

# CYRUS PSX-R POWER SUPPLY SERIES 2

## SERVICE MANUAL



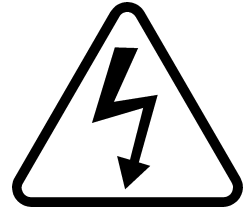
### SPECIFICATIONS

Load regulation $\pm 35.5V$	0.2% full power into <i>Cyrus IIIi</i>
Load regulation $\pm 21V$	0.001% @ 20VA
Line regulation	0.2% at full output load
Noise	<40 $\mu V$ rms
Dimensions (H x W x D)	73 x 215 x 360 (mm), 2.8 x 8.4 x 14.1 (inches)
Weight	6kg
Finish	Black

NOTE:- See type identification page for PSX-R series 1/series 2 model differences

# CYRUS

## CYRUS PSX-R TYPE IDENTIFICATION



These two symbols shown are displayed prominently on the Cyrus PSX-R base cover label. They indicate that the following cautions must be observed by all personnel-

***CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER OR BACK.***

***THERE ARE NO USER SERVICEABLE PARTS INSIDE THE PRODUCT.***

***ALWAYS REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.***

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## CYRUS PSX-R TYPE IDENTIFICATION

### **PSX-R series 1/series 2 identification**

Early in the course of production, the PSX-R was upgraded with the addition of a variable mode of operation. When the changes took place, no external modifications were made to the series 2 unit so differentiation between series 1 and series 2 is made by reference to the units PCB number as follows-

**Series 1** PSX-R PCB reference reads HA7B1\*\*\* (for example HA7B1121)

**Series 2** PSX-R PCB reference reads HA7B2\*\*\* (for example HA7B2132)

The circuits for the two PSX-R units are completely different. When servicing a series 1 PSX-R, refer to the appropriate PSX-R series 1 service manual.

NOTE:- Series 1 PSX-R units have limited compatibility with only the listed products-

Cyrus III, Cyrus Discmaster, Cyrus Dacmaster, Cyrus dAD7, Cyrus dAD3.

### **Rating label**

The Cyrus PSX-R is manufactured to meet the power requirements of different world markets. Each PSX-R carries a rating label on the rear panel which includes details of the following:

#### **Nominal power voltage**

This will be either     230V   For use on nominal 220V - 240V AC mains supply.  
                                 115V   For use on nominal 110V - 120V AC mains supply

If it becomes necessary to adjust the nominal voltage for use in another zone, the power transformer and the power fuse must *both* be replaced with original parts from Cyrus to be the correct type for the new zone

#### **AC fuse rating**

The AC fuse rating is also shown on the label. If replacing the AC fuse it is essential that the replacement fuse is exactly the same specification as the original fuse, supplied by Cyrus. All mains fuses have a 'Timelag' blow characteristic.

#### **Power consumption**

The power consumption figure is indicated under conditions of full power.

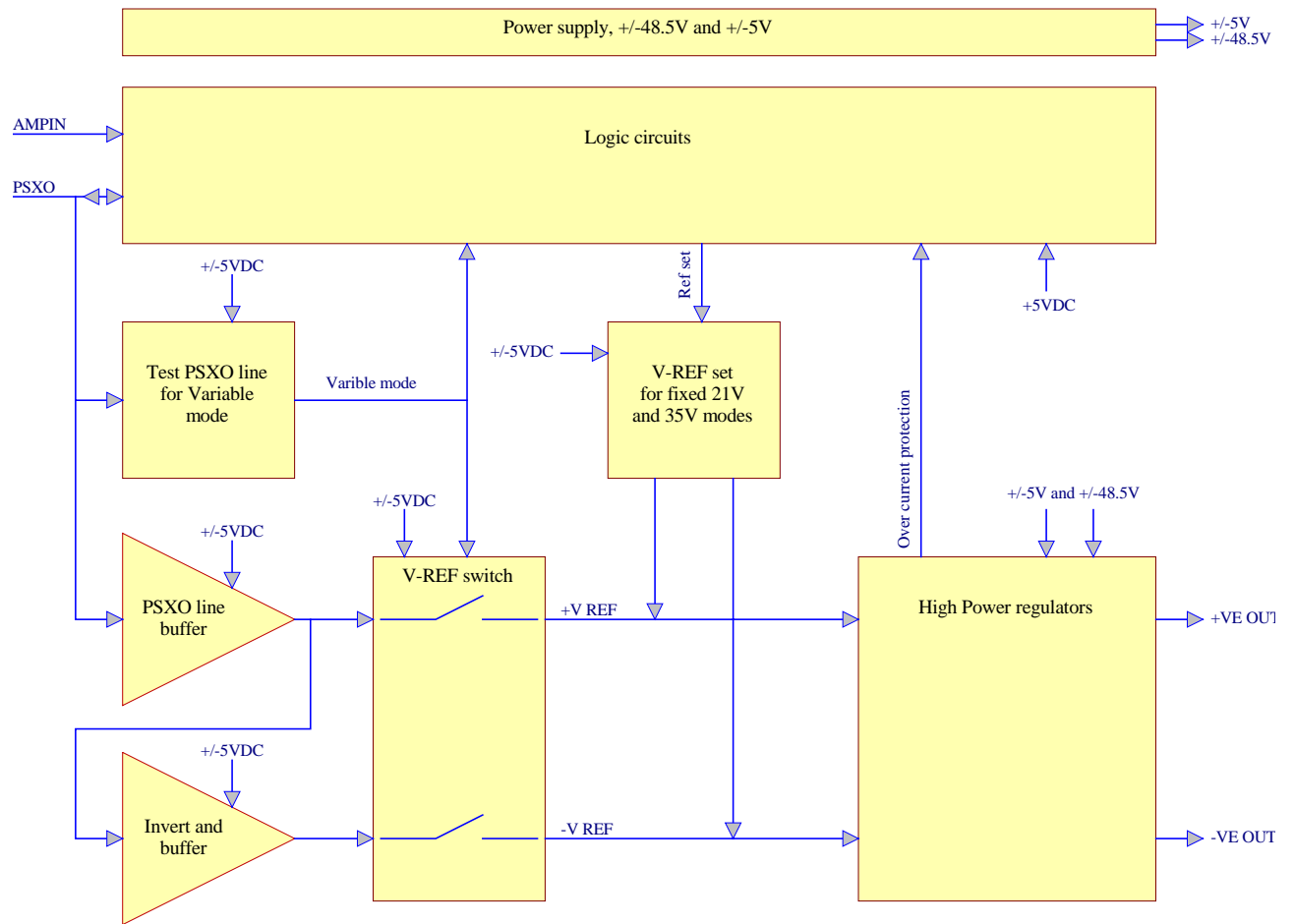
### **Serial number**

Each Cyrus PSX-R carries a serial number code which identifies the following-

- Type of product
- Market destination
- Build number

The serial number is visible through a window in the baseplate caution label. It is therefore important to ensure that a baseplate removed from a product is re-fitted to the same product. In any communications with Cyrus Service or Quality departments it is essential that the full serial number is quoted so that original specification parts and service information may be supplied.

# CYRUS PSX-R BLOCK DIAGRAM



## CYRUS PSX-R TECHNICAL DESCRIPTION

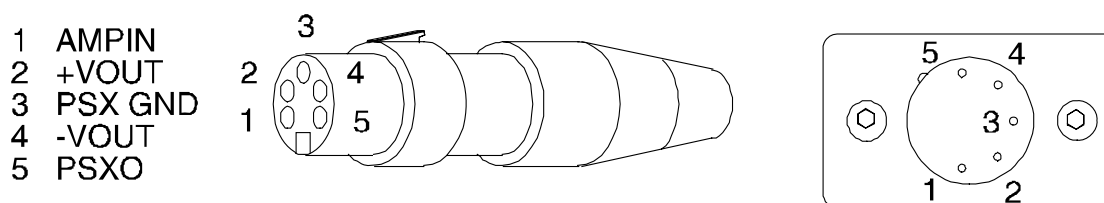
The PSX-R is an external regulated power supply upgrade designed specifically for the CYRUS range of electronics. The PSX-R provides a very clean low impedance power source to replace the internal power supply of the connected unit (e.g. CYRUS IIIi) and so power supply induced distortions, noise and other effects are dramatically reduced.

### Operation modes

The PSX-R has four modes of operation to match the connected product. The mode required is set by the product connected to the PSX-R through the voltage applied to the PSXO and AMPIN lines which are connected through the PSX-R output cable.

In addition, an overcurrent condition within the PSX-R when the high voltage mode is set will cause the PSXO line to be clamped low, signalling power supply failure to the control system of a connected amplifier.

This diagram shows the pin connections for the PSX-R wiring system-



The following table shows the PSX-R modes which may be selected.

Mode	PSXO	AMPIN	Standby mode	Output voltage
Low voltage	0V	Any	Disabled, LED only.	$\pm 21V$
Standby	1.8V~5V	0V	Standby	$\pm 0.2V$
Variable voltage	1.8V~3.0V	5V	Operate	PSXO x 10 ( $\pm 18V \sim \pm 30V$ )
High voltage	5V	5V	Operate	$\pm 35V$

The modes available are explained here in more detail-

### Low voltage 21V mode

This mode is intended for use with low voltage products such as CD players and DACs, where the power is required even in standby mode to maintain a constant operating temperature. Standby mode will only toggle the standby LED colour and the PSX-R output voltage will remain at  $\pm 21V$ . Low voltage mode is set when the voltage fed to the PSXO line is less than 1.8V (except when the PSX-R is self protecting).

### Standby mode

In standby mode the output voltage is approximately  $\pm 0.2V$  (except 21V mode). Standby may be set when if the PSX-R is set for Variable or High voltage use. In these cases the PSX-R sets to standby when the AMPIN line is low and operate mode when AMPIN is set high (5V). If the PSX is unconnected it will default to standby mode.

## CYRUS PSX-R TECHNICAL DESCRIPTION

### High voltage 35V mode

This voltage mode has a full standby mode and over current protection. High voltage mode is set by setting the PSXO line to 5V.

### Variable mode

Variable mode is set externally by setting the PSXO line to one tenth of the required voltage e.g. set PSXO to 2.5V and the PSX-R will give an output of  $\pm 25V$ . Variable mode does not have over current protection but does have a full standby mode.

### Protection mode

The PSX-R will protect against over current (approx. 11amps) in either the positive or negative rail. Over-current protection works internally in all modes. When protection is activated, the PSXO (PSX OK) line will be set low. Note that the PSXO error output signal is only valid in High voltage mode.

This table summarises the functionality of the five wire interface between the PSX-R and the attached product.

### Regulators

The regulator block multiplies the  $\pm VREF$  DC reference voltages by 10x and provides high current delivery. There is a regulator block for the +ve and another for the -ve, the two regulators are very similar in operation and therefore only the +ve regulator is described. The core of the regulator is an opamp (IC101), because the current buffer is inverting the  $\pm$  signal inputs on the opamp are effectively reversed (pins 3/2 respectively). R140/C117 (and C115) provide local compensation to prevent oscillation. T103 is a common base amplifier to translate the output signal from the opamp to T105. As the current increases in T103, the voltage across R113 increases. This in-turn increases the current in T105 pulling T107/9 base voltages up. T107/9 is connected as an emitter follower therefore the emitter voltage also increases. D109 and D110 prevent damage to the regulators when the source unit has higher supplies rails than the PSX-R.

## CYRUS PSX-R FAULT FINDING

When checking a faulty PSX-R the following procedure is recommended to check operation in High Voltage mode-

- Set test mode to switch the power supply on, set to High Voltage mode..
- Check the voltage references.
- If the voltage references are OK, check the Power Regulators.
- If the voltage references are not OK, check the logic circuits.
- Check other modes of operation.

### **Setting Test Mode**

To set the PSX-R to test mode, disconnect the PSX-R from the mains power and connect a short length of insulated wire between pin 1 and pin 5 of the output socket. Now re-connect the power and the PSX-R will switch to operate in 35V mode, enabling circuit tests to be made without a partnering Cyrus product.

### **Checking the Voltage References**

Refer to the circuit diagram and check the voltages around VR101 and VR102. If these voltages measure correctly, the check the voltages at the two test points marked on the schematic marked +VREF and -VREF.

### **Checking the Power Regulators**

Check the voltages across R112 and R113 are correct according to the schematic. Checks of the driver and output transistors should then be made with a diode test meter with the power disconnected.

### **Checking the Logic circuits**

The PSX-R is controlled by discrete logic gates and has no microcontroller or embedded software. For the following logic tests to be made it will be necessary to connect a Cyrus product (CD player, amplifier etc) to the PSX-R to enable the required mode to be set.

The following lists show the correct test voltages which will be measured for different operational modes of the logic circuits:-

#### **High voltage mode, set to operate**

AMPIN and PSXO are both 5V

IC103-11 (pin 11) is low.

IC103-12 is high.

IC103-13 is low.

IC103-2 is low.

IC103-3 is high.

IC103-1 is low.

IC103-5 is low.

IC103-6 is low.

IC103-4 is high.

This sets IC105 (3x2 multiplexer) to allow +/-VREF to float. When +/-VREF float their voltage is determined by R106/7/8/9, giving +/-3.5VDC, therefore the regulator output voltage is +/-35VDC.



## CYRUS PSX-R FAULT FINDING

### High voltage mode, set to Standby

AMPIN is low and PSXO is high

IC103-11 is low.

IC103-12 is high.

IC103-13 is low.

IC103-2 is low.

IC103-3 is low.

IC103-1 is high.

IC103-5 is high.

IC103-6 is low.

IC103-4 is low.

This sets IC105 to connect +/-VREF to ground, therefore the regulator output voltage is 0V

### Low voltage mode, set to standby (LED red)

AMPIN and PSXO are both low

IC103-11 is low.

IC103-12 is low.

IC103-13 is high.

IC103-2 is high.

IC103-3 is low.

IC103-1 is low.

IC103-5 is low.

IC103-6 is low.

IC103-4 is high.

### Low voltage mode, set to operate (LED green)

AMPIN is high and PSXO is low

IC103-11 is low.

IC103-12 is low.

IC103-13 is high.

IC103-2 is high.

IC103-3 is high.

IC103-1 is low.

IC103-5 is low.

IC103-6 is low.

IC103-4 is high.

Again this sets IC105 to connect R126 between +/-VREF. +/-VREF voltage is now determined by R106/7/8/9 and R126, giving +/-2.1VDC, therefore the regulator output voltage is +/-21VDC. (21V mode has active regulators in both standby and operate mode.

### Variable mode, set to operate

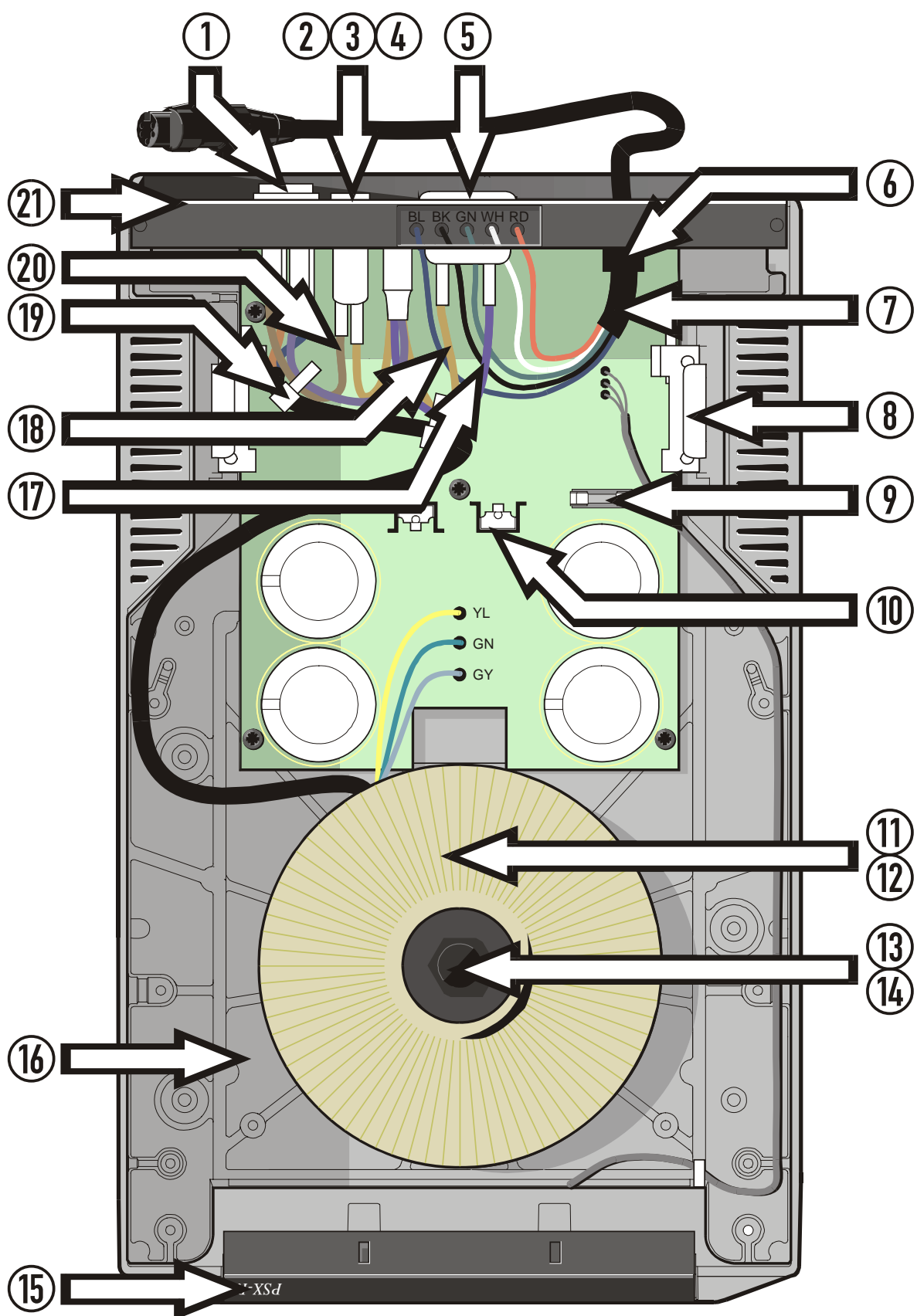
If a fault is suspected with variable mode operation, connect a Cyrus product requiring the variable mode of operation. Switch on the product and the PSX-R and check the voltage at the PSXO input (this voltage will depend on the connected product). If the circuit is working correctly this voltage will now appear as the +VREF and -VREF reference voltages.

## **CYRUS PSX-R ALIGNMENT**

There is no alignment needed for this product

<b>CYRUS PSX-R BLANK PAGE FOR NOTES</b>
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# CYRUS PSX-R CHASSIS PARTS DRAWING



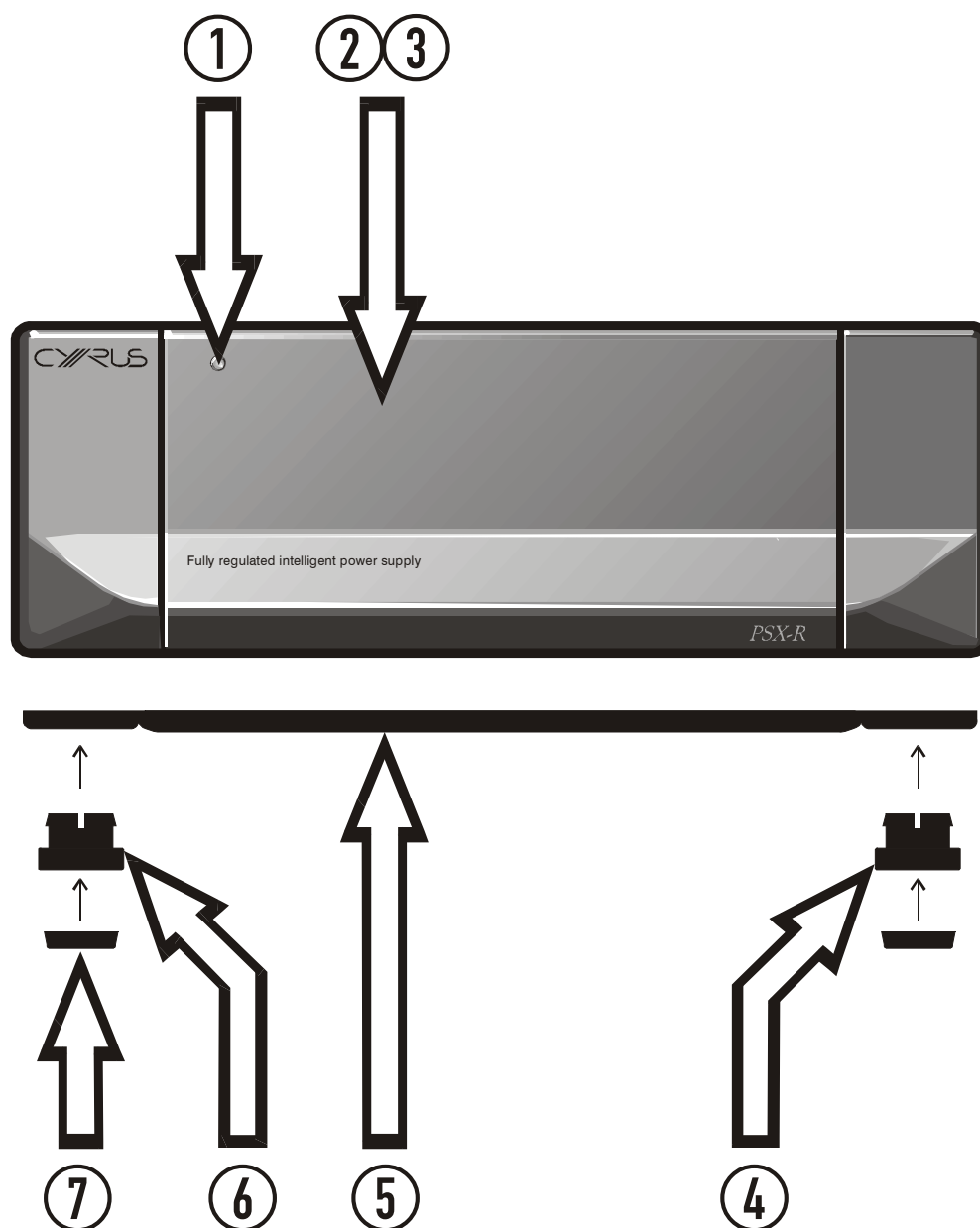
## CYRUS PSX-R CHASSIS PARTS LIST

### Main chassis

Ref	Part number	Description
1	AM-POWSW	Power switch
2	PS-T2.0A	T2.0A Timelag power fuse - for 230 volts only #
2	PS-T2.5A	T2.5A Timelag power fuse - for 115 volts only#
3	AM-MFUSE	Fuseholder #
4	AM-FCOVE	Fuse cover #
5	AM-MTERM	AC power inlet #
6	PS-CBLCL	Cable clamp for connector and lead
7	PS-SKT5WB	5 pin connector and lead
8	AM-TCLMP/MB	Transistor clamp
9	PS-F5.0AEU	F5.0A Quick blow fuse
10	AM-H6237B	Heatsink clamp
11	PS-TX230	Transformer for 230 volts only #
11	PS-TX110	Transformer for 115 volts only #
12	AM-TXWAS95	Neoprene washer
13	AM-M12WAB	Power transformer washer
14	PS-12M50B	Power transformer fixing bolt
15	see following page	Front panel complete
16	AM-COVER/B	Chassis
17	AM-CBPOW/106	Power cable (blue) #
18	AM-CBPOW/75S	Power cable (brown) #
19	AM-CTSHT	Cable tie
20	AM-CBPOW/76L	Power cable (brown) #
21	PS-BACKP	Rear panel

*NOTE- Parts marked # are safety critical and must be replaced only with identical types supplied by Cyrus Electronics.*

## CYRUS PSX-R FRONT PANEL PARTS DRAWING



## CYRUS PSX-R FRONT PANEL PARTS LIST

### Front panel

Ref	Part number	Description
1	AM-PLENS/02	Standby lens
2	AM-FACIA/MB	Front fascia
3	AM-FRONT/02	Technical moulding
4	AM-FTINS/LH	Left hand foot insert
5	AM-BPPLT/B	Base plate
6	AM-FTINS/RH	Right hand foot insert
7	AM-BFOOT	Rubber foot

### Packing list

Part number	Description
AM-MLEUR	Mains lead
PS-MANUL	Instruction manual

## CYRUS PSX-R PCB PARTS LIST

### Location of parts in the amplifier

All parts of the PSX-R are located on the main PCB with the exception of the front panel LED indicator.

### Ordering parts from the parts list

When ordering PCB parts from the parts list, always quote the following information to ensure that the correct parts are supplied-

- Model number
- Serial number
- Component PCB reference
- Value
- Full description

For example-

- Cyrus PSX-R
- HBE00001
- R114
- 270R
- Resistor, 5% fusible

### Understanding the parts list

The parts list which follows covers the Cyrus PSX-R PCB assembly.

- Column 1 of the parts list shows the reference number that will be found on the PCB and the schematic diagram.
- Column 2 of the parts list shows brief details of the component package.
- Column 3 of the parts list shows the component value or type number.
- Column 4 of the parts list shows the tolerance and type of the component.
- Column 5 of the parts list is for notes concerning changes made to parts specifications.



# CYRUS PSX-R PCB PARTS LIST

## RESISTORS

R101	W21	0.1R	WW 3W 5%	
R102	W21	0.1R	WW 3W 5%	
R103	MRS25	2k	MF 1/4W 1%	
R104	MRS25	2k	MF 1/4W 1%	
R105	MRS25	56k	MF 1/4W 1%	
R106	MRS25	24k	MF 1/4W 1%	
R107	MRS25	24k	MF 1/4W 1%	
R108	MRS25	56k	MF 1/4W 1%	
R109	MRS25	56k	MF 1/4W 1%	
R110	MRS25	1k	MF 1/4W 1%	
R111	MRS25	1k	MF 1/4W 1%	
R112	NFR25	270R	NFR 1/4W 5%	
R113	NFR25	270R	NFR 1/4W 5%	
R114	NFR25	270R	NFR 1/4W 5%	
R115	NFR25	270R	NFR 1/4W 5%	
R116	MRS25	18k	MF 1/4W 1%	
R117	MRS25	18k	MF 1/4W 1%	
R118	MRS25	2k	MF 1/4W 1%	
R119	MRS25	2k	MF 1/4W 1%	
R120	NFR25	270R	NFR 1/4W 5%	
R121	MRS25	56k	MF 1/4W 1%	
R122	MRS25	56k	MF 1/4W 1%	
R123	MRS25	1k	MF 1/4W 1%	
R124	MRS25	10k	MF 1/4W 1%	
R125	MRS25	270R	MF 1/4W 1%	
R126	MRS25	47k	MF 1/4W 1%	
R127	MRS25	1.6k	MF 1/4W 1%	
R128	MRS25	2.4k	MF 1/4W 1%	
R129	MRS25	1k	MF 1/4W 1%	
R130	MRS25	1k	MF 1/4W 1%	
R131	MRS25	56k	MF 1/4W 1%	
R132	MRS25	150k	MF 1/4W 1%	
R133	MRS25	150k	MF 1/4W 1%	
R134	MRS25	270R	MF 1/4W 1%	
R135	MRS25	270R	MF 1/4W 1%	
R136	MRS25	56k	MF 1/4W 1%	
R137	RG3	0.22R	WW 3W 5%	
R138	RG3	0.22R	WW 3W 5%	
R139	MRS25	56k	MF 1/4W 1%	
R140	MRS25	1k	MF 1/4W 1%	
R141	MRS25	1k	MF 1/4W 1%	
R142	MRS25	2k	MF 1/4W 1%	
R143	MRS25	2k	MF 1/4W 1%	
R144	MRS25	18k	MF 1/4W 1%	
R145	MRS25	18k	MF 1/4W 1%	
R146	MRS25	18k	MF 1/4W 1%	
R147	MRS25	510R	MF 1/4W 1%	
R148	MRS25	18k	MF 1/4W 1%	
R149	MRS25	8.2k	MF 1/4W 1%	
R150	MRS25	8.2k	MF 1/4W 1%	
R151	MRS25	2k	MF 1/4W 1%	
R152	MRS25	2k	MF 1/4W 1%	
R153	MRS25	0R	MF 1/4W 0%	
R154	MRS25	0R	MF 1/4W 0%	

## CYRUS PSX-R PCB PARTS LIST

R155	NFR25	4.7R	NFR 1/4W 5%	
R156	NFR25	4.7R	NFR 1/4W 5%	

Key:

NFR = non-flammable resistor. MRS25 = axial metal film resistor. W21 = wirewound

### **CAPACITORS**

C101	MKS2	10nF	PE 100V 10%	
C102	MKS2	10nF	PE 100V 10%	
C103	MKS2	10nF	PE 100V 10%	
C104	MKS2	10nF	PE 100V 10%	
C105	NS2G/097	7000uF	EL 50V 20%	
C106	NS2G/097	7000uF	EL 50V 20%	
C107	NS2G/097	7000uF	EL 50V 20%	
C108	NS2G/097	7000uF	EL 50V 20%	
C109	RE2	22uF	EL 63V 20%	
C110	RE2	22uF	EL 63V 20%	
C111	RE2	22uF	EL 63V 20%	
C112	RE2	22uF	EL 63V 20%	
C113	RE2	22uF	EL 63V 20%	
C114	RE2	22uF	EL 63V 20%	
C115	FKP2	150pF	PP 63V 5%	
C115A	FKP2	150pF	PP 63V 5%	
C116	FKP2	150pF	PP 63V 5%	
C116A	FKP2	150pF	PP 63V 5%	
C117	FKP2	3.3nF	PP 63V 5%	
C118	FKP2	3.3nF	PP 63V 5%	
C119	RE2	22uF	EL 63V 20%	
C120	RE2	22uF	EL 63V 20%	
C121	RE2	10uF	EL 50V 20%	
C122	MKS2	100nF	PE 63V 10%	
C123	MKS2	100nF	PE 63V 10%	
C124	MKS2	100nF	PE 63V 10%	
C125	TAP	2.2uF	TB 16V 10%	
C126	TAP	2.2uF	TB 16V 10%	
C127	MKS2	100nF	PE 63V 10%	
C128	MKS2	100nF	PE 63V 10%	

Key:

PE = polyester. PP = polypropylene. TB = tantalum bead. EL = electrolytic

### **DIODES**

D101		1N5402	3A rectifier diode	
D102		1N5402	3A rectifier diode	
D103		1N5402	3A rectifier diode	
D104		1N5402	3A rectifier diode	
D105		1N5402	3A rectifier diode	
D106		1N5402	3A rectifier diode	
D107		1N5402	3A rectifier diode	
D108		1N5402	3A rectifier diode	
D109		1N4002	1A signal diode	
D110		1N4002	1A signal diode	

## CYRUS PSX-R PCB PARTS LIST

D111		1N4002	1A signal diode	
D112		1N4002	1A signal diode	
D113			DELETED	
D114			DELETED	
D115		1N4002	1A signal diode	
D116		1N4002	1A signal diode	
D117		1N4002	1A signal diode	
D118		1N4002	1A signal diode	
D119		1N4002	1A signal diode	
LED101		LTL-52RG	Bi-colour LED	

### **TRANSISTORS**

T101	TO-92	2SA1038	PNP signal transistor	
T102	TO-92	2SC2389	NPN signal transistor	
T103	T0-202	MJE243	NPN power transistor	
T104	T0-202	MJE253	PNP power transistor	
T105	T0-202	MJE253	PNP power transistor	
T106	T0-202	MJE243	NPN power transistor	
T107	TOP-3	2SD1047E	NPN power transistor	
T108	TOP-3	2SD1047E	NPN power transistor	
T109	TOP-3	2SD1047E	NPN power transistor	
T110	TOP-3	2SD1047E	NPN power transistor	
T111	TO-220	TIP31	NPN power transistor	
T112	TO-220	TIP32	PNP power transistor	

### **INTEGRATED CIRCUITS**

IC101	DIL-8	NE5534AN	Low noise OP-AMP	
IC102	DIL-8	NE5534AN	Low noise OP-AMP	
IC103	DIL-14	74HC02	Quad NOR gate	
IC104	DIL-14	74HC14	HEX inverter	
IC105	DIL-16	74HC4053BCN	Triple 2 input multiplxer	
IC106	DIL-16	74HC4053BCN	Triple 2 input multiplxer	
IC107	DIL-8	NE5532N	Dual low noise OP-AMP	
IC108	DIL-8	LM393	Open collector comparator	

### **VOLTAGE REGULATORS**

VR101	TO220	7805T	+5V regulator	
VR102	TO220	7905T	-5V regulator	

### **OTHERS**

FC1		Fuse Cap	Safety cap for FS1	
FC2		Fuse Cap	Safety cap for FS1	
FS101		Fuse holder	PCB mount	
FS102		Fuse holder	PCB mount	

## CYRUS PSX-R PCB PARTS LIST

TP1 to 8			LOUPOTS	
SW101	TO220	Thermal Switch	NOT FITTED	
SW102	TO220	Thermal Switch	NOT FITTED	
CAB101			0.1" 3-core Ribbon for LED1	
CB 1 to 4		Ceramic Beads	For R101/102	
CB 5 to 8			DELETED	

## CYRUS PSX-R SCHEMATIC DIAGRAMS

### Schematic diagram index

The Cyrus PSX-R schematic diagrams are listed below.

SHEET 1..... Complete circuit

