The gain stage is constructed with U1B whose output is routed to the low-pass filter using U3C. The low pass filter is standard as a 3-pole Butterworth type of 15KHz. It also may be readily reconfigured. The input and output of the LP filter are routed to SW101 for selection of the desired signal. The output of SW101 is then input to the limiter-compressor.

The limiter -compressor is constructed with deliberately restricted compression range. Compressors with large gain compression capability often exacerbate feedback in systems where the gain is increased only to be reduced by the compressor action. Should the input be reduced the gain will suddenly appear as the compressor recovers and feedback will result.

The compressor is not a part of the circuit function until a control signal biases on U4. U4 is what is known as an operational transconductance amplifier or OTA. Such a device converts a small input voltage into an output current which is proportional to the control current injected into pin 5. When Q100 is off, R117 acts to assure that no leakage current will enable any amount of compression. When Q100 is on, the current in R118 turns on U4 which becomes an additional feedback loop in parallel with R112 and decreases the net stage gain proportional to the current in R112. The input signal to U4 is provided by the divider R114 and R113. Since the OTA has an offset voltage like any other op-amp, this must be offset by a small DC voltage from R115 and R116, the offset adjustment. Failure to null this error would result in thumping of the compressor as it changed gain. C111 is used to decouple any DC from the module. The output is then routed to the jack switch in J21. If an input is applied to J21, the balanced input module is not part of the signal path.

The control signal for the OTA is derived from a threshold detector (full-wave) composed of comparators U6A and U6B. Should the main input amplifier signal to the balanced gain stage exceed the thresholds established by the wiper of R7 or the output of U2D, the comparators will signal Q100 via R120 to turn on. C112 acts to filter the control signal such that the turn-on of Q100 is governed by C112 and R120 while the turn-off is governed by C112 and R119. This makes the attack time of the compressor much faster than the decay time, as is desired for minimum distortion operation of the system.

The output of U2D is the inverted replica of the DC threshold reference on the wiper of R7, the threshold control. When R7 is set to maximum the only signals which have sufficient amplitude to reach the threshold are feedback error signals caused by overload of the PSA. All overloads will then result in compression of signals processed by the balanced input module. If R7 is decreased the thresold will pass below the overload values and into the signal range (remember that the signal here detected is a -⅛th scale replica of the output). This will allow the compressor to restrain the output power of the unit to protect fragile drivers, etc.

Should stereo tracking of the compressors be desired the test points TP5 and TP6 may be shorted together. This will cause the compressors to compress equally despite which channel may have initiated the gain reduction.

If the action of the compressors is undesirable in an application, the OTA's U4 and U5 or comparators U6 may be removed from their sockets to prevent all compression.

When making a hurried hook-up of a sound system it is often handy to know if the amplifier is attached to the loudspeakers that it is to drive, i.e., no open or shorted speaker cables. To make this test easier, the PSA-2 has a built in tone generator which provides inpulses at a 50Hz rate. As such the spectrum will excite tweeters or woofers with a signal that has very little power yet is quite distinctive and audible.

The generator is constructed with U1D which excites both signal channels with a pulse shaped by C1 in conjunction with R111 and R211. U1D is wired as an astable which has sufficient regeneration to oscillate only when SW1 is closed.

I. PSA-2/PSA-2X Display

The display of the PSA-2 is a combined set of indicators to show the state of the output stage supplies, power applied to the control supply, signal on the outputs and outputs overloaded (IOC).

Amber LED D1, powered by R1 and the -24VDC unregulated supply is used to indicate power applied. Yellow LED's D112 and D212 are used to indicate the standby condition of their respective channels.

The following discussion will center around the channel 1 circuitry which uses a quad-comparator, U100. Channel 2 is of course identical.

If a sufficient output signal is present to forward bias D107 and D108 with the current through R106 and overcome the bias of resistors R107-110 to U100C, then the monostable U100D will fire and turn on Q101. This will in turn light LED D111 (green) to indicate that a signal is present on the output of channel 1. Should the signal cease, the current in R111 will act to charge C101 and reset U100D. D109 is used to assure proper resetting of the charge on C101 when the monostable resets. The use of such a monostable driven signal indicator makes even short transients highly visable.

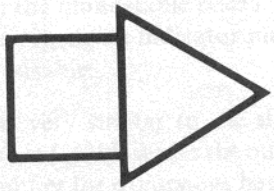
The operation of the IOC is very similar to the signal detector with the difference that U100B senses the output signal of the main input amplifier for excursions beyond approximately twelve peak volts. Diodes D100-104 in conjunction with zener D102 are used to sense such

overload indications. U100B in turn sets monostable U100A which turns on Q100. Should Q100 be powered, LED D106 (red) will indicate overload and steal the operating current from D111 to extinguish the signal indicator. This is to make the IOC more noticeable in that two lights will flash upon its operation. D110 is placed in series with D111 to insure the extinction of the green LED when the IOC lights.

SECTION 8
SERVICE BULLETINS

Periodically, a situation may arise where Crown will feel that it is necessary to change or update specific circuitry by the addition or subtraction of component parts. This information is automatically sent to all Crown Warranty Service Stations. It should be kept with this manual, preferably behind this page as indicated by the note at bottom. Should there be any question pertaining to these changes or updates, call or write the Crown Technical Service Department.

PLACE ALL SERVICE UPDATES HERE



SUBJECT: Thermal Sense Chip Change

SERIAL NUMBERS AFFECTED: SN 10000-11343 (PSA-2) 111947-112551 (SA-2)

On each SA2/PSA2 output module is a thermal sensing chip (U300/U400). Because of availability problems of the metal case chip, we are going to the same circuit in a plastic case. The old part number is C 5067-1. When changing the thermal sense chip (metal type) on the above serial number group, the following parts and installation procedures are essential:

QUANTITY	CPN	DESCRIPTION
1	C 5826-0	Thermal Sense Chip
1	W 9351-3	Teflon tubing 3/8" (.375) length
1	D 5064-7	Kapton Insulator

Step 1. Install the teflon tubing (CPN W9351-3) on the middle lead of the chip (fig.1)

Step 2. Bend all leads up the face or flat surface of the chip so leads are extending above the chip (fig. 2).

Step 3. Insert the chip into the Kapton Insulator (fig. 2 and 3) used to insulate the thermal sense leads from the heat sink

Step 4. Insert the chip, wrapped with the Kapton Insulator, into the heat sink with flat surface of chip facing D 303 (positive module) or D 403 (negative).

Step 5. Cut the Kapton Insulator vertically in two places (fig. 2), fold the cut portions flush against the heatsink and remount printed circuit board.

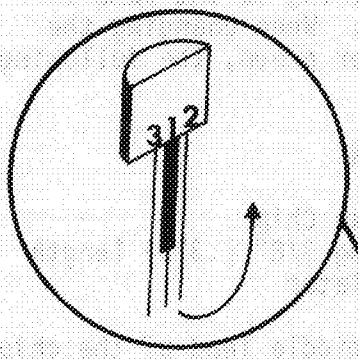
Step 6. Solder the heat sensing chip leads to their respective trace (fig. 4).

David R. Engstrom

Dave Engstrom
Product Specialist

DRE/jao

Figure 1



THERMAL TRANSISTOR

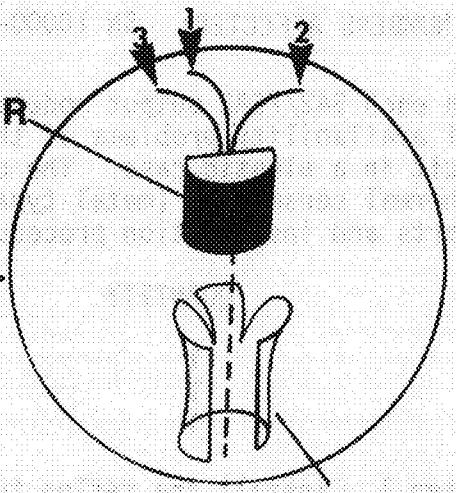
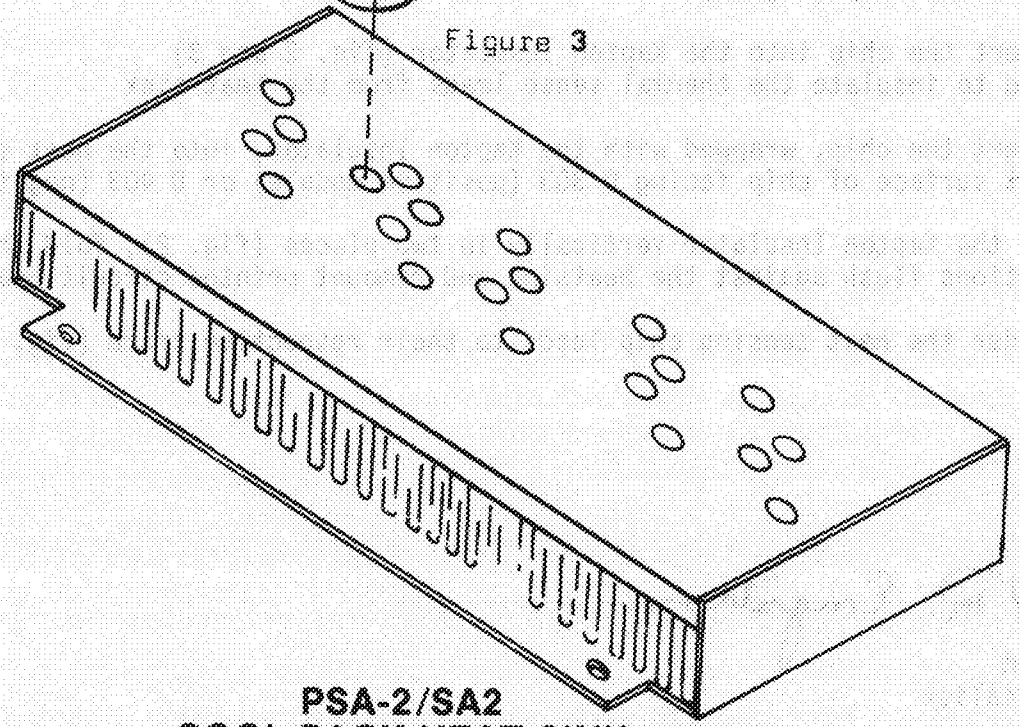


Figure 2

KAPTON INSULATOR

Figure 3



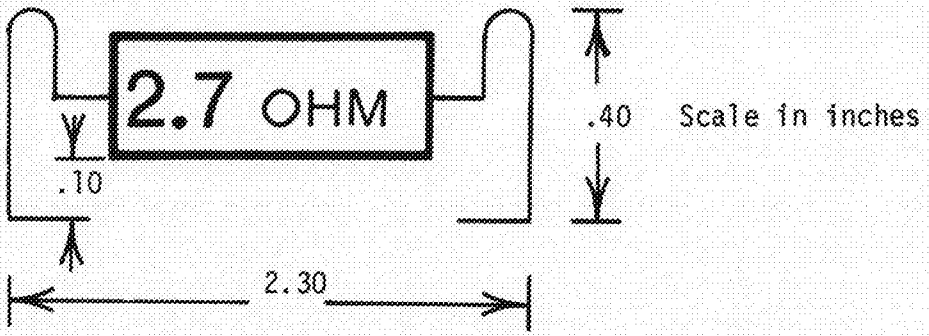
PSA-2/SA2
COOL PACK HEAT SINK

SA2/PSA2 Intermittant Instability (Addendum)

10000-11343 (PSA2) 11947-112551 (SA2)

With reference to the RLC output terminating network problem (refer to Service Bulletin SA2PSA2020780), two components in particular were mentioned the 2.7 ohm 10w resistor and the 1uh torriod coil.

If replacement of the resistor is in order be sure the leads are bent to provide optimum tension relief (see diagram below). Lead lengths should be within given measurements.



All SA2/PSA2 amplifiers after the above serial number group have the above mentioned modification installed during production.

If you have any further questions concerning this modification, please feel free to call or write.

David R. Engstrom

Dave R. Engstrom
Product Specialist

SA2/PSA2 Intermittant Instability

10000-11343 (PSA-2) 111947-112551 (SA-2)

On the output of every SA2/PSA2 Amplifier is a RLC output terminating network (L100/L200, R125/R225,C119/C219). It has come to our attention that because of the wrapping and soldering techniques used in production an instability problem can develop. The following are two possibilities to look for:

1.) The leads of the 2.7 ohm 10w resistor were cut too short so the resistor sits rather snug on the mother board (located inside chassis). If excessive pressure is used to install the output modules, the resistor could be damaged (the resistor lead breaking away from the resistor itself). Replacement of the resistor is in order.

	CPN	DESCRIPTION
Part	C3813-0	2.7 ohm 10w

2.) The torroid coils (L100,L200) were produced with the connector leads wrapped to tight. When soldered, the insulation heats and a break in the insulation takes place; causing a short and eliminating the coil/resistor network from the circuit. Unsolder the leads from the coil and unwrap one or more lead windings to seperate the wire ends where the insulation is broken through.

If you have a SA2 or PSA2 that exhibits instability, excessive heating and the high speed fan turns on between 5-10 seconds after the instability shows itself, the above may be the cause of the failure. If you have any further questions, please call or write.

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Dave R. Engstrom
Product Specialist

SUBJECT: Input FET Change Board Modification

SERIAL NUMBERS AFFECTED: 10000-11233 (PSA-2) 11947-112666 (SA-2)

On the input circuitry of every SA-2/PSA-2 amplifier is dual FET (Q101 and Q201). Because of availability problems of this part, we are changing part suppliers. The currently used E411 Dual N-CH JFET (CPN C 4015-1) will be replaced with a NPD 5566 Dual FET (CPN C 5440-0). These two parts are not interchangeable so in the event Q101 or Q201 is defective and the new part is used as a replacement, follow the procedures below:

Quantity	CPN	Description
1	C 5440-0	Q101/Q201 input Dual FET

1) Cut the trace on the component side between Q101 and R105 (see fig.-1)

2) Cut the trace on the component side between Q201 and R206 (see fig.-1)

3. Solder six jumper wires on the foil side at these locations (fig.-2)

Q101-pin 1 to R105
Q101-pin 2 to pin 3
Q101-pin 7 to pin 8
Q201-pin 1 to R206
Q201-pin 2 to pin 3
Q201-pin 7 to pin 8

If you have any questions, please call or write.

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High Speed Fan Modification

10000-11994 (PSA-2X) 226-360 (PSA-2DX) 11947-112787 (SA2)

Many customers have experienced a problem with the fan going into high speed operation at both low power levels and at turn on. The Crown Engineering Department has issued a modification raising the threshold where the fan comes on. This modification changes the high speed fan threshold point from -3.23Vdc (122 degrees F) to -3.36Vdc (144 degrees F). Because of the Self Analyzing protection circuit, this change will not cause undo stress on the output devices. The modification procedures and parts are as follows:

QUANTITY	CPN	DESCRIPTION
1	C 5744-5	5.76K ⅛w 1%
1	C 4223-1	360K ⅛w 5% (R3)

MODIFICATION PROCEDURES:

1. Change R2 (on the main drive printed circuit board) from 5.49K ⅛w resistor to 5.76K ⅛w 1%.

2. Change R3 (on the main drive printed circuit board) from the 220K ⅛w 5% resistor to the new 360K ⅛w 5% resistor.

All amplifiers with serial numbers in the above mentioned ranges that exhibit this problem should have this modification. All amplifiers above these serial numbers are being modified in production.

If you have any further questions, please feel free to call or write.

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SUBJECT:Power Supply Fuse Change

SERIAL NUMBERS AFFECTED: 10000-11719 (PSA-2X) 226-336 (PSA-2DX) 111947-112787 (SA-2)

All PSA-2/SA-2 amplifiers in the above serial number group are incorporated with two 12 amp fuses (F1 and F2) on the amplifiers relay module. However, the original design called for two 20 amp fuses, but because of a Bill of Material error, the 12 amp fuse was used instead. This may result in premature blowing of this fuse when operating at maximum output into a 2 ohm load in stereo or a 4 ohm load in mono operation.

Anytime a PSA-2X, PSA-2DX or SA-2 is in for repair, please change the fuses from the 12 amp to 20 amp as standard procedure. Replacement parts are as follows:

QUANTITY	CPN	DESCRIPTION
2	C 3840-3	20 amp fuse

If you should have any questions, please feel free to call or write.

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SA-2/PSA-2 OUTPUT TRANSISTOR SUBSTITUTION MODIFICATION

Because of availability problems in obtaining the C 4718-0 output transistor, part number D 5617-2 is being used as a substitutionary part with the following main module modification:

QUANTITY	CPN	DESCRIPTION
4	C 5846-8	48.7K ohm ½ w 1%

When substituting D 5617-2 output transistor in PSA-2 or SA-2 amplifiers for C 4718-0 output transistors, change R120, R121, R220, R221 from the existing value of 57.6K ohm ½ w 1% resistor (CPN C 5256-0) to the value of 48.7K ohm ½ w 1% (CPN C 5846-8) resistor.

If you have any further questions, please feel free to call or write.

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SUBJECT - SA2/PSA2 Main Board Change May 6, 1980

SERIAL NO'S.

PSA-2X	11415
PSA-20X	305
SA-2	112551

Incorporated into either an SA2 or PSA2 amplifier is an input muting circuit to eliminate turn-on transients. The input mute module is located inside the amplifier's main frame near the input connector module.

All SA2/PSA2 amplifiers over the serial numbers given above will have the muting circuit incorporated on the main module. Both boards are interchangeable; however, if replacing an SA2/PSA2 main module with a serial number higher than the above given numbers (with an older module) the amplifier will not have the input muting circuit. The SA2/PSA2 Service Manual, pages 6-9 and 6-10 show the incorporation of the circuit on the main module, pages 6-11 show the main module layouts.

If you have any further questions, please call or write.

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SUBJECT: PSA-2 Output Device Change Mod

SERIAL NUMBERS AFFECTED: PSA-2 Amps in for service with C4718-0 or D5617-2 output devices

Due to reliability problems in the PSA-2 amplifier, caused by output transistor failure, output device part numbers C 4718-0 and D 5617-2 have been discontinued and are being replaced by part number C 5869-0.

When servicing a PSA-2 amplifier, all C 4718-0 or D 5617-2 output devices should be removed (even if failure is not output device related) and the new C 5869-0 output device installed. The only circuit modification required is the deletion of the two (2) capacitors, C 401 (.1 mfd) from the negative output modules in both channels.

This change is for the PSA-2 amplifier only. We are not experiencing this mode of failure in the SA-2 amplifier.

If you have any further questions, please feel free to call or write.

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SA-2/PSA-2X/PSA-2DX OUTPUT TRANSISTOR CHANGE

Because of availability problems with the C 4718-O output transistor used in the SA-2/PSA-2X/PSA-2DX amplifiers, we are changing to a new transistor. The new part number is C 5869-O.

The new output transistors were first used in the following serial numbers:

MODEL	SERIAL NUMBER
SA-2	112801
PSA-2X	11922
PSA-2DX	361

As of this date, we are using both types of output devices, however, when servicing, keep in mind they are not interchangeable.

We have an alternate part (CPN C 5617-2) that is a direct replacement for the C 4718-O with a small modification on the main module (when ordering replacement output transistor C 4718-O, the C 5617-2 will be sent with service letter #SA2PSA2 010881, explaining the modification procedures).

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PSA-2 IOC Low level triggering modification

Any PSA-2 Display Module

In early production of the PSA-2 amplifier, a low level signal would cause the IOC LED's to illuminate. This was caused by crosstalk within the LM339 used for both the IOC as well as the signal presents indicator (U100 and U200 on the PSA-2 display module). For this reason, D113 and D213 were added to limit the size of this spike by (at .6v greater than the -15v supply) shunting the spike to the -15v supply.

In November of 1980, we used LM339 chips purchased from a different vendor to be used in this circuit and the problem reappeared. To cure is as follows:

QUANTITY	CPN	DESCRIPTION
2	C 3447-1	1N270 diode
2	C 2631-7	10 K ohm ¼ w

1) Remove the diodes presently being used in positions D113 and D213 (CPN C 2851-1) on PSA-2X display module

2) Replace with CPN C 3447-1 (1 N270 germanium diode)

3) Install from the base to emitter junction of each transistor (Q101 and Q201) a 10 K ohm ¼ w resistor (CPN C 2631-7)

We have found this problem exists only when using the National LM339 chip for U100 and U200 on the PSA-2X display board (problem does not exist on the SA-2 display board).

If you have any questions, please call or write.

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