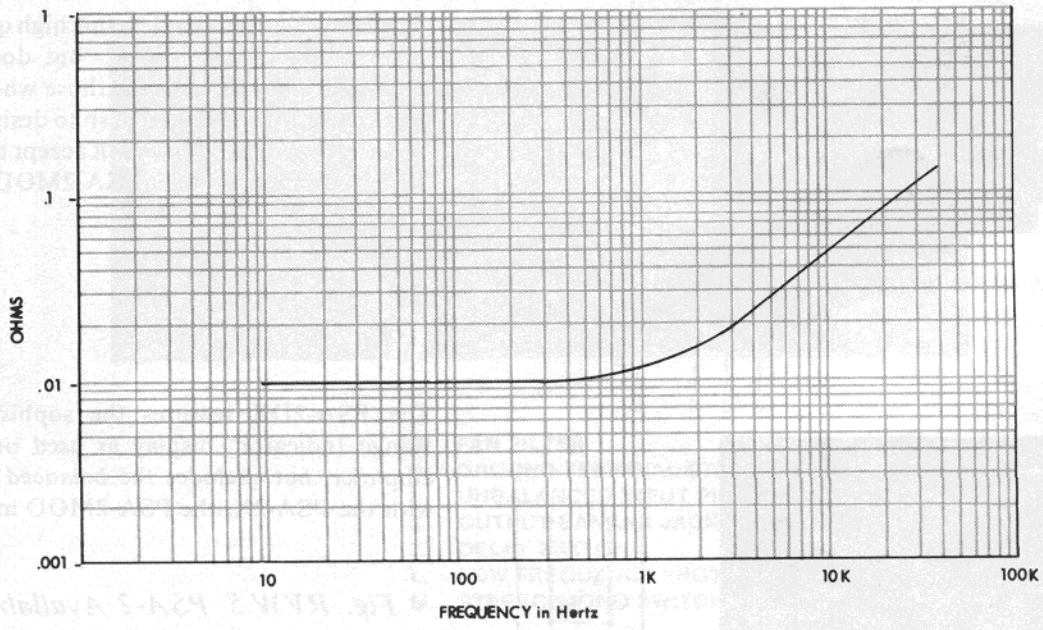
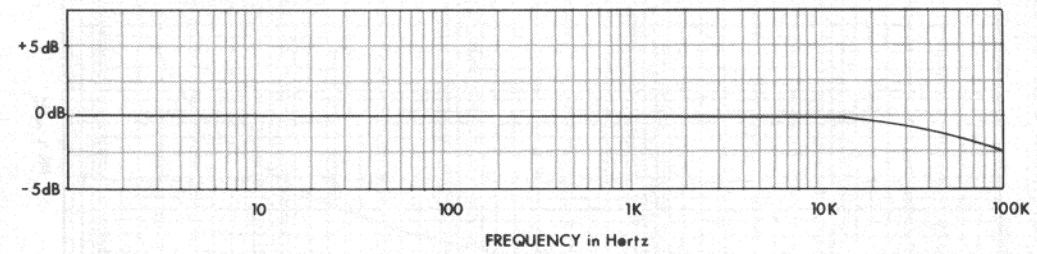


Fig. RVW.7 Typical Output Impedance



ONE WATT INTO AN EIGHT OHM LOAD

Fig. RVW.8 Typical Frequency Response

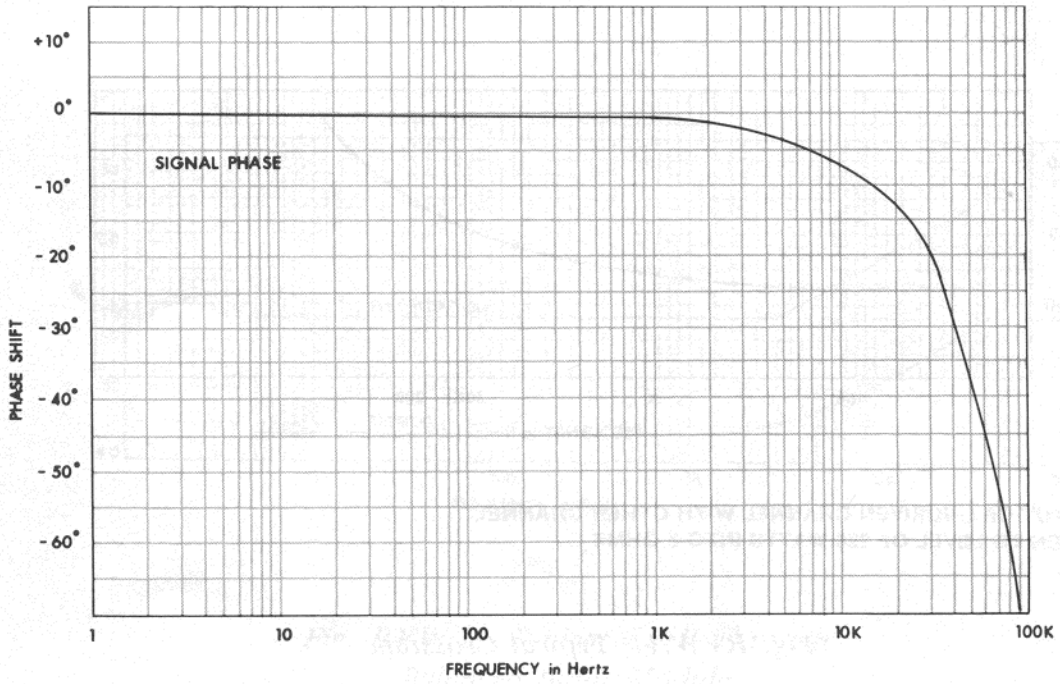


Fig. RVW.9 Output Phase Response

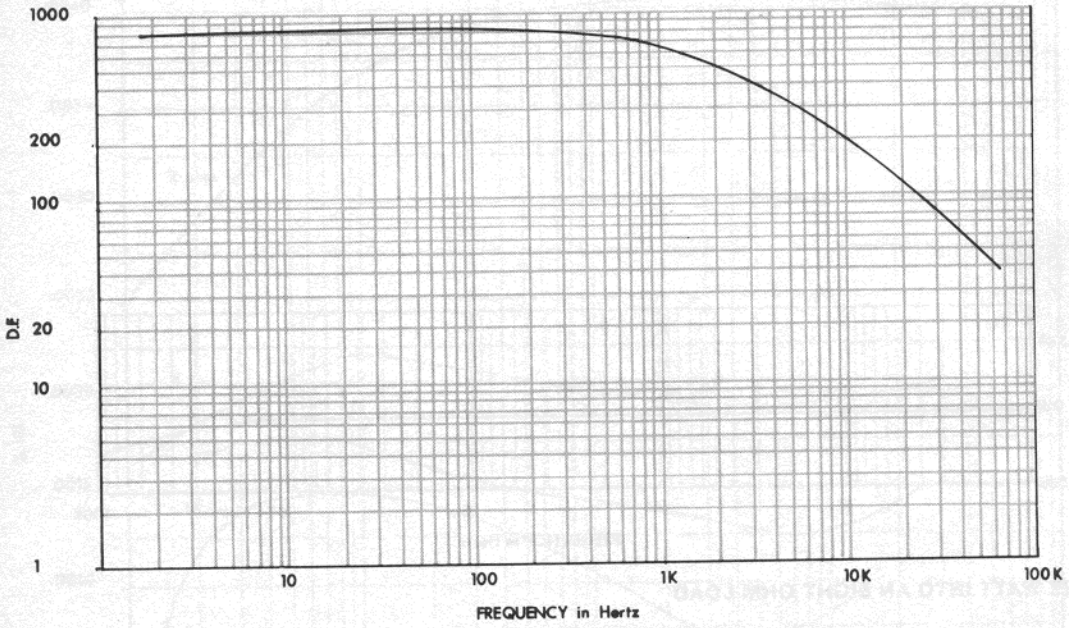
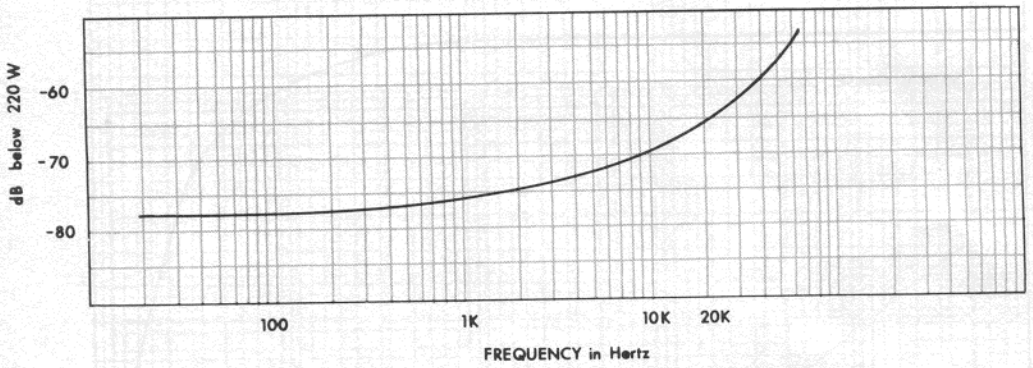


Fig. RVW.10 Typical Damping Factor



OUTPUT OF UNDRIVEN CHANNEL WITH OTHER CHANNEL DRIVEN TO LEVEL OF 220 WATTS INTO 8 OHMS

Fig. RVW.11 Typical Crosstalk

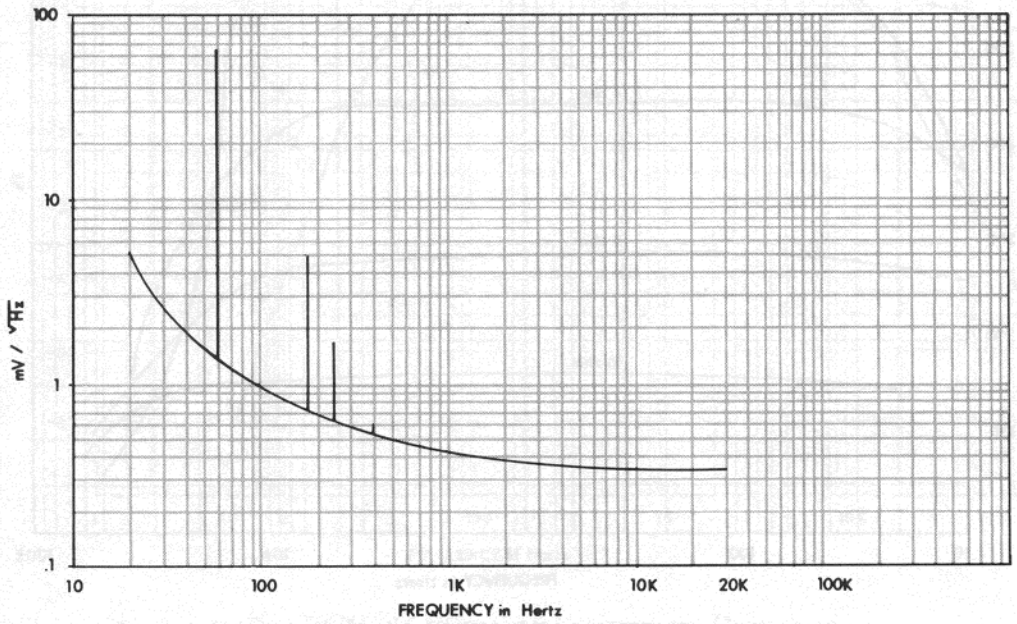


Fig. RVW.12 Typical Noise Spectrum

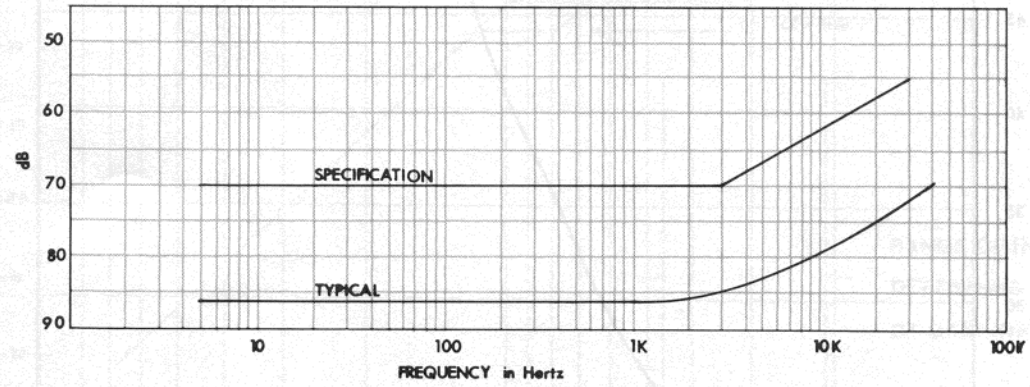


Fig. RVW.13 Typical CMR Through Balanced Input Module