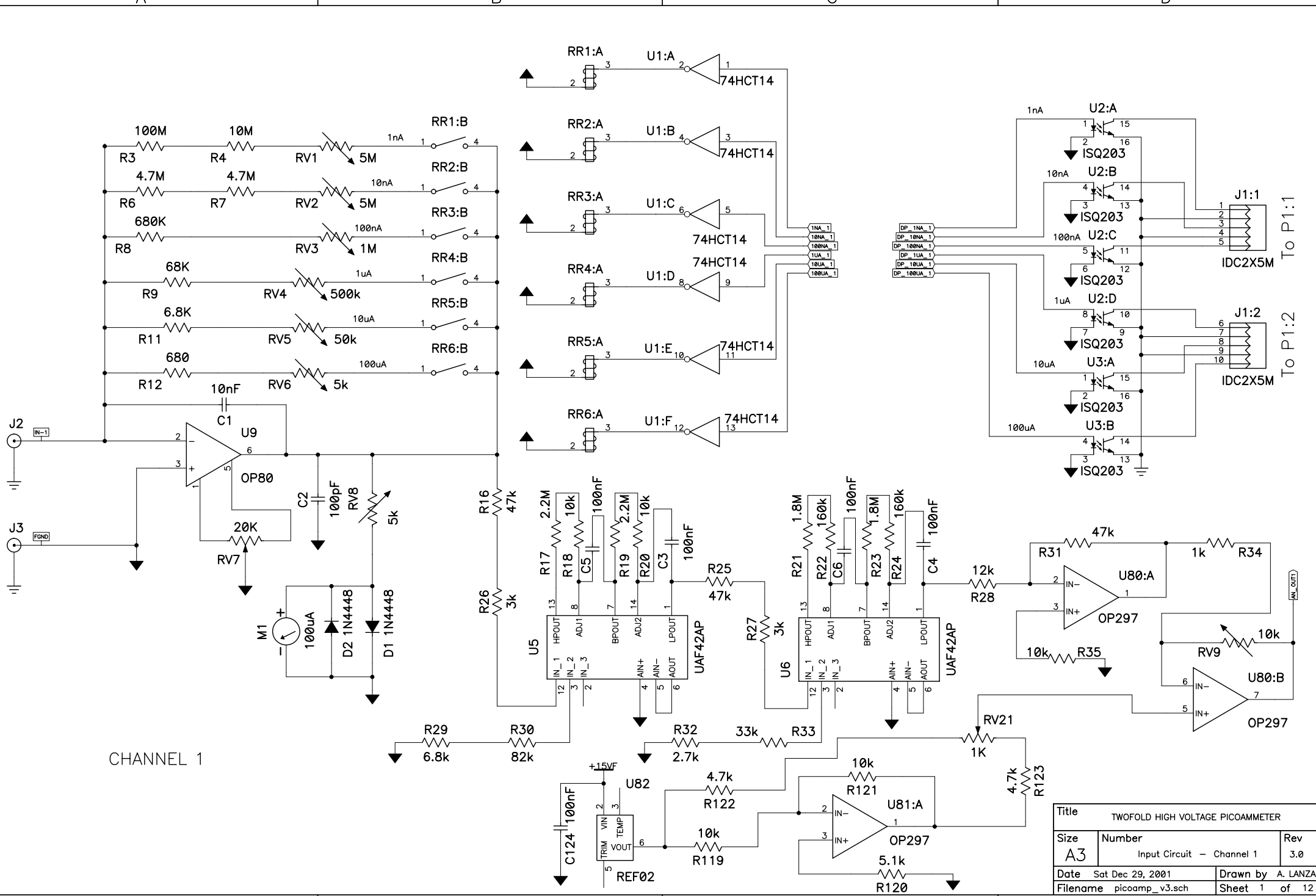
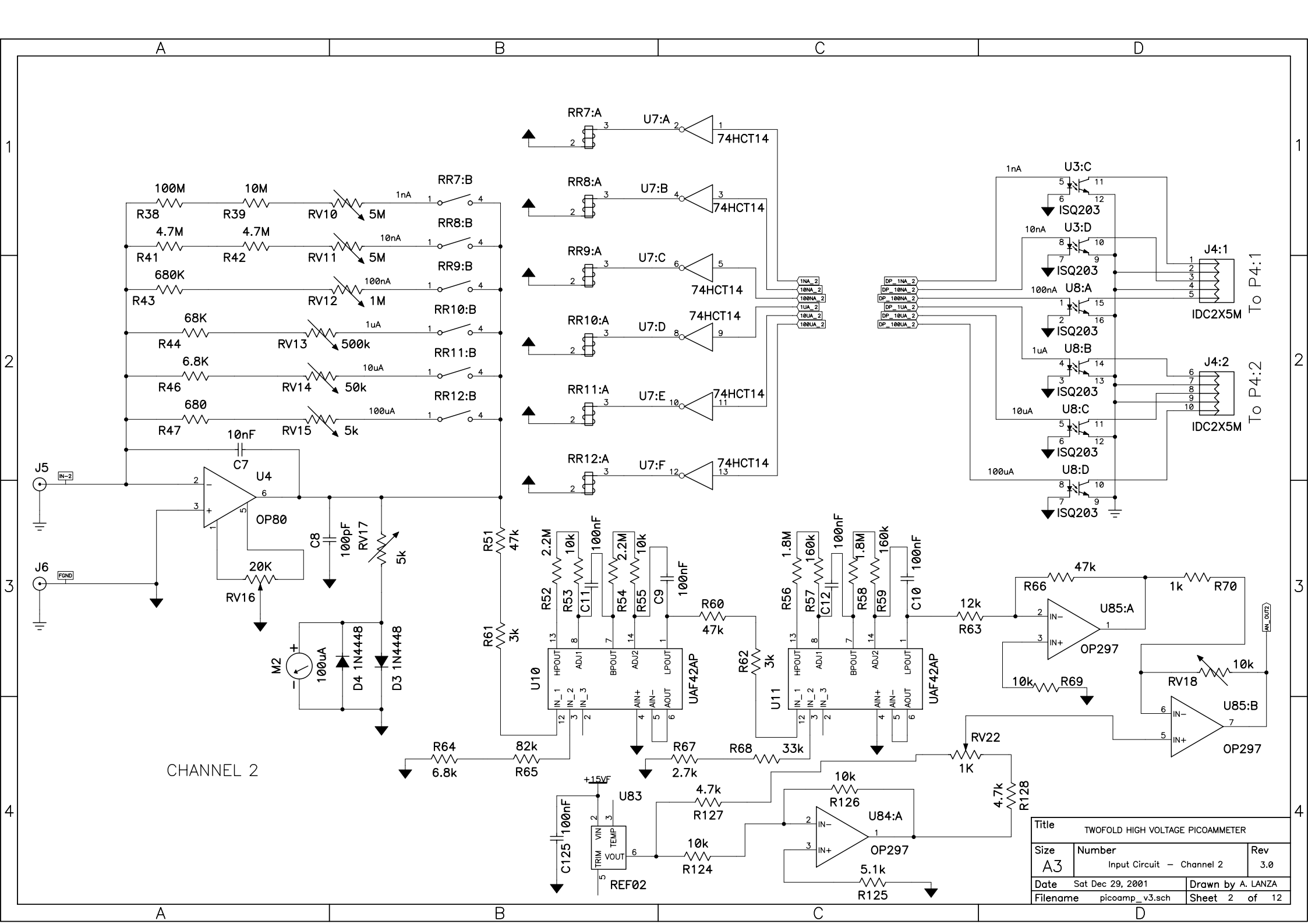
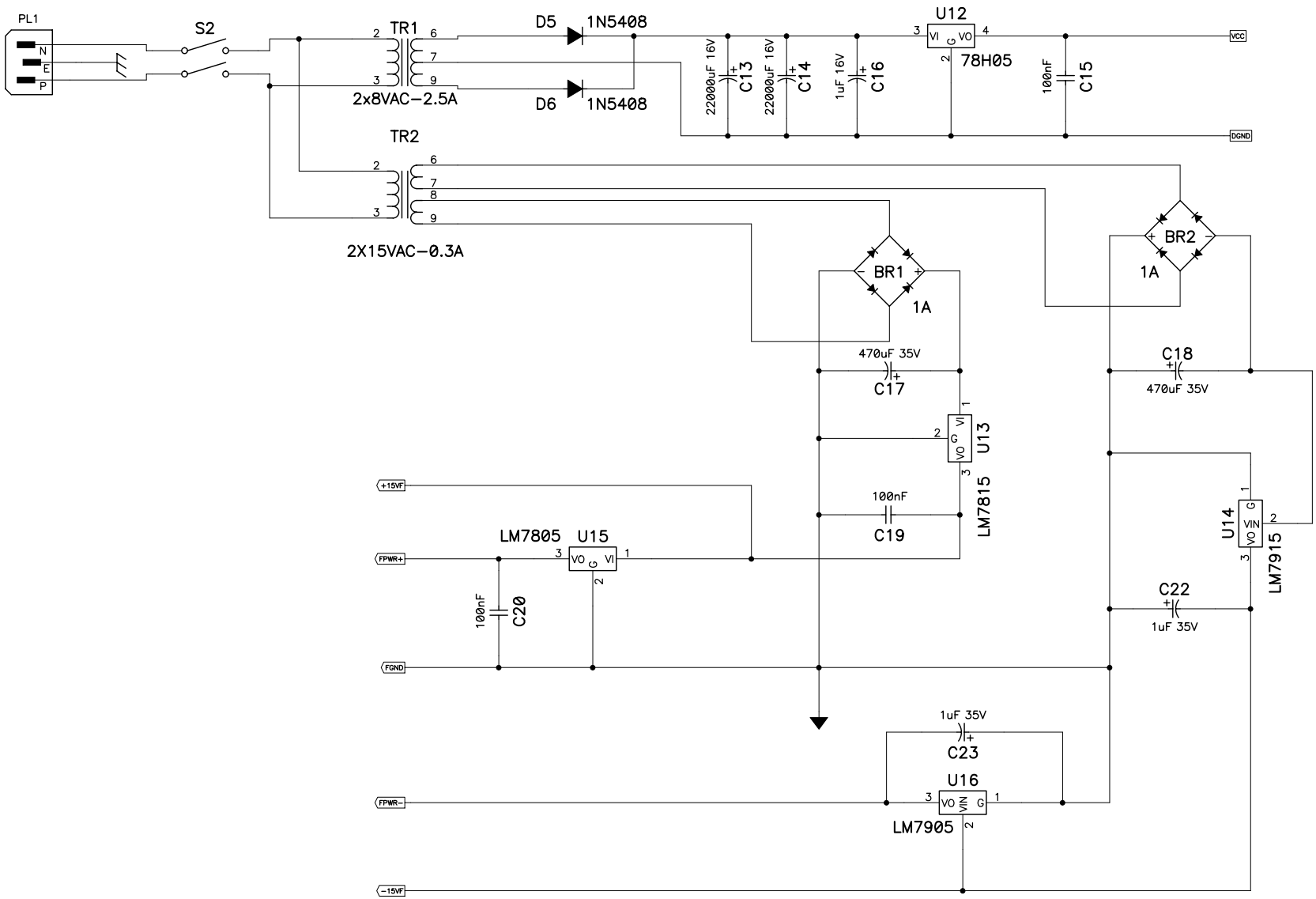
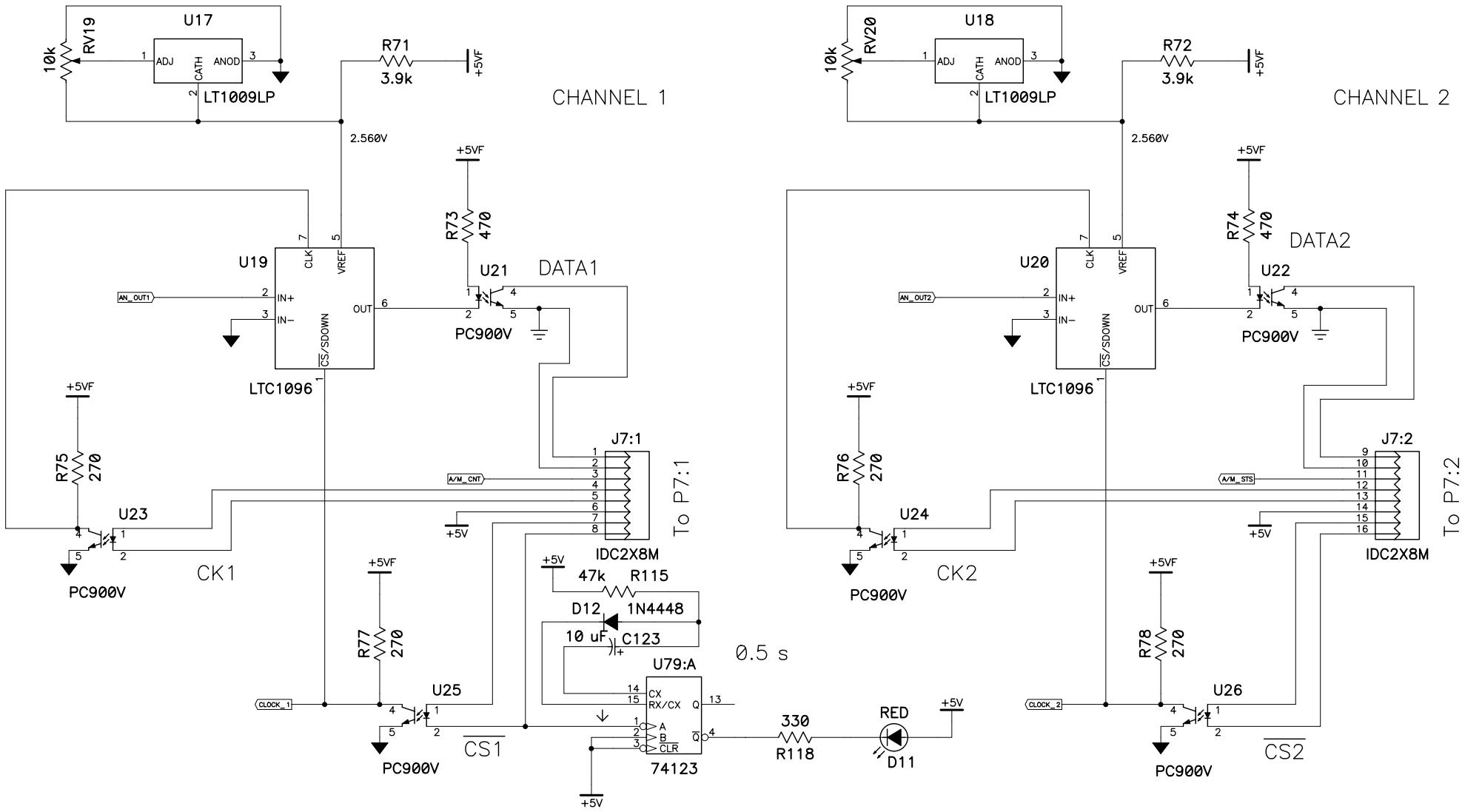

RR1:A
U1:A
74HCT14
RR2:A
U1:B
RR3:A
U1:C
RR4:A
U1:D
RR5:A
U1:E
RR6:A
U1:F
100M
10M
R3
R4
RV1
5M
1nA
RR1:B
4.7M
4.7M
R6
R7
RV2
10nA
RR2:B
680K
R8
RV3
1M
100nA
RR3:B
68K
R9
RV4
500k
1uA
RR4:B
6.8K
R11
RV5
50k
10uA
RR5:B
680
R12
RV6
5k
100uA
RR6:B
10nF
C1
J2
IN-1
U9
OP80
J3
FGND
20K
RV7
C2
100pF
RV8
5k
M1
100uA
D2 1N4448
D1 1N4448
R16
47k
R26
3k
2.2M
10k
R17
R18
C5
100nF
R19
R20
C3
R25
47k
U5
UAF42AP
HPOUT
ADJ1
BPOUT
ADJ2
LPOUT
IN_1
IN_2
IN_3
AIN+
AIN-
AOUT
1.8M
160k
R21
R22
C6
R23
R24
C4
R27
3k
U6
12k
R28
47k
R31
1k
R34
U80:A
OP297
IN-
IN+
AN_OUT
10k
R35
RV9
10k
U80:B
R29
6.8k
R30
82k
R32
2.7k
33k
R33
RV21
1K
+15VF
U82
C124
100nF
VIN
TEMP
TRIM
VOUT
REF02
4.7k
R122
10k
R119
10k
R121
U81:A
4.7k
R123
5.1k
R120
1nA
U2:A
ISQ203
10nA
U2:B
100nA
U2:C
1uA
U2:D
10uA
U3:A
100uA
U3:B
DP_1NA_1
DP_10NA_1
DP_100NA_1
DP_1UA_1
DP_10UA_1
DP_100UA_1
J1:1
J1:2
IDC2X5M
To P1:1
To P1:2
CHANNEL 1
Title
TWOFOLD HIGH VOLTAGE PICOAMMETER
Size
A3
Number
Input Circuit – Channel 1
Rev
3.0
Date
Sat Dec 29, 2001
Drawn by
A. LANZA
Filename
picoamp_v3.sch
Sheet
1
of
12


CHANNEL 2
R38 100M
R39 10M
RV10 5M
1nA
RR7:B
R41 4.7M
R42 4.7M
RV11 5M
10nA
RR8:B
R43 680K
RV12 1M
100nA
RR9:B
R44 68K
RV13 500k
1uA
RR10:B
R46 6.8K
RV14 50k
10uA
RR11:B
R47 680
RV15 5k
100uA
RR12:B
C7 10nF
J5
IN-2
J6
FGND
U4
OP80
RV16 20K
C8 100pF
RV17 5k
M2 100uA
D4 1N4448
D3 1N4448
R51 47k
R61 3k
RR7:A
RR8:A
RR9:A
RR10:A
RR11:A
RR12:A
U7:A
U7:B
U7:C
U7:D
U7:E
U7:F
74HCT14
1NA_2
10NA_2
100NA_2
1UA_2
10UA_2
100UA_2
DP_1NA_2
DP_10NA_2
DP_100NA_2
DP_1UA_2
DP_10UA_2
DP_100UA_2
U3:C
U3:D
U8:A
U8:B
U8:C
U8:D
ISQ203
J4:1
J4:2
IDC2X5M
To P4:1
To P4:2
R52 2.2M
R53 10k
C11 100nF
R54 2.2M
R55 10k
C9 100nF
R60 47k
R62 3k
U10
U11
UAF42AP
HPOUT
ADJ1
BPOUT
ADJ2
LPOUT
IN_1
IN_2
IN_3
AIN+
AIN-
AOUT
R56 1.8M
R57 160k
C12 100nF
R58 1.8M
R59 160k
C10 100nF
R63 12k
R64 6.8k
R65 82k
R67 2.7k
R68 33k
R66 47k
R70 1k
U85:A
U85:B
OP297
IN-
IN+
R69 10k
RV18 10k
AN_OUT2
RV22 1K
R128 4.7k
+15VF
U83
REF02
TRIM
VIN
TEMP
VOUT
C125 100nF
R127 4.7k
R124 10k
R126 10k
U84:A
R125 5.1k
Title
TWOFOLD HIGH VOLTAGE PICOAMMETER
Size
A3
Number
Input Circuit – Channel 2
Rev
3.0
Date
Sat Dec 29, 2001
Drawn by A. LANZA
Filename
picoamp_v3.sch
Sheet 2 of 12

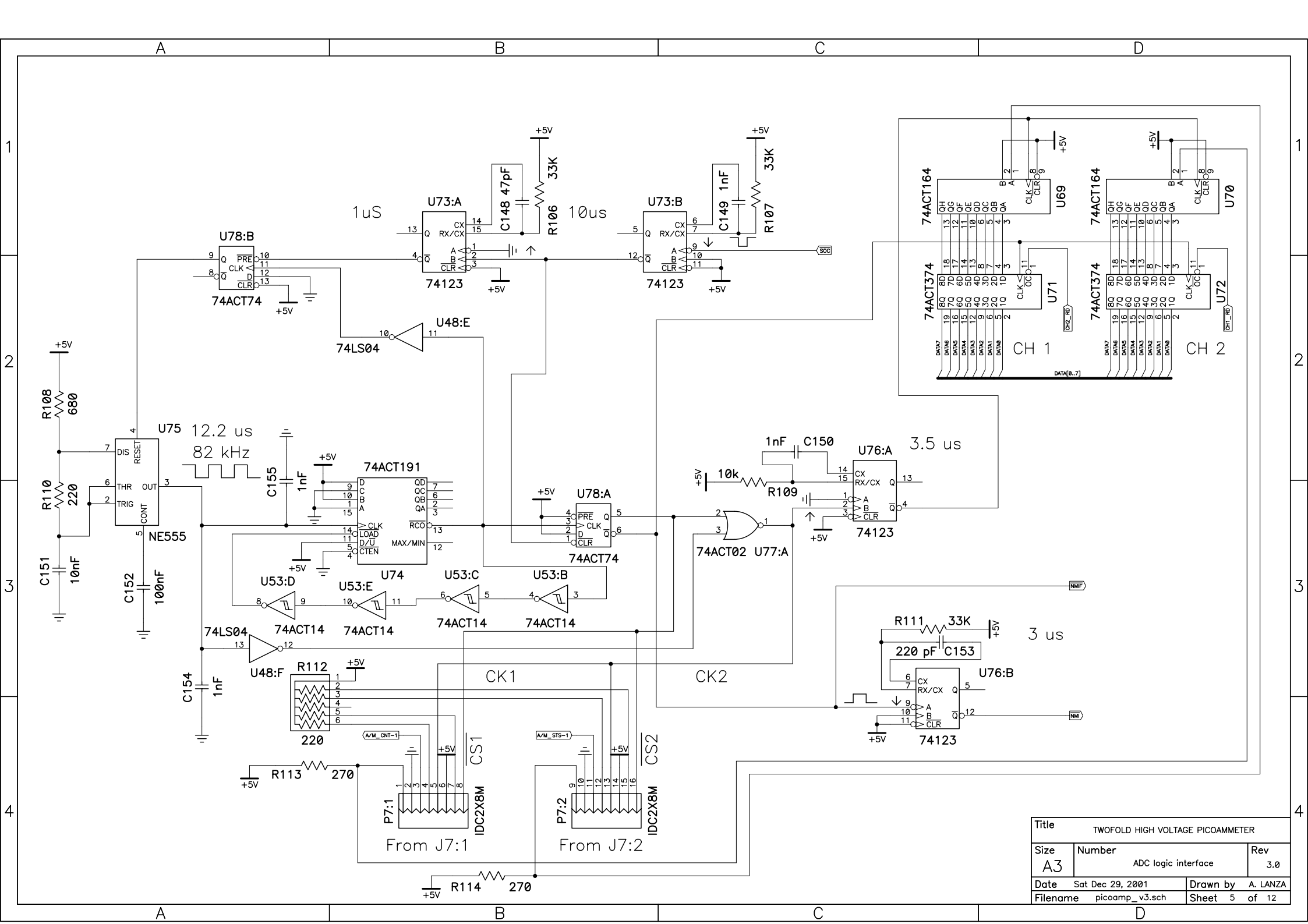


Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A3	Number Power Supplies	Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA
Filename picoamp_v3.sch		Sheet 3 of 12

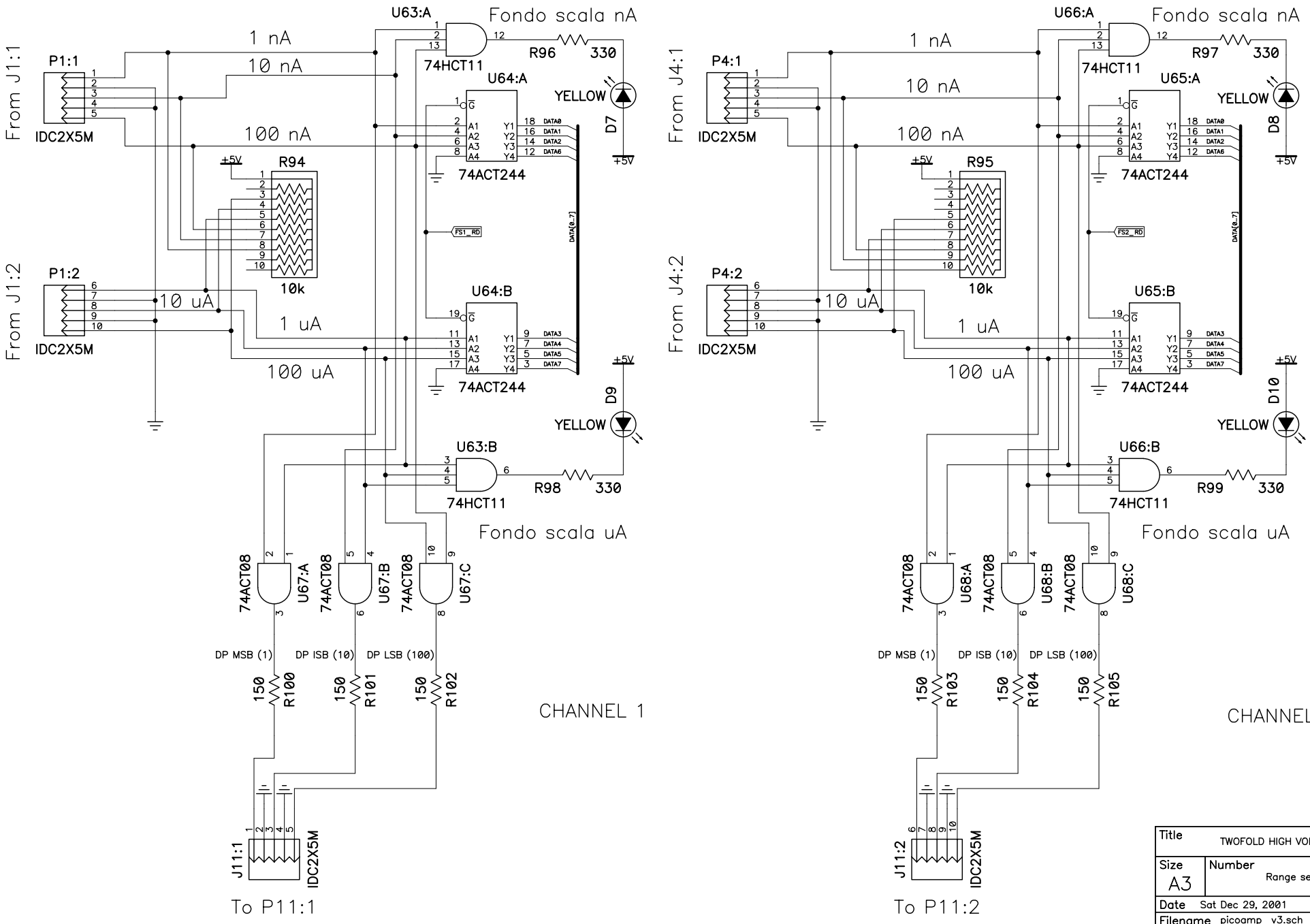


Conversion time 138 us (leading edge to trailing edge $\overline{CS1}$)

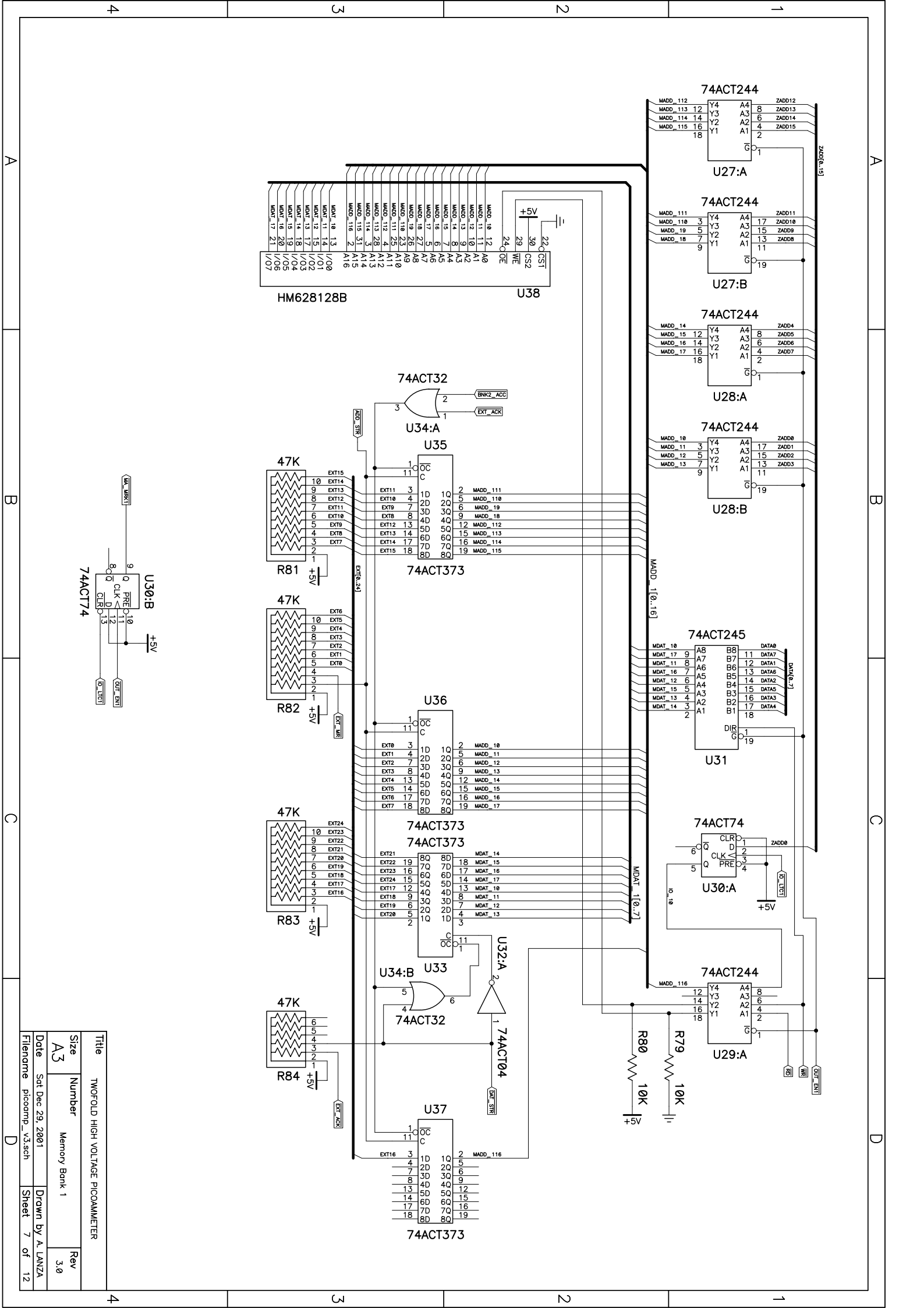
Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A3	Number ADCs	Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA
Filename picoamp_v3.sch		Sheet 4 of 12



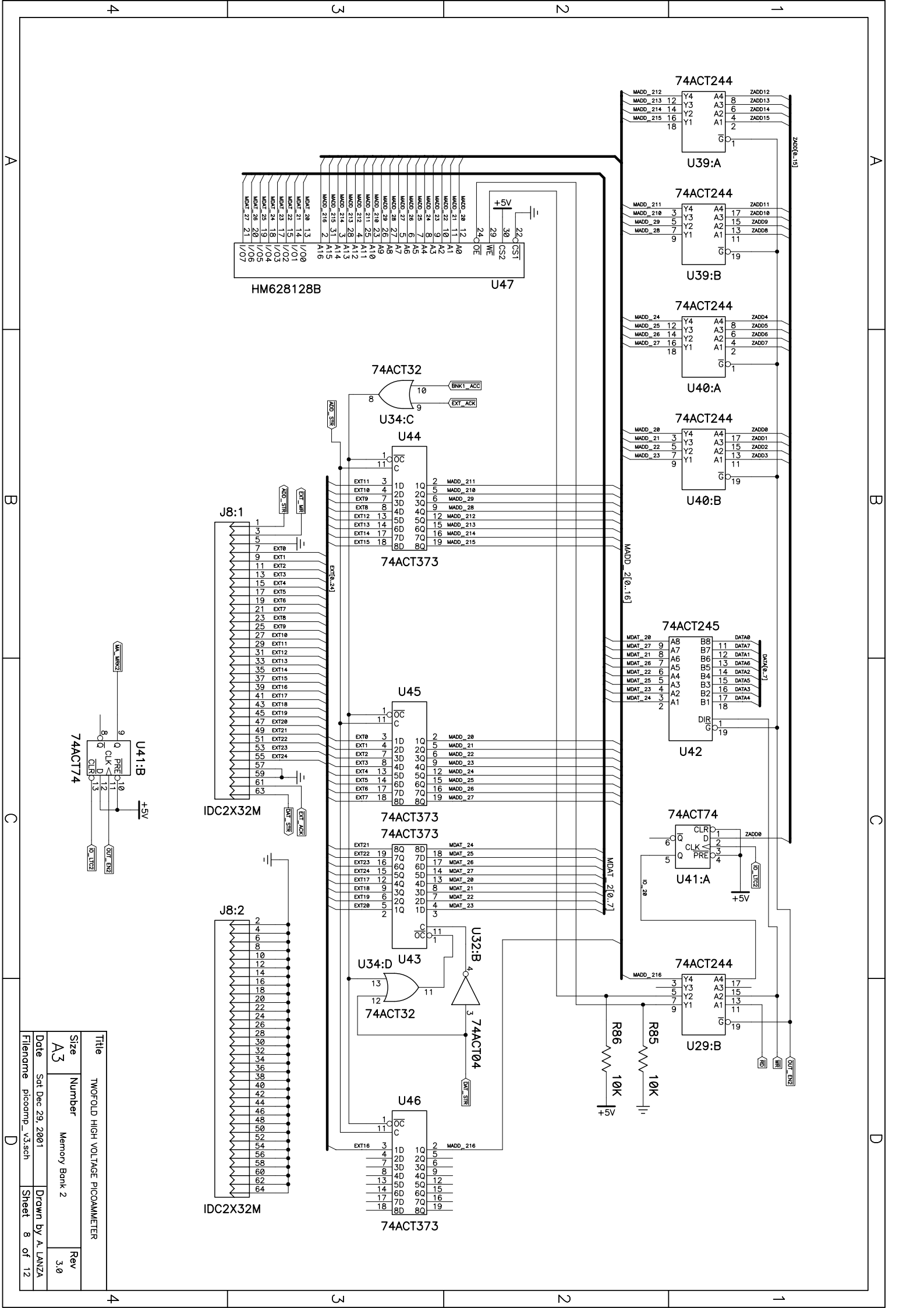
Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A3	Number ADC logic interface	Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA
Filename picoamp_v3.sch		Sheet 5 of 12



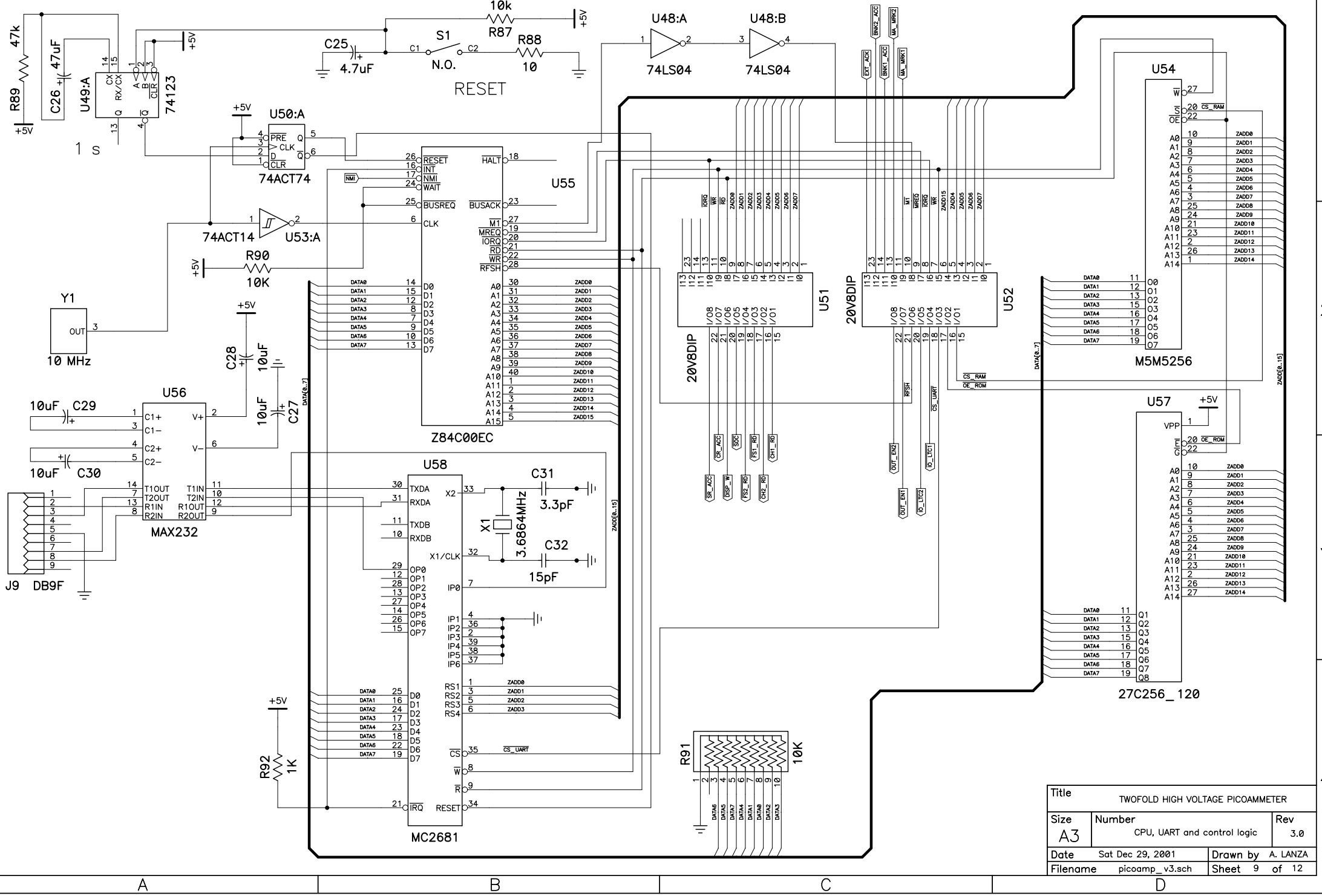
Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A3	Number Range selection	Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA
Filename picoamp_v3.sch		Sheet 6 of 12

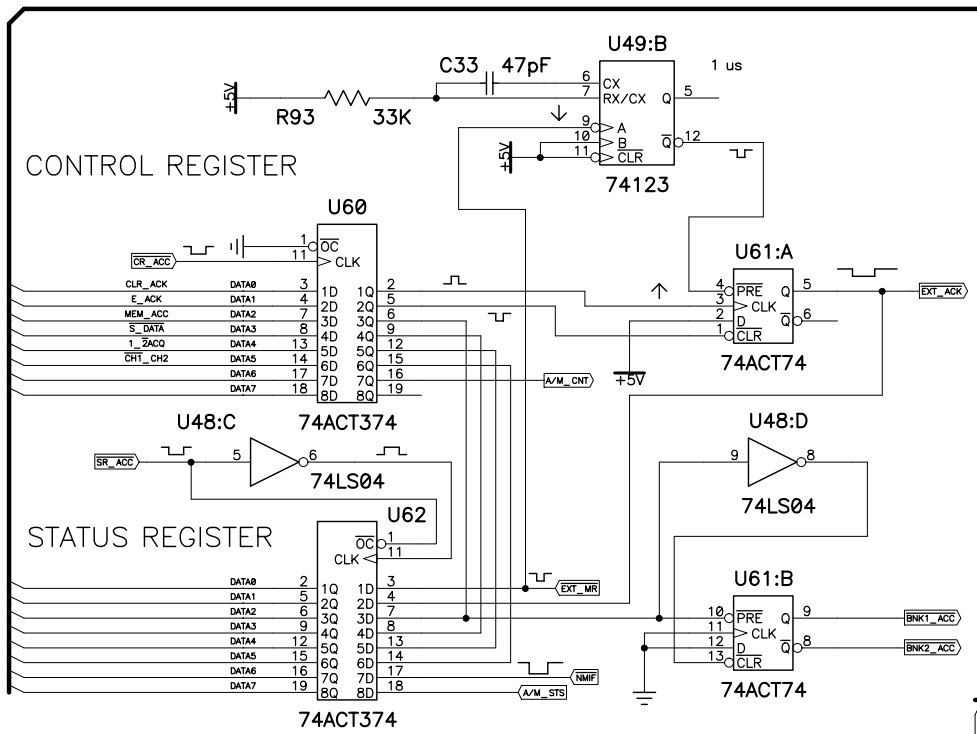


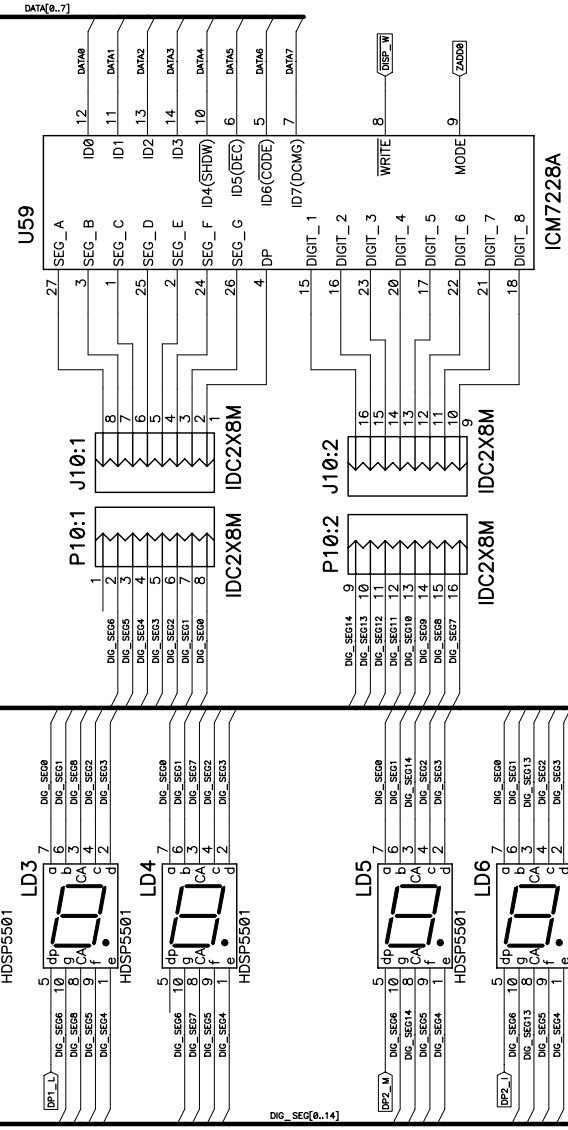
Title	TWOFOLD HIGH VOLTAGE PICOAMMETER		
Size A3	Number Memory Bank 1		Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA	
Filename picoamp_v3.sch		Sheet 7 of 12	

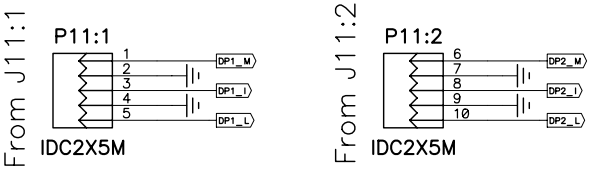


Title	TWOFOLD HIGH VOLTAGE PICOAMMETER		
Size A3	Number Memory Bank 2		Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA	
Filename picoamp_v3.sch		Sheet 8 of 12	


10k
R87
+5V
C25
4.7uF
S1
N.O.
C1
C2
R88
10
RESET
U48:A
U48:B
74LS04
74LS04
47k
R89
C26
47uF
U49:A
74123
1 S
U50:A
74ACT74
U53:A
74ACT14
R90
10K
Y1
10 MHz
C28
10uF
C27
10uF
C29
10uF
C30
10uF
U56
MAX232
J9
DB9F
U55
Z84C00EC
U58
MC2681
C31
3.3pF
C32
15pF
X1
3.6864MHz
R92
1K
R91
10K
U51
20V8DIP
U52
20V8DIP
U54
M5M5256
U57
27C256_120
CS_RAM
OE_ROM
CS_UART
Title
TWOFOLD HIGH VOLTAGE PICOAMMETER
Size
A3
Number
CPU, UART and control logic
Rev
3.0
Date
Sat Dec 29, 2001
Drawn by
A. LANZA
Filename
picoamp_v3.sch
Sheet
9
of
12







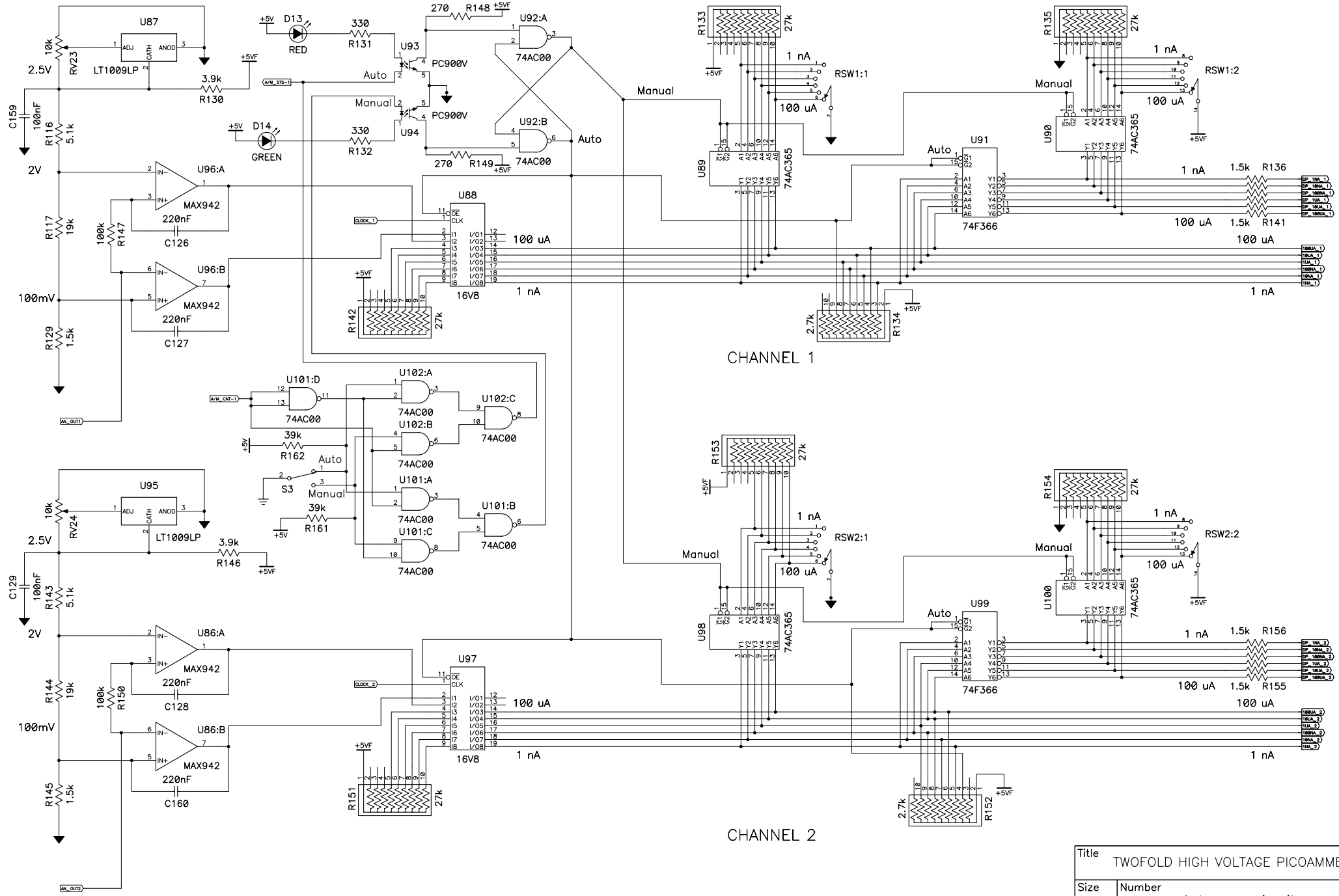
CONTROL REGISTER

Bit 0 –> CLR_ACK (1 = clear ext ack)
Bit 1 –> E_ACK (0 = ext memory access acknowledged)
Bit 2 –> MEM_ACC (1 = bank1, 0 = bank2)
Bit 3 –> $\overline{\text{S\_DATA}}$ (0 = data sent to serial port using UART timer)
Bit 4 –> 1_2ACQ (0 = DAQ for both channels, 1 = DAQ for one channel)
Bit 5 –> $\overline{\text{CH1\_CH2}}$ (0 = DAQ ch 1, 1 = DAQ ch 2)
Bit 6 –> A/M_CNT (0=A/M switch–range cntr, 1=A/M range swapped)

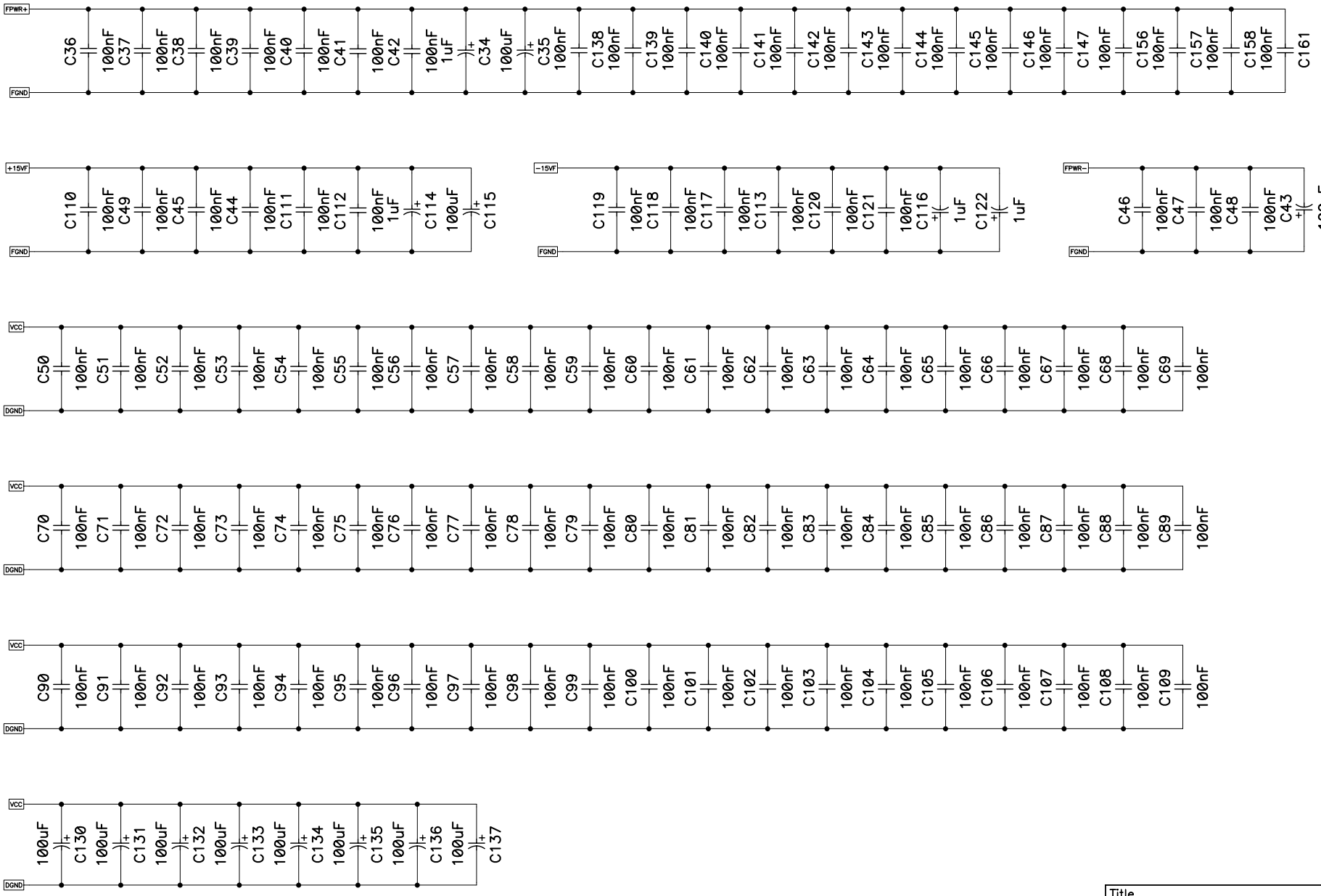
STATUS REGISTER

Bit 0 –> $\overline{\text{EXT\_MR}}$ (0 = ext memory access required)
Bit 1 –> $\overline{\text{EX\_ACK}}$ (0 = ext memory access acknowledged)
Bit 2 –> MEM_ACC (1 = bank1, 0 = bank2)
Bit 3 –> $\overline{\text{S\_DATA}}$ (0 = data sent to serial port using UART timer)
Bit 4 –> 1_2ACQ (0 = DAQ for both channels, 1 = DAQ for one channel)
Bit 5 –> $\overline{\text{CH1\_CH2}}$ (0 = DAQ ch 1, 1 = DAQ ch 2)
Bit 6 –> NMIF (DAQ interrupt flag, 0 = int asserted)
Bit 7 –> A/M_STS (0 = AUTO range, 1 = MANUAL range)

Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A3	Number Control & Status Reg's, Digital Display	Rev 3.0
Date	Sat Dec 29, 2001	Drawn by A. LANZA
Filename	picoamp_v3.sch	Sheet 10 of 12



Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A2	Number Autorange circuit	Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA
Filename picoamp_v3.sch		Sheet 11 of 12



Title	TWOFOLD HIGH VOLTAGE PICOAMMETER	
Size A3	Number Bypass Capacitors	Rev 3.0
Date Sat Dec 29, 2001		Drawn by A. LANZA
Filename picoamp_v3.sch		Sheet 12 of 12