Service Manual

HPX Series

Applicable Models:

HPX4600

HPX6000

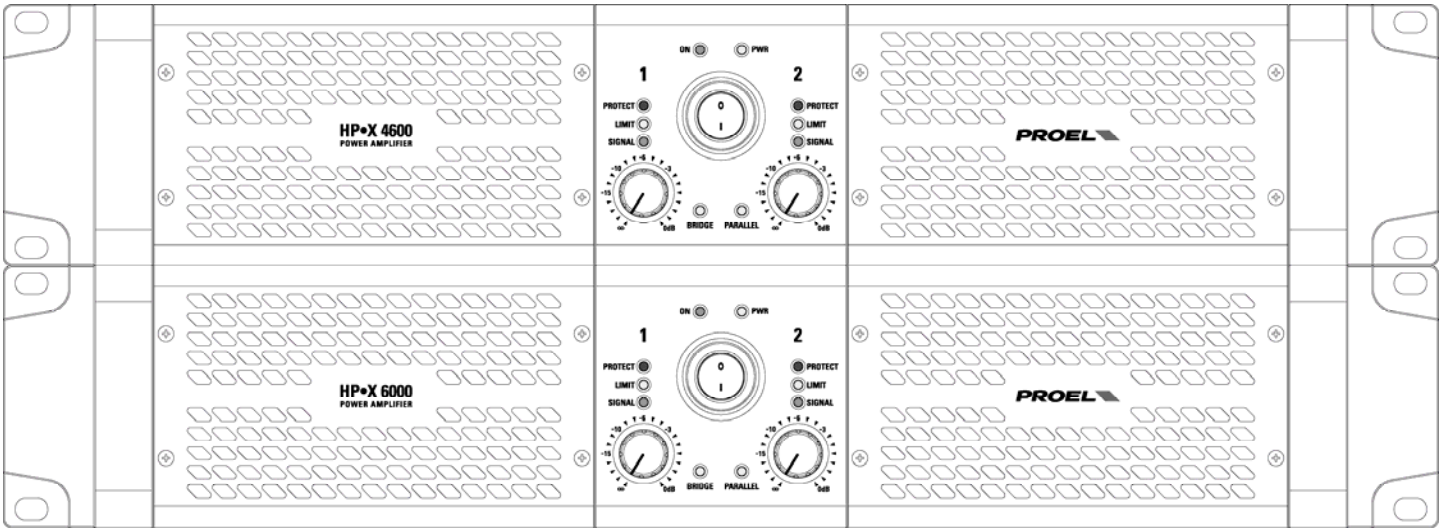


Table of Contents

1 Safety Instructions

1.1 Due to high voltage internal, please be careful during troubleshooting and maintenance course.
Please read the user manual and this maintenance manual first.

1.2 Due to the wrong operation in checking and repairing course will results to ruined damage on some parts, so please operate follow this manual.

1.3 The maintenance person must be ONLY a qualified professional personnel authorized by PROEL.

1.4 Don’t replace the key devices and adjust the adjustable potentiometers by yourself, it will change the parameter of the equipment.

1.5 Please cut off the power to guarantee the safety of the service person when repairing.

1.6 The devices marked  in the drawing indicates a key device, please replace it ONLY with a spare part specified by PROEL.

2 Technical Specification

MODEL	HPX4600	HPX6000
Power 8 ohm *	850 W	1200 W
Power 4 ohm *	1400 W	2000 W
Power 2 ohm **	2300 W	3000 W
Power BRIDGE 8 ohm *	3000 W	4100 W
Power BRIDGE 4 ohm **	4600 W	6000 W
Output Stage	Class 3H	
Frequency response (+0/-0.5 dB)	20 Hz - 20 KHz	
Input Sensitivity (selectable)	0.775 Vrms (0 dBu) / 1.0 Vrms (0 dBV) / 32 dB (fixed GAIN)	
Input Connectors / Impedance	XLR M (with XLR F LINK), 20 Kohm (balanced), 10 Kohm (unbalanced)	
Output Connectors	SPEAKON and Binding Post	
Damping Factor	> 200	
Slew Rate	> 20 V/uS	
S/N Ratio (unweighted)	> 90 dB	
THD+N	< 0.1%	
Controls	INPUT LEVEL, INPUT SENSITIVITY, STEREO/BRIDGE/PARALLEL, SOFT CLIPPING	
LED Indicators	POWER, ON, PARALLEL, BRIDGE, SIGNAL, LIMIT, PROTECT	
Cooling	Variable speed DC fan	
Protections	AC low power, DC, thermal, short circuit, VHF, CLIP limiter, SOFT CLIP limiter	
Mains Supply Voltage	230 VAC (±10%) 50/60 Hz or 120VAC (±10%) 50/60 Hz	
Maximum Consumption	2330 VA	3320 VA
Rated Consumption ***	620 VA	830 VA
Standby Consumption	5 VA	6 VA
Dimensions (W x H x D)	483 x 89 x 505 mm 19" x 3.5" x 19.9" (2U rack)	
Weight	13 Kg (28.7 lb)	13,6 Kg (29.9 lb)

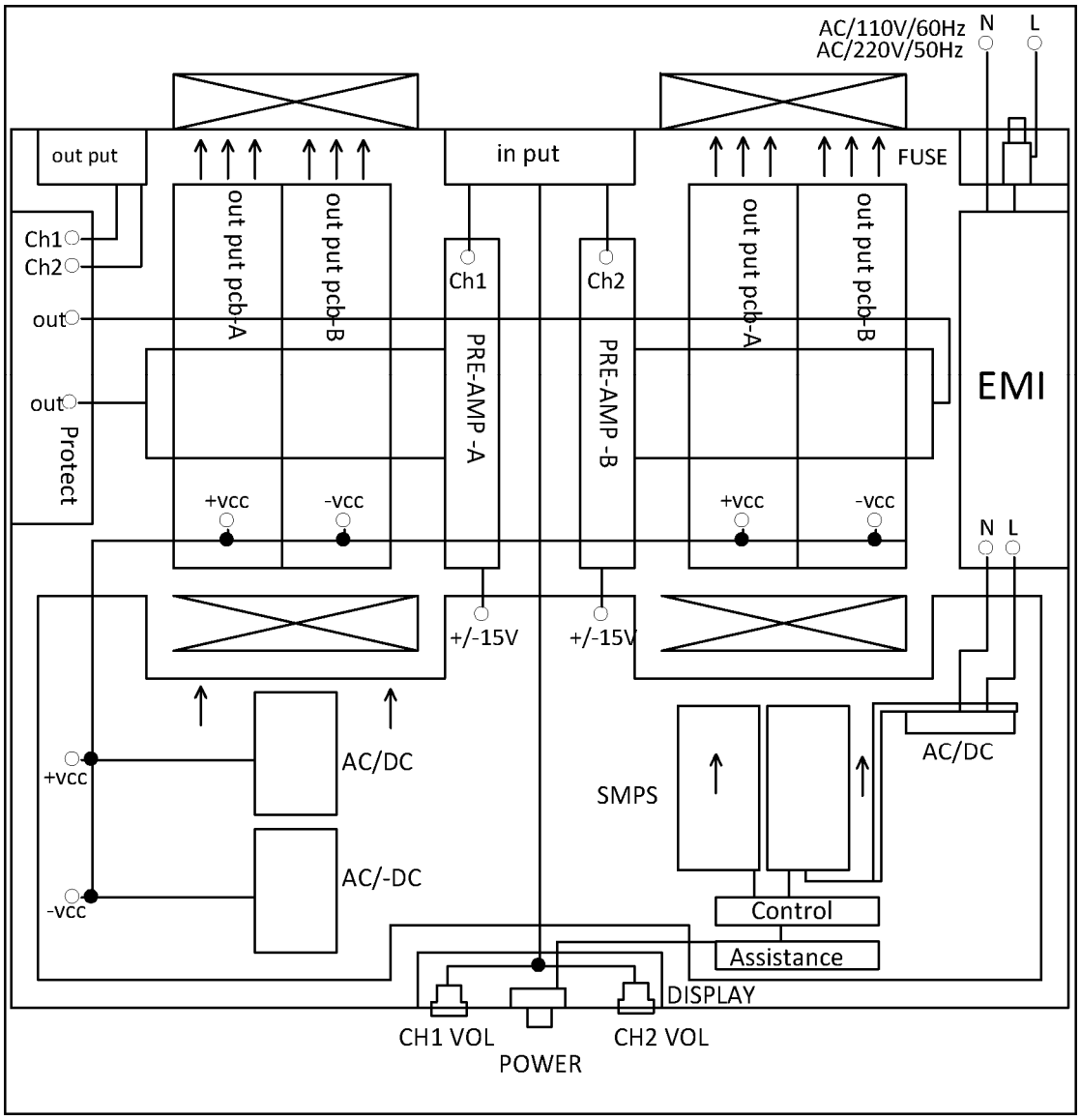
* RMS both channel THD < 1%

** 40 ms burst

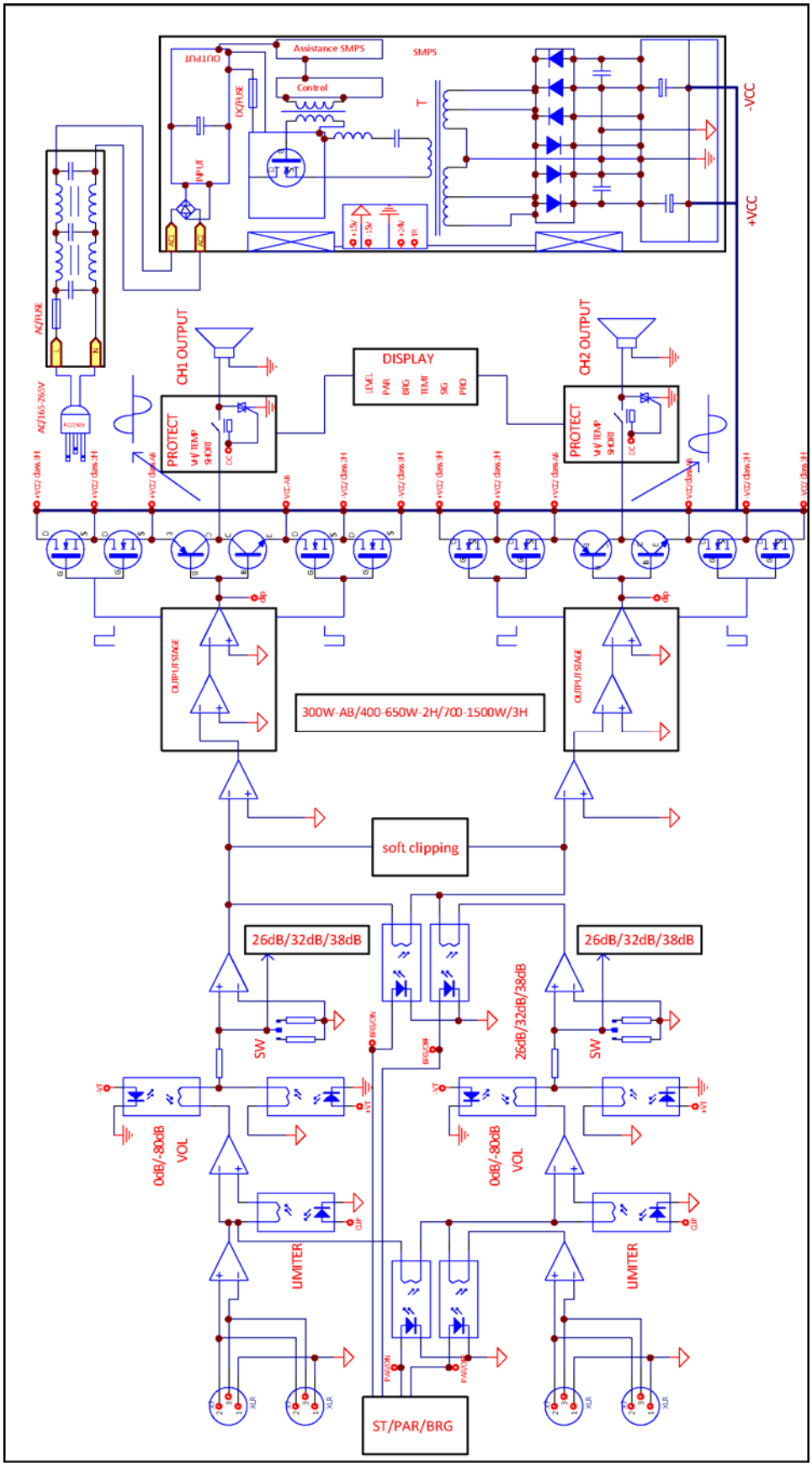
*** Rated consumption is measured with pink noise with a crest factor of 12 dB, this can be considered a standard music program.

3 Block Diagram

3.1 HPX4600 / HPX6000 Block Diagram:



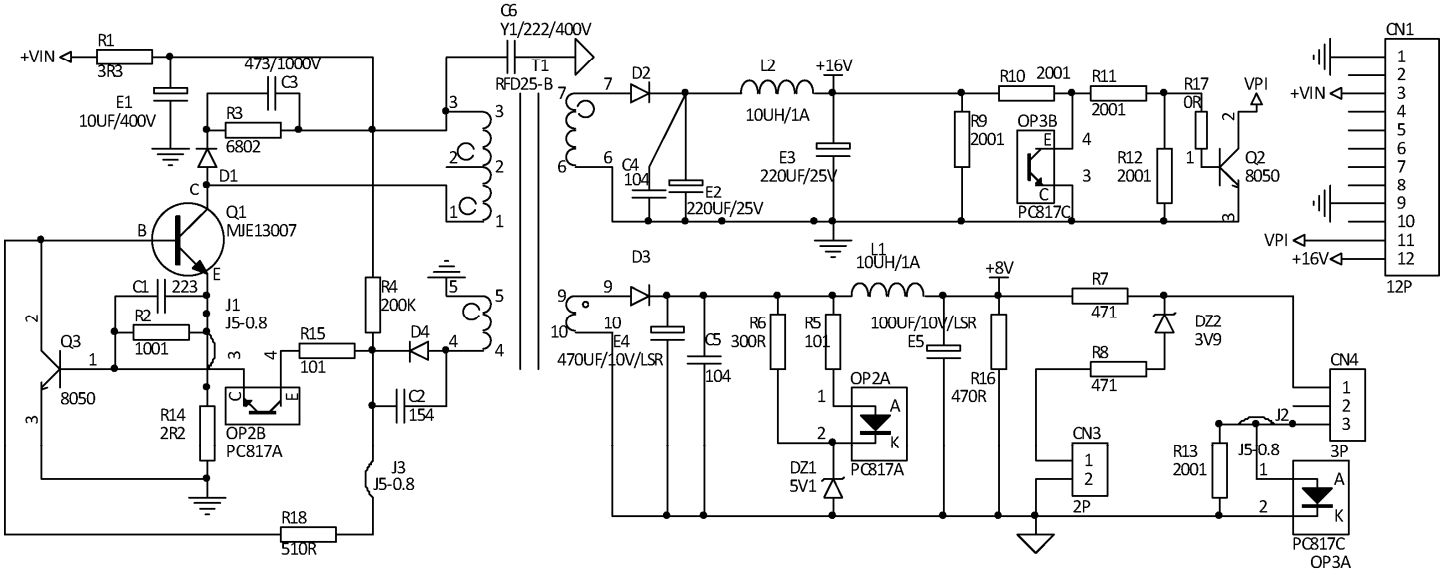
4 Signal Flowchart



5 Malfunction Analysis on SMPS (Power Supply)

5.1 Circuit Diagram of Aux Power Supply Module:

96PCASAE430000 - HPX4600/6000-AUX PSU MODULE 16V 5V PCBA

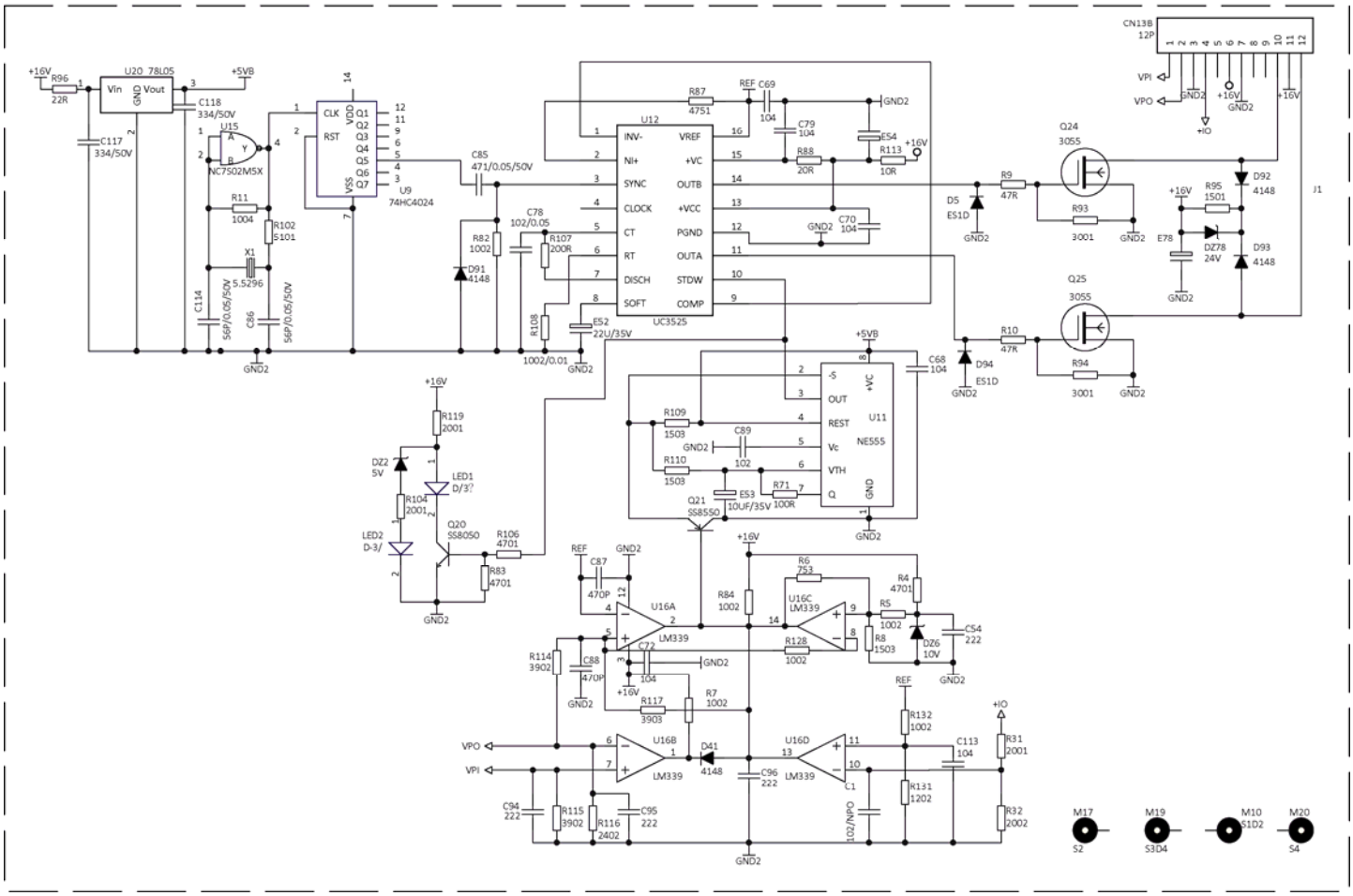


5.2 Malfunction Analysis on Aux Power Supply Module:

Sequence No.	Circuit to check	Most Probably Failures
1	Aux Power Supply Board	STY LED is off; the equipment is unavailable to start. - Check the circuit, see if the CN1 pin and the copper foil of Aux Power Supply is broken; When amplifier connects to power supply, the Aux Power Supply (self-activated switch) will start to work, it provides two group standby power supply +5V & +16V. Among them, CN3/+5V is for power on/off led (orange), CN1/12 foot/+16V is for the main power control board, the main power on/off is controlled by the CN4/(1)(3) in plug. When the CN4/(1)(3) is closed, OP3/817 will be connected, Q2/8050 will be downed to low level (VPI).
Repairing Guide: When repairing the power board, please cut the DC/300V fuse, series connect a 100W—200W lamp to start the machine, preventing the damage of related device when repairing.		

5.3 Circuit Diagram of SMPS Control Module:

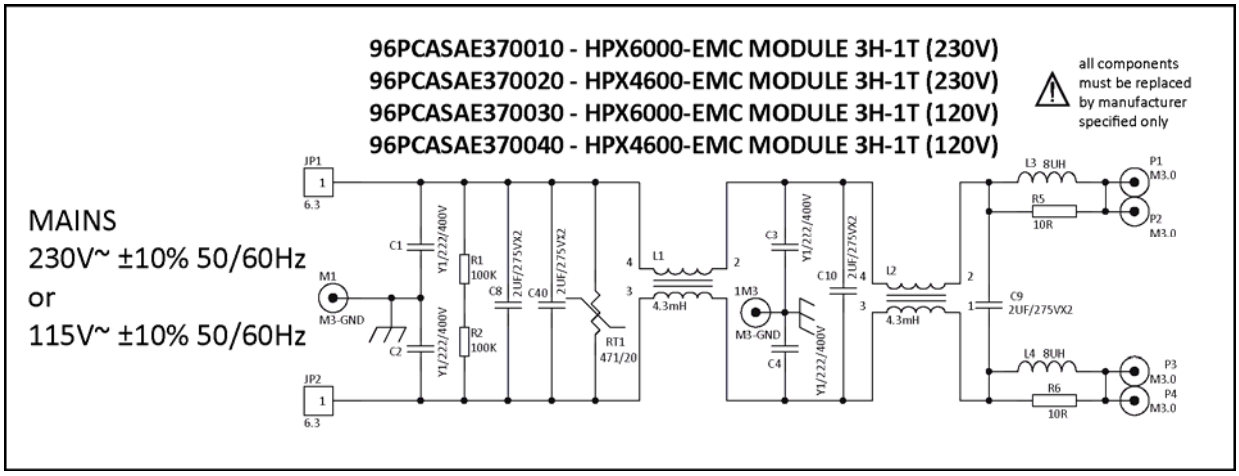
96PCASAE324310 - HPX4600-CONTROL MODULE 3H
96PCASAE324111 - HPX6000-CONTROL MODULE 3H



5.4 Malfunction Analysis on SMPS Control Module:

Sequence No.	Circuit Function	Failure
1	SMPS Control	-The equipment is unavailable to start; -Protection function will be activated when in low impedance output; -Cyclic protection of the switch power; -Delay start, over-voltage PROT, low-voltage PROT and over current PROT.
Repairing Guide: 1) When repairing the control board, you can cut every protect circuit gradually found the defective area!		

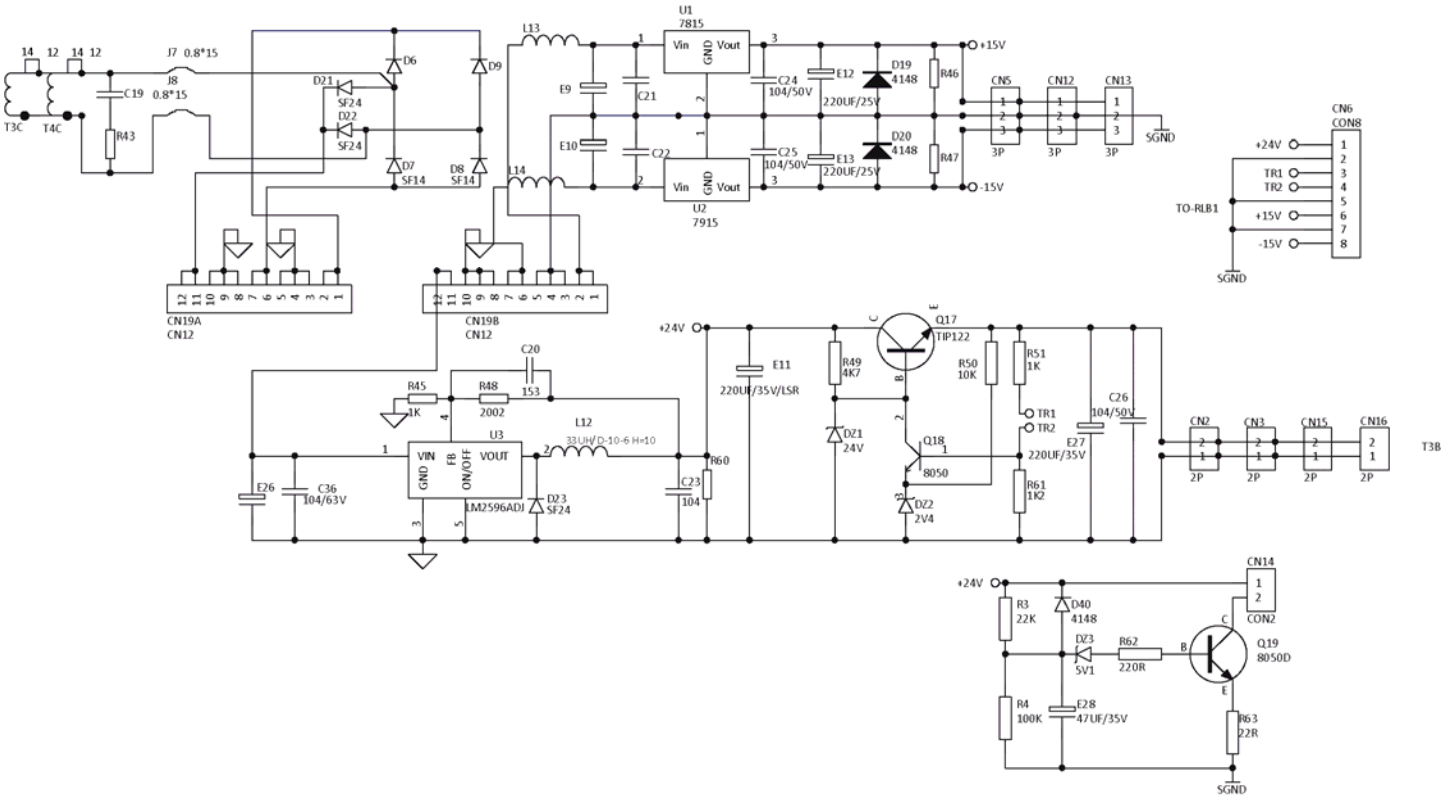
5.5 Circuit Diagram of EMC Module:



5.6 Malfunction Analysis on EMC Module:

Sequence No.	Circuit Function	Failure
1	Line Filter	- Restriction on EMI and RFI The equipment is unavailable to start-up, the AC fuse of the rear panel is burnt when connected the electricity check the RT1 component and see if there is short circuit.

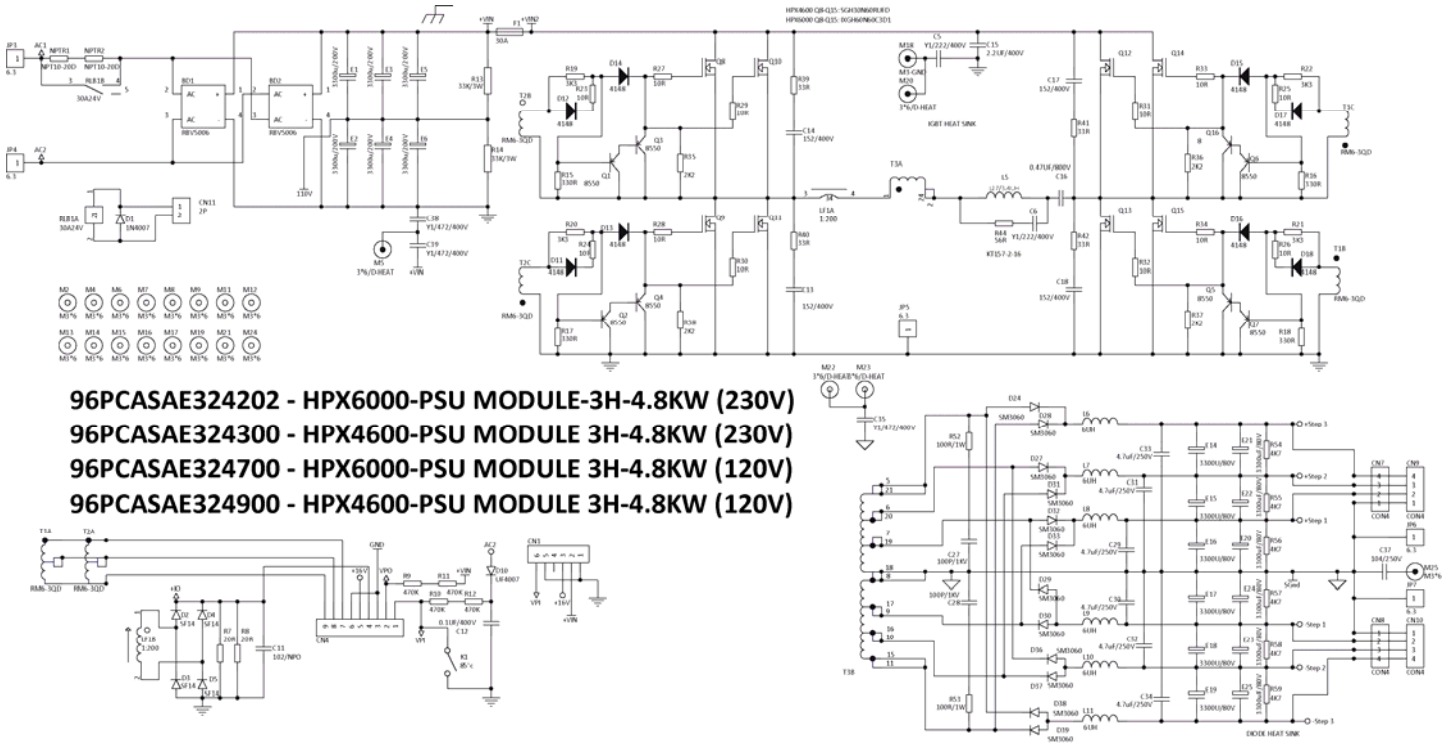
5.7 Circuit Diagram of Low Voltage control circuit:



5.8 Malfunction Analysis on Low Voltage control circuit:

Sequence No.	Circuit Function	Failure
1	Low-voltage Control	- The equipment cannot be started: LM2596 zener will output - one group +24V, provided power supply for the relay, fans and LED on front panel. Amplifier protection: ±15V power supply is abnormal. Fans are stopped, quick or slow working. Soft-start resistor is burnt on power supply. - Connecting the jumper of 110V and ACI port, the double voltage rectifier will let the circuit work with 110V and 120V mains voltage.
Repairing Guide: Equipment cannot be started, but the LED on control board is normal. Please check if the +24V power supply of CN6 connector is normal or not.		

5.9 Circuit Diagram of SMPS PSU Module:



96PCASAE324202 - HPX6000-PSU MODULE-3H-4.8KW (230V)
96PCASAE324300 - HPX4600-PSU MODULE 3H-4.8KW (230V)
96PCASAE324700 - HPX6000-PSU MODULE 3H-4.8KW (120V)
96PCASAE324900 - HPX4600-PSU MODULE 3H-4.8KW (120V)

5.10 Malfunction Analysis on SMPS PSU Module:

Sequence No.	Circuit Function	Failure
1	Soft-start / Rectifier Filter	- Smoke comes out but still works when power output, focus to check whether the relay does not pull-in results NPTR1, NPTR2 thermistor burnt due to over-current; - Connect the jumper of 110V and ACI port to form the voltage doubling rectifying circuit, then it can work in 110V and 120V voltage program; - Rectified filter circuit short-circuit and cause burnt of the AC input

		fuse;
2	LLC resonant converter	- K1/85°c thermal switch is often closed result to the start-up unavailable; - High-current while start-up the equipment, cause the burnt out of the primary side F1/DC/300V fuse; - Switching transistors do not work, check the driving transformer T2 (driving waveform please refer to the figure 1), the primary current of HF transformer formed a loop through the primary side current T3A, resonant inductance L5 and resonant capacitor 16 (LLC resonant converter ZCS Waveform please refer to figure 2); - Check the primary side current by LF1 current transformer, abnormal of the related components will results protection;
3	Fan Speed Control Circuit	- Fans do not work. - Fast rotating. - It is easily to go into over-heat protection if the fans don't speed up after the module temperature increasing.
4	Rectifier Output Circuit	- Rectifier outputs three main voltage (+Step1/-Step1, +Step2/-Step2, + Step3/-Step3), any one of them short circuit will results to power supply protection when start-up. - Low-voltage control board outputs +24 V and ± 15V sub-voltage. All the indicators on front panel do not shined if +24V no output (start-up unavailable); ±15V power supply abnormal will cause power amplifier distortion and protection

Figure 1 Driving Waveform

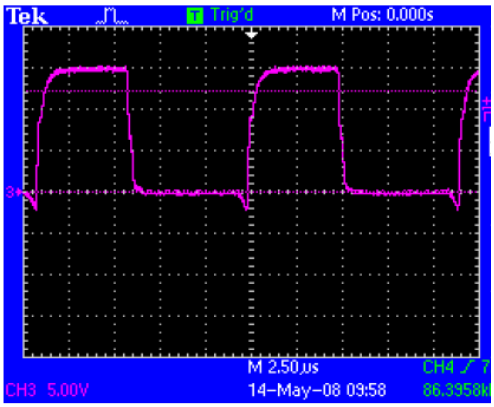
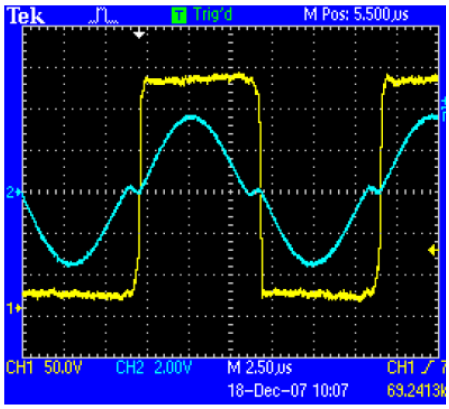


Figure 2 LLC Resonant Converter ZCS Waveform



Repairing Guide:

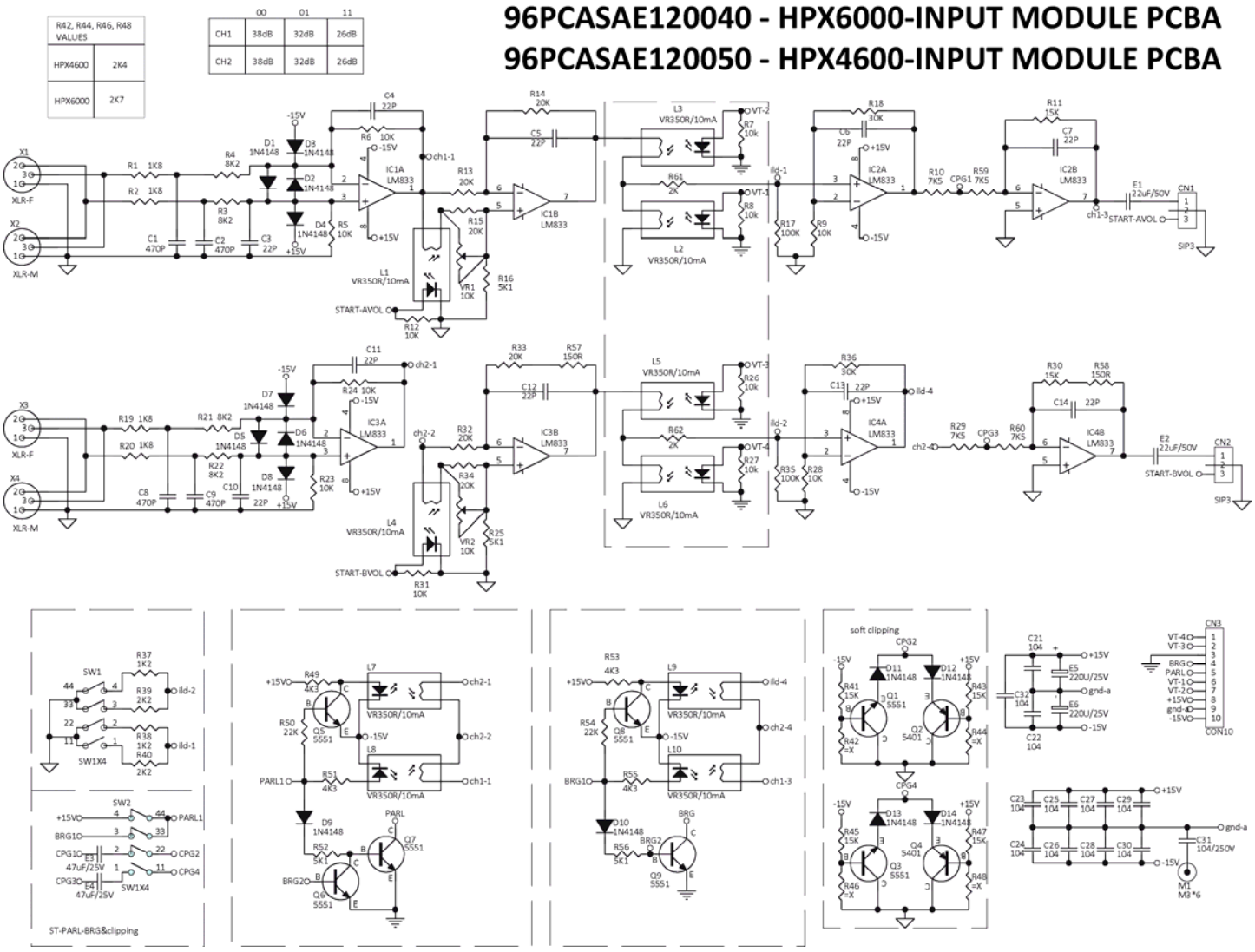
1) When repairing the SMPS board, please cut the DC/300V fuse, series connect a 100W—200W lamp to start the machine, preventing the damage of related device when repairing.

2) When the SMPS can not be started, repeats the protection and restart, please disconnect + VCC,-VCC then try to start, if it is normal, it means short-circuit in amplified part, check the amplified circuit, otherwise it is the failure of SMPS;

3) Power supply protection means – all the indicator lights on the panel lit and then immediately black out;

6 Malfunction Analysis on Input Module

6.1 Circuit Diagram of Input Module:



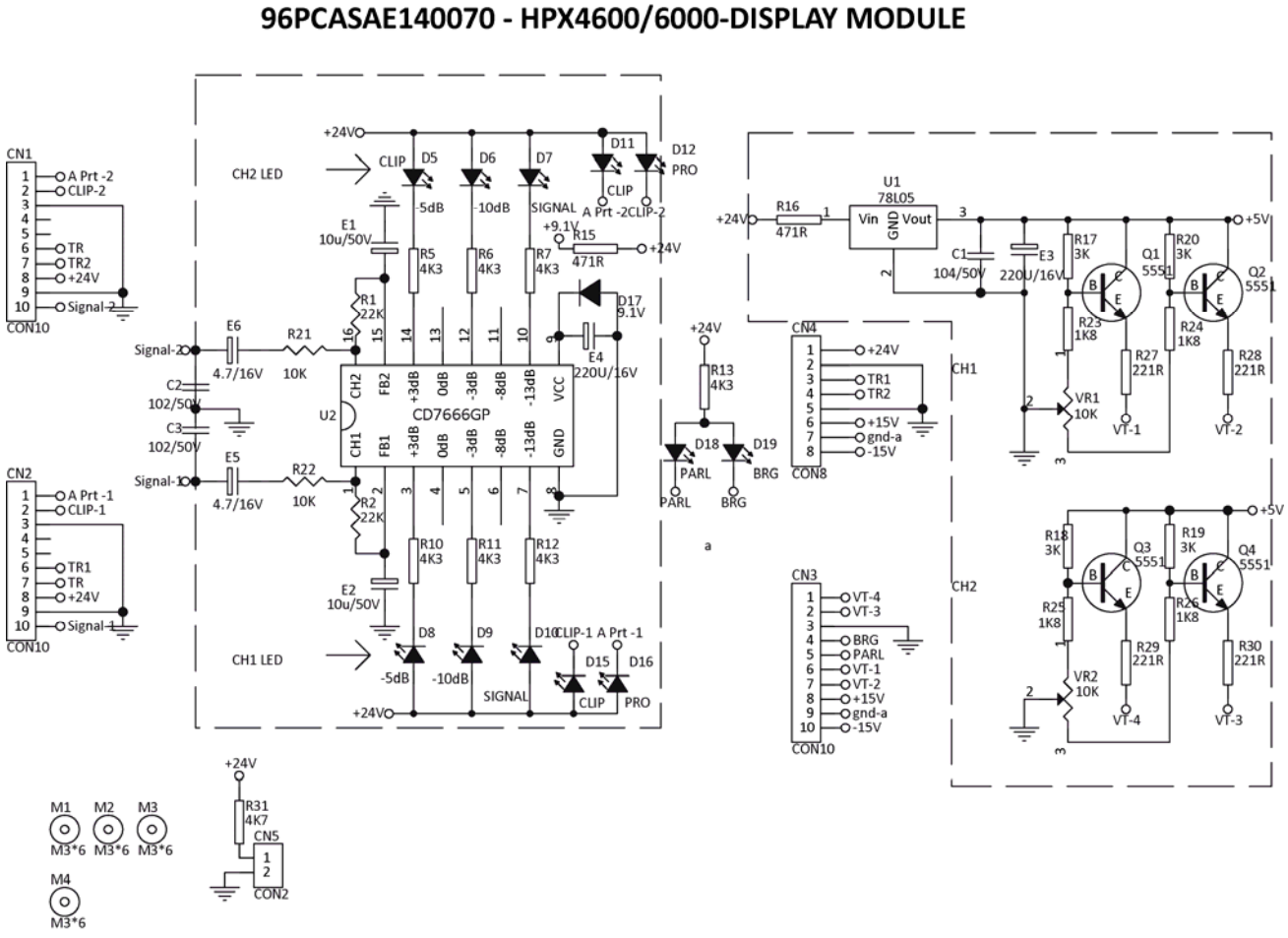
6.2 Malfunction Analysis on Input Module:

Sequence No.	Circuit Function	Failure
1	Stereo / Parallel / Bridge Switch Circuit	- Poor connection of two-way switch SW2 (4-3) or not located at the right position will cause parallel or bridge indicator does not shine, that can not function on and off. - Parallel indicator does not shine, poor connection of D10, R56, Q9; - Bridge indicator does not shine, poor contact of D9, R52, Q6, Q7;
2	Photoelectric Volume Control Circuit	- Linear optical coupler L3 or L5 is damaged, no sound in CH1 or CH2; - Linear optical coupler L2 or L6 is damaged, sound leaking in CH1 or CH2;
3	Soft Clip Circuit	- Poor contact of two-way switch SW2 (2-1) or not located at the right position will cause no soft clip in CH1 or CH2; - Abnormal of soft clip circuit formed by Q1, Q2, Q3, Q4 will cause

		distortion of waveform.
4	Sensitivity Switch Circuit	- Poor contact of two-way switch SW2 (4-3) or not located at the right position will cause abnormal of CH1's sensitivity; - Poor contact of two-way switch SW2 (2-1) or not located at the right position will cause abnormal of CH2's sensitivity.
5	Clip Limit Circuit	- Damage of L1, L4 linear optical coupler will cause no clip limit in CH1 or CH2; - There is big signal output even if the amplifier already over-heat protection-VR1/VR2 are not in the best resistance value;
6	±15V Power Supply	- +15 V or-15V power supply imbalance will cause serious distortion of the voice, and power amplifier protection etc.;
Repair Guidelines: 1) There is still large signal output when in protection circuit, increase the volume and the signal source and then detect the output waveform by opening oscilloscope or multimeter, adjust the output waveform to minimum through VR1/VR2 when the amplifier start self-protection. Note: Debugging must be done before the protection LED is off, you can repeat the debugging in interval.		

7 Malfunction Analysis on Display Module

7.1 Circuit Diagram of Display Module:



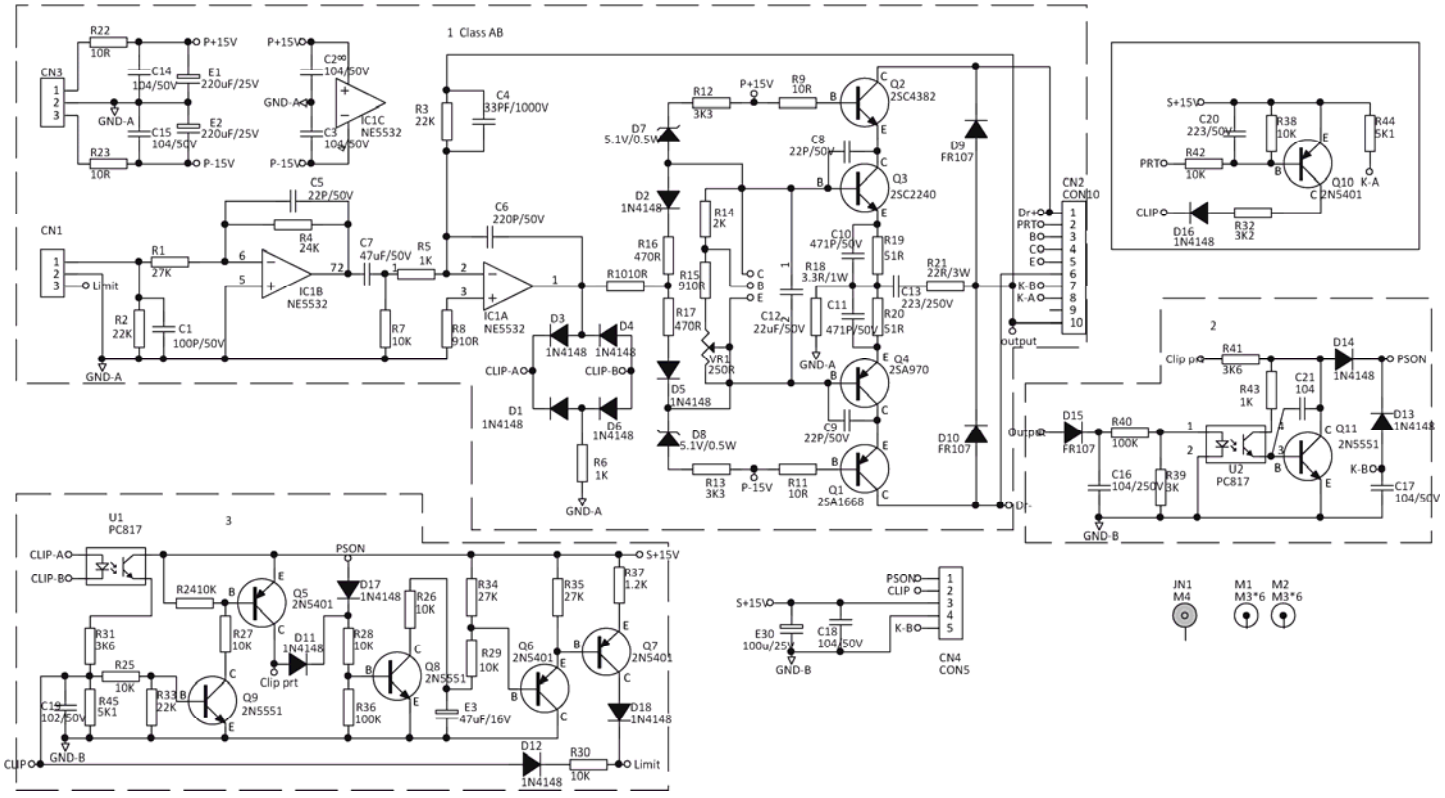
7.1 Malfunction on Display Module:

Sequence No.	Circuit Function	Failure
1	Display /Volume Control Board	- CN4 socket off, no +24 V power supply will cause start-up unavailable; - Poor contact of CN1/CN2 socket will cause the fan fast rotating and indicator off in front panel; - No +5 V power supply of U1/78L05 will cause no sound;
Repairing Guide: Cannot start-up the equipment, but the indicator on the power control board is normal. Check whether the CN4 socket of +24V power supply is normal or not?		

8 Malfunction Analysis on Pre-Amplifier Module

8.1 Circuit Diagram of Pre-amp Module:

96PCASAE315100 - HPX4600/6000-PRE-AMP MODULE-A PCBA
96PCASAE315200 - HPX4600/6000-PRE-AMP MODULE-B PCBA

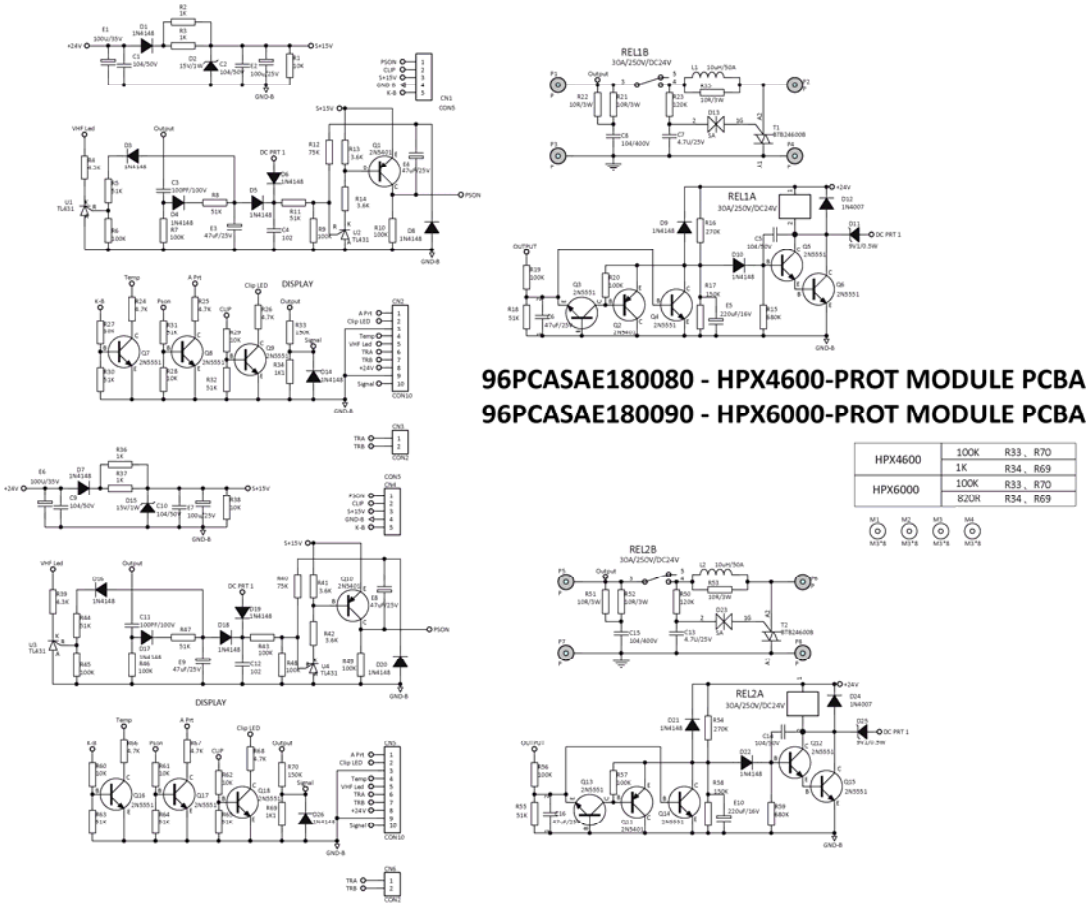


8.2 Malfunction Analysis on Pre-amp Module:

Sequence No.	Circuit Function	Failure
1	Class AB Power Output	- The damage of IC1/5532 will results to DC output protection of the amplifier. - Abnormal of ±15V power supply will cause bias difference or amplifier protection. - The damage of Q1, Q2 voltage amplification transistor will cause high current. - Amplifier self-excitation: check whether the device of C6/220P was turned bad.
2	Short-circuit Protection	- Amplifier output short-circuit and no protection; - Start-up protection; - The amplifier will start protection in soft clip status if the component D15, U2/817 damaged.
3	Clip Limit Circuit	- No clip limit, check if the U1/817 is damaged. - Limit delay. Check the D12, R30. - Waveform jitter when in clip limit, check whether the Q5, Q6, Q7, Q8, E3 are normal or not. - No volume gradually increase functions;
Repairing Guide: 1) When repairing the amplifier, please series connect a 100W—200W lamp to start-up the equipment to avoid the damage of related device; 2) The circuit of CH1 and CH2 is the same but the sequence No. of device is different, all the testing parameter can be shared; 3) Power amplifier protection means the power and protection indicators on the front panel are lit;		

9 Malfunction Analysis on Protection Module

9.1 Circuit Diagram of Protection Module:



96PCASAE180080 - HPX4600-PROT MODULE PCBA
96PCASAE180090 - HPX6000-PROT MODULE PCBA

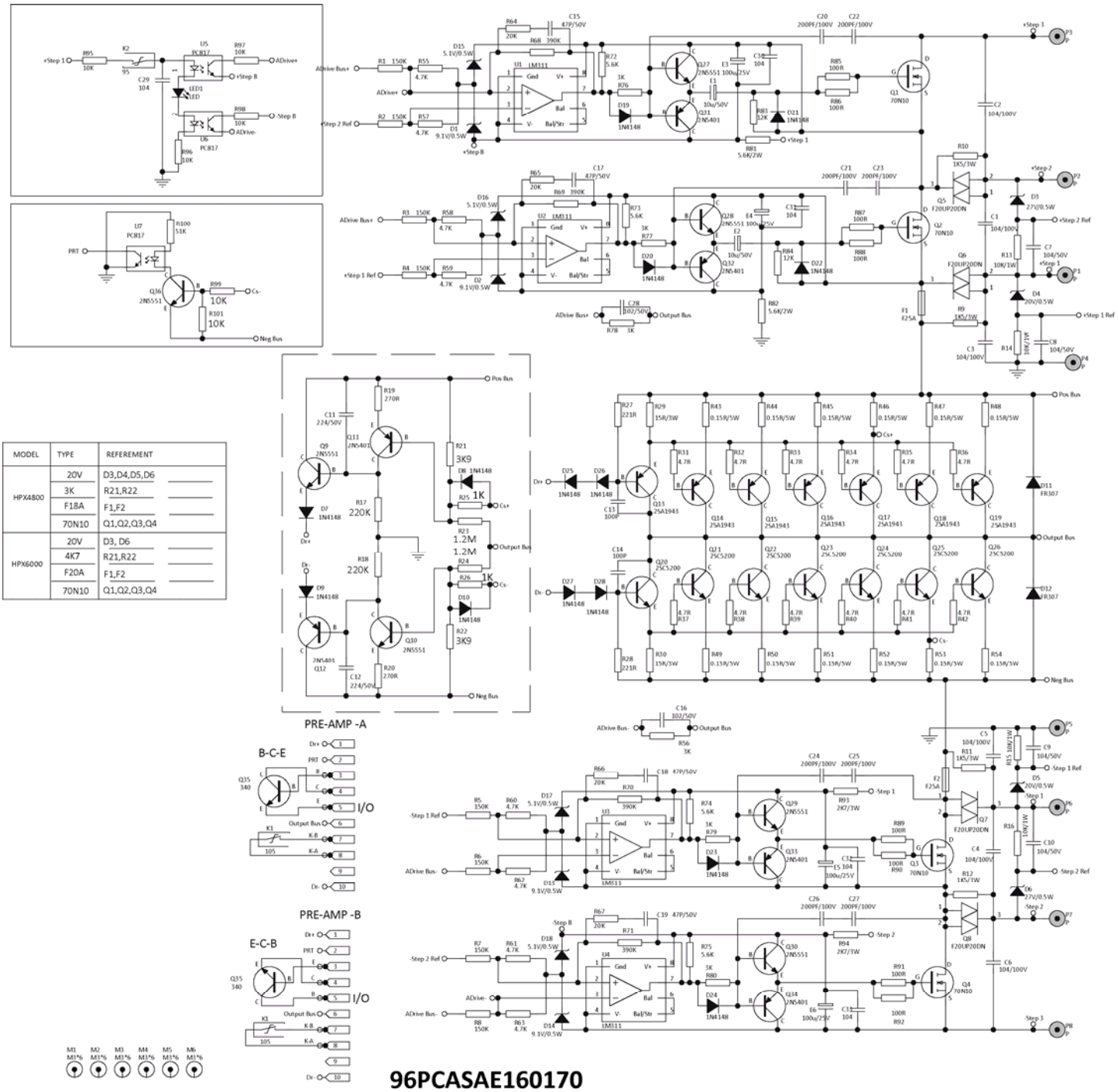
HPX4600	100K	R33、R70
	1K	R34、R69
HPX6000	100K	R33、R70
	820R	R34、R69

9.2 Malfunction Analysis on Protection Module:

Sequence No.	Circuit Function	Failure
1	Indicator Driving Circuit	- Indicator driving circuit includes: signal indicator, clipping indicator, TEMP indicator, PROT indicator and high-frequency indicator;
2	VHF/Over-heat Protection and Delay Circuit	- The delay circuit is a collection of VHF, short circuit, over-heat, DC-protection, as well as start-up delay. When the protection function and start-up delay are abnormal please check this circuit.
3	DC Protection Circuit	- No output - relay does not pull-in. First check whether it is normal for 24V power supply, Q5 and Q6 is connected or not. - Power on / off has the sound of shock - a long pull-in on the relay; - Q3, Q2, Q4, C6, R19, R18 form a positive and negative DC detection circuit, abnormal will cause DC protection and relay disconnected;
Repairing Guide: 1) The circuit of CH1 and CH2 is the same but the sequence No. of device is different, all the testing parameter can be shared;		

10 Malfunction Analysis on Power Output Stage Module

10.1 Circuit Diagram of Power Output Stage Module:



MODEL	TYPE	REFEREMENT
HPX4800	20V	D3,D4,D5,D6
	3K	R21,R22
	F18A	F1,F2
	70N10	Q1,Q2,Q3,Q4
HPX6000	20V	D3, D6
	4K7	R21,R22
	F20A	F1,F2
	70N10	Q1,Q2,Q3,Q4

96PCASAE160170
HPX4600-OUTPUT STAGE MODULE-A PCBA
96PCASAE160180
HPX4600-OUTPUT STAGE MODULE-B PCBA
96PCASAE160150
HPX6000-OUTPUT STAGE MODULE-A PCBA
96PCASAE160160
HPX6000-OUTPUT STAGE MODULE-B PCBA

10.2 Malfunction Analysis on Power Output Stage Module:

Sequence No.	Circuit Function	Failure
1	Class AB Power Output	- Damage of components C1, C2 will results module loading self-excitation. - Voltage between components Q3-Q6 and Q8-Q11BE will be down to 0.3-0.43; If the voltage is high, it will result in static current raised and the burnt out of power transistors. If it is low, it will cause cross-over distortion.
2	3H Logic Power Switch Circuit	- Low output/ early Clipping: Positive or negative power supply should not be opened, without second step power supply. - The resistance of amplified module is heating abnormally, positive / negative power transistor (Q19, Q22) is connecting or short circuit for long time; - The abnormal of high-speed switching comparator / LM311 would results to second step power supply could not use and low output.
3	Overload Protect Circuit	- Output short-circuit and no protect, cause burnt the fuse on the module. - Start-up protect; - negative-positive bias of the power output transistor is abnormal; - small output load caused by false operation of overload;
4	Short Circuit Protect	- the protection indicator will not be shined when the amplifier output is short-circuit. - when signal is increased, the amplifier will go into protection function;
5	Temperature Degradation	- Maloperation of temperature degradation circuit, LED shined, caused the 3H switch forced to replace 2H logic power supply, and that will result in small power output.
Repairing Guide: 1) When repairing the amplifier, please series connect a 100W—200W lamp to start-up the equipment to avoid the damage of related device; 2) The circuit of CH1 and CH2 is the same but the sequence No. of device is different, all the testing parameter can be shared; 3) Power amplifier protection means the power and protection indicators on the front panel are lit;		

11 Special Notes

11.1 No prior notice if any change on these models happened;

11.2 Should any problem can not be solved, please contact us or send back for repairing;

11.3 Please do not replace the key devices that will influence the performance of equipment.

notes

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