Service Dept.
6033 De Soto Ave.
Woodland Hills, CA 91367
P. 818-575-3600
F. 818-676-1585
E. service@line6.com

WARNING!!!

Dangerous and lethal potentials are present in this product!!

Before proceeding any further, the service center is warned that caution must be used when troubleshooting, repairing and testing the circuits in this unit. High voltage AC line-connected potentials are present in the circuits used in this unit.

All work performed on this unit must be done with an isolation transformer connected between the power circuit's input and the AC line in order to prevent electric shock, especially when connecting test equipment to the circuit. Extreme caution must be used when working on this product!!!

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

MODIFIED SCH PER ECR # 224901 AND RELEASED AS REV C1
MODIFIED SCH PER ECR # 226302 AND RELEASED AS REV C2

Local Chassis – AGND Connection

GUITAR INPUT DAUGHTER PCB

15Vpp @ guitar in = 5Vpp

5Vpp Max

2.7Vpp Max per output (5.4Vpp differential)

Fc = 30K 23Vpp Max

CODEC

23Vpp from DAC = 4.86Vpp

5Vpp from FX Return = 23Vpp

FX LOOP LEFT/MONO

FX LOOP RIGHT

SEND

RETURN

5Vpp Max

FX LOOP CONFIG. (DSP Control Signals)	FX_ON	FX_OFF	PARALLEL
FX_LOOP_PARALLEL	LOW	HIGH	HIGH
FX_LOOP_OFF	LOW	HIGH	LOW

DRAWN: DBLACKMORE	DATED: 1/22/02		
CHECKED: Name (F.Last)	DATED: 00/00/01		
SCALE: 1:1	SIZE: C	PART NUMBER: 35-00-0121	SHEET: 1 OF 7

COMPANY: LINE 6

TITLE: SHARCTONE MAIN
ANALOG IN & FX LOOP

PROGRAM: PADS POWER LOGIC V4.0

REV: C2

FILENAME: /SharcTone Product Family/DUET 212 Combo/Electrical/Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

HEADPHONE CIRCUITRY

HEADPHONE OUTPUT

DIRECT OUT LEFT

DIRECT OUT RIGHT

MASTER VOLUME POT ON FRONT PCB

CODEC

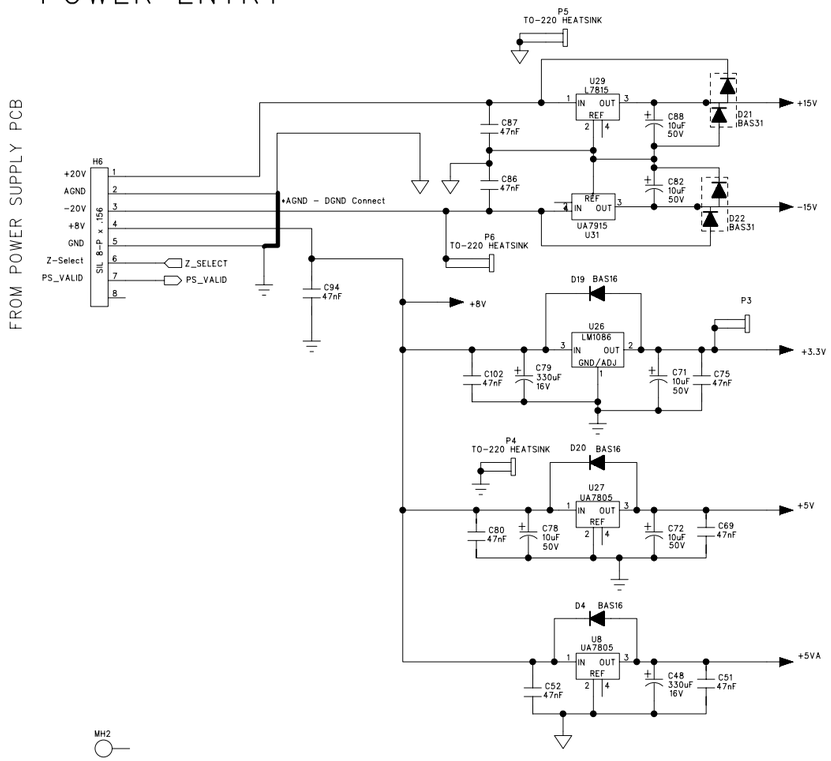
STEREO POWER AMP SEND

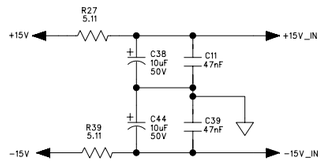
SUPPORT BRACKET BR1 INSTALLED ONLY ON CLASSIC 112

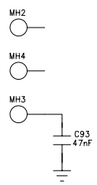
COMPANY:	LINE 6
TITLE:	SHARCTONE MAIN DIRECT & HEADPHONE OUT
PROGRAM:	PADS POWER LOGIC V4.0
REV:	C2
FILENAME:	/SharcTone Product Family/DUET 212 Combo/Electrical/ /Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch
DRAWN: D. BLACKMORE	DATED: 1/22/02
CHECKED: Name (F.Last)	DATED: 00/00/01
SCALE: 1:1	SIZE: C
PART NUMBER: 35-00-0121	SHEET: 2 OF 7

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

POWER ENTRY







FIDUCIAL MARKS

FID3 FID4 FID5 FID1 FID2

FID6 FID7 FID10 FID9 FID8

DRAWN: D. BLACKMORE	DATED: 1/22/02	COMPANY: LINE 6	
CHECKED: Name (F.Last)	DATED: 00/00/01	TITLE: SHARCTONE MAIN POWER	
		PROGRAM: PADS POWER LOGIC V4.0	REV: C2
		FILENAME: /SharcTone Product Family/DUET 212 Combo/Electrical/ /Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch	
		SCALE: 1:1 SIZE: C PART NUMBER: 35-00-0121	SHEET: 3 OF 7

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

S1
44 PIN
PLCC-050
SOCKET
21-44-0044

U16
87C51MB2

U15
SHARCTONE MAIN PLD
LATTICE M4A3-64/64-10VC
45-06-0001

U23
TAS1020A

U20
74LCX245

U22
AT88SC153

U18
LM810-5V

U19-A 74LCX14
U19-B 74LCX14
U19-C 74LCX14
U19-D 74LCX14
U19-E 74LCX14
U19-F 74LCX14

USB OPTION

INSTALL THIS SECTIONS COMPONENTS ONLY WHEN USING THE USB OPTION
•Do Not Install USB Option for Duet or Sharctone series

USE SEPARATE TRACES FROM 3.3V REGULATOR TO SUPPLY PIN 2 AVDD AND PIN 45 AVSS.

* Header H3 and C119 are not installed in production assy.

DRAWN: D. MOLNAR	DATED: 3/29/2002
CHECKED: Name (F.Last)	DATED: 00/00/01

COMPANY: LINE 6

TITLE: SHARCTONE MAIN
DIGITAL

PROGRAM: PADS POWER LOGIC V4.0

REV: C2

FILENAME: /SharcTone Product Family/DUET 212 Combo/Electrical/ /Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch

SCALE: 1:1 | SIZE: C | PART NUMBER: 35-00-0121 | SHEET: 4 OF 7

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

DSP JTAG PORT

* Do Not Install H2 and R70 in Production Assy.
** Remove R66 when using the DSP emulator.

SHARC
U14
ADSP-21065

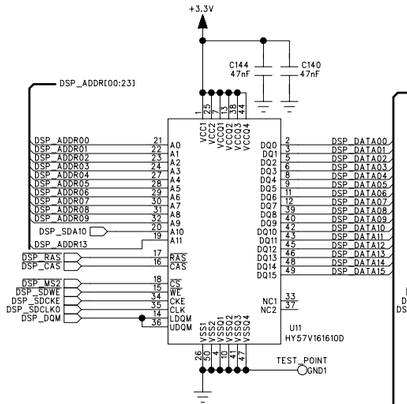
BSEL = H: DSP "EPROM BOOT MODE" WITH DSP_BMS THE BOOT MODE CHIP SELECT
ENA_MCU_DSP_BOOT = L: REDIRECT DSP BOOT TO MCU/DSP INTERFACE (see MCU)
ENA_MCU_DSP_BOOT = H: DSP BOOT FROM FLASH MEMORY

DRAWN: D. MOLNAR	DATED: 3/29/2002		
CHECKED: Name (F.Last)	DATED: 00/00/01		
COMPANY: LINE 6			
TITLE: SHARCTONE MAIN DSP			
PROGRAM: PADS POWER LOGIC V4.0			REV: C2
FILENAME: /SharcTone Product Family/DUET 212 Combo/Electrical/ /Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch			
SCALE: 1:1	SIZE: C	PART NUMBER: 35-00-0121	SHEET: 5 OF 7

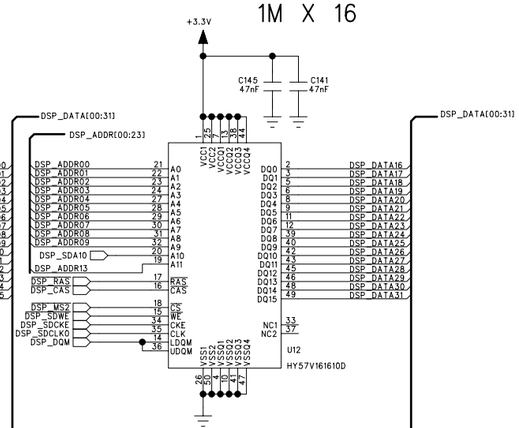
DSP MEMORY

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

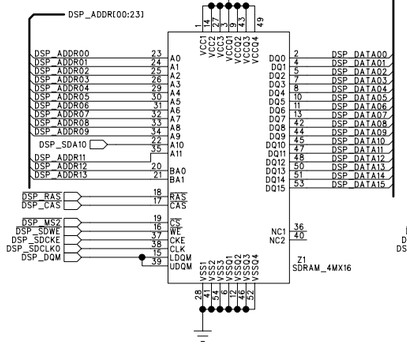
SDRAM LOWER 1M X 16



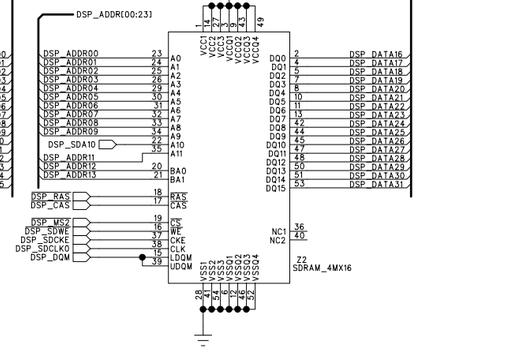
SDRAM UPPER 1M X 16



SDRAM LOWER 4M X 16

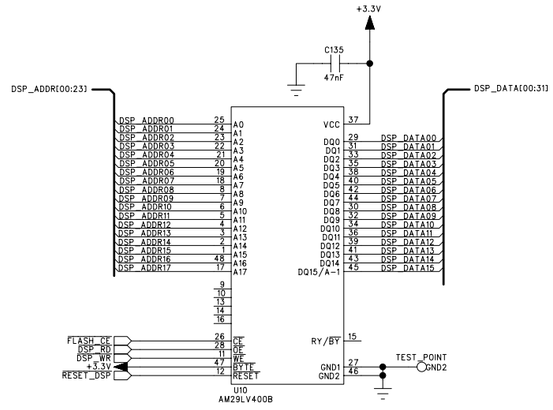


SDRAM UPPER 4M X 16



NOTE: The PCB layout is configured to install Either the 1M X 16 or the 4M X 16 parts but not both!

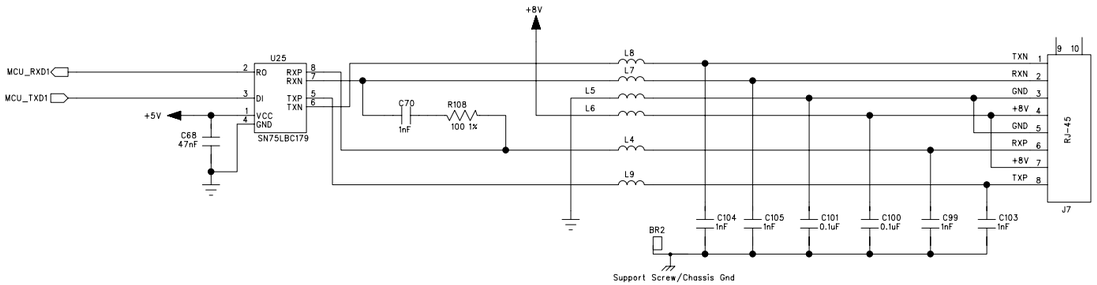
FLASH MEMORY



DRAWN: D. MOLNAR	DATED: 1/22/02	COMPANY: LINE 6	
CHECKED: Name (F.Last)	DATED: 00/00/01	TITLE: SHARCTONE MAIN DSP MEMORY	
		PROGRAM: PADS POWER LOGIC V4.0	REV: C2
		FILENAME: /SharcTone Product Family/DUET 212 Combo/Electrical/ /Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch	
		SCALE: 1:1 SIZE: C PART NUMBER: 35-00-0121	SHEET: 6 OF 7

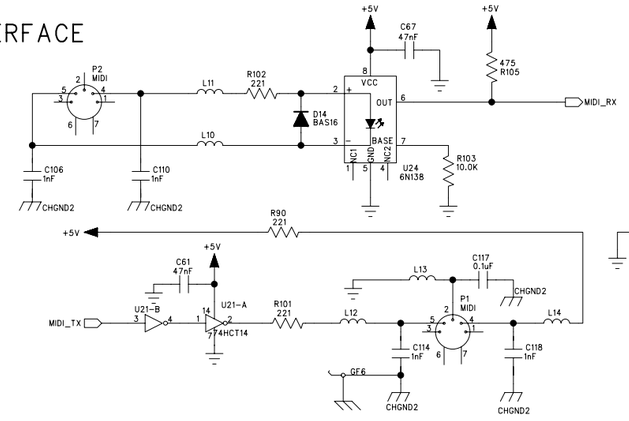
ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

FBX CLASS FOOT CONTROLLER INTERFACE



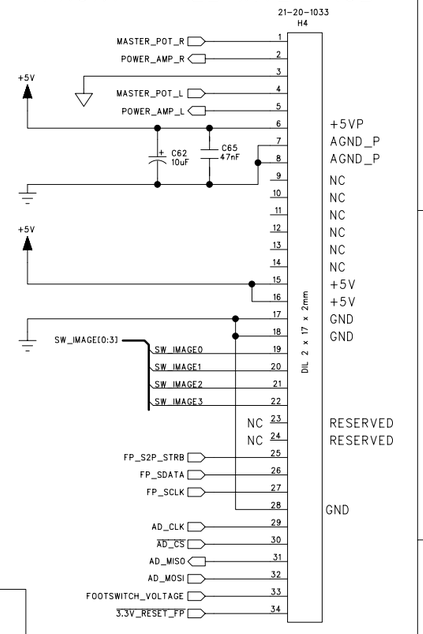
MIDI INTERFACE

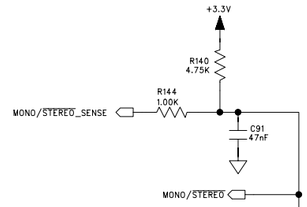
MIDI IN



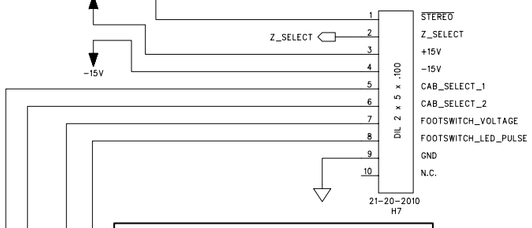
MIDI OUT

FRONT PANEL INTERFACE

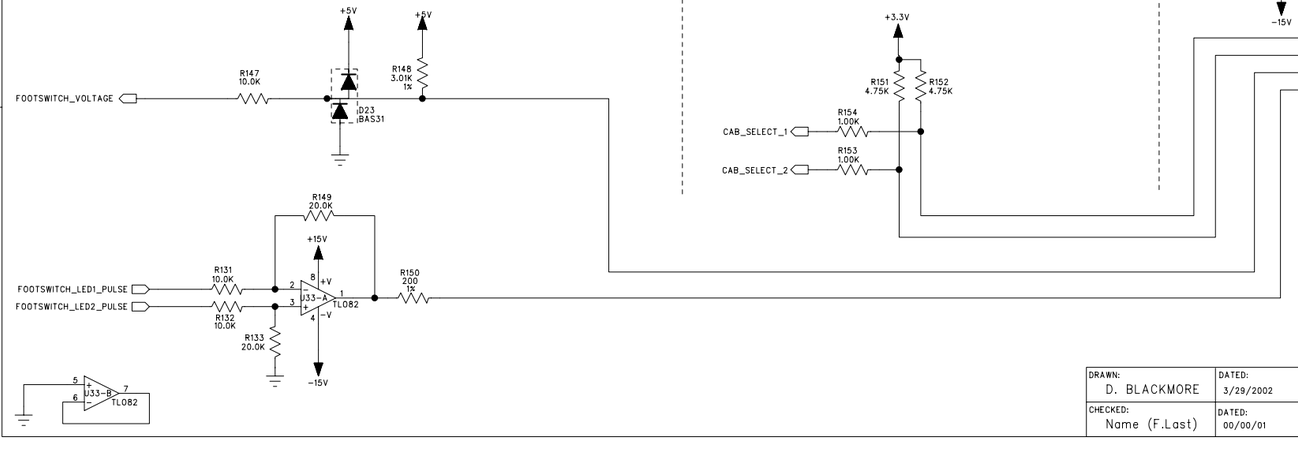




SPEAKER OUT CONNECTOR



FROM FOOTSWITCH JACK (2 switch / 2 LED)



FROM CAB SELECT SWITCH

DRAWN: D. BLACKMORE	DATED: 3/29/2002	COMPANY: LINE 6	
CHECKED: Name (F.Last)	DATED: 00/00/01	TITLE: SHARCTONE MAIN INTERFACE	
		PROGRAM: PADS POWER LOGIC V3.5.1	REV: C2
		FILENAME: /SharcTone Product Family/DUET 212 Combo/Electrical/ /Schematic/Main/REV C/SHARCTONE MAIN REV C2.sch	
		SCALE: 1:1 SIZE: C PART NUMBER: 35-00-0121	SHEET: 7 OF 7

SWITCHES AND ENCODERS

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

RELEASED AS REV A JUNE 7, 2002
CHANGED D3-4 D9-12 D19-20 D22 PER ECO # 221301. SAVED AS REV A1.

INTERFACE TO MAIN PCB

21-20-1033 H8

	1	MASTER_POT_R
	2	POWER_AMP_R
	3	AGND
	4	MASTER_POT_L
	5	POWER_AMP_L
+5V_P	6	+5V_P
AGND_P	7	
AGND_P	8	
+15V	9	NC
-15V	10	NC
+8V	11	NC
+8V	12	NC
GND_M	13	NC
GND_M	14	NC
+5V	15	+5V
+5V	16	
GND	17	
GND	18	
	19	SW_IMAGE0
	20	SW_IMAGE1
	21	SW_IMAGE2
	22	SW_IMAGE3
RESERVED	23	NC
RESERVED	24	NC
	25	FP_S2P_STRB
	26	FP_SDATA
	27	FP_CLK
GND	28	
	29	AD_CLK
	30	AD_CS
	31	AD_MISO
	32	AD_MOSI
	33	FOOTSWITCH_VOLTAGE
	34	3.3V_RESET

C8 47nF
C5 47nF
C39 10uF 10V

SW_IMAGE[0:3] → SW_IMAGE[0:3]

ENCODER 0 AMP 1 / ENCODER 1 AMP 2

M1, M2

E1, E2: MSB, NC, LSB, COM, NC

E1 MSB	3	D24 BAS16 *
E1 NC	7	D25 BAS16
E1 LSB	4	D23 BAS16
E1 COM	8	D21 BAS16
E2 MSB	3	D18 BAS16 *
E2 NC	7	D17 BAS16
E2 LSB	4	D16 BAS16
E2 COM	8	D14 BAS16

H1: DIL RA-W-2x3x100

H9: HDR-F-2x3x100

1	SW_IMAGE0	
2	SW_IMAGE1	
3	SW_IMAGE2	
4	SW_IMAGE3	
5	SW_GROUP0	
6	SW_GROUP1	

BREAKAWAY BOARD

ACTUAL ENCODERS ARE 8 POSITION (3 BIT)
AND PIN 3 IS NOT USED ON E1 & E2

* DO NOT INSTALL D18 & D24

Toggle Switch 0 AMP 1 / AMP 2

H7, SW1, BREAKAWAY BOARD

H6:

1	D5 BAS16	SW_IMAGE0
2	D6 BAS16	SW_IMAGE1
3	SW_GROUP3	

Toggle Switch 1 SPLIT / DBL TRACK

H4, SW6, BREAKAWAY BOARD

H5:

1	D13 BAS16	SW_IMAGE2
2	D15 BAS16	SW_IMAGE3
3		

+5V

R17 10.0K SW_IMAGE0
R18 10.0K SW_IMAGE1
R15 10.0K SW_IMAGE2
R16 10.0K SW_IMAGE3

CHANNEL SELECT SWITCHES

SW_GROUP2	SW2	D1 BAS16	SW_IMAGE0
SW_GROUP2	SW3	D2 BAS16	SW_IMAGE1
SW_GROUP2	SW4	D7 BAS16	SW_IMAGE2
SW_GROUP2	SW5	D8 BAS16	SW_IMAGE3

MH1 MH2 MH3 MH4 MH5

Mounting holes for witch frame

C4 47nF +5V

U2 74HCT595 (I16)

8	GND	
16	+V	
13	OE	
12	RCLK	FP_S2P_STRB
10	SCLR	3.3V_RESET
11	SCLK	FP_CLK
14	SER	FP_SDATA
9	SDO	FP_SDATA_CHAIN
7	Q7	POT_MUX_C
6	Q6	POT_MUX_B
5	Q5	POT_MUX_A
4	Q4	
3	Q3	SW_GROUP3
2	Q2	SW_GROUP2
1	Q1	SW_GROUP1
15	Q0	SW_GROUP0

COMPANY:	LINE 6 INC		
TITLE:	SHARCTONE DUET FRONT PANEL		
PROGRAM:	PADS POWER LOGIC V4.0		REV: A1
FILENAME:	G:/CLIENTS/FFD/SharcTone Product Family/SharcTone DUET/ /Electrical/Schematic/Front Panel/REV A/DUET FP REV A.sch		
SCALE: 1:1	SIZE: C	PART NUMBER: 35-00-0122	SHEET: 1 OF 3

DRAWN:	D. MOLNAR/DB	DATED:	6/10/02
CHECKED:	Name (F.Last)	DATED:	00/00/01

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

POTENTIOMETERS

DRIVE POT0 · BASS POT1 · MID POT2 · TREBLE POT3 · PRESENCE POT4 · VOLUME POT5 · REVERB POT6

+5V_P · C20 47nF · AGND_P · R38 · R36 · R34 · R32 · R30 · R28 · R26 · C32 47nF · ALL POTS

POT7 POT8 POT9 POT10 POT11 POT12 POT13

+5V_P · C21 47nF · AGND_P · R39 · R37 · R35 · R33 · R31 · R29 · R27 · C35 47nF · ALL POTS

+5V · C7 47nF · +5V_P · R19 10.0 · C38 1uF 50V · AGND_P

U3 TLC1543CDW

VCC GND · IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8 IN9 IN10 IN11 · REF+ REF− EOC DOUT ADRIN CLK CSN

AD_MISO · AD_MOSI · AD_CLK · AD_CS

C6 C10 C11 C12 C13 C14 C15 C16 C17 C18 — 47nF · AGND_P

+5V_P · C29 47nF · AGND_P

U5 74HC4051

VCC · IN0 IN1 IN2 IN3 IN4 IN5 IN6 IN7 · COM A B C · VEE GND

POT_MUX_A · POT_MUX_B · POT_MUX_C

C25 C28 C27 C26 C30 — 47nF · AGND_P

FOOTSWITCH_VOLTAGE

AGND_P

MASTER VOLUME POT

MASTER_POT_R · R24 10.0K · POWER_AMP_R · R25-A · 10KB LINEAR

MASTER_POT_L · R23 10.0K · POWER_AMP_L · R25-B · 10KB LINEAR

AGND · AGND CONNECTION TO SHAFT

This section is electrically isolated from the rest of the front panel PCB.

JEWEL LED BREAK-AWAY PCB

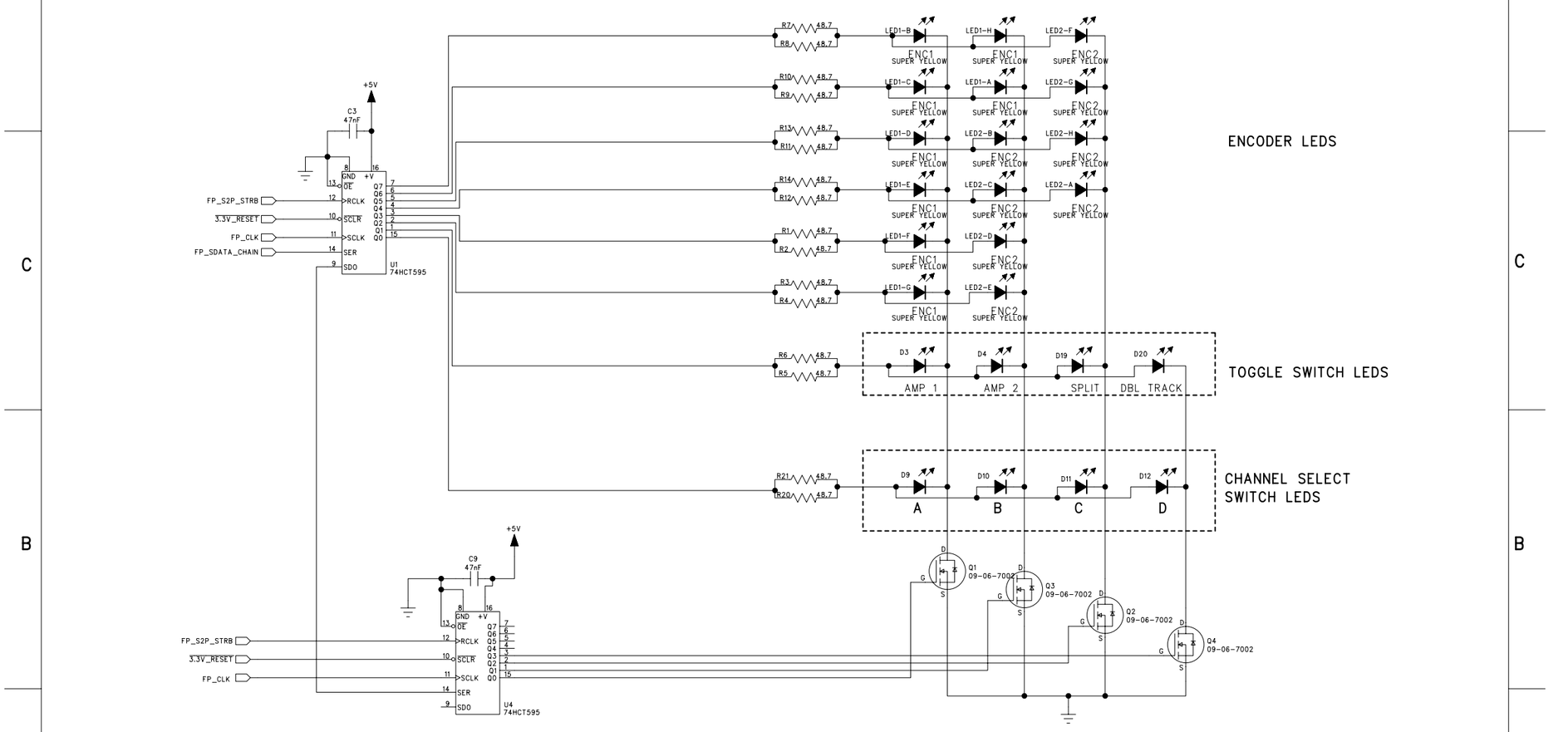
21-20-0202 H3 · R22 150 · D22 · MT10 MT13

21-20-0202 H2 · +5V · GND

COMPANY:	LINE 6 INC
TITLE:	SHARCTONE DUET FRONT PANEL
PROGRAM:	PADS POWER LOGIC V4.0
REV:	A1
FILENAME:	/SharcTone Product Family/SharcTone DUET/ /Electrical/Schematic/Front Panel/REV A/DUET FP REV A.sch
DRAWN: D. MOLNAR/DB	DATED: 6/10/02
CHECKED: Name (F.Last)	DATED: 00/00/01
SCALE: 1:1	SIZE: C
PART NUMBER: 35-00-0122	SHEET: 2 OF 3

FRONT PANEL LEDS

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:



PCB MOUNTING HOLES

MT12 MT9 MT3 MT2 MT1 MT11 — C37 C34 C19 C2 C1 C36 — 47nF — AGND

MT4 MT8 MT6 MT7 MT5 — C22 C33 C24 C31 C23 — 47nF — AGND_P

FIDUCIAL MARKS

FID1 FID3 FID2 FID4

DRAWN: D. MOLNAR/DB	DATED: 6/10/02
CHECKED: Name (F.Last)	DATED: 00/00/01

COMPANY: LINE 6

TITLE: SHARCTONE DUET FRONT PANEL

PROGRAM: PADS POWER LOGIC V4.0

REV: A1

FILENAME: /SharcTone Product Family/SharcTone DUET/ /Electrical/Schematic/Front Panel/REV A/DUET FP REV A.sch

SCALE: 1:1 | SIZE: C | PART NUMBER: 35-00-0122 | SHEET: 3 OF 3

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

H3 CHANGED TO 5 PIN & $\overline{\text{STEREO}}$ SENSE ADDED TO PIN 5
TO MAKE IT COMPATABLE WITH CLASSIC SERIES
REV X2 CHANGED TO REV A FOR PRODUCTION RELEASE
CONNECT PIN 9 TO 10 ON PWR AMP IC. RELEASE AS
REV B PER ECO # 223101

FROM POWER SUPPLY
H3
1 N.C.
2
3
4
5
6 N.C.
C10 47uF 100V
+LOW
-LOW
C8 47uF 100V

FROM MAIN BD - H3
H1
1
2 +AUDIO_L
3 -AUDIO_L
4 MONO/$\overline{\text{STEREO}}$
5 +AUDIO_R
6 -AUDIO_R
7
8
9
10 $\overline{\text{AMP_MUTE}}$

TO SPEAKER OUT
H2
1
2 OUTPUT_R+
3
4 OUTPUT_L+
5 MONO/$\overline{\text{STEREO}}$
SIL 5-P x .156

BR1
PCB SUPPORT CLIP
30-51-0105

C3 47pF
R2-G 20K
R2-H 20K
+LOW
C4 10nF 100V
$\overline{\text{AMP_MUTE}}$
R2-E 20K
+AUDIO_L
R2-F 20K
+VS
+PWVS
BUF_DRV
STBY_GND
IN+
IN-
-PWVS
-VS
SGND
MUTE
STBY
OUT
BOOTSTRAP
BOOT_LOADER
CLIP_DET
U1
12-30-7293
TDA7293
C6 50V 33uF
-LOW
C5 10nF 100V
C1 100pF
R2-C 20K
R2-D 20K
R1 124K
C2 10uF 50V
R2-A 20K
R2-B 20K
-AUDIO_L
R3 0.47 2W
R4 0.47 2W
C7 0.1uF
R5 2.2 2W
OUTPUT_L+

LEFT CHANNEL

C13 47pF
R10-G 20K
R10-H 20K
+LOW
C15 10nF 100V
$\overline{\text{AMP_MUTE}}$
R10-E 20K
+AUDIO_R
R10-F 20K
U2
12-30-7293
TDA7293
C16 50V 33uF
-LOW
C14 10nF 100V
C11 100pF
R10-C 20K
R10-D 20K
R9 124K
C12 10uF 50V
R10-A 20K
R10-B 20K
-AUDIO_R
R8 0.47 2W
R7 0.47 2W
C9 0.1uF
R6 2.2 2W
OUTPUT_R+

RIGHT CHANNEL

COMPANY: LINE 6

TITLE: DUET POWER AMP

PROGRAM: PADS POWER LOGIC V4.0

REV: B

FILENAME: G:/CLIENTS/FFD/SharcTone Product Family/Duet/Electrical/ /Schematic/Power Amp/Rev B/Power Amp Rev B.sch

DRAWN: T. BURTON DATED: 6/5/02

CHECKED: DATED: Date

SCALE: 1:1 SIZE: C PART NUMBER: 35-00-0123 SHEET: 1 OF 1

ECOs INCLUDED ON THIS SCHEMATIC/PCB REVISION		
ECO NO:	DATE:	DESCRIPTION:

Duet Rev A for production release 6/02
Schematic updated per ECO # 031105 & # 223101 and,
SCHEMATIC & PCB RELEASED AS REV C.

POWER SWITCH

LINE FILTER

120/240 SELECT

INSTALL JUMPER FOR 120V OPERATION

INSTALL JUMPER HERE FOR VETTA

INSTALL CONNS J3 & J7 FOR DUET

INSTALL JUMPER HERE FOR VETTA

PRIMARY POWER

SECONDARY POWER

OUTPUT FILTERING

8V BUCK REGULATOR

VOLTAGE FEEDBACK

CONTROL SYSTEM

SECONDARY THERMAL PROTECT – DO NOT STUFF

PRIMARY THERMAL PROTECT

POWER SUPPLY VALID

DRAWN: E.M./d.b.	DATED: 6/10/02
CHECKED: .	DATED: .

COMPANY: LINE 6

TITLE: SHARCTONE DUET POWER SUPPLY

PROGRAM: PADS POWER LOGIC V4

REV: C

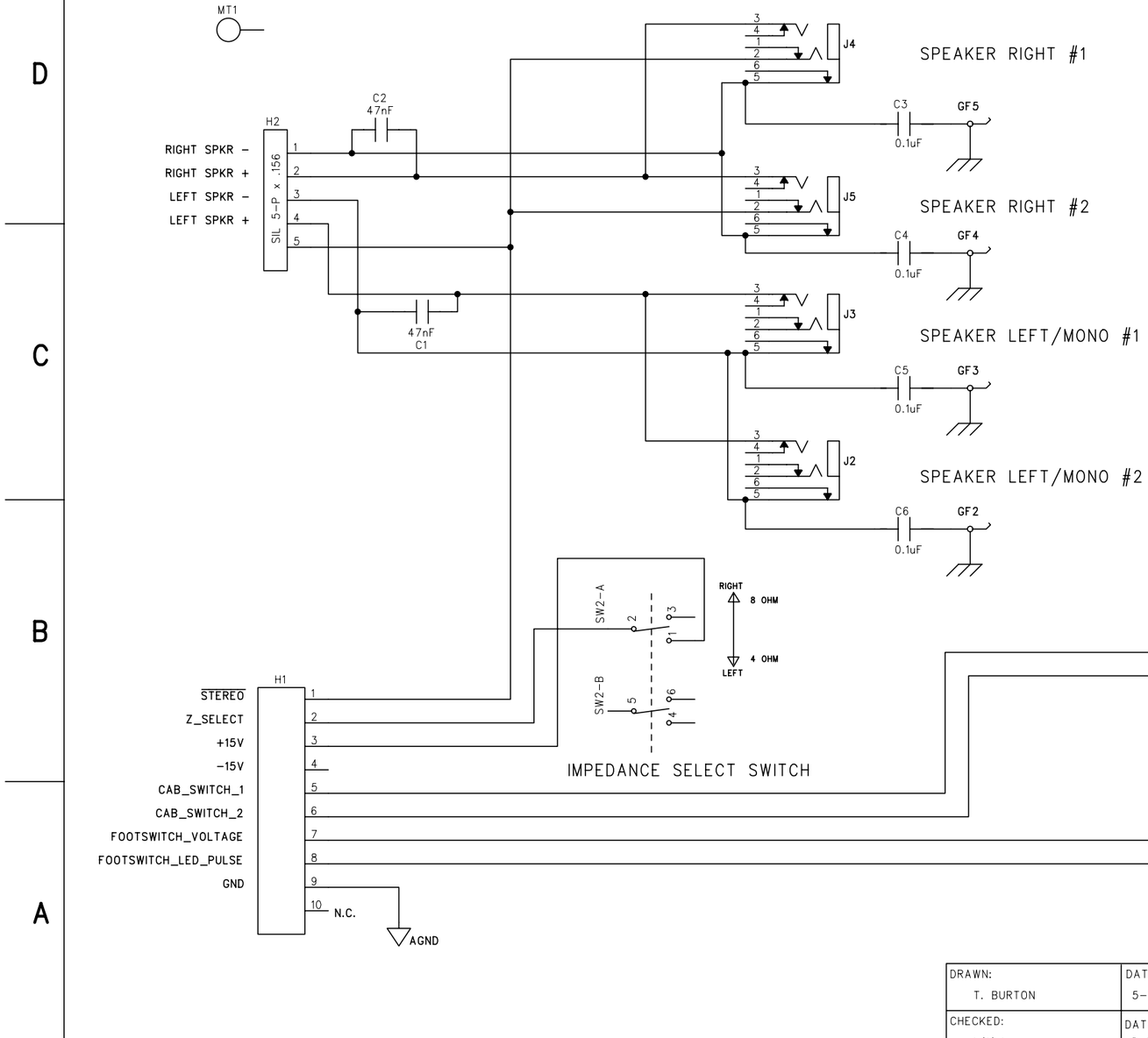
FILENAME: Sharctone Product Family/Duet 212 Combo/Electrical/ /Schematic/Power Supply/Rev C/Duet PWR SUPPLY REV C.sch

SCALE: 1:1 | SIZE: D | PART NUMBER: 35-00-0139 | SHEET: 1 OF 1

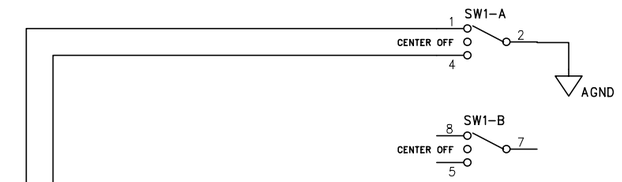
DUET SPEAKER OUT PCB

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

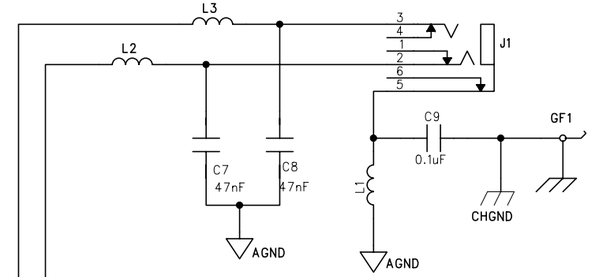
HI CHANGED TO 5 PIN CONN & $\overline{\text{STEREO}}$ SENSE ADDED TO PIN 5
TO MAKE COMPATABLE WITH CLASSIC SERIES
REV X2 UPDATED TO REV A FOR PRODUCTION RELEASE



CAB SELECT SWITCH



FOOTSWITCH INTERFACE (2 SWITCH/ 2 LED)

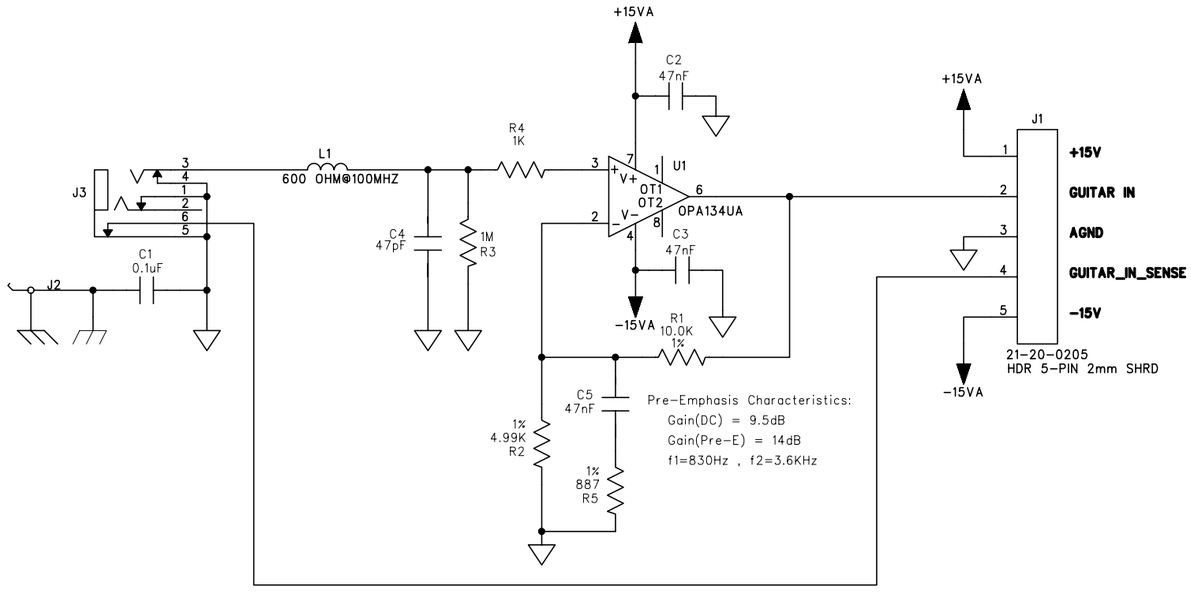


DRAWN: T. BURTON	DATED: 5-17-02		
CHECKED: Initials	DATED: Date		
COMPANY: LINE 6			
TITLE: DUET SPEAKER OUT PCB			
PROGRAM: PADS POWER LOGIC V4.0			REV: A
FILENAME: /SharcTone Product Family/Duet/Electrical/ /Schematic/Speaker Out/Rev A/DUET SPKR OUT REV A.sch			
SCALE: 1:1	SIZE: B	PART NUMBER: 35-00-0132	SHEET: 1 OF 1

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

PER ECO# 223903 – CORRECTED PCB SOLDER MASK PROBLEM

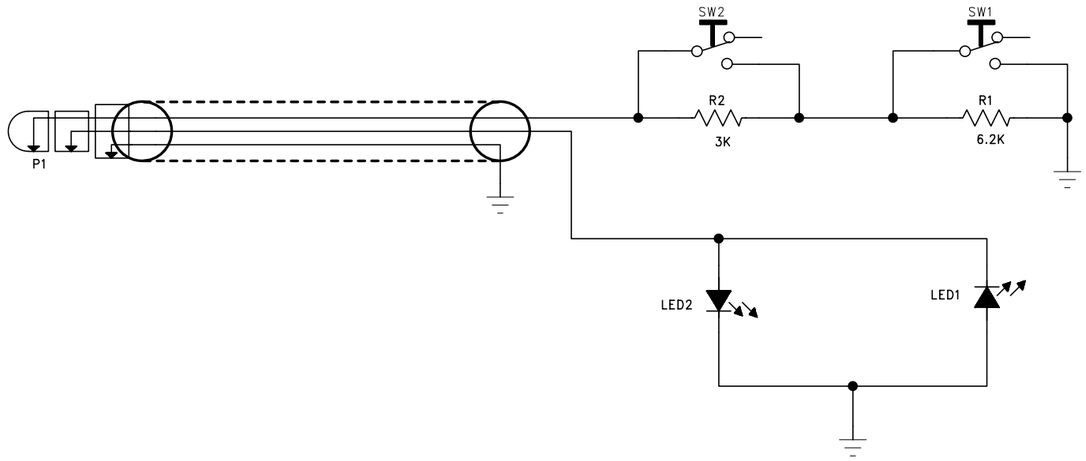
GUITAR INPUT PCB



DRAWN: D. Blackmore	DATED: Date 7/10/02
CHECKED: Initials	DATED: Date

COMPANY: LINE 6			
TITLE: DUET GUITAR INPUT PCB			
PROGRAM: PADS POWER LOGIC V4.0			REV: C
FILENAME: SHARCTONE Product Family/DUET 212 Combo/Electrical/ /Schematic/GUITAR IN/REV C/DUET GUITAR IN REV C.SCH			
SCALE: 1:1	SIZE: B	PART NUMBER: 35–00–0169	SHEET: 1 OF 1

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
A	N/A - SAME AS REV.X0a	M.H.	9/12/02



DRAWN: K.D.	DATED: 4/22/02	COMPANY: LINE 6	
CHECKED: M.H.	DATED: 9/12/02	TITLE: DUET PEDAL BOX	
		PROGRAM: PADS POWER LOGIC V4.0	REV: A
		FILENAME: /Product/Hardware/Schematics/Pedal Box Rev A.sch	
		SCALE: 1:1 SIZE: B	PART NUMBER: 50-00-0140 SHEET: 1 OF 1

LINE 6
DuoVerb 212 Combo Parts List

Item # : 99-010-1015

Level	Seq	Component-Item	Component-Description	Qty-Per-Parent
Parent Item: 99-010-1015		AMP DUOVERB COMBO 212 US		
1		21-37-1160	CABLE PWR UL/CSA SJT 8.2ft Blk EL-302 w/GND EL70	1.000000
1		40-00-0073	SHEET ACCESSORY DOMESTIC	1.000000
1		40-00-0171	MANUAL USER DUOVERB	1.000000
1		40-10-0006B	FOAM CORNER PE-LAM 1.5pcf BOTTOM	4.000000
1		40-10-0006T	FOAM CORNER PE-LAM 1.5pcf TOP	4.000000
1		40-10-0023	CARTON GIFT/SHIPPER DUET 212	1.000000
1		40-10-0181	BOX INSERT FOOTSWITCH POWER-CORD	1.000000
1		40-20-0010	BAG PLASTIC 43"x38"x.004 CLEAR	1.000000
1		40-20-0011	BAG PLASTIC 10 x 16 2 mil	1.000000
1		40-25-0100	LABEL BAR CODE SERIAL NUMBER 4-PANEL LABEL	1.000000
1		50-00-0141	ASSY PEDAL CHNL SWITCHER A-B	1.000000
2		01-12-0302	RES CARBON FILM 3.0K 1/4W 5% TH	1.000000
			Ref: R2	
2		01-12-0622	RES CARBON FILM 6.2K 1/4W 5% TH	1.000000
			Ref: R1	
2		18-00-0001	LED RED A/B SWITCHER BOX DUET	2.000000
			Ref: D1,D2	
2		24-00-0003	SWITCH PUSH BUTTON PUSH-ON PUSH-OFF SPDT 3P SIL TH PCB MT	2.000000

2	30-51-0107	CHASSIS SWITCHER CHANNEL A-B 5.2x4.3x1.8 AL	1.000000
2	40-10-0026	CARTON SHIPPING SWITCHER PEDAL A/B WHITE	1.000000
1	59-00-0167	ASSY DUET 212 COMBO COMPLETE UNIT	1.000000
2	11-20-1212	SPEAKER 12" 8-OHM CELES MFR #T5291/MM	2.000000
2	21-34-0028	CAB 1/4" RT ANGLE to DUAL QUICKCONNECT .205 14 IN 18AWG	2.000000
2	30-00-0018	SCREW 6-32 SLFTPG x.75 FLH PHILLIPS	4.000000
2	30-00-0033	SCREW 10-24 x7/8 TRUSS HD PHH MACH SCR BLK OX	8.000000
2	30-00-1032	SCR 10-32 x 1 1/4 OVAL CT SK PHH NICKEL	8.000000
2	30-57-0001	HANDLE DUET	1.000000
2	40-25-0020	LABEL INSPECTION QUALITY	1.000000
2	40-25-0100	LABEL BAR CODE SERIAL NUMBER 4-PANEL LABEL	1.000000
2	50-00-0131	ASSY CABINET SPEAKER DUET 212	1.000000
3	30-00-0812	SCR #8 x .75" LG PHH TRUSS BLK OXIDE w/WAX (CORNER)	4.000000
3	30-00-6839	SCR WD 10-12 x 7/8" PHIL PN STEEL	4.000000
3	30-06-1024	NUT TEE 10-24 X 5/16 STEEL	8.000000
3	30-27-0022	PIPING VINYL EXTD W/EMB WELT OFF-WHITE MFR's P/N:EW18002	9.300000
3	30-30-1530	CORNER PROTECTOR BLACK BLACK 2 LEGS CUT OUT	4.000000
3	30-33-0021	CABINET SPEAKER 212S PLYWOOD BALTIC BIRCH .75 THK	.000000
3	30-36-0003	COVER VINYL BLACK 23oz. TAURUS/BLACK SHEETING	1.400000

3	30-39-0004	CLOTH GRILL TAN PAPER (WOVEN)	.400000
3	30-75-0008	FOOT RUBBER 1.50" I.D. x .75"H BLACK	4.000000
2	50-00-0167	ASSY DUET CHASSIS w/HDWR & ELECTRONICS COMPLETE	1.000000
3	21-30-0009-3	CAB DIL 10 PIN .100 PITCH 3.0 IN	1.000000
3	21-30-0009-4	CAB DIL 10 PIN .100 PITCH 5.5 IN	1.000000
3	21-34-0014-3	CAB ASSY SIL 8 PIN .156 PITCH 4.5 LG	1.000000
3	21-34-0015	CAB SIL 5 PIN .079 IN PITCH 5.4 IN LG	1.000000
3	21-34-0018-2	CAB ASSY SIL 2 PIN .295 5.75	1.000000
3	21-34-0021-3	CAB ASSY SIL 6 PIN .156 PITCH 10.0 LG	1.000000
3	21-34-0030	CAB ASSY SIL 2PIN 2MM LG 2.0 PITCH	1.000000
3	21-34-0031	CAB ASSY SIL 5 PIN 7.25 LG	1.000000
3	21-34-9034	CAB DIL RIBBON 34-PIN 1.27mm 152.40mm	1.000000
3	24-03-0002	SWITCH TOGGLE SPST ON-OFF 250V 6A 2-PIN CHASSIS MNT	1.000000
3	24-19-6325	FUSE 6.3 AMP 250V 5X20mm DOM F	1.000000
3	24-21-1122	CAP SWITCH	1.000000
3	30-00-0018	SCREW 6-32 SLFTPG x.75 FLH PHILLIPS	4.000000
3	30-00-0606	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASHER BLK OXIDE	4.000000
3	30-00-0607	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASH ZINC	33.000000
3	30-00-0610	SCR 6-32 x 5/8 LG PHILLIPS PNH STL ZINC (W/ LK WASH)	2.000000
3	30-00-4250	SCR SHEET METAL PAN HEAD SLF TAP. 4 x.250" w/BLK OXIDE	4.000000

3	30-00-8375	SCR SHEET METAL #8 x.375" PPH SELF TAP w/BLK OXIDE	2.000000
3	30-03-0015	WASHER .750 OD x.560 IDx .045	1.000000
3	30-03-0017	WASHER 15.9 x11.9x .53mm STEEL NICKEL	3.000000
3	30-15-0004	SPACER .13THKx.63OD NYLON MUDGE 5610-82-.125	1.000000
3	30-15-0012	SPACER .75 OD x .50 id x .19 ht NYLON	3.000000
3	30-24-0003	TIE CABLE 4" CLEAR	1.000000
3	30-27-0049	LT PIPE SHARCTONE 1.4 OD x .47 HIGH CLR POLY MINITEXTURE	2.000000
3	30-27-0054	KNOB BI-DIRECTIONAL .800 DIA X .560H HIGH IMPACT ABS CREAM	2.000000
3	30-27-0059	LENS LED .19" DIA x.29" HT PLASTIC CLEAR SNAP-IN	4.000000
3	30-45-2000-2	KNOB POT PLASTIC CREAM w/BLACK INDICATOR LINE	15.000000
3	30-51-0098	CHASSIS COVER DUET 24.24x5.13x7.5 ELEC GALV STL	1.000000
3	30-51-0113	LENS JEWEL CLEAR .610 Dx.654"H MTL BSE w/NUT MFR#01-0170W w/n	1.000000
3	30-63-0010	INSULATION, VOLARAPOLYOLEFIN F OAM, 26.5 x 1/4 x 1/16	.080000
3	30-75-0010	PEDAL SWITCH RUBBER PAD	.500000
3	40-25-0015	LABEL GROUND SYMBOL	1.000000
3	50-00-0079	ASSY CHASSIS w/ARTWORK DUET	1.000000
4	30-51-0097	CHASSIS DUET 24.24x7.94x5.1 ELEC GALV STL	1.000000
3	50-00-0121	PCBA MAIN DUET	1.000000
4	01-00-0000	RES 0R 5% 0805 Ref: R50,R66,R167	3.000000

4	01-00-0155	RES 1.5M 5% 0805	1.000000
		Ref: R89	
4	01-24-1000	RES 100R 1% 0805	3.000000
		Ref: R64,R67,R108	
4	01-24-1001	RES 1.00K 1% 0805	19.000000
		Ref: R8,R21,R54-56,R86,R92,R95-96,R113,R115,R120,R130,R144-145, R153-154,R157-158	
4	01-24-1002	RES 10.0K 1% 0805	28.000000
		Ref: R10,R23,R51-52,R59-60,R68,R71,R73-74,R76-77,R80,R83,R103, R110-111,R116-118,R128,R131-132,R134-136,R141,R147	
4	01-24-1003	RES 100K 1% 0805	10.000000
		Ref: R97-98,R137,R165-166,R168-172	
4	01-24-1004	RES 1.00M 1% 0805	6.000000
		Ref: R72,R75,R85,R88,R91,R94	
4	01-24-1102	RES 11.0K 1% 0805	4.000000
		Ref: R99-100,R106-107	
4	01-24-1241	RES 1.24K 1% 0805	2.000000
		Ref: R4,R9	
4	01-24-15R0	RES 15R 1% 0805	2.000000
		Ref: R123,R142	
4	01-24-1822	RES 18.2K 1% 0805	4.000000
		Ref: R2-3,R6,R13	
4	01-24-2000	RES 200R 1% 0805	1.000000
		Ref: R150	
4	01-24-2001	RES 2.00K 1% 0805	16.000000
		Ref: R7,R15,R19,R24-26,R32,R34-38,R44-45,R47-48	
4	01-24-2002	RES 20.0K 1% 0805	2.000000
		Ref: R133,R149	

4	01-24-2210	RES 221R 1% 0805	3.000000
		Ref: R90,R101-102	
4	01-24-2211	RES 2.21K 1% 0805	2.000000
		Ref: R61,R62	
4	01-24-2741	RES 2.74K 1% 0805	2.000000
		Ref: R17-18	
4	01-24-2801	RES 2.80K 1% 0805	2.000000
		Ref: R79,R82	
4	01-24-3011	RES 3.01K 1% 0805	6.000000
		Ref: R20,R87,R93,R112,R114,R148	
4	01-24-3651	RES 3.65K 1% 0805	2.000000
		Ref: R57-58	
4	01-24-4321	RES 4.32K 1% 0805	1.000000
		Ref: R33	
4	01-24-4750	RES 475R 1% 0805	3.000000
		Ref: R104-105,R109	
4	01-24-4751	RES 4.75K 1% 0805	10.000000
		Ref: R53,R69,R140,R146,R151-152,R159-162	
4	01-24-47R5	RES 47.5R 1% 0805	8.000000
		Ref: R119,R124-126,R129,R138-139,R143	
4	01-24-5110	RES 511R 1% 0805	1.000000
		Ref: R12	
4	01-24-5R11	RES 5.11R 1% 0805	6.000000
		Ref: R27,R39,R43,R46,R163-164	
4	01-24-6041	RES 6.04K 1% 0805	1.000000
		Ref: R22	
4	01-24-6650	RES 665R 1% 0805	2.000000
		Ref: R63,R65	
4	01-24-6810	RES 681R 1% 0805	4.000000
		Ref: R1,R16,R40,R49	

4	01-24-7500	RES 750R 1% 0805	2.000000
		Ref: R78,R81	
4	01-24-7501	RES 7.50K1% 0805	1.000000
		Ref: R5	
4	01-24-8253	RES 825K 1% 0805	1.000000
		Ref: R84	
4	01-24-8871	RES 8.87K 1% 0805	8.000000
		Ref: R11,R14,R28-31,R41-42	
4	01-48-9103	POT STEREO 10KA AUDIO TAPER HORIZ MT 25mm RND PLASTIC	1.000000
		Ref: POT1	
4	03-10-6108	CAP ELEC 1000uF 6.3V 20% RADIAL 8/11.5/5	2.000000
		Ref: C18,C24	
4	03-12-0337	CAP ELEC 330uF 16V 20% RADIAL 8/11.5/5	2.000000
		Ref: C48,C79	
4	03-18-0105	CAP ELEC 1uF 50V 20% RADIAL 5/11/5	14.000000
		Ref: C3-4,C8-9,C16-17,C19,C40,C46-47,C63-64,C73-74	
4	03-18-0106	CAP ELEC 10uF 50V 20% RADIAL 5/11/5	14.000000
		Ref: C15,C28,C38,C44,C57-58,C62,C66,C71-72,C76,C78,C82,C88	
4	03-18-0474	CAP ELEC 0.47uF 50V 20% RADIAL 5/11/5	1.000000
		Ref: C59	
4	03-50-0102	CAP NPO 1nF 50V 5% 0805	4.000000
		Ref: C70,C106,C110,C118	
4	03-50-0272	CAP NPO 2.7nF 50V 5% 0805	4.000000
		Ref: C7,C27,C31-32	
4	03-50-0391	CAP NPO 390pF 50v 5% 0805	8.000000
		Ref: C2,C6,C10,C12-14,C20,C23	
4	03-52-0102	CAP X7R 1nF 50V 20% 0805	17.000000
		Ref: C34,C43,C96-97,C99,C103-105,C114,C121,C126,C132,C138,C148-149,C154,C158	

4	03-52-0104	CAP X7R 0.1uF 50V 20% 0805		12.000000
			Ref: C54,C56,C95,C100-101,C117,C120,C125,C131,C137,C147,C152	
4	03-52-0221	CAP X7R 220pF 50V 20% 0805		6.000000
			Ref: C1,C5,C49-50,C77,C81	
4	03-52-0222	CAP X7R 2.2nF 50V 20% 0805		2.000000
			Ref: C26,C36	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805		63.000000
			Ref: C11,C21-22,C25,C29-30,C33,C35,C37,C39,C41-42,C45,C51-53,C55, C60-61,C65,C67-69,C75,C80,C83,86-87,89-94,102,C115,C122-124, C127-130,C133-136,C139-146,C150-151,C153,C155-157,C159-160	
4	06-20-0099	DIODE GEN PUR DUAL 70V 215mA 6nS SOT-23 SM BAV99		8.000000
			Ref: D1-3,D5-6,D21-23	
4	06-34-0016	DIODE SWITCHING 75V 200mA 6nS SOT-23 SM BAS16LT1		15.000000
			Ref: D4,D7-20	
4	09-10-4401	TRANS NPN SMALL-SIGNAL MBT4401 SOT-23 SM		3.000000
			Ref: Q1,Q3-4	
4	09-10-4403	TRANS PNP SMALL-SIGNAL MBT4403 SOT-23 SM		1.000000
			Ref: Q2	
4	11-00-3000	CRYSTAL OSCILLATOR 30MHz 3.3V DIP4 TH		1.000000
			Ref: Y1	
4	11-10-0501	FERRITE BEAD 500R @100mHZ 2.5A 1206 SM		2.000000
			Ref: L5-6	
4	11-10-0601	FERRITE BEAD 600R @100MHZ 1206		26.000000
			Ref: L1-4,L7-28	
4	12-02-1086	IC REG +3.3V T0-220 TH LM1086		1.000000
			Ref: U26	
4	12-02-7805	IC REG +5v 1.5 Amp TH		2.000000
			Ref: U8,U27	
4	12-02-7815	IC REG +15V 1AMP TO-220 TH	Ref: U29	1.000000

4	12-02-7915 7915	IC REG -15V 1AMP TO-220 TH	1.000000
		Ref: U31	
4	12-54-0082	IC OP AMP DUAL TL082CD SO-8 SM	3.000000
		Ref: U2-3,U33	
4	12-54-0084	IC OP AMP QUAD TL084CD SM	6.000000
		Ref: U1,U7,U17,U28,U30,U32	
4	12-54-5538 NE5532AD8 SM SO-8	IC OP-AMP DUAL LO NOISE	1.000000
		Ref: U4	
4	12-62-4053 TSSOP-16 SM CD4053BPW	IC SWITCH-ANALOG TRIPLE 2-CHAN	2.000000
		Ref: U9,U13	
4	12-64-4528 AUDIO CODEC SM AK4528	IC CONVERTER 24B 48/96KHz	2.000000
		Ref: U5-6	
4	15-40-6138 DIP-8 TH	IC 6N138 OPTO-ISOLATOR	1.000000
		Ref: U24	
4	15-64-0014 6 SM	IC 74HCT14 HEX INVERTER	1.000000
		Ref: U21	
4	15-65-0014 INV HEX SCHMITT TRIGGER SM	IC 74LCX14 LOW VOLTAGE CMOS	1.000000
		Ref: U19	
4	15-67-0179 TRANSCEIVER SN75LBC179 SO-8 SM	IC RS-485 LOW PWR DIFF	1.000000
		Ref: U25	
4	15-70-1610 HY57V161610DTC-7 SM	IC DRAM 1M X 16 SDRAM	2.000000
		Ref: U11-12	
4	15-86-1065 ADSP-21065LKS-240 MQFP208 SM	IC DSP SHARC	1.000000
		Ref: U14	
4	15-92-5810 SOT-23 SM LM810	IC RESET 5V 5% ACTIVE-HI	1.000000
		Ref: U18	
4	21-00-6616 HORIZ TH	JACK 1/4" TRS 6-PIN PCB MT Ref: J3-6,J9	5.000000

4	21-04-5075	JACK DIN 5-PIN FEMALE MIDI PCB-MNT RT-ANG LN 05075	Ref: P1-2	2.000000
4	21-08-0013	JACK XLR MALE PCB MNT RT ANG TH NEUTRIK-NC3MAH	Ref: J1-2	2.000000
4	21-16-0045	JACK RJ-45 8-PIN FEMALE PCB-MNT RT-ANG	Ref: J7	1.000000
4	21-18-0002	TERMINALSCREW PCB MOUNT RT ANGLE SNAP-IN TH	Ref: BR2	1.000000
4	21-20-0205	HDR PCB MT SIL 5-PIN x 2mm FEMALE SHRD VERT MT TH	Ref: H1	1.000000
4	21-20-1033	HDR PCB MT DIL 34-PIN 2x17x2mm MALE SHRD VERT MT TH	Ref: H4	1.000000
4	21-20-1568	HDR PCB MT SIL 8-PIN X .156 MALE VERT-MNT FRIC-LOCK	Ref: H6	2.000000
4	21-20-2010	HDR PCB MT DIL 10-PIN 2x5x100 MALE SHRD VERT	Ref: H5,H7	1.000000
4	21-44-0044	SOCKET 44 PIN PLCC - .050 LOW PROFILE SMT	Ref: S1	1.000000
4	24-09-0222	SWITCH SLIDE DPDT	Ref: SW1	2.000000
4	30-00-0607	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASH ZINC	Ref: U29,U31	2.000000
4	30-06-0623	NUT 6-32 W/CAPTV-STAR-WASHER	Ref: U29,U31	7.000000
4	30-18-3030	CLIP GND PCB .30x.30x.07	Ref: GF1-6,GF8	1.000000
4	30-51-0029	HEATSINK AL BLK ANODIZED	Ref: P3	1.000000
4	30-51-0057	HEAT SINK, BLACK ANODIZED AL, WAKEFIELD #287-1AB	Ref: P4	1.000000

4	45-01-0001	IC PROGRAMMED MPU V1.01	1.000000
		c/s = CFA3 DUET	
		Ref: U16	
5	15-84-8752	IC MPU 87C51MB OTP w/2K byte	1.000000
		SRAM and 64K ROM PLCC44	
4	45-02-0002	IC PROGRAMMED FLASH v1.00	1.000000
		c/s=06DC261F DUET	
		Ref: U10	
5	15-78-0000	IC FLASH 4Meg 512Kx8/256x16	1.000000
		TSOP-48 SM AM29LV400	
4	45-06-0001	IC PROGRAMMED PLD SHARCTONE	1.000000
		REV B	
		Ref: U15	
5	15-96-0000	IC PLD 64 MACROCELL/64IO	1.000000
		TQFP100 SM M4A3-64/64-10VC	
3	50-00-0122	PCBA FRONT PANEL DUET	1.000000
4	01-24-1002	RES 10.0K 1% 0805	4.000000
		Ref: R15-18	
4	01-24-10R0	RES 10.0R 1% 0805	1.000000
		Ref: R19	
4	01-24-1500	RES 150R 1% 0805	1.000000
		Ref: R22	
4	01-24-48R7	RES 48.7R 1% 0805	16.000000
		Ref: R1-14,R20-21	
4	01-48-0103	POT MONO 10KB LINEAR TAPER	14.000000
		25 mm D-SHAFT	
		Ref: R26-39	
4	01-48-4103	POT STEREO 10KB LINEAR TAPER	1.000000
		25mm	
		Ref: R25	
4	03-10-0106	CAP ELEC 10uF 10V 20% RADIAL	1.000000
		4/5/5	
		Ref: C39	
4	03-18-0105	CAP ELEC 1uF 50V 20% RADIAL	1.000000
		5/11/5 Ref:C38	

4	03-52-0473	CAP X7R 47nF 50V 20% 0805	37.000000
		Ref: C1-37	
4	06-34-0016	DIODE SWITCHING 75V 200mA 6nS SOT-23 SM BAS16LT1	14.000000
		Ref: D1-2,D5-8,D13-17,D21,D23,D25	
4	09-06-7002	TRANS MOSFET N-CHAN 60V 7R5 SOT-23 SM 2N7002	4.000000
		Ref: Q1-4	
4	12-64-1543	IC ADC 10 BIT 11 CHANNEL SM TLC1543CDW	1.000000
		Ref: U3	
4	15-62-4051	IC 74HC4051 8 TO 1 ANALOG MUX/DMUX SM 74HC4051	1.000000
		Ref: U5	
4	15-64-0595	IC 74HCT595 OCTAL SHIFT REG W/ 3-S SO-16 SM	3.000000
		Ref: U1-2,U4	
4	18-02-0001	LED YELLOW SUPERBRITE T1(3MM) TH L934SYC	9.000000
		Ref: D3-4,D9-12,D19-20,D22	
4	18-22-0003	LED YELLOW SUPER 2.0x1.2x1.1mm AP2012SYC SM	16.000000
		Ref: LED 1 A-H, LED2 A-H	
4	21-20-0202	HDR PCB MT SIL 2-PIN x 2mm MALE SHRD VERT MT TH	2.000000
		Ref: H2-3	
4	21-20-1033	HDR PCB MT DIL 34-PIN 2x17x2mm MALE SHRD VERT MT TH	1.000000
		Ref: H8	
4	21-21-0000	HDR PCB MT DIL 6-PIN 2x3x.100 MALE RT ANGLE MT TH	1.000000
		Ref: H1	
4	21-21-0002	HDR PCB MT DIL 6-PIN 2x3x .100 FEMALE VERT MT	1.000000
		Ref: H9	
4	21-34-0029	CAB ASSY SIL 3 2.54 2.756IN BOTH ENDS TINNED	2.000000
		Ref: H4-5,H6-7	
4	24-03-0100	SWITCH TOGGLE SPDT MOMENTARY ON-OFF-ON 3-PIN V-MOUNT PCB	2.000000
		Ref: SW1,SW6	
4	24-12-0000	ENCODER 8-STEP GREY CODE 25mm D-SHFT METAL H-MOUNT PCB Ref: E1-2	2.000000

4	24-31-1105	SWITCH TACT 6mm SQ 4-PIN TH	4.000000
		Ref: SW2-5	
3	50-00-0132	PCBA SPEAKER OUT DUET	1.000000
4	03-52-0104	CAP X7R 0.1uF 50V 20% 0805	5.000000
		Ref: C3-6,C9	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805	2.000000
		Ref: C7-8	
4	11-10-0601	FERRITE BEAD 600R @100MHZ 1206	3.000000
		Ref: L1-3	
4	21-00-6616	JACK 1/4" TRS 6-PIN PCB MT HORIZ TH	5.000000
		Ref: J1-5	
4	21-20-1565	HDR PCB MT SIL 5-PIN X .156 MALE VERT-MNT FRIC-LOCK	1.000000
		Ref: H2	
4	21-20-2010	HDR PCB MT DIL 10-PIN 2x5x100 MALE SHRD VERT	1.000000
		Ref: H1	
4	24-09-0128	SWITCH SLIDE DPDT RA PCB MT ON-OPEN-ON SWEETA SPA-128	1.000000
		Ref: SW1	
4	24-09-0222	SWITCH SLIDE DPDT	1.000000
		Ref: SW2	
4	30-18-3030	CLIP GND PCB .30x.30x.07	5.000000
		Ref: GF1-5	
3	50-00-0139	PCBA POWER SUPPLY DUET	1.000000
4	01-00-0100	RES 10R 5% 0805	4.000000
		Ref: R14,R16-17,R24	

4	01-00-0101	RES 100R 5% 0805			2.000000
		Ref: R11,R20			
4	01-00-0471	RES 470R 5% 0805			2.000000
		Ref: R15,R18			
4	01-12-0154	RES CARBON FILM 150K 1/4W 5% TH			2.000000
		Ref: R1-2			
4	01-20-0102	RES METAL OXIDE 1K 2W 5% TH			1.000000
	S/B 01-22-0102				
		Ref: R57			
4	01-20-0132	RES METAL OXIDE 1.3K 1W 5% TH			1.000000
	S/B 01-21-0132				
		Ref: R42			
4	01-20-0390	RES METAL OXIDE 39R 2W 5% TH			5.000000
	S/B 01-22-0390				
		Ref: R52-56			
4	01-20-0393	RES METAL OXIDE 39K 2W 5% TH			2.000000
	S/B 01-22-0393				
		Ref: R3-4			
4	01-20-0563	RES METAL OXIDE 56K 2W 5% TH			3.000000
	S/B 01-22-0563				
		Ref: R45-47			
4	01-20-0R22	RES METAL OXIDE 0.22R 2W 5% TH			1.000000
	S/B 01-22-0R22				
		Ref: R32			
4	01-22-0202	RES METAL OXIDE 2K 2W 5% TH		.0000	2.000000
		Ref: R60,R61			
4	01-24-1001	RES 1.00K 1% 0805			2.000000
		Ref: R22,R48			
4	01-24-1002	RES 10.0K 1% 0805			10.000000
		Ref: R5-8,R21,R23,R26,R30,R36,R59			
4	01-24-1003	RES 100K 1% 0805			4.000000
		Ref: R28,R33-34,R39			
4	01-24-1242	RES 12.4K 1% 0805			1.000000
		Ref: R12			
4	01-24-1821	RES 1.82K 1% 0805	Ref: R58		1.000000

4	01-24-2001	RES 2.00K 1% 0805	1.000000
		Ref: R9	
4	01-24-2152	RES 21.5K 1% 0805	1.000000
		Ref: R38	
4	01-24-2492	RES 24.9K 1% 0805	3.000000
		Ref: R37,R44,R51	
4	01-24-3012	RES 30.1K 1% 0805	1.000000
		Ref: R19	
4	01-24-3482	RES 34.8K 1% 0805	1.000000
		Ref: R50	
4	01-24-3921	RES 3.92K 1% 0805	1.000000
		Ref: R35	
4	01-24-4751	RES 4.75K 1% 0805	3.000000
		Ref: R13,R25,R29	
4	01-24-4752	RES 47.5K 1% 0805	1.000000
		Ref: R10	
4	01-24-4992	RES 49.9K 1% 0805	1.000000
		Ref: R43	
4	01-24-8871	RES 8.87K 1% 0805	1.000000
		Ref: R27	
4	01-70-0001	THERMISTOR NTC 100K@25C 0603 SM	1.000000
		Ref: NTC1	
4	01-70-1032	THERMISTOR INRUSH 10R@4A 4/10/7.8 TH	1.000000
		Ref: RT1	
4	03-00-1681	CAP CER DISC 680pF 1000V 10% TH 7D/4.5/5	5.000000
		Ref: C31,C35-38	
4	03-10-0228	CAP ELEC 2200uF 10V 20% 105C LowZ 0.04R RADIAL 12.5/25/5 Ref: C57	1.000000

4	03-14-1227	CAP ELEC 220uF 25V 20% RADIAL LowZ 0.15R RADIAL 8/15/5	1.000000
		Ref: C12	
4	03-18-0105	CAP ELEC 1uF 50V 20% RADIAL 5/11/5	1.000000
		Ref: C40	
4	03-18-0106	CAP ELEC 10uF 50V 20% RADIAL 5/11/5	6.000000
		Ref: C13,C43,C58-59,C64-65	
4	03-18-0107	CAP ELEC 100uF 50V 20% 105C LowZ 0.2R RADIAL 8/20/5	4.000000
		Ref: C41-42,C44-45	
4	03-18-0477	CAP ELEC 470uF 50V 20% 105C LowZ 0.05R RADIAL12.5/25/5	4.000000
		Ref: C32-34,C39	
4	03-22-1477	CAP ELEC 470uF 200V 20% SNAP-IN RADIAL 25/25/10	2.000000
		Ref: C7-8	
4	03-36-0105	CAP 1uF 250VDC 10% ESTR TH 18.5/7.4/15/15	1.000000
		Ref: C26	
4	03-41-0224	CAP X-CAP 0.22uF 275VAC 20% POLYPROYPYLENE 18/9.5/17.5/15	2.000000
		Ref: C2,C6	
4	03-42-0471	CAP Y-CAP 470pF 250VAC 20% TH CER DISC 8D/7/7.5	3.000000
		Ref: C4-5,C10	
4	03-50-0101	CAP NPO 100pF 50V 10% 0805	2.000000
		Ref: C23,C25	
4	03-50-0102	CAP NPO 1nF 50V 5% 0805	3.000000
		Ref: C15-16,C18	
4	03-50-0331	CAP NPO 330pF 50v 5% 0805	1.000000
		Ref: C17	
4	03-52-0332	CAP X7R 3.3nF 50V 20% 0805	1.000000
		Ref: c27	
4	03-52-0472	CAP X7R 4.7nF 50V 20% 0805	1.000000
		Ref: c20	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805 Ref: C9,C11,C14,C19,C21-22,C24,C30,C46-56,C60-63	23.000000

4	03-52-1103	CAP X7R 10nF 100V 10% 0805	1.000000
		Ref: C28	
4	03-75-0102	CAP Y-CAP 1nF 250VAC 20% TH	2.000000
		CER DISC 7D/7/7.5	
		Ref: C1,C3	
4	06-08-0020	DIODE ZENER 20V 5% 1W	1.000000
		DO-41 TH 1N4747A	
		Ref: D6	
4	06-08-0330	DIODE ZENER 3.3V 5% 1W	1.000000
		DO-41 TH 1N4728A	
		Ref: D4	
4	06-12-0160	DIODE ULTRA FAST 600V 1A 50nS	1.000000
		59-04 PLASTIC TH MUR160	
		Ref: D5	
4	06-16-0405	DIODE BRIDGE 600V 4A	1.000000
		4-PIN SIL RS-4L TH RS405L	
		Ref: D1	
4	06-24-0420	DIODE ULTRAFAST 4A 200V	6.000000
		TO-267-03 TH MUR420	
		Ref: D7-9,D11-12,D14	
4	06-34-0016	DIODE SWITCHING 75V 200mA	2.000000
		6nS SOT-23 SM BAS16LT1	
		Ref: D2-3	
4	06-34-0021	DIODE SWITCHING 250V 200mA	2.000000
		50nS SOT-23 SM BAS21LT1	
		Ref: D10,D13	
4	09-00-4401	TRANS NPN SMALL-SIGNAL 2N4401	1.000000
		TH	
		Ref: Q5	
4	09-00-4403	TRANS PNP SMALL-SIGNAL 2N4403	1.000000
		TH	
		Ref: Q8	
4	09-10-4401	TRANS NPN SMALL-SIGNAL MBT4401	3.000000
		SOT-23 SM	
		Ref: Q1,Q9-10	
4	09-10-4403	TRANS PNP SMALL-SIGNAL MBT4403	8.000000
		SOT-23 SM	
		Ref: Q2-4,Q11,Q13-16	
4	09-61-1060	TRANS POWER MOSFET N-CHANL	2.000000
		Ref: Q6-7	

4	11-10-0010	INDUCTOR ROD CHOKE 10uH VERT MNT TH ICE C03-00100-06-00	Ref: L3-4	2.000000
4	11-10-1145	INDUCTOR PWR CHOKE 145uH VERT MNT 4P TH ICE I01--0145-02-00	Ref: L5	1.000000
4	11-10-3501	INDUCTOR COMMON MODE LINE FILTER ICE LF-35040-0044	Ref: L1-2	2.000000
4	11-30-4220	XFMR FLYBACK ICA-0708 AX3	Ref: T1	1.000000
4	12-00-0431	IC REG ADJ PREC SHUNT <36V TO-226AA(LP) TH TL431	Ref: U3	1.000000
4	12-02-7818	IC REG +18V 1 AMP TH TO-220	Ref: U5	1.000000
4	12-02-7918	IC REG -18V 1 AMP TH TO-220	Ref: U6	1.000000
4	12-70-2576	IC REG SWITCHER STEP-DOWN ADJ LM2576 TO-263 SM	Ref: U4	1.000000
4	15-40-8102	IC OPTO-ISOLATOR MOC8102 DIP6-400 TH	Ref: U2	1.000000
4	15-68-3844	IC CONTROLLER PWM SO-8 UC3844D8	Ref: U1	1.000000
4	21-14-0001	JACK IEC 3-PIN MALE PCB-MNT RT-ANG GND SS-7B-1	Ref: J2	1.000000
4	21-20-1566	HDR PCB MT SIL 6-PIN X .156 MALE VERT-MNT FRIC-LOCK	Ref: J6	1.000000
4	21-20-1568	HDR PCB MT SIL 8-PIN X .156 MALE VERT-MNT FRIC-LOCK	Ref: J7	1.000000
4	21-20-2075	HDR PCB MT SIL 2-PIN X 7.5mm MALE VERT MT FRIC-LOCK TH	Ref: J1,J3-5	4.000000
4	21-34-0006	CAB SIL 2 PIN 1.95" .156" PITCH	Ref: J1,J5	2.000000

4	21-34-1806	CABLE EARTHING w/EYELET 18AWG 126MM	1.000000
		Ref: AC Jack to Chassis	
4	21-48-9521	CLIP FUSE HOLDER	2.000000
		Ref: F1	
4	24-19-6325	FUSE 6.3 AMP 250V 5X20mm DOM F	1.000000
		Ref: F1	
4	30-00-0607	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASH ZINC	2.000000
		Ref: HS1-2	
4	30-06-0623	NUT 6-32 W/CAPTV-STAR-WASHER	2.000000
		Ref: HS1-2	
4	30-51-0057	HEAT SINK, BLACK ANODIZED AL, WAKEFIELD #287-1AB	2.000000
		Ref: HS1-2	
3	50-00-0163	ASSY AMP POWER w/HEATSINK & HARDWARE	1.000000
4	30-00-0010	SCREW 8-32 x.562 SCH CAP SCR	2.000000
		Ref: Clamps	
4	30-00-0028	SCREW 8-32 x 5/16" SHCS	1.000000
		Ref: Support Bracket BR1	
4	30-03-0002	WASHER #8 .293 x.174x .040 STEEL	3.000000
		Ref: (2) Clamps (1) Support bracket	
4	30-06-0007	NUT .344 HEX 8-32 STEEL ZINC	3.000000
		Ref: (2) clamps (1) support bracket	
4	30-51-0059-3	HEATSINK 4.0 IN LG AL ALY BLK ANODIZE	1.000000
		Ref: POWER AMP ASSY.	
4	30-51-0073	CLAMP HEATSINK TO-220 1.3x.45x.35" CR STEEL 1018	2.000000
		Ref: POWER AMP ASSY.	
4	30-51-0105	BRKT SUPPORT .565 x .530 x .690 EG STEEL	1.000000
		Ref: BR1	

4	30-63-0006	PAD THERMAL 6mil 25mm x 30mm w/ADHESIVE 4KVAC VTM-0	2.000000
		Ref: u1-2	
5	01-20-02R2	RES METAL OXIDE 2.2R 2W 5% TH S/B 01-22-02R2	2.000000
		Ref: R5-6	
5	01-22-0R47	RES METAL OXIDE 0.47R 2W 5% TH	4.000000
		Ref: R3-4,R7-8	
5	01-24-1243	RES 124K 1% 0805	2.000000
		Ref: R1,R9	
5	01-60-0203	RES NETWORK ISOLATED 20K 16P 8R .3W 2% CER SOP-16 SM	2.000000
		Ref: R2,R10	
5	03-18-0106	CAP ELEC 10uF 50V 20% RADIAL 5/11/5	2.000000
		Ref: C2,C12	
5	03-18-0336	CAP ELEC 33uF 50V 20% RADIAL 5/11/5	2.000000
		Ref: C6,C16	
5	03-22-0476	CAP ELEC 47uF 100V 20% RADIAL 10/15/5	2.000000
		Ref: C8,C10	
5	03-24-1104	CAP MET-POLY 0.1uF 100VDC 5% TH 4.5/7.5/7/5	2.000000
		Ref: C7,C9	
5	03-52-0101	CAP X7R 100pF 50V 20% 0805	2.000000
		Ref: C1,C11	
5	03-52-0470	CAP X7R 47pF 50V 20% 0805	2.000000
		Ref: C3,C13	
5	03-52-1103	CAP X7R 10nF 100V 10% 0805	4.000000
		Ref: C4-5,C14-15	
5	12-30-7293	IC POWER-AMP 100W TDA7293 TO-220/15 TH	2.000000
		Ref: U1-2	
5	21-20-1565	HDR PCB MT SIL 5-PIN X .156 MALE VERT-MNT FRIC-LOCK	1.000000
		Ref: H2	
5	21-20-1566	HDR PCB MT SIL 6-PIN X .156 MALE VERT-MNT FRIC-LOCK Ref: H3	1.000000

5	21-20-2010	HDR PCB MT DIL 10-PIN 2x5x100 MALE SHRD VERT	1.000000
		Ref: H1	
3	50-00-0169	PCBA INPUT GUITAR SHARCTONE SERIES	1.000000
4	01-00-0102	RES 1K 5% 0805	1.000000
		Ref: R4	
4	01-00-0105	RES 1M 5% 0805	1.000000
		Ref: R3	
4	01-24-1002	RES 10.0K 1% 0805	1.000000
		Ref: R1	
4	01-24-4991	RES 4.99K 1% 0805	1.000000
		Ref: R2	
4	01-24-8870	RES 887R 1% 0805	1.000000
		Ref: R5	
4	03-46-0104	CAP X7R 0.1uF 50V 20% 1206	1.000000
		Ref: C1	
4	03-50-0470	CAP NPO 47pF 50V 10% 0805	1.000000
		Ref: C4	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805	3.000000
		Ref: C2-3,C5	
4	11-10-0601	FERRITE BEAD 600R @100MHZ 1206	1.000000
		Ref: L1	
4	12-54-0134	IC OP AMP - OPA134UA SM SO-8	1.000000
		Ref: U1	
4	21-00-6617	JACK 1/4" TRS 6-PIN PCB MT HORIZ TH W/CHROME HRDWARE	1.000000
		Ref: J3	
4	21-20-0205	HDR PCB MT SIL 5-PIN x 2mm FEMALE SHRD VERT MT TH Ref:J1	1.000000

4	30-18-3030	CLIP GND PCB .30x.30x.07	1.000000
		Ref: J2	
3	50-00-0190	OVERLAY w/ARTWORK DUET	1.000000
4	30-42-0014 AL ALY	OVERLAY DUET 23.25x4.75 .020	1.000000

LINE 6
DuoVerb HD Parts List

Item: 99-020-0415

Level	Seq	Component-Item	Component-Description	Qty-Per-Parent
Parent Item: 99-020-0415		AMP DUOVERB HD US 120V		
1		21-37-1160	CABLE PWR UL/CSA SJT 8.2ft Blk EL-302 w/GND EL70	1.000000
1		40-00-0073	SHEET ACCESSORY DOMESTIC	1.000000
1		40-00-0171	MANUAL USER DUOVERB	1.000000
1		40-10-0006T	FOAM CORNER PE-LAM 1.5pcf TOP	8.000000
1		40-10-0024	CARTON GIFT DUET HD L	1.000000
2		41-00-0002	ARTWORK BOX GIFT DUET HD	.000000
1		40-10-0181	BOX INSERT FOOTSWITCH POWER-CORD	1.000000
1		40-20-0010	BAG PLASTIC 43"x38"x.004 CLEAR	1.000000
1		40-20-0011	BAG PLASTIC 10 x 16 2 mil	1.000000
1		40-25-0100	LABEL BAR CODE SERIAL NUMBER 4-PANEL LABEL	1.000000
1		50-00-0141	ASSY PEDAL CHNL SWITCHER A-B	1.000000
2		01-12-0302	RES CARBON FILM 3.0K 1/4W 5% TH	1.000000
			Ref: R2	
2		01-12-0622	RES CARBON FILM 6.2K 1/4W 5% TH	1.000000
			Ref: R1	
2		18-00-0001	LED RED A/B SWITCHER BOX DUET	2.000000
			Ref: D1,D2	
2		24-00-0003	SWITCH PUSH BUTTON PUSH-ON PUSH-OFF SPDT 3P SIL TH PCB MT	2.000000

2	30-51-0107	CHASSIS SWITCHER CHANNEL A-B 5.2x4.3x1.8 AL	1.000000
2	40-10-0026	CARTON SHIPPING SWITCHER PEDAL A/B WHITE	1.000000
1	59-00-0168	ASSY DUET HD COMPLETE UNIT	1.000000
2	30-00-1032	SCR 10-32 x 1 1/4 OVAL CT SK PHH NICKEL	8.000000
2	30-00-9358	SCR #3 1/2"LG OVAL CTSK PHH BLK (SUBST FOR 30-00-0358)	2.000000
2	30-03-0110	WASHER FINISHING #10 NICKEL	4.000000
2	30-57-0001	HANDLE DUET	1.000000
2	30-60-0003	LOGO LINE 6 WHT ON BLK 7.3x2.0x.25 HORIZ BR FNSH	1.000000
2	40-25-0020	LABEL INSPECTION QUALITY	1.000000
2	50-00-0167	ASSY DUET CHASSIS w/HDWR & ELECTRONICS COMPLETE	1.000000
3	21-30-0009-3	CAB DIL 10 PIN .100 PITCH 3.0 IN	1.000000
3	21-30-0009-4	CAB DIL 10 PIN .100 PITCH 5.5 IN	1.000000
3	21-34-0014-3	CAB ASSY SIL 8 PIN .156 PITCH 4.5 LG	1.000000
3	21-34-0015	CAB SIL 5 PIN .079 IN PITCH 5.4 IN LG	1.000000
3	21-34-0018-2	CAB ASSY SIL 2 PIN .295 5.75	1.000000
3	21-34-0021-3	CAB ASSY SIL 6 PIN .156 PITCH 10.0 LG	1.000000
3	21-34-0030	CAB ASSY SIL 2PIN 2MM LG 2.0 PITCH	1.000000
3	21-34-0031	CAB ASSY SIL 5 PIN 7.25 LG	1.000000
3	21-34-9034	CAB DIL RIBBON 34-PIN 1.27mm 152.40mm	1.000000

3	24-03-0002	SWITCH TOGGLE SPST ON-OFF 250V 6A 2-PIN CHASSIS MNT	1.000000
3	24-19-6325	FUSE 6.3 AMP 250V 5X20mm DOM F	1.000000
3	24-21-1122	CAP SWITCH	1.000000
3	30-00-0018	SCREW 6-32 SLFTPG x.75 FLH PHILLIPS	4.000000
3	30-00-0606	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASHER BLK OXIDE	4.000000
3	30-00-0607	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASH ZINC	33.000000
3	30-00-0610	SCR 6-32 x 5/8 LG PHILLIPS PNH STL ZINC (W/ LK WASH)	2.000000
3	30-00-4250	SCR SHEET METAL PAN HEAD SLF TAP. 4 x.250" w/BLK OXIDE	4.000000
3	30-00-8375	SCR SHEET METAL #8 x.375" PPH SELF TAP w/BLK OXIDE	2.000000
3	30-03-0015	WASHER .750 OD x.560 IDx .045	1.000000
3	30-03-0017	WASHER 15.9 x11.9x .53mm STEEL NICKEL	3.000000
3	30-15-0004	SPACER .13THKx.63OD NYLON MUDGE 5610-82-.125	1.000000
3	30-15-0012	SPACER .75 OD x .50 id x .19 ht NYLON	3.000000
3	30-24-0003	TIE CABLE 4" CLEAR	1.000000
3	30-27-0049	LT PIPE SHARCTONE 1.4 OD x .47 HIGH CLR POLY MINITEXTURE	2.000000
3	30-27-0054	KNOB BI-DIRECTIONAL .800 DIA X .560H HIGH IMPACT ABS CREAM	2.000000
3	30-27-0059	LENS LED .19" DIA x.29" HT PLASTIC CLEAR SNAP-IN	4.000000
3	30-45-2000-2	KNOB POT PLASTIC CREAM w/BLACK INDICATOR LINE	15.000000
3	30-51-0098	CHASSIS COVER DUET 24.24x5.13x7.5 ELEC GALV STL	1.000000
3	30-51-0113	LENS JEWEL CLEAR .610 Dx.654"H MTL BSE w/NUT MFR#01-0170W w/n	1.000000

3	30-63-0010	INSULATION, VOLARAPOLYOLEFIN F OAM, 26.5 x 1/4 x 1/16	.080000
3	30-75-0010	PEDAL SWITCH RUBBER PAD	.500000
3	40-25-0015	LABEL GROUND SYMBOL	1.000000
3	50-00-0079	ASSY CHASSIS w/ARTWORK DUET	1.000000
4	30-51-0097	CHASSIS DUET 24.24x7.94x5.1 ELEC GALV STL	1.000000
3	50-00-0121	PCBA MAIN DUET	1.000000
4	01-00-0000	RES 0R 5% 0805	3.000000
		Ref: R50,R66,R167	
4	01-00-0155	RES 1.5M 5% 0805	1.000000
		Ref: R89	
4	01-24-1000	RES 100R 1% 0805	3.000000
		Ref: R64,R67,R108	
4	01-24-1001	RES 1.00K 1% 0805	19.000000
		Ref: R8,R21,R54-56,R86,R92,R95-96,R113,R115,R120,R130,R144-145, R153-154,R157-158	
4	01-24-1002	RES 10.0K 1% 0805	28.000000
		Ref: R10,R23,R51-52,R59-60,R68,R71,R73-74,R76-77,R80,R83,R103, R110-111,R116-118,R128,R131-132,R134-136,R141,R147	
4	01-24-1003	RES 100K 1% 0805	10.000000
		Ref: R97-98,R137,R165-166,R168-172	
4	01-24-1004	RES 1.00M 1% 0805	6.000000
		Ref: R72,R75,R85,R88,R91,R94	
4	01-24-1102	RES 11.0K 1% 0805	4.000000
		Ref: R99-100,R106-107	
4	01-24-1241	RES 1.24K 1% 0805	2.000000
		Ref: R4,R9	

4	01-24-15R0	RES 15R 1% 0805	2.000000
		Ref: R123,R142	
4	01-24-1822	RES 18.2K 1% 0805	4.000000
		Ref: R2-3,R6,R13	
4	01-24-2000	RES 200R 1% 0805	1.000000
		Ref: R150	
4	01-24-2001	RES 2.00K 1% 0805	16.000000
		Ref: R7,R15,R19,R24-26,R32,R34-38,R44-45,R47-48	
4	01-24-2002	RES 20.0K 1% 0805	2.000000
		Ref: R133,R149	
4	01-24-2210	RES 221R 1% 0805	3.000000
		Ref: R90,R101-102	
4	01-24-2211	RES 2.21K 1% 0805	2.000000
		Ref: R61,R62	
4	01-24-2741	RES 2.74K 1% 0805	2.000000
		Ref: R17-18	
4	01-24-2801	RES 2.80K 1% 0805	2.000000
		Ref: R79,R82	
4	01-24-3011	RES 3.01K 1% 0805	6.000000
		Ref: R20,R87,R93,R112,R114,R148	
4	01-24-3651	RES 3.65K 1% 0805	2.000000
		Ref: R57-58	
4	01-24-4321	RES 4.32K 1% 0805	1.000000
		Ref: R33	
4	01-24-4750	RES 475R 1% 0805	3.000000
		Ref: R104-105,R109	
4	01-24-4751	RES 4.75K 1% 0805	10.000000
		Ref: R53,R69,R140,R146,R151-152,R159-162	

4	01-24-47R5	RES 47.5R 1% 0805	8.000000
		Ref: R119,R124-126,R129,R138-139,R143	
4	01-24-5110	RES 511R 1% 0805	1.000000
		Ref: R12	
4	01-24-5R11	RES 5.11R 1% 0805	6.000000
		Ref: R27,R39,R43,R46,R163-164	
4	01-24-6041	RES 6.04K 1% 0805	1.000000
		Ref: R22	
4	01-24-6650	RES 665R 1% 0805	2.000000
		Ref: R63,R65	
4	01-24-6810	RES 681R 1% 0805	4.000000
		Ref: R1,R16,R40,R49	
4	01-24-7500	RES 750R 1% 0805	2.000000
		Ref: R78,R81	
4	01-24-7501	RES 7.50K1% 0805	1.000000
		Ref: R5	
4	01-24-8253	RES 825K 1% 0805	1.000000
		Ref: R84	
4	01-24-8871	RES 8.87K 1% 0805	8.000000
		Ref: R11,R14,R28-31,R41-42	
4	01-48-9103	POT STEREO 10KA AUDIO TAPER HORIZ MT 25mm RND PLASTIC	1.000000
		Ref: POT1	
4	03-10-6108	CAP ELEC 1000uF 6.3V 20% RADIAL 8/11.5/5	2.000000
		Ref: C18,C24	
4	03-12-0337	CAP ELEC 330uF 16V 20% RADIAL 8/11.5/5	2.000000
		Ref: C48,C79	
4	03-18-0105	CAP ELEC 1uF 50V 20% RADIAL 5/11/5	14.000000
		Ref: C3-4,C8-9,C16-17,C19,C40,C46-47,C63-64,C73-74	
4	03-18-0106	CAP ELEC 10uF 50V 20% RADIAL	14.000000
		Ref: C15,C28,C38,C44,C57-58,C62,C66,C71-72,C76,C78,C82,C88	

4	03-18-0474 5/11/5	CAP ELEC 0.47uF 50V 20% RADIAL	1.000000
		Ref: C59	
4	03-50-0102	CAP NPO 1nF 50V 5% 0805	4.000000
		Ref: C70,C106,C110,C118	
4	03-50-0272	CAP NPO 2.7nF 50V 5% 0805	4.000000
		Ref: C7,C27,C31-32	
4	03-50-0391	CAP NPO 390pF 50v 5% 0805	8.000000
		Ref: C2,C6,C10,C12-14,C20,C23	
4	03-52-0102	CAP X7R 1nF 50V 20% 0805	17.000000
		Ref: C34,C43,C96-97,C99,C103-105,C114,C121,C126,C132,C138, C148-149,C154,C158	
4	03-52-0104	CAP X7R 0.1uF 50V 20% 0805	12.000000
		Ref: C54,C56,C95,C100-101,C117,C120,C125,C131,C137,C147,C152	
4	03-52-0221	CAP X7R 220pF 50V 20% 0805	6.000000
		Ref: C1,C5,C49-50,C77,C81	
4	03-52-0222	CAP X7R 2.2nF 50V 20% 0805	2.000000
		Ref: C26,C36	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805	63.000000
		Ref: C11,C21-22,C25,C29-30,C33,C35,C37,C39,C41-42,C45,C51-53,C55, C60-61,C65,C67-69,C75,C80,C83,86-87,89-94,102,C115,C122-124, C127-130,C133-136,C139-146,C150-151,C153,C155-157,C159-160	
4	06-20-0099 6nS SOT-23 SM BAV99	DIODE GEN PUR DUAL 70V 215mA	8.000000
		Ref: D1-3,D5-6,D21-23	
4	06-34-0016 6nS SOT-23 SM BAS16LT1	DIODE SWITCHING 75V 200mA	15.000000
		Ref: D4,D7-20	
4	09-10-4401 SOT-23 SM	TRANS NPN SMALL-SIGNAL MBT4401	3.000000
		Ref: Q1,Q3-4	
4	09-10-4403 SOT-23 SM	TRANS PNP SMALL-SIGNAL MBT4403 Ref: Q2	1.000000

4	11-00-3000	CRYSTAL OSCILLATOR 30MHz 3.3V DIP4 TH	1.000000
		Ref: Y1	
4	11-10-0501	FERRITE BEAD 500R @100mHZ 2.5A 1206 SM	2.000000
		Ref: L5-6	
4	11-10-0601	FERRITE BEAD 600R @100MHZ 1206	26.000000
		Ref: L1-4,L7-28	
4	12-02-1086	IC REG +3.3V T0-220 TH LM1086	1.000000
		Ref: U26	
4	12-02-7805	IC REG +5v 1.5 Amp TH	2.000000
		Ref: U8,U27	
4	12-02-7815	IC REG +15V 1AMP TO-220 TH	1.000000
		Ref: U29	
4	12-02-7915	IC REG -15V 1AMP TO-220 TH 7915	1.000000
		Ref: U31	
4	12-54-0082	IC OP AMP DUAL TL082CD SO-8 SM	3.000000
		Ref: U2-3,U33	
4	12-54-0084	IC OP AMP QUAD TL084CD SM	6.000000
		Ref: U1,U7,U17,U28,U30,U32	
4	12-54-5538	IC OP-AMP DUAL LO NOISE NE5532AD8 SM SO-8	1.000000
		Ref: U4	
4	12-62-4053	IC SWITCH-ANALOG TRIPLE 2-CHAN TSSOP-16 SM CD4053BPW	2.000000
		Ref: U9,U13	
4	12-64-4528	IC CONVERTER 24B 48/96KHz AUDIO CODEC SM AK4528	2.000000
		Ref: U5-6	
4	15-40-6138	IC 6N138 OPTO-ISOLATOR DIP-8 TH	1.000000
		Ref: U24	
4	15-64-0014	IC 74HCT14 HEX INVERTER 6 SM	1.000000
		Ref: U21	
4	15-65-0014	IC 74LCX14 LOW VOLTAGE CMOSINV HEX SCHMITT TRIGGER SM Ref: U19	1.000000

4	15-67-0179	IC RS-485 LOW PWR DIFF TRANSCEIVER SN75LBC179 SO-8 SM	1.000000
		Ref: U25	
4	15-70-1610	IC DRAM 1M X 16 SDRAM HY57V161610DTC-7 SM	2.000000
		Ref: U11-12	
4	15-86-1065	IC DSP SHARC ADSP-21065LKS-240 MQFP208 SM	1.000000
		Ref: U14	
4	15-92-5810	IC RESET 5V 5% ACTIVE-HI SOT-23 SM LM810	1.000000
		Ref: U18	
4	21-00-6616	JACK 1/4" TRS 6-PIN PCB MT HORIZ TH	5.000000
		Ref: J3-6,J9	
4	21-04-5075	JACK DIN 5-PIN FEMALE MIDI PCB-MNT RT-ANG LN 05075	2.000000
		Ref: P1-2	
4	21-08-0013	JACK XLR MALE PCB MNT RT ANG TH NEUTRIK-NC3MAH	2.000000
		Ref: J1-2	
4	21-16-0045	JACK RJ-45 8-PIN FEMALE PCB-MNT RT-ANG	1.000000
		Ref: J7	
4	21-18-0002	TERMINALSCREW PCB MOUNT RT ANGLE SNAP-IN TH	1.000000
		Ref: BR2	
4	21-20-0205	HDR PCB MT SIL 5-PIN x 2mm FEMALE SHRD VERT MT TH	1.000000
		Ref: H1	
4	21-20-1033	HDR PCB MT DIL 34-PIN 2x17x2mm MALE SHRD VERT MT TH	1.000000
		Ref: H4	
4	21-20-1568	HDR PCB MT SIL 8-PIN X .156 MALE VERT-MNT FRIC-LOCK	1.000000
		Ref: H6	
4	21-20-2010	HDR PCB MT DIL 10-PIN 2x5x100 MALE SHRD VERT	2.000000
		Ref: H5,H7	
4	21-44-0044	SOCKET 44 PIN PLCC - .050 LOW PROFILE SMT	1.000000
		Ref: S1	

4	24-09-0222	SWITCH SLIDE DPDT		1.000000
		Ref: SW1		
4	30-00-0607	SCR 6-32 x 7/16 PHIL PN HD STL w/LK WASH ZINC		2.000000
		Ref: U29,U31		
4	30-06-0623	NUT 6-32 W/CAPTV-STAR-WASHER		2.000000
		Ref: U29,U31		
4	30-18-3030	CLIP GND PCB .30x.30x.07		7.000000
		Ref: GF1-6,GF8		
4	30-51-0029	HTSK AL BLK ANDZ		1.000000
		Ref: P3		
4	30-51-0057	HEAT SINK, BLACK ANODIZED AL, WAKEFIELD #287-1AB		1.000000
		Ref: P4		
4	45-01-0001	IC PROGRAMMED MPU V1.01 c/s = CFA3 DUET		1.000000
		Ref: U16		
5	15-84-8752	IC MPU 87C51MB OTP w/2K byte SRAM and 64K ROM PLCC44		1.000000
4	45-02-0002	IC PROGRAMMED FLASH v1.00 c/s=06DC261F DUET		1.000000
		Ref: U10		
5	15-78-0000	IC FLASH 4Meg 512Kx8/256x16 TSOP-48 SM AM29LV400		1.000000
4	45-06-0001	IC PROGRAMMED PLD SHARCTONE REV B		1.000000
		Ref: U15		
5	15-96-0000	IC PLD 64 MACROCELL/64IO TQFP100 SM M4A3-64/64-10VC		1.000000
3	50-00-0122	PCBA FRONT PANEL DUET		1.000000
4	01-24-1002	RES 10.0K 1% 0805		4.000000
		Ref: R15-18		
4	01-24-10R0	RES 10.0R 1% 0805		1.000000
		Ref: R19		
4	01-24-1500	RES 150R 1% 0805	Ref: R22	1.000000

4	01-24-48R7	RES 48.7R 1% 0805	16.000000
		Ref: R1-14,R20-21	
4	01-48-0103	POT MONO 10KB LINEAR TAPER 25 mm D-SHAFT	14.000000
		Ref: R26-39	
4	01-48-4103	POT STEREO 10KB LINEAR TAPER 25mm	1.000000
		Ref: R25	
4	03-10-0106	CAP ELEC 10uF 10V 20% RADIAL 4/5/5	1.000000
		Ref: C39	
4	03-18-0105	CAP ELEC 1uF 50V 20% RADIAL 5/11/5	1.000000
		Ref: C38	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805	37.000000
		Ref: C1-37	
4	06-34-0016	DIODE SWITCHING 75V 200mA 6nS SOT-23 SM BAS16LT1	14.000000
		Ref: D1-2,D5-8,D13-17,D21,D23,D25	
4	09-06-7002	TRANS MOSFET N-CHAN 60V 7R5 SOT-23 SM 2N7002	4.000000
		Ref: Q1-4	
4	12-64-1543	IC ADC 10 BIT 11 CHANNEL SM TLC1543CDW	1.000000
		Ref: U3	
4	15-62-4051	IC 74HC4051 8 TO 1 ANALOG MUX/DMUX SM 74HC4051	1.000000
		Ref: U5	
4	15-64-0595	IC 74HCT595 OCTAL SHIFT REG W/ 3-S SO-16 SM	3.000000
		Ref: U1-2,U4	
4	18-02-0001	LED YELLOW SUPERBRITE T1(3MM) TH L934SYC	9.000000
		Ref: D3-4,D9-12,D19-20,D22	
4	18-22-0003	LED YELLOW SUPER 2.0x1.2x1.1mm AP2012SYC SM	16.000000
		Ref: LED 1 A-H, LED2 A-H	
4	21-20-0202	HDR PCB MT SIL 2-PIN x 2mm MALE SHRD VERT MT TH Ref: H2-3	2.000000

4	21-20-1033	HDR PCB MT DIL 34-PIN 2x17x2mm MALE SHRD VERT MT TH	1.000000
		Ref: H8	
4	21-21-0000	HDR PCB MT DIL 6-PIN 2x3x.100 MALE RT ANGLE MT TH	1.000000
		Ref: H1	
4	21-21-0002	HDR PCB MT DIL 6-PIN 2x3x .100 FEMALE VERT MT	1.000000
		Ref: H9	
4	21-34-0029	CAB ASSY SIL 3 2.54 2.756IN BOTH ENDS TINNED	2.000000
		Ref: H4-5,H6-7	
4	24-03-0100	SWITCH TOGGLE SPDT MOMENTARY ON-OFF-ON 3-PIN V-MOUNT PCB	2.000000
		Ref: SW1,SW6	
4	24-12-0000	ENCODER 8-STEP GREY CODE 25mm D-SHFT METAL H-MOUNT PCB	2.000000
		Ref: E1-2	
4	24-31-1105	SWITCH TACT 6mm SQ 4-PIN TH	4.000000
		Ref: SW2-5	
3	50-00-0132	PCBA SPEAKER OUT DUET	1.000000
4	03-52-0104	CAP X7R 0.1uF 50V 20% 0805	5.000000
		Ref: C3-6,C9	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805	2.000000
		Ref: C7-8	
4	11-10-0601	FERRITE BEAD 600R @100MHZ 1206	3.000000
		Ref: L1-3	
4	21-00-6616	JACK 1/4" TRS 6-PIN PCB MT HORIZ TH	5.000000
		Ref: J1-5	
4	21-20-1565	HDR PCB MT SIL 5-PIN X .156 MALE VERT-MNT FRIC-LOCK	1.000000
		Ref: H2	
4	21-20-2010	HDR PCB MT DIL 10-PIN 2x5x100 MALE SHRD VERT Ref:H1	1.000000

4	24-09-0128	SWITCH SLIDE DPDT RA PCB MT ON-OPEN-ON SWEETA SPA-128	1.000000
		Ref: SW1	
4	24-09-0222	SWITCH SLIDE DPDT	1.000000
		Ref: SW2	
4	30-18-3030	CLIP GND PCB .30x.30x.07	5.000000
		Ref: GF1-5	
3	50-00-0139	PCBA POWER SUPPLY DUET	1.000000
4	01-00-0100	RES 10R 5% 0805	4.000000
		Ref: R14,R16-17,R24	
4	01-00-0101	RES 100R 5% 0805	2.000000
		Ref: R11,R20	
4	01-00-0471	RES 470R 5% 0805	2.000000
		Ref: R15,R18	
4	01-12-0154	RES CARBON FILM 150K 1/4W 5% TH	2.000000
		Ref: R1-2	
4	01-20-0102	RES METAL OXIDE 1K 2W 5% TH S/B 01-22-0102	1.000000
		Ref: R57	
4	01-20-0132	RES METAL OXIDE 1.3K 1W 5% TH S/B 01-21-0132	1.000000
		Ref: R42	
4	01-20-0390	RES METAL OXIDE 39R 2W 5% TH S/B 01-22-0390	5.000000
		Ref: R52-56	
4	01-20-0393	RES METAL OXIDE 39K 2W 5% TH S/B 01-22-0393	2.000000
		Ref: R3-4	
4	01-20-0563	RES METAL OXIDE 56K 2W 5% TH S/B 01-22-0563	3.000000
		Ref: R45-47	
4	01-20-0R22	RES METAL OXIDE 0.22R 2W 5% TH S/B 01-22-0R22	1.000000
		Ref: R32	

4	01-22-0202	RES METAL OXIDE 2K 2W 5% TH		.0000	2.000000
		Ref: R60,R61			
4	01-24-1001	RES 1.00K 1% 0805			2.000000
		Ref: R22,R48			
4	01-24-1002	RES 10.0K 1% 0805			10.000000
		Ref: R5-8,R21,R23,R26,R30,R36,R59			
4	01-24-1003	RES 100K 1% 0805			4.000000
		Ref: R28,R33-34,R39			
4	01-24-1242	RES 12.4K 1% 0805			1.000000
		Ref: R12			
4	01-24-1821	RES 1.82K 1% 0805			1.000000
		Ref: R58			
4	01-24-2001	RES 2.00K 1% 0805			1.000000
		Ref: R9			
4	01-24-2152	RES 21.5K 1% 0805			1.000000
		Ref: R38			
4	01-24-2492	RES 24.9K 1% 0805			3.000000
		Ref: R37,R44,R51			
4	01-24-3012	RES 30.1K 1% 0805			1.000000
		Ref: R19			
4	01-24-3482	RES 34.8K 1% 0805			1.000000
		Ref: R50			
4	01-24-3921	RES 3.92K 1% 0805			1.000000
		Ref: R35			
4	01-24-4751	RES 4.75K 1% 0805			3.000000
		Ref: R13,R25,R29			
4	01-24-4752	RES 47.5K 1% 0805			1.000000
		Ref: R10			
4	01-24-4992	RES 49.9K 1% 0805	Ref: R43		1.000000

4	01-24-8871	RES 8.87K 1% 0805	1.000000
		Ref: R27	
4	01-70-0001	THERMISTOR NTC 100K@25C 0603 SM	1.000000
		Ref: NTC1	
4	01-70-1032	THERMISTOR INRUSH 10R@4A 4/10/7.8 TH	1.000000
		Ref: RT1	
4	03-00-1681	CAP CER DISC 680pF 1000V 10% TH 7D/4.5/5	5.000000
		Ref: C31,C35-38	
4	03-10-0228	CAP ELEC 2200uF 10V 20% 105C LowZ 0.04R RADIAL 12.5/25/5	1.000000
		Ref: C57	
4	03-14-1227	CAP ELEC 220uF 25V 20% RADIAL LowZ 0.15R RADIAL 8/15/5	1.000000
		Ref: C12	
4	03-18-0105	CAP ELEC 1uF 50V 20% RADIAL 5/11/5	1.000000
		Ref: C40	
4	03-18-0106	CAP ELEC 10uF 50V 20% RADIAL 5/11/5	6.000000
		Ref: C13,C43,C58-59,C64-65	
4	03-18-0107	CAP ELEC 100uF 50V 20% 105C LowZ 0.2R RADIAL 8/20/5	4.000000
		Ref: C41-42,C44-45	
4	03-18-0477	CAP ELEC 470uF 50V 20% 105C LowZ 0.05R RADIAL12.5/25/5	4.000000
		Ref: C32-34,C39	
4	03-22-1477	CAP ELEC 470uF 200V 20% SNAP-IN RADIAL 25/25/10	2.000000
		Ref: C7-8	
4	03-36-0105	CAP 1uF 250VDC 10% ESTR TH 18.5/7.4/15/15	1.000000
		Ref: C26	
4	03-41-0224	CAP X-CAP 0.22uF 275VAC 20% POLYPROYPYLENE 18/9.5/17.5/15	2.000000
		Ref: C2,C6	
4	03-42-0471	CAP Y-CAP 470pF 250VAC 20% TH CER DISC 8D/7/7.5 Ref: C4-5,C10	3.000000

4	03-50-0101	CAP NPO 100pF 50V 10% 0805		2.000000
		Ref: C23,C25		
4	03-50-0102	CAP NPO 1nF 50V 5% 0805		3.000000
		Ref: C15-16,C18		
4	03-50-0331	CAP NPO 330pF 50v 5% 0805		1.000000
		Ref: C17		
4	03-52-0332	CAP X7R 3.3nF 50V 20% 0805		1.000000
		Ref: c27		
4	03-52-0472	CAP X7R 4.7nF 50V 20% 0805		1.000000
		Ref: c20		
4	03-52-0473	CAP X7R 47nF 50V 20% 0805		23.000000
		Ref: C9,C11,C14,C19,C21-22,C24,C30,C46-56,C60-63		
4	03-52-1103	CAP X7R 10nF 100V 10% 0805		1.000000
		Ref: C28		
4	03-75-0102	CAP Y-CAP 1nF 250VAC 20% TH		2.000000
		CER DISC 7D/7/7.5		
		Ref: C1,C3		
4	06-08-0020	DIODE ZENER 20V 5% 1W		1.000000
		DO-41 TH 1N4747A		
		Ref: D6		
4	06-08-0330	DIODE ZENER 3.3V 5% 1W		1.000000
		DO-41 TH 1N4728A		
		Ref: D4		
4	06-12-0160	DIODE ULTRA FAST 600V 1A 50nS		1.000000
		59-04 PLASTIC TH MUR160		
		Ref: D5		
4	06-16-0405	DIODE BRIDGE 600V 4A		1.000000
		4-PIN SIL RS-4L TH RS405L		
		Ref: D1		
4	06-24-0420	DIODE ULTRAFAST 4A 200V		6.000000
		TO-267-03 TH MUR420		
		Ref: D7-9,D11-12,D14		
4	06-34-0016	DIODE SWITCHING 75V 200mA		2.000000
		6nS SOT-23 SM BAS16LT1		
		Ref: D2-3		
4	06-34-0021	DIODE SWITCHING 250V 200mA	Ref: D10,D13	2.000000

4	09-00-4401 TH	TRANS NPN SMALL-SIGNAL 2N4401	1.000000
		Ref: Q5	
4	09-00-4403 TH	TRANS PNP SMALL-SIGNAL 2N4403	1.000000
		Ref: Q8	
4	09-10-4401 SOT-23 SM	TRANS NPN SMALL-SIGNAL MBT4401	3.000000
		Ref: Q1,Q9-10	
4	09-10-4403 SOT-23 SM	TRANS PNP SMALL-SIGNAL MBT4403	8.000000
		Ref: Q2-4,Q11,Q13-16	
4	09-61-1060	TRANS POWER MOSFET N-CHANL	2.000000
		Ref: Q6-7	
4	11-10-0010 MNT TH ICE C03-00100-06-00	INDUCTOR ROD CHOKE 10uH VERT	2.000000
		Ref: L3-4	
4	11-10-1145 MNT 4P TH ICE I01--0145-02-00	INDUCTOR PWR CHOKE 145uH VERT	1.000000
		Ref: L5	
4	11-10-3501 FILTER ICE LF-35040-0044	INDUCTOR COMMON MODE LINE	2.000000
		Ref: L1-2	
4	11-30-4220	XFMR FLYBACK ICA-0708 AX3	1.000000
		Ref: T1	
4	12-00-0431 TO-226AA(LP) TH TL431	IC REG ADJ PREC SHUNT <36V	1.000000
		Ref: U3	
4	12-02-7818	IC REG +18V 1 AMP TH TO-220	1.000000
		Ref: U5	
4	12-02-7918	IC REG -18V 1 AMP TH TO-220	1.000000
		Ref: U6	
4	12-70-2576 LM2576 TO-263 SM	IC REG SWITCHER STEP-DOWN ADJ	1.000000
		Ref: U4	
4	15-40-8102 DIP6-400 TH	IC OPTO-ISOLATOR MOC8102 Ref: U2	1.000000

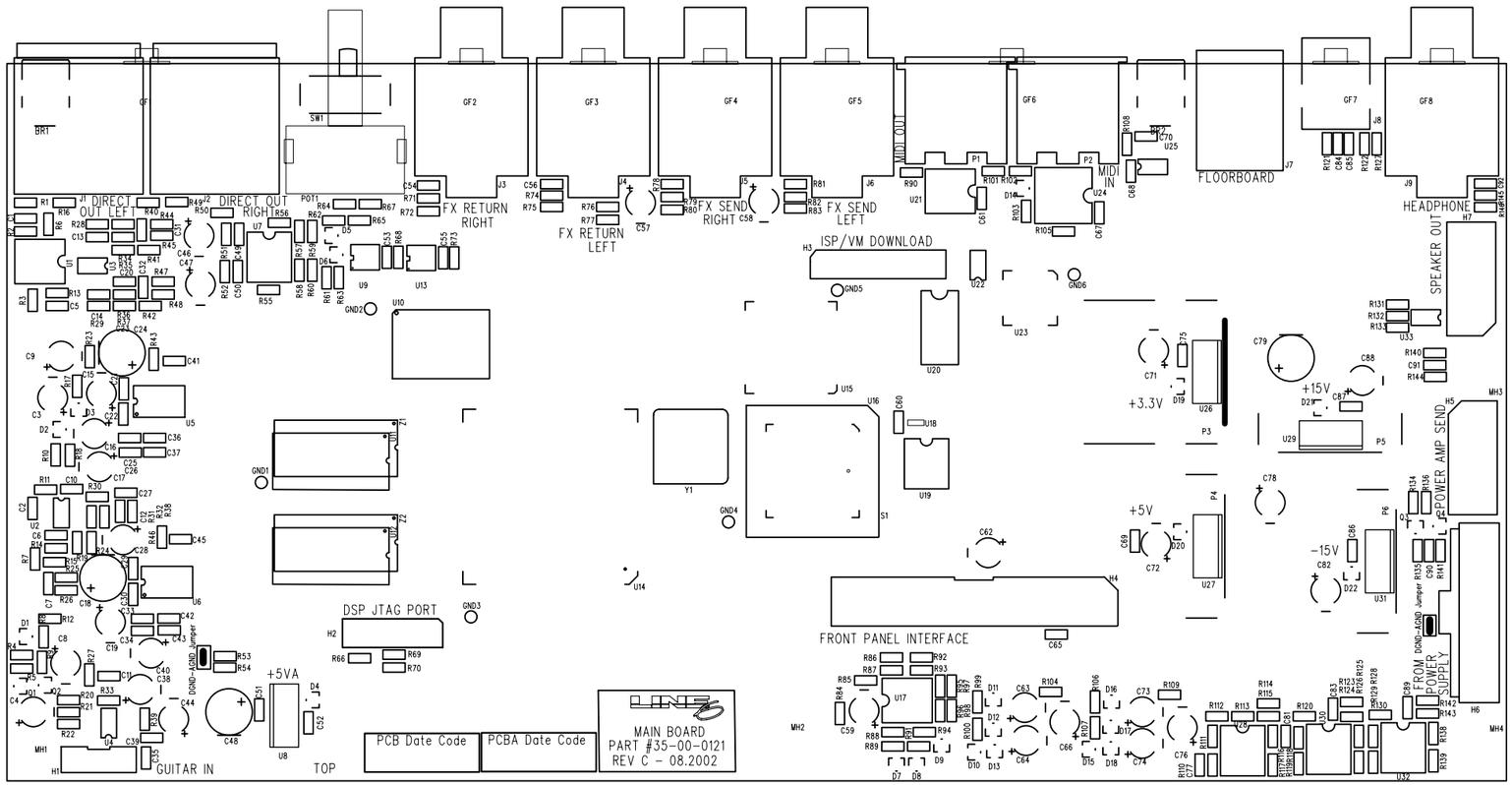
4	15-68-3844	IC CONTROLLER PWM SO-8	1.000000
	UC3844D8		
		Ref: U1	
4	21-14-0001	JACK IEC 3-PIN MALE PCB-MNT	1.000000
	RT-ANG GND SS-7B-1		
		Ref: J2	
4	21-20-1566	HDR PCB MT SIL 6-PIN X .156	1.000000
	MALE VERT-MNT FRIC-LOCK		
		Ref: J6	
4	21-20-1568	HDR PCB MT SIL 8-PIN X .156	1.000000
	MALE VERT-MNT FRIC-LOCK		
		Ref: J7	
4	21-20-2075	HDR PCB MT SIL 2-PIN X 7.5mm	4.000000
	MALE VERT MT FRIC-LOCK TH		
		Ref: J1,J3-5	
4	21-34-0006	CAB SIL 2 PIN 1.95" .156"	2.000000
	PITCH		
		Ref: J1,J5	
4	21-34-1806	CABLE EARTHING w/EYELET 18AWG	1.000000
	126MM		
		Ref: AC Jack to Chassis	
4	21-48-9521	CLIP FUSE HOLDER	2.000000
		Ref: F1	
4	24-19-6325	FUSE 6.3 AMP 250V 5X20mm DOM F	1.000000
		Ref: F1	
4	30-00-0607	SCR 6-32 x 7/16 PHIL PN HD	2.000000
	STL w/LK WASH ZINC		
		Ref: HS1-2	
4	30-06-0623	NUT 6-32 W/CAPTV-STAR-WASHER	2.000000
		Ref: HS1-2	
4	30-51-0057	HEAT SINK, BLACK ANODIZED AL,	2.000000
	WAKEFIELD #287-1AB		
		Ref: HS1-2	
3	50-00-0163	ASSY AMP POWER w/HEATSINK &	1.000000
	HARDWARE		
4	30-00-0010	SCREW 8-32 x.562 SCH CAP SCR	2.000000
		Ref: Clamps	
4	30-00-0028	SCREW 8-32 x 5/16" SHCS	1.000000
		Ref: Support Bracket BR1	

4	30-03-0002 STEEL	WASHER #8 .293 x.174x .040	3.000000
		Ref: (2) Clamps (1) Support bracket	
4	30-06-0007	NUT .344 HEX 8-32 STEEL ZINC	3.000000
		Ref: (2) clamps (1) support bracket	
4	30-51-0059-3 ANODIZE	HEATSINK 4.0 IN LG AL ALY BLK	1.000000
		Ref: POWER AMP ASSY.	
4	30-51-0073 1.3x.45x.35" CR STEEL 1018	CLAMP HEATSINK TO-220	2.000000
		Ref: POWER AMP ASSY.	
4	30-51-0105 .690 EG STEEL	BRKT SUPPORT .565 x .530 x	1.000000
		Ref: BR1	
4	30-63-0006 w/ADHESIVE 4KVAC VTM-O	PAD THERMAL 6mil 25mm x 30mm	2.000000
		Ref: u1-2	
5	01-20-02R2 S/B 01-22-02R2	RES METAL OXIDE 2.2R 2W 5% TH	2.000000
		Ref: R5-6	
5	01-22-0R47	RES METAL OXIDE 0.47R 2W 5% TH	4.000000
		Ref: R3-4,R7-8	
5	01-24-1243	RES 124K 1% 0805	2.000000
		Ref: R1,R9	
5	01-60-0203 16P 8R .3W 2% CER SOP-16 SM	RES NETWORK ISOLATED 20K	2.000000
		Ref: R2,R10	
5	03-18-0106 5/11/5	CAP ELEC 10uF 50V 20% RADIAL	2.000000
		Ref: C2,C12	
5	03-18-0336 5/11/5	CAP ELEC 33uF 50V 20% RADIAL	2.000000
		Ref: C6,C16	
5	03-22-0476 10/15/5	CAP ELEC 47uF 100V 20% RADIAL	2.000000
		Ref: C8,C10	
5	03-24-1104 TH 4.5/7.5/7/5	CAP MET-POLY 0.1uF 100VDC 5%	2.000000
		Ref: C7,C9	

LINE 6
INDENTED BILL OF MATERIAL

5	03-52-0101	CAP X7R 100pF 50V 20% 0805	2.000000
		Ref: C1,C11	
5	03-52-0470	CAP X7R 47pF 50V 20% 0805	2.000000
		Ref: C3,C13	
5	03-52-1103	CAP X7R 10nF 100V 10% 0805	4.000000
		Ref: C4-5,C14-15	
5	12-30-7293	IC POWER-AMP 100W TDA7293 TO-220/15 TH	2.000000
		Ref: U1-2	
5	21-20-1565	HDR PCB MT SIL 5-PIN X .156 MALE VERT-MNT FRIC-LOCK	1.000000
		Ref: H2	
5	21-20-1566	HDR PCB MT SIL 6-PIN X .156 MALE VERT-MNT FRIC-LOCK	1.000000
		Ref: H3	
5	21-20-2010	HDR PCB MT DIL 10-PIN 2x5x100 MALE SHRD VERT	1.000000
		Ref: H1	
3	50-00-0169	PCBA INPUT GUITAR SHARCTONE SERIES	1.000000
4	01-00-0102	RES 1K 5% 0805	1.000000
		Ref: R4	
4	01-00-0105	RES 1M 5% 0805	1.000000
		Ref: R3	
4	01-24-1002	RES 10.0K 1% 0805	1.000000
		Ref: R1	
4	01-24-4991	RES 4.99K 1% 0805	1.000000
		Ref: R2	
4	01-24-8870	RES 887R 1% 0805	1.000000
		Ref: R5	
4	03-46-0104	CAP X7R 0.1uF 50V 20% 1206	1.000000
		Ref: C1	

	03-50-0470	CAP NPO 47pF 50V 10% 0805	1.000000
		Ref: C4	
4	03-52-0473	CAP X7R 47nF 50V 20% 0805	3.000000
		Ref: C2-3,C5	
4	11-10-0601	FERRITE BEAD 600R @100MHZ 1206	1.000000
		Ref: L1	
4	12-54-0134	IC OP AMP - OPA134UA SM	1.000000
	SO-8		
		Ref: U1	
4	21-00-6617	JACK 1/4" TRS 6-PIN PCB MT	1.000000
	HORIZ TH	W/CHROME HRDWARE	
		Ref: J3	
4	21-20-0205	HDR PCB MT SIL 5-PIN x 2mm	1.000000
	FEMALE SHRD VERT MT TH		
		Ref: J1	
4	30-18-3030	CLIP GND PCB .30x.30x.07	1.000000
		Ref: J2	
3	50-00-0190	OVERLAY w/ARTWORK DUET	1.000000
4	30-42-0014	OVERLAY DUET 23.25x4.75 .020	1.000000
	AL ALY		
2	50-00-0191	ASSY CABINET DUET HEAD	1.000000
3	30-00-0812	SCR #8 x .75" LG PHH TRUSS BLK	16.000000
	OXIDE w/WAX (CORNER)		
3	30-00-6839	SCR WD 10-12 x 7/8" PHIL PN	4.000000
	STEEL		
3	30-27-0022	PIPING VINYL EXTD W/EMB WELT	4.500000
	OFF-WHITE MFR's P/N:EW18002		
3	30-30-1530	CORNER PROTECTOR BLACK BLACK	8.000000
	2 LEGS CUT OUT		
3	30-36-0003	COVER VINYL BLACK 23oz.	1.000000
	TAURUS/BLACK SHEETING		
3	30-75-0008	FOOT RUBBER 1.50" I.D. x .75"H	4.000000
	BLACK		



DATE CODE REQUIREMENTS

1) Silkscreen date code for bare PCB fabrication in area marked on drawing.
2) Place date code stamp or sticker for finished PCBA in area marked on drawing.

SILKSCREEN TOP

COMPANY: LINE 6		
PROGRAM: PADS POWER PCB 4.0		
FILE: \SharcTone Product Family\Duet 212 Combo\Electrical\ PCB\Sharctone Family Main\REV C\SHARCTONE MAIN REV C.pcb		
SCALE: 1:1	REV: C	DATE: AUGUST 21, 2002
TITLE: **Sharctone Main Board**		

PART # 35-00-0121

ASSEMBLY BOTTOM

COMPANY: LINE 6

PROGRAM: PADS POWER PCB 4.0

FILE: /SharcTone Product Family/Duet 212 Combo/Electrical/
PCB/Sharctone Family Main/REV C/SHARCTONE MAIN REV C.pcb

SCALE: 1:1 | REV: C | DATE: AUGUST 21, 2002

TITLE: Sharctone Main Board

PART # 35-00-0121

ASSEMBLY DRAWING BOTTOM

COMPANY: LINE 6

PROGRAM: PADS POWER PCB 4.0

FILE: \SharcTone Product Family\Duet 212 Combo\Electrical\
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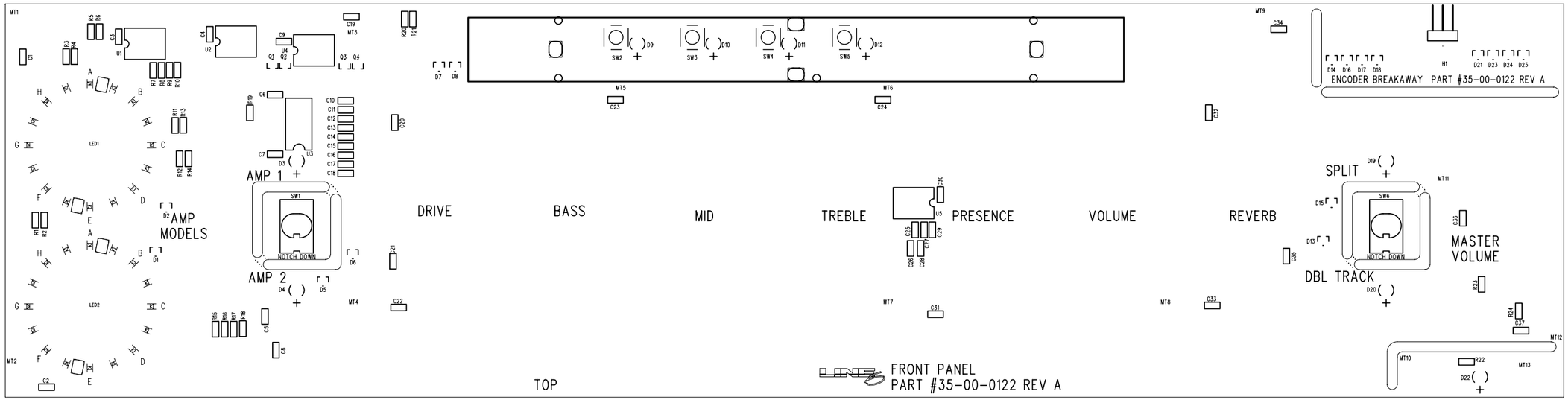
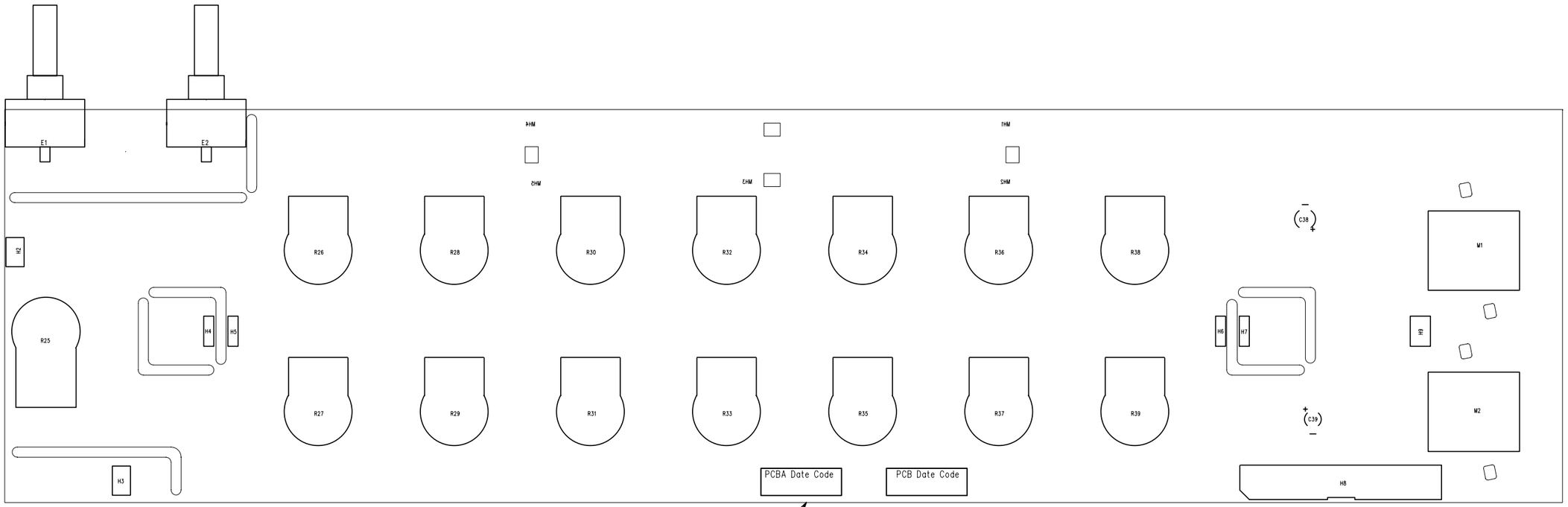
SCALE: 1:1 | REV: A | DATE: JUNE 19, 2002

TITLE: Sharctone Main Board



SILKSCREEN TOP

COMPANY: LINE 6 INC.		
PROGRAM: PADS POWER PCB V4.0		
FILE: \ScharcTone Product Family\Duet 212 Combo\Electrical\ \Duet Front Panel\Rev A\Duet Front Panel Rev A.pcb		
SCALE: NONE	REV: A	DATE: JUNE 19, 2002
TITLE: DUET FRONT PANEL	DRAWING NO: 35-00-0122	



Place PCBA Date Code Here

COMPANY: LINE 6 INC.		
PROGRAM: PADS POWER PCB V4.0		
FILE: /ScharcTone Product Family/Duet 212 Combo/Electrical/ /Duet Front Panel/Rev A/Duet Front Panel Rev A.pcb		
SCALE: NONE	REV: A	DATE: JUNE 19, 2002
TITLE: DUET FRONT PANEL	DRAWING NO: 35-00-0122	

DATE CODE REQUIREMENTS

1) Silkscreen date code for bare PCB fabrication in area marked on drawing.
2) Place date code stamp or sticker for finished PCBA in area marked on drawing.

ASSEMBLY DRAWING BOTTOM

COMPANY: LINE 6 INC.		
PROGRAM: PADS POWER PCB V4.0		
FILE: \ScharcTone Product Family\Duet 212 Combo\Electrical\ \Duet Front Panel\Rev A\Duet Front Panel Rev A.pcb		
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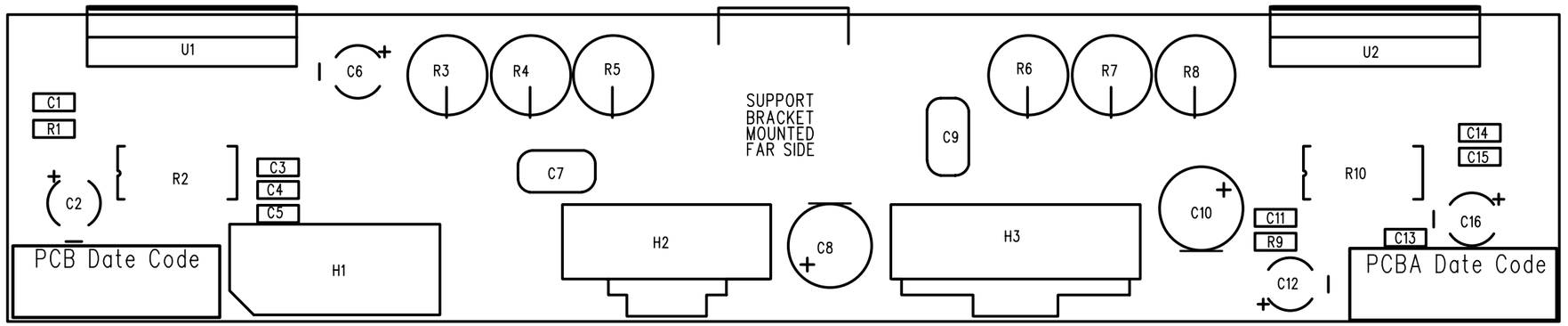
TITLE: DUET FRONT PANEL	DRAWING NO: 35-00-0122	

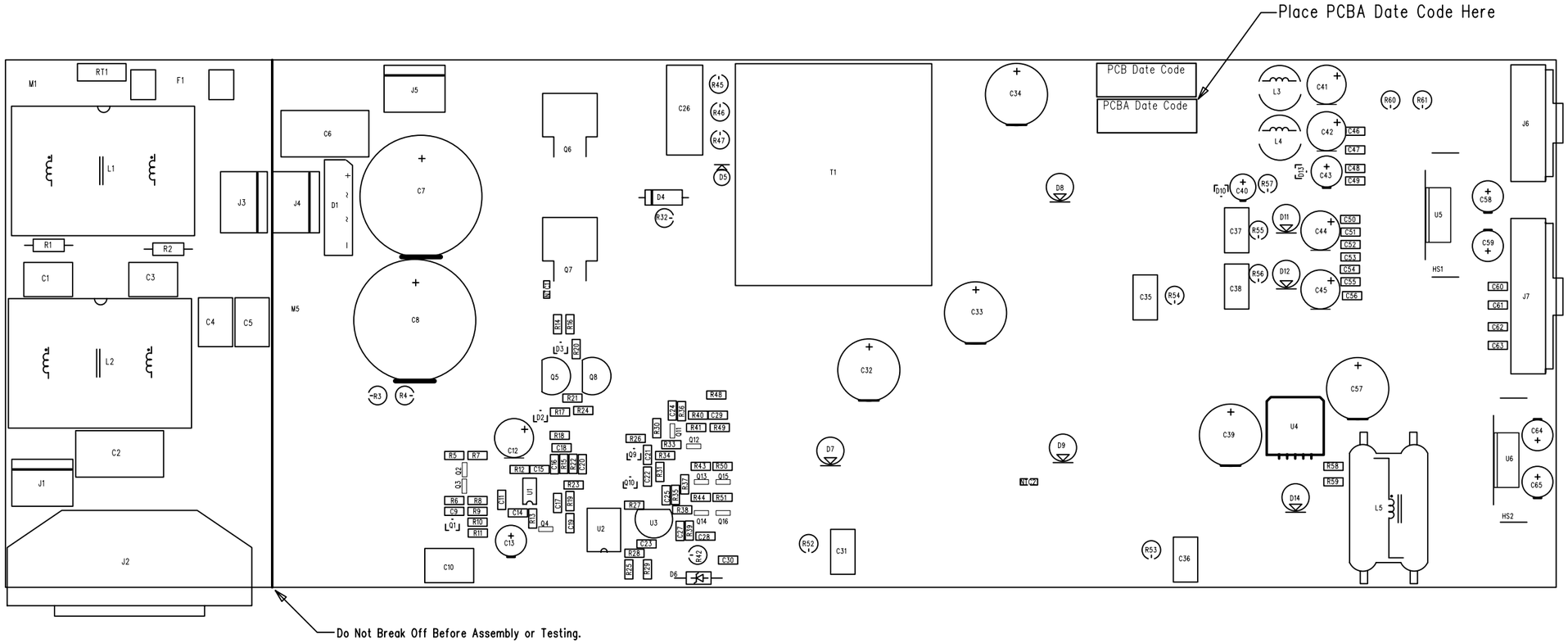


DATE CODE REQUIREMENTS

1) Silkscreen date code for bare PCB fabrication in area marked on drawing.
2) Place date code stamp or sticker for finished PCBA in area marked on drawing.

ASSEMBLY TOP

COMPANY: LINE 6		
PROGRAM: PADS POWER PCB 4.0		
FILE: \Duet 212 Combo\Electrical\PCB\Power Amp\Rev B\Duet Pwr Amp Rev B.pcb		
SCALE: 1:1	REV: B	DATE: AUGUST 19, 2002
TITLE: DUET Power Amp		35-00-0123

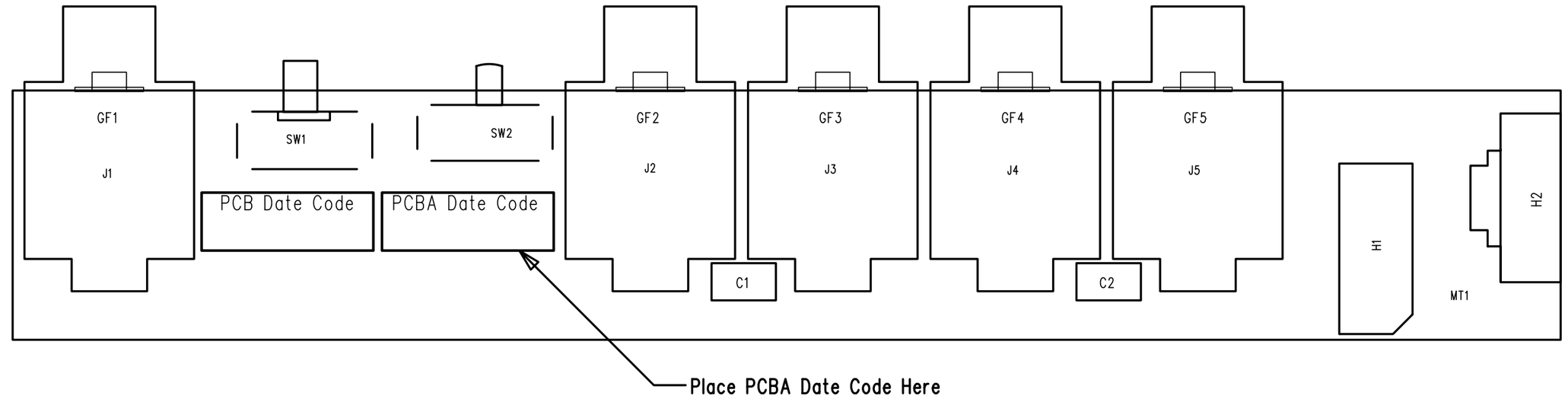


DATE CODE REQUIREMENTS

1) Silkscreen date code for bare PCB fabrication in area marked on drawing.
2) Place date code stamp or sticker for finished PCBA in area marked on drawing.

ASSEMBLY TOP

COMPANY: LINE 6 INC.		
PROGRAM: PADS POWER PCB V4.0		
FILE: Sharctone Product Family\Duet 212 Combo\Electrical\ \Pcb\Power Supply\Rev B\Duet Combo Pwr Supply Rev C.pcb		
SCALE: NONE	REV: C	DATE: AUGUST 19, 2002
TITLE: SHARCTONE DUET COMBO POWER SUPPLY		DRAWING NO: 35-00-0139



ASSEMBLY TOP

DATE CODE REQUIREMENTS

1) Silkscreen date code for bare PCB fabrication in area marked on drawing.
2) Place date code stamp or sticker for finished PCBA in area marked on drawing.

COMPANY: LINE 6

PROGRAM: PADS POWER PCB 4.0

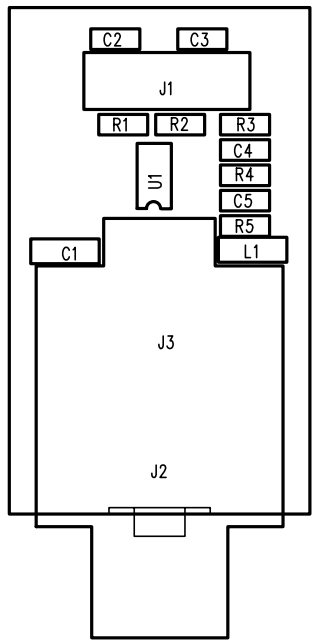
FILE: Duet 212 Combo\Electrical\PCB\Power Amp\REV A\DUET SPKR OUT REV A.pcb

SCALE: 1:1	REV: A	DATE: JUNE 10, 2002

TITLE: DUET Speaker Out

ASSEMBLY BOTTOM

COMPANY: LINE 6		
PROGRAM: PADS POWER PCB 4.0		
FILE: Duet 212 Combo/Electrical/PCB/Power Amp/REV A/DUET SPKR OUT REV A.pcb		
SCALE: 1:1	REV: A	DATE: JUNE 10, 2002
TITLE: DUET Speaker Out		



ASSEMBLY TOP

COMPANY: LINE 6		LINE 6 INC.
PROGRAM: PADS POWER PCB V4.0		
FILE: \SHARCTONE Product Family\DUET 212 Combo\Electrical\PCB\GUITAR IN\REV C\DUET GUITAR IN REV C.pcb		
SCALE: NONE	REV: C	DATE: AUGUST 27, 2002
TITLE: SHARCTONE GUITAR INPUT		DRAWING NO: 35-00-0169

LINE 6
Engineering

CONFIDENTIAL

Duoverb Theory of Operation R.P. September 25. 2002

The * sign next to a control signal name indicates that this control is active low

The Duoverb electronic circuitry is distributed across 7 PCBs:

- Duet Power Supply PCB (Almost exactly the same as AX3 Combo Power Supply)
- Sharctone Main PCB
- Duet Power Amplifier PCB
- Duet U.I.(User Interface) PCB
- Duet Guitar Input PCB
- Duet Speaker Output PCB
- Pedal Box PCB

Power Supply System (Re-printed from AX3 Notes, with modifications):

On the Power Supply PCB:

The main components of the power supply system are located on the power supply PCB. This is a switch mode power supply. Directly connected to the AC input is the line filter. The line filter is a break-away board of the Power Supply. The AC input is connected from the line filter to the power supply through headers J3 and J4. The line filter limits the noise that the power supply injects into the AC line. L1 and L2 are common mode inductors, which work with "Y-caps" C1, 3, 4, 5 to filter common mode noise. Common mode noise is on both the line and neutral. A Y-cap is connected from line or neutral to the chassis. The chassis should be connected to earth ground. There are two X-caps – C2 & C6, which are connected from line to neutral and they filter differential noise. **Service note:** Both X and Y caps go through special testing from the safety agencies and should only be replaced with approved parts.

The fuse F1 provides protection in case of a failure in the primary circuit. **Service note:** It is very unlikely that this fuse will blow without a catastrophic failure. Never replace the fuse and apply power before repairing any failed components.

The negative temperature coefficient (NTC) thermistor RT1 limits inrush current when the unit is cold.

D1, C6, and C7 comprise a full-wave, or voltage doubler rectifier circuit. If a jumper is installed across J5, the unit is in voltage doubler mode and the nominal AC input range will be 100 to 120VAC. If no jumper is present the range is 200 to 240VAC. When the jumper is set properly for the available AC, the DC voltage across C6, C7 is a roughly constant 350VDC. **Service note:** If no jumper is installed (240VAC mode), and the unit is operated at 120VAC, it will function but it will not be able to output full power. If the opposite condition is present (jumper in 240VAC) the unit will get damaged (350V across 200V caps). Obviously, great care should be taken to avoid this condition.

The power converter is a flyback topology (The correct term for the magnetic element in a flyback converter is a coupled inductor but it is commonly referred to as a flyback transformer.

An inductor can store energy while an ideal transformer transfers energy but does not store it. We won't buck tradition so we'll call it a flyback transformer).

The basic operation is to apply the input voltage across T1-A by turning on Q6, 7. Energy is stored in T2 and all of the secondary diodes are reverse biased. When Q6, 7 turn off, the stored energy is transferred to the outputs. As the voltage flies back, the secondary diodes are forward biased. Voltage clamp D5, C26, R45-47 limits the voltage across Q6, 7 by providing a path for primary current flow while the energy is being transferred from primary to secondary. The secondary voltages will track each other quite well as long as a nominal load is applied: **Service note:** This supply is not designed to be operated with no load. This condition may over stress the output caps. Using the AX3 Combo Power Supply test fixture (resistor load) will allow test bench operation. A buck regulator consisting of IC U4 Inductor L5 and Capacitor C57 regulates the voltage generated by winding T1_B. This generates an 8V regulated output. Also, the voltages generated by the T1_D winding are stepped down to ±18 V by the linear regulators U5 and U6.

The Voltage Feedback circuit monitors secondary voltages (+8Pre, +45Pre, -45Pre and PS_Valid). The PS_VALID signal is AC coupled into the feedback and does not play a part in determining the DC output voltages. Transistors Q9-11, Q13-16 comprise a circuit that does level shifting, voting and output voltage switching. The regulation scheme looks at +8Pre, +45Pre, and -45Pre and decides which is at, or below, their nominal regulation point and regulates this output. The other outputs are ignored and allowed to exceed their regulation points.

This circuit controls the duty cycle of the primary switching through the opto-isolator U2 and shunt regulator U3 on the secondary side. On the primary side, controller IC U1 (U1 is itself supplied by the T1_E secondary winding) drives the gates of the main MOSFETs through buffer transistors Q5, 8. This provides the voltage regulation feedback loop. A thermal protection circuits monitors the temperature of the primary components through the thermistor NTC1, and shut down the controller IC U1 if necessary.

The sequence of events at application of power is as follows: C6, 7 are charged and current flows through R3, 4. The PWM chip U1 is in a low power mode and the main MOSFETs are not being switched. When the voltage at +HK (house keeping) reaches about 17V, the PWM chip starts running and the main MOSFETs start switching. The current supplied by R3, 4 is not sufficient to allow continued operation so the voltage at +HK drops. If the secondary voltages ramp up properly, then winding T1-E will power +HK before it drops to the lower cut off point of about 10V. If there is a short on the output or one of several other failures, the PWM will shutoff at +HK=10V and +HK will start to charge again. This charge and discharge cycle will continue at a rate of several Hz. **Service note: Do not attempt to monitor primary voltages with an oscilloscope. The safest method is to use an isolation transformer. Removing the 'scope ground connection or "floating" the scope is potentially lethal for the technician or others that may come in contact with the 'scope.**

In addition the Z_SELECT signal controls the voltage feedback circuit and allows to selection of one of two sets for DC output values:

	On connector J6 to the Power Amp	On connector J7 to the Main PCB

	+ LO	- LO	–HI	+20V	-20V	PS_Valid	+8V
If Z_SELECT is set at +15V	+32	-32	-36	+18	-18	+20	+8
If Z_SELECT is set at 0V (or floating)	+45	-45	-50	+18	-18	+30	+8

This feature is used to adjust the voltage rail of the power amps (+LO and – LO) as a function of the speaker impedance that they currently drive. For 8 Ohm load the Z-select line will be left floating and the supply will provide ±45 Volts. For 4 Ohm load the Z-select line will be pulled to 15V and the supply will provide only ±32 Volts. This will result in the same maximum audio power on each load setup.
Note: The Power Amp rail outputs have minimum load resistors on them R60, 61, to ensure proper loading when the Power Amp IC's go into stand-by mode. This happens when the Power Amps are muted.

The PS_VALID signal validates the other supplies. A high level indicates that all the supplies are within a valid range. This line will also go low before any of the supply start to drop significantly.

Note that the ground references for the voltages on J6 (to power amp) and J2 (to main PCB) are not connected together on the supply. The same is true of the AGND and DGND signal on J2. They will be connector together only through the Main PCB and Power Amp PCB.

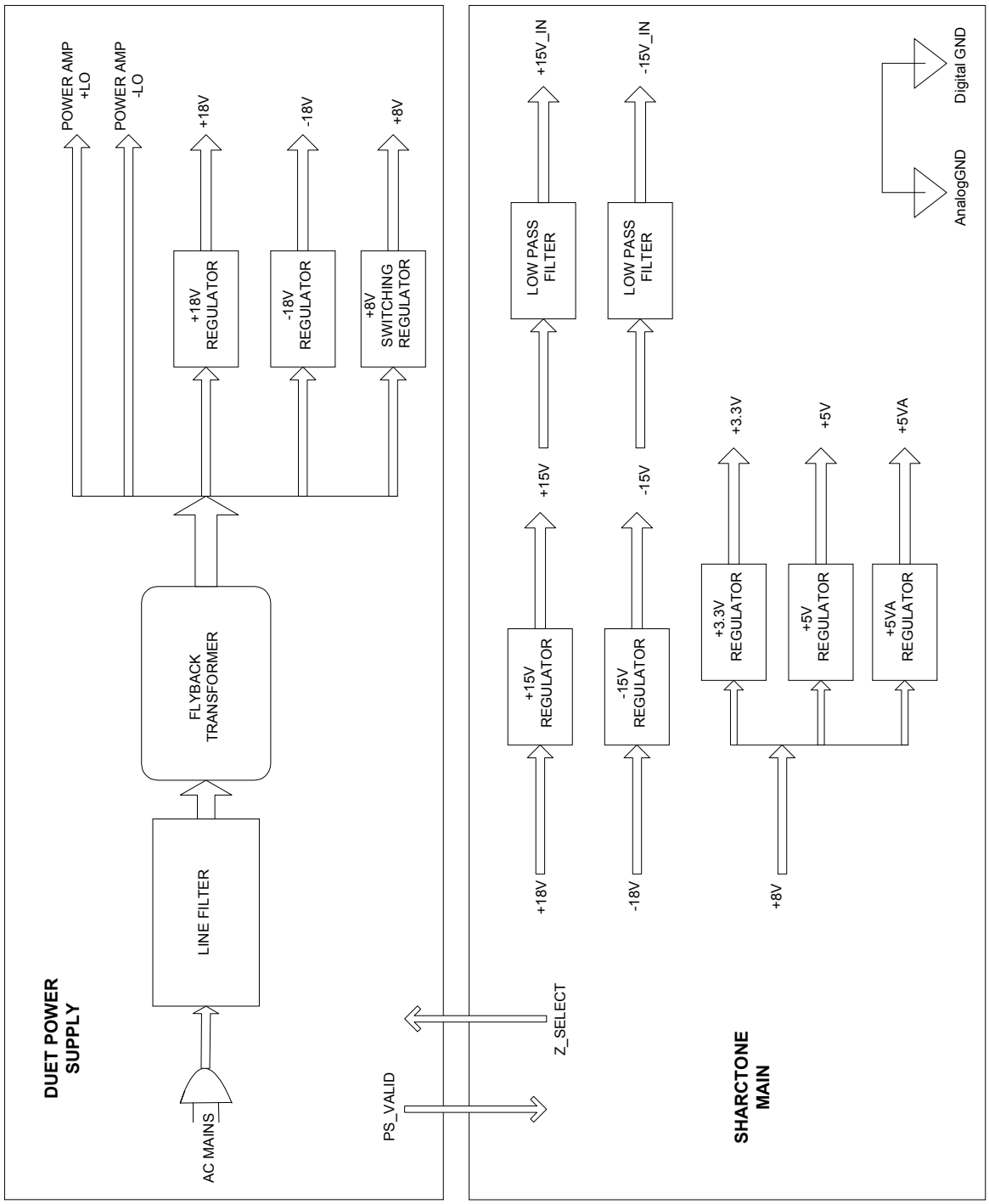
On the Main PCB:
The ±18V (labeled ±20V on the connector H6) are further stepped down and regulated ±15V by the linear regulators U29 and U31. These ±15V supplies directly drive a number of Op amps on the main board and on the power amp PCB. The ±15V are both further filtered by an RC network (R27, C38 and R39, C44) to create the ±15V_IN supplies, which are used by the op amps of the guitar input circuitry. This extra filtering removed any possibility of supply induced audio feedback between the audio output and input stages..

The +8V is stepped down and regulated to +5VA (A= Analog) by U8, +5V by U27 and +3.3V by U26.
The +5VA is used only for the Audio converters U5 and U6.
The +5V supplies the logic on the Main PCB and the U.I. PCBs including the microprocessor U16.
The 3.3V supplies the logic on the main PCB including the Sharc DSP U14.

The +8V also directly supplies the FBV and FBV Shortboard (Foot Controller Options) where it will be regulated down to 5V.

On the U.I. PCB:
After arriving on the U.I. PCB, the +5V and its ground (GND) are separated into two local signal pairs +5V/ GND and +5V_P/AGND_P. The separation between these pairs is only achieved through the U.I. PCB layout. The +5V_P/AGND_P drives the 14 potentiometers, the front panel ADC U3, and the mutliplexor U5. The +5V/ GND drives all other circuits on the front panel PCB. This setup improves the potentiometer jitter immunity.

DUET POWER SUPPLY SYSTEM FLOWCHART



Audio System:

Guitar Input PCB:

The guitar input is first buffered and amplified on the Guitar Input PCB before it reaches the Main PCB at connector H1 (15Vpp @ 5Vpp at the guitar jack). The signal is buffered and amplified by U1. U1 also adds high frequency pre-emphasis gain starting with the lower corner frequency around 830Hz.

On the Main PCB:

The input from the guitar input board on H1 is spliced into two branches:

- On the upper branch, R20 and R22 divide the signal for a +/-2.5 VPP range (@ 5Vpp, 100Hz at guitar input). C4 allows this signal to be DC biased at +2.5V by the ADC input. Q1 and Q2 clip the signal to a maximum range of 0-5V. The signal drives the left channel of the ADC section of CODEC U6.

- In the lower branch, U4-B adds a gain of 5.32 to the signal. C8 allows this signal to be DC biased at +2.5V by the ADC input. The double diode D1 limit the maximum signal swing to a -0.6V /+5.6V range before entering the right channel ADC section of CODEC U6. Note that the signal on this branch will clip for guitar input level above 0.310 Vpp.

The net result is two signals with a gain difference of 16, each feeding one of the two ADC inputs. Once these signals are converted and moved into the DSP, the DSP code will monitor the amplitude of the signals and use the one of the two versions most appropriate for the current input level. The DSP will also apply a de-emphasis filter complementary to the filter function implemented by U1 on the Guitar Input PCB. This scheme allows for significantly improving the signal noise and low-level distortion performance of the ADC.

There is also a Guitar_In_Sense line from H1 that senses if a plug is in the guitar input. If no plug is sensed then the power amps are muted and the zeros are sent out the DACs.

Effect loop (Stereo Send and Return):

The digital signal from the DSP feeds the DAC section of CODEC U6. The left and right differential outputs of the DAC are amplified by a gain of 8.9 (from the differential DAC output to U2 output) and Low Pass filtered (FC = 20KHz) by U2_A and B. This output is fed to either an FX Loop or bypassed around the FX Loop. There is an FX_Loop_Ret_Sense line that senses if a plug is in either FX Return jack. Once a plug is sensed the FX Loop becomes active, otherwise it is bypassed using the analog switches U9 and U13. The DSP send the appropriate control signal to control the analog switches. The control legend is located on the bottom left corner of page 1 on the Sharctone Main schematic.

FX Send:

The outputs of U2_A and B feed the FX Loop Sends (Left and Right). The resistors R78, 79 and R81, R82 divide the signal down from 23Vpp to roughly 5Vpp at the jacks J5 and J6. The Left FX Send Jack (J6) acts as a summed mono send when only that jack is plugged into. Once both are plugged into each jack carries its respective channel separately.

FX Return:

The Return for the FX Loop is into jacks J3 and J4. The Left FX Return Jack (J4) acts as a summed mono return and feeds the same signal to both channels only when that jack is plugged into. When both jacks are plugged into each carries its respective channel separately.

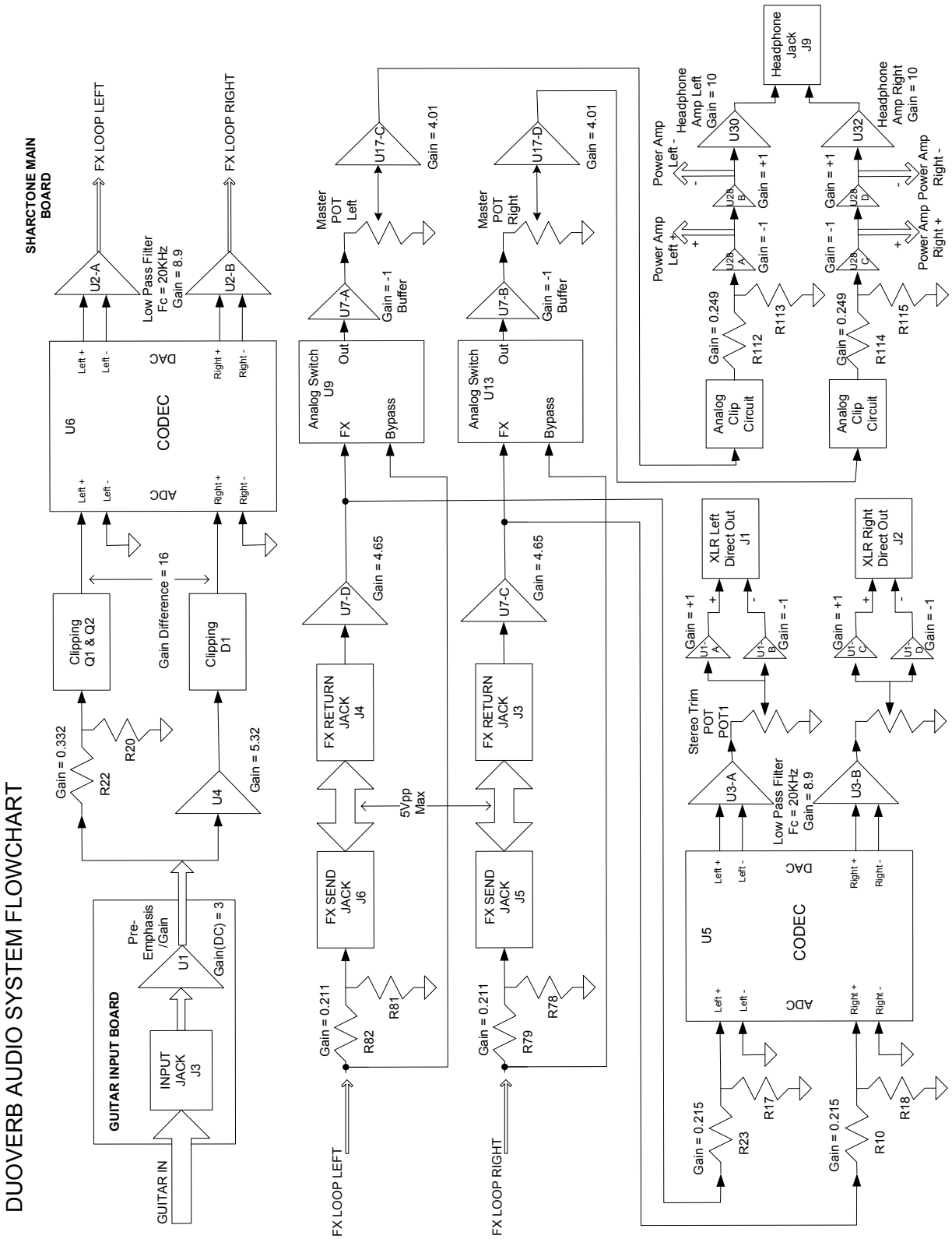
The return takes a max signal of 5Vpp and U7_C and D amplify this signal by a gain 4.65 to give us a possible 23Vpp at their outputs. This allows the bypassed and active FX Loop to have the same system gain.

Direct Outputs:
There are two paths for the direct output feeds. One is when the FX Loop is bypassed and the direct output audio DAC section of CODEC U5 is fed with the same input signal as the input to CODEC U6, and so the CODEC U5 inputs are inactive. The other is when the FX Loop is active and the direct output audio inputs to CODEC U5 are active and fed from the outputs of U7_C and D. Then resistors R10, R18 and R17, R23 divide the signal down from 23Vpp to 5Vpp for the ADCs of the CODEC U5. This signal is then fed to the DSP by CODEC U5. The digital signal from the DSP feeds the DAC section of CODEC U5. The left and right differential outputs of the DAC are amplified by a gain of 8.9 (from the differential DAC output to U3 output) and Low Pass filtered (FC = 20KHz) by U3_A and B. This output is fed to a differential buffer, U1, which drives the XLR balanced outputs.

Power Amp and Headphone Outputs:
The analog switches that control the FX Loop switching feed the unity gain buffer comprised of U7_A and B. These feed the master volume pot on the U.I. PCB. This in turn is routed back to the Main PCB and feeds the analog clip circuitry. This clip circuitry is comprised of a pre-gain stage U17_C and D, a diode clip section, and post attenuation stage R112, R113 and R114, R115. This clip level is set up such that it only comes in effect when the signal is near the power rails of the Power Amp and Headphone op-amp. It also purposely introduces a small amount of cross-over distortion when it is driven on. The output of this clip circuitry is fed to a differential buffer made of U28, which drives the balanced inputs to the Power Amp through connector H5. This also directly feeds the headphone amps comprised of U30 and U32. These are fed out through jack J9. There is a Headphone_Sense line from jack J9 that mutes the Power Amp output when a plug is sensed in the jack.

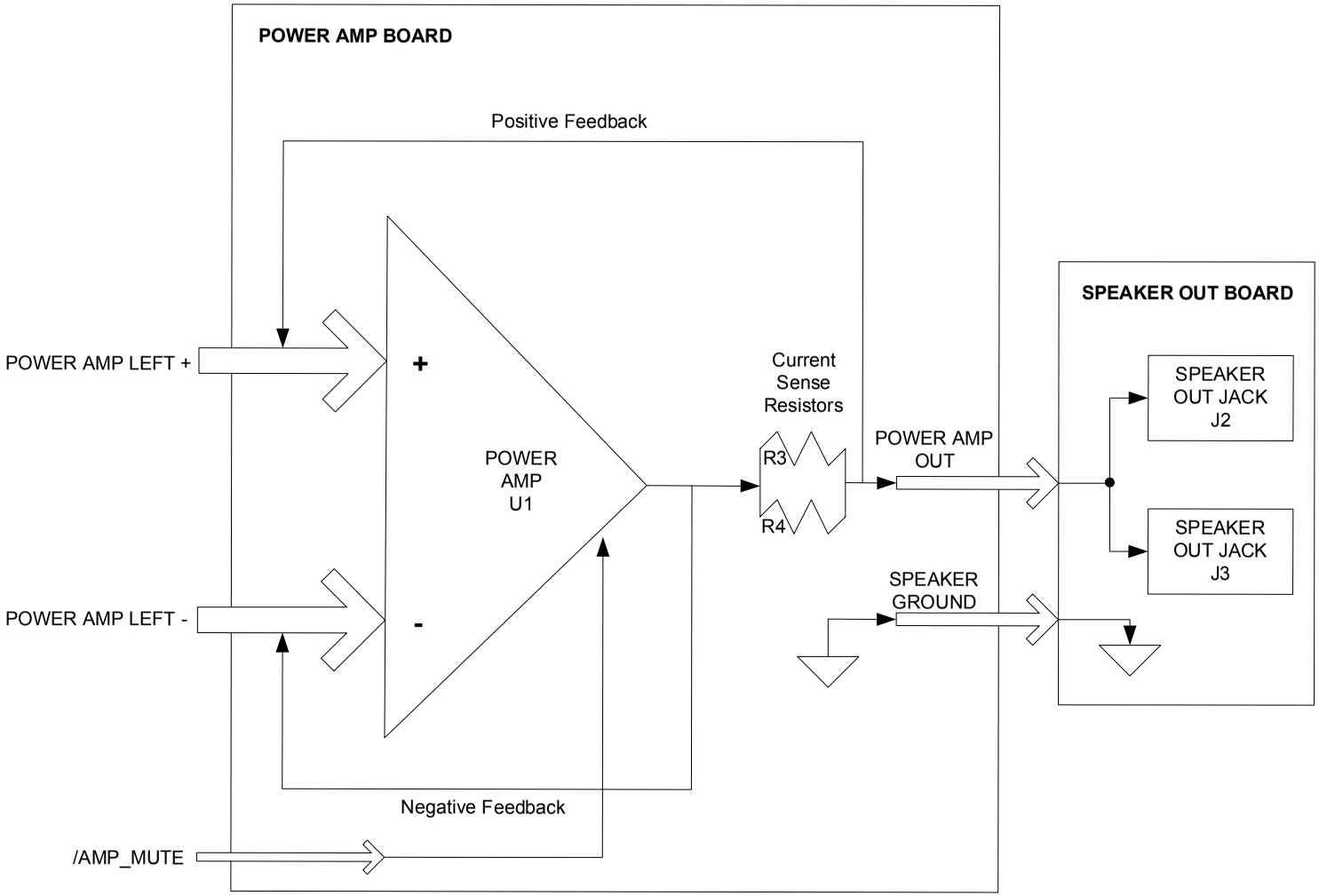
On the Power Amp PCB:
The differential inputs from the Sharctone Main PCB feed the Duet Power Amp PCB through header H1. These signals are sent to the Power Amp ICs U1 and U2. The Power Amp audio outputs are routed to the Duet Speaker PCB through header H3. These Power Amp ICs are configured in a combination voltage and current sense mode. The resistors R3, R4 and R7, R8 provide the voltage and current sensing which is fed back to the inputs of the power amps. The voltage rails for the amps change with the impedance selection corresponding to what was covered in the Duet Power Supply section. Notice also that the power amp can be muted by the POWERAMP_MUTE* signal (0V = muted, above 4V = un-muted). There is a clip on the Power Amp assembly that locks into the middle channel on the heat-sink and provides mechanical stability. The mounting clamps for the Power Amp ICs are to be properly aligned according to the assembly instructions.

On the Speaker Output PCB:
The outputs from the Duet Power Amp PCB are routed onto the Duet Speaker Out PCB through header H2. The speaker output jacks J2, J3, J4, and J5 feed the external and internal speakers of the head and combo configuration of the Duoverb. The header H1 on this board passes the rest of the control and sensing signals on the Duet Speaker Out PCB.


DUOVERB AUDIO SYSTEM FLOWCHART
GUITAR IN
GUITAR INPUT BOARD
INPUT JACK J3
U1
Pre-Emphasis /Gain
Gain(DC) = 3
Gain = 0.332
R22
R20
Clipping Q1 & Q2
Clipping D1
Gain Difference = 16
U4
Gain = 5.32
SHARCTONE MAIN BOARD
U6
CODEC
ADC
DAC
Left +
Left -
Right +
Right -
U2-A
U2-B
Low Pass Filter Fc = 20KHz Gain = 8.9
FX LOOP LEFT
FX LOOP RIGHT
FX SEND JACK J6
FX SEND JACK J5
FX RETURN JACK J4
FX RETURN JACK J3
5Vpp Max
Gain = 0.211
R82
R81
R79
R78
U7-D
U7-C
Gain = 4.65
Analog Switch U9
Analog Switch U13
FX
Bypass
Out
U7-A
U7-B
Gain = -1 Buffer
Master POT Left
Master POT Right
U17-C
U17-D
Gain = 4.01
U5
U3-A
U3-B
Low Pass Filter Fc = 20KHz Gain = 8.9
Stereo Trim POT POT1
U1-A
U1-B
U1-C
U1-D
Gain = +1
Gain = -1
XLR Left Direct Out J1
XLR Right Direct Out J2
Gain = 0.215
R23
R17
R10
R18
Power Amp Left +
Power Amp Left -
Power Amp Right +
Power Amp Right -
U28 A
U28 B
U28 C
U28 D
Gain = -1
Gain = +1
Gain = 0.249
R112
R113
R114
R115
Analog Clip Circuit
U30
U32
Headphone Amp Left Gain = 10
Headphone Amp Right Gain = 10
Headphone Jack J9

DUOVERB POWER AMP AUDIO SYSTEM FLOWCHART

(Only Left Channel is Shown / Right Channel is Identical)



I/O system:

The following Input and Output (I/O) signals control Duoverb operations

GUITAR_IN_SENSE

This input signal is generated on the Duet Guitar Input PCB and read on the Sharctone Main PCB by an I/O pin on the DSP, U14. It is high when a jack is plugged in the guitar input and low otherwise. When this signal is read low (= no jack plugged in), the DSP mutes the audio signal path in order to keep the noise on the audio outputs at a minimum

Z-SELECT (Impedance Select Switch on back of Amp)

The user-controlled switch on the back of the amplifier toggles the status of the Z_SELECT signal. This signal is only sensed by the Duet Power supply to change the voltage rails for the power amps.

4 Ohm (+15V) - Power Amp Rails at roughly 30V
8 Ohm (open) - Power Amp Rails at roughly 45V

FX_RET_SENSE

This input signal, generated by effect return ¼" jacks J3 or J4, is read by an I/O pin of the DSP, U14. It is high when a plug is inserted in either of the FX LOOP RETURN jacks and low otherwise. When no jack is sensed on this input (= low), the DSP bypasses the FX Loop. When a plug is inserted (=high) the FX Loop becomes active.

POWERAMP_MUTE *

An I/O pin of the DSP, U14, generates this output signal. When low it mutes the power amps. It is kept low from the start up of the firmware until all DSP code is running. This last item takes about 2 seconds from the time the AC power is turned ON. The POWERAMP_MUTE* signal is OR'ed with the PS_VALID signal using the transistor circuits utilizing Q3 and Q4. This arrangement helps muting the power amp as soon as the power supply starts to fall, and therefore limits the amount of audio thump when the power is turned OFF.

MONO/STEREO*

This input signal is generated on the Duet Speaker Output PCB by right speaker jacks J4 & J5, and is read by an I/O pin of the DSP, U14. The signal is high (Mono mode) until a plug is inserted in either right speaker jacks J4 and J5. Once a plug is inserted the signal is pulled low (Stereo mode).

HEADPHONE_SENSE

This input signal is generated by the Headphone jack J9, and is read by an I/O pin on the DSP, U14. It is high when a plug is connected to the headphone output jack and low otherwise. When a plug is connected into the Headphone Output (presumably a headphone), the DSP signal going to the power amp mute is muted.

CAB_SELECTS

The user, controlled switch on the back of the amplifier (Cab Select), can toggle the status of the CAB_SELECT_1 and CAB_SELECT_2 signals. These are read by the DSP, U14. This changes the speaker modeling on the audio outputs.

I/II SWITCH
The pedal jack, J1, on the back of the amplifier allows use of the channel select pedal. This jack feeds the sense lines FOOTSWITCH_VOLTAGE and FOOTSWITCH_LED_PULSE on the Duet Speaker Out PCB. The FOOTSWITCH_VOLTAGE line is routed to the U.I PCB where it is read by an A/D converter and fed to the micro, U16.
The FOOTSWITCH_LED_PULSE is read directly by the micro, U16.

DIRECT OUTPUTS TRIM POT
This user-controlled trim POT, POT1, is located on the back of the amplifier. It is used to adjust the level of the audio signal out the Direct Out XLRs, J1 and J2. It is directly in the signal path to these jacks and acts as an attenuator.

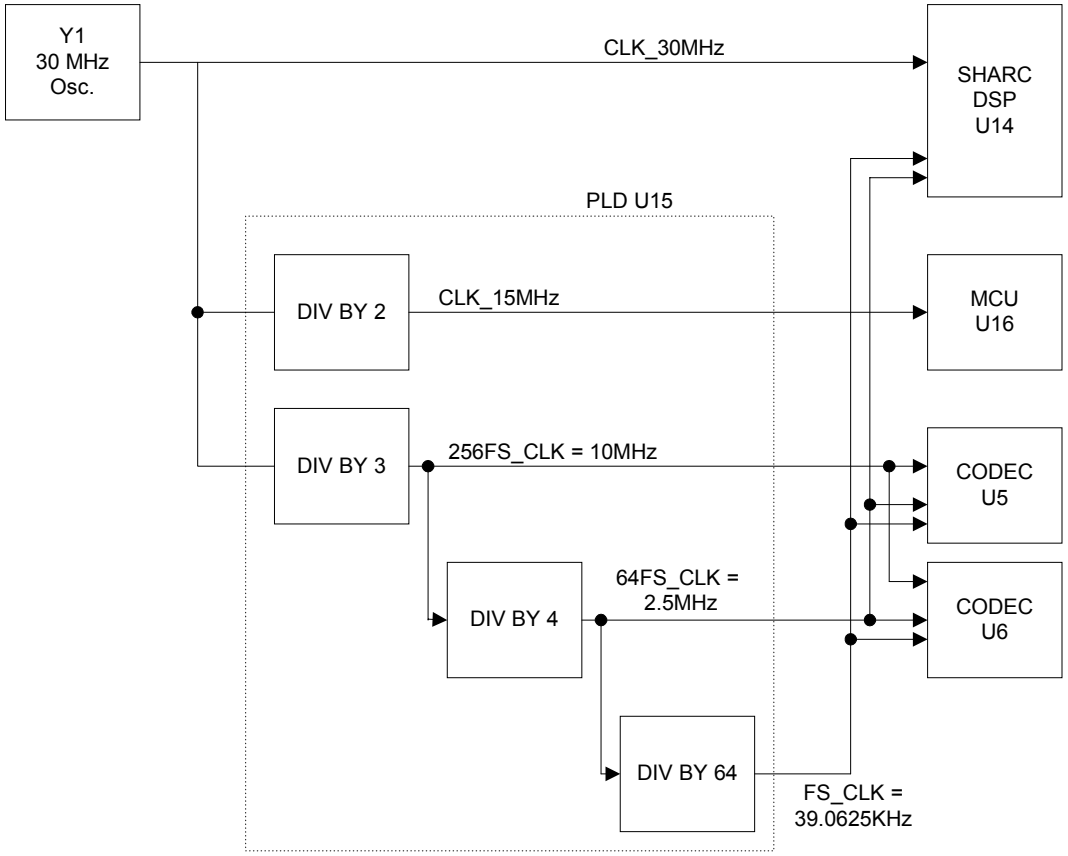
U.I. POTENTIOMETERS:
The 14 U.I. potentiometers (7 on the top, over 7 on the bottom) provide a voltage from 0 to 5V. These voltages are digitized by the U.I. ADC U3. The resulting serial stream is read by the Main PCB microprocessor U16.
The other stereo POT, R25, is the analog Master Volume control.

U.I. LEDs:
All of the U.I. LEDs (except the jewel light LED) are driven by the shift registers U1 and U4. The rows of the matrix are directly driven by U1, and the columns of the matrix are driven by U4, and the associated buffer transistors Q1-4. The multiplexing cycle is about 10ms long.

U.I. SWITCHES AND ENCODERS:
All of the U.I. switches and encoders are read directly by the micro, U16.

Clock system:

All of the DuoVerb logic is driven from clocks derived from a single 30MHz oscillator. All of the sub-clocks are generated by dividers in the PLD IC (U15).



Bus system:

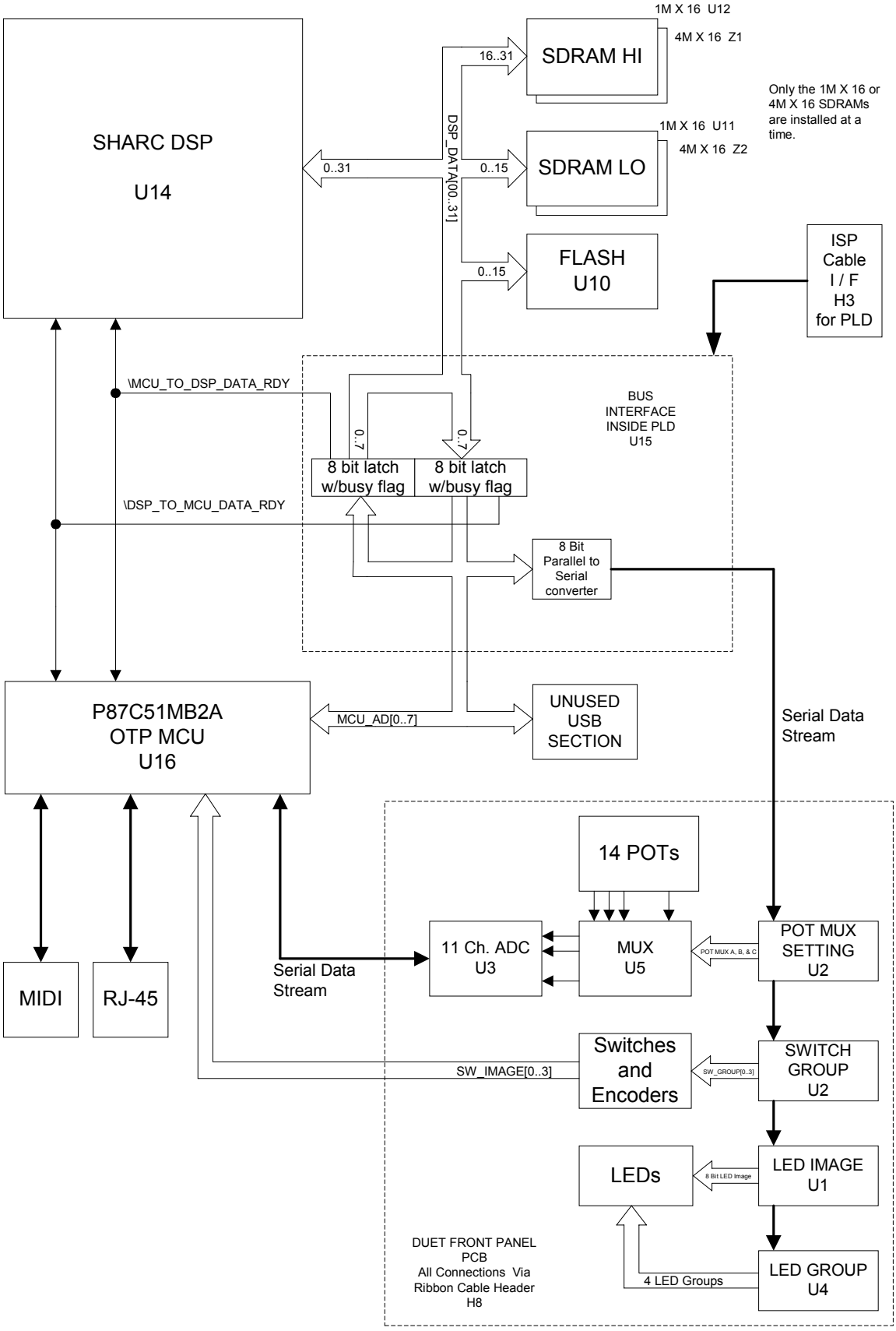
The Microcontroller (MCU U16) is the host controller for the DuoVerb. The MCU is a One Time Programmable microcontroller (OTP). It contains the CODE ROM for the DuoVerb system as well as some internal SRAM. VERY IMPORTANT - This chip must be programmed like an EPROM before it can be used in the DuoVerb system. Its data bus (MCU_AD[0..7]) is bridged to both the DSP subsystem via a bidirectional latch and the front panel serial bus inside the PLD U15. All address decoding for the MCU is performed inside the PLD. (Note: The below diagram does not show the address bus and control lines).

If the MCU wishes to send a byte to the DSP, it writes a byte to the MCU-to-DSP latch inside the PLD U15. Writing this byte causes a busy flag to become asserted (MCU_TO_DSP_DATA_RDY*). When this flag is asserted, the DSP receives an interrupt which tells the DSP to read the byte from the MCU-to-DSP latch. The MCU_TO_DSP_DATA_RDY* flag is deasserted when the DSP reads the MCU-to-DSP latch. The MCU polls the MCU_TO_DSP_DATA_RDY* line and cannot write another byte until this line is deasserted. This same process works for the DSP_TO_MCU_DATA_RDY* for sending bytes from the DSP to the MCU.

The DSP local bus (DSP_DATA[00..31] is a 32 bit bus that interfaces 32 bit wide SDRAM in 2 1MX16 chips U11 and U12 (Note that you can substitute 4MX16 chips in the overlapping IC locations Z1 and Z2 but this is not currently used) and the FLASH memory U10 to the DSP. This bus is also bridged to the MCU bus via the bidirectional latch inside the PLD U15 described in the paragraph above.

The DuoVerb Front Panel's peripherals are all controlled/interfaced to the MCU over a single ribbon cable. The MCU_AD[0..7] data bus is converted to serial (inside the PLD U15) and sent up to the front panel board where it is reconverted back to parallel to control various items including: a) potentiometer muxing to the ADC, b) switch group selection, c) LED mux and driving. The pot ADC U3 is connected directly the MCU on the main board via its own serial bitstream. The switch image is also directly connected to the MCU (I/O port ins) via its own bus SW_IMAGE[0..3].

The drawing below details the DuoVerb's system bus architecture:


SHARC DSP
U14
SDRAM HI
1M X 16 U12
4M X 16 Z1
SDRAM LO
1M X 16 U11
4M X 16 Z2
Only the 1M X 16 or 4M X 16 SDRAMs are installed at a time.
FLASH
U10
ISP Cable I / F H3 for PLD
16..31
0..31
0..15
DSP_DATA[00..31]
\MCU_TO_DSP_DATA_RDY
\DSP_TO_MCU_DATA_RDY
BUS INTERFACE INSIDE PLD U15
8 bit latch w/busy flag
8 bit latch w/busy flag
8 Bit Parallel to Serial converter
P87C51MB2A OTP MCU U16
MCU_AD[0..7]
UNUSED USB SECTION
Serial Data Stream
14 POTs
11 Ch. ADC U3
MUX U5
POT MUX SETTING U2
POT MUX A, B, & C
MIDI
RJ-45
Serial Data Stream
Switches and Encoders
SW_IMAGE[0..3]
SWITCH GROUP U2
SW_GROUP[0..3]
LEDs
LED IMAGE U1
8 Bit LED Image
LED GROUP U4
4 LED Groups
DUET FRONT PANEL PCB
All Connections Via Ribbon Cable Header H8

Power On Reset:

1. On power up, the reset IC U18 generates an active HIGH reset. This causes the entire system to become reset (both main and front panel PCBs).
2. When the system reset is deasserted, the MCU subsystem boots up executing its runtime code from within its internal OTP ROM.
3. The MCU holds the DSP in reset by default of its own reset. Upon executing its code, the MCU will deassert the RESET_DSP* line going to the DSP.
4. The MCU will then dump the DSP's BOOT CODE to the DSP.
5. Once all of the DSP BOOT CODE is sent to the DSP, the DSP will execute this boot code.
6. The boot code running on the DSP will immediately load the DSP RUNTIME CODE from the FLASH memory (U10) into the DSP.
7. After all of the runtime code is loaded into the DSP, the DSP will then begin executing the runtime code.
8. The system is now up and running!

Troubleshooting:

1. The FLASH memory on the Duoverb is updated every seven seconds with any setting changes (eg. MIDI channel, LCD contrast, knob change, etc…). This means that if the Duoverb is powered down in less then seven seconds after a setting is changed then the item will not be stored correctly in the FLASH memory. When the Duoverb is powered back on its previous setting will be restored.
2. The board powers up, the LEDs are displaying the correctly, the buttons and knobs work, but there is NO AUDIO. First, check the audio input circuitry and make sure audio makes it through the input op-amp all the way to the codec (U6) inputs. Second, make sure that the codec has the appropriate clocks driving it (See section CLOCK SYSTEM above). Third, check the audio path from the output of the codec to the direct outs, FX loop, power amp, and headphone circuitry. Fourth, check that the signal GUITAR_IN_SENSE is HIGH (HIGH means that a jack is plugged into the Duoverb's guitar input.). If this signal is not HIGH then the guitar in jack or the support circuitry for the sense line is faulty. If the system thinks that a plug is not plugged into the guitar jack it will automatically mute the audio. Fifth, the audio is correct all the way to the codec and the clocks are correct then it is possible that the DSP or an item on its bus is malfunctioning. At this point check for faulty soldering on the DSP or other items on its bus.
3. The buttons and encoders work but the POTs do not. First power down and then power up in test mode (Press the channel D button on power up). If the pots fail in test mode check the ADC U3.
4. The board seems to be working properly but the LEDs do not work. First power down and then power up in test mode (Press the channel D button on power up). If the LEDs fail in test mode check the LED-driving matrix on the front panel.

5. The board seems to be working but the buttons and encoders do not work. First power down and then power up in test mode (Press the channel D button on power up). If the buttons and encoders do not work in test mode check for bad soldering on PLD U15, MCU U16, and any of the switch matrix diodes (see schematic).
6. If the Direst Outputs become scratchy or have a raised noise-floor, check the Direct Trim POT (POT1). This part can become bad and affect the audio. Just remove and replace.
7. If the FX Loop does not appear to be working correctly, make sure that the control lines for the analog switches (U9 & U13) are getting the correct signals form the DSP. The chart on the bottom on page 1 of the schematic explains the states of the control lines.
8. The audio out the speaker outputs looks to be dropping out for cycles on the scope and have some sections cut out on the leading phase of the waveform. This is a sign that the power amp IC's (U1 & U2) are near thermal limit and internally are shutting down. Make sure they are properly clamped down with sufficient pressure.
9. In the event of a failure of one power amp IC it is most likely that the other is also damaged and need to be replaced.

Engineering

DUET Self Test Instructions

11-07-02 Rev A

The following SELF TEST has been extracted from the DUET FINAL TEST RACK INSTRUCTIONS for the NI Tester.

PART I: SETUP

CABLE SETUP: (1-MIDI CABLE, 1-MODIFIED RJ-45 CABLE see attached sheet)

1). Connect the **MIDI IN** to the **MIDI OUT** jack on the DUET.
2). Connect the modified RJ-45 loop back cable **PEDAL** to **PEDAL** jack on the DUET.

PART II: DUET SELF TESTS

FRONT PANEL TEST

1. While holding down the **D** button, flip the **POWER** switch on to the DUET. The jewel light on the power switch should light.
2. All the LED's should light on the Duet Front Panel, then they will go out and only the top left LED **A** should be on.
3. Press the top left button **A** next to begin the LED Test. All LED's should light at the same time and then light one individually.
4. When the LED test is finished press button **B** LED **B** should light. Press the button **B** a second time to begin the Button, Switch, Encoders & Pots test.
5. Press the 4 buttons, the 4 LED's should light.
6. Flip the 2 switches **AMP 1 / AMP 2** & **SPLIT / BLEND** up and down, the 2 LED's by the switches should turn on and off.
7. Turn the 2 encoders on the left side of the board, the circle of LED's should light.
8. Turn the 14 pots, the top 4 LED's should light.

SRAM / MIDI / FLOORBOARD TEST

1. While holding down the **A** button, flip the **POWER** switch on to the DUET.
2. LED **A** should light if SRAM passes.
3. LED **B** should light if MIDI passes.
4. LED **C** should light if the floorboard test passes.
5. LED **D** will **NOT** light.

A/B SWITCH

1. Plug in the A/B floor switch.
2. Press each button on the floorboard, the LED's should light correspondingly on the DUET amp.

Engineering

RJ-45 TEST CABLE WIRING DIAGRAM

11-08-02

A standard RJ-45 cable can be used to make a RJ-45 Test Cable used in self test modes on many LINE 6 products. 4 wires must be connected:

- WIRE/PIN1(TXN) to WIRE/PIN2 (RXN)
- WIRE/PIN6 (RXP) to WIRE/PIN8 (TXP)

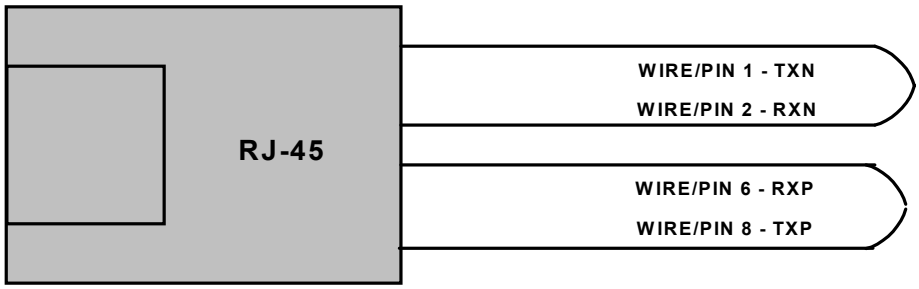


Figure 1

The pin out on the bottom of an RJ-45 PCB mount connector is label as indicated in Figure 2:

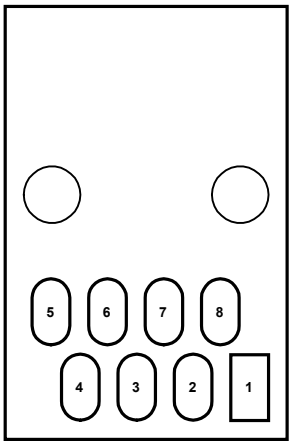


Figure 2 – Bottom view pinout on RJ-45 PCB connector

Mechanical Assembly instructions: DuoVerb 212 and HD

Rev B 8/30/02

Forward and Notes

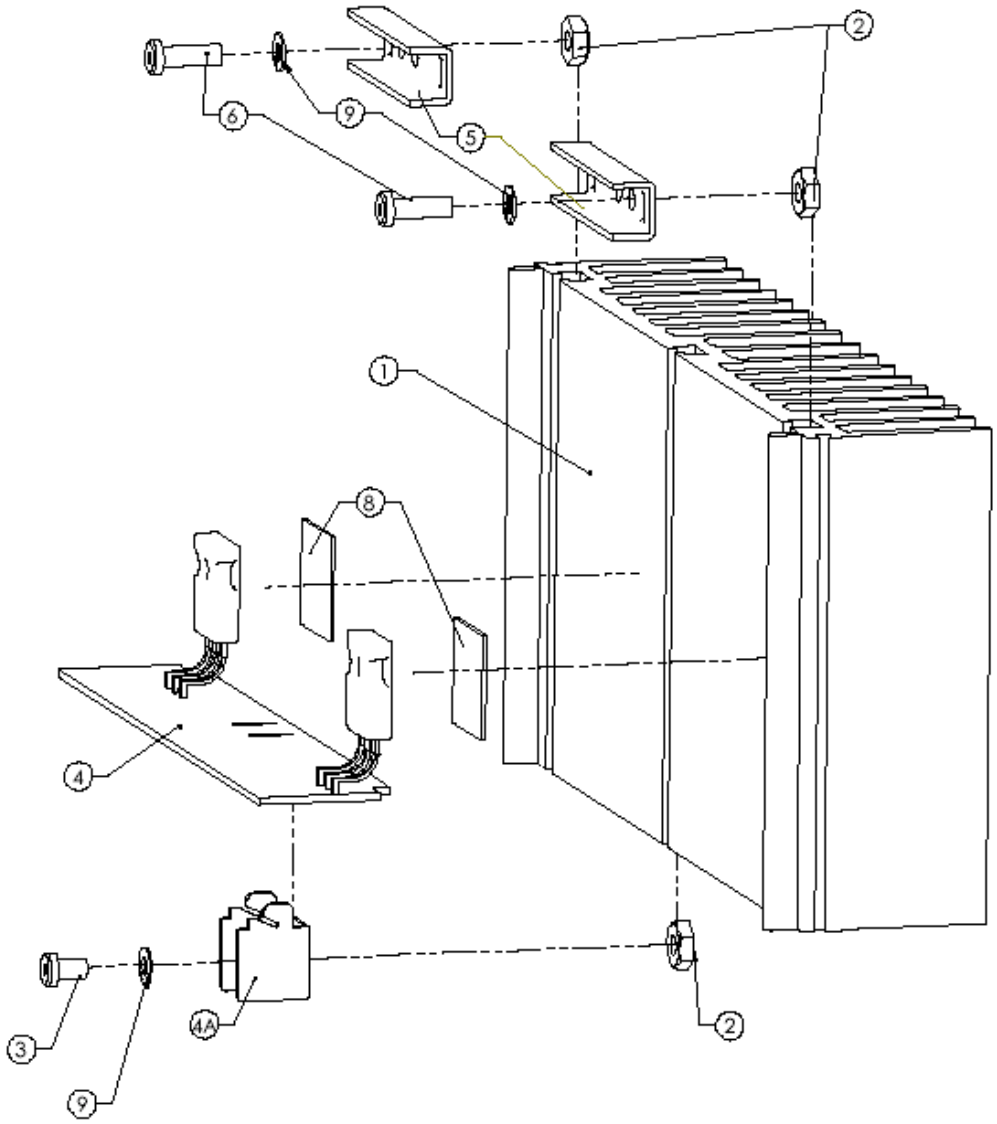
The information in this booklet applies the DuoVerb 212 and HD.

This booklet deals with assembling the major sub-assemblies, the final product, and quality/inspection considerations. See also the Related Electrical assembly documentation, for major considerations in assembling the electrical components of the PCBs (through the soldering process and preparation of the board for addition of custom components).

A note on the text: the illustrations in this book are for reference only. In some cases, color and geometry of illustrations may not accurately reflect the color or exact geometry of actual parts.

- Unless otherwise noted, all dimensions are in inches.
- Part identifying notes are in this format: Description (Part Number)
- Drawings are not to scale.
- Torque value tolerance +/- .5 in.-lbs. Do not over tighten any components.
- For clarity, not all component details are shown. This is especially true with respect to cable assemblies. They are often omitted from views to provide a clearer picture of the material discussed. Do not be confused by the absence (or unexpected presence) of any component in the illustrations in this book.

Power Amp Assembly



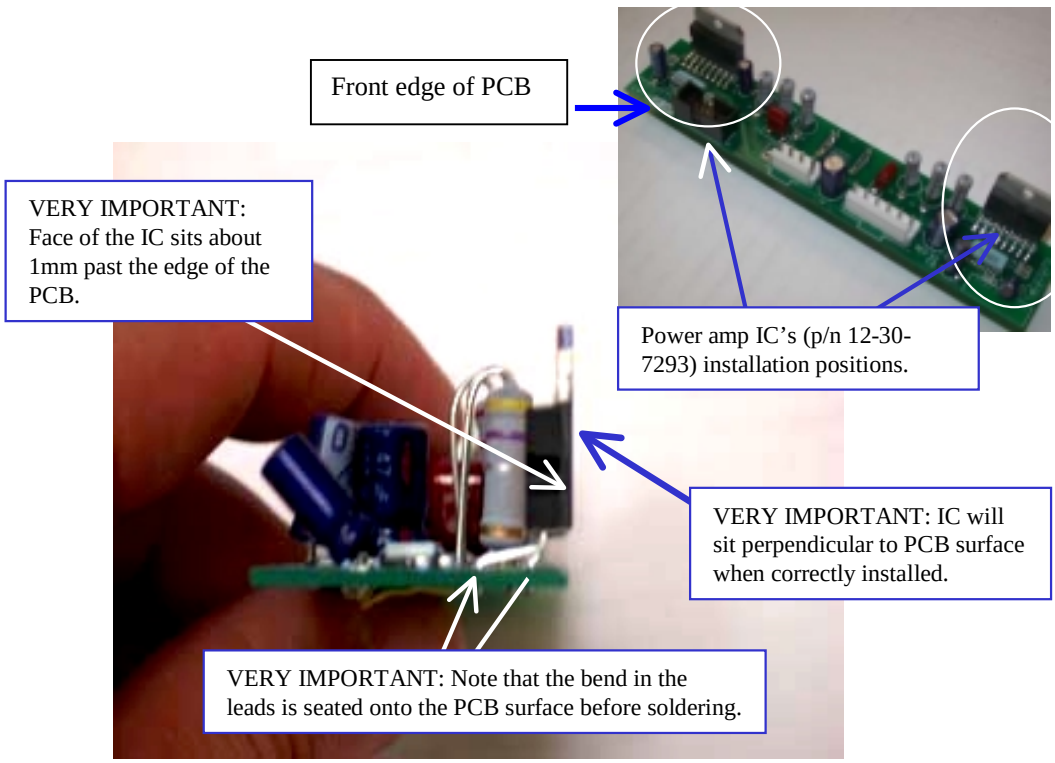
ITEM	QTY	LINE6 PART NO	DESCRIPTION
1	1	30-51-0059-3	HEAT SINK, BLACK ANODIZED
2	3	30-06-0007	NUT, HEX
3	1	30-00-0028	SCR CAP SOCKET HD #8 X .3125
4	1	50-00-0123	PCBA - POWER AMP
4A	1	30-51-0105	SUPPORT BRACKET
5	2	30-51-0073	CLAMP, HEATSINK
6	2	30-00-0010	SCR CAP SOCKET HD #8 X .562
8	2	30-63-0006	THERMAL PAD .85 X .85
9	3	30-03-0002	WASHER LOCK #8

a) Check the installation of headers and capacitors

1. Check orientation of all headers. All headers shall be mounted flush to PCB.
   - The center notch of H2 shall face the front edge of the board (see figure below).
   - The edged tabs of H1 and H3 shall face the front edge of the board
2. Check for the installation and orientation of all electrolytic capacitors.

b) Attach Power components and Pads

1. Install Power Amp ICs (Line 6# 12-30-7293) on component side of the Power Amp board (50-00-0123) to positions labeled as U1 and U2 as shown in the figure below (note orientation of the component).



Ensure that the IC:

1 - seats down to the bend in the leads then solder in place.

2 - is vertical with a slant of no more than +/- 2 degrees from the vertical (perpendicular to the PCB plane).

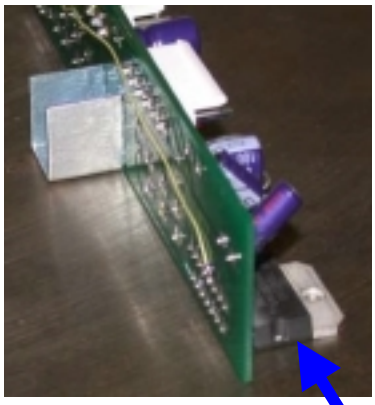
3 - overhangs the back edge of the board 1 mm.

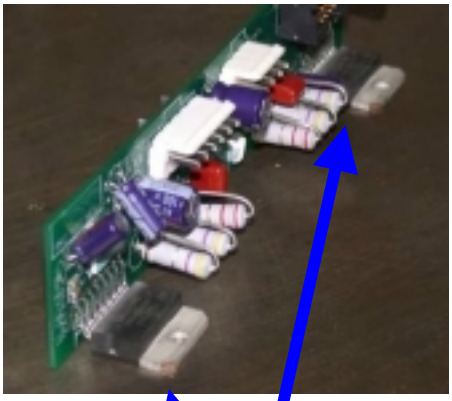
c) Attach the Support Bracket to the PCB

1. Install support bracket (Line 6# 30-51-0105) on solder side of board through the 2 slots in the middle of the PCB. Check that the bracket is flush to the underside, bend tabs outward to secure the bracket in place.

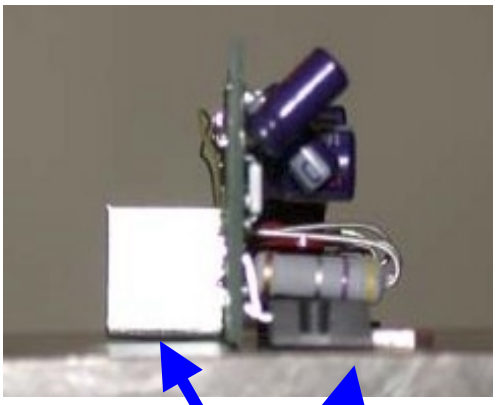
d) Inspect the flatness of the assembled PCB

1. Lay the assembled PCB on a reference flat surface. Confirm that the front face of the 2 IC's and the front of the support bracket lie flat on the surface. Maximum out of flatness tolerance is .5 mm (.020 inches)). If part exceeds tolerance, do not use and set aside for rework.





Inspect to see that IC's lie flat on reference surfaces

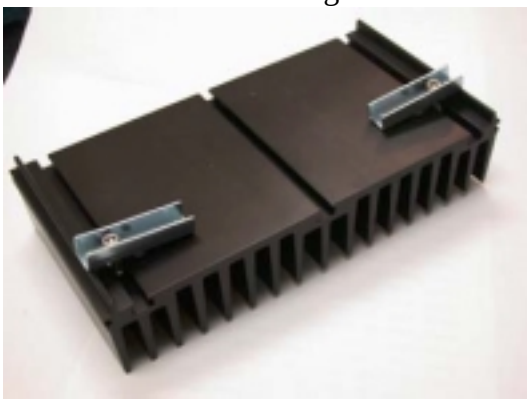


Inspect to see that both the IC's and support bracket are co-planer

d) Secure the PCB assembly to the heat sink with the device clamps

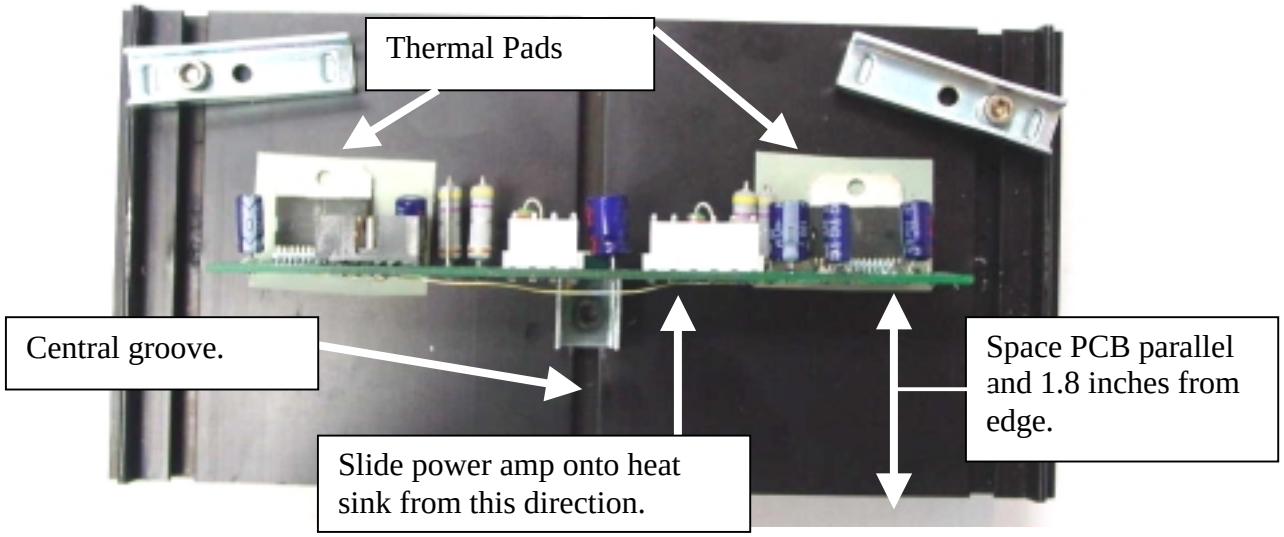
It is recommended that the following procedure be done using a jig to ensure accurate board placement and sufficient clearance for critical components – contact Line 6 manufacturing engineering for details)

1. Partially assemble 2 device clamps using for each clamp a #8 socket head cap screw (30-00-0010), #8 lock washer (30-03-0002) and #8 hex nut (30-06-0007) (see exploded view on pg 3 for reference). Slide each assembly into the edge grooves on the heat sink letting them lie loose upon placement.

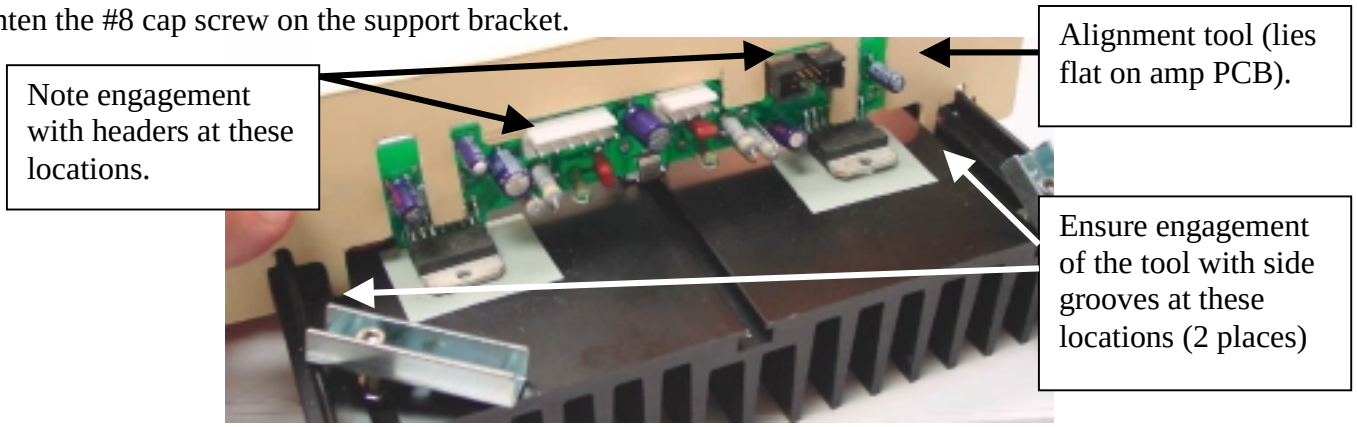


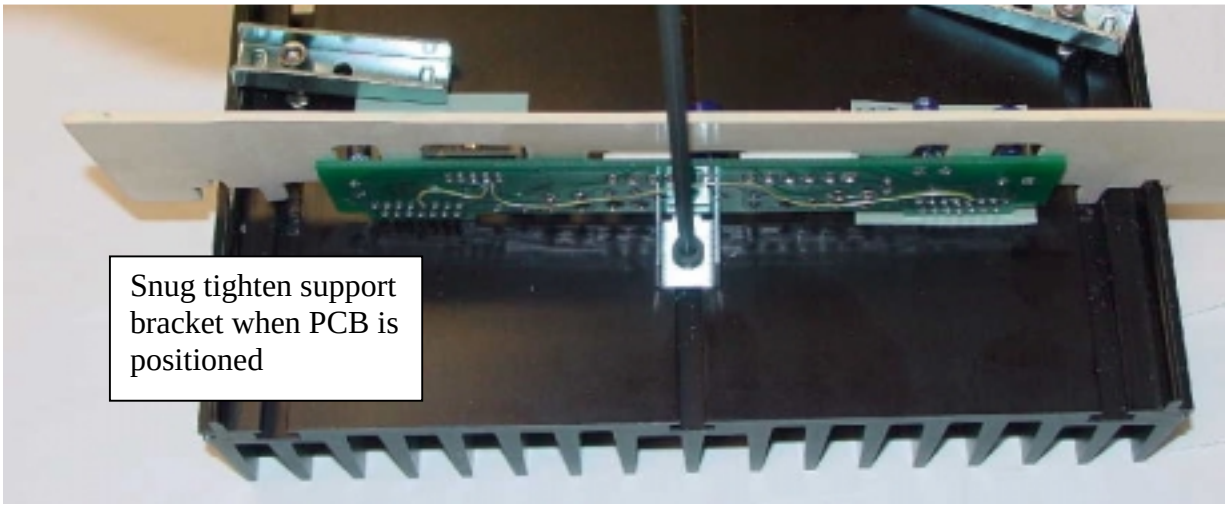
2. Loosely secure a 5/16 #8 Socket head cap screw (30-00-0028, see page 3) with a lock washer (30-03-0002) to the support bracket using a #8 hex nut (30-06-0007).

3. Slide the PCB assembly onto the heat sink 1.80 inches (45 mm) allowing the #8 cap screw to slide up the central groove. Insert the thermal pad under the IC covering the underside as shown in the figure below.

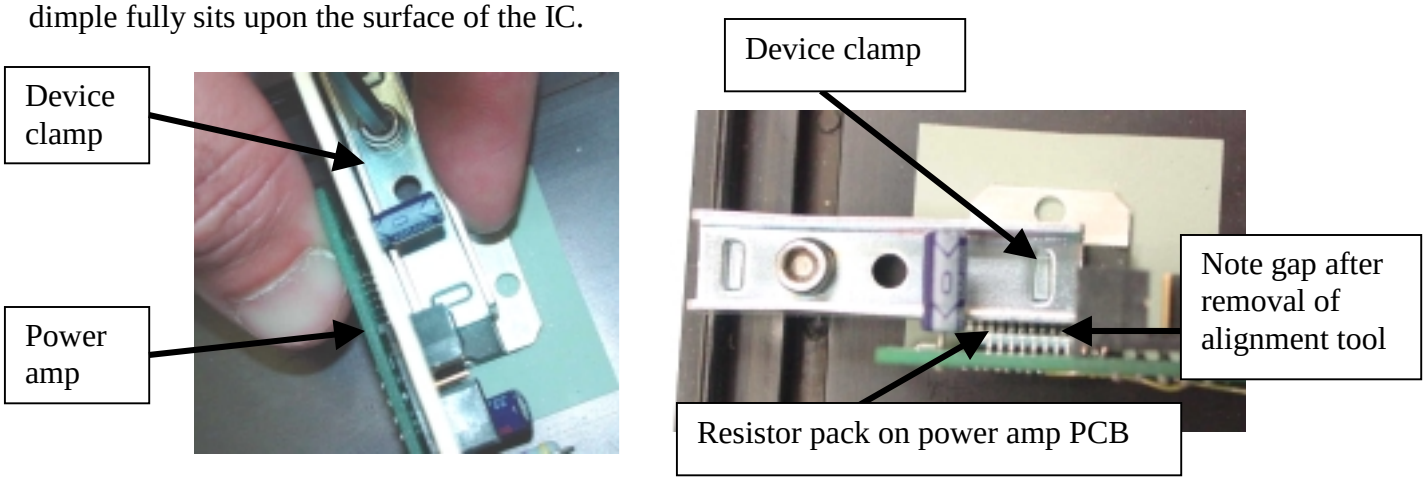


4. Insert the Line 6 supplied Power Amp PCB alignment tool onto the board surface as shown in the figure below. The tool will ensure parallel alignment of the board to the Heat sink edge. When fully engaged snug tighten the #8 cap screw on the support bracket.

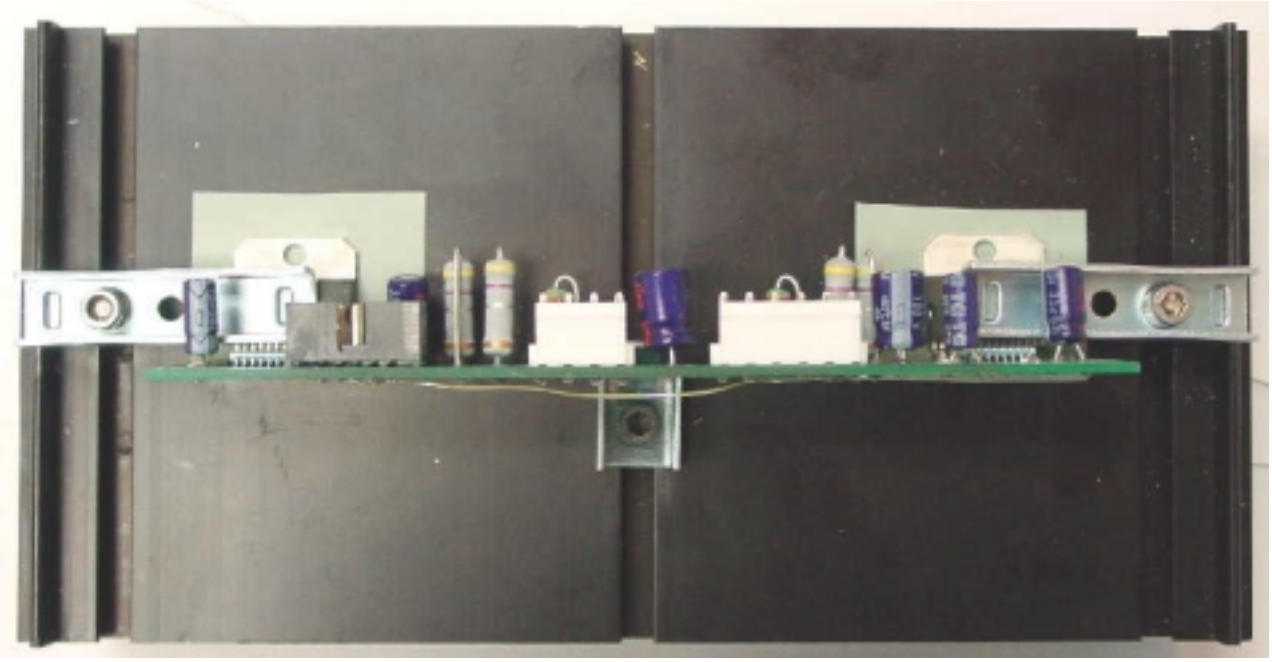




5. With the alignment tool still in place, position the device clamps over the IC ensuring that the edge of the alignment tool is pinched between the edge of the device clamp and the top surface of the resistor pack on the PCB. When positioned as shown in the figure below, snug tighten the #8 cap screws. Ensure that dimple fully sits upon the surface of the IC.

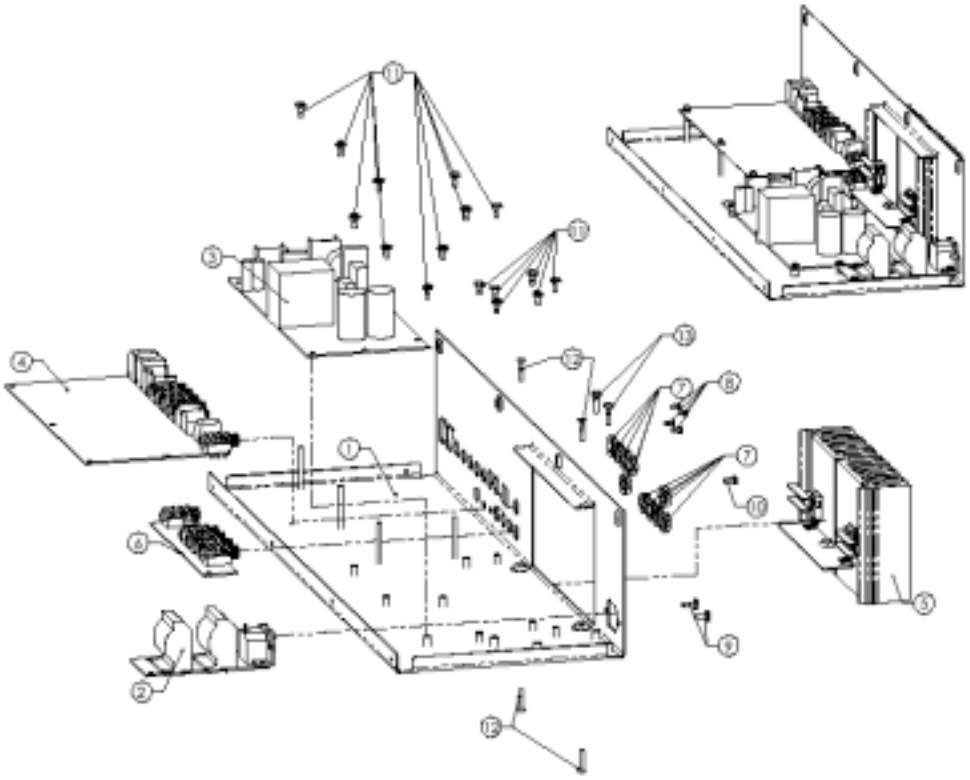


6. Tighten the #8 cap screw on the support bracket to 12 inch-lbs. Tighten the cap screws on the device clamps to 12 inch-lbs and remove the alignment tool. Ensure that a suitable gap of between 1 mm min to 2 mm max exists between the device clamp and resister packs (see figure above for step 5). Observe if the board is parallel and exhibits no significant flex or stress (see figure below).



End of section

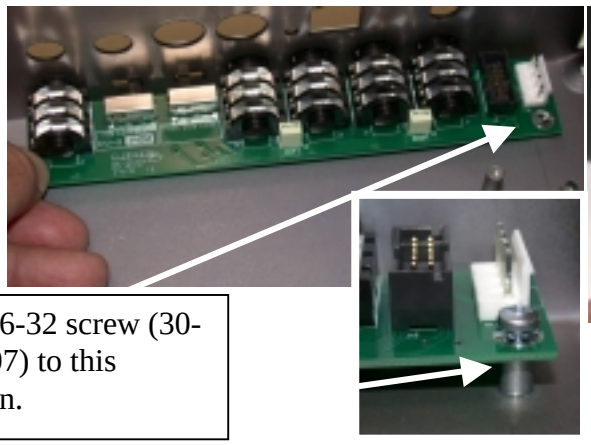
The Chassis Assembly



ITEM	QTY	LINE6 PART NO	DESCRIPTION
1	1	50-00-0079	ASSY, CHASSIS ARTWORK
2	1	N/A	PCBA, LINE FILTER (PWR SUPL BREAKAWAY)
3	1	50-00-0096	PCBA, POWER SUPPLY
4	1	50-00-0121	PCBA, MAIN BOARD
5	1	50-00-0123	PCBA, POWER AMP
6	1	50-00-0132	PCBA, OUTPUT BOARD
7	10	N/A [INCL ASSY]	NUT, JACK
8	4	30-00-4250	SCR, #4 X .25, SH METAL, PN HD, PHIL, BL OXIDE
9	2	30-00-8375	SCR, #8 X .375, SH METAL, BL OXIDE
10	1	30-00-0375	SCR, 6-32 X .375, PHIL, PH BL OXIDE
11	16	30-00-0607	SCR, 6-32 X 7/16, PH, PN W/LK WASH
12	4	30-00-0018	SCR, 6-32 X .75, FL H PHIL, SELF TAPPING
13	2	30-00-0610	SCR, 6-32 X 5/8, PH, PN W/LK WASH
14	1	21-34-0021-3	CA ASSY, PWR AMP - PWR SUPL
15	1	21-34-0014-3	CA ASSY, PWR SUPL - MAIN
16	1	21-34-0008-3	CA ASSY, PWR AMP - OUTPUT
17	1	21-30-0009-3	CA ASSY, PWR AMP - MAIN (FOR OUTPUT PCB)
18	1	21-30-0009-4	CA ASSY, PWR AMP - MAIN
19	2	21-34-0006	CA ASSY, JUMPER

a) Mount the speaker output PCB

1. Insert the Output PCB (50-00-0132) into the chassis (50-00-0079). Ensure that the slider switches protrude through the rectangular openings. Place a 6-32 screw with lock washer (30-00-0607) onto the standoff BUT DO NOT TIGHTEN. Secure the jacks to the back face of the chassis using the 5 supplied plastic jack nuts. After securing the jacks, tighten the 6-32 screw to 10-12 inch-pounds.

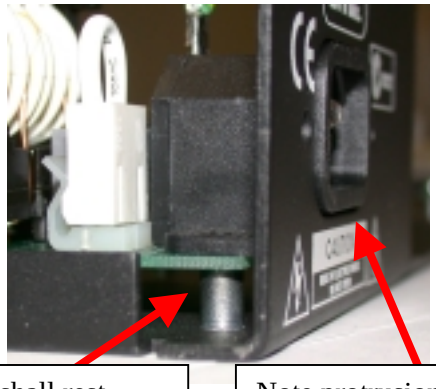


Install 6-32 screw (30-00-0607) to this location.

Ensure slider switches protrude through holes.

b)Mount the line filter PCB

1. Insert the line filter PCB (breakaway PCB from 50-00-0096, power supply PCB) into the chassis. Ensure that the plastic AC receptacle protrudes through the opening and the underside of the PCB is sitting on the standoffs. Loosely secure the plastic face of AC receptacle to the face of the chassis using #8 black oxide self-tapping screws (30-00-8375).



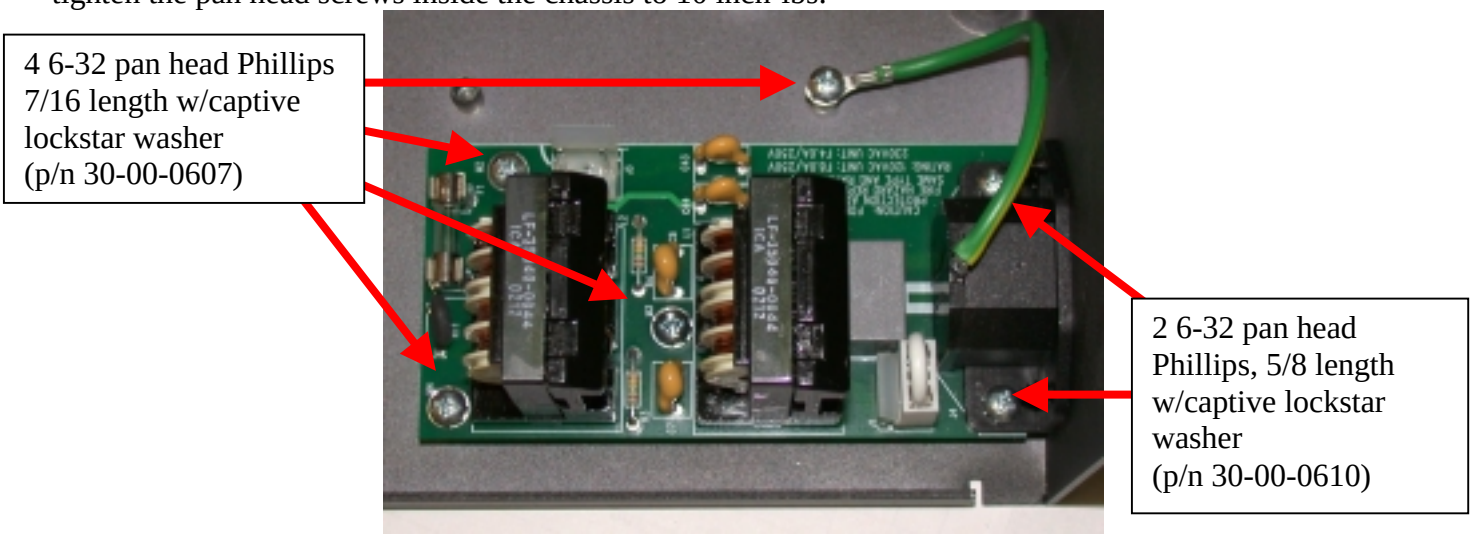
Note PCB shall rest upon standoff when properly

Note protrusion of AC receptacle though the sheet metal

#8 self tapping screws for AC receptacle mounting

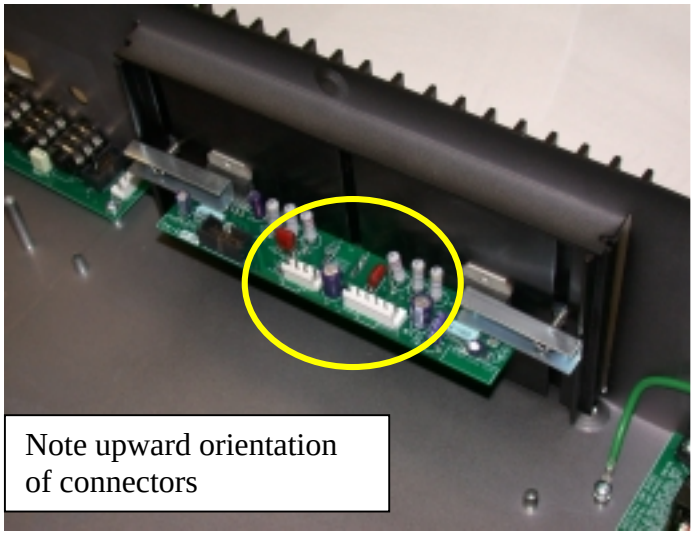
2. Secure the PCB and grounding cable with 4 6-32 pan head Phillips (7/16 length) screws (30-00-0607) and 2 6-32 pan head phil (5/8 length) (30-00-0610) as shown in the figure below. DO NOT TIGHTEN.

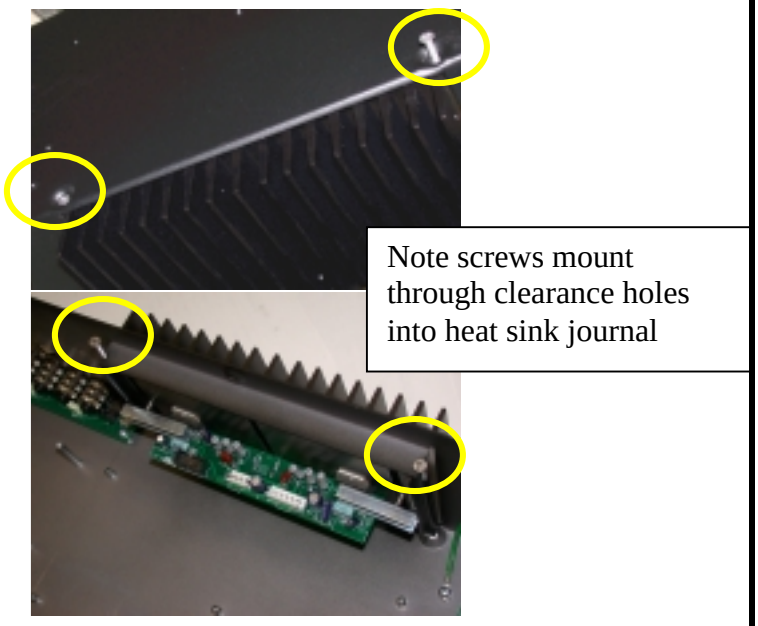
Tighten the self-tapping screws on the AC receptacle (5-6 in/lbs- be careful not to strip out the thread), then tighten the pan head screws inside the chassis to 10 inch-lbs.



c) Mount the power amp assembly into the chassis.

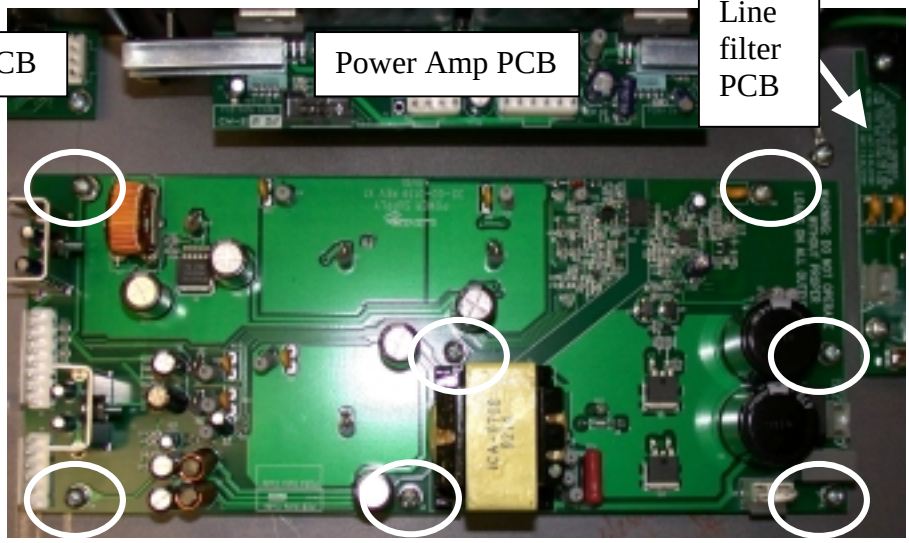
1. Insert the power amp assembly (50-00-0123) into the chassis. Orient the assembly with the connectors facing up when installing (see figure). The journal of the heat sink shall sit on the dimples of the chassis base and register in the cutout of the fold on the chassis back face. Secure the heat sink to the chassis with 4 #6 self-tapping screws (30-00-0018). Tighten to 10-12 inch-lbs (These screws may require partial insertion, then reversing out, then re-insertion, to fully seat- This may not always be consistent due the heat-sink extrusion hole not always being consistent).





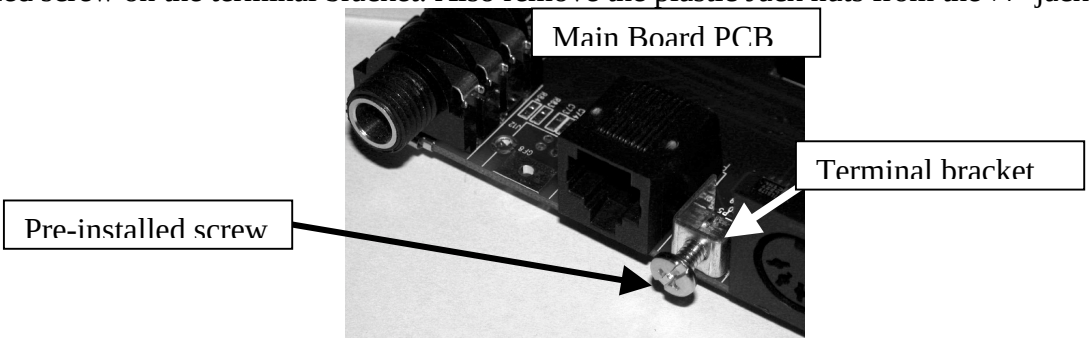
d) Mount the power supply PCB

1. Place the power supply PCB assembly (50-00-0096) into position in the chassis (see figure). Secure the assembly using 7 6-32 captive lockstar pan head Philips (30-00-0607) to torque 10in/lbs.

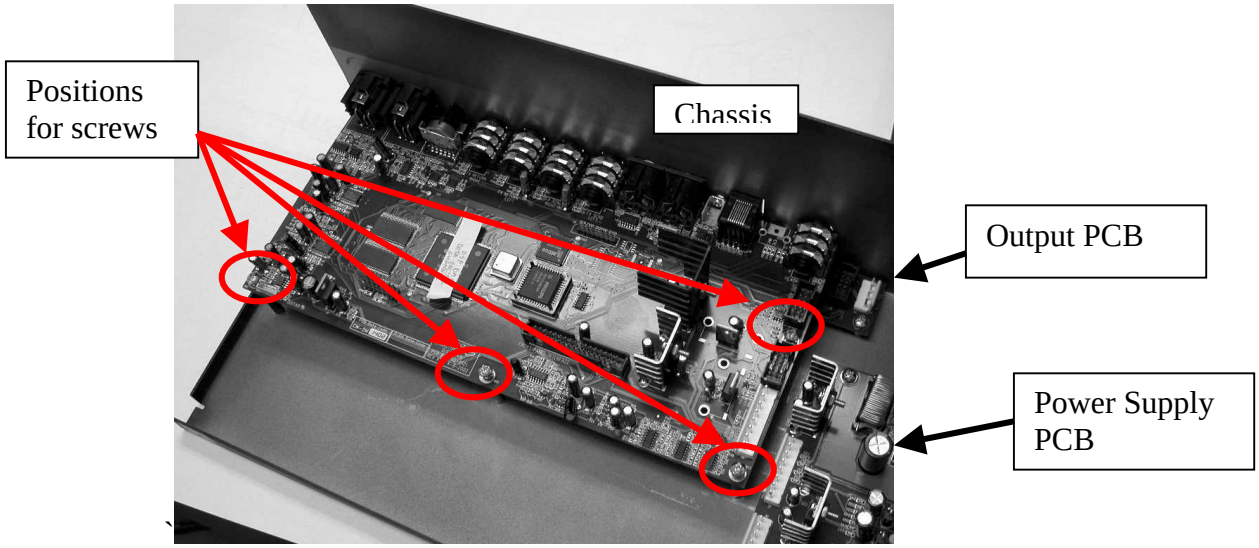


e) Mount the main board PCB

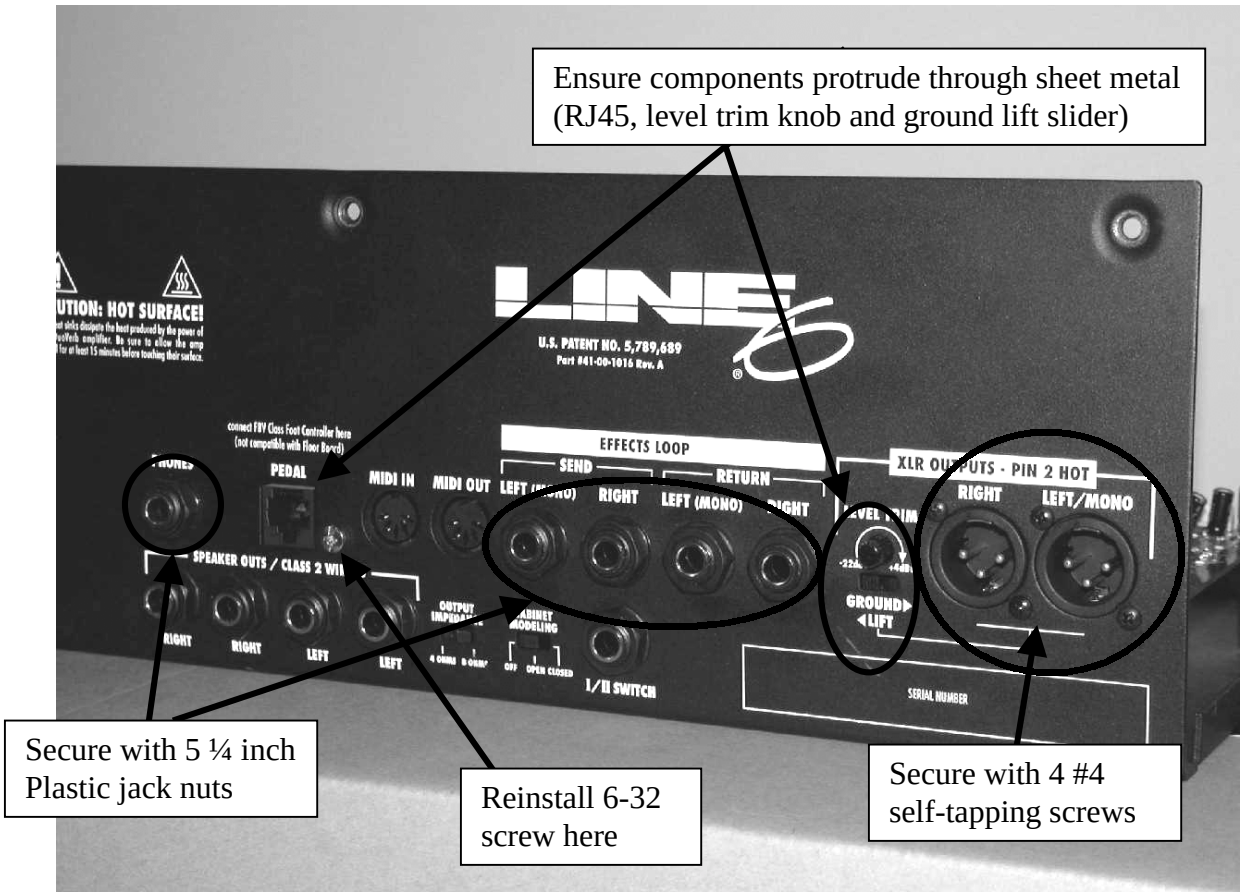
1. Installed on the main PCB is a right angle terminal bracket with a preinstalled 6-32 screw. Remove the preinstalled screw on the terminal bracket. Also remove the plastic Jack nuts from the ¼" jacks.



2. Install the main board (50-00-0121) into position in the chassis. The PCB will sit on 4 1.25-inch long standoffs. Loosely place 4 6-32 captive lockstar machine screws (30-00-0607) into these holes. DO NOT TIGHTEN.



3. Reinstall loosely the 6-32 screw previously removed from the terminal bracket using the through hole on the back face of the chassis (see figure). Loosely apply the 5 ¼ inch plastic jack nuts to the quarter inch jacks. Loosely install 4 #4 x .25 black self-tapping screws (30-00-4250) screws to the XLR outputs.

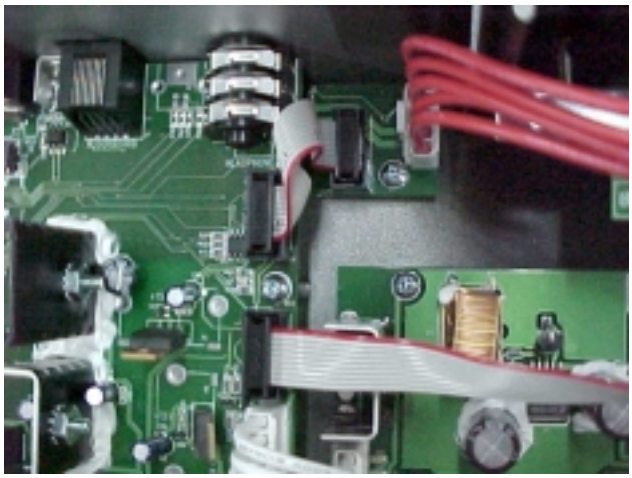


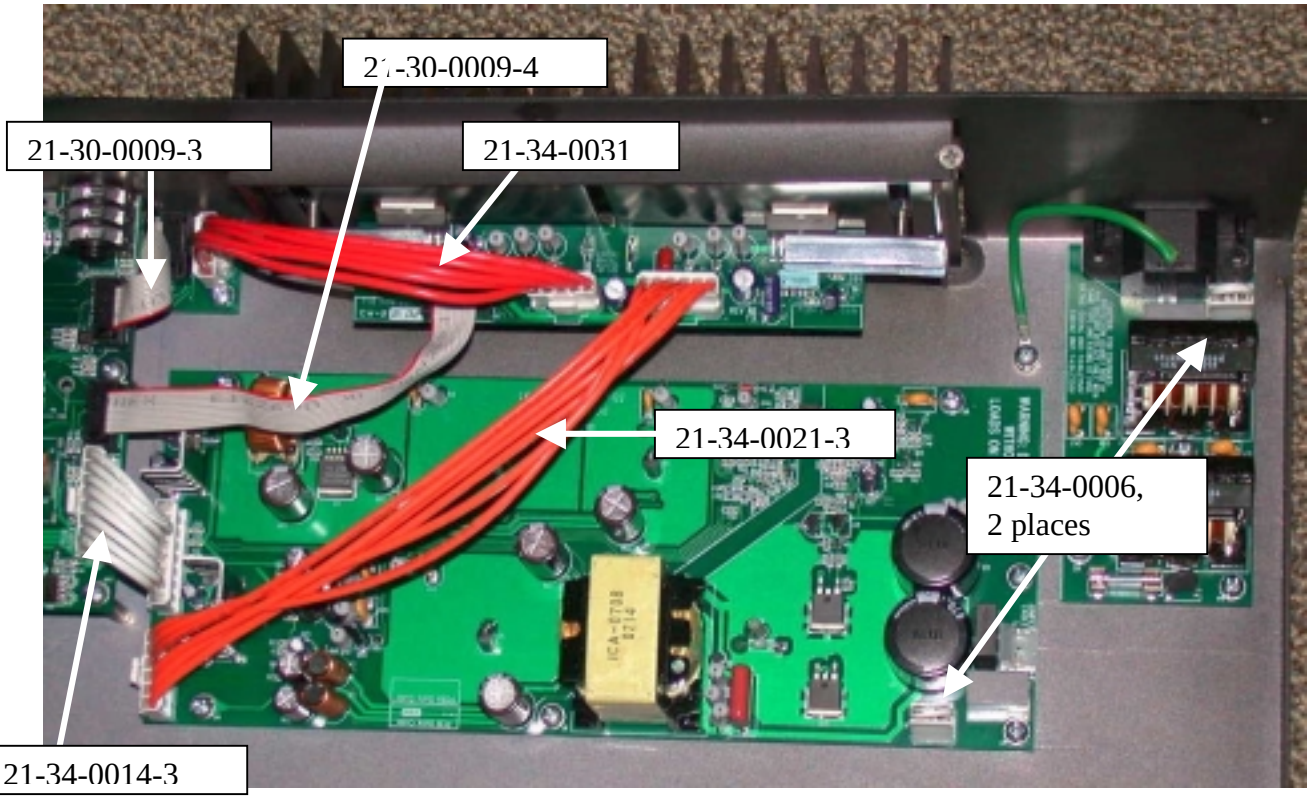
4. Ensure that the level trim knob, the ground lift switch and the Pedal RJ45 connector protrude though the cutouts in the sheet metal (see figure for step 3 above). Finish tightening the plastic jack nuts (5-6 in/lbs) then the terminal screw (7-8 in/lbs), and finally the #4 screws on the XLR's (4-5 in/lbs- careful not to strip the threads).

5. Ensure that the PCB is not lifting up against the 6-32 screws securing the board to the standoff. If it is, remove the screws and measure the lift. If the board sits more than 0.2 inches from the standoff, reject the chassis. If the board is within this tolerance, then apply final tightening on the screws (10 in/lbs).

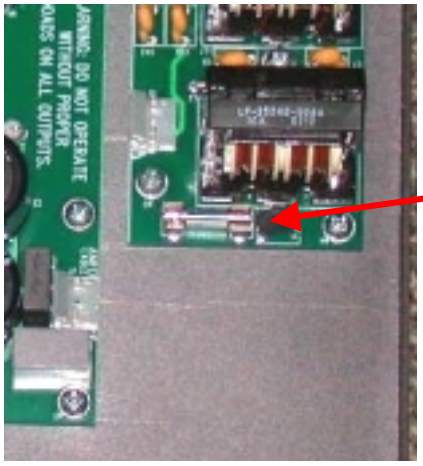
e) Attach the cables& fuse to the assembly.

1. Attach cables to the assembly according to the figure below. Ensure that all connectors are fully engaged with the PC board connector and are not loose. Apply the fuse to the line filter PCB as noted in the figure.





Cable part number	Cable description	PCB Routing
21-30-0009-3	10 pin ribbon, 3 inch length	Between Output and Main
21-30-0009-4	10 pin ribbon, 5.5 inch length	Between Main and Power Amp
21-34-0014-3	8 pin, .156 pitch clip connector, 4.5 inch length	Between Main and Power Supl
21-34-0021-3	6 pin, .156 pitch clip connector, 10 inxh lwngth	Between Power Supl and Output
21-34-0031	5 pin, .156 pitch clip connector, 7.35 in length	Between Power Amp and Output
21-34-0006	2 pin jumper	Mounted on Pwr Supl and Filter



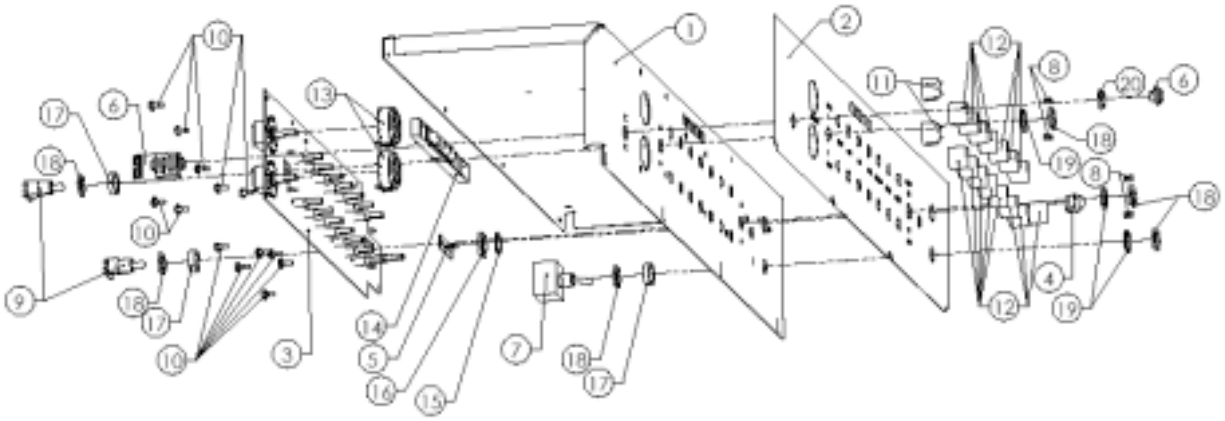
Install fuse on line filter board at this location.

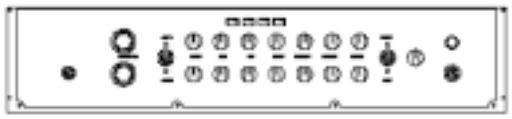
#24-19-6325 6.3A 250v - US & JA.

#24-19-3152 3.15A 250v - UK, EU, & AU.

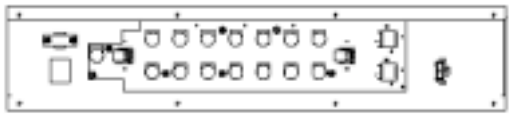
End of section

The Chassis Cover Assembly

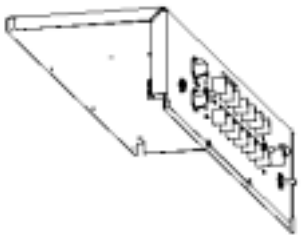




FRONT VIEW



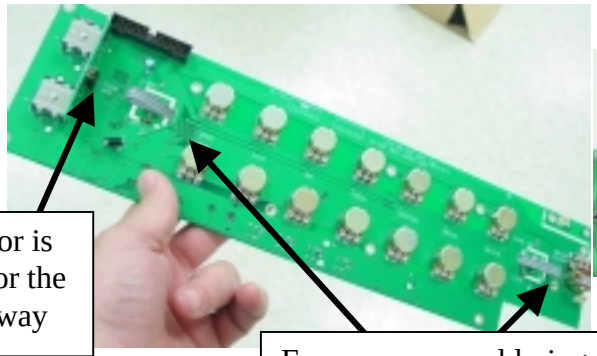
REAR VIEW



ITEM	QTY	LINE6 PART NO	DESCRIPTION
1	1	30-51-0098	CHASSIS COVER, DUET
2	1	50-00-0190	ARTWORK ASSY, OVERLAY, DUET
3	1	50-00-0122	ASSY SUB - PCB BOARD, UI
4	1	30-51-0113	JEWEL LENS
5	1	N/A (50-00-0122 BREAKAWY)	PCBA, JEWEL LIGHT LED
6	1	50-00-0099	PCBA, INPUT GUITAR, AX3
7	1	24-03-0002	POWER SWITCH
8	4	30-27-0059	LENS, LED, MOUSER
9	2	N/A (50-00-0122 BRKAWY)	PCBA, MOMENTARY SWITCH
10	13	30-00-0607	SCR, 6-32 X 7/16, PH, PN W/LK WASH
11	2	30-27-0054	KNOB, BI-DIRECTIONAL, CREAM
12	15	30-45-2000-2	KNOB, FLEXTONE STYLE, CREAM COLOR
13	2	30-27-0049	LIGHT PIPE, 2 SHOT
14	1	24-21-1122	SWITCH, CAP (PLASTIC)
15	1	30-03-0015	WASHER, WAVE, .56 ID X .75 X .045
16	1	N/A (INCL IN ASSY)	NUT, JEWEL LENS
17	3	30-15-0012	SPACER, .75O D X .50 ID X .20 L
18	6	N/A (INCL IN ASSY)	NUT, SWITCH
19	3	30-03-0017	WASHER, FINISHING, #10, NICKEL
20	1	30-15-0004	SPACER .13THK X.63OD NYLON
21	2	21-34-0029	CA ASSY, MOMENTARY SWITCH
22	1	21-34-0030	CA ASSY, LED

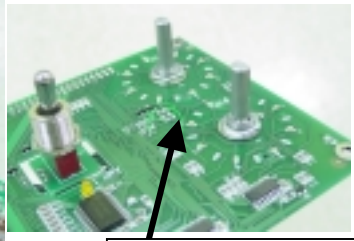
a)Inspect the front panel PCB.

1. Confirm that 2 cables (21-34-0029) have been properly soldered into the front panel PCB (50-00-0122) between positions H4 and H5 and between H6 and H7. Confirm that the encoder breakaway assembly has been mounted with the connector fully engaged and the knobs protruding perpendicular to the front panel surface.



Ensure connector is fully engaged for the encoder breakaway

Ensure proper soldering for these 2 cables

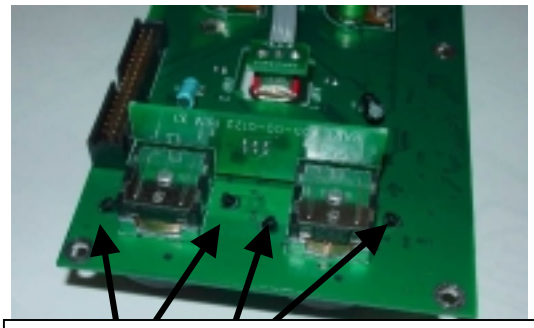


Confirm that the 2 encoders are fully seated in place and perpendicular to PCB.

b) Attach the light pipe and button frame to the front panel.

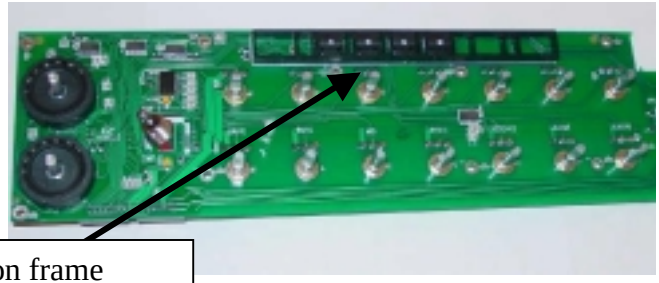
1. Attach 2 light pipes (30-27-0049) to the silkscreen side of the front panel as shown below. Ensure that the clips engage and the bottom surface of the light pipe sits on the surface of the PCB.

Light pipe positions



Check for full protrusion of clips through backside of PCB (4 clips and 4 pins)

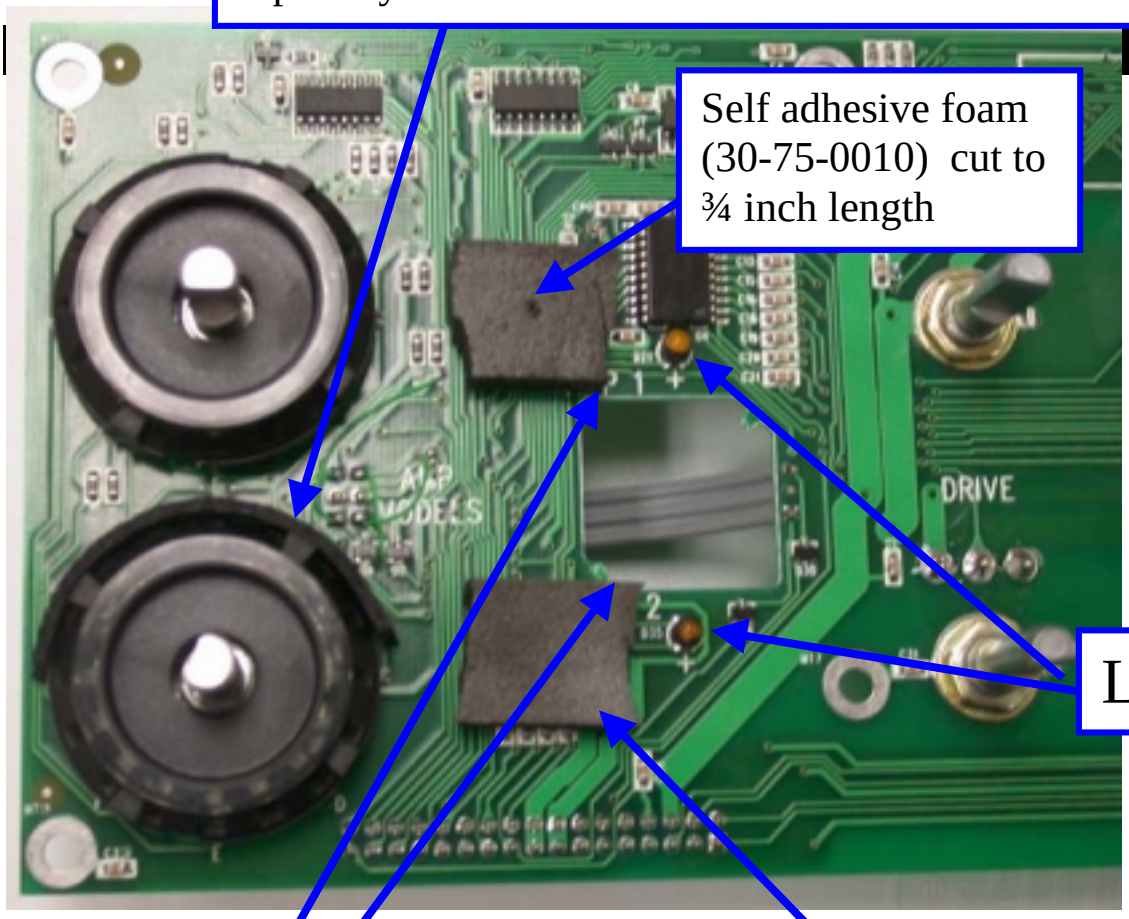
2. Attach the button frame (24-21-1122) to the silkscreen side of the front panel. Ensure that the 4 clips on the frame have fully engaged on the back surface of the PCB.



Position for button frame

Apply Foam pieces to PCBA & light pipes.

2 inch strip of the 3/8 wide self adhesive foam (P/N 30-63-0010) applied to the top edge of the light pipe. Apply to the bottom light Pipe only.

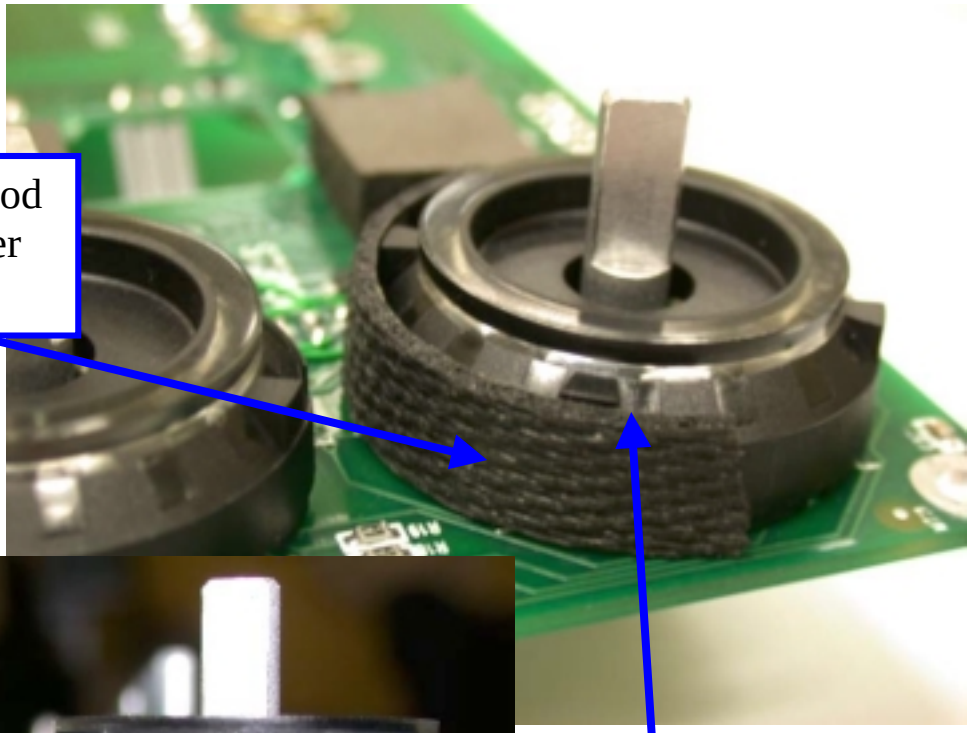


Self adhesive foam (30-75-0010) cut to ¾ inch length

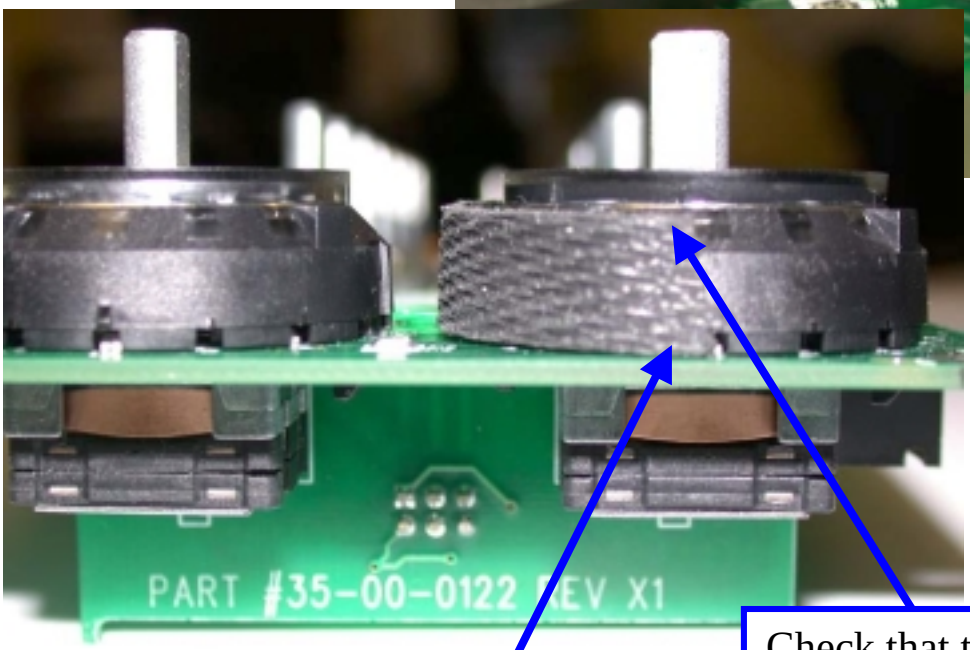
LED's

Note position of foam about 3/8 inch from the led and even with the top and bottom edges of the cutout

Self adhesive foam (30-75-0010) cut to ¾ inch length



Ensure foam strip has good contact with the perimeter of the plastic lightpipe.

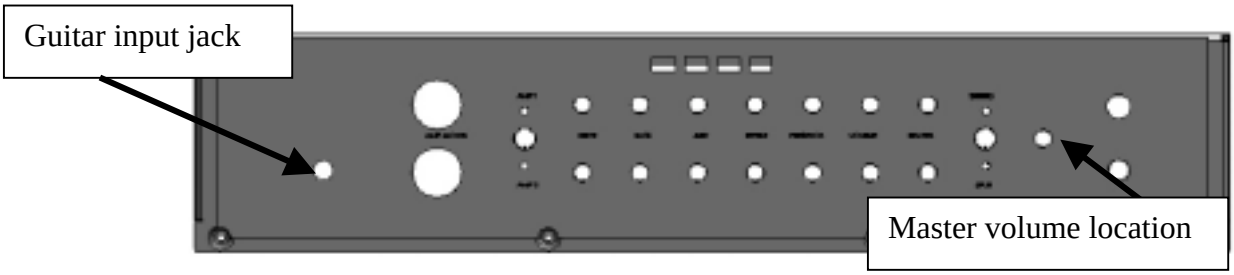


Check that the top edge of foam just meets the step on the light pipe and does not overlap.

When properly mounted the bottom edge of the foam should just meet the edge of the PCB.

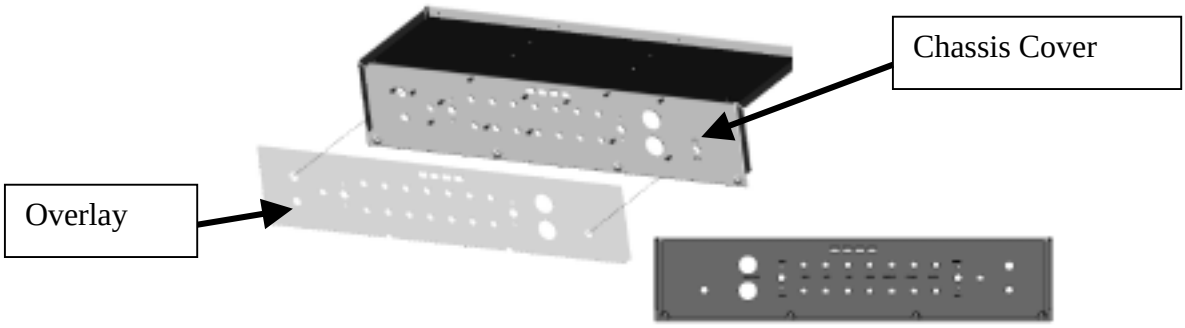
c) Attach the overlay to the chassis cover.

1. The overlay (50-00-0190) is indexed with the chassis cover (30-51-0098) at the holes for the guitar input and at the Master volume. An alignment tool is required for this step and contains a flat surface with 2 pins, set to the diameter and locations for the input hole and the Master volume hole (see figure below).



2. Remove the protective backing from the overlay and set the part into the alignment tool silkscreen side down.

3. Inspect the chassis cover and clean away any dust or debris from this surface. When suitably clean, slide the cover onto the tool, ensure it has made full contact with the overlay.



4. Remover the chassis cover from the tool and smooth out the overlay And inspect for a satisfactory alignment. Leave clear protective cover on the overlay .

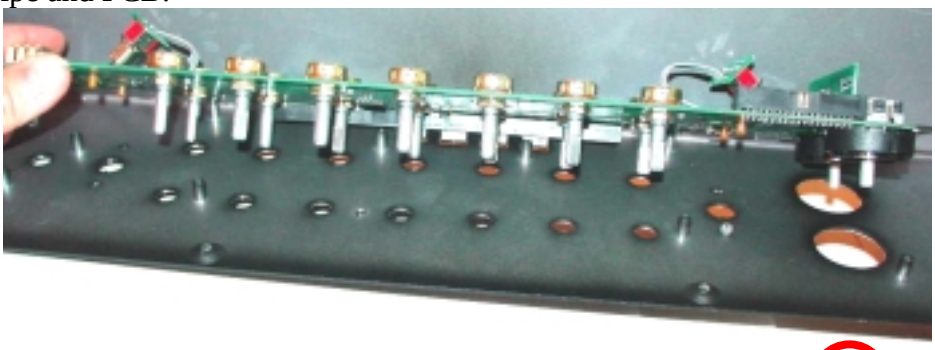
FROM THIS STEP FORWARD COTTON GLOVES SHALL BE USED IN THE ASSEMBLY PROCESS WHERE POTENTIAL CONTACT WITH THE OVERLAY COULD OCCUR.

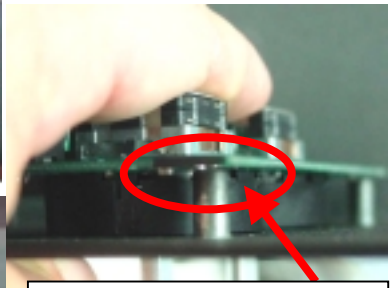
c) Front Panel PCB: clip out breakaway PCB's.

1. Clip out the 2 momentary switch assemblies from the front panel. Use care not to damage the pre-soldered cabling for these PCB's.

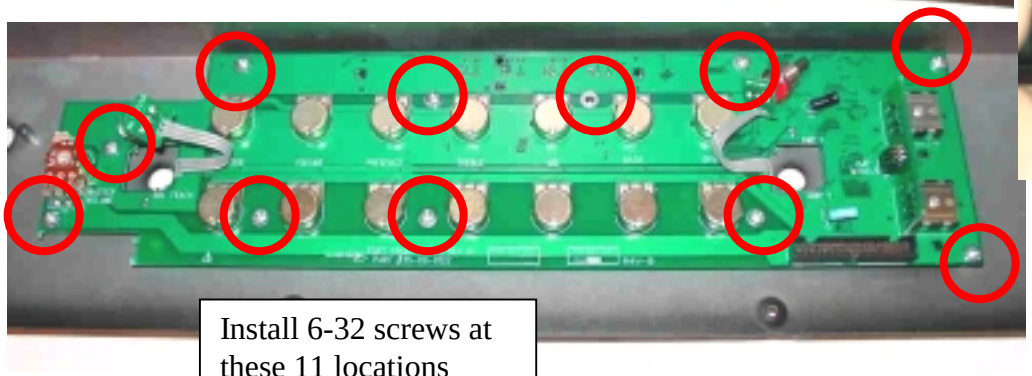
d) Mount the front panel PCB.

1. Place PCB onto chassis cover and ensure that the 2 light pipes and the button frame are seated properly and are protruding from the front cover (see figure below). Ensure that the PCB only sits about .35 mm (.015 inch) max from the standoff at the location of the light pipe. If the gap is larger, then reseat the lightpipe and PCB.





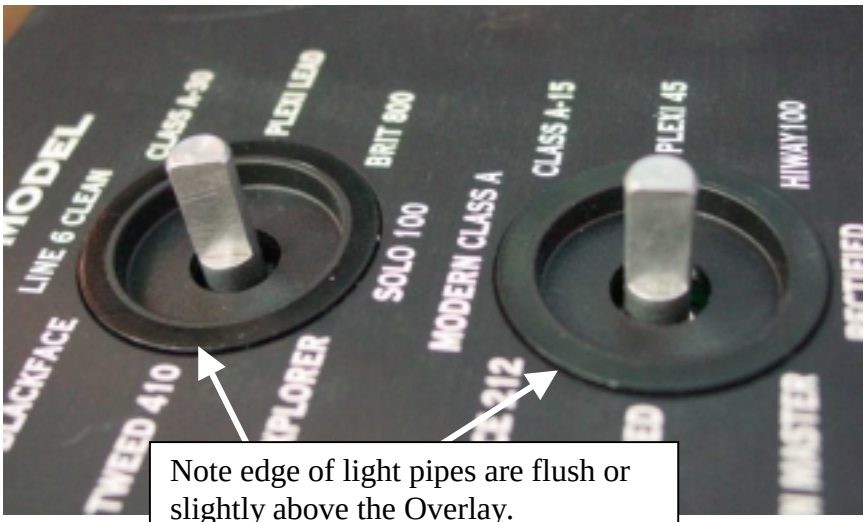
Confirm gap of less than .020 inch (.5mm) between standoff and PPCB surface. If gap is larger, loosed screws and reseat PCB.



Install 6-32 screws at these 11 locations

2. Secure the PCB with 11 6-32 captured lockstar pan head Phillips (30-00-0607)to Torque 10in/lbs (see above).

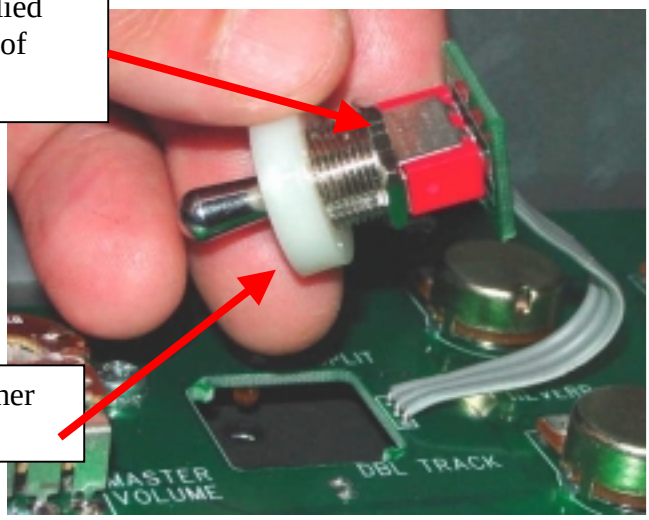
3. Inspect to see that the light pipe is sitting flush or slightly above the sheet metal (see figure below). If the light pipe sits below the sheet metal, loosen the screws, reset the front panel until the light pipe is seated and then tighten the screws.



Note edge of light pipes are flush or slightly above the Overlay.

3. Turn the nut for the amp ½ switch and the blend switch to the end of the bushing (see figure below). Apply a nylon ring (30-15-0012) onto the bushing and insert the switch into the keyhole opening. Apply the flat finishing washer (30-03-0017) and secure with the supplied flat hex nut.(5-6in/lbs).

Turn supplied nut to end of bushing.



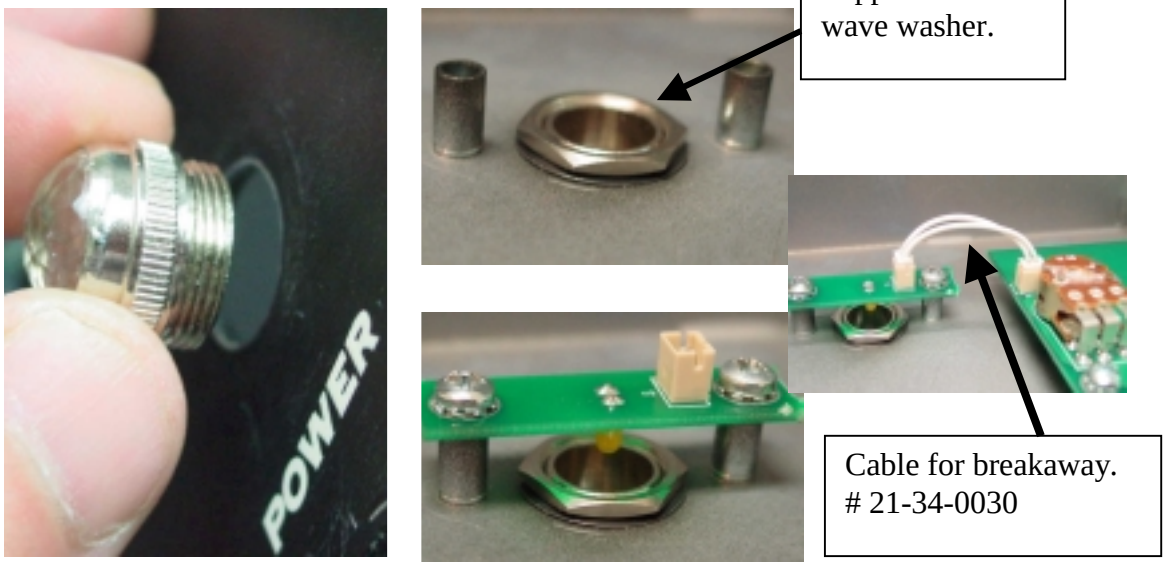
Nylon spacer washer # 30-15-0012

Flat finishing washer # 30-03-0017

Supplied hex nut

d) Assemble the jewel lens

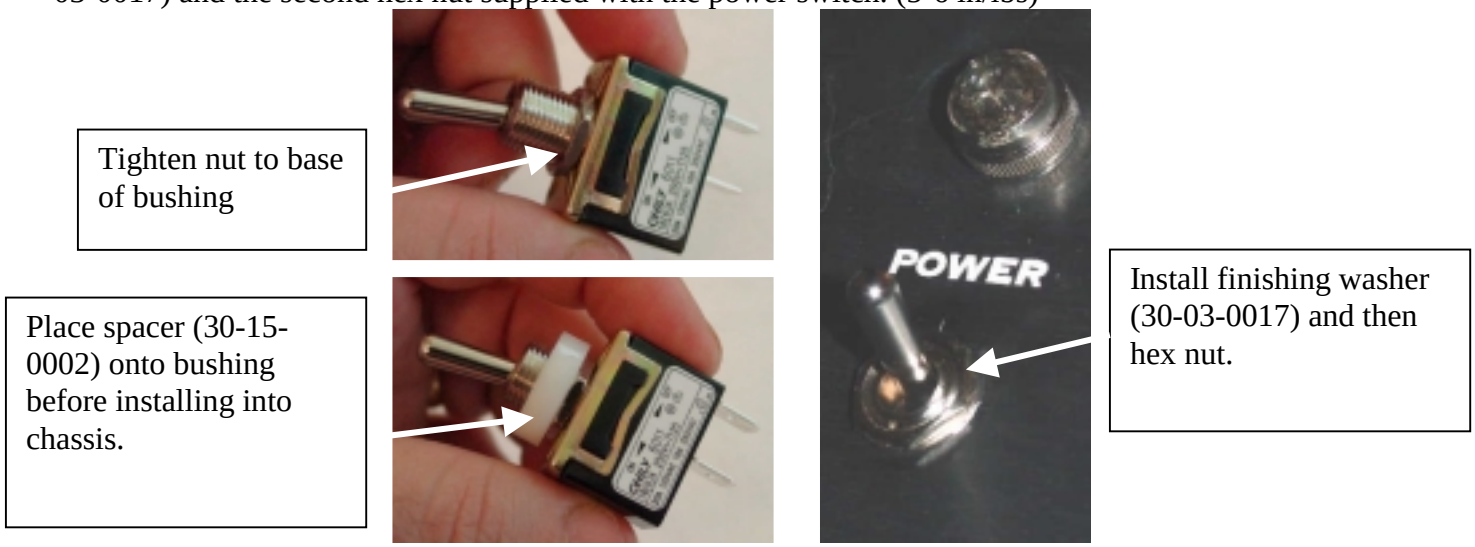
1. Insert the jewel lamp lens (30-51-0113) through the front of the cover. Apply a wave washer (30-03-0015) and secure using the supplied hex nut (8 –10 in/lbs).



2. Secure the jewel lens PCB to the standoffs using 2, 6-32 lockstar machine screws (30-00-0607 – 10 in/lbs). Apply the cable (21-34-0030) between the jewel lens PCB and the front panel PCB (see figure above).

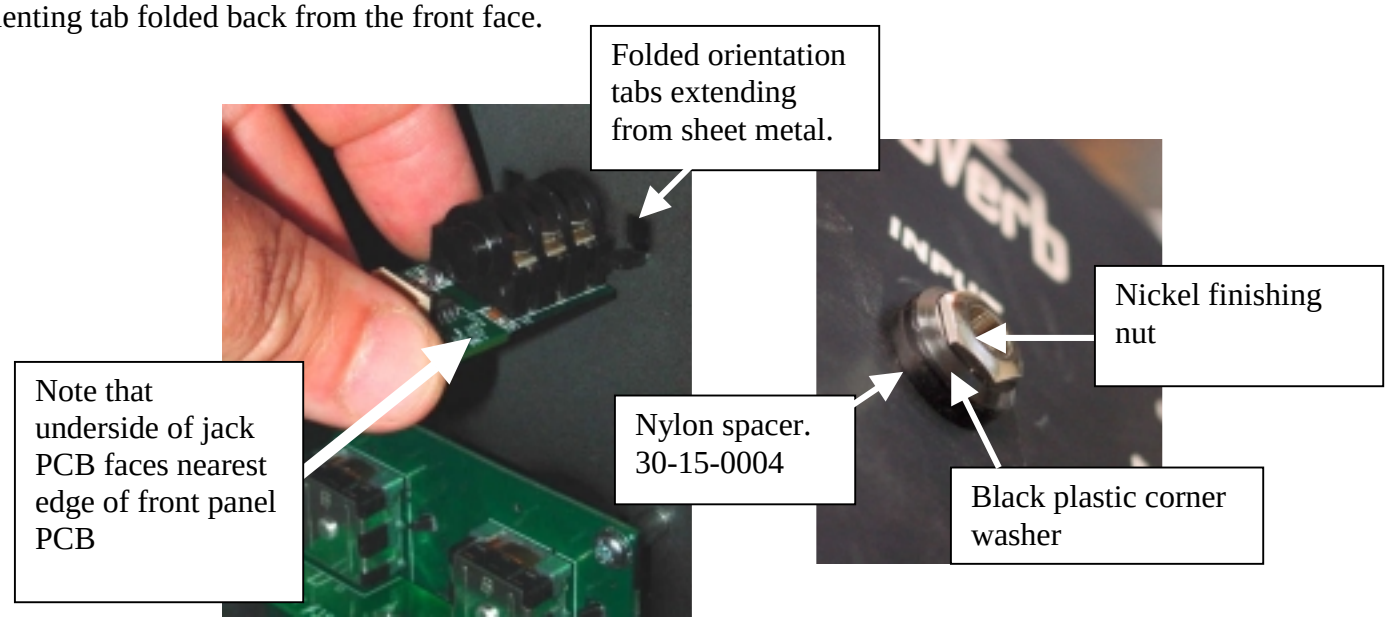
e) Mount the power switch

1. Turn the nut for the power switch (24-03-0002) to the end of the bushing (see figure). Apply a nylon spacer ring (30-15-0002) and insert into chassis cover. Secure component using a flat finishing washer (30-03-0017) and the second hex nut supplied with the power switch. (5-6 in/lbs)



f) Install the Guitar Input Jack

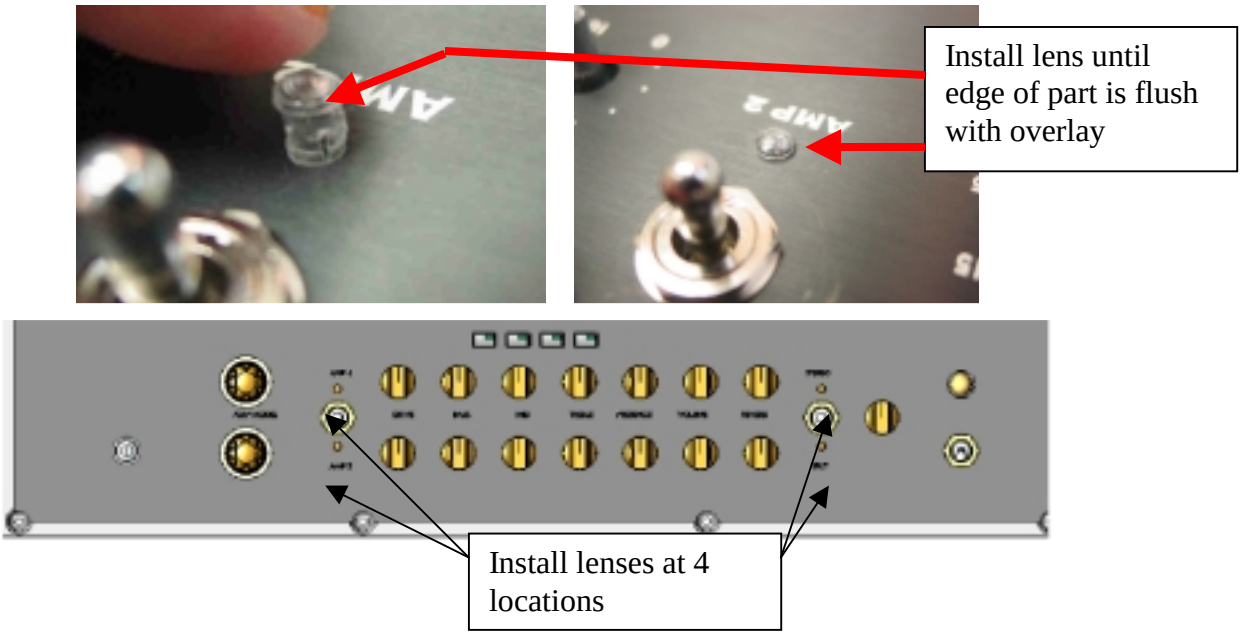
1. Insert the guitar jack PCB (50-00-0099) from the backside of the chassis. Ensure that the bottom of the PCB lies oriented to the front Panel PCB (see figure below). The edges of the ¼ jack shall lie between 2 orienting tab folded back from the front face.



2. When positioned, secure the jack from the front face first installing a black spacer (30-15-0004) followed by an included black plastic corner washer and secured with the nickel finishing nut 5-6 in/lbs (included with the PCB assembly).

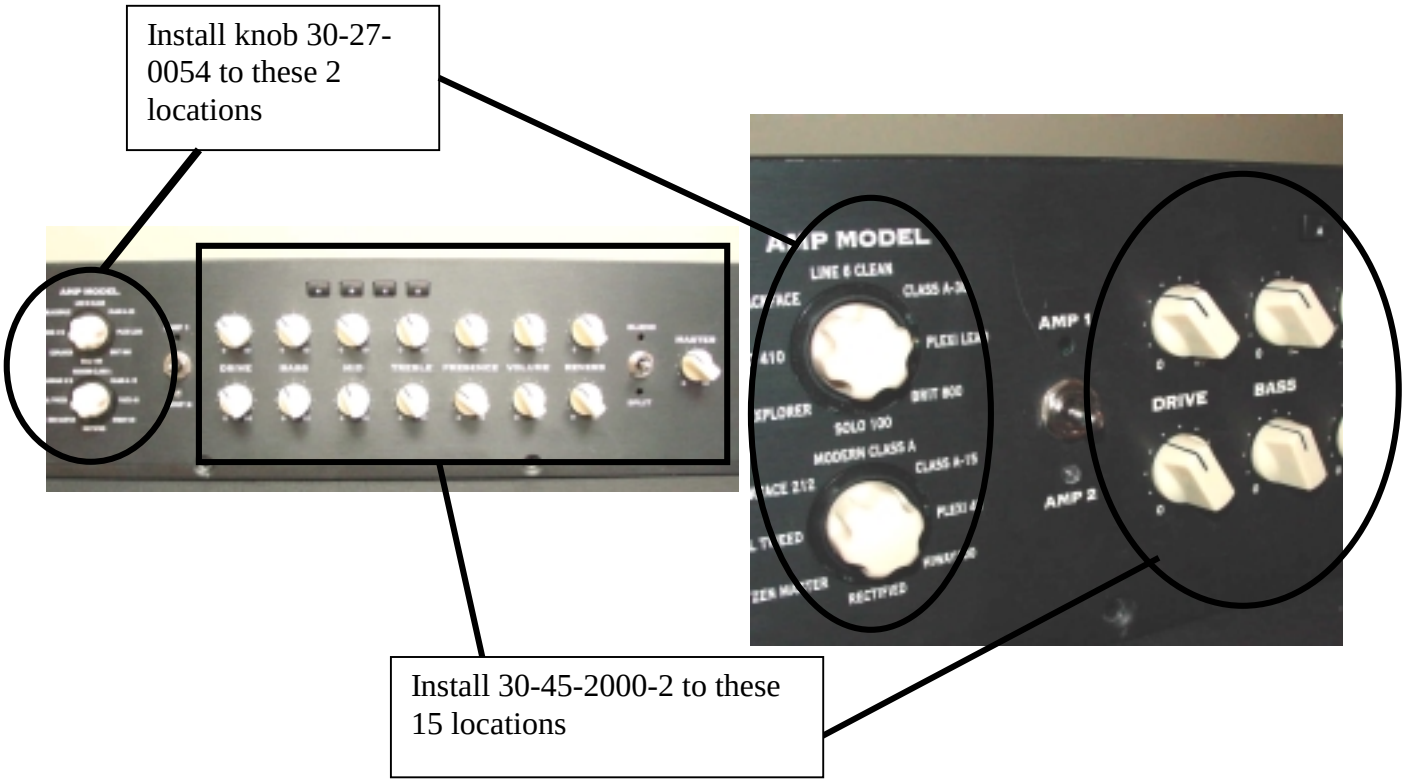
f) Install the LED lenses

1. Install 4 lenses for the led's (30-27-0059). These will insert until the edge of the lens sits flush on the front panel.



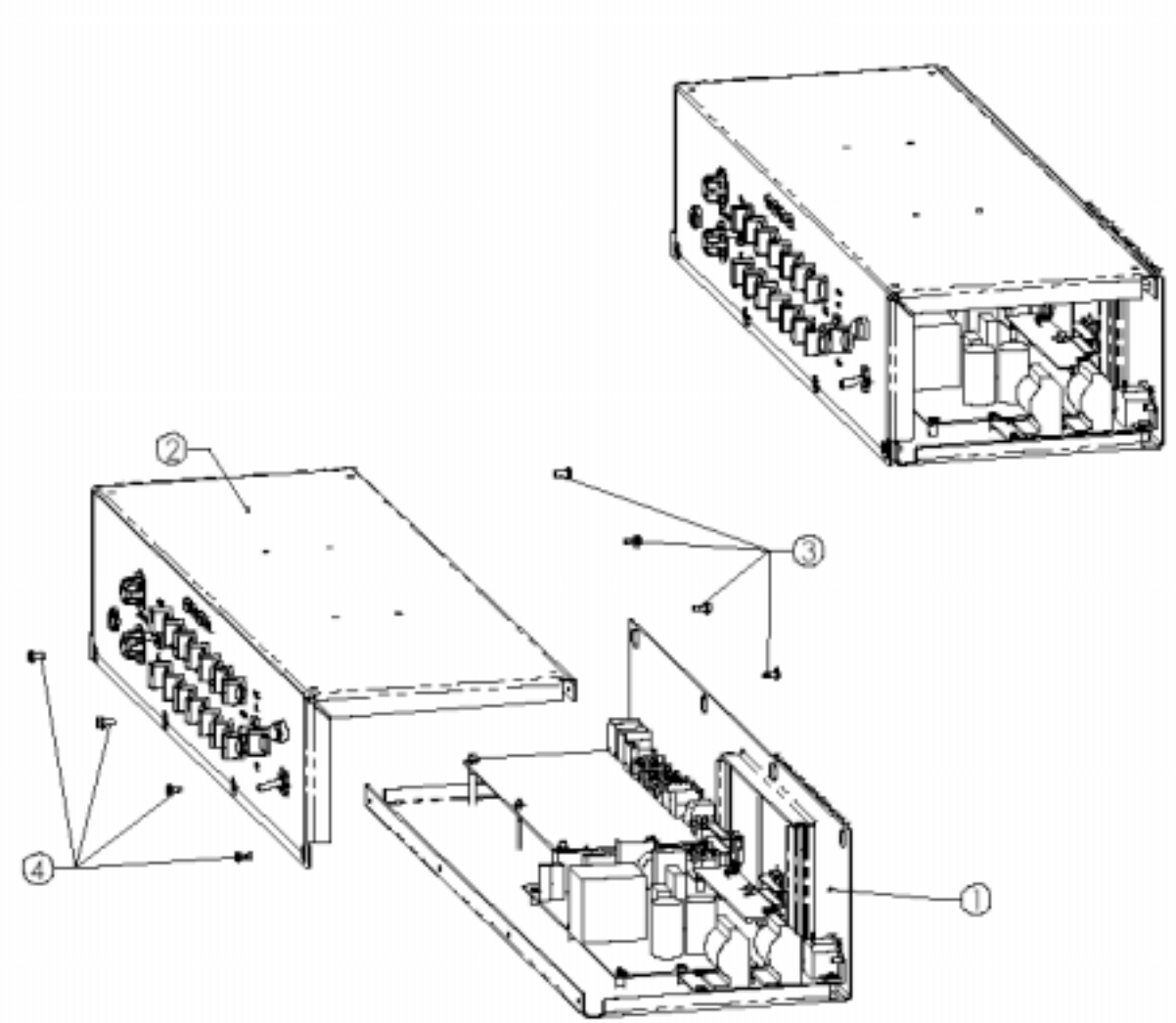
f) Install knobs

1. Install 2 encoder knobs (30-27-0054) onto the Amp Model encoders (see figure). Install 15 cream flextone style knobs (30-45-2000-2) onto the remaining shafts. Turn all knobs to ensure they are not scraping on the overlay. If scraping is felt, pull back slightly on knob until no further scraping is observed.



End of section

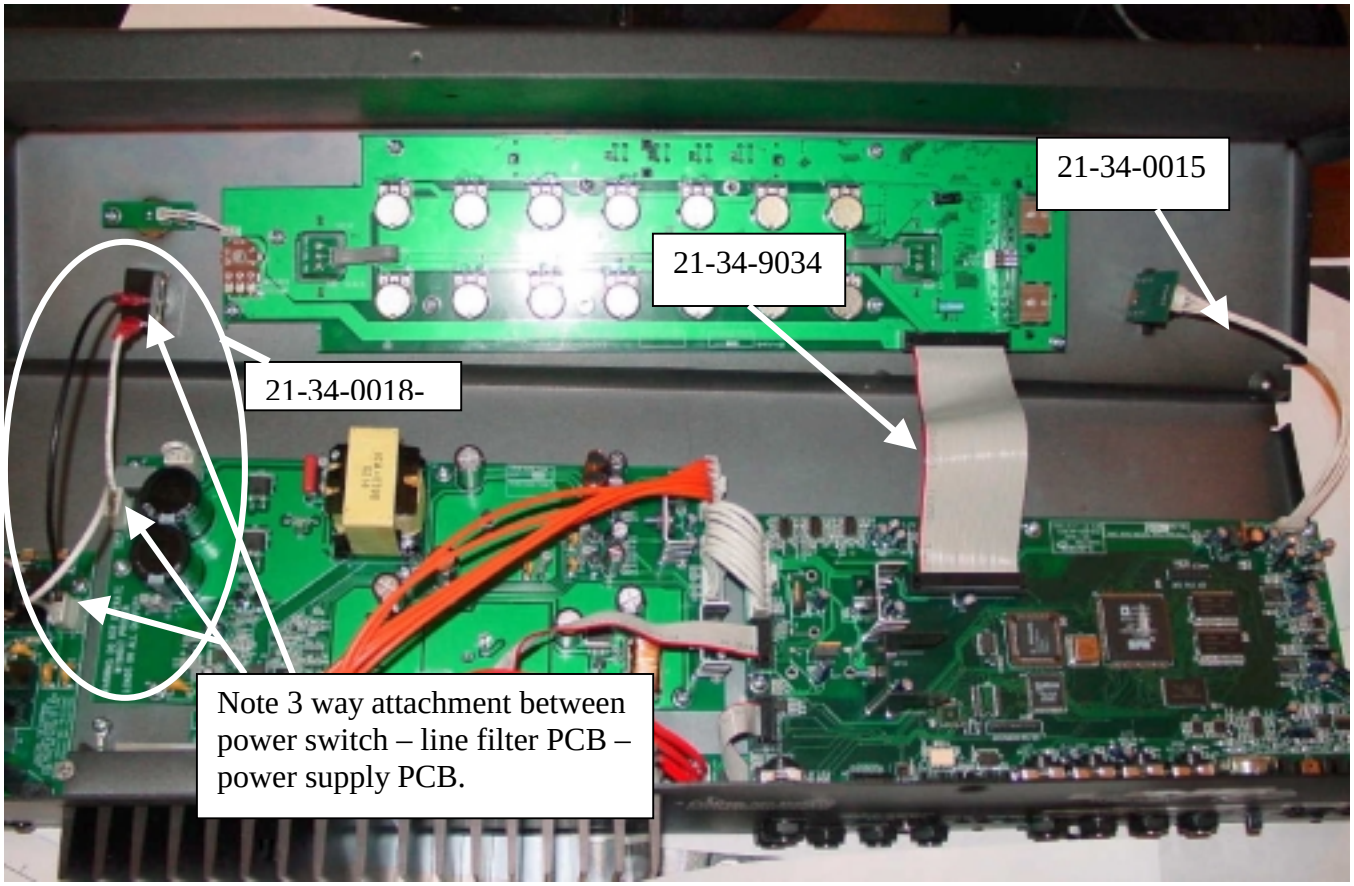
Completing the Head Assy

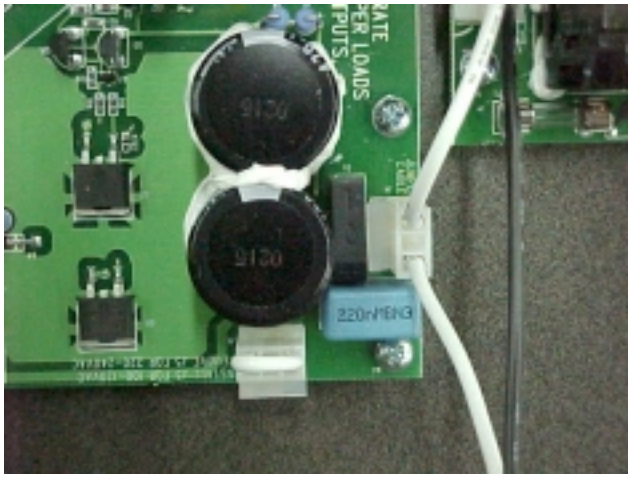


ITEM NO.	QTY.	LINE6 PART NO	DESCRIPTION
1	1	N/A (REF ASSY)	ASSY SUB - CHASSIS
2	1	N/A (REF ASSY)	ASSY SUB - CHASSIS COVER
3	4	30-00-0606	SCR, 6-32 X 7/16, PH, PN W/LK WASH, LB OXIDE FINISH
4	4	30-00-0607	SCR, 6-32 X 7/16, PH, PN W/LK WASH
6	1	21-34-9034	CA ASSY, MAIN - FRONT PANEL
7	1	21-34-0015	CA ASSY, GUITAR INPUT
8	1	21-34-0018-2	CA ASSY, MAIN POWER SWITCH
9	1	30-24-0003	ZIP TIE

Connect the cabling between the chassis and cover

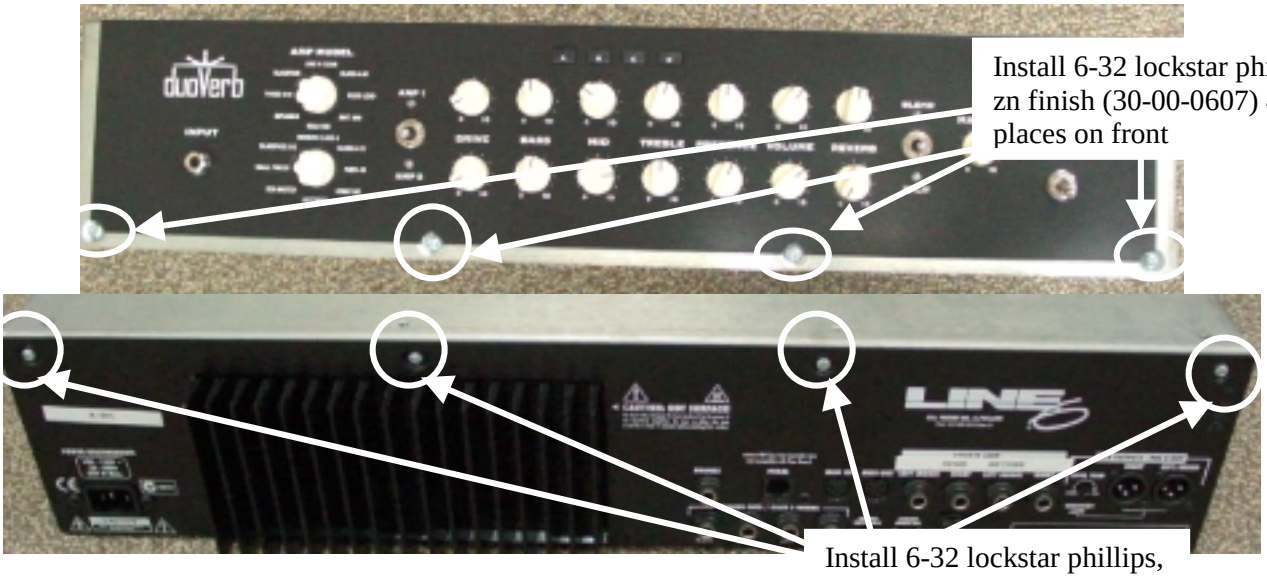
1. There are three cables that attached between the cover and the chassis assembly. See the figure below for cable identification and locations.





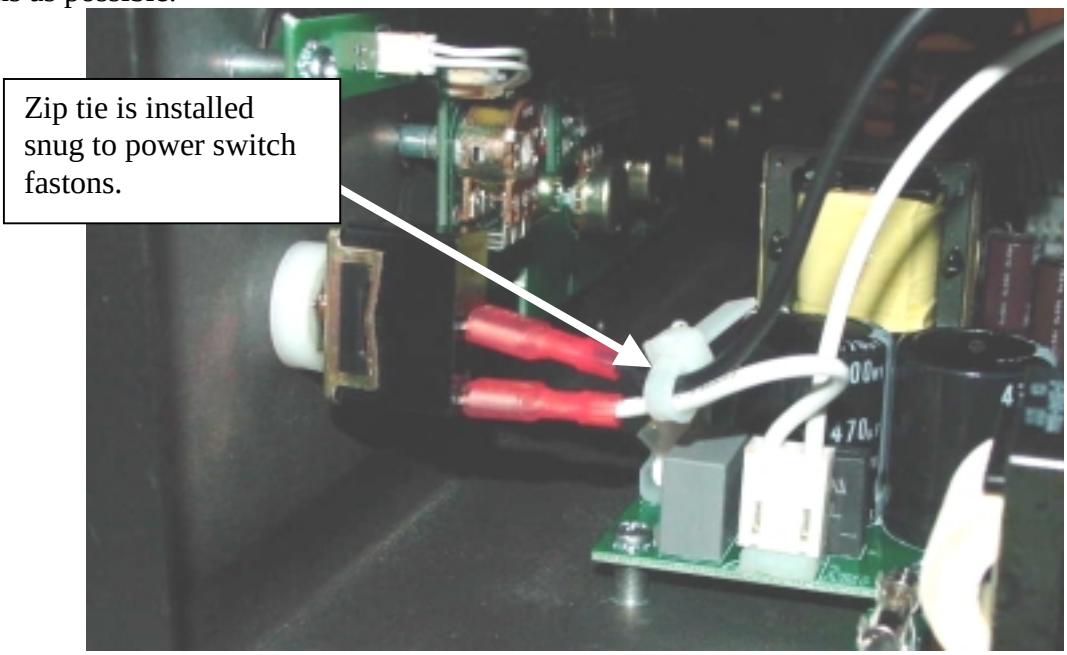
Secure the chassis to the cover

1. Place the cover over the chassis. Secure the front of the cover to the chassis using 4 6-32 captive lockstar pan head Philips screws, Zn finish (30-00-0607). Attach the back panel of the chassis to the back fold of the cover using 4 6-32 captive lockstar pan head Phillips, black oxide finish (30-00-0606). Torque 8-10 in/lbs.



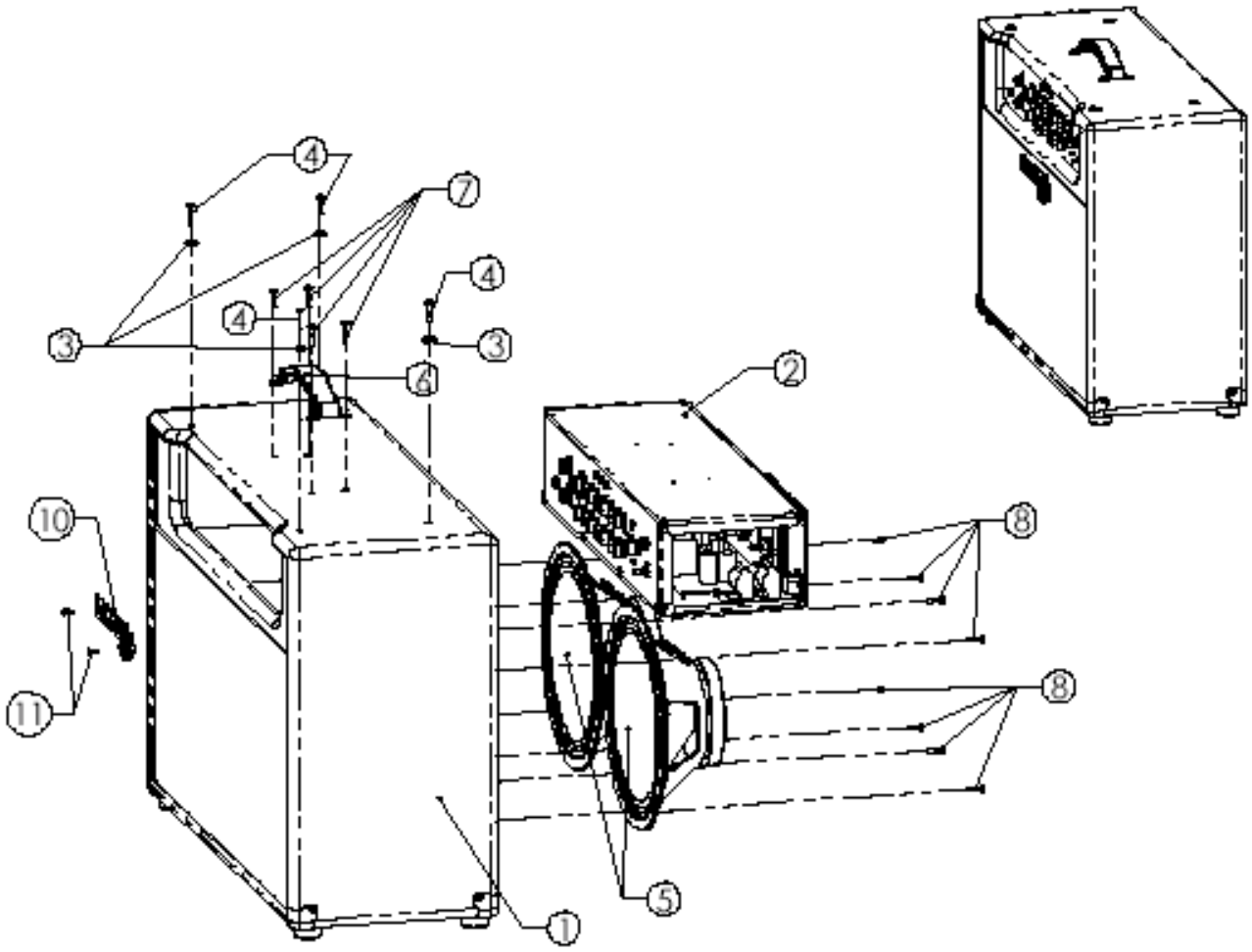
Secure the zip-tie to power switch cable

3. Secure a zip tie (30-24-0003) around the cables attached to the power switch. Push the zip tie as close to the fastons as possible.



End of section_____

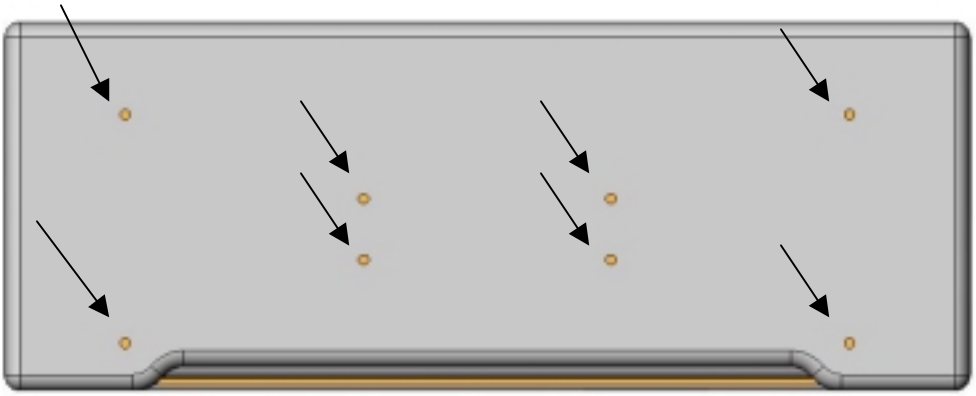
Completing the Combo 212 Unit



ITEM	QTY	LINE6 PART NO	DESCRIPTION
1	1	50-00-0131	ASSY FULL, SPEAKER CAB
2	1	50-00-0167	ASSY FULL – HEAD
3	4	30-03-0110	WASHER, FINISHING, #10, NICKEL
4	8	30-00-1032	SCR, 10-32 X 1.25, PH, OVAL, NICKEL
5	2	11-20-1212	SPEAKERS, CELESTION 100
6	1	30-57-0001	HANDLE STRAP
7	4	30-00-1032	SCR, 10-32 x 1.25" OVAL CTSK, PHH,NICK
8	8	30-00-0033	SCR, 10-24 X 7/8", PHIL, Truss, BL OXIDE
9	2	21-34-0028	CA ASSY, OUTPUT
10	1	30-60-0003	LOGO, LINE 6
11	2	30-00-9358	SCR #3 1/2"LG OVAL CTSK PHH
	1	40-25-0100	LABEL, BARCODE S/N 4 PANEL.

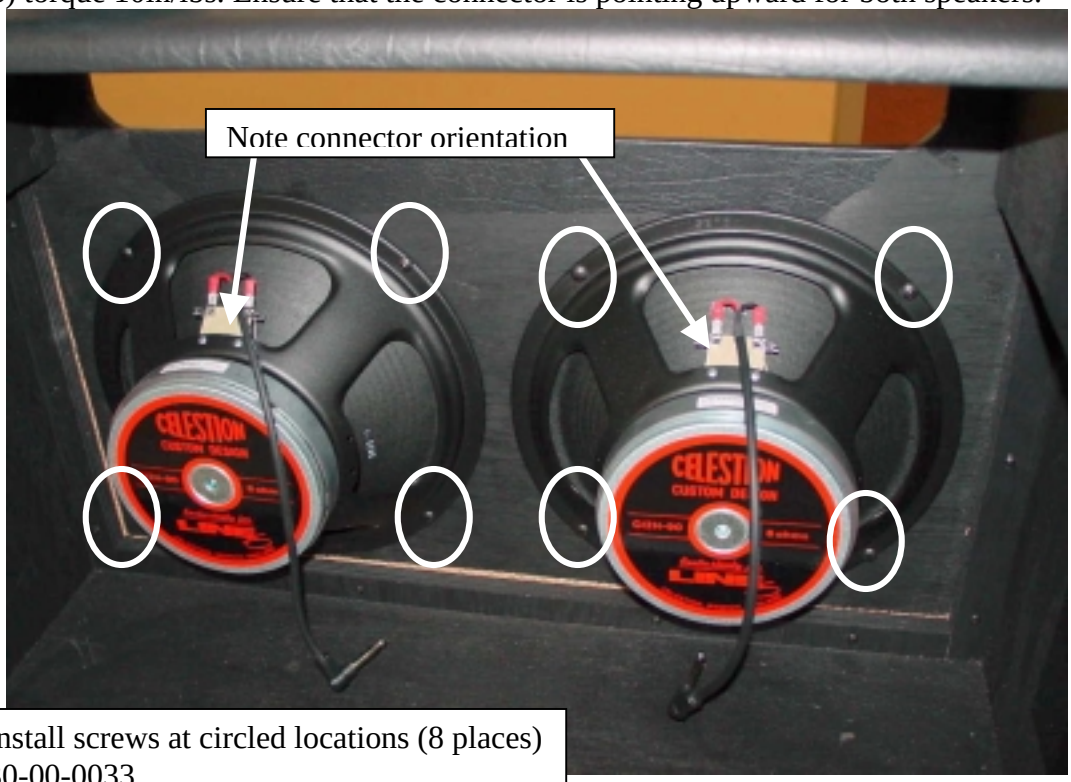
a) Punch the vinyl wrap

1. Punch the vinyl wrap covering the thought holes on the cover of the cabinet. (See arrows below) **REMOVE ANY EXCESS MATERIAL THAT MAY EXIST UNDER THE COVER THAT WOULD OBSTRUCT THE THOUGH HOLES.**



b)Install the speakers into the cabinet

1. Install the speakers into the cabinet using 8 black oxide #10-24 X 7/8 inch Truss head phillips screws (30-00-0033) torque 10in/lbs. Ensure that the connector is pointing upward for both speakers.

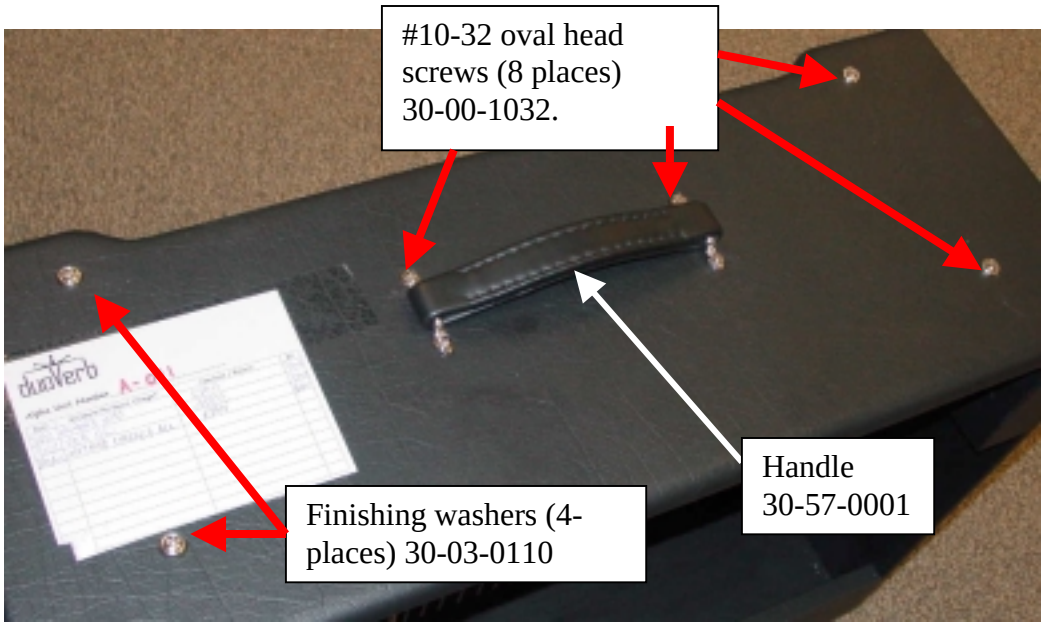


Install screws at circled locations (8 places)
30-00-0033

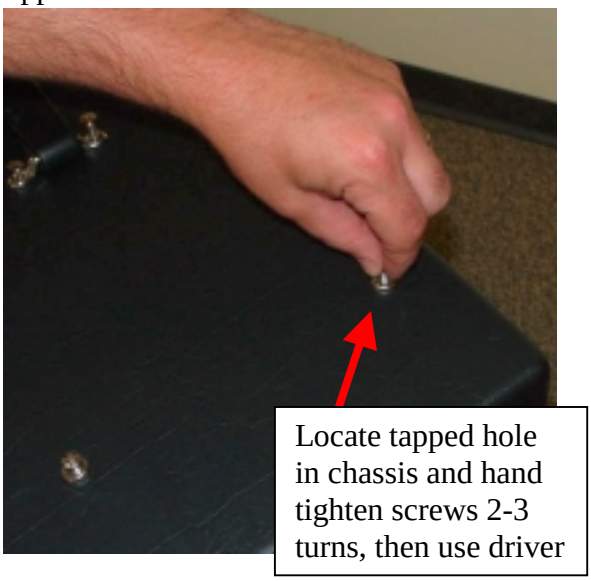
4. Install the 2 speaker cables (21-34-0028) onto the fastons as shown in the figure above.

c) Install handle, chassis and logo

1. Install chassis mounting hardware onto though holes. This includes 8 #10-32 nickel oval head Phillips screws (30-00-1032), 4 nickel finishing washers (30-03-0110) and the handle (30-57-0001). Inspect the underside of the cover to ensure that the threads on the screws are clear of any vinyl.



2. Install the chassis into the cabinet. Before hand tightening the screws, ensure that the chassis has cleared the screws and that the user interface panel is in contact with the front panel of the cabinet (see figure). When positioned, locate tapped holes in chassis and hand tighten screws 2 or 3 turns (see figure). When the screws are started, then use driver, torquing the screws to approx 12 in-lbs.



3. Install Line 6 logo (30-60-0003) to the front of the cabinet using 2 oval head screws (30-00-9358). The logo is positioned at the midline of the cabinet with the horizontal edge of the text positioned ½ inch below the horizontal piping (see figure).

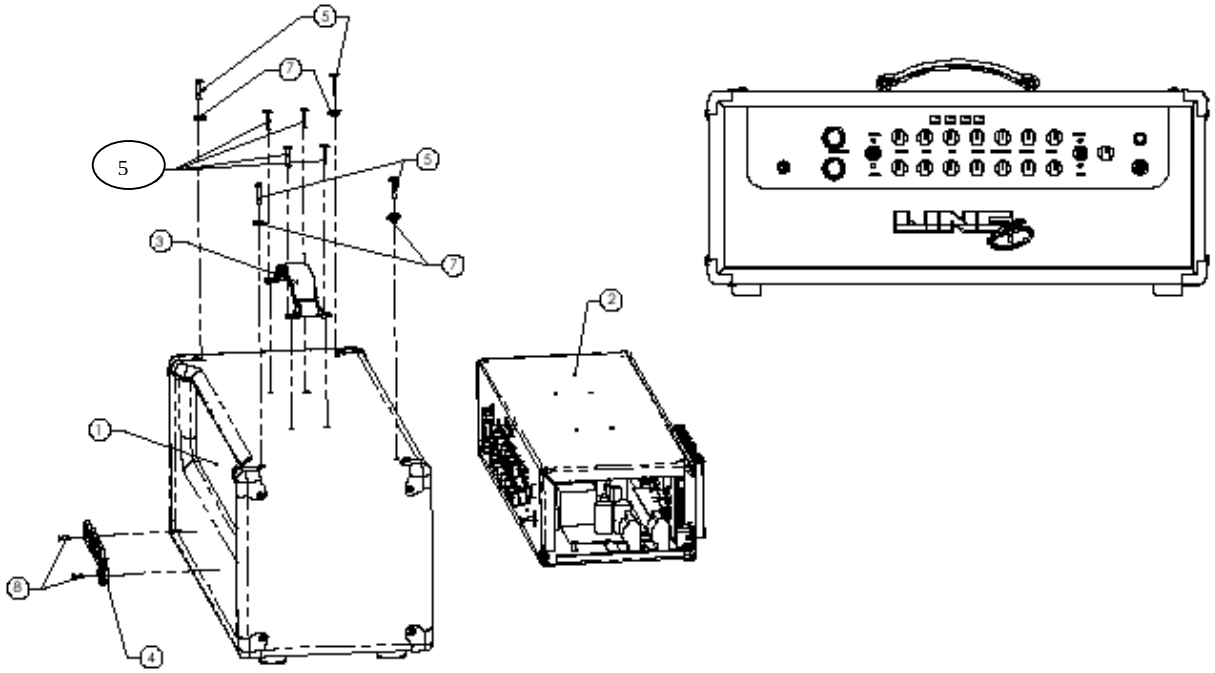
*** ALL KNOBS SHOULD BE SET TO ZERO FOR PACKOUT.**

PACK-OUT LIST (DuoVerb Combo)

1) 40-00-0074 SHEET ACCESSORY, INTL…….. (1 PER).
2) 40-25-0100 LABEL, BARCODE S/N, 4 PANEL ……..(1 PER).
3) 40-00-0002 CHART, PRESET DUET ……(1 PER).
4) 40-00-0171 MANUAL, USER, DUET ……(1 PER).
5) 40-20-0010 BAG, PLASTIC 43”x 38” x .004” CLEAR …… (1 PER).
6) 40-20-0011 BAG, PLASTIC 10”x 16” 2MIL ……(1 PER).
7) 50-00-0141 ASSY, PEDAL CHANNEL SWITCHER A-B … (1 PER).
8) I. 21-37-1163 CABLE POWER AU. ……..(1 PER) OR:
ii. 21-37-2067 CABLE , POWER EU. ……. (1 PER) OR:
iii. 21-37-1160 CABLE, POWER US/JA. . (1 PER) OR:
iv. 21-37-2068 CABLE, POWER UK. ….. (1 PER).
9) 40-10-0006B FOAM CORNER, BOTTOM …… (4 PER).
10) 40-10-0006T FOAM CORNER, TOP …… (4 PER).
11) 40-10-0023 CARTON, GIFT/SHIPPING DUET 212… (1 PER).

End of section

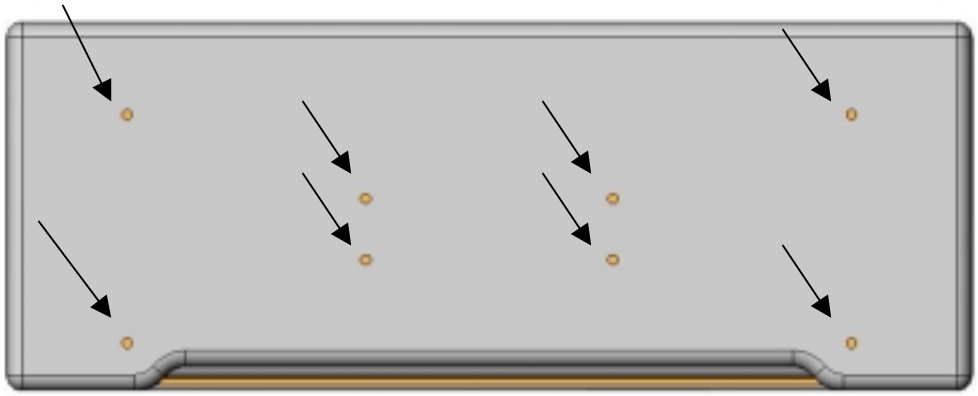
Completing the Head Unit



ITEM	QTY	LINE6 PART NO	DESCRIPTION
1	1	50-00-0191	ASSY, FULL, CABINET, HD, DUET
2	1	50-00-0167	ASSY FULL - HEAD
3	1	30-57-0001	HANDLE STRAP
4	1	30-60-0003	LOGO
5	8	30-00-1032	SCR, 10-32 x 1.25" OVAL CTSK, PHH,NICK
7	4	30-03-0110	WASHER, FINISHING, #10, NICKEL
8	2	30-00-9358	SCR #3 1/2"LG OVAL CTSK PHH
	1	40-25-0100	LABEL, BARCODE S/N 4 PANEL.

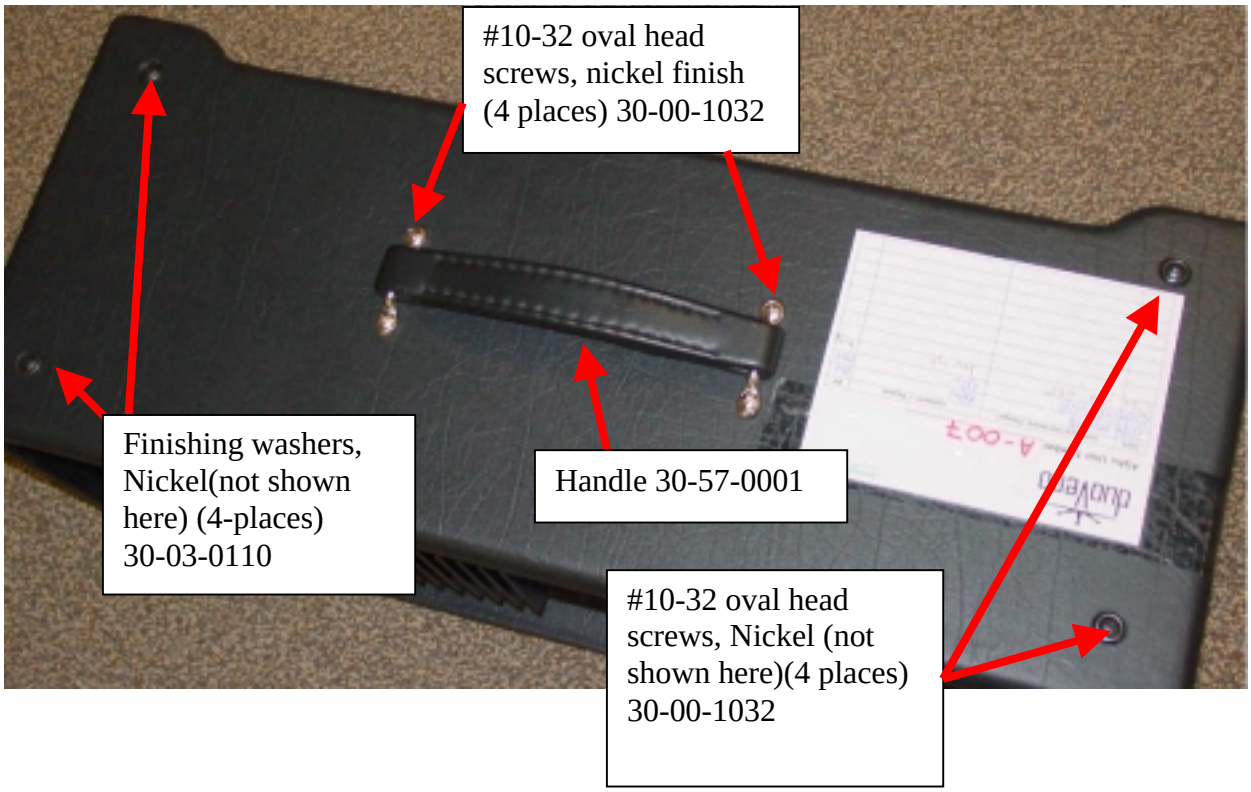
a) Punch the vinyl wrap

1. Punch the vinyl wrap covering the through holes on the cover of the cabinet. (See arrows below) **REMOVE ANY EXCESS MATERIAL THAT MAY EXIST UNDER THE COVER THAT WOULD OBSTRUCT THE THOUGH HOLES.**

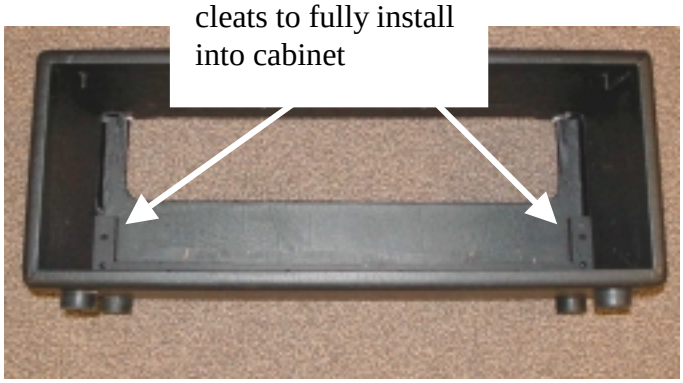


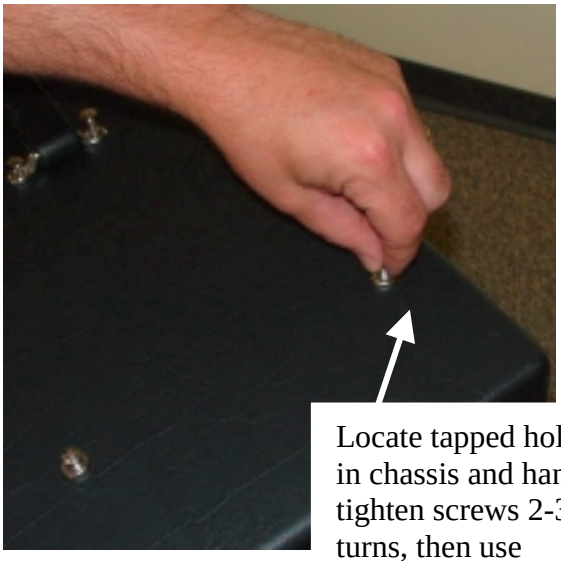
b) Install handle, chassis and logo

1. Install chassis mounting hardware onto though holes. This includes 8 #10-32 nickel oval head Phillips screws (30-00-1032), 4 Nickel finishing washers (30-03-0110) and the handle (30-57-0001). Inspect the underside of the cover to ensure that the threads on the screws are clear of any vinyl.



2. Install the chassis into the cabinet. The chassis will have to clear the cleats holding the front panel of the cabinet (see figure below left). Before hand tightening the screws, ensure that the chassis has cleared the screws and that the user interface panel is in contact with the front panel of the cabinet(see figure for step 2 from previous section for mounting chassis into combo cabinet). When positioned, locate tapped holes in chassis and hand tighten screws 2 or 3 turns (see figure below). When the screws are started, then use driver torquing the screws to approx 12 in-lbs.





3. Install logo (30-60-0003) to front panel using 2 self-tapping screws (30-00-9358). Position the logo at the midline of the unit, 1.5 inched below the user interface opening.

*** ALL KNOBS SHOULD BE SET TO ZERO FOR PACKOUT.**

End of section.

Test and Inspect the Completed Unit.

To help ensure maximum quality of all products, it is the responsibility of the assembler to complete a post assembly inspection prior to sending the unit on to electrical testing and final inspection. This should help achieve one goal: no unit shall ever be returned from test and inspection for rework because of a mechanical defect that could have been corrected at the assembly stage. Remember that things that have already been inspected during assembly may have been inadvertently damaged during the assembly process. With this in mind, fully inspect the unit for mechanical defects. Things to look for include:

- Cosmetic damage to any visible surface of the unit. This includes but is not limited to: defects to the silk-screening – both front and back panel, dents, dings or scratches in all outer surfaces, smooth even surface color of the front panel, even paint coverage and texture to the top cover, scratched or fingerprinted lenses, scratches or fingerprints on buttons, damage to button text or keycaps, and/or visible process marks on knobs and other plastic parts.

- Proper complete assembly of all parts. This includes but is not limited to: Presence of all parts, flush full insertion of all screws. Even consistent spacing of knobs, proper centering of lenses in cutouts, etc.

- Proper mechanical function of all components. This includes re-testing all knobs for smooth consistent feel, testing all buttons for proper feel.

- Add stickers for inspection, serial number and AC voltage.

If there is any question about the quality of a unit, consult a supervisor for guidance. If the unit passes assembly inspection, the unit is complete and ready to proceed to electrical testing, final inspection, pack and ship.

PACK-OUT LIST (DuoVerb HD)

1) 40-00-0074 SHEET ACCESSORY, INTL…….. (1 PER).
2) 40-25-0100 LABEL, BARCODE S/N, 4 PANEL ……..(1 PER).
3) 40-00-0002 CHART, PRESET DUET ……(1 PER).
4) 40-00-0171 MANUAL, USER, DUET ……(1 PER).
5) 40-20-0010 BAG, PLASTIC 43”x 38” x .004” CLEAR …… (1 PER).
6) 40-20-0011 BAG, PLASTIC 10”x 16” 2MIL ……(1 PER).
7) 50-00-0141 ASSY, PEDAL CHANNEL SWITCHER A-B … (1 PER).
8) I. 21-37-1163 CABLE POWER AU. ……..(1 PER) OR:
ii. 21-37-2067 CABLE , POWER EU. ……. (1 PER) OR:
iii. 21-37-1160 CABLE, POWER US/JA. . (1 PER) OR:
iv. 21-37-2068 CABLE, POWER UK. ….. (1 PER).
9) 40-10-0006T FOAM CORNER, TOP …… (8 PER).
10) 40-10-0024 CARTON, GIFT/SHIPPING DUET HD… (1 PER).

END OF DOCUMENT.