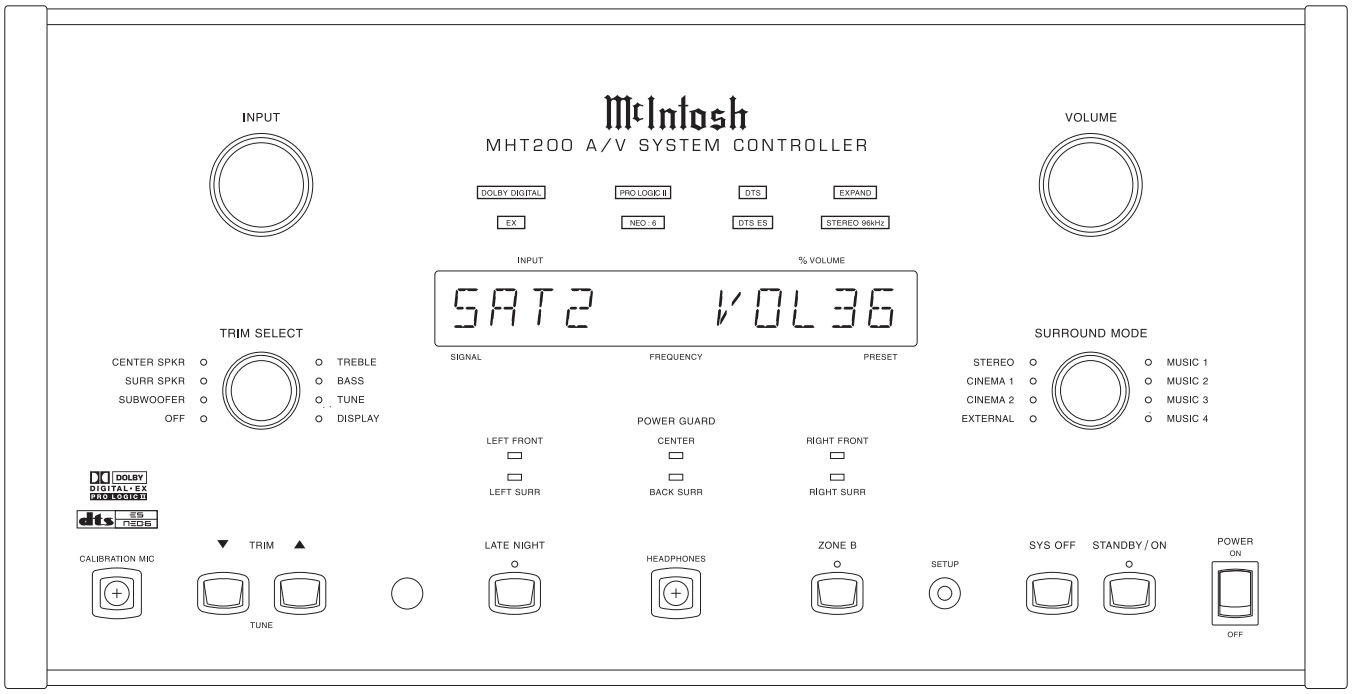
MHT200

A/V SYSTEM CONTROLLER



CONTENTS

SERVICE MANUAL

PERFORMANCE SPECIFICATIONS

Preamplifier and Processor Specifications

Frequency Response
Stereo:
Left and Right Loudspeakers: +0-0.5dB from 20Hz-20,000Hz

Music 1-4:
Left, Center, Right Loudspeakers: +0-0.5dB from 20Hz-20,000Hz
Large Surround Loudspeakers: +0-0.5dB from 20Hz-20,000Hz

Pro-Logic:
Left, Center, Right, Large Loudspeakers: +/-0.5dB from 20Hz-20,000Hz
Large Surround Loudspeakers: +1-3dB from 20Hz-6.3kHz
Subwoofer[1]: 20Hz-140Hz

Dolby Digital, DTS and External Input:
Left, Center, Right Large Loudspeakers: +/-0.5dB from 20Hz-20,000Hz
Large Surround Loudspeakers: +/-0.5dB from 20Hz-20,000Hz
Subwoofer[1]: 20Hz-140Hz

Rated Output
2V for all channels

Input Impedance
22k ohms

Output Impedance
Less than 560 ohms for all channels

Maximum Output Voltage
8V

Total Harmonic Distortion
0.05% for all channels

Sensitivity
Analog Input: 100mV IHF
Dolby Level: 200mV Input
External Input: 200mV for 2.0V Output

Signal To Noise Ratio
Greater than 90dB A-weighted

Maximum Input Signal
Analog Input: 6Vrms

Tone Controls
+/-12dB from the flat setting

[1] If any of the channels have the Loudspeaker Setting of Small, the subwoofer has a electronic low pass filter with a corner frequency of 80Hz and a 24dB per Octave roll-off in all modes except external. The Frequency Response of the Subwoofer Channel is also determined by the Crossover Setting.

Power Amplifier Specifications

Power Output
Minimum sine wave continuous average power output per channel, all channels operating is: 100 watts into 4 ohm load, 70 watts into a 8 ohm load

Rated Power Band
20Hz to 20,000Hz

Total Harmonic Distortion
Maximum Total Harmonic Distortion at any power level from 250 milliwatts to rated power output is: 0.05% for 4 or 8 ohm load

Dynamic Headroom
1.8dB

Frequency Response
+0, -0.25dB from 20Hz to 20,000Hz
+0, -3dB from 10Hz to 1000,000Hz

Sensitivity
1.0 Volt

A-Weighted Signal To Noise Ratio
92dB (112dB below rated output)

Intermodulation Distortion
Maximum Intermodulation Distortion if instantaneous peak output per channel does not exceed twice the rated output, for any combination of frequencies from 20Hz to 20,000Hz, with all channels operating is: 0.05% for 4 or 8 ohm loads

Input Impedance
20,000 ohms

Wide Band Damping Factor
100 at 4 ohms
200 at 8 ohms

General Specifications

Power Requirements
100 Volts, 50/60Hz at 8.4 Amps
110 Volts, 50/60Hz at 7.7 Amps
120 Volts, 50/60Hz at 7.0 Amps
220 Volts, 50/60Hz at 3.5 Amps
230 Volts, 50/60Hz at 3.5 Amps
240 Volts, 50/60Hz at 3.5 Amps
Note: Refer to rear panel of the MHT200 for the correct voltage.

Dimensions
Front Panel: 17-3/4 inches (45.09cm) wide, 9-7/16 inches (23.97cm) high. Depth behind front mounting panel is 19 inches (48.26cm) including clearance for connectors. Panel clearance required in front of mounting panel is 1-1/8 inches (2.9cm).

Weight
73 pounds (33.1kg) net, 87 pounds (39.5kg) shipping

PERFORMANCE SPECIFICATIONS con't

FM Tuner

Useable Sensitivity
14dBF which is 1.4uV across 75 ohms

50dB Quieting Sensitivity
Mono: 19dBF which is 2.4uV across 75 ohms
Stereo: 35dBF which is 15uV across 75 ohms

Signal To Noise Ratio
Mono: 75dB
Stereo: 70dB

Frequency Response
Mono: +0, -1dB from 20Hz to 15,000Hx
Stereo: +0, -1dB from 20Hz to 15,000Hz

Harmonic Distortion
Mono: 0.3% at 100Hz, 0.3% at 1,000Hz, 0.3% at 10,000Hz
Stereo: 0.45% at 100Hz, 0.45% at 1,000Hz, 0.65% at 10,000Hz

Intermodulation Distortion
Mono: 0.25%
Stereo: 0.45%

Capture Ratio
1.2dB

Alternate Channel Selectivity
75dB

Spurious Response
100dB

Image Response
75dB

RF Intermodulation
65dB

Stereo Separation
45dB at 100Hz
45dB at 1,000Hz
35dB at 10,000Hz

SCA Rejection
65dB

AM Tuner

Sensitivity
20uV External Antenna Input

Signal To Noise Ratio
48dB at 30% modulation
58dB at 100% modulation

Harmonic Distortion
0.5% maximum at 50% modulation

Frequency Response
50Hz to 6kHz NRSC

Adjacent Channel Selectivity
45dB minimum IHF

Image Rejection
65dB minimum from 540Hz to 1,600kHz

IF Rejection
80dB minimum

NOTES

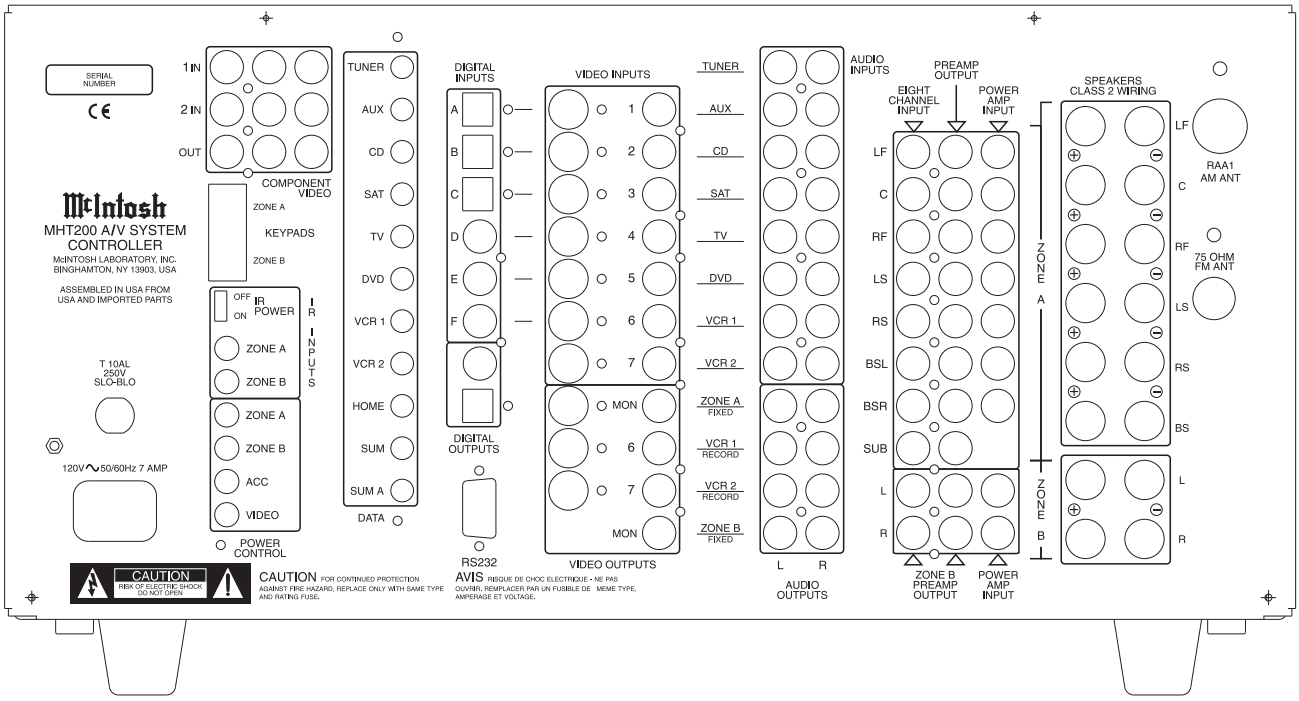
1. The heavy lines on the schematic denote the primary signal path.

2. Unless otherwise noted, all voltages indicated on the schematics are measured under the following conditions:
   a. AC input at 120 volts, 50/60Hz.
   b. All voltages are +/-10% with respect to ground. A high impedance (10 megaohm) voltmeter must be used.

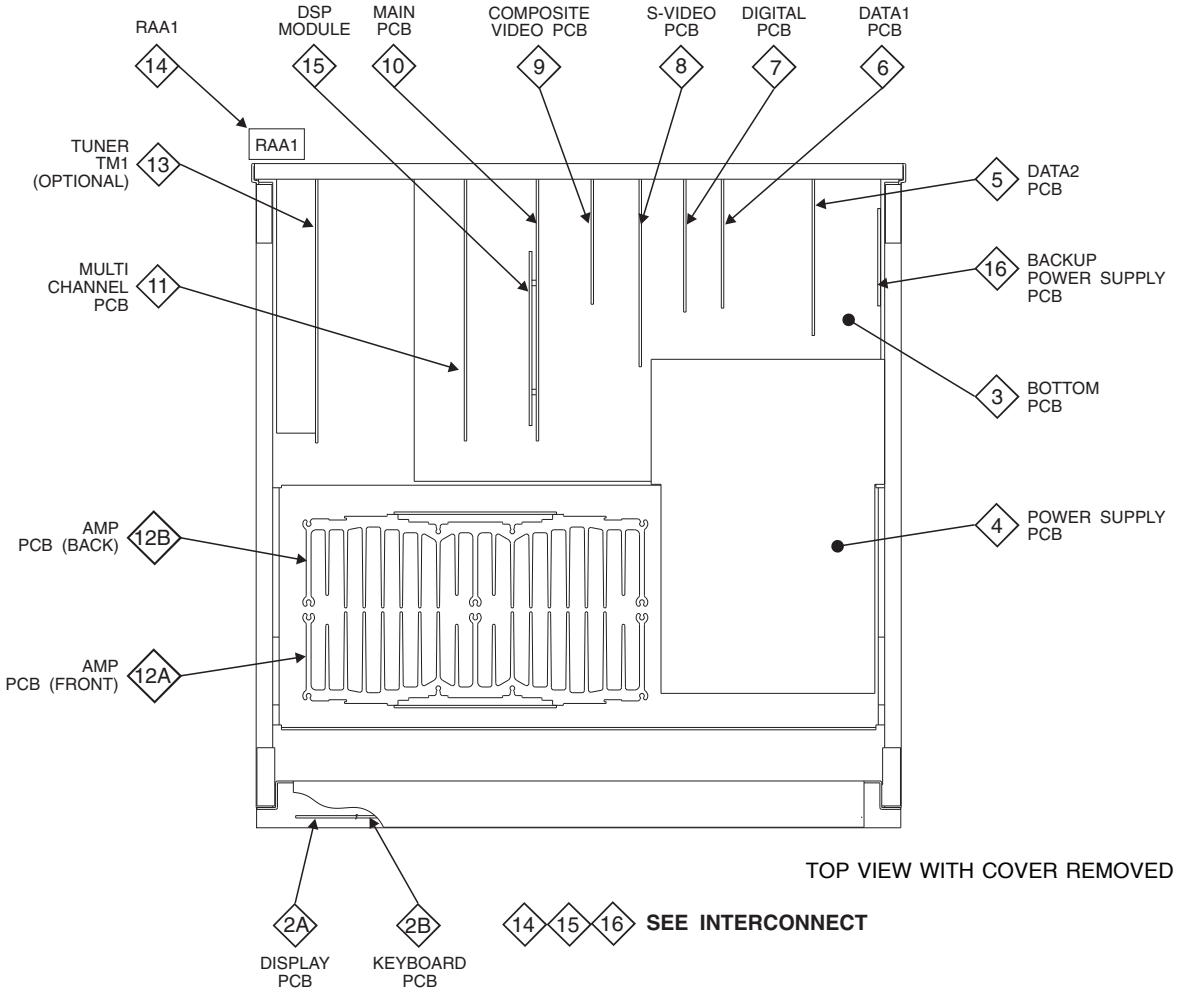
4. On PC board drawings, Square pad indicates:
   a. Polarized Capacitors - Positive
   b. Diodes - Cathode
   c. Others - Pin 1

5. **WARNING**
   Parts marked with the symbol ⚠ have critical characteristics. Use only replacement parts recommended by the manufacturer.

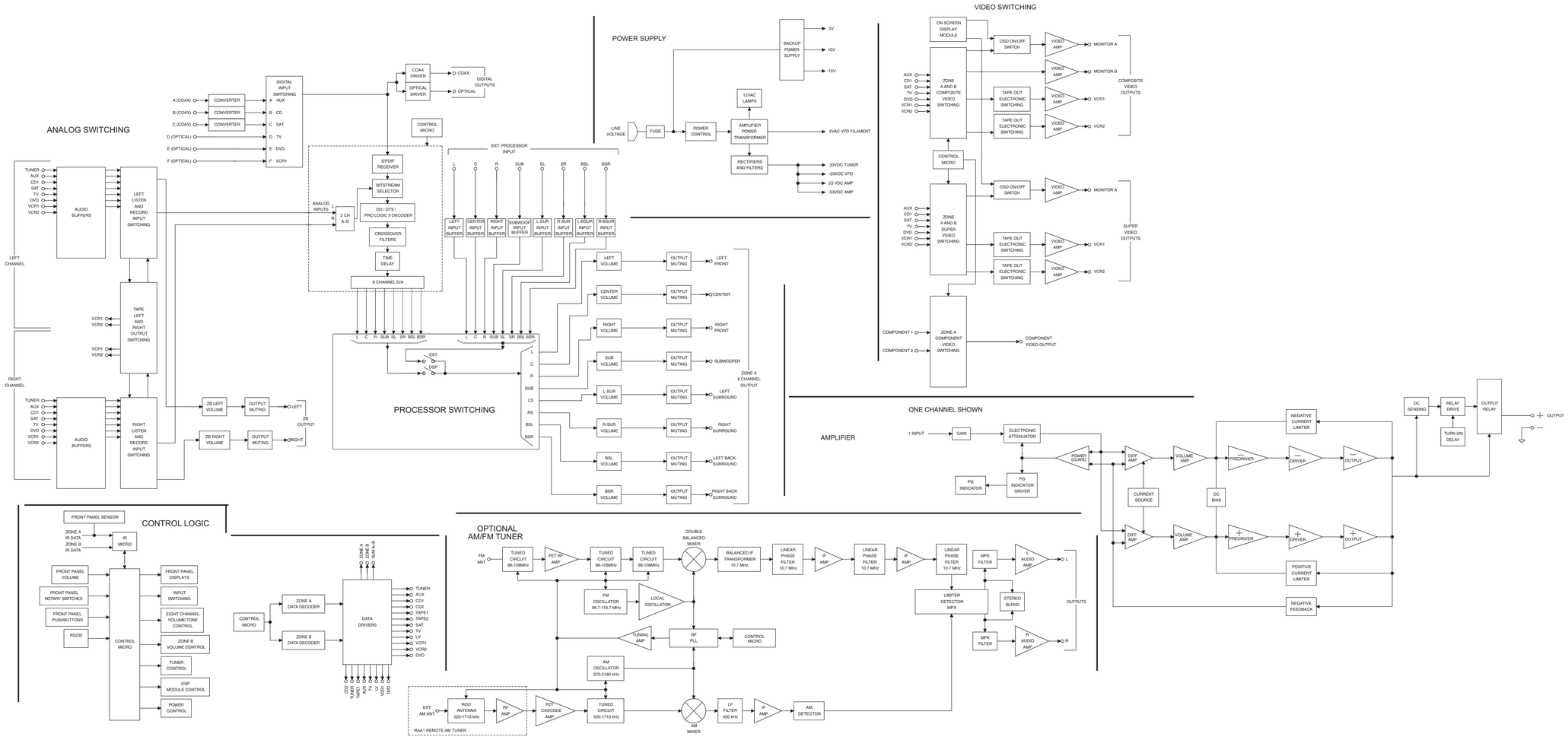
REAR PANEL



SECTION LOCATIONS

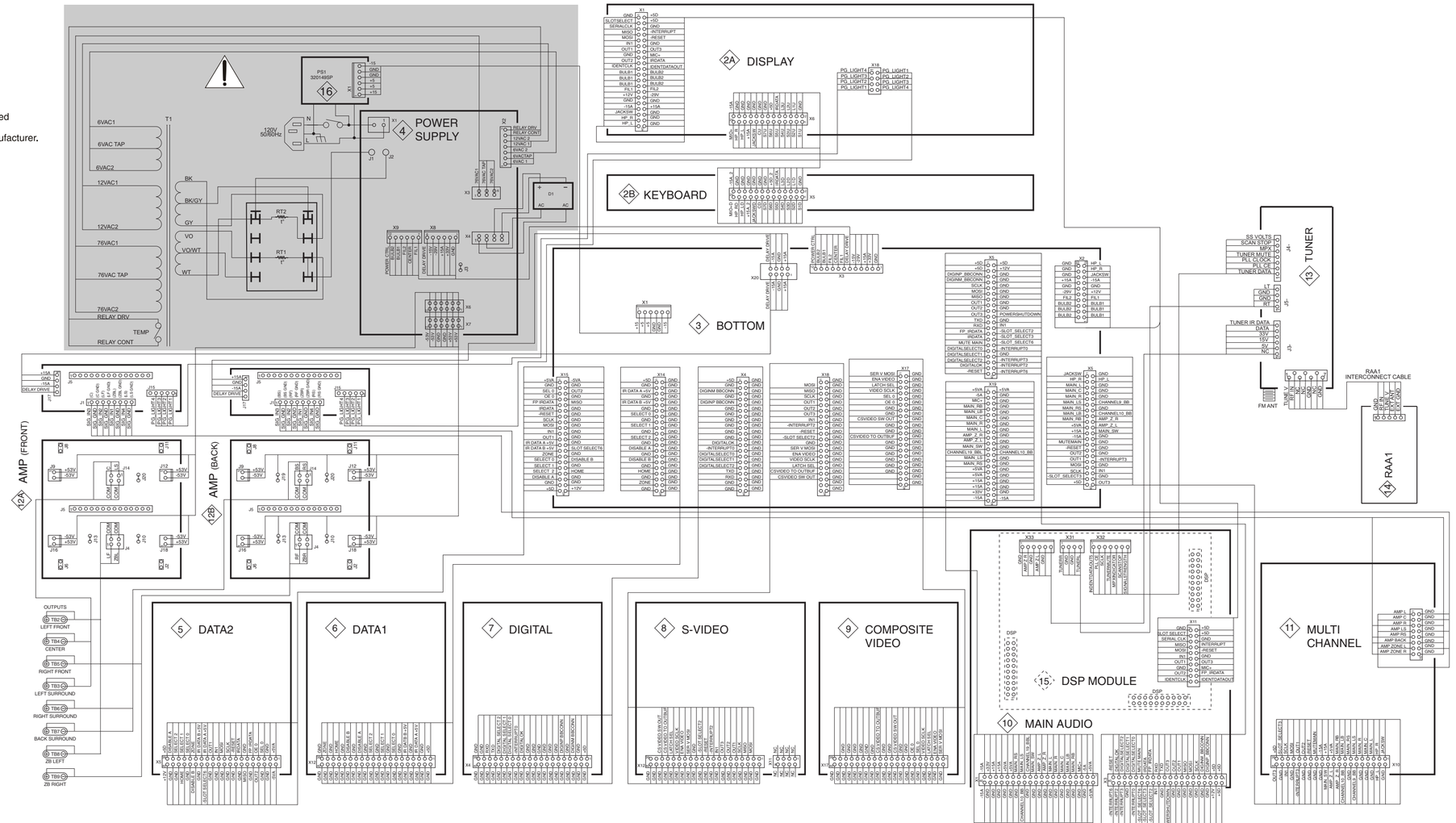


BLOCK DIAGRAM

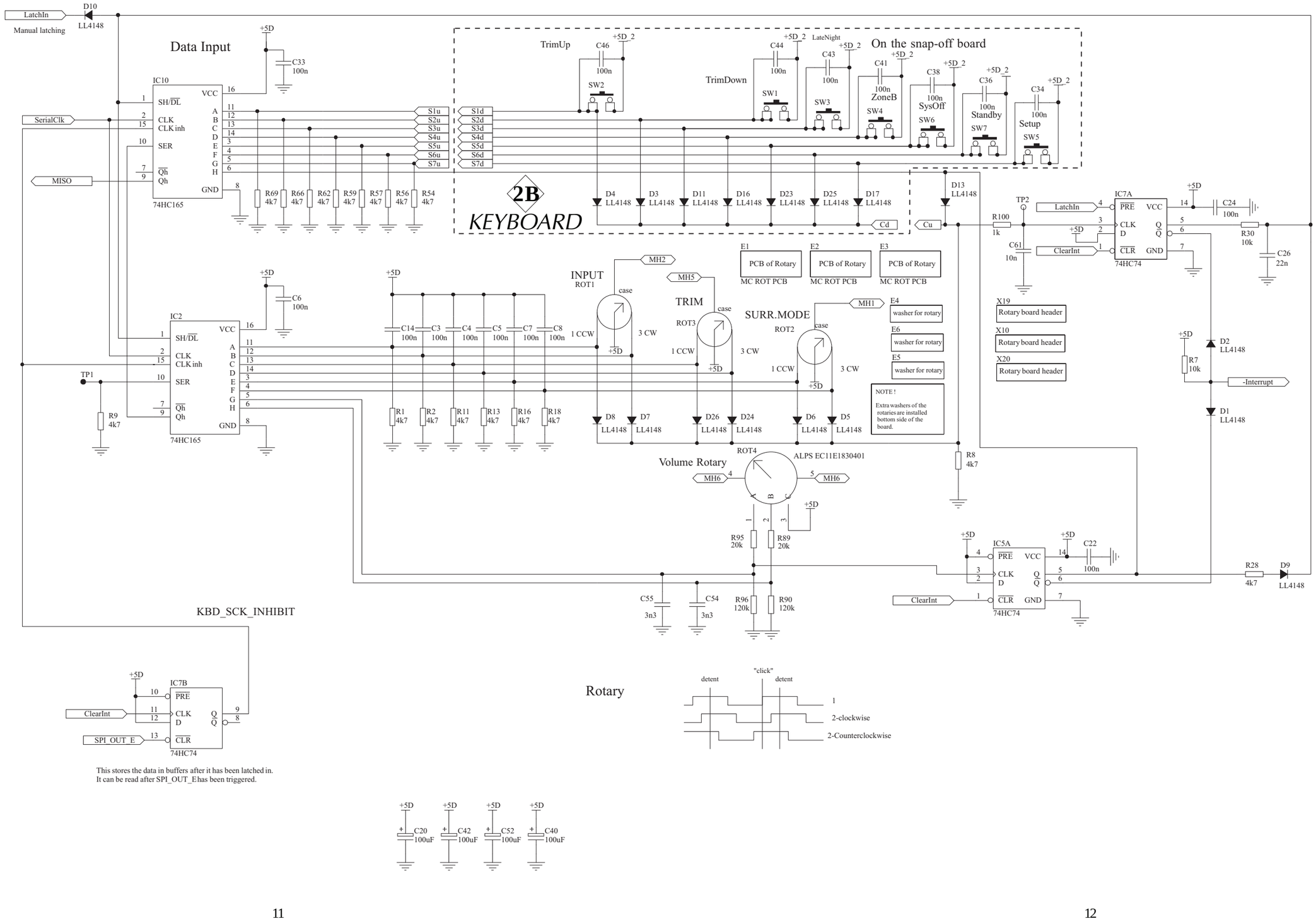


1 INTERCONNECT

WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.

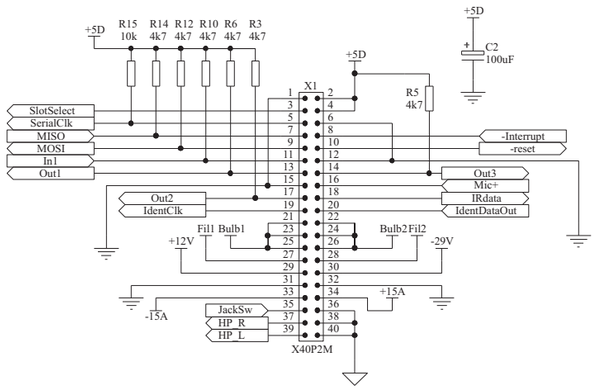


2A DISPLAY 320167 SH 1 OF 4

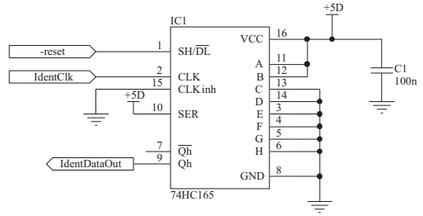


2A DISPLAY 320167 SH 2 OF 4

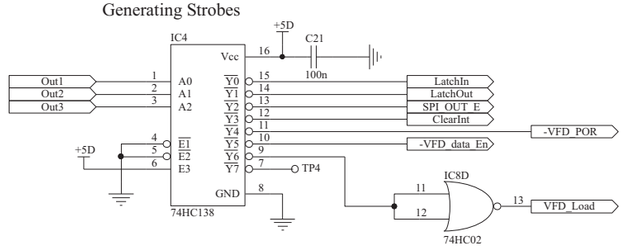
Standard Slot Circuits: Slot + power + HP connector

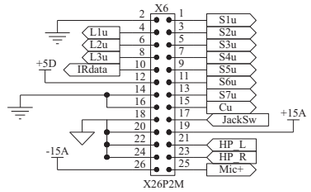


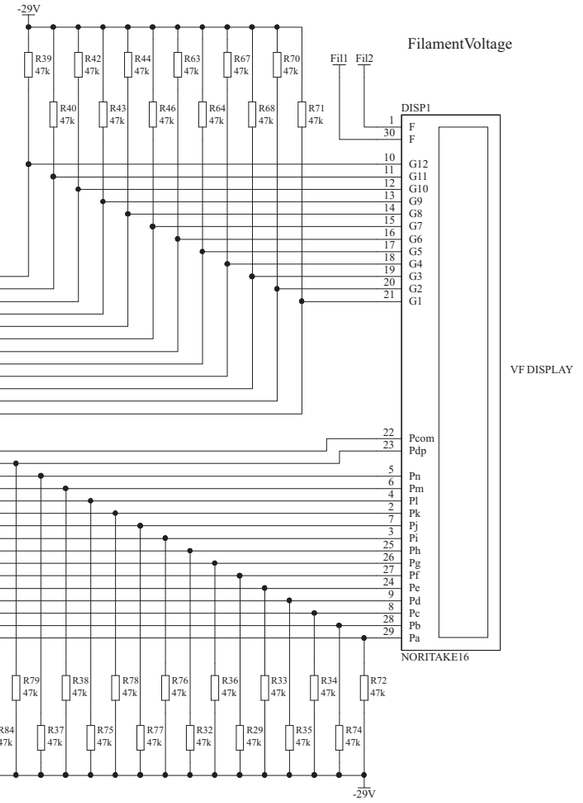
Slot Identification circuit

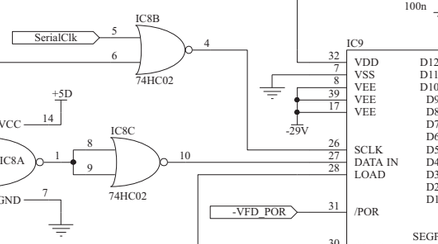


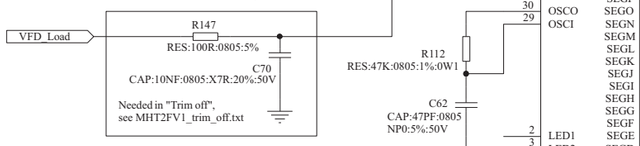
Generating Strobes



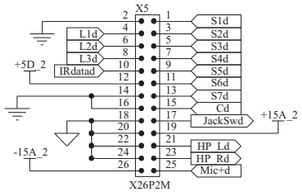






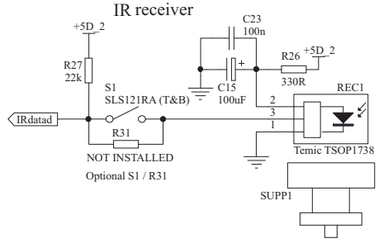


On the snap-off board

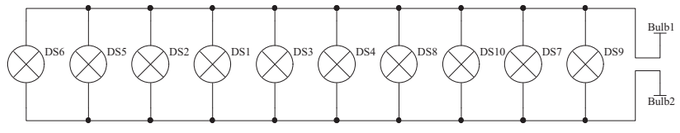


2B KEYBOARD

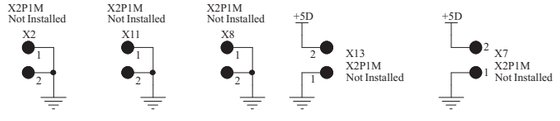
IR receiver



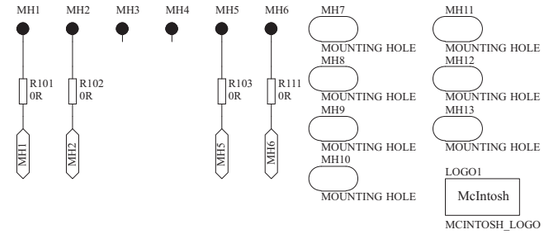
Light bulbs



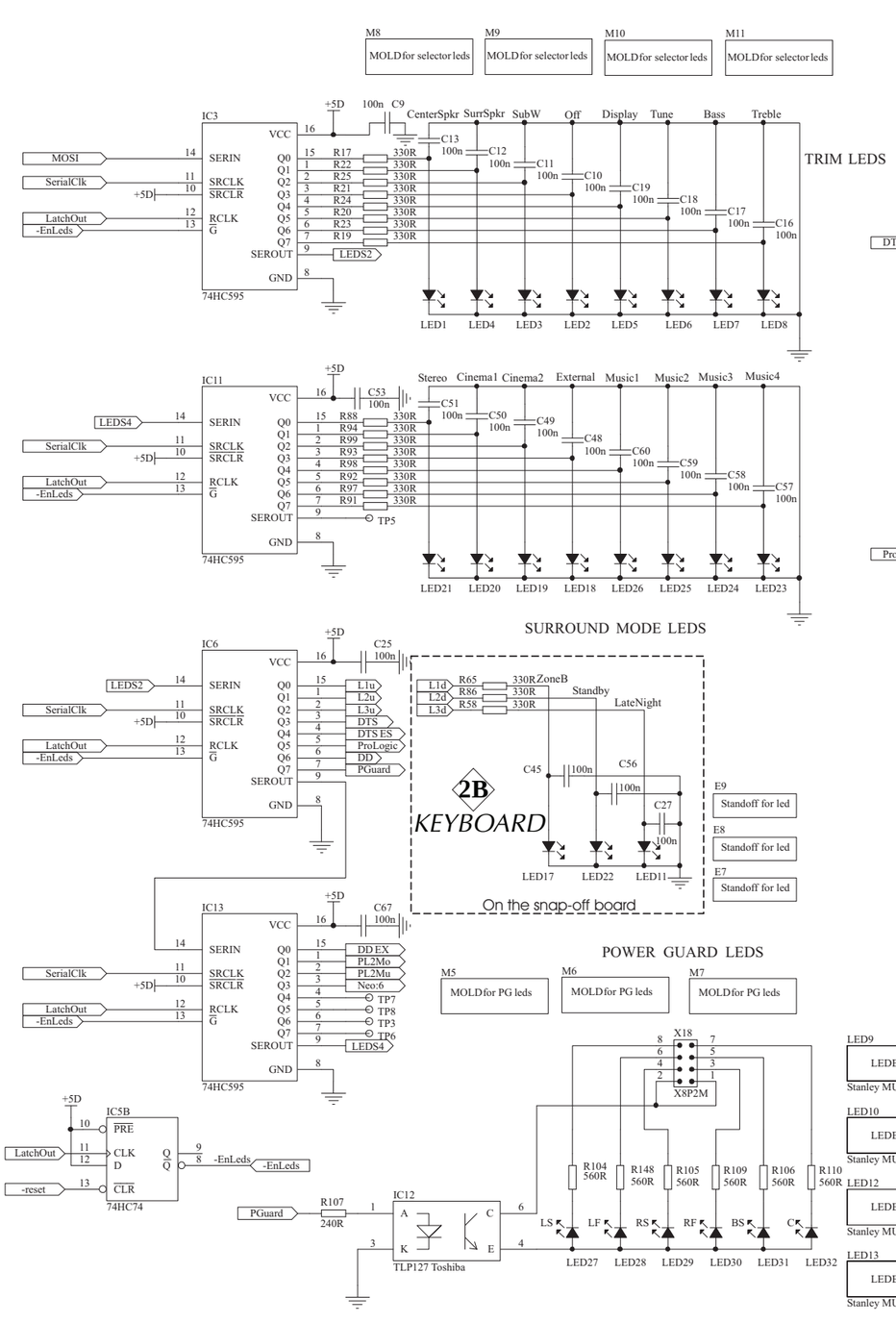
Scope hooks, power for prototyping etc.



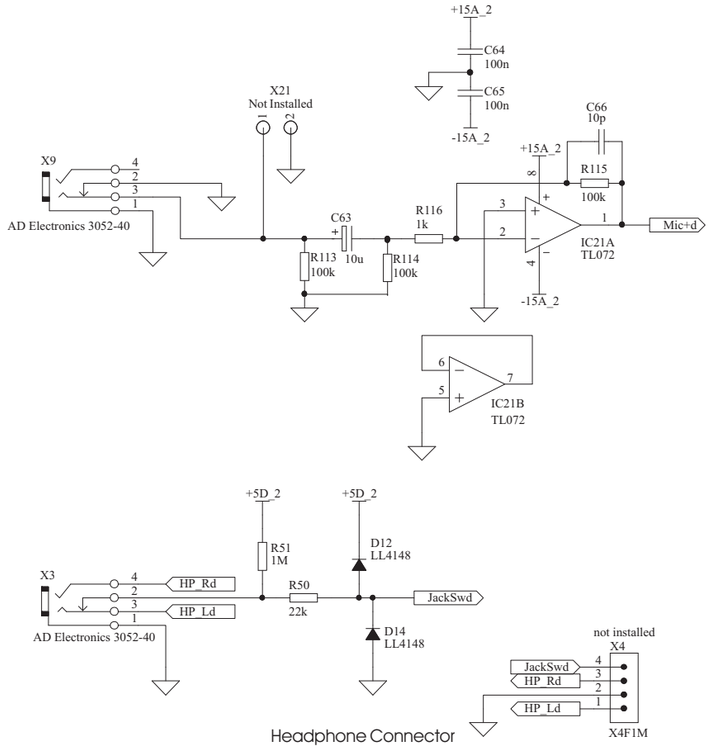
Mounting holes



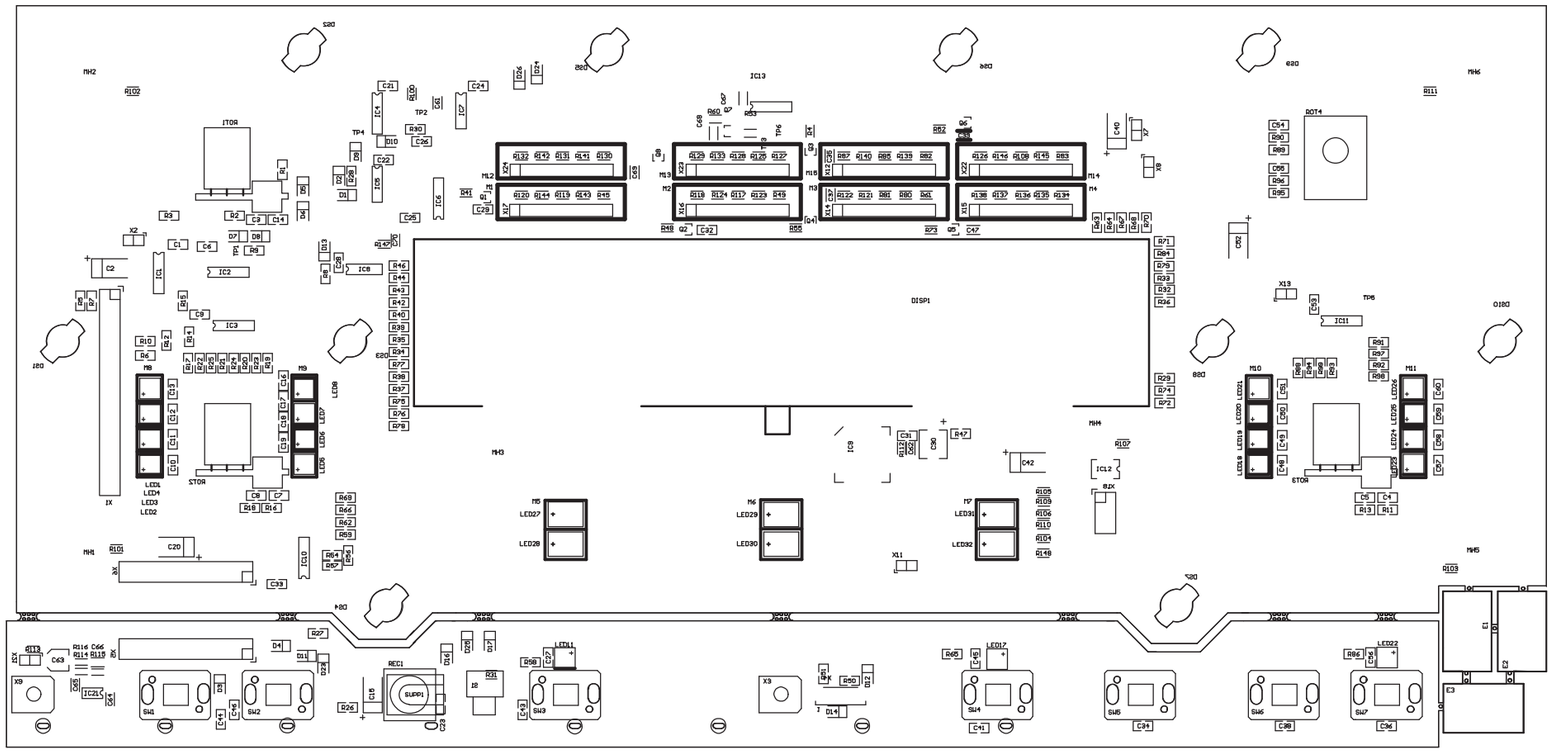
2A DISPLAY 320167 SH 3 OF 4



2A *DISPLAY* *320167 SH 4 OF 4 AND* *PCB*

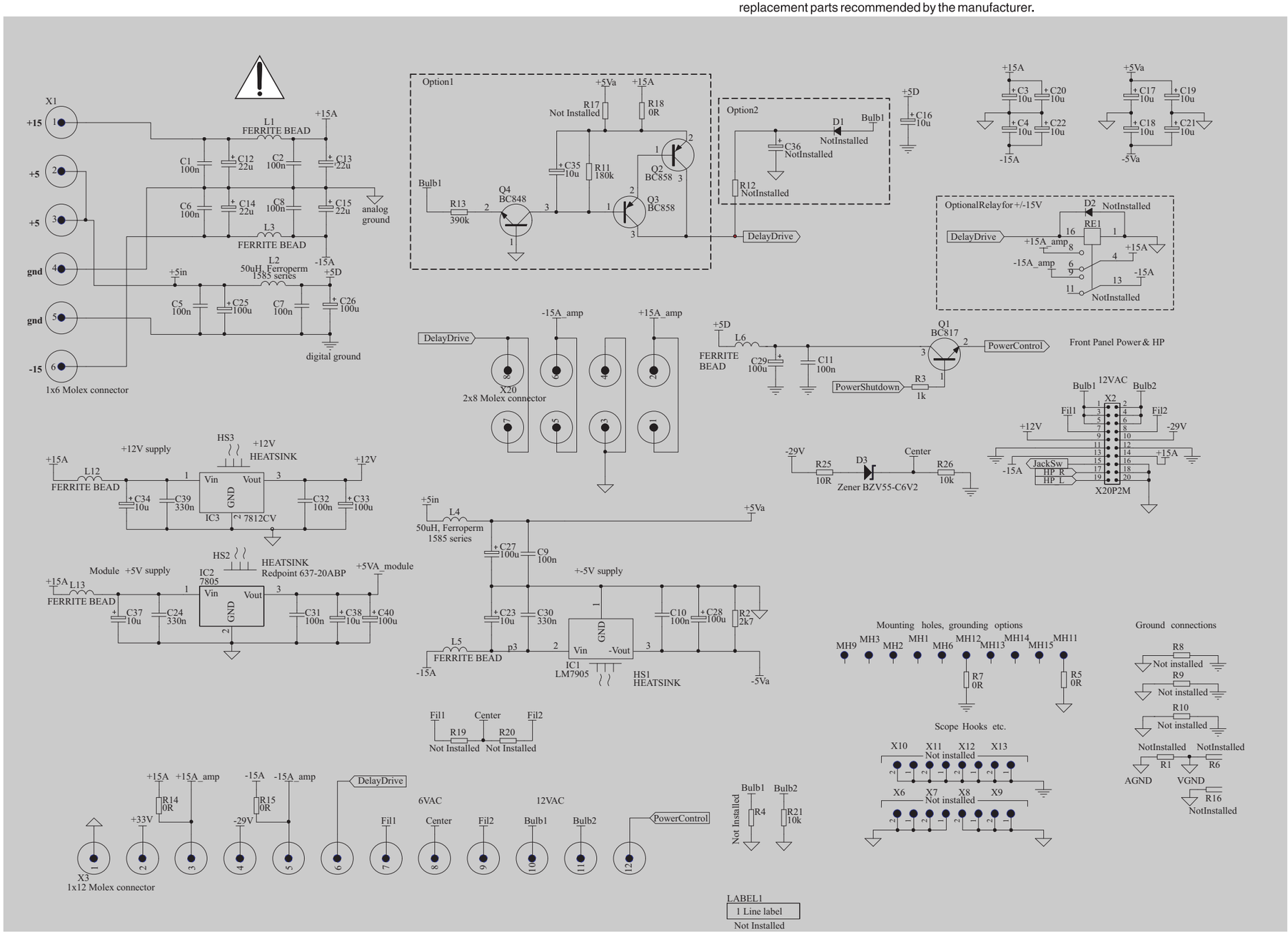


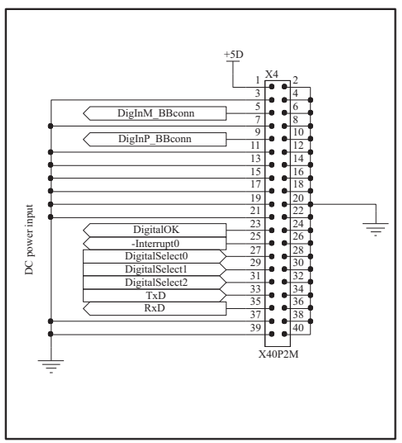
2B *KEYBOARD* *320167*



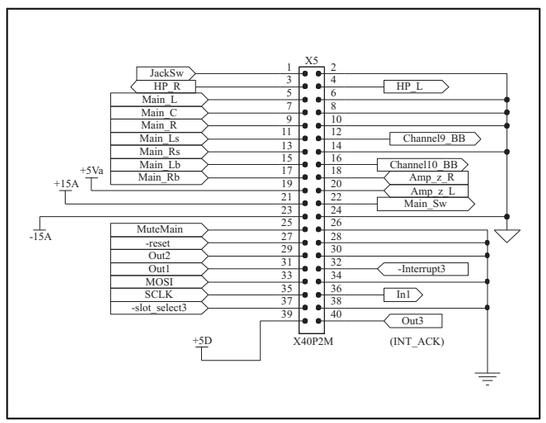
3 BOTTOM 320168 SH 1 OF 2

WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.

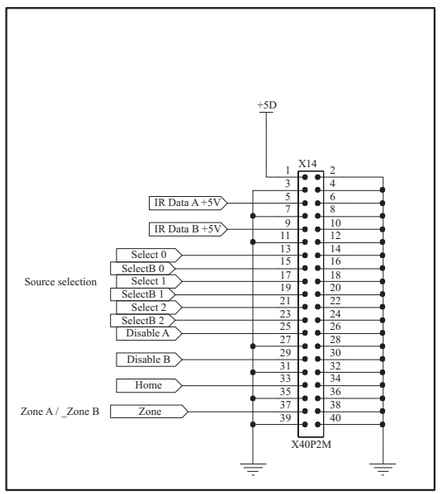




Digital Board

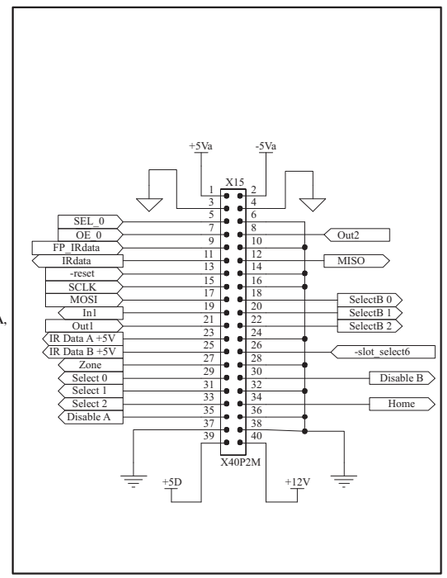


Multichannel Board

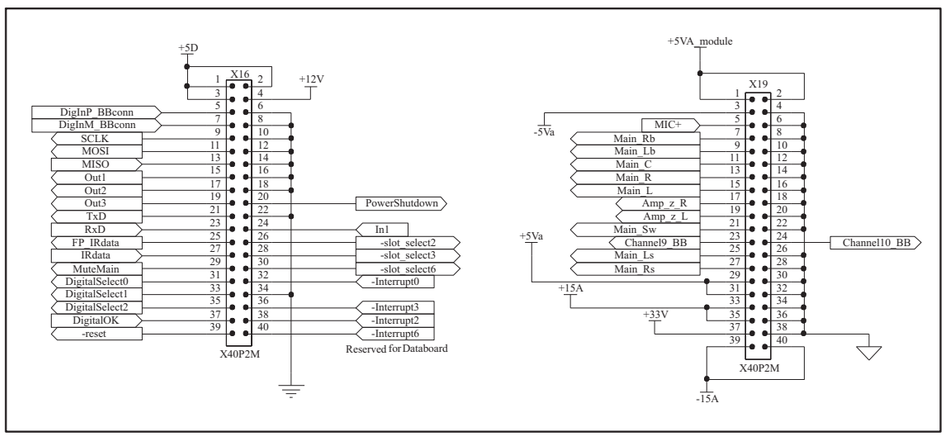


DataBoard_1

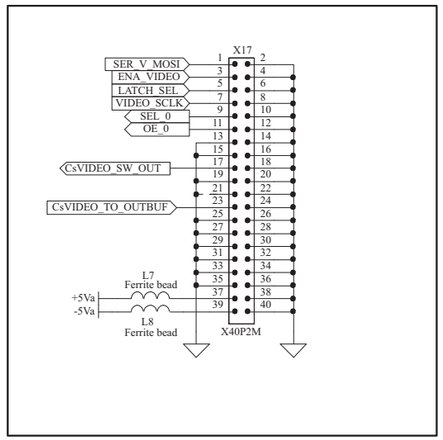
Zone info, +5V=Zone A, 0V=ZoneB



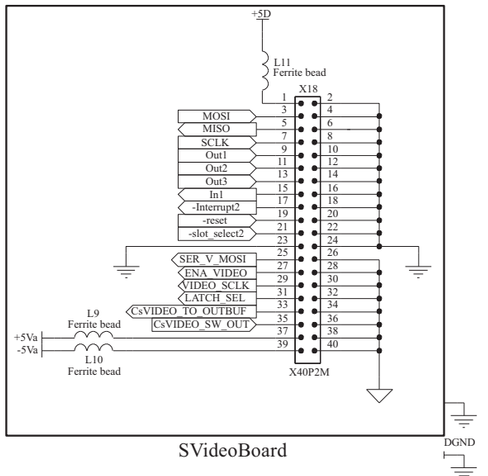
Databoard2



Main Audio Board

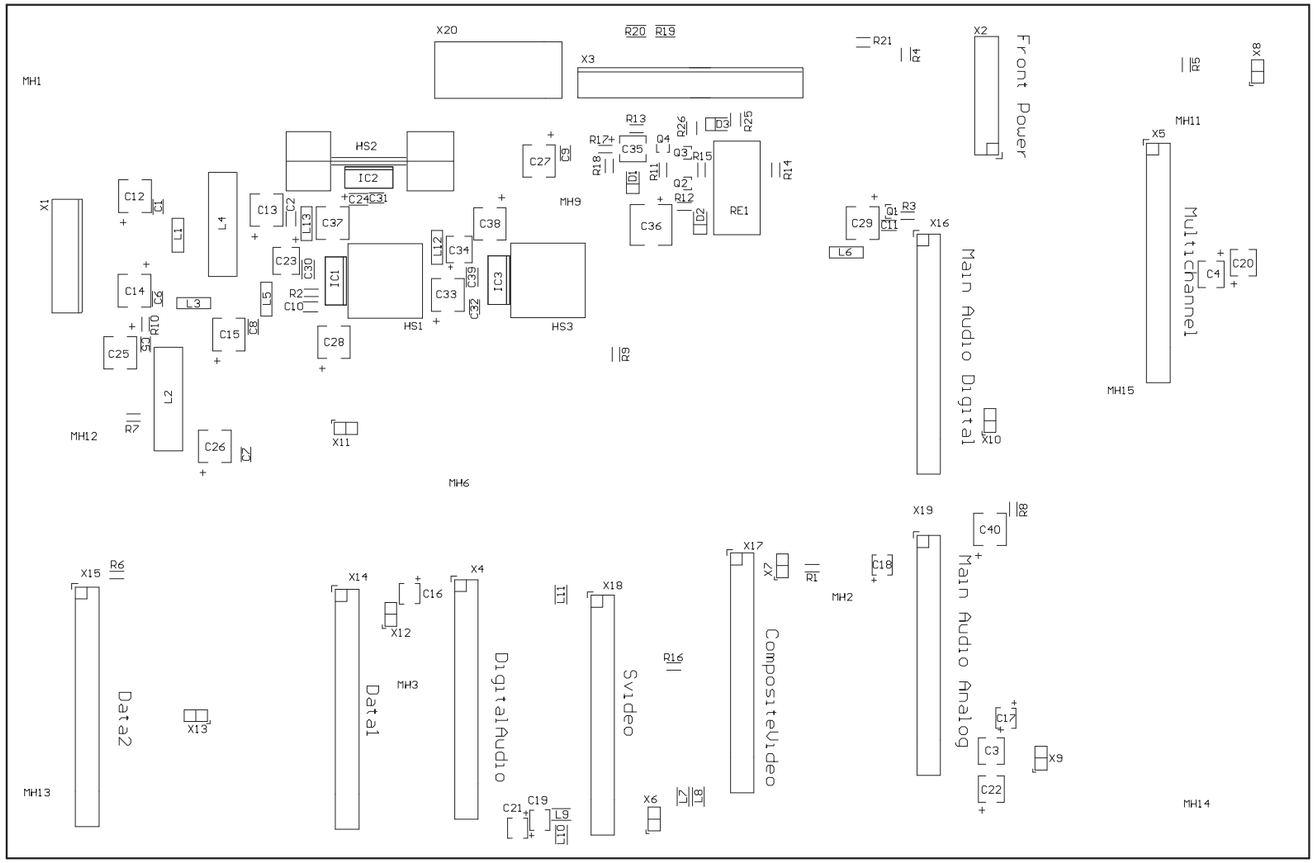


Cs_VideoBoard



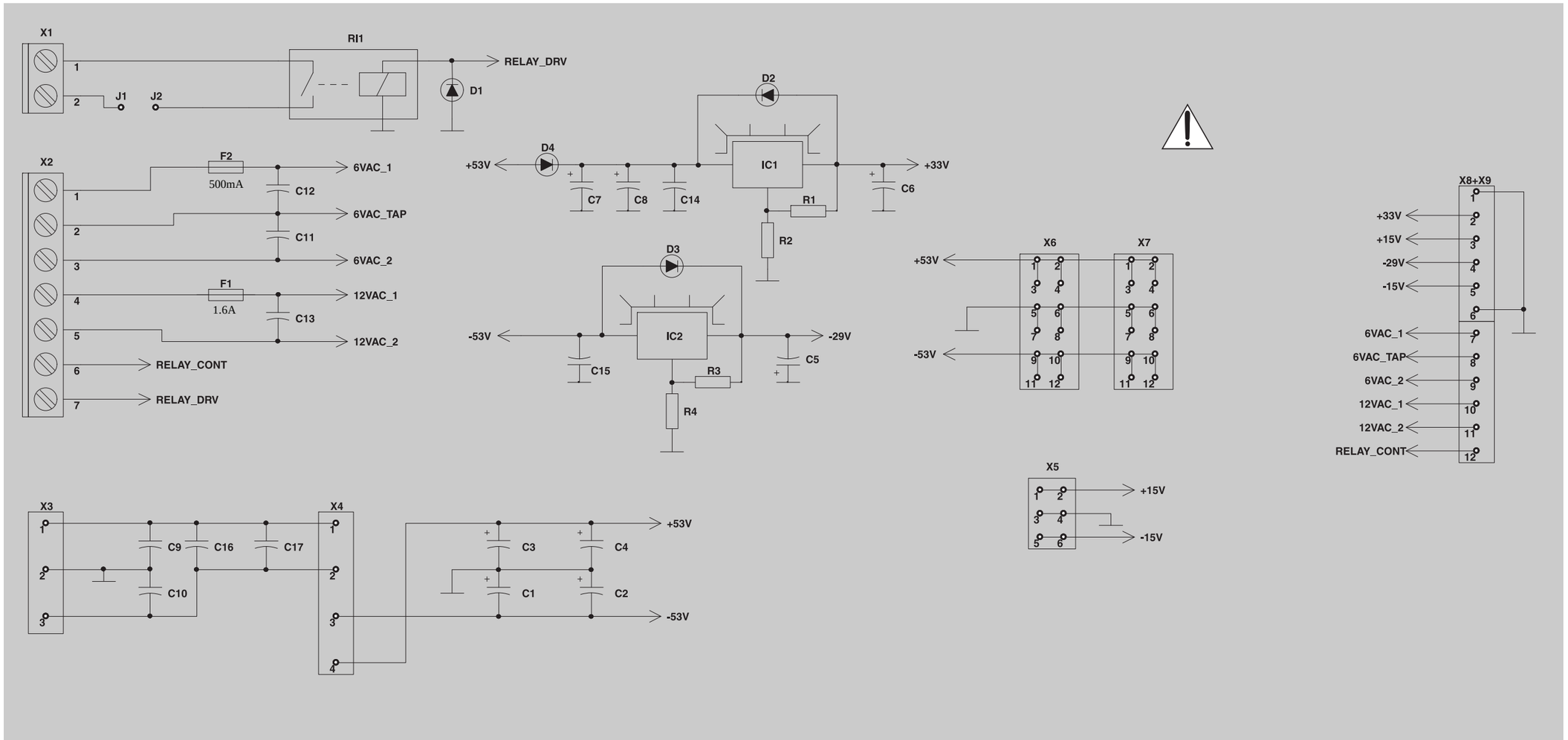
SVideoBoard

3 BOTTOM 320168



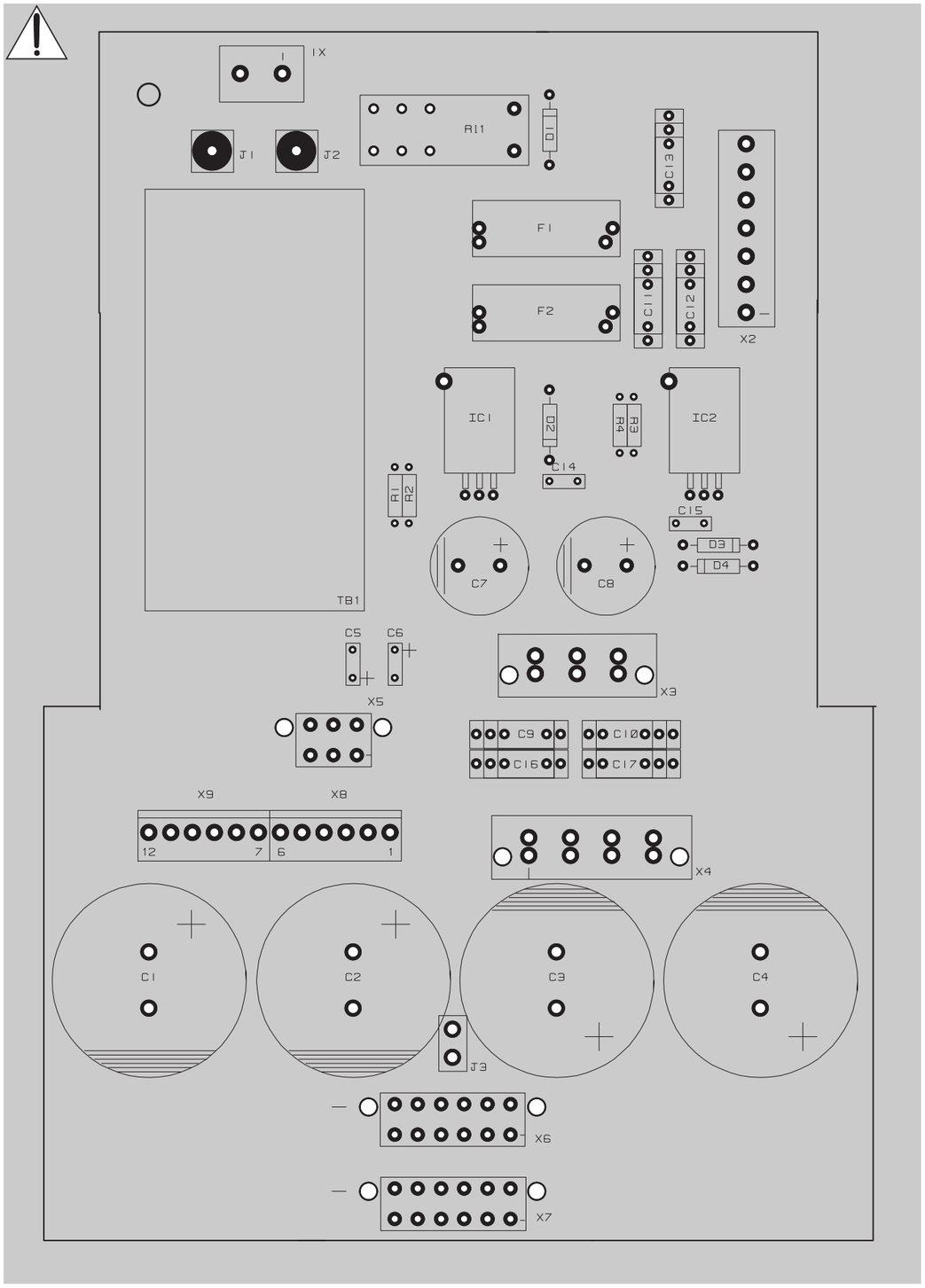
4 POWER SUPPLY 320131

⚠ WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.

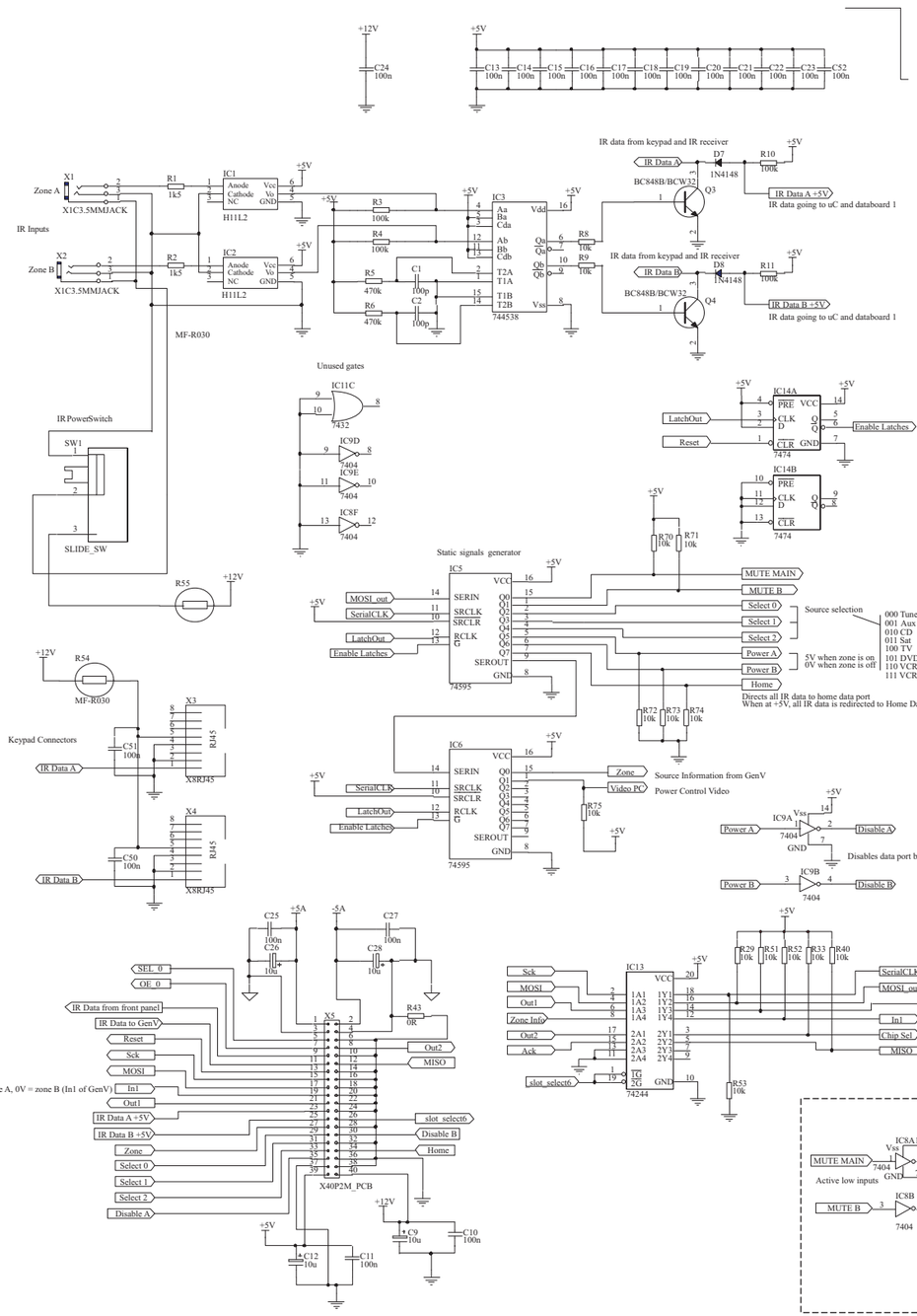


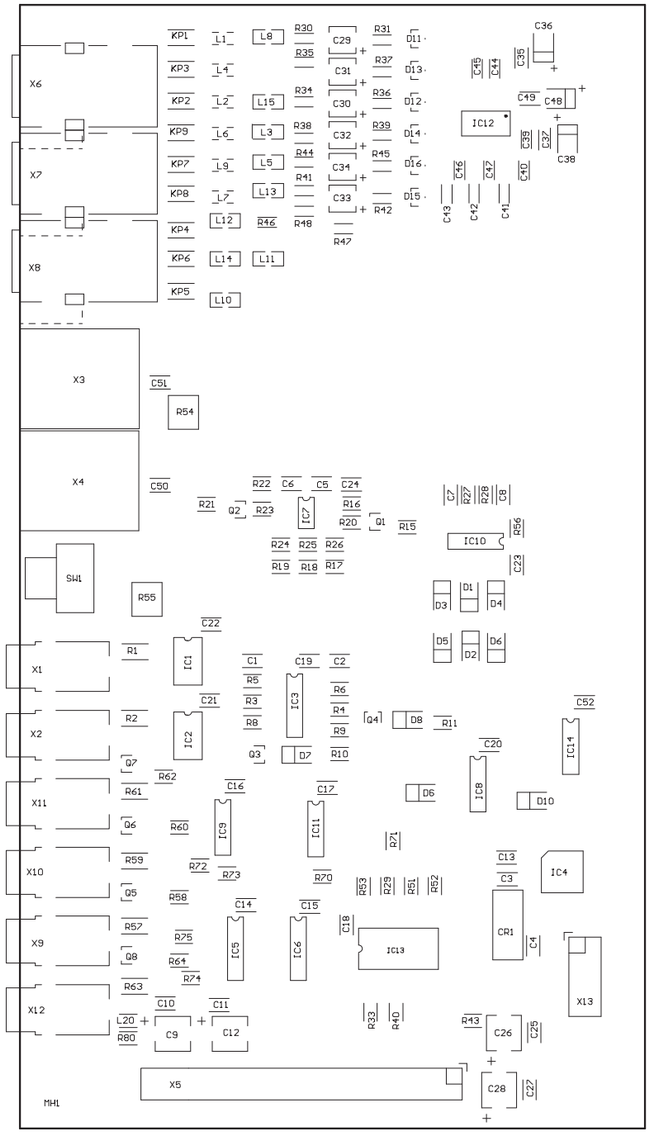
F1 = T1.6AL 250V
F2 = T500mAL 250V

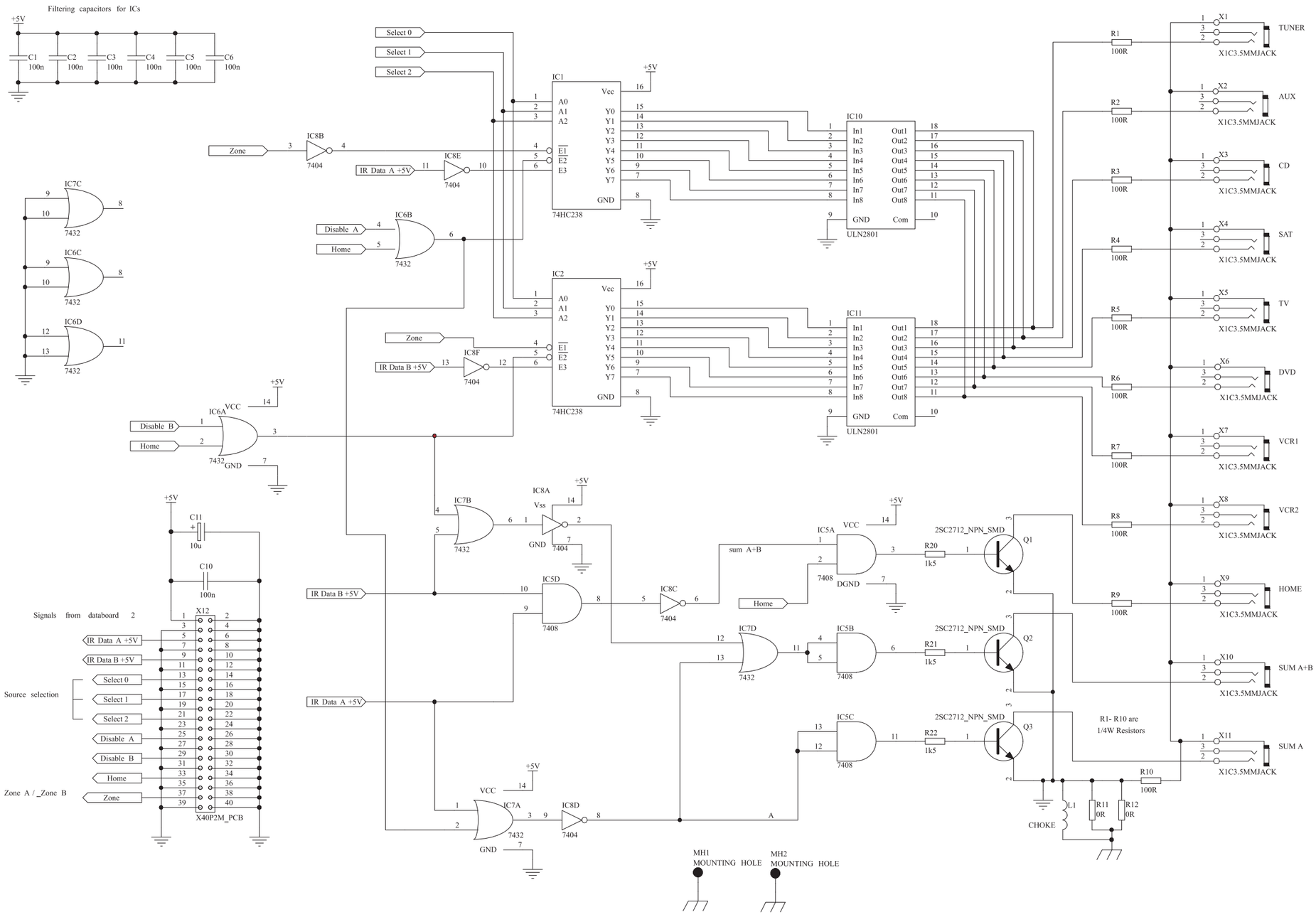
4 *POWER SUPPLY* *320131*

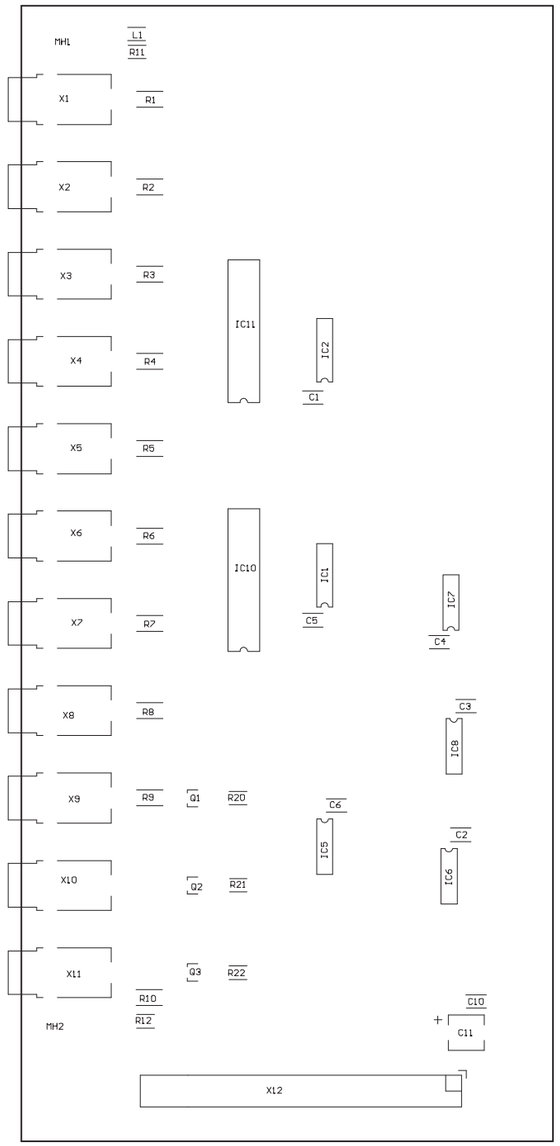


⚠ WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.


+12V
C24 100n
+5V
C13 100n C14 100n C15 100n C16 100n C17 100n C18 100n C19 100n C20 100n C21 100n C22 100n C23 100n C52 100n
IR Inputs
X1 Zone A
X1C3.5MMJACK
R1 1k5
IC1 H11L2
X2 Zone B
X1C3.5MMJACK
R2 1k5
IC2 H11L2
MF-R030
R3 100k
R4 100k
R5 470k
R6 470k
C1 100p
C2 100p
IC3 744538
IR data from keypad and IR receiver
IR Data A
D7 1N4148
R10 100k
BC848B/BCW32 Q3
IR Data A +5V
IR data going to uC and databoard 1
IR data from keypad and IR receiver
IR Data B
D8 1N4148
R11 100k
BC848B/BCW32 Q4
IR Data B +5V
IR data going to uC and databoard 1
R8 10k
R9 10k
Unused gates
IC11C 7432
IC9D 7404
IC9E 7404
IC9F 7404
IRPowerSwitch
SW1
SLIDE_SW
R55
MF-R030
+12V
R54
MF-R030
Keypad Connectors
X3 RJ45 X8RJ45
C51 100n
IR Data A
X4 RJ45 X8RJ45
C50 100n
IR Data B
Static signals generator
IC5 74595
MOSI_out
SerialCLK
LatchOut
Enable Latches
Select 0
Select 1
Select 2
Power A
Power B
Home
Source selection
000 Tuner
001 Aux
010 CD
011 Sat
100 TV
101 DVD
110 VCR1
111 VCR2
5V when zone is on
0V when zone is off
Directs all IR data to home data port
When at +5V, all IR data is redirected to Home Data port
R70 10k
R71 10k
R72 10k
R73 10k
R74 10k
IC6 74595
Zone
Video PC
Source Information from GenV
Power Control Video
R75 10k
LatchOut
Enable Latches
SerialCLK
IC14A
IC14B 7474
LatchOut
Reset
Enable Latches
MUTE MAIN
MUTE B
Informs GenV from which zone IR data is received
+5V = zone A, 0V = zone B
IC4 AT90S4433
Reset
CONFIRM A
CONFIRM B
Zone Info
IR Data to GenV
Active low chip select
Chip Sel
MOSI_out
Ack
SerialCLK
IR Data A +5V
IR Data B +5V
Zone
Source Information from GenV
CR1 8MHz
C3 33p
C4 33p
X13 X10P2M
MOSI_out
Reset
SerialCLK
Ack
MISO for programming
Do not install!!!!
IR data generated by uC
CONFIRM B
IR Data from front panel
Zone
+5V = zone A, 0V = zone B
IC11B 7432
IC8D 7404
D10 1N4148
R15 10k
IR Data B
BC848B/BCW32 Q1
When muted changes between +5V and +8V.
R17 30k
R18 20k
R19 36k
IC7B MC33178P
C5 1n
R16 1k
R20 220R
BLINK B
IR data generated by uC
CONFIRM A
IR Data from front panel
Zone
+5V = zone A, 0V = zone B
IC11A 7432
IC8C 7404
D9 1N4148
R21 10k
IR Data A
Q2 BC848B/BCW32
When muted changes between +5V and +8V.
If Power A/B is at 0V, then at +5V,
R24 30k
R25 20k
R26 36k
IC7A MC33178P
C6 1n
R22 1k
R23 220R
IR Data A
BLINK A
Disables data port buffers of selected zone
IC9A IC9B 7404
Power A
Power B
Disable A
Disable B
MH1 MOUNTING HOLE
L20 CHOKE
R80 0R
SEL_0
OE_0
IR Data from front panel
IR Data to GenV
Reset
Sck
MOSI
Out1
IR Data A +5V
IR Data B +5V
Zone
Select 0
Select 1
Select 2
Disable A
X40P2M_PCB
Out2
MISO
slot_select6
Disable B
Home
C25 100n
C26 10u
C28 100n
C27 100n
R43 0R
C12 10u
C11 100n
C9 10u
C10 100n
IC13 74244
Sck
MOSI
Out1
Zone Info
Out2
Ack
slot_select6
R29 10k
R51 10k
R52 10k
R33 10k
R40 10k
R53 10k
SerialCLK
MOSI_out
In1
Chip Sel
MISO
IC8E 7404
LatchOut
When LatchOut is pulsed, then contents of shift register of 74595 is transferred to output
MUTE MAIN
Active low inputs
MUTE B
IC8A IC8B 7404
D1 1N4148
D2 1N4148
R56 100k
C8 1n
IC10A IC10B IC10C IC10D 7400
R28 1M
R27 4M7
C7 100n
D3 1N4148
D4 1N4148
BLINK A
BLINK B
When muted changes between +5V and 0V.
If Power A/B is at 0V Blink A/B is at 0V,
D5 1N4148
D6 1N4148
Power A
Power B
5V when zone is on
0V when zone is off
Component Video
X6
Input 1 B
Input 1 G
Input 1 R
Shield
HSP-243V3-47
L1 NFM51R10P157
C29 10u
R30 75R
D11 BAS70-04
R31 100k
IN1B
KP1
KP2
L8 CHOKE
L2 NFM51R10P157
C30 10u
R34 75R
D12 BAS70-04
R36 100k
IN1G
L5 CHOKE
L4 NFM51R10P157
C31 10u
R35 75R
D13 BAS70-04
R37 100k
IN1R
KP3
L3 CHOKE
-5A
+5A
X7
Input2 B
Input2 G
Input2 R
Shield
HSP-243V3-47
KIPINAVAL1
KP7
KP8
KP9
L6 NFM51R10P157
C32 10u
R38 75R
D14 BAS70-04
R39 100k
IN2B
L7 NFM51R10P157
C33 10u
R41 75R
D15 BAS70-04
R42 100k
IN2G
L15 CHOKE
L14 CHOKE
L9 NFM51R10P157
C34 10u
R44 75R
D16 BAS70-04
R45 100k
IN2R
L13 CHOKE
X8
Output B
Output G
Output R
Shield
HSP-243V3-47
KP4
KP5
KP6
OUTB
OUTG
OUTR
L12 CHOKE
L11 CHOKE
L10 CHOKE
Video muxes
IC12A AD8185
IN1B
IN1G
IN1R
IN2B
IN2G
IN2R
SEL_0
OE_0
IN0A
IN1A
IN2A
IN0B
IN1B
IN2B
SEL A/B
OE
OUT0
OUT1
OUT2
R4675R
R4775R
R4875R
OUTB
OUTG
OUTB
Video MUX power bypassing
IC12B AD8185
C35 100n
C36 10u
C37 100n
C38 10u
C39 10n
C40 10n
C41 10n
C42 10n
C43 10n
C44 10n
C45 10n
C46 10n
C47 10n
C48 10u
C49 100n
Active low
Video PC
R64 10k
Q8 BC848B BCW32
Power Control Video
X12
X1C3.5MMJACK
R63 680R
R57 680R
+5V when zone is on
0V when zone is off
Power A
Power B
IC11D 7432
IC9F 7404
R58 10k
BC848B/BCW32 Q5
Power Control ACC
X9
X1C3.5MMJACK
R61 680R
R59 680R
Disable A
R62 10k
Q7 BC848B BCW32
Disable B
R60 10k
Q6 BC848B BCW32
Power Control Zone B
X10
X1C3.5MMJACK
X11
X1C3.5MMJACK
Power Control Zone A


KP1
KP3
KP2
KP9
KP7
KP8
KP4
KP6
KP5
L1
L4
L2
L6
L9
L7
L8
L15
L3
L5
L13
L12
L14
L10
L11
R30
R35
R34
R38
R44
R41
R46
R48
R31
R37
R36
R39
R45
R42
R47
C29
C31
C30
C32
C34
C33
D11
D13
D12
D14
D16
D15
C36
C45
C44
C35
C49
C48
IC12
C38
C37
C46
C47
C40
C43
C42
C41
X6
X7
X8
X3
X4
C51
R54
C50
R21
Q2
R22
C6
C5
C24
R23
IC7
R16
R20
Q1
R15
R24
R25
R26
R19
R18
R17
C7
R27
R28
C8
R56
IC10
C23
SW1
R55
D3
D1
D4
D5
D2
D6
C22
R1
IC1
C1
C19
C2
R5
R6
R3
R4
R8
R9
IC3
Q4
D8
R11
C52
IC14
C21
R2
IC2
Q3
D7
R10
C20
IC8
D10
D6
X1
X2
X11
X10
X9
X12
Q7
R62
R61
C16
C17
Q6
R60
IC9
IC11
R71
R59
R72
R73
R70
C13
C3
IC4
Q5
R58
R53
R29
R51
R52
C14
C15
R57
R75
IC5
IC6
C18
IC13
CR1
C4
Q8
R64
R74
R63
C10
C11
X13
L20
R80
C9
C12
R33
R40
R43
C26
C25
X5
C28
C27
MHL


Filtering capacitors for ICs
+5V
C1 100n
C2 100n
C3 100n
C4 100n
C5 100n
C6 100n
Select 0
Select 1
Select 2
IC1
74HC238
Vcc
GND
A0
A1
A2
E1
E2
E3
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Zone
IR Data A +5V
IR Data B +5V
IC8B
IC8E
IC8F
7404
Disable A
Home
IC6B
IC6C
IC6D
IC7C
7432
Disable B
IC6A
VCC
GND
IC2
IC10
IC11
ULN2801
In1
In2
In3
In4
In5
In6
In7
In8
Out1
Out2
Out3
Out4
Out5
Out6
Out7
Out8
GND
Com
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
100R
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X1C3.5MMJACK
TUNER
AUX
CD
SAT
TV
DVD
VCR1
VCR2
HOME
SUM A+B
SUM A
C11
10u
C10
100n
Signals from databoard 2
X12
X40P2M_PCB
Source selection
Zone A / _Zone B
IC7B
IC7A
IC8A
IC8C
IC8D
Vss
IC5D
7408
IC5A
IC5B
IC5C
IC7D
DGND
sum A+B
2SC2712_NPN_SMD
Q1
Q2
Q3
R20
R21
R22
1k5
R1- R10 are
1/4W Resistors
CHOKE
L1
R11
R12
0R
MH1
MOUNTING HOLE
MH2
MOUNTING HOLE


MH1
L1
R11
X1
R1
X2
R2
X3
R3
IC11
IC2
C1
X4
R4
X5
R5
X6
R6
IC10
IC1
C5
IC7
C4
X7
R7
X8
R8
C3
IC8
X9
R9
Q1
R20
C6
IC5
C2
IC6
X10
Q2
R21
X11
Q3
R22
R10
C10
R12
MH2
C11
X12

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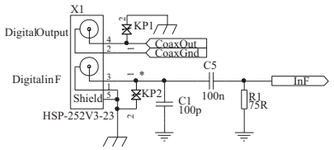

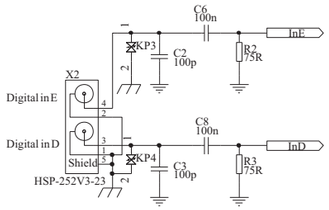

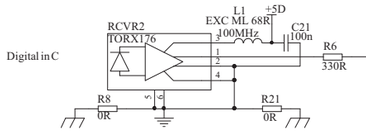

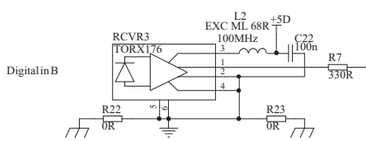

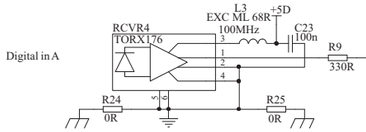

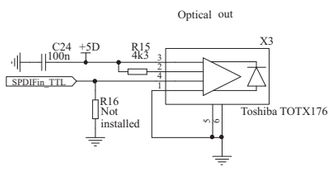

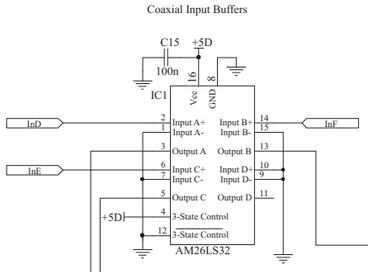

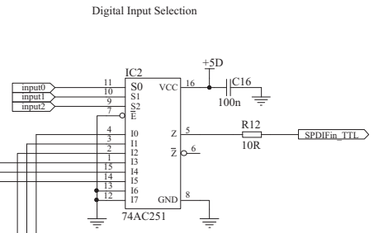

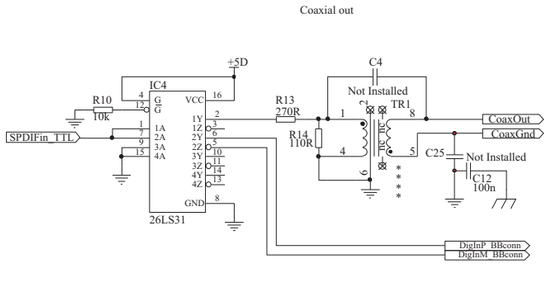

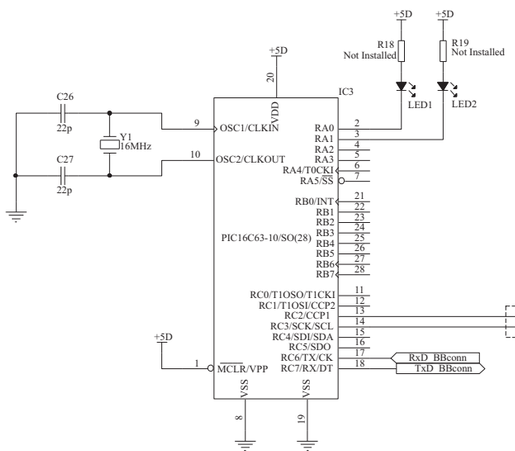

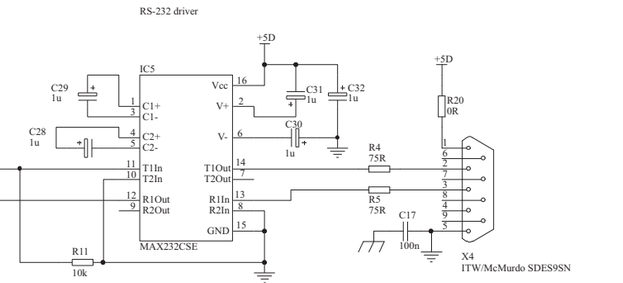

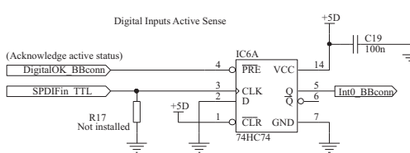

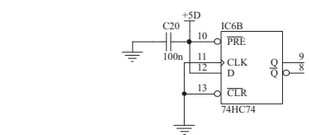

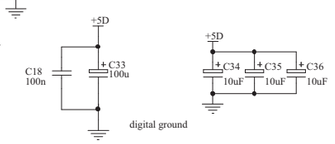

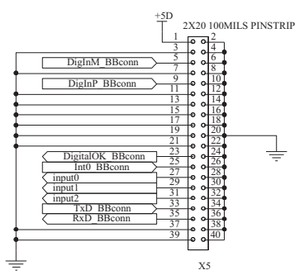

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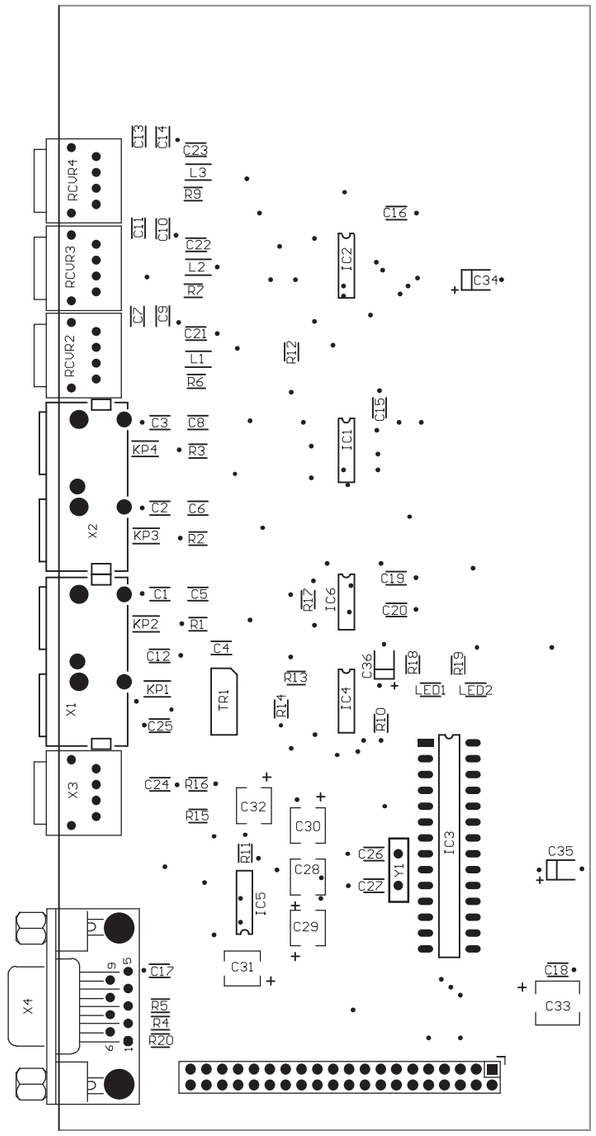
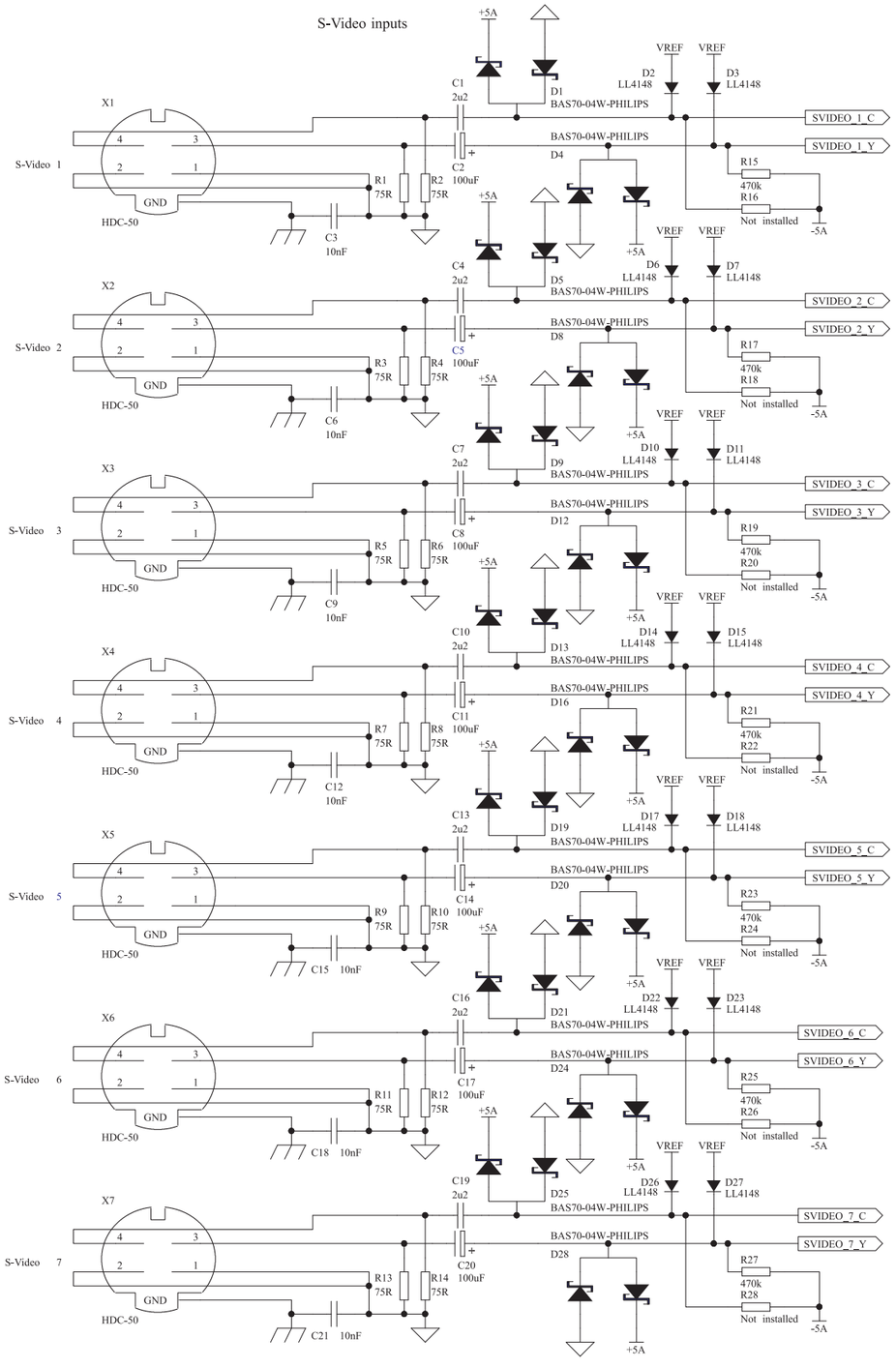
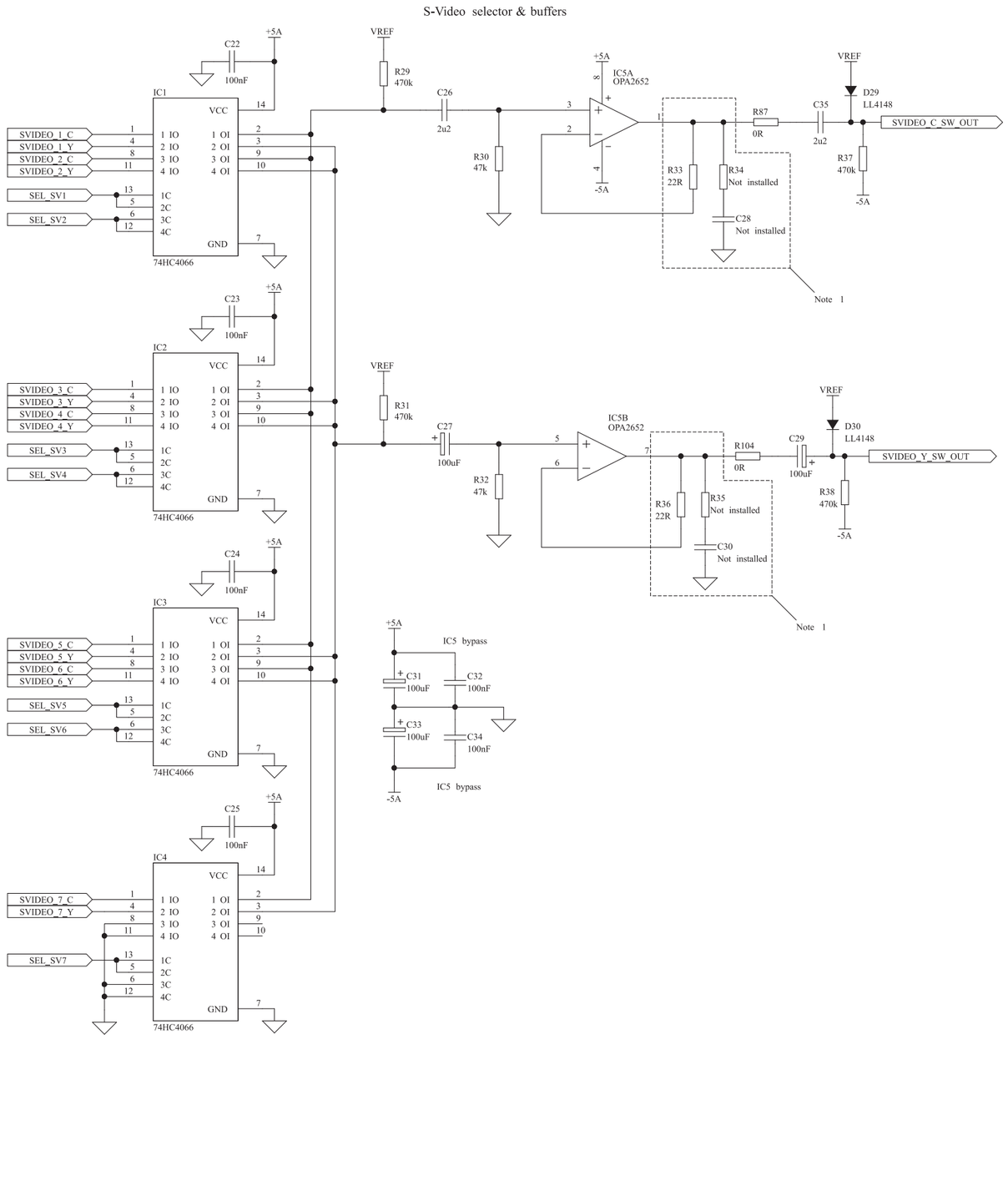


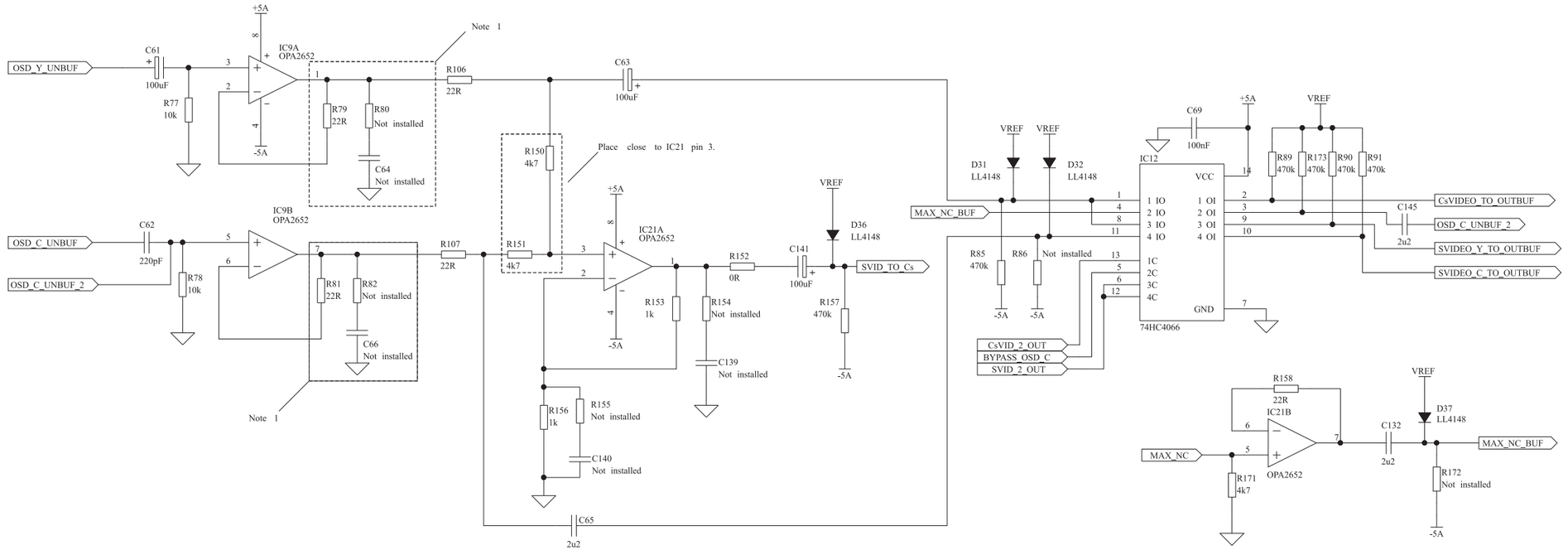
8 S-VIDEO 320125 SH 1 OF 5



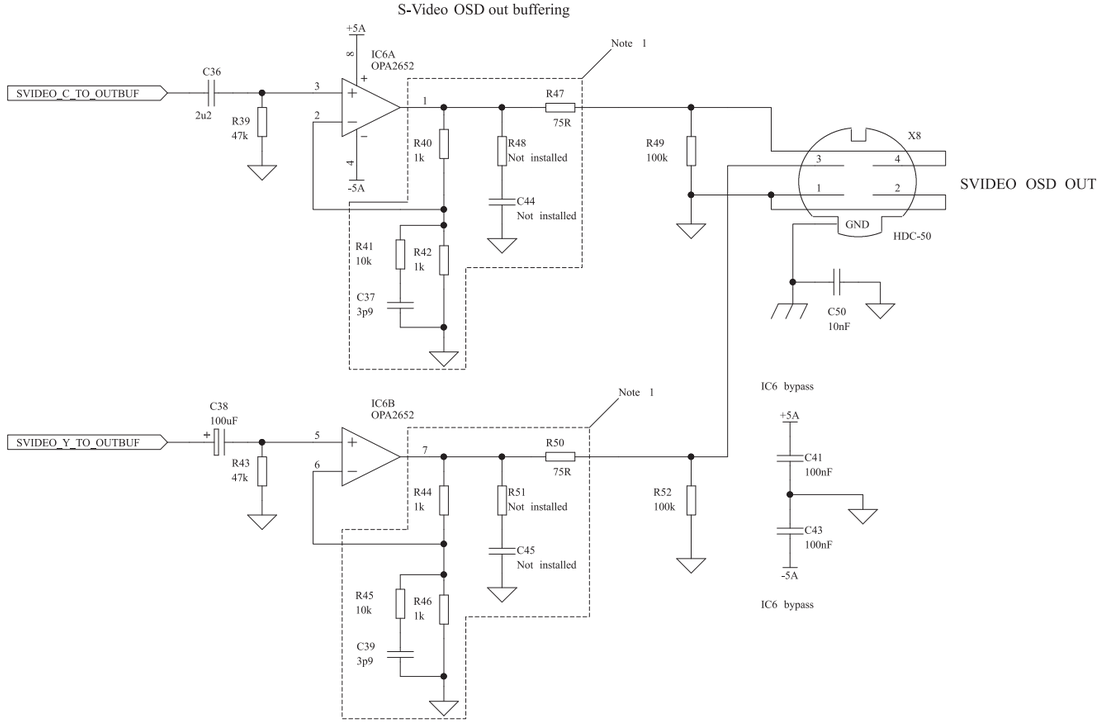


8 S-VIDEO 320125 SH 2 OF 5

OSD Output Buffering And Switching

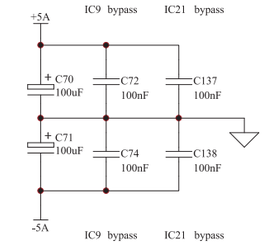


S-Video OSD out buffering

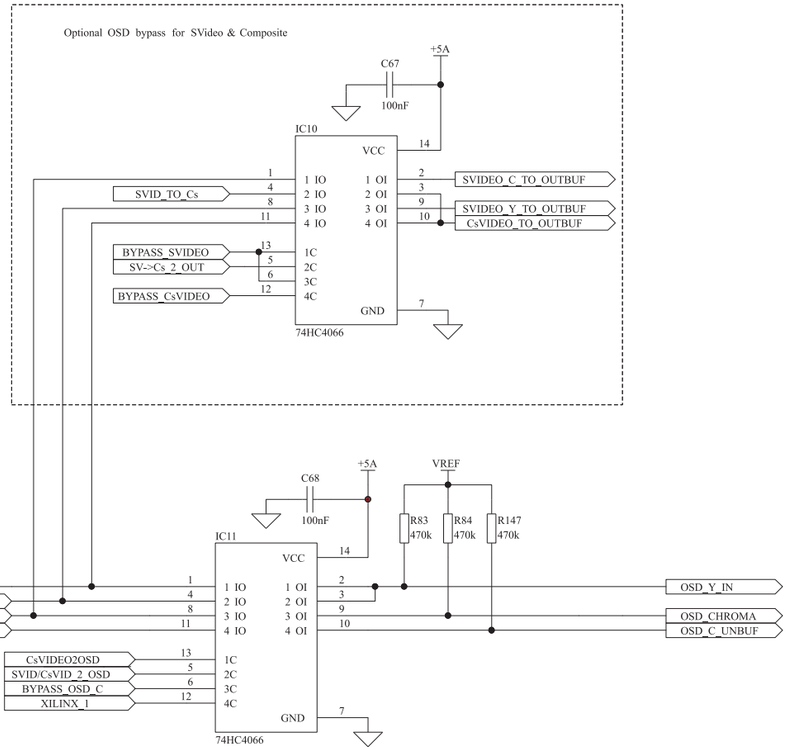


SVIDEO OSD OUT

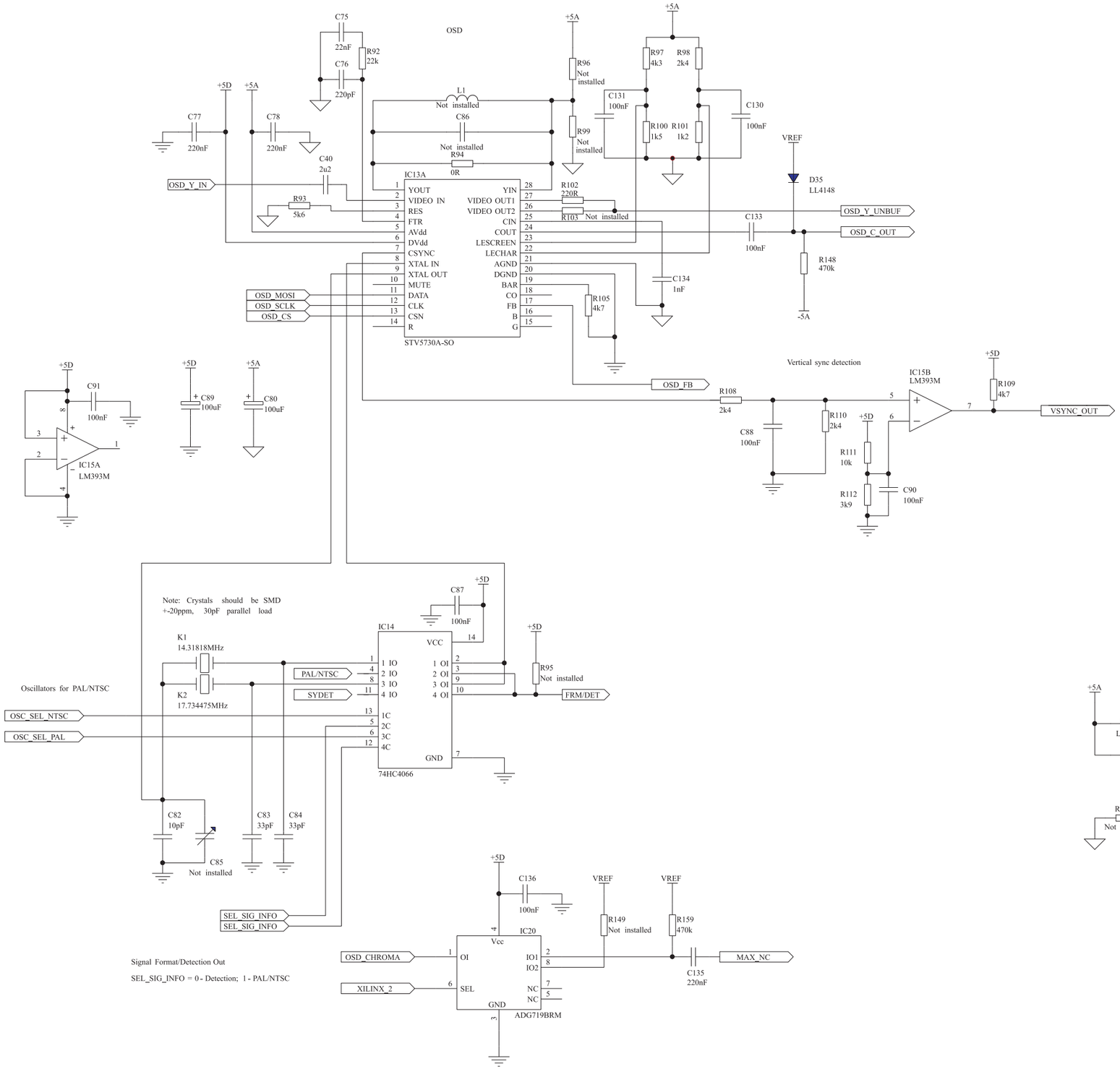
Video Signal Routing to OSD

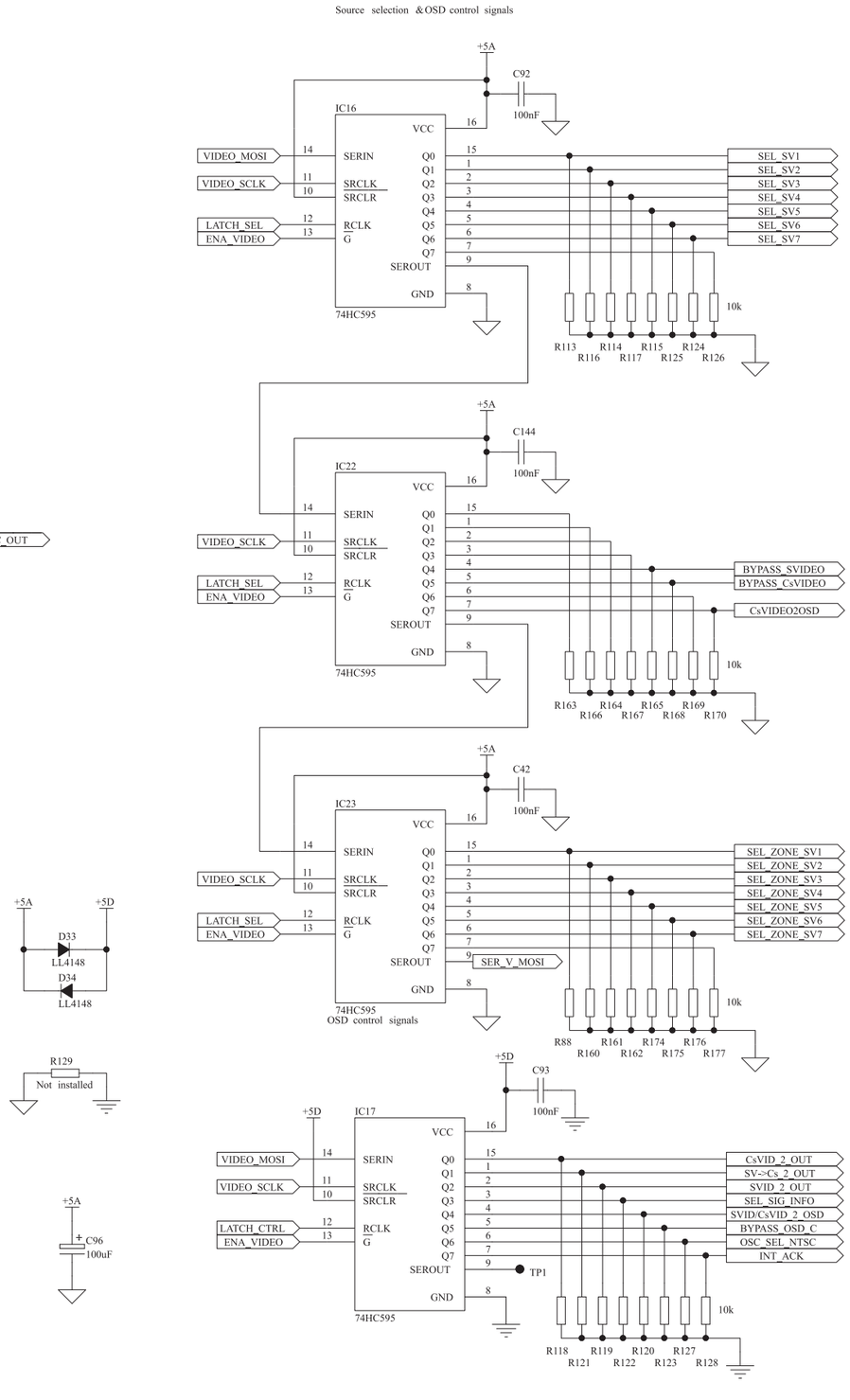


Optional OSD bypass for SVideo & Composite

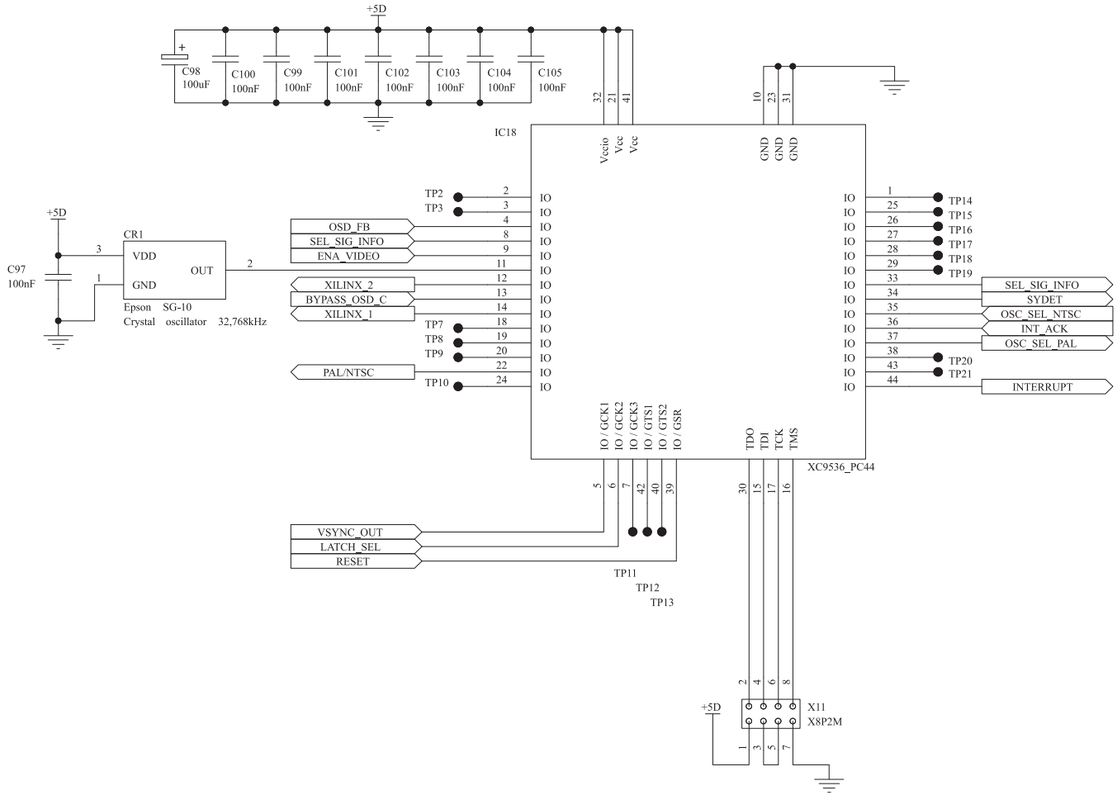


8 S-VIDEO 320125 SH 3 OF 5

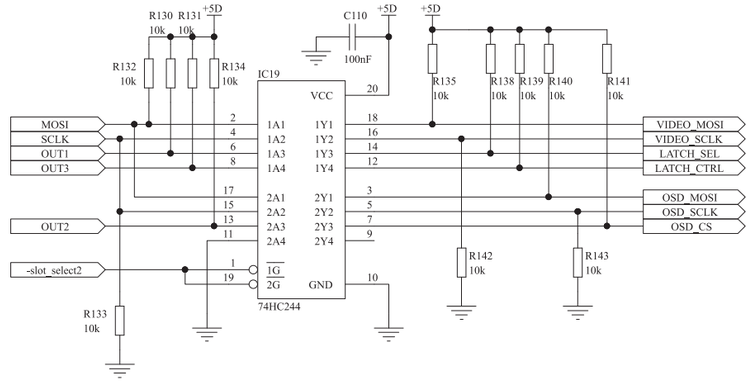


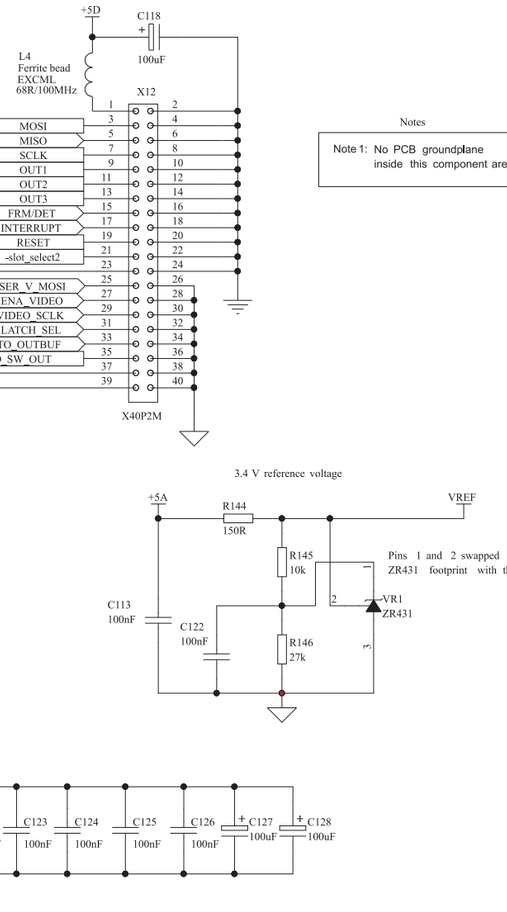


8 S-VIDEO 320125 SH 4 OF 5

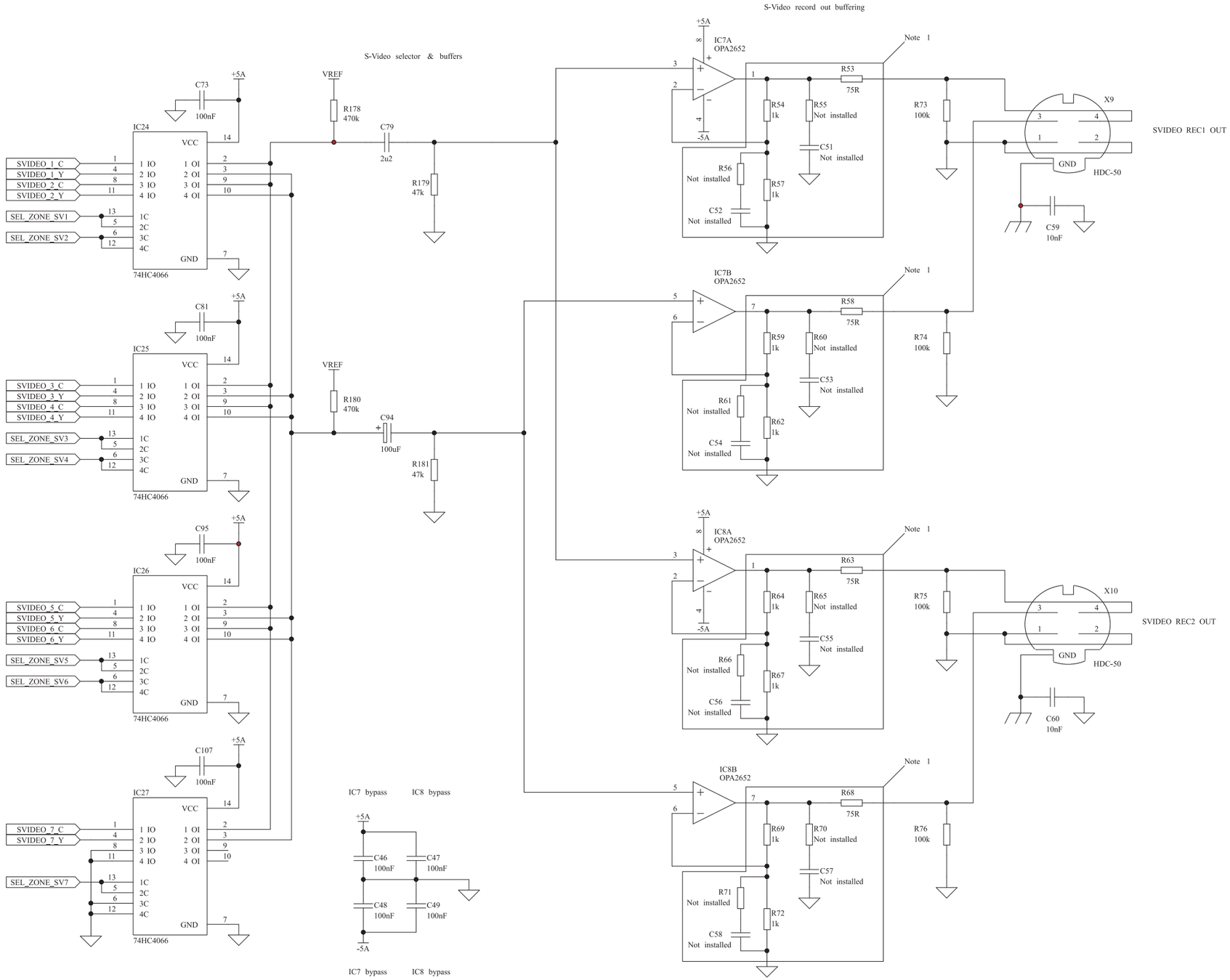


Control bus buffering

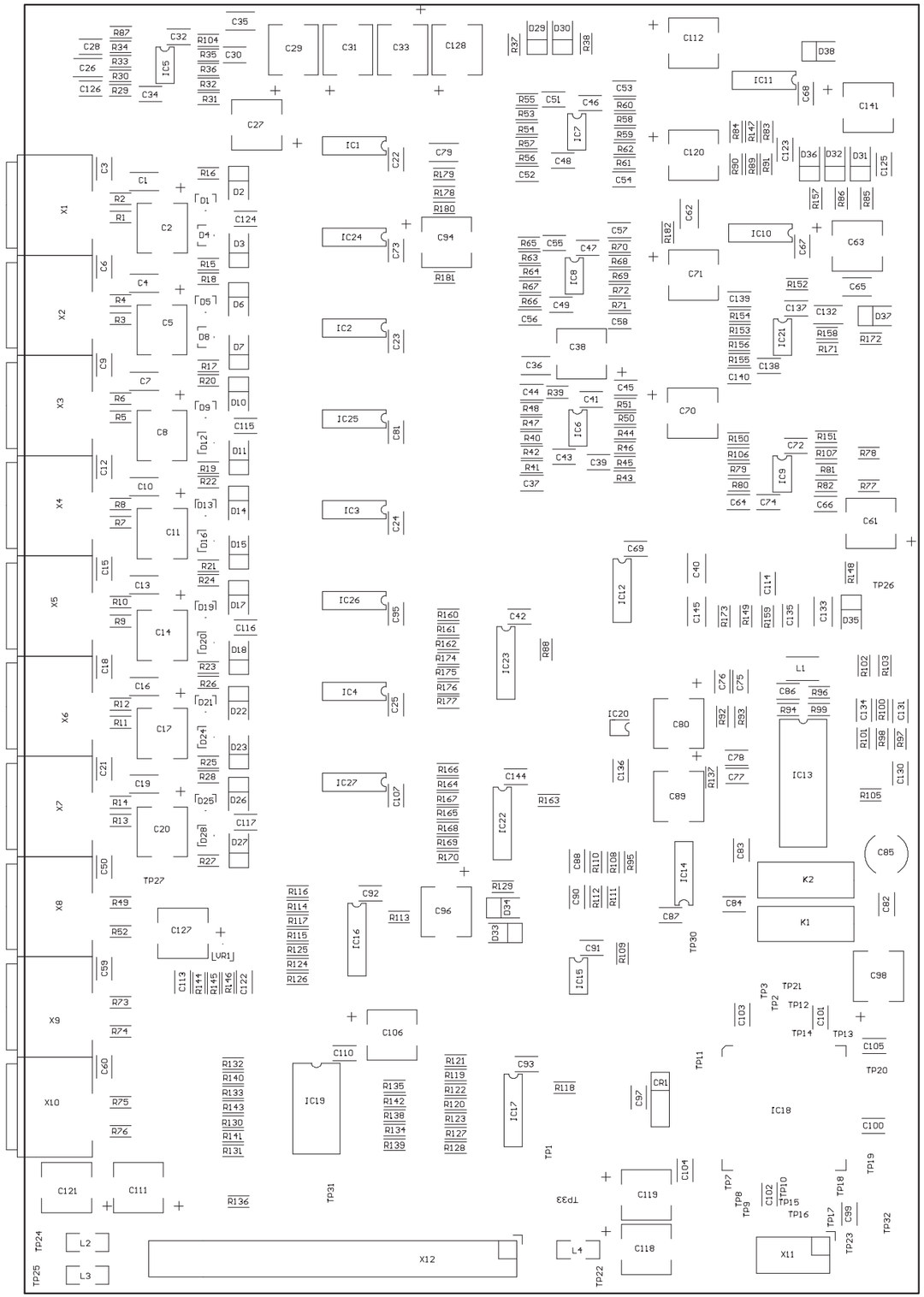




8 S-VIDEO 320125 SH 5 OF 5

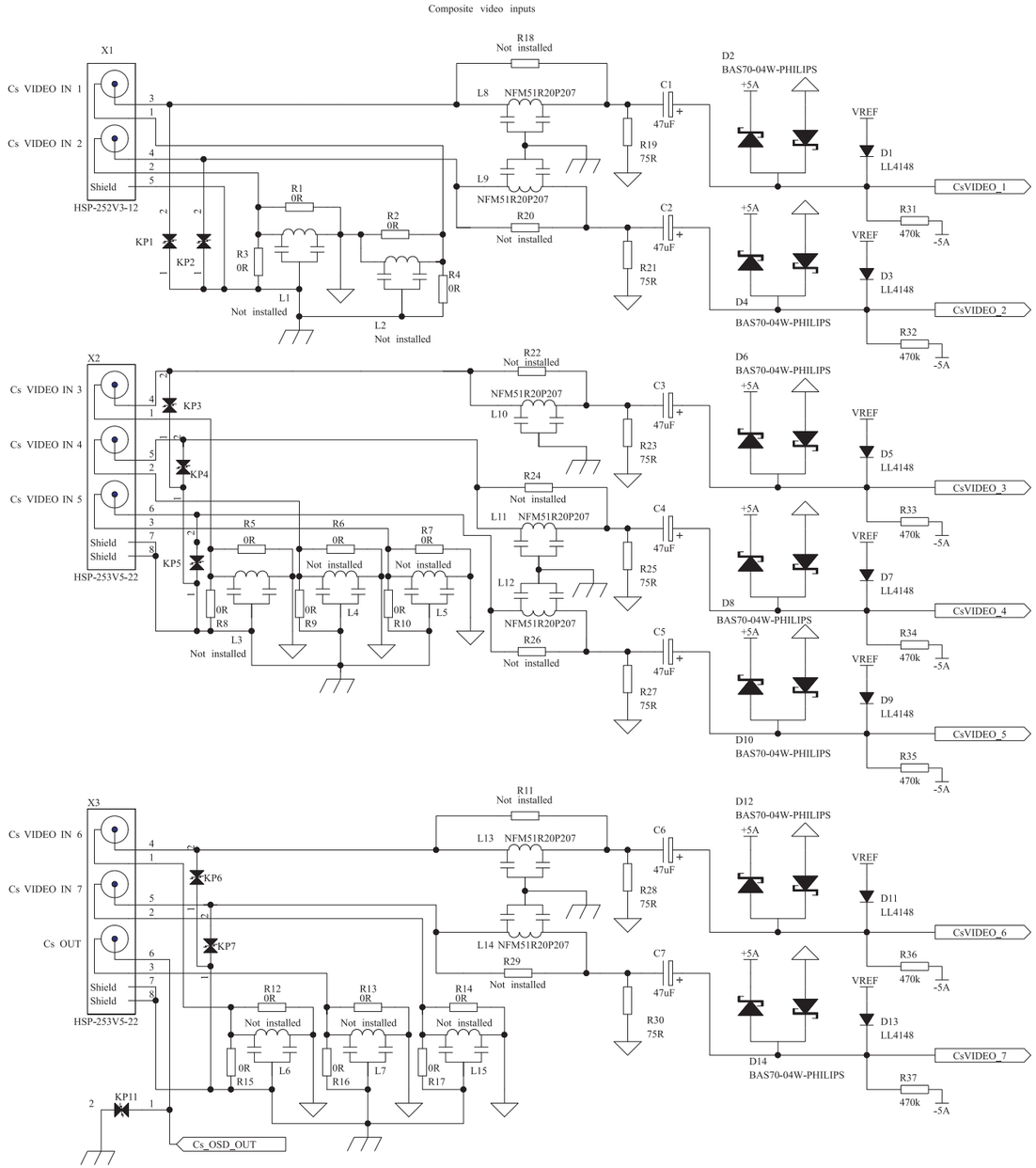


MHT200

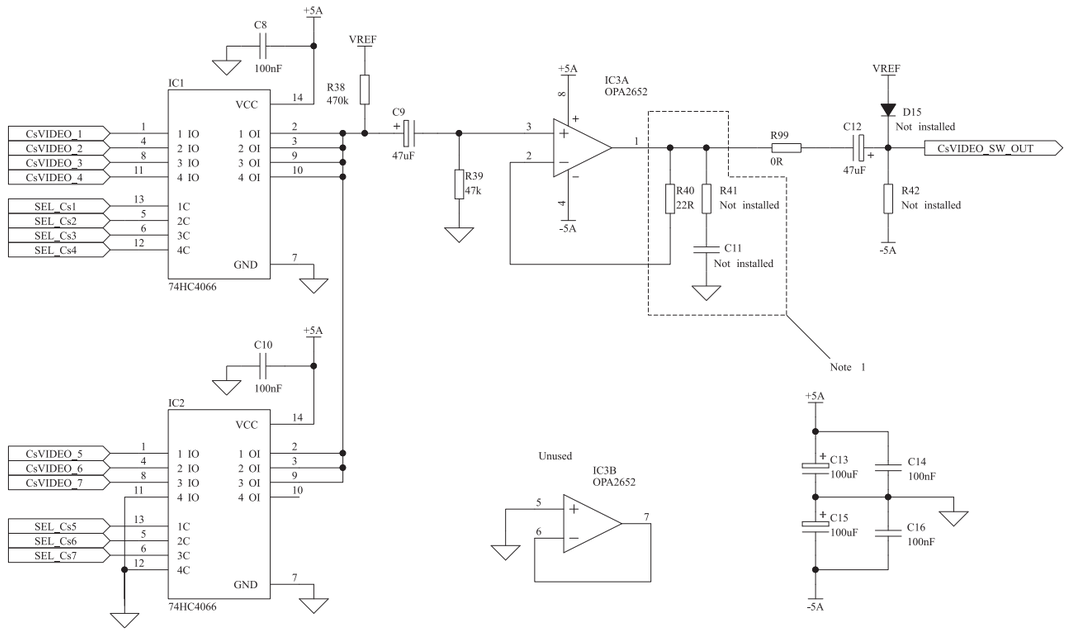


9 COMPOSITE VIDEO 320124 SH 1 OF 2

Composite video inputs

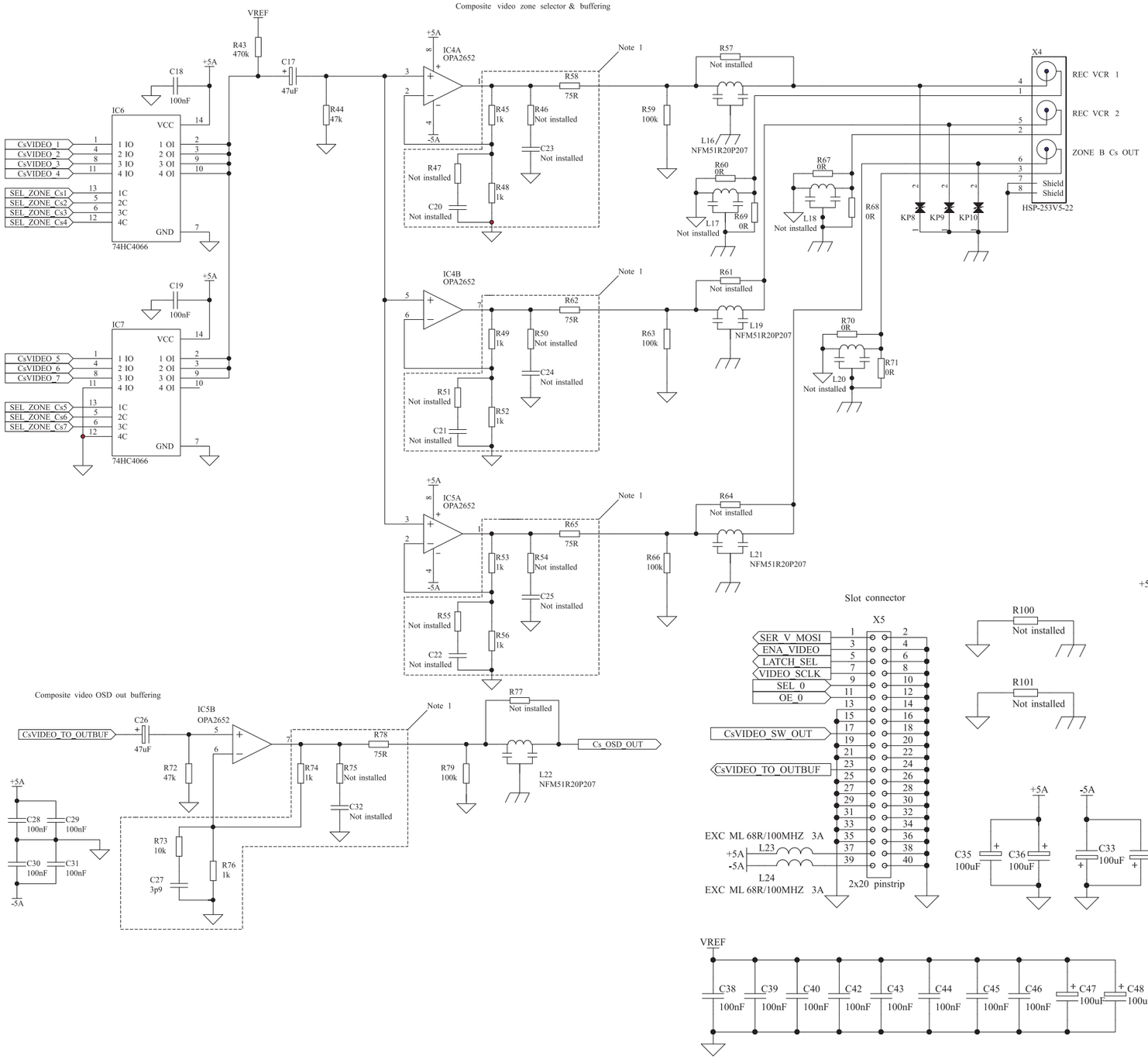


Composite video selectors & buffers



9 COMPOSITE VIDEO 320124 SH 2 OF 2

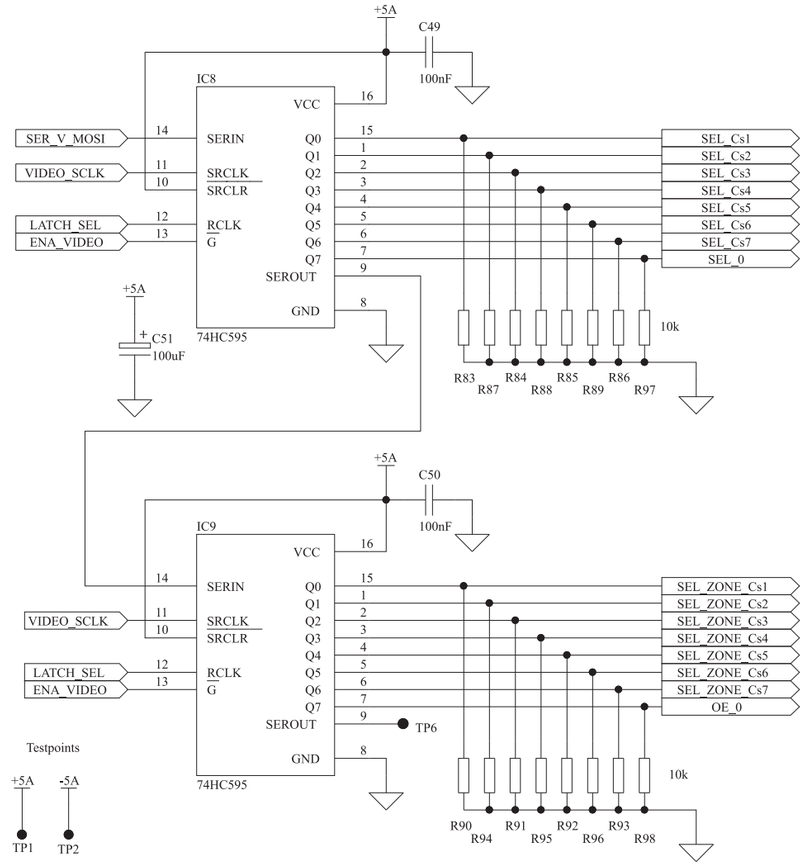
Composite video zone selector & buffering



Composite video OSD out buffering

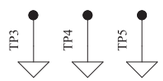
Slot connector

Source selection

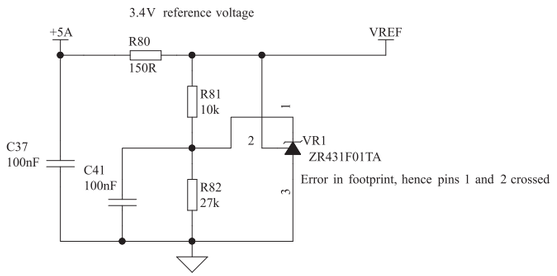


+5A,-5A Testpoints

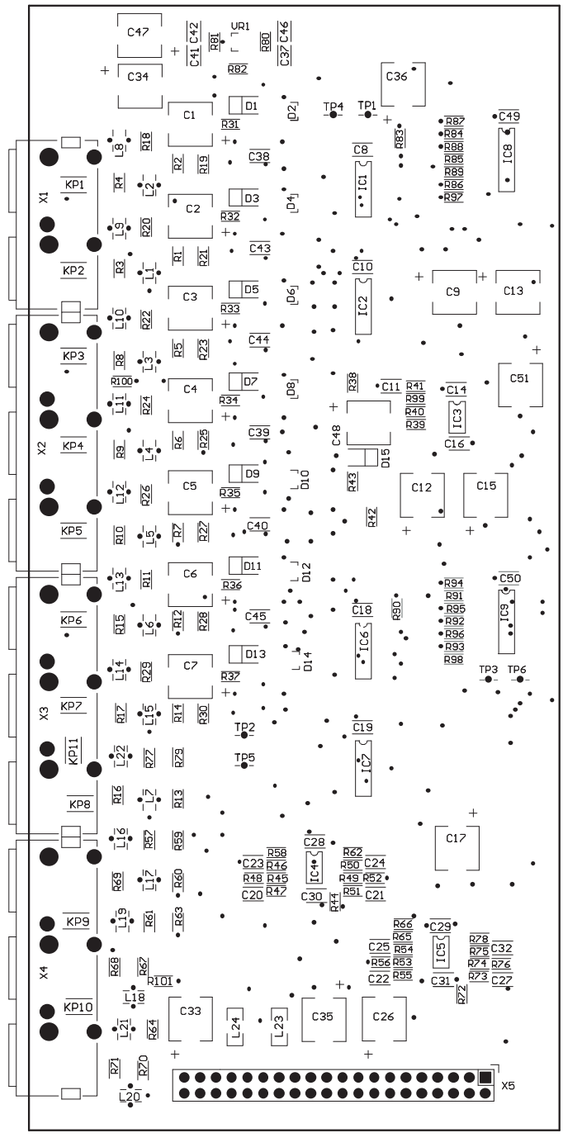
VGND Testpoints



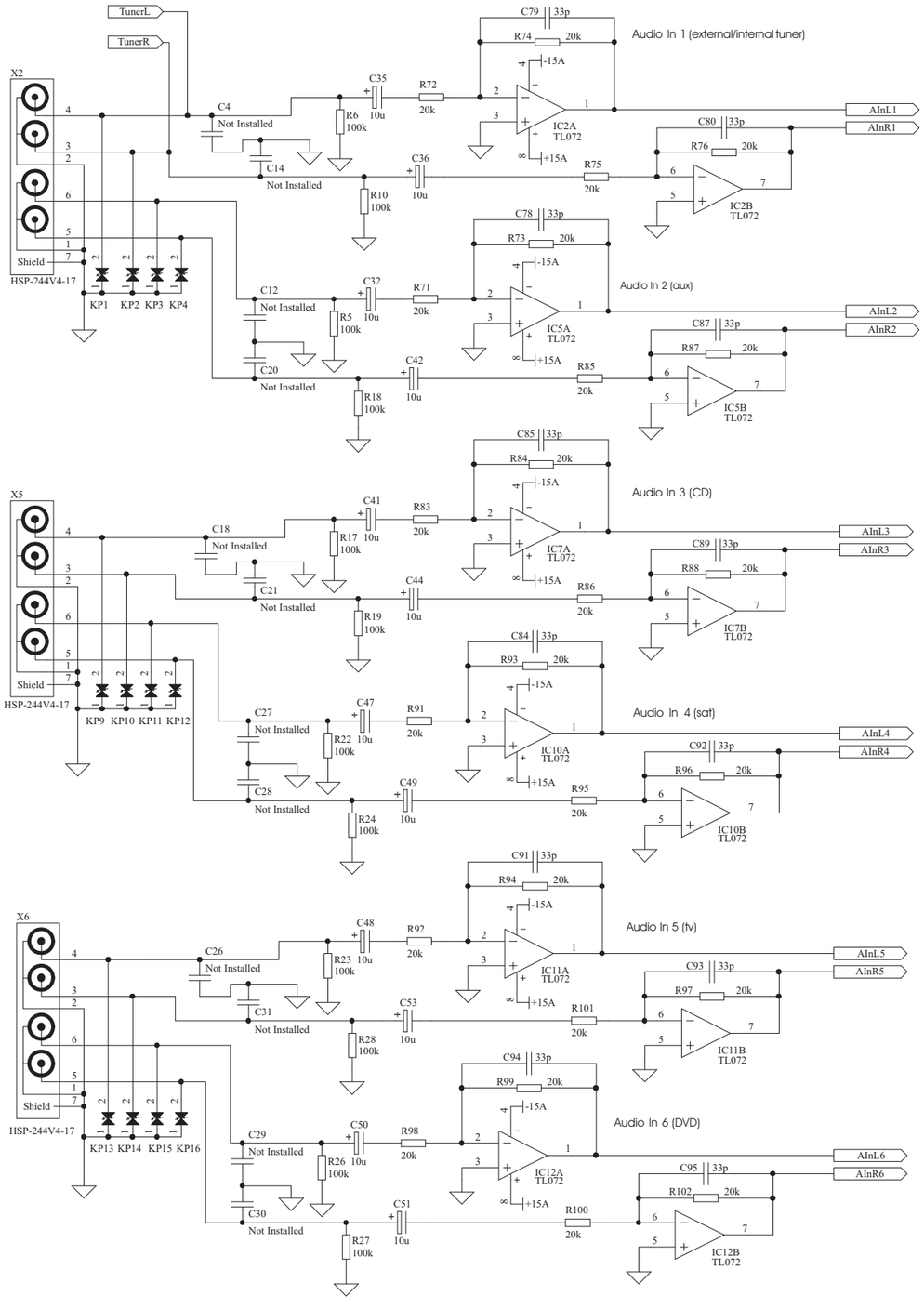
3.4V reference voltage

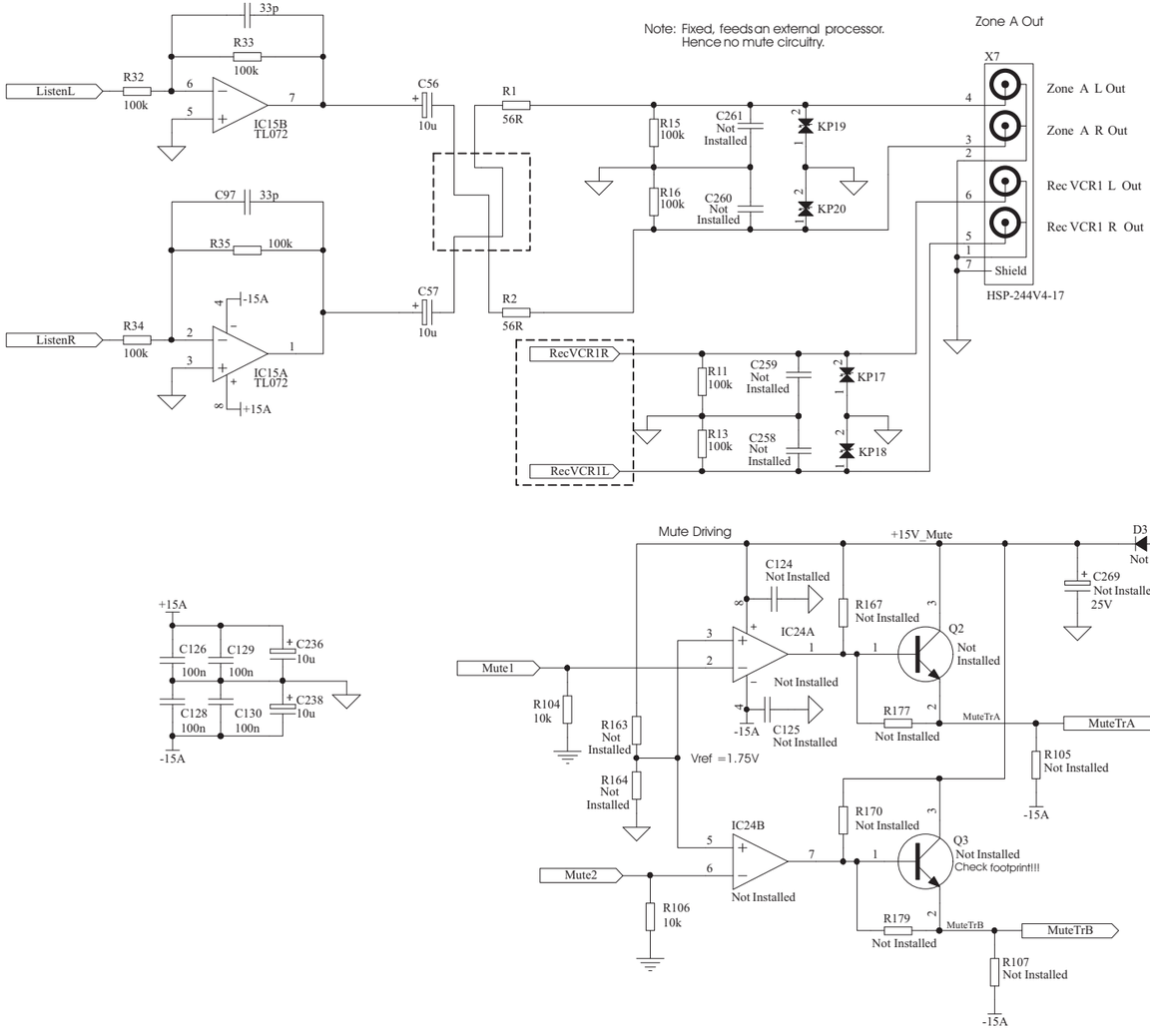


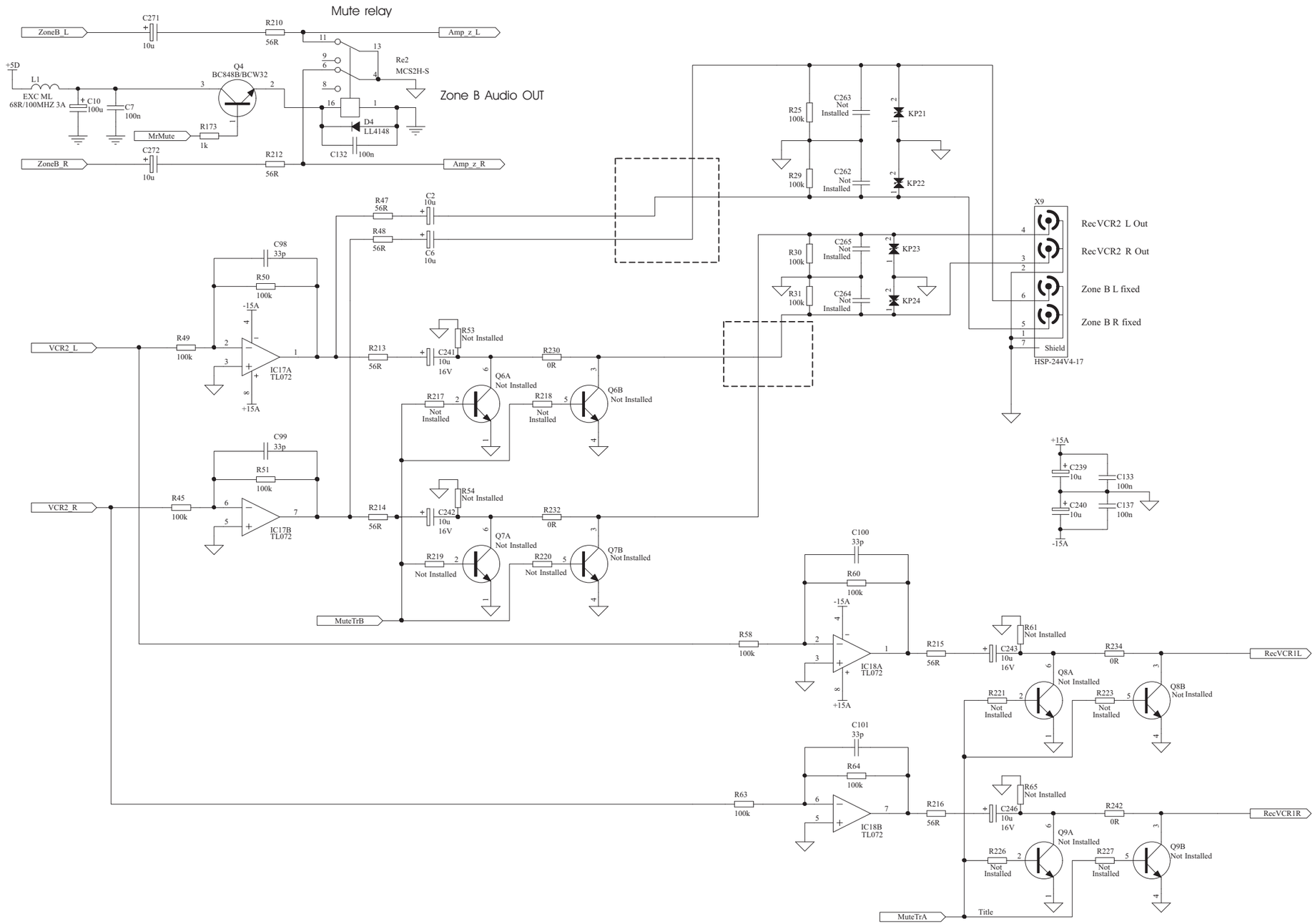
9 COMPOSITE VIDEO 320124



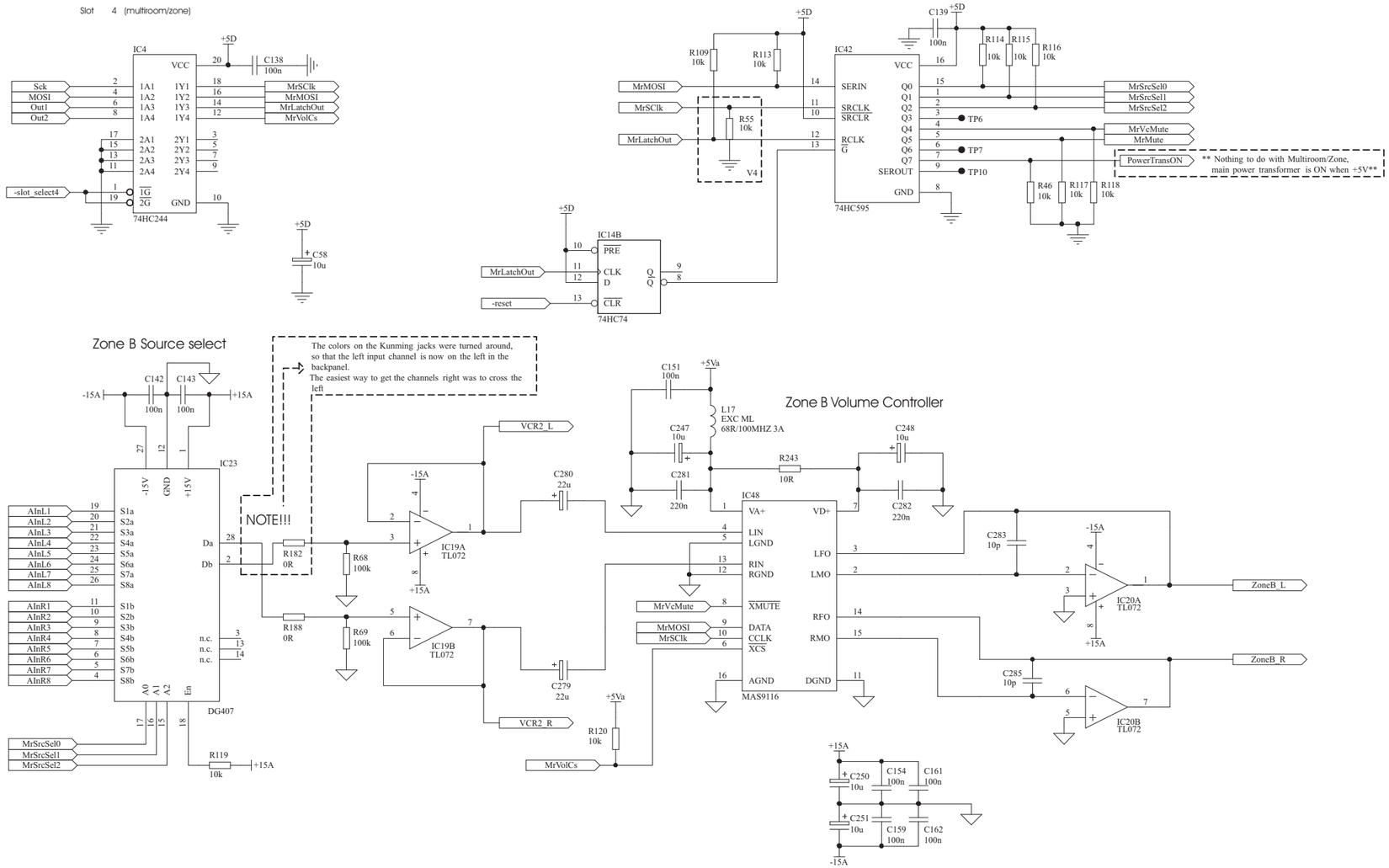
10 MAIN AUDIO 320165 SH 1 OF 7

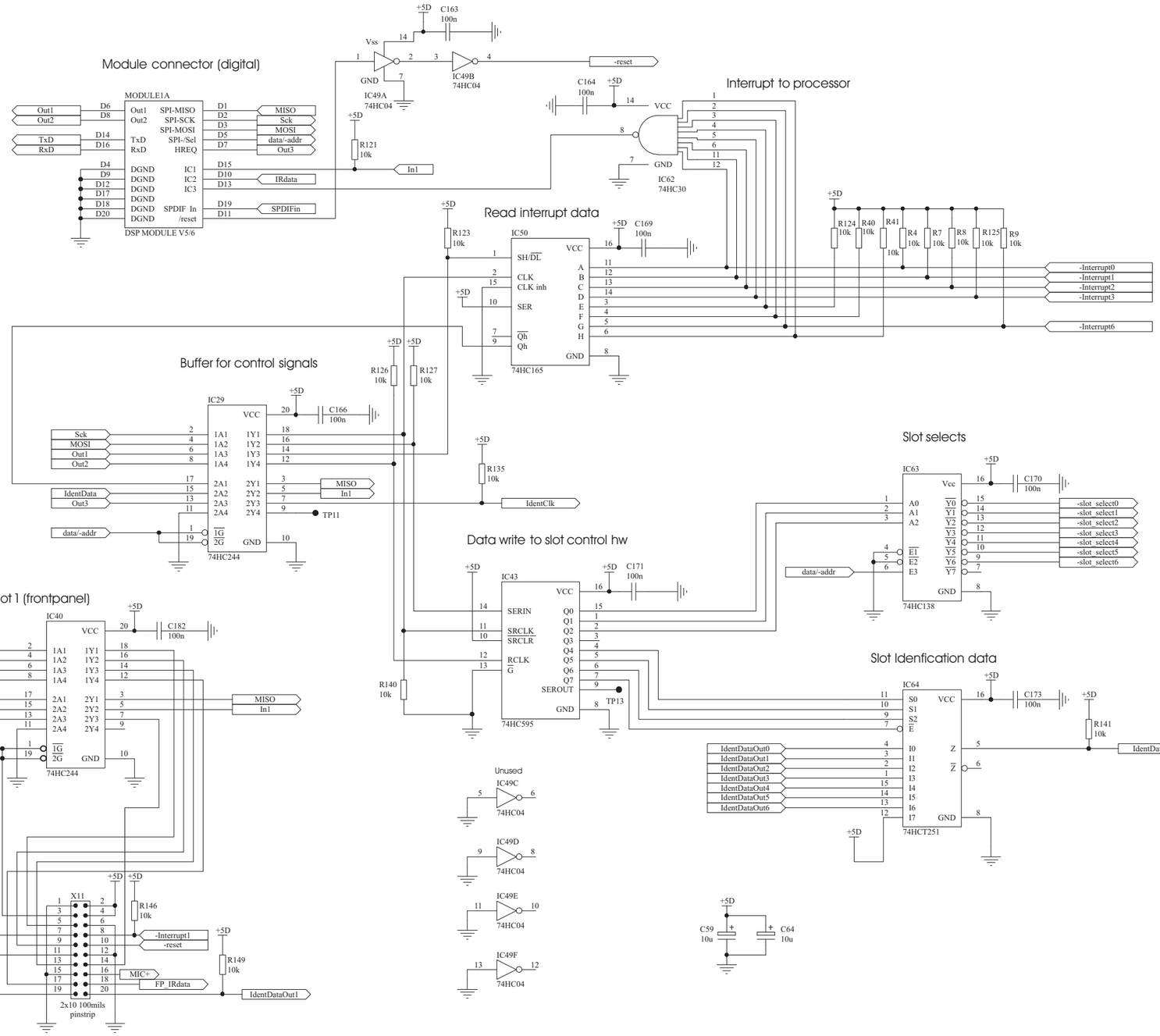




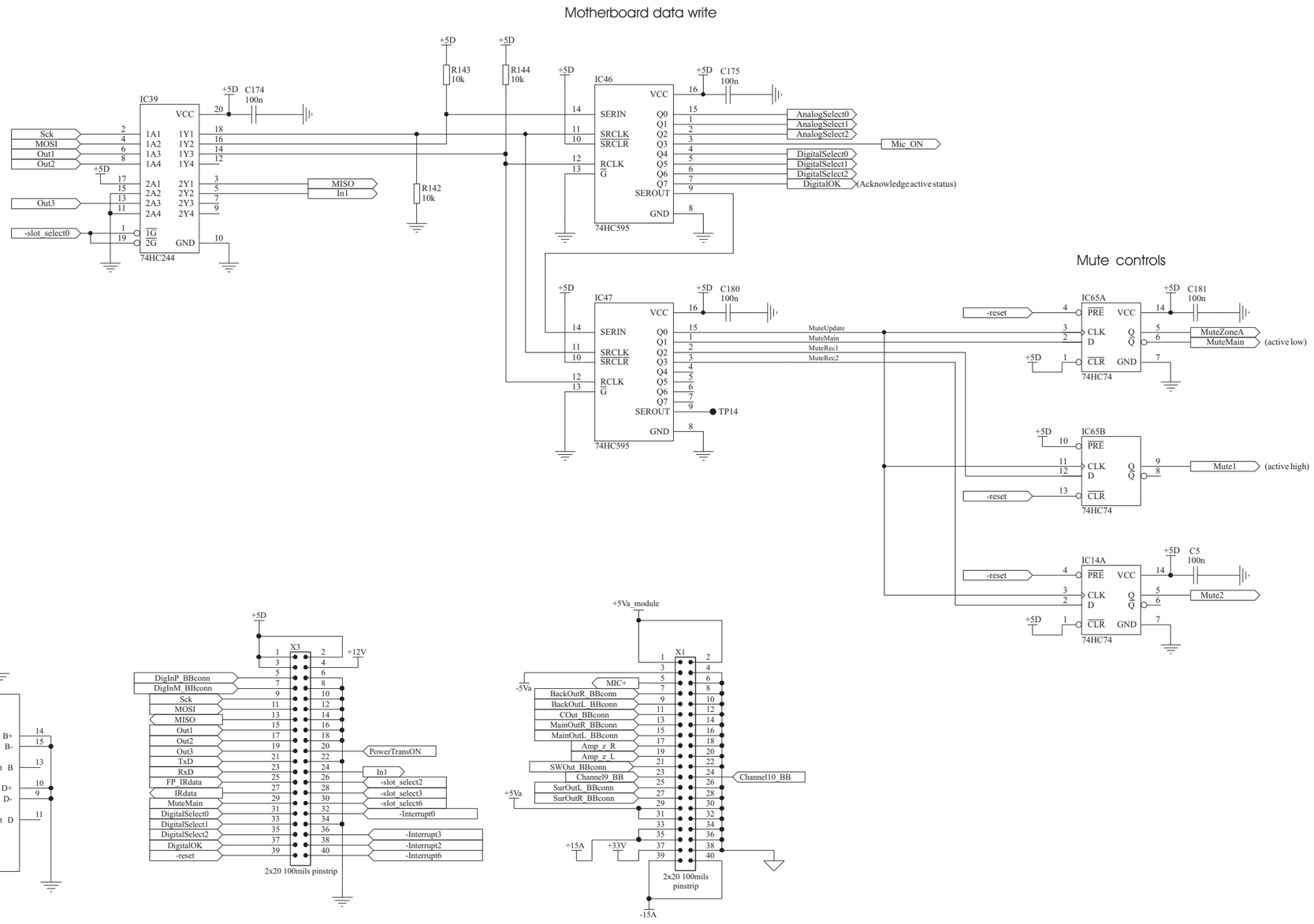

Mute relay
ZoneB_L
C271
10u
R210
56R
Amp_z_L
11
13
9
6
Re2
MCS2H-S
4
8
+5D
L1
EXC ML
68R/100MHZ 3A
Q4
BC848B/BCW32
3
2
Zone B Audio OUT
+ C10
100u
C7
100n
16
1
D4
LL4148
MrMute
R173
1k
C132
100n
ZoneB_R
C272
10u
R212
56R
Amp_z_R
R47
56R
C2
10u
R48
56R
C6
10u
C98
33p
R50
100k
-15A
VCR2_L
R49
100k
4
2
3
1
IC17A
TL072
+15A
8
R53
Not Installed
R213
56R
C241
10u
16V
R230
0R
Q6A
Not Installed
R217
Not
Installed
2
R218
Not
Installed
5
Q6B
Not Installed
6
3
7
C99
33p
R51
100k
VCR2_R
R45
100k
6
5
7
IC17B
TL072
R214
56R
R54
Not Installed
C242
10u
16V
R232
0R
Q7A
Not Installed
R219
Not Installed
2
R220
Not Installed
5
Q7B
Not Installed
6
3
4
MuteTrB
R25
100k
C263
Not
Installed
2
1
KP21
R29
100k
C262
Not
Installed
2
1
KP22
R30
100k
C265
Not
Installed
2
1
KP23
R31
100k
C264
Not
Installed
2
1
KP24
X9
4
3
2
6
5
1
7
Shield
HSP-244V4-17
Rec VCR2 L Out
Rec VCR2 R Out
Zone B L fixed
Zone B R fixed
+15A
C239
10u
C133
100n
C240
10u
C137
100n
-15A
C100
33p
R60
100k
-15A
R58
100k
2
3
IC18A
TL072
8
+15A
R215
56R
R61
Not Installed
C243
10u
16V
R234
0R
RecVCR1L
Q8A
Not Installed
R221
Not
Installed
2
R223
Not
Installed
5
Q8B
Not Installed
6
3
1
4
C101
33p
R64
100k
R63
100k
6
5
7
IC18B
TL072
R216
56R
R65
Not Installed
C246
10u
16V
R242
0R
RecVCR1R
Q9A
Not Installed
R226
Not
Installed
2
R227
Not
Installed
5
Q9B
Not Installed
6
3
1
4
MuteTrA
Title

10 MAIN AUDIO 320165 SH 3 OF 7

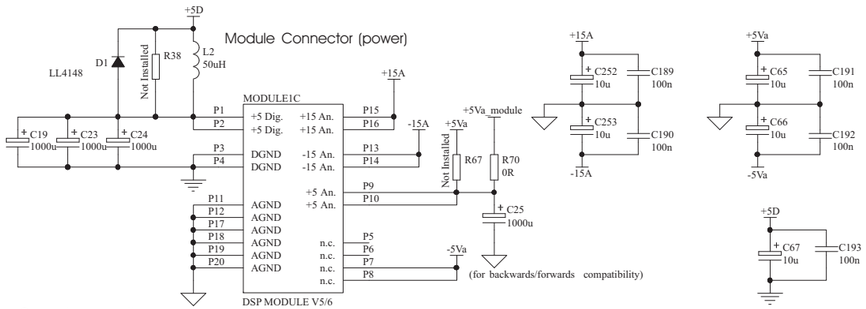



Module connector (digital)
MODULE1A
Out1
Out2
TxD
RxD
SPI-MISO
SPI-SCK
SPI-MOSI
SPI-/Sel
HREQ
DGND
IC1
IC2
IC3
SPDIF In
/reset
MISO
Sck
MOSI
data/-addr
Out3
IRdata
SPDIFin
DSP MODULE V5/6
IC49A
74HC04
IC49B
74HC04
-reset
In1
R121
10k
C163
100n
C164
100n
Interrupt to processor
IC62
74HC30
Read interrupt data
IC50
74HC165
SH/DL
CLK
CLK inh
SER
Qh
R123
10k
C169
100n
R124
10k
R40
10k
R41
10k
R4
10k
R7
10k
R8
10k
R125
10k
R9
10k
-Interrupt0
-Interrupt1
-Interrupt2
-Interrupt3
-Interrupt6
Buffer for control signals
IC29
74HC244
R126
10k
R127
10k
C166
100n
IdentData
Out3
data/-addr
IdentClk
TP11
R135
10k
Slot selects
IC63
74HC138
-slot_select0
-slot_select1
-slot_select2
-slot_select3
-slot_select4
-slot_select5
-slot_select6
C170
100n
Data write to slot control hw
IC43
74HC595
SERIN
SRCLK
SRCLR
RCLK
G
SEROUT
TP13
R140
10k
C171
100n
Slot Idenfication data
IC64
74HCT251
IdentDataOut0
IdentDataOut1
IdentDataOut2
IdentDataOut3
IdentDataOut4
IdentDataOut5
IdentDataOut6
R141
10k
C173
100n
Unused
IC49C
IC49D
IC49E
IC49F
74HC04
C59
10u
C64
10u
Slot 1 (frontpanel)
IC40
74HC244
-slot_select1
X11
2x10 100mils
pinstrip
R146
10k
R149
10k
-Interrupt1
-reset
MIC+
FP_IRdata
IdentDataOut1
C182
100n

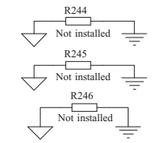
10 MAIN AUDIO 320165 SH 5 OF 7



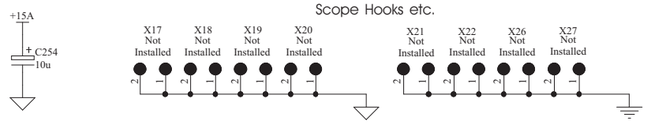
Module Connector (power)



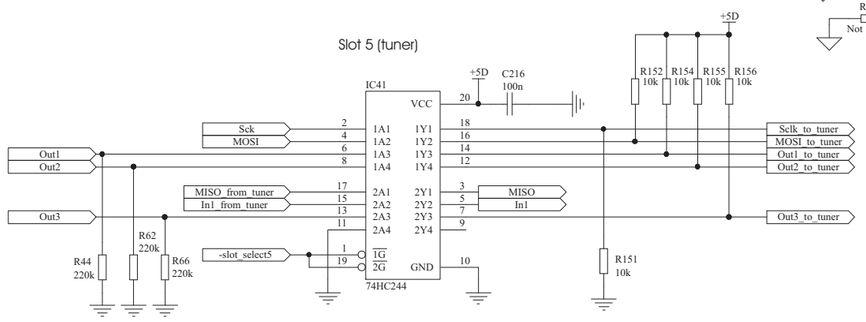
Ground connections

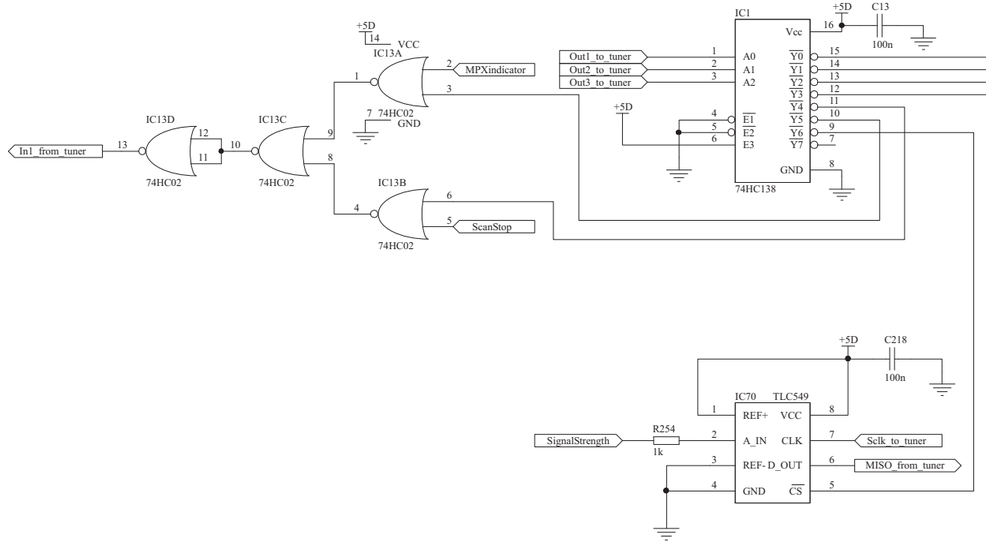


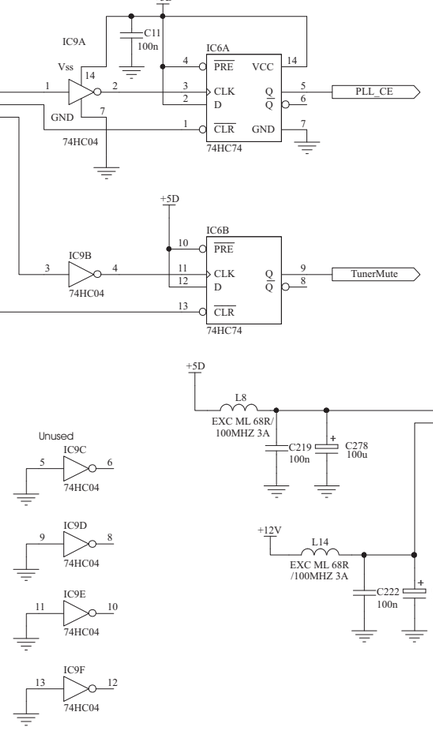
Scope Hooks etc.

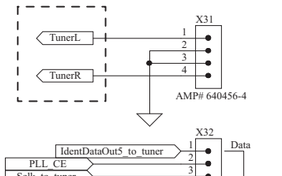


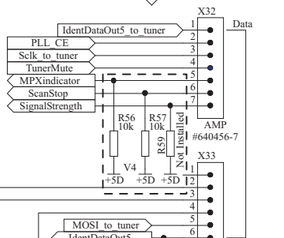
Slot 5 (tuner)

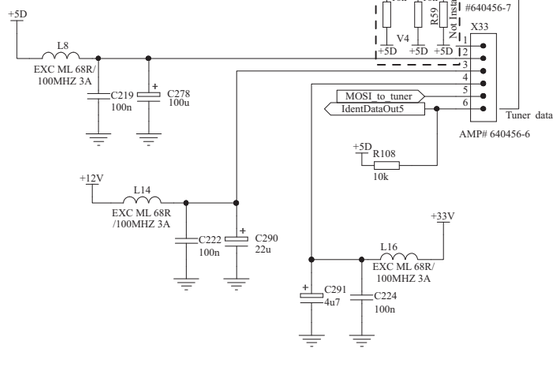








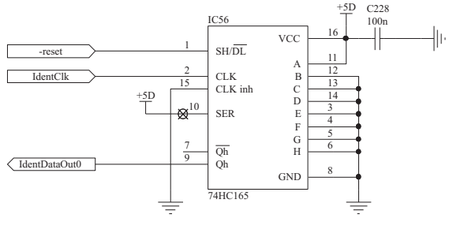




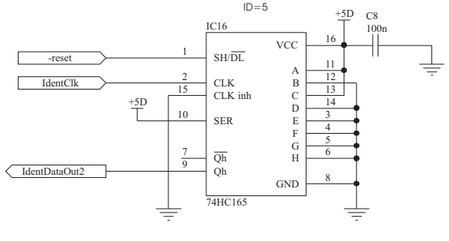
10 MAIN AUDIO 320165 SH 7 OF 7

Slot 0 (motherboard)

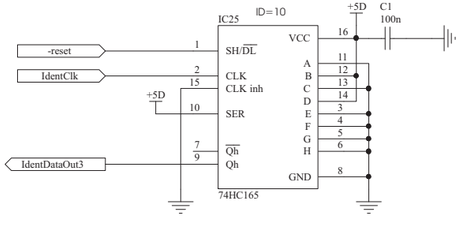
slot hw number=1: Motherboard rev2



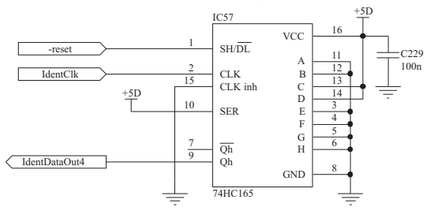
Slot 2 (videoboard)



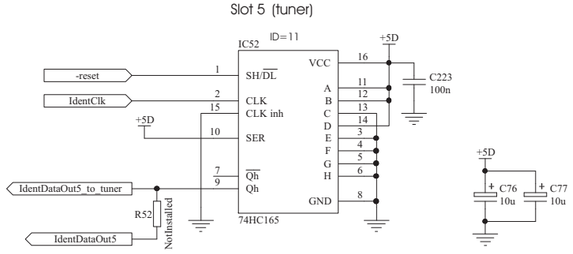
Slot 3 (multichannel io)



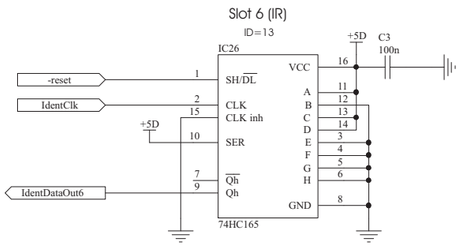
Slot 4 (multiroom)

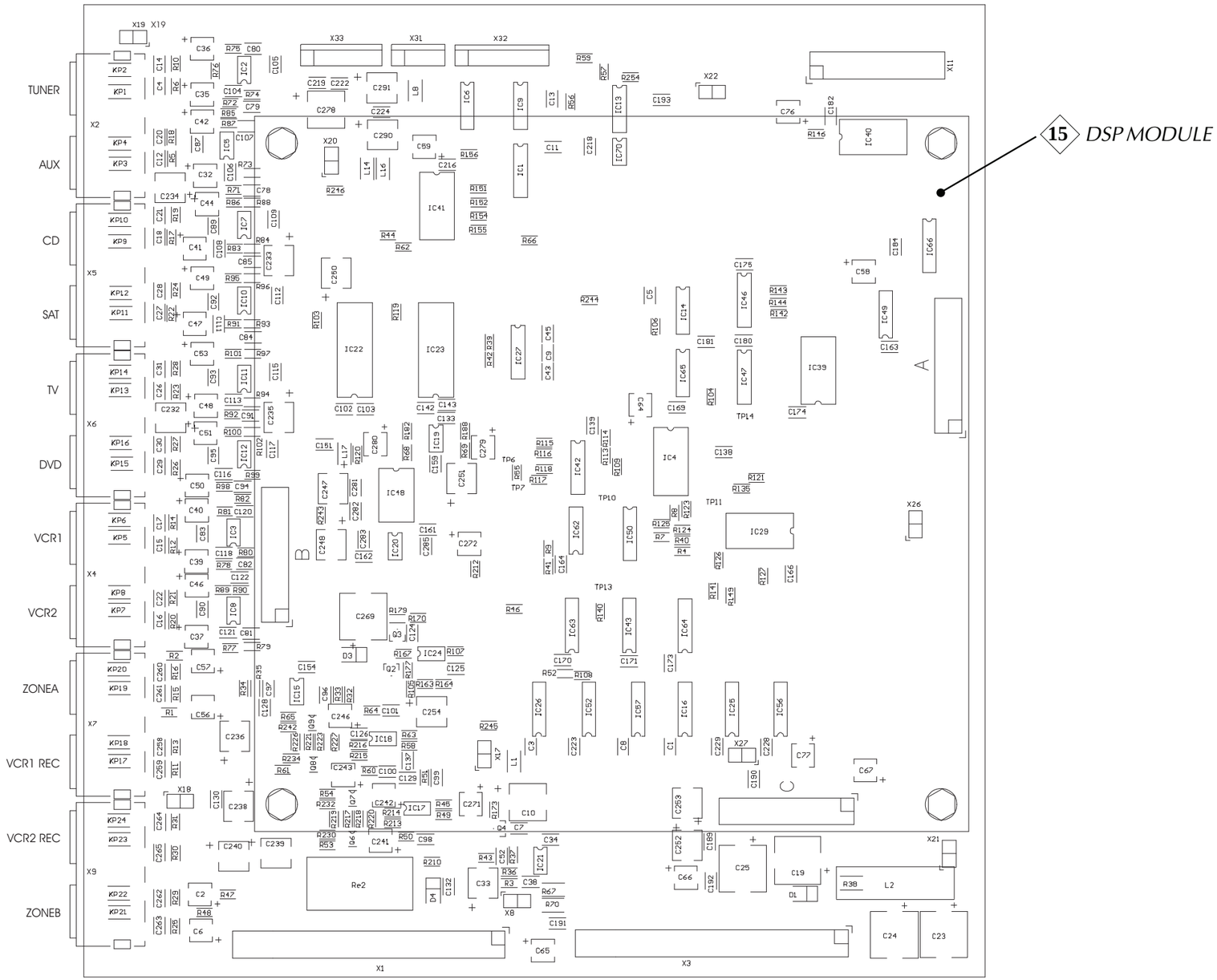


Slot 5 (tuner)



Slot 6 (IR)

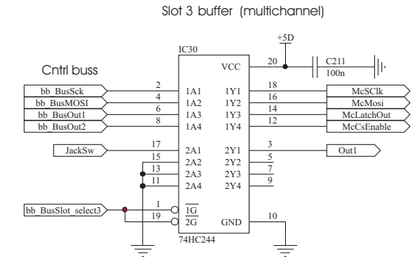



15 DSP MODULE
TUNER
AUX
CD
SAT
TV
DVD
VCR1
VCR2
ZONEA
VCR1 REC
VCR2 REC
ZONEB
A
B
X1
X2
X3
X4
X5
X6
X7
X8
X9
X11
X18
X19
X20
X21
X22
X26
X27
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC20
IC21
IC22
IC23
IC25
IC26
IC27
IC29
IC39
IC40
IC41
IC42
IC43
IC45
IC46
IC47
IC48
IC49
IC50
IC52
IC56
IC57
IC62
IC63
IC64
IC66
IC70
Re2
TP6
TP7
TP10
TP11
TP13
TP14

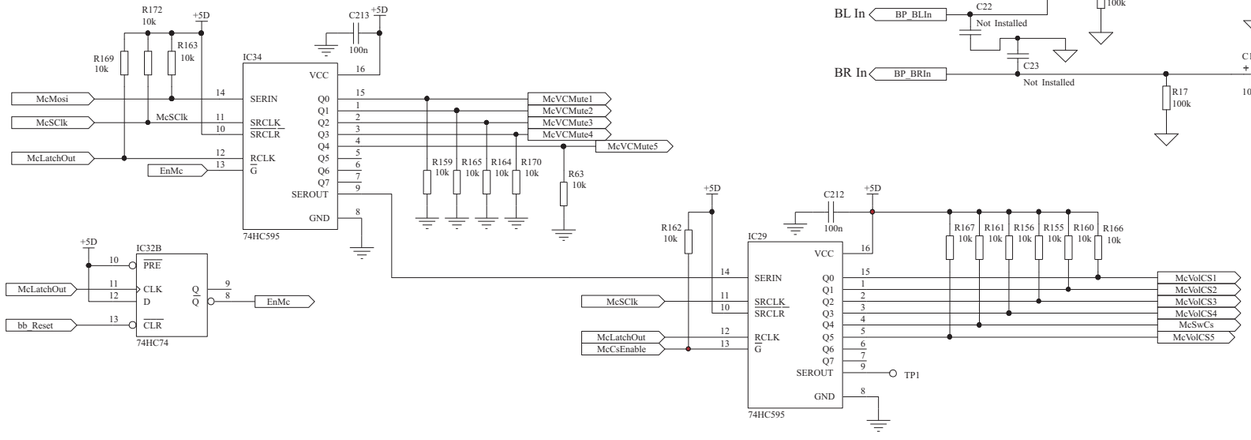
11 MULTI CHANNEL 320169 SH 1 OF 6

MHT200

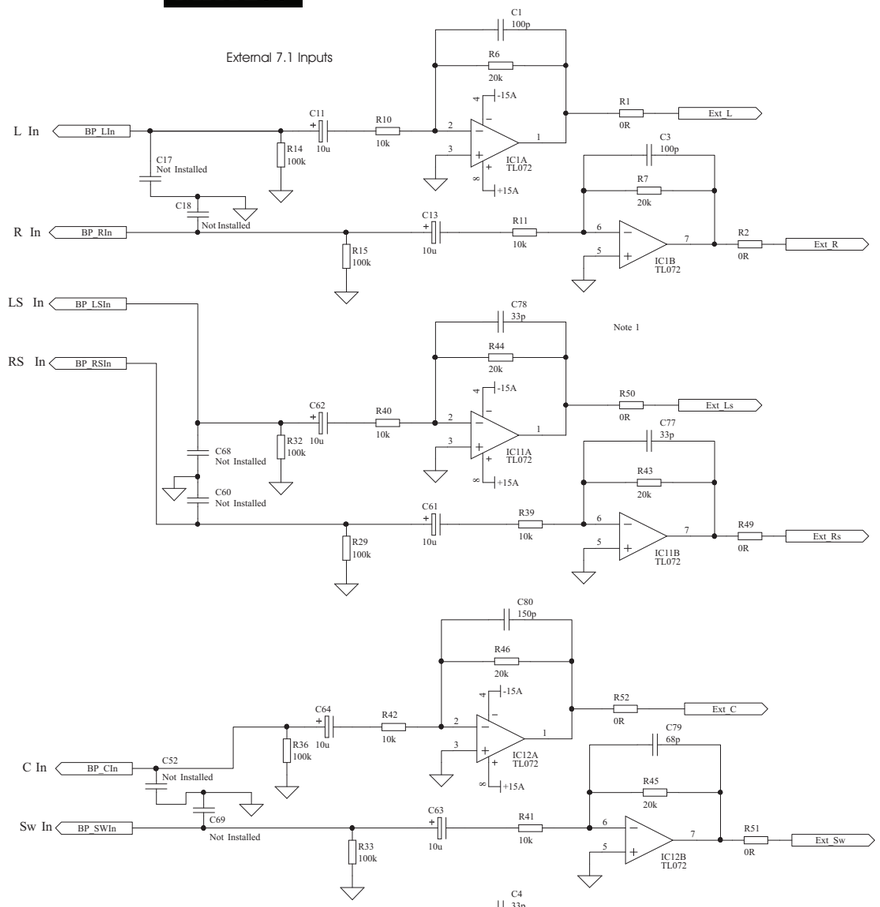
Slot 3 buffer (multichannel)



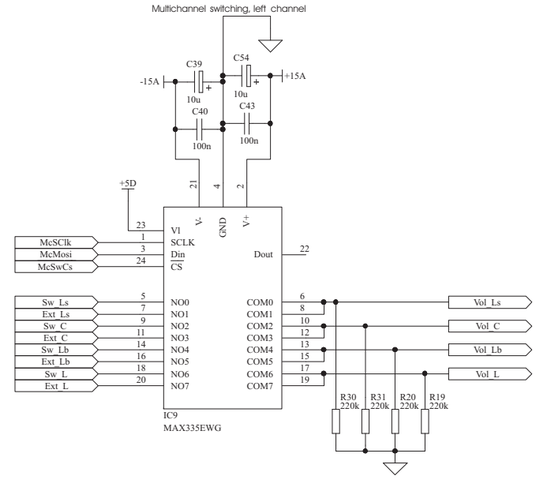
Chip select & mute registers



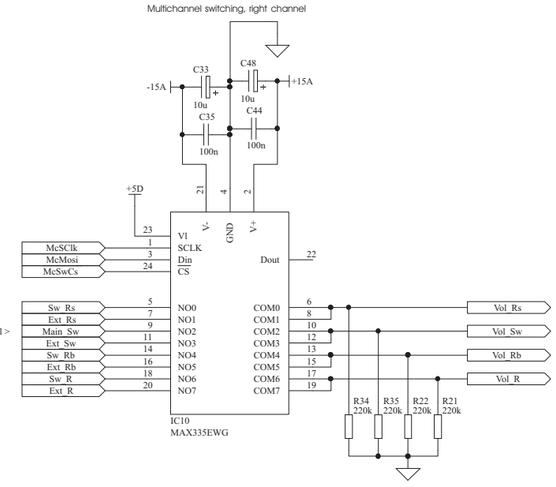
External 7.1 Inputs

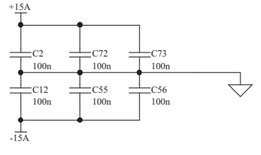


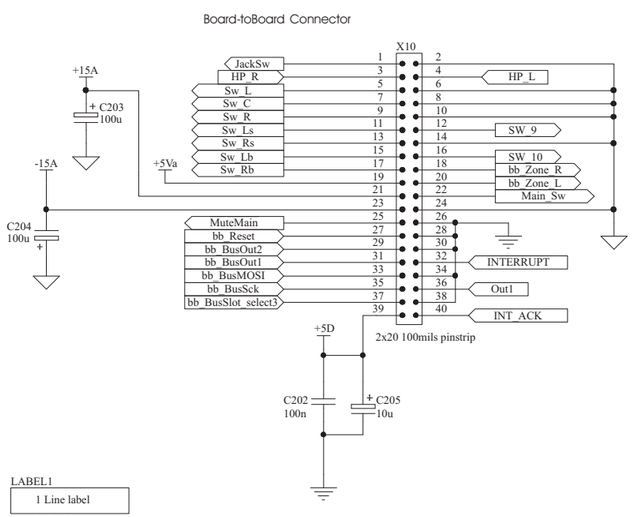
Multichannel switching, left channel



Multichannel switching, right channel



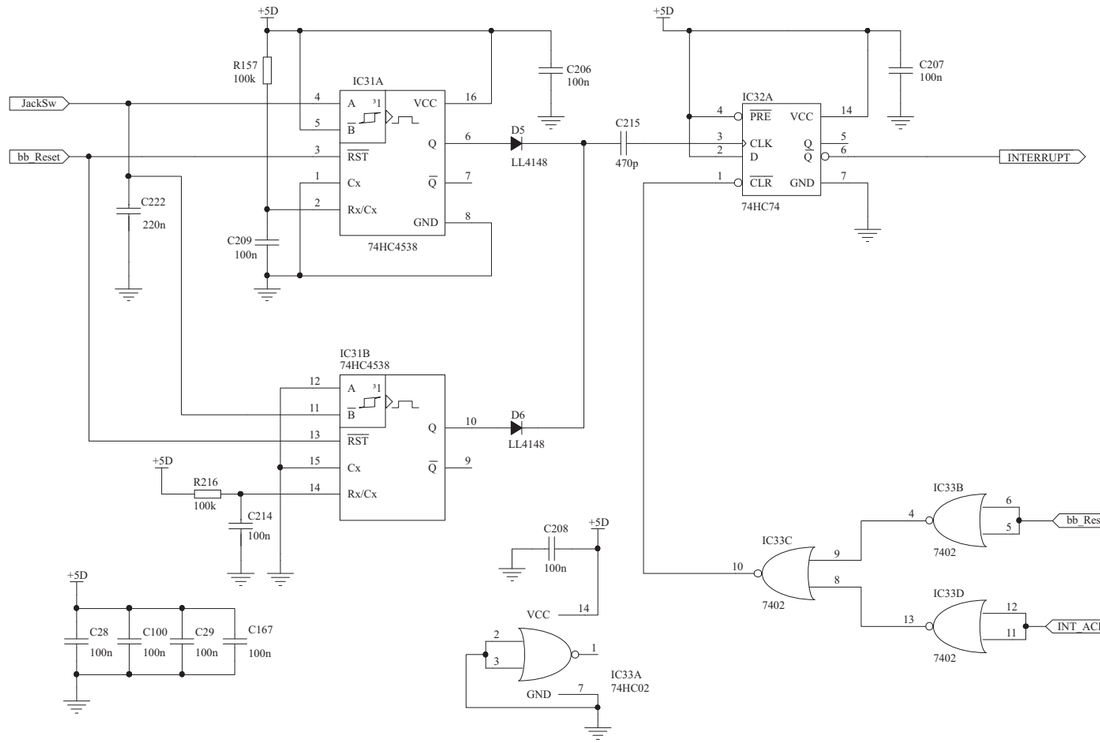




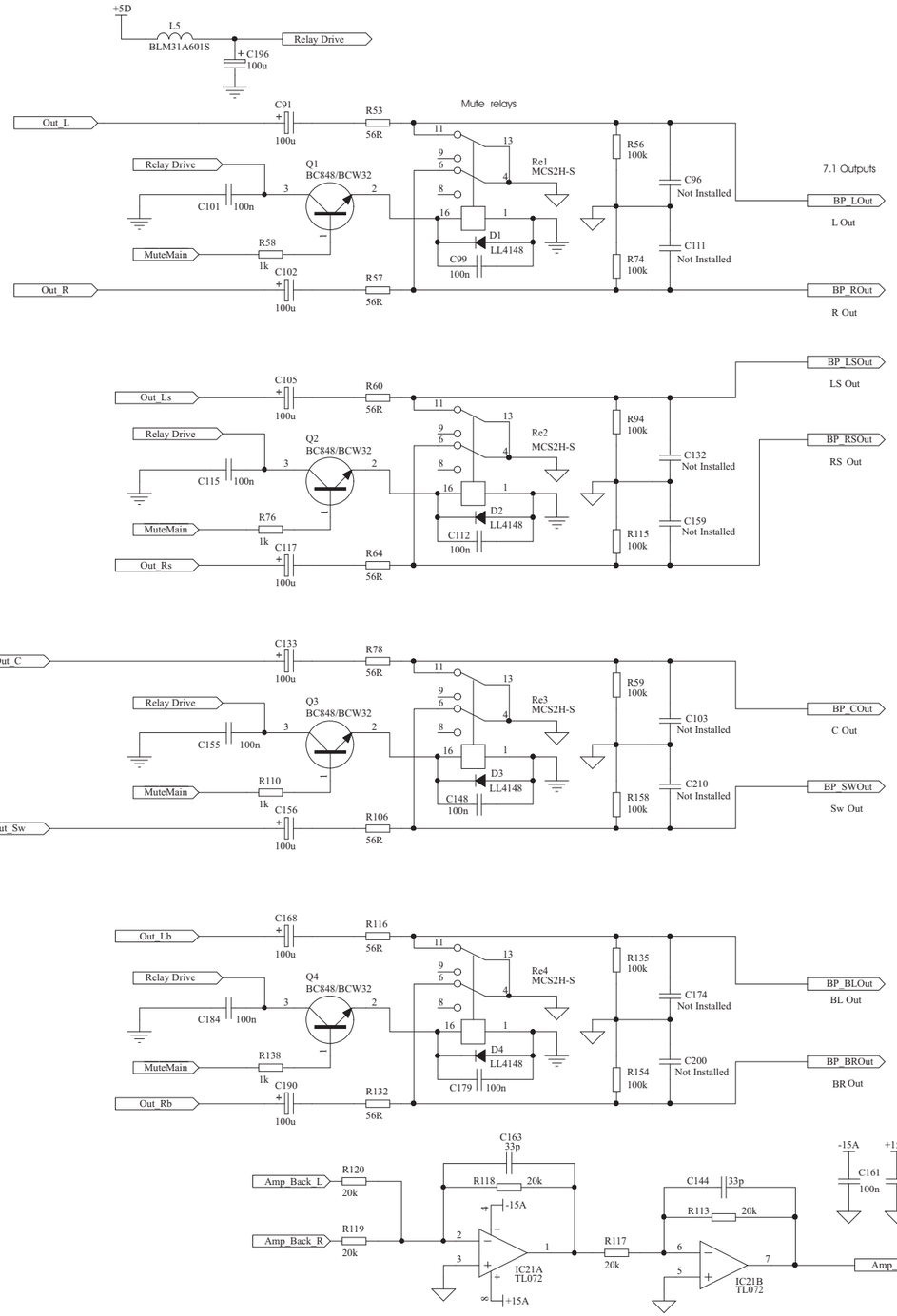
LABEL1

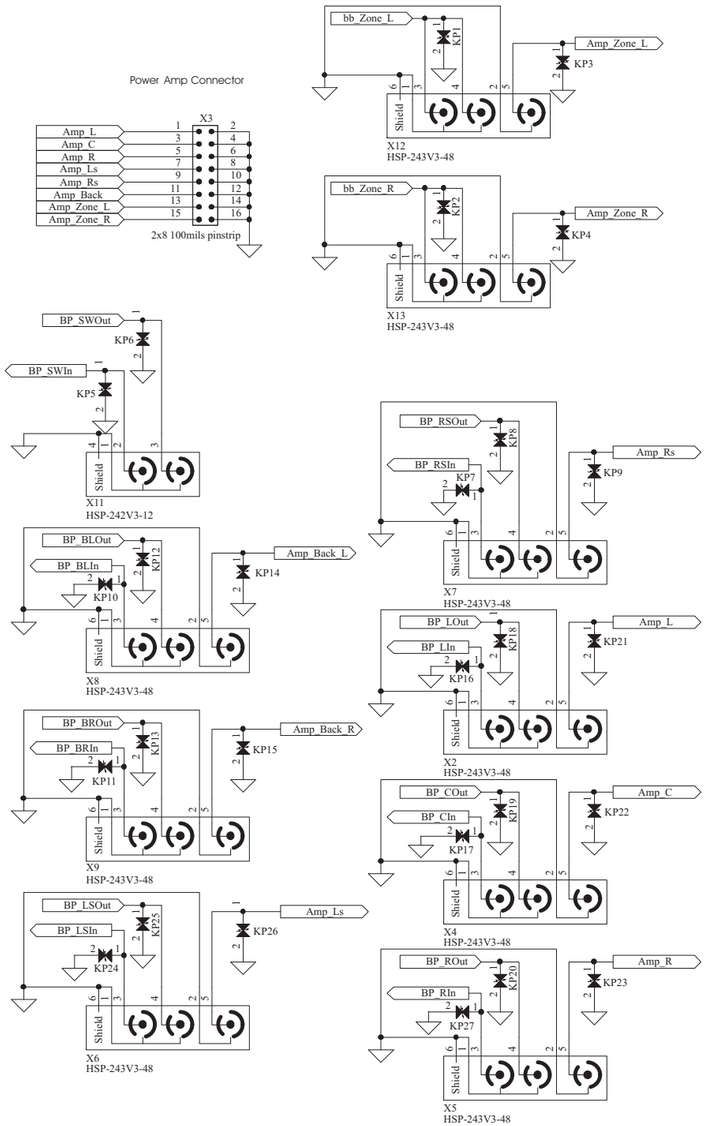
1 Line label

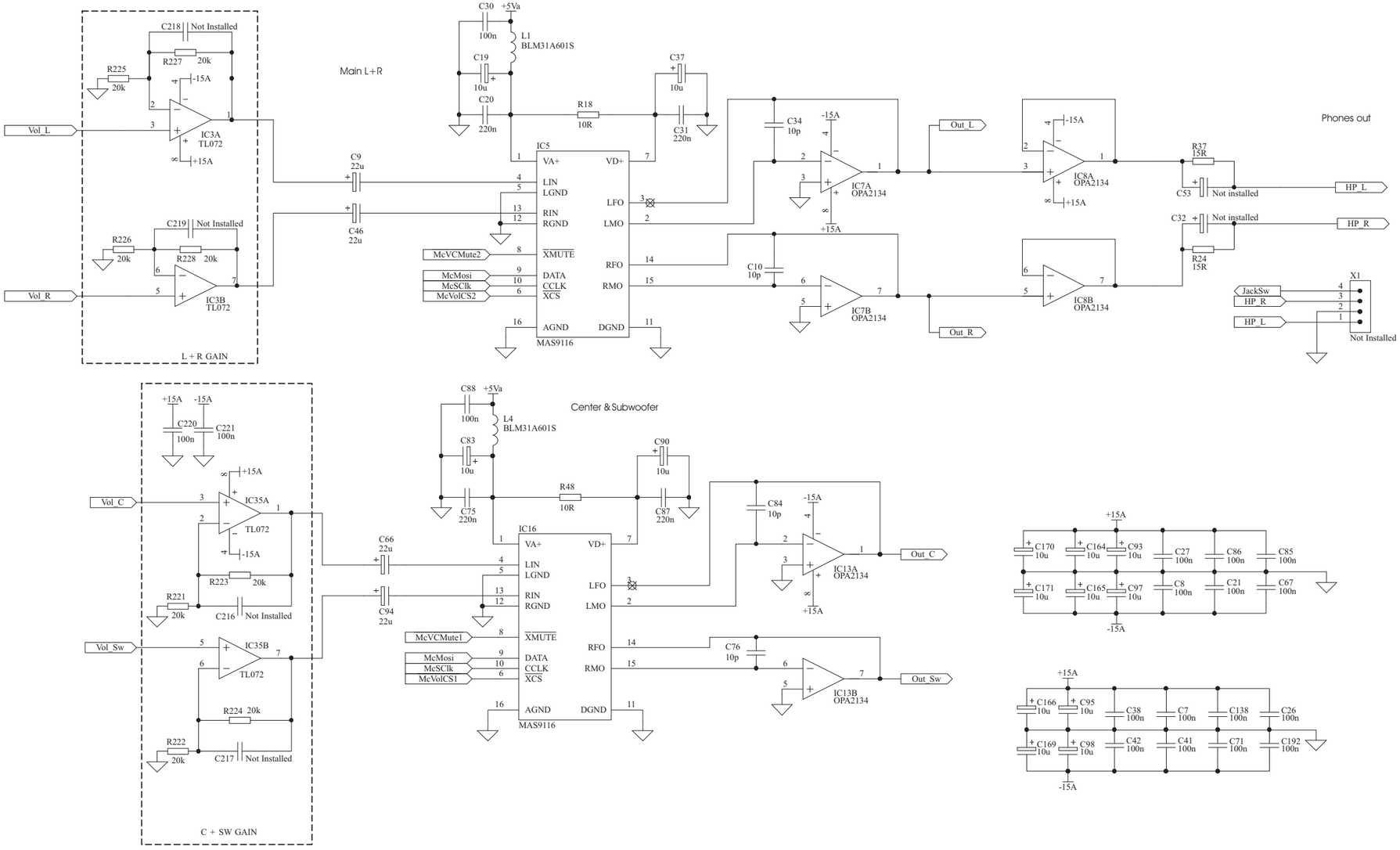
Not Installed



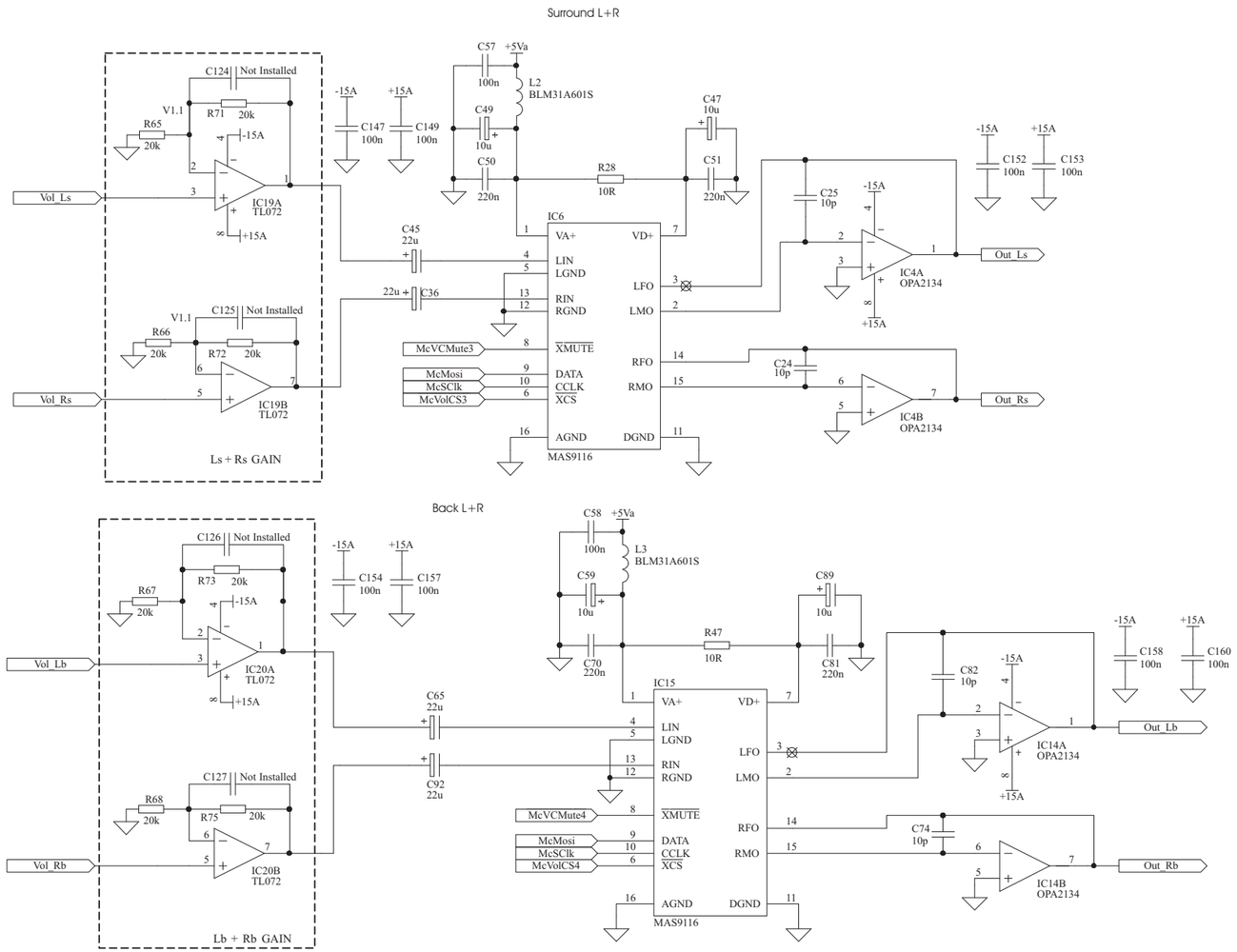
11 MULTI CHANNEL 320169 SH 3 OF 6

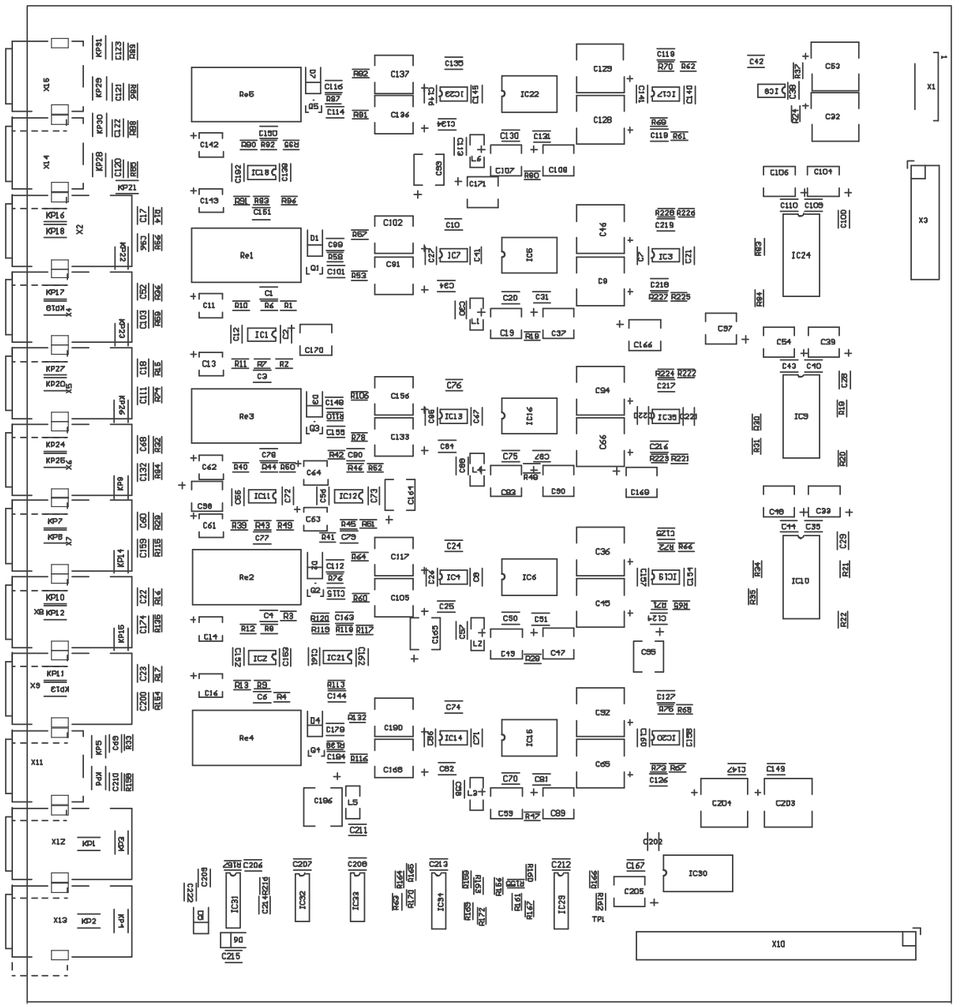





L + R GAIN
C218 Not Installed
R227 20k
R225 20k
-15A
IC3A TL072
+15A
Vol_L
C219 Not Installed
R228 20k
R226 20k
IC3B TL072
Vol_R
Main L+R
C30 +5Va
100n
L1 BLM31A601S
C19 10u
C20 220n
R18 10R
C37 10u
C31 220n
C9 22u
C46 22u
IC5
VA+
VD+
LIN
LGND
LFO
RIN
RGND
LMO
XMUTE
RFO
DATA
CCLK
XCS
RMO
AGND
DGND
MAS9116
McVCMute2
McMosi
McSClk
McVolCS2
C34 10p
C10 10p
IC7A OPA2134
IC7B OPA2134
Out_L
Out_R
IC8A OPA2134
IC8B OPA2134
Phones out
R37 15R
C53 Not installed
C32 Not installed
R24 15R
HP_L
HP_R
JackSw
X1
Not Installed
C + SW GAIN
C220 100n
C221 100n
IC35A TL072
Vol_C
R223 20k
C216 Not Installed
R221 20k
IC35B TL072
Vol_Sw
R224 20k
C217 Not Installed
R222 20k
Center & Subwoofer
C88 +5Va
100n
L4 BLM31A601S
C83 10u
C75 220n
R48 10R
C90 10u
C87 220n
C66 22u
C94 22u
IC16
MAS9116
McVCMute1
McMosi
McSClk
McVolCS1
C84 10p
C76 10p
IC13A OPA2134
IC13B OPA2134
Out_C
Out_Sw
C170 10u
C164 10u
C93 10u
C27 100n
C86 100n
C85 100n
C171 10u
C165 10u
C97 10u
C8 100n
C21 100n
C67 100n
C166 10u
C95 10u
C38 100n
C7 100n
C138 100n
C26 100n
C169 10u
C98 10u
C42 100n
C41 100n
C71 100n
C192 100n

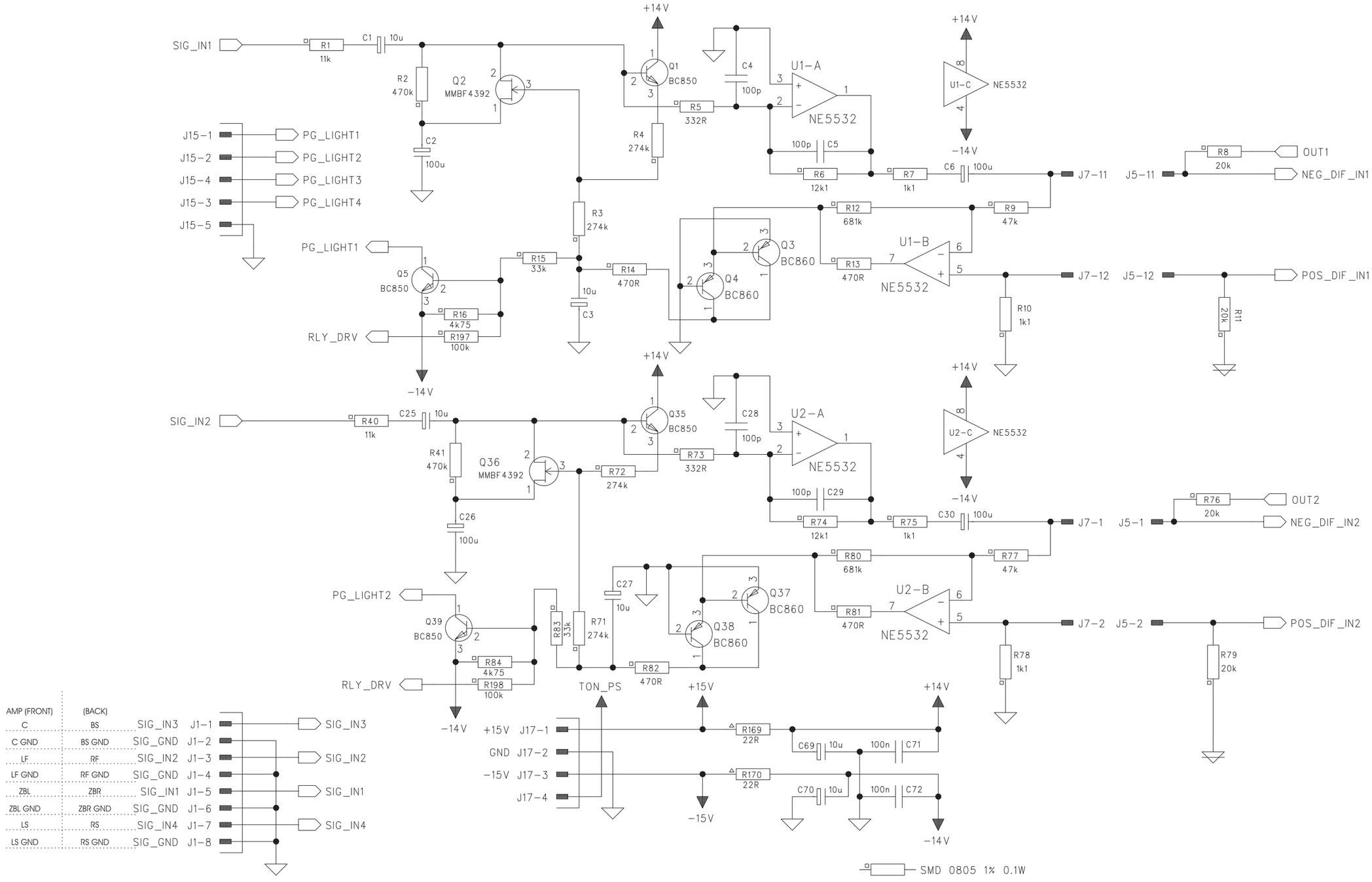
11 MULTI CHANNEL *320169 SH 5 OF 6*



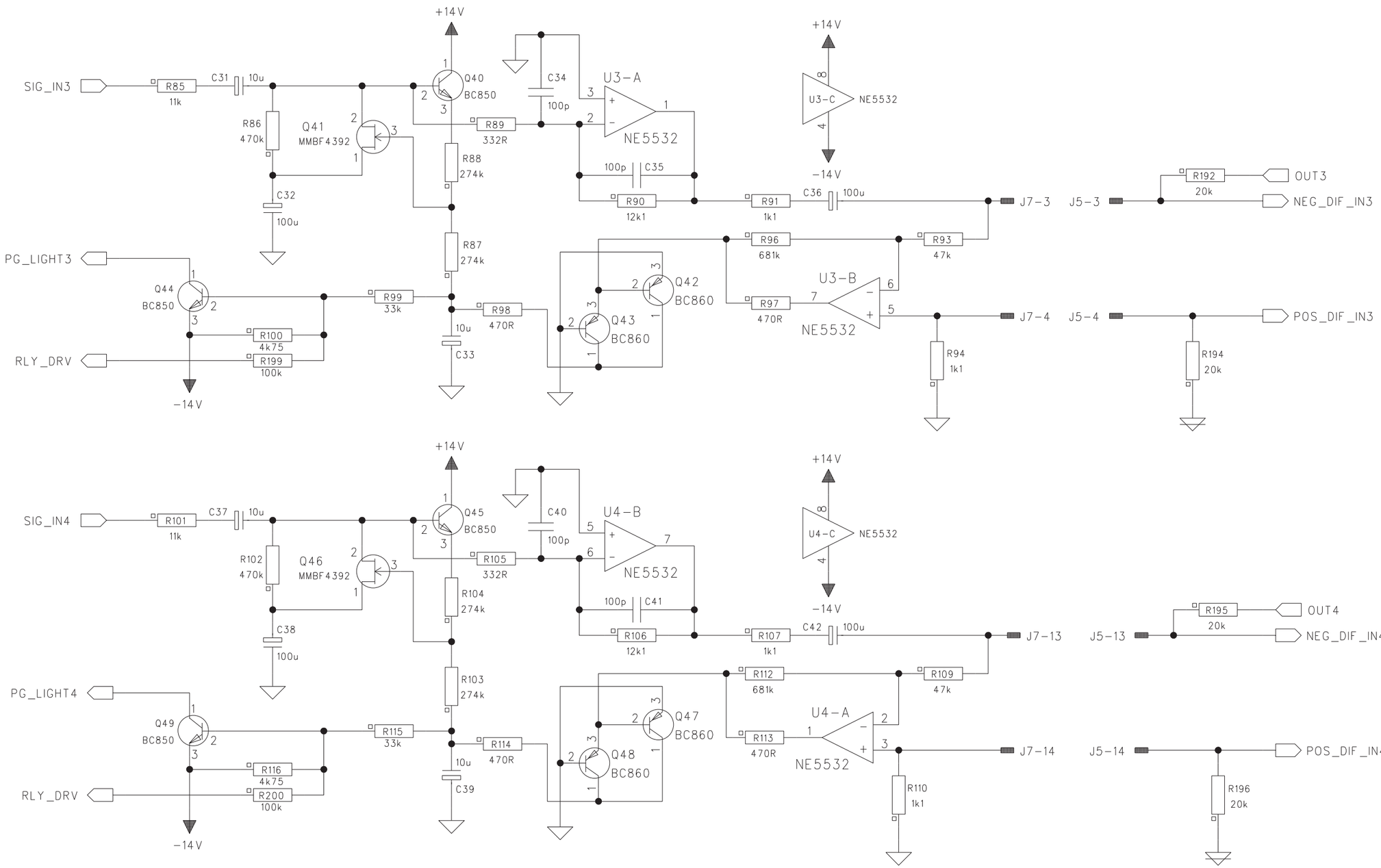


NOTES

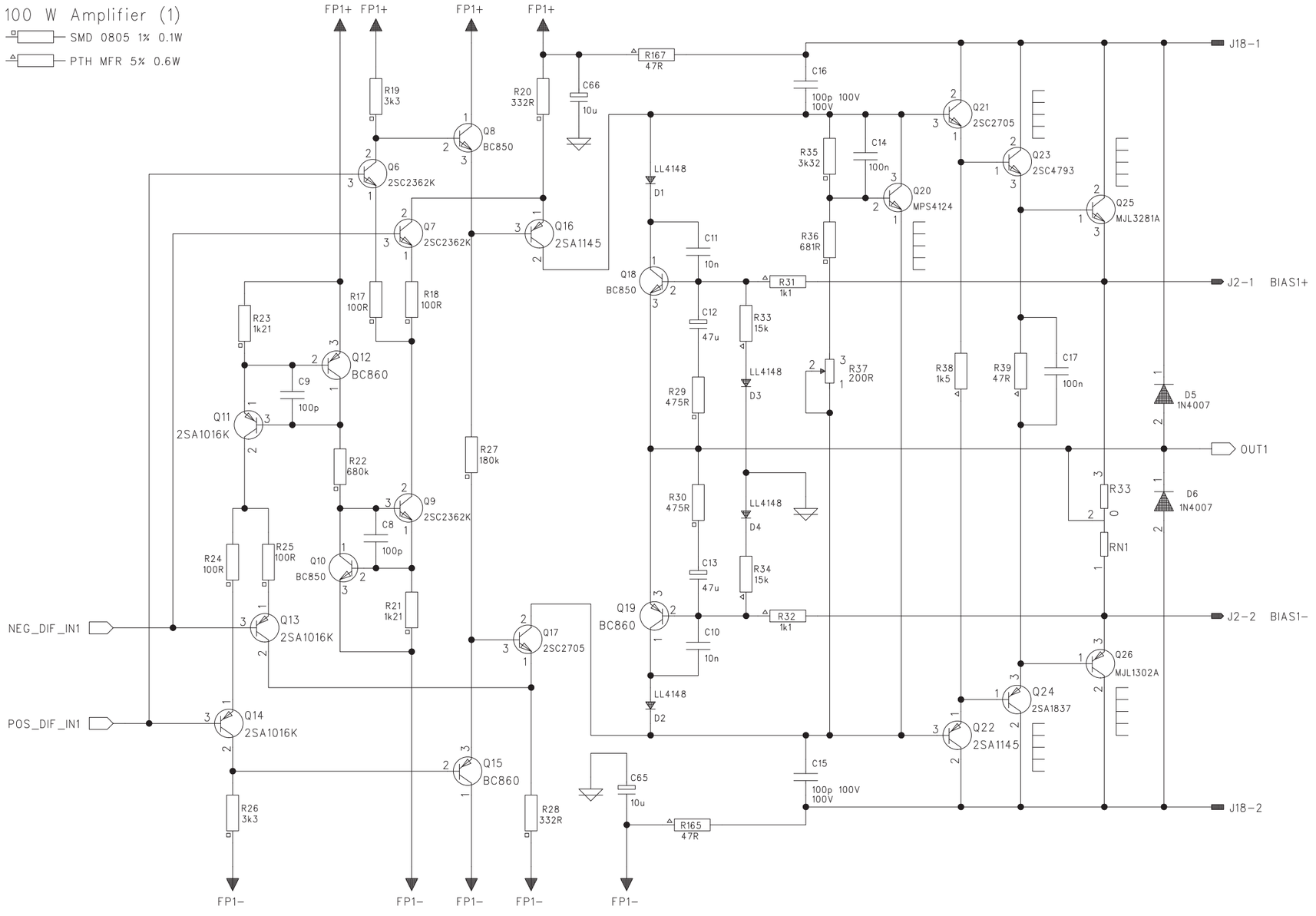
AMPLIFIER *320129 (FRONT & BACK) SH 1 OF 7*



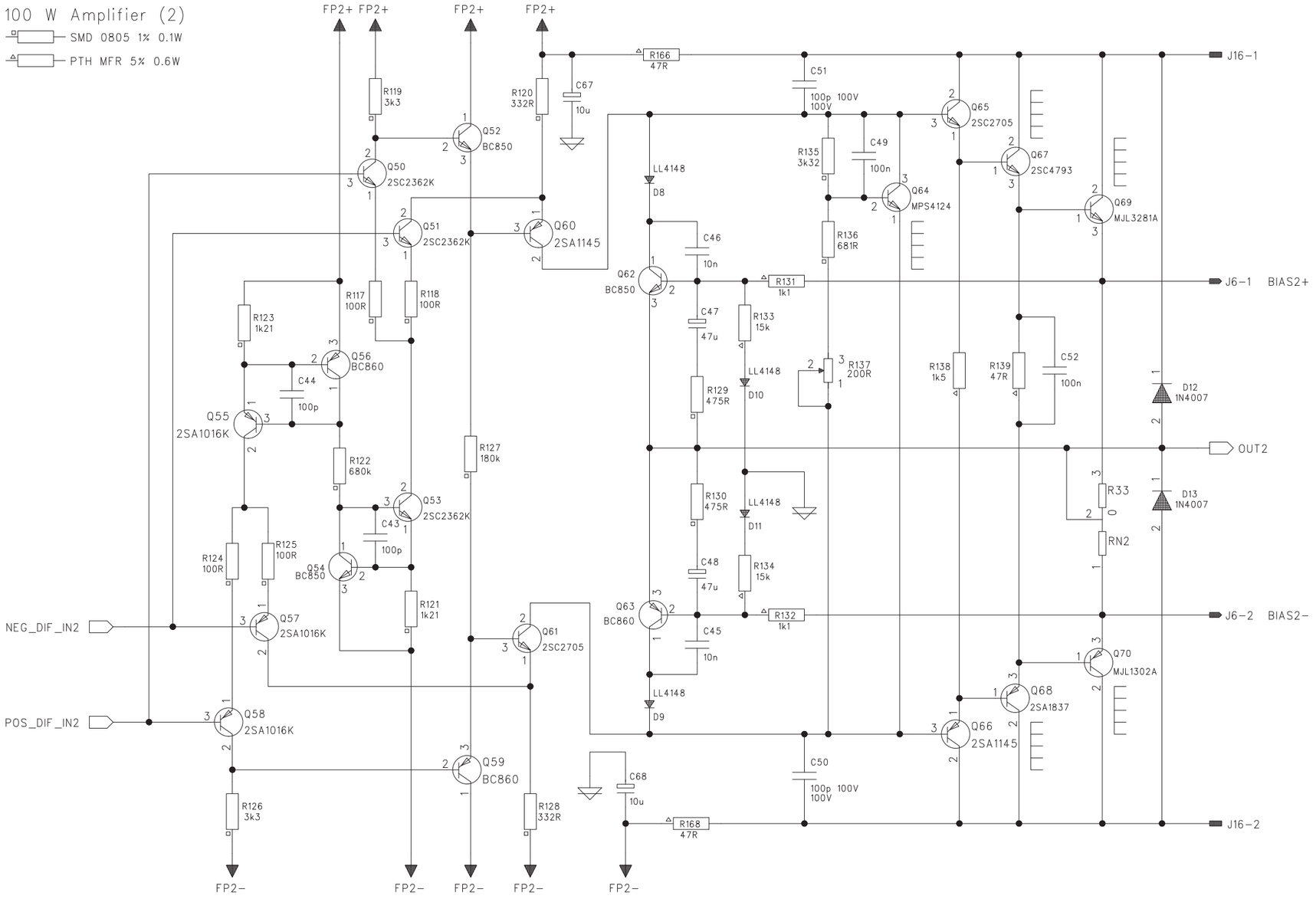
12 A/B AMPLIFIER 320129 (FRONT & BACK) SH 2 OF 7



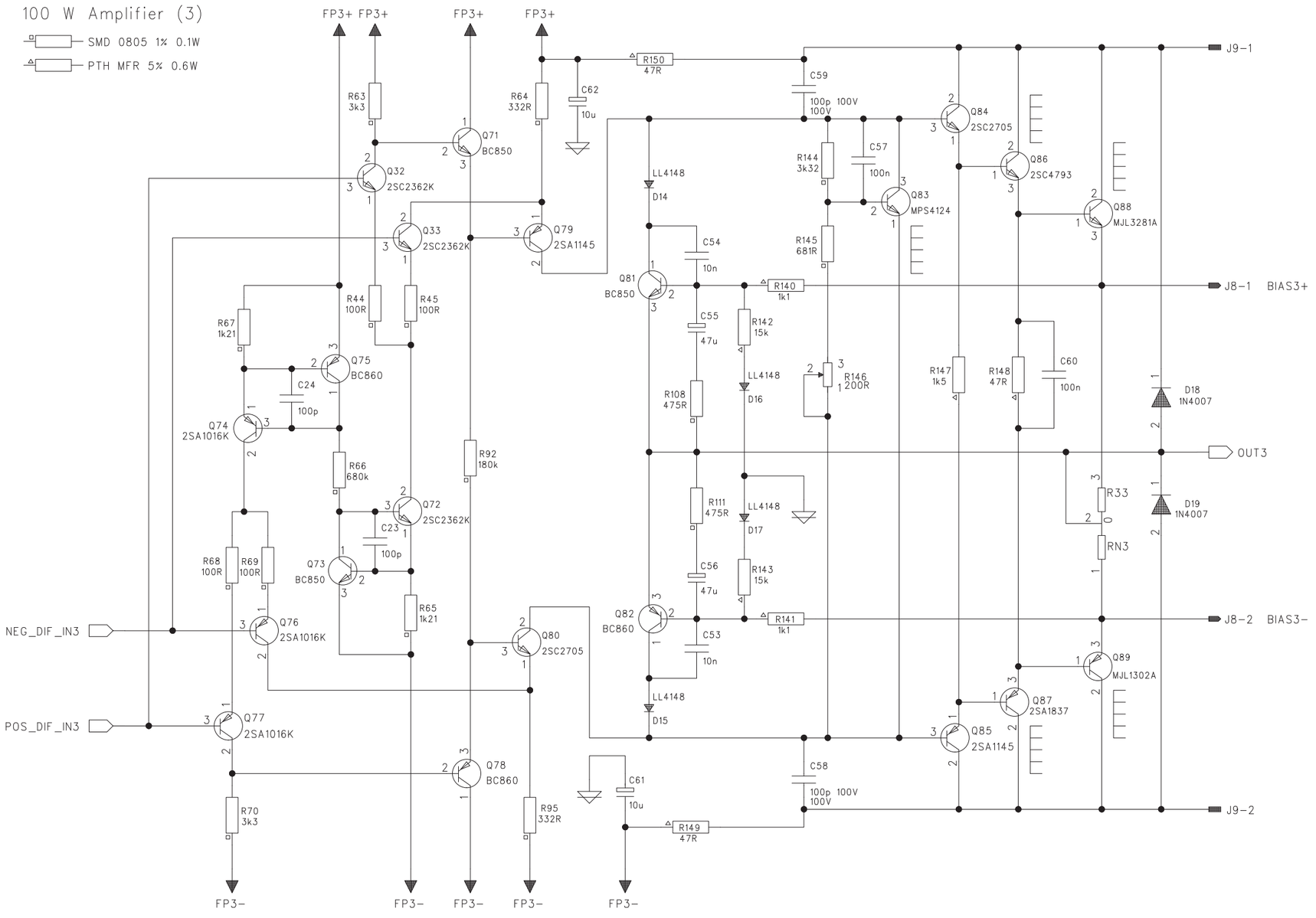
AMPLIFIER *320129 (FRONT & BACK) SH 3 OF 7*



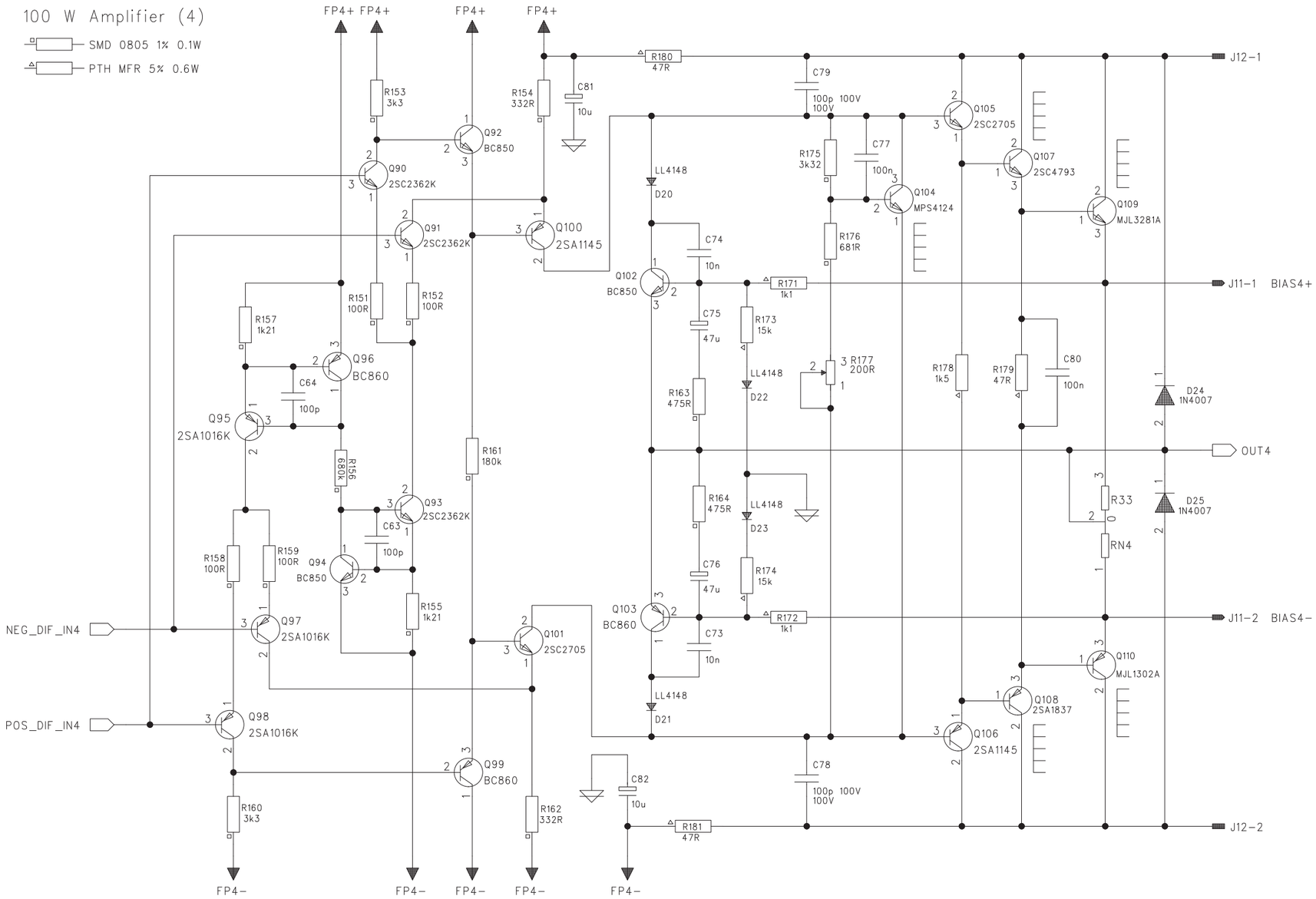
12AB AMPLIFIER 320129 (FRONT & BACK) SH 4 OF 7



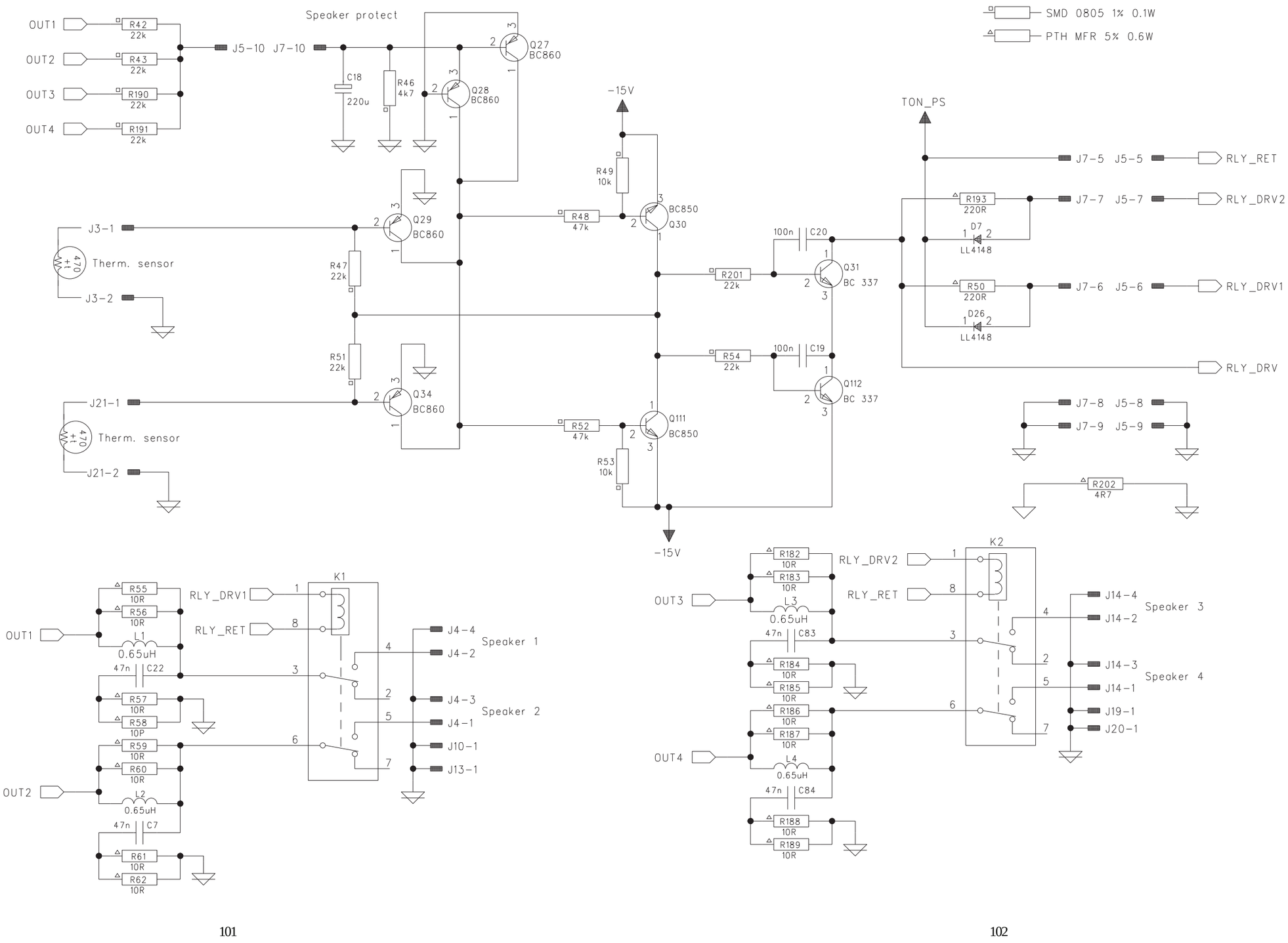
AMPLIFIER *320129 (FRONT & BACK) SH 5 OF 7*



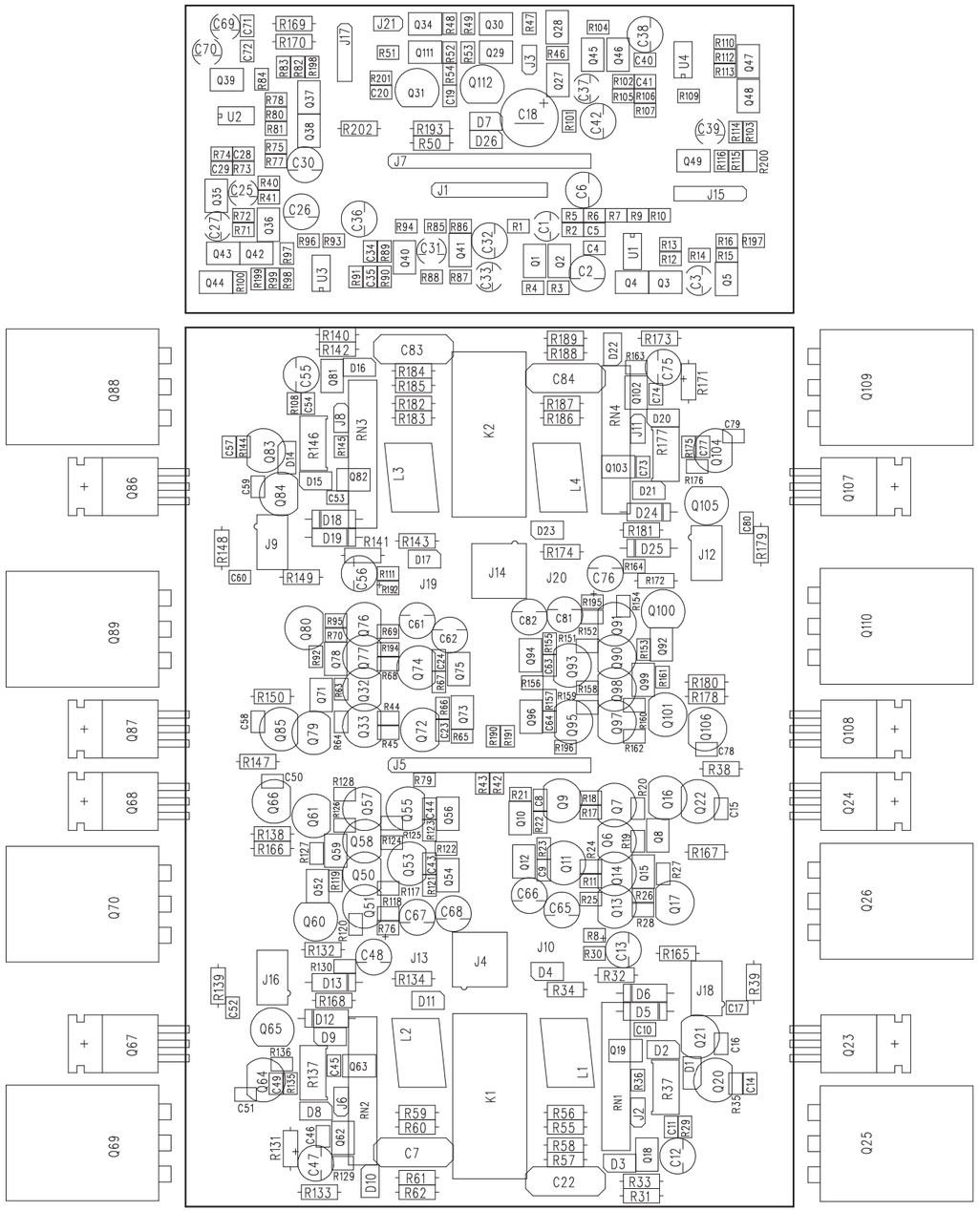
12AB AMPLIFIER 320129 (FRONT & BACK) SH 6 OF 7



AMPLIFIER *320129 (FRONT & BACK) SH 7 OF 7*



12AB AMPLIFIER 320129 (FRONT & BACK)



TUNER ALIGNMENT PROCEDURE

Note: Refer to Figure 1 while reading the below procedure.

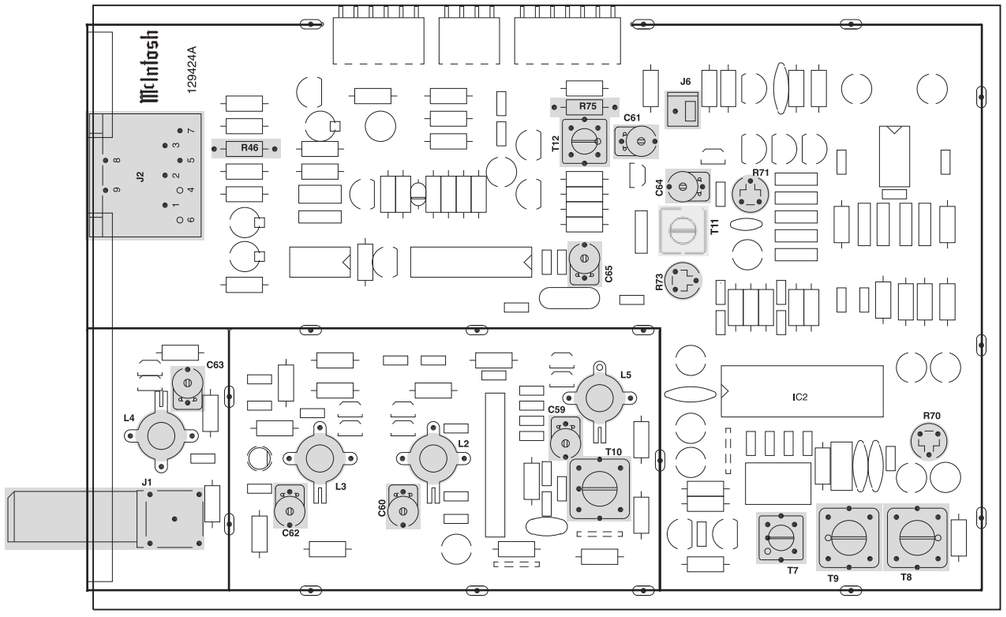
FM ALIGNMENT PROCEDURE

1. Connect an FM Signal Generator to Antenna Input.
2. Connect Distortion Analyzer to the TUNER INPUT RCA jacks. (These jacks act as the Tuner Output.)
3. Remove Top Cover and AM/FM TUNER Cover. Turn On the AC rocker switch. Press the red Standby button to turn the unit On.
4. Select Tuner with the Zone A selector knob. Put Tuner into FM mode and tune to 87.5MHz.
5. Adjust L5 (FM OSC Coil) for 3.5VDC at R46.
6. Tune to 108.5MHz and adjust C59 (FM OSC Trimmer Capacitor) for 24.5VDC at R46.
7. Repeat steps 4, 5 and 6 as necessary for a tuning range of 3.5VDC to 24.5VDC at R46.
8. Tune the Generator and Tuner to 90MHz and adjust Coils: L2 (FM MIX), L3 (FM RF) and L4 (FM ANT) for best sensitivity.
9. Tune the Generator and Tuner to 104MHz and adjust Trimmer Capacitors: C60 (FM MIX), C62 (FM RF) and C63 (FM ANT) for best sensitivity.
10. Repeat 8 and 9 until no improvement in sensitivity is noted.
11. Tune Tuner to 90MHz with no RF Input and adjust T9 (FM DETector Primary) for zero volts between TP1 and TP2 relative (connector J6).
12. Tune the Generator to 90MHz and adjust the RF Output to 1000uV and 100% MONO modulation at 1000Hz. Then adjust T8 (FM DETector SECondary) for lowest distortion.
13. Reduce the Generator Output to minimum and detune the Generator so the Receiver picks up only noise, then recheck the voltage between TP1 and TP2 (connector J6). Adjust T8 and C65 if needed. If it is not 0+/- 0.2VDC, repeat steps 11 and 12.If there is interference from a station on this frequency, tune the Tuner to a nearby frequency free from interference for this measurement.
14. Tune the Generator to 90MHz with a 1000uV output. Then switch the Generator to stereo (left only) and adjust T10 (FM IF Transformer) for the lowest distortion at the TUNER INPUT RCA jacks.
15. Switch the Analyzer to the right channel TUNER INPUT jack and adjust R71 (MPX SEParation Pot) for best separation (minimum output).
16. Switch the Generator to the Right Channel and the Analyzer to the Left Channel. Adjust R71 (MPX SEParation Pot) and check for best separation (minimum output).
17. Disconnect voltmeter from TP1 and TP2 (J6). Reduce the generator output to 5uV and adjust R73 (STEREO SWITCH Pot) so the MPX light (Dot next to Signal Strength number) just comes on.

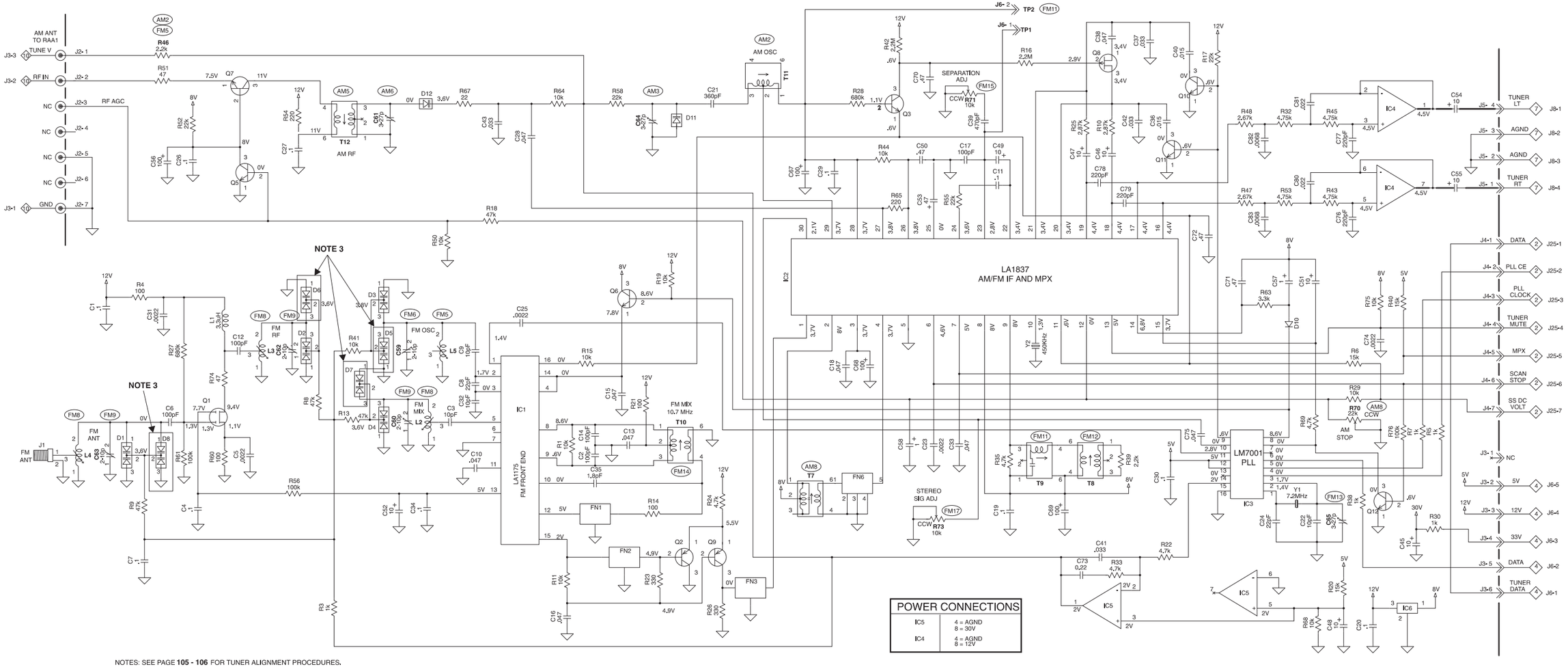
AM ALIGNMENT PROCEDURE

1. Connect an AM Signal Generator to the RAA1 ”EXT ANT” pin of the 5 pin connector. (Refer to Page 110.) Connect a Distortion Analyzer to the MHT200 rear panel TUNER INPUT RCA jacks. (These jacks act as the Tuner Output.)
2. Tune to bottom of band, and adjust T11 (AM OSC Coil) for 3.0VDC at R46.
3. Tune to top of band and adjust C64 (AM OSC Trimmer Capacitor) for 26.0VDC at Connector R46.
4. Repeat steps 4 and 5 as necessary for a Tuning Voltage Range of 3.0 to 26.0VDC.
5. Tune the Generator and Tuner to 600kHz, then adjust Coils: T101 (AM ANT) and T12 (AM RF) for best sensitivity. *Note: Coil T101 (AM ANT) is located on the RAA1. It is labeled “L1”.*
6. Tune the Generator and Tuner to 1400kHz, then adjust Trimmer Capacitors: C106 (AM ANT) and C61 (AM RF) for best sensitivity. *Note: Trimmer Capacitor C106 (AM AMT) is located on the RAA1. It is labeled “C1”.*
7. Repeat 8 and 9 until no improvement in sensitivity is noted.
8. Note the initial position of R70, and then adjust R70 fully counter clockwise. Tune the Generator and Tuner to 1400kHz (20uV, 30% modulation), then Adjust T7 (AM IF) for maximum signal.
9. Tune the Generator and Tuner to 1400kHz (100mV, 30% modulation). Slowly adjust R70 clockwise until the MHT100 front panel signal strength display reads “9”.
10. Check both channels for signal to noise performance, and re-adjust R70 and as needed.

Figure 1



13 TUNER 049084



POWER CONNECTIONS

IC5	4 = AGND 8 = 30V
IC4	4 = AGND 8 = 12V

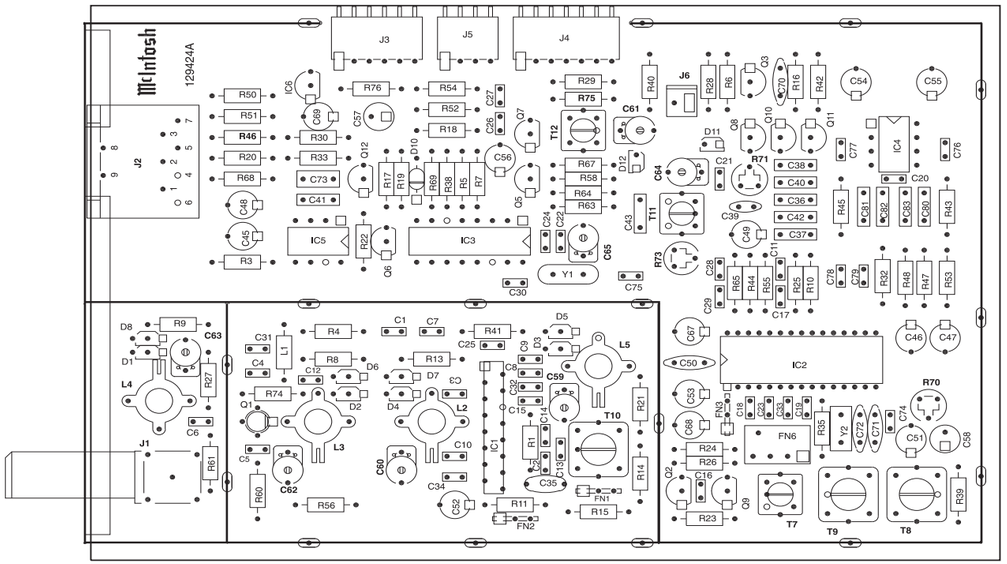
NOTES: SEE PAGE **105 - 106** FOR TUNER ALIGNMENT PROCEDURES.

(FM1) THROUGH (FM17) REFER TO STEPS IN THE FM ALIGNMENT PROCEDURE.

(AM1) THROUGH (AM10) REFER TO STEPS IN THE AM ALIGNMENT PROCEDURE.

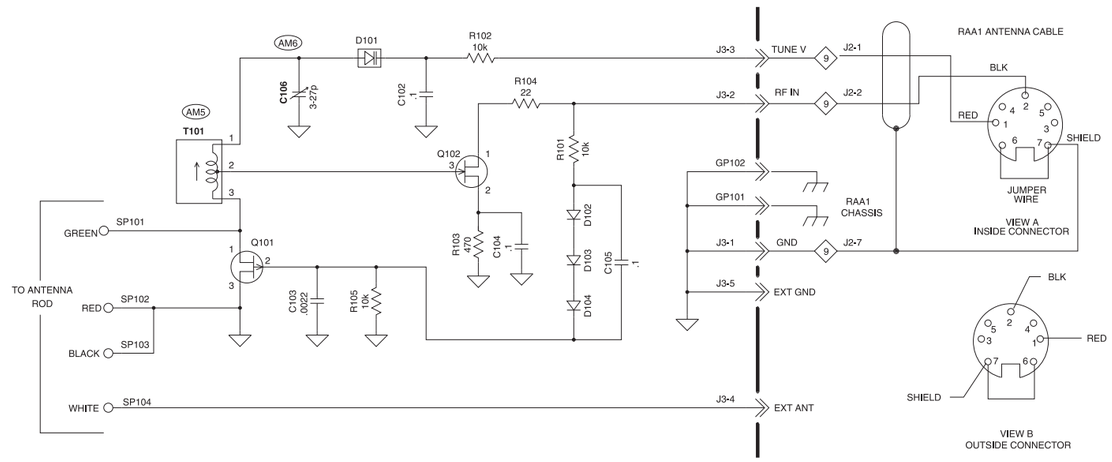
NOTE 3: FOR JAPANESE CONVERSION, VARACTORS D5, D6, D7 AND D8 ARE ADDED IN PARALLEL WITH D1, D2, D3 AND D4.

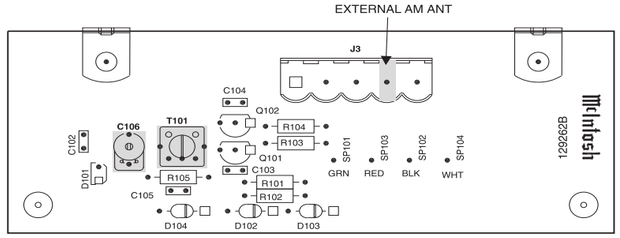
13 TUNER 049084



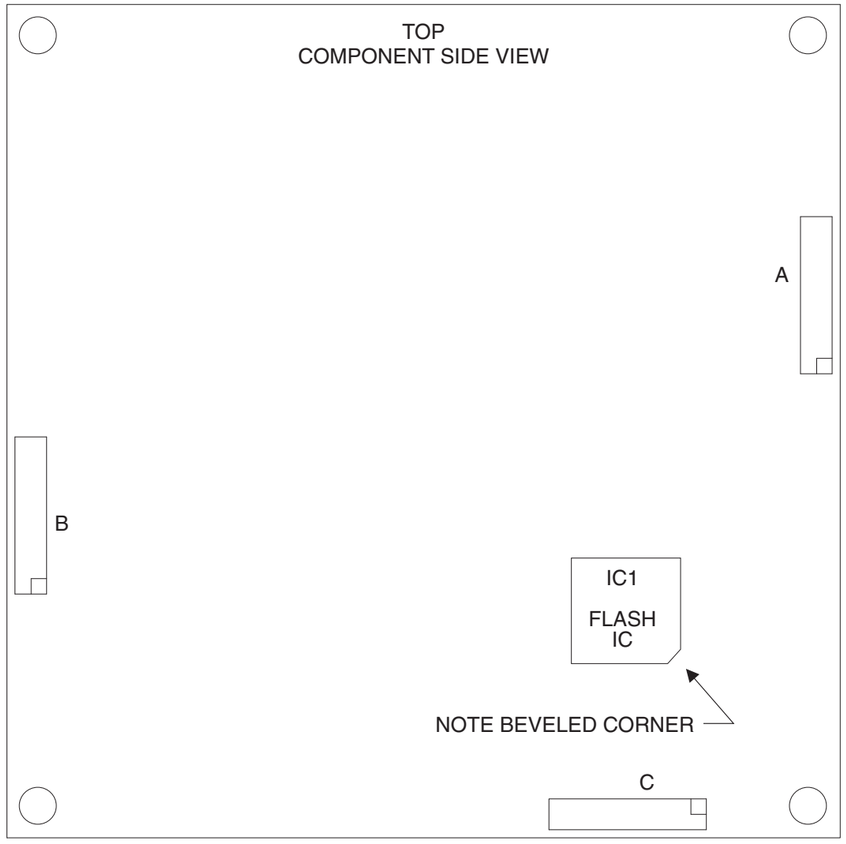
NOTE: SEE PAGE 105 - 106 FOR TUNER ALIGNMENT PROCEDURES

14 RAA1 SECTION



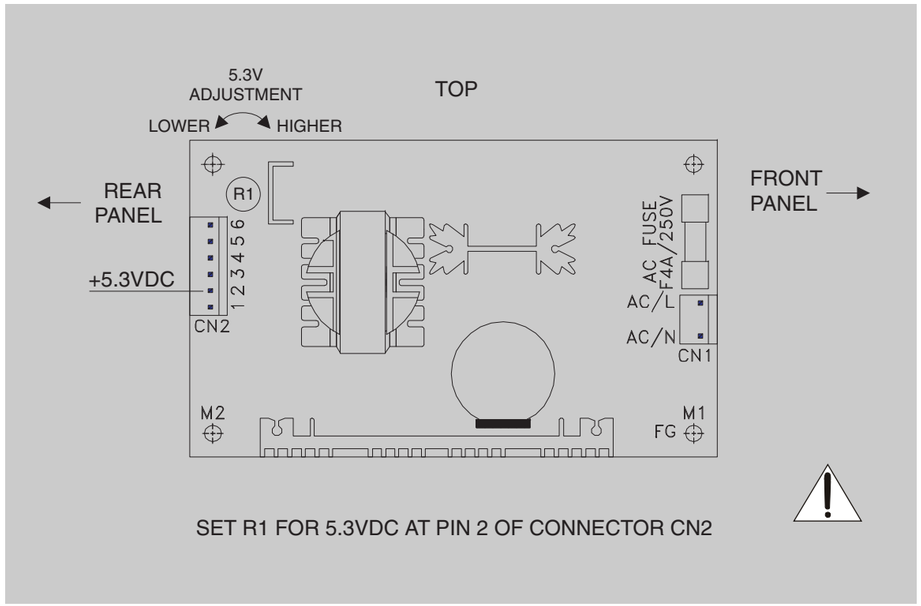


15 DSP MODULE 320166



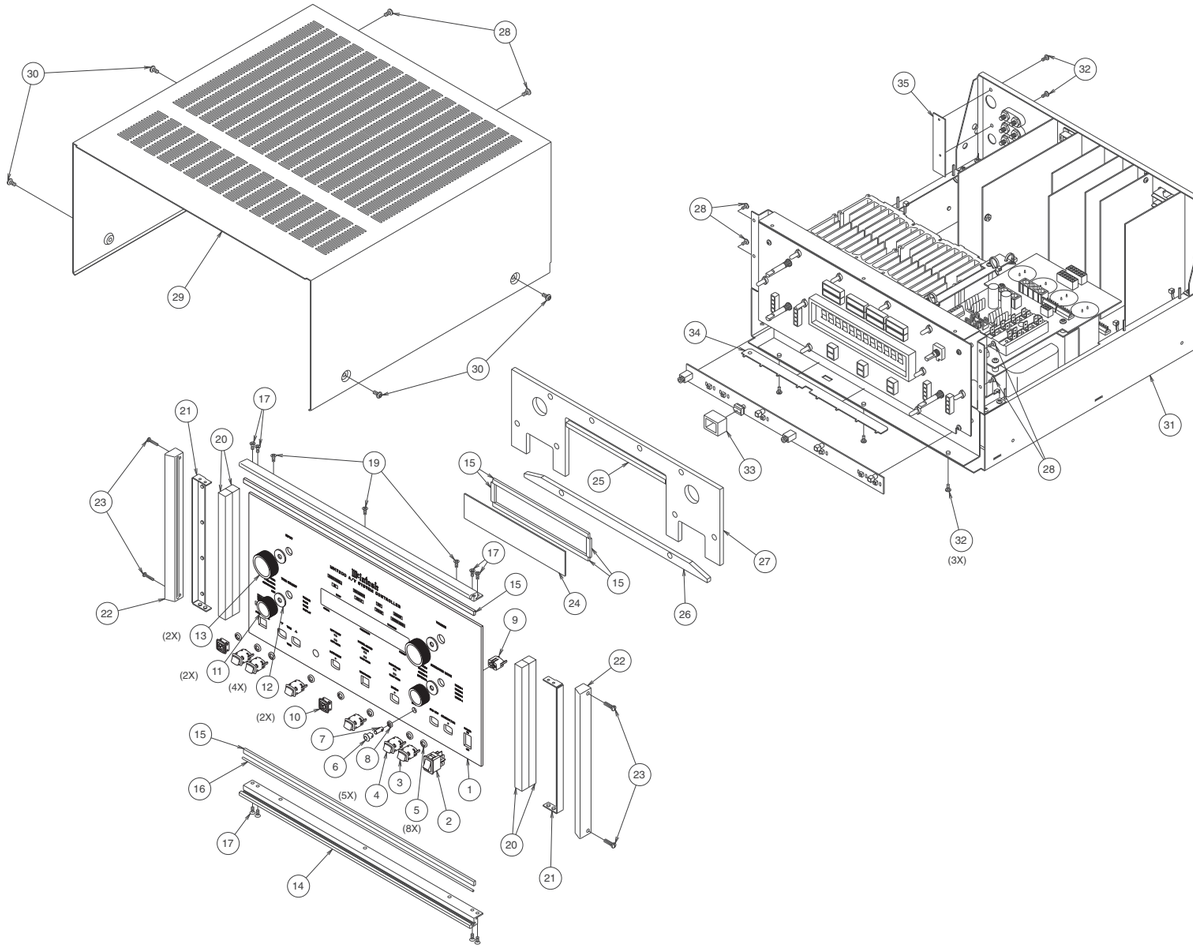
IC1
133506SP = BLANK IC
133507SP = MHT200 V6.44 PROGRAMMED IC

16 BACKUP POWER SUPPLY 320149



WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.

MHT200 EXPLODED VIEW and PARTS LIST



1	016489	GLASS
2	148073	SWITCH DPDT ROCKER
3	017531	PUSHBUTTON ASSY RED
4	017517	PUSHBUTTON ASSY BLK
5	078033	O-RING
6	017938	BEZEL PUSHBUTTON
7	017852	PUSHBUTTON BLK
8	078032	O-RING
9	017741	RECEPTACLE PUSHBUTTON
10	017854	BEZEL HEADPHONE
11	049600	ASSY KNOB 25.5mm
12	104017	WASHER FELT
13	049598	ASSY KNOB 35mm
14	018706	EXTRUSION BOTTOM
15	094016	TAPE FOAM 1/4 X 1/8
16	098113	CORD DIAL .027 BLACK BRAID SILK
17	100149	SCREW MACH 6-32 X 1/4 FL U/H ST
18	018705	EXTRUSION TOP
19	101172	SCREW TC 6-32 X 1/4 PH FL U/C
20	094360	TAPE FOAM 1/2 X 1/2
21	004939	BRACKET EXTRUSION
22	018615	END CAP 9”
23	101042	SCREW TS 4-40 X 1/2 FILLISTER
24	017738	PLEXI FILTER
25	094017	TAPE FOAM 1/4 X1/4
26	017851	PUSHBUTTON DISPLAY PLEXI
27	017850	PLEXIGLAS LOGO/TRIM/SURROUND
28	101054	SCREW TAPTITE 6-32 X 1/4 PH PN BLK
29	005163	TOP COVER
30	101078	SCREW TAP 8-32 X 5/16 PH PN BLK
31	320143	MHT200 CONTROLLER SUBASSY
32	101109	SCREW TAPTITE 6-32 X 5/16 PH PN BLK
33	094443	SENSOR GASKET
34	017218	PCB STIFFENER
35	005078	REAR PANEL PLUG

REPACKING INSTRUCTION

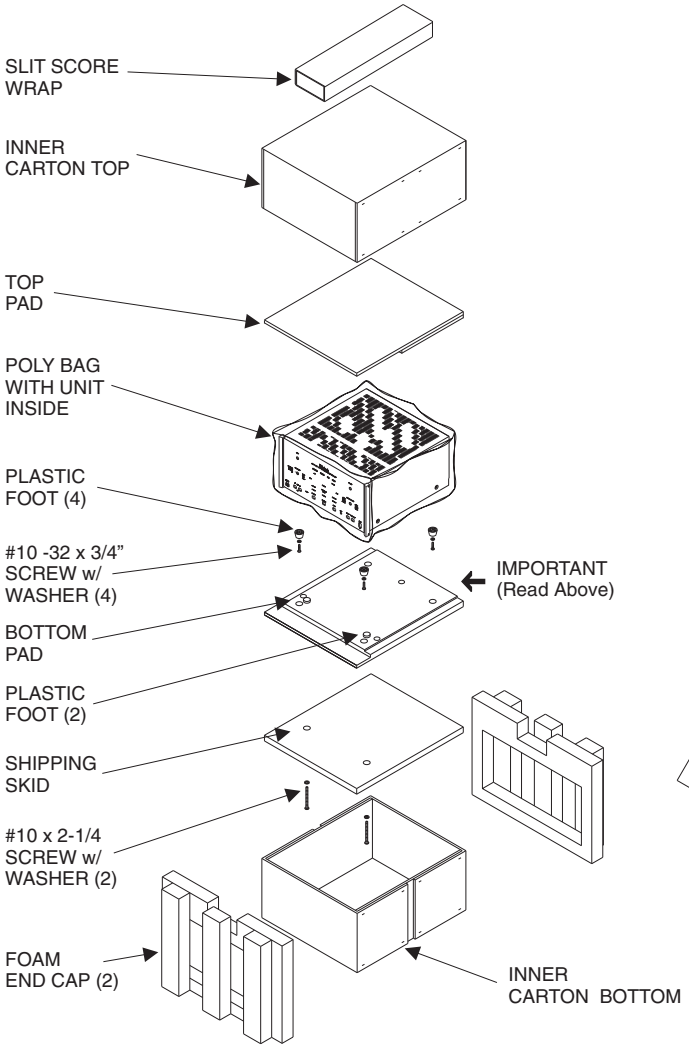
In the event it is necessary to repack the unit for shipment, the unit must be packed exactly as shown below.

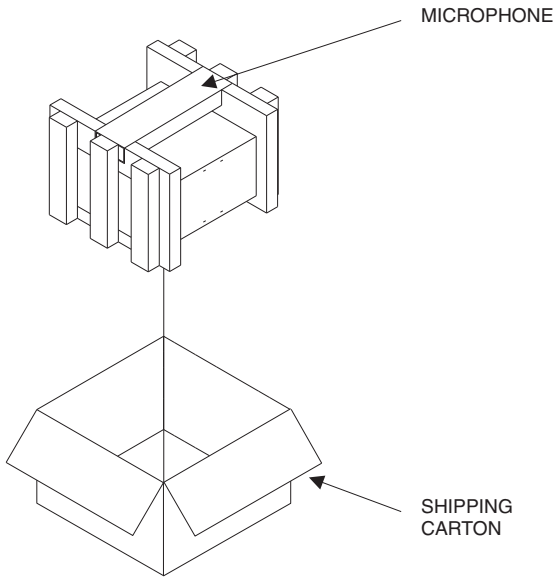
IMPORTANT - The four plastic feet must be attached to the bottom of the unit so they will locate in the four holes of the bottom pad. Two #10 x 2-1/4" screws and washers must be used to fasten the unit securely to the bottom pad and wood skid. Failure to do this will result in shipping damage.

If a shipping carton or any of the interior parts is needed, please call or write the Customer Service Department of McIntosh Laboratory. Order parts from the accompanying list by part number.

Use the original shipping carton and interior parts only if they are in good serviceable condition.

Qty.	Part No.	Description
1	033160	Slit scored wrap
1	034198	Inner carton top
1	033725	Top pad
4	017218	Plastic foot (unit)
1	033739	Poly bag
4	100159	#10-32 x 3/4" Machine screw
4	104083	#10 x 7/16" Flat washer
1	034197	Bottom pad
2	017218	Plastic foot (spacer)
1	034196	Shipping skid
2	101169	#10 x 2-1/4" Wood screw
2	104033	#10 x 1-3/4" Flat washer
2	034159	Foam end caps
1	034158	Shipping carton
1	034199	Inner carton bottom





MHT200

A/V SYSTEM CONTROLLER

SERVICE MANUAL

McINTOSH LABORATORY, INC., 2 CHAMBERS STREET, BINGHAMTON, NEW YORK 13903 Printed in U.S.A. Part Number 040897