AVTECH ELECTROSYSTEMS LTD.

NANOSECOND WAVEFORM ELECTRONICS
SINCE 1975

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INSTRUCTIONS

MODEL AVP-AVH-C-2CHPP-CUA

1 MHz DUAL CHANNEL

HIGH SPEED PULSE GENERATOR

WITH SUBNANOSECOND RISE & FALL TIMES

SERIAL NUMBER: _____

WARRANTY

Avtech Electrosystems Ltd. warrants products of its manufacture to be free from defects in material and workmanship under conditions of normal use. If, within one year after delivery to the original owner, and after prepaid return by the original owner, this Avtech product is found to be defective, Avtech shall at its option repair or replace said defective item. This warranty does not apply to units which have been dissembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

TECHNICAL SUPPORT

Phone: 613-226-5772 or 1-800-265-6681
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World Wide Web: http://www.avtechpulse.com

TABLE OF CONTENTS

Manual Reference: T:\instructword\avp\AVP-AVH-C-2CHPP-CUA,ed1.odt.
Last modified April 24, 2007.

INTRODUCTION

The AVP-AVH-C-2CHPP-CUA is a high performance instrument capable of generating narrow pulses with subnanosecond switching times at repetition rates up to 1 MHz.

Two outputs (OUT A and OUT B) are provided.

The amplitude of OUT A is adjustable from +5V to +20V. Its pulse width is variable from 0.5 ns to 1.5 ns. The rise and fall times are < 200 ps (20%-80%).

The amplitude of OUT B is adjustable from +2V to +10V. The pulse width is fixed at < 100 ps (FWHM).

The relative delay between the two outputs is adjustable over a ±2 ns range (at least).

Each output is designed to drive 50Ω loads. (A 50Ω load is required for proper operation.) Each output is AC-coupled.

This instrument is intended for use in research and development laboratories.

ORIGINAL QUOTATION

Date: Thu, 11 Jan 2007 16:10:48 -0500
From: Avtech Sales
Subject: Avtech dual-channel pulse generator quote

XXXXX,

Following your recent inquiry, I am pleased to quote as follows:

Quote number: 13592

Model number: AVP-AVH-C-2CHPP-CUA

Description: Customized Dual-Channel Ultra-High-Speed Pulse Generator

General description: Two outputs (OUT A and OUT B) are provided. Both outputs are triggered by a common trigger source, which can be the internal oscillator or an external TTL trigger pulse. OUT B can be delayed relative to OUT A by 0 to 2 ns.

OUT A amplitude: +5V to +20V, adjustable (using a one-turn control), to 50 Ohms.

OUT A pulse width (FWHM): 0.5 to 1.5 ns, adjustable (using a one-turn control).

OUT A rise and fall times (20%-80%): < 200 ps

OUT B amplitude: +2V to +10V, adjustable (using a one-turn control), to 50 Ohms.

OUT B pulse width (FWHM): < 100 ps, fixed.

B-A delay: OUT B can be delayed relative to OUT A by 0 to 2 ns (using a one-turn control).

PRF: 100 Hz to 1 MHz (internal trigger), or 0 Hz to 1 MHz (external trigger)

Output connectors: SMA female

Other: similar to the standard single-channel AVP-AV-HV2-C-P and AVH-S-1-C-P models, described at http://www.avtechpulse.com/speed/avp-av-hv2 and http://www.avtechpulse.com/impulse/avh-s-1.

Price: $XXXXX US each, FOB destination (includes 5% academic discount).

Quote valid for: 60 days

Estimated delivery: 60 days after receipt of order (excluding export permit* delays).

*Export Permit: These instruments are very high performance pulse generators, which are considered to be "Nuclear-Related Dual-Use Goods"

under government regulations. As such, an "End Use Statement" must be completed when ordering. The necessary form is attached (in PDF format). We will use the information in the completed form to apply for an export license from the Canadian government, which will take 1 to 6 weeks to obtain. We cannot ship your order without the license. Please return the completed form to us by fax.

Please call or email me if I can be of further assistance.

Thank you for your interest in our products!

Regards,
Dr. Michael J. Chudobiak
Chief Engineer

--- Avtech Electrosystems Ltd. ---------- since 1975 ---

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http://www.avtechpulse.com/

Pulse Generators - Laser Diode Drivers - HV Amplifiers
Monocycle Generators - Impulse Generators - Pulse Amplifiers
Current Pulsers - Function Generators - Frequency Dividers - and more!

EUROPEAN REGULATORY NOTES

EC DECLARATION OF CONFORMITY

We Avtech Electrosystems Ltd.
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Ottawa, Ontario
Canada K2C 3H4

declare that this pulse generator meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance pertains to the following specifications as listed in the official Journal of the European Communities:

EN 50081-1 Emission

EN 50082-1 Immunity

and that this pulse generator meets the intent of the Low Voltage Directive 72/23/EEC as amended by 93/68/EEC. Compliance pertains to the following specifications as listed in the official Journal of the European Communities:

EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use

CE

DIRECTIVE 2002/95/EC (RoHS)

This instrument is exempt from Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment. Specifically, Avtech instruments are considered "Monitoring and control instruments" (Category 9) as defined in Annex 1A of Directive 2002/96/EC. The Directive 2002/95/EC only applies to Directive 2002/96/EC categories 1-7 and 10, as stated in the "Article 2 - Scope" section of Directive 2002/95/EC.

DIRECTIVE 2002/96/EC (WEEE)

European customers who have purchased this equipment directly from Avtech will have completed a "WEEE Responsibility Agreement" form, accepting responsibility for

WEEE compliance (as mandated in Directive 2002/96/EC of the European Union and local laws) on behalf of the customer, as provided for under Article 9 of Directive 2002/96/EC.

Customers who have purchased Avtech equipment through local representatives should consult with the representative to determine who has responsibility for WEEE compliance. Normally, such responsibilities with lie with the representative, unless other arrangements (under Article 9) have been made.

Requirements for WEEE compliance may include registration of products with local governments, reporting of recycling activities to local governments, and financing of recycling activities.

[redacted]

INSTALLATION

VISUAL CHECK

After unpacking the instrument, examine it to ensure that it has not been damaged in shipment. Visually inspect all connectors, knobs, and handles. Confirm that a power cord and an instrumentation manual (this manual) are with the instrument. If the instrument has been damaged, file a claim immediately with the company that transported the instrument.

POWER RATINGS

This instrument is intended to operate from 100 - 240 V, 50 - 60 Hz.

The maximum power consumption is 57 Watts. Please see the "FUSES" section for information about the appropriate AC and DC fuses.

This instrument is an "Installation Category II" instrument, intended for operation from a normal single-phase supply.

CONNECTION TO THE POWER SUPPLY

An IEC-320 three-pronged recessed male socket is provided on the back panel for AC power connection to the instrument. One end of the detachable power cord that is supplied with the instrument plugs into this socket. The other end of the detachable power cord plugs into the local mains supply. Use only the cable supplied with the instrument. The mains supply must be earthed, and the cord used to connect the instrument to the mains supply must provide an earth connection. (The supplied cord does this.)

⚠ Warning: Failure to use a grounded outlet may result in injury or death due to electric shock. This product uses a power cord with a ground connection. It must be connected to a properly grounded outlet. The instrument chassis is connected to the ground wire in the power cord.

The table below describes the power cord that is normally supplied with this instrument, depending on the destination region:

MINIMIZING WAVEFORM DISTORTIONS

USE 50Ω TRANSMISSION LINES AND LOADS

Connect the load to the pulse generator with 50Ω transmission lines (e.g. RG-58 or RG-174 cable).

This instrument requires a 50Ω load for proper operation. It will not properly drive a high-impedance load. The output stage will be damaged if it is operated into an open circuit (or any other high impedance). Failures due to improper output loading are not covered by the warranty.

USE LOW-INDUCTANCE LOADS

Lenz's Law predicts that for an inductive voltage spike will be generated when the current through an inductance changes. Specifically, $V_{SPIKE} = L \times dI_{LOAD}/dt$, where L is the inductance, I_{LOAD} is the load current change, and t is time. For this reason, it is important to keep any parasitic in the load low. This means keeping wiring short, and using low inductance components. In particular, wire-wound resistors should be avoided.

PREVENTING DAMAGE

The AVP-AVH-C-2CHPP-CUA may fail if triggered at a PRF greater than 1 MHz.

This unit is designed to operate into a load impedance of 50 Ohms and the output stage will be damaged if it is operated into an open circuit (or any other high impedance). Failures due to improper output loading are not covered by the warranty.

The lifetime of the switching elements in the pulse generator module is proportional to the running time of the instrument. For this reason the prime power to the instrument should be turned off when the instrument is not in use.

MECHANICAL INFORMATION

TOP COVER REMOVAL

If necessary, the interior of the instrument may be accessed by removing the four Phillips screws on the top panel. With the four screws removed, the top cover may be slid back (and off).

⚠ Always disconnect the power cord and allow the instrument to sit unpowered for 10 minutes before opening the instrument. This will allow any internal stored charge to discharge.

There are no user-adjustable internal circuits. For repairs other than fuse replacement, please contact Avtech (info@avtechpulse.com) to arrange for the instrument to be returned to the factory for repair. Service is to be performed solely by qualified service personnel.

⚠ Caution: High voltages are present inside the instrument during normal operation. Do not operate the instrument with the cover removed.

RACK MOUNTING

A rack mounting kit is available. The -R5 rack mount kit may be installed after first removing the one Phillips screw on the side panel adjacent to the front handle.

ELECTROMAGNETIC INTERFERENCE

To prevent electromagnetic interference with other equipment, all used outputs should be connected to shielded loads using shielded coaxial cables. Unused outputs should be terminated with shielded coaxial terminators or with shielded coaxial dust caps, to prevent unintentional electromagnetic radiation. All cords and cables should be less than 3m in length.

MAINTENANCE

REGULAR MAINTENANCE

This instrument does not require any regular maintenance.

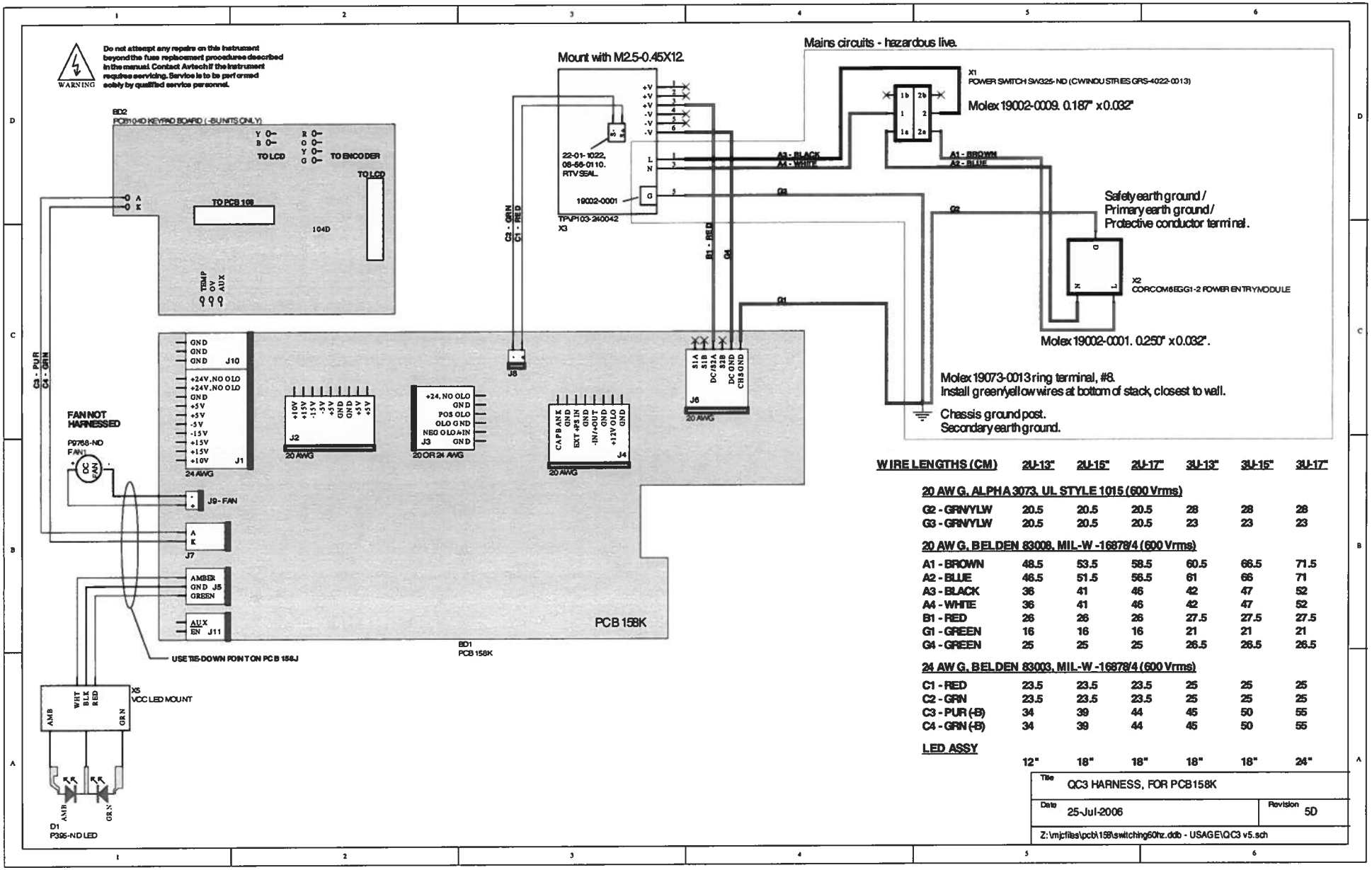
On occasion, one or more of the four rear-panel fuses may require replacement. All fuses can be accessed from the rear panel. See the "FUSES" section for details.

CLEANING

If desired, the interior of the instrument may be cleaned using compressed air to dislodge any accumulated dust. (See the "TOP COVER REMOVAL" section for instructions on accessing the interior.) No other cleaning is recommended.

WIRING DIAGRAMS

WIRING OF AC POWER



WIRE LENGTHS (CM)	2U-13"	2U-15"	2U-17"	3U-13"	3U-15"	3U-17"
20 AWG, ALPHA 3073, UL STYLE 1015 (600 Vrms)						
G2 - GRN/YLW	20.5	20.5	20.5	28	28	28
G3 - GRN/YLW	20.5	20.5	20.5	23	23	23
20 AWG, BELDEN 83008, MIL-W-16878/4 (600 Vrms)						
A1 - BROWN	48.5	53.5	58.5	60.5	66.5	71.5
A2 - BLUE	46.5	51.5	56.5	61	66	71
A3 - BLACK	36	41	46	42	47	52
A4 - WHITE	36	41	46	42	47	52
B1 - RED	26	26	26	27.5	27.5	27.5
G1 - GREEN	16	16	16	21	21	21
G4 - GREEN	25	25	25	26.5	26.5	26.5
24 AWG, BELDEN 83003, MIL-W-16878/4 (600 Vrms)						
C1 - RED	23.5	23.5	23.5	25	25	25
C2 - GRN	23.5	23.5	23.5	25	25	25
C3 - PUR (-B)	34	39	44	45	50	55
C4 - GRN (-B)	34	39	44	45	50	55
LED ASSY						
	12"	18"	18"	18"	18"	24"

Title	QC3 HARNESS, FOR PCB158K
Date	25-Jul-2006
Revision	5D
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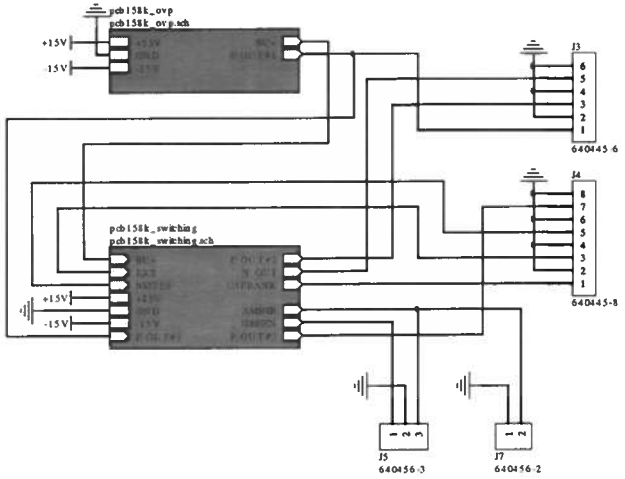
PCB 158K - LOW VOLTAGE DC POWER SUPPLY, 1/3



Title	LOW VOLTAGE DC/DC POWER SUPPLY
Date	25-Jul-2006
Revision	
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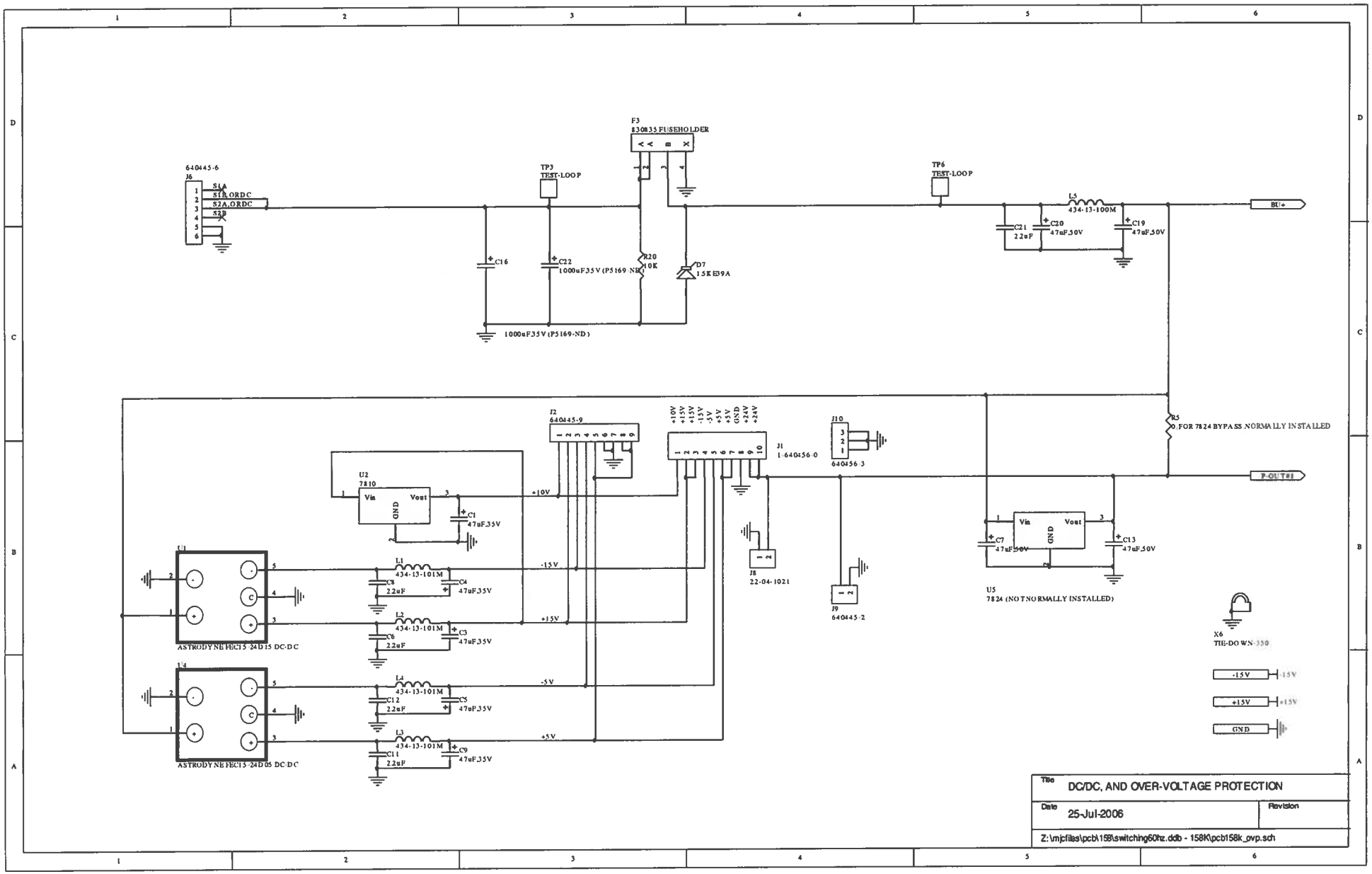
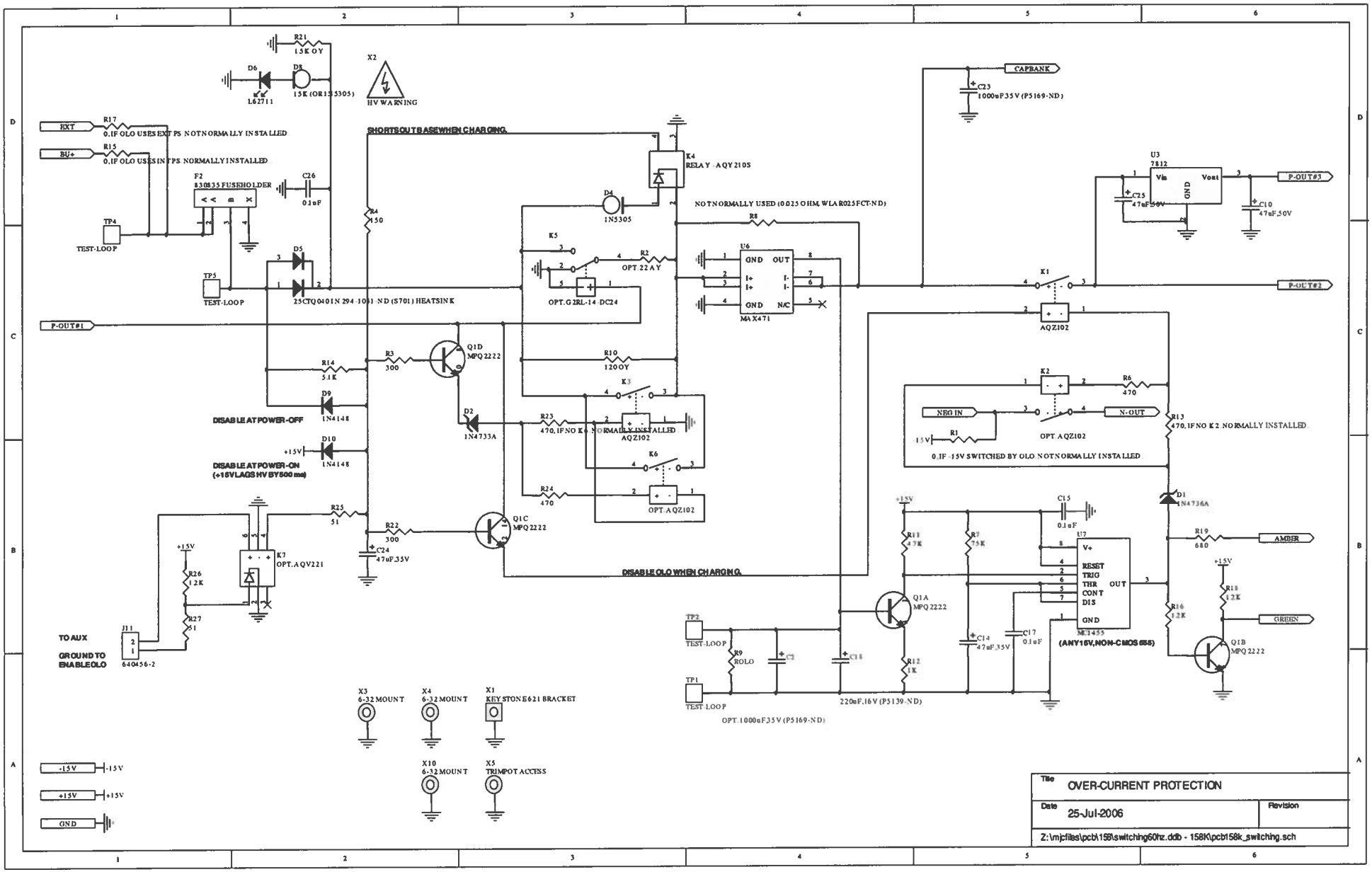
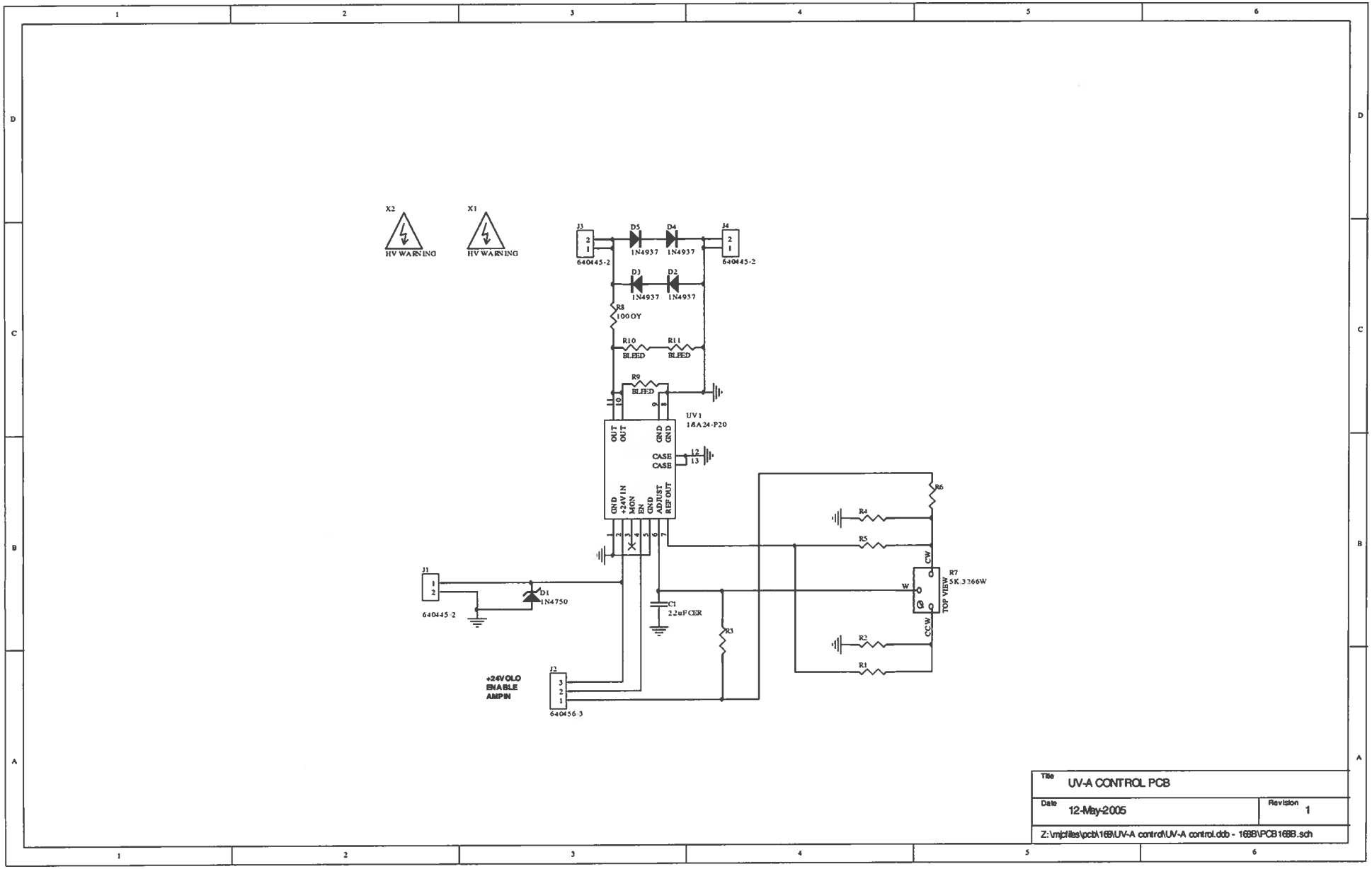
PCB 158K - LOW VOLTAGE DC POWER SUPPLY, 2/3



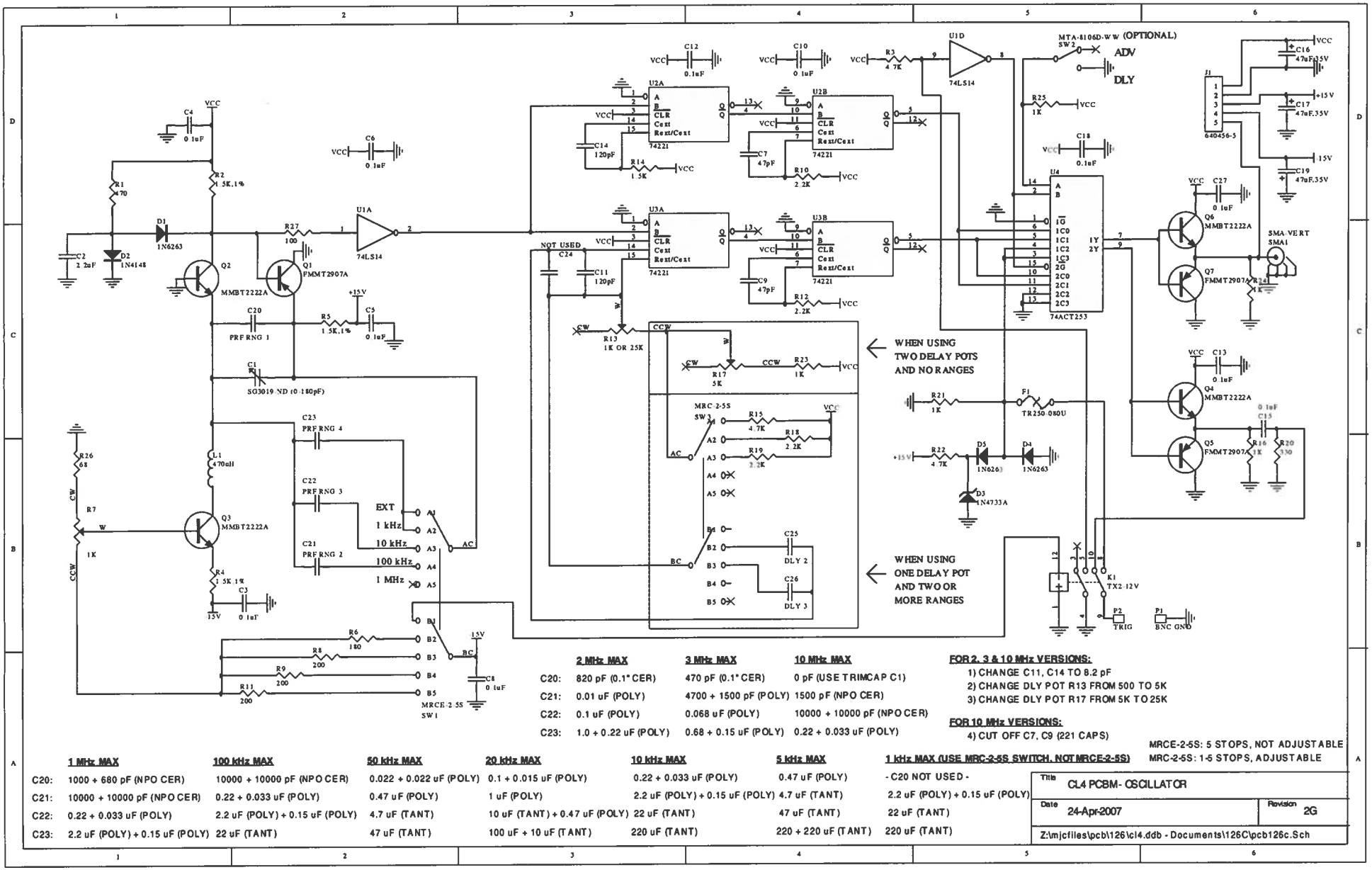
PCB 158K - LOW VOLTAGE DC POWER SUPPLY, 3/3



PCB 168B - HIGH VOLTAGE DC POWER SUPPLY



PCB 126C - OSCILLATOR AND TRIGGER CIRCUIT



	2 MHz MAX	3 MHz MAX	10 MHz MAX
C20:	820 pF (0.1" CER)	470 pF (0.1" CER)	0 pF (USE TRIMCAP C1)
C21:	0.01 uF (POLY)	4700 + 1500 pF (POLY)	1500 pF (NPO CER)
C22:	0.1 uF (POLY)	0.068 uF (POLY)	10000 + 10000 pF (NPO CER)
C23:	1.0 + 0.22 uF (POLY)	0.68 + 0.15 uF (POLY)	0.22 + 0.033 uF (POLY)

FOR 2, 3 & 10 MHz VERSIONS:

1) CHANGE C11, C14 TO 8.2 pF
2) CHANGE DLY POT R13 FROM 500 TO 5K
3) CHANGE DLY POT R17 FROM 5K TO 25K

FOR 10 MHz VERSIONS:

4) CUT OFF C7, C9 (221 CAPS)

MRCE-2-5S: 5 STOPS, NOT ADJUSTABLE
MRC-2-5S: 1-5 STOPS, ADJUSTABLE

	1 MHz MAX	100 kHz MAX	50 kHz MAX	20 kHz MAX	10 kHz MAX	5 kHz MAX	1 kHz MAX (USE MRC-2-5S SWITCH, NOT MRCE-2-5S)
C20:	1000 + 680 pF (NPO CER)	10000 + 10000 pF (NPO CER)	0.022 + 0.022 uF (POLY)	0.1 + 0.015 uF (POLY)	0.22 + 0.033 uF (POLY)	0.47 uF (POLY)	- C20 NOT USED -
C21:	10000 + 10000 pF (NPO CER)	0.22 + 0.033 uF (POLY)	0.47 uF (POLY)	1 uF (POLY)	2.2 uF (POLY) + 0.15 uF (POLY)	4.7 uF (TANT)	2.2 uF (POLY) + 0.15 uF (POLY)
C22:	0.22 + 0.033 uF (POLY)	2.2 uF (POLY) + 0.15 uF (POLY)	4.7 uF (TANT)	10 uF (TANT) + 0.47 uF (POLY)	22 uF (TANT)	47 uF (TANT)	22 uF (TANT)
C23:	2.2 uF (POLY) + 0.15 uF (POLY)	22 uF (TANT)	47 uF (TANT)	100 uF + 10 uF (TANT)	220 uF (TANT)	220 + 220 uF (TANT)	220 uF (TANT)

Title	CL4 PCBM- OSCILLATOR
Date	24-Apr-2007
Revision	2G
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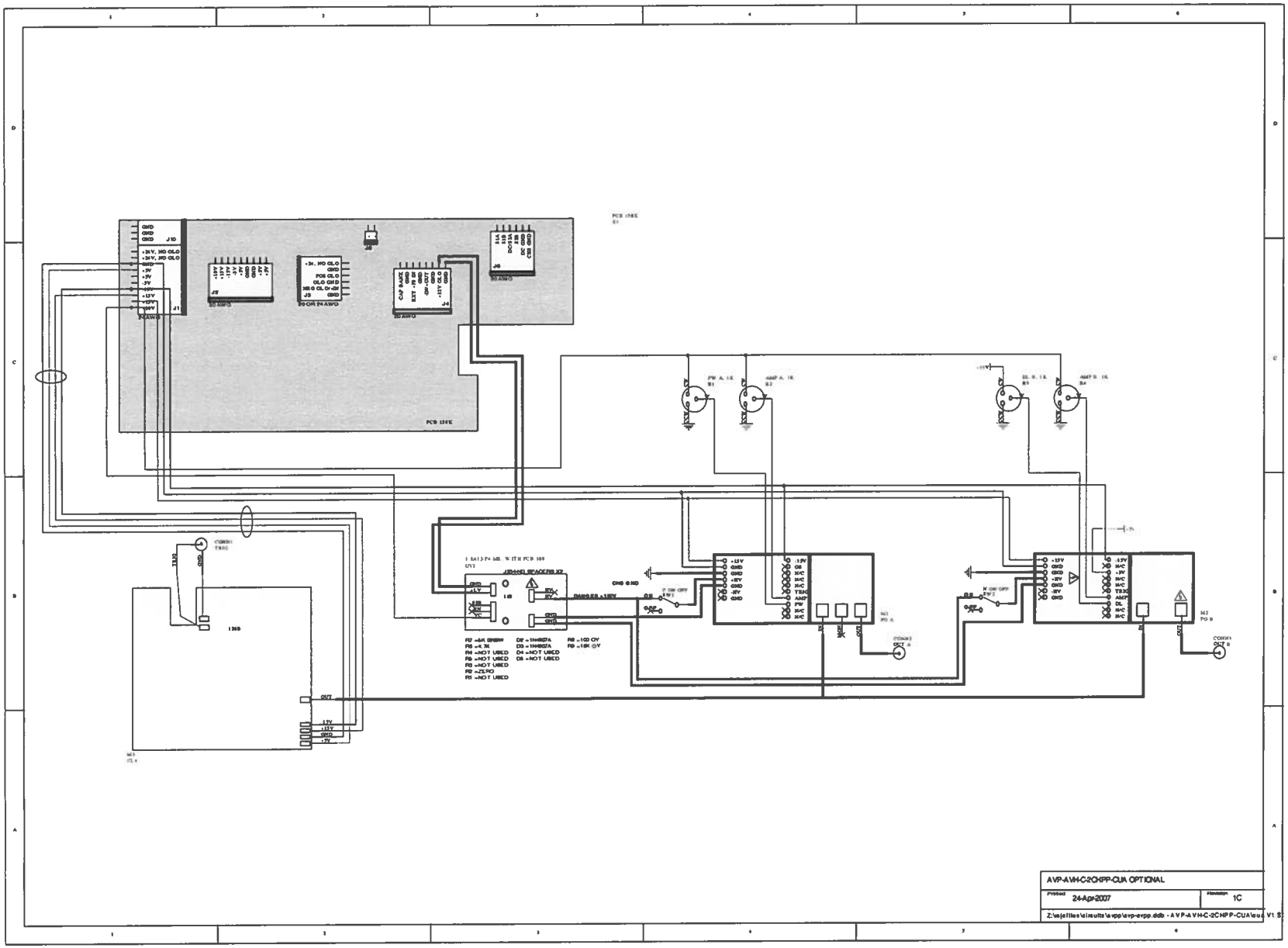
MAIN WIRING



PERFORMANCE CHECK SHEET

April 25/07