NEW VBEAM SYSTEM PERFORMANCE & USAGE DATA

Customer Name _____ *Date* _____ *Laser S/N* _____

Service Engineer _____ *Energy Meter Serial Number* _____ *Cal Due Date* _____

BEFORE SERVICING DATA

RECORD ALL VALUES BELOW (ALL MEAUSREMENTS TO BE TAKEN WITH EXTERNAL METER UNLESS OTHERWISE STATED!)

PARAMETER	VALUE	PARAMETER	VALUE
GUI REV		*DCD PRESSURE (±1)*	(PSI)
OS REV		?V at 9.2J-See Section 5 in procedure *8503-01-0853 (Optimum ?V is =350V)*	(?V)
CPU I/O		DELIVERED ENERGY(10MM) (INTO OPHIR)@9.20J	(J)
DYE TEMP (MEASURED(60 +/-2.5°C)	(°C)	DELIVERY TRANS(10MM) (INTO OPHIR)@9.2J	(%)
DI TEMP (TOGGLE SCREEN (MEASURED (60 +/-2.5°C)	(°C)	CALIBRATION PORT ENERGY(10MM) @9.2J	(J)
LINE VOLTAGE	*(Vac)*	CALIBRATION PORT TRANS.(10MM) @9.2J *(within 5% of Ophir % above)*	(%)
HV MEASURED (REF SET TO=2875Vdc) (±43Vdc)	(PSI)	TOTAL PULSES	

LIST FAULTS:									
ADDITIONAL INFO									

AFTER SERVICING DATA

same as 10J/cm² 7.85 delivered 9.24 head

RECORD ALL VALUES BELOW (ALL MEAUSREMENTS TO BE TAKEN WITH EXTERNAL METER UNLESS OTHERWISE STATED!)

PARAMETER	VALUE	PARAMETER	VALUE
GUI REV		*DCD PRESSURE (±1)*	(PSI)
OS REV		?V at 9.2J-See Section 5 in procedure *8503-01-0853 (Optimum ?V is =350V)*	(?V)
CPU I/O		DELIVERED ENERGY [redacted] (INTO OPHIR) [redacted]	(J)
DYE TEMP (MEASURED(60 +/-2.5°C)	(°C)	DELIVERY TRANS(10MM) (INTO OPHIR)@9.2J	(%)
DI TEMP (TOGGLE SCREEN (MEASURED (60 +/-2.5°C)	(°C)	CALIBRATION PORT ENERGY [redacted]	(J)
LINE VOLTAGE	*(Vac)*	CALIBRATION PORT TRANS.(10MM) @9.2J *(within 5% of Ophir % above)*	(%)
HV MEASURED (REF SET TO=2875Vdc) (±43Vdc)	(PSI)	TOTAL PULSES	

BUBBLE SENSOR	**Cryo 7.75±.0.5VDC**	**No Cryo ≥10.5VDC**
DELIVERY SYSTEM		
CANISTER		

(USER MODE) LASER PERFORMANCE TESTS: *CALIBRATE PER TABLE THEN PULSE 3X INTO OPHIR (MUST BE WITHIN "OPHIR JOULE" SPEC - OPEN LVM SCREEN AND PRESS RESET THEN PULSE INTO CALPORT FOR TX - OPEN LVM SCREEN AND PRESS RESET THEN PULSE INTO CALPORT 30 TIMES AND CHECK 3SI % FOR HD AND CP. (IF 3MM NOT PRESENT THEN N/A FOR THAT ROW)*

SPOT SIZE	FLUENCE	PW	OPHIR JOULES, +/-14% ()=NOMINAL	TxMn%=80 (=34% FOR 3MM)	HD3Si%=14%	CP3Si%=14%
3MM	*11J/cm²*	*1.5M*	*0.67min (0.78) 0.89max*			
10MM	*7j/cm²*	*.45M*	*4.73min (5.50) 6.27max*	=34%		
10MM	*10 J/cm²*	*10MS*	*6.79min (7.9) 9.01max*	=34%		
10MM	*3 J/cm²*	*10MS*	*2.06min (2.4) 2.74max*	=34%		

DCD ALIGNMENT TESTS: REFERENCE OPERATIONS MANUAL (8501-00-1780 SECTION 6.0)

Del. Sys	PASS		AIMING BEAM	VISABLE THROUGH GOGGLES?	
Aligned	*YES*	*NO*	*12MM LEVEL-1*	*YES*	*NO*

NEW VBEAM SYSTEM PERFORMANCE & USAGE DATA

Customer Name _____ *Date* _____ *Laser S/N* _____

Service Engineer _____ *Energy Meter Serial Number* _____ *Cal Due Date* _____

BEFORE SERVICING DATA

RECORD ALL VALUES BELOW (ALL MEAUSREMENTS TO BE TAKEN WITH EXTERNAL METER UNLESS OTHERWISE STATED!)

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DI TEMP (TOGGLE SCREEN (MEASURED (60 +/-2.5°C)	(°C)	CALIBRATION PORT ENERGY(10MM) @9.2J	(J)
LINE VOLTAGE	*(Vac)*	CALIBRATION PORT TRANS.(10MM) @9.2J *(within 5% of Ophir % above)*	(%)
HV MEASURED (REF SET TO=2875Vdc) (±43Vdc)	(PSI)	TOTAL PULSES	

LIST FAULTS:									
ADDITIONAL INFO									

AFTER SERVICING DATA

RECORD ALL VALUES BELOW (ALL MEAUSREMENTS TO BE TAKEN WITH EXTERNAL METER UNLESS OTHERWISE STATED!)

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OS REV		?V at 9.2J-See Section 5 in procedure *8503-01-0853 (Optimum ?V is =350V)*	(?V)
CPU I/O		DELIVERED ENERGY [redacted] (INTO OPHIR) [redacted]	(J)
DYE TEMP (MEASURED(60 +/-2.5°C)	(°C)	DELIVERY TRANS(10MM) (INTO OPHIR)@9.2J	(%)
DI TEMP (TOGGLE SCREEN (MEASURED (60 +/-2.5°C)	(°C)	CALIBRATION PORT ENERGY [redacted]	(J)
LINE VOLTAGE	*(Vac)*	CALIBRATION PORT TRANS.(10MM) @9.2J *(within 5% of Ophir % above)*	(%)
HV MEASURED (REF SET TO=2875Vdc) (±43Vdc)	(PSI)	TOTAL PULSES	

BUBBLE SENSOR	**Cryo 7.75±.0.5VDC**	**No Cryo ≥10.5VDC**
DELIVERY SYSTEM		
CANISTER		

(USER MODE) LASER PERFORMANCE TESTS: *CALIBRATE PER TABLE THEN PULSE 3X INTO OPHIR (MUST BE WITHIN "OPHIR JOULE" SPEC - OPEN LVM SCREEN AND PRESS RESET THEN PULSE INTO CALPORT FOR TX - OPEN LVM SCREEN AND PRESS RESET THEN PULSE INTO CALPORT 30 TIMES AND CHECK 3SI % FOR HD AND CP. (IF 3MM NOT PRESENT THEN N/A FOR THAT ROW)*

SPOT SIZE	FLUENCE	PW	OPHIR JOULES, +/-14% ()=NOMINAL	TxMn%=80 (=34% FOR 3MM)	HD3Si%=14%	CP3Si%=14%
3MM	*11J/cm²*	*1.5M*	*0.67min (0.78) 0.89max*			
10MM	*7j/cm²*	*.45M*	*4.73min (5.50) 6.27max*	-34%		
10MM	*10 J/cm²*	*10MS*	*6.79min (7.9) 9.01max*	-34%		
10MM	*3 J/cm²*	*10MS*	*2.06min (2.4) 2.74max*	-34%		

DCD ALIGNMENT TESTS: REFERENCE OPERATIONS MANUAL (8501-00-1780 SECTION 6.0)

Del. Sys	PASS		AIMING BEAM	VISABLE THROUGH GOGGLES?	
Aligned	*YES*	*NO*	*12MM LEVEL-1*	*YES*	*NO*

New Vbeam

hold down maintenance mode button code 6645

Service Manual

Models: 9914-00-0300

9914-00-0310

9914-00-0320

Candela Corporation
530 Boston Post Road
Wayland, MA 01778-1886
Telephone (508) 358-7637
Toll Free (800) 733-8550 ext.336 (Technical Support)
Toll Free (800) 73-LASER (Customer Service)

Caution

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Caution

Federal (USA) law restricts this device to sale by or on the order of a physician.

"Candela"™

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SECTION FOUR **ENGINEERING DRAWINGS** **Revision**

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Delivery Systems:

Assembly Drawings/BOMs Cont. **Revision**

SAFETY: WARNINGS

CAUTION!!

DURING ANY PART OF THIS PROCEDURE WHEN IT IS POSSIBLE THAT THE LASER MIGHT FUNCTION AND EMIT LIGHT, SAFETY EYEWEAR MUST BE WORN. THE EYEWEAR MUST HAVE AN OPTICAL DENSITY OF AT LEAST 6 AT 591NM TO 597NM

WARNING

THE ELECTRICAL HAZARDS PRESENT DURING SERVICING OF THE VBEAM CAN BE EXTREMELY DANGEROUS AND LETHAL IF PROPER PRECAUTIONS ARE NOT TAKEN. THE VBEAM SHOULD BE SERVICED ONLY BY QUALIFIED TECHNICIANS WHO HAVE RECEIVED APPROPRIATE TRAINING ON THE VBEAM FROM CANDELA, AND WHO ARE FAMILIAR WITH THE SAFETY CONSIDERATIONS DISCUSSED IN THIS MANUAL.

WARNING

THE LASER WILL DUMP ALL CAPACITOR VOLTAGE WHEN THE SYSTEM IS SHUT DOWN BUT, THE HIGH VOLTAGE CAPACITOR STILL MAY RETAIN LETHAL VOLTAGES. IF VOLTAGE REMAINS, IT MUST BE DISHCARGED BEFORE THE LASER IS MOVED OR SERVICED FOR ANY REASON. RESIDUAL VOLTAGES REQUIRE STICK DISCHARGING OR TIME FOR THE BLEEDER CIRCUITS TO COMPLETELY BLEED THE VOLTAGE OFF OF THE CAPACITOR. SEE THEORY OF OPERATION FOR BLEED TIME DESCRIPTION. VERIFY THAT THE CAPACITOR IS DISCHARGED BELOW 25VDC, CHECKED VIA A DVM WITH HIGH VOLTAGE PROBE, BEFORE SERVICING.

FAULTS AND LABELS

The *Vbeam* has been labeled in accordance with domestic and international agency standards. All laser operators should be familiar with the location and meaning of the labels. The symbol on the rear panel of the laser is placed there to draw the attention of the operator to the manual for further information concerning the on/off mains switch. The mains switch should be placed in the "0" position when the system is not being used. When the system is to be used, the mains switch must be moved to the "1" position.

Please see Section 7: "Labels and Symbols" of the Operations Manual (8501-00-1780) for a detailed description of the labels.

Please see below for a list of the faults:

Fault Type	Fault #	Fault Description
Fault 1 – Bubble Detect Circuit Fault	1.1	HP Bubble Circuit Test didn't detect a change in the signal (with DCD-enabled HP).
	1.2	Canister Bubble Circuit Test didn't detect a change in the signal (with DCD-enabled HP).
Fault 2	2	Rom checksum failure
Fault 3- Shutter Fault	3.1	Shutter isn't in correct state when checked or does not respond to actuation to correct state.
Fault 4 – HVPS Fault	4.1	High Voltage Power Supply
	4.2	High Voltage Power Supply Communications Time-out.
Fault 5 – HV Tolerance Fault	5.1	High Voltage Power Supply tolerance fault.
	5.2	High Voltage Power Supply charge time-out.
Fault 6- Calibration Fault	6.2	Laser failed to complete calibration (CAL) to desired Fluence within 15 pulses. ❖ Damaged or dirty windows and/or focal lens. ❖ Laser mobility shocks may have shifted the laser head out of alignment ❖ Worn delivery system components ❖ Aging laser dye solution, dye cartridge, fluid system and/or laser head components. ❖ Low power input or output

Fault 7 – Deionized (DI) Water System Fault	7.1	DI water temp < 55.5° C while in READY or CAL.
	7.2	DI water temp > 66° C.
	7.3	DI Water Pump Pressure Fault. Low or no DI water pressure and/or flow. ❖ DI water system pressure switch does not change when power turned on. ❖ DI water pump is not ON or DI pressure switch is not actuated. ❖ DI water level is low and/or there are air bubbles flowing through the fluid system.
	7.4	Temperature Sensor Fault (sensor opened or shortened).
Fault 8 – DCD System Fault	8.1	Low DCD pressure. ❖ Cryogen Canister may be empty ❖ Air bubbles need to be purged out of new canister ❖ Flow of cryogen may be obstructed ❖ Overheated delivery system or DCD canister ❖ DCD Settings may be out of range.
	8.2	High DCD pressure. ❖ Air bubbles need to be purged out of new canister ❖ Flow of cryogen may be obstructed ❖ Overheated delivery system or DCD canister ❖ DCD Settings may be out of range.
	8.3	DCD Valve Current was not detected while spraying.
	8.4	DCD Pressure Sensor fault. (sensor opened or shortened).
Fault 9 – Warm-Up Timeout	9.1	DI water temperature not in normal range after 60 minute warm-up.
	9.2	DCD pressure not in normal range after 30 minute warm-up with DCD enabled.
Fault 10 – Delivery System Fault	10.1	HP type changed or unrecognized while in READY state
	10.4	Fiber not detected while in READY state.
	10.5	Spot Size changed while in Ready.

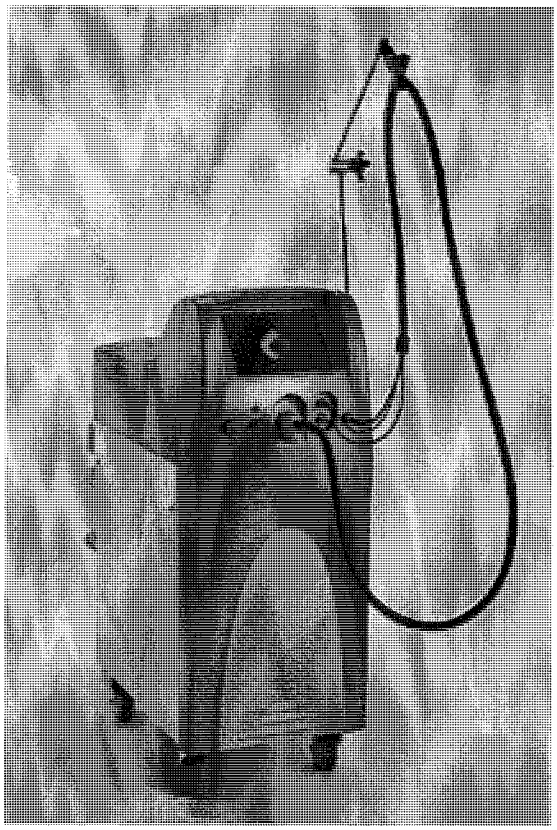
Fault 11- Wavelength Fault	11	Wavelength out of range. ❖ Dye solution may need COT ❖ Dye solution may need to be replaced due to "over-cotting".
Fault 12 – Energy Out-of-Range Fault	12.1	Head energy (HD) of last treatment pulse was 14% lower than expected head energy (xHD).
	12.2	Head energy (HD) of last treatment pulse was 14% higher than expected head energy (xHD).
	12.3	Head energy (HD) of last treatment pulse > Max Treatment HD energy.
	12.4	HD total energy not evenly balanced between each subpulse.
	12.5	HD2 energy not within ± 20% of HD1 energy.
Fault 13 – Trigger Switch Fault	13	The redundant trigger switches were in two different states for > 1 second while in READY state.
Fault 14 – Simmer Fault	14	The simmer circuit did not start or dropped out while in READY.
Fault 15 – Transmission Fault	15.1	Low Transmission (Tx). ❖ Dirty windows and/or pitted focus lens ❖ Incorrect windows were installed ❖ Worn delivery system ❖ Laser mobility shocks may have shifted the laser head out of alignment ❖ Tx settings may be out of range
	15.2	High Transmission (Tx). ❖ Missing focus lens or windows in distance gauge or delivery system ❖ Incorrect windows were installed ❖ Tx settings may be out of range
Fault 16 – Replace Canister	16	Displays if canister bubble is detected in READY and DCD is enabled. ❖ Cryogen Canister may be empty ❖ Air bubbles need to be purged out of new canister ❖ Flow of cryogen may be obstructed ❖ Overheated delivery system or DCD canister
Fault 17 – Purge Required	17	Bubble percentage is outside of tolerable range (± 15% bubbles). ❖ Cryogen Canister may be empty ❖ Air bubbles need to be purged out of new canister ❖ Cryogen line may be obstructed ❖ Overheated delivery system or DCD canister
Fault 18 – Circuit Calibration Fault	18.1	Circuit Calibration Energy Fault

	18.2	Circuit Calibration DI Fault
	18.3	Circuit Calibration DCD Fault
Fault 19	19.1	Trigger Fault
	19.3	Laser Timer Fault.
	19.4	Lasing Head Power Fault
	19.5	High Voltage Dump Fault
Fault 20 – Dye System Fault	20.1	Dye Pump Pressure Fault ❖ Dye pressure switch does not change when power turned on. ❖ Dye pump is not ON or Dye pressure switch not actuated.
	20.2	Dye Cartridge Top Cover may not be fully or properly installed in place.
	20.3	No Dye Cartridge present
Fault 21 – Code Update Fault	21	Code Update did not complete properly.
Fault 22 – Interprocessor Comm. Fault	22	Interprocessor Communications Fault
Fault 23- Communications to Device Faults	23.1	One-Wire Communication Fault
	23.2	Failure to Write to Device
	23.3	Unable to Sync to Device
Fault 24- COT Fault	24.1	Insufficient COT ❖ COT bottle may be empty ❖ Flow of COT may be obstructed
	24.2	COT Limit Fault. COT addition exceeded its limits.

	24.3	COT Pump Circuit Fault ❖ COT pressure switch does not change when power turned on. ❖ COT pump is not ON or pressure switch not actuated


CANDELA

SYSTEM OVERVIEW



VBEAM2

The VBEAM2 system is a flashlamp excited pulsed dye laser which delivers energy at a wavelength of 595 nm and a pulse width between 0.45 ms to 40 ms. The pulse durations are 0.45, 1.5, 3, 6, 10, 20, 30, and 40 ms. This laser system has the Dynamic Cooling Device (DCD) built into it which provides a short spray of cryogen prior to firing the laser pulse. The Dye cartridge is user replaceable. Laser energy is delivered through a delivery system handpiece, smart distance gauge and optical fiber which are all user replaceable parts. The delivery system consists of a cable, handpiece, and various size distance gauges. The cable contains the optical fiber, DCD line, and electrical cable. The handpiece houses the cryogen spray valve, bubble sensor, fingerswitch, one-wire ID microchip and the distance gauge receptacle.

Eight Smart Distance Gauges determine the spot sizes: 3 mm, 5 mm, 7 mm, 10 mm, 12 mm, 3x10 mm, 7 mm (Pigmented Lesion) and 10 mm (Pigmented Lesion). There are three different Pathways Models. They are:

- Vbeam Aesthetica will have the 7 mm Compression, 10 mm Compression, 7 mm, and 10 mm distance gauges.
- Vbeam Platinum will have the 3 mm, 5 mm, 7 mm, 10 mm, 12 mm, and 3x10 mm distance gauges.
- Vbeam Perfecta will have all 8 distance gauges.

Two pulsing modes are available with either the foot switch or finger switch (which is user selectable):

1. Single Pulse Mode:
   1.1. Each depression of the trigger switch generates a single pulse.
2. Repeat Pulse Mode:
   2.1. Continuous pulses are delivered when the trigger switch is continuously depressed.

NOTE: The repetition rate for the repeat mode goes up to 1.5Hz (dependant on spot size, fluence level, pulse duration and efficiency of the system).

The VBEAM2 operates from an input line voltage of 185 VAC to 253 VAC at 50/60 Hz. There are no adjustments required on the laser to operate over this voltage range. The system does not contain an isolation transformer. All of the components that are directly connected to the AC input were chosen for low line leakage current to ensure the systems meets the leakage current requirements of IEC-601 and UL-2601. Maximum current drawn by the laser system is 17.4 A at 230 VAC input. The thermal load for the laser system is 2000W (6824 BTU/hr) when in STANDBY and 4000W (13,649 Btu/hr) when in READY.

The VBEAM2 system is fully air cooled. All fans used are operated from 24 VDC so their performance is constant for low or high AC input line voltage and for 50 or 60 Hz power sources. There are a total of 7 fans in the system:

1. One is built into the high voltage power supply (HVPS).
2. One fan is mounted to the front of the frame to cool the modulator area.
3. Two are mounted to the water cooled heat exchanger (these are the only fans that are switched on and off by the firmware, all other fans turn on as soon as the system is powered on).
4. One in the Upper Chassis Section.
5. One built into the AC line filter.
6. One in the DCD Section.

The deionized water system is maintained at 60°C (140°F) to obtain optimum performance from the laser head. The dye solution is also maintained at 60°C (140°F) through a liquid-to-liquid heat exchanger. A 2000 Watt heater and air-cooled heat exchanger regulate the water at its proper temperature which in turn heats the dye solution to its proper temperature. An initial warm-up time of approximately 12 minutes (from a cold start) is required for the deionized water and dye solution to be at the correct operating temperature. This time varies depending on the ambient temperature in the room and the line voltage. (At low line voltage the heater's output power is less than 2000 Watts). The warm-up time of the cryogen canister is about 10 minutes. Thus, the system warm-up time is <15 minutes.

A wavelength monitor assembly is included to monitor the wavelength in the system. When the wavelength decreases, the firmware turns on the inject pump which adds triplet quencher (COT) to the dye reservoir. The added COT displaces some of the dye from the dye cartridge which increases the absorbance to its proper level to correct the wavelength.

There are two I/O Controllers in this laser system. The Sharp LH7A404-11 Engine Card mounted to the Color Display PCB controls the GUI Interface and external I/O Ports - SVGA Display, Touch screen, Audio, RAM and Real Time Clock. This Engine Card controls external ports also such as the USB, Compact Flash, Ethernet, RS-232 and a UART which interfaces with the second microcomputer. The other I/O Controller located on the CPU I/O PCB is a MC68HC812 microprocessor system controller, used to monitor and direct all internal system functions. A built in Maintenance Program, activated by the front panel display, gives the service technician access to system status and control functions for repair and maintenance. A

USB Port located on the rear of the frame will provide access to upgrade future firmware revisions; using a memory stick.

For purposes of technical review, the laser can be divided into three major subsections. They are:

- **OPTICAL SYSTEM**
- **FLUIDS (DI WATER, DYE SOLUTION, AND DCD)**
- **ELECTRONICS**

Each section will be addressed in this theory of operation. The system firmware will not be discussed here unless it is required to explain the functioning of the laser. For detailed information on the system firmware, please see the following documents:

- VBEAM2 Firmware Design Specification (1010-01-3130)
- VBEAM2 Firmware Requirements Specification (1010-06-3130)
- VBEAM2 Flowcharts (1010-02-3130).

OPTICAL SYSTEM

A drawing of the optical system is shown in Figure 1. The optical assemblies located inside the laser system are the laser rail and the calibration port. The Laser Rail 7122-00-7527 contains the following:

I. Laser Head
II. Beam Shutter Assembly
III. Aiming Beam Assembly
IV. Head Detector Assembly
V. Fiber Receptacle Assembly

All of the above components are precisely located on the laser rail with pins. The only alignment required is the laser head resonator and the fiber receptacle. The fiber receptacle is pre-aligned and normally does not require alignment unless the lenses are replaced in the field (However, it should be, at a minimum, verified at each service call)

The other two optical assemblies are:

VI. Delivery System (includes-optical fiber & handpiece which connect to front of laser)
VII. Calport Assembly (Not on laser rail)

I.Laser Head (7122-00-7528)

The laser head contains one flashlamp (7.15 mm bore, 400 torr, .5 mm thick glass), dye cell, water jacket, two ceramic reflectors and two mirrors. The max reflector, mounted at the rear of the laser head, is ideally a 100% mirror. Laser light is reflected back and forth through the laser cavity between the max reflector and the output coupler. The output coupler is a partial reflector that allows approximately 30% of the laser energy to pass through it.

Operation of the laser head at higher energy output levels could reduce the lifetime of the head. Therefore, maximum delivered energy and fluences are determined by set maximum head energy of 13.0J and realistic delivery system between 70 % to 85% transmission.

A two piece metal cover is mounted over the laser rail to protect the optics from dust contamination. It also protects the service technician from the high voltages present in the

vicinity of the laser head and from optical hazards. Unless required for trouble-shooting, the laser should not be pulsed with the laser cover removed. If the cover is removed, it should be replaced as soon as possible and the laser should never be left with the laser cover off.

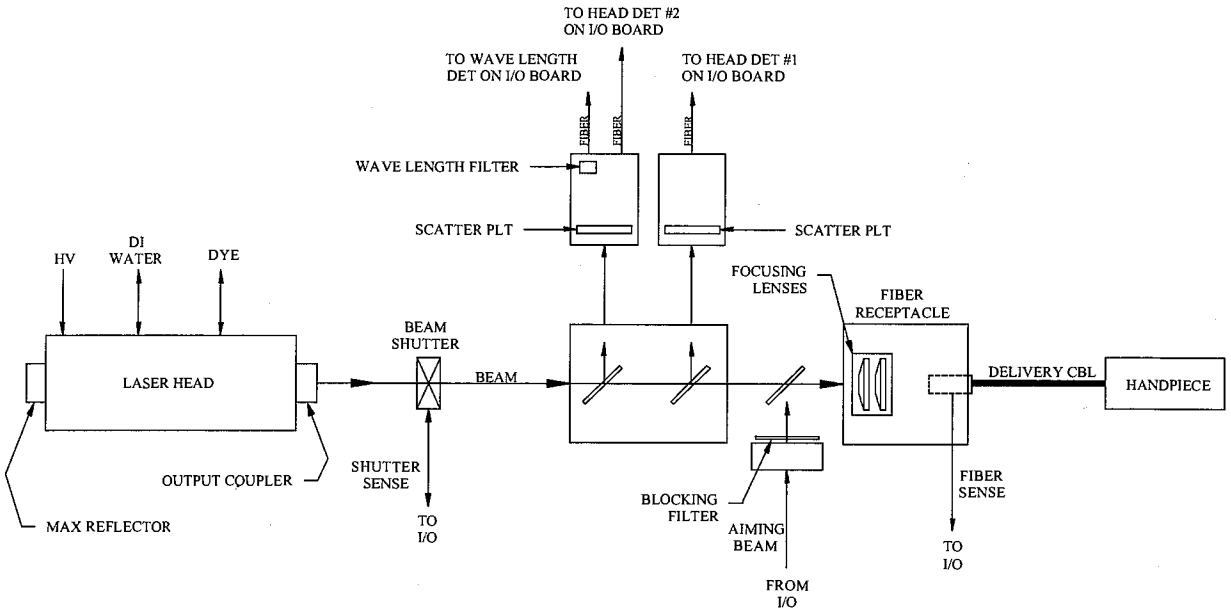


Figure 1 Laser Rail Drawing

When the laser is in Ready state, never touch the laser head or rest test equipment on it as it is only a trigger switch away from being pulsed. Therefore, use extreme caution when servicing the laser head.

II. Beam Shutter Assembly (7122-00-3590)

The beam shutter allows laser light to pass on to the fiber coupling lenses when it is energized. Normally it is not energized so it blocks any laser light exiting the partial reflector end of the laser head. A ceramic block is mounted to the surface of the beam shutter blade so that it is in line with the laser beam when the shutter is in the blocking position. The ceramic block reflects most of the laser energy that hits it and absorbs the rest. The reflected laser light is dispersed in a divergent pattern. The beam shutter normally does not get hit with laser energy. As a result, it is not designed to withstand repeated high energy pulses from the laser head. The beam shutter is used solely as a safety device to prevent laser energy from exiting the laser system under fault conditions.

The beam shutter is controlled by firmware. It can not be opened unless the Firmware command is present. An optical switch on the shutter assembly is used to sense the position of the shutter. The sensor is positioned so that it detects infrared light from the LED side of the optical switch when the shutter is in the laser beam path. When the shutter is energized and moves out of the beam path, the infrared light is blocked by the back end of the shutter blade. The firmware will only allow the laser system to enter the Ready state if the beam shutter is blocking the laser beam path in Standby state.

III. Aiming Beam Assembly (7122-00-3588)

The Aiming Beam Assembly consists of a Green LED which works in the 530 nm range. This LED can be controlled via the user interface. In User mode the operator can choose from 3 different settings of brightness. In MM mode the service technician can control the LED via % duty cycle. The aiming beam reflects off of a 45° dichroic beamsplitter into the fiber focusing assembly due to the 530nm reflective coating on the beamsplitter. The beam splitter transmits the 595 dye laser beam. There is a filter immediately after the LED to block 595nm back reflections.

IV. Head Detector Assembly

There are two beam splitters which are part of the head detector assembly. The head detector assembly is between the focus lens assembly and beam shutter assembly. These two beam splitters split off 2 - 3% from the main beam. The reflected beam from each beamsplitter is reflected off a separate ceramic diffuser to scatter and homogenize the optical signal and into separate optical fiber cables which are connected to photodiodes on the CPU I/O PCB. There are three fiber cable connectors in this assembly: two for the head energy detectors and one for the wavelength detector. One head detector is used to monitor the power and energy in the beam for controlling the switching of the IGBT. Both head detectors monitor the energy being delivered and the firmware will use these signals to determine if there is a fault. The Wavelength detector monitors the wavelength being delivered and the firmware will use this signal to determine when to add COT or if there is a wavelength fault.

V. Fiber Receptacle

The fiber receptacle assembly contains two lenses that are used to couple the laser beam onto the end of the fiber. The lenses are designed and located so that the proximal tip of the fiber is at the image plane of the output end of the dye cell. This gives a uniform beam profile on the fiber and causes the laser beam diameter to be 0.8mm diameter resulting in maximum coupling efficiency and lifetime. The lenses are held in place with o-rings that help keep them centered in the beam path, but fine alignment is still necessary. For new receptacles, this alignment is done on a fixture at the factory. The lenses are designed to be field replaceable and alignable. If lens replacement is performed, it is important to note the orientation of the existing lenses so that the new lenses are installed properly.

The proximal end of the fiber is inserted into the fiber receptacle and locked into position with ball plungers on the fiber assembly. A micro-switch mounted inside the fiber receptacle is used to allow the firmware to detect the presence of a fiber. This same signal is used by a hardware interlock circuit to prevent operation of the high voltage power supply without a fiber installed. If the laser is turned on and the fiber is removed, the firmware will assume that a new fiber has been installed and it will clear out the existing calibration table stored by the firmware. This will cause the laser system to perform a full calibration the next time the laser is put into Ready state.

VI. Delivery System

The Delivery System is used with the removable Smart Distance Gauges (Sizes: 3mm, 5mm, 7mm, 10mm, 12mm, elliptical 3mm X 10mm, 7 mm Pigmented Lesion and 10 mm Pigmented Lesion. The Delivery System has the DCD components incorporated in it. The DCD

components are in the handpiece assembly, which contains the cryogen valve, bubble sensor, HP PCB, the electrical cable and cryogen tubing that connects to the front of the laser system. Two identical HP PCBs on either side of the Smart Distance Gauge (Figure#2) determine the HP type, spot size detection, and position thru an EPROM on the PCB. This allows the firmware to determine the Delivery System configuration. Nominal fiber transmission is ~80-85%.

The delivery system contains a 1.0 mm diameter fiber. A fiber scrambler is attached several inches from the connector at the proximal and distal end of the fiber to homogenize the beam profile. The proximal end connector has a ring around it for ball plungers to secure it into the fiber receptacle on the front of the laser. There is one micro-switch in the fiber receptacle, which tells the firmware that a delivery system is installed. The distal end of the fiber connects to the HP assembly (Figure#3).

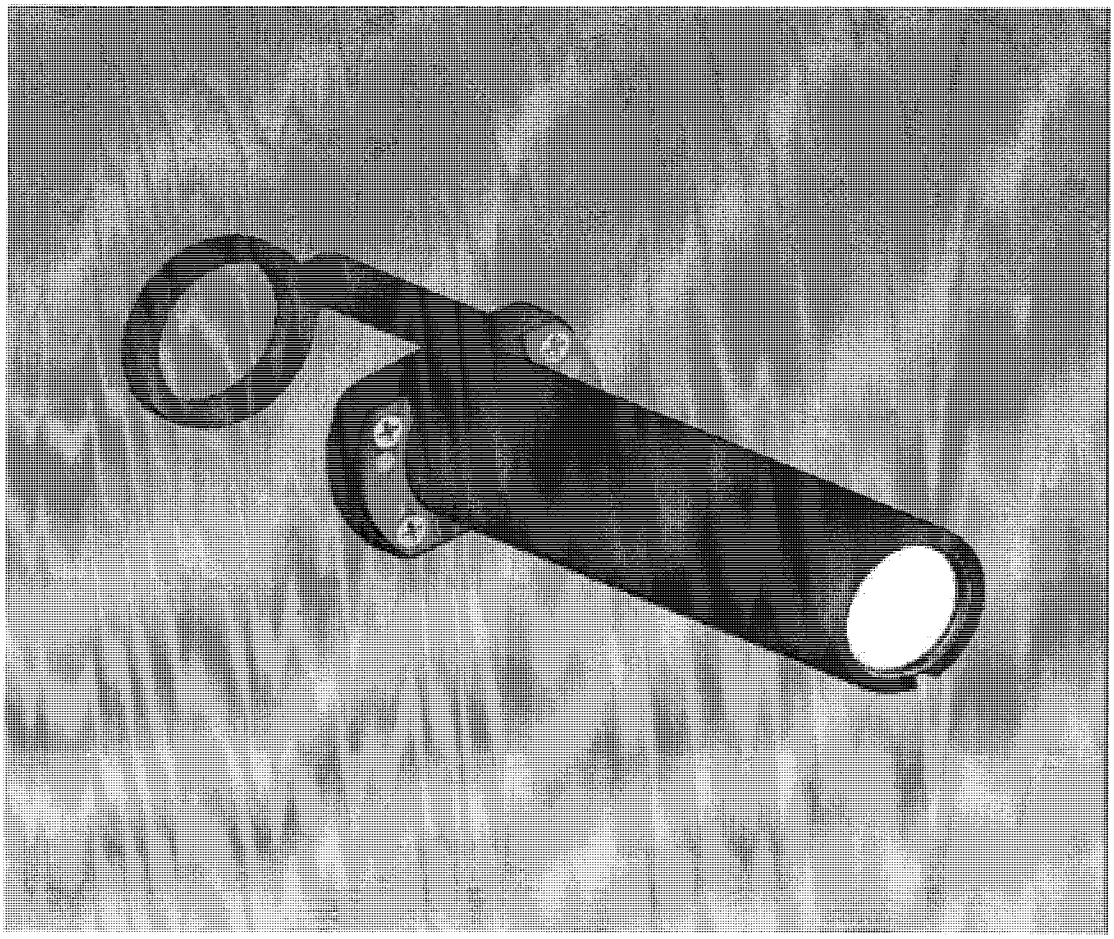


Figure 2 Smart Distance Gauge

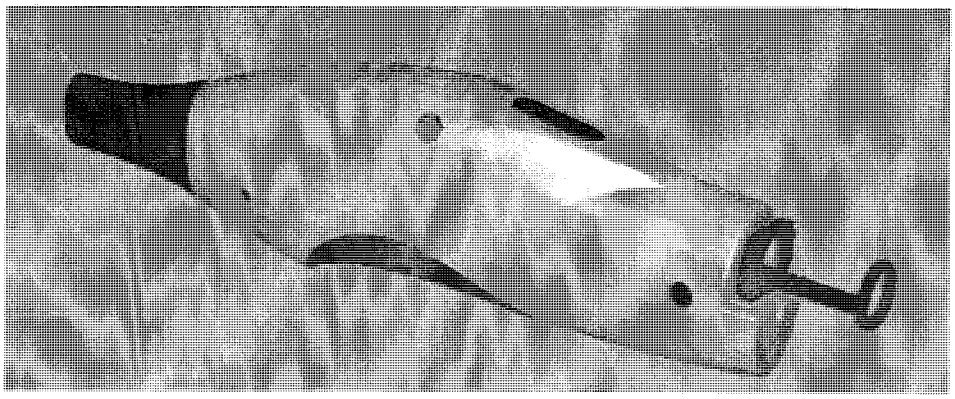


Figure 3 Delivery HandPiece Assembly with Smart Distance Gauge

All Smart Distance Gauges contain 2 or 3 lens and 2 protective windows. The 3 and 5 mm spot size gauges also contain attenuating filters. The Compression gauges have an additional lens at the end which comes in contact with the patient.

The handpiece body can be disassembled by removing the three screws on the side of the handpiece. All the internal parts can be serviced if required. The electrical cable connects into the Handpiece PCB with a twelve pin connector. The Handpiece PCB contains the optical sensor and potentiometer used for the bubble detector, an EPROM for handpiece recognition, HP Type, DCD detection and the connector for the cryogen spray valve. A finger switch also plugs into this PCB. A shielded ground wire connects the body of the cryogen valve to chassis ground to prevent buildup of static charge and provide proper grounding of these metal parts. A pogo pin assembly plugs into the HP board and makes contact with the one-wire PCBs on the Distance Gauge, when inserted into the handpiece, which detects when the Smart Gauge is fully inserted into the handpiece and differentiates between which Smart Gauge is present. Whenever the handpiece is taken apart, several items must be re-tested. These include checking that the DCD spray alignment and function and the calibration of the bubble circuit. When a Smart Distance Gauge is attached to the end of the handpiece; it is held in place by nylon ball plungers. The User can change the Smart Distance Gauge to any of the spot sizes listed earlier, depending on which Vbeam version he/she owns..

VII. Calport Assembly

The VBEAM2 calport collects the laser light and transmits it via fiber optic to the optical sensor on the CPU I/O PCB in order to measure delivered energy. The Calport contains one over-travel pushbutton switch that senses when the handpiece is fully inserted in the calport. The calport is positioned at a 20 degree angle and contains a close fit bored out block to aid in preventing the handpiece from falling out after it is inserted.

Laser energy from the handpiece is directed through a protective window and ceramic plate. Some of the energy scattered through the plate passes through an optical fiber cable to a photodiode detector on the CPU I/O PCB. The ceramic plate provides a scattering volume, which both attenuates and scatters the light. The high level of scattering nearly eliminates calport sensitivity to spot size and misalignment of the spot at the input face. The optical fiber connector connects to an optical cable that brings the signal to the photodiode detector on the CPU I/O PCB and converts the optical sample of the laser beam energy to a current pulse. This current pulse is processed and calibrated before being sent on to the firmware to measure the actual energy into the Calport. The VBEAM2 operating fluence range is currently 2 - 40 J/cm^2, depending on the spot size. There are 8 different spot sizes, which correspond to specific

fluence levels. The conversion factors used to convert energy to fluence are shown in Table 1.These factors are equal to 1/spot area.

Spot Size	Conversion Factor
3 mm	14.08 x External Meter Energy
5 mm	5.10 x External Meter Energy
7 mm	2.60 x External Meter Energy
10 mm	1.27 x External Meter Energy
12 mm	0.88 x External Meter Energy
3 mm X 10 mm	4.24 x External Meter Energy
7 mm Comp.	2.60 x External Meter Energy
10 mm Comp.	1.27 x External Meter Energy

Table 1 Energy to Fluence Conversion Factors

The available energy density settings for each spot size and the external energy meter value associated with that spot size are shown in Appendix A at the end of the Theory of Operation.

Whenever maintenance or repair of the laser system is required be sure to adhere to the following safety statements:

WARNING

During servicing of the laser system use only safety eyewear known to have an optical density of = 4.9 or more between 591 - 597 nm. Safety eyewear designed for use with other laser systems may not provide adequate protection.

During servicing of the laser head, the service technician should never contact the laser head cavity while the system is on because it could be at voltages as high as 3500 volts.

FLUID SYSTEM

The VBEAM2 contains two separate fluid systems; a deionized (DI) water system and dye solution system. The temperature of these systems is regulated at 60°C (140°F).

DI Fluid System

The total water capacity of this system is approximately 1.8 liters and 1.4 liters for the dye solution without the dye cartridge volume. A block diagram detailing the fluid system is shown in Figure 4. For the DI fluid system a centrifugal pump is used to circulate the

deionized water in the system. The pump is mounted directly under the water reservoir. Typical pump output pressure generated is 11.5 PSI (measured at the pump outlet) with a nominal flow rate of 0.9 GPM through the head path. The water flow and pressure are not adjustable.

The pump output flows up to the laser head on the upper chassis. The tubing connection between the pump and the laser head has several components in it. First a pressure switch is located just after the DI pump to detect water pressure. If there is not enough pressure out of the pump, the pressure switch will activate the software to display a fault. The DI fluid system may be low on water or have a leak. The DI pump is controlled by the CPU; therefore after this fault is detected, the pump will be shut off.

Water then flows from the pressure switch to the laser head and enters a parallel path about half way up to the head. The parallel path consists of a DI cartridge, particle filter and a bypass tube. Most of the water travels through the bypass tube. Approximately 5% of the flow is through the DI cartridge and particle filter. The cartridge contains a deionizing section to maintain the purity of the water (high resistivity). The particle filter prevents ceramic dust from being burned-on the dye cell and flashlamp which can decrease the head's efficiency. The particle filter must be changed once per year as part of the Preventative Maintenance (PM) kit.

The DI cartridge contains a de-ionizing section to maintain the purity of the water (high resistivity). The DI cartridge must be changed if the pellets in the cartridge change color from a dark purple to light brown.

The laser head output is connected to the DI heat exchanger. The heat exchanger is cooled with two 24 VDC fans which are controlled by the firmware. The fans are mounted on the heat exchanger and pull air up from the bottom of the laser fluid compartment. Exhaust air exits the fluid compartment out the rear of the laser chassis. A foam filter in the bottom of the fluid compartment minimizes the amount of dust picked up by the incoming air. The foam filter must be changed at regular intervals to prevent restriction of the cooling air.

The output of the heat exchanger is connected to the heater manifold. The heater manifold contains a single 2000 watt heater, the DI temperature sensor, and a thermal overtemperature switch. If an overtemperature problem occurs that cannot be corrected by the firmware or hardware, then the thermal overtemperature (OT) switch will open which removes 24 VDC power from the main relay thus turning off the entire laser system. The OT switch is self resetting. After it opens, it typically takes from 10 to 20 minutes for it to reset itself. At this time the laser will have to be manually restarted. The heater is disabled by the firmware when the triggerswitch is depressed. This is done to limit the AC input current drawn by the system during pulsing of the laser. The heater is not required when pulsing since the majority of the pulsed energy goes into the DI water in the laser head. The temperature sensor is based on a thermistor that has a resistance that varies with temperature; it is used in conjunction with circuits on the CPU I/O PCB which allows the firmware to monitor the temperature of the water. The drain valve is located after the heater manifold and is manually operated to remove water from the system. It is located at the lowest point in the DI fluid system.

The output from the heater manifold flows through a liquid to liquid heat exchanger, then to the DI reservoir; which completes the DI loop. This liquid to liquid exchanger will pass the heat from the heated DI water to the dye solution during warm-up and from the

heated dye solution to the water during lasing. The dye solution will heat to the same temperature as the DI water 60°C (140°F). The dye solution will track the DI water system.

The combination of the 2000 watt heater in the heater manifold and the heat exchanger fans work together to maintain the water in the laser system at 60°C (140°F). The temperature is regulated to ± 2°C to ensure good efficiency and stability and to minimize variations from different laser heads. For best accuracy, the temperature sense circuit should only be calibrated with both the heater and heat exchanger fans off. This ensures that the water temperature measured by the external sensor in the reservoir is at the same temperature as the sensor in the heater manifold.

The firmware uses two set points to control the heater and fans. The heater is turned on whenever the water temperature is at 59.5°C or less. The heat exchanger fans are turned on whenever the water temperature is at 60.5°C or greater. There is some undershoot and overshoot in the water temperature at each of these set points. The firmware over temperature fault is set for 66°C. The laser will not go into the Ready state if this fault is present. Normally, the firmware should declare an over temperature fault before the over-temperature thermostat turns off the laser. If this does not happen, then most likely the temperature sensor is bad or miss-calibrated. The firmware will also declare an over-temperature fault if the temperature is less than 5°C. This is because if the temperature is less than 5°C, the firmware assumes the temperature sensor has failed or become open circuited. Also, if the temperature drops below 55.5°C while in the Ready state, a fault will be displayed.

Dye Fluid System

The second fluid loop is the dye fluid system. The dye solution system consists of a 50/50 mixture of ethylene glycol and deionized water. This solution flows from a dye pump that is a positive displacement pump continuously circulating the dye at 1.6 GPM. An adjustment screw on the pump head allows for proper set up of the flow rate. At 1.6 GPM a typical system will produce 48 PSI at the pump head; at 60 Hz. The output of the pump is sent to the Dye cartridge, the laser head, and the liquid-to-liquid heat exchanger then into the dye reservoir; which completes the dye loop.

The COT inject pump is used to transfer COT from the COT bottle into the dye reservoir. COT is required to maintain the correct dye absorbance, affecting the wavelength. The COT concentration slowly decreases in a system, mostly as a function of time or usage due to evaporation. Wavelength will be checked at the beginning of the first calibration after laser is turned on. If the wavelength is found to be below specifications, an extended COT addition and delay cycle will occur. At this time sufficient COT will be added to restore proper wavelength. The addition of COT takes place at a rate of 11.3 milliliters per nanometer. This will be followed by a mandatory 3 minute mixing delay period.

The Dye Cartridge located at the rear of the laser system is User replaceable. The laser should always be shut off before replacing. There is a Dye Cartridge shield, which is part of the Dye cartridge assembly; that when removed activates an interlock switch which will shut down the pumps. Also a One-wire EPROM on this assembly is counting the dye cartridge pulses used.

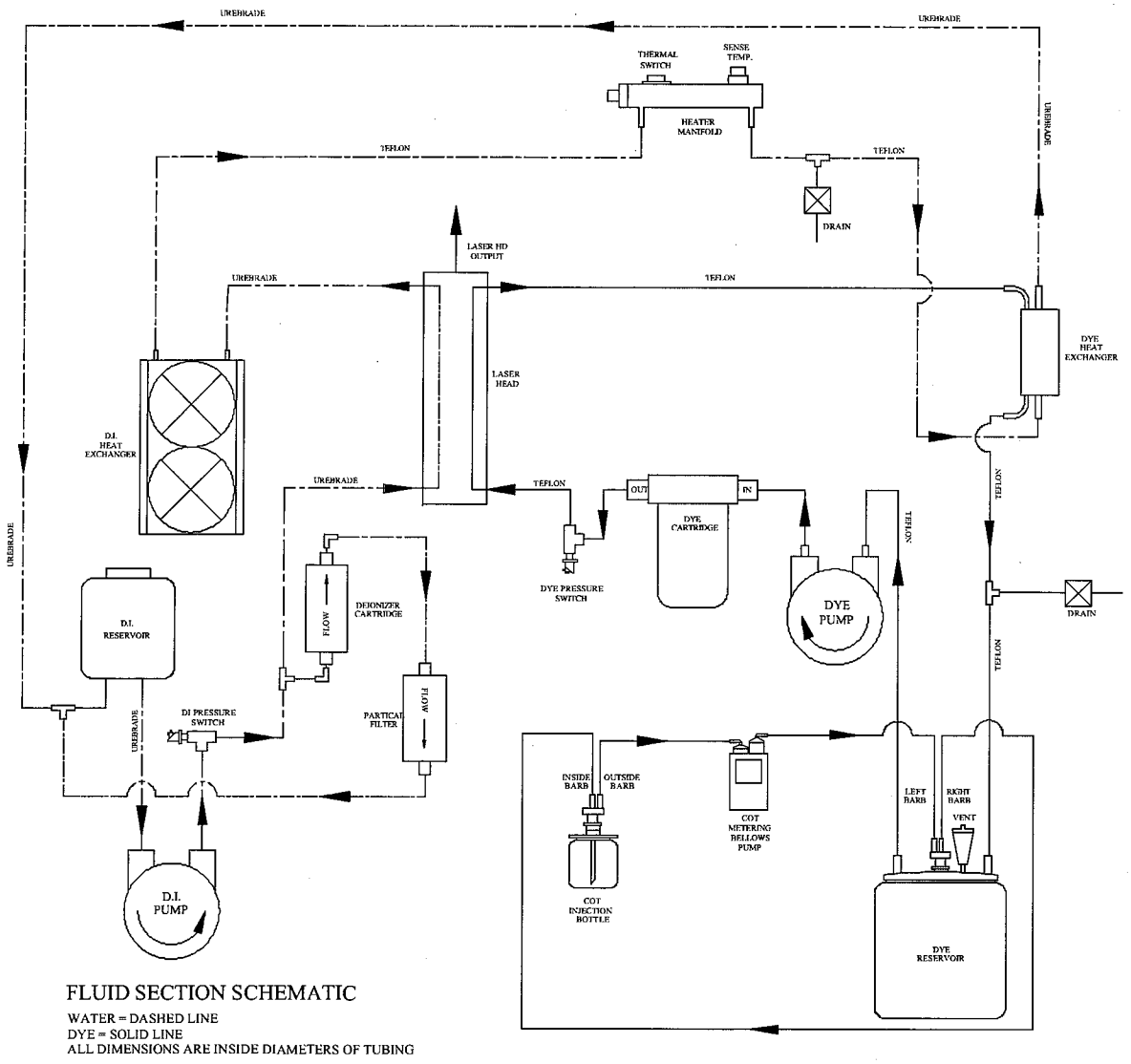


Figure 4 Fluid Block Diagram

DCD (Dynamic Cooling Device)

The DCD system is in the fluid section and partially in the upper chassis. Access to the DCD canister is located under the door compartment of the top cover. The cryogen connector and electrical interface are located on the front of the laser system. A block diagram of the system is shown in Figure 5.

Operation of some of the DCD functions such as bubble detect, DCD valve driver, and DCD pressure circuits are covered in detail in the CPU I/O board section.

The DCD canister is warmed by four 50 Watt resistors at 28VAC. The feedback in the control loop is the cryogen pressure. The firmware monitors the pressure as previously described and regulates the heater to maintain a specific operating pressure. Typical warm-up time is <7 minutes.

*NOTE: The DCD purge duration is the same as the selected pulse duration setting.

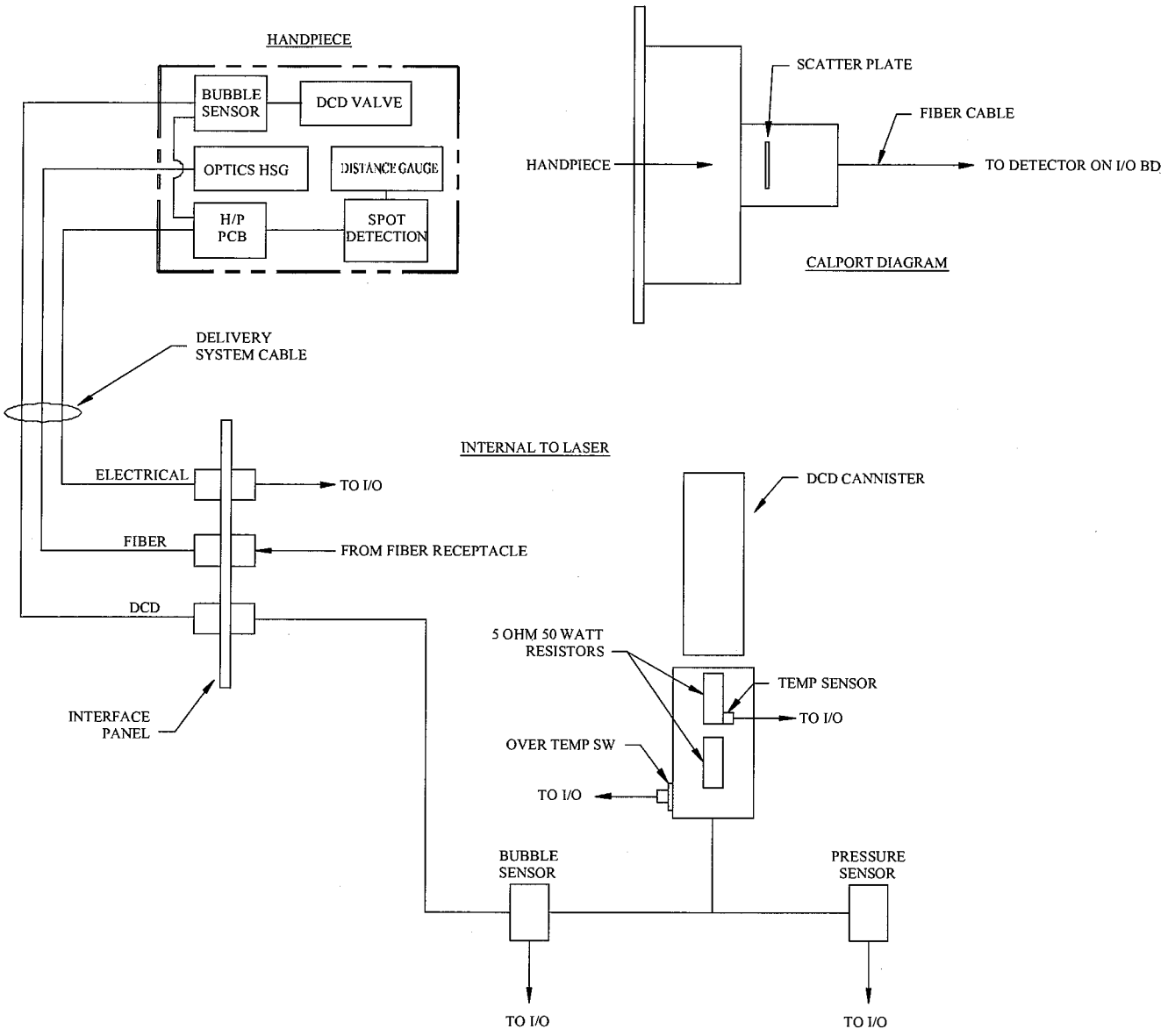


Figure 5 DCD Option Block Diagram

ELECTRICAL SYSTEM

A block diagram of the control system is shown in Figure 6. All the user circuits and Input/Output interface circuits are located on the CPU I/O PCB or Color Display PCB, which are the hearts of the control system. The Color Display PCB with the Engine card is located behind the front bezel assembly of the laser system. The CPU I/O PCB is easily accessible by moving the front skin panel of the laser system. The CPU I/O PCB interfaces with all the other PC boards in the laser system. The User interface controlled by the Color Display PCB's Engine Card is accomplished through a touch screen display that allows the customer to control the laser functions such as fluence level, cryogen spray time, laser state, etc. Feedback to the user is

provided by a SVGA display which provides status messages and laser system operating parameters.

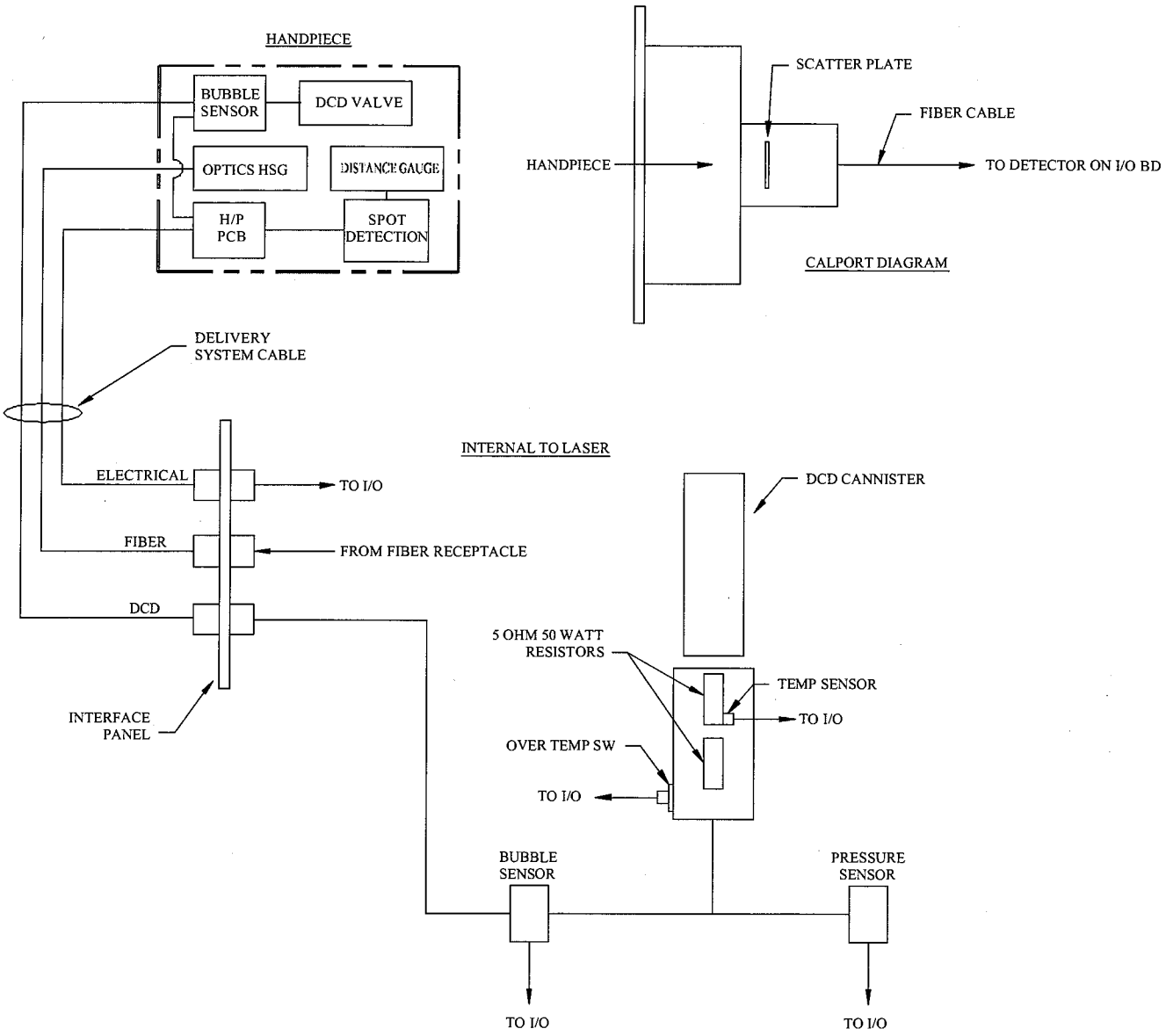


Figure 6 Control System Block Diagram

CPU I/O PCB (Schematic 7111-80-2691)

The CPU I/O PCB functions as the brain for the internal operations of the laser system. It contains the EPROM, which stores the control system firmware for the VBEAM2 and an MC68HC812 microprocessor that directs all commands for proper operation of the laser.

Most digital signals are isolated using opto-couplers or fiber optics. To accomplish the signal isolation requirements, there are four ground returns present on this board. The various returns and their functions are listed below in Table 2.

Return	Associated Power Supply	Associated Circuits
D*	+5 VDC (+5 V/ ± 15 V DC/DC PS)	CPU and logic circuits
A*	± 15 VDC (+5 V/ ± 15 V DC/DC PS)	Analog circuits (temp circuits, energy circuits)
B	+24 VDC (from HVPS)	Digital I/O
HP	+24V_HP (from AC PCB) +5V_HP (created from +24V_HP)	HP circuits and 1-Wire Devices

Table 2 CPU I/O PCB Returns

- Note: "A" analog and "D" digital grounds are not electrically isolated from each other.

The following CPU I/O circuits will be reviewed here:

I. Beam Shutter Circuit
II. Trigger Circuit
III. ADC Circuits
IV. High Voltage Power Supply Interface Circuits
V. Calport Energy Detector Circuit
VI. DI Temperature Circuit
VII. DCD Pressure Circuit.
VIII. DCD Valve Driver Circuit
IX. DCD Current Detect Circuit
X. Bubble Sense Circuit

NOTE: Due to their simplicity, some basic I/O circuits are not discussed. Refer to the VBEAM2 CPU I/O schematic (7111-80-2691) as indicated by the page reference for each circuit.

I. Beam Shutter Circuit (7111-80-2691, page 3)

The beam shutter can only be opened if the firmware commands it. Control of the beam shutter is as follows:

1. CPU drives (SHUT_CMD) this put a low at U75 & turns on LED D46 (Shutter Command Present)
2. When U75 activates, +24VDC will applied to U105-1 (solenoid driver and pulse width modulator)
3. Power to the shutter solenoid, supplied by U105-6, is 24Vdc. After approximately 100ms, determined by C153, the solenoid voltage is modulated, PWM determined by R302, at ~58% duty cycle to keep it from overheating. TP52 reads ~+14Vdc when solenoid is activated

II. Trigger, Dump, and Modulator Input Circuits (7111-80-2691, page 8)

Trigger Circuit:

The trigger circuit has several signals that need to be satisfied before it sends the trigger signal to the HV Control PCB, 7111-80-2694. Those signals are correct PW Timing Circuits, Over Energy Circuit, Over Current Circuit, and proper head power and energy levels. The block diagram of the Modulator circuit is shown in Figure#7.

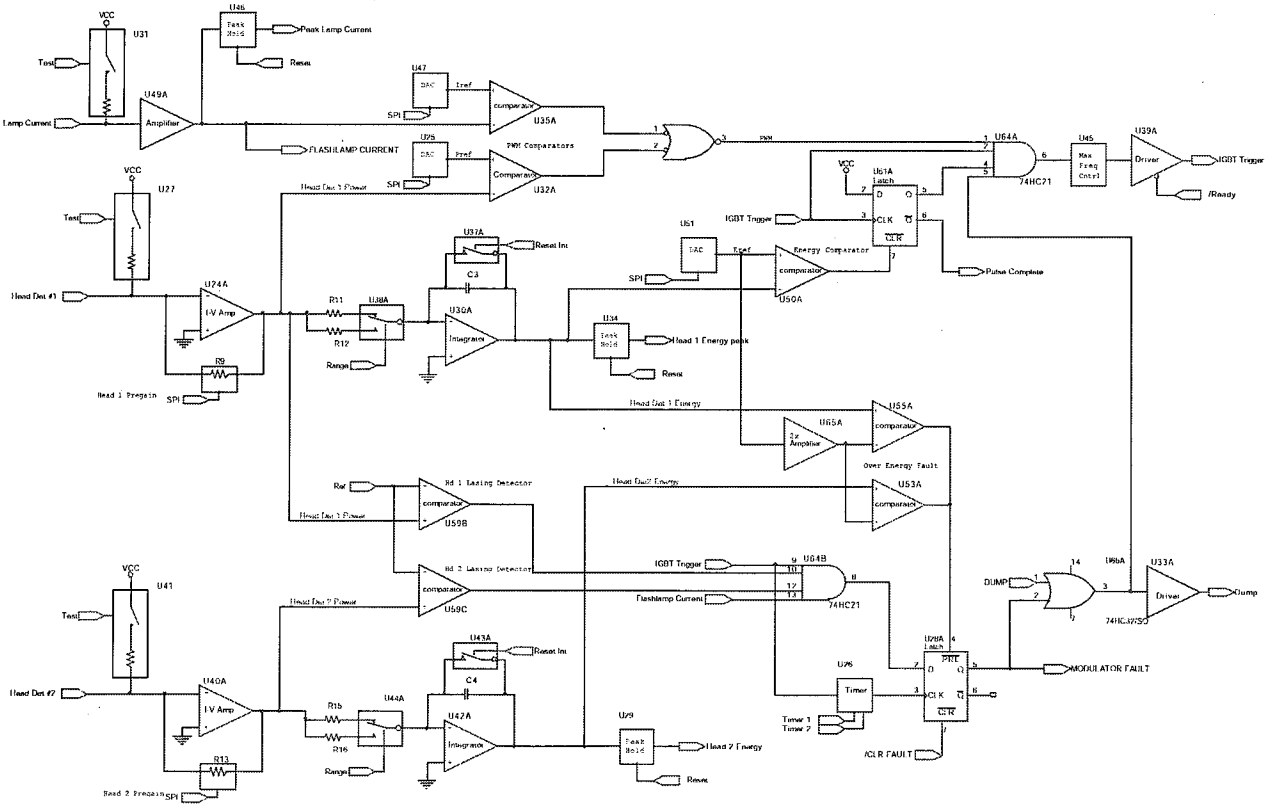


Figure 7 Block Diagram of Modulator Circuit

The Modulator can be broken down by a set of circuits – Lamp Current, Energy Feedback, Head Power, Trigger Input, Pulse Timing, Freq Control, and Over-Current. Each circuit works together to delivery the correct PWM, Pulse and Sub Pulses Duration, and correct Level output. Further in depth discussion of the Modulator Circuit will be covered in Service Training.

Dump Circuit:

The dump circuit is a safety device which effectively discharges the capacitors when one of three main conditions occurs:

1. Laser power shutdown:
   1.1. There is a comparator, U1, on the High Voltage Dump PCB 7111-00-2697, which if the voltage drops below 12Vdc on the board, which happens quickly during a power down, will send a signal to the Dump SCR and dump the voltage.
2. Trigger timer fault:
   2.1. The dump signal from the CPU (Fiber optic signal from J9 (CPU) to J2 (HV Dump PCB) will be activated during a Trigger Timer fault and a High is sent to U45A-5. This High biases Q7 causing current to sink to ground turning on D26 (LED Dump) and causing current to flow through J9-1/2 Transmitter, activating it.
3. CPU command signal:
   3.1. The CPU can send a High to U42-6, which puts a low at U42-13 causing current to sink to ground turning on D26 (LED Dump) and causing current to flow through J9-1/2 Transmitter, activating it.

III. Analog-to-Digital Converter (ADC) Circuits (7111-80-2691, page 14 and 16)

The CPU I/O board uses two ADC circuits to interface with the system analog inputs. Four analog signals are processed through an external 12 bit ADC chip U8. Also there are six analog signals processed directly through an internal 8 bit ADC port of the CPU chip U36.

The 12 bit ADC U8 reads the Calport, Head#1, Head#2 and Wavelength energy signals. Communication between the CPU and the ADC is through the serial SPI bus. The ADC is provided a precision 4.9V reference derived from the U57A. Full scale input is 4.9V and specifics of the signals measured by the ADC are discussed in the related sections of this document.

The 8 bit ADC located on the CPU analog port is used to read the DI water temperature, DCD pressure, DCD Heater Temperature, Lamp Current, 4.9Vreference Check, and a spare port. Full scale input is the same 4.9V reference used by the 12 Bit ADC. Specifics on the signals measured by this input are discussed in related sections of this document.

IV. HVPS Interface Circuits (7111-80-2691, page 11)

High Voltage Power Supply (HVPS) communication is carried out via two fiber optic communication cables. These cables are J13, TX1 (Transmitting information to the HVPS), and J14, RX1 (Receiving information from the HVPS). These two cables carry the following information:

- High Voltage Reference (HV Ref)-Used for sending (to the HVPS) a command to set the voltage at a specific setting.
- High Voltage Sample (HV Sample)-Used for receiving (from the HVPS) what the capacitor is actually charged up too.
- HVPS Enable/Disable-Disables or Enables charging of the HVPS.
- Flashlamp Simmer Start-Used for biasing the laser head chassis in order to make the flashlamps simmer (~-5/10KV pulse)

- Flashlamp Simmer-Used for maintaining the simmering of the flashlamp (nominal +1500Vdc at start, drops to a typical ~240Vdc when simmering, as measured at the flashlamp anode)

The information is transmitted using a serial communications protocol operating at 9600 baud as described I the table below:

Host Command	HVPS Response	Description	
		Value Sent	Response
!SVxxxxcc(cr)	**!RVxxxxcc(cr)**	Set Voltage (1 V increments) Value can be 0 to 2900	**Read voltage setting from HVPS**
!SExxxxcc(cr)	**!RAxxxxcc(cr)**	Enable command (msd – lsd) MSD = Simmer 3SD = HV Enable 2SD = Clear Fault LSD = unused 0 = disable; 1 = enable	***Returned*** **MSD = Simmer** **3SD = HV enable** **2SD = unused** **LSD = unused** 0 = disabled; 1 = enabled
!RVcc(cr)	!RVxxxxcc(cr)	Read voltage setting from HVPS (returns the target voltage that was set with the A01 command) xxxx = 0 to 2900	
!RLcc(cr)	!RLxxxxcc(cr)	Read current live voltage from HVPS (returns the current live voltage at the output of the power supply) xxxx = 0 to 2900	
!RScc(cr)	!RSxxxxcc(cr)	Read Status (msd – lsd) MSD = Simmer (0 = no simmer, 1 = simmer) 3SD = EOC (1= charged) 2SD = Fault (1 = fault) LSD = unused	
!RAcc(cr)	!RAxxxxcc(cr)	Read Status Settings (msd – lsd) MSD = Simmer (1= simmer command set) 3SD = HV enable (1 = HV enabled) 2SD = unused LSD = unused	
!RMcc(cr)	!RMxxxxcc(cr)	Read Model number (returns a four character model code for the power supply)	
!RVcc(cr)	!RVmmrrcc(cr)	Read Manufacturer & Revision mm = two character manufacturer code rr = two character revision level	

xxxx = ascii character data
cc = checksum
mm = manufacturer code
rr = revision

Table 3 HVPS Communication Protocol

A third fiber optic cable is used to indicate EOC (end of charge) condition from the power supply. With the serial interface operating at 9600baud, it takes about 10ms to send a command to the power supply and another 10ms to receive a response. Having the EOC as a

separate signal gives the firmware a high speed indication when the charge voltage has been reached without having to wait for the communications delays.

V. Calport and Head Energy Detector Circuit (7111-80-2691 page 10)

There are four nearly identical circuits used to measure the feedback from the Head#1, Head#2, Wavelength and Calport energy detector circuits. The Calport circuit works as follows:

a. An optical fiber in the Calport sends the light signal to the photodiode on the CPU I/O PCB. This signal converts the laser energy to a current. This current is fed into a current to voltage converter (I to V) formed by Op-Amp U11A and digital resistor U2A. The output of U11A is a voltage that is proportional to the Power of the laser energy at the Calport.
b. The voltage at U11A is then fed into an integrator formed by U11B and C21. The output of the integrator is proportional to the energy into the calport.
c. The integrator has two range settings that are selected by the firmware by U18 and R23 and R35. The integrator also has a resent function formed by R36 and U18 that quickly discharges the integration capacitor after a measurement.
d. The output of the integrator is fed to a peak hold circuit formed by U24B and U24A and their associated components. This circuit captures the peak level of the output of U11B and holds it at TP16. This signal is divided by two by R61 and R62 and sent to the 12 bit ADC.
e. Transistor Q3 is used to reset the peak hold circuit after it is read by the CPU. This signal and the reset integrator are normally held in a reset state by the firmware until just before a laser pulse.

Calibration of the Head#1, Head#2, Wavelength and Calport circuits is accomplished in the firmware using digital resistors. These resistors change the gain of the current to voltage amplifier. A calibration routine determines the correct value for the resistor. The digital resistor is volatile and must be reset by the firmware each time power is applied to the board. To help ensure the resistor is set properly, a test circuit formed by R36 and U18 is used. After calibration the test signal is switched into the circuit and a voltage is read from the peak hold circuit. This voltage is then stored by the firmware. At the beginning of every calibration, the test signal is switched into the circuit and the measure value should be the same as the values stored after calibration. If the values do not agree, a Circuit Cal Fault is generated.

VI. DI Temperature Circuit (7111-80-2691, page 5)

The DI temperature sensor is a thermistor located within a small stainless steel tube and inserted into the heater manifold to sense the DI water temperature. The NC thermistor has a nominal value of 10K at 25 °C and varies by approximately 4.4% per °C. The thermistor is very repeatable but not linear even over a small temperature range. The DI temperature circuit linearizes the thermistor over the expected operating range and then converts the resistance change to a voltage output with a transfer function of 0.1V/°C.

Standard thermistor formulas describe how to calculate the value of a parallel resistor that will linearize the thermistor change over a selected operating temperature range. The parallel resistor Rp is calculated:

RT1 = Low Temp R (R10°C = 19990 Ohm)
RT2 = Mid Temp R (R40°C = 5326 Ohm)
RT3 = High Temp R (R70°C = 1752 Ohm)

$$Rp = \frac{RT2*(RT1+RT3)-2*RT1*RT3}{RT1+RT3-2*RT2}$$

The VBEAM2 DI water operating temperature is 60°C so Rp was calculated for a range of 10°C to 70°C and found to be 4120 Ohms. The basic circuit design works as follows:

1. Rp and thermistor are in the feedback path of a non-inverting amplifier U60A so that as the thermistor resistance changes, the gain of the amplifier will change.
2. A 5.0Vdc ref voltage is applied to U60A-3 and is then amplified by this temperature varying gain.
3. The gain resistor R188 and the ref were chosen to give an output which changes by 0.1V/°C.
4. The output of U60A -3 now has the correct sensitivity of 0.1V/°C but the offset scaling is wrong and the direction of change is opposite from desired.
5. To correct this, U60A -3 is fed to the inverting summing amplifier U60BB and inverted with a gain of one by R180 and R188 so that it now gets larger (more positive) for an increase in temperature.
6. The only thing left is to correct the offset. R187 sum a negative 4.9 volt reference with the temp output to bring the output voltage into the desired operating range of 0°C to 100°C being equal to 0V to 10V with a sensitivity of 0.1V/°C.
    a. This voltage can be measured at TP37 with a 5°C tolerance at this test point.
7. This output at TP37 is then divided by 2 to provide a 0 to 5V signal to the CPU 8-bit A-D converter. Full scale to this converter is actually 4.9V so the firmware processes this circuit to give full scale input of 0V to 4.9V equal to 0°C to 98°C.

Note: Setting the temperature offset is done via the Circuit Calibration screen and is simply setting an offset to make the laser display read what is on the calibrated temperature meter. There are NO pots to adjust for this circuit.

VII. DCD Pressure Circuit (7111-80-2691, page 5)

The pressure sensor is mounted to the brass tee fitting that the DCD canister output connects to. The VBEAM2 firmware monitors the DCD pressure and regulates the four 50W heater resistors surrounding the DCD canister to maintain the proper operating pressure for the DCD. The pressure sensor has a range of 0 to 150 PSI with a 300 PSI maximum over-pressure value. The sensor has internal signal conditioning circuitry and provides a full-scale output of 4.50 volts at 150psi +/_3psi and a 0.5 volt offset at zero PSI. The sensor transfer function is 26.7 millivolts per PSI and is accurate to better than 1% over 25°C to 60°C operating temperature range. Electrically, it is powered by the 5 volt reference U55. The pressure sensor output signal (TP36-which has a 3psi tolerance at this test point) is sent to the CPU 8-bit A/D converter where the maximum pressure reading is at 4.5 volts, which corresponds to 150 PSI. A DCD pressure fault is declared by the firmware if the pressure exceeds 135 PSI. DCD pressure calibration is done via the Circuit Calibration screen and is simply setting an offset to make the laser display read what is on the Fluke pressure meter. There are not pots to adjust for this circuit.

VIII. DCD Valve Driver (7111-80-2691, page 7)

The DCD valve is located in the delivery system handpiece and is a 12V solenoid actuated flow valve. The valve is driven from a PWM solenoid driver located on the CPU I/O board. To get

increase turn on time from the valve, the drive circuit uses 24Vdc to actuate the valve and then uses PWM to maintain the valve in the ON position with a decreased current to prevent burnout. The circuit works in the following manner:

HP Solenoid Valve Activation:

1. CPU sends a Low signal turning on Led D40 (HPValve On) and activating U67-2.
2. When the transistor in U67 turns on it supplies 24Vdc to U104-1and Q19-1.
3. Q19 turns on, through R313 and R310, Q23 opening the 24V RTN from the DCD solenoid through U104-6 (PWM).
4. U104 allows full 24Vdc to the DCD solenoid for 10ms, determined by C155.
5. After 10ms, U104 starts pulse width modulation, determined by R314, of the voltage at ~46% duty cycle or ~11Vdc, which can be checked at U104-6 to GND or TP54.

HP Solenoid Valve Protection/Turn-Off:

The driver circuit also provides a means to turn off the valve rapidly when power is removed. The circuit provides two fly-back paths for the valve circulating currents:

-End of DCD Spray Pulse Rapid Valve Turnoff:

1. CPU sends a signal to shut the DCD solenoid valve.
2. U67 deactivates which shuts off 24V to U104-1 and Q19-1.
3. Q23 opens allowing a path through D75, a 33V Zener, and D74.
4. The Zener forces the valve voltage to exceed 33V causing rapid current dissipation and quick shut down

-PWM Mode Drive Operation:

1. The DCD valve ON state consists of U104, Q23, and Q19 all ON.
2. When the circuit is modulating, D70 allows for a low loss current path providing fly-back protection.

IX. DCD Current Detect Circuit (7111-80-2691-7)

To ensure that the DCD valve driver is operating properly, a current detect circuit is used to monitor the current in the handpiece valve. If the valve current is not present, a fault will be generated. The detector consists of a 0.15 ohm sense resistor R315 in series with the valve driver. The voltage produced as the valve current passes through the resistor is amplified by op amp U103A which is configured as a non inverting amplifier. The gain of 36.75 gives enough sensitivity to detect the 700ma average valve current when operating in the PWM mode. The output of U103A will turn on Q15 when current is detected. This turns on LED D57 (DCD Valve Activated) and the diode by supplying current to opto-coupler U68-1/2 which feeds back the status to the CPU.

X. Handpiece and Canister Bubble Sense (7111-80-2691-6/7111-80-2660)

The handpiece bubble sense circuit uses a slotted optical switch located in the handpiece for the bubble detection sensor. The cryogen tube is located in the center of the slot so the photo-sensor in the switch detects the light transmitted through the cryogen tube. The sensor is calibrated with cryogen in the tube. When the tube is empty the transmission of light through it drops by approximately 50%.

The HP bubble-detect circuit works in the following manner:

1. The slotted optical switch is in the feedback loop of op amp U98A.
2. A 10 volt reference created by U109 is supplied to U98A-3.
3. The photo-transistor output of the optical switch is connected to U98A-2 through resistor R281.

4. U98A-1 (output) is connected to the LED portion of the slotted optical switch.
5. The output voltage of U98A-1 adjusts itself to a level that provides sufficient current in the LED of the optical switch so that its phototransistor can generate 10 volts at U98A-2.
6. Under this condition, the feedback loop is in regulation and the output voltage of U98A-1 is adjusted to 7.75 VDC (can be read on TP46) with the cryogen tubing full.
7. Potentiometer R1 in the HP, which shunts some of the phototransistor output current to ground, is adjusted to ensure 7.75Vdc+/-.5V.
8. When the cryogen tube becomes empty (bubbles exist), the phototransistor's output drops and op amp U98A compensates for this by raising its output voltage to drive more current into the slotted switch LED.
9. U98A-1 (output) is connected to U98B-5, which is configured as a comparator. The reference voltage is 10 volts which is connected to U98B-6.
10. When U98B-5 goes above 10 volts, U98B-7 (output) switches from a Low to a High state.
11. Since U98B-7 is connected to opto-isolator U62-2, the High state stops current flow through the diode half of opto-isolator turning it and D53 (HP Bubble OK) off, signifying bubble faults.
12. With no current flowing through diode side of U62, U62-6 becomes a High which feeds back to the CPU signaling there are bubbles present. R253 provides a small amount of hysteresis for U98B to prevent oscillations when it switches states.

The HP bubble-detect TEST circuit works in the following manner:

1. Transistor Q17 and resistor R282 form the bubble test circuit.
2. The test circuit is activated by the firmware through U64 which turns on transistor Q17.
3. With Q17, a small amount of the feedback current from the optical switch is shunted away from U98A-2 thus simulating a bubble in the cryogen line.
4. The output of U98A will rise to compensate for the loss of feedback current and cause U98B to simulate a bubble detect.

The Canister bubble-detect circuit works identically to the handpiece circuit. A slotted switch located on the Canister Bubble PC board 7111-00-2520 is used to detect bubbles existing in the cryogen tube near the DCD canister. The circuit uses U99A, U99B and U63 to detect bubbles and Q18 and R283 as part of the bubble test circuit as described in the handpiece bubble circuit description.

MODULATOR

WARNING!!

THE LASER WILL DUMP ALL CAPACITOR VOLTAGE WHEN THE SYSTEM IS SHUT DOWN BUT, THE HIGH VOLTAGE CAPACITOR STILL MAY RETAIN LETHAL VOLTAGES. IF VOLTAGE REMAINS, IT MUST BE DISHCARGED BEFORE THE LASER IS MOVED FOR ANY REASON. RESIDUAL VOLTAGES REQUIRE STICK DISCHARGING OR TIME FOR THE BLEEDER CIRCUITS TO COMPLETELY BLEED THE VOLTAGE OFF OF THE CAPACITOR. SEE THEORY OF OPERATION FOR BLEED TIME DESCRIPTION. VERIFY THAT THE CAPACITOR IS COMPLETELY DISCHARGED AND CHECKED VIA A DVM WITH HIGH VOLTAGE PROBE, BEFORE SERVICING.

Overview:

The modulator section consists of 5 main parts:

PFN COMPONENT	P/N	SPECIFICATIONS/Sub-COMPONENTS
High Voltage Power Supply (HVPS)	4001-01-0079	3000J/s; 2900VDC; 24Vdc-6A PS
High Voltage PCB (HV PCB)	7111-00-2693	IGBT, Snubber and Bleeder circuits between cap terminal connections
High Voltage Control PCB (HVCNTL PCB)	7111-00-2694	IGBT Trigger and Dsat control
Capacitor	1510-00-0110	1500uf
HV Dump PCB	7111-00-2697	SCR, 0.5 Ohm resistor, 35uh choke

Table 4 Modulator Components and their Specifications and Sub-components

When the laser is put into Ready state the High Voltage Power Supply (HVPS) supplies a 'Simmer Start" signal of ~-5-10Kv to the laser head cavity from the simmer start transformer in an attempt to initiate simmer current. The "Simmer Voltage" to the anode is a nominal voltage of 1500VDC then dropping to a typical of 240VDC as the lamp start to simmer.
The HVPS always charges the capacitor to 2900VDC.

The front display settings and firmware control routines determine the proper operation of the modulator. These settings and reference levels determine how many sub pulses are required to make up the total Pulse Width Duration. The modulator uses power and energy feedback from the head detectors to determine the proper output energy; per sub pulse and total energy. During these sub pulses; these feedback parameters determine how long and the amplitude of modulations that are required to delivery the output energy requested. The total energy delivered is the addition of sub pulse energies.

These electrical pulse durations, created with one or up to 8 sub pulses are controlled by the firmware and switched through the IGBT. The modulator uses PWM technology to allow for variable sub pulse widths at a range from 100us to 500us, full width half maximum (FWHM). This allows the total lasing pulse durations delivered to the patient to vary from 450us to 40ms.

The laser pulse trigger is a signal that originates in the CPU, is transmitted via fiber optics to the High Voltage Control PCB (7111-00-2694) and culminates with the activating of IGBT Q1 on the High Voltage PCB (7111-00-2693). Inside each sub pulse the firmware and hardware PWMs to obtain the desired sub pulse width and total pulse width as requested by firmware.

A chart of the pulse width vs. number of sub pulses and sub pulse timing can be seen below:

Front Panel Pulse Width	**Number of Sub Pulses**	**Sub Pulse Timing Ranges**
0.45 ms	1	360 – 540 us
1.5 ms	4	180 – 500 us
3 ms – 40 ms	8	180 – 500 us

Table 5 Sub-Pulses used for specific pulse width ranges

An example of the pulse widths can be seen in the O'Scope picture below, Figure 8.

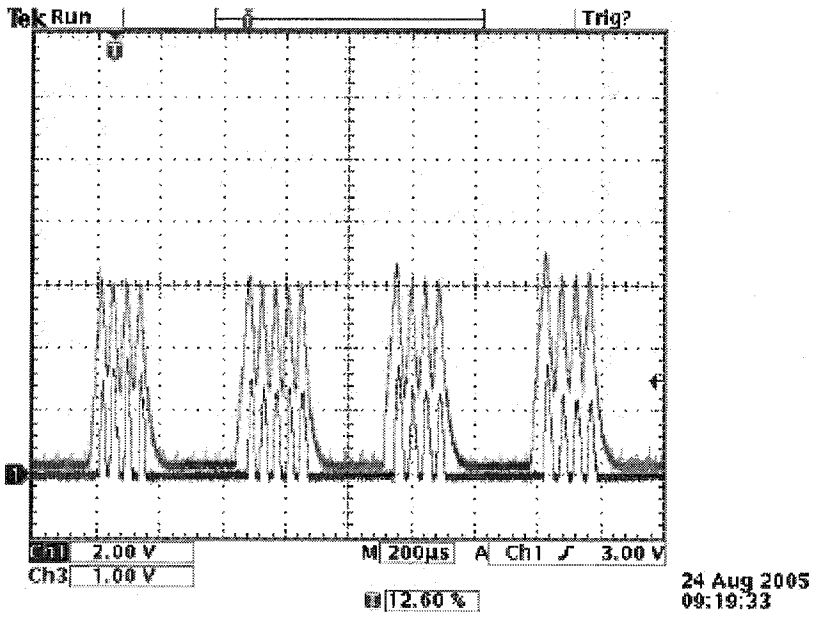


Figure 8 Picture of 4 of 8 sub pulses of a 3ms Pulse Duration

This is a picture of the first four sub pulses of eight for a 3ms pulse duration. Channel 1 is the actual Head#1 energy signal measured on the CPU I/O PCB TP14. Channel 3 is the actual Lamp Current pulse as measured on the CPU I/O PCB TP31.

The HV Dump PCB circuit allows the laser to dump all of the capacitor voltage to discharge through a SCR, 35uH Choke and four 2.0 Ohm resistors in parallel. There are also bleed down circuits built into the High Voltage PCB (7111-00-2693) and HV Dump PCB (7111-00-2697). The bleed down circuit is the same on each PCB so 5T=RC = 2.42M*1500uF= **300 minutes**. A simplified schematic of the modulator section is shown in Figure 9.

The Modulator which includes the High Voltage PCB and High Voltage Control PCB has several functions. Please see the circuit descriptions of each below:

I. High Voltage Power Supply (HVPS)
II. Laser "IGBT Trigger" and "IGBT Fault"
III. Dump Circuit

I. High Voltage Power Supply (HVPS)

The HVPS is a 2900VDC power supply with the following built in:

- Simmer Start
- Simmer Power Supply
- 24VDC 6A Power Supply for the CPU I/O

The HVPS communicates via an isolated fiber optic bundle (part of 7122-00-3704). There is a transmit signal coming from J14, CPU I/O PCB going to J3 of the HVPS. The CPU I/O has a receiver, J13, for signals coming from the HVPS. This fiber optic link is how all the communications for HVPS. There is an End of Charge signal that comes from J4 on the HVPS to J11 on the CPU I/O PCB. This signal tells the CPU when the HVPS is fully charged and ready for the next pulse. See page 16, XIII HVPS Interface Circuits for more details.

II. Laser "IGBT Trigger" and "IGBT Fault" (7111-80-2694/7111-80-2693)

The trigger signal is the signal that causes IGBT Q1 to activate for a pre-set duration causing voltage to be applied to the flashlamps. The trigger circuit works in the following manner:

Laser IGBT Trigger: (7111-80-2694)

Note: The right side of U3 is not grounded (floating) and could potentially have hazardous voltages present.

1. DC/DC converter LS1 provides, to the transistor power stage (Q2/Q5) ~-15Vdc to Q4 collector and ~+15Vdc to Q2 collector and the emitter TP6 is the floating ground.
2. The CPU sends out a Trigger pulse from J8, CPU I/O PCB, to J3 of the High Voltage Control PCB (7111-00-2694) via a fiber optic cable. See page 14, XI. Trigger, Dump, and Modulator Signals, for a description of CPU Trigger Circuit.
3. This input signal to J3 puts a low into the inverter U2.
4. U2 output is high which turns on LED D10 (IGBT Trig On) and puts on high into U3. (Trigger pulses can be seen with an O'Scope on TP8)
5. If there are no De-saturation faults present U3 the IGBT driver sends a high to U3-11.
6. U3-11 will bias the power stage (Q2 & Q5) to Drive the IGBT Gate ON.
   6.1. The U2 command signal, TP8, versus the IGBT actual trigger signal, TP7, can be seen in Figure#9.

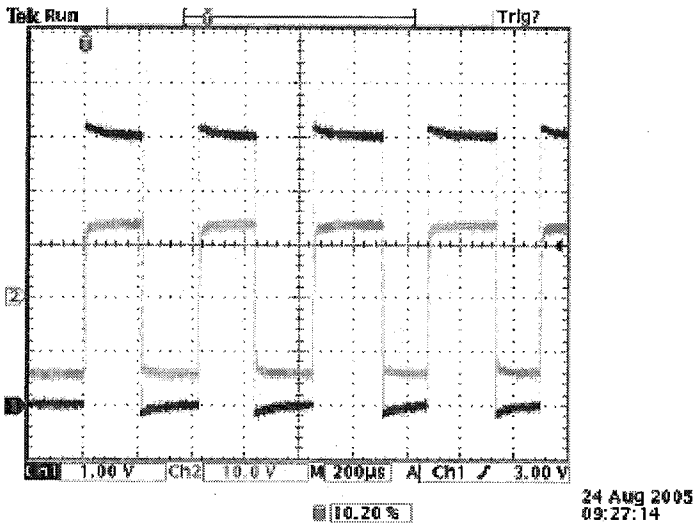


Figure 9 Input/Output trigger signals from High Voltage Control PCB

- Ch1 to TP8 (Trigger command from CPU) WRT to TP3 DGND
- Ch2 to TP7 (Signal from U3-11 to IGBT gate) WRT to TP6 (IGBT emitter) (Triggered off of Ch1)

IGBT Fault:

There is an IGBT De-saturation (De-Sat) fault that can occur if the IGBT collector to emitter breaks down. The De-Sat fault works as follows:

1. The IGBT fault signal is always on, signifying NO FAULT. This is accomplished with +5Vdc through a pull-up resistor, R15
2. This +5Vdc turns Q3 on, causing current flow through the fiber optic transmitter J2 which in turn sends a signal through a fiber optic cable to J6 on the CPU I/O PCB, signifying NO IGBT FAULT.
3. U3 looks at the IGBT, Q1, and emitter voltage via feedback to U3-16.
4. U3 looks at the IGBT, Q1, and collector voltage via U3-14 through R6, D1, D2, D4 and D5.

5. When the voltage potential between the collector to emitter rises above 7Vdc, a De-Sat fault occurs which causes U3-6 to go low shutting off Q3
6. When Q3 is off the fiber optic transmitter J2 is off
7. With NO signal going from J2 to J6 on the CPU I/O PCB LED D24 (IGBT Fault) on the CPU I/O PCB will activate signifying to the CPU that a fault is present.

III. HV Dump PCB Circuit (7111-00-2697)

The Dump circuit is in place, as described previously, to allow for the dumping of all voltage in the capacitor. The dump consist of four 2.0 Ohm resistors in parallel and a 3300V 540A SCR rated for 100A/us and a 35uH HV wire coil in path to ground (see drawing 7122-99-7532). Capacitor voltage dumps during the following situations:

- Dumps automatically on power down
- Dump at start of all calibrations
- Dump Test on 1st calibration (HP is in Calibration Port)

There are two types of dumps that occur in the VBEAM2, a hardware voltage dump and a software voltage dump.

Hardware Voltage Dump:

1. U1 on the High Voltage Dump PCB is a comparator with a +5VDC reference voltage supplied by U2-1 to U1-3.
2. U1-2 has +6V supplied to it via the voltage divider between R7 and R8.
3. Upon loss of power, the 6V signal will rapidly drop. Once it drops below the +5VDC reference (takes ~35ms), the out put of U1-7 will go Low.
4. With U1-7 Low, the following occurs:
   4.1. U3-2 (Dump signal driver) goes Low.
   4.2. LED D2 (Dump On) activates signifying dump is On
5. This Low at U3-2 forces U3-7 to send ~+11.5VDC to Q2-1 turning it on
6. This Causes the ~+11Vdc stored in C7 to discharge through D4 causing a voltage drop at T1-1/2, ~+11VDC, which in turn causes voltage on T1-3/5 - 4/6, ~+11VDC (unloaded), ~+10.0 (Loaded)
7. This voltage induces ~1.0A of current to J3-1 to turn on the Dump SCR.
8. Figure#10 shows the dump circuit in action, Ch1 is the trigger command, Ch2 is the "loaded" voltage drop across the secondary of the transformer, see Figure#10.

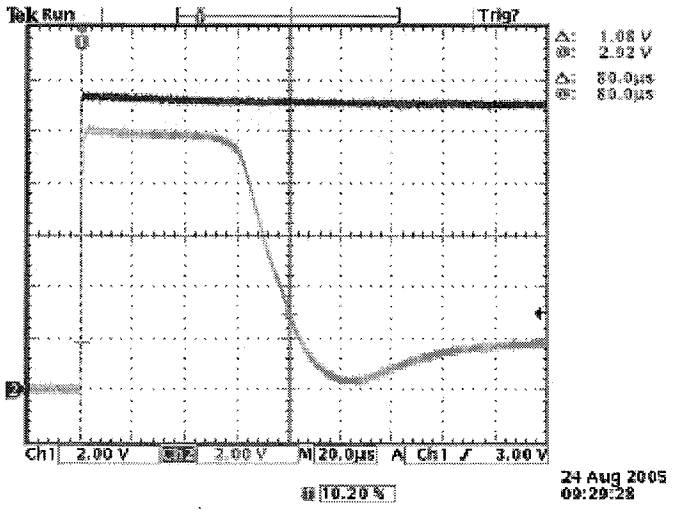


Figure 10 Dump Circuit waveforms taken while dump circuit was activated

- Ch1 to TP1 and DGND
- Ch2 to T1-3 and rtn to T1-6

Software Voltage Dump:

1. The software dump occurs when the CPU I/O PCB sends a signal from fiber optic transmitter J9 through a fiber optic cable to fiber optic receiver J2 on the High Voltage Dump PCB.
2. Once J2 is activated, U3 is activated turning on LED D2 (SCR Trigger On).
3. The rest of the dump circuit continues as in step 4.1 thru step 8.0 of the ***Hardware Voltage Dump*** section above.

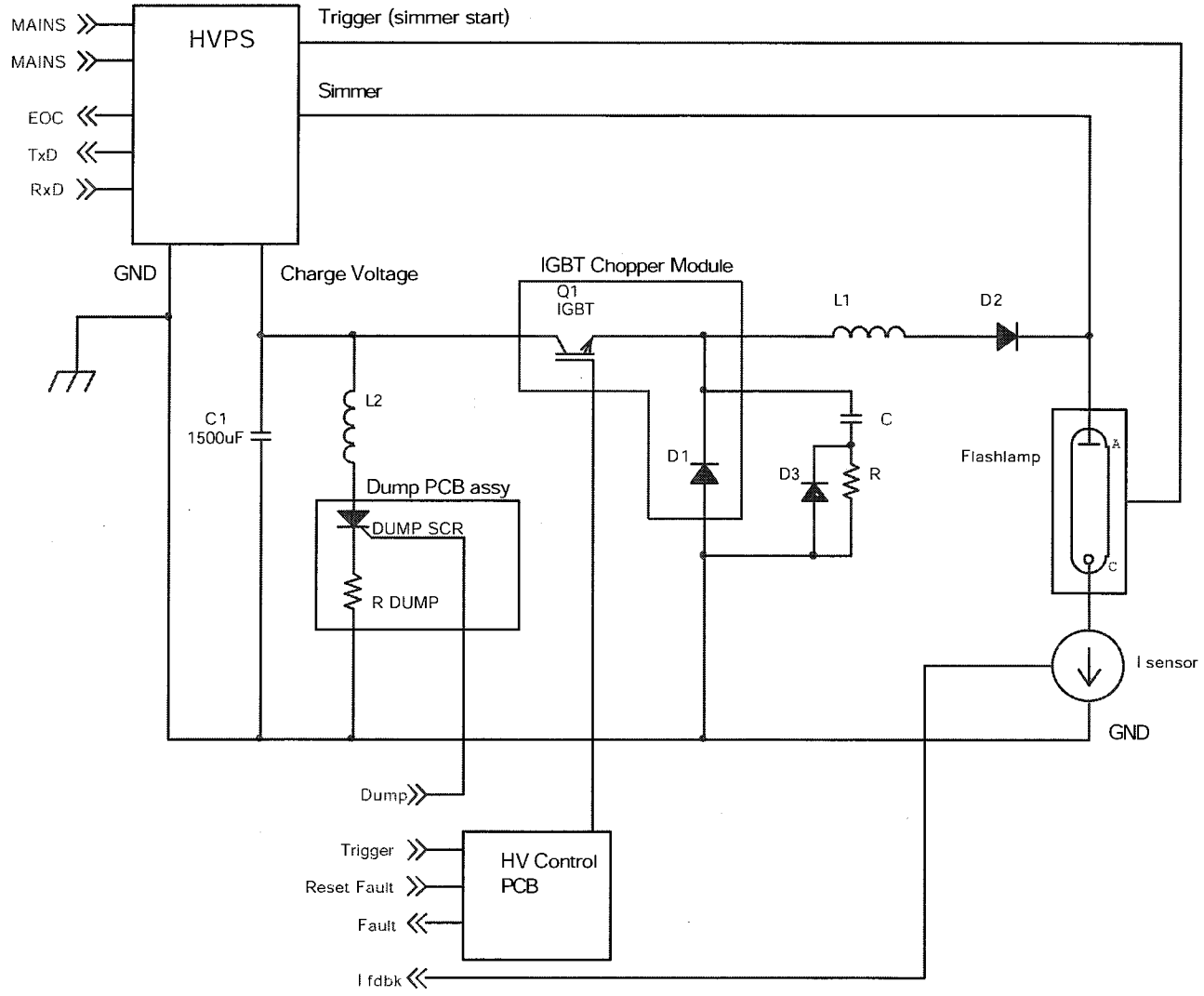


Figure 11 Modulator Block Diagram

LASER SAFETY INTERLOCK CIRCUIT

The hardware interlock circuit in the laser prevents the laser from lasing. The safety interlock circuit is performed in the system wiring consisting of:

- CDRH Connector
- AC Line Filter over-temperature (OT) switch
- DI heater manifold OT switch.

Each of these devices functions as a normally closed switch connected in series with one another. They are part of the circuit that provides coil current for the main relay. If one of them becomes open, the relay current flow is interrupted. This opens the main relay on the AC distribution PCB and shuts down all power to the laser system except the 24 VDC on the AC Distribution PCB. The laser cannot be turned on again until all the interlock switches are closed.

CDRH interlock

The CDRH interlock is a connector located on the back of the laser. It is provided so the physician can connect an external door switch to it. If the door is opened while the physician is lasing, the laser will be shut down and lasing prevented.

AC Line Filter Switch

The AC Line Filter switch will turn off power to the laser if the OT reaches 110°C. This OT switch protects the AC Line Filter components from over-heating. The customer must wait for this OT switch to reset itself; when the component temperatures reach a safe operating temperature.

DI Heater Manifold OT Switch

The DI heater manifold OT switch will turn off power to the laser if a fault occurs in the heater circuit that allows the manifold temperature to exceed 80°C. Normally the firmware would declare a water over temperature fault before the OT switch opens unless a serious fault exists in the heater circuit.

AC DISTRIBUTION PCB (7111-00-2696)

The AC Distribution board uses a power relay K2 to switch AC mains power on in the system. This relay is controlled by the Safety Interlock Circuit and is energized by the key switch. Once this relay is energized, power is supplied to the HVPS which in turn provides 24VDC to power the main CPU board and the system will power-up. In addition to the K2 AC mains relay, the AC Distribution PCB provides the following:

1. Solid state relays U5/U6/U7 for the Dye Pump, 2000W DI heater and DCD heater.
   1.1. These relays are controlled by firmware to turn the pump, DI heater and DCD heater on as necessary.
2. An isolated (by T2) 24VDC Switching PS circuit creates 24VDC power for the Safety Interlock Circuit.
3. An isolated (by T1) 12VDC Linear PS circuit creates 12VDC power for the HV PCBs.

4. Control signal "SW_24VDC" from K1 is used to control the 25W DC/DC converter U95 on the CPU I/O board. When the Safety Interlock Circuit turns off, this signal disables U95 which in effect turns off power to the CPU for a quick as possible system power-down.

ACCURACY

The references made to components in the laser system and on pc boards were accurate at the time this theory of operation was written. However, future changes and upgrades may cause errors if they impact this document and it is not revised. Therefore, in the event a discrepancy between the Theory of Operation and the actual system documentation is discovered, it should be assumed that the system documentation is correct.

SERVICE NOTE

Whenever maintenance or repair of the laser system is required be sure to adhere to the following safety statement:

WARNING

The electrical hazards present during servicing of the VBEAM2 can be extremely dangerous and lethal if proper precautions are not taken. The VBEAM2 should be serviced only by qualified technicians who have received appropriate training on the VBEAM2 from Candela, and who are Familiar with the safety considerations discussed in this section.

Appendix A: VBEAM2 Spot Size-Pulse Width-Fluence Chart

3 mm Fluence Table, Page 1 of 3

Spot size =	3	mm
Area =	0.071	cm2
Transmission =	41	%

			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
11.00	0.778	1.896	1.896	0.474	0.237	4.2
11.25	0.795	1.940	1.940	0.485	0.242	4.3
11.50	0.813	1.983	1.983	0.496	0.248	4.4
11.75	0.831	2.026	2.026	0.506	0.253	4.5
12.00	0.848	2.069	2.069	0.517	0.259	4.6
12.25	0.866	2.112	2.112	0.528	0.264	4.7
12.50	0.884	2.155	2.155	0.539	0.269	4.8
12.75	0.901	2.198	2.198	0.550	0.275	4.9
13.00	0.919	2.241	2.241	0.560	0.280	5.0
13.25	0.937	2.284	2.284	0.571	0.286	5.1
13.50	0.954	2.327	2.327	0.582	0.291	5.2
13.75	0.972	2.371	2.371	0.593	0.296	5.3
14.00	0.990	2.414	2.414	0.603	0.302	5.4
14.25	1.007	2.457	2.457	0.614	0.307	5.5
14.50	1.025	2.500	2.500	0.625	0.312	5.6
14.75	1.043	2.543	2.543	0.636	0.318	5.7
15.00	1.060	2.586	2.586	0.647	0.323	5.7
15.25	1.078	2.629	2.629	0.657	0.329	5.8
15.50	1.096	2.672	2.672	0.668	0.334	5.9
15.75	1.113	2.715	2.715	0.679	0.339	6.0
16.00	1.131	2.758	2.758	0.690	0.345	6.1
16.25	1.149	2.802	2.802	0.700	0.350	6.2
16.50	1.166	2.845	2.845	0.711	0.356	6.3
16.75	1.184	2.888	2.888	0.722	0.361	6.4
17.00	1.202	2.931	2.931	0.733	0.366	6.5
17.25	1.219	2.974	2.974	0.743	0.372	6.6
17.50	1.237	3.017	3.017	0.754	0.377	6.7
17.75	1.255	3.060	3.060	0.765	0.383	6.8
18.00	1.272	3.103	3.103	0.776	0.388	6.9
18.25	1.290	3.146	3.146	0.787	0.393	7.0
18.50	1.308	3.189	3.189	0.797	0.399	7.1
18.75	1.325	3.233	3.233	0.808	0.404	7.2
19.00	1.343	3.276	3.276	0.819	0.409	7.3
19.25	1.361	3.319	3.319	0.830	0.415	7.4
19.50	1.378	3.362	3.362	0.840	0.420	7.5
19.75	1.396	3.405	3.405	0.851	0.426	7.6
20.00	1.414	3.448	3.448	0.862	0.431	7.7
20.25	1.431	3.491	3.491	0.873	0.436	7.8
20.50	1.449	3.534	3.534	0.884	0.442	7.9
20.75	1.467	3.577	3.577	0.894	0.447	7.9
21.00	1.484	3.620	3.620	0.905	0.453	8.0
21.25	1.502	3.664	3.664	0.916	0.458	8.1
21.50	1.520	3.707	3.707	0.927	0.463	8.2
21.75	1.537	3.750	3.750	0.937	0.469	8.3
22.00	1.555	3.793	3.793	0.948	0.474	8.4
22.25	1.573	3.836	3.836	0.959	0.479	8.5
22.50	1.590	3.879	3.879	0.970	0.485	8.6

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

3 mm Fluence Table, Page 2 of 3

Spot size =	3	mm
Area =	0.071	cm2
Transmission =	41	%

			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
22.75	1.608	3.922	3.922	0.981	0.490	8.7
23.00	1.626	3.965	3.965	0.991	0.496	8.8
23.25	1.643	4.008	4.008	1.002	0.501	8.9
23.50	1.661	4.052	4.052	1.013	0.506	9.0
23.75	1.679	4.095	4.095	1.024	0.512	9.1
24.00	1.696	4.138	4.138	1.034	0.517	9.2
24.25	1.714	4.181	4.181	1.045	0.523	9.3
24.50	1.732	4.224	4.224	1.056	0.528	9.4
24.75	1.749	4.267	4.267	1.067	0.533	9.5
25.00	1.767	4.310	4.310	1.078	0.539	9.6
25.25	1.785	4.353	4.353	1.088	0.544	9.7
25.50	1.802	4.396	4.396	1.099	0.550	9.8
25.75	1.820	4.439	4.439	1.110	0.555	9.9
26.00	1.838	4.483	4.483	1.121	0.560	10.0
26.25	1.856	4.526	4.526	1.131	0.566	10.1
26.50	1.873	4.569	4.569	1.142	0.571	10.2
26.75	1.891	4.612	4.612	1.153	0.576	10.2
27.00	1.909	4.655	4.655	1.164	0.582	10.3
27.25	1.926	4.698	4.698	1.175	0.587	10.4
27.50	1.944	4.741	4.741	1.185	0.593	10.5
27.75	1.962	4.784	4.784	1.196	0.598	10.6
28.00	1.979	4.827	4.827	1.207	0.603	10.7
28.25	1.997	4.870	4.870	1.218	0.609	10.8
28.50	2.015	4.914	4.914	1.228	0.614	10.9
28.75	2.032	4.957	4.957	1.239	0.620	11.0
29.00	2.050	5.000	5.000	1.250	0.625	11.1
29.25	2.068	5.043	5.043	1.261	0.630	11.2
29.50	2.085	5.086	5.086	1.271	0.636	11.3
29.75	2.103	5.129	5.129	1.282	0.641	11.4
30.00	2.121	5.172	5.172	1.293	0.647	11.5
30.25	2.138	5.215	5.215	1.304	0.652	11.6
30.50	2.156	5.258	5.258	1.315	0.657	11.7
30.75	2.174	5.301	5.301	1.325	0.663	11.8
31.00	2.191	5.345	5.345	1.336	0.668	11.9
31.25	2.209	5.388	5.388	1.347	0.673	12.0
31.50	2.227	5.431	5.431	1.358	0.679	12.1
31.75	2.244	5.474	5.474	1.368	0.684	12.2
32.00	2.262	5.517	5.517	1.379	0.690	12.3
32.25	2.280	5.560	5.560	1.390	0.695	12.4
32.50	2.297	5.603	5.603	1.401	0.700	12.5
32.75	2.315	5.646	5.646	1.412	0.706	12.5
33.00	2.333	5.689	5.689	1.422	0.711	12.6
33.25	2.350	5.732	5.732	1.433	0.717	12.7
33.50	2.368	5.776	5.776	1.444	0.722	12.8
33.75	2.386	5.819	5.819	1.455	0.727	12.9
34.00	2.403	5.862	5.862	1.465	0.733	13.0

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

3 mm Fluence Table, Page 3 of 3

Spot size =	3	mm
Area =	0.071	cm2
Transmission =	41	%

			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
34.25	2.421	5.905	5.905	1.476	0.738	13.1
34.50	2.439	5.948	5.948	1.487	0.743	13.2
34.75	2.456	5.991	5.991	1.498	0.749	13.3
35.00	2.474	6.034	6.034	1.509	0.754	13.4
35.25	2.492	6.077	6.077	1.519	0.760	13.5
35.50	2.509	6.120	6.120	1.530	0.765	13.6
35.75	2.527	6.163	6.163	1.541	0.770	13.7
36.00	2.545	6.207	6.207	1.552	0.776	13.8
36.25	2.562	6.250	6.250	1.562	0.781	13.9
36.50	2.580	6.293	6.293	1.573	0.787	14.0
36.75	2.598	6.336	6.336	1.584	0.792	14.1
37.00	2.615	6.379	6.379	1.595	0.797	14.2
37.25	2.633	6.422	6.422	1.606	0.803	14.3
37.50	2.651	6.465	6.465	1.616	0.808	14.4
37.75	2.668	6.508	6.508	1.627	0.814	14.5
38.00	2.686	6.551	6.551	1.638	0.819	14.6
38.25	2.704	6.594	6.594	1.649	0.824	14.7
38.50	2.721	6.638	6.638	1.659	0.830	14.8
38.75	2.739	6.681	6.681	1.670	0.835	14.8
39.00	2.757	6.724	6.724	1.681	0.840	14.9
39.25	2.774	6.767	6.767	1.692	0.846	15.0
39.50	2.792	6.810	6.810	1.702	0.851	15.1
39.75	2.810	6.853	6.853	1.713	0.857	15.2
40.00	2.827	6.896	6.896	1.724	0.862	15.3

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

5 mm Fluence Table, Page 1 of 2

Spot size =	5	mm
Area =	0.196	cm2
Transmission =	65	%

5 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
6.00	1.178	1.812	1.812	0.453	0.227	4.0
6.25	1.227	1.888	1.888	0.472	0.236	4.2
6.50	1.276	1.963	1.963	0.491	0.245	4.4
6.75	1.325	2.039	2.039	0.510	0.255	4.5
7.00	1.374	2.115	2.115	0.529	0.264	4.7
7.25	1.424	2.190	2.190	0.548	0.274	4.9
7.50	1.473	2.266	2.266	0.566	0.283	5.0
7.75	1.522	2.341	2.341	0.585	0.293	5.2
8.00	1.571	2.417	2.417	0.604	0.302	5.4
8.25	1.620	2.492	2.492	0.623	0.312	5.5
8.50	1.669	2.568	2.568	0.642	0.321	5.7
8.75	1.718	2.643	2.643	0.661	0.330	5.9
9.00	1.767	2.719	2.719	0.680	0.340	6.0
9.25	1.816	2.794	2.794	0.699	0.349	6.2
9.50	1.865	2.870	2.870	0.717	0.359	6.4
9.75	1.914	2.945	2.945	0.736	0.368	6.5
10.00	1.963	3.021	3.021	0.755	0.378	6.7
10.25	2.013	3.096	3.096	0.774	0.387	6.9
10.50	2.062	3.172	3.172	0.793	0.396	7.0
10.75	2.111	3.247	3.247	0.812	0.406	7.2
11.00	2.160	3.323	3.323	0.831	0.415	7.4
11.25	2.209	3.398	3.398	0.850	0.425	7.6
11.50	2.258	3.474	3.474	0.868	0.434	7.7
11.75	2.307	3.549	3.549	0.887	0.444	7.9
12.00	2.356	3.625	3.625	0.906	0.453	8.1
12.25	2.405	3.700	3.700	0.925	0.463	8.2
12.50	2.454	3.776	3.776	0.944	0.472	8.4
12.75	2.503	3.851	3.851	0.963	0.481	8.6
13.00	2.553	3.927	3.927	0.982	0.491	8.7
13.25	2.602	4.003	4.003	1.001	0.500	8.9
13.50	2.651	4.078	4.078	1.020	0.510	9.1
13.75	2.700	4.154	4.154	1.038	0.519	9.2
14.00	2.749	4.229	4.229	1.057	0.529	9.4
14.25	2.798	4.305	4.305	1.076	0.538	9.6
14.50	2.847	4.380	4.380	1.095	0.548	9.7
14.75	2.896	4.456	4.456	1.114	0.557	9.9
15.00	2.945	4.531	4.531	1.133	0.566	10.1
15.25	2.994	4.607	4.607	1.152	0.576	10.2
15.50	3.043	4.682	4.682	1.171	0.585	10.4
15.75	3.093	4.758	4.758	1.189	0.595	10.6
16.00	3.142	4.833	4.833	1.208	0.604	10.7
16.25	3.191	4.909	4.909	1.227	0.614	10.9
16.50	3.240	4.984	4.984	1.246	0.623	11.1
16.75	3.289	5.060	5.060	1.265	0.632	11.2
17.00	3.338	5.135	5.135	1.284	0.642	11.4
17.25	3.387	5.211	5.211	1.303	0.651	11.6
17.50	3.436	5.286	5.286	1.322	0.661	11.7
17.75	3.485	5.362	5.362	1.340	0.670	11.9

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

5 mm Fluence Table, Page 2 of 2

Spot size =	5	mm
Area =	0.196	cm2
Transmission =	65	%

5 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
18.00	3.534	5.437	5.437	1.359	0.680	12.1
18.25	3.583	5.513	5.513	1.378	0.689	12.3
18.50	3.632	5.588	5.588	1.397	0.699	12.4
18.75	3.682	5.664	5.664	1.416	0.708	12.6
19.00	3.731	5.739	5.739	1.435	0.717	12.8
19.25	3.780	5.815	5.815	1.454	0.727	12.9
19.50	3.829	5.890	5.890	1.473	0.736	13.1
19.75	3.878	5.966	5.966	1.492	0.746	13.3
20.00	3.927	6.042	6.042	1.510	0.755	13.4
20.25	3.976	6.117	6.117	1.529	0.765	13.6
20.50	4.025	6.193	6.193	1.548	0.774	13.8
20.75	4.074	6.268	6.268	1.567	0.784	13.9
21.00	4.123	6.344	6.344	1.586	0.793	14.1
21.25	4.172	6.419	6.419	1.605	0.802	14.3
21.50	4.222	6.495	6.495	1.624	0.812	14.4
21.75	4.271	6.570	6.570	1.643	0.821	14.6
22.00	4.320	6.646	6.646	1.661	0.831	14.8
22.25	4.369	6.721	6.721	1.680	0.840	14.9
22.50	4.418	6.797	6.797	1.699	0.850	15.1
22.75	4.467	6.872	6.872	1.718	0.859	15.3
23.00	4.516	6.948	6.948	1.737	0.868	15.4
23.25	4.565	7.023	7.023	1.756	0.878	15.6
23.50	4.614	7.099	7.099	1.775	0.887	15.8
23.75	4.663	7.174	7.174	1.794	0.897	15.9
24.00	4.712	7.250	7.250	1.812	0.906	16.1
24.25	4.761	7.325	7.325	1.831	0.916	16.3
24.50	4.811	7.401	7.401	1.850	0.925	16.4
24.75	4.860	7.476	7.476	1.869	0.935	16.6
25.00	4.909	7.552	7.552	1.888	0.944	16.8
25.25	4.958	7.627	7.627	1.907	0.953	16.9
25.50	5.007	7.703	7.703	1.926	0.963	17.1
25.75	5.056	7.778	7.778	1.945	0.972	17.3
26.00	5.105	7.854	7.854	1.963	0.982	17.5
26.25	5.154	7.930	7.930	1.982	0.991	17.6
26,50	5.203	8.005	8.005	2.001	1.001	17.8
26.75	5.252	8.081	8.081	2.020	1.010	18.0
27.00	5.301	8.156	8.156	2.039	1.020	18.1
27.25	5.351	8.232	8.232	2.058	1.029	18.3
27.50	5.400	8.307	8.307	2.077	1.038	18.5
27.75	5.449	8.383	8.383	2.096	1.048	18.6
28.00	5.498	8.458	8.458	2.115	1.057	18.8
28.25	5.547	8.534	8.534	2.133	1.067	19.0
28.50	5.596	8.609	8.609	2.152	1.076	19.1
28.75	5.645	8.685	8.685	2.171	1.086	19.3
29.00	5.694	8.760	8.760	2.190	1.095	19.5
29.25	5.743	8.836	8.836	2.209	1.104	19.6
29.50	5.792	8.911	8.911	2.228	1.114	19.8
29.75	5.841	8.987	8.987	2.247	1.123	20.0
30.00	5.890	9.062	9.062	2.266	1.133	20.1

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

7 mm Fluence Table

Spot size =	7	mm
Area =	0.385	cm2
Transmission =	85	%

7 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
4.00	1.54	1.81	1.81	0.453	0.226	4.0
4.25	1.64	1.92	1.92	0.481	0.241	4.3
4.50	1.73	2.04	2.04	0.509	0.255	4.5
4.75	1.83	2.15	2.15	0.538	0.269	4.8
5.00	1.92	2.26	2.26	0.566	0.283	5.0
5.25	2.02	2.38	2.38	0.594	0.297	5.3
5.50	2.12	2.49	2.49	0.623	0.311	5.5
5.75	2.21	2.60	2.60	0.651	0.325	5.8
6.00	2.31	2.72	2.72	0.679	0.340	6.0
6.25	2.41	2.83	2.83	0.707	0.354	6.3
6.50	2.50	2.94	2.94	0.736	0.368	6.5
6.75	2.60	3.06	3.06	0.764	0.382	6.8
7.00	2.69	3.17	3.17	0.792	0.396	7.0
7.25	2.79	3.28	3.28	0.821	0.410	7.3
7.50	2.89	3.40	3.40	0.849	0.424	7.5
7.75	2.98	3.51	3.51	0.877	0.439	7.8
8.00	3.08	3.62	3.62	0.906	0.453	8.0
8.25	3.17	3.74	3.74	0.934	0.467	8.3
8.50	3.27	3.85	3.85	0.962	0.481	8.6
8.75	3.37	3.96	3.96	0.990	0.495	8.8
9.00	3.46	4.07	4.07	1.019	0.509	9.1
9.25	3.56	4.19	4.19	1.047	0.524	9.3
9.50	3.66	4.30	4.30	1.075	0.538	9.6
9.75	3.75	4.41	4.41	1.104	0.552	9.8
10.00	3.85	4.53	4.53	1.132	0.566	10.1
10.25	3.94	4.64	4.64	1.160	0.580	10.3
10.50	4.04	4.75	4.75	1.188	0.594	10.6
10.75	4.14	4.87	4.87	1.217	0.608	10.8
11.00	4.23	4.98	4.98	1.245	0.623	11.1
11.25	4.33	5.09	5.09	1.273	0.637	11.3
11.50	4.43	5.21	5.21	1.302	0.651	11.6
11.75	4.52	5.32	5.32	1.330	0.665	11.8
12.00	4.62	5.43	5.43	1.358	0.679	12.1
12.25	4.71	5.55	5.55	1.387	0.693	12.3
12.50	4.81	5.66	5.66	1.415	0.707	12.6
12.75	4.91	5.77	5.77	1.443	0.722	12.8
13.00	5.00	5.89	5.89	1.471	0.736	13.1
13.25	5.10	6.00	6.00	1.500	0.750	13.3
13.50	5.20	6.11	6.11	1.528	0.764	13.6
13.75	5.29	6.23	6.23	1.556	0.778	13.8
14.00	5.39	6.34	6.34	1.585	0.792	14.1
14.25	5.48	6.45	6.45	1.613	0.806	14.3
14.50	5.58	6.57	6.57	1.641	0.821	14.6
14.75	5.68	6.68	6.68	1.670	0.835	14.8
15.00	5.77	6.79	6.79	1.698	0.849	15.1
15.25	5.87	6.90	6.90	1.726	0.863	15.3
15.50	5.97	7.02	7.02	1.754	0.877	15.6
15.75	6.06	7.13	7.13	1.783	0.891	15.8
16.00	6.16	7.24	7.24	1.811	0.906	16.1
16.25	6.25	7.36	7.36	1.839	0.920	16.3
16.50	6.35	7.47	7.47	1.868	0.934	16.6
16.75	6.45	7.58	7.58	1.896	0.948	16.9
17.00	6.54	7.70	7.70	1.924	0.962	17.1
17.25	6.64	7.81	7.81	1.953	0.976	17.4
17.50	6.73	7.92	7.92	1.981	0.990	17.6
17.75	6.83	8.04	8.04	2.009	1.005	17.9
18.00	6.93	8.15	8.15	2.037	1.019	18.1
18.25	7.02	8.26	8.26	2.066	1.033	18.4
18.50	7.12	8.38	8.38	2.094	1.047	18.6
18.75	7.22	8.49	8.49	2.122	1.061	18.9
19.00	7.31	8.60	8.60	2.151	1.075	19.1
19.25	7.41	8.72		2.179	1.089	14.5
19.50	7.50	8.83		2.207	1.104	14.7
19.75	7.60	8.94		2.235	1.118	14.9
20.00	7.70	9.06		2.264	1.132	15.1

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.
If 0.45 msec is not allowed, than it is based on 0.15 msec sub-pulse width, 4 sub-pulses (1.5 msec).

10 mm Fluence Table

Spot size =	**10**	**mm**
Area =	**0.785**	**cm2**
Transmission =	**85**	**%**

10 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	**Delivered Energy, J**	**Total Head Energy, J**	**Head Energy per Sub-Pulse**			**Peak Power into Fiber*, KW**
3.00	2.36	2.77	2.77	0.693	0.346	6.2
3.25	2.55	3.00	3.00	0.751	0.375	6.7
3.50	2.75	3.23	3.23	0.808	0.404	7.2
3.75	2.95	3.46	3.46	0.866	0.433	7.7
4.00	3.14	3.70	3.70	0.924	0.462	8.2
4.25	3.34	3.93	3.93	0.982	0.491	8.7
4.50	3.53	4.16	4.16	1.039	0.520	9.2
4.75	3.73	4.39	4.39	1.097	0.549	9.8
5.00	3.93	4.62	4.62	1.155	0.577	10.3
5.25	4.12	4.85	4.85	1.213	0.606	10.8
5.50	4.32	5.08	5.08	1.270	0.635	11.3
5.75	4.52	5.31	5.31	1.328	0.664	11.8
6.00	4.71	5.54	5.54	1.386	0.693	12.3
6.25	4.91	5.77	5.77	1.444	0.722	12.8
6.50	5.11	6.01	6.01	1.501	0.751	13.3
6.75	5.30	6.24	6.24	1.559	0.780	13.9
7.00	5.50	6.47	6.47	1.617	0.808	14.4
7.25	5.69	6.70	6.70	1.675	0.837	14.9
7.50	5.89	6.93	6.93	1.732	0.866	15.4
7.75	6.09	7.16	7.16	1.790	0.895	15.9
8.00	6.28	7.39	7.39	1.848	0.924	16.4
8.25	6.48	7.62	7.62	1.906	0.953	16.9
8.50	6.68	7.85	7.85	1.963	0.982	17.5
8.75	6.87	8.08	8.08	2.021	1.011	18.0
9.00	7.07	8.32	8.32	2.079	1.039	18.5
9.25	7.26	8.55		2.137	1.068	14.2
9.50	7.46	8.78		2.194	1.097	14.6
9.75	7.66	9.01		2.252	1.126	15.0
10.00	7.85	9.24		2.310	1.155	15.4

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.
If 0.45 msec is not allowed, than it is based on 0.15 msec sub-pulse width, 4 sub-pulses (1.5 msec).

12 mm Fluence Table

Spot size =	**12**	**mm**
Area =	**1.131**	**cm2**
Transmission =	**85**	**%**

12 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	**Delivered Energy, J**	**Total Head Energy, J**	**Head Energy per Sub-Pulse**			**Peak Power into Fiber*, KW**
2.00	2.26	2.66	2.66	0.665	0.333	5.9
2.25	2.54	2.99	2.99	0.748	0.374	6.7
2.50	2.83	3.33	3.33	0.832	0.416	7.4
2.75	3.11	3.66	3.66	0.915	0.457	8.1
3.00	3.39	3.99	3.99	0.998	0.499	8.9
3.25	3.68	4.32	4.32	1.081	0.541	9.6
3.50	3.96	4.66	4.66	1.164	0.582	10.3
3.75	4.24	4.99	4.99	1.247	0.624	11.1
4.00	4.52	5.32	5.32	1.331	0.665	11.8
4.25	4.81	5.65	5.65	1.414	0.707	12.6
4.50	5.09	5.99	5.99	1.497	0.748	13.3
4.75	5.37	6.32	6.32	1.580	0.790	14.0
5.00	5.65	6.65	6.65	1.663	0.832	14.8
5.25	5.94	6.99	6.99	1.746	0.873	15.5
5.50	6.22	7.32	7.32	1.830	0.915	16.3
5.75	6.50	7.65	7.65	1.913	0.956	17.0
6.00	6.79	7.98	7.98	1.996	0.998	17.7
6.25	7.07	8.32	8.32	2.079	1.039	18.5
6.50	7.35	8.65	8.65	2.162	1.081	19.2
6.75	7.63	8.98		2.245	1.123	15.0
7.00	7.92	9.31		2.328	1.164	15.5

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.
If 0.45 msec is not allowed, than it is based on 0.15 msec sub-pulse width, 4 sub-pulses (1.5 msec).

3 x 10 mm Fluence Table

Spot size =	3 x 10	mm
Area =	0.236	cm2
Transmission =	80	%

3 x 10 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
10.00	2.36	2.95	2.95	0.736	0.368	6.5
10.25	2.42	3.02	3.02	0.755	0.377	6.7
10.50	2.47	3.09	3.09	0.773	0.387	6.9
10.75	2.53	3.17	3.17	0.792	0.396	7.0
11.00	2.59	3.24	3.24	0.810	0.405	7.2
11.25	2.65	3.31	3.31	0.828	0.414	7.4
11.50	2.71	3.39	3.39	0.847	0.423	7.5
11.75	2.77	3.46	3.46	0.865	0.433	7.7
12.00	2.83	3.53	3.53	0.884	0.442	7.9
12.25	2.89	3.61	3.61	0.902	0.451	8.0
12.50	2.95	3.68	3.68	0.920	0.460	8.2
12.75	3.00	3.76	3.76	0.939	0.469	8.3
13.00	3.06	3.83	3.83	0.957	0.479	8.5
13.25	3.12	3.90	3.90	0.976	0.488	8.7
13.50	3.18	3.98	3.98	0.994	0.497	8.8
13.75	3.24	4.05	4.05	1.012	0.506	9.0
14.00	3.30	4.12	4.12	1.031	0.515	9.2
14.25	3.36	4.20	4.20	1.049	0.525	9.3
14.50	3.42	4.27	4.27	1.068	0.534	9.5
14.75	3.48	4.34	4.34	1.086	0.543	9.7
15.00	3.53	4.42	4.42	1.104	0.552	9.8
15.25	3.59	4.49	4.49	1.123	0.561	10.0
15.50	3.65	4.57	4.57	1.141	0.571	10.1
15.75	3.71	4.64	4.64	1.160	0.580	10.3
16.00	3.77	4.71	4.71	1.178	0.589	10.5
16.25	3.83	4.79	4.79	1.197	0.598	10.6
16.50	3.89	4.86	4.86	1.215	0.607	10.8
16.75	3.95	4.93	4.93	1.233	0.617	11.0
17.00	4.01	5.01	5.01	1.252	0.626	11.1
17.25	4.06	5.08	5.08	1.270	0.635	11.3
17.50	4.12	5.15	5.15	1.289	0.644	11.5
17.75	4.18	5.23	5.23	1.307	0.653	11.6
18.00	4.24	5.30	5.30	1.325	0.663	11.8
18.25	4.30	5.38	5.38	1.344	0.672	11.9
18.50	4.36	5.45	5.45	1.362	0.681	12.1
18.75	4.42	5.52	5.52	1.381	0.690	12.3
19.00	4.48	5.60	5.60	1.399	0.699	12.4
19.25	4.54	5.67	5.67	1.417	0.709	12.6
19.50	4.59	5.74	5.74	1.436	0.718	12.8
19.75	4.65	5.82	5.82	1.454	0.727	12.9
20.00	4.71	5.89	5.89	1.473	0.736	13.1
20.25	4.77	5.96	5.96	1.491	0.746	13.3
20.50	4.83	6.04	6.04	1.509	0.755	13.4
20.75	4.89	6.11	6.11	1.528	0.764	13.6
21.00	4.95	6.19	6.19	1.546	0.773	13.7
21.25	5.01	6.26	6.26	1.565	0.782	13.9
21.50	5.07	6.33	6.33	1.583	0.792	14.1
21.75	5.12	6.41	6.41	1.601	0.801	14.2
22.00	5.18	6.48	6.48	1.620	0.810	14.4
22.25	5.24	6.55	6.55	1.638	0.819	14.6
22.50	5.30	6.63	6.63	1.657	0.828	14.7
22.75	5.36	6.70	6.70	1.675	0.838	14.9
23.00	5.42	6.77	6.77	1.694	0.847	15.1
23.25	5.48	6.85	6.85	1.712	0.856	15.2
23.50	5.54	6.92	6.92	1.730	0.865	15.4
23.75	5.60	6.99	6.99	1.749	0.874	15.5
24.00	5.65	7.07	7.07	1.767	0.884	15.7
24.25	5.71	7.14	7.14	1.786	0.893	15.9
24.50	5.77	7.22	7.22	1.804	0.902	16.0
24.75	5.83	7.29	7.29	1.822	0.911	16.2
25.00	5.89	7.36	7.36	1.841	0.920	16.4

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

7 mm Compression Fluence Table

Spot size =	7	mm
Area =	0.385	cm2
Transmission =	82	%

7 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
4.00	1.54	1.88	1.88	0.469	0.235	4.2
4.25	1.64	1.99	1.99	0.499	0.249	4.4
4.50	1.73	2.11	2.11	0.528	0.264	4.7
4.75	1.83	2.23	2.23	0.557	0.279	5.0
5.00	1.92	2.35	2.35	0.587	0.293	5.2
5.25	2.02	2.46	2.46	0.616	0.308	5.5
5.50	2.12	2.58	2.58	0.645	0.323	5.7
5.75	2.21	2.70	2.70	0.675	0.337	6.0
6.00	2.31	2.82	2.82	0.704	0.352	6.3
6.25	2.41	2.93	2.93	0.733	0.367	6.5
6.50	2.50	3.05	3.05	0.763	0.381	6.8
6.75	2.60	3.17	3.17	0.792	0.396	7.0
7.00	2.69	3.29	3.29	0.821	0.411	7.3
7.25	2.79	3.40	3.40	0.851	0.425	7.6
7.50	2.89	3.52	3.52	0.880	0.440	7.8
7.75	2.98	3.64	3.64	0.909	0.455	8.1
8.00	3.08	3.75	3.75	0.939	0.469	8.3
8.25	3.17	3.87	3.87	0.968	0.484	8.6
8.50	3.27	3.99	3.99	0.997	0.499	8.9
8.75	3.37	4.11	4.11	1.027	0.513	9.1
9.00	3.46	4.22	4.22	1.056	0.528	9.4
9.25	3.56	4.34	4.34	1.085	0.543	9.6
9.50	3.66	4.46	4.46	1.115	0.557	9.9
9.75	3.75	4.58	4.58	1.144	0.572	10.2
10.00	3.85	4.69	4.69	1.173	0.587	10.4
10.25	3.94	4.81	4.81	1.203	0.601	10.7
10.50	4.04	4.93	4.93	1.232	0.616	11.0
10.75	4.14	5.05	5.05	1.261	0.631	11.2
11.00	4.23	5.16	5.16	1.291	0.645	11.5
11.25	4.33	5.28	5.28	1.320	0.660	11.7
11.50	4.43	5.40	5.40	1.349	0.675	12.0
11.75	4.52	5.51	5.51	1.379	0.689	12.3
12.00	4.62	5.63	5.63	1.408	0.704	12.5
12.25	4.71	5.75	5.75	1.437	0.719	12.8
12.50	4.81	5.87	5.87	1.467	0.733	13.0
12.75	4.91	5.98	5.98	1.496	0.748	13.3
13.00	5.00	6.10	6.10	1.525	0.763	13.6
13.25	5.10	6.22	6.22	1.555	0.777	13.8
13.50	5.20	6.34	6.34	1.584	0.792	14.1
13.75	5.29	6.45	6.45	1.613	0.807	14.3
14.00	5.39	6.57	6.57	1.643	0.821	14.6
14.25	5.48	6.69	6.69	1.672	0.836	14.9
14.50	5.58	6.81	6.81	1.701	0.851	15.1
14.75	5.68	6.92	6.92	1.731	0.865	15.4
15.00	5.77	7.04	7.04	1.760	0.880	15.6

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.

10 mm Compression Fluence Table

Spot size =	10	mm
Area =	0.785	cm2
Transmission =	82	%

10 mm Spot Size			Pulse Width, msec			
			0.45	1.5	3 - 40	
			Number of Sub-Pulses			
			1	4	8	
Fluence, J/cm2	Delivered Energy, J	Total Head Energy, J	Head Energy per Sub-Pulse			Peak Power into Fiber*, KW
3.00	2.36	2.87	2.87	0.718	0.359	6.4
3.25	2.55	3.11	3.11	0.778	0.389	6.9
3.50	2.75	3.35	3.35	0.838	0.419	7.4
3.75	2.95	3.59	3.59	0.898	0.449	8.0
4.00	3.14	3.83	3.83	0.958	0.479	8.5
4.25	3.34	4.07	4.07	1.018	0.509	9.0
4.50	3.53	4.31	4.31	1.078	0.539	9.6
4.75	3.73	4.55	4.55	1.137	0.569	10.1
5.00	3.93	4.79	4.79	1.197	0.599	10.6
5.25	4.12	5.03	5.03	1.257	0.629	11.2
5.50	4.32	5.27	5.27	1.317	0.658	11.7
5.75	4.52	5.51	5.51	1.377	0.688	12.2
6.00	4.71	5.75	5.75	1.437	0.718	12.8
6.25	4.91	5.99	5.99	1.497	0.748	13.3
6.50	5.11	6.23	6.23	1.556	0.778	13.8
6.75	5.30	6.47	6.47	1.616	0.808	14.4
7.00	5.50	6.70	6.70	1.676	0.838	14.9
7.25	5.69	6.94	6.94	1.736	0.868	15.4
7.50	5.89	7.18	7.18	1.796	0.898	16.0
7.75	6.09	7.42	7.42	1.856	0.928	16.5
8.00	6.28	7.66	7.66	1.916	0.958	17.0
8.25	6.48	7.90	7.90	1.975	0.988	17.6
8.50	6.68	8.14	8.14	2.035	1.018	18.1
8.75	6.87	8.38	8.38	2.095	1.048	18.6
9.00	7.07	8.62	8.62	2.155	1.078	19.2
9.25	7.26	8.86		2.215	1.107	14.8
9.50	7.46	9.10		2.275	1.137	15.2
9.75	7.66	9.34		2.335	1.167	15.6
10.00	7.85	9.58		2.395	1.197	16.0

*Peak Power is based on 0.45 msec pulse width, which gives the highest value.
If 0.45 msec is not allowed, than it is based on 0.15 msec sub-pulse width, 4 sub-pulses (1.5 msec).

NEW VBEAM SYSTEM PERFORMANCE & USAGE DATA

Customer Name _____ *Date* _____ *Laser S/N* _____

Service Engineer _____ *Energy Meter Serial Number* _____ *Cal Due Date* _____

BEFORE SERVICING DATA

RECORD ALL VALUES BELOW (ALL MEAUSREMENTS TO BE TAKEN WITH EXTERNAL METER UNLESS OTHERWISE STATED!)

PARAMETER	VALUE	PARAMETER	VALUE
GUI REV		*DCD PRESSURE (±1)*	(PSI)
OS REV		?V at 9.2J-See Section 5 in procedure *8503-01-0853 (Optimum ?V is =350V)*	(?V)
CPU I/O		DELIVERED ENERGY(10MM) (INTO OPHIR)@9.20J	(J)
DYE TEMP (MEASURED(60 +/-2.5°C)	(°C)	DELIVERY TRANS(10MM) (INTO OPHIR)@9.2J	(%)
DI TEMP (TOGGLE SCREEN (MEASURED (60 +/-2.5°C)	(°C)	CALIBRATION PORT ENERGY(10MM) @9.2J	(J)
LINE VOLTAGE	*(Vac)*	CALIBRATION PORT TRANS.(10MM) @9.2J *(within 5% of Ophir % above)*	(%)
HV MEASURED (REF SET TO=2875Vdc) (±43Vdc)	(PSI)	TOTAL PULSES	

LIST FAULTS:									
ADDITIONAL INFO									

AFTER SERVICING DATA

RECORD ALL VALUES BELOW (ALL MEAUSREMENTS TO BE TAKEN WITH EXTERNAL METER UNLESS OTHERWISE STATED!)

PARAMETER	VALUE	PARAMETER	VALUE
GUI REV		*DCD PRESSURE (±1)*	(PSI)
OS REV		?V at 9.2J-See Section 5 in procedure *8503-01-0853 (Optimum ?V is =350V)*	(?V)
CPU I/O		DELIVERED ENERGY(10MM) (INTO OPHIR)@9.20J	(J)
DYE TEMP (MEASURED(60 +/-2.5°C)	(°C)	DELIVERY TRANS(10MM) (INTO OPHIR)@9.2J	(%)
DI TEMP (TOGGLE SCREEN (MEASURED (60 +/-2.5°C)	(°C)	CALIBRATION PORT ENERGY(10MM) @9.2J	(J)
LINE VOLTAGE	*(Vac)*	CALIBRATION PORT TRANS.(10MM) @9.2J *(within 5% of Ophir % above)*	(%)
HV MEASURED (REF SET TO=2875Vdc) (±43Vdc)	(PSI)	TOTAL PULSES	

BUBBLE SENSOR	**Cryo 7.75±.0.5VDC**	**No Cryo ≥10.5VDC**
DELIVERY SYSTEM		
CANISTER		

(USER MODE) LASER PERFORMANCE TESTS: *CALIBRATE PER TABLE THEN PULSE 3X INTO OPHIR (MUST BE WITHIN "OPHIR JOULE" SPEC - OPEN LVM SCREEN AND PRESS RESET THEN PULSE INTO CALPORT FOR TX - OPEN LVM SCREEN AND PRESS RESET THEN PULSE INTO CALPORT 30 TIMES AND CHECK 3SI % FOR HD AND CP. (IF 3MM NOT PRESENT THEN N/A FOR THAT ROW)*

SPOT SIZE	FLUENCE	PW	OPHIR JOULES, +/-14% ()=NOMINAL	TxMn%=80 (=34% FOR 3MM)	HD3Si%=14%	CP3Si%=14%
3MM	*11J/cm²*	*1.5M*	*0.67min (0.78) 0.89max*			
10MM	*7j/cm²*	*.45M*	*4.73min (5.50) 6.27max*	*=34%*		
10MM	*10 J/cm²*	*10MS*	*6.79min (7.9) 9.01max*	*=34%*		
10MM	*3 J/cm²*	*10MS*	*2.06min (2.4) 2.74max*	*=34%*		

DCD ALIGNMENT TESTS: REFERENCE OPERATIONS MANUAL (8501-00-1780 SECTION 6.0)

Del. Sys	PASS		AIMING BEAM	VISABLE THROUGH GOGGLES?	
Aligned	*YES*	*NO*	*12MM LEVEL-1*	*YES*	*NO*

LASER HEAD PULSES		LASER DYE PULSES		LASER LAMP PULSES		TOTAL PULSES	

!!CLEAR FAULT LIST AND RESET PULSE COUNTER(S) IF APPLICABLE!!

Inspection and Cleaning of Optics Procedure


CANDELA

Clean optics are essential for proper laser performance. Dirty or pitted optics can result in low energy output from the laser head, poor beam quality or reduced energy transmission from the laser head to the output of the fiber. All optical components should be frequently inspected and must be kept free of dust, moisture, fingerprints and other contamination.

If a laser system is operated when the optics are dirty, the result is likely to be permanent damage to the optics. The optics should be inspected, and cleaned if necessary, before they are installed and during each preventive maintenance visit. Whenever poor beam quality is obtained, or the energy output at the laser head is inadequate for the high voltage level (with new dye), the optics should be inspected, and cleaned if necessary. Damaged optics must be replaced.

Equipment Required

Lens tissue

Air bulb or canned air

Propanol or isopropyl alcohol

Acetone

Cotton balls or swabs (Use only high quality surgical cotton balls, sorted to remove any with embedded abrasives)

Cleaning Procedure

1. This procedure must be performed with gloved hands, in an environment that is as free of dust as possible. Always handle an optic by its edges.

2. Remove the optic from its holder, and place it on a piece of lens tissue.

3. Use an air bulb to rid the mirror surface of dust particles. A commercially available duster can containing compressed air or inert gas may be used; the can must be kept upright to avoid depositing contaminants from the bottom of the can onto the optic.

4. Dampen a lens tissue, cotton ball or swab with reagent grade isopropyl alcohol or Propanol.

5. Gently wipe the surface of the optic with the damp cotton or tissue. Do not rub hard. Drag the cotton across the surface just fast enough so that the liquid evaporates right behind the cotton. This should leave no streaks.

6. Repeat steps 4 and 5 using lens tissue or cotton swab with acetone. This will remove any residue which may have been left by the alcohol or Propanol.


CANDELA

New Vbeam *CPU I/O Calibration Procedure*

CPU I/O Calibration Procedure

WARNING!!

DURING THIS PROCEDURE IT IS POSSIBLE THAT THE LASER MAY FIRE, EMITTING LASER RADIATION. THEREFORE SAFETY EYEWEAR MUST BE WORN. THE EYEWEAR MUST HAVE AN OPTICAL DENSITY OF AT LEAST 4.9 AT 591 - 597.

THE HIGH VOLTAGES PRESENT IN THIS SYSTEM ARE LETHAL. THIS PROCEDURE MUST BE PERFORMED ONLY BY THOSE TECHNICIANS WHO ARE FAMILIAR WITH THE PRECAUTIONS REQUIRED WHEN WORKING WITH HIGH VOLTAGE SYSTEMS, AND THOSE WHO HAVE BEEN TRAINED ON THE VBEAM SYSTEM AND ITS PROCEDURES.

WARNING!!

THE LASER WILL DUMP ALL CAPACITOR VOLTAGE WHEN THE SYSTEM IS SHUT DOWN BUT, THE HIGH VOLTAGE CAPACITOR STILL MAY RETAIN LETHAL VOLTAGES. IF VOLTAGE REMAINS, IT MUST BE DISHCARGED BEFORE THE LASER IS MOVED OR SERVICED FOR ANY REASON. RESIDUAL VOLTAGES REQUIRE STICK DISCHARGING OR TIME FOR THE BLEEDER CIRCUITS TO COMPLETELY BLEED THE VOLTAGE OFF OF THE CAPACITOR. SEE THEORY OF OPERATION FOR BLEED TIME DESCRIPTION. VERIFY THAT THE CAPACITOR IS DISCHARGED COMPLETELY, CHECKED VIA A DVM WITH HIGH VOLTAGE PROBE, BEFORE SERVICING.

NOTE: If the OPHIR NOVA display is used, be sure the wavelength is set to "Visible" or "<.8u", depending on the meter head being used.

This procedure encompasses all CPU calibrations. Please ensure that if the CPU I/O PCB has been replaced; all of the below procedures are completed along with the transferring of all the Laser counts and Serial Number from the "System Info" screen in Maintenance Mode.

1. Head Detector (1 & 2) and Calport Detector Calibration

1.1. Put on laser safety eyewear.

1.2. Verify the Laser Head and Optical Rail is aligned. (ref. 8503-01-0858).

1.3. Go to the Maintenance Mode and select the "Ckt Cal" screen.

1.4. Select Head 1, Head 2, and Calport (make sure a checkmark is displayed in the box next to the selections).

1.5. Press the Cal Energy Ckt button to begin the calibration.

1.6. Follow the prompts at the bottom of the screen.

1.6.1. The software will set the current and prompt the technician to pulse into the Ophir meter and Calport as the calibration progresses. When pulsing into the

Ophir a keypad will pop up so that the technician can enter the Ophir reading (If the Ophir doesn't read any energy, then enter a "0". When making entries into the pop up keypad, they must be entered in milli-joules (mJ).

1.6.1.1. Example 1: If the meter is reading .769J, the technician will enter 769 (no decimal point) into the keypad.

1.6.1.2. Example 2: If the meter is reading 4.35J, the technician will enter 4350 (must add the "0" at the end to make it mJ).

1.7. The software will prompt the technician with "Cal Successful" when it is complete.

Note: If the laser software is asking for the technician to pulse into the Calport and the laser is mistakenly pulsed into the Ophir a "PreGain Error" will occur. If this happens, restart the procedure.

2. Wavelength Calibration

2.1. Verify that the laser head and optical rail are aligned. See: (8503-01-0858).

2.2. If using a manual monochromator that needs a correction factor; find the green wavelength of a florescent overhead light. It should be 546nm. If your monochromator reads 544nm then you need to apply a correction factor of +2nm to the reading you get from your monochromator.

2.3. Put on laser safety eyewear

2.4. Go to the Maintenance Mode and select the "Laser Ctrl" screen and set up the following parameters.

2.4.1. Pulse Duration: .45ms

2.4.2. Voltage: 2875 (should always be set to 2875V)

2.4.3. Power: 33000

2.4.4. Energy: 13000

2.4.5. Amps: Start at 400A and adjust up to get 4.5J on Head Detector #1.

2.5. Install the handpiece and 10mm distance gauge. Tape a white piece of paper onto the entrance and exit slits of a monochromator. Position the monochromator at least 1 foot away from the handpiece. Place a shield over the top of the handpiece and monochromator to cut down on the scattered light. Align the handpiece so the beam is hitting the white paper at the entrance slit of the monochromator. This can be done with eyewear on because a faint red light will be visible for alignment.

2.6. Remove eyewear and pulse the laser, observing the paper at the exit slit. Adjust the wavelength on the monochromator to maximize the light on the exit slit. If it is too bright to accurately find a maximum, thicken the paper on the entrance slit. The light

on the paper at the exit slit should be dim, not bright. Note this wavelength (ex., 593.6nm). Apply the correction factor for your monochromator.

2.7. Put eyewear back on and insert the handpiece into the calport.

2.8. Go to the "Laser Ctrl" screen (ref Figure 1), press the Cal WL button, pulse the laser once and type in the wavelength on the pop up keypad.

2.9. Add COT if the wavelength is less than 591nm. Use a Scrub Filter if the wavelength is greater than 596nm.

3. DCD Pressure Calibration

3.1. Connect the pressure transducer to the 300mv jack of the DVM. Ensure the pressure transducer reads zero. Attach the pressure transducer to the front bezel cryogen bulkhead.

3.2. Enter Maintenance Mode and verify that a DCD Cryogen canister is installed and completely warmed up; pressure is between 115 and 125 psi.

3.3. Verify the pressure on the transducer is > 100psi before starting calibration.

3.4. Go to the Ckt Cal screen.

3.5. Press and hold the "Cal DCD" button to start the calibration.

3.6. On the key pad, enter the DCD pressure reading from the external pressure transducer.

3.7. Press "Enter" at the bottom of the keypad to calibrate the DCD pressure.

3.8. Wait 5-10 minutes for the pressure to stabilize. Verify on the TOGGLE screen DCD (PSI) reading matches the pressure transducer to within ± 1PSI.

3.9. Now remove the canister. Let DCD pressure fully exhaust from laser and meter; about two minutes. Verify on the TOGGLE screen DCD (PSI) reading matches the pressure transducer to within ± 1PSI. It must be between 0.0 - 1.0 PSI. Re-install canister.

4. BUBBLE CIRCUIT CALIBRATION

4.1. Preparing the cryogen line for testing:

4.2. Connect the Vbeam HP Delivery System to the Vbeam laser.

4.3. Ensure a cryogen canister is installed in the laser. If not, install one per the procedure in the Operator's Manual. Turn on the VBEAM laser. System should display a warm-up message.

4.4. The DCD unit must complete warm-up prior to the following tests! The cryogen is fully warmed up when the canister pressure on the TOGGLE screen in MM mode is between 118 and 122 PSI.

4.5. Handpiece Bubble Circuit Calibration

4.5.1. Ensure the laser is in "Standby". While pointing the handpiece in a safe direction, in the TOGGLE screen press the "Purge" button. There should be a smooth hiss of cryogen exiting the DCD nozzle every time you push the button. Do this 10-15 times to purge out any bubbles in the cryogen line.

4.5.2. If the spray is weak or not smooth, bubbles may still exist in the line. Check to be sure the cryogen tank is fully warmed. If tank is warm and bubbles persist, the cryogen tank is probably low. Replace canister per procedure in the Operator's Manual and repeat the above step.

4.5.3. Go to Standby. Connect a DVM to the Bubble Sense Test Point on the CPU I/O PCB at TP46 (+) and TP48 (-). Verify the voltage is 7.75 VDC ± 0.5 VDC.

4.5.4. If adjustment is required open the delivery system handpiece; adjust potentiometer R1 for a DVM reading of 7.75V +/- 0. 5V @ TP46 (+) and TP48 (-). Close the handpiece and tighten the screws.

4.5.5. Disconnect the cryogen line from the front panel bulkhead connector. Push the cryogen connector against a flat surface to quickly exhaust the cryogen in the delivery system line. Verify the voltage on the CPU I/O PCB at TP46 (+) and TP48 (-) is greater than 10.5 VDC.

4.5.6. Reconnect the cryogen line to the front panel bulkhead connector. Verify that within two minutes, the voltage on the CPU I/O PCB at TP46 (+) and TP48 (-) is 7.75 VDC ± 0.5 VDC.

4.6. Canister Bubble Detector calibration procedure

4.6.1. Connect a DVM to the Canister Bubble Sense Test Point on the CPU I/O PCB at TP45 (+) and TP48 (-). Verify the voltage is 7.75 VDC ± 0.5 VDC. If not, adjust R1 of the Canister Bubble PCB to get 7.75VDC on the DVM.

4.6.2. Remove the canister from the DCD Assembly. Verify the voltage on the CPU I/O PCB at TP45 (+) and TP48 (-) is greater than 10.5 VDC.

4.6.3. Re-install the canister into the DCD Assembly. Verify that within two minutes the voltage on the CPU I/O PCB at TP45 (+) and TP48 (-) is 7.75 VDC ± 0.5 VDC.

5. LASER EFFICIENCY TEST

5.1. Go to the Lase Ctrl screen in MM Mode and set the following:

5.2. PULSE WIDTH = 10 MS

5.3. DISTANCE GAUGE = 10 MM

5.4. I_REF = 1600 A (IT MAY DEFAULT TO A SLIGHTLY LOWER NUMBER)

5.5. E_REF = 900 MJ (0.90J)

5.6. P_REF = 9000 W

5.7. HV REF = 2875V

5.8. With the handpiece in the Cal Port, pulse once at these settings. Observe the HD1 reading and adjust E_Ref as needed until HD1 reads 9200 ± 0.1 mJ. The goal at this point is to measure how much voltage is being removed from the capacitor during the pulse. Make a note of the HV Sample. Set the HV Ref to 0V, immediately take a pulse and observe the HV sample just after the pulse. Subtract the HV Sample immediately before the pulse from the HV Sample after to get your ?V for Laser Efficiency.

New Vbeam *Focus Lens Replacement Procedure*

FOCUS LENS REPLACEMENT

WARNING!!

THE HIGH VOLTAGES PRESENT IN THIS SYSTEM ARE LETHAL. THIS PROCEDURE MUST BE PERFORMED ONLY BY THOSE TECHNICIANS WHO ARE FAMILIAR WITH THE PRECAUTIONS REQUIRED WHEN WORKING WITH HIGH VOLTAGE SYSTEMS, AND THOSE WHO HAVE BEEN TRAINED ON THE VBEAM SYSTEM AND ITS PROCEDURES.

WARNING!!

THE LASER WILL DUMP ALL CAPACITOR VOLTAGE WHEN THE SYSTEM IS SHUT DOWN BUT, THE HIGH VOLTAGE CAPACITOR STILL MAY RETAIN LETHAL VOLTAGES. IF VOLTAGE REMAINS, IT MUST BE DISHCARGED BEFORE THE LASER IS MOVED OR SERVICED FOR ANY REASON. RESIDUAL VOLTAGES REQUIRE STICK DISCHARGING OR TIME FOR THE BLEEDER CIRCUITS TO COMPLETELY BLEED THE VOLTAGE OFF OF THE CAPACITOR. SEE THEORY OF OPERATION FOR BLEED TIME DESCRIPTION. VERIFY THAT THE CAPACITOR IS COMPLETELY DISCHARGED, CHECKED VIA A DVM WITH HIGH VOLTAGE PROBE, BEFORE SERVICING.

NOTE: EXERCISE EXTREME CARE. CLEANLINESS OF OPTICS IS ESSENTIAL. REFER TO SERVICE PROCEDURE 8503-01-0060 FOR OPTIC CLEANLINESS.

1. Remove the fiber from the fiber receptacle. Remove top cover and laser rail dust cover.
2. Remove the head detector; remove the front fiber optic (Head #1).
3. Remove the aiming beam assembly.
4. Remove screws holding the fiber receptacle to the rail.
5. Disconnect the microswitch.
6. Remove the fiber receptacle, see figure 1.

    1. Loosen the two Jam nuts on the set screws.
    2. Loosen the two set screws.
    3. Loosen the two positioning screws on the focus lens housing.
    4. Remove the four rear screws that secure the focus lens housing (7122-00-3597) into the fiber receptacle assembly.

    (Pay attention to component order when disassembling)

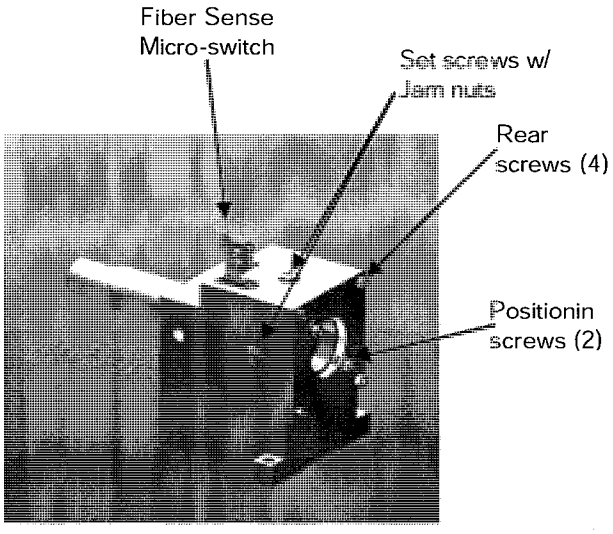


Figure 1: Fiber Focusing Assy.

7. Remove the Lens housing (7122-00-7476):

   7.1. Remove Jam nut.

   7.2. Pry out the first lens, or turn the barrel upside down and tap it sharply onto a clean piece of paper on a table.

   7.3. Pry out the first o-ring.

   7.4. Remove the spacer.

   7.5. Push out the second lens.

8. Replace or clean optics and o-rings as needed:

9. Lens Housing Assembly procedure (refer to drawing 7122-99-7476 for re-assembly):

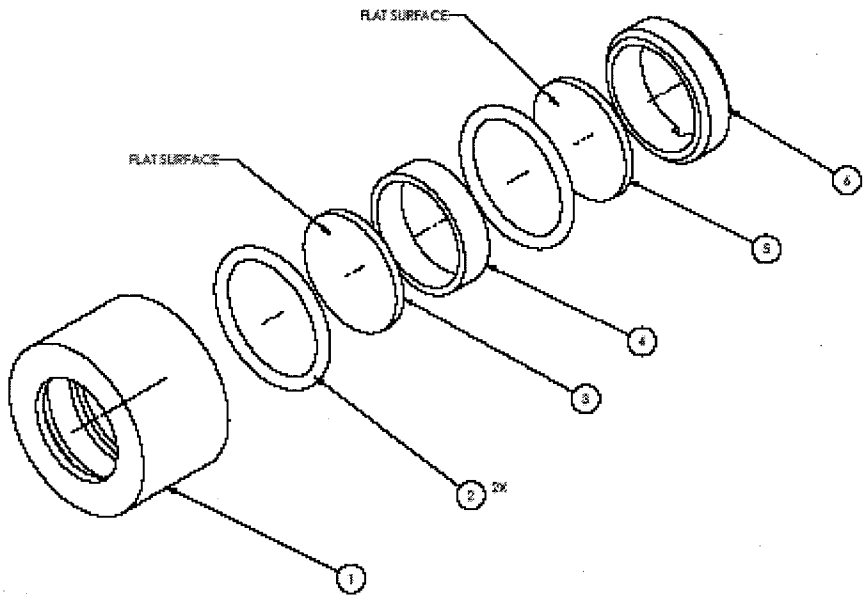


Figure 2: Lens Housing Exploded

   9.1. Install first o-ring, Item 2.

   9.2. Install first lens, Item 3, using Insertion tool (1301-00-8121). Push down on insertion device to seat lens.

   9.3. Install Spacer Item 4 in orientation shown.

   9.4. Install the Second o-ring, Item 2. Push the o-ring into the groove with a plastic tool or the wooden end of a cotton applicator.

9.5. Install the second lens, Item 5 in the orientation shown, using insertion tool or a 15 mm distance gauge. Push down on insertion device to seat lens.

9.6. Screw the jam nut Item 6 in orientation shown into the housing until it stops. Back out nut one turn and tap the side of the housing a few times to properly center the lenses. Tighten the nut so that it is snug. **DO NOT OVER TIGHTEN.**

9.7. See below for lens orientation:

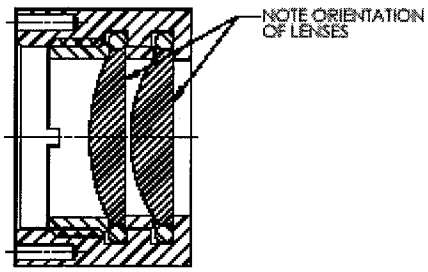


Figure 3: Lens Housing

10. Fiber Receptacle assembly procedure:

10.1. Install the lens housing assy into the receptacle block in the orientation shown. Roughly align (rotate) the lens housing so that the housing's (2) threaded 4-40 tapped holes are aligned diagonally with the receptacle block's threaded 4-40 holes.

10.2. Hold the receptacle block vertically, snout end facing down, lens housing facing up. Gently push the lens housing diagonally so that it is resting flat inside the block.

10.3. Visually inspect the centering of the lens housing inside the receptacle block. The space (gap) between the outer diameter of the lens housing and the inner diameter of the receptacle block should be even all the way around. Adjust set screws (Figure 1) until the space (gap) is even.

10.4. Attach the plate (item 5), in orientation shown, onto the lens housing with hardware (2 ea. - items 6 and 7). Fully tighten the screws, then, back out ½ turn each.

10.5. Carefully rotate the plate (with housing attached), if needed, so that the plate's (4) mounting holes are aligned with the (4) threaded holes in the receptacle body. Secure plate onto block with screws (4 ea - item 6). Fully tighten screws.

11. Install the receptacle onto the rail.

12. Perform Fiber Alignment Verification; see Head and Optical Rail Alignment procedure 8503-01-0858.

New Vbeam
Preventative Maintenance Procedure

NEW VBEAM PREVENTATIVE MAINTENANCE PROCEDURE

NOTICE: THIS PROCEDURE MUST BE COMPLETED, ALONG WITH THE LASER PERFORMANCE AND USAGE DATA SHEET (**REF P/N 10-400-00146**) AND IN CONJUNCTION WITH THE PM CHECKLIST AT THE END OF THIS PROCEDURE.

WARNING!!

DURING THIS PROCEDURE IT IS POSSIBLE THAT THE LASER MAY FIRE, EMITTING LASER RADIATION. THEREFORE SAFETY EYEWEAR MUST BE WORN. THE EYEWEAR MUST HAVE AN OPTICAL DENSITY OF AT LEAST 4.9 AT 591 - 597 NM.

WARNING!!

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WARNING!!!!!

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NOTE: If the OPHIR NOVA display is used, be sure the wavelength is set to "Visible or <.8u", depending on the meter head being used.

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

DURING THIS PROCEDURE, LASER LIGHT MAY POTENTIALLY EXIT THE FIBER RECEPTACLE. THEREFORE, BE SURE TO WEAR PROTECTIVE GOGGLES, AND PUT THE 100J OPHIR METER HEAD AT THE OUTPUT OF THE RECEPTACLE TO ACT AS A BEAM DUMP.

1. Record the before data on the System Performance and Usage Data Sheet. If the wavelength recorded with the monochromator doesn't match the WL on the computer, calibrate the wavelength detector using the procedure in the CPU Calibration Procedure (ref 8503-01- 0856)
2. **Ensure the Capacitors are COMPLETELY DISCHARGED!**
3. Drain the DI water from the laser and discard it. Replace the DI particle filter.
4. Remove the head/wavelength detector assembly from the rail.
5. Remove the old beam splitters from the head/wavelength detector assembly and install the new ones.
6. Remove the high voltage cables from the lamp.
7. Loosen the two small plates compressing the o-rings that hold the flashlamp in place. Remove the flashlamp by carefully rotating it and pushing/pulling it out of the back of the laser head. **NOTE: FLASHLAMP IS VERY FRAGILE**
8. Install the clean, new flashlamp and o-rings in reverse order from above.
9. In Maintenance Mode, reset the Lamp pulses to "0".
10. Re-install the head/wavelength detector assembly onto the optical rail.
11. Refill the system with fresh DI water.
12. Replace the carbon luer.
13. Replace all air filters.
14. ONLY IF NEEDED, replace the dye cartridge, COT and solvent.
15. If necessary rebuild the head following the HEAD REBUILD PROCEDURE:
    - 15.1. The laser head should be disassembled and all parts cleaned and inspected. There have been times when **cleaning the glass/optical components was all that was required to fix a low energy head.** If the last visit was <6 months ago or <50,000 pulses and all glass/optical components are not physically damaged, then cleaning the components may be all that is necessary. **Note: Before removing and disassembling the laser head, make sure that there are reference marks on the alignment knobs so that they can be reset to their original position should they get moved.**
    - 15.2. Remove the head from the rail. Drain fluids left in the head.
    - 15.3. Remove the flashlamp.
    - 15.4. Remove the large end blocks.
    - 15.5. FLUSHING THE DYE CELL: After removing the end blocks, but before removing the dye cell, be sure the cell is empty of all dye, so no dye gets on the ceramics. This can be done by squirting water down the dye cell or standing the tube on end (while holding the dye cell in place) onto some paper towels and tapping the dye cell against the towels to remove the remaining dye.
    - 15.6. Remove the dye cell.

15.7. Remove the end caps.

15.8. Remove the water jacket.

15.9. CLEANING THE OPTICS: Before rebuilding the head, ALL glass components must be cleaned with a solvent –propanol (isopropanol alcohol), ethanol, methanol, or acetone. Without cleaning, poor performance could result. When cleaning the dye cell, it **must** be cleaned inside and outside. It can be cleaned inside by pushing cotton or lens tissue moistened with solvent through the cell. A 1/8" diameter wooden dowel, available at most craft or hobby stores, can be used to push the material. The most critical components to clean are the resonator optics on the uncoated (dye) side. As soon as these optics are exposed to air, the solvent leaves a film on the optic. **This film must be removed before rebuilding the head.** Otherwise, the surface of the optic will be damaged. The damage is very difficult to see but reduces the optic's efficiency. Shining a light at an angle onto the surface is a way to see it. **Note: This cleaning cannot be stressed enough. Good optical components have been mistaken as bad ones due to lack of cleaning.**

15.10. The ceramics can now be removed. (Do not touch with bare hands)

15.11. **Replace the ceramics if necessary**, re-install the water jacket and end caps. Be sure the end cap bosses fit into the ceramics and the water jacket fits into its counter-bore. When the end caps are tightened, the water jacket must be loose – you can hear it rattle.

15.12. Install the dye cell and replace (if necessary) the dye cell o-rings.

15.13. Remove the optics from the end blocks by removing the outer plate that contains the adjustment knobs. Pull the optics mount out of the end block. Remove the 2 screws that secure the cover plate and push the optic out of its holder.

15.14. Remove and replace (if necessary) o-rings.

15.15. Verify that the maximum and partial optics are spotless.

15.16. **Replace both the max and partial optics if necessary**.

15.16.1. Verify that the max and partial are installed in the correct orientation and on their correct end of the laser.

15.17. Install the optics and re-assemble the head in reverse order. Leave the output end block slightly loose; tightening it only after it is mounted on the optical rail. The purpose of this is to ensure that the laser cavity's feet make good contact with the rail and that there is no rotational stress (which can lead to alignment problems) on the laser cavity.

15.18. Install the laser head onto the optical rail. Verify that the system has DI water in it. Turn on the laser and **carefully watch for leaks**.

15.19. On the COUNTS screen, reset head pulse count to 0.

16. Rough Align Laser Head (See Rough Laser Head Alignment in the Head and Optical Rail Alignment Procedure)

17. Peak out the Laser Head Energy (See Final Laser Head Alignment in the Head and Optical Rail Alignment Procedure)
18. Check the mode (burn at receptacle with alignment plug) per the Head and Optical Rail Alignment Procedure.
19. Verify Fiber Focusing Lens Alignment per the Head and Optical Rail Alignment Procedure.
20. Perform High Voltage Verification Procedure.
21. Perform CPU I/O PCB Calibrations.
22. Perform DCD Bubble Sense Calibrations.
23. Calibrate and pulse laser with all spot sizes at low and high Pulse Durations with low and high fluence.
24. Clear Fault List.
25. Record all necessary data in ISR.

New Vbeam *Head and Optical Rail Alignment Procedure*

HEAD AND OPTICAL RAIL ALIGNMENT PROCEDURE

WARNING!!

DURING THIS PROCEDURE IT IS POSSIBLE THAT THE LASER MAY FIRE, EMITTING LASER RADIATION. THEREFORE SAFETY EYEWEAR MUST BE WORN. THE EYEWEAR MUST HAVE AN OPTICAL DENSITY OF AT LEAST 4.9 AT 591 - 597.

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NOTE: If the OPHIR NOVA display is used, be sure the wavelength is set to "Visible" or "<.8u", depending on the meter head being used.

1. **Laser Head Alignment:**
   1.1. Rough Laser Head Alignment

   Note: Never install the top and side pins at the same time. The reflector brackets could get bent or damaged.

   1.1.1. Insert a dowel pin tool all the way into side access (locater) hole. Adjust the lower (horizontal) adjustment knob clockwise (in) while slightly sliding the tool in/out of the locater hole, until the inner surface of the optic mounting bracket <u>just makes contact</u> with the tool ("feeler gauge" tight). Remove tool from locater hole. Adjust the lower knob counterclockwise (out) 1½ turns.

   1.1.2. Insert dowel pin tool all the way into top access (locater) hole. Adjust the upper (vertical) adj. knob while slightly sliding the tool in and out of the locater hole, until the inner surface of the optic mntg brkt <u>just makes contact</u> with the tool ("feeler gauge" tight). Remove tool.

   1.1.3. Repeat step 1.1.1, except this time adjust the lower adjustment knob until the optic mntg brkt <u>just</u> <u>makes contact</u> with the tool ("feeler gauge" tight). Remove tool.

   1.1.4. Repeat above steps if needed until both upper and side adjustments <u>just make contact</u> ("feeler gauge" tight). Remove tool when satisfied. The optic mirror mount is now roughly aligned for lasing tests.

1.1.5. Repeat above steps for opposite mount (end support) assembly.

1.1.6. When set, mark upper surface of adjustment knob with indelible marker as a reference point.

1.2. Final Laser Head Alignment:

1.2.1. To align the laser head for peak energy, either the front display panel, Maintenance Mode Laser Control screen HD Energy, or a scope hooked to the head energy circuit can be used.

1.2.2. For using the scope; connect a scope probe on the Head#1 energy circuit between TP14 and TP39(gnd). Setup the scope to the following settings: 200mv per division; time base is 200us; rising edge trigger; set trigger to 500mv.

1.2.3. Go to MM Mode go to Laser Control Screen.

1.2.4. Put on eyewear and enter READY.

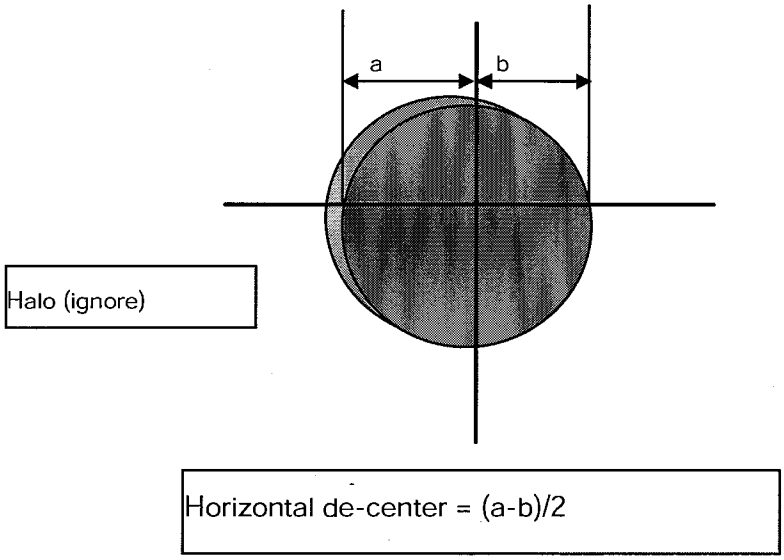
1.2.5. Set the HV to 2875V. Set P_Ref to 33000W, set E_Ref to 12000mJ, Set I_Ref to 400A. Set the Pulse Width to 0.45ms and the DCD spray to 0. Set the Rep Rate to 1.5 Hz. Pulse the laser a few times, noting the energy on the front display or peak voltage on the scope. Adjust the HR (high or max. reflector) and OC (output coupler) to roughly peak out the energy. This is not yet the final adjustment. **Be sure to use the phenolic wrench.** If there is no lasing with a lamp current of I_Ref =400A, increase the Lamp current until there is lasing. If the energy starts to exceed 7 J as you align, decrease the lamp current. If the laser does not lase at I_Ref =1200A, **discharge the laser**, **go to STANDBY**, and **discharge the flashlamp anode**. **Be sure to measure the voltage on the anode to be certain the caps are discharged.** Re-do the "Rough Laser Head Alignment (Step14)".

2. Alignment Plug Burn (Mode Burn)

2.1. Put on eyewear and enter READY.

2.2. In Maintenance Mode, Laser Cntrl screen set the current to get ~6.5-7J. Attach black electrical tape to the alignment plug tool and imprint the plug's cross hair onto the tape with a fine ball point pen. Install the plug into the front of the receptacle (facing the shutter) so the cross hair is vertical and horizontal. Put a bag in front of the plug and make a burn on the tape by pulsing the laser ONCE. If the cross hair mark gets burned off, re-mark it with a fine pencil or pen. Tape the burn below. The burn must be symmetric and round

2.3. Measure the centering of the burn with respect to the cross hair. If the burn has a small, partial "halo", ignore the halo when measuring the centering. See the picture below.



2.4. Measure the centering of the burn with respect to the cross hair. Record it below. It must be 0.75 mm or less vertically and horizontally. Be sure to divide by 2 if you measure the beam centering by measuring the difference between the distances from each beam edge to the cross hair. For example, if the top edge of the beam is 2.0 mm from the cross hair and the bottom edge of the beam is 2.5 mm from the cross hair, then the difference is 0.5 mm and the beam is off center vertically by half this, or 0.25 mm. Replace the rail if the centering fails.

3. Fiber Focusing Alignment Verification:

3.1. Adjust the lamp current until energy is 1.5 - 2.0 J using current mode on the laser.

3.2. Use the following procedure to verify the alignment of the receptacle using the alignment tool and to perform an alignment if necessary. Most alignment tools are slightly de-centered, so this procedure also reduces the error caused by this de-center to a negligible value.

3.3. Put some distinguishable mark onto the back of the alignment tool. Apply red or black "Sharpie" to the proximal end of the fiber on the alignment tool. Insert the tool into the receptacle with the mark facing up and pulse **ONCE**.

3.4. Remove the tool and inspect the tool with the eye loupe, keeping the mark on the tool in the up position. The ink from the "Sharpie" will be gone where the beam hit.

3.5. Rotate the connector so the mark is facing down and repeat above steps. Be sure to look at the end of the fiber with the mark **down** this time. If the location of the burn has changed from the previous step, then the tool has a de-center error. The actual beam location is the middle of the two beam locations. At the actual beam location, if the thickest "Sharpie" band is more than twice the thinnest band, then the receptacle must be aligned or replaced.

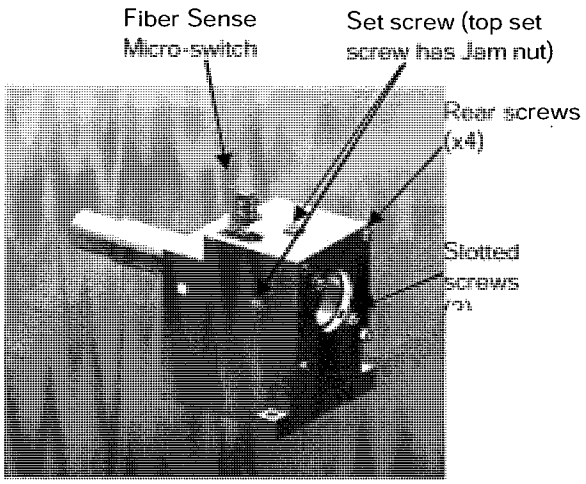


Figure 1: Fiber Focusing Assy.

4. Fiber Focusing Alignment (Ref Figure1):

4.1. Remove the head detector; remove the front fiber optic (Head #1). Remove the aiming beam assy.

4.2. Remove the ¼-32 Jam nut from the top set screw.

4.3. Turn set screw in until they just make contact with Lens Housing. Loosen the two inner (in the slotted holes) 4 -40 soc head screws securing the lens housing assembly to the fiber receptacle block ¾ turn each.

4.4. Reinstall the head detector and aiming beam assembly.

4.5. Slightly adjust one of the two set screws, located on the top (vertical axis) and left (horizontal axis) side of the fiber receptacle block (do not touch the ball plunger screw on the right side of the block). Adjust the set screw in the desired direction (ex: if burn spot is off to the left on the tool, adjust the lens housing towards the right (looking at the beam input side of the fiber receptacle)).

4.5.1. Do the "Sharpie" burn and re-adjust until alignment is acceptable.

4.5.2. Tighten the two 4-40 screws evenly and repeat the two "Sharpie" burns to make sure nothing has shifted, recording the results in the right circles in the previous steps.

4.5.3. After alignment is complete, back out the top ¼-32 set screws ~1/8".

4.5.4. Thread the Jam nut onto the top set screw and tighten.

4.5.5. Repeat the two "Sharpie" burns to make sure nothing has shifted.

4.5.6. Clean the fiber alignment tool's tip with a cotton applicator and solvent when finished and replace caps to ends of the tool. Press the Dump button to dump the capacitor voltage. Verify with a DVM and 1000:1 probe that no voltage exists at the flashlamp.

4.5.7. Install the laser rail dust cover.

New Vbeam *HVPS*
Verification Procedure

HVPS VERIFICATION

WARNING !!

DURING THIS PROCEDURE IT IS POSSIBLE THAT THE LASER MAY FIRE, EMITTING LASER RADIATION. THEREFORE SAFETY EYEWEAR MUST BE WORN. THE EYEWEAR MUST HAVE AN OPTICAL DENSITY OF AT LEAST 4.9 AT 591 - 597.

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Note: The input impedance of Autoranging Fluke handheld digital multimeters varies as a function of range. The only range that deviates significantly from 10 MW is the 3V (Models 21, 23, 25, 27, 70, 73, 75, 77) or 4V (Models 10, 11, 12, 29, 79, 83, 85, 86, 87, 88) range where the impedance is 11.11 MW. To enhance the measurement accuracy when using this range, apply a correction factor of 0.99, I.E. MULTIPLY THE DISPLAYED DVM READING BY .99.

1. Set-up the 1000:1 red high voltage probe connected to a DVM to measure the voltage on terminal E1 of the Modulator capacitor and secure the probe ground lead to chassis.

2. Turn the laser back on. In Maintenance Mode set the pulse width to 10 ms and the high voltage for 1000V.

3. Go to Ready. Verify that the DVM, reads 1.000 VDC (1000 V) ± 0.015 VDC.

4. Turn off the laser to dump the voltage. Verify with the DVM that there is no voltage on the capacitor signifying that the dump did occur.

5. Place the 1000:1 probe back on terminal E1. Turn the laser back on. Set the high voltage screen and adjust the high voltage setting for 2000V.

6. Go to Ready. Verify the voltage on the DVM is 2.000 VDC (2000 V) ± 0.030 VDC.

7. Verify the sample voltage in Maintenance Mode is 2000 VDC ± 30 VDC.

8. Adjust the high voltage to 2875V and press enter. Verify the voltage on the DVM, reads 2.875 VDC (2875 V) ± 0.043VDC.

9. Turn off the laser to dump the voltage or press the Dump Button. Verify with the DVM that there is no voltage on the capacitor signifying that the dump did occur and then remove the DVM probe.

10. Remove all probes from the high voltage section and replace the plastic shield.

New Vbeam
Installation Procedure

WARNING

FOLLOW THE INSTALLATION STEPS IN SEQUENCE TO ELIMINATE ANY POSSIBLE DAMAGE TO THE SYSTEM.

Equipment Needed:

- Adjustable Wrench
- 2.5 Liters of Distilled Water

1. Laser System Unpacking:

1.1. Using the adjustable wrench, remove the front of the crate. Keep the front nearby to use as a ramp to roll the laser system from the crate.

1.2. Remove the accessories located from the crate.

1.3. Place one end of the front of the crate on the floor. Butt the other end against the floor of the crate (install one of the bolts previously removed from the front of the crate into the center hole to keep the ramp from sliding. Grasp the laser on each side and gently roll the laser out of the crate.

1.4. Move the laser to the room that has been prepared for its use. Make sure the required space and electrical requirements are met. To prevent the laser system from moving inadvertently, lock each front wheel once laser is in final resting place.

2. COT Installation:

2.1. Install the COT bottle that was shipped in the Hazardous Materials Box.

3. Carbon Luer Installation:

3.1. Remove the protective plastic cap from the top of the Dye Reservoir and tape to the lid for later use..

3.2. Install the Carbon Luer from the Accesory Kit.

4. Coolant system filling:

4.1. Remove the black cap on the reservoir, located on the rear of the laser.

4.2. Add distilled water up to the point it can be seen inside the black spout..

NOTE: Always use distilled water when filling the reservoir. Using water that is not distilled will result in poor flash lamp performance and damage.

4.3. Replace the black cap on the reservoir.

4.4. Plug the male end of the power cord into the approved outlet.

4.5. The fluid lines within the laser must now be filled with water. To do this, turn the system on for 2 minutes then shut it off. Then repeat steps 4.1-4.3 until the water level inside reservoir can be seen in the fill area.

5. Initial Cryogen Canister Installation:

5.1. Remove the DCD cryogen canister from the packaging box. Be sure to read all labels on the canister before installing into the system.

5.2. Open the door on the top left of the rear bezel. Insert canister valve side down into the opening on the top left side of the laser system. GENTLY push the canister down until the two clips lock into place on the bottom off the canister (Note: A small amount of cryogen may vent out).

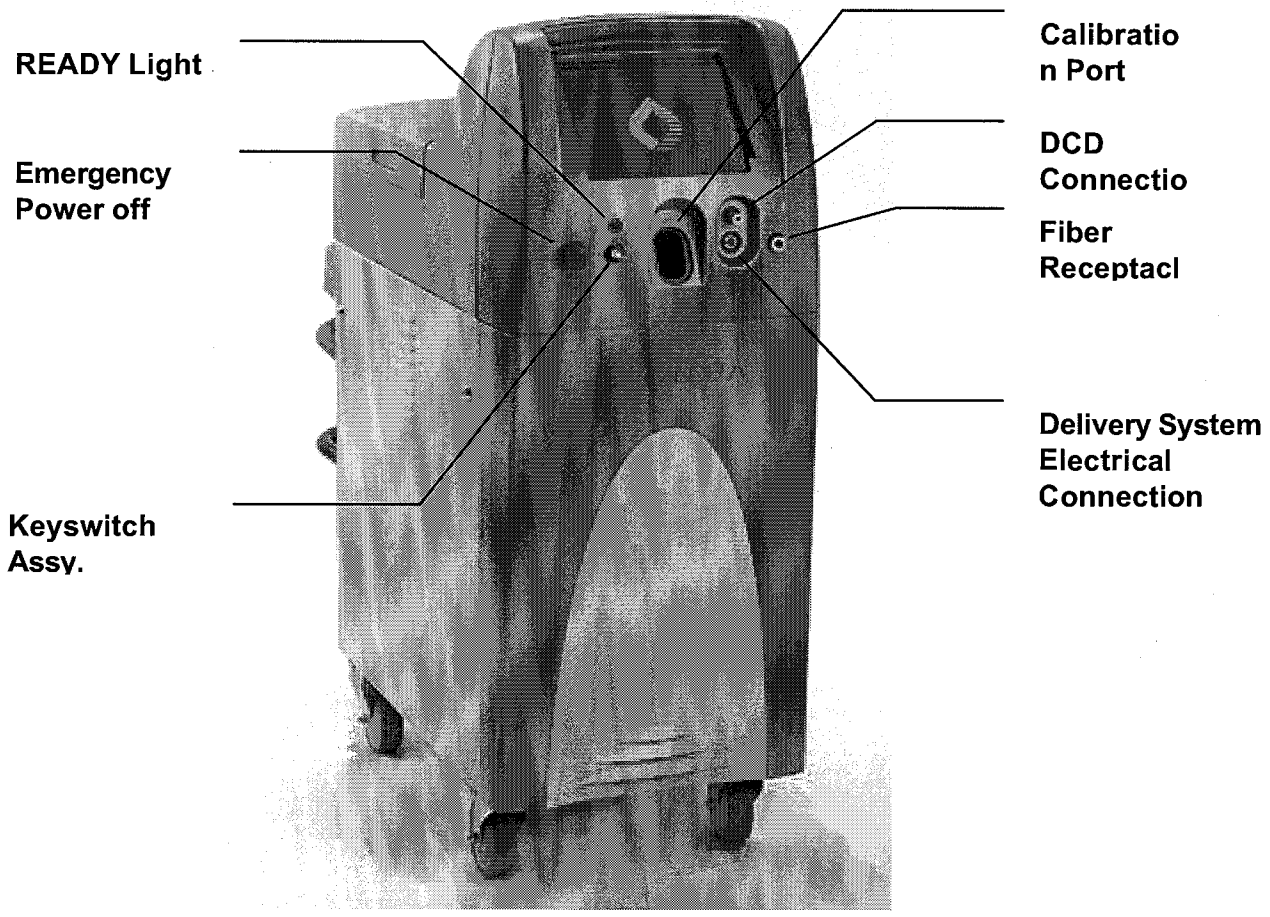


Figure 1: Display Bezel and Delivery System Locations

6. Handpiece Assembly Installation:

6.1. Refer to figure 1 for handpiece assembly system connection locations.

6.2. Remove the handpiece assembly from the accessory kit package.

6.3. With the system turned off, place the distal end of the handpiece assembly into the calport.

6.4. Connect the handpiece control (round, electrical plug) connector to the handpiece valve control receptacle on the front of the laser system, see figure 1. Connect the cryogen output connector to the cryogen line receptacle on the front of the laser system, see figure 1, as follows: Using both hands, push the knurled connector on the front of the laser system away from you while gently pushing the mating connector into the knurled connector until it stops. Release the knurled connector.

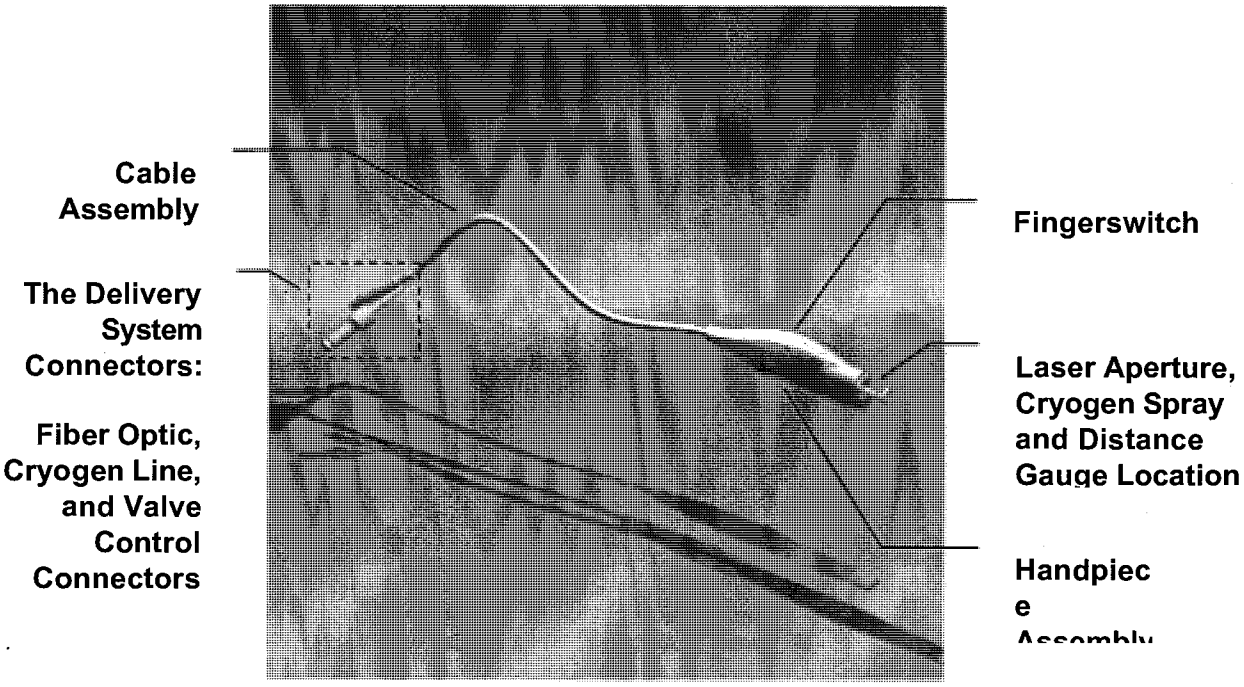


Figure 2: Delivery System and Handpiece Assembly

7. Distance Gauge Installation:

7.1. Refer to figure 2 above for distance gauge location.

Note: The distance gauge to be used for treatment MUST BE INSTALLED before performing the calibration procedure.

7.2. Insert the distance gauge into the distal end of the handpiece delivery system.

8. Fiber Assembly Installation:

8.1. Refer to figure 1 for fiber assembly system connection locations.

8.2. With the system turned off, remove the protective cap on the proximal fiber receptacle located on the front of the system.

8.3. Remove the fiber assembly from its package.

8.4. Insert the proximal fiber connector into the proximal fiber receptacle, located on the front of the system, until it clicks into place and stops.

8.5. Refer to the Operator Manual for a description of the controls and indicators.

9. Footswitch Installation:

9.1. Remove the footswitch from its package.

9.2. Attach the tubing end to the bulkhead connector on the rear panel of the laser.

10. Laser Alignment and Calibration:

10.1. Ensure that the system is completely warmed up and complete the following procedures to ensure the laser is running to within Candela specifications:

10.1.1. Fiber Focusing Lens Alignment from the Head and Optical Rail Alignment Procedure, 8503-01-0858

10.1.2. CPU I/O Calibration Procedure, 8503-01-0853

11. Complete the Laser Data and Performance Data Sheet:

11.1. Complete all sections of the Laser Data and Performance Data Sheet.

11.2. Install each Distance Gauge and complete 2 calibrations at different energies and pulse durations for each Distance Gauge.

12. Relocation:

12.1. Care should always be taken when moving the *Vbeam*. Special care should be taken when thresholds, elevator doors, ramps, and other uneven or sloping floor surfaces are encountered. A severe physical shock could cause the alignment of the laser head or the optical fiber to be disturbed. Furthermore, if the system is allowed to get out of control when being moved, personal injury or physical damage could result.

12.2. If it becomes necessary to relocate the *Vbeam* call Candela or the distributor for details. Failure to do so may result in damage to the system, and may void any warranty.

(PART OF 7122-00-7533)
(HV HARNESS VBEAM 2)

125-PNK-HV-22
126-PNK-HV-22
SIMMER TRIGGER WIRE
SIMMER WIRE

HVPS RTN
28-BLU-12
HVPS LINE
29-BRN-12
FERRITE ATTENUATOR W/1-LOOP 5645-00-0060

32-WHT HV-14
33-BLK-12
E11

J1
AC INPUT
TRIG/SIMMER
HV OUT
GND STUD

A3
HVPS
4001-01-0079

J2 24VDC OUTPUT
J3 CONTROL SIGNALS
J4 EOC
A3P2
A3P3
A3P4
#13
#14
#11

30-WHT-16
31-WHT-16
FIBER OPTIC CABLE #13
FIBER OPTIC CABLE #14
FIBER OPTIC CABLE #11

FERRITE ATTENUATOR W/1-LOOP 5645-00-0060

PART OF CABLE P/N 7122-00-3704

A2P16
A2P13/P14
A2P12
J16 24VDC IN
J13 TxD
J14 RxD
HVPS CONTROL SIGNALS
J12 END OF CHARGE

A2
PART OF
CPU I/O PCB
7111-00-2691

HV CONTROL SIGNALS
DUMP J9
RESET J10
FAULT J6
TRIG J8
FIBER OPTIC CABLE #9
FIBER OPTIC CABLE #10
FIBER OPTIC CABLE #6
FIBER OPTIC CABLE #8
FIBER BUNDLE P/N 7122-00-3704

159-BLK-12
(HEATSINK)
E11

A15
HIGH VOLTAGE PCB
7111-00-2693

Q8
DUAL IGBT 3300V 800A
P/N 4820-00-0082
C
E1
E2
G
A

SNUBBER CAPACITOR

137-WHT-HV-10
CENTER
L3
100uH 35A
OUTSIDE
136-WHT-HV-10
40-WHT HV-10
D7 2200V
DIODE_MODULE

E1 BLEEDER E2
S9 Heatsink Temp SW

131-WHT-HV-10
E1
E2 156-BLK-12
CENTER
L1
30uH 35A
OUTSIDE
1500uF
RETURN
PFN CAPACITOR
E11

133-WHT-HV-10
WHT
RED
E2
SCR
Q1 1A 2K 5/G 4/K
3600V 240A
P/N 4819-00-0240
DUMP RESISTOR
J3 2 1 A16P3
132-WHT-HV-10
E1

A16
HV DUMP PCB
7111-00-2697
S1 Thermal Switch
DUMP J2 #9
OPEN @ 175F
CLOSE @ 145F
J15 A16P1
1 +12V
1 +12V RTN
CLR BLK
CLR BLK

A14
HIGH VOLTAGE CONTROL PCB
7111-00-2694
C E G
#10 J1 RESET
#6 J2 FAULT
#8 J3 TRIG
HV PCB PWR IN
J5
J4 A14P4

CABLE P/N 7122-00-3709

CABLE # 112
(PART OF
SIGNAL HARNESS
7122-00-7526)

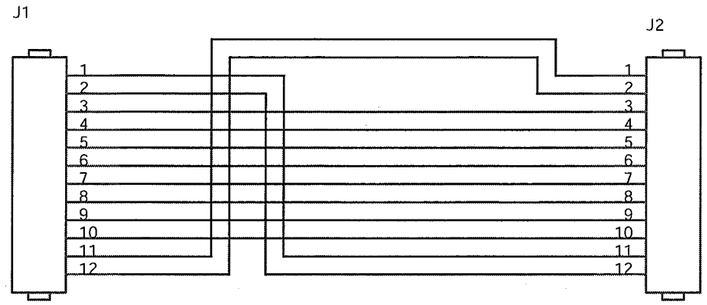
T4P1
RED
WHT
BLK
GRN
J1
T4 CURRENT SENSOR

FERRITE ATTENUATOR W/1-LOOP 5645-00-0060

Flashlamp Front
Anode (Red)
LASER HEAD
Cathode
Flashlamp Rear

127-WHT-HV-10
125-PNK-HV-22

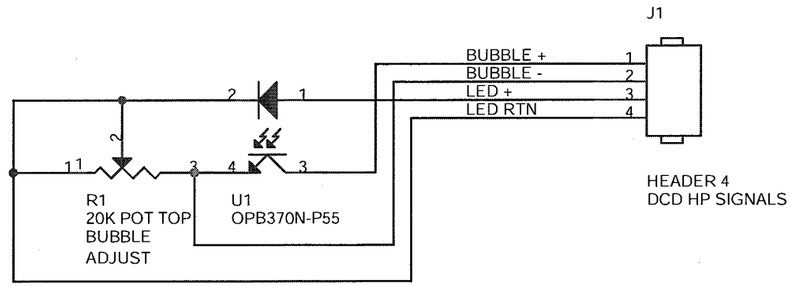
CANDELA CORPORATION		PROPRIETARY	
TITLE SYSTEM SCHEMATIC, VBEAM2		SIZE B	DRAWING NO. 9914-80-0300
		REV. 12	
		DATE: Tuesday, November 15, 2005	SHEET 2 OF 7



HEADER 12

HEADER 12 CIRCULAR

	01						DRAWN	O. SCHIRDUAN	12/12/01	PROPRIETARY	**CANDELA CORPORATION** 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883	
ECO#	13019						CHECKED	S. MOGREN	12/12/01	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.	TITLE SCHEMATIC, HP BULKHEAD PCB	SIZE B / DRAWING NO. 7111-80-2510 / REV. 01
DATE	10/12/01						ENG ELEC	O. SCHIRDUAN	12/12/01			DATE: Monday, December 10, 2001 / SHEET 1 OF 1
CHK'D	OKS							APPROVED	DATE			



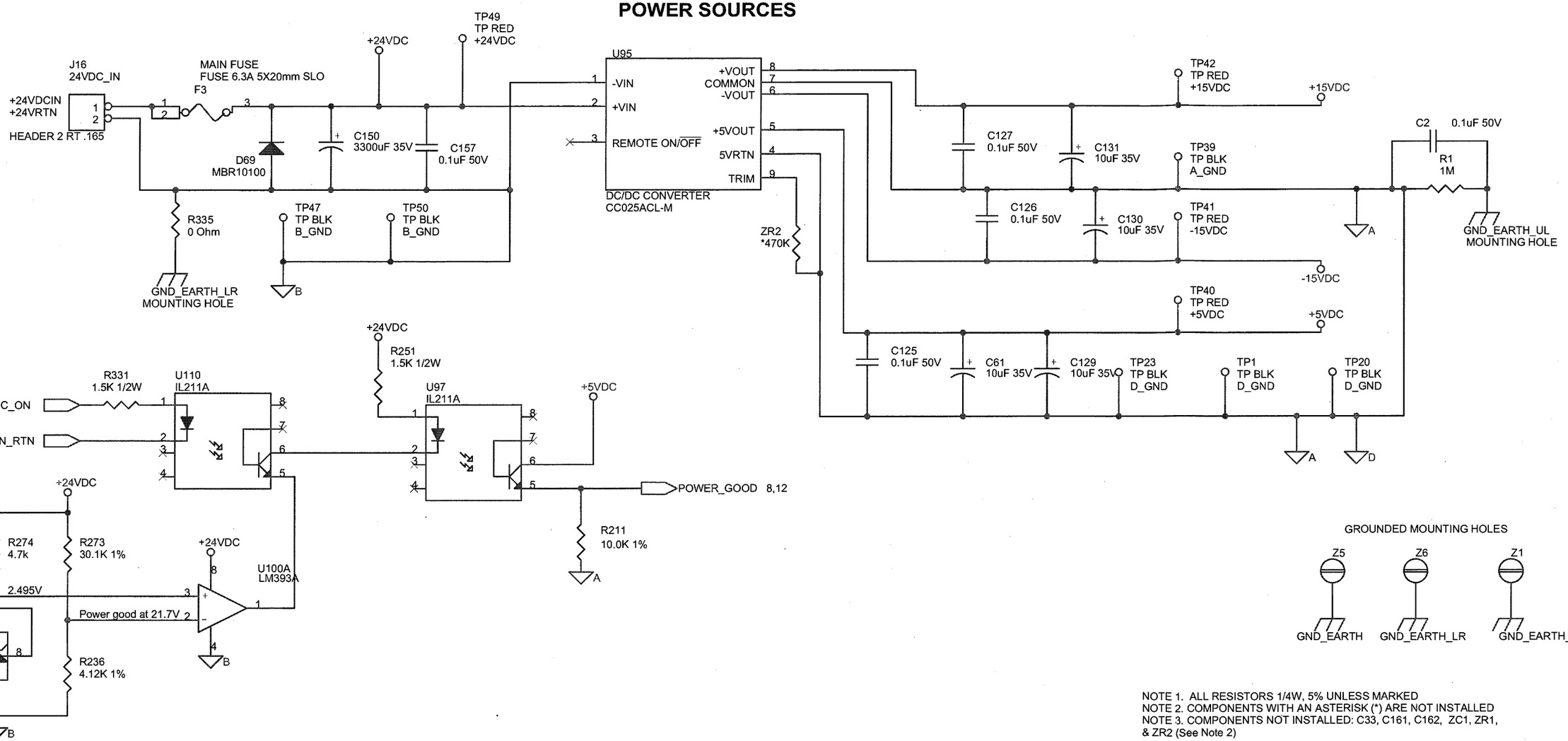
MOUNTING HOLES

Z2 Z4

R	03						DRAWN	OWEN SCHIRDUAN	12-10-01	PROPRIETARY	**CANDELA CORPORATION** 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883
ECO#	13019						CHECKED	SCOTT MOGREN	12-10-01	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.	TITLE: SCHEMATIC, DCD CANISTER PCB
DATE	12-10-01						ENG ELEC	OWEN SCHIRDUAN	12-10-01		SIZE B | DRAWING NO. 7111-80-2520 | REV. 03
CHK'D	OKS							APPROVED	DATE		DATE: Wednesday, December 12, 2001 | SHEET 1 OF 1

A B C D E

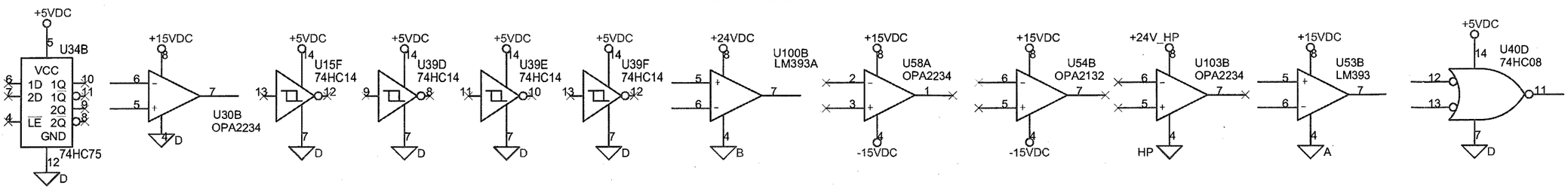
POWER SOURCES



GROUNDED MOUNTING HOLES

NOTE 1. ALL RESISTORS 1/4W, 5% UNLESS MARKED
NOTE 2. COMPONENTS WITH AN ASTERISK (*) ARE NOT INSTALLED
NOTE 3. COMPONENTS NOT INSTALLED: C33, C161, C162, ZC1, ZR1, & ZR2 (See Note 2)

SPARES



PAGE INDEX

REV	04	05	06	07	08	09	DRAWN	SSM	1/10/05
ECO#	14883	15061	15152	15196	15352	15480	CHECKED	OKS	1/10/05
DATE	2/16/05	5/16/05	7/22/05	8/9/05	10/19/05	11/15/05	ENG ELEC	SSM	1/10/05
CHK'D	SSM	SSM	SSM	SSM	SSM	SSM		APPROVED	DATE

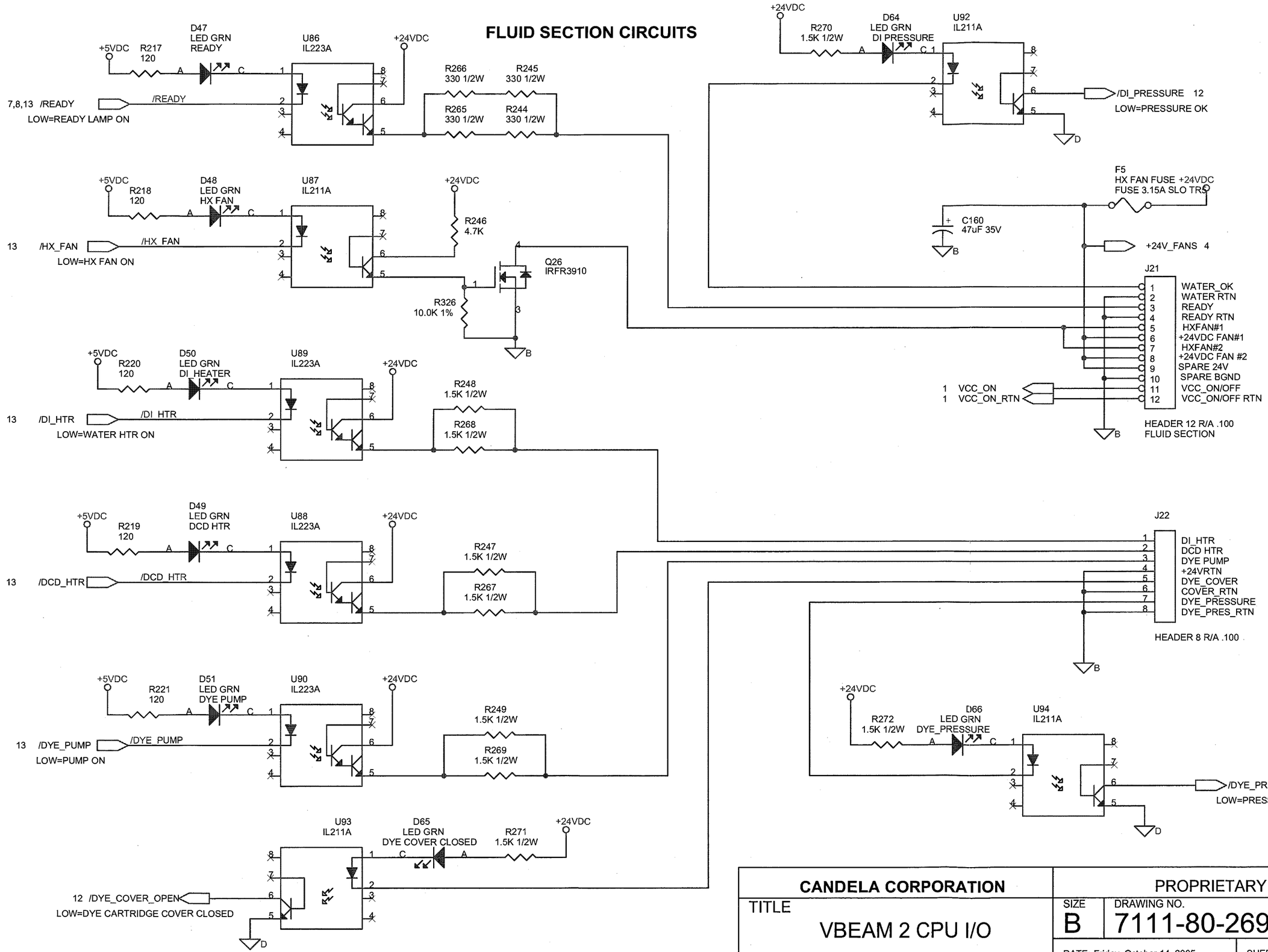
CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

TITLE SCHEMATIC
VBEAM 2 CPU I/O

SIZE B | DRAWING NO. 7111-80-2691 | REV. 09

DATE: Tuesday, November 15, 2005 | SHEET 1 OF 16

FLUID SECTION CIRCUITS



CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 2 OF 16	

LASER RAIL CIRCUITS

+5VDC
R222 120
D52 LED GRN ATTENUATOR CMD
U91 IL211A
12 /ATTEN_BUF
LOW=OUT OF PATH
+24VDC
R250 10.0K 1%
C156 0.1uF 50V
C143 10uF 35V
U106 DRV101
FLAG
Vs
PWM
DELAY
D72
R235 4.7K
C154 0.1uF 50V
R303 20K
TP53 TP SMT ATTEN
+5VDC
R208 120
D43 LED GRN SHUTTER CMD
U75 IL211A
13 /SHUT_CMD
LOW=OUT OF PATH
+24VDC
R234 10.0K 1%
R233 4.7K
C152 0.1uF 50V
C147 10uF 35V
U105 DRV101
FLAG
Vs
PWM
DELAY
D71 1N5819M
C153 0.1uF 50V
R302 20K
4 24V FUSED (To Pumps)
F2 FUSE 5A SLO TR5
+24VDC
C158 10uF 35V
TP52 TP SMT SHUTTER
R330 1.5K
R329 1.5K
R318 1.5K
R317 1.5K
R334 1.5K
R333 1.5K
R324 1.5K
R323 1.5K
J19
HEADER 26 RT_ANG,LCH
+24VDC 1
+24VDC 2
SHUTTER 3
SHUT ANODE 4
ATTENUATOR 5
SHUT CATHODE 6
+24VDC 7
SHUT STATUS 8
CAL SW 9
ATTEN ANODE 10
BGND 11
ATTEN STATUS 12
FIBER DET 13
BGND 14
BGND 15
+24VDC 16
17
AIMING PWR 18
19
AIMING RTN 20
BGND 21
+24VDC 22
BGND 23
+24VDC 24
BGND 25
+24VDC 26

U81 IL211A
D62 LED GRN SHUTTER IN PATH
R263 1.5K 1/2W
+24VDC
12 /SHUT_IN_PATH
Q16 2N7002
R287 1.5K
R280 4.7K

U80 IL211A
D61 LED GRN ATTEN IN PATH
R262 1.5K 1/2W
+24VDC
12 /ATTEN_IN_PATH
Q20 2N7002
R319 1.5K
R325 4.7K

U79 IL211A
D60 LED GRN FIBER
R261 1.5K 1/2W
+24VDC
12 /FIBER_DET
LOW=FIBER IN

U76 IL211A
D58 LED GRN CAL SW
R259 1.5K 1/2W
+24VDC
12 /CAL_SW

AIM BEAM PWR
+5VDC
R213 120
D44 LED GRN AIM BEAM
U74 IL211A
+24VDC
R232 4.7K
13 /AIM_BEAM
LOW = ON
Q25 IRFR3910
R316 10.0K 1%

AIMING BEAM DRIVER
U108 LM2674
+24VDC
C144 47uF 35V
VIN
CB
NC
VSW
NC
ON/OFF
GND
FB
C141 .01uF
L1 176uH
D67 1N5819M
R295 5.11K 1%
TP51 TP RED 7.4V
C148 47uF 35V
U107 LM317/TO220
VIN
VOUT
ADJ
C149 47uF 35V
R304 10 Ohm
R305 10 Ohm
R306 10 Ohm
R294 1.00K 1%

CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
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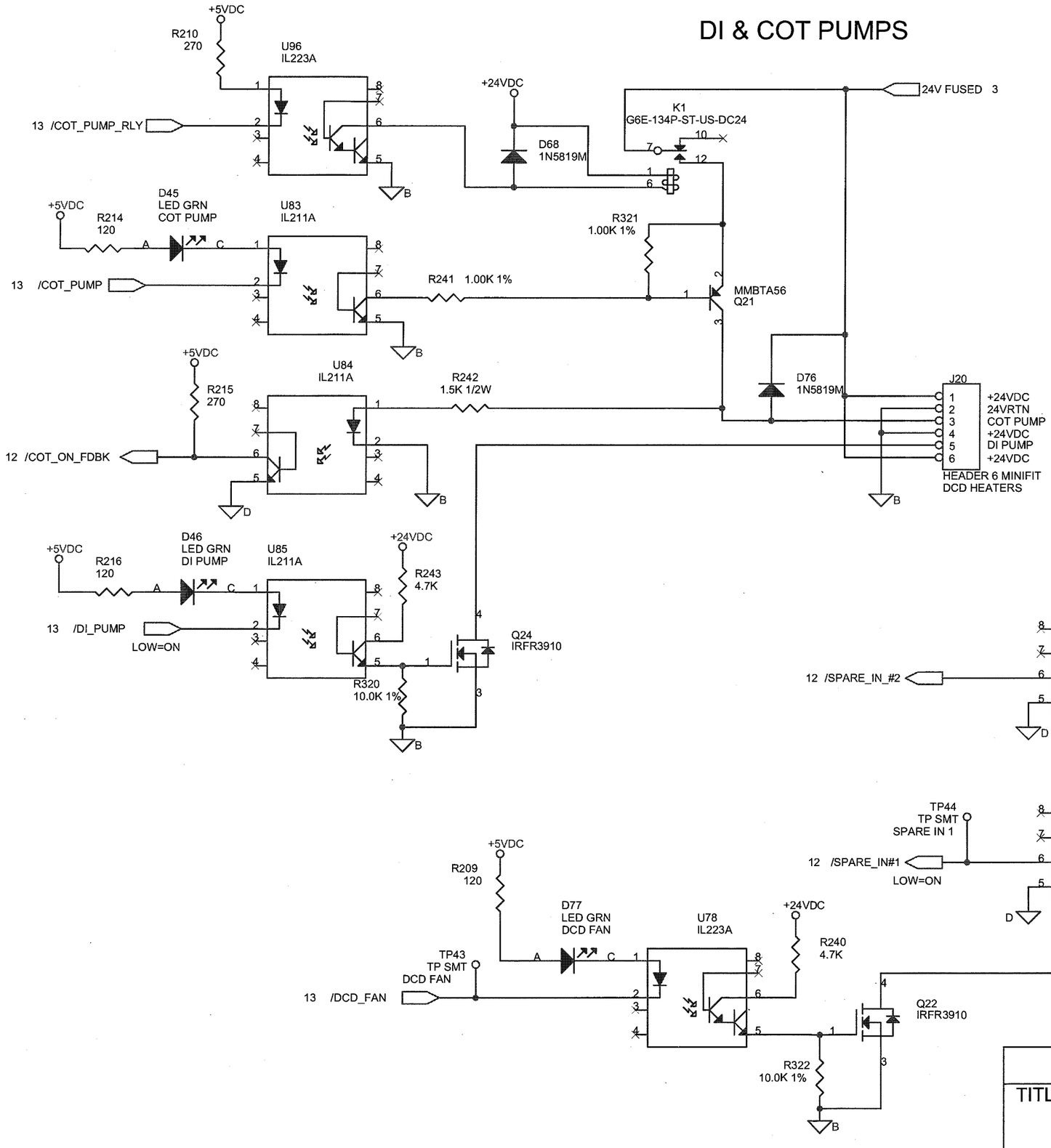
DI & COT PUMPS



CANDELA CORPORATION		PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691 REV.: 09
	DATE: Friday, October 14, 2005	SHEET 4 OF 16

TEMP, PRESSURE AND HP CIRCUITS

R168 10.0K 1%
R163 10.0K 1%
R164 1.5k
R169 100k
U57A OPA2234
SPARE_A/D 16

TP36
TP SMT
DCD PRESSURE

V = (.0267)x(psi) +0.5
psi = (V-.5)x(37.5)
0.5V = 0 psi
4.5V=150 psi (+/- 3 psi)

R158 100
DCD_PRES
DCD_PRES 16

C122 0.1uF 50V
R185 267 1%
R189 2.26K 1%
U59A OPA2234
R186 6.49K 1%
R179 6.49K 1%
+15VDC
C118 0.1uF 50V
U59B OPA2234
C123 0.1uF 50V
-15VDC

0.1V/C
10V = 100 DEGREES C (+/- 4C)
TP38
TP SMT
DCD HEATER TEMP

R178 1.00K 1%
D39 LL6263
R184 1.00K 1%
DCD_HTR_TEMP 16

J15
SPARE AGND 1
SPARE A/D 2
AGND 3
DCD TEMP + 4
DCD TEMP - 5
+5VDC 6
UNUSED 7
DCD PRES 8
DCD PRES RTN 9
DCD PRES 5V 10
WATER TEMP+ 11
WATER TEMP- 12
ANALOG HEADER 12 R/A .100

R194 2.26K 1%
R193 931 1%
R190 2.26K 1%

C120 0.1uF 50V
R181 732 1%
R182 4.12K 1%
U60A OPA2234
R180 10.0K 1%
R188 10.0K 1%
+15VDC
C119 0.1uF 50V
U60B OPA2234
C124 0.1uF 50V
-15VDC

0.1V/C
10V = 100 DEGREES C (+/- 4C)
TP37
TP SMT
DI TEMP

R177 1.00K 1%
D38 LL6263
R176 1.00K 1%
DI_TEMP 16

R192 1.00K 1%
R191 604 1%
R187 4.12K 1%

+15VDC
R155 470
R161 470
R156 470
R160 470
5.0V
U55 TL431ACD
R172 10.0K 1%
R173 10.0K 1%
C116 1uF 35V

+15VDC
C114 0.1uF 50V
U56 REF02
IN
OUT
TEMP
NC
NC
NC
TRIM
GND

R174 10.0K 1%
+15VDC
C117 0.1uF 50V
R175 10.0K 1%
U58B OPA2234
C121 0.1uF 50V
-15VDC
-4.9VREF 9,10

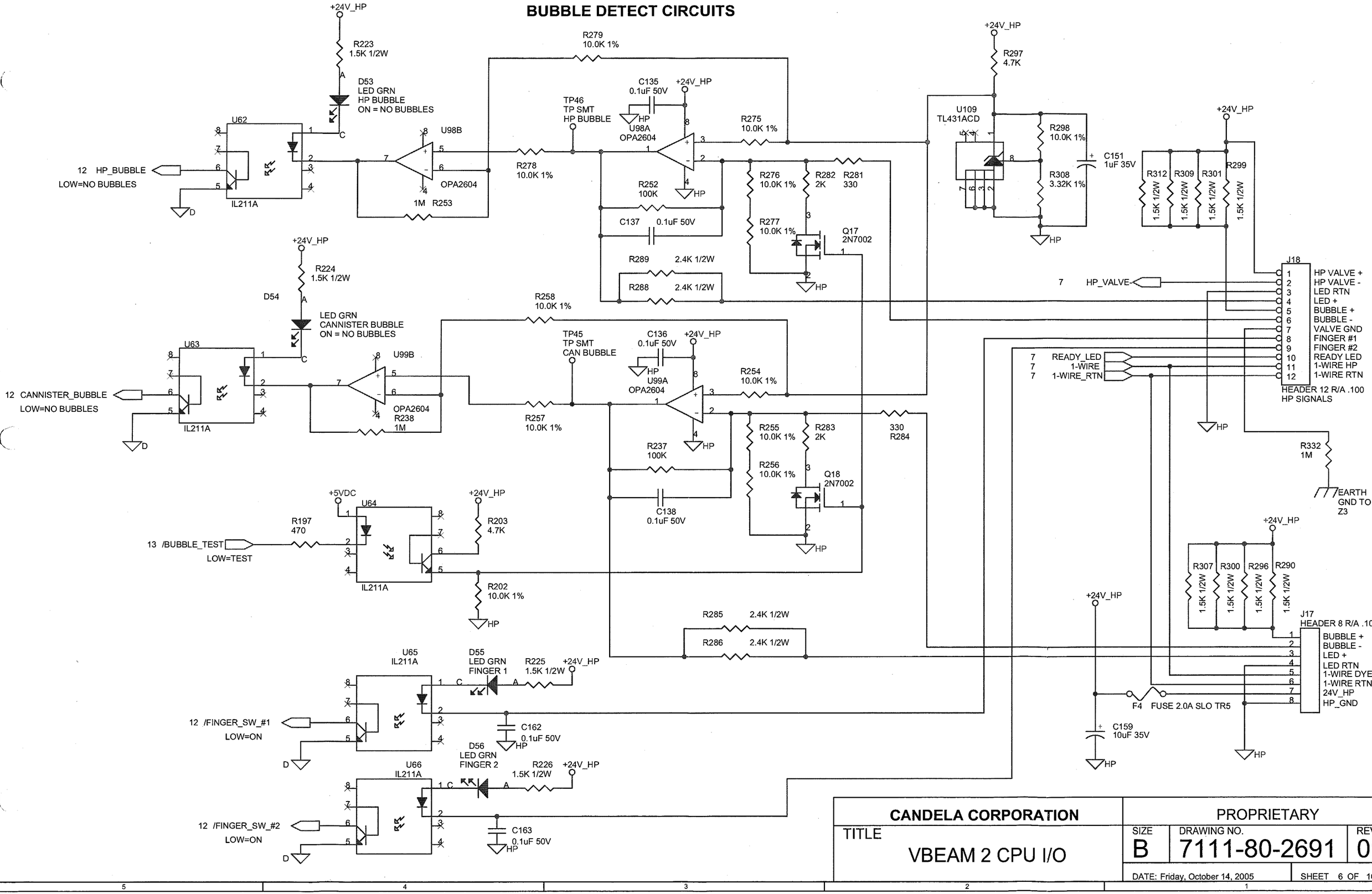
TP35
TP RED
4.9V REF
4.9V
+4.9VREF 14,16

R167 200 1%
+15VDC
C115 0.1uF 50V
U57B OPA2234
D36 SMBJ5.0CA
R162 10.0K 1%

CANDELA CORPORATION		PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691 REV.: 09
	DATE: Friday, October 14, 2005	SHEET 5 OF 16

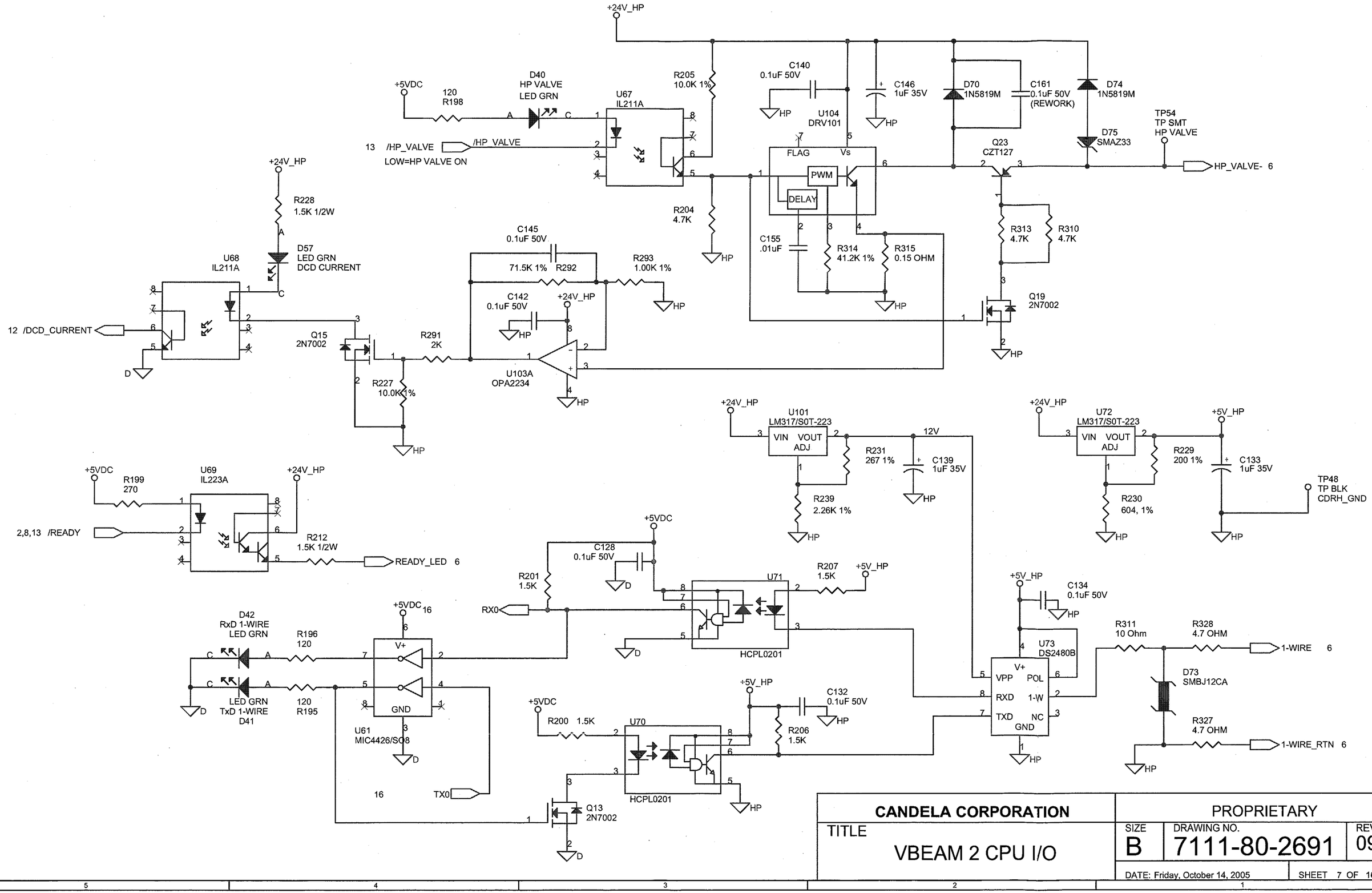
5 4 3 2 1

BUBBLE DETECT CIRCUITS



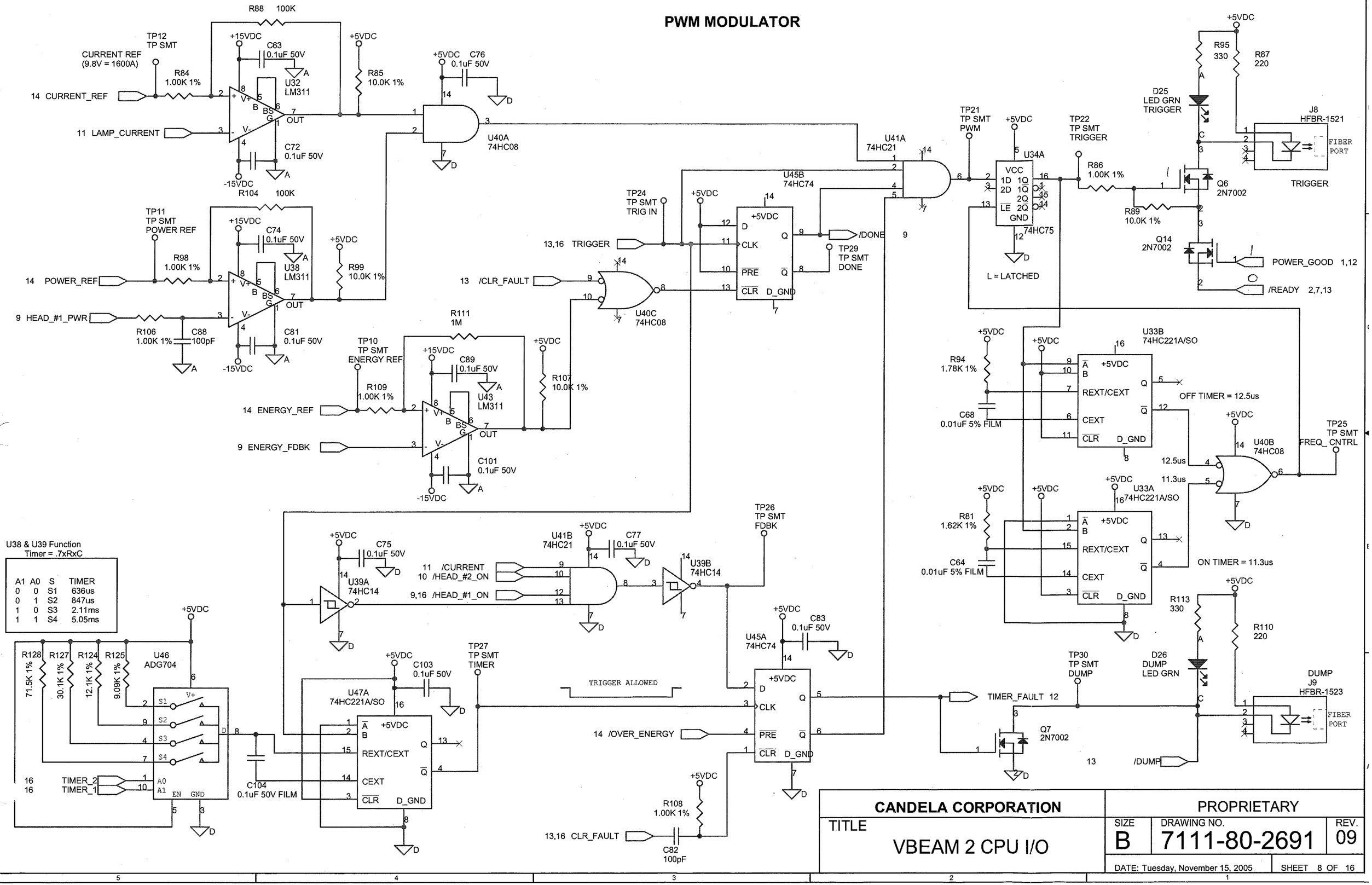
CANDELA CORPORATION		PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691 REV.: 09
	DATE: Friday, October 14, 2005	SHEET 6 OF 16

DCD VALVE and 1-WIRE



CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 7 OF 16	

PWM MODULATOR



CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Tuesday, November 15, 2005	SHEET 8 OF 16	

HEAD #1 ENERGY

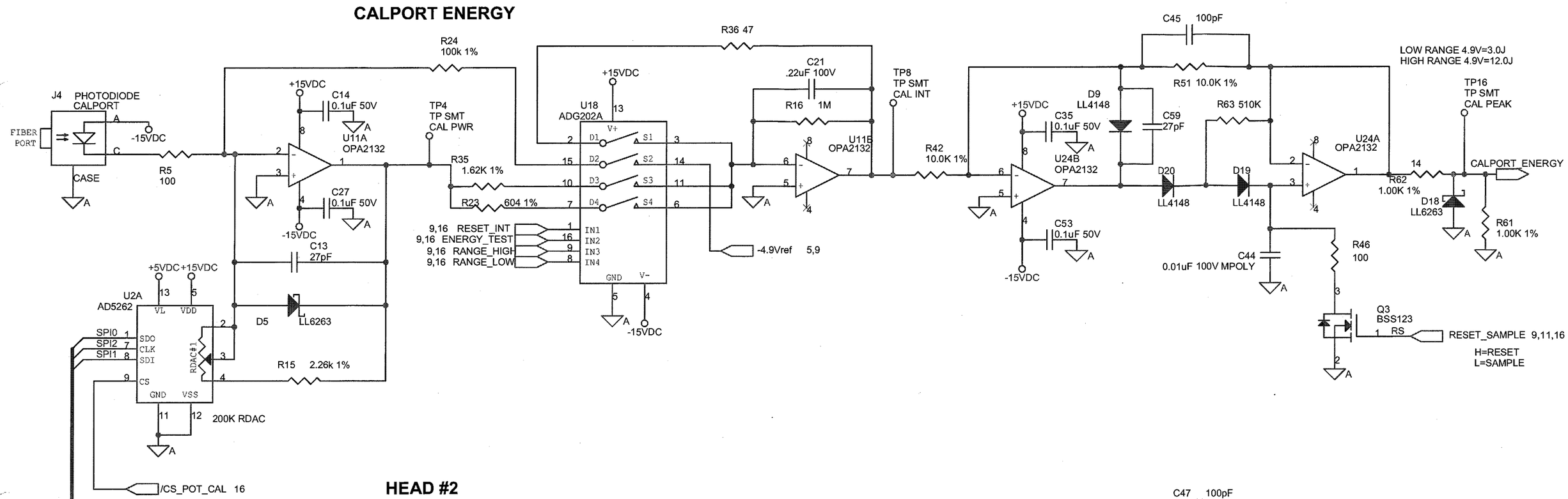
J2 PHOTODIODE HEAD 1
FIBER PORT
CASE
R3 100
R20 100K 1%
-15VDC
+15VDC
C10 0.1uF 50V
U9A OPA2132
C25 0.1uF 50V
TP2 TP SMT HEAD 1 PWR
R32 47
C19 .22uF 100V
R12 1M
U9B OPA2132
TP6 TP SMT HEAD 1 INT
R40 10.0K 1%
C41 100pF
R49 10.0K 1%
ENERGY_FDBK 8
LOW RANGE 4.9V=3.0J
HIGH RANGE 4.9V=12.0J
C33 0.1uF 50V
U22B OPA2132
D7 LL4148
C57 27pF
R57 510K
U22A OPA2132
TP14 TP SMT HEAD 1 PEAK
HEAD_#1_ENERGY
D14 LL4148
D13 LL4148
R56 1.00K 1%
D12 LL6263
R55 1.00K 1%
C51 0.1uF 50V
C40 0.01uF 100V MPOLY
R44 100
Q1 BSS123
RESET_SAMPLE 10,11,16
H=RESET
L=SAMPLE
R31 1.62K 1%
R19 604 1%
U16 ADG202A
10,16 RESET_INT
10,16 ENERGY_TEST
10,16 RANGE_HIGH
10,16 RANGE_LOW
-4.9Vref 5,10
C1 0.1uF 50V
+5VDC
C9 27pF
D3 LL6263
R11 2.26K 1%
U1A AD5262 200K RDAC
SPI0
SPI2
SPI1
SDO
CLK
SDI
CS
RDAC#1
HEAD_#1_PWR 8
/CS_POT_HEAD 16
SPI[0..2]
SPI[0..2] 10,14,16
R78 28.7K 1%
0.24V
R79 470
C62 0.1uF 50V
U31B LM393A
R80 100K
R133 10.0K 1%
/HEAD_#1_ON 8,16
U47B 74HC221A/SO
R136 10.0K 1%
R132 2K
/DONE
TP32 TP SMT LASER PW
LASER_PW 16

WAVELENGTH

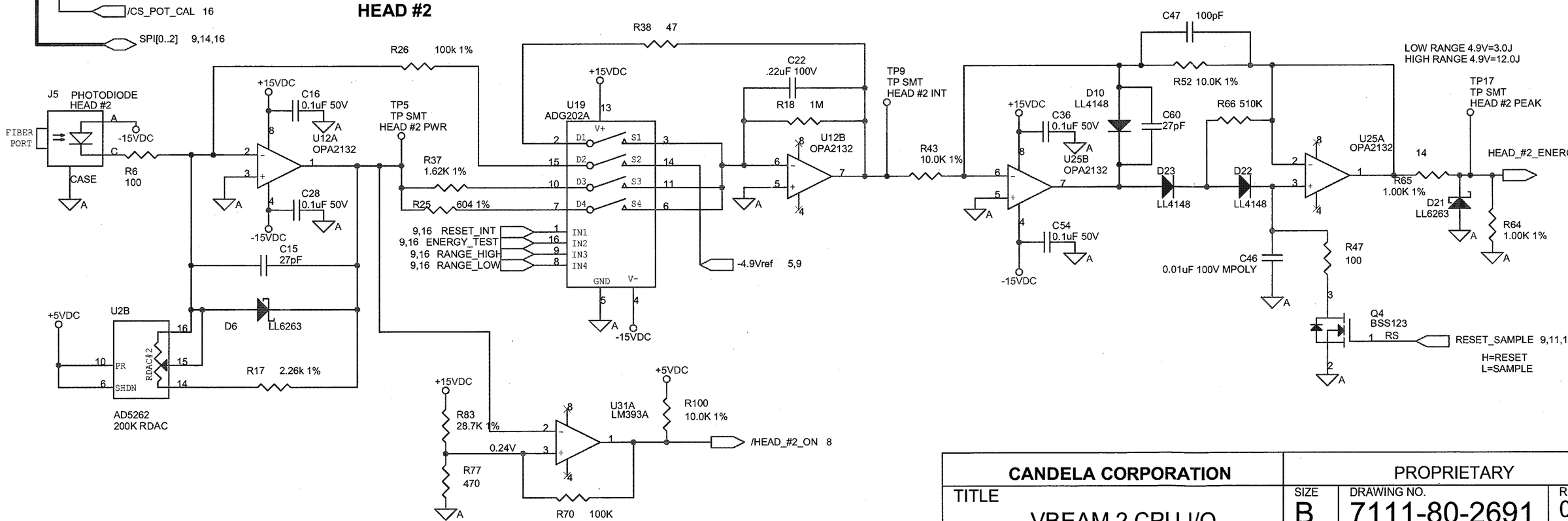
J3 PHOTODIODE WAVELENGTH
FIBER PORT
CASE
R4 100
R22 332K 1%
C12 0.1uF 50V
U10A OPA2132
C26 0.1uF 50V
TP3 TP SMT WAVELENGTH
R33 1.62K 1%
R21 604 1%
U17 ADG202A
10,16 RESET_INT
10,16 ENERGY_TEST
10,16 RANGE_HIGH
10,16 RANGE_LOW
-4.9Vref 5,10
C11 27pF
D4 LL6263
R13 332K 1%
U1B AD5262 200K RDAC
RDAC#2
R34 47
C20 .22uF 100V
R14 1M
U10B OPA2132
TP7 TP SMT WAVE INT
R41 10.0K 1%
C43 100pF
R50 10.0K 1%
LOW RANGE 4.9V=3.0J
HIGH RANGE 4.9V=12.0J
C34 0.1uF 50V
U23B OPA2132
D8 LL4148
C58 27pF
R60 510K
U23A OPA2132
TP15 TP SMT WAVE PEAK
WAVELENGTH
D17 LL4148
D16 LL4148
R59 1.00K 1%
D15 LL6263
R58 1.00K 1%
C52 0.1uF 50V
C42 0.01uF 100V MPOLY
R45 100
Q2 BSS123
RESET_SAMPLE 10,11,16
H=RESET
L=SAMPLE

CANDELA CORPORATION			PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 9 OF 16	

CALPORT ENERGY

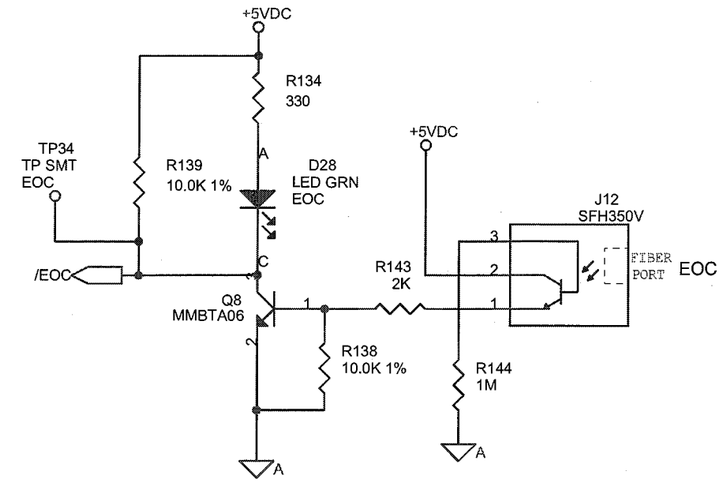


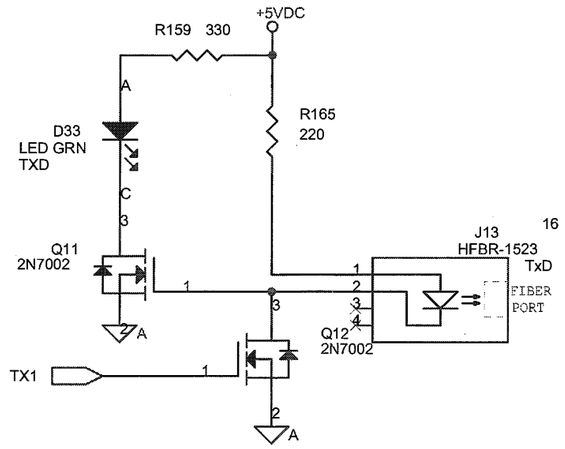
HEAD #2

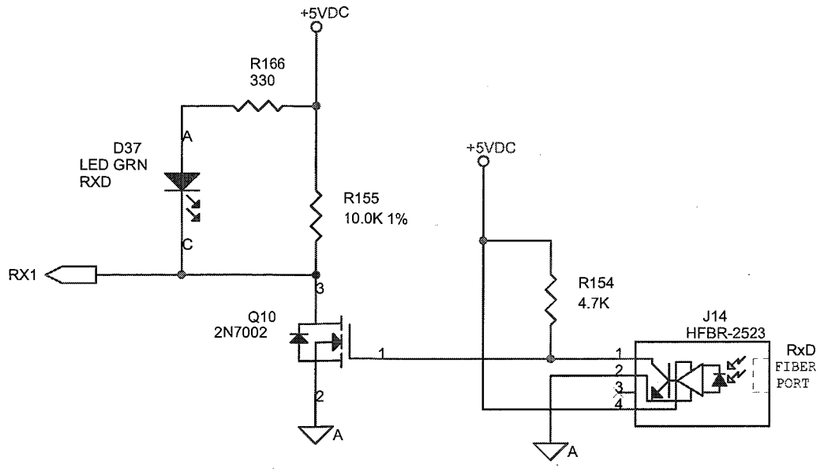


CANDELA CORPORATION			PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005		SHEET 10OF 16

HVPS INTERFACE



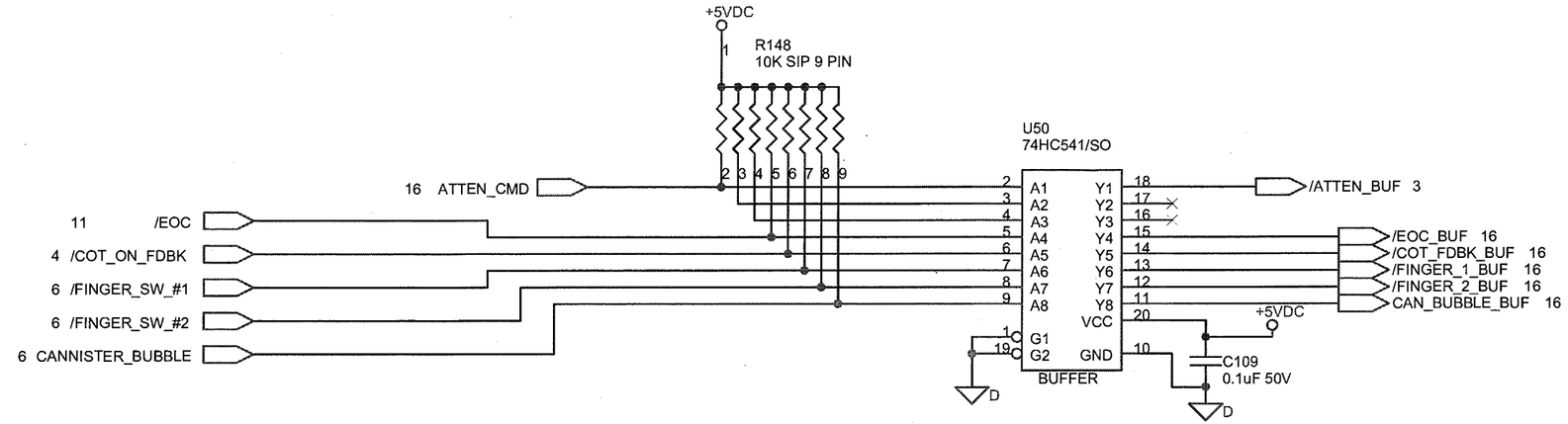


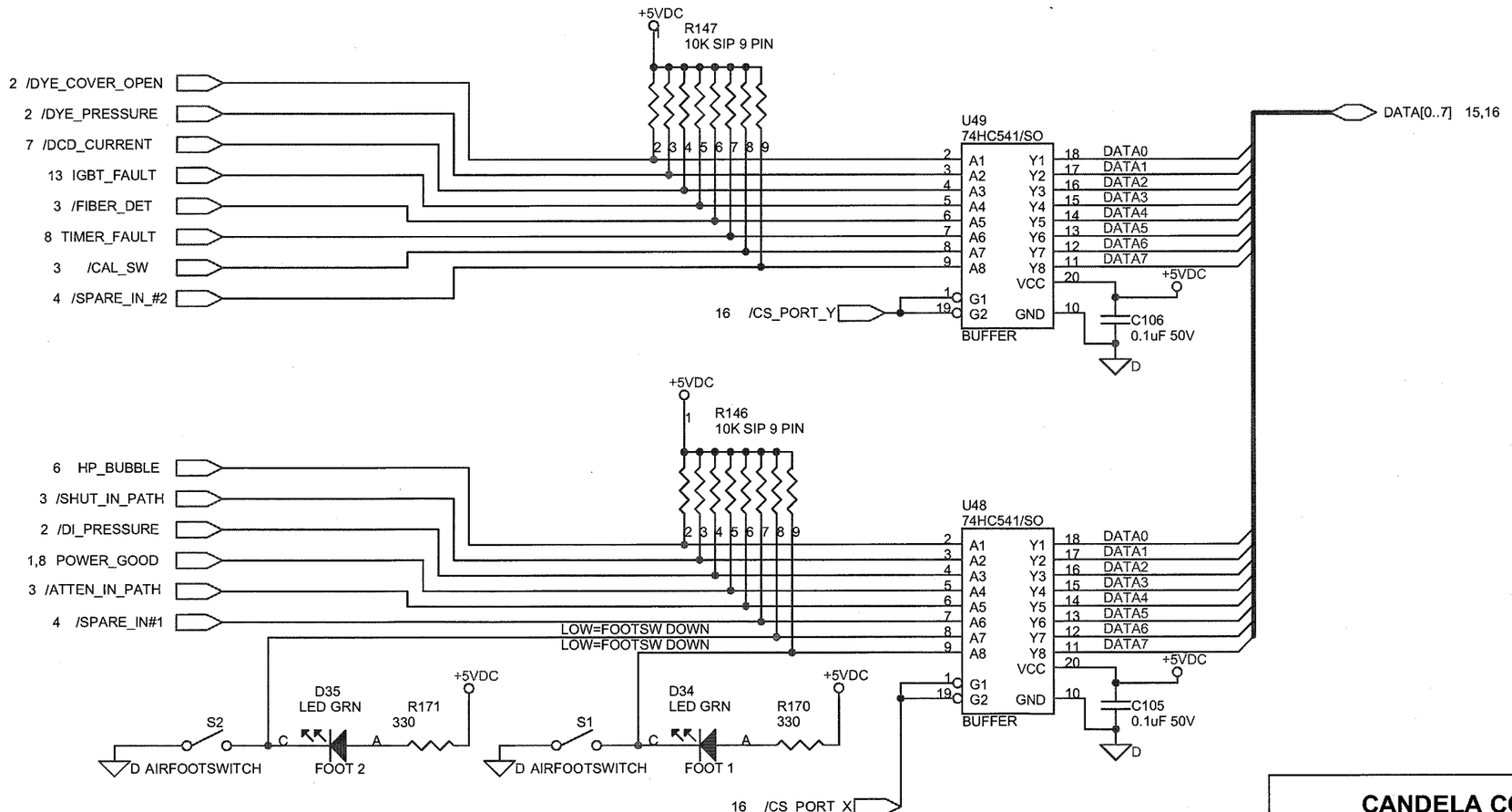


LAMPCURRENT

CANDELA CORPORATION			PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 11OF 16	

INPUT SIGNAL CIRCUITS





CANDELA CORPORATION		PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691
	REV.: 09	
	DATE: Friday, October 14, 2005	SHEET 12OF 16

OUTPUT DRIVER CIRCUITS

8,9,12,16 PT[0..7]

PT[0..7]

PT7 — LASER_PW 9,16

PT6

PT5

PT4

PT3

PT2 — TRIGGER 8,16

PT1 — /HEAD_#1_ON 8,9,16

PT0 — /EOC_BUF 12,16

R123
10.0k 1%

D

U51
ULN2803A

16 COT_PUMP

16 READY

16 SHUT_CMD

16 COT_PUMP_RLY

R131
10K SIP 9 PIN

2 3 4 5 6 7 8 9

1

D

GND — 9

CLAMP — 10

D

DRIVER

1	18	LOW=ENABLE → /COT_PUMP 4
2	17	LOW=ENABLE → /AIM_BEAM 3
3	16	LOW=ENABLE → /DCD_HTR 2
4	15	LOW=ENABLE → /HP_VALVE 7
5	14	LOW=ENABLE → /HX_FAN 2
6	13	→ /READY 2,7,8
7	12	→ /SHUT_CMD 3
8	11	→ /COT_PUMP_RLY 4

+5VDC

C110
0.1uF 50V

C107
10uF 10V

D

U39C
74HC14

14

5 — 6 → /CLR_FAULT 8

7

+5VDC

R10
10.0k 1%

9,10,15,16 PD[0..7]

PD[0..7]

PD7

PD6 — ENERGY_TEST 9,10,16

PD5 — /PROG_ENABLE 15,16

PD4

PD3

PD2

PD1

PD0

U42
ULN2803A

8,16 CLR_FAULT

16 BEEPER

R105
10K SIP 9 PIN

2 3 4 5 6 7 8 9

1

D

GND — 9

CLAMP — 10

D

DRIVER

1	18	LOW=TEST → /BUBBLE_TEST 6
2	17	
3	16	→ /DYE_PUMP 2
4	15	→ /DI_PUMP 4
5	14	LOW=ENABLE
6	13	→ /DUMP 8
7	12	LOW=ENABLE → /DI_HTR 2
8	11	LOW=ENABLE → /DCD_FAN 4

+5VDC

C100
0.1uF 50V

C98
10uF 10V

D

R183
100

+5VDC

BZ1
EFB-CB37C11
BUZZER

+5VDC

R71
330

A

D24
LED GRN
IGBT FAULT

C

Q5
2N7002

1

2

A

+5VDC

R82
10.0K 1%

+5VDC

J6
HFBR-2523

1 2 3 4

IGBT FAULT
FIBER
PORT

A

OFF = FAULT
ON = O.K.

12 IGBT_FAULT

+5VDC

R129
330

R126
220

A

IGBT RESET

LED GRN
RESET IGBT FAULT
D27

C

J10
HFBR-1523

1 2 3 4

FIBER
PORT

CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 13OF 16	

5 | 4 | 3 | 2 | 1

A/D CIRCUITS

9,10,16 SPI[0..2] SPI[0..2]

U8
MAX1247
A/D CONVERTER

SPI2 16 SCLK — VDD 1 — +5VDC
16 /CS_ADC 15 CS — CH0 2
SPI1 14 DIN — CH1 3
13 SSTRB — CH2 4
SPI0 12 DOUT — CH3 5
11 DGND — COM 6
+5VDC 10 AGND — SHDN 7 — +5VDC
9 VDD. — VREF 8 — +4.9VREF 5,16

C18 0.1uF 50V
C8 10uF 10V
C24 0.1uF 50V
C32 2200pF
C31 2200pF
C30 2200pF
C29 2200pF

f=1/2X3.14XRXC

R30 0 Ohm — CALPORT_ENERGY 10
R29 0 Ohm — HEAD_#1_ENERGY 9
R28 0 Ohm — HEAD_#2_ENERGY 10
R27 0 Ohm — WAVELENGTH 9

U7
LM74/SO8
+5VDC C5 0.1uF 50V
SPI0 1 SI/O — V+ 8
SPI2 2 SCLK — NC 6
16 /CS_TEMP 7 CS — NC 5
NC 3
GND 4

TP19
TP SMT
DAC REF

+15VDC
2.45V REF
U30A
OPA2234
R76 10.0K 1% — +4.9VREF 5,16
R69 10.0K 1%

9,10,16 SPI[0..2] SPI[0..2]

U21
SPI1 DIN — VDD +5VDC C39 0.1uF 50V
SPI2 SCLK — VOUT
16 /CS_DAC_ENERGY CS — REFIN
DOUT — AGND
MAX539

R91 10.0K 1%
C65 100pF
R90 10.0K 1%
U35A
OPA2234
ENERGY_REF 8
(FS = 9.8V)

R93 9.09K 1%
C67 100pF
R92 9.09K 1%
+15VDC C66 0.1uF 50V
(FS = 4.9V)
U35B
OPA2234
(A = 1.56)

TP28
TP SMT
OVER_ENERGY REF
+15VDC C90 0.1uF 50V
+5VDC R112 10.0K 1%
9 HEAD_#1_ENERGY
(FS = 4.9V)
U44A
LM393A
/OVER_ENERGY 8

U28
SPI1 DIN — VDD +5VDC C50 0.1uF 50V
SPI2 SCLK — VOUT
16 /CS_DAC_POWER CS — REFIN
DOUT — AGND
MAX539

R103 10.0K 1%
C79 100pF
R97 10.0K 1%
U37B
OPA2234
POWER_REF 8
(FS = 9.8V)

U44B
LM393A
10 HEAD_#2_ENERGY
(FS = 4.9V)

U29
SPI1 DIN — VDD +5VDC C56 0.1uF 50V
SPI2 SCLK — VOUT
16 /CS_DAC_CURRENT CS — REFIN
DOUT — AGND
MAX539

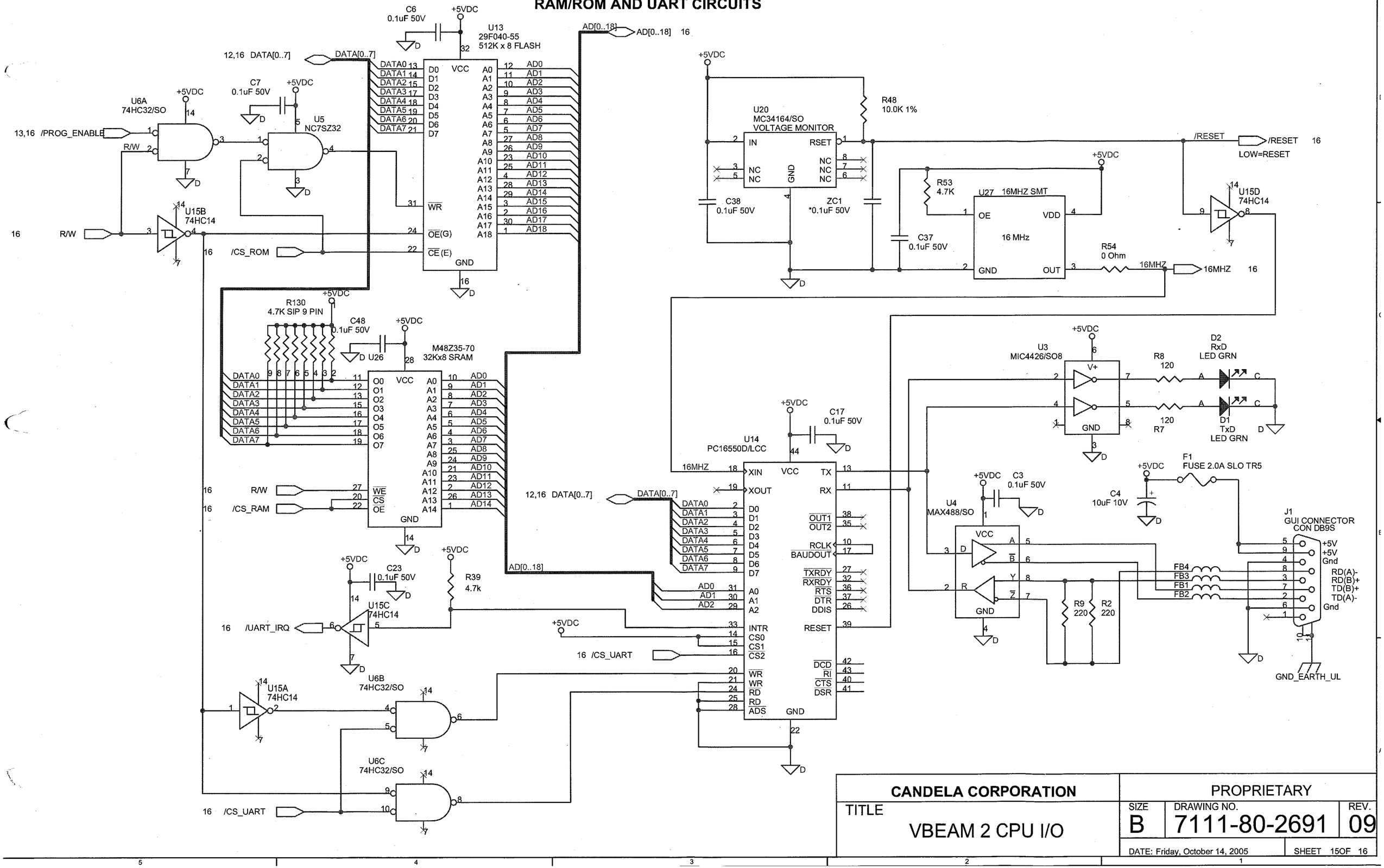
R102 10.0K 1%
C73 100pF
R96 10.0K 1%
+15VDC C78 0.1uF 50V
U37A
OPA2234
CURRENT_REF 8
(FS = 9.8V)

(FS = FULL SCALE)

CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 14OF 16	

5 4 3 2 1

RAM/ROM AND UART CIRCUITS



CANDELA CORPORATION		PROPRIETARY	
TITLE: VBEAM 2 CPU I/O	SIZE: B	DRAWING NO.: 7111-80-2691	REV.: 09
	DATE: Friday, October 14, 2005	SHEET 15OF 16	

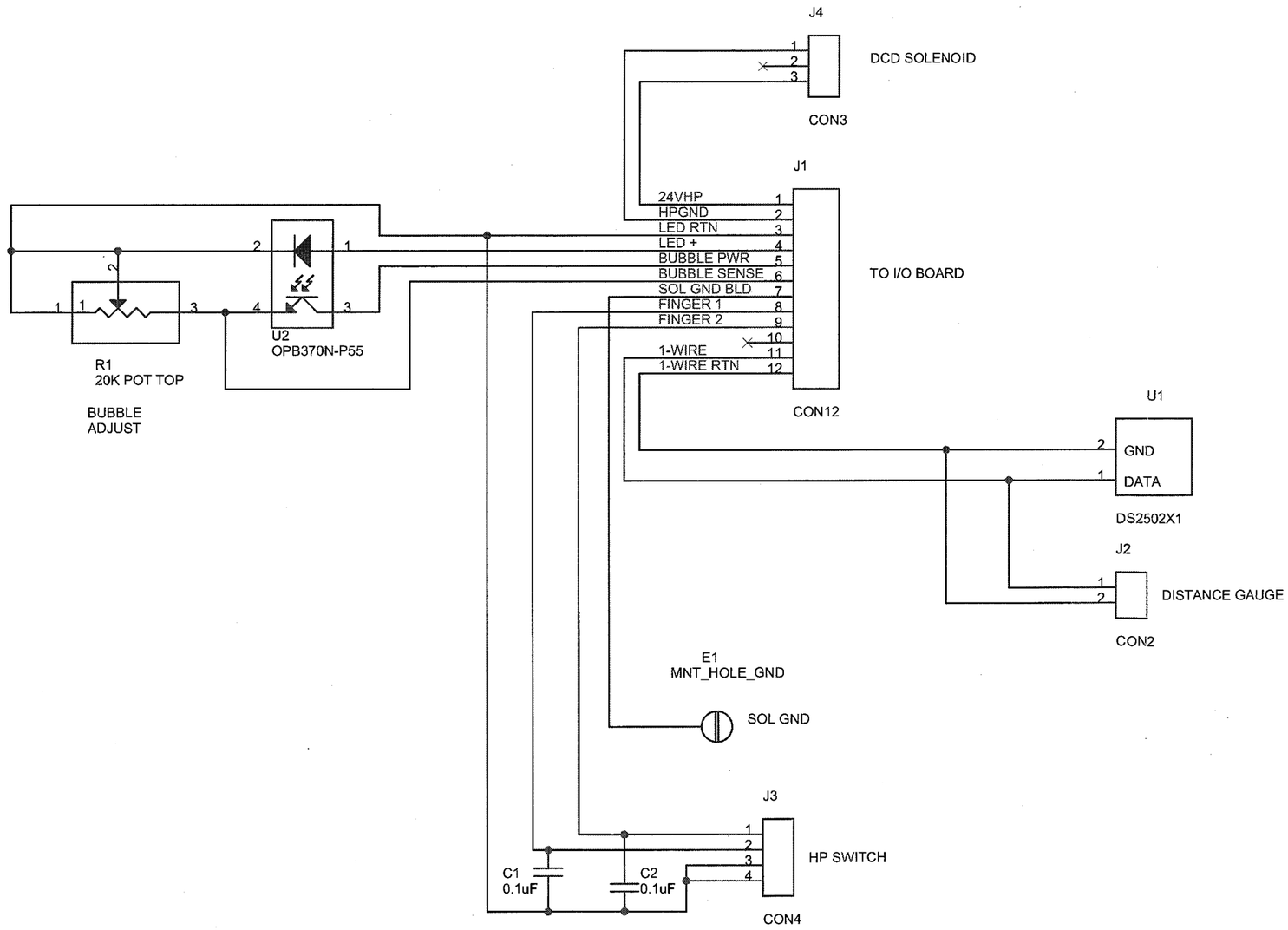
CPU CIRCUITS

CPU

U36
MC68HC812A4

(ANALOG INPUTS FULL SCALE = 4.9V)

CANDELA CORPORATION	PROPRIETARY
TITLE: VBEAM 2 CPU I/O	SIZE: B
DRAWING NO.: 7111-80-2691	REV.: 09
DATE: Friday, October 14, 2005	SHEET 16OF 16



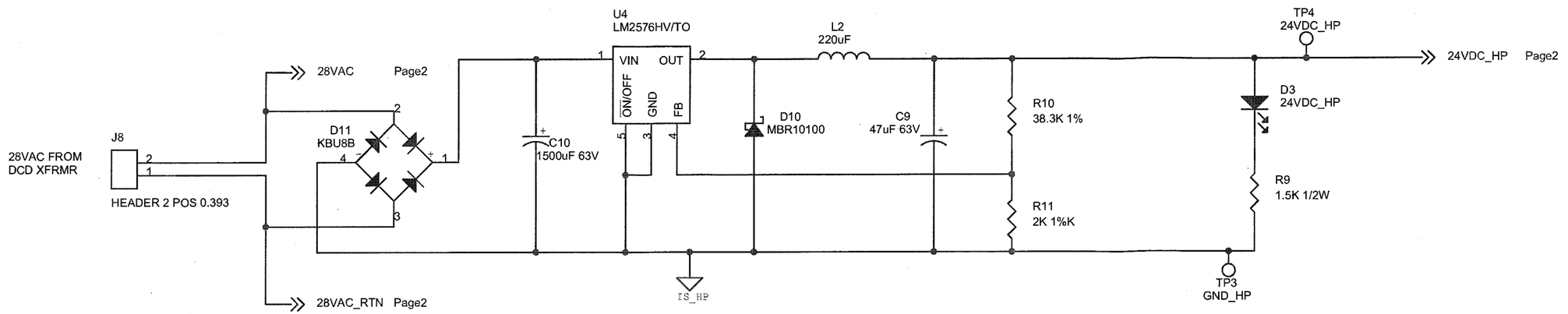
	03						DRAWN	Robert Broderick	2/9/05	PROPRIETARY
ECO#	15374						CHECKED	Robert Broderick	2/23/05	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.
DATE	10/19/05						ENG ELEC	<eng mech>	<medate>	
CHK'D	RB							APPROVED	DATE	

CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

TITLE
SCHEMATIC HANDPIECE PCB, VBEAM2

SIZE	DRAWING NO.	REV.
B	7111-80-2695	03

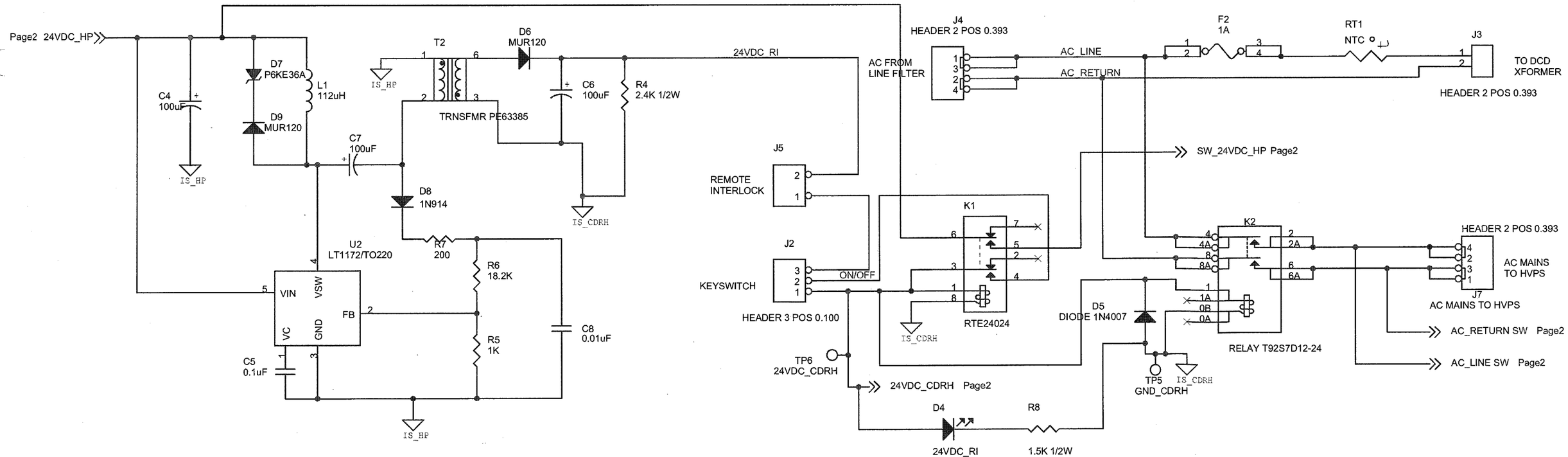
DATE: Wednesday, October 19, 2005 SHEET 1 OF 1



04

15045

5/12/05



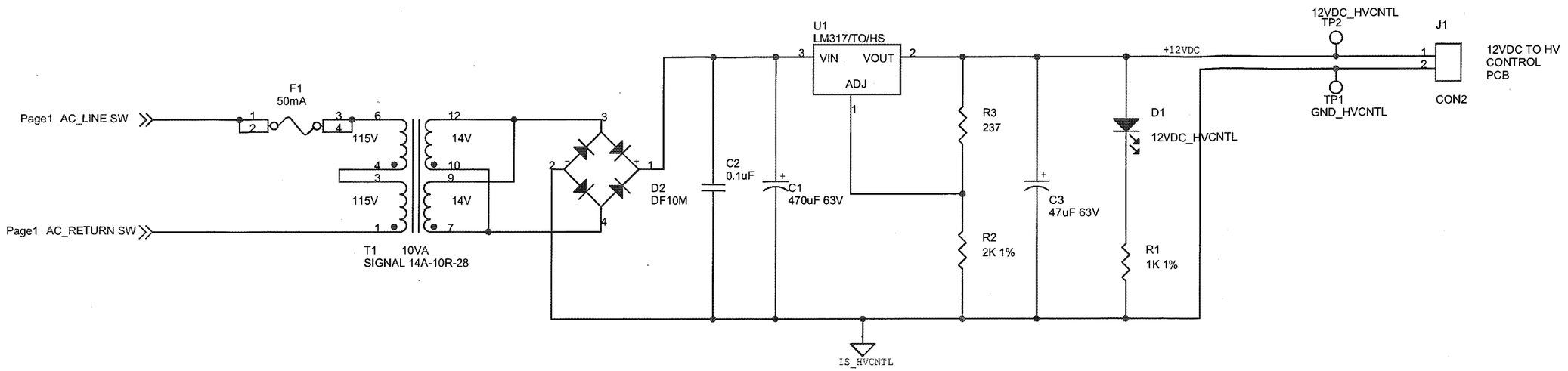
REV	04						DRAWN	Robert Broderick	5/12/05	PROPRIETARY
ECO#	15045						CHECKED	<checked>	<chkdate>	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.
DATE	5/12/05						ENG ELEC	Robert Broderick	5/12/05	
CHK'D								APPROVED	DATE	

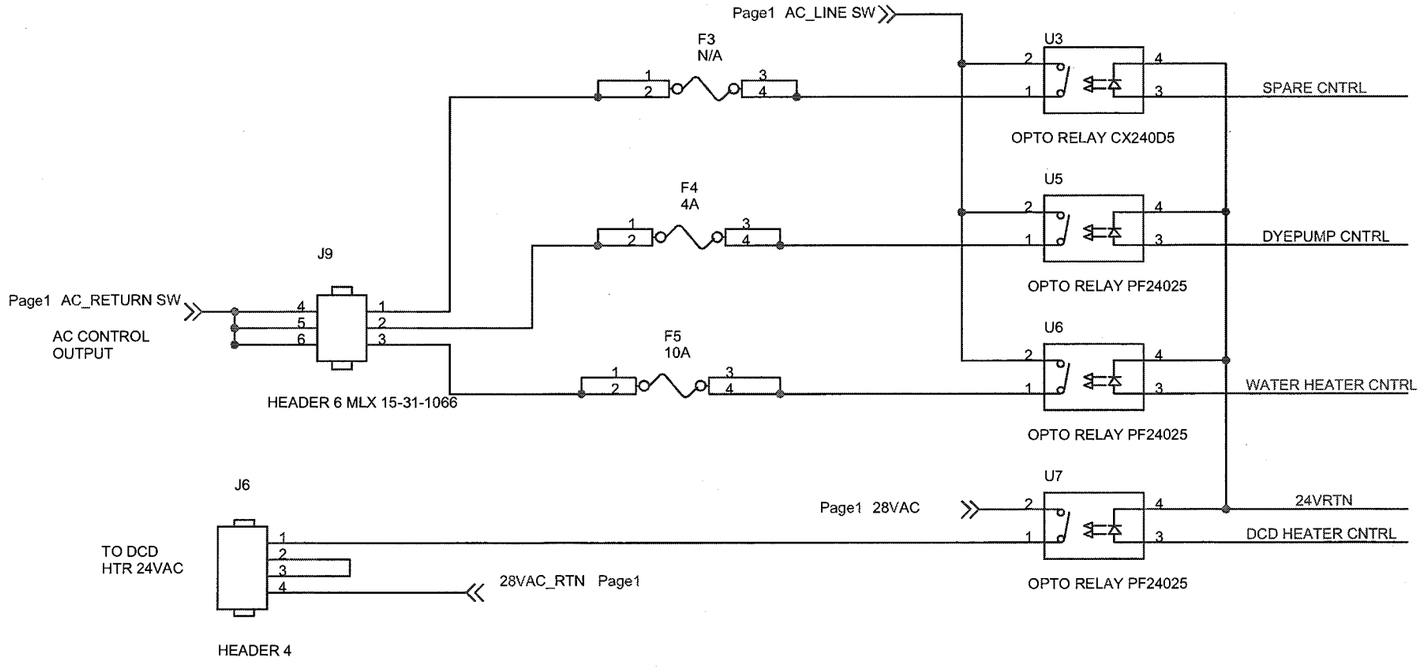
CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

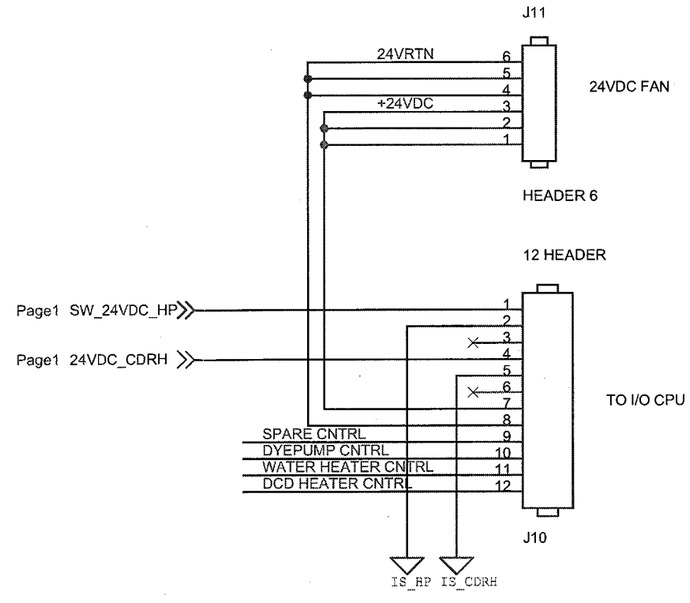
TITLE
Schematic, AC Board, VBEAM2

SIZE	DRAWING NO.	REV.
B	7111-80-2696	04

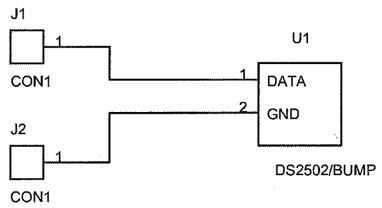
DATE: Tuesday, May 24, 2005 SHEET 1 OF 2



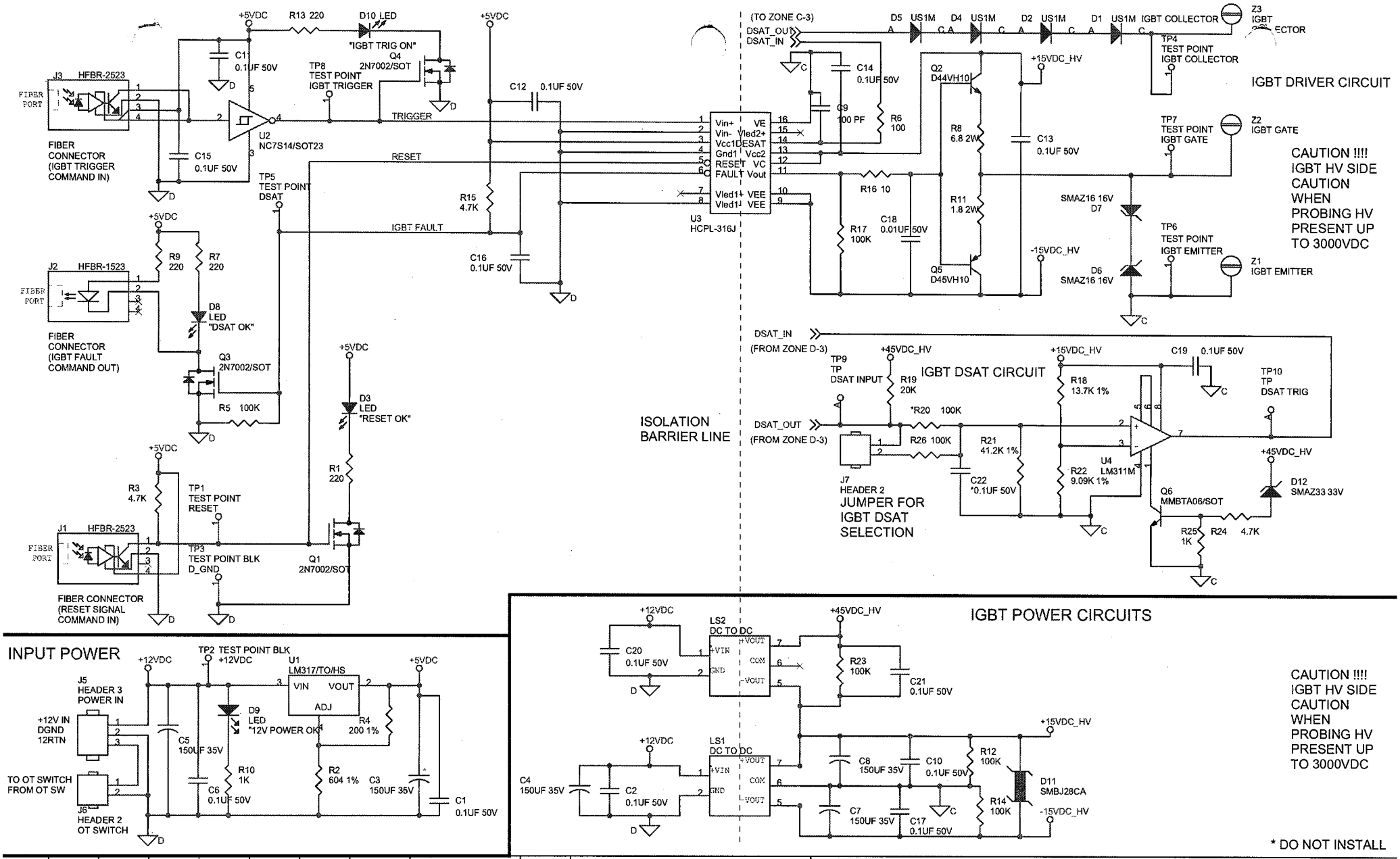




CANDELA CORPORATION		PROPRIETARY
TITLE Schematic, AC Board VBEAM2	SIZE B	DRAWING NO. 7111-80-2696 REV. 04
	DATE: Friday, May 13, 2005	SHEET 2 OF 2



REV	B						DRAWN	Robert Broderick	5/20/2005	PROPRIETARY	**CANDELA CORPORATION** 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883
ECO#	15076						CHECKED	Robert Broderick	5/20/2005	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.	TITLE: SCHEMATIC DISTANCE GAUGE PCB, VB2
DATE	5/23/05						ENG ELEC	Robert Broderick	5/20/2005		SIZE: B; DRAWING NO.: 7111-80-2698; REV.: B
CHK'D							APPROVED		DATE		DATE: Monday, May 23, 2005; SHEET 1 OF 1



REV	10	11	12	13	14		DRAWN	OWEN SCHIRDUAN	1-20-05
ECO#	14824	15110	15166	15240	15373		CHECKED	SCOTT MOGREN	1-20-05
DATE	1-20-05	6-8-05	7-28-05	08-30-05	10-20-05		ENG ELEC	OWEN SCHIRDUAN	1-20-05
CHK'D	OKS	OKS	OKS	OKS	OKS			APPROVED	DATE

CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

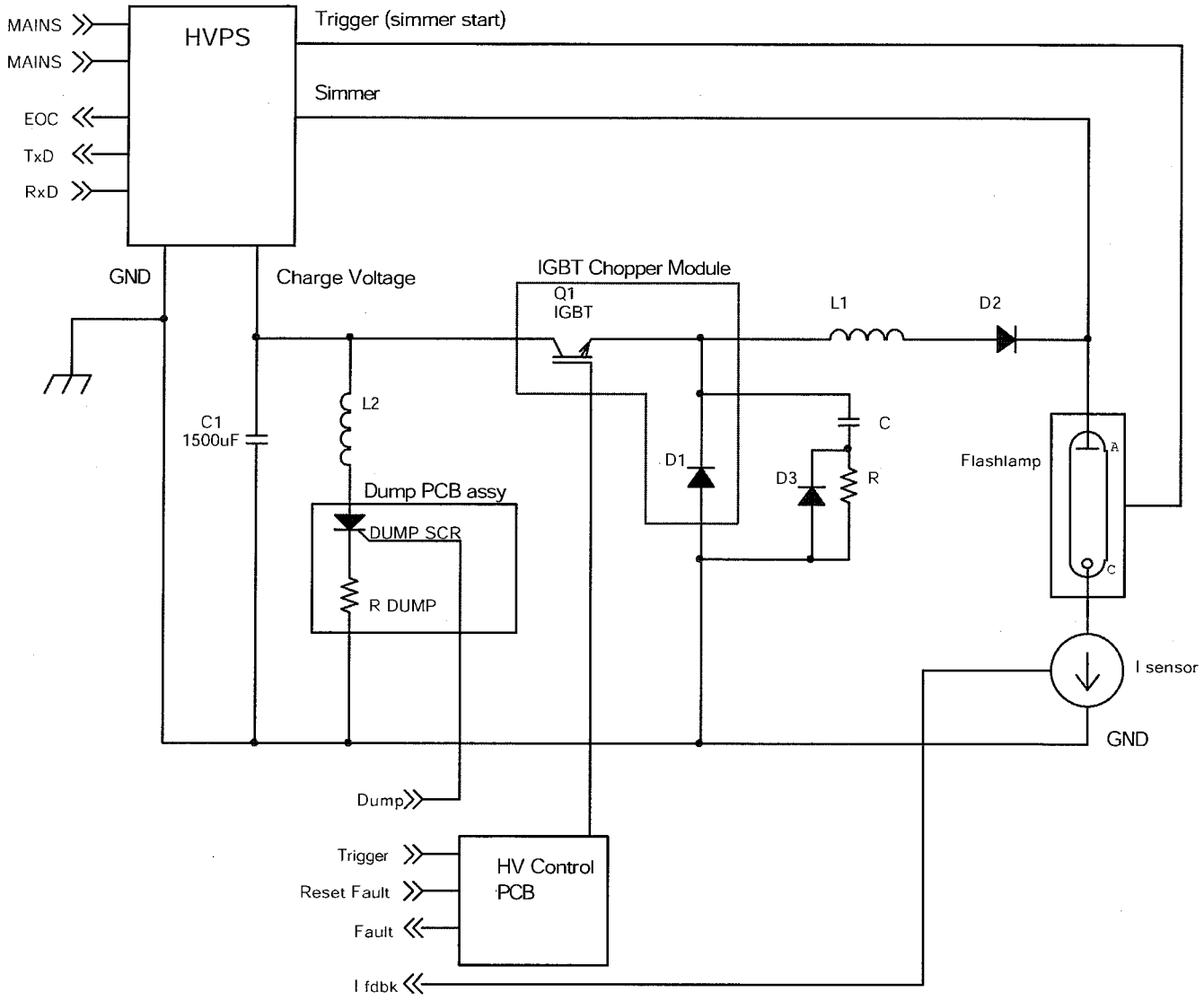
TITLE

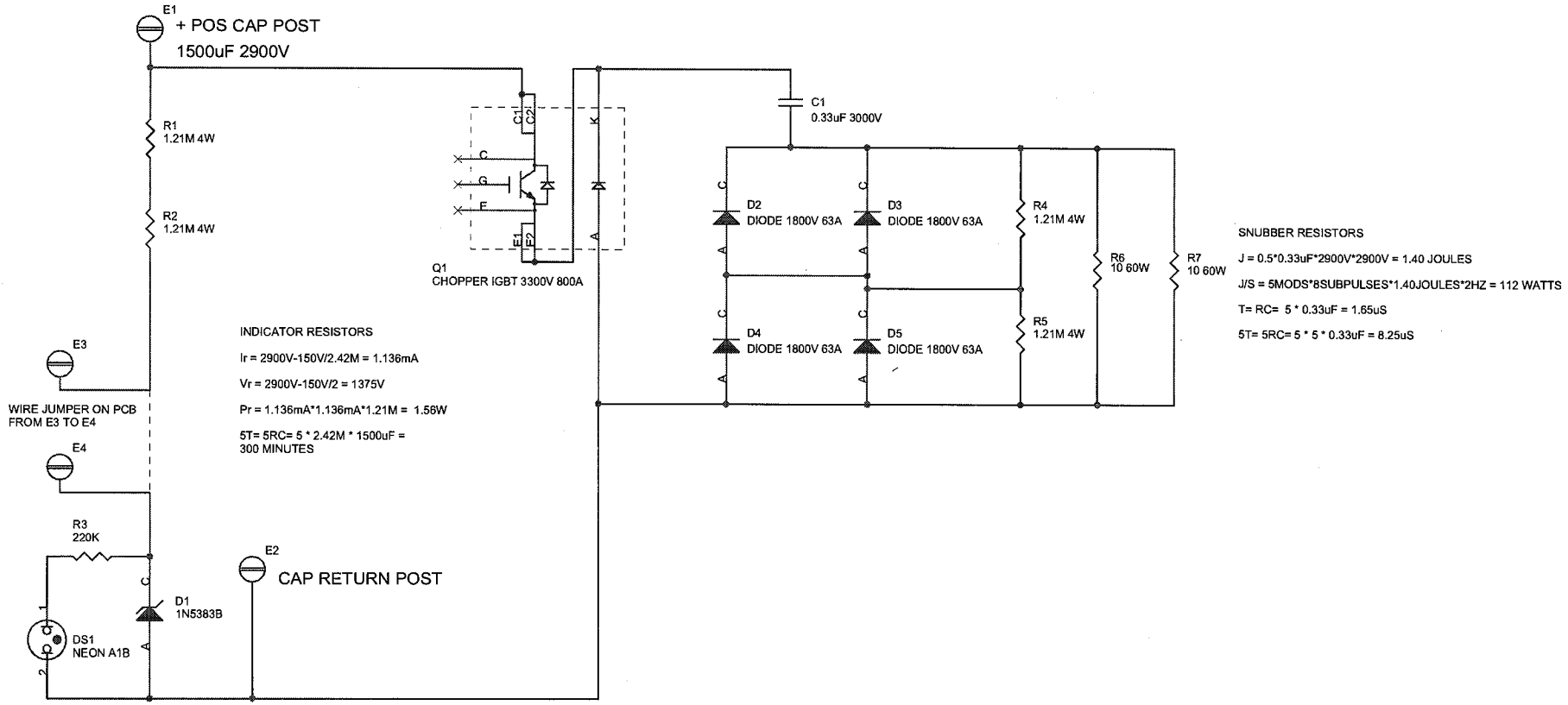
SCH, HV IGBT CNTL PCB, VBEAM2

SIZE	DRAWING NO.	REV.
B	7111-80-2694	14

DATE: Thursday, October 20, 2005 SHEET 1 OF 1

Modulator Block Diagram





REV	06	07					DRAWN	OWEN SCHIRDUAN	1-20-05
ECO#	14829	15048					CHECKED	SCOTT MOGREN	1-20-05
DATE	1-20-05	05-12-05					ENG ELEC	OWEN SCHIRDUAN	1-20-05
CHK'D	OKS	OKS						APPROVED	DATE

CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

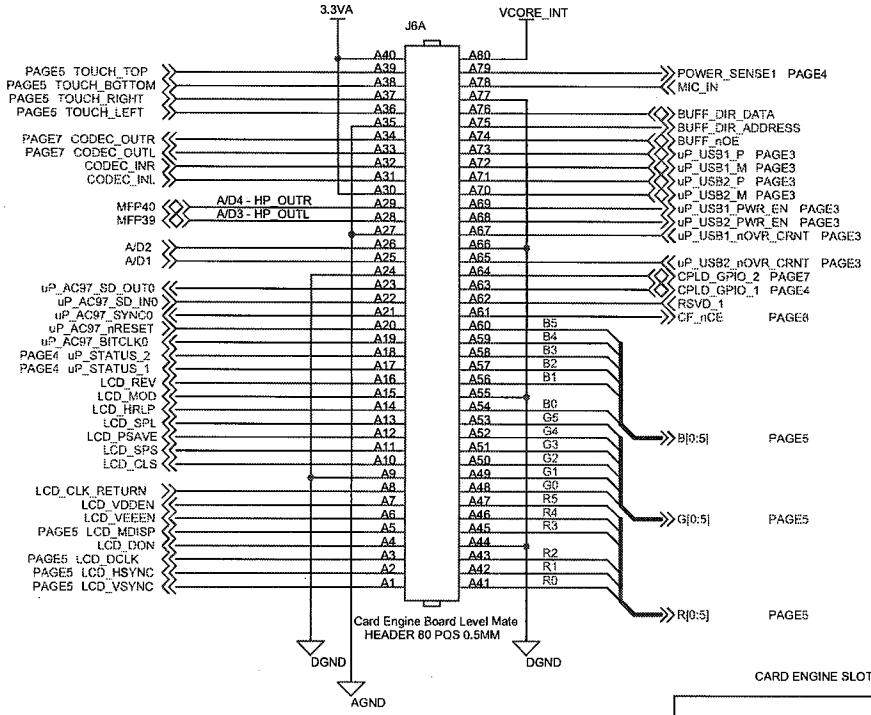
TITLE
SCH, HIGH VOLTAGE PCB,VBEAM2

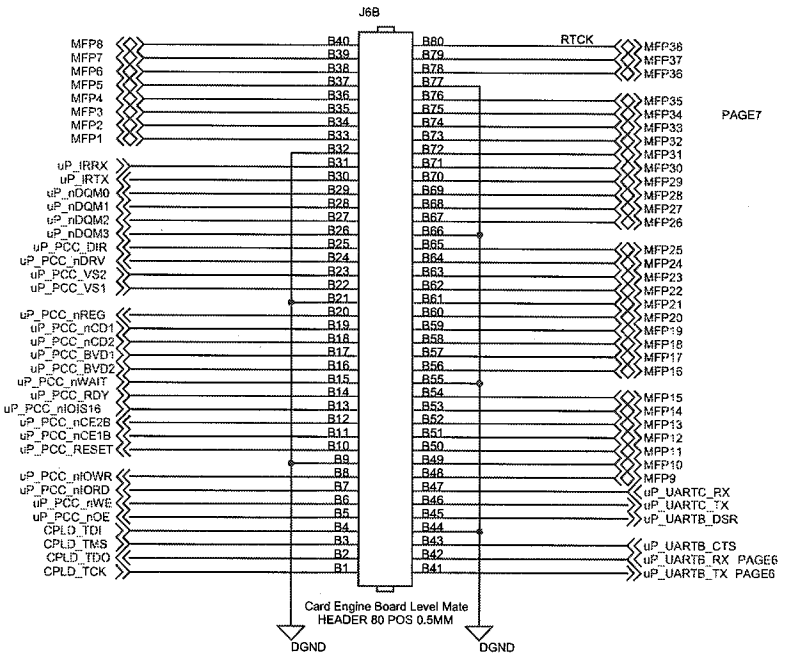
SIZE	DRAWING NO.	REV.
B	7111-80-2693	07

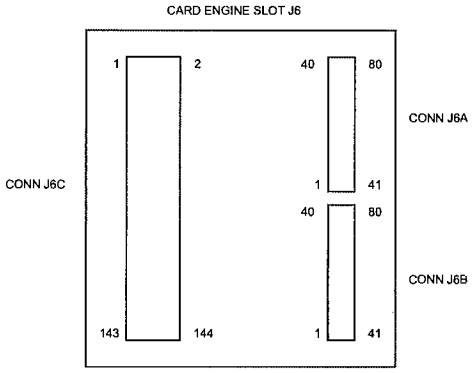
DATE: Monday, May 16, 2005 SHEET 1 OF 1

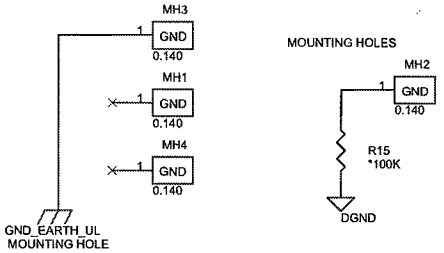
A B C D E

ENGINE CARD EXPANSION BUS - J6A AND J6B









*DO NOT POPULATE

REV	07	08	08				DRAWN	OWEN SCHIRDUAN	3-22-05
ECO#	15011	15145	15240				CHECKED	SCOTT MOGREN	3-22-05
DATE	4-29-05	7-19-05	08-30-05				ENG ELEC	OWEN SCHIRDUAN	3-22-05
CHK'D	OKS	OKS	OKS					APPROVED	DATE

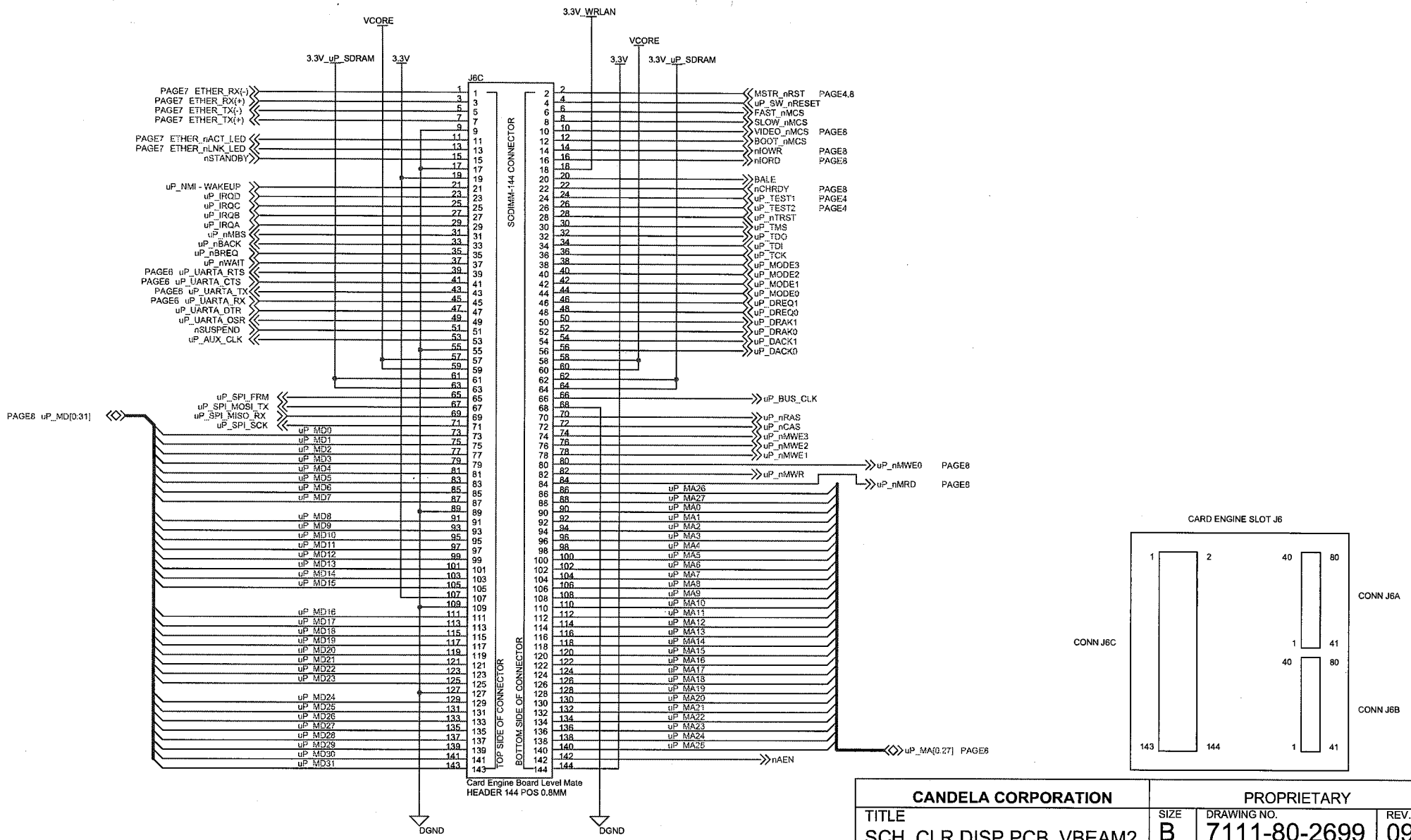
CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

TITLE SCHEMATIC
COLOR DISPLAY PCB, VBM2

SIZE	DRAWING NO.	REV.
B	7111-80-2699	09

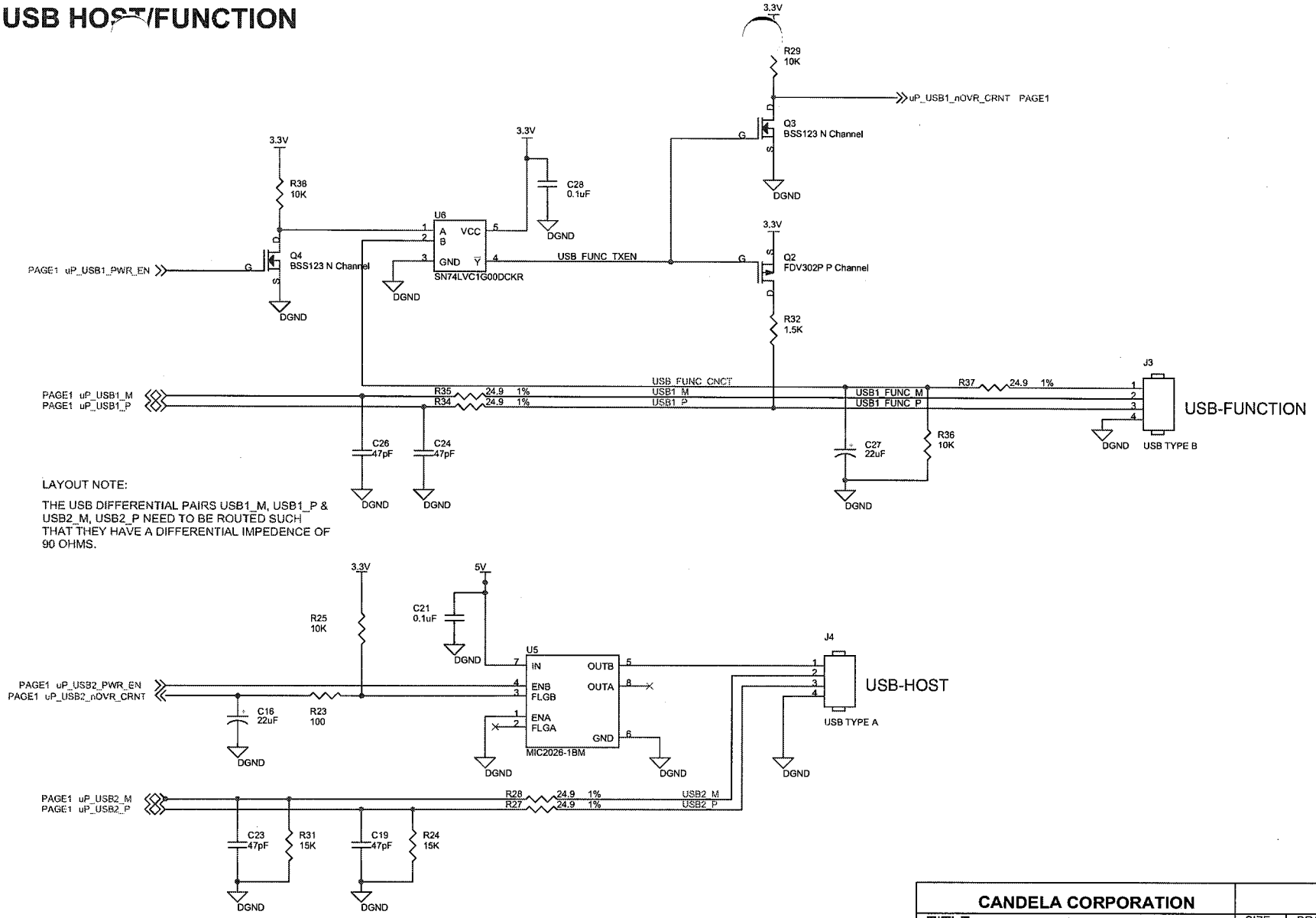
DATE: Tuesday, August 30, 2005 SHEET 1 OF 8

ENGINE CARD EXPANSION BUS - J6C



CANDELA CORPORATION			PROPRIETARY
TITLE SCH, CLR DISP PCB, VBEAM2	SIZE B	DRAWING NO. 7111-80-2699	REV. 09
	DATE: Tuesday, August 30, 2005		SHEET 2 OF 8

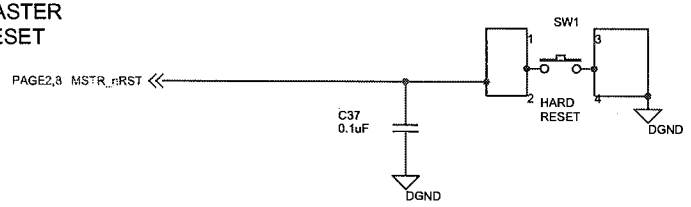
USB HOST/FUNCTION



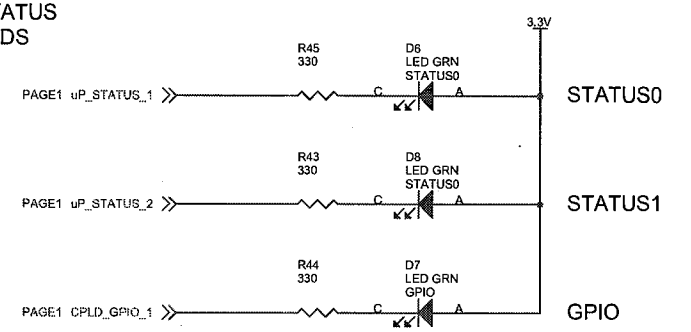
CANDELA CORPORATION			PROPRIETARY
TITLE: SCH, CLR DISP PCB, VBEAM2	SIZE: B	DRAWING NO.: 7111-80-2699	REV.: 09
	DATE: Tuesday, August 30, 2005		SHEET 3 OF 8

POWER

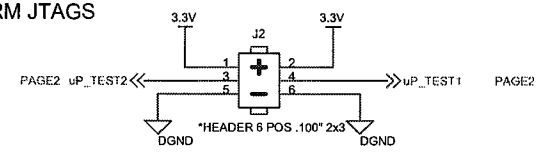
MASTER RESET



STATUS LEDS



SH AND ARM JTAGS



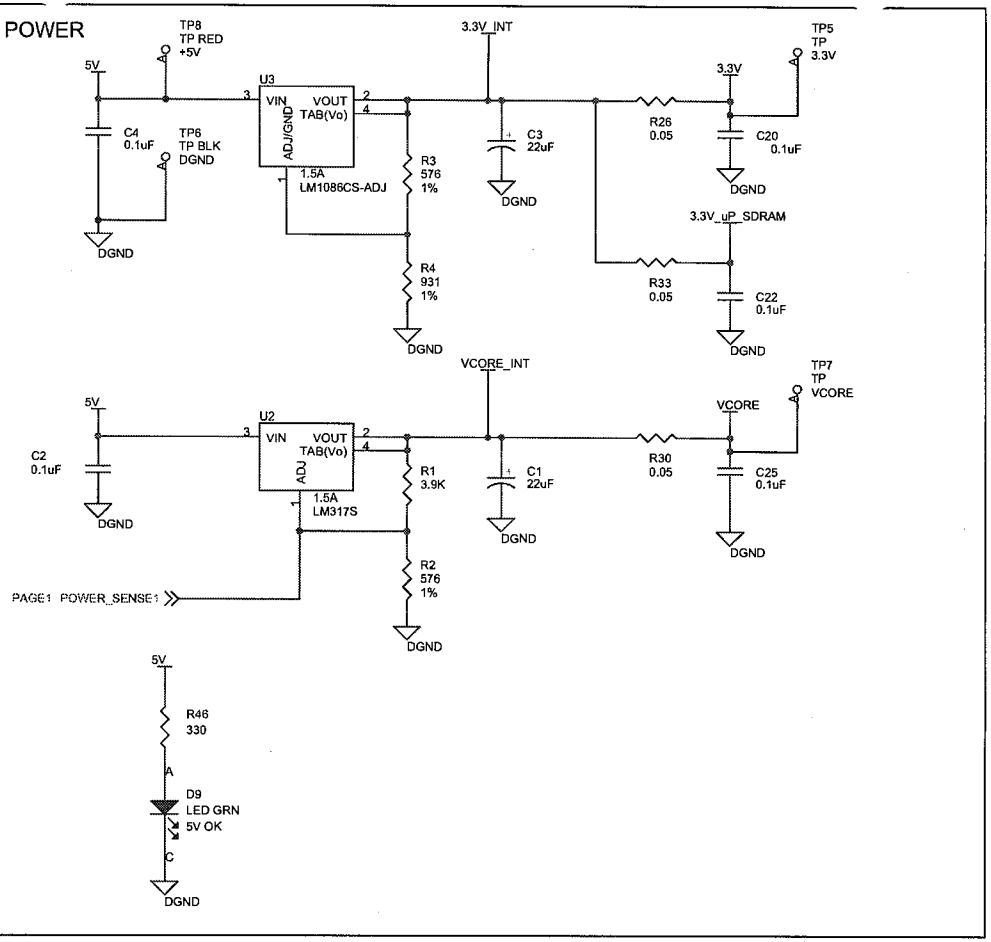
J11 JUMPER SETTINGS FOR NORMAL OPERATION

J6.1.3.5 uP_TEST2 NO POP
J6.2.4.6 uP_TEST1 NO POP

J11 JUMPER SETTINGS FOR JTAG OPERATION

J6.1.3.5 uP_TEST2 +
J6.2.4.6 uP_TEST1 -

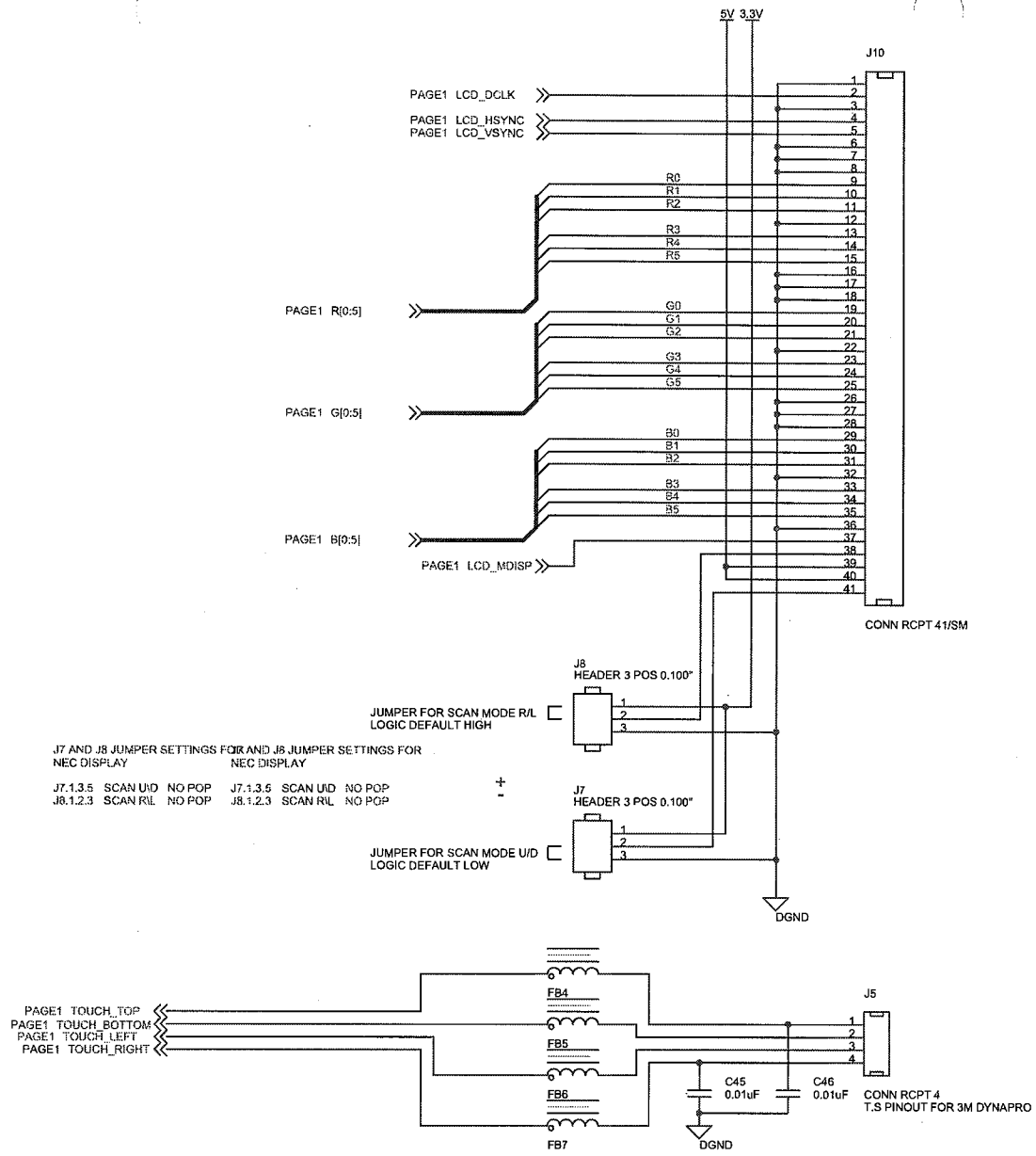
POWER



*DO NOT POPULATE

CANDELA CORPORATION		PROPRIETARY	
TITLE: SCH, CLR DISP PCB, VBEAM2	SIZE: B	DRAWING NO.: 7111-80-2699	REV.: 09
	DATE: Tuesday, August 30, 2005	SHEET 4 OF 8	

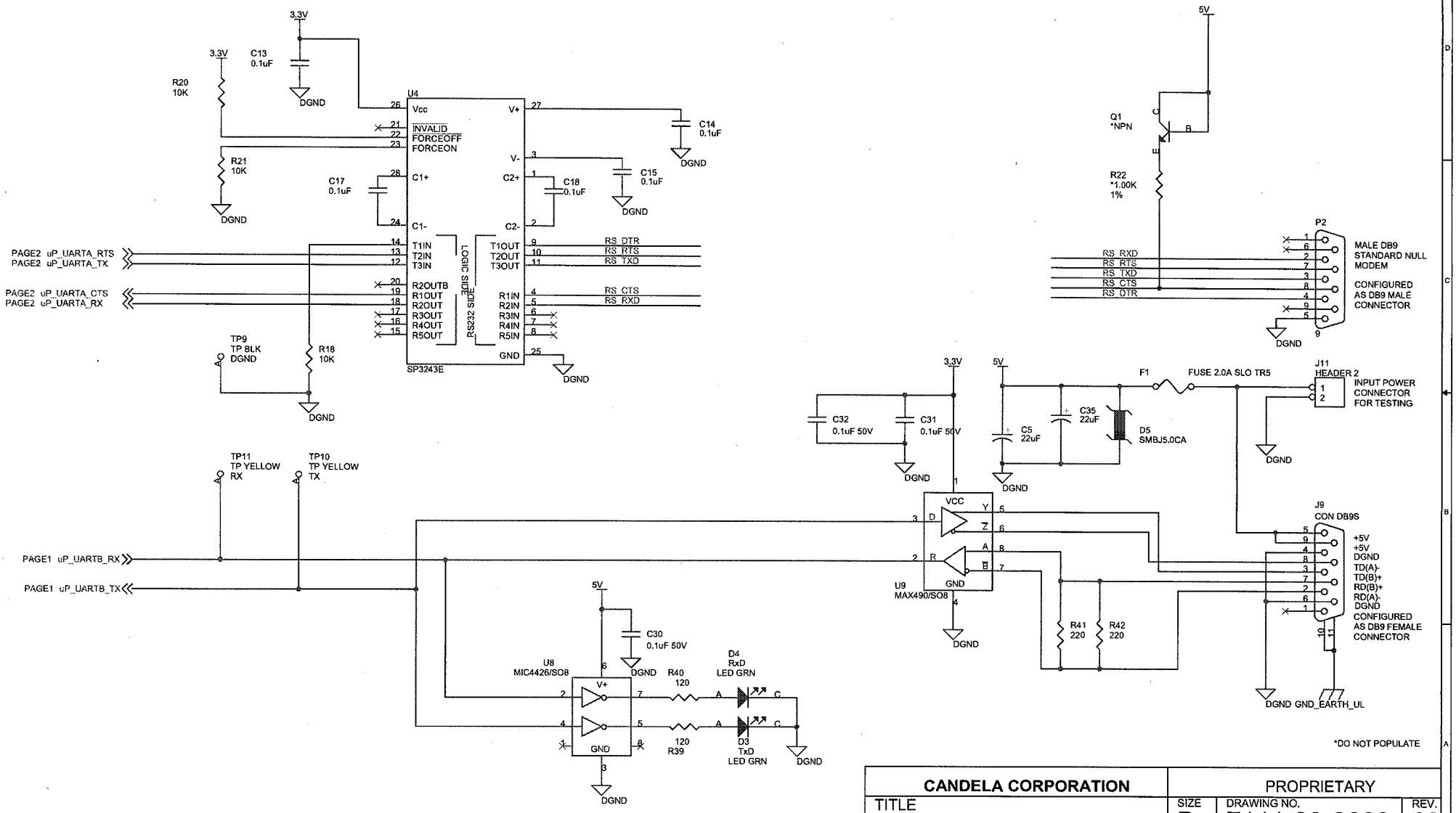
LCD DISPLAY



CANDELA CORPORATION		PROPRIETARY	
TITLE: SCH, CLR DISP PCB, VBEAM2	SIZE: B	DRAWING NO.: 7111-80-2699	REV.: 09
	DATE: Tuesday, August 30, 2005	SHEET 5 OF 8	

RS232, RS422 AND DB9 CONNECTORS

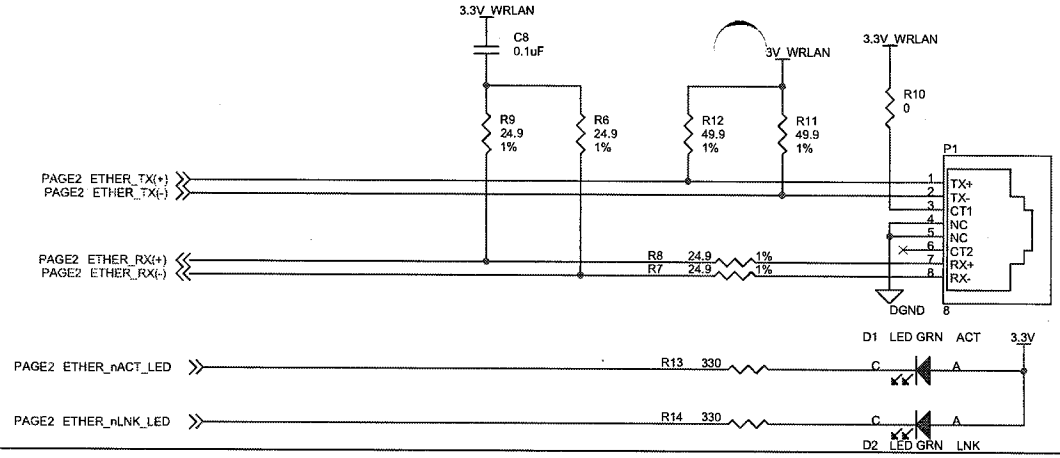
SERIAL PORT



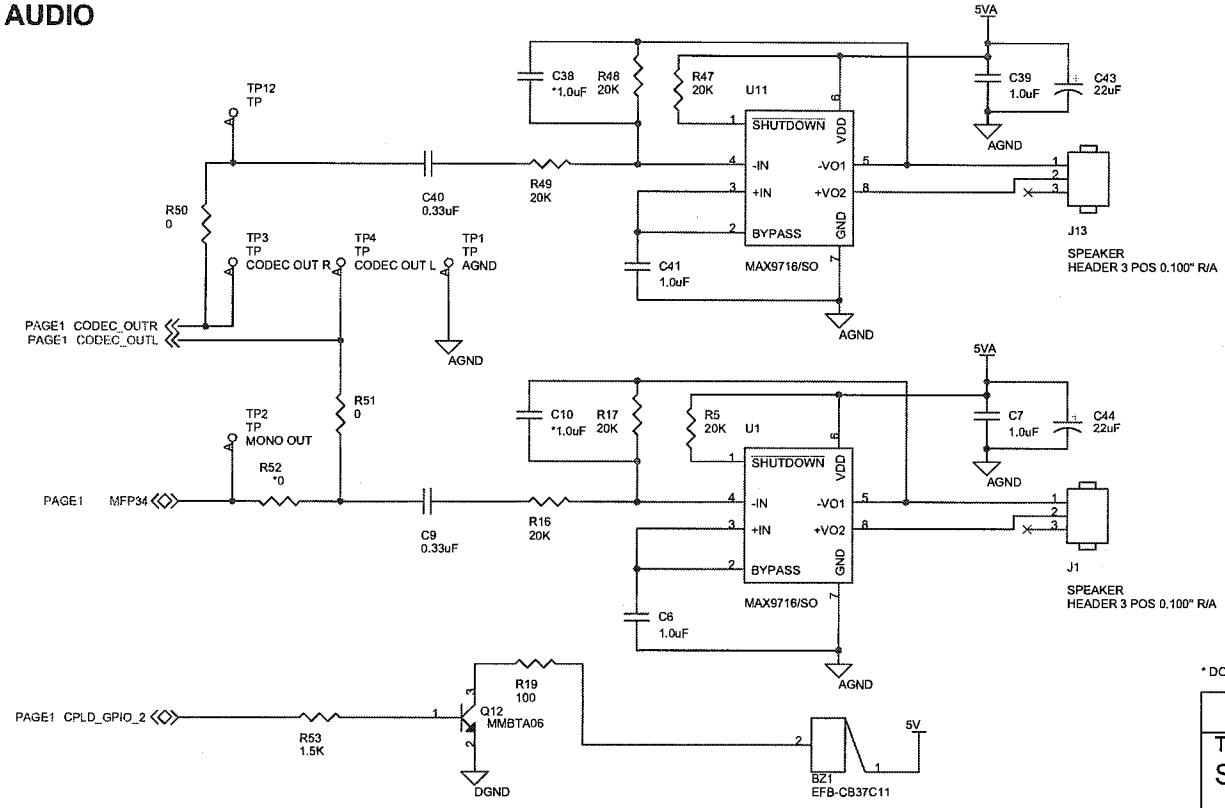
*DO NOT POPULATE

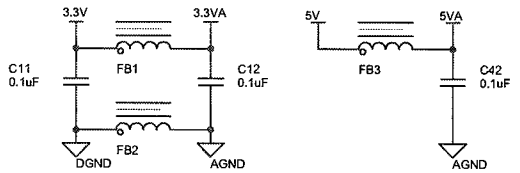
CANDELA CORPORATION		PROPRIETARY
TITLE: SCH, CLR DISP PCB, VBEAM2	SIZE: B	DRAWING NO.: 7111-80-2699 REV.: 09
	DATE: Tuesday, August 30, 2005	SHEET 6 OF 8

ENGINE ETHERNET



AUDIO

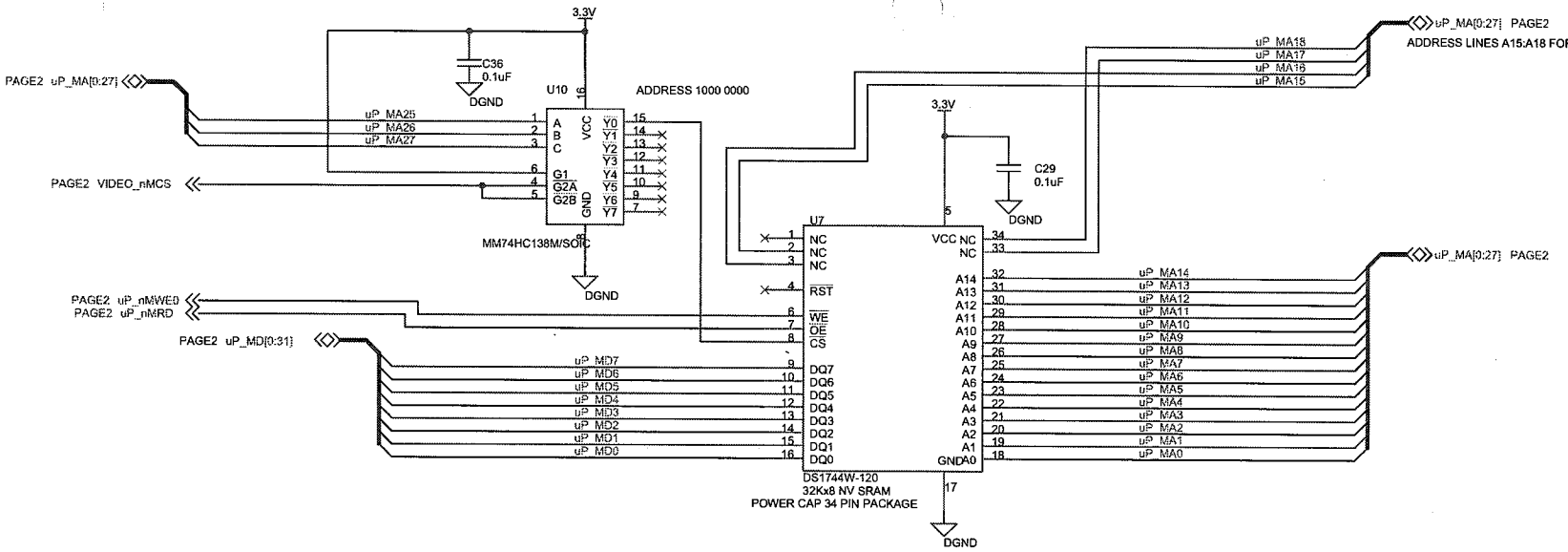




* DO NOT POPULATE

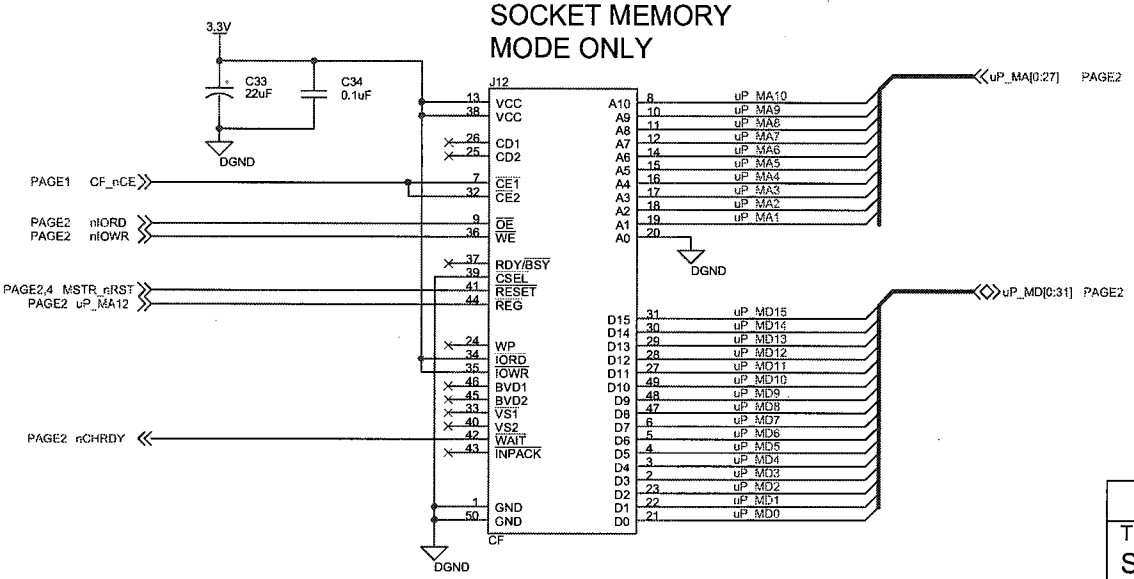
CANDELA CORPORATION		PROPRIETARY
TITLE: SCH, CLR DISP PCB, VBEAM2	SIZE: B	DRAWING NO.: 7111-80-2699 REV.: 09
	DATE: Tuesday, August 30, 2005	SHEET 7 OF 8

RAM AND REAL TIME CLOCK



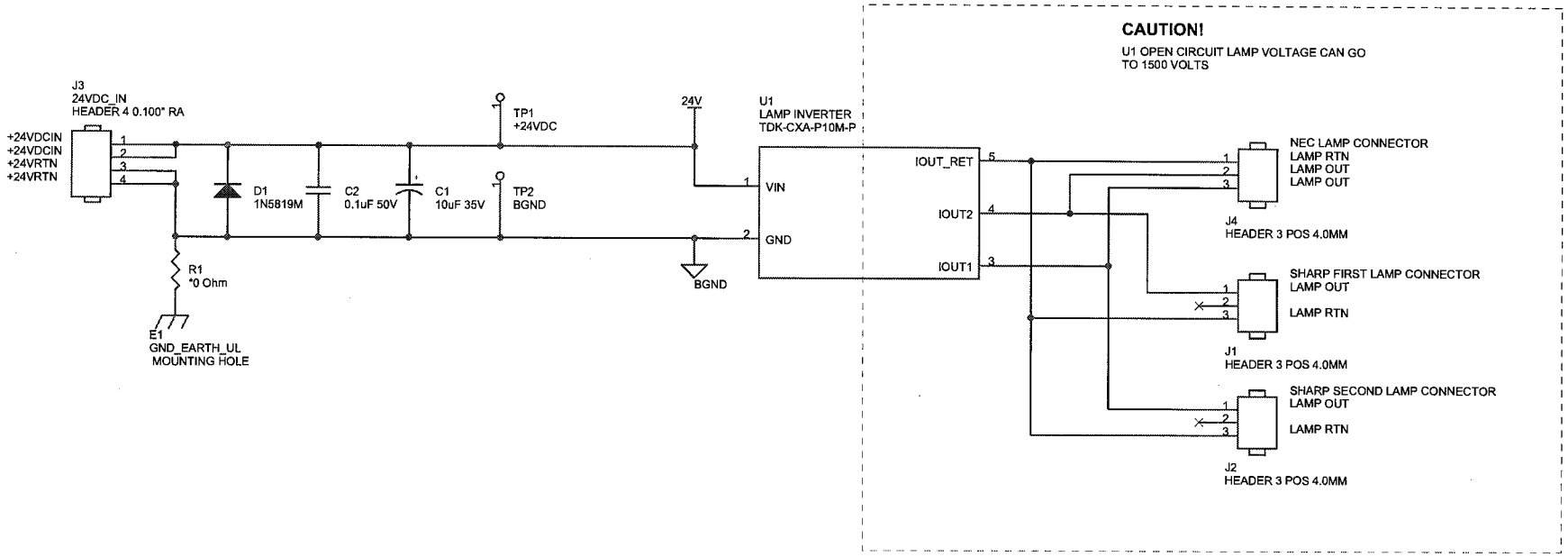
COMPACT FLASH

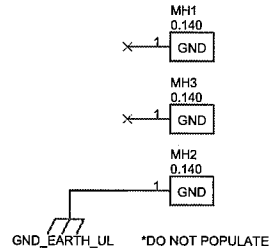
COMPACT FLASH
SOCKET MEMORY
MODE ONLY



CANDELA CORPORATION		PROPRIETARY	
TITLE SCH, CLR DISP PCB, VBEAM2	SIZE B	DRAWING NO. 7111-80-2699	REV. 09
	DATE: Tuesday, August 30, 2005	SHEET 8 OF 8	

LAMP INVERTER





REV	02						DRAWN	OWEN SCHIRDUAN	3-22-05
ECO#	15012						CHECKED	SCOTT MOGREN	3-22-05
DATE	4-29-05						ENG ELEC	OWEN SCHIRDUAN	3-22-05
CHK'D	OKS							APPROVED	DATE

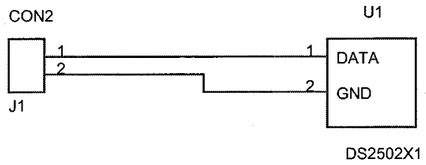
CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

TITLE SCHEMATIC
LAMP INVERTER PCB, VBM2

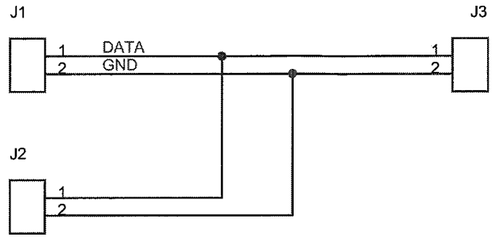
SIZE	DRAWING NO.	REV.
B	7111-80-2700	02

DATE: Friday, April 29, 2005

SHEET 1 OF 1



REV	01						DRAWN	Robert Broderick	5/6/05	PROPRIETARY	CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883
O#	15036						CHECKED	<checked>	<chkdate>	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.	TITLE: SCHEMATIC DYE CARTRIDGE ID PCB, VBEAM2
DATE	5/6/05						ENG ELEC	Robert Broderick	5/6/05		SIZE B | DRAWING NO. 7111-80-2701 | REV. 01
CHK'D	RB							APPROVED	DATE		DATE: Friday, May 13, 2005 | SHEET 1 OF 1



REV	01						DRAWN	Robert Broderick	5/13/05	PROPRIETARY	**CANDELA CORPORATION** 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883
O#	15072						CHECKED	<checked>	<chkdate>	This drawing contains confidential information proprietary to Candela Corporation. It must not be reproduced or disclosed to others or used in any other way, in whole or in part, except as authorized in writing by Candela Corporation.	TITLE: SCHEMATIC DCD LOCKOUT PCB, VBEAM2
DATE	5/23/05						ENG ELEC	Robert Broderick	5/13/05		SIZE: B — DRAWING NO.: 7111-80-2702 — REV.: 01
CHK'D	RB							APPROVED	DATE		DATE: Monday, May 23, 2005 — SHEET 1 OF 1

Assembly	Description	Rev
7122-00-0110	Assy Pump,Dye,Vbeam	R= .04

Item Seq	Component	Description	Rev	Qty
1	3414-SS-1607	PUMP,SS,80GPH@1725RPM@60-99PS	R= ..A	1.0
2	3501-00-0150	MTR,1/3HP1725RPM,115/230,50/60	R= ..A	1.0
3	3408-13-0606	Hose,Barb,SS,3/8NPTx3/8 Barb	R= .02	2.0
4	2710-00-0001	TAPE,TEFLON 1/2" DAYTON#4X543A	R= .01	0.0
5	7122-00-0550	Assy,Cable,AC Motor,Vbeam	R= .01	1.0
6	3415-00-0001	CLAMP,V-BAND PROCON #1113	R= .01	1.0
7	2960-00-0001	CABLE TIE,.87"D,3.9L,.10W,NYL	R= ..A	1.0
999	7122-99-0110	Assy Dwg,Pump,Dye,SLP	R= .05	0.0
1200	7122-00-0570	Assy,Fxtr,Dye Pump Pressure,Vb	R= .01	0.0

Assembly	Description	Rev
7122-00-3316	Assy,Heat Exchanger,DI	R= .0A

Item Seq	Component	Description	Rev	Qty
1	3455-00-0135	Ht Xchgr,Apsen,90 Conn,W/Pems	R= .01	1.0
2	2603-00-0250	Fan,Axl235CFM,24VDC,6.75D	R= .01	2.0
5	2832-OC-0610	SCR,CAP,SOC HD 6-32X5/8",SS	R= .01	8.0
7	2818-00-0600	WASHER,LOCK,SPLIT #6 ID	R= .01	8.0
999	7122-99-3316	Assy Dwg,Heat Exchanger,DI	R= .0A	0.0

Assembly	Description	Rev
7122-00-3477	ASSY,DIODE,GREEN	R= .04

Item Seq	Component	Description	Rev	Qty
1	4150-06-0003	CONN,RCPT, 3P,.100",WIRE/WIRE	R= ..A	1.0
2	4150-06-0305	TERM,CRMP,PIN,.060",24-30G,15u	R= ..A	2.0
3	4812-01-0150	DIODE,MODULE,GREEN	R= .0A	1.0
5	6040-03-2210	WIRE,STRD 22AWG WHT UL1061 300	R= ..A	0.8
999	7122-99-3477	ASSY DWG,DIODE GREEN	R= .04	0.0
1005	8502-10-0220	MFG PRCD,CRIMPING	R= .11	0.0
1200	7122-00-3200	Assy,Cable,Aim Beam Test	R= .0A	0.0
1201	4001-00-0400	Power Supply,5V DC,Phono Plug	R= .01	0.0

Assembly	Description	Rev
7122-00-3565	ASSY,FRAME,VBEAM 2	R= .07

Item Seq	Component	Description	Rev	Qty
1	1301-00-8378	FRAME,VBEAM 2	R= .11	1.0
2	1414-00-0302	CASTER,RGD,4" WHL	R= .01	2.0
3	1414-00-0301	CASTER,SWVL,LOCK,4" WHL	R= .01	2.0
4	2801-FC-3118	NUT,STD HEX SS 5/16-18	R= .01	16.0
5	2818-00-3100	WASHER,LOCK,SPLIT 5/16"ID	R= .01	16.0
6	2891-00-0174	CLIP,SP,BALL STUD,12 lbs	R= .01	2.0
7	2801-FC-0425	NUT,STD HEX SS 4-40	R= .01	4.0
8	2925-01-1612	BSHG,SNAP,1.0HL,3/4ID NYL BLK	R= ..A	8.0
9	2925-01-2421	BSHG,SNAP,1.5HL,1-5/16ID,BLK	R= ..A	1.0
10	2925-01-2822	BSHG,SNAP,1.75HL,1.37ID,NYL,BK	R= .01	1.0
11	3190-06-0040	GSKT KIT,EMI,C-FOLDw/PSA,8-22"	R= .01	1.0
12	3199-00-0012	Grom,Adhsv,.036-.062",Natrl	R= .01	0.5
13	2710-05-1002	VELCRO HOOK,1"W,w/ADH BACK	R= .01	5.8
14	1301-00-8626	FLTR AIR PWR SPLY	R= .01	1.0
15	1301-00-8627	FLTR AIR AC LINE	R= .01	1.0
16	1301-00-8628	FLTR AIR FAN	R= .02	1.0
17	1301-00-8629	FLTR AIR FL SECT 1	R= .01	1.0
18	1301-00-8630	FLTR AIR FL SECT 2	R= .01	1.0
19	1301-00-8631	FLTR AIR FL SECT 3	R= .01	1.0
20	2440-00-1030	PLUG DOME,.750 ID	R= .01	1.0
21	2157-40-4082	LBL,SHEET,FR ASSY,VB2,ENG	R= .02	1.0
22	2157-25-0011	LABEL,FUNCTIONAL GROUND SYMBOL	R= ..B	3.0
23	2157-40-8121	LBL,WEEE,1" x 1"	R= .01	1.0
24	2157-40-8123	LBL,IEC,TYPE B APLD,0.75"x0.75"	R= .01	1.0
25	3199-00-0009	GROM,CATERPLR.062-099",BLK,P/E	R= ..A	0.4
999	7122-99-3565	ASSY DWG,FRAME,VBEAM 2	R= .03	0.0

Assembly	Description	Rev
7122-00-3588	ASSY,AIMING BEAM,VBEAM2	R= .09

Item Seq	Component	Description	Rev	Qty
1	8055-00-0303	BMSPLTR,DICHR,530/595,25.4DIA	R= .08	1.0
2	2847-02-0804	SCR,PNH,NYL,PH,8-32 x 1/4	R= .01	2.0
3	1301-00-8675	HSG,AIMING BEAM	R= .03	1.0
4	1301-00-8289	MOUNT,BLOCK,DIODE	R= .0A	1.0
5	2832-OC-0810	SCR,CAP,SOC HD 8-32 X 5/8	R= .01	2.0
6	2846-30-0406	SCR,SEMS,EXT TH,PHLPS,4-40x3/8	R= ..A	2.0
7	2818-00-0800	WASHER,LOCK,SPLIT #8 ID	R= .01	2.0
9	7122-00-3477	ASSY,DIODE,GREEN	R= .04	1.0
10	8025-00-0570	FLTR,SHT PASS,570nm,D=25.4mm	R= .01	1.0
11	2960-00-0008	CABLE TIE,2"BNDL,MARKER TAB,MI	R= .01	1.0
12	2960-00-0001	CABLE TIE,.87"D,3.9L,.10W,NYL	R= ..A	1.0
999	7122-99-3588	ASSY DWG,AIMING BEAM,VBEAM2	R= .19	0.0
1500	8502-00-0020	INSTR,OPTICS CLEANING	R= ..B	0.0

Assembly	Description	Rev
7122-00-3590	ASSY,BEAM BLOCKER	R= .04

Item Seq	Component	Description	Rev	Qty
1	1301-00-8501	BRKT,SHIELD,LASER RAIL	R= .01	1.0
2	1301-00-8688	BEAM BLOCKER BLADE,VBEAM2	R= .01	1.0
3	4550-00-0050	ROTARY SOLENOID-3E,45 CW	R= ..B	1.0
4	5108-05-0070	SW,OPT,SLTD,.060"APERT,OPAQUE	R= ..A	1.0
5	4150-06-0305	TERM,CRMP,PIN,.060",24-30G,15u	R= ..A	6.0
6	2846-30-0406	SCR,SEMS,EXT TH,PHLPS,4-40x3/8	R= ..A	2.0
7	2847-05-0305	SCR,PNHD,PH,3-48x5/32,18-8,SS	R= .01	3.0
8	2961-00-0050	MNT,CBL TIE,FLAT,PRESSIN,.312H	R= ..A	2.0
9	2801-04-0440	NUT,KEPS,HEX,SS 4-40	R= .01	2.0
10	4150-06-0006	CONN,RCPT, 6P,.100",WIRE/WIRE	R= ..A	1.0
11	1301-00-8500	SHIELD,LASER RAIL	R= .04	1.0
12	1301-00-8269	BLOCKER,CERAMIC,VPYAG	R= .03	1.0
13	2818-00-0400	WASHER,LOCK,SPLIT #4 ID	R= .01	2.0
14	1608-00-0001	ADHESIVE,LOCKTITE #222-31	R= .01	0.0
15	2960-00-0002	CABLE TIE,1.25"D,5.6L,.10W,NYL	R= ..A	4.0
16	2847-02-0806	SCR,MACH,PNH,NYL,PH,8-32 x 3/8	R= .01	2.0
17	2832-OC-0406	SCR,CAP,SOC HD 4-40 X 3/8	R= .01	2.0
18	2818-00-0300	WASHER,LOCK,SPLIT #3 ID	R= .01	3.0
19	2801-FC-0425	NUT,STD HEX SS 4-40	R= .01	2.0
20	2960-00-0008	CABLE TIE,2"BNDL,MARKER TAB,MI	R= .01	1.0
21	2817-00-0305	WASHER,FLAT #3 ID 5/16 OD	R= .01	3.0
999	7122-99-3590	ASSY DWG,BEAM BLOCKER	R= .04	0.0
1005	8502-10-0220	MFG PRCD,CRIMPING	R= .11	0.0
1006	7121-86-8000	Test Prcd,3E,Beam Shutter,GL	R= .0B	0.0

Assembly	Description	Rev
7122-00-3593	ASSY,LENS,COLLIMATED	R= .04

Item Seq	Component	Description	Rev	Qty
1	1301-00-8432	CRTG,HSG,COLLIMATED	R= .02	1.0
2	1301-00-8433	ENDCAP,COLLIMATED	R= .02	1.0
3	1301-00-8434	SPCR,LENS,COLLIMATED	R= .02	1.0
4	1301-00-8515	MAG,.093 DIA x .06 THK	R= .01	2.0
5	2851-PC-0803	SCR,MA,FLHD,PH 0-80x3/16,82DEG	R= .01	4.0
6	1606-00-0010	ADH,EPOXY,5-MIN,CLEAR,1oz TUBE	R= ..A	0.1
7	3160-01-0130	ORING,WHTSIL,.356 ID x .020 TH	R= .01	1.0
8	3160-09-0080	O-Ring,Redsil,0.390x0.050W	R= .01	2.0
9	8050-00-1030	LENS,PL/CX,10mmD,30mmFL,A55	R= .01	2.0
999	7122-99-3593	ASSY DWG,LENS,COLLIMATED	R= .04	0.0
1200	1301-00-8652	TOOL,LENS INSRTN,10mm OPT,VBM2	R= .02	0.0
1500	8502-00-0020	INSTR,OPTICS CLEANING	R= ..B	0.0

Assembly	Description	Rev
7122-00-3597	ASSY,HSG,LENS,FBR,RCPT	R= .03

Item Seq	Component	Description	Rev	Qty	ECO
1	1301-00-8451	HSG,LENS FBR RCPT	R= .03	1.0	14701
2	3160-00-0120	O-RING,BUNA-N 1"ID 1-3/16"OD	R= ..A	2.0	14897
3	8050-00-2552	LENS,PL/CX,25.4D,50.8FL,BBAR	R= .01	1.0	14897
4	1301-00-8535	LENS SPCR FBR RCPT	R= .02	1.0	14897
5	8050-00-2563	LENS,PL/CX,25.4D,63.5FL,BBAR	R= .01	1.0	14897
6	1301-00-8635	LOCK NUT,LENS HOUSING	R= .01	1.0	15153
999	7122-99-3597	ASSY DWG,HSG,LENS FBR RCPT	R= .03	0.0	14701
1200	1301-00-8121	LENS,INSERTION TOOL,MGL	R= .01	0.0	14897
1500	8502-00-0020	INSTR,OPTICS CLEANING	R= ..B	0.0	14701

Assembly	Description	Rev
7122-00-3640	ASSY,SPLIT-TUBE DCD UNIT	R= .10

Item Seq	Component	Description	Rev	Qty
1	1301-00-8457	PL INSULNG DCD VALVE	R= .03	1.0
2	1301-00-8458	BRKT DCD HTR ASSY	R= .05	1.0
3	1301-00-8467	ENCL,ASSY,DCD	R= .05	1.0
4	1301-00-8453	PL,HALF TUBE DCD HTR	R= .03	2.0
5	1301-00-8376	BRKT,DCD HTR TUBE	R= .0C	1.0
6	5108-06-0330	THERMO,OPEN@100C,MNL R,1/4"QC	R= .01	1.0
7	1301-00-8679	GDE NOZ CGA 600 CRYOGEN	R= .01	1.0
8	1301-00-8678	NOZ CGA 600 CRYOGEN	R= .05	1.0
9	2981-02-5912	SPR COMPN .059SS .75OD x 1"LG	R= .01	1.0
10	1301-00-8456	PL DCD VALVE SPR	R= .02	1.0
11	4784-00-0001	RES,WW,50W,5ohm,1%,CHASSIS MT	R= .01	4.0
12	2881-00-0808	SCR,SHLDR,SLOT,303SS 8-32X3/16	R= .01	2.0
13	1301-00-8463	BRKT SPRT CLIP DCD	R= .04	2.0
14	1301-00-8462	CLIP SPR DCD	R= .05	2.0
15	2801-04-0440	NUT,KEPS,HEX,SS 4-40	R= .01	4.0
16	1301-00-8472	MANF FOUR PORT DCD	R= .04	1.0
17	7111-00-2520	Assy,BOM,PCB,DCD Canister	R= ..B	1.0
18	7122-00-3673	ASSY,WRG KIT,DCD W/SPR CLAMP	R= .06	1.0
19	3404-10-0210	CONN,MALE,1/8Tx10-32 O-RNG BRS	R= .01	3.0
20	2846-30-0804	SCR,SEMS,EXT TH,PHLPS,8-32x1/4,ZINC	R= .01	19.0
25	2925-01-1210	BSHG,SNAP,.750HL,39/64ID,NYL,B	R= .01	1.0
26	3407-93-0200	PLUG,HEX HEAD,SS 1/8"MPT	R= ..A	1.0
27	2981-00-4235	SPR COMPN.040SS .30OD x .500L	R= .01	2.0
28	2832-OC-0404	SCR,CAP,SOC HD 4-40 X 1/4	R= .01	1.0
29	2832-OC-0402	SCR,CAP,SOC HD 4-40 X 1/8	R= .01	2.0
30	2818-00-0400	WASHER,LOCK,SPLIT #4 ID	R= .01	2.0
31	2846-30-0810	SCR,SEMS,EXTH,PHLPS,#8-32X5/8	R= .01	2.0
32	2981-06-0011	SPR GTR .09WD x 2.60ID	R= .01	1.0
33	2832-OC-0403	SCR,CAP,SOC HD 4-40 X 3/16	R= .01	7.0
34	2846-30-0204	SCR,SEMS,EXT TH,PHLPS,2-56x1/4	R= .01	9.0
35	1301-00-7741	Tube Lock,Handpiece,Diode	R= .04	1.0
36	1617-00-0030	SEALANT,PIPE,HVAC-BLUE	R= ..A	0.0
37	1615-00-0020	COATING,THERMAL JOINT COMPOUND	R= .01	0.0
39	2801-12-0256	NUT,LOCK,ESNA,LIGHT,THIN,2-56	R= ..A	8.0
41	3423-00-0231	TUBING,TEFLON PFA	R= ..A	4.5
42	2960-00-0001	CABLE TIE,.87"D,3.9L,.10W,NYL	R= ..A	2.0
44	2846-30-0820	SCR SEMS EXT TH PH 8-32 x 1.25 Z	R= .01	2.0
45	2846-30-0606	SCR,SEMS,EXT TH,PHLPS,6-32x3/8	R= ..A	2.0
46	2860-05-0020	RIVET,SNAP,NYL.157MTG.177+GRIP	R= ..B	4.0
47	7122-00-3329	Assy,Axial Fan,80MM SQ,28.2CFM	R= .02	1.0
48	3140-02-2202	GROMMET 1/4 ID 9/16OD 3/8	R= .01	1.0
49	1301-00-8672	COVER DCD ENCLOSURE	R= .01	1.0
50	2817-10-0801	WSHR FLT NYL #8 .375OD X .06THK	R= .02	4.0
51	1301-00-8692	SHIELD DCD SAFETY	R= .02	2.0
52	2961-00-0010	MOUNT,CABLE TIE,SLF-STK .75X.7	R= .01	1.0
999	7122-99-3640	ASSY DWG,SPLIT-TUBE DCD UNIT	R= .04	0.0
1000	9914-80-0300	SCHEM,SYS,VBEAM2	R= .12	0.0
1006	7122-86-3640	TEST PRCD,SPLIT-TUBE DCD UNIT	R= .03	0.0

Assembly	Description	Rev
7122-00-3660	ASSY,MANF DI,5/8" OD CRTG HTR	R= .04

Item Seq	Component	Description	Rev	Qty
1	1301-00-8528	MANIFOLD,DI,5/8" OD CRTG HTR	R= .02	1.0
2	7122-00-3745	ASSY,WTR HTR TEMP PROBE,VBM2	R= .01	1.0
3	3406-60-1012	CONN,THRMCPL,5/8T x 3/4 NPT,SS	R= .01	1.0
4	4152-21-0203	CONN,RCPT,IN-LINE, 3P,AMP#2073	R= .01	1.0
5	4150-03-0030	TERM,PIN,.062",14-18G,.130"INS	R= ..A	2.0
6	2832-OC-0403	SCR,CAP,SOC HD 4-40 X 3/16	R= .01	2.0
10	2710-00-0001	TAPE,TEFLON 1/2" DAYTON#4X543A	R= .01	0.1
11	3455-31-0070	HTR,CRTG,5/8D,2000W,240V	R= .02	1.0
12	5108-06-0175	THERMO,NC,OPEN@175F,CLOSE@145F	R= ..A	1.0
13	2818-00-0400	WASHER,LOCK,SPLIT #4 ID	R= .01	2.0
14	2145-00-4010	PAD,CONDUCTIVE,THERMAL	R= ..A	1.0
15	6090-00-0040	TUBING,SHRINK PVC 1/4" DIA.	R= .01	1.0
999	7122-99-3660	ASSY DWG,MANF DI,5/8"OD CRTG H	R= .06	0.0
1005	8502-10-0220	MFG PRCD,CRIMPING	R= .11	0.0

Assembly	Description	Rev
7122-00-3670	ASSY,HP DLVY CBL,W/DCD	R= .03

Item Seq	Component	Description	Rev	Qty
1	7122-00-3801	ASSY,DCD/ELECTRICAL CBL,VBEAM2	R= .01	1.0
3	7122-20-3671	TESTED,7122-00-3671	R= .01	1.0
4	2960-00-0002	CABLE TIE,1.25"D,5.6L,.10W,NYL	R= ..A	4.0
11	6091-01-0125	BRAID,TUBULAR,SELF WRAP,0.50D	R= .01	7.8
999	7122-99-3670	ASSY DWG,HP DLVY CBL,W/DCD	R= .05	0.0

Assembly	Description	Rev
7122-00-3674	ASSY,IGBT	R= .06

Item Seq	Component	Description	Rev	Qty
1	1301-00-8511	HEAT SINK,IGBT,7.75"	R= .09	1.0
2	1301-00-8558	WALL,LEFT,ISLN,IGBT	R= .02	1.0
3	1301-00-8559	WALL,FR,ISLN,IGBT	R= .02	1.0
4	1301-00-8560	WALL,BACK,ISLN,IGBT	R= .01	1.0
5	1301-00-8561	WALL,R,ISLN,IGBT	R= .02	1.0
6	4820-00-0082	IGBT MDL,CHOPPER,3300V,800A	R= .01	1.0
7	7111-00-2693	PCB,ASSY,HV PCB,VBEAM2	R= .08	1.0
8	7111-00-2694	PCB ASSY,HV CONTROL PCB,VBEAM2	R= .14	1.0
9	2846-30-0608	SCR,SEMS,EXT TH,PHLPS,6-32x1/2	R= ..A	14.0
10	2847-01-0608	SCR,MA,B-HD,NYL,SLOT,6-32x1/2	R= .01	4.0
11	2145-00-4012	PAD,THERMAL,IGBT	R= .01	1.0
12	1301-00-8605	RIB,CENTER,IGBT	R= .02	1.0
14	2832-OC-2506	SCR,CAP,SOC HD 1/4-20 X 3/8	R= .01	8.0
15	7122-00-3735	ASSY,HTSK THERMOSWITCH	R= .02	1.0
16	2961-00-0020	MOUNT,CBL TIE,#10 SCR,.195H,NY	R= ..B	2.0
17	2846-30-0404	SCR,SEMS,EXT TH,PHLPS,4-40X1/4	R= .01	1.0
999	7122-99-3674	ASSY DWG,IGBT	R= .02	0.0

Assembly	Description	Rev
7122-00-3681	ASSY,DSPL TOUCH SCRN	R= .07

Item Seq	Component	Description	Rev	Qty
1	1301-00-8550	DSPL MTG PL	R= .05	1.0
2	1301-00-8551	DSPL EMI SHLD	R= .03	1.0
3	2846-30-0404	SCR,SEMS,EXT TH,PHLPS,4-40X1/4	R= .01	17.0
4	2846-30-0406	SCR,SEMS,EXT TH,PHLPS,4-40x3/8	R= ..A	4.0
5	7111-00-2699	ASSY,BOM,CLR DSPL CNTL,VBEAM2	R= .11	1.0
6	7111-00-2700	ASSY,PCB LAMP INV,VBEAM2	R= .03	1.0
7	3910-00-1131	TOUCH SCRN 10.4",4-WIRE	R= .01	1.0
8	3910-00-1132	LCD,SVGA,COLORTFT,10.4"	R= .01	1.0
9	7122-00-3822	ASSY,VBEAM2,DSPL+CARDENG	R= .01	1.0
10	1301-00-8615	SHLD,BACKLIGHT BD	R= .02	1.0
11	2225-05-0414	STDF,M/F,1/4HX,7/8L,4-40,AL	R= .01	3.0
12	2710-00-0109	TAPE,DBL-SIDED,1/2"W	R= .01	2.5
13	6032-00-0370	CBL,CLR DSPL,41 PINS,9"	R= .01	1.0
999	7122-99-3681	ASSY DWG,DSPL TOUCH SCRN	R= .02	0.0
1200	1301-00-8655	FXTR,TOUCHSCRN ALIGN	R= .03	0.0

Assembly	Description	Rev
7122-00-3692	PERFECTA DELIVERY SYSTEM	R= .10

Item Seq	Component	Description	Rev	Qty
1	7111-00-2695	ASSY,BOM,HP,PCB,VBEAM2	R= .07	1.0
2	1301-00-8441	HSG,CRTG,HANDPIECE	R= .11	1.0
3	7122-00-3670	ASSY,HP DLVY CBL,W/DCD	R= .03	1.0
4	1301-02-8445	SHL,LEFT,HP,PERFECTA	R= .09	1.0
5	1301-02-8444	SHL,RIGHT,HP,PERFECTA	R= .09	1.0
6	1301-00-8513	ASSY, FGRSW	R= .04	1.0
7	1301-00-8514	ASSY,CONT,DIST GAUGE	R= .01	1.0
8	2832-OC-0004	SCR,CAP,SOC HD,0-80 x 1/4	R= .01	1.0
9	2845-00-0605	SCR,BTNHD,SKT,6-32x5/16,SS,BLK	R= .01	2.0
10	2846-30-0204	SCR,SEMS,EXT TH,PHLPS,2-56x1/4	R= .01	4.0
11	2845-00-2814	SCR,BTNHD,SKT,6-32x 7/8 ST BLK	R= .01	1.0
12	2981-02-2636	Sprng,Comp,.026"MW,.36"OD,.5"L	R= .01	1.0
13	2990-02-0403	PLGR,BALL,SS,NYLOK,4-48X3/16"L	R= ..A	2.0
14	1301-00-7741	Tube Lock,Handpiece,Diode	R= .04	1.0
15	1301-00-8613	CLMP,SPLT BRD,DLVYSYS,DSTLEND	R= .04	2.0
16	7122-00-3592	ASSY,CRTG,WDO	R= .03	1.0
17	7122-00-3644	ASSY,VALVE,DCD	R= .04	1.0
18	3409-02-0200	FERRULE,SET,1/8T,NYLON	R= ..A	1.0
19	2843-10-0402	SCR,SET SC HLF/FPT,SS, 440x1/8	R= .01	4.0
20	7122-00-3593	ASSY,LENS,COLLIMATED	R= .04	1.0
21	1301-00-8624	CLMP,SPLT BRD,DLVY SYS,PRX END	R= .05	2.0
22	2157-40-8064	LBL, DEL SYS IDENT, MGL	R= .0C	1.0
23	6510-01-0495	SHIP MTRL,BOX,CORGTD,ANTI-STAT	R= .01	1.0
25	2832-OC-0204	SCR,CAP,SOC HD 2-56 X 1/4	R= .01	4.0
26	1301-00-8452	NOZ,HP,.020" OPNG	R= .01	1.0
999	7122-99-3692	ASSY DWG,HP DLVY SYS	R= .04	0.0
1006	7122-86-3692	TST PRCD,HP,DLVY SYS	R= .02	0.0
1007	7122-87-3692	QUAL PRCD,HP,DLVY SYS	R= .02	0.0
1008	8502-10-0300	MFG PRCD,LEAK DET,HFC R134a/p	R= ..A	0.0
1200	7122-00-3764	ASSY,FXTR,CLMTD LENS CNTRTN	R= *01	0.0
1201	7122-00-3781	ASSY,FXTR,VBEAM2 DIST GAUGE	R= .01	0.0
1202	7122-00-3671	ASSY,FBR CBL	R= .04	0.0
1203	7111-96-2695	OBSOLETE	R= .02	0.0
1204	7122-00-3786	ASSY,TST CBL,DLVY SYS,VBEAM2	R= .01	0.0
1205	1301-00-8632	ADPTR ORBTL FXTR PRXML CON VB2	R= .02	0.0
1206	9514-96-0880	ASSY,TEST FIXTURE,LASER,MGL	R= *01	0.0
1207	1301-00-8694	TOOL,BALL PLGR	R= .02	0.0

Assembly	Description	Rev
7122-00-3805	ASSY,WTR HTR,VBEAM2	R= .03

Item Seq	Component	Description	Rev	Qty
1	7122-00-3660	ASSY,MANF DI,5/8" OD CRTG HTR	R= .04	1.0
2	7122-00-3723	ASSY,TFLN TBG HTR MANF LIQ HE	R= .02	1.0
3	3455-00-0005	Ht Exchanger Liquid to Liquid	R= ..C	1.0
4	2902-00-0050	CLAMP,HOSE,WRM,SS,LINE7/16-3/4	R= ..A	4.0
5	1617-00-0001	GREASE,HIGH VACUUM #DC 970V	R= .01	0.0
6	1301-00-8608	TBG TFLN 5/8OD HT MANF HT EXCH	R= .02	1.0
7	7122-00-3714	ASSY,URBRD TBG HT EXCH TO RSVR	R= .03	1.0
999	7122-99-3805	ASSY DWG,WTR HTR,VBEAM2	R= .01	0.0

Assembly	Description	Rev
7122-00-3806	ASSY,WTR PMP,VBEAM2	R= .03

Item Seq	Component	Description	Rev	Qty
1	1301-00-8491	WTR RSVR,ROTO-MOLDED,RECT	R= .01	1.0
2	7122-00-3717	ASSY,UREBRAID ELEMENT TO RSVR	R= .02	1.0
3	3414-00-0170	PUMP DI,5.3GPM,3500RPM,24VDC	R= .02	1.0
4	7122-00-3725	ASSY,PUMP PRESS SW	R= .02	3.0
5	2902-00-0040	CLAMP,HOSE,WRM,SS,LINED,5/8-1"	R= ..A	5.0
6	3424-01-1000	TUBING,UREBRADE,.905OD X 5/8ID	R= ..A	0.4
7	3410-11-1009	Conn,M,Wht PP,5/8Barb x 1/2NPT	R= .0A	1.0
8	3410-11-0808	CONN,M,WHT PP,1/2BARB x 1/2MPT	R= .01	1.0
9	2710-00-0001	TAPE,TEFLON 1/2" DAYTON#4X543A	R= .01	0.0
10	1617-00-0001	GREASE,HIGH VACUUM #DC 970V	R= .01	0.0
999	7122-99-3806	ASSY DWG,WTR PMP,VBEAM2	R= .03	0.0

Assembly	Description	Rev
7122-00-7495	VBEAM2 FLUID SECTION	R= .15

Item Seq	Component	Description	Rev	Qty
1	7122-00-3316	Assy,Heat Exchanger,DI	R= .0A	1.0
2	1301-00-8636	COLLAR,DYE CARTRIDGE,.70 ID	R= .01	1.0
3	7122-00-7497	ASSY,DI TUBING KIT VBEAM2	R= .06	1.0
4	7122-00-3165	Assy,DI Filter	R= ..A	1.0
5	7122-00-3805	ASSY,WTR HTR,VBEAM2	R= .03	1.0
6	7122-00-3806	ASSY,WTR PMP,VBEAM2	R= .03	1.0
9	3414-00-0190	BLWS PUMP,3/4"MTR,24VDC	R= .03	1.0
11	7122-00-0080	Assy,Rsvr,Dye,Vbeam	R= ..B	1.0
13	1301-00-4173	SPONGE,2"DIAx1"THK	R= ..A	1.0
14	1630-00-0180	DISH,WEIGHING,ALUM,57mmDIA	R= ..A	1.0
15	2801-03-2520	NUT,KEPS,EX TTH,1/4-20,STL/ZN	R= .01	8.0
16	2961-00-0040	MOUNT,CABLE TIE,#10 SCR MT,.61	R= ..A	3.0
17	2846-30-0806	SCR,SEMS,EXT TH,PHLPS,8-32x3/8	R= .01	4.0
18	2902-00-0013	Clamp,worm,SS,2 5/16"-3 1/4"	R= .01	3.0
19	3510-00-1071	MOUNT,VIBRATION 3/4ODx3/8H X 1	R= .01	4.0
20	2846-30-2511	SCR,SEMS,EXT Th,Ph,8-32x3/8,BL	R= .01	6.0
21	2817-00-2509	Wsh,Fl,1/4" ID 9/16"OD,SS	R= .01	6.0
22	2801-03-1032	NUT,KEPS,EX TTH,10-32,STL/ZN	R= .01	2.0
23	3412-28-0003	CPL,BLK HD,QC,PLYSLFN,3/8 BARB	R= .01	2.0
24	2801-03-0832	NUT,KEPS,EX TTH, 8-32,STL/ZN	R= .02	2.0
25	7122-00-0110	Assy Pump,Dye,Vbeam	R= .04	1.0
26	7121-00-2270	BOM,BTL ASSY,COT INJECTOR	R= ..L	0.0
27	2902-00-0040	CLAMP,HOSE,WRM,SS,LINED,5/8-1"	R= ..A	3.0
28	2902-00-0050	CLAMP,HOSE,WRM,SS,LINE7/16-3/4	R= ..A	6.0
29	2832-OC-3108	SCR,CAP,SOC HD 5/16-18 X 1/2	R= .01	2.0
30	2818-00-3100	WASHER,LOCK,SPLIT 5/16"ID	R= .01	2.0
31	2902-00-0030	CLAMP,HOSE,SS,SAE"F"3 1/16-4"D	R= ..A	1.0
35	1607-00-0001	ADH,RTV732,WHITE,4.7 OZ TUBE	R= .01	0.0
38	1617-00-0001	GREASE,HIGH VACUUM #DC 970V	R= .01	0.0
39	2817-00-3114	WASHER,FLAT 5/16ID 7/8 OD SS	R= .01	2.0
40	2902-00-0080	Clamp,Worm,SS,1 1/16"-2 1/2"	R= .01	1.0
41	2846-31-1006	SCR,SEMS,EXTH,PHILPS,10-32X3/8	R= .01	2.0
999	7122-99-7495	ASSY DWG,FLUID SECT,VBEAM2	R= .02	0.0
1000	9914-80-0300	SCHEM,SYS,VBEAM2	R= .12	0.0

Assembly	Description	Rev
7122-00-7497	ASSY,DI TUBING KIT VBEAM2	R= .06

Item Seq	Component	Description	Rev	Qty
1	7122-00-3713	ASSY,URBRD TBG DNZ FLTR PRT F	R= .02	1.0
3	7122-00-3715	ASSY,URBRD TBG PR SW DI FLTR	R= .02	1.0
4	7122-00-3716	ASSY,URBRD TBG DNZ FLTR HD	R= .02	1.0
7	1301-00-8610	TBG TFLN 1/2OD PUMP-DYE BHD	R= .03	1.0
8	7122-00-3718	ASSY,TEFLON TBG HD HTR EXCHR	R= .02	1.0
9	7122-00-3719	ASSY,TEFLON TBG HD HTR EQL	R= .02	1.0
10	7122-00-3720	ASSY,TEFLON TBG RSVR TO PUMP	R= .02	1.0
11	7122-00-3721	ASSY,TEFLON TBG HD DYE PRES SW	R= .03	1.0
13	7122-00-3722	ASSY,TFLN TBG DYE RSVR TO PUMP	R= .02	1.0
15	7122-00-3724	ASSY,TFLN TBG DYE RSVR LIQ HE	R= .03	1.0
17	7122-00-3726	ASSY,DYE CRTG PRESS SW	R= .03	1.0
18	7122-00-3737	ASSY,SPRTHANE TBNG DI FILL	R= .02	0.0
19	7122-00-3769	ASSY,LSR HD PARTICLE FLTR	R= .02	1.0
20	3424-01-0600	TUBING,UREBRADE 3/8"ID,.630"OD	R= ..A	1.0
1005	7122-85-0060	MFG PRCD,PACKAGING,GENERIC	R= .01	0.0

Assembly	Description	Rev
7122-00-7500	VBEAM2 UPPER CHASSIS SECTION	R= .16

Item Seq	Component	Description	Rev	Qty
1	5609-00-0200	XFMR,STPDN,115/230P,28V,250VA	R= .01	1.0
2	5108-08-0020	SNSR,CUR,LEM HAC 800-S,800A	R= .01	1.0
3	7122-00-7498	ASSY,CPU/LSR I/O W/FW,VBEAM2	R= *01	1.0
4	7122-00-3565	ASSY,FRAME,VBEAM 2	R= .07	1.0
5	7122-00-7527	ASSY,LASER RAIL	R= .08	1.0
6	2846-30-0810	SCR,SEMS,EXTH,PHLPS,#8-32X5/8	R= .01	1.0
7	7122-00-7510	ASSY,DISPLY BEZ,VBM2,MET ROSE	R= .10	1.0
8	7122-00-3747	ASSY,FBR CBLS,ST,VBEAM2	R= .01	1.0
9	2960-00-0001	CABLE TIE,.87"D,3.9L,.10W,NYL	R= ..A	5.0
10	1301-00-8595	DUSTBOX,FRONT	R= .06	1.0
11	1301-00-8596	DUSTBOX,BACK	R= .02	1.0
12	7122-00-3640	ASSY,SPLIT-TUBE DCD UNIT	R= .10	1.0
13	2846-30-0806	SCR,SEMS,EXT TH,PHLPS,8-32x3/8	R= .01	10.0
14	2801-03-0832	NUT,KEPS,EX TTH, 8-32,STL/ZN	R= .02	6.0
15	1301-00-8683	SHLD,XFMR	R= .02	1.0
16	3410-24-0202	CONN,BLKHD,HDPE,BARB 1/8 X 1/8	R= ..A	1.0
17	3510-00-0110	Mt,VIB 1"ODx3/4"h,1/4-20 M/F	R= .02	4.0
18	2157-26-0011	LABEL,TRIANGLE,1.97",HIGH VOLT	R= ..A	1.0
19	7122-00-3329	Assy,Axial Fan,80MM SQ,28.2CFM	R= .02	1.0
20	2860-05-0020	RIVET,SNAP,NYL.157MTG.177+GRIP	R= ..B	4.0
21	2801-03-2520	NUT,KEPS,EX TTH,1/4-20,STL/ZN	R= .01	4.0
22	2846-31-1006	SCR,SEMS,EXTH,PHILPS,10-32X3/8	R= .01	5.0
23	2846-30-0606	SCR,SEMS,EXT TH,PHLPS,6-32x3/8	R= ..A	6.0
24	1301-00-8586	BUMPER/SPRT,DYE CRTG	R= .02	1.0
25	2832-OC-0806	SCR,CAP,SOC HD 8-32 x 3/8	R= .01	1.0
26	1301-00-8587	BUMPER,DYE CRTG	R= .01	1.0
27	2801-20-1033	NUT,ACRN(CAP),SS,1/4-20X.25 DP	R= .01	4.0
28	2860-05-0070	RIVET,SNAP,NYL.122MTG.157+GRIP	R= .01	2.0
29	2818-00-0800	WASHER,LOCK,SPLIT #8 ID	R= .01	1.0
30	2157-40-8124	LBL,NOT A HANDLE	R= .02	1.0
31	2157-10-0060	LABEL,ETL,UL 60601-1	R= .01	1.0
999	7122-99-7500	ASSY DWG,UP CHAS,VBEAM2 2 TONE	R= .03	0.0
1000	9914-80-0300	SCHEM,SYS,VBEAM2	R= .12	0.0
1005	7122-85-7500	MFG PRCD,UPR CHASSIS SECT,VBM2	R= .03	0.0

Assembly	Description	Rev
7122-00-7510	ASSY,DISPLY BEZ,VBM2,MET ROSE	R= .10

Item Seq	Component	Description	Rev	Qty
1	7111-00-2510	Assy,BOM,PCB,HP Bulkhead	R= .01	1.0
2	7122-00-7520	ASSY,CALPORT	R= .06	1.0
3	7122-00-3681	ASSY,DSPL TOUCH SCRN	R= .07	1.0
4	7122-00-3001	Assy,Keyswitch,Diode	R= .0A	1.0
7	7122-00-0560	Assy,Indicator Lite,Vbeam	R= .0A	1.0
8	1301-00-8533	PL,MTG,FR DSPL BEZEL	R= .10	1.0
9	1301-00-8534	PL,INTFC,DUSTBOX	R= .03	1.0
10	3199-00-0008	GROM,CTRPLR,.099-.144 BLK,P/E	R= .01	0.3
11	3199-00-0009	GROM,CATERPLR.062-099",BLK,P/E	R= ..A	0.3
12	2846-30-0606	SCR,SEMS,EXT TH,PHLPS,6-32x3/8	R= ..A	4.0
13	2846-30-0806	SCR,SEMS,EXT TH,PHLPS,8-32x3/8	R= .01	8.0
14	2801-03-0832	NUT,KEPS,EX TTH, 8-32,STL/ZN	R= .02	2.0
15	3140-01-4050	GROMMET 3/8"ID 1/2"GD	R= .01	2.0
16	3140-00-1220	GROMMET,3/4"ID 1-5/8"OD 1/4GD	R= ..A	1.0
17	3412-26-0220	CONN,QC,RCPT,BR,BLKHD,1/8T	R= ..B	1.0
18	2157-25-0010	LABEL,SAFETY GROUND	R= ..C	2.0
19	2820-00-7510	Washer,Lock,Int.5/16,SS	R= .01	1.0
20	1301-10-8540	BEZEL,DISPLAY,MTLC ROSE	R= .04	1.0
21	3409-02-0200	FERRULE,SET,1/8T,NYLON	R= ..A	1.0
22	7122-00-3771	ASSY,GND CBL,COLOR DSPL,VBEAM2	R= .02	1.0
23	1301-00-8607	SPRT BRKT,DSPL	R= .01	1.0
24	2801-03-2520	NUT,KEPS,EX TTH,1/4-20,STL/ZN	R= .01	2.0
25	2157-40-8122	LBL,IEC,RADN WRN,0.5" x 0.5"	R= .01	1.0
26	2817-NY-0008	WASHER,NYLON #8 FLAT 1/2"OD X	R= .01	4.0
27	2846-31-1006	SCR,SEMS,EXTH,PHILPS,10-32X3/8	R= .01	2.0
28	4150-06-0002	CONN,RCPT, 2P,.100",WIRE/WIRE	R= ..A	1.0
999	7122-99-7510	ASSY DWG,DSPL BEZ,VBM2	R= .03	0.0
1200	5501-00-0731	TOOL,DISM,KEY-EMO SW,EAO	R= .01	0.0
1201	5501-00-0732	TOOL,MTG WRNCH,KEY-EMO SW,EAO	R= .01	0.0

Assembly	Description	Rev
7122-00-7520	ASSY,CALPORT	R= .07

Item Seq	Component	Description	Rev	Qty
1	1301-00-7719	Calport Foam Tube,Diode	R= .04	1.0
2	1301-00-7720	Ceramic Disk,Calport,Diode	R= .04	1.0
3	1301-00-8160	RETAINER,CALPORT WINDOW	R= .02	1.0
4	1301-00-8536	CONN,ST THREADED	R= .01	1.0
5	1301-00-8552	BLK,GLOVE,CALPORT	R= .03	1.0
6	1301-00-8553	PL,ST CONNECTOR,CALPORT	R= .02	1.0
7	1301-00-8554	BLK,HSG,FOAM,CALPORT	R= .03	1.0
8	1301-00-8555	BLK,DIFFUSER,20 DEG,CALPORT	R= .04	1.0
9	2818-00-0800	WASHER,LOCK,SPLIT #8 ID	R= .01	4.0
10	2832-OC-0826	Scr,Cap,Soc HD 8-32x1 5/8 SS	R= .01	4.0
11	2846-30-0604	SCR,SEMS,EXT TH,PHLPS,6-32x1/4	R= ..A	1.0
12	7122-00-3712	ASSY,SW,PB,OVERTRAVEL	R= .02	1.0
13	8010-00-0016	WDO,DUST,CALPORT	R= .01	1.0
14	2843-CC-0604	SCR,SET SOC CUP PT 6-32 X 1/4,SS	R= .01	2.0
15	2846-30-0808	SCR,SEMS,EXT TH,PHLPS,8-32x1/2	R= .01	2.0
16	1608-00-0001	ADHESIVE,LOCKTITE #222-31	R= .01	0.0
999	7122-99-7520	ASSY DWG,CALPORT	R= .04	0.0
1005	8502-00-0020	INSTR,OPTICS CLEANING	R= ..B	0.0

Assembly	Description	Rev
7122-00-7523	VBEAM2 AC INPUT SECTION	R= .10

Item Seq	Component	Description	Rev	Qty
1	7111-00-2696	ASSY,BOM,AC BOARD,VBEAM2	R= .08	1
2	7122-00-3675	ASSY,MN LN 25 AMP CKT BRKR SW	R= .01	1
3	7122-00-7524	ASSY,HARN,AC,VBEAM2	R= .09	1
4	5601-05-0020	FILTER,EMI,20A,W/CUTOUT	R= .01	1
5	7122-00-3330	Assy,Linecord,MGL	R= .0A	1
6	2903-01-0005	CLAMP,CABLE,0.625"DIA,NYLON	R= .01	1
7	7122-00-7526	ASSY,HARN,SIG,VBEAM2	R= .05	1
8	1301-00-8585	HDW KIT,HIGH DRBLTY DRWR CONN	R= .01	1
9	7122-00-3701	ASSY,CBL DYE CRTG TO CHASSIS	R= .02	1
10	5102-00-0162	SW,PB,PNL MNT,CHERRY E68-40A	R= .01	1
11	2846-30-0806	SCR,SEMS,EXT TH,PHLPS,8-32x3/8	R= .01	4
12	2846-30-0808	SCR,SEMS,EXT TH,PHLPS,8-32x1/2	R= .01	1
13	2817-00-0806	WASHER,FLAT #8 ID 3/8 OD	R= .01	1
14	2846-30-2509	SCR,SEMS,EXT,Th,Ph,4-40x.25,BL	R= .01	2
15	2846-30-2510	SCR,SEMS,EXT Th,Ph,6-32x3/8,BL	R= .01	2
16	2801-03-0832	NUT,KEPS,EX TTH, 8-32,STL/ZN	R= .02	5
17	2224-20-0832	STDF,M/F,5/16hx,2.5L,8-32,Al	R= .01	2
18	2224-20-0864	STDF,F,1/4HX,AL, 8-32 X 4	R= ..A	2
19	4050-05-0001	Header,PNL MNT,5.08mm,2 POS	R= .01	1
20	4050-05-0002	PLUG,2 POS,5.08MM,SCREW TERM	R= .01	1
21	4050-05-0003	Jumper,2 POS,5.08mm	R= .01	1
22	2960-00-0001	CABLE TIE,.87"D,3.9L,.10W,NYL	R= ..A	25
23	2961-00-0020	MOUNT,CBL TIE,#10 SCR,.195H,NY	R= ..B	2
24	2846-30-2511	SCR,SEMS,EXT Th,Ph,8-32x3/8,BL	R= .01	1
999	7122-99-7523	ASSY DWG,AC INOUT,VBEAM2	R= .02	0
1000	9914-80-0300	SCHEM,SYS,VBEAM2	R= .12	0
1005	7122-85-7523	MFG PRCD,AC SECT,VBEAM2	R= .01	0

Assembly	Description	Rev
7122-00-7527	ASSY,LASER RAIL	R= .08

Item Seq	Component	Description	Rev	Qty
1	1301-00-8421	RAIL,LASER,VBEAM2	R= .29	1.0
2	2817-00-1007	WASHER,FLAT #10 ID 9/16"OD	R= .01	2.0
3	2818-00-0800	WASHER,LOCK,SPLIT #8 ID	R= .01	4.0
4	2818-00-1000	WASHER,LOCK,SPLIT #10 ID	R= .01	2.0
5	2832-OC-0812	SCR,CAP,SOC HD 8-32 X 3/4	R= .01	1.0
7	2832-OF-1012	SCR,CAP,SOC HD 10-32 X 3/4	R= .01	2.0
8	2846-30-0806	SCR,SEMS,EXT TH,PHLPS,8-32x3/8	R= .01	2.0
9	2832-OC-0808	SCR,CAP,SOC HD 8-32 X 1/2	R= .01	3.0
10	7122-00-7530	ASSY,HEAD DETECTOR	R= .10	1.0
11	7122-00-3590	ASSY,BEAM BLOCKER	R= .04	1.0
12	7122-00-7528	ASSY,LSR HD,VBEAM2	R= .08	1.0
13	7122-00-3588	ASSY,AIMING BEAM,VBEAM2	R= .09	1.0
14	7122-00-7529	ASSY,FIBER RECEPTACLE,VBEAM2	R= .06	1.0
15	2881-01-1010	SCR,SHLDR,SKHD,303SS 10-32X1/4	R= .01	2.0
16	2981-02-1200	Spr Cprsn,.049SS,.360OD,7/16"L	R= .01	2.0
19	2157-26-0011	LABEL,TRIANGLE,1.97",HIGH VOLT	R= ..A	1.0
21	1301-00-8654	LMP WIRE GDE,LSR HD	R= .04	2.0
22	2872-00-0404	THUMBSCR,KNRLD CP,RD,4-40x1/4	R= .01	2.0
23	7122-00-3744	ASSY,KIT,GND WIRE,VBEAM2	R= .02	1.0
999	7122-99-7527	ASSY DWG,LASER RAIL	R= .05	0.0

Assembly	Description	Rev
7122-00-7528	ASSY,LSR HD,VBEAM2	R= .08

Item Seq	Component	Description	Rev	Qty
1	1301-00-7395	Dye Cell,4mmx8mm Cleaned	R= .0C	1.0
2	1301-00-7408	Water Jacket,Pyrex,Sclero-LP	R= .04	1.0
3	1301-00-7435	Flashlamp Plate,Sclero-LP	R= .03	2.0
4	1301-00-7396	Reflector,6.05"	R= ..B	2.0
5	1301-00-8521	SPRT,REFL,LASER HEAD	R= .02	2.0
6	1301-00-8523	BRKT,MTG,REFL,LASER HEAD	R= .01	1.0
7	1301-00-8522	PL,ADJ REFL,LASER HEAD	R= .04	2.0
8	1301-00-7388	TUBE,SS,SCLERO-LP	R= .0A	1.0
9	1301-00-8425	SUPPORT,RR,LASER HEAD	R= .12	1.0
10	1301-00-8424	SUPPORT,FRT,LASER HEAD	R= .10	1.0
11	1301-00-8622	ENDCAP,RR,LASER HEAD,WET	R= .01	1.0
12	1301-00-7839	Knob,Adj Hd Laser,Cbeam	R= .06	4.0
13	2872-01-2515	Thumb Scr M3-0.25x15MM	R= .01	4.0
14	2801-00-0020	Nut,Ultra Fine Adj M3	R= .01	4.0
15	2818-00-0800	WASHER,LOCK,SPLIT #8 ID	R= .01	6.0
16	2832-OC-0406	SCR,CAP,SOC HD 4-40 X 3/8	R= .01	20.0
17	2832-OC-0820	SCR,CAP,SOC HD 8-32 x 1-1/4	R= .01	6.0
18	2832-00-0203	SCR,CAP,SOC HD 2-56 X 3/16	R= .01	4.0
19	2981-00-2404	Spring,Comp .25x.040x.13	R= .01	6.0
20	3160-01-0011	O-RNG,WHTSIL,5/16id7/16od1/16w	R= .01	2.0
21	3160-01-0012	O-RNG,WHTSIL,3/8"ID,1/2"OD	R= .01	2.0
22	3160-02-0010	O-RING,SLCONE,1/4" ID 3/8"	R= .01	2.0
23	3160-02-0024	O-Ring,Wht,Silicon,.276IDx.047	R= .01	2.0
24	3160-02-0127	O-ring,Slcone,1-7/16ID,1-5/8OD	R= .01	2.0
25	3160-05-0111	O-RNG,EPR,7/16"IDx5/8"ODx3/32W	R= ..A	2.0
26	3406-40-0602	ELBOW,MALE 3/8T x 1/8MPT SS	R= ..A	2.0
27	3406-41-0605	Elbow,45"Male,3/8Tx1/8NPT,SS	R= .0A	2.0
28	9908-04-1220	FLASHLAMP,7.15mm,ENDS	R= .06	1.0
29	8005-00-2013	HR,580-600nm,0.375"Dia	R= .01	1.0
30	8001-00-0002	PR,70%R@580-600nm,0.375"Dia	R= .01	1.0
31	1608-00-0001	ADHESIVE,LOCKTITE #222-31	R= .01	0.0
32	1617-00-0001	GREASE,HIGH VACUUM #DC 970V	R= .01	0.0
33	2710-00-0001	TAPE,TEFLON 1/2" DAYTON#4X543A	R= .01	1.0
34	1606-00-0010	ADH,EPOXY,5-MIN,CLEAR,1oz TUBE	R= ..A	0.0
37	3160-01-0123	O-ring,Whtsil,1-3/16ID,1-3/8OD	R= .01	2.0
38	1301-00-8525	PVT PIN,REFL,LASER HEAD	R= .02	2.0
39	1301-00-8623	ENDCAP,FRONT,LASER HEAD,WET	R= .01	1.0
40	1301-00-8545	BRKT,MTG,REAR REFL	R= .01	1.0
41	2818-00-0200	WASHER,LOCK,SPLIT #2 ID	R= .01	4.0
42	2818-00-0400	WASHER,LOCK,SPLIT #4 ID	R= .01	0.0
999	7122-99-7528	ASSY DWG,LSR HD,VBEAM2	R= .05	0.0
1005	7122-85-7528	MFG,PRCD,LSR HEAD	R= .01	0.0
1200	2880-12-0664	PIN,DWL,STL,.1877OD x 2" LONG	R= .01	0.0
1201	1301-00-7411	Rail,Laser Vbeam	R= ..A	0.0

1500 8502-00-0020 INSTR,OPTICS CLEANING R= ..B 0.0

Assembly	Description	Rev
7122-00-7529	ASSY,FIBER RECEPTACLE,VBEAM2	R= .06

Item Seq	Component	Description	Rev	Qty
1	1301-00-8447	RCPT,FBR	R= .17	1.0
2	7122-00-3597	ASSY,HSG,LENS,FBR,RCPT	R= .03	1.0
3	2990-00-0104	Plunger,Ball 1/4-20 1-4LBS	R= .01	2.0
4	2843-OC-2506	Scr,Set Soc,Oval Pt 1/4-32x3/8	R= .01	2.0
5	1301-00-8062	PLATE,REAR RCPT FIBER,MGL	R= .02	1.0
6	2832-OC-0406	SCR,CAP,SOC HD 4-40 X 3/8	R= .01	6.0
7	2817-00-0405	WASHER,FLAT #4 ID 5/16 OD	R= .01	2.0
8	2990-06-2510	PLGR,BAL,SS,NYLOK,1/4-20X.53LG	R= .01	3.0
9	7122-00-3357	ASSY,INTERLOCK,MICROSWITCH,MGL	R= .0A	1.0
10	2869-07-0060	CAP,.750"ID,1/2"L,VINYL,BLK	R= .01	1.0
11	2832-OC-0404	SCR,CAP,SOC HD 4-40 X 1/4	R= .01	2.0
12	2801-02-2533	NUT,NPB,1/4-32 NEF x .09 THK	R= .01	2.0
14	2818-00-0400	WASHER,LOCK,SPLIT #4 ID	R= .01	2.0
999	7122-99-7529	ASSY DWG,FBR RCPT,VBEAM2	R= .14	0.0
1005	7122-85-7529	PRCD,MFG,FBR RECEPTACLE,VBEAM2	R= .01	0.0
1200	5501-00-0740	TOOL,CONN,FBR,PROXIMAL,VBEAM2	R= .02	0.0
1201	7122-00-3702	ASSY,FXTR,RCPT,ALIGN	R= .02	0.0

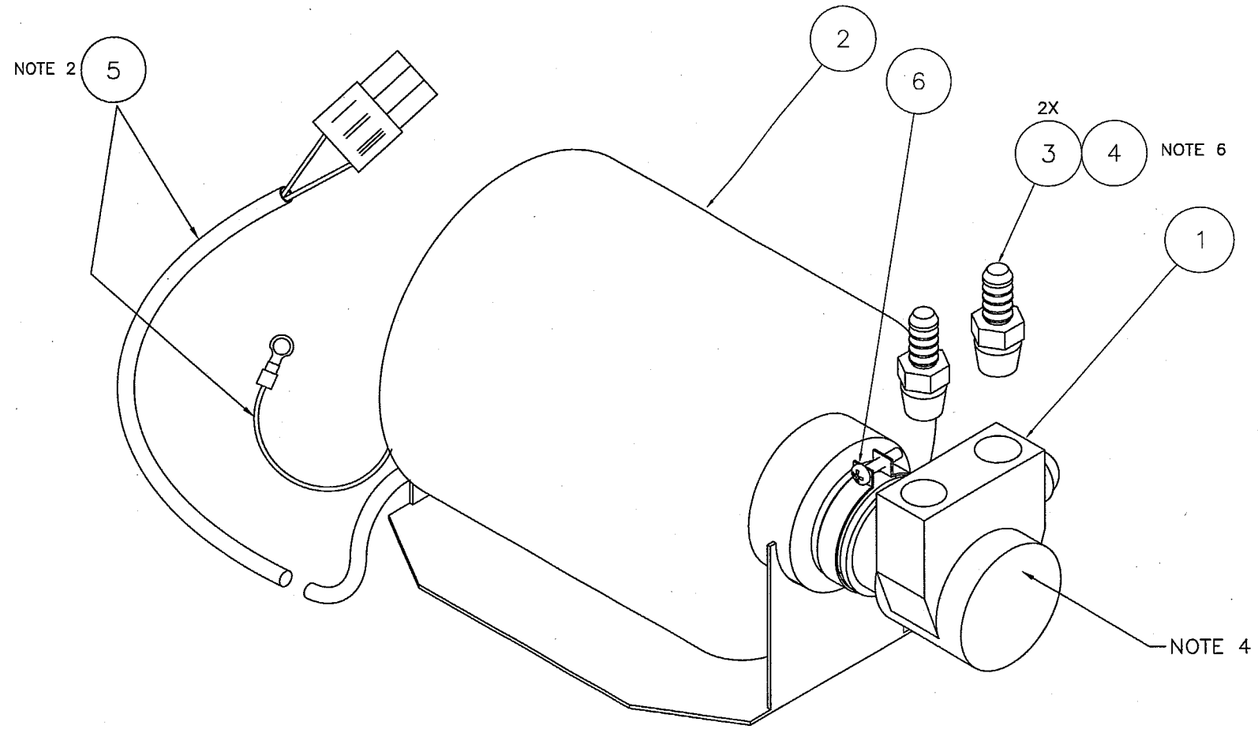
Assembly	Description	Rev
7122-00-7530	ASSY,HEAD DETECTOR	R= .10

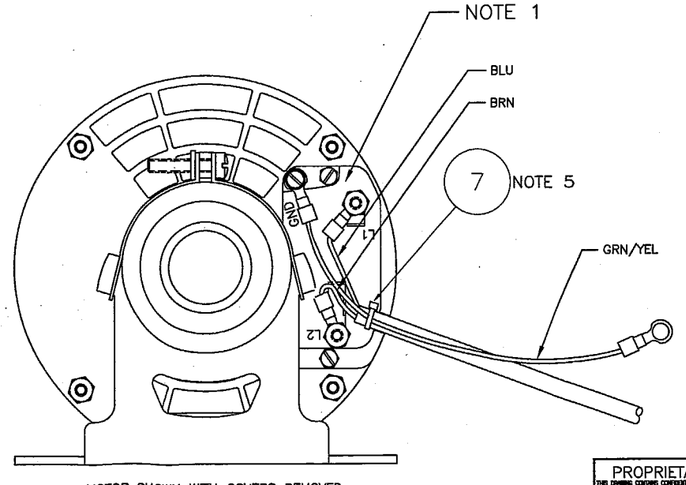
Item Seq	Component	Description	Rev	Qty
1	1301-00-8674	HSG,BEAM SPLTR	R= .04	1.0
2	1301-00-8673	HSG,ENGY DET	R= .04	1.0
3	1301-00-8536	CONN,ST THREADED	R= .01	3.0
4	8055-00-0290	Beamsplitter,Dual Coated	R= .03	2.0
5	8025-00-0160	FLTR,BG-36,0.32"lta,0.02"thick	R= .02	1.0
6	3160-02-0009	O-RING,SLCONE 7/32"ID 11/32	R= .01	1.0
7	1301-00-8489	MTG PL,ENGY DET	R= .12	1.0
8	2847-02-0804	SCR,PNH,NYL,PH,8-32 x 1/4	R= .01	8.0
9	2843-CC-0403	SCR,SET SOC CUP PT 4-40 X 3/16	R= .01	3.0
10	2832-OC-0410	SCR,CAP,SOC HD 4-40 x 5/8	R= .01	2.0
11	1301-00-7496	Cer Disk,Calport,Sclero-LP	R= .02	2.0
20	2832-OC-0408	SCR,CAP,SOC HD 4-40 X 1/2	R= .01	2.0
21	2818-00-0400	WASHER,LOCK,SPLIT #4 ID	R= .01	4.0
22	8015-00-1190	MIRROR,1"DIA.,1/8"THK	R= .01	2.0
999	7122-99-7530	ASSY DWG,HEAD DETECTOR	R= .09	0.0
1500	8502-00-0020	INSTR,OPTICS CLEANING	R= ..B	0.0

Assembly	Description	Rev
7122-00-7532	VBEAM2 HV SECTION	R= .15

Item Seq	Component	Description	Rev	Qty
1	7122-00-0491	ASSY,FAN W/LEADS	R= .01	1.0
2	2846-30-0406	SCR,SEMS,EXT TH,PHLPS,4-40x3/8	R= ..A	1.0
3	7122-00-3674	ASSY,IGBT	R= .06	1.0
4	1510-00-0110	CAP,PFN,1500uF,3.3KV	R= .11	1.0
5	4001-01-0079	HVPS,3.1KV,3KJ/S,TRIG,SIM	R= .02	1.0
6	1301-00-8583	STDF MALE FEMALE 3/8-16 x 2.5	R= .02	2.0
7	2846-30-0806	SCR,SEMS,EXT TH,PHLPS,8-32x3/8	R= .01	4.0
8	7122-00-3704	ASSY,HARN,FBR BDL,VBM2	R= .02	1.0
9	7111-00-2697	ASSY BOM,HV DUMP,VBEAM2	R= .10	1.0
10	5650-35-0030	IDCTR,FOIL,30uH,35A	R= .01	1.0
11	1301-00-8544	SHIELD,HV	R= .04	1.0
12	7122-00-3803	ASSY,THYR,VBEAM2	R= .01	1.0
13	5650-30-0100	Inductor,Foil,100uH,30A	R= .01	1.0
14	4816-01-2200	Diode,HV,2200V,120A,DUAL MOD	R= .01	1.0
15	2832-OF-1006	SCR,CAP,SOC HD 10-32 X 3/8	R= .01	4.0
16	7122-00-3709	ASSY,CABLE,HV SIGN POWER,VBM2	R= .02	1.0
17	2960-00-0002	CABLE TIE,1.25"D,5.6L,.10W,NYL	R= ..A	5.0
18	2801-03-1032	NUT,KEPS,EX TTH,10-32,STL/ZN	R= .01	4.0
19	2846-31-1008	SCR,SEMS,EXT,PHLPS,10-32X1/2	R= .01	6.0
20	1301-00-8658	BAF HTSK HV SECT	R= .01	1.0
22	1301-00-8656	FOAM,BAFFLE,FRAME	R= .01	1.0
24	2817-00-3716	WASHER,FLAT 3/8 ID 1"OD SS	R= .01	2.0
25	2818-00-3700	WASHER,LOCK,SPLIT 3/8" ID	R= .01	2.0
26	2801-FC-0616	NUT,STD HEX SS 3/8-16	R= .01	2.0
27	2846-31-2508	SCR,SEMS,EXT,PHLPS,1/4-20X1/2	R= .01	2.0
29	2817-00-3114	WASHER,FLAT 5/16ID 7/8 OD SS	R= .01	2.0
30	2801-03-3118	NUT,KEPS,EX TTH,5/16-18	R= .01	2.0
31	2832-OC-0832	SCR,CAP,SOC HD 8-32 X 2	R= .01	4.0
32	2801-03-0832	NUT,KEPS,EX TTH, 8-32,STL/ZN	R= .02	8.0
33	2818-00-0800	WASHER,LOCK,SPLIT #8 ID	R= .01	4.0
999	7122-99-7532	ASSY DWG,HV SECTION	R= .04	0.0
1005	7122-85-7532	MFG PRCD,HV SECTION,VBEAM2	R= .02	0.0

REVISIONS						
REV.	ECO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
3	12003	DESIGN RELEASE	JGW	2/5/00	A. VALENTI	2/5/00
5	12075	PILOT CHANGES	JGW	3/15/00	A. VALENTI	3/15/00





MOTOR SHOWN WITH COVERS REMOVED
FOR CONNECTING WITH ITEM 5
(INTERNAL MOTOR WIRING NOT SHOWN)

NOTES:
1. THE MOTOR MUST BE CONFIGURED FOR 230VAC. OPERATION AS FOLLOWS
   A. THE BLUE WIRE MUST BE CONNECTED TO TERMINAL 5.
   B. THE WHITE WIRE MUST BE CONNECTED TO TERMINAL 3.
2. CONNECT HARNESS (ITEM 5) TO MOTOR AS INDICATED.
3. SET PUMP PRESSURE AT 75 PSI ON PUMP HEAD TEST STATION (ITEM 1200). PRIOR TO MOUNTING HEAD TO MOTOR, INSPECT FOR LEAKS AND REPAIR ACCORDINGLY.
4. MARK PUMP WITH PRESSURE SETTING AT LOCATION SHOWN.
5. SECURE ALL THREE WIRES (INCLUDING JACKET) PRIOR TO WIRE EXIT HOLE.
6. USE 3 TO 4 WRAPS OF TEFLON TAPE (ITEM 4).

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN	J. WATSON	2/5/00
CHECK	A. VALENTI	2/5/00
DESIGN ENGINEERING	C. JOHNSON	2/5/00
MANUFACTURING ENG	C. REYNOLDS	2/5/00

MATERIAL

FINISH

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED
x = .030 X/X ± 1/32
.XX = .010 X° ± 30'
.XXX = .005

ALL MACH SURFACES
CONCENTRICITY .005 TIR
DEBURR AND BREAK ALL SHARP EDGES

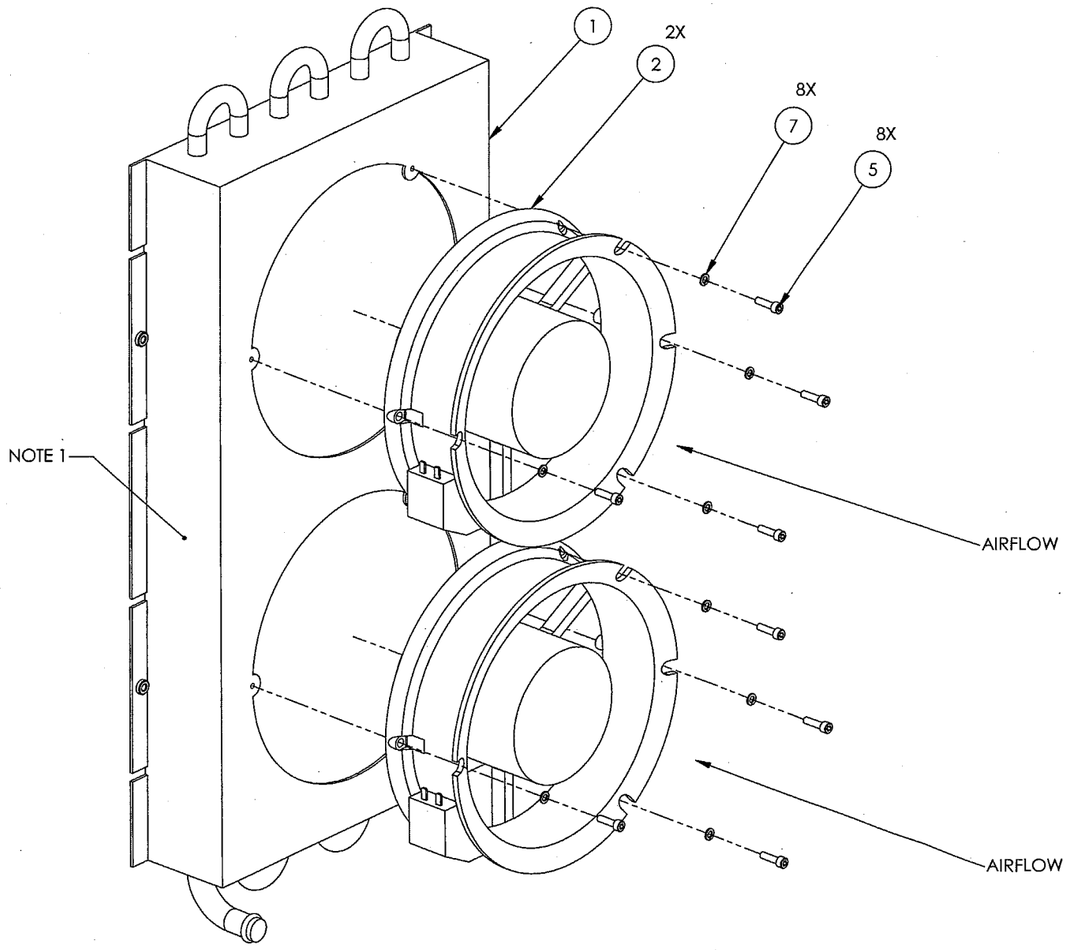
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1863

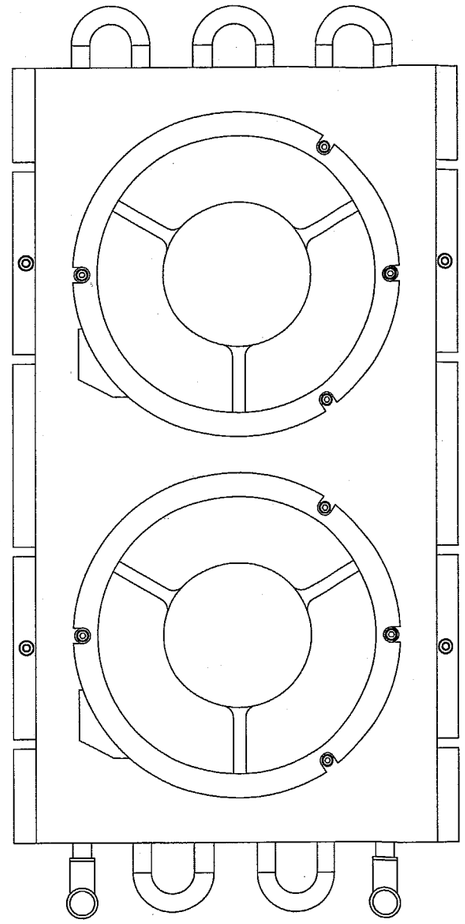
TITLE
ASSY, PUMP
DYE, VBEAM

SIZE	DRAWING NO.	REV.
D	7122-99-0110	5

SCALE FULL SHEET 1 OF 1

REVISIONS						
REV.	ECO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	13738	INITIAL RELEASE	DSD	1/17/03	SMG	1/23/03
A	13869	ADDED ELECTRICAL LEADS	DSD	3/14/03	SMG	3/17/03





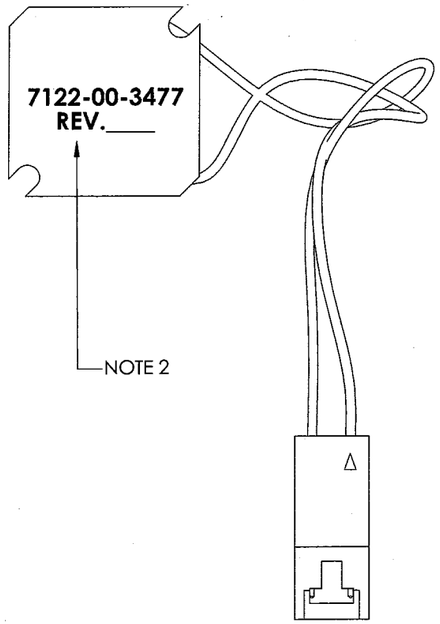
NOTES:
1. MARK CANDELA PART NUMBER AND CURRENT BOM REV LETTER USING 1/8-3/16 CHARACTERS APPROXIMATELY AS SHOWN.

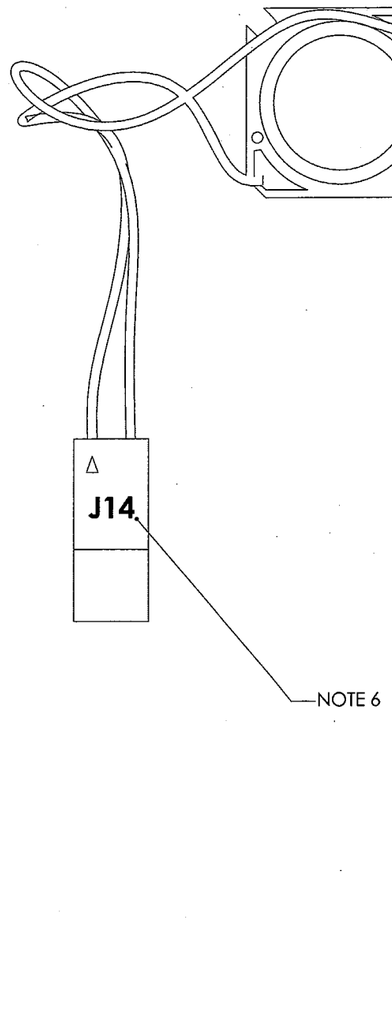
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

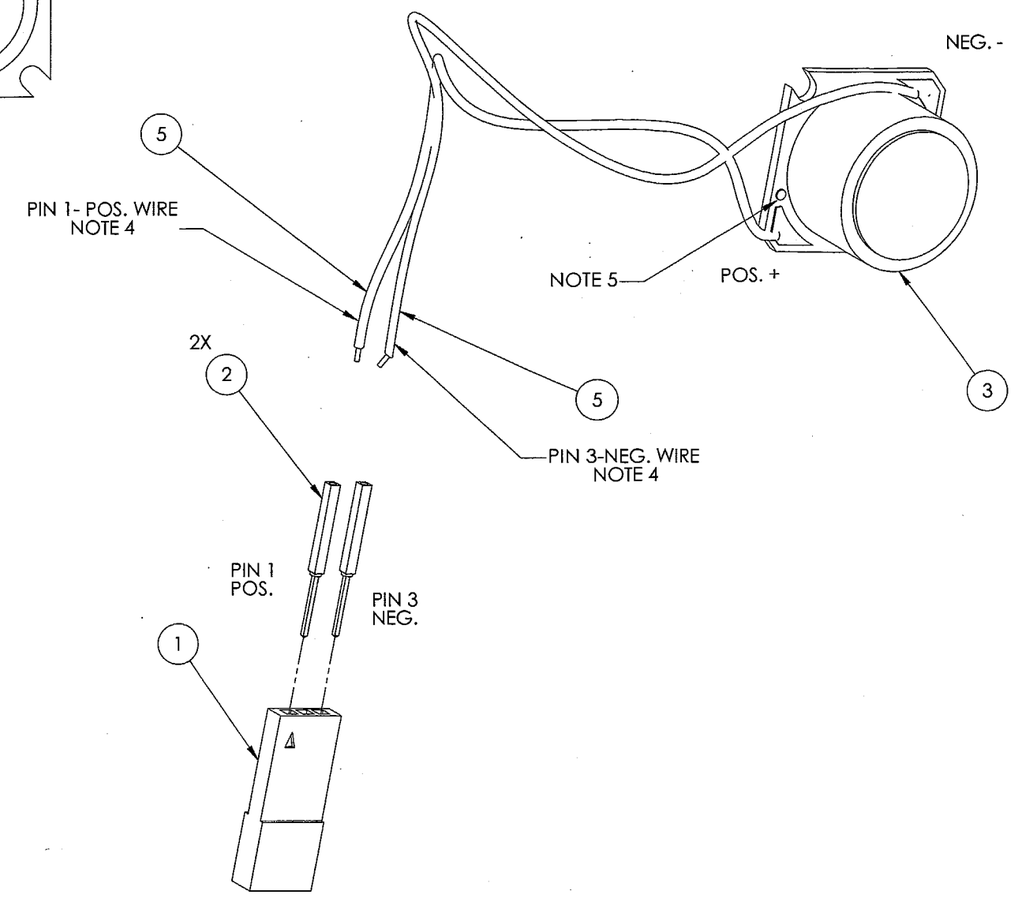
PARTS LIST

DRAWN D. DILEO	DATE 1/17/03	DO NOT SCALE THIS DRAWING	CANDELA CORPORATION 530 Boston Post Rd. Wayland, Massachusetts 01778-1883
CHECK S. GAUNTLETT	DATE 1/17/03	DIMENSIONS IN INCHES [MM]	TITLE: ASSY, HEAT EXCHANGER, DI
DESIGN ENGINEERING D. DILEO	DATE 1/17/03	UNLESS OTHERWISE SPECIFIED: X = .030, XX = .010, XXX = .005, X X ± 1/32, X° ± 30'	
MANUFACTURING ENG	DATE	ALL MACH SURFACES 63, CONCENTRICITY .005 TIR, DEBURR AND BREAK ALL SHARP EDGES	SIZE C; DRAWING NO. 7122-99-3316; REV. A
MATERIAL			SCALE 1/3; SHEET 1 OF 1
FINISH			

REVISIONS						
REV.	ECO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	14151	INITIAL RELEASE	DSD	10/21/03	SMG	10/21/03
03	14245	ADDED NOTES DEL. CABLE TIE MARKER	DSD	12/9/03	J.C.	12/9/03
04	14424	CHANGED SOME NOTES	DSD	3/5/04	J.C.	3/5/04







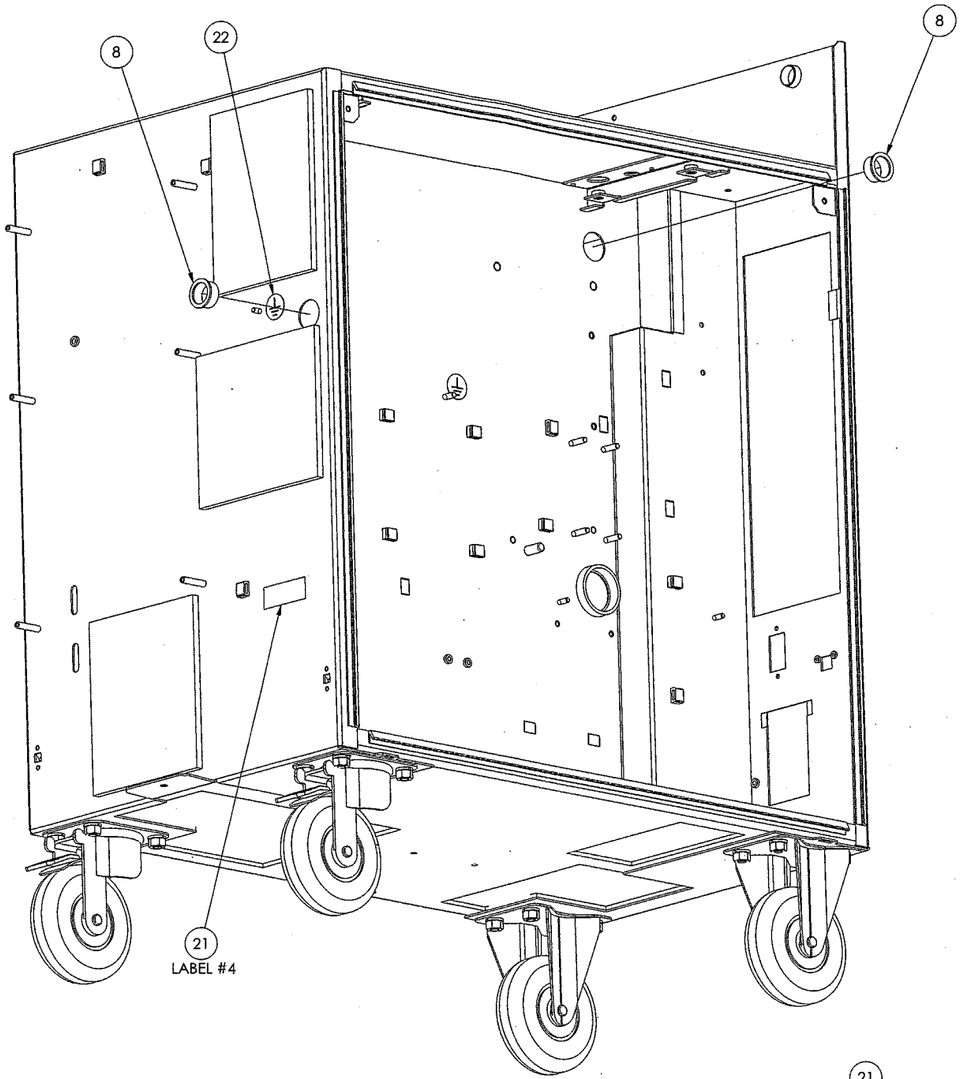
NOTES:
1. PLACE ASSEMBLY IN SUITABLE SIZE BAG.
2. MARK BACK OF DIODE (ITEM3) WITH CANDELA PART NUMBER AND CURRENT BOM REV. USING AN INDELIBLE MARKER.
3. USE CRIMP PROCEDURE ITEM 1005.
4. CUT WIRE TO 4" AND THEN STRIP1/4" INSULATION OFF SOLDER END OF WIRES.
5. CIRCLE MARK INDICATES POSITIVE SIDE FOR SOLDER CONNECTIONS. MAKE SURE WIRES ARE SOLDERED ON SOLDER PAD.
6. MARK CONNECTOR "J14" USING INDELIBLE MARKER AND LABEL.
7. CONNECT THE DIODE TO DC POWER SUPPLY (ITEM 1201) USING CABLE ASSY (ITEM 1200).

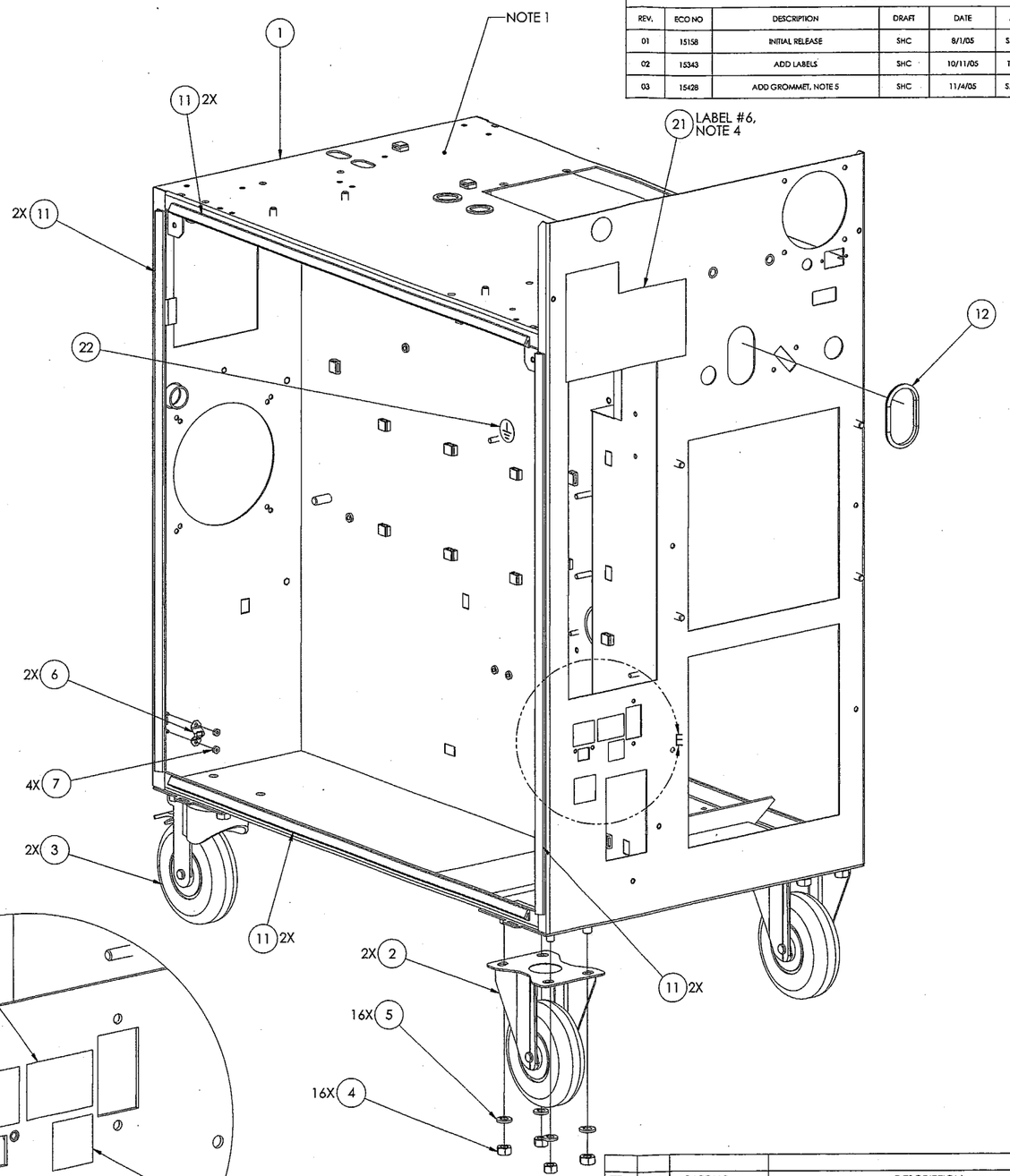
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

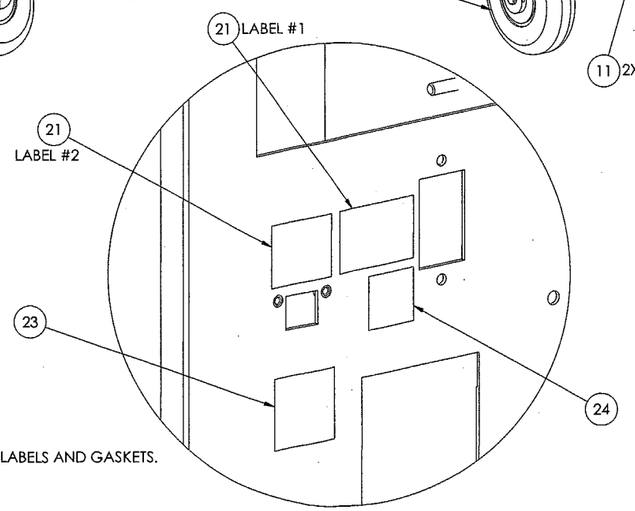
PARTS LIST

DRAWN D. DILEO	DATE 10/1/03	DO NOT SCALE THIS DRAWING	CANDELA CORPORATION 530 Boston Post Rd. Wayland, Massachusetts 01778-1883
CHECK S. GAUNTLETT	DATE 10/1/03	DIMENSIONS IN INCHES[MM]	TITLE
DESIGN ENGINEERING D. DILEO	DATE 10/1/03	UNLESS OTHERWISE SPECIFIED	ASSY, DIODE, GREEN
MANUFACTURING ENG	DATE	X = .030 XX = .010 XXX = .005 X X ± 1/32 X° ± 30'	SIZE C / DRAWING NO. 7122-99-3477 / REV. 04
MATERIAL		ALL MACH SURFACES 63 CONCENTRICITY .005 TIR	SCALE: 2:1 SHEET 1 OF 1
FINISH		DEBURR AND BREAK ALL SHARP EDGES	

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15158	INITIAL RELEASE	SHC	8/1/05	S. GAUNTLETT	8/1/05
02	15343	ADD LABELS	SHC	10/11/05	T. CATINEAU	10/11/05
03	15428	ADD GROMMET, NOTE 5	SHC	11/4/05	S. GAUNTLETT	11/4/05







DETAIL E
SCALE 1 : 1

NOTES:
1. MARK CANDELA PART NUMBER AND CURRENT REVISION USING 1/8-3/8" CHARACTERS AND LOCATE AS SHOWN.
2. PARTS MUST BE CLEAN (USE ISOPROPOL ALCOHOL) AND FREE FROM ALL GREASE, OILS, AND GRIT BEFORE APPLYING LABELS AND GASKETS.
3. ORIENT GASKETS AS SHOWN ON PAGE 3.
4. LABEL #6 (ITEM 21) SHOULD BE AFFIXED SUCH THAT BOTTOM OF LABEL IS JUST TOUCHING TOP OF VENT CUTOUT. LEFT SIDE OF LABEL SHOULD BE 7/8" FROM EDGE OF FRAME.
5. ALL VELCRO STRIPS (ITEM 13) ARE 1/4" WIDE, TO BE CUT BY VENDOR.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SCRONIN	DATE: 8/1/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 8/1/2005	
DESIGN ENGINEERING: SCRONIN	DATE: 8/1/2005	DIMENSIONS IN INCHES[MM]
MANUFACTURING ENG:		UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

PROPRIETARY

MATERIAL:

FINISH:

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

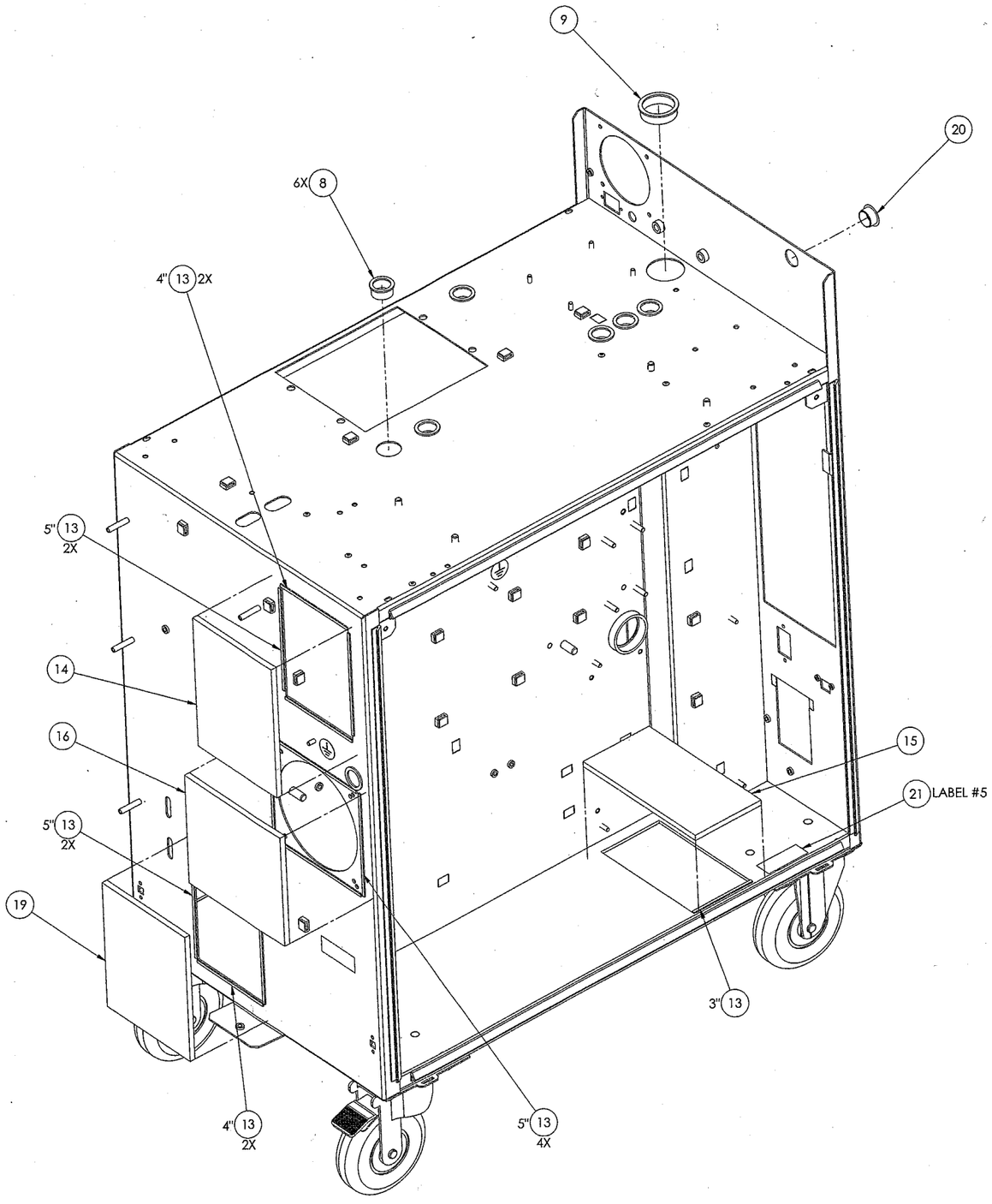
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

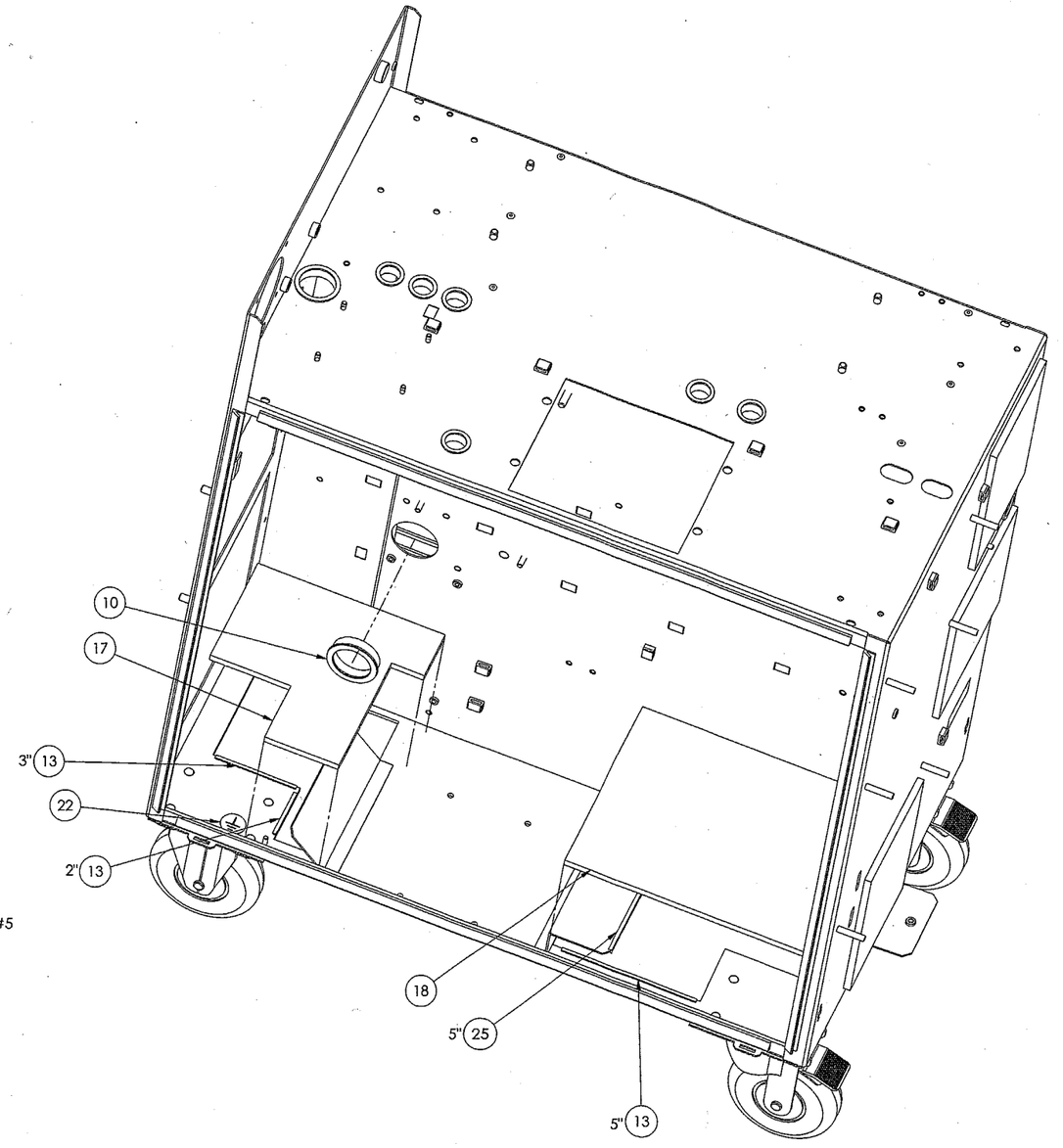
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE:
ASSY, FRAME

SIZE	DRAWING NO.	REV.
D	7122-99-3565	03

SCALE: 2/5 SHEET 1 OF 3



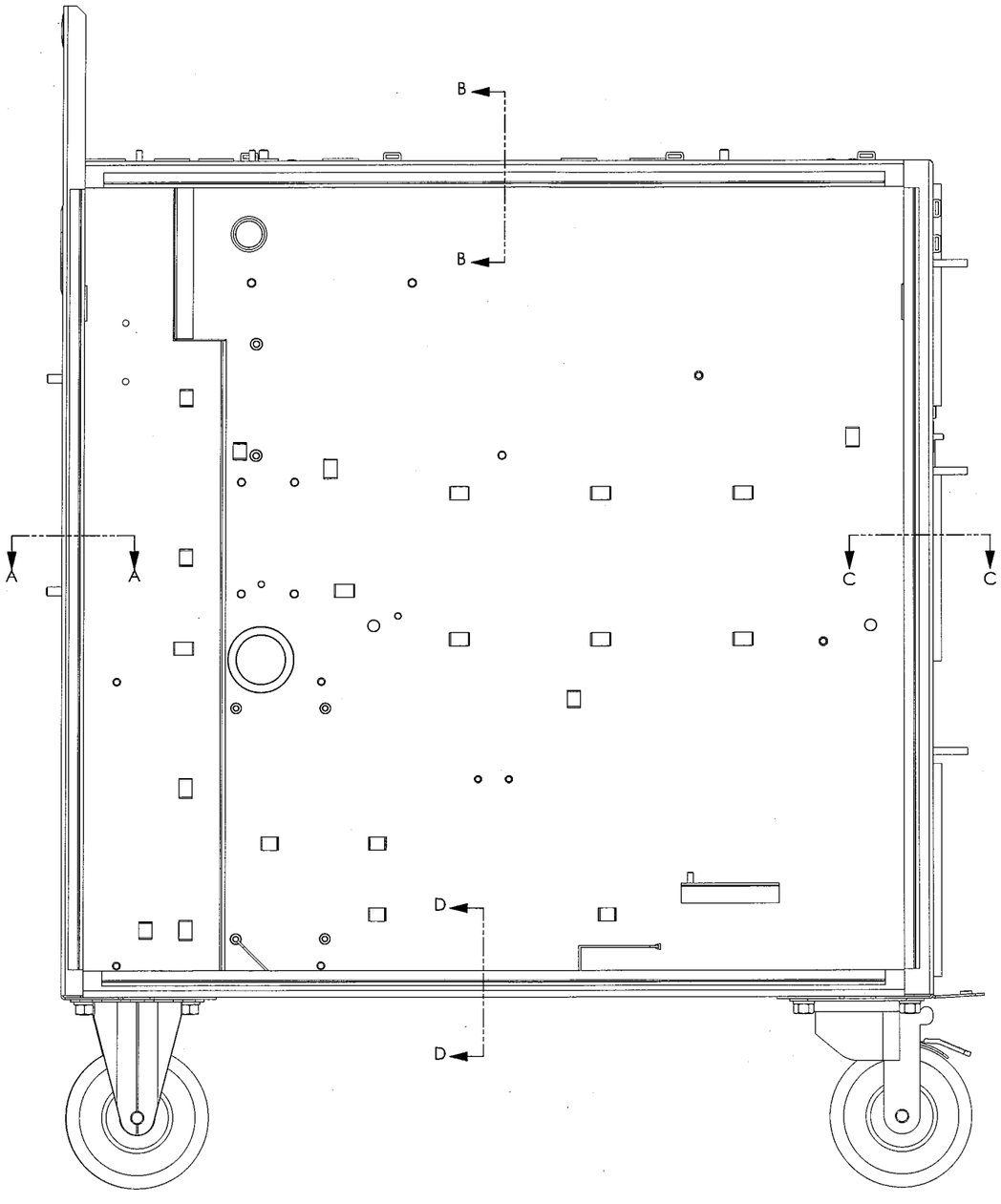


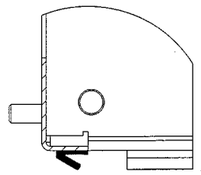
ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SCRONIN	DATE: 8/1/2005	DO NOT SCALE THIS DRAWING	CANDELA CORPORATION, 530 Boston Post Rd. Wayland, Massachusetts 01778-1883
CHECK: SGAUNTLETT	DATE: 8/1/2005	DIMENSIONS IN INCHES [MM]	TITLE: ASSY, FRAME
DESIGN ENGINEERING: SCRONIN	DATE: 8/1/2005	UNLESS OTHERWISE SPECIFIED: .X ± .030 X/X ± 1/32; .XX ± .010 X° ± 30'; .XXX ± .005	SIZE: D; DRAWING NO.: 7122-99-3565; REV.: 03
MANUFACTURING ENG:		ALL MACH SURFACES 63; CONCENTRICITY .005 TIR; DEBURR AND BREAK ALL SHARP EDGES	SCALE: 2/5; SHEET 2 OF 3

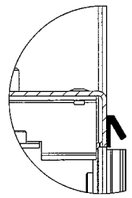
MATERIAL:

FINISH:

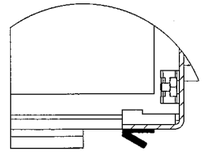




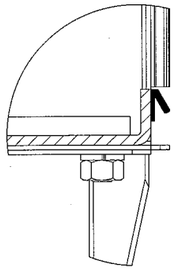
SECTION A-A
SCALE 1 : 1



SECTION B-B
SCALE 1 : 1



SECTION C-C
SCALE 1 : 1



SECTION D-D
SCALE 1 : 1

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SCRONIN DATE: 8/1/2005
CHECK: SGAUNTLETT DATE: 8/1/2005
DESIGN ENGINEERING: SCRONIN DATE: 8/1/2005
MANUFACTURING ENG:

PROPRIETARY

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES [MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63

CONCENTRICITY .005 TIR

DEBURR AND BREAK ALL SHARP EDGES

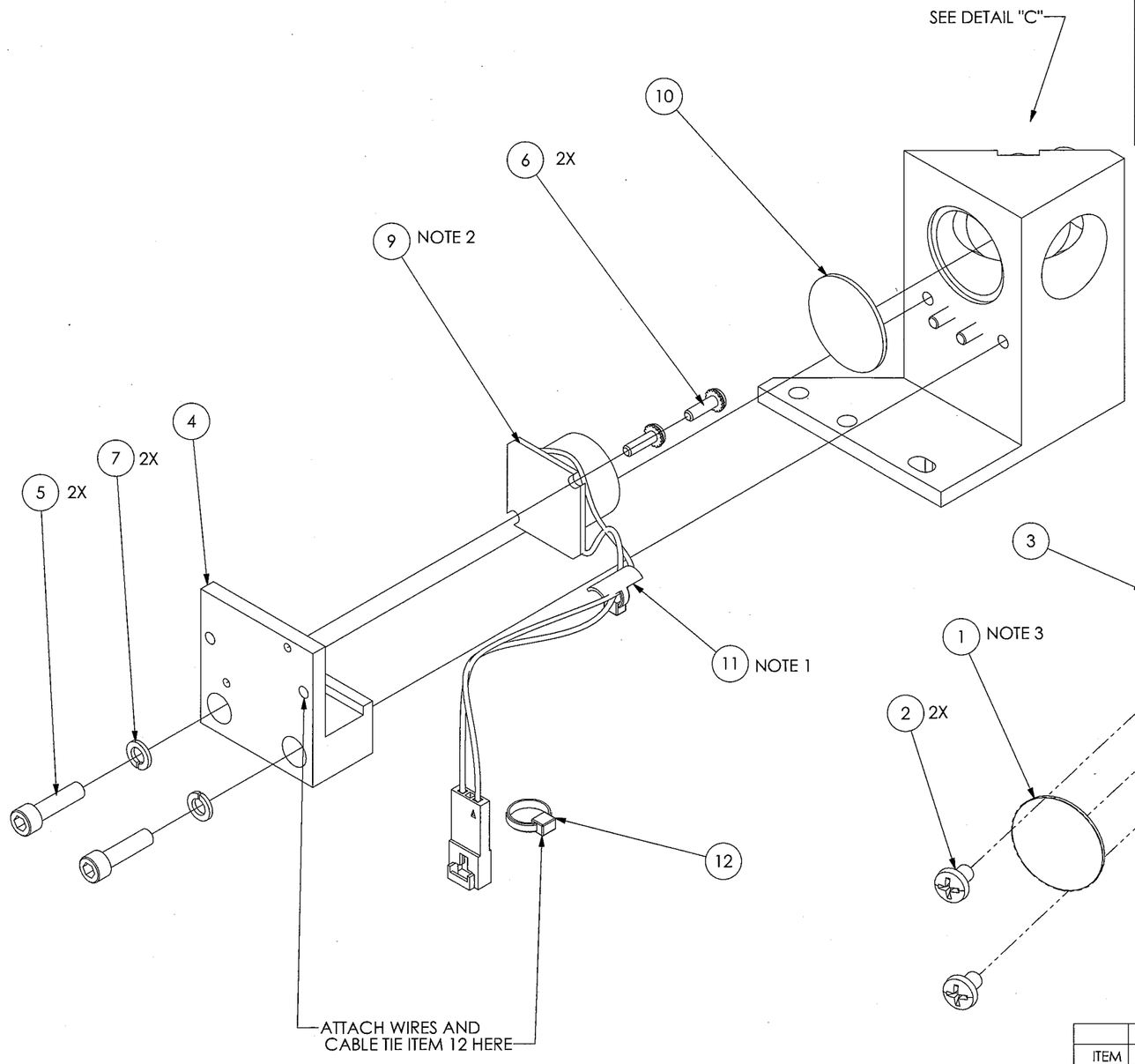
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

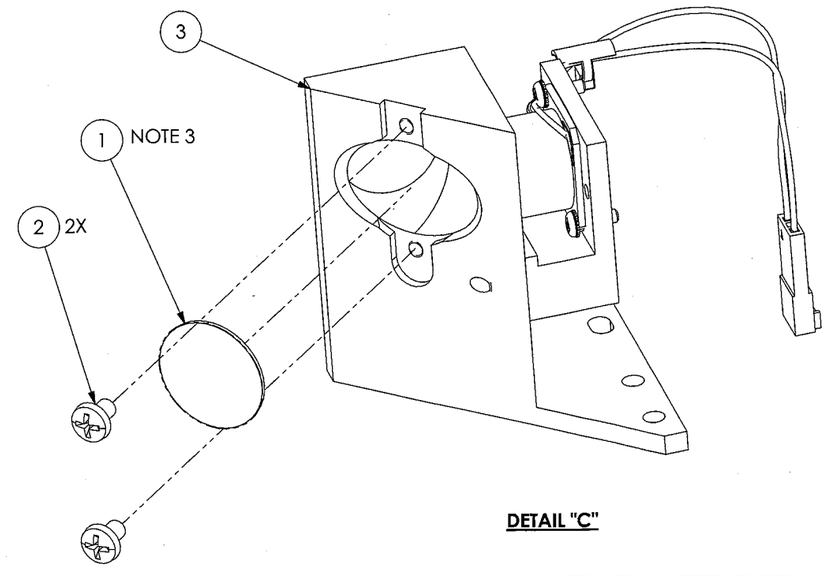
TITLE: ASSY, FRAME

SIZE D | DRAWING NO. 7122-99-3565 | REV. 03

SCALE: 1:2 SHEET 3 OF 3

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	14747	INITIAL RELEASE	SMG	2/11/2005	AGV	2/11/2005
07	15035	REDRAWN AND REVISED	AGV	5/09/2005	SMG	5/09/2005
18	15276	REVISED AND REDRAWN	AGV	9/15/2005	SMG	9/16/2005
19	15435	ADDED BALLOON 11	SAM G.	11/04/05	DALE M.	11/07/05





DETAIL "C"

NOTES:

1. MARK ID CABLE TIE ITEM 11 WITH CANDELA PART NUMBER AND CURRENT BOM REVISION.
2. POSITION WIRES AS SHOWN.
3. PLACE ITEM 1 WITH REFLECTIVE SIDE FACING INSIDE ITEM 3
4. IF NECESSARY, CLEAN OPTICAL PARTS PER PROCEDURE ITEM 1500.
5. BUILD UNDER LAMINAR HOOD.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

THIRD ANGLE PROJECTION

DRAWN: AVALENTI	DATE: 7/25/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 7/26/2005	
DESIGN ENGINEERING: AVALENTI	DATE: 7/25/2005	DIMENSIONS IN INCHES [MM]
MANUFACTURING ENG:	DATE:	UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

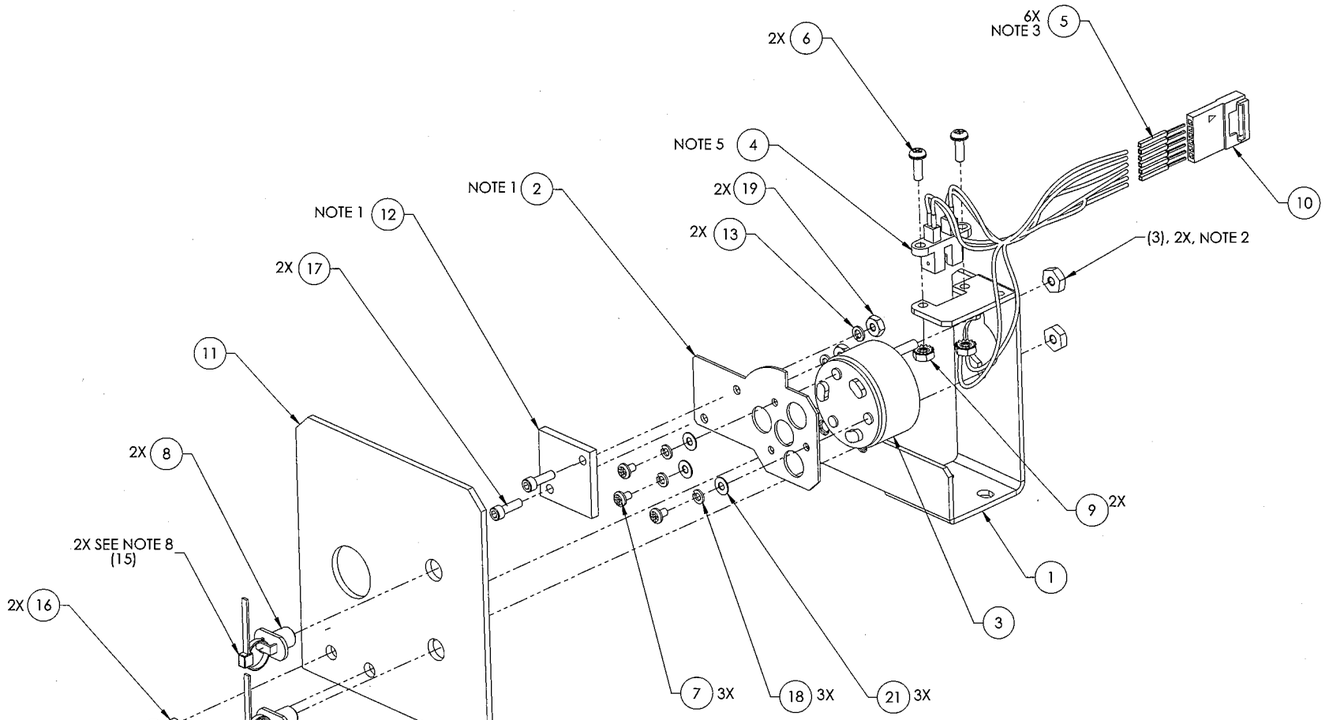
TITLE:

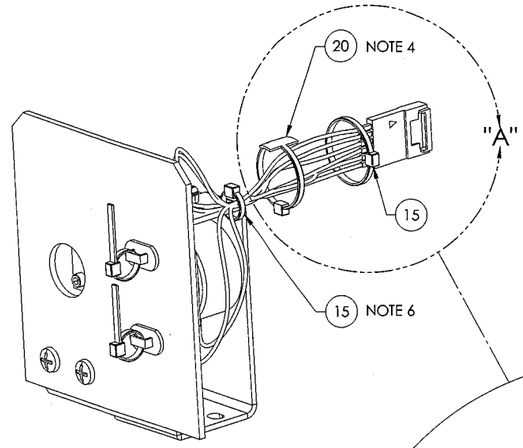
AIMING BEAM ASSEMBLY

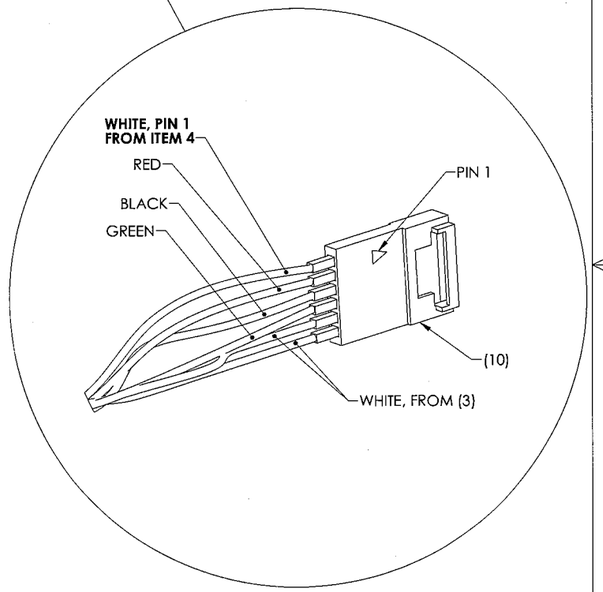
SIZE	DRAWING NO.	REV.
C	7122-99-3588	19

SCALE: 1:1 SHEET 1 OF 1

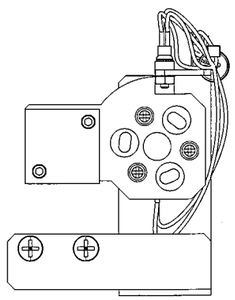
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
03	15214	INITIAL RELEASE	AGV	8/16/2005	SMG	8/16/2005
04	15414	REPLACED ITEM 2	AGV	11/4/2005	SMG	11/4/2005



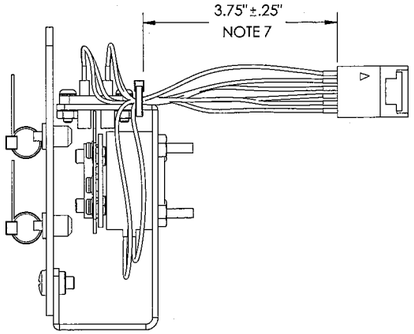




DETAIL "C"
SCALE 2:1



DETAIL "B"
SHOWN WITHOUT
ITEM 11
SCALE 2:1



NOTES:

1. CLEAN BLOCKER (ITEM 12) AND BLADE (ITEM 2) WITH SOLVENT.
2. PUT SMALL AMOUT OF ADHESIVE LOCTITE (ITEM 14) ON SCREW THREADS. USE NUT THAT IS PROVIDED WITH SOLENOID (ITEM 3).
3. REFER TO CRIMPING PROCEDURE (ITEM 1005).
4. USING AN INDELIBLE MARKER, MARK THE CABLE TIE TAB (ITEM 20) WITH THE ASSEMBLY PART NUMBER AND CURRENT BOM REVISION.
5. TIGHTEN NUTS UNTIL LOCK WASHERS ARE FLAT. DO NOT OVERTIGHTEN.
6. SECURE WIRE BUNDLE AS SHOWN USING ITEM 15.
7. CUT WIRE BUNDLE TO LENGTH SHOWN BEFORE TERMINATING WIRES.
8. LEAVE ENOUGH ROOM IN CABLE TIES ITEM 15 FOR HV CONNECTIONS. APPROXIMATELY 3/4"DIA. INSIDE OF CABLE TIES.
9. AFTER ASSEMBLED, CLEAN ASSEMBLY WITH FILTERED COMPRESSED AIR/N2.
   PLACE CLEANED ASSEMBLY IN BAG AND MARK WITH P/N AND CURRENT BOM REV.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

SHEET 1 OF 1

DRAWN AVALENTI	DATE 8/19/2005	DO NOT SCALE THIS DRAWING
CHECK SGAUNTLETT	8/22/2005	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING AVALENTI	8/19/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG		X = .030 X X ± 1/32 .XX = .010 X° ± 30' .XXX = .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

MATERIAL

FINISH ---

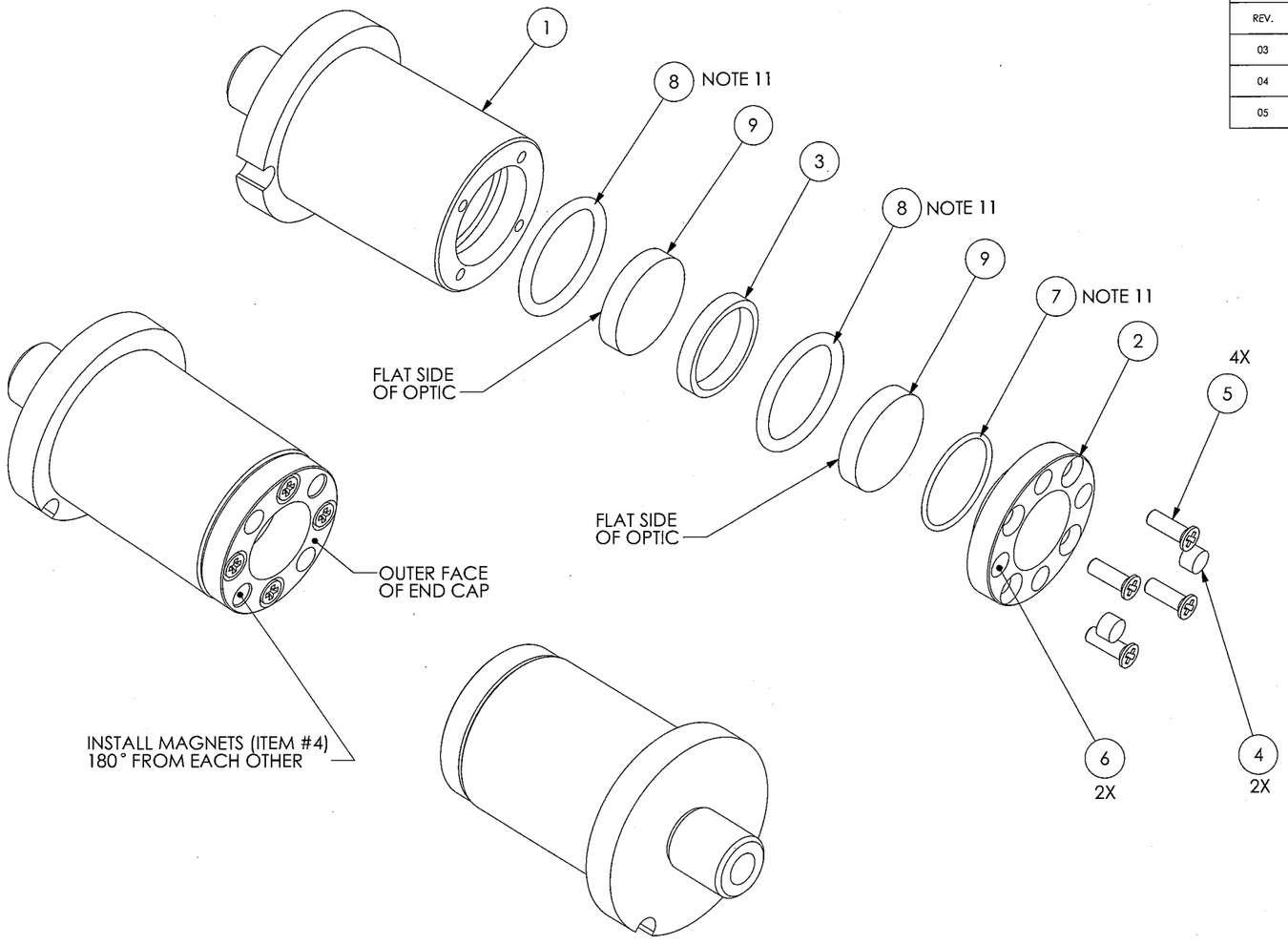
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

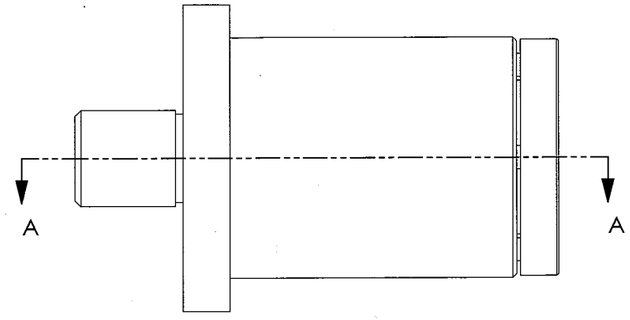
TITLE
BEAM BLOCKER ASSEMBLY

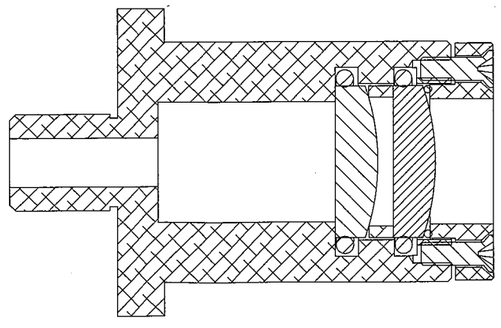
SIZE	DRAWING NO.	REV.
D	7122-99-3590	04

SCALE: 1:1 UNLESS OTHERWISE NOTED SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
03	15189	INITIAL RELEASE	D. DILEO	8/2/2005	SMG	8/2/2005
04	15293	DEL. NOTE FOR MAGNET INSTALLATION	D.DILEO	9/12/2005	S.GAUNTLETT	9/12/2005
05	15389	ADDED NOTE 11, 1	SAM G.	11/14/05	DALE M.	11/14/05







SECTION A-A
SCALE 4 : 1

NOTES:
1. CLEAN ITEMS 1,2 AND 3 IN A ULTRASONIC CLEANER FOR 10 MINUTES. RINSE WITH WATER THEN ISOPROPANOL. DRY OFF WITH COMPRESSED AIR.
2. ADD ONE DROP OF ADHESIVE (ITEM 6) INSIDE 2 C'BORES OF END CAP (ITEM 2)AND MAKE SURE THE MAGNETS (ITEM 4) SIT EITHER FLUSH OR BELOW THE OUTER FACE OF THE END CAP (ITEM 2). WIPE OFF ANY EXCESS ADHESIVE ON THE OUTSIDE OF MAGNET.
3. ASSEMBLE UNDER A LAMINAR FLOW HOOD.
4. USE EXTREME CARE WHEN HANDLING LENSES, CLEAN PER PROCEDURE ITEM 1005. FINGER COTS MUST BE WORN.
5. INSTALL FIRST O'RING (ITEM 8) INTO CRTG (ITEM 1). PUSH O'RING INTO THE GROOVE WITH A PLASTIC/WOODEN END OF A COTTON APPLICATOR.
6. INSTALL FIRST LENS (ITEM 9) IN ORIENTATION SHOWN. DO THIS BY PLACING THE LENS ON TOP OF THE LENS INSERTION TOOL (ITEM 1200). (THE TOOL'S FLANGE SHOULD BE FACING DOWN, RESTING ON BENCH). CAREFULLY SLIDE THE CRTG (ITEM 1) OVER THE LENS/INSERTION TOOL AND GENTLY PUSH DOWN TO SEAT THE LENS. LIFT THE HOUSING/TOOL ASSY UP TOGETHER AND CAREFULLY FLIP OVER, PLACING ON BENCH. HOLD THE ASSY VERTICAL,REMOVE TOOL AND SET ASIDE.
7. INSTALL SPACER (ITEM 3) AND SECOND O'RING (ITEM 8 - INSTALL AS EXPLAINED IN NOTE 4).
8. INSTALL THE SECOND LENS (ITEM 9) IN ORIENTATION SHOWN. REPEAT THE INSTALLATION PROCEDURE AS IN NOTE 5.
9. INSTALL O'RING (ITEM 7) ON TOP OF SECOND LENS (ITEM 9). AFTER THE ADHESIVE IS DRY FROM THE MAGNETS, ATTACH END CAP (ITEM 2) INTO THE CRTG UNTIL IT STOPS. BACK OUT THE SCREWS ONE TURN AND TAP THE SIDE OF THE HOUSING A FEW TIMES TO PROPERLY CENTER THE LENSES. TIGHTEN THE SCREWS (ITEM 5) SO THAT END CAP (ITEM 2) IS SNUG.
10. PLACE COMPLETED ASSY INTO BAG AND MARK BAG WITH PART NUMBER AND CURRENT BOM REVISION.
11. BEFORE ASSEMBLY, BAKE O-RINGS UNCOVERED AT 200°C (390°F) FOR 30 MINUTES.

DRAWN: DDILEO	DATE: 8/2/2005	
CHECK: SGAUNTLETT	DATE: 8/2/2005	
DESIGN ENGINEERING: DDILEO	DATE: 8/2/2005	
MANUFACTURING ENG:	DATE:	

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES [MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

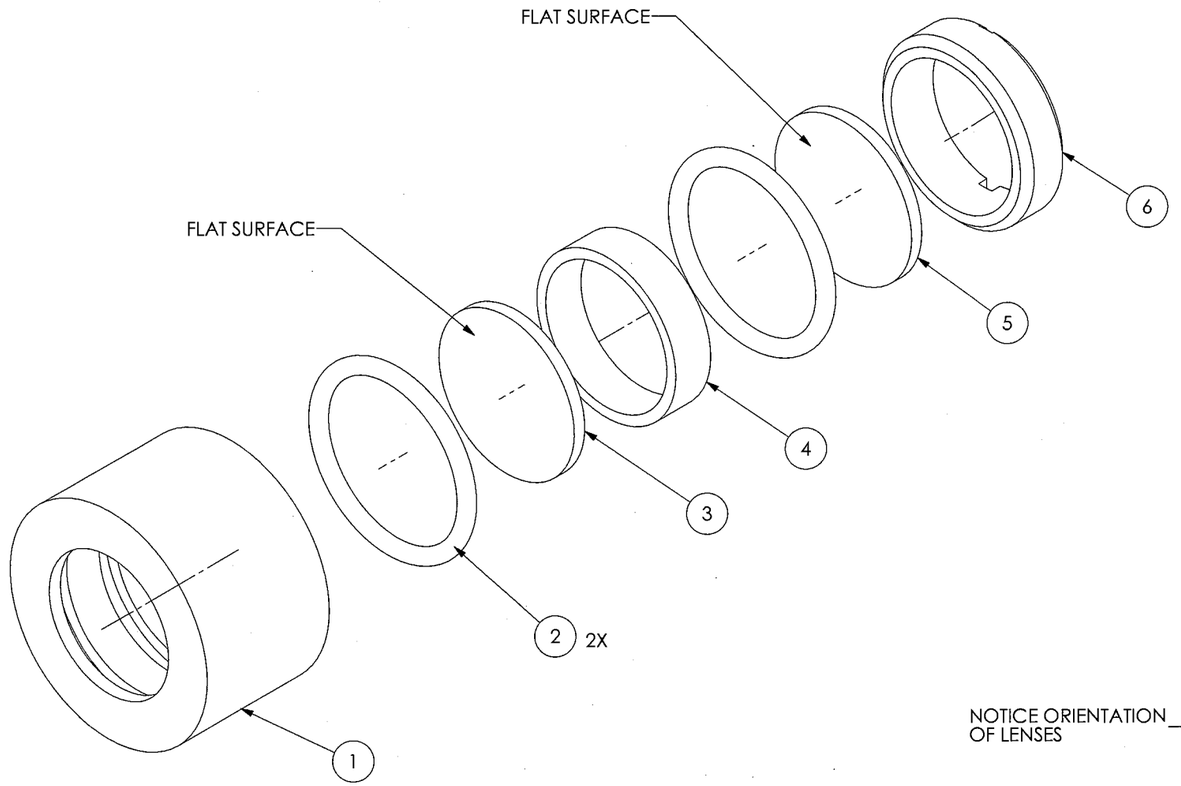
TITLE:

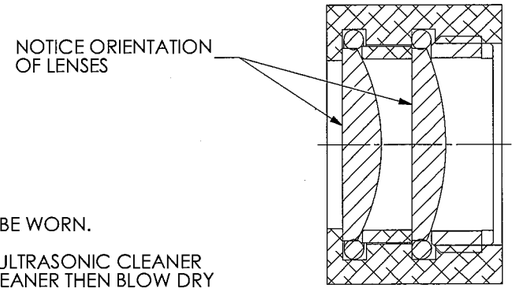
ASSY, LENS, COLLIMATED

SIZE	DRAWING NO.	REV.
C	7122-99-3593	05

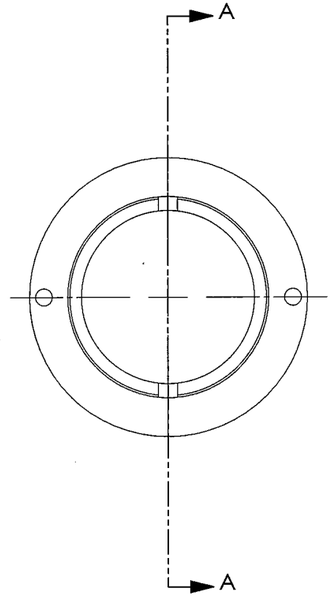
SCALE: 3:1 SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	15214	INITIAL RELEASE	AGV	8/16/2005	SMG	8/16/2005
03	15435	EDITED NOTE 3	SAM G.	11/04/05	DALE M.	





SECTION A-A



NOTES:

1. ASSEMBLE UNDER A LAMINAR FLOW HOOD.
2. USE EXTREME CARE WHEN HANDLING LENSES. CLEAN PER PROCEDURE ITEM 1005. FINGER COTS MUST BE WORN.
3. THOROUGHLY CLEAN THE HOUSING, SPACER, AND JAM NUT (ITEMS 1,4, AND 6 RESPECTIVELY), USIING ULTRASONIC CLEANER OR MANUALLY WITH A SOLVENT SUCH AS PROPANOL OR METHANOL. RINSE IF USING ULTRASONIC CLEANER THEN BLOW DRY WITH COMPRESSED AIR/NITROGEN WITH EITHER METHOD.
4. INSTALL FIRST O-RING (ITEM 2) INTO HOUSING (ITEM 1). PUSH O-RING INTO THE GROOVE WITH A PLASTIC/WOODEN END OF A COTTON APPLICATOR.
5. INSTALL FIRST LENS (ITEM 3) IN ORIENTATION SHOWN. NOTICE THIS LENS HAS A THICKER CENTER. DO THIS BY PLACING THE LENS ON TOP OF THE LENS INSERTION TOOL (ITEM 1200). (THE TOOL'S FLANGE SIDE SHOULD BE FACING DOWN, RESTING ON BENCH). CAREFULLY SLIDE THE HOUSING (ITEM 1) OVER THE LENS/INSERTION TOOL AND GENTLY PUSH DOWN TO SEAT THE LENS. LIFT THE HOUSING/TOOL ASSY UP TOGETHER AND CAREFULLY FLIP OVER, PLACING ON BENCH. HOLD THE ASSY VERTICAL, REMOVE TOOL, AND SET ASIDE.
6. INSTALL SPACER (ITEM 4) AND SECOND O-RING (ITEM 2 - INSTALL AS EXPLAINED IN NOTE 4).
7. INSTALL THE SECOND LENS (ITEM 5) IN ORIENTATION SHOWN. REPEAT THE INSTALLATION PROCEDURE DESCRIBED IN NOTE 5.
8. SCREW THE JAM NUT (ITEM 6) INTO THE HOUSING UNTIL IT STOPS. BACK OUT THE NUT ONE TURN AND TAP THE SIDE OF THE HOUSING A FEW TIMES TO PROPERLY CENTER THE LENSES. TIGHTEN THE NUT SO THAT IT IS SNUG. DO NOT OVERTIGHTEN.
9. PLACE COMPLETED ASSY INTO BAG AND MARK BAG WITH PART NUMBER AND CURRENT BOM REVISION.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

PARTS LIST

DRAWN: AVALENTI	DATE: 7/22/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 7/25/2005	
DESIGN ENGINEERING: AVALENTI	DATE: 7/22/2005	DIMENSIONS IN INCHES [MM]
MANUFACTURING ENG:	DATE:	UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

THIRD ANGLE PROJECTION

MATERIAL:

FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

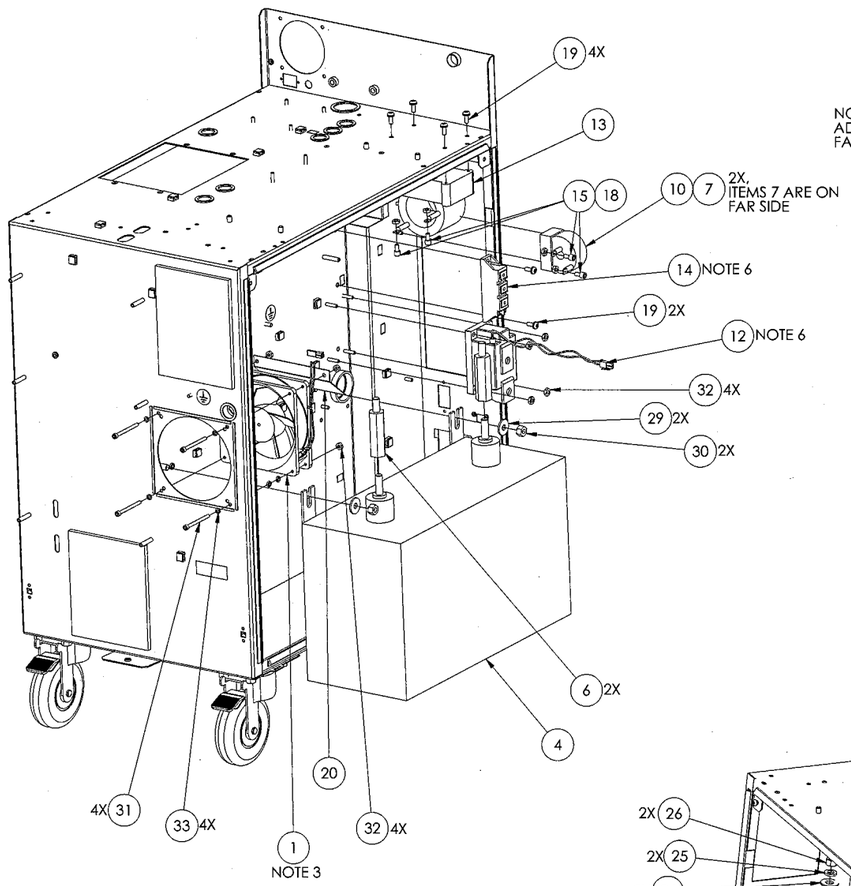
TITLE:

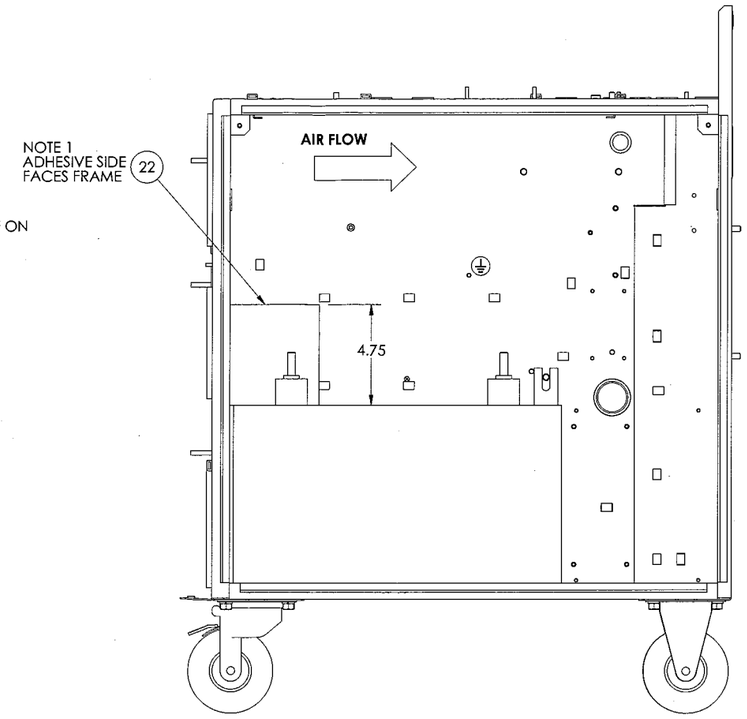
LENS HOUSING ASSY FIBER RECEPTACLE

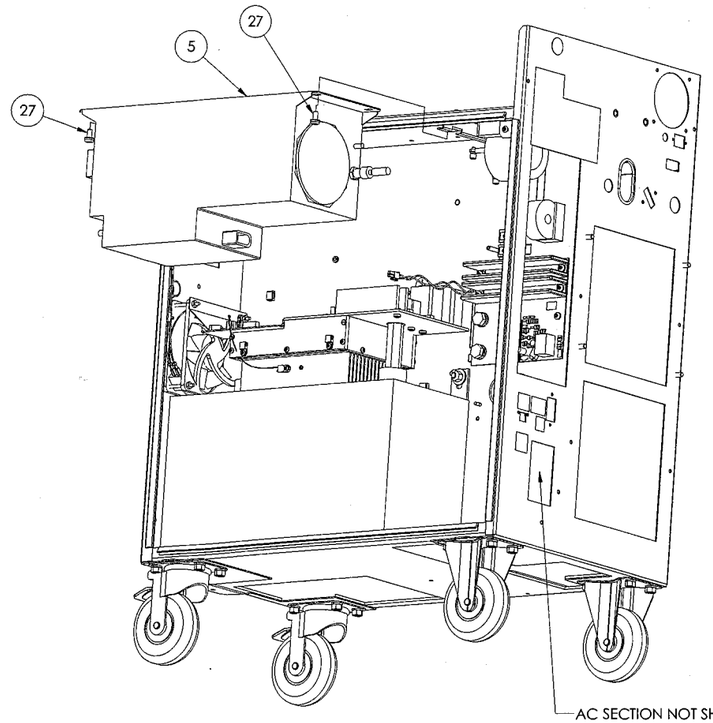
SIZE	DRAWING NO.	REV.
C	7122-99-3597	03

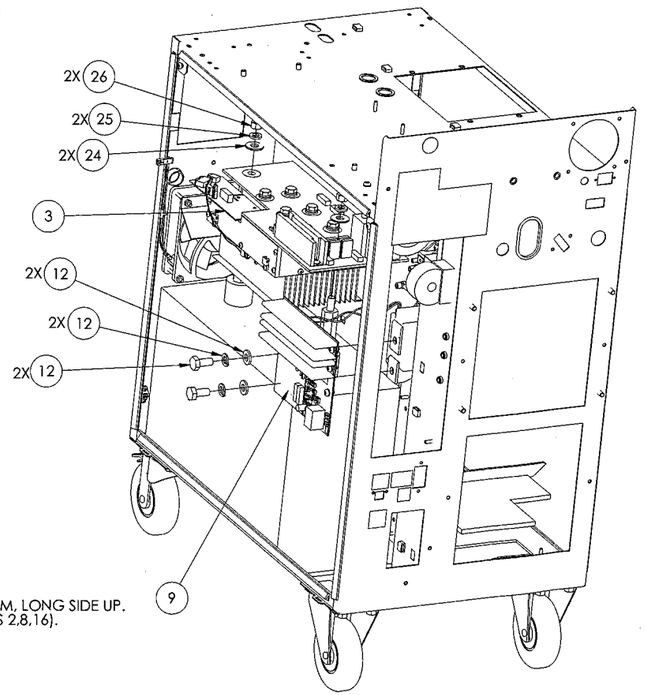
SCALE: 2:1 SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	15395	INITIAL RELEASE	SG	10/26/05	OWEN S.	10/25/05
03	15444	CHANGES PER PILOT BUILD	SHC	11/9/05	OWEN S.	11/10/05
04	15479	RENAME BALLOON 23 TO 32	SHC	11/15/05	OWEN S.	11/15/05









NOTES:
1. WIPE AREA WITH ISOPROPANOL BEFORE ADHERING ITEM 22. NOTE ORIENTATION OF FOAM, LONG SIDE UP.
2. REFER TO SYSTEM SCHEMATIC (ITEM 1000) FOR PROPER WIRING OF THE HARNESSES (ITEMS 2,8,16).
3. INSTALL FAN (ITEM 1) SO AIR FLOW IS TOWARDS BACK OF UNIT, WIRES FACING OUT.
4. SECURE WIRES TO CAP (ITEM 4) PRIOR TO SECURING IGBT (ITEM 3).
5. DO NOT USE TIE WRAP GUN ON TIE WRAPS, HAND TIGHTEN ONLY.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

THIRD ANGLE PROJECTION

PROPRIETARY

DRAWN: S.GERAGONIS	DATE: 10/19/05	DO NOT SCALE THIS DRAWING
CHECK: O.SCHIRDUAN	DATE: 10/20/05	
DESIGN ENGINEERING: O.SCHIRDUAN	DATE: 10/17/05	DIMENSIONS IN [INCHES][MM]
MANUFACTURING ENG:		UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

FINISH:

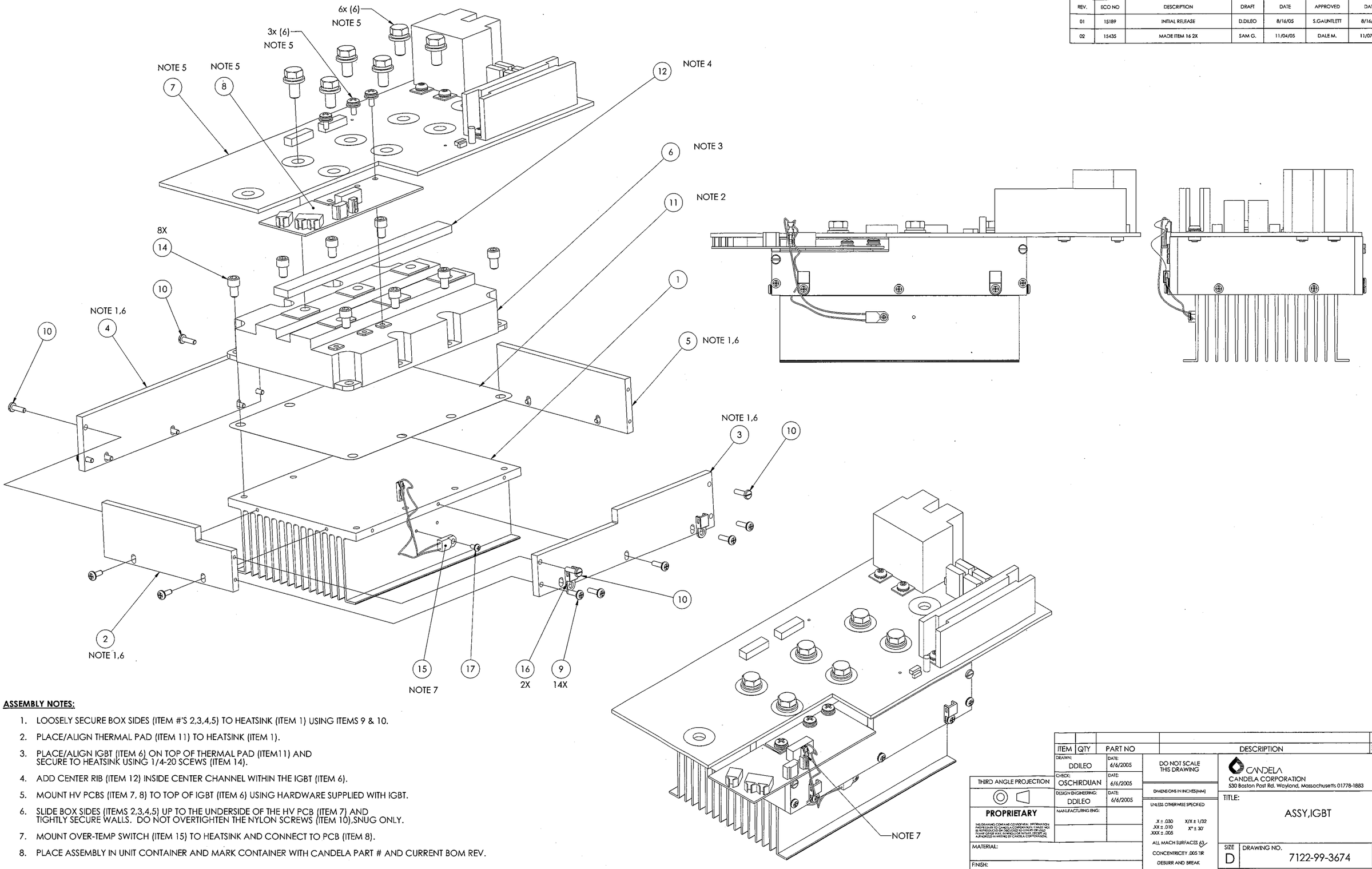
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: ASSY, HV SECTION, VBEAM2

SIZE	DRAWING NO.	REV.
D	7122-99-7532	04

SCALE: 1:2 SHEET 1 OF 2

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15189	INITIAL RELEASE	D.DILEO	8/16/05	S.GAUNTLETT	8/16/05
02	15435	MADE ITEM 16 2X	SAM G.	11/04/05	DALE M.	11/07/05



ASSEMBLY NOTES:

1. LOOSELY SECURE BOX SIDES (ITEM #'S 2,3,4,5) TO HEATSINK (ITEM 1) USING ITEMS 9 & 10.
2. PLACE/ALIGN THERMAL PAD (ITEM 11) TO HEATSINK (ITEM 1).
3. PLACE/ALIGN IGBT (ITEM 6) ON TOP OF THERMAL PAD (ITEM11) AND SECURE TO HEATSINK USING 1/4-20 SCEWS (ITEM 14).
4. ADD CENTER RIB (ITEM 12) INSIDE CENTER CHANNEL WITHIN THE IGBT (ITEM 6).
5. MOUNT HV PCBS (ITEM 7, 8) TO TOP OF IGBT (ITEM 6) USING HARDWARE SUPPLIED WITH IGBT.
6. SLIDE BOX SIDES (ITEMS 2,3,4,5) UP TO THE UNDERSIDE OF THE HV PCB (ITEM 7) AND TIGHTLY SECURE WALLS. DO NOT OVERTIGHTEN THE NYLON SCREWS (ITEM 10),SNUG ONLY.
7. MOUNT OVER-TEMP SWITCH (ITEM 15) TO HEATSINK AND CONNECT TO PCB (ITEM 8).
8. PLACE ASSEMBLY IN UNIT CONTAINER AND MARK CONTAINER WITH CANDELA PART # AND CURRENT BOM REV.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

THIRD ANGLE PROJECTION

DRAWN: DDILEO	DATE: 6/6/2005	
CHECK: OSCHIRDUAN	DATE: 6/6/2005	
DESIGN ENGINEERING: DDILEO	DATE: 6/6/2005	
MANUFACTURING ENG:		

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63

CONCENTRICITY .005 TIR

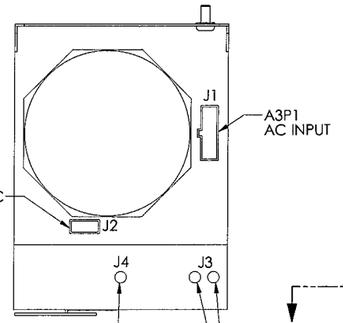
DEBURR AND BREAK ALL SHARP EDGES

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

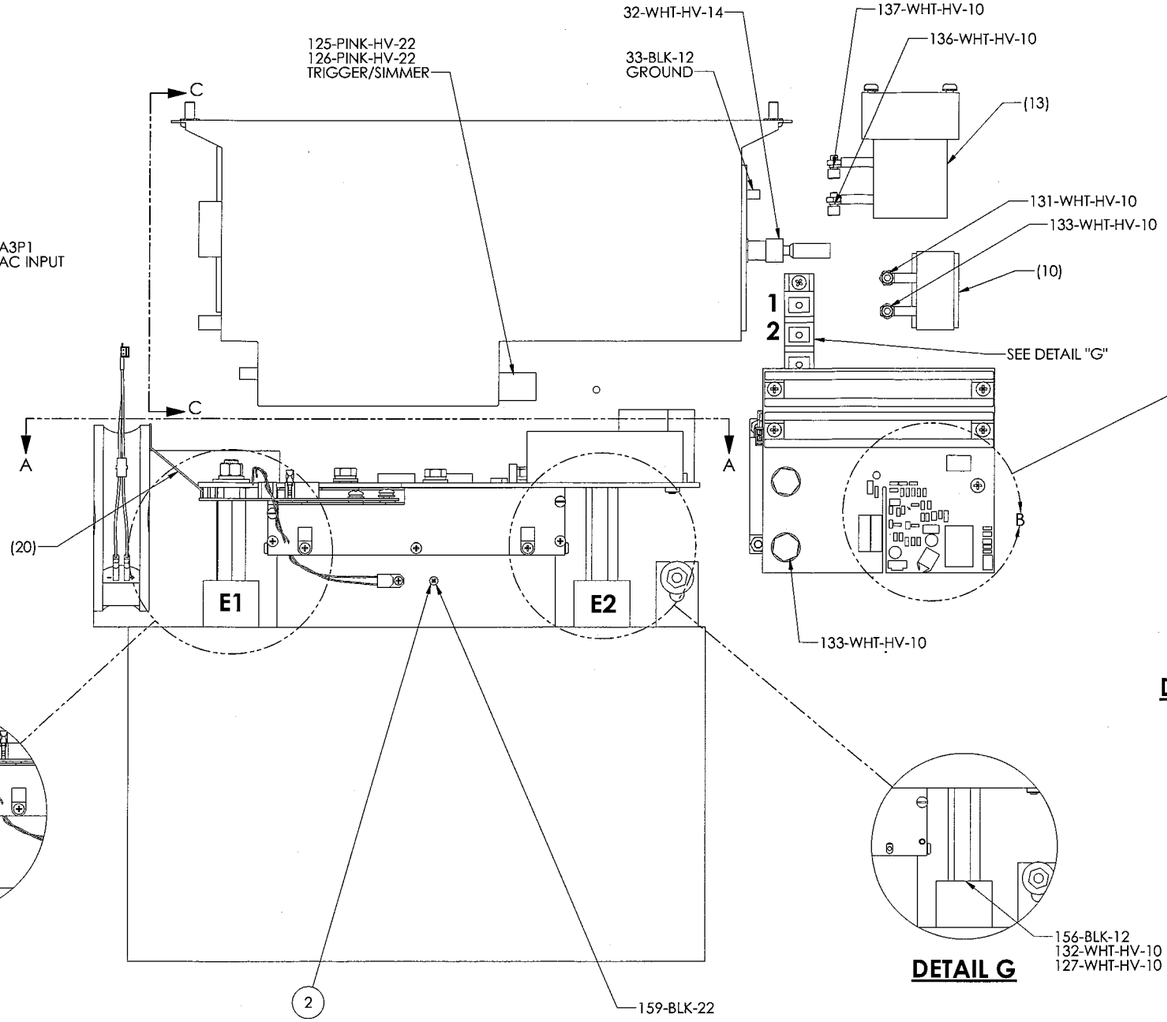
TITLE:
ASSY,IGBT

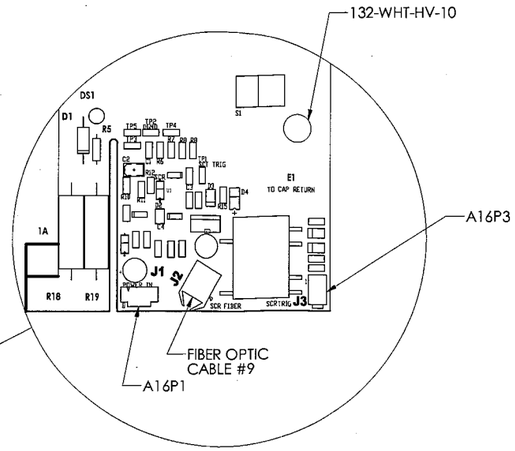
SIZE	DRAWING NO.	REV.
D	7122-99-3674	02

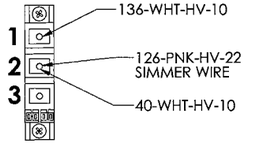
SCALE: 3:4 SHEET 1 OF 1



VIEW C
FRAME NOT SHOWN





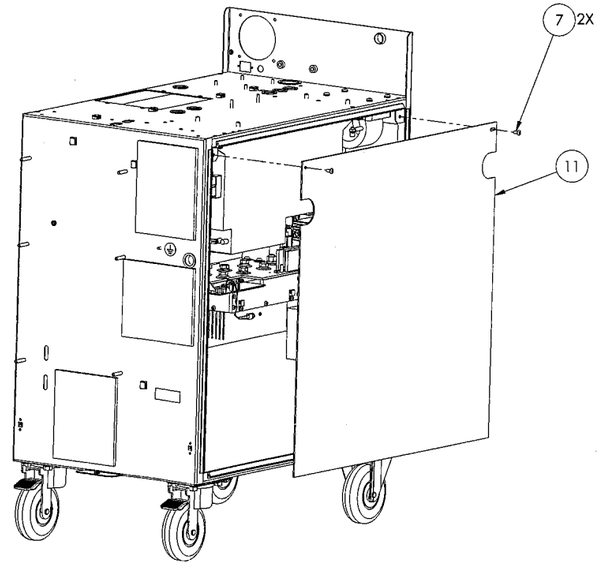


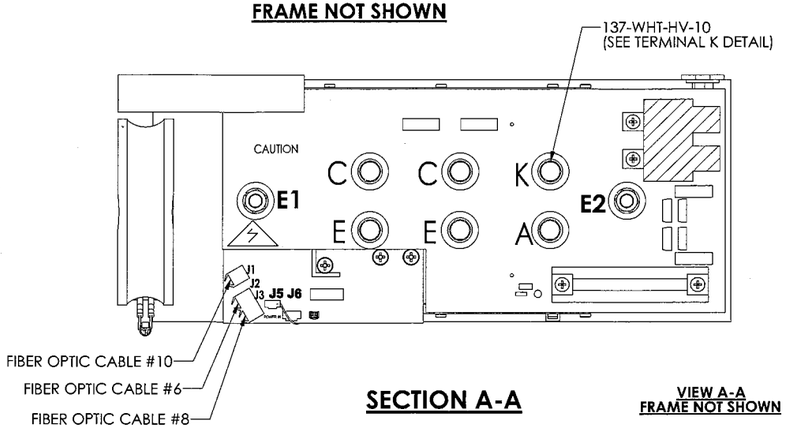
DETAIL "G"

DETAIL F

DETAIL G

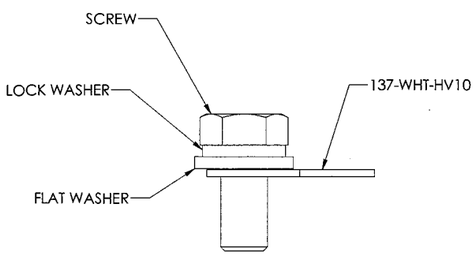
FRAME NOT SHOWN





SECTION A-A

VIEW A-A
FRAME NOT SHOWN



TERMINAL K

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: S.GERAGONIS DATE: 10/19/05
CHECK: O.SCHIRDUAN DATE: 10/20/05
DESIGN ENGINEERING: O.SCHIRDUAN DATE: 10/17/05
MANUFACTURING ENG:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]
UNLESS OTHERWISE SPECIFIED
.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

PROPRIETARY
THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION PROPRIETARY TO CANDELA CORPORATION. IT MUST NOT BE REPRODUCED, DISCLOSED OR USED IN WHOLE OR IN PART EXCEPT AS AUTHORIZED IN WRITING BY CANDELA CORPORATION.

MATERIAL:
FINISH:

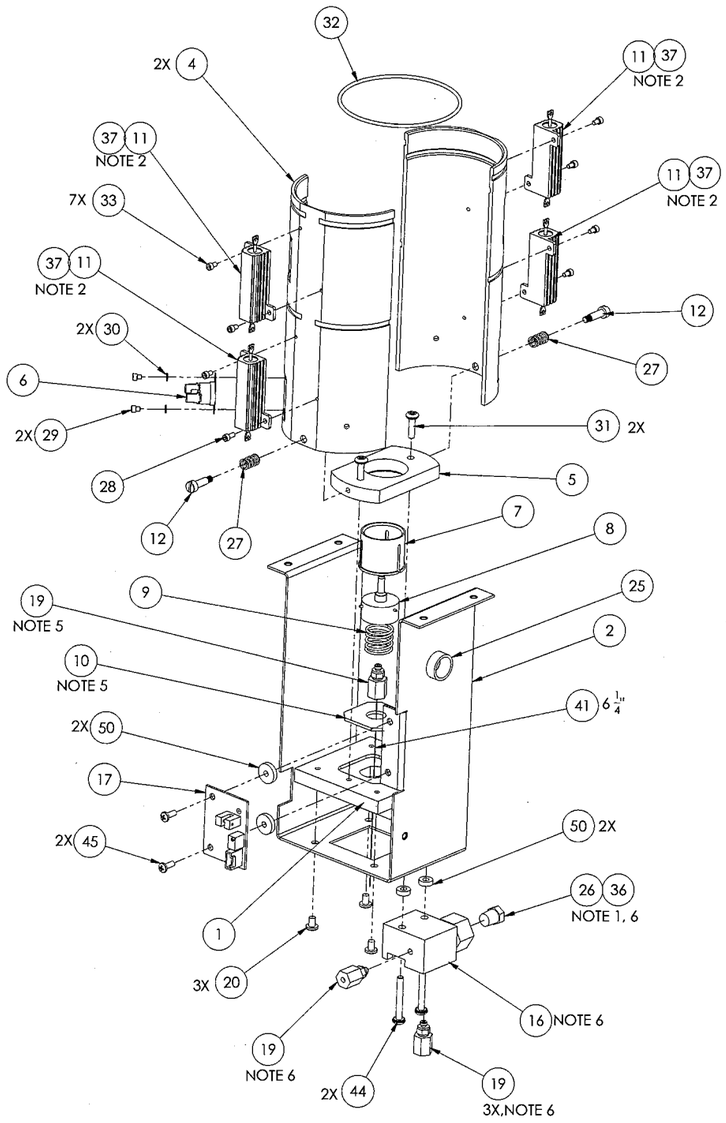
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

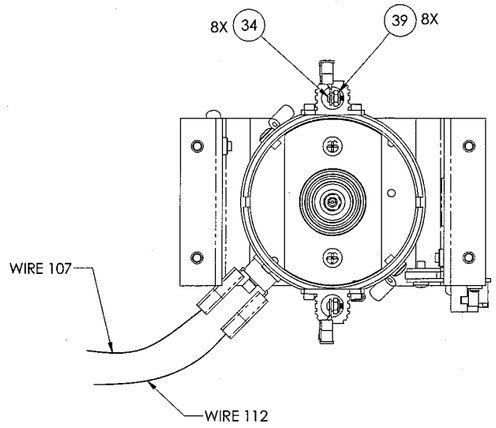
TITLE: ASSY, HV SECTION, VBEAM2

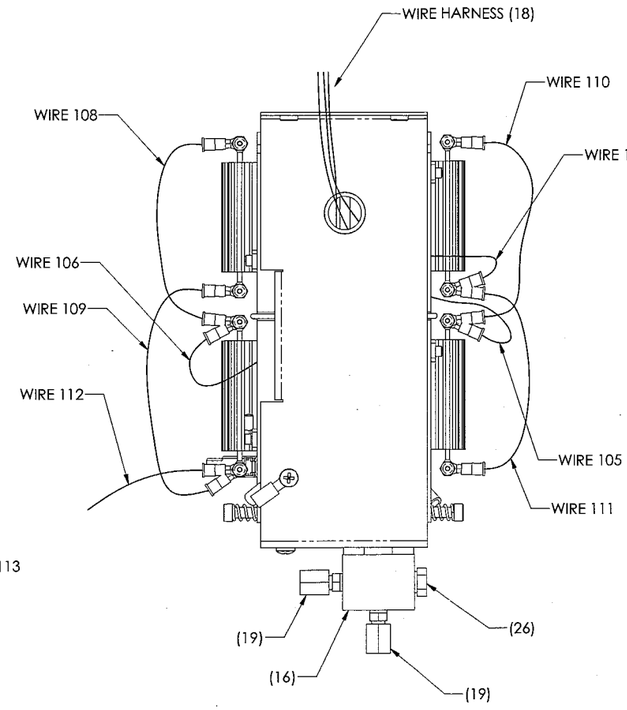
SIZE D | DRAWING NO. 7122-99-7532 | REV. 04

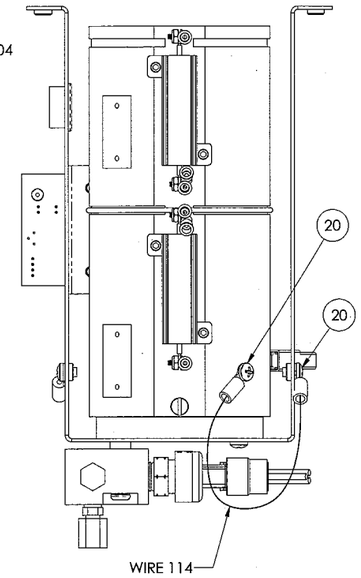
SCALE: 1:2 SHEET 2 OF 2

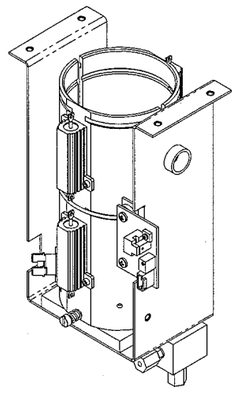
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15210	INITIAL RELEASE	SMG	8/12/2005	TC	8/12/2005
02	15328	ADD FAN ASSEMBLY	SMG	10/5/2005	TC	10/5/2005
03	15499	ADD SAFETY SHIELDS	SMG	11/21/2005	SHC	11/21/2005
04	15448	ADDED ITEM 51 AND NOTES 11,12	SAM G.	11/29/05	DALE M.	11/29/05











HEATER TUBE ASSEMBLY

NOTES:
1. USE HVAC - BLUE PIPE SEALANT (ITEM 36) TO PIPE THREADS ONLY WHERE NOTED.
2. APPLY A THIN UNIFORM LAYER OF THERMAL JOINT COMPOUND (ITEM 37) ON THE BOTTOM OF EACH POWER RESISTER (ITEM 11).
3. SOME PARTS AND WIRES NOT SHOWN IN VIEWS FOR CLARITY.
4. ALL WIRE CALLOUTS ARE PART OF THE WIRE HARNESS KIT (ITEM 18).
5. SWAGE TUBE (ITEM 41) WITH CONNECTOR (ITEM 19) THIS END FIRST BEFORE FULLY ASSEMBLING.
6. ASSEMBLE MANIFOLD (ITEM16) WITH PLUG (ITEM 26), 2 CONNECTORS (ITEM 19)AND PRESSURE SENSOR FROM WIRE HARNESS (ITEM 18) PRIOR TO MOUNTING ONTO BRACKET (ITEM2).
7. INSTALL MANIFOLD ASSEMBLY INTO ENCLOSURE PRIOR TO INSTALLING HEATER TUBE ASSEMBLY FROM PAGE 1.
8. USE CABLE TIE (ITEM 42) TO DRESS WIRE HARNESS (ITEM 18) AS NEEDED.
9. CAPTURE TUBING WITH TUBE LOCK (ITEM 35) AND SECURE WITH SCREW (ITEM 34).
10. PLUG CONNECTOR A11P1 FROM WIRE HARNESS (ITEM 18) TO RECEPTACLE J1ON BUBBLE SENSE BOARD (ITEM 17).
11. CONNECT J25 OF WIRE HARNESS TO FAN (ITEM 47).
12. DO NOT SQUASH TUBING. DO NOT USE TIE WRAP GUN.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SGAUNTLETT	DATE: 4/6/2005	DO NOT SCALE THIS DRAWING
CHECK: TCATINEAU	DATE: 4/6/2005	DIMENSIONS IN INCHES [MM]
DESIGN ENGINEERING: SGAUNTLETT	DATE: 4/6/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

MATERIAL: ---

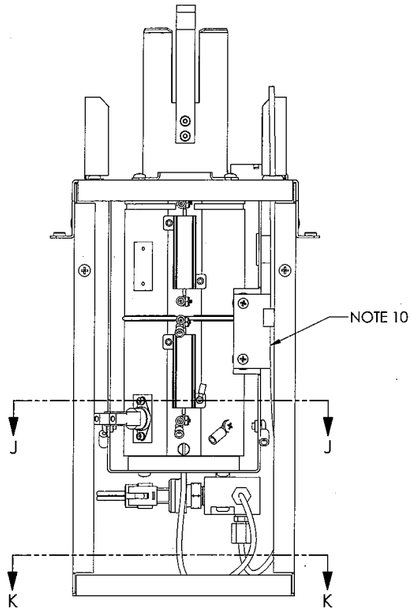
FINISH: ---

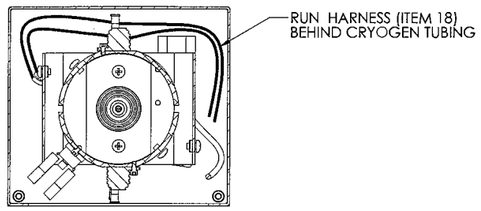
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: ASSY DCD

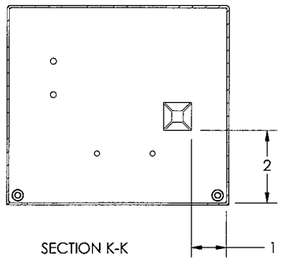
SIZE	DRAWING NO.	REV.
D	7122-99-3640	04

SCALE: 1:2 SHEET 1 OF 2

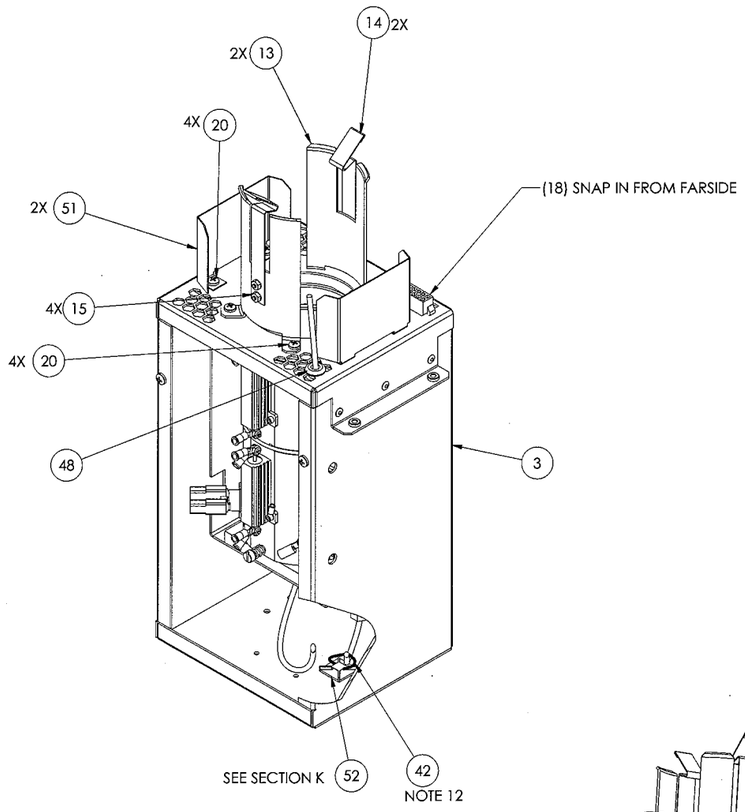


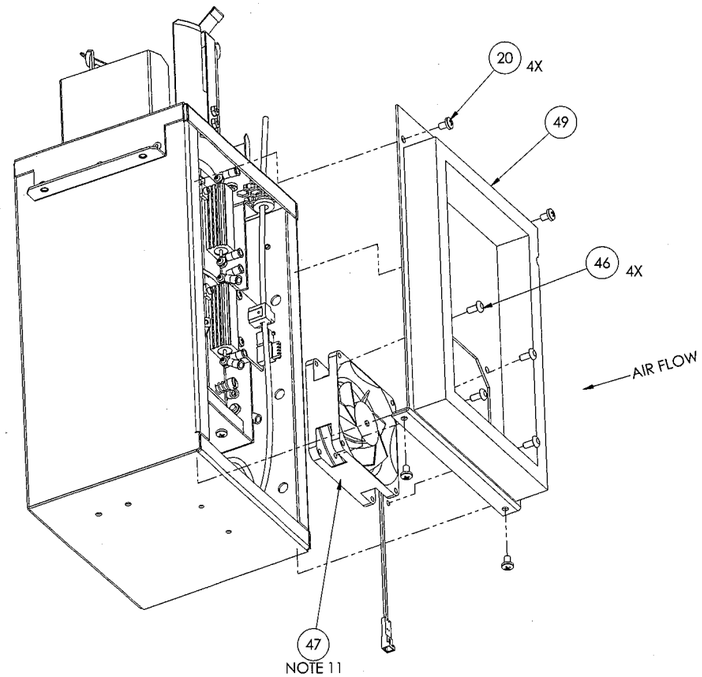


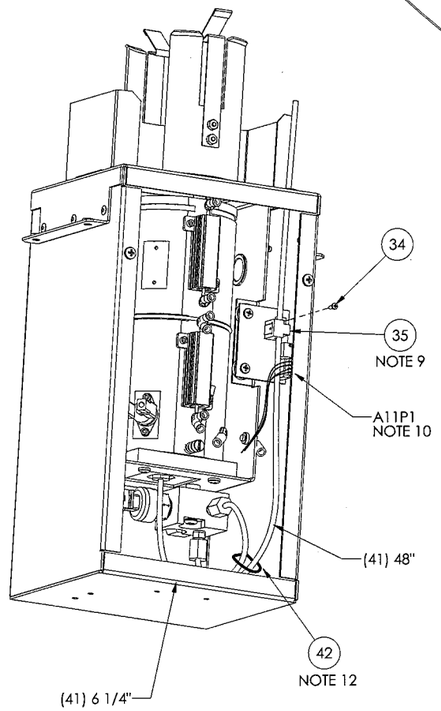
SECTION J-J



SECTION K-K







ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SGAUNTLETT	DATE: 4/6/2005	DO NOT SCALE THIS DRAWING
CHECK: TCATINEAU	DATE: 4/6/2005	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: SGAUNTLETT	DATE: 4/6/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

PROPRIETARY

MATERIAL: ---

FINISH: ---

CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: ASSY DCD

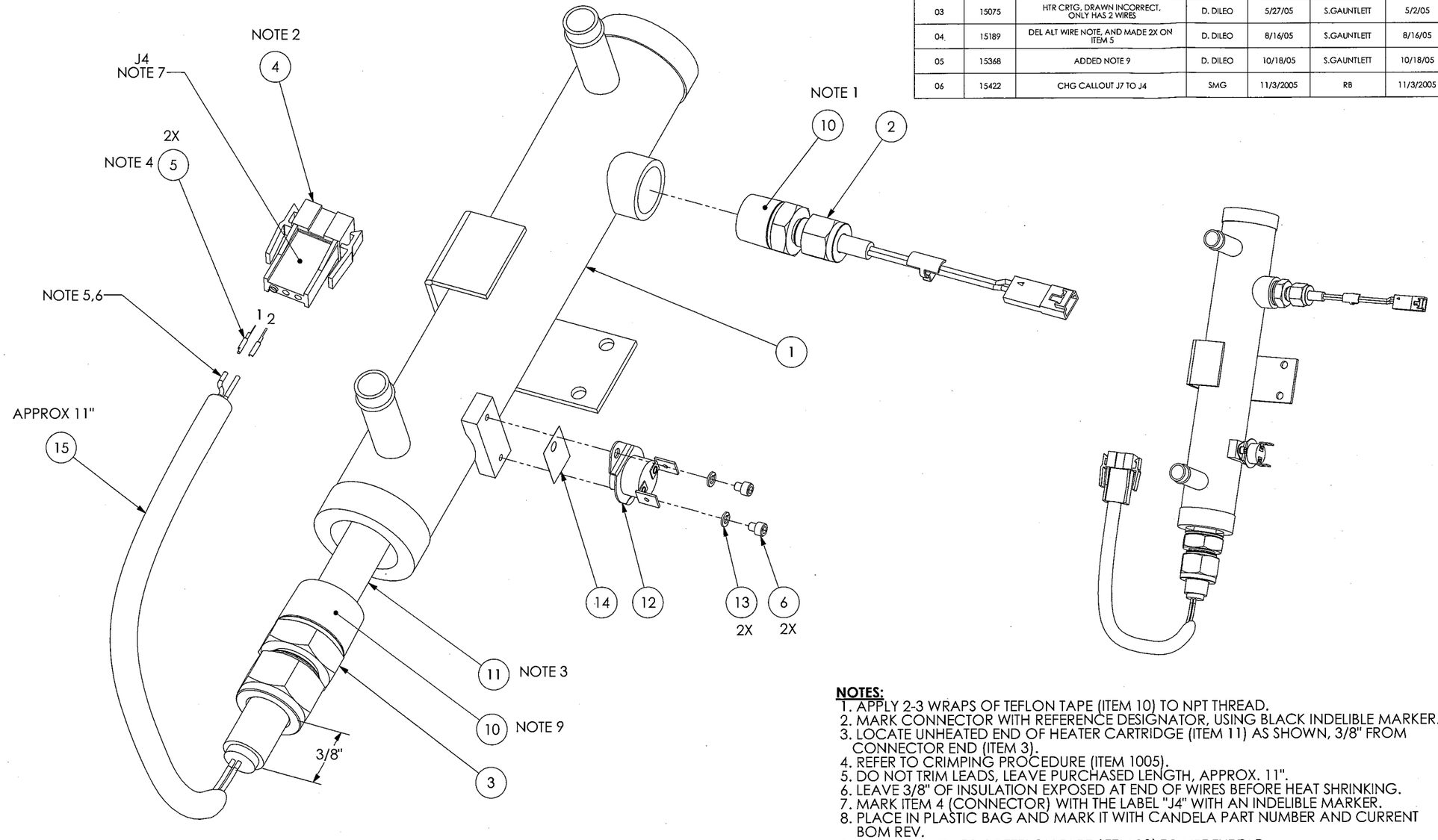
SIZE	DRAWING NO.	REV.
D	7122-99-3640	04

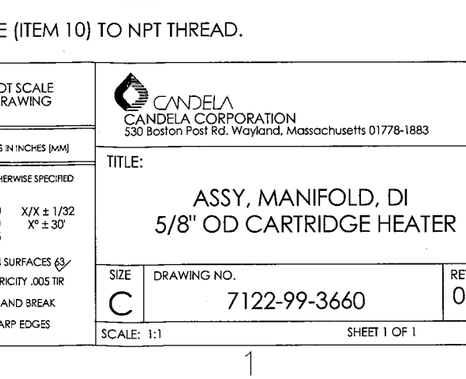
SCALE: 1:2 SHEET 2 OF 2

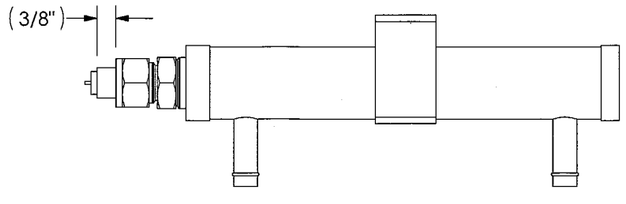
11/30/20051:41 PM

7122-99-3640.SLDDRW

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	14852	INITIAL RELEASE	D. DILEO	3/2/2005	S.GAUNTLETT	3/2/2005
03	15075	HTR CRTG, DRAWN INCORRECT, ONLY HAS 2 WIRES	D. DILEO	5/27/05	S.GAUNTLETT	5/2/05
04.	15189	DEL ALT WIRE NOTE, AND MADE 2X ON ITEM 5	D. DILEO	8/16/05	S.GAUNTLETT	8/16/05
05	15368	ADDED NOTE 9	D. DILEO	10/18/05	S.GAUNTLETT	10/18/05
06	15422	CHG CALLOUT J7 TO J4	SMG	11/3/2005	RB	11/3/2005







NOTES:
1. APPLY 2-3 WRAPS OF TEFLON TAPE (ITEM 10) TO NPT THREAD.
2. MARK CONNECTOR WITH REFERENCE DESIGNATOR, USING BLACK INDELIBLE MARKER.
3. LOCATE UNHEATED END OF HEATER CARTRIDGE (ITEM 11) AS SHOWN, 3/8" FROM CONNECTOR END (ITEM 3).
4. REFER TO CRIMPING PROCEDURE (ITEM 1005).
5. DO NOT TRIM LEADS, LEAVE PURCHASED LENGTH, APPROX. 11".
6. LEAVE 3/8" OF INSULATION EXPOSED AT END OF WIRES BEFORE HEAT SHRINKING.
7. MARK ITEM 4 (CONNECTOR) WITH THE LABEL "J4" WITH AN INDELIBLE MARKER.
8. PLACE IN PLASTIC BAG AND MARK IT WITH CANDELA PART NUMBER AND CURRENT BOM REV.
9. APPLY 4-5 WRAPS OF TEFLON TAPE (ITEM 10) TO NPT THREAD.

THIRD ANGLE PROJECTION

DRAWN: DDILEO	DATE: 3/2/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 3/2/2005	
DESIGN ENGINEERING: DDILEO	DATE: 3/2/2005	DIMENSIONS IN INCHES [MM]
MANUFACTURING ENG:	DATE:	UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

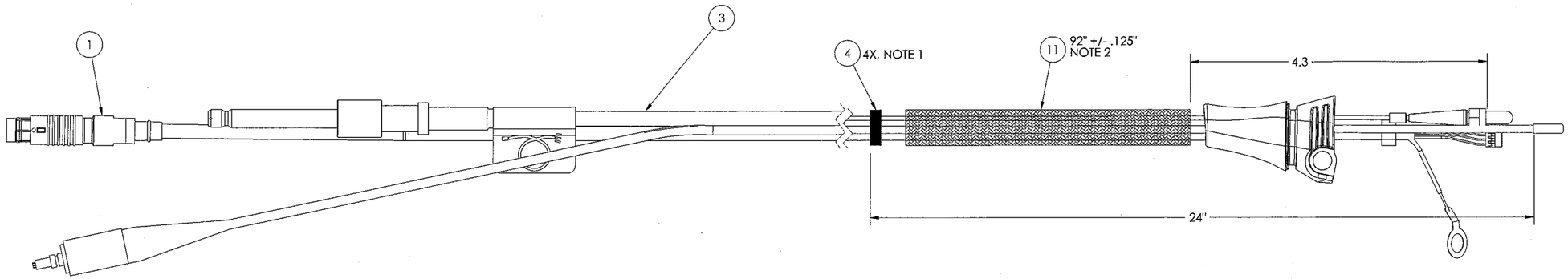
TITLE:

ASSY, MANIFOLD, DI
5/8" OD CARTRIDGE HEATER

SIZE	DRAWING NO.	REV.
C	7122-99-3660	06

SCALE: 1:1 SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	15161	INITIAL RELEASE	SAM G.	07/22/05	MIKE C.	07/22/05
03	15244	ADDED TO NOTE 6	SAM G.	08/30/05	GARY J.	08/30/05
04	15290	UPDATED NOTES AND DIMS	SAM G.	09/19/05	MIKE C.	09/20/05
05	15383	REMOVED ALL ELECTRICAL TO A NEW PRINT	SAM G.	11/03/05	MIKE C.	11/03/05



NOTES:

1. APPLY CABLE TIES, ITEMS 4, 20" APART, BEFORE INSTALLING ITEM 11. STARTING AT LOCATION SHOWN, FROM DISTAL END OF TEFLON TUBING. DO NOT OVERTIGHTEN. MUST MOVE FAIRLY EASILY.
2. POSITION SHEATHING (ITEM 11) AS SHOWN FROM DISTAL END OF FIBER.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: S. GERAGONIS DATE: 7/20/2005
CHECK: MCLANCY DATE: 7/20/2005
DESIGN ENGINEERING: MCLANCY DATE: 7/20/2005
MANUFACTURING ENG:

THIRD ANGLE PROJECTION

PROPRIETARY

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK ALL SHARP EDGES

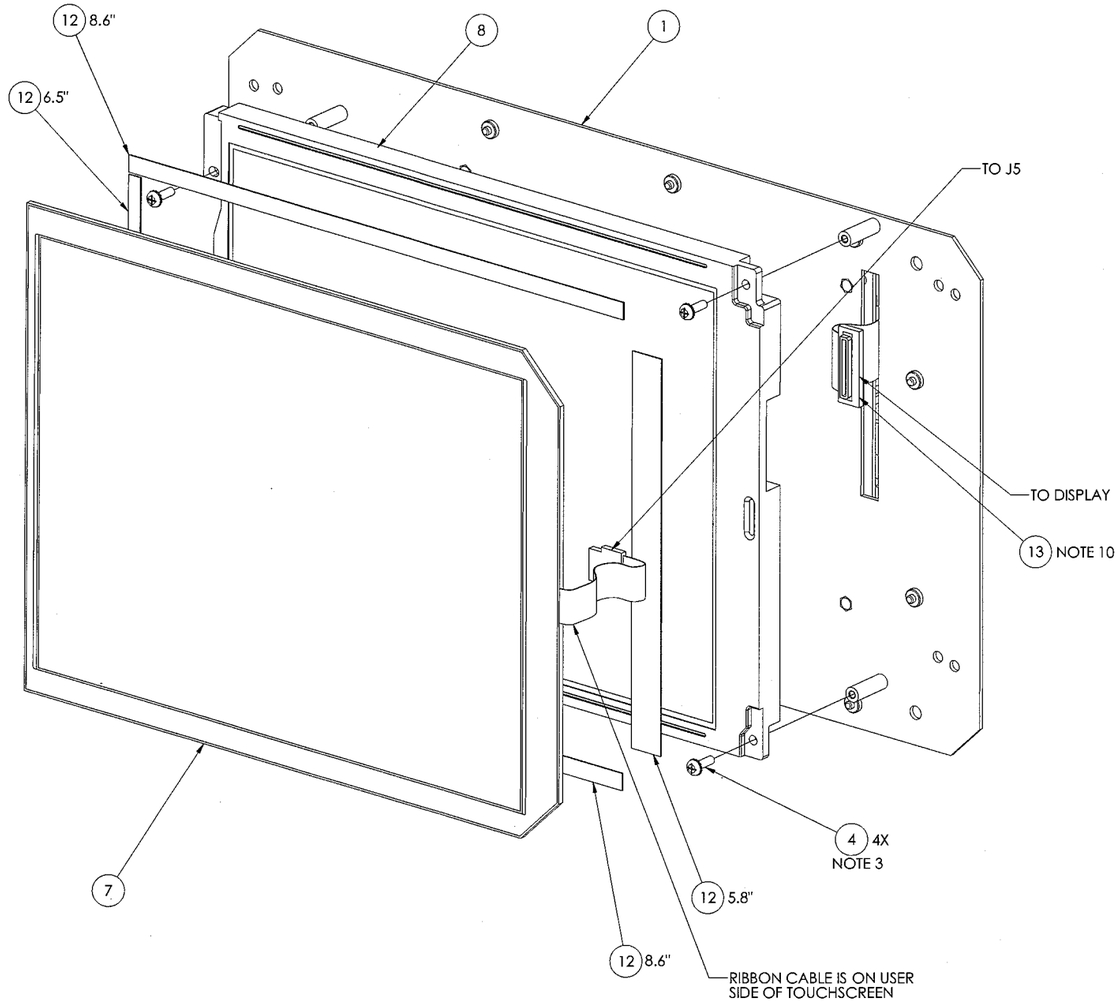
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

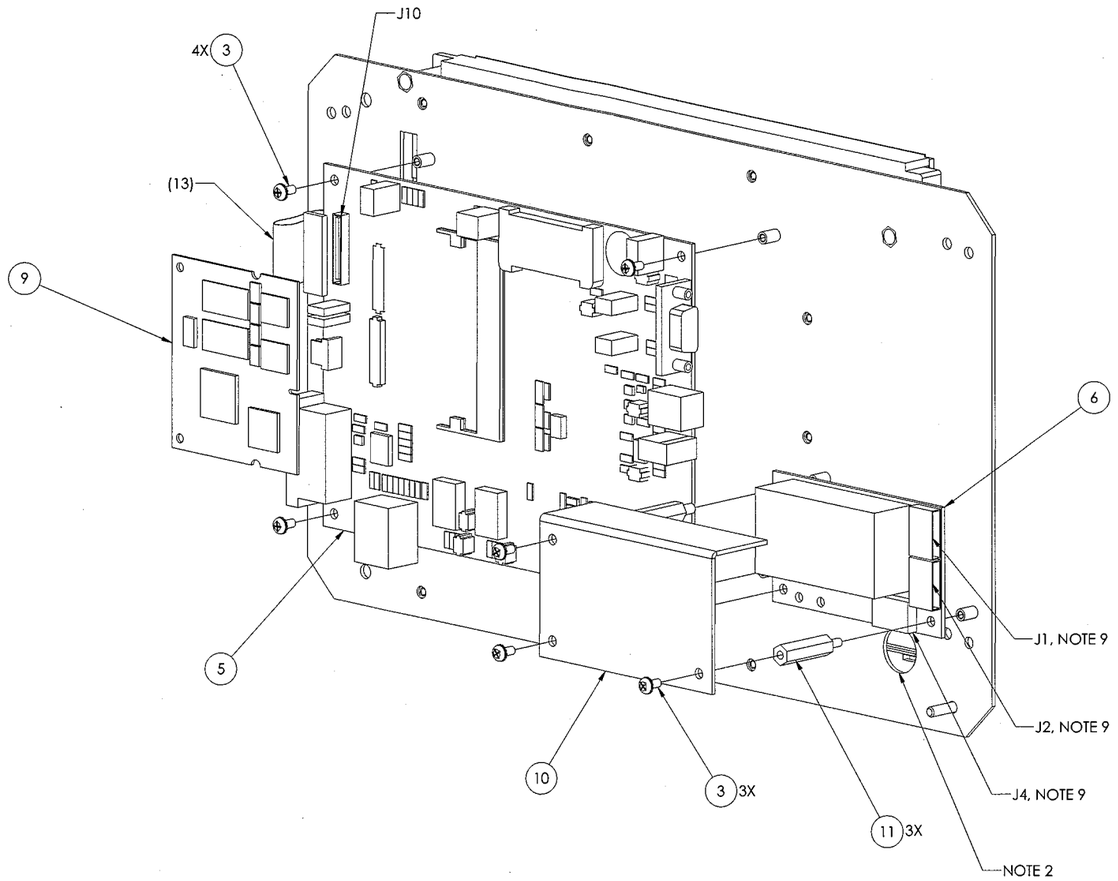
TITLE:
ASSY, DELIVERY CABLE WITH DCD, VBEAM2

SIZE D | DRAWING NO. 7122-99-3670 | REV. 05

SCALE: 1:2 SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15243	INITIAL RELEASE	SHC	8/25/05	S. GAUNTLETT	8/25/05
02	15264	CHANGE NOTE 5	SHC	9/14/05	S. GAUNTLETT	9/14/05
03	15532	ADD NOTE 12 AND 13	SAM G.	11/28/05	SMG	11/28/05





NOTES:
1. EXERCISE EXTREME CARE. CLEANLINESS IS MANDATORY. USE POWDERLESS FINGER COTS OR GLOVES WHEN ASSEMBLING. KEEP TOUCHSCREEN FREE OF LINT AND FINGER PRINTS.
2. PLACE ASSY IN UNIT CONTAINER (ANTI-STATIC BAG) FOR IDENTIFICATION AND MARK CONTAINER WITH PART NUMBER AND CURRENT BOM REVISION.
3. ASSEMBLE AT AN APPROVED ESD STATION. DETERMINE IF VIDEO DISPLAY (ITEM 8) IS A "SHARP" MODEL OR "NEC" MODEL BY LOOKING AT EDGE OF DISPLAY FOR APPROPRIATE MARKING. FOR "NEC" DISPLAY, USE ONLY THREE SCREWS (ITEM 4).
4. SET TOUCHSCREEN (ITEM 7) ON FLAT SURFACE WITH USER SIDE OF TOUCHSCREEEN FACING DOWN (GLASS SIDE UP). APPLY DOUBLE-SIDED TAPE (ITEM 12) TO TOUCHSCREEN AS SHOWN (SHEET 2). USE A RAZOR BLADE OR KNIFE EDGE TO TRIM EXCESS TAPE TO ACHIEVE DIMENSIONS SHOWN. PEEL BACK TAPE LINER TO EXPOSE ADHESIVE.
5. ATTACH TOUCHSCREEN RIBBON CABLE TO FOUR-PIN CONNECTOR (J5) ON BOARD AFTER ADHERING TOUCHSCREEN (ITEM 7) TO DISPLAY (ITEM 8).
6. USE TOUCHSCREEN FIXTURE TOOL (ITEM 1200) BY PLACING THE TOOL OVER THE TOUCHSCREEN PEM NUTS AS SHOWN. ORIENTATION OF THE TOOL IS DEPENDENT ON THE DISPLAY MODEL. SECURE WITH #6 NUT AND BOLT IF NECESSARY.
7. BEING CAREFUL NOT TO LET THE TOUCHSCREEN CONTACT THE DISPLAY, POSITION TOUCHSCREEN SUCH THAT IT BUTTS AGAINST BOTH FLANGES OF THE TOOL. SECURE TOUCHSCREEN BY LOWERING ONTO THE DISPLAY AND PRESSING DOWN.
8. REMOVE THE PLASTIC SHIELD/COVER FROM THE TOUCHSCREEN BEFORE ADHERING TO THE DISPLAY.
9. USE J1 AND J2 FOR DUAL LAMP WIRES (SHARP DISPLAY). USE J4 FOR SINGLE LAMP WIRES (NEC DISPLAY).
10. ATTACH COLOR DISPLAY CABLE (ITEM 13) TO DISPLAY (ITEM 8) BEFORE SECURING DISPLAY TO MOUNTING PLATE (ITEM 1).
11. MARK WITH AN "N" IF USING NEC DISPLAY OR AN "S" IF USING SHARP DISPLAY USING INDELIBLE MARKER APPROXIMATELY AS SHOWN.
12. PUT WIRES FROM ITEM 8 THROUGH HOLE IN ITEM 1. ALSO PLACE WIRES UNDER ITEM 6 BEFORE PLUGGING INTO ITEM 6.
13. CUT PLASTIC COVER, REMOVED IN STEP 8, IN HALF AND ADHERE TO DISPLAY (ITEM 7), STICKY SIDE MUST FACE DISPLAY.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

THIRD ANGLE PROJECTION

PROPRIETARY

DRAWN: SCRONIN	DATE: 8/25/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 8/25/2005	DIMENSIONS IN INCHES [MM]
DESIGN ENGINEERING: SCRONIN	DATE: 8/25/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005

MATERIAL:

FINISH:

ALL MACH SURFACES

CONCENTRICITY .005 TIR

DEBURR AND BREAK

ALL SHARP EDGES

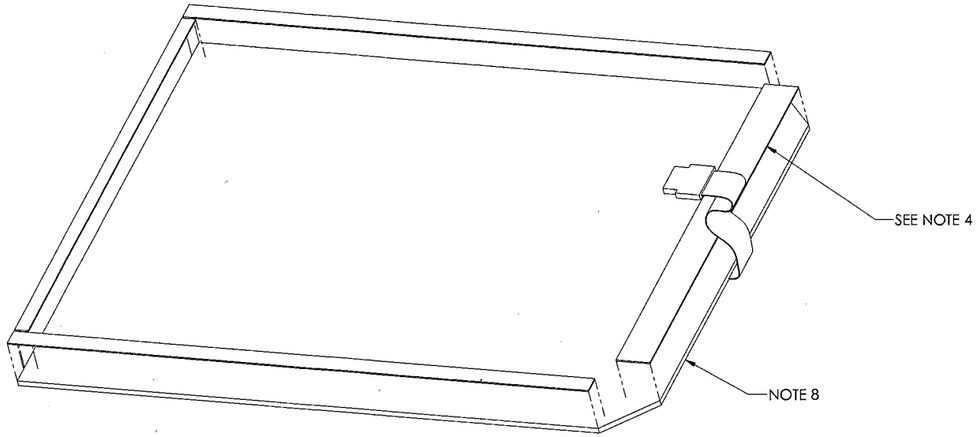
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

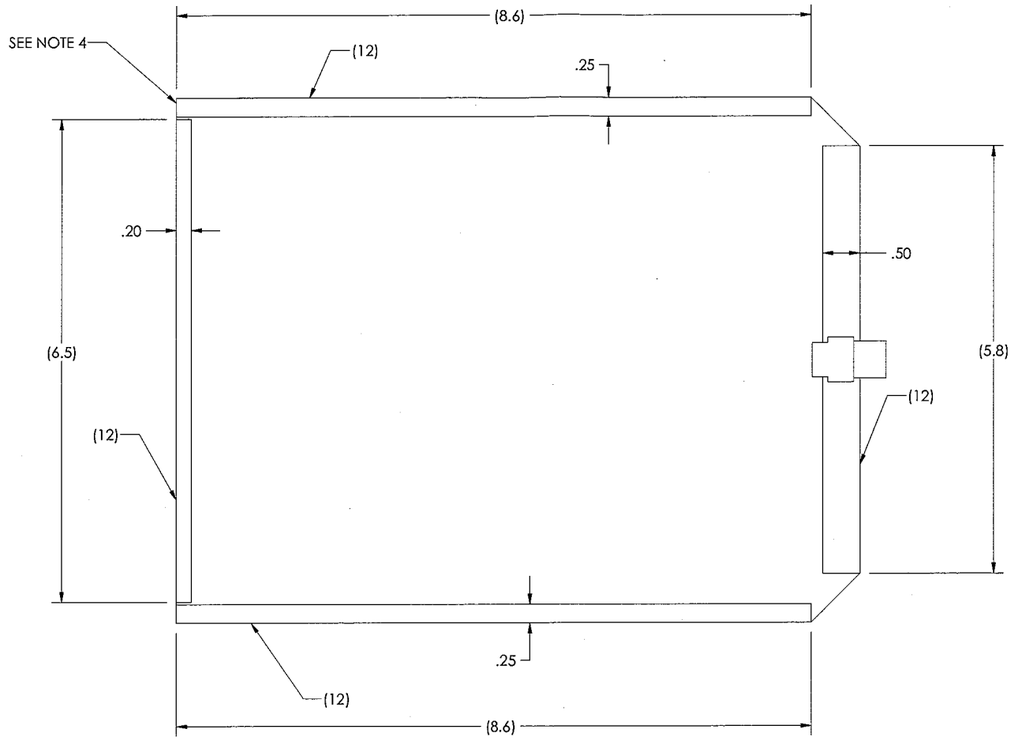
TITLE:

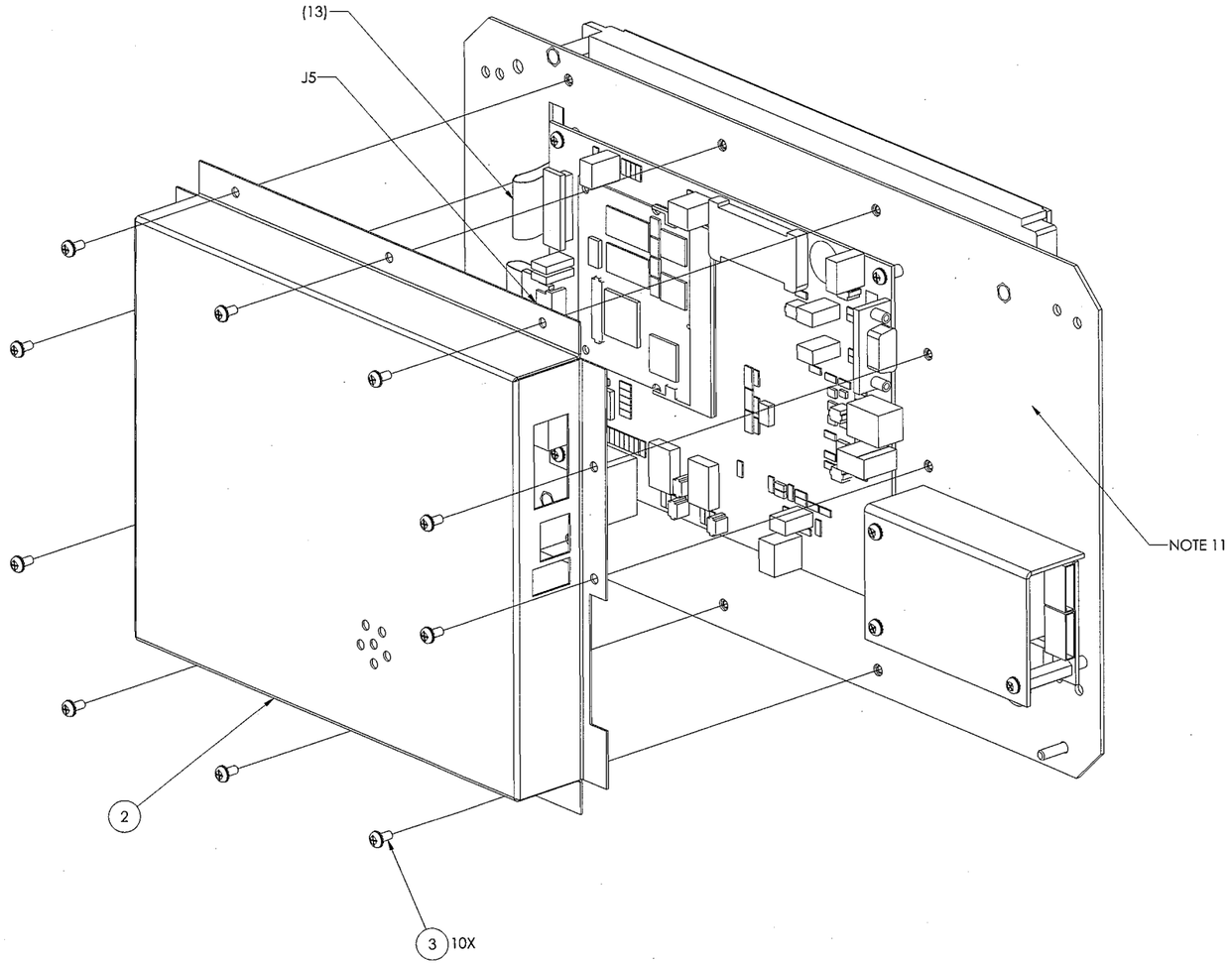
ASSY, DISPLAY TOUCHSCREEN

SIZE	DRAWING NO.	REV.
D	7122-99-3681	03

SCALE: 1/1 SHEET 1 OF 3







ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SCRONIN	DATE: 8/25/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 8/25/2005	
DESIGN ENGINEERING: SCRONIN	DATE: 8/25/2005	DIMENSIONS IN INCHES[MM]
MANUFACTURING ENG:		UNLESS OTHERWISE SPECIFIED .X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

PROPRIETARY

MATERIAL:

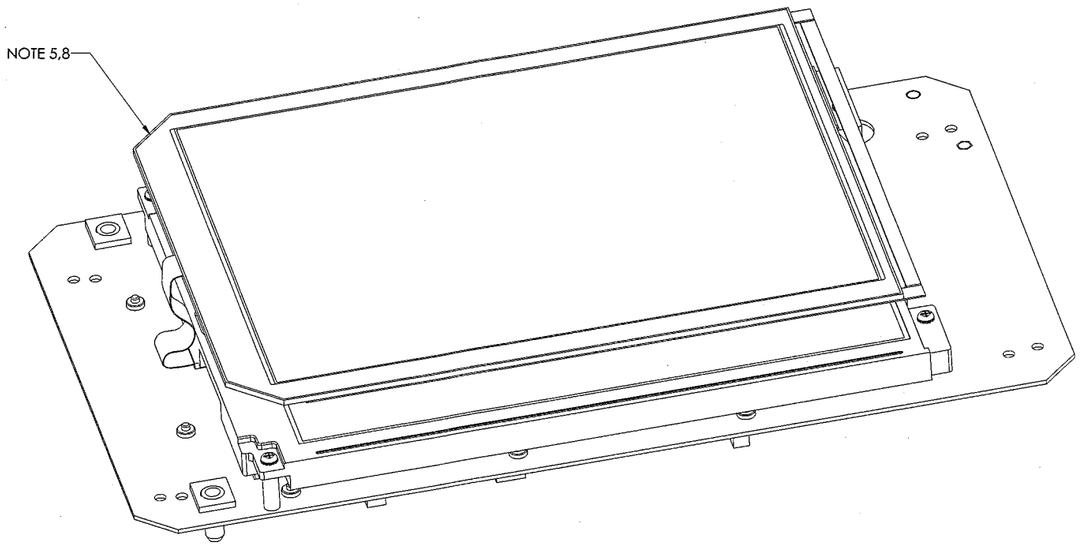
FINISH:

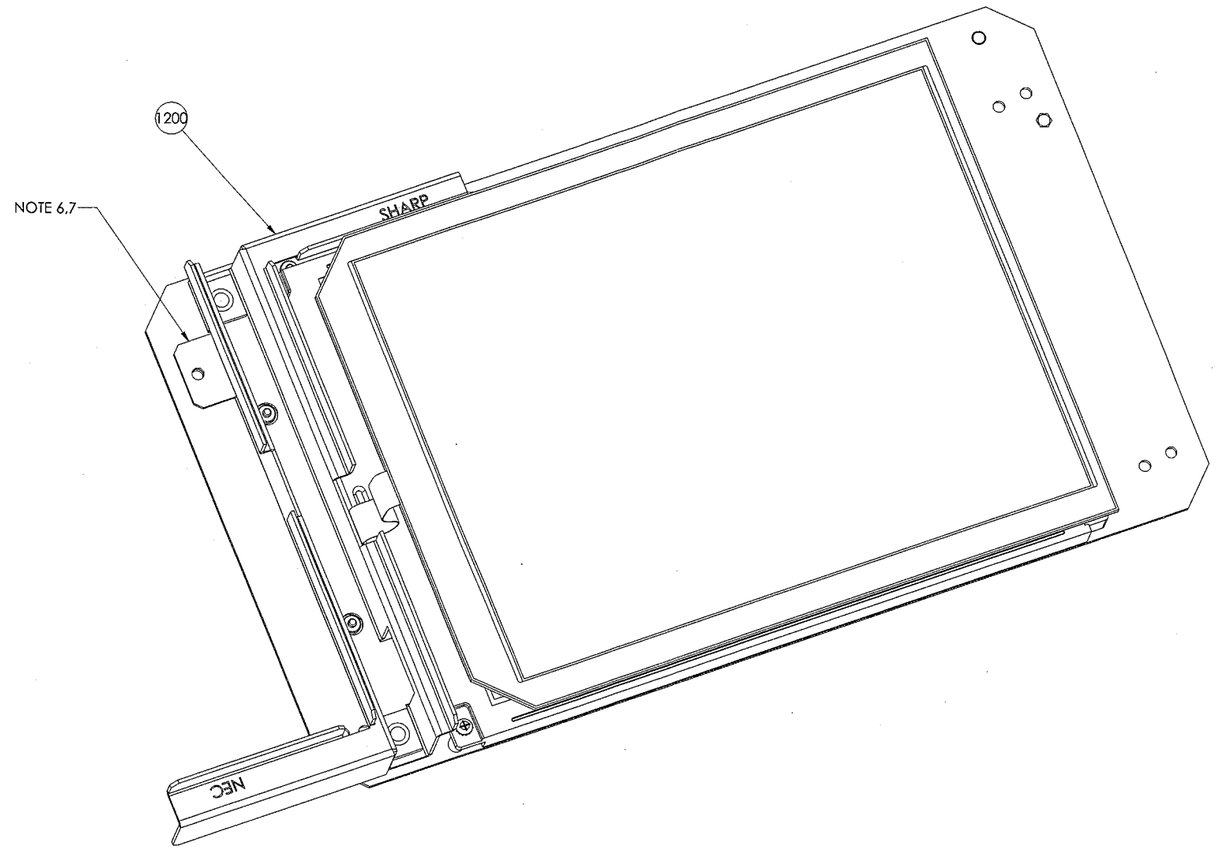
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

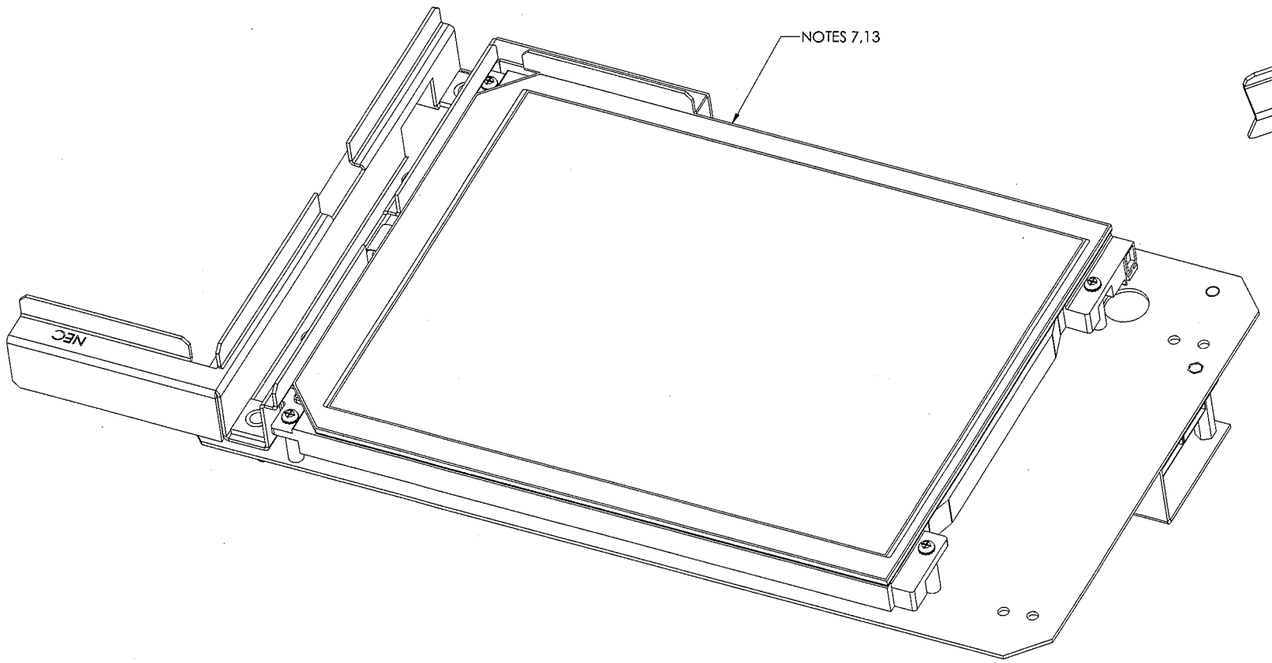
TITLE:
ASSY, DISPLAY
TOUCHSCREEN

SIZE	DRAWING NO.	REV.
D	7122-99-3681	03

SCALE: 1/1 SHEET 2 OF 3







ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SCRONIN	DATE: 8/25/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 8/25/2005	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: SCRONIN	DATE: 8/25/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

MATERIAL:

FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

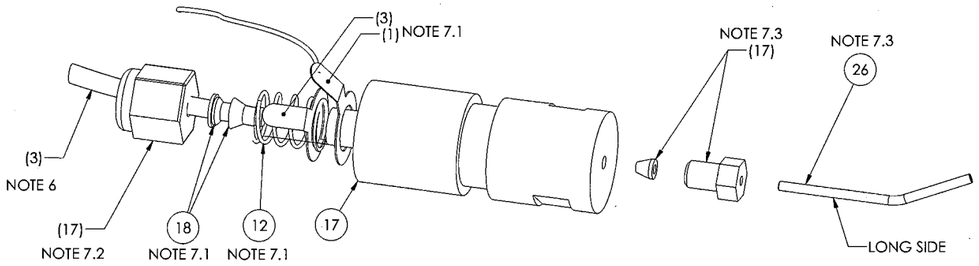
TITLE:

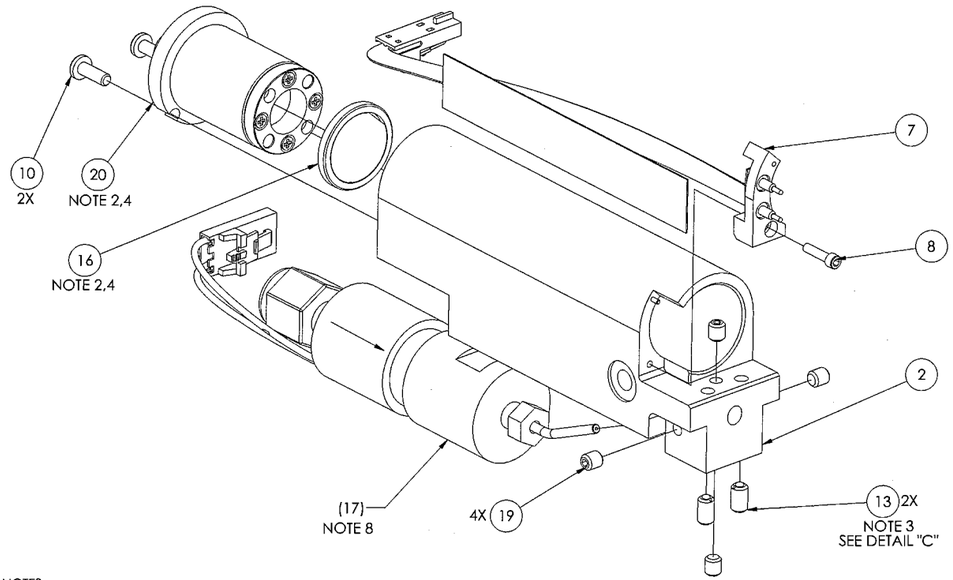
ASSY, DISPLAY TOUCHSCREEN

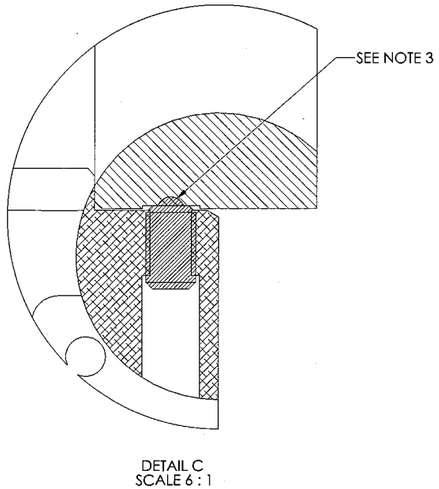
SIZE	DRAWING NO.	REV.
D	7122-99-3681	03

SCALE: 1/1 SHEET 3 OF 3

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
02	15284	INITIAL RELEASE	D. DILEO	10/12/05	M. CLANCY	10/12/05
03	15383	FIXED PLACEMENT OF ELEC. CABLE MOVED CABLE 90 DEG	D. DILEO	10/19/05	M. CLANCY	10/19/05
04	15522	SHOW TOOL/ADD NOTES	SHC	11/22/05	M. CLANCY	11/22/05





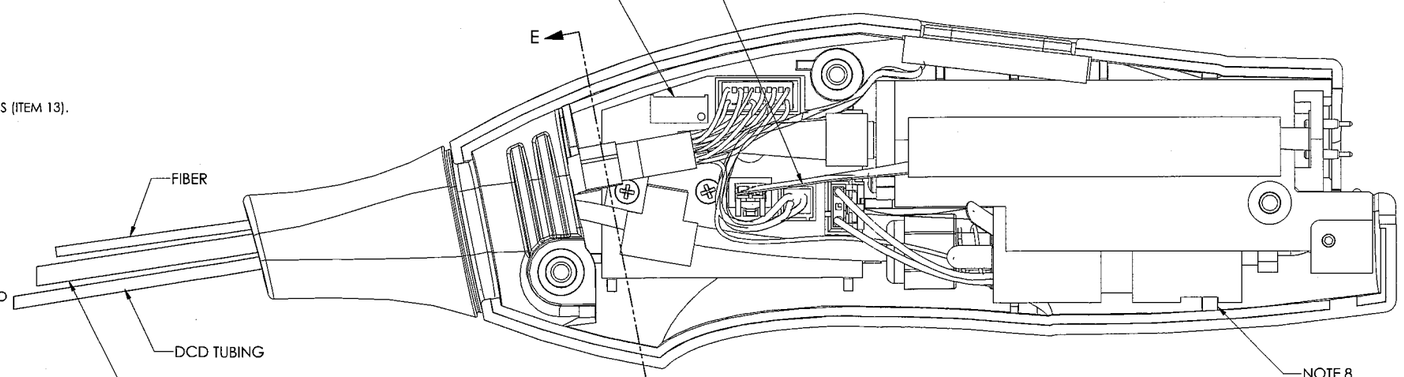


DETAIL C
SCALE 6 : 1

VIEW A

TAB TO THIS SIDE SEE **DETAIL D** SHEET 2

NOTE 10



SHEET 2

NOTES:
1. CLEAN THE HOUSING CARTRIDGE (ITEM 2) IN ULTRASONIC CLEANER FOR 10 MINUTES. THEN RINSE IN WATER AND ISOPROPANOL.
2. DO NOT TOUCH OPTICAL SURFACES.
3. INSERT TOOL (ITEM 1207) INTO HOUSING (ITEM 2). TIGHTEN BOTH PLUNGERS (ITEM 13) UNTIL THEY BOTTOM OUT ON TOOL. SEE VIEW A, DETAIL C. LOOSEN BALL PLUNGERS EXACTLY 1/2 A TURN AND REMOVE TOOL.
4. BEFORE ASSEMBLING PCB (ITEM1) TO HP SHELL (ITEM 4), PROGRAM PCB USING PCB HP TEST FIXTURE (ITEM 1203). PLACE WINDOW CARTRIDGE (ITEM 16) ONTO THE COLLIMATING LENS ASSY (ITEM 20), THEN INSTALL THESE INTO THE HOUSING (ITEM 2) WITH BALL PLUNGERS (ITEM 13). TEST LENS OPTICS AND CENTRATION USING PROCEDURE (ITEM 1006) BEFORE ATTACHING OTHER ITEMS TO THE HOUSING.
5. INSTALL BUTTON (ITEM 6) BEFORE INSTALLING HOUSING (ITEM 2).
6. PURGE DCD LINE WITH NITROGEN (PRIOR TO ASSEMBLING): SAFETY GLASSES MUST BE WORN WHEN PERFORMING SECTION 6.
   6.1 USE EXTREME CAUTION WHEN PERFORMING SECTION 6 AS THE PRESSURE OF THE NITROGEN IS SET TO 175 PSI.
   6.2 BLOW OUT THE DCD TUBE CONTAINED IN THE DELIVERY CABLE ASSY BY CONNECTING THE CRYOGEN CONNECTOR AT THE PROXIMAL END OF THE DLVY CABLE TO THE MATING CONNECTOR LABELED "NITROGEN" ON THE TOP COVER OF THE TEST STATION. THIS CONNECTOR IS A DIRECT LINE TO THE NITROGEN TANK.
   6.3 REMOVE THE PLASTIC CAP LOCATED ON THE BARE TUBE AT THE DISTAL END OF THE CABLE ASSY.
   6.4 FIRMLY HOLD THE END OF THE BARE TUBE. AIM AT A SAFE LOCATION AND OPEN THE BALL VALVE FOR 5 SECONDS.
   6.5 CLOSE VALVE AND REMOVE DELIVERY SYSTEM.
7. DCD VALVE INSTALLATION
   7.1 INPUT END OF VALVE: REMOVE CAP AND FERRULES. DISCARD METAL FERRULES. CHECK TO MAKE SURE THE 1/8" DIAMETER TUBE WILL FIT PROPERLY INTO THE VALVE. INSTALL SOLDER LUGS (ITEM 1 AND ITEM 3), SPRING (ITEM 12), NYLON FERRULE SET (ITEM 18) AND VALVE NUT AS SHOWN. MAKE SURE SOLDER LUGS ARE INSTALLED OVER THREADED VALVE BODY BEFORE THE CRYOGEN TUBING IS INSTALLED.
   7.2 INSTALL TUBE INTO VALVE CONNECTOR UNTIL IT STOPS. HAND TIGHTEN NUT. MARK NUT AND BODY POSITION FOR REFERENCE. TIGHTEN THE NUT ONE TURN AFTER FINGER TIGHT USING A 7/16" WRENCH ON THE NUT AND A THIN 7/16" WRENCH ON THE BODY NEAR THE MIDDLE. DO NOT OVER TIGHTEN.
   7.3 PLACE NOZZLE INSIDE VALVE UNTIL IT STOPS & ORIENT NOZZLE AS SHOWN. TIGHTEN NUT FINGER TIGHT THEN ONE ADDITIONAL TURN.
8. VALVE MUST BE POSITIONED FULLY IN DIRECTION OF ARROW WITH THE SPRAY TUBE CENTERED IN THE HOUSING (ITEM 2) BEFORE TIGHTENING. MAKE SURE FLAT ON VALVE IS LINED UP WITH RIB ON LEFT HANDPIECE SHELL (ITEM 4).
9. POSITION AND ROUTE ALL WIRES AND CONNECTORS AS SHOWN.
10. BEND POT TOWARDS THE BACK OF THE SHELL FOR ELECTRICAL CABLE WIRES TO SEAT PROPERLY.
11. MAKE SURE FIBER SITS IN GROOVE.
12. POSITION CRIMP (ITEM 3) AS SHOWN.
13. ADD PIECE OF TAPE AS SHOWN (LENGTH OF HOUSING APPROXIMATELY 2.5 INCHES).
14. SLIDE SHEATHING (ITEM 3) TO END OF C'BORE INSIDE CLAMP (ITEM 15) AS SHOWN IN DETAIL F (SHEET 2). USE SCREWS (ITEM 25) TO SECURE BOTH CLAMPS AROUND SHEATHING.
15. ONCE THE THE DISTAL END CLAMPS ARE SECURE, PULL SHEATHING SNUG AND POSITION PROX. CLAMPS (ITEM 21) TO APPROX. DIM AS SHOWN AND SECURE WITH SCREWS (ITEM 25).
16. ATTACH LABEL (ITEM 22) ON THE ELECTRICAL CABLE 4" FROM THE CONNECTOR THAT ATTACHES TO THE LASER.
17. CHECK CENTERING AGAIN AFTER HANDPIECE IS ASSEMBLED, PROCEDURE (ITEM 1006).

ITEM	QTY	PART NO	DESCRIPTION	NOTE

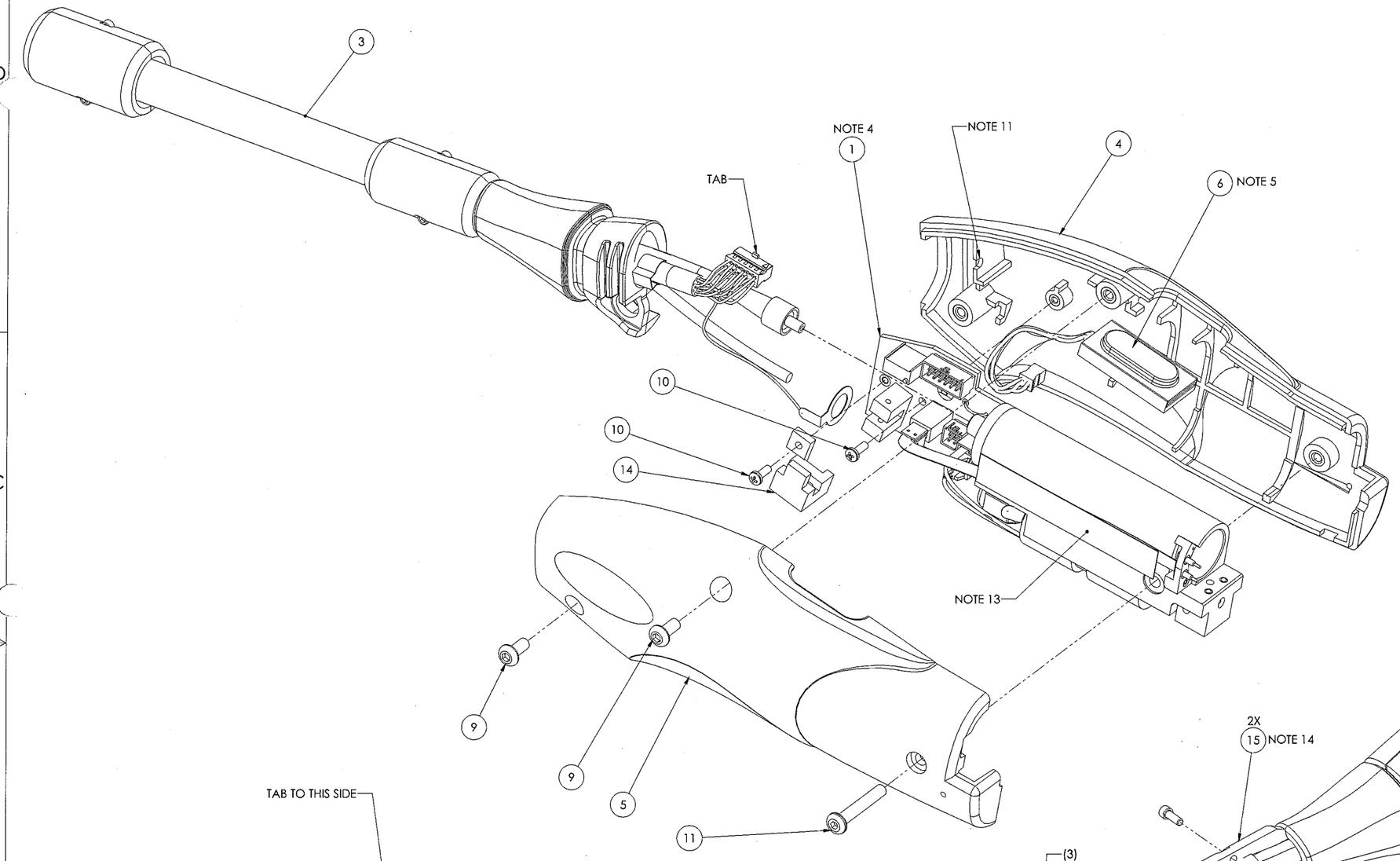
DRAWN: DDILEO	DATE: 10/6/2004	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 10/6/2004	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: DDILEO	DATE: 10/6/2004	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES
MATERIAL:		
FINISH:		

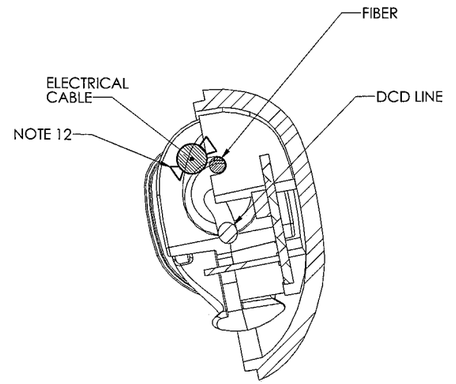
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: HP ASSY, VBEAM II

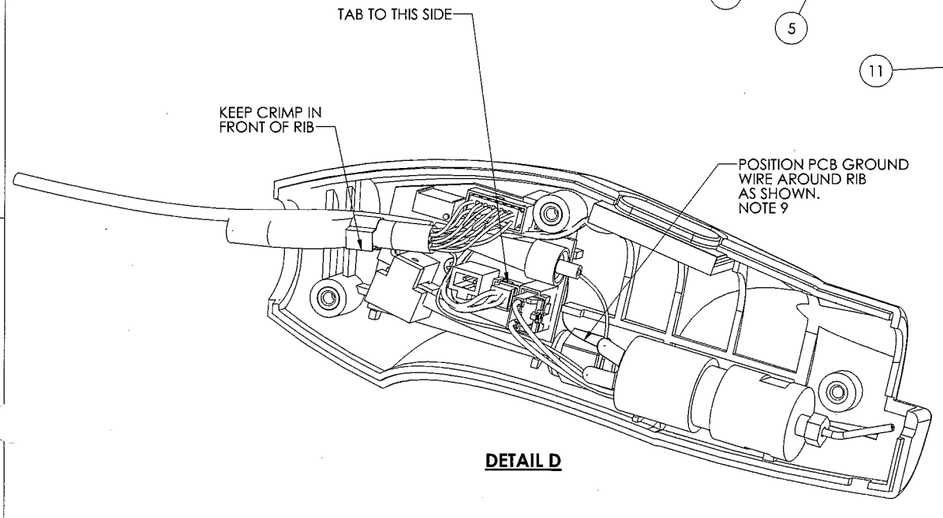
SIZE	DRAWING NO.	REV.
D	7122-99-3692	04

SCALE: 4:2 SHEET 1 OF 2

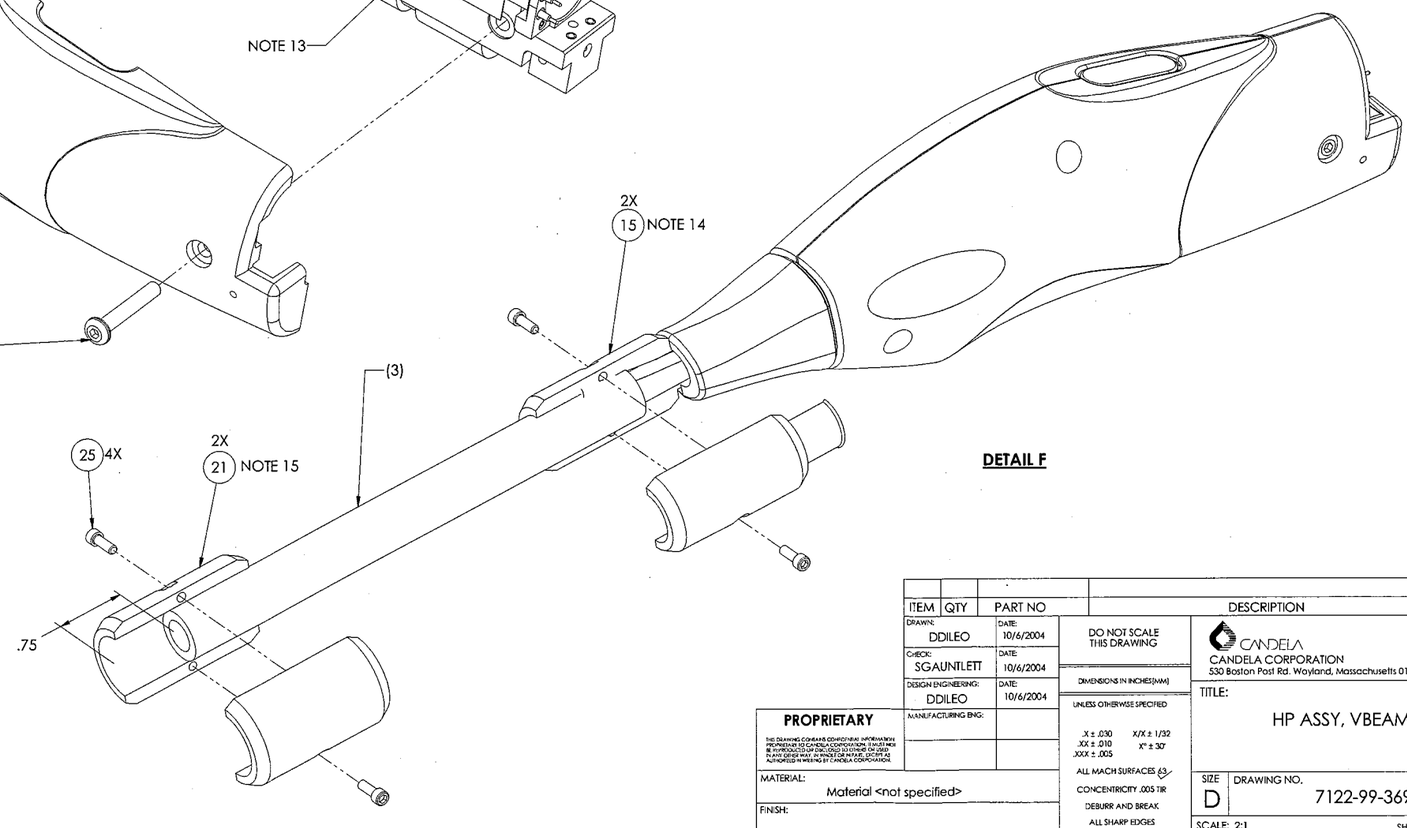




SECTION E-E



DETAIL D



DETAIL F

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: DDILEO	DATE: 10/6/2004	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 10/6/2004	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: DDILEO	DATE: 10/6/2004	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

MATERIAL: Material <not specified>

FINISH:

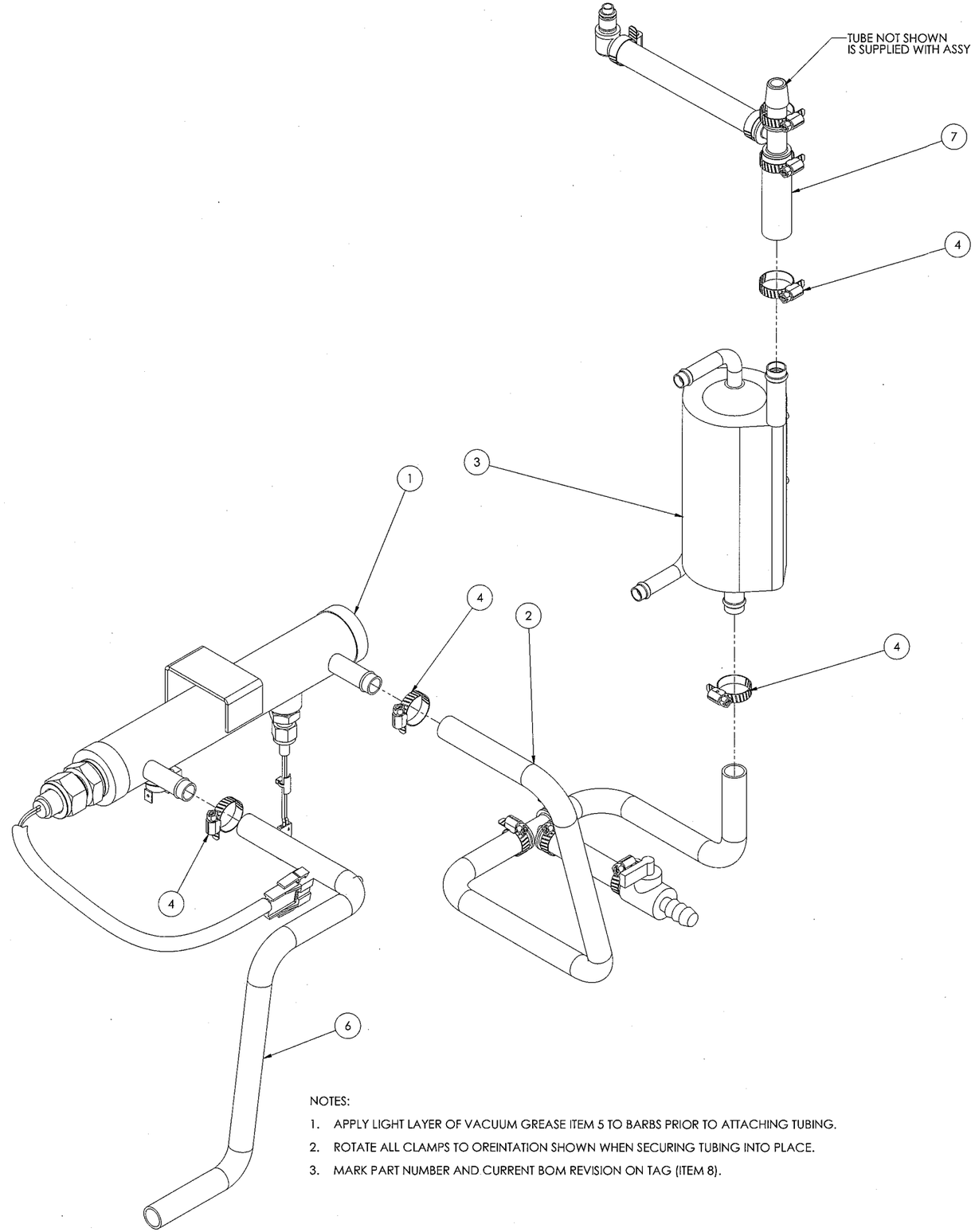
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

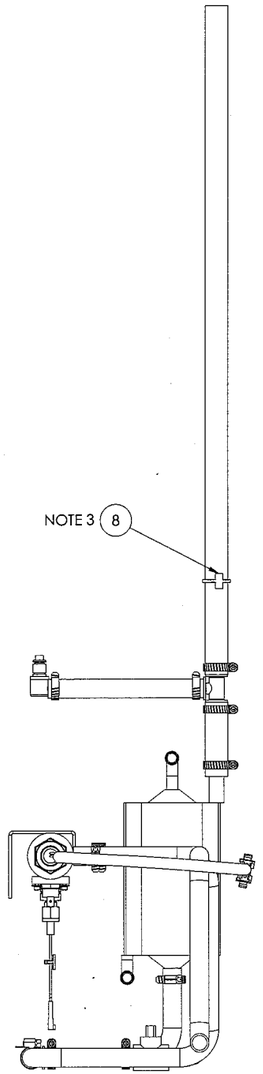
TITLE: HP ASSY, VBEAM II

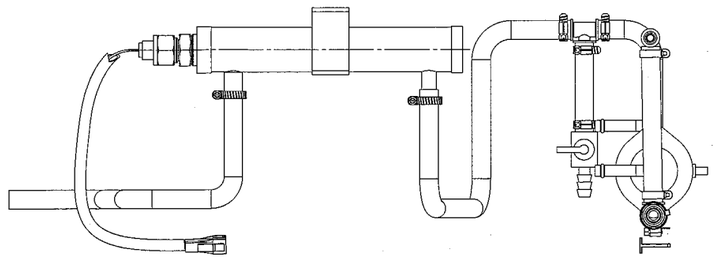
SIZE	DRAWING NO.	REV.
D	7122-99-3692	04

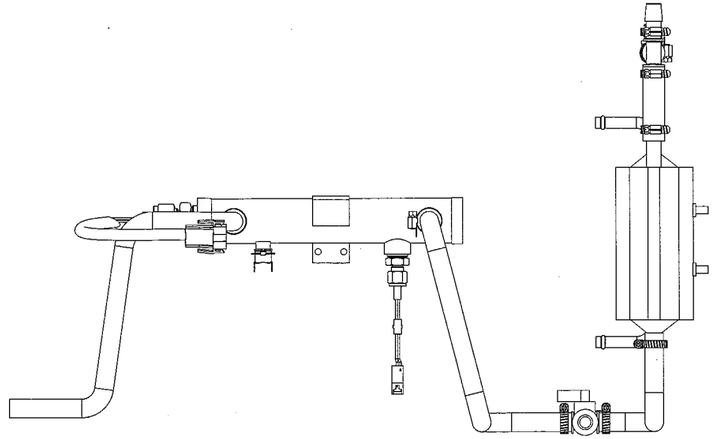
SCALE: 2:1 SHEET 2 OF 2

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15384	INITIAL RELEASE	AGV	10/25/2005	SMG	10/25/2005
02	15561	ADDED ITEM 8	SAM G.	12/03/05	DALE M.	12/05/05









NOTES:

1. APPLY LIGHT LAYER OF VACUUM GREASE ITEM 5 TO BARBS PRIOR TO ATTACHING TUBING.
2. ROTATE ALL CLAMPS TO OREINTATION SHOWN WHEN SECURING TUBING INTO PLACE.
3. MARK PART NUMBER AND CURRENT BOM REVISION ON TAG (ITEM 8).

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: A.VALENTI	DATE: 10/25/05	DO NOT SCALE THIS DRAWING
CHECK: S.GAUNTLET	DATE: 10/25/05	
DESIGN ENGINEERING: K.ROBINSON	DATE: 10/25/05	DIMENSIONS IN INCHES[MM]
MANUFACTURING ENG: J.CLARK	10/25/05	UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

FINISH:

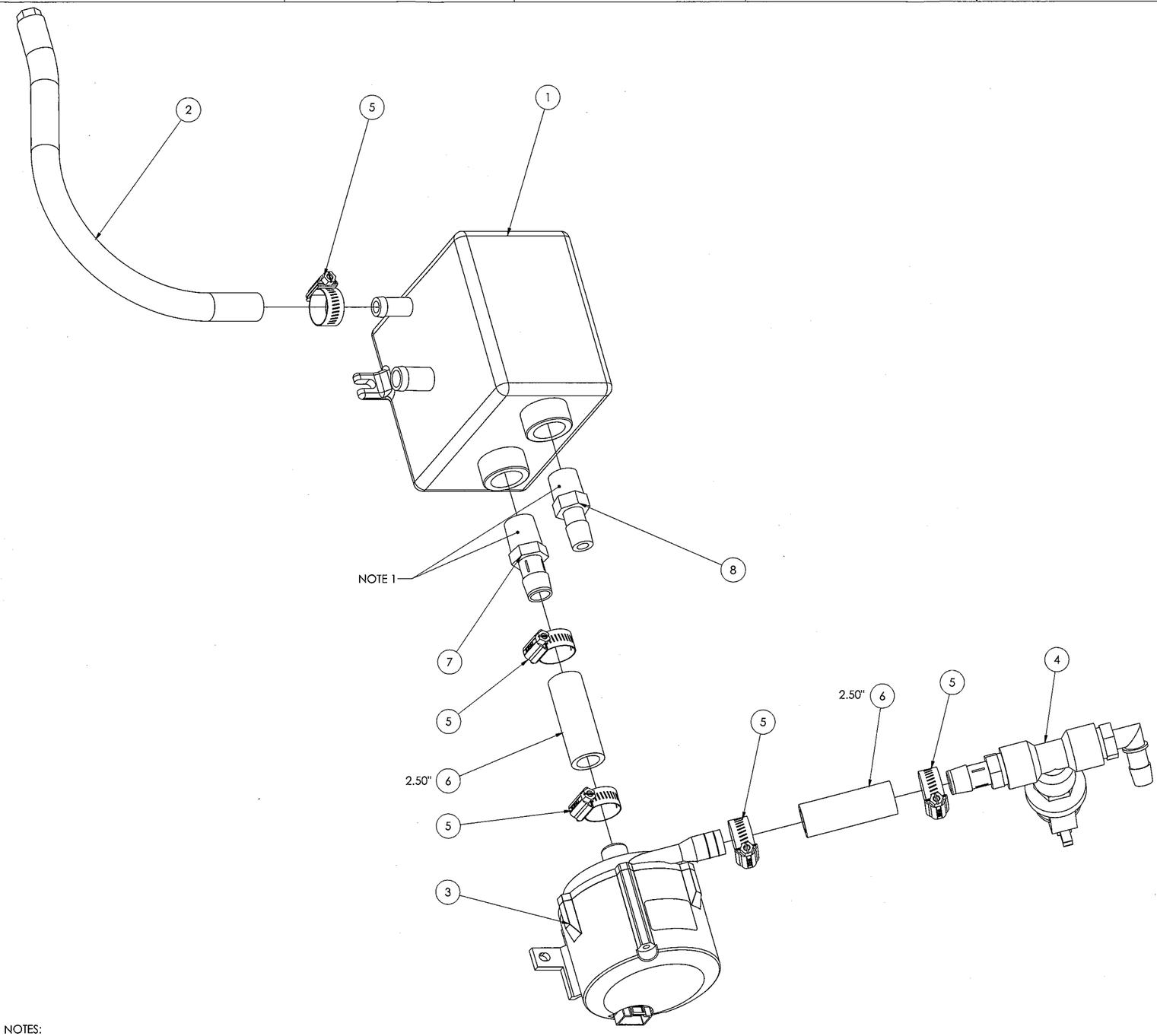
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

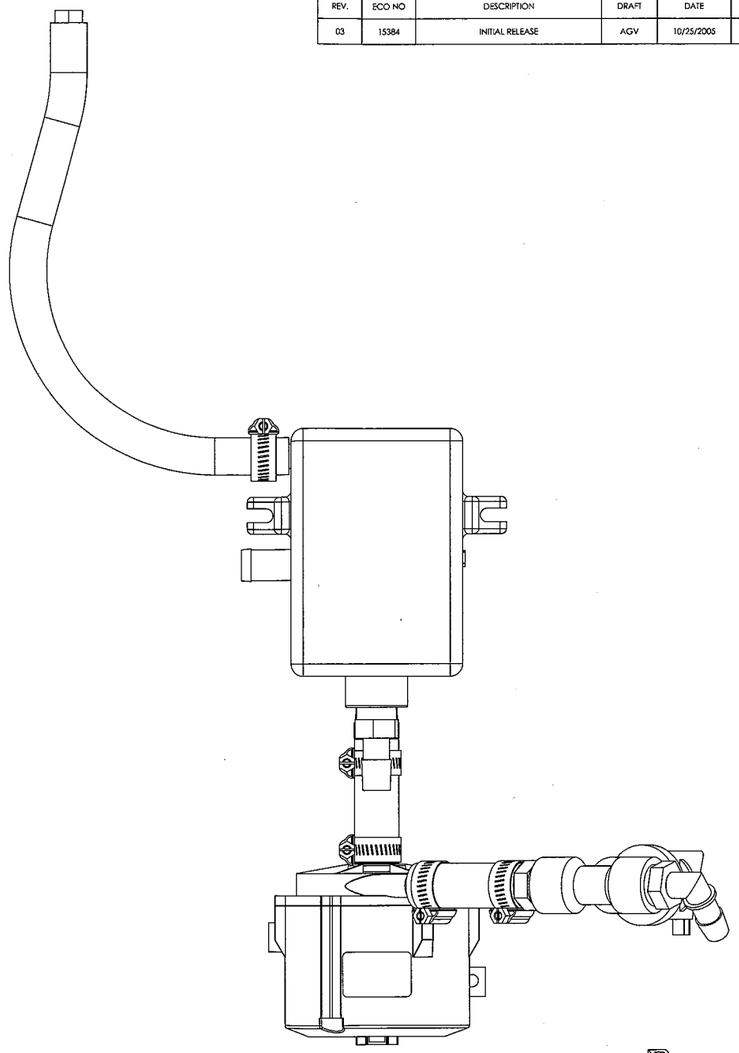
TITLE:
WATER HEATER ASSEMBLY

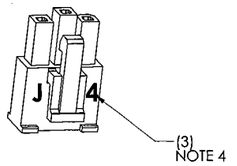
SIZE	DRAWING NO.	REV.
D	7122-99-3805	02

SCALE: 2:3 SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
03	15384	INITIAL RELEASE	AGV	10/25/2005	SMG	10/25/2005







NOTES:

1. APPLY 4-5 TURNS OF TEFLON TAPE ITEM 9 TO THREADS BEFORE ASSEMBLING.
2. APPLY LIGHT LAYER OF VACUUM GREASE ITEM 10 TO BARBS PRIOR TO ATTACHING TUBING.
3. ROTATE ALL CLAMPS TO ORIENTATION SHOWN WHEN SECURING TUBING INTO PLACE.
4. MARK " J 4" AS SHOWN WITH PERMANENT MARKER OR EQUIVALENT METHOD ON CONNECTOR OF MOTOR CABLE (ITEM 3) .
5. MARK COMPLETED ASSEMBLY WITH CANDELA PART NUMBER AND CURRENT BOM REVISION SYMBOL.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: A.VALENTI	DATE: 10/25/05	DO NOT SCALE THIS DRAWING
CHECK: S.GAUNTLET	DATE: 10/25/05	
DESIGN ENGINEERING: K.ROBINSON	DATE: 10/25/05	DIMENSIONS IN INCHES[MM]
MANUFACTURING ENG: J.CLARK	10/25/05	UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

FINISH:

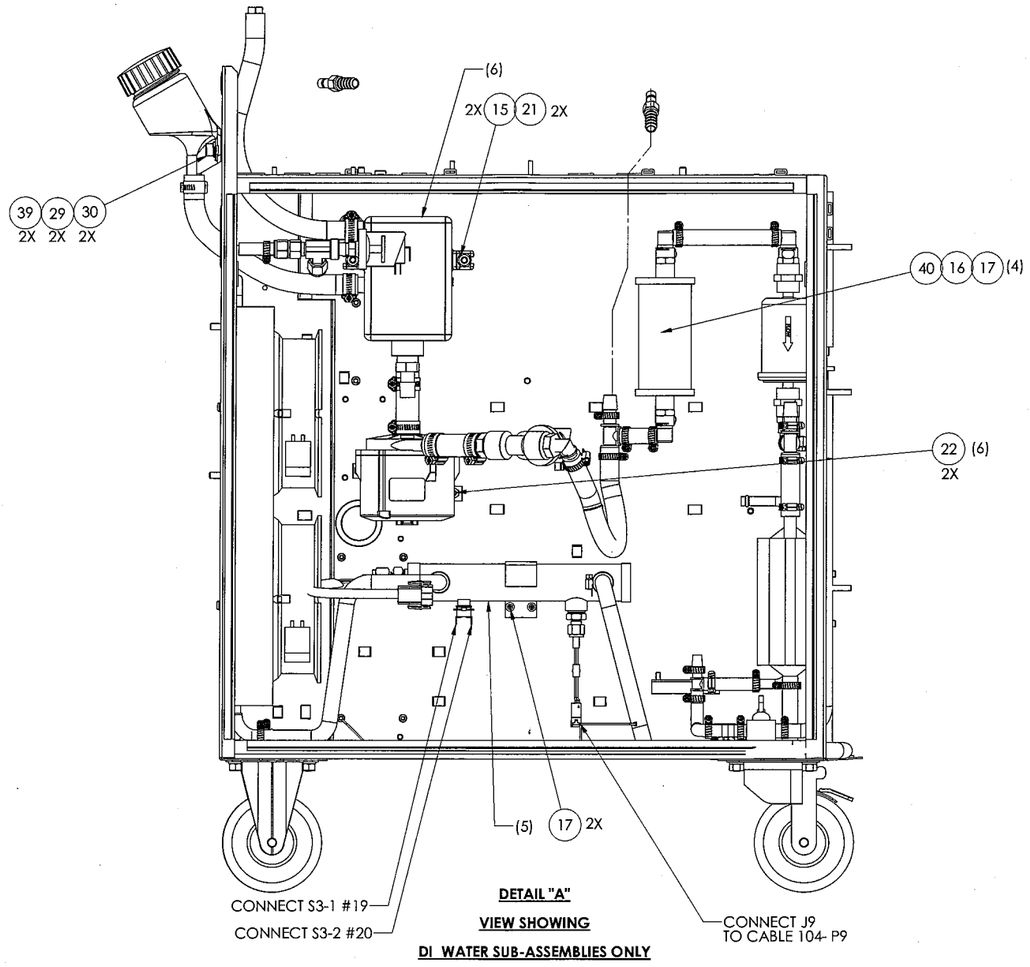
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: WATER PUMP ASSEMBLY

SIZE	DRAWING NO.	REV.
D	7122-99-3806	03

SCALE: 1:1.5 SHEET 1 OF 1

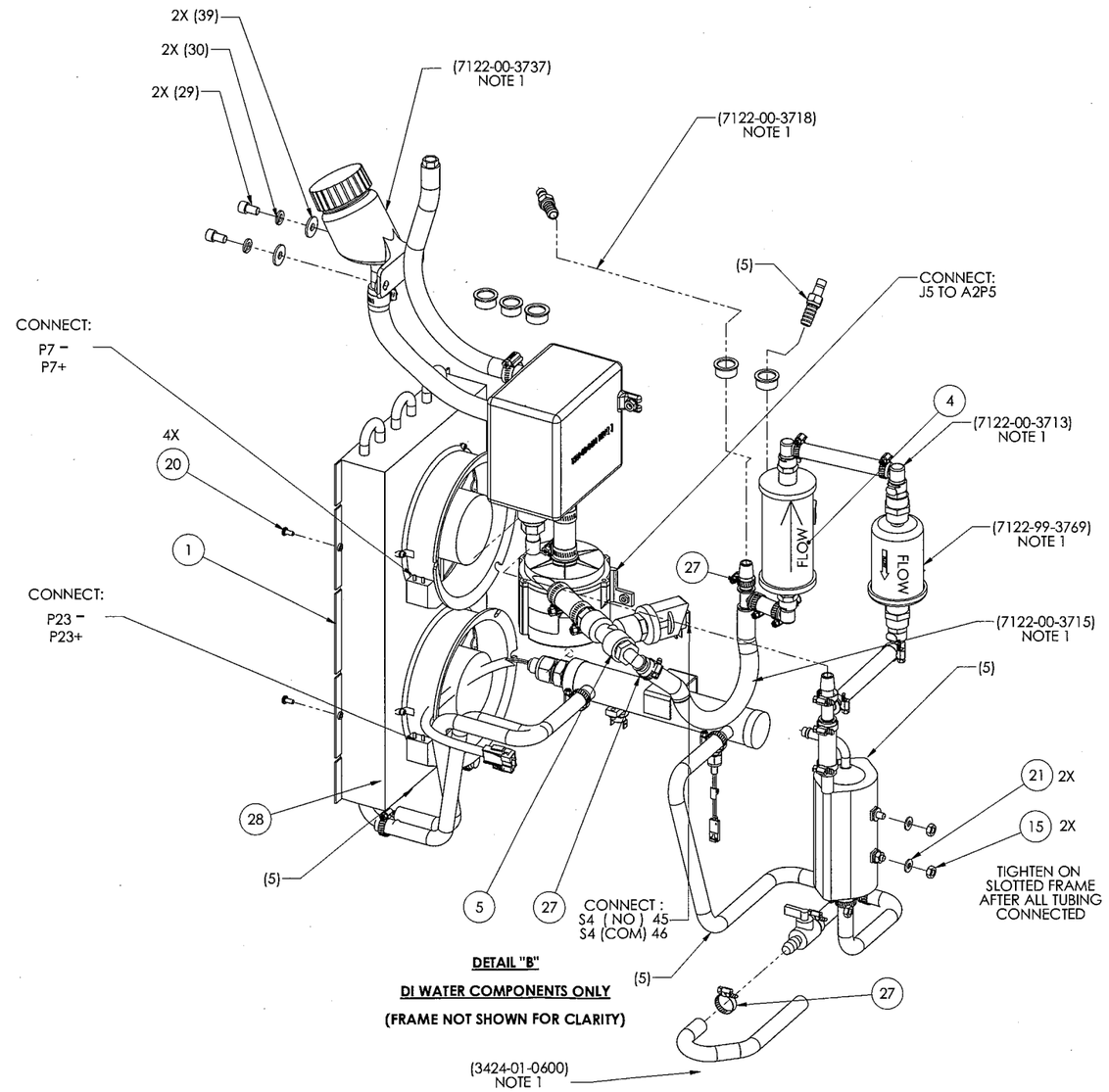
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15384	INITIAL RELEASE	AGV	10/20/2005	SMG	10/21/2005
02	15535	REVISED AND UPDATED	AGV	11/8/2005	SMG	11/8/2005



DETAIL "A"

VIEW SHOWING

DI WATER SUB-ASSEMBLIES ONLY



DETAIL "B"

DI WATER COMPONENTS ONLY

(FRAME NOT SHOWN FOR CLARITY)

NOTES:

1. INDIVIDUAL TUBING FROM TUBING KIT (ITEM 3) IS CALLED OUT BY PART #. (SHEETS 1 AND 3).
2. APPLY THIN FILM OF VACUUM GREASE (ITEM 38) TO EACH BARB FITTING PRIOR TO INSTALLING TUBING.
3. PLACE GROUNDING LABEL (ITEM 36) NEXT TO THE GROUNDING STUD ON FRAME.
4. ATTACH GREEN AND YELLOW GROUND WIRE FROM DYE PUMP (ITEM 25) TO STUD.
5. IF POSSIBLE, FACE ALL TUBING CLAMPS TO THE FRONT FOR EASY ACCESS.
6. PLACE DISH (ITEM 14) WITH SPONGE (ITEM 13) UNDER THE DYE PUMP COUPLING. ADHERE DISH TO CHASSIS FLOOR WITH RTV (ITEM 35.)
7. INDIVIDUAL URETHANE TUBING ASSYS FROM THE TUBING KIT (ITEM 3) IS CALLED OUT BY PART/ASSY NUMBER (SHEET 1.)
8. INDIVIDUAL TEFLON TUBING ASSYS FROM THE TUBING KIT (ITEM 3) IS CALLED OUT BY PART NUMBER (SHEET 3.)
9. DO NOT USE TIE WRAP GUN ON TIE WRAPS HAND TIGHTEN ONLY.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: A.VALENTI DATE: 10/1/05
CHECK: S.CRONIN DATE: 10/13/05
DESIGN ENGINEERING: S.CRONIN DATE: 10/1/05
MANUFACTURING ENG: J.CLARK 10/14/05

THIRD ANGLE PROJECTION

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]
UNLESS OTHERWISE SPECIFIED
.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

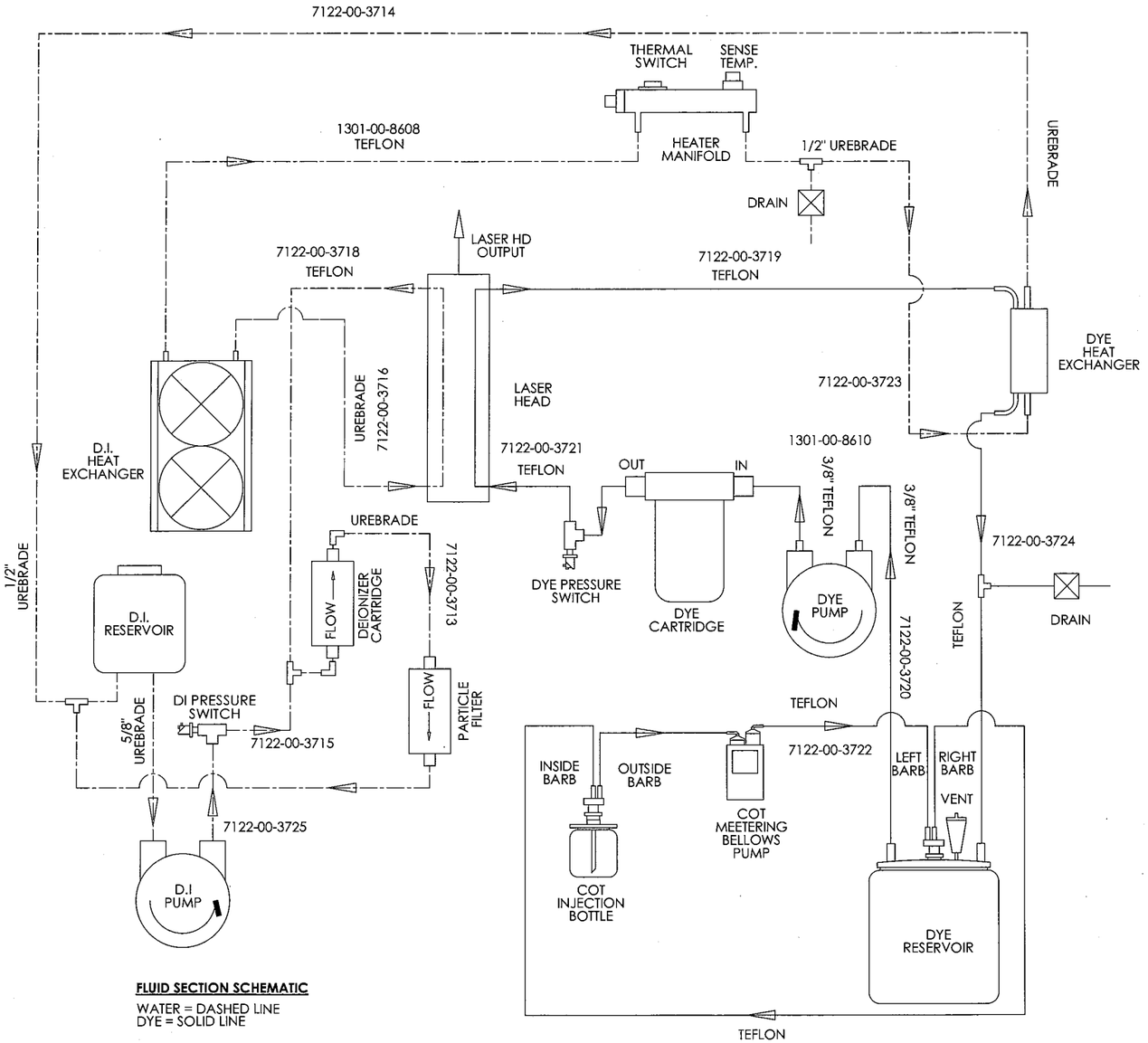
FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE:
FLUID SECTION ASSEMBLY
VBEAM 2

SIZE D | DRAWING NO. 7122-99-7495 | REV. 02

SCALE: 1:3 SHEET 1 OF 4



FLUID SECTION SCHEMATIC

WATER = DASHED LINE
DYE = SOLID LINE

ITEM	QTY	PART NO	DESCRIPTION	NOTE

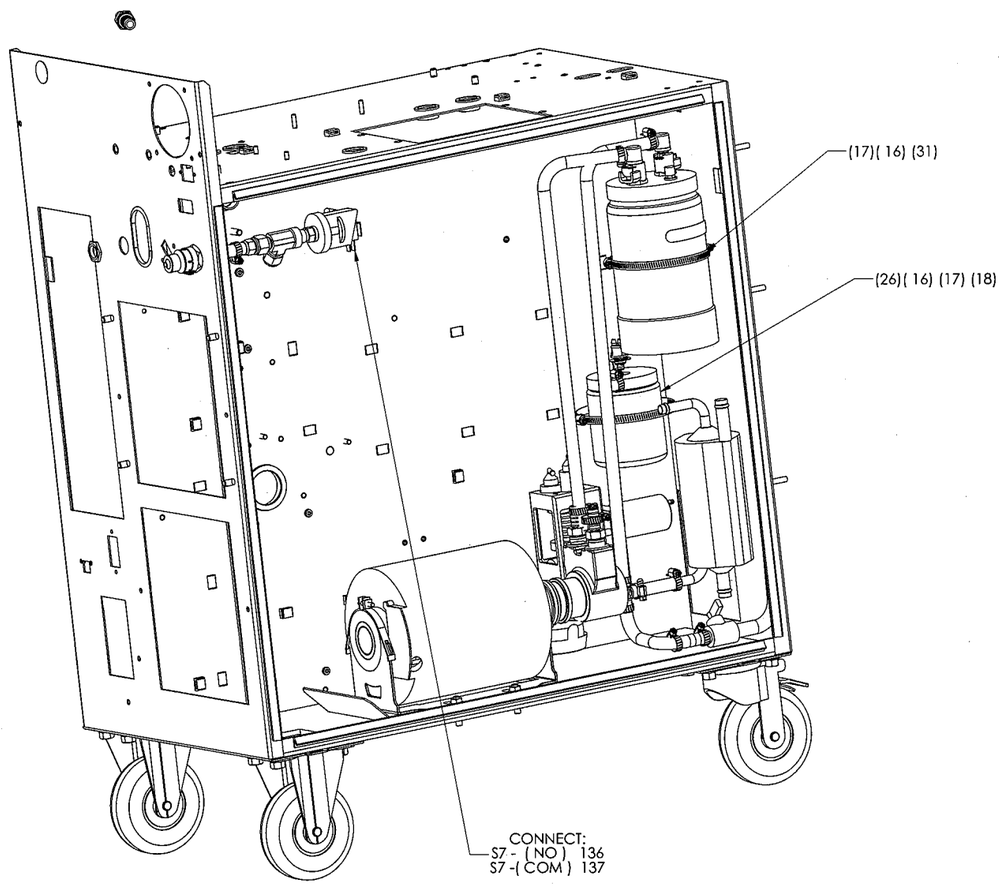
DRAWN: A.VALENTI	DATE: 11/29/05	DO NOT SCALE THIS DRAWING
CHECK: S.CRONIN	DATE: 11/29/05	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: S.CRONIN	DATE: 11/29/05	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG: J.CLARK	11/29/05	.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES
MATERIAL:		
FINISH:		

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE:
FLUID SECTION ASSEMBLY
VBEAM 2

SIZE	DRAWING NO.	REV.
D	7122-99-7495	02

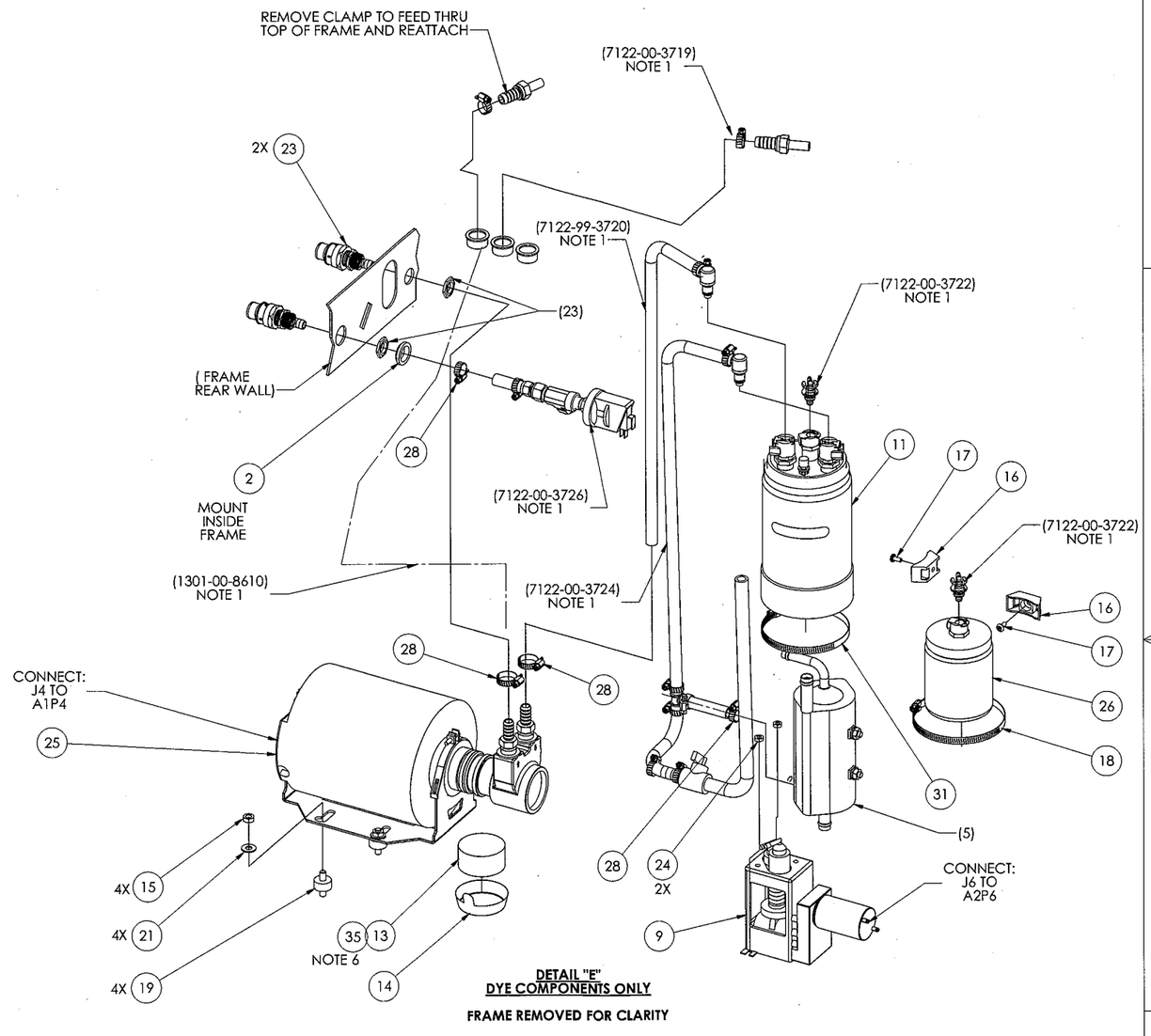
SCALE: 1:3 SHEET 2 OF 4



DETAIL "D"

VIEW SHOWING DYE

SUB-ASSEMBLIES ONLY



DETAIL "E"

DYE COMPONENTS ONLY

FRAME REMOVED FOR CLARITY

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: DATE:

CHECK: DATE:

DESIGN ENGINEERING: DATE:

MANUFACTURING ENG:

PROPRIETARY

THE DRAWING CONTAINS CONFIDENTIAL INFORMATION PROPRIETARY TO CANDELA CORPORATION. IT MUST NOT BE REPRODUCED OR DISCLOSED TO OTHERS OR USED FOR OTHER THAN IN WHOLE OR IN PART, EXCEPTS AS AUTHORIZED IN WRITING BY CANDELA CORPORATION.

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES

CONCENTRICITY .005 TIR

DEBURR AND BREAK ALL SHARP EDGES

CANDELA

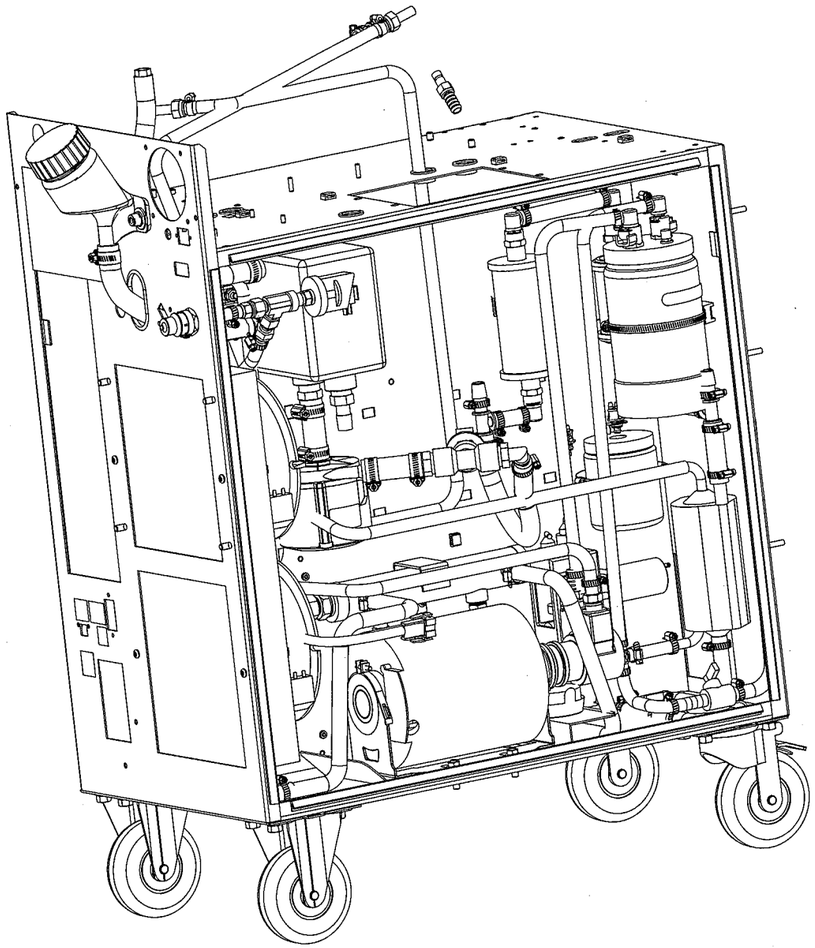
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE:

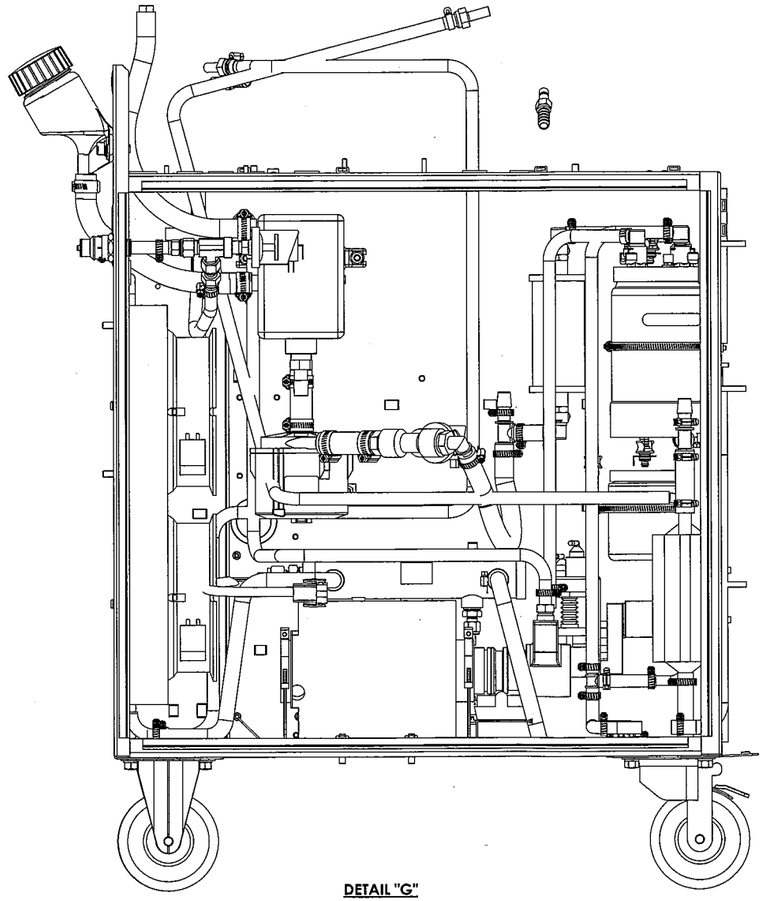
FLUID SECTION VBEAM 2 ASSEMBLY

SIZE	DRAWING NO.	REV.
D	7122-99-7495	02

SCALE: 1:3 SHEET 3 OF 4



DETAIL "F"



DETAIL "G"

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: DATE:

CHECK: DATE:

DESIGN ENGINEERING: DATE:

MANUFACTURING ENG:

PROPRIETARY

THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION PROPRIETARY TO CANDELA CORPORATION IT MUST NOT BE REPRODUCED OR DISCLOSED IN WHOLE OR IN PART TO ANY PERSONS WHO HAVE NOT BEEN SPECIFICALLY AUTHORIZED IN WRITING BY CANDELA CORPORATION.

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63

CONCENTRICITY .005 TIR

DEBURR AND BREAK ALL SHARP EDGES

CANDELA

CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

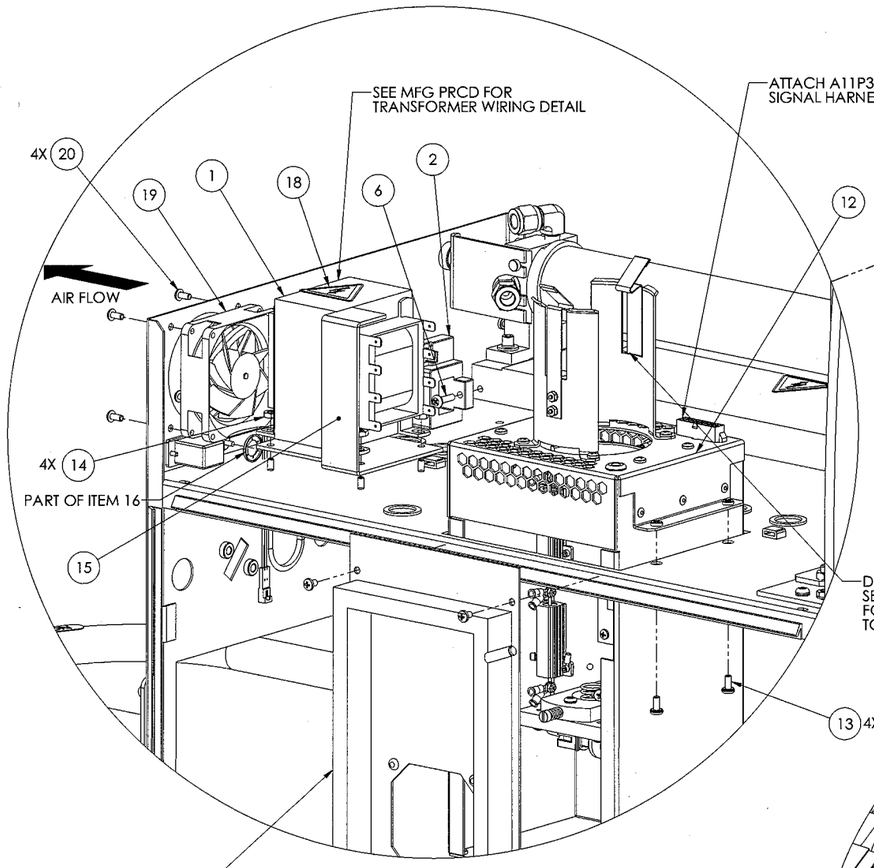
TITLE:

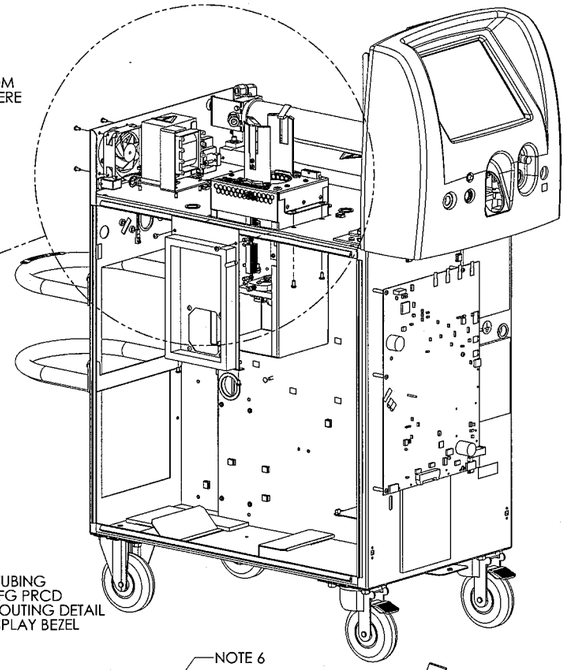
FLUID SECTION VBEAM 2 ASSEMBLY

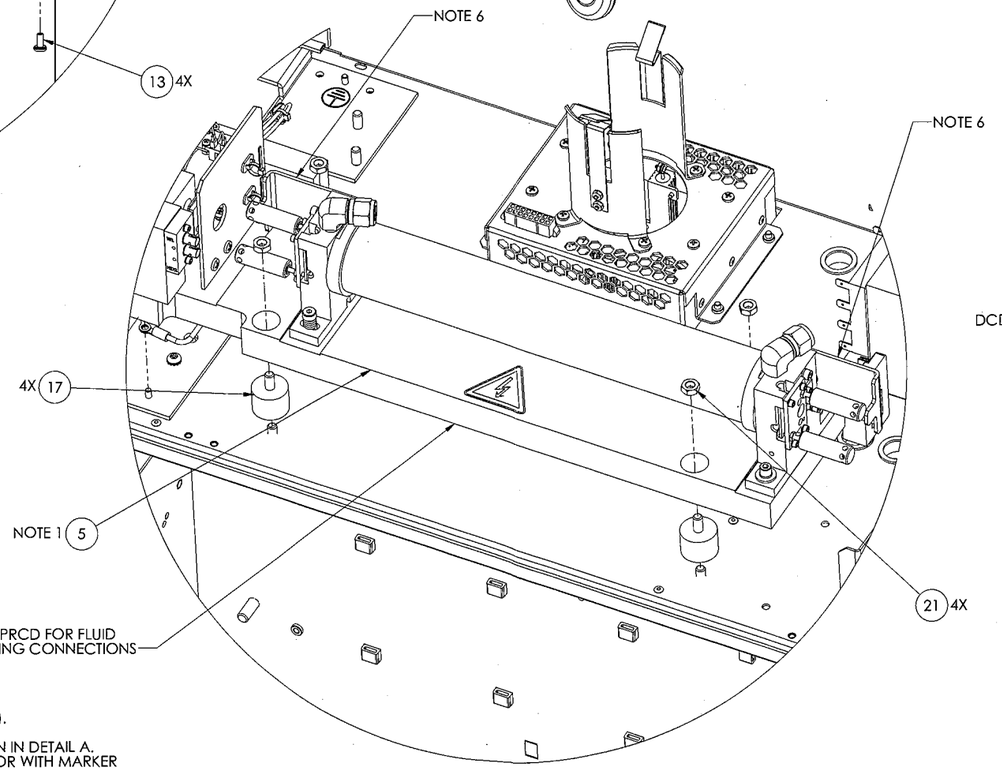
SIZE	DRAWING NO.	REV.
D	7122-99-7495	02

SCALE: 1:3 SHEET 4 OF 4

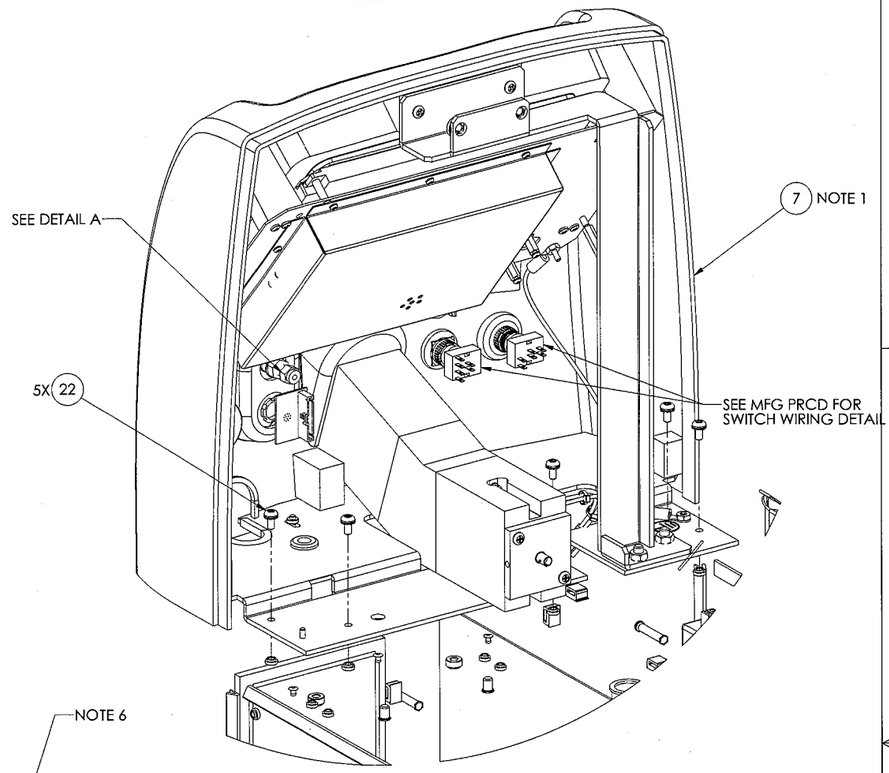
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15385	RELEASE DRAWING	SHC	10/25/05	S. GAUNTLETT	10/25/05
03	15535	ADDED ITEM 30, NOTES 8 AND 9	AGV	11/28/2005	S.GAUNTLETT	11/28/2005



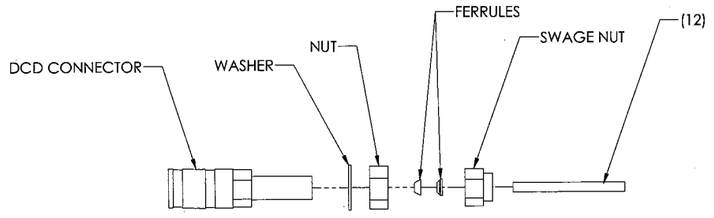




DETAIL C



DETAIL B



DETAIL A (SEE NOTE 5)

NOTES:
1. ATTACH DISPLAY BEZEL (ITEM 7) BEFORE ATTACHING LASER RAIL (ITEM 5).
2. ATTACH FRONT DUSTBOX (ITEM 10) BEFORE ATTACHING BACK DUSTBOX (ITEM 11).
3. REFER TO MANUFACTURING PROCEDURE (ITEM 1005) TO LAYOUT FIBER CABLE ASSY (ITEM 8).
4. REFER TO SYSTEM SCHEMATIC (ITEM 1000) FOR COMPLETE HARNESS CONNECTIONS.
5. LOOSEN NUT ON DCD CONNECTOR AND PLACE NUT AND FERRULES ON TUBING AS SHOWN IN DETAIL A. SCREW NUT ONTO DCD CONNECTOR UNTIL HAND TIGHT. MARK ONE EDGE OF CONNECTOR WITH MARKER AND TIGHTEN ONE FULL TURN WITH WRENCH.
6. ADJUST LAMP WIRE GUIDE SUCH THAT GUIDE IS SNUG AGAINST FLASHLAMP COLLAR.
7. DCD COVER MAY NEED TO BE REMOVED TO INSTALL DCD ASSY (ITEM 12) THROUGH FRAME. IF DCD COVER IS REMOVED, REATTACH AFTER DCD ASSY IS SECURED TO FRAME.
8. APPLY LABEL (ITEM 30) ON TOP OF BAR (ITEM 26) APPROX. CENTERED AS SHOWN. CLEAN SURFACE BEFORE APPLYING LABEL.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: S. CRONIN	DATE: 10/25/05	DO NOT SCALE THIS DRAWING
CHECK: S. GAUNTLETT	DATE: 10/25/05	
DESIGN ENGINEERING: S. CRONIN	DATE: 10/25/05	DIMENSIONS IN INCHES[MM]
MANUFACTURING ENG:		UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

PROPRIETARY

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK ALL SHARP EDGES

MATERIAL:

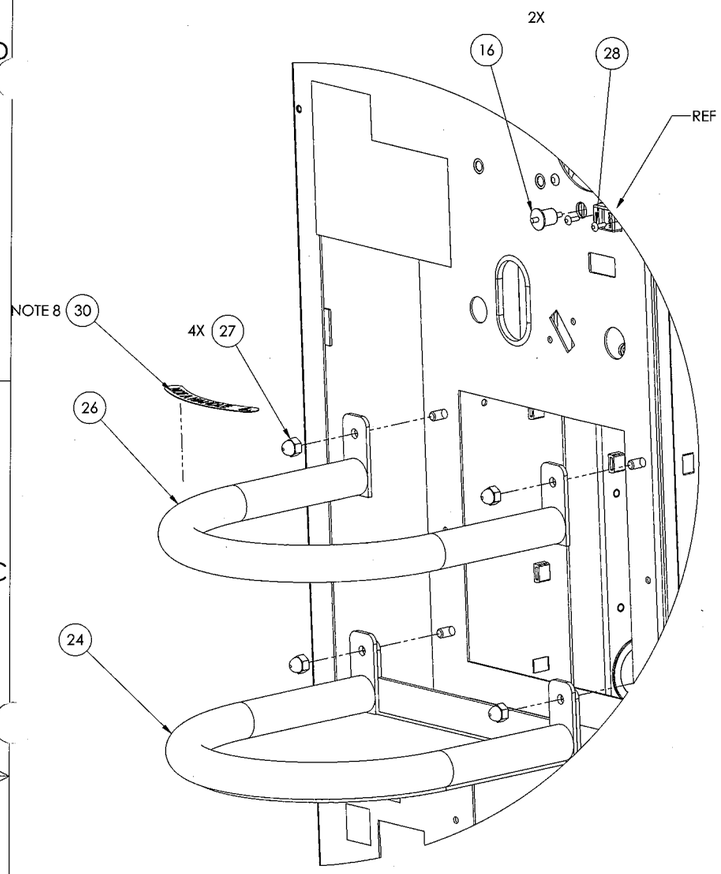
FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

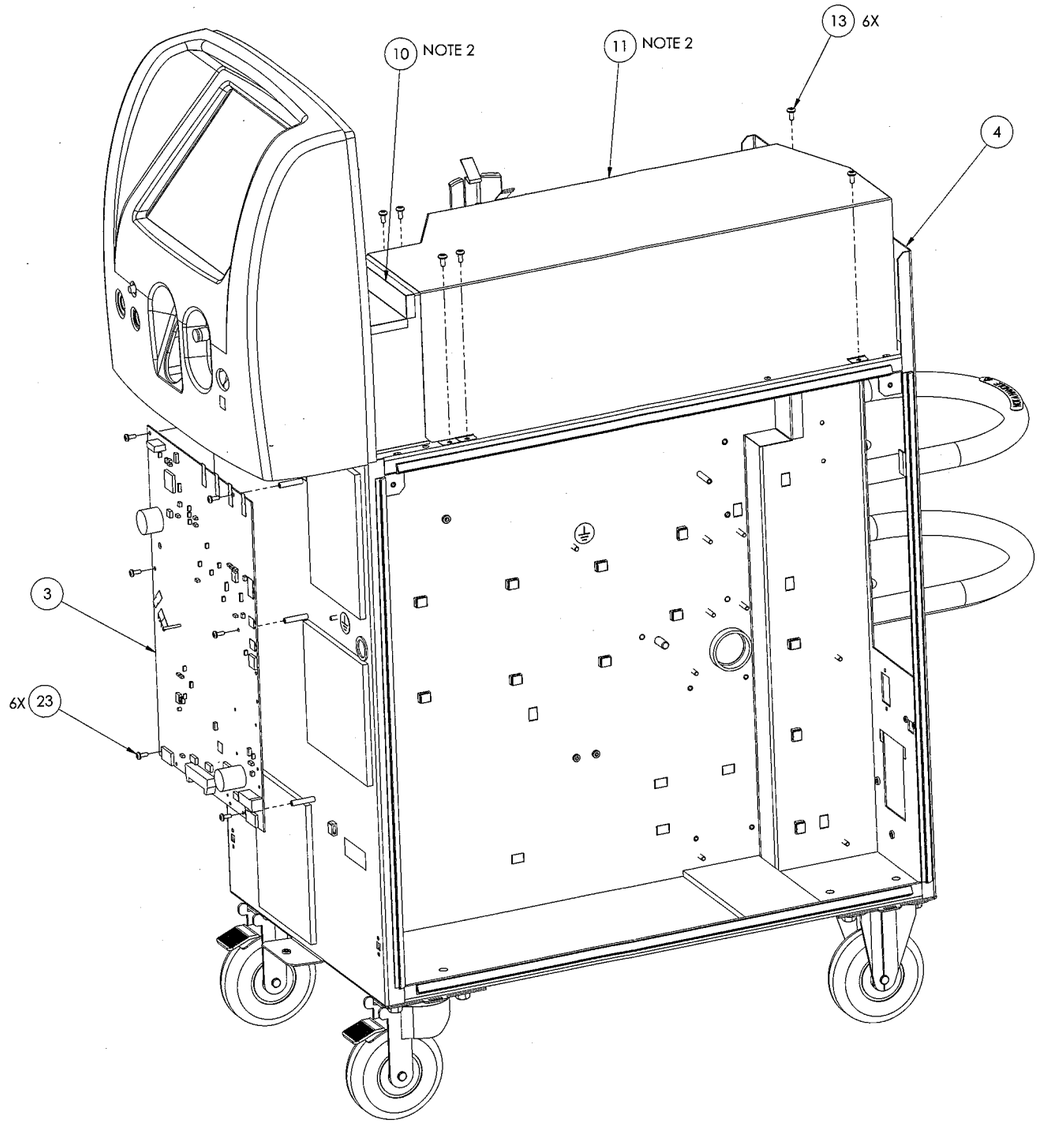
TITLE:
ASSY,
UPPER CHASSIS

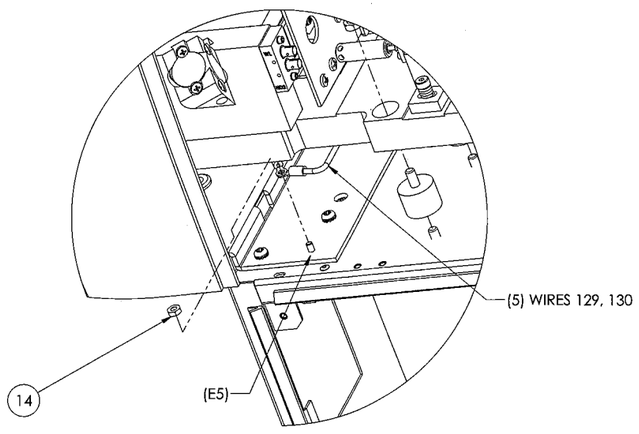
SIZE	DRAWING NO.	REV.
D	7122-99-7500	03

SCALE: 1:2 SHEET 1 OF 2



DETAIL D





DETAIL K

S. CRONIN 10/25/05

S. GAUNTLETT 10/25/05

ITEM	QTY	PART NO	DESCRIPTION	NOTE

S. CRONIN 10/25/05

DRAWN:	DATE:	
CHECK:	DATE:	
DESIGN ENGINEERING:	DATE:	
MANUFACTURING ENG:		

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63

CONCENTRICITY .005 TIR

DEBURR AND BREAK ALL SHARP EDGES

MATERIAL:

FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

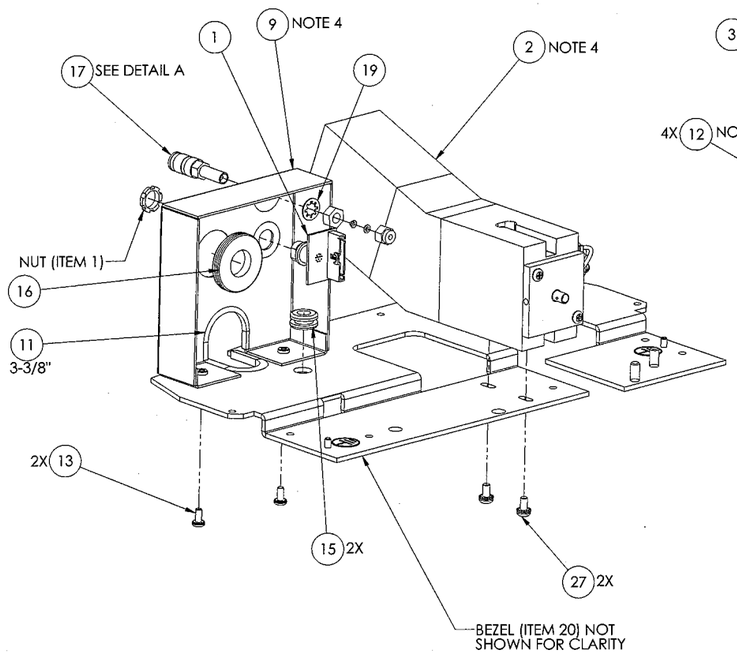
TITLE:

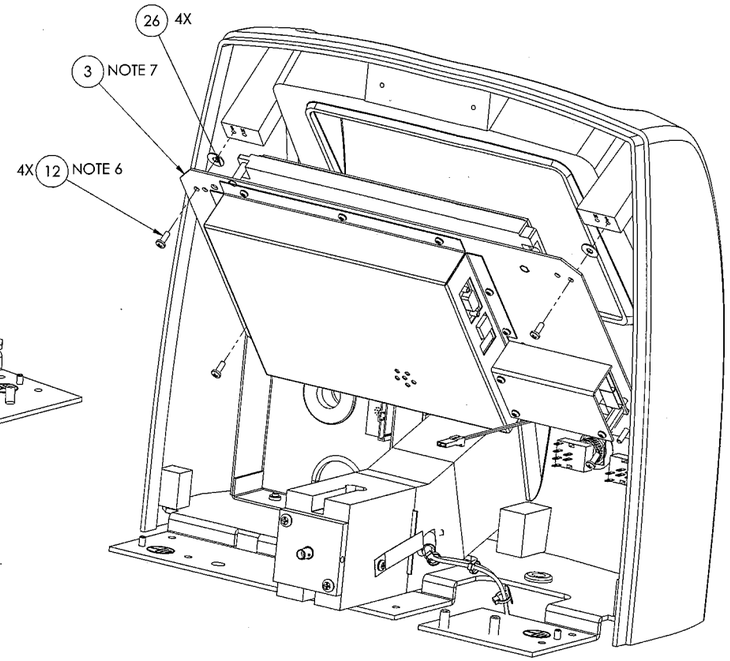
ASSY,
UPPER CHASSIS

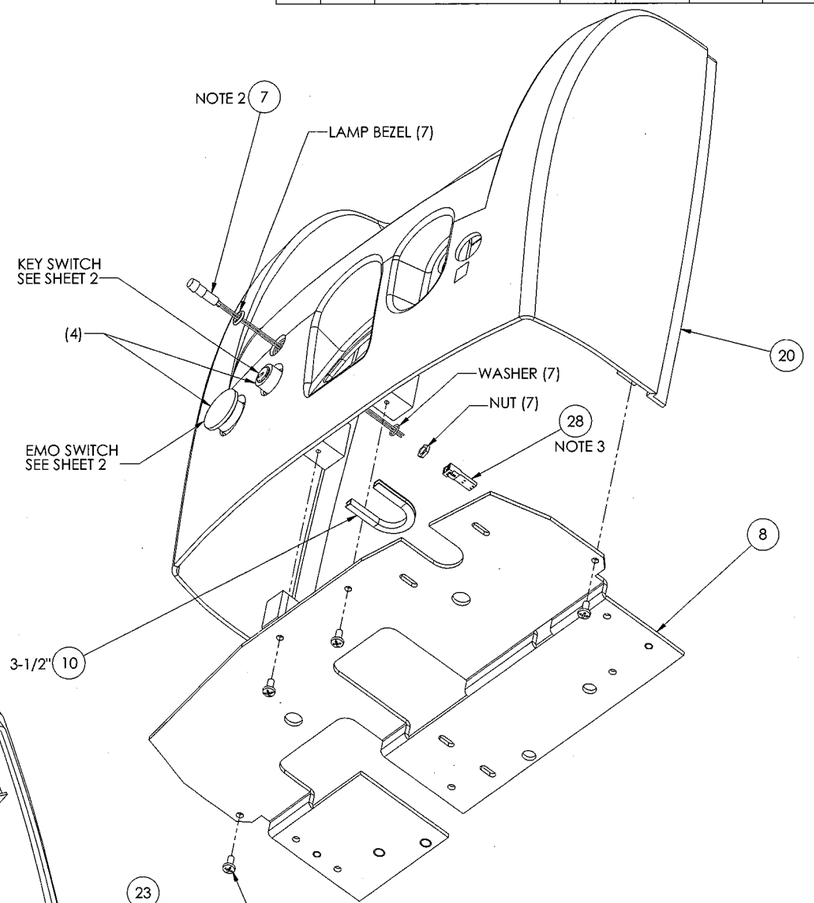
SIZE	DRAWING NO.	REV.
D	7122-99-7500	03

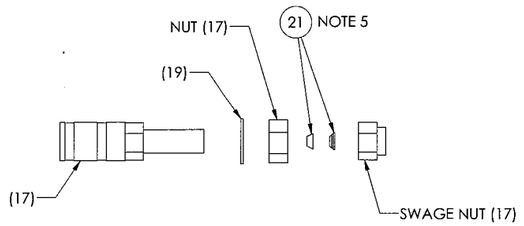
SCALE: 1:2 SHEET 2 OF 2

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15264	INITIAL RELEASE	SHC	9/7/05	S. GAUNTLETT	9/7/05
02	15343	CHANGE LABEL	SHC	10/12/05	T. CATINEAU	10/12/05
03	15487	REMOVE GASKET/ADD FOUR WASHERS	SHC	11/16/05	D. MERRITT	11/16/05
04	15532	ADDED NOTE 7	SAM G.	11/29/05	D. MERRITT	11/29/05

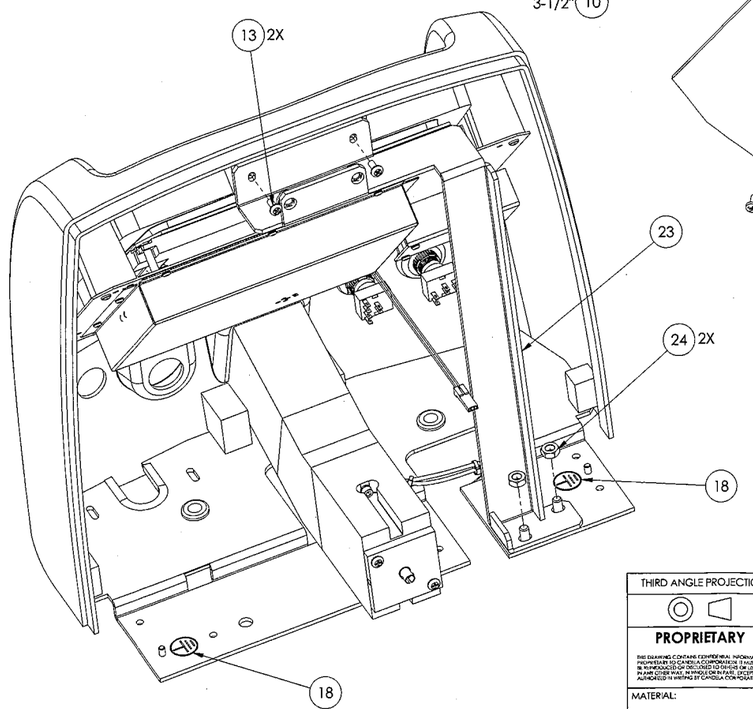








DETAIL A



NOTES:
1. INSTALLING THE KEY SWITCH AND EMO ASSEMBLY:
   A). REMOVE THE SWITCH BLOCK FROM THE BACK OF THE KEY SWITCH BY INSERTING THE DISMANTLING TOOL (ITEM 1200) AS SHOWN IN DETAIL B. REMOVE THE PLASTIC NUT USING THE WRENCH TOOL (ITEM 1201) AS SHOWN IN DETAIL C. WITH THE KEY REMOVED FROM THE KEY SWITCH, PASS THE KEY SWITCH THROUGH THE BEZEL AND SECURE WITH THE SQUARE LOCK WASHER AND PLASTIC NUT. TIGHTEN THE NUT USING THE WRENCH AS SHOWN IN DETAIL D.
   B). REMOVE THE SWITCH BLOCK FROM THE BACK OF THE EMO SWITCH BY INSERTING THE DISMANTLING TOOL AND THEN REMOVING THE PLASTIC NUT (SAME AS NOTE 1A). PASS THE EMO SWITCH THROUGH THE BEZEL AND SECURE WITH THE PLASTIC NUT. TIGHTEN THE NUT USING THE WRENCH.
   C). REATTACH THE SWITCH BLOCKS TO THE SWITCHES. BOTH SWITCH BLOCKS ARE KEYED AND CAN ONLY BE INSTALLED IN ONE POSITION.
2. FEED WIRES FROM INDICATOR LIGHT ASSY (ITEM 7) THRU BEZEL WALL AND TIGHTEN WITH FASTENERS SUPPLIED.
3. ATTACH CONNECTOR BODY (ITEM 28) TO BOTH PINS FROM INDICATOR LIGHT ASSY (ITEM 7). NO POLARITY IS NEEDED.
4. ATTACH INTERFACE PLATE (ITEM 9) AND CALPORT (ITEM 2) UP TIGHT AGAINST BEZEL (ITEM 20) BEFORE TIGHTENING APPROPRIATE HARDWARE.
5. REMOVE NUT AND FERRULES SUPPLIED WITH CONNECTOR (PART OF ITEM 17). DISCARD METAL FERRULES AND INSTALL NYLON FERRULES (ITEM 21).
6. DETERMINE IF DISPLAY ASSY (ITEM 3) USES A SHARP (S) MODEL OR AN NEC (N) MODEL. ALIGN APPROPRIATE HOLES MARKED N/S ON BEZEL (ITEM 20) WITH CORRESPONDING HOLES ON DISPLAY ASSY.
7. REMOVE PLASTIC COVER ON ITEM 3 BEFORE SECURING IT TO ITEM 20. REPLACE THE PLASTIC COVER WHEN DONE.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

THIRD ANGLE PROJECTION

DRAWN: SCRONIN	DATE: 9/7/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 9/7/2005	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: SCRONIN	DATE: 9/7/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

MATERIAL:

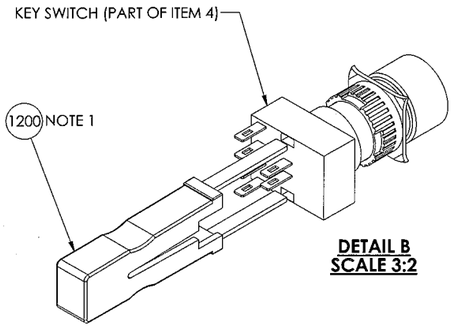
FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

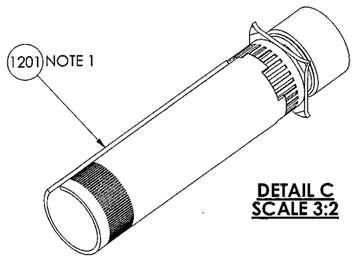
TITLE: ASSY, DISPLAY BEZEL

SIZE	DRAWING NO.	REV.
D	7122-99-7510	04

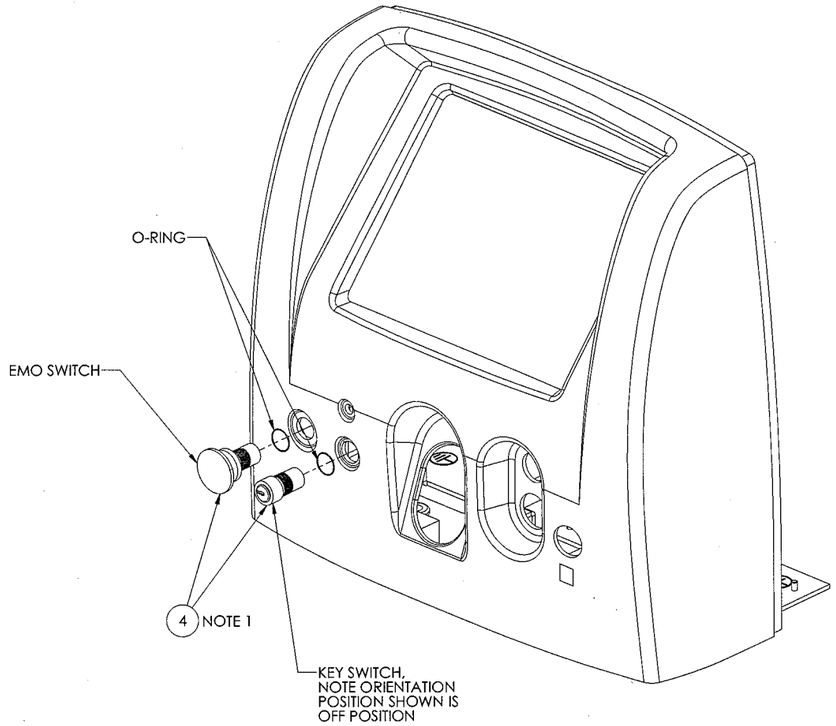
SCALE: 1:2 SHEET 1 OF 2

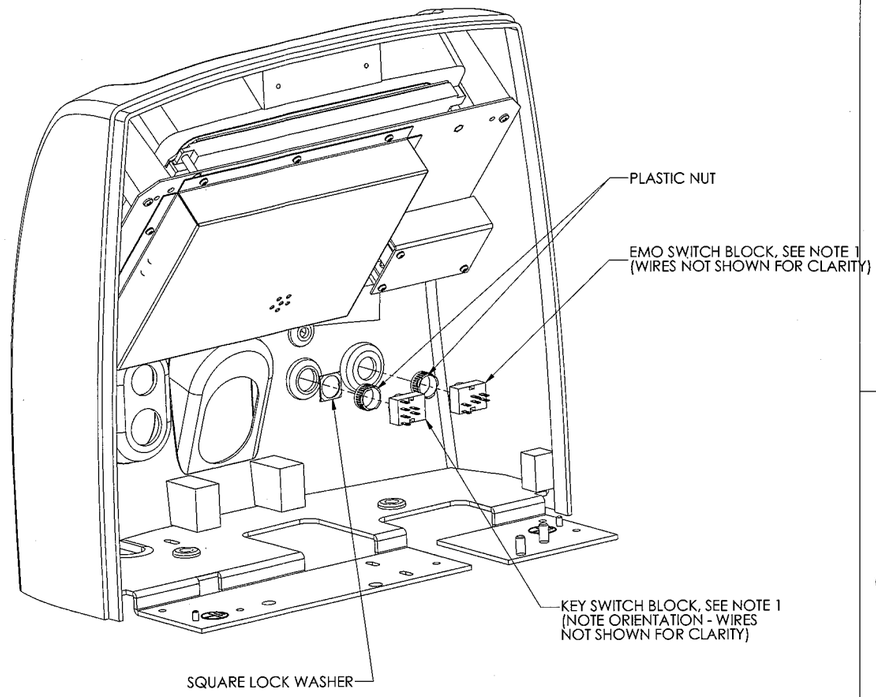


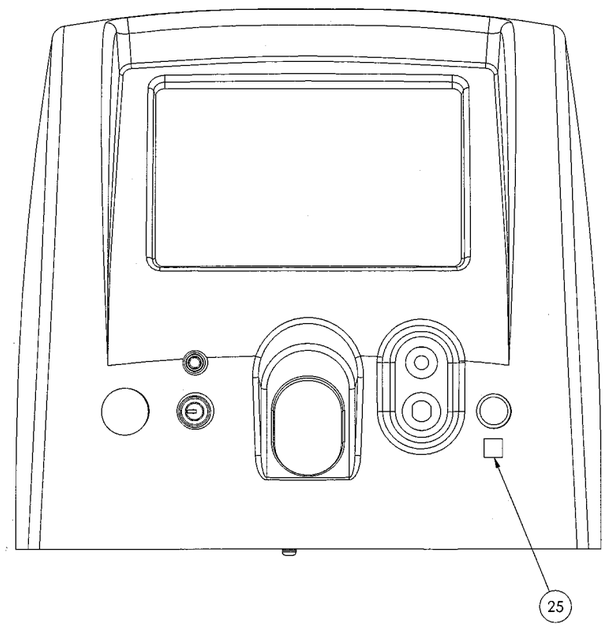
DETAIL B
SCALE 3:2

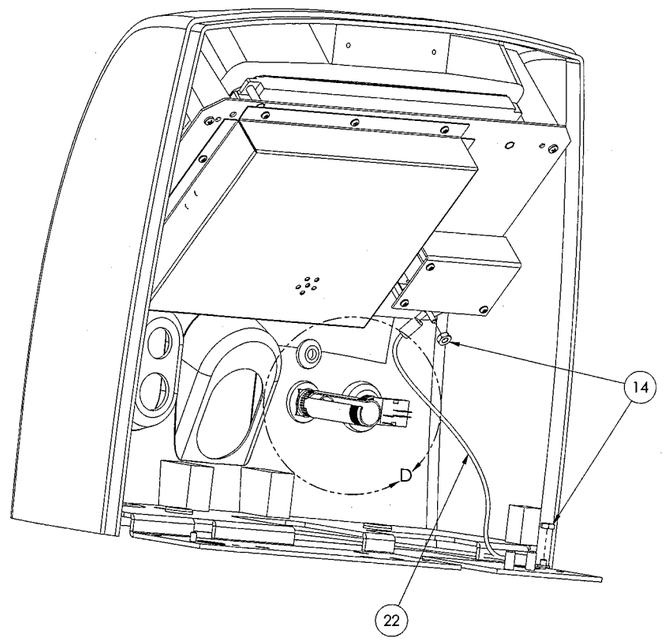


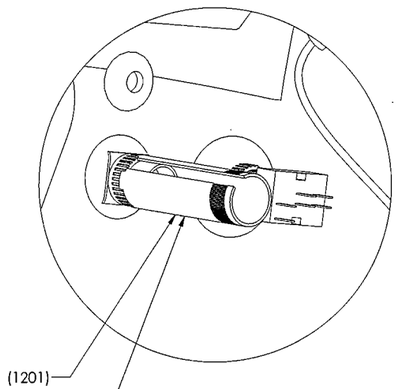
DETAIL C
SCALE 3:2











DETAIL D
SCALE 1 : 1

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SCRONIN	DATE: 9/7/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 9/7/2005	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: SCRONIN	DATE: 9/7/2005	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

MATERIAL:

FINISH:

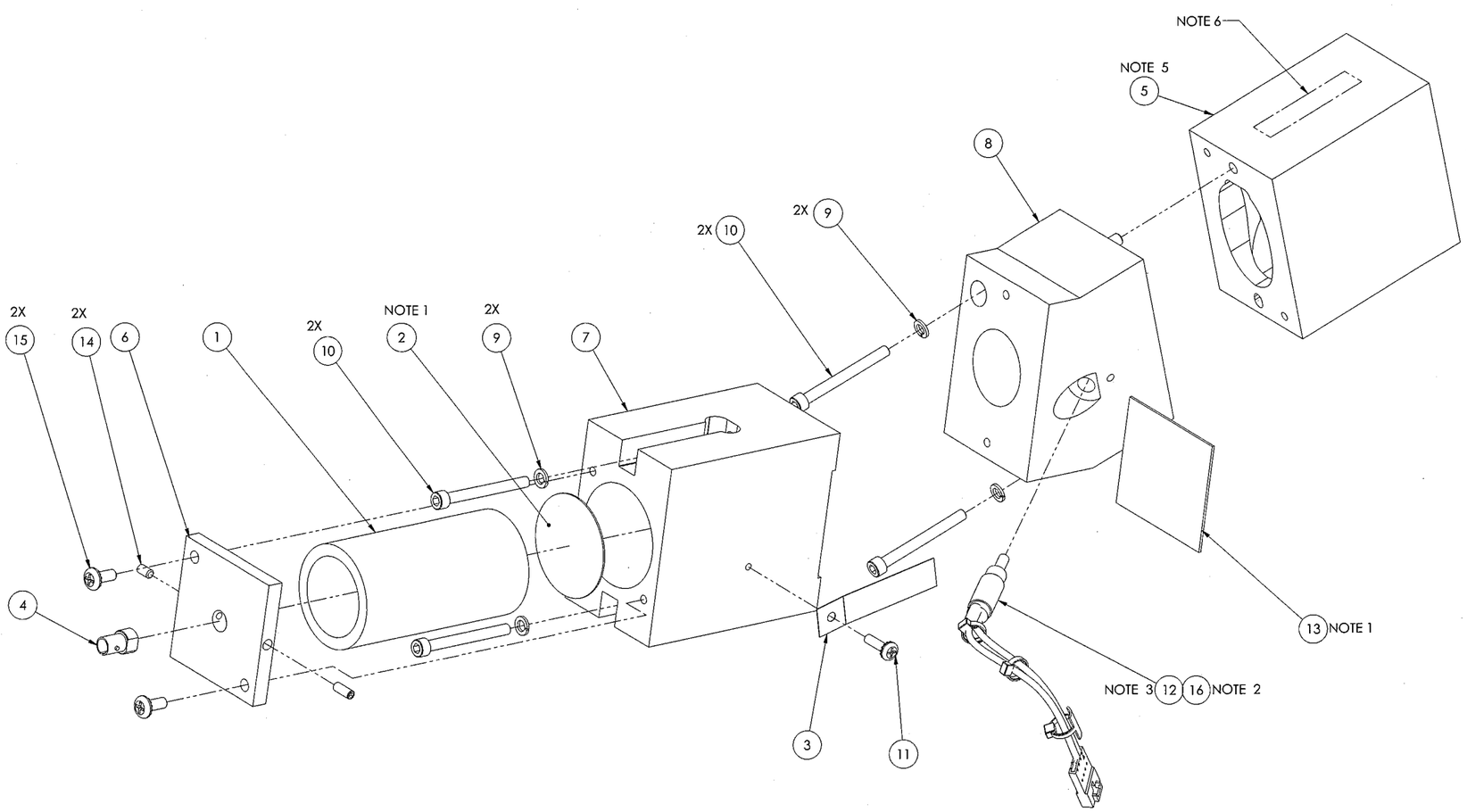
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

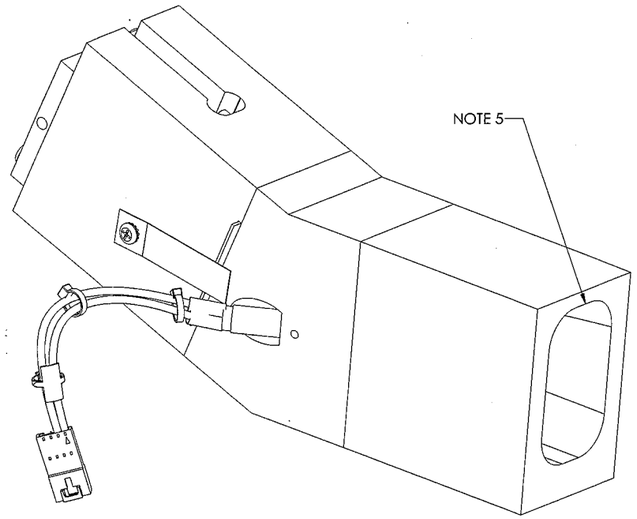
TITLE: ASSY, DISPLAY BEZEL

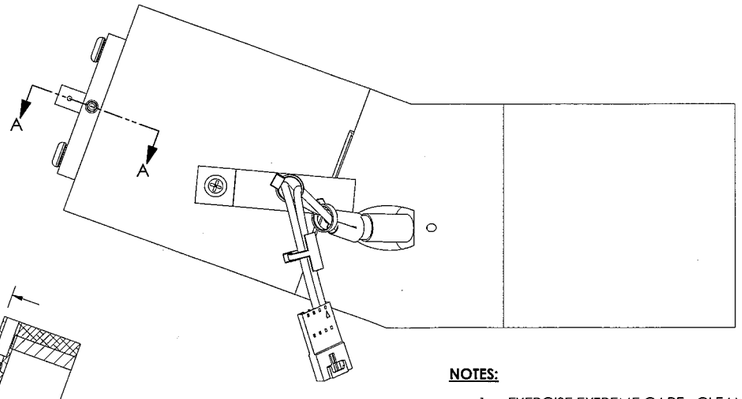
SIZE	DRAWING NO.	REV.
D	7122-99-7510	04

SCALE: 1:2 SHEET 2 OF 2

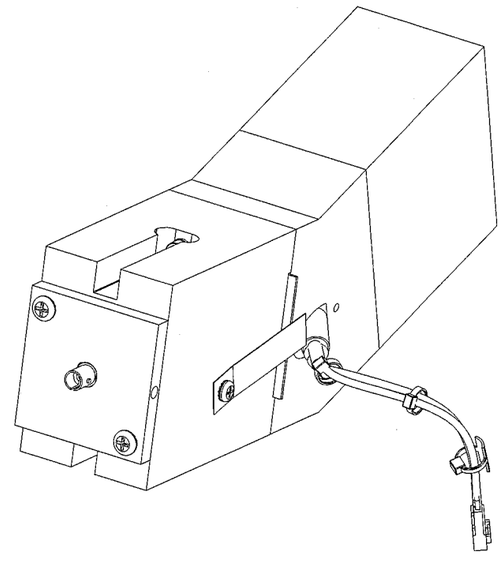
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15189	INITIAL RELEASE	D. DILEO	8/16/05	S.GAUNTLETT	8/16/05
02	15368	ADDED INSTALLATION NOTE	D. DILEO	10/18/05	S.GAUNTLETT	10/18/05
03	15495	MOVE SWITCH	SMG	11/16/2005	SC	11/16/2005
04	15554	REMOVE SET SCREW/ADD LOCTITE	SHC	12/1/05	S. GAUNTLETT	12/1/05







SECTION A-A



NOTES:

1. EXERCISE EXTREME CARE. CLEANLINESS IS MANDATORY. CLEAN CERAMIC (ITEM 2) WITH ISOPROPANOL ALCOHOL BEFORE INSERTING INTO FOAM HOUSING BLOCK (ITEM 7). BLOW DRY WITH COMPRESSED AIR/N2 (HANDLE ONLY FROM EDGES). IF THE WINDOW REQUIRES CLEANING, CLEAN PER PROCEDURE (ITEM 1005).
2. APPLY A SMALL AMOUNT OF THREAD LOCK (ITEM 16) TO THE THREADS OF THE OVERTRAVEL SWITCH (ITEM 12). DO NOT ALLOW THREAD LOCK TO DRIP INTO INTERNAL PART OF DIFFUSER (ITEM 8).
3. HAND TIGHTEN SWITCH (ITEM 12) UNTIL SNUG.
4. SCREW ST CONNECTOR (ITEM 4) TO APPROX. DIMENSION SHOWN IN SECTION A-A AND SECURE WITH SET SCREWS (ITEM 14) ON FLATS OF ST CONNECTOR.
5. INSTALL GLOVE BLOCK (ITEM 5) TO DIFFUSER BLOCK (ITEM 8) BEFORE INSTALLING DIFFUSER BLOCK TO FOAM HOUSING BLOCK (ITEM 7). MAKE SURE THIN PART OF BLOCK IS ORIENTED TO THE TOP OF THE ASSY.
6. MARK CANDELA ASSY NUMBER AND CURRENT BOM REVISION.
7. PLACE ASSY IN UNIT CONTAINER FOR IDENTIFICATION AND MARK CONTAINER WITH CANDELA ASSY NUMBER AND CURRENT BOM REVISION.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: DDILEO DATE: 8/16/2005
CHECK: SGAUNTLETT DATE: 8/16/2005
DESIGN ENGINEERING: DDILEO DATE: 8/16/2005
MANUFACTURING ENG:

THIRD ANGLE PROJECTION

PROPRIETARY

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

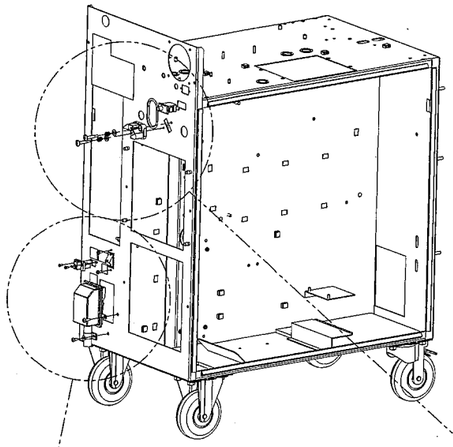
TITLE:

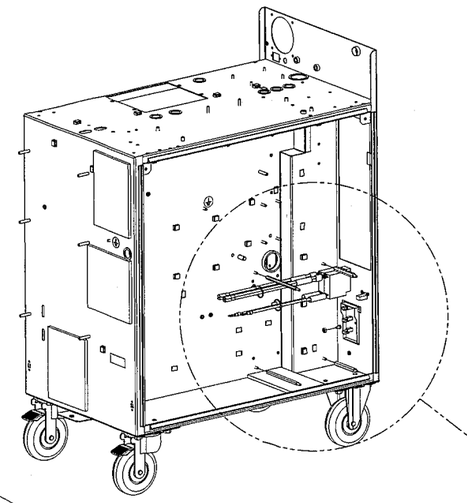
ASSY, CALPORT

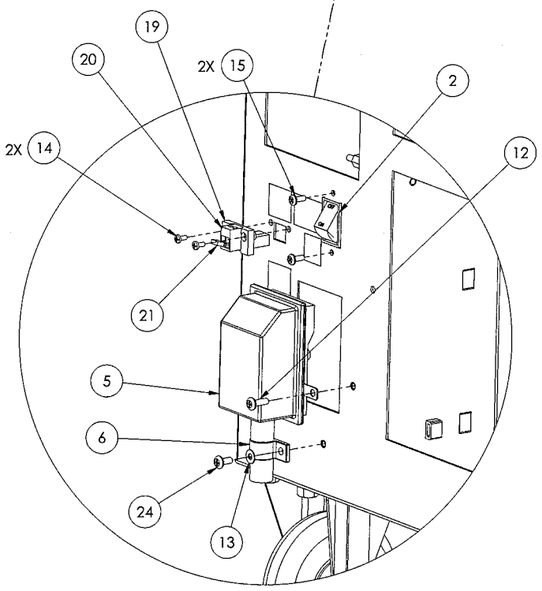
SIZE D | DRAWING NO. 7122-99-7520 | REV. 04

SCALE: 1:1 SHEET 1 OF 1

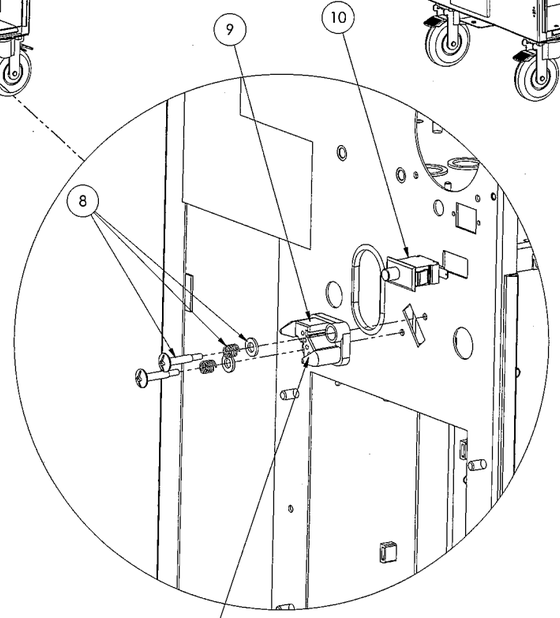
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
01	15379	INITIAL RELEASE	SMG	10/20/2005	RB	10/20/2005
02	15444	ADD LINE/LOAD TO LINE FILTER	SHC	11/8/05	S. GAUNTLETT	11/8/05



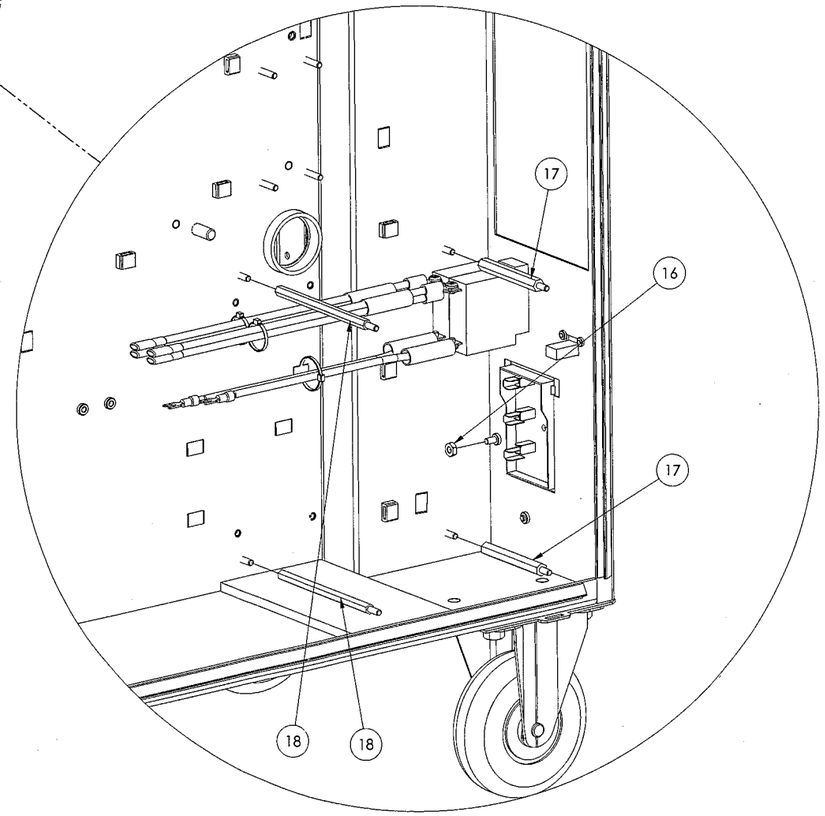




DETAIL A
SCALE 1 : 2



DETAIL B
SCALE 1 : 2



DETAIL C
SCALE 1 : 2

NOTES:
1. REFER TO THE MANUFACTURING PROCEDURE (ITEM 1005) TO LAYOUT AC HARNESS (ITEM3) AND SIGNAL HARNESS (ITEM 7).
2. REFER TO WIRE SCHEMATIC (ITEM 1000) FOR COMPLETE HARNESS CONNECTIONS.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SGAUNTLETT DATE: 10/19/05
CHECK: SCRONIN DATE: 10/19/05
DESIGN ENGINEERING: SGAUNTLETT DATE: 10/19/05
MANUFACTURING ENG: DATE:

THIRD ANGLE PROJECTION

PROPRIETARY

MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

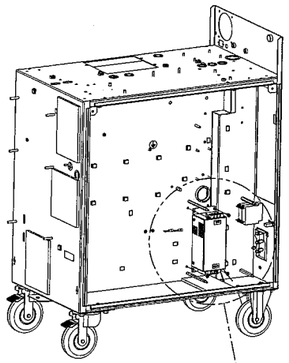
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

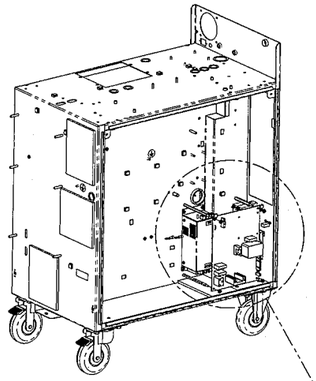
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

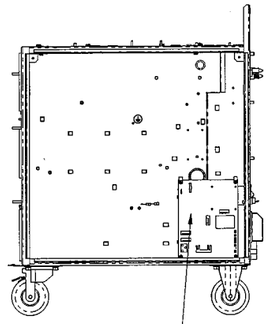
TITLE:
ASSY AC SECT VB2

SIZE D | DRAWING NO. 7122-99-7523 | REV. 02

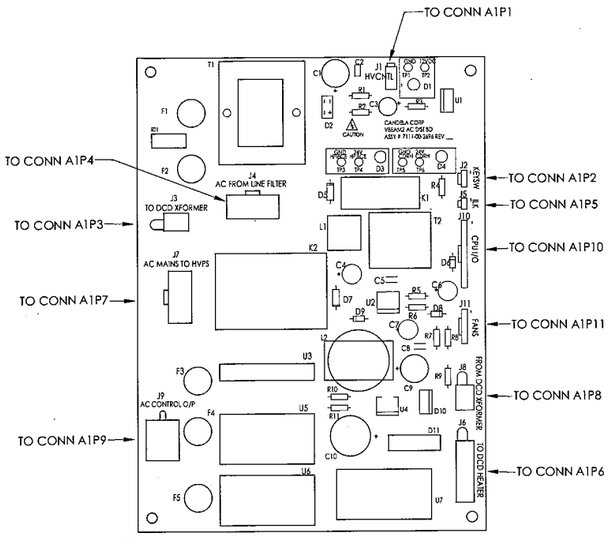
SCALE: 1:6 SHEET 1 OF 2





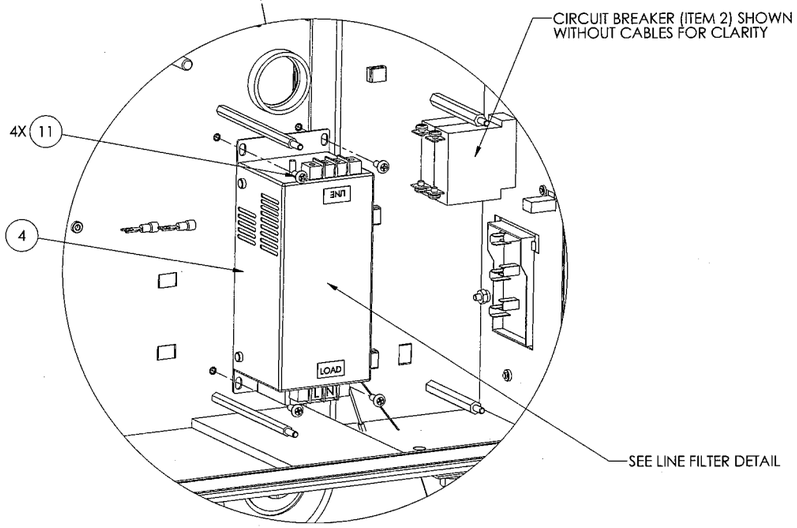


SEE AC BD DETAIL

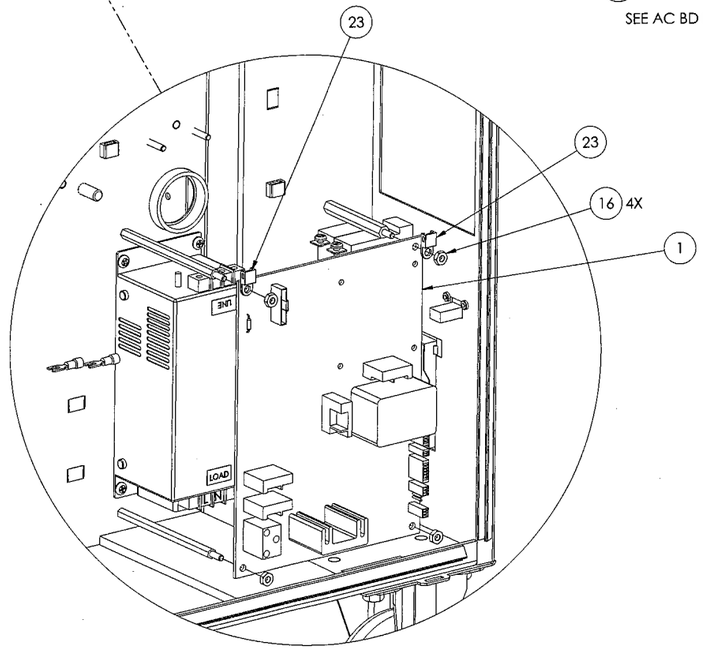


AC BD DETAIL

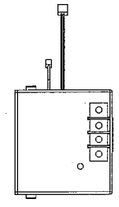
COMPONENT A1 FROM SYSTEM SCHEMATIC

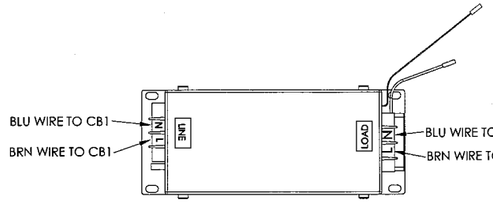


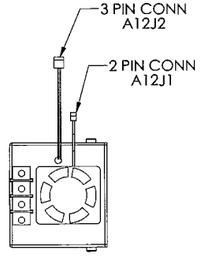
DETAIL D
SCALE 1 : 2



DETAIL E
SCALE 1 : 2







LINE FILTER DETAIL

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: SGAUNTLETT	DATE: 10/19/05	DO NOT SCALE THIS DRAWING
CHECK: SCRONIN	DATE: 10/19/05	DIMENSIONS IN INCHES[MM]
DESIGN ENGINEERING: SGAUNTLETT	DATE: 10/19/05	UNLESS OTHERWISE SPECIFIED
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005 ALL MACH SURFACES 63 CONCENTRICITY .005 TIR DEBURR AND BREAK ALL SHARP EDGES

PROPRIETARY

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MATERIAL:

FINISH:

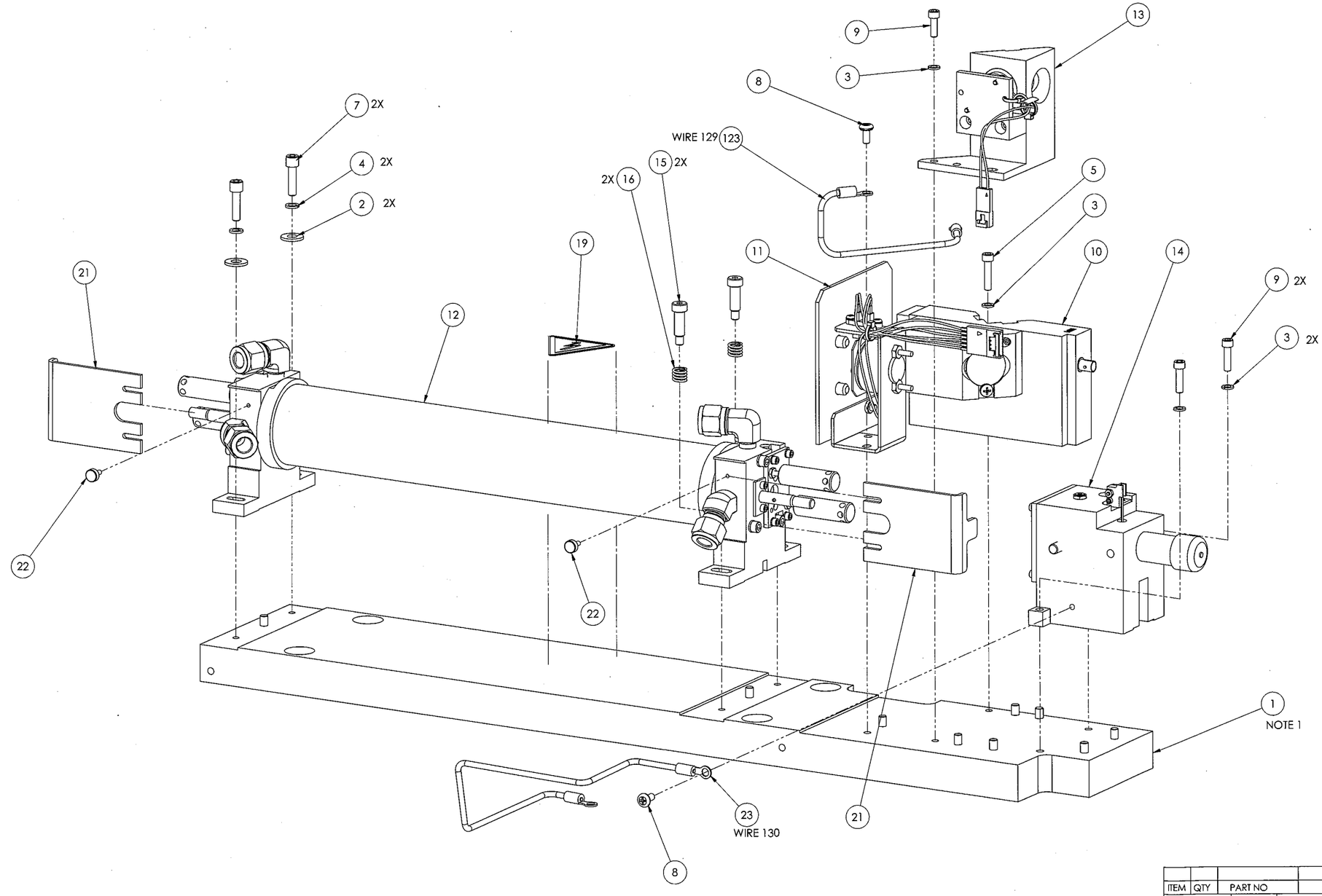
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: ASSY AC SECT VB2

SIZE	DRAWING NO.	REV.
D	7122-99-7523	02

SCALE: 1:8 SHEET 2 OF 2

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
05	15305	INITIAL RELEASE	AGV	9/23/2005	SMG	9/23/2005
06	15528	ADDED ITEM 23	AGV	11/23/2005	SMG	11/23/2005



NOTES:

1. WIPE DOWN LASER RAIL ITEM 1 WITH ISOPROPANAL AND BLOW DRY.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: AVALENTI	DATE: 8/17/2005	DO NOT SCALE THIS DRAWING
CHECK: SGAUNTLETT	DATE: 8/17/2005	
DESIGN ENGINEERING: AVALENTI	DATE: 8/17/2005	DIMENSIONS IN INCHES[MM]
MANUFACTURING ENG:		UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

FINISH:

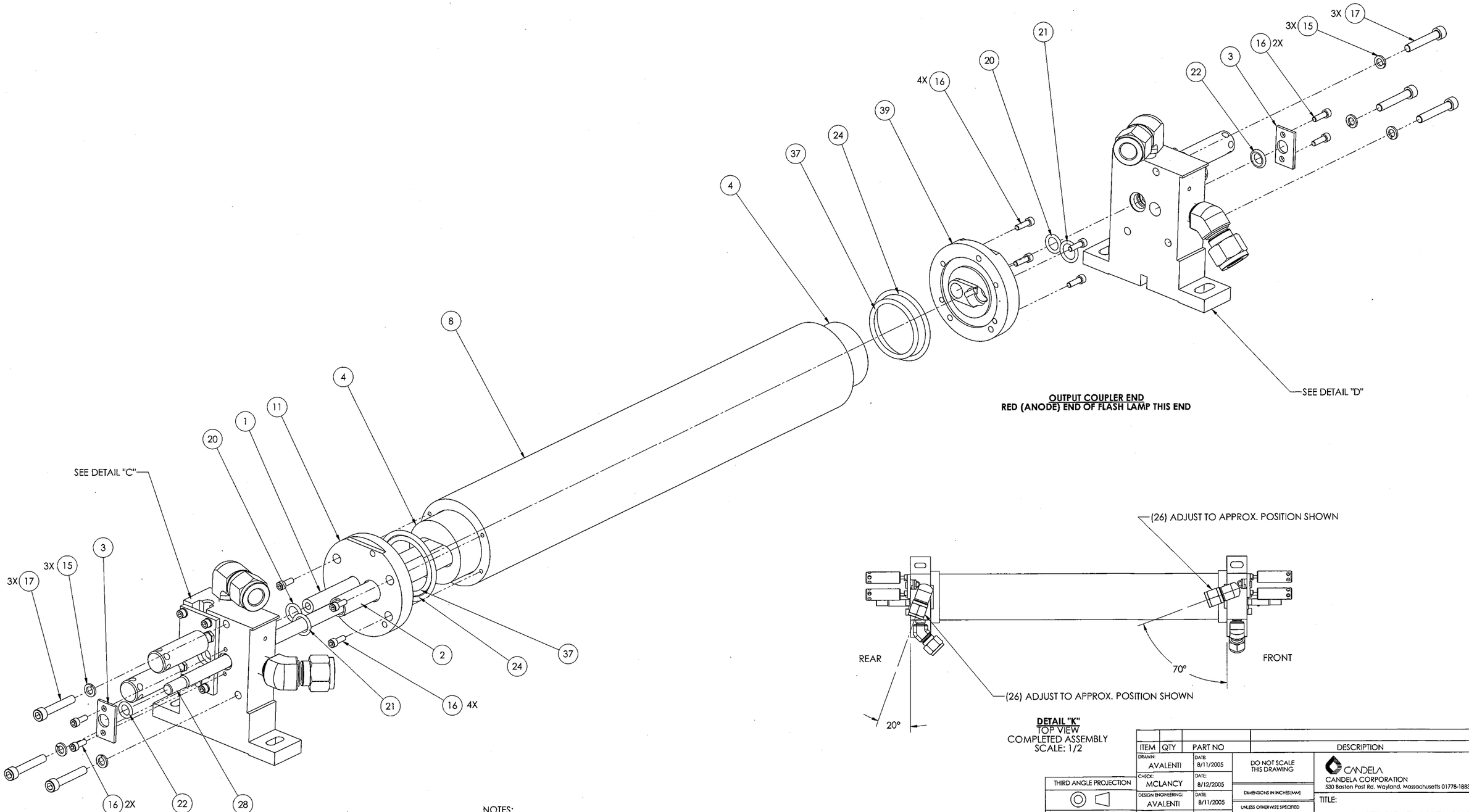
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE:
LASER RAIL ASSEMBLY

SIZE	DRAWING NO.	REV.
D	7122-99-7527	06

SCALE: 0.75:1 SHEET 1 OF 1

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
04	15257	INITIAL RELEASE	AGV	9/06/2005	SMG	9/06/2005
05	15437	ITEM 26 ANGLE 70 DEG WAS 45 DEG	AGV	11/16/2005	SMG	11/17/2005



OUTPUT COUPLER END
RED (ANODE) END OF FLASH LAMP THIS END

MAX REFLECTOR END

NOTES:

1. EXERCISE EXTREME CARE - CLEANLINESS IS MANDATORY.
2. REFER TO ASSEMBLY PROCEDURE (ITEM 1005).

DETAIL "K"
TOP VIEW
COMPLETED ASSEMBLY
SCALE: 1/2

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: AVALENTI	DATE: 8/11/2005	DO NOT SCALE THIS DRAWING
CHECK: MCLANCY	DATE: 8/12/2005	
DESIGN ENGINEERING: AVALENTI	DATE: 8/11/2005	DIMENSIONS IN INCHES [MM]
MANUFACTURING ENG:		UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

PROPRIETARY

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.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:

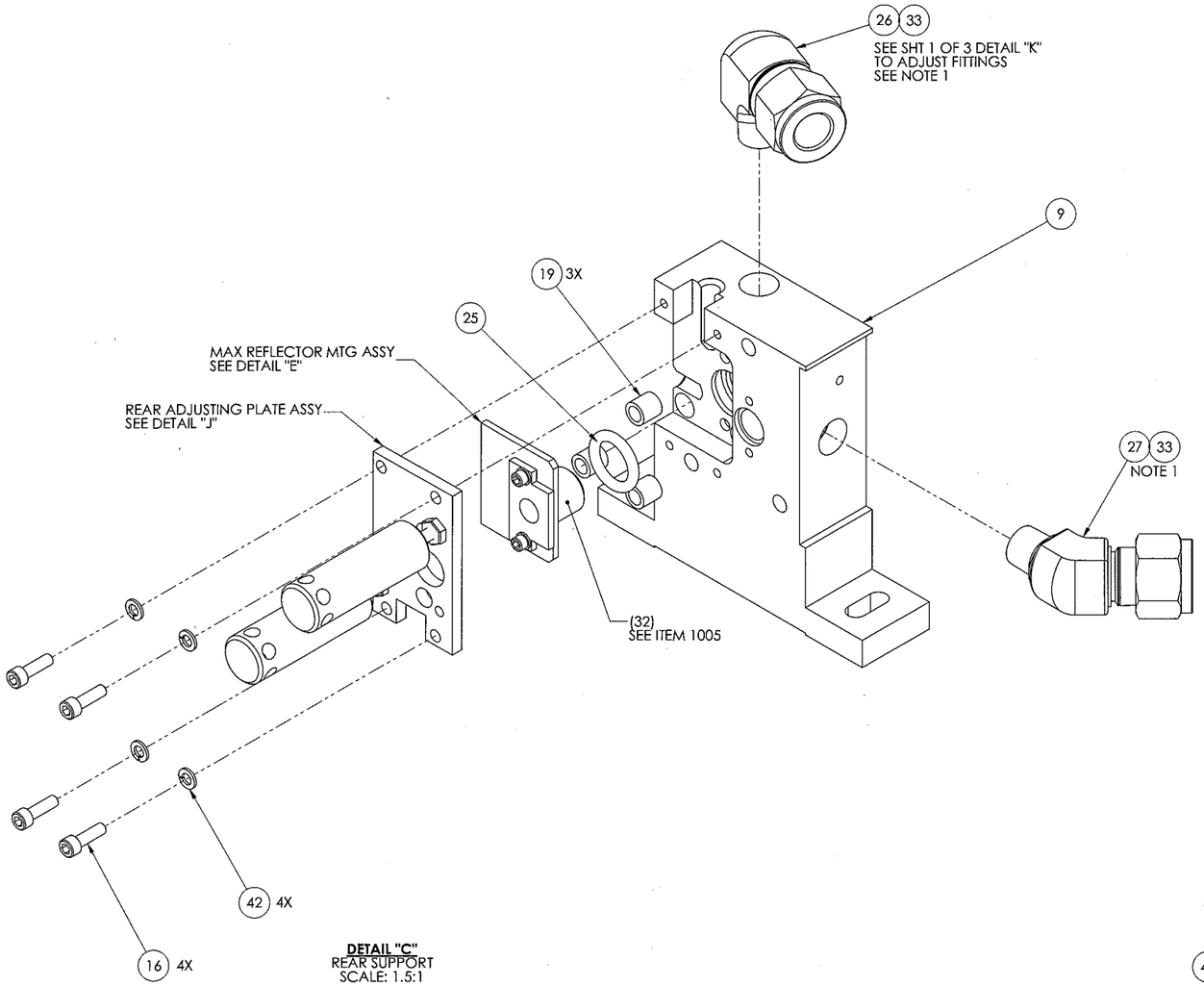
FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

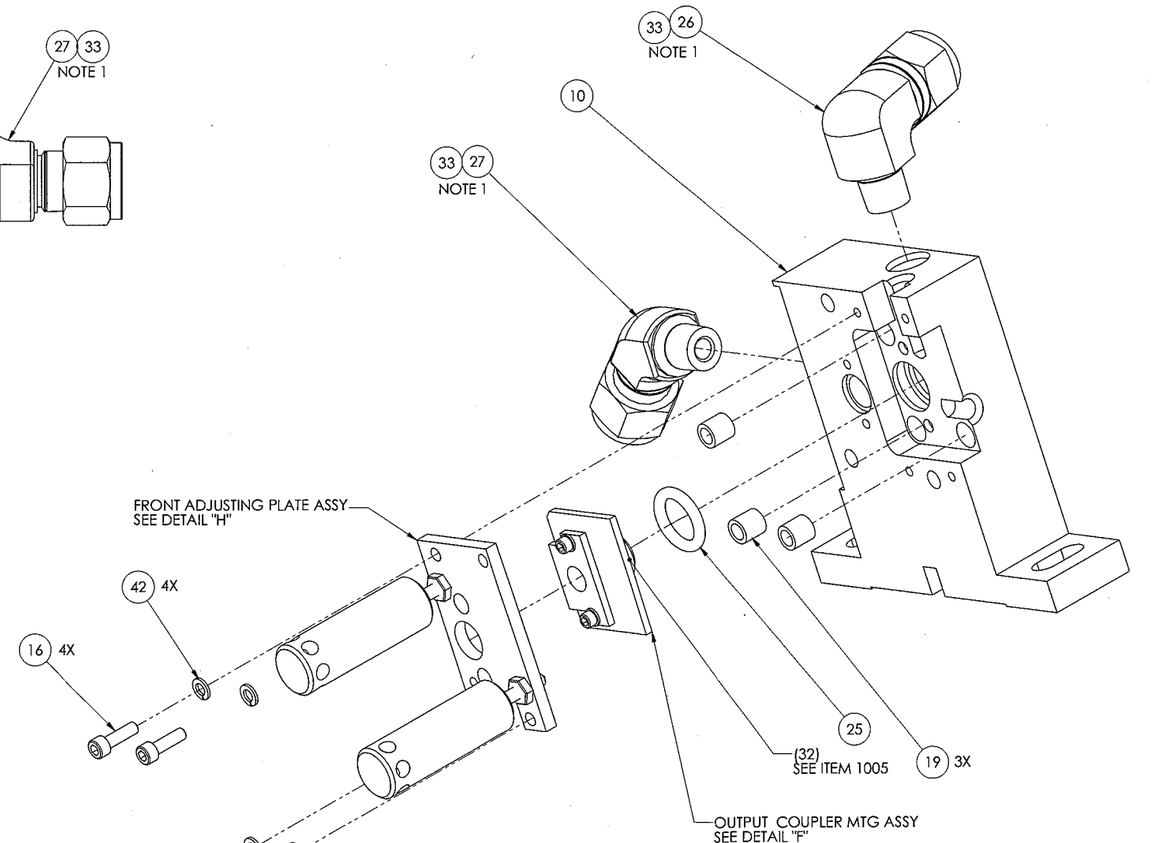
TITLE:
LASER HEAD ASSEMBLY
VBEAM 2

SIZE	DRAWING NO.	REV.
D	7122-99-7528	05

SCALE: 1:1 SHEET 1 OF 3



DETAIL "C"
REAR SUPPORT
SCALE: 1.5:1



DETAIL "D"
FRONT SUPPORT
SCALE: 1.5:1

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: AVALENTI DATE: 8/11/2005
CHECK: MCLANCY DATE: 8/12/2005
DESIGN ENGINEERING: AVALENTI DATE: 8/11/2005
MANUFACTURING ENG:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES [MM]

UNLESS OTHERWISE SPECIFIED
.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

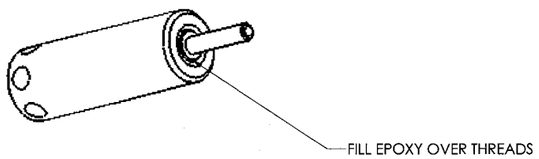
MATERIAL:
FINISH:

CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

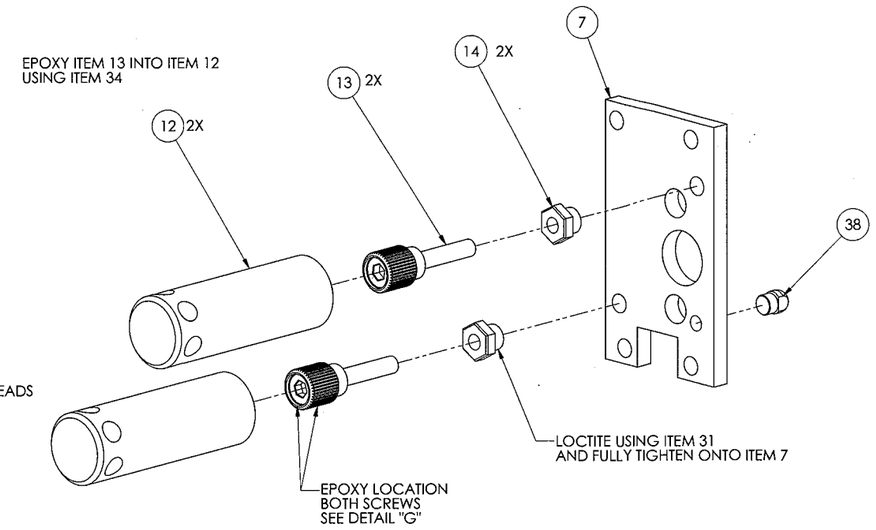
TITLE:
LASER HEAD ASSEMBLY
VBEAM 2

SIZE D | DRAWING NO. 7122-99-7528 | REV. 05

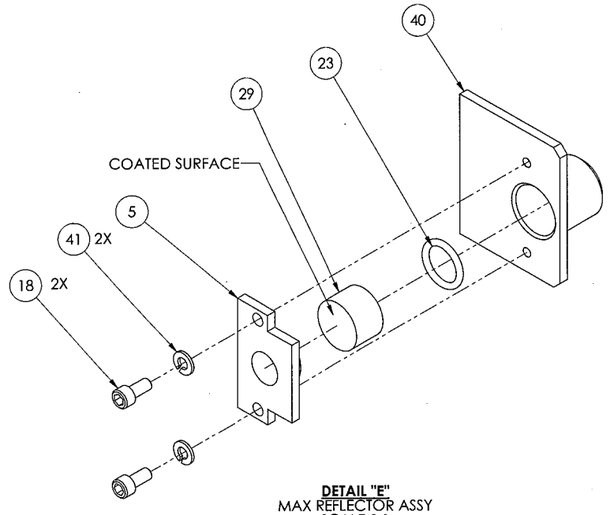
SCALE: 1:1 SHEET 2 OF 3



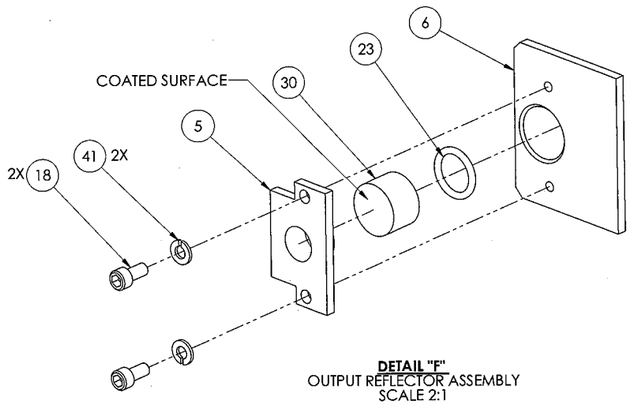
DETAIL "G"



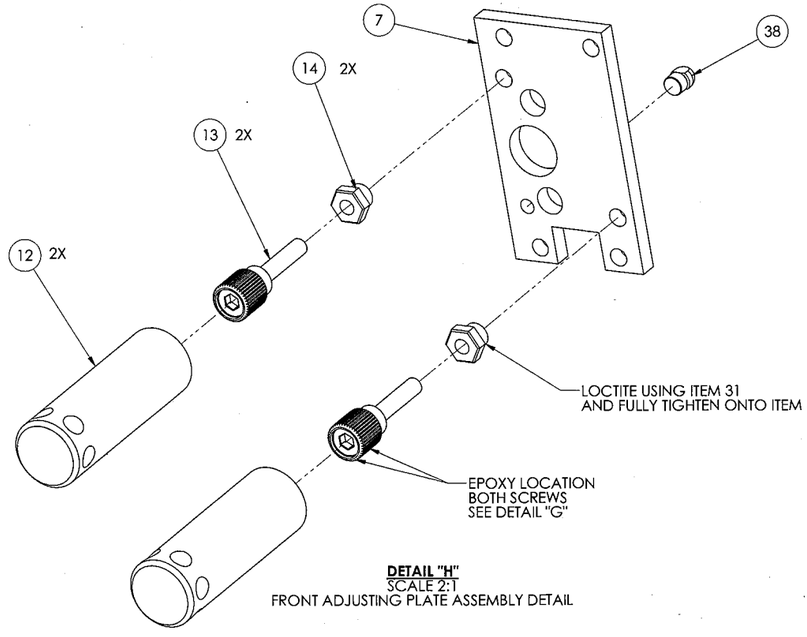
DETAIL "J"
SCALE 2:1
REAR ADJUSTING PLATE ASSEMBLY DETAIL



DETAIL "E"
MAX REFLECTOR ASSY
SCALE 2:1



DETAIL "F"
OUTPUT REFLECTOR ASSEMBLY
SCALE 2:1



DETAIL "H"
SCALE 2:1
FRONT ADJUSTING PLATE ASSEMBLY DETAIL

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: AVALENTI DATE: 8/11/2005
CHECK: MCLANCY DATE: 8/12/2005
DESIGN ENGINEERING: AVALENTI DATE: 8/11/2005
MANUFACTURING ENG:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED
.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005
ALL MACH SURFACES
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

MATERIAL:
FINISH:

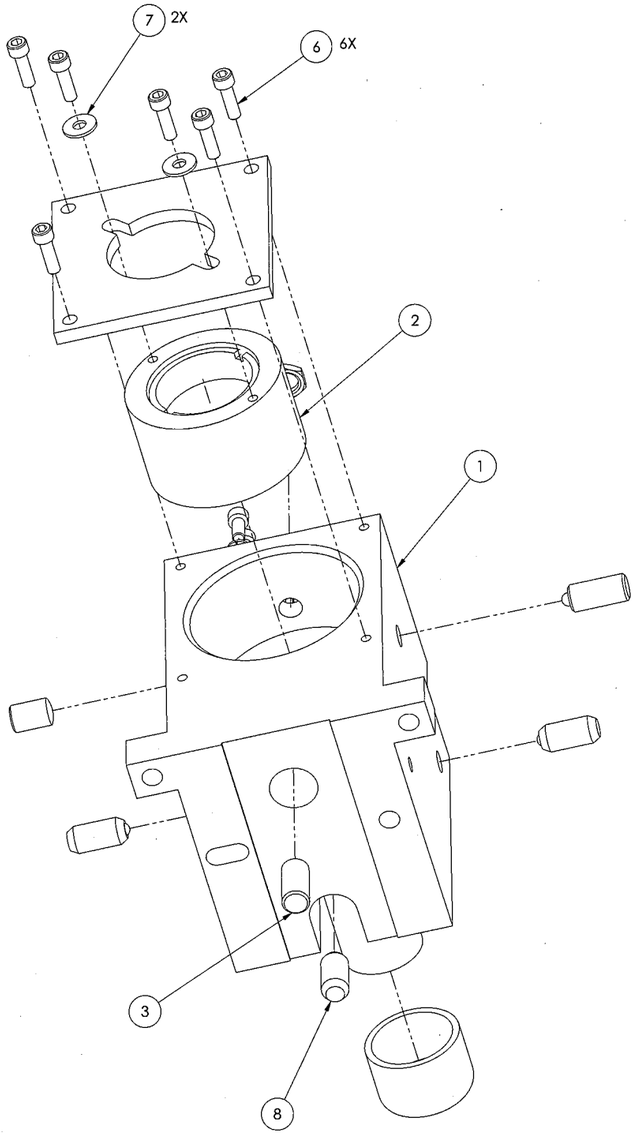
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

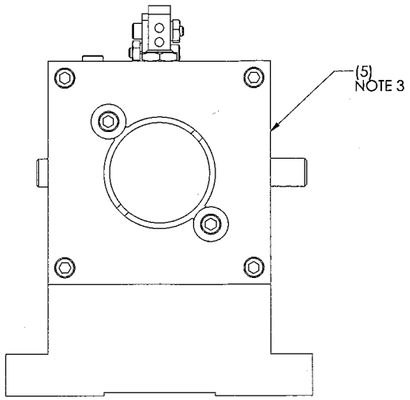
TITLE:
LASER HEAD ASSEMBLY
VBEAM 2

SIZE D | DRAWING NO. 7122-99-7528 | REV. 05

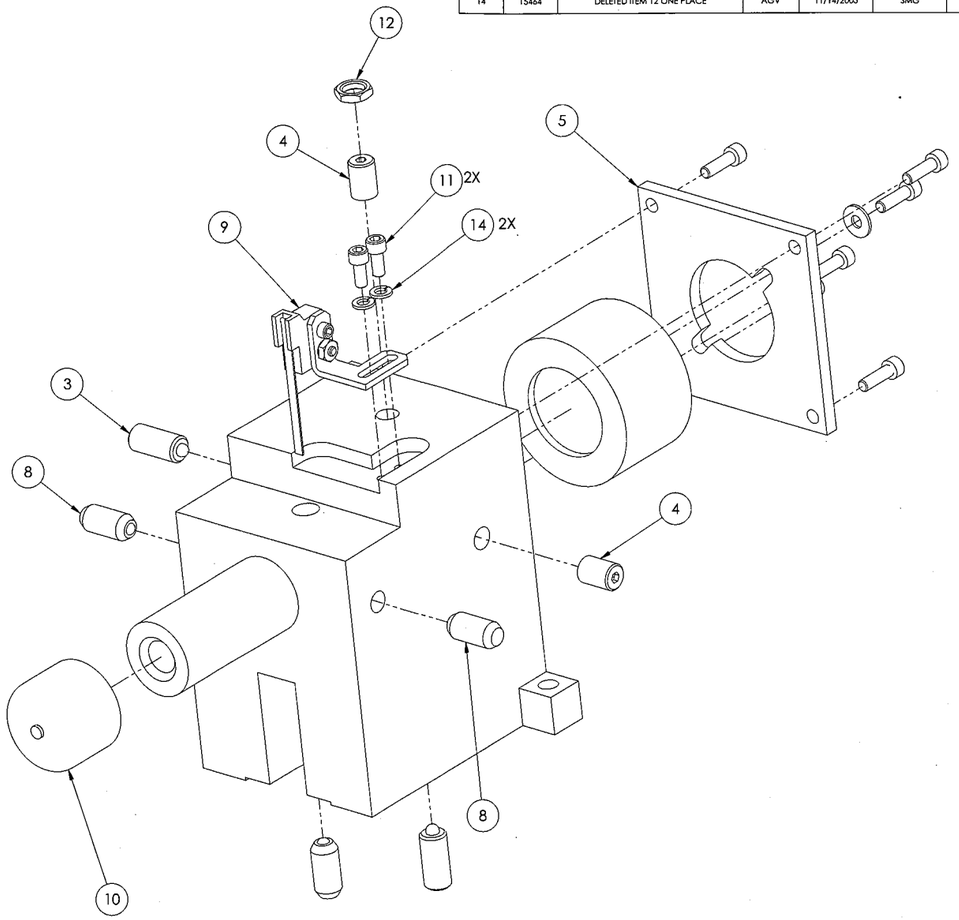
SCALE: 2:1 SHEET 3 OF 3

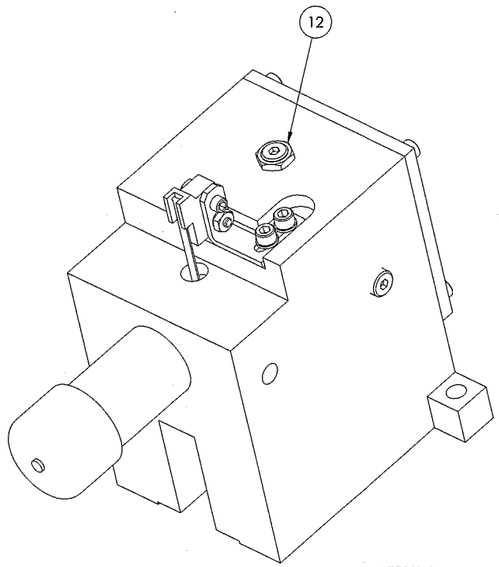
REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
13	15238	INITIAL RELEASE	SAM G.	8/24/2005	SMG	8/24/2005
14	15464	DELETED ITEM 12 ONE PLACE	AGV	11/14/2005	SMG	11/14/2005





VIEW C





DETAIL A

NOTES:

1. THE ASSEMBLY MUST BE BUILT UNDER A LAMINAR FLOW HOOD. EXERCISE EXTREME CARE. ASSEMBLE PER PROCEDURE (ITEM 1005).
2. PLACE ASSEMBLY IN UNIT CONTAINER AND MARK WITH PART NUMBER AND CURRENT BOM REVISION.
3. POSITION ITEM 5 AS SHOWN. SEE VIEW C.
4. REFER TO MFG PROCEDURE ITEM 1005.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: S. GERAGONIS 8/22/2005
CHECK: MCLANCY 8/22/2005
DESIGN ENGINEERING: MCLANCY 8/22/2005
MANUFACTURING ENG:
MATERIAL:
FINISH:

THIRD ANGLE PROJECTION

PROPRIETARY

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DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

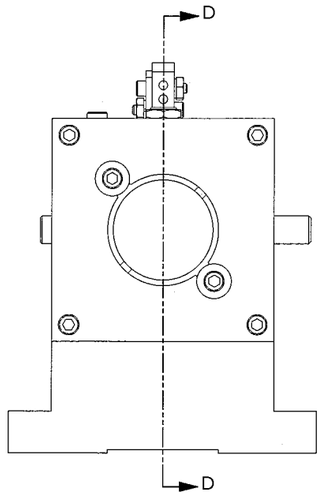
ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

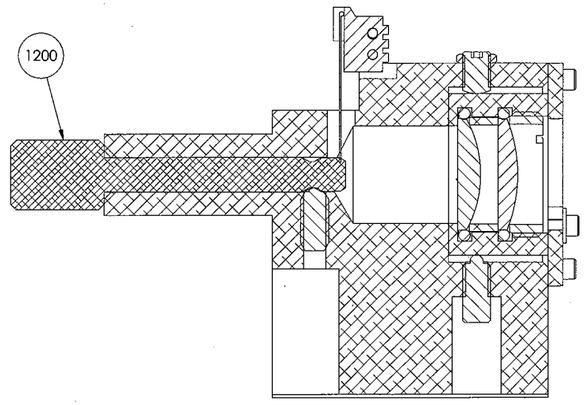
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

TITLE: ASSY, FIBER RECEPTACLE

SIZE D | DRAWING NO. 7122-99-7529 | REV. 14

SCALE: 1.5:1 SHEET 1 OF 2





SECTION D-D

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: S. GERAGONIS — DATE: 8/22/2005
CHECK: MCLANCY — DATE: 8/22/2005
DESIGN ENGINEERING: MCLANCY — DATE: 8/22/2005
MANUFACTURING ENG:

PROPRIETARY

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MATERIAL:

FINISH:

DO NOT SCALE THIS DRAWING

DIMENSIONS IN INCHES[MM]

UNLESS OTHERWISE SPECIFIED

.X ± .030 X/X ± 1/32
.XX ± .010 X° ± 30'
.XXX ± .005

ALL MACH SURFACES 63
CONCENTRICITY .005 TIR
DEBURR AND BREAK
ALL SHARP EDGES

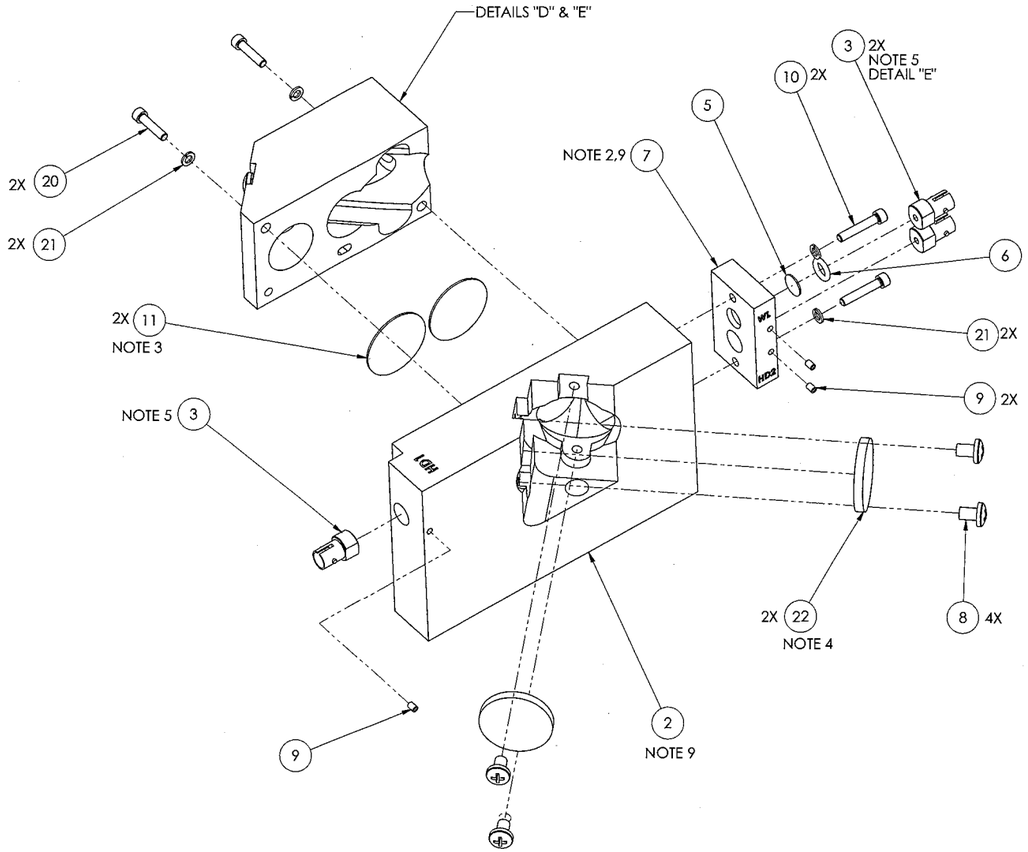
CANDELA
CANDELA CORPORATION
530 Boston Post Rd. Wayland, Massachusetts 01778-1883

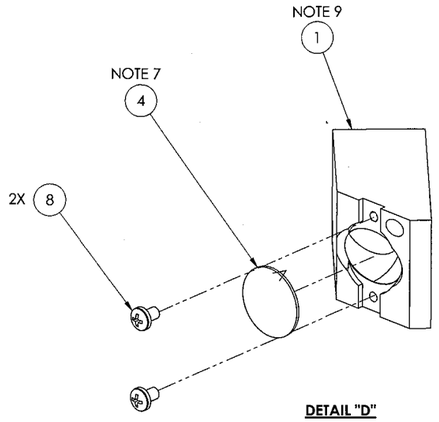
TITLE: ASSY, FIBER RECEPTACLE

SIZE	DRAWING NO.	REV.
D	7122-99-7529	14

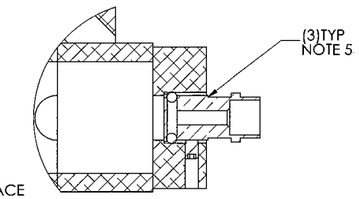
SCALE: 1.5:1 SHEET 2 OF 2

REVISIONS						
REV.	ECO NO	DESCRIPTION	DRAFT	DATE	APPROVED	DATE
08	15276	INITIAL RELEASE	AGV	9/13/2005	SMG	9/19/2005
09	15469	ADD NOTES 7, 8, 9	SMG	11/22/2005	MC	11/22/2005

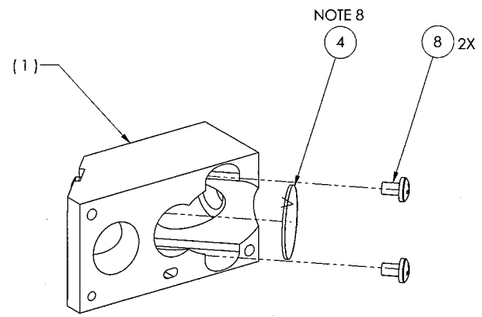




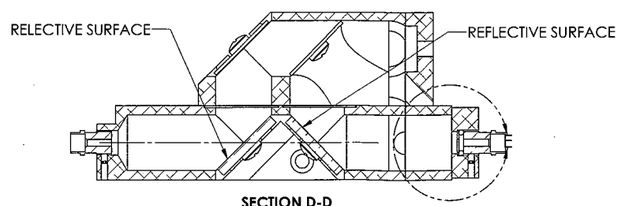
DETAIL "D"



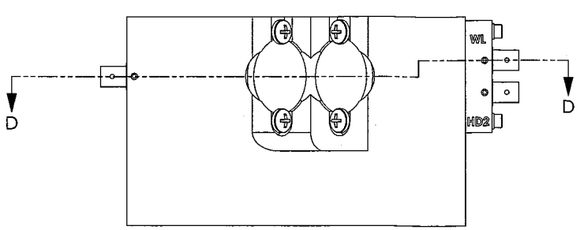
DETAIL E
SCALE 2 : 1

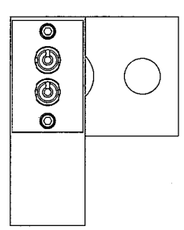


DETAIL "E"



SECTION D-D
SCALE 1 : 1





DETAIL "C"
COMPLETED ASSEMBLY

NOTES:

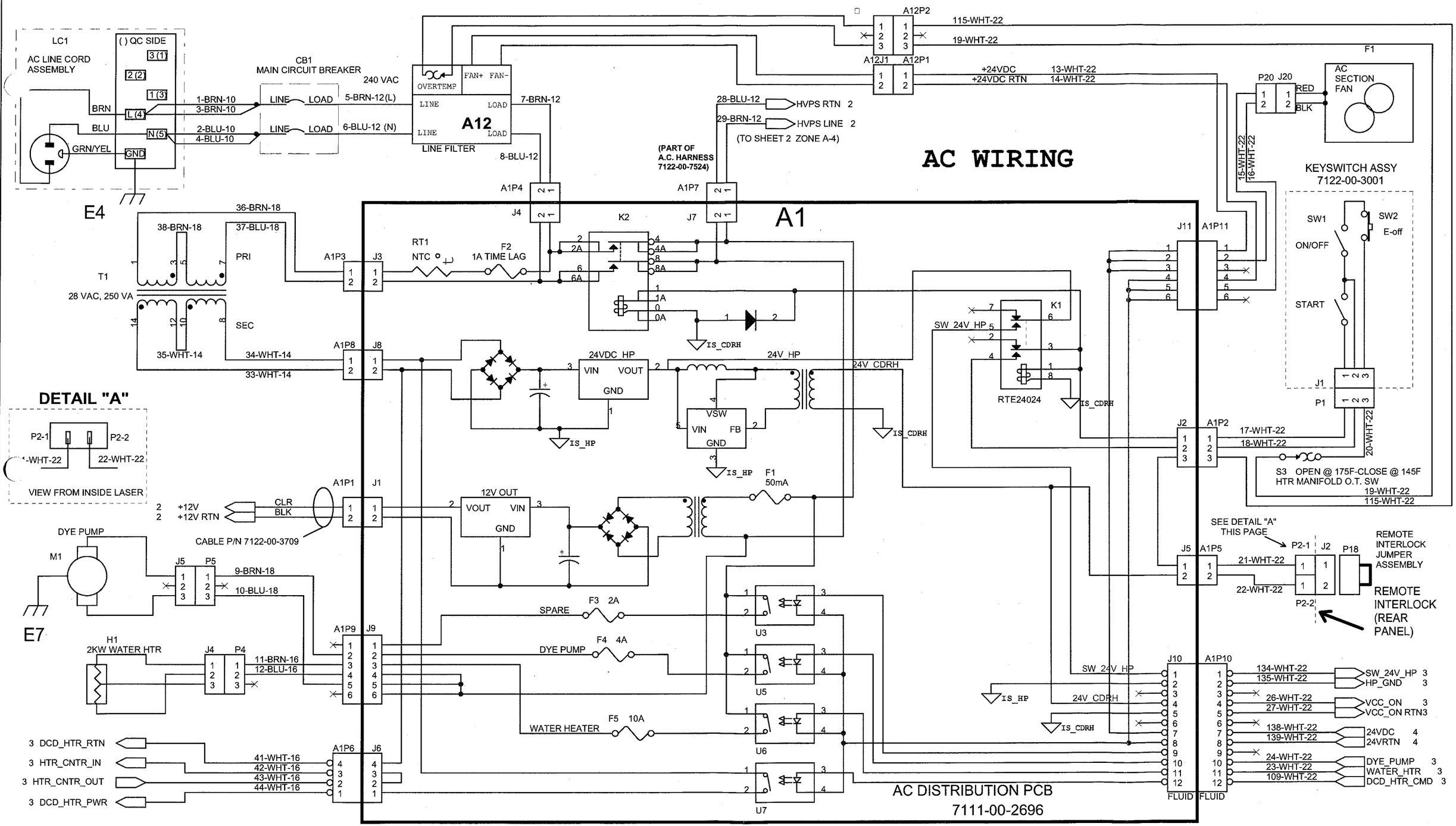
(BUILD ASSEMBLY UNDER A LAMINAR FLOW HOOD)

1. PLACE COMPLETED ASSEMBLY IN BAG MARKED WITH PART NUMBER AND CURRENT BOM REVISION.
2. NOTICE POSITION OF ITEM 7 AS MOUNTED ON ITEM 2.
3. PLACE CERAMIC DISKS ITEM 11 INTO RECESSES ON ITEM 2.
4. PLACE ITEM 22 WITH REFLECTIVE SIDE FACING INSIDE OF ITEM 2.
5. CONNECTOR ITEM 3 INITIALLY SCREWED INTO PLACE FLUSH TO OUTSIDE SURFACE. UNSCREW UNTIL EITHER FLAT IS ALIGNED WITH SECURING SCREW ITEM 9. TYPICAL SETTING FOR ALL LOCATIONS.
6. IF NECESSARY, CLEAN OPTICAL PARTS PER PROCEDURE ITEM 1500.
7. ARROW ON ITEM 4 FACES INTO ITEM 1.
8. ARROW ON ITEM 4 FACES OUT OF ITEM 1.
9. CLEAN ITEMS 1, 2 AND 7 WITH ISOPROPANOL AND DRY WITH COMPRESSED AIR.

ITEM	QTY	PART NO	DESCRIPTION	NOTE

DRAWN: AVALENTI	DATE: 8/16/2005	DO NOT SCALE THIS DRAWING	CANDELA CORPORATION, 530 Boston Post Rd. Wayland, Massachusetts 01778-1883
CHECK: SGAUNTLETT	DATE: 8/17/2005	DIMENSIONS IN INCHES[MM]	TITLE: ENERGY DETECTOR ASSEMBLY
DESIGN ENGINEERING: AVALENTI	DATE: 8/16/2005	UNLESS OTHERWISE SPECIFIED	
MANUFACTURING ENG:		.X ± .030 X/X ± 1/32 .XX ± .010 X° ± 30' .XXX ± .005	
THIRD ANGLE PROJECTION		ALL MACH SURFACES 63	SIZE D — DRAWING NO. 7122-99-7530 — REV. 09
PROPRIETARY		CONCENTRICITY .005 TIR	SCALE: 1.5:1 — SHEET 1 OF 1
MATERIAL:		DEBURR AND BREAK	
FINISH:		ALL SHARP EDGES	

AC WIRING



REV	07	08	09	10	11	12	DRAWN	Robert Broderick	11-10-04
ECO#	15020	15191	15341	15422	15433	15474	CHECKED		xxxxx
DATE	3-24-05	8-03-05	9-28-05	10-12-05	11-9-05	11-15-05	ENG ELEC		
CHK'D	KPR	KPR	KPR	DM	DM	DM		APPROVED	DATE

CANDELA CORPORATION 530 Boston Post Road Wayland, Massachusetts U.S.A. 01778-1883

TITLE

SYSTEM SCHEMATIC, VBEAM2

SIZE	DRAWING NO.	REV.
B	9914-80-0300	12

DATE: Tuesday, November 15, 2005 SHEET 1 OF 7

FLUID AND DCD SECTION

A2

PART OF
CPU/LASER I/O PCB
7111-00-2691

S4
DI PRESSURE SWITCH
NO
COMMON
45-WHT-22
46-WHT-22

DS1
"READY" INDICATOR
J19 P19

F2 UPPER HX FAN#1
P7- HXFAN#1
P7+ +24VDC

F3 LOWER HX FAN#2
P23- HXFAN#2
P23+ +24VDC

A2P21 J21
47-WHT-22
48-WHT-22
49-WHT-22
50-WHT-22
64-WHT-22
63-WHT-22
26-WHT-22
27-WHT-22
FLUID

1 VCC_ON
1 VCC_ON RTN

1 WATER_HTR
1 DCD_HTR_CMD
1 DYE_PUMP
23-WHT-22
109-WHT-22
24-WHT-22

A2P22 J22
154-WHT-22
155-WHT-22
136-WHT-22
137-WHT-22
ANALOG

S9
DYE COVER OPEN
NO
COMMON

S7
DYE PRESSURE SWITCH
NO
COMMON

J23
A2P23

A19
E
CART
1-WIRE EPROM
J1 A19P1
CLR
BLK
CABLE #115 - TWISTED PAIR
1-WIRE CRTG
1-WIRE CRTG RTN

J17 A2P17
51-WHT-22 BUBBLE +
52-WHT-22 BUBBLE -
53-WHT-22 LED+
54-WHT-22 RTN
CLR
BLK
134-WHT-22 1-WIRE CTRG
135-WHT-22 1-WIRE CRTG RTN
24V_HP 1
HP_GND 1
ANALOG

J15 A2P15
E12
SHLD
DCD TEMP +
DCD TEMP -
57-WHT-22 PSI VOUT+
58-WHT-22 PSI VOUT -
60-WHT-22 +5V IN
ANALOG
SHLD
E12

CABLE #104
DI TEMP + CLR
DI TEMP - BLK
P9 J9
RED
BLK
RT1
DI Temperature

J20 A2P20
P6 J6
147-WHT-18
146-WHT-18
M2
COT PUMP
+24V

P5 J5
145-WHT-18
144-WHT-18
M3
DI PUMP
+24V

1 DCD_HTR_RTN 41-WHT-16
1 HTR_CNTR_IN 42-WHT-16
1 HTR_CNTR_OUT 43-WHT-16
1 DCD_HTR_PWR 44-WHT-16
142-WHT-22
143-WHT-22

CABLE #111
CLR
BLK
142-WHT-22
143-WHT-22

P3 J3
57-WHT-22
58-WHT-22
60-WHT-22
41-WHT-16
42-WHT-16
43-WHT-16
44-WHT-16

A11 INTERNAL DCD OPTION

7122-00-3673
DCD HARNESS
A11P1
100-WHT-22
101-WHT-22
102-WHT-22
103-WHT-22

CANNISTER BUBBLE DETECTOR PCB
7111-00-2520

GRN
BLK
RED
104-WHT-18
105-WHT-18
106-WHT-18
107-WHT-18

158-WHT-22
157-WHT-22

GRN
V1
BLK
CRYOGEN PRESSURE TRANSDUCER
RED
DCD HTR RETURN

FRONT SHELL
DCD HTR POWER
HTR CNTR OUT
108-WHT-18
DCD HTR R2
109-WHT-18
DCD HTR R1
S5
O.T. SW
112-WHT-18
OPEN @ 200 F - MNL RST
113-GRN/YEL-14
E9
RT2
DCD Temp

REAR SHELL
HTR CNTR IN
110-WHT-18
DCD HTR R4
DCD HTR R3
111-WHT-18
114-GRN/YEL-14
E10

THERMISTOR
MOUNTED TO R1
LOWER RIGHT MOUNT

J25
P25
F5 DCD FAN
RED
BLK

DCD HEATERS - 4 X 5 OHMS @ 50 WATTS EACH

ELECTRICALLY COMBINED RESISTANCE = 5 OHMS
WHEN CONNECTED TO AC DISTRIBUTION PCB

RESISTANCE = 2.5 OHMS BETWEEN PINES 8 & 9.
RESISTANCE = 2.5 OHMS BETWEEN PINS 10 & 11

CANDELA CORPORATION	PROPRIETARY	
TITLE SYSTEM SCHEMATIC, VBEAM2	SIZE B	DRAWING NO. 9914-80-0300 REV. 12
	DATE: Tuesday, November 15, 2005	SHEET 3 OF 7

LASER RAIL SECTION

(PART OF
GROUND WIRE KIT
7122-00-3744)

129-GRN/YEL-14

BEAM SHUTTER ASSY.

SHUTTER SENSE

E5

BEAM SHUTTER SOLENOID

WHT
RED
BLK
GRN
WHT
WHT

J12 P12

73-WHT-22 SHTTR PWR IN
74-WHT-22 SHTTR LED+
75-WHT-22 SHTTR LED -
76-WHT-22 SHTTR STAT
77-WHT-22 SOLENOID +
78-WHT-22 SOLENOID -

(PART OF
SIGNAL HARNESS
7122-00-7526)

148-WHT-22
149-WHT-22
150-WHT-22
151-WHT-22
152-WHT-22
153-WHT-22

P8 — SPARE

81-WHT-22 CALSW
82-WHT-22 CAL SW RTN

P13 J13

83-WHT-22 — S6 — 84-WHT-22

A4
CALPORT
ENERGY
DETECTOR

J1 — FIBER OPTIC CABLE #4 — J4

CALPORT

A2

PART OF
CPU/LASER I/O PCB
7111-00-2691

J19 A2P19

1 73-WHT-22
2 77-WHT-22
3 78-WHT-22
4 74-WHT-22
5 153-WHT-22
6 75-WHT-22
7 152-WHT-22
8 76-WHT-22
9 81-WHT-22
10 149-WHT-22
11 82-WHT-22
12 151-WHT-22
13 91-WHT-22
14 150-WHT-22
15 92-WHT-22
16 148-WHT-22
17 79-WHT-22
18
19 80-WHT-22
20 141-WHT-22
21 140-WHT-22
22 86-WHT-22
23 85-WHT-22
24 139-WHT-22
25 138-WHT-22
26

LASER RAIL SIGNALS

AIMING BEAM — D5

P14 J14

79-WHT-22
80-WHT-22

GOUNDED TO RAIL

F4

HV SECTION
FAN

P11 J11

140-WHT-22 +24VDC
141-WHT-22 +24VDC RTN

RED
BLK

85-WHT-22 — 24VDC 5
86-WHT-22 — 24VRTN 5
TO LCD DISPLAY BACKLIGHT

138-WHT-22 — 24VDC 1
139-WHT-22 — 24VRTN 1
TO AC DISTRIBUTION PCB

A5
HEAD ENERGY
& WAVELENGTH
DETECTOR

J1 — FIBER OPTIC CABLE #2 — J2 — HEAD DET #1

J1 — FIBER OPTIC CABLE #3 — J3 — HEAD DET #2

J1 — FIBER OPTIC CABLE #5 — J5 — WAVELENGTH

S8 FIBER INTERLOCK

FRONT

P15 J15

91-WHT-22
92-WHT-22

93-WHT-22
94-WHT-22

FIBER
COUPLER

130-GRN/YEL-14

(PART OF
GROUND WIRE KIT
7122-00-3744)

E5

CANDELA CORPORATION	PROPRIETARY	
TITLE: SYSTEM SCHEMATIC, VBEAM2	SIZE: B	DRAWING NO.: 9914-80-0300
	REV.: 12	
	DATE: Tuesday, November 15, 2005	SHEET 4 OF 7

USER INTERFACE

A2

PART OF
CPU I/O PCB
7111-00-2691

J1
RS422

DB9 RECPTCLE

CABLE# 113
6032-00-0380

5	+5V	5
9	+5V	9
4	GND	4
8	RD(A)-	8
3	RD(B)+	3
7	TD(A)+	7
2	TD(B)+	2
6	GND	6
1		1

J9
DB9 RECPTCLE

DISPLAY TOUCH SCREEN ASSY

LS1
SPEAKER

A6P1
J1

A6
7111-00-2699

J4 USB

J5 A6P5
1
2
3
4
TS

A7
TOUCH
SCREEN

LOGIC
LH7A404
CARD ENGINE

J10
A6P10

6032-00-0370

A8P1 J1

A8
800 X 600
COLOR
LCD
DISPLAY

6032-00-0390

USB

FERRITE
ATTENUATOR
5645-00-0070

BULKHEAD AT REAR OF LASER

A17
LAMP
INVERTER
PCB **7111-00-2700**

J1 SHARP LAMP1
J2 SHARP LAMP2

4	24VDC	85-WHT-22	1
4	24VRTN	86-WHT-22	2
			3
			4

A17P3 J3

NEC LAMP
1
2
3
J4* A17P4

BACKLIGHT LAMP

(* USE J4 FOR SINGLE CONNECTION LAMP)

128-BRAIDED CABLE

E8

E3

A9
HAND PIECE ASSEMBLY

SOLENOID
GRN
GRN

DISTANCE GAUGE
EPROM
1
2

HP SENSE PCB 7111-00-2695

BUBBLE
ADJUST

HP ID
EPROM

FNGRSW1
FNGRSW2

HP SWITCH

DELIVERY SYSTEM CABLE (CABLE# 102)

CABLE# 108

HANDPIECE

J18 A2P18

1	+24VDC SOLENOID	BLU	1
2	SOLENOID -	ORG	2
3	BGND	WHT	3
4	LED +	RED	4
5	BUBBLE PWR IN	BLK	5
6	BUBBLE SENSE	BRN	6
7	VALVE GND	W/BR	7
8	FINGER 1	YEL	8
9	FINGER 2	GRN	9
10	READY LED	W/BK	10
11	1-WIRE	GRY	11
12	1-WIRE RTN	VIO	12

A10P1 J1 J2 A10P2

1	1	1	1	BLK	1
2	2	2	2	BRN	2
3	3	3	3	RED	3
4	4	4	4	ORG	4
5	5	5	5	YEL	5
6	6	6	6	GRN	6
7	7	7	7	BLU	7
8	8	8	8	VIO	8
9	9	9	9	GRY	9
10	10	10	10	WHT	10
11	11	11	11	W/BK	11
12	12	12	12	W/BR	12

P1 J1

1	1	+24V CDRH
2	2	SOLENOID -
3	3	LED RTN
4	4	LED+
5	5	BUBBLE PWR IN
6	6	BUBBLE SENSE
7	7	VALVE GND
8	8	FINGER 1
9	9	FINGER 2
10	10	1-WIRE
11	11	1-WIRE RTN
12	12	

A10
HP BULKHEAD
PCB ASSY
7111-00-2510

J2
CONNECTOR
GROUNDED
THROUGH
MOUNTING
HARDWARE

E13

CANDELA CORPORATION		PROPRIETARY	
TITLE: SYSTEM SCHEMATIC, VBEAM2	SIZE: B	DRAWING NO.: 9914-80-0300	REV.: 12
	DATE: Tuesday, November 15, 2005	SHEET 5 OF 7	

SYSTEM GND & RETURN LOCATIONS

UPPER CHASSIS

E3 - BEZEL PLATE, LEFT SIDE NEAR MOUNTING HOLES
E4 - REAR PANEL, BOTTOM AT POWER ENTRY BOX TAB
E5 - BEZEL PLATE UNDER LASER RAIL, FRONT RIGHT

E8 - TOUCH PANEL DISPLAY MOUNTING BRACKET

DCD SECTION

E9 - DCD HANGING BRACKET, FRONT
E10 - DCD HANGING BRACKET, REAR

FLUID SECTION

E7 - FRAME FLOOR BEHIND DYE PUMP MOTOR

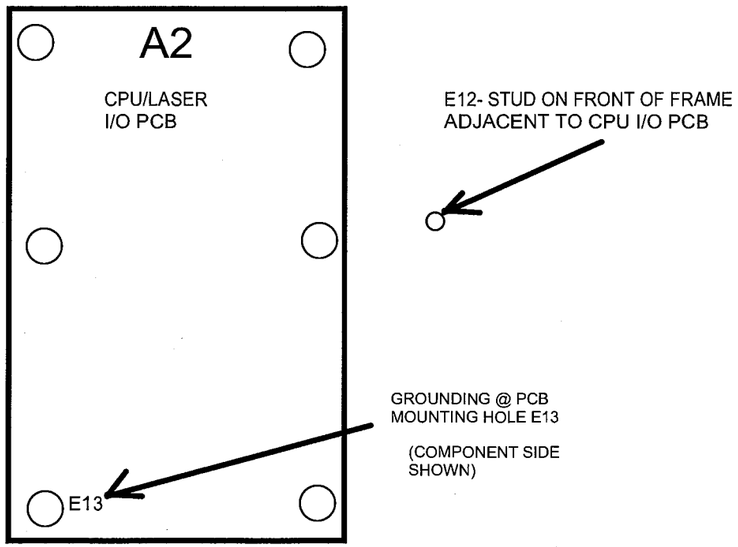
HIGH VOLTAGE SECTION

E1 - PFN CAPACITOR,LEFT SIDE TERMINAL

E2 - PFN CAPACITOR, RIGHT SIDE TERMINAL

E11 - HV SECTION PARTITION

CPU/I/O PCB



HIGHEST USED REFERENCE DESIGNATORS

A17	D5	LS1	F5	RT2
T4	E13	L4	U1	
CABLE 114	H1	M3	S9	
CB1	J24	P24	WIRE# 161	

CANDELA CORPORATION	PROPRIETARY	
TITLE SYSTEM SCHEMATIC, VBEAM2	SIZE B	DRAWING NO. 9914-80-0950 / REV. 12
	DATE: Tuesday, November 15, 2005	SHEET 6 OF 7

REV 05:
Added seperate 24VDC_CDRH and 24VDC_HP on Page 1 AC Section - Rob

REV 07:
Initial release ECO 15020 - KPR

REV 08:
Add GND wire kit and gnd to IGBT heatsink- ECO 15191 - KPR

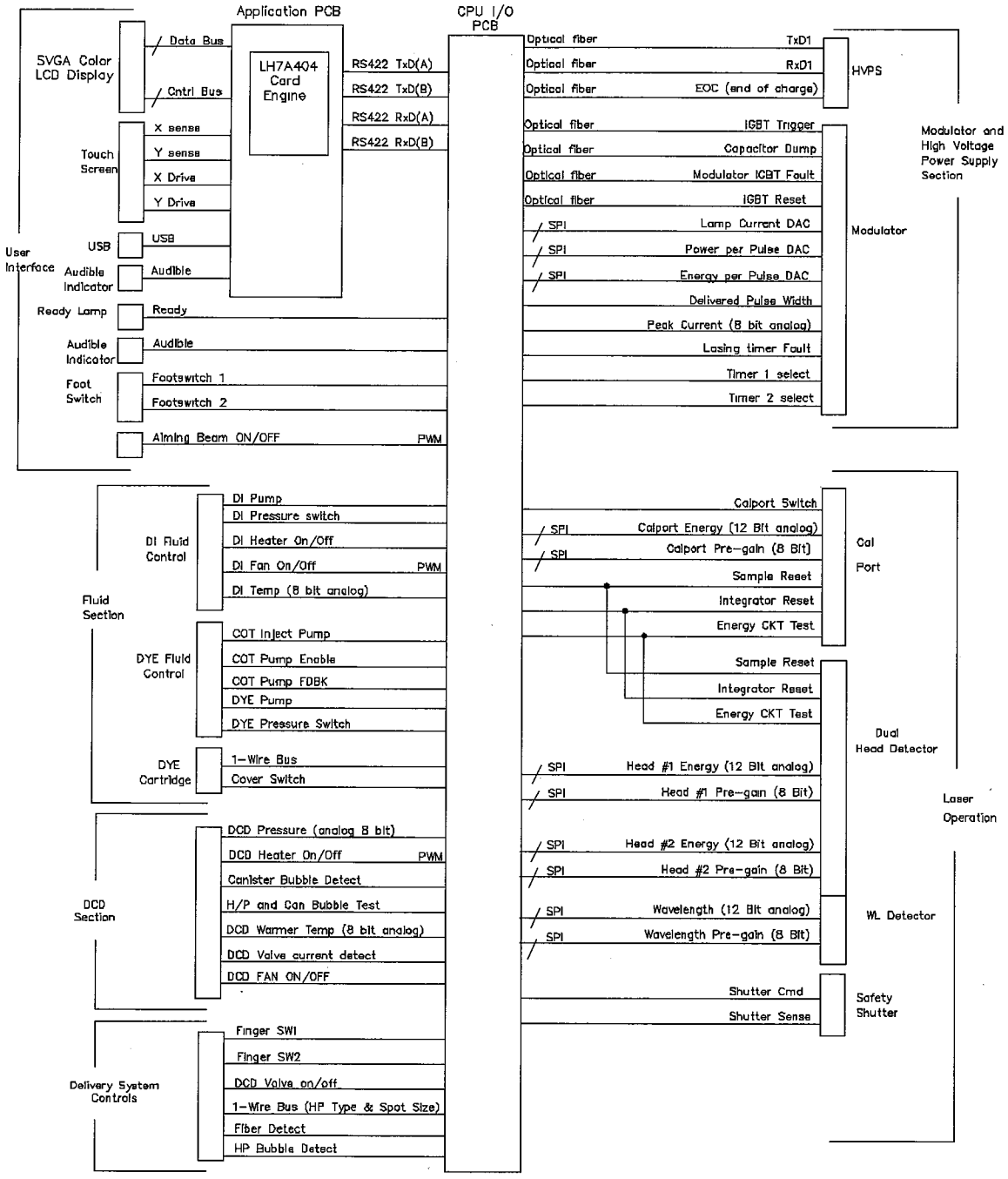
REV 09:
Add DCD fan, delete DCD 1-wire eprom and change to 16pin DCD connector- ECO 15341 - KPR

REV 11:
Change CPU connector designation to J1 from J5 (page 5) - DM

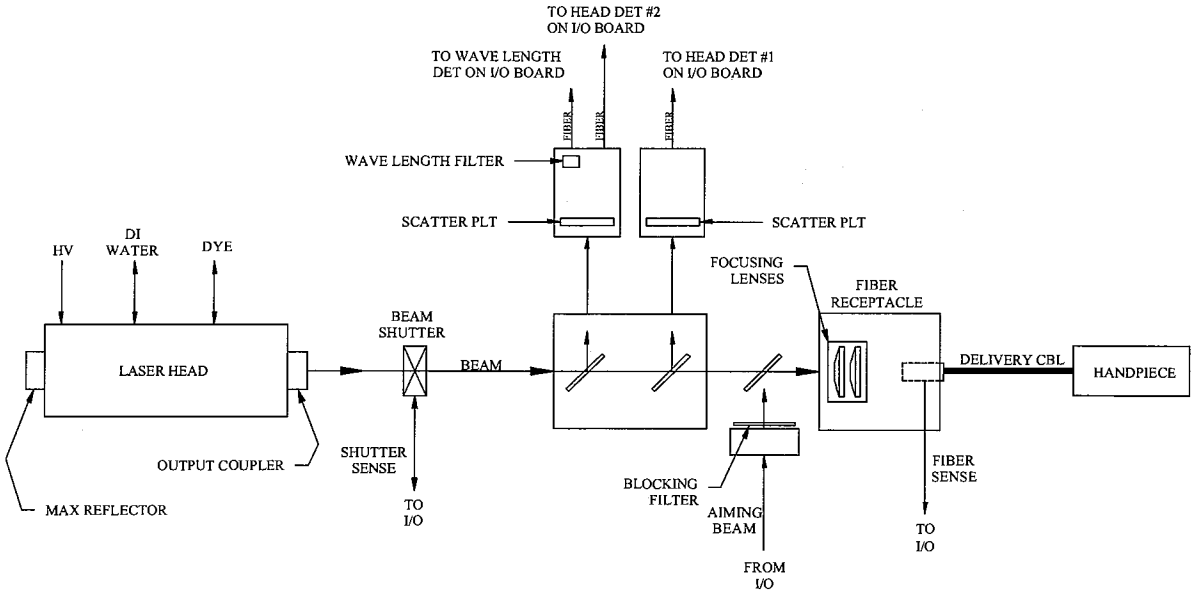
REV 12:
Change Ref desigantor of Dye Cover Switch and DCD Fan connector

CANDELA CORPORATION	PROPRIETARY		
TITLE SYSTEM SCHEMATIC, VBEAM2	SIZE B	DRAWING NO. 9914-80-0300	REV. 12
	DATE: Tuesday, November 15, 2005	SHEET 7 OF 7	

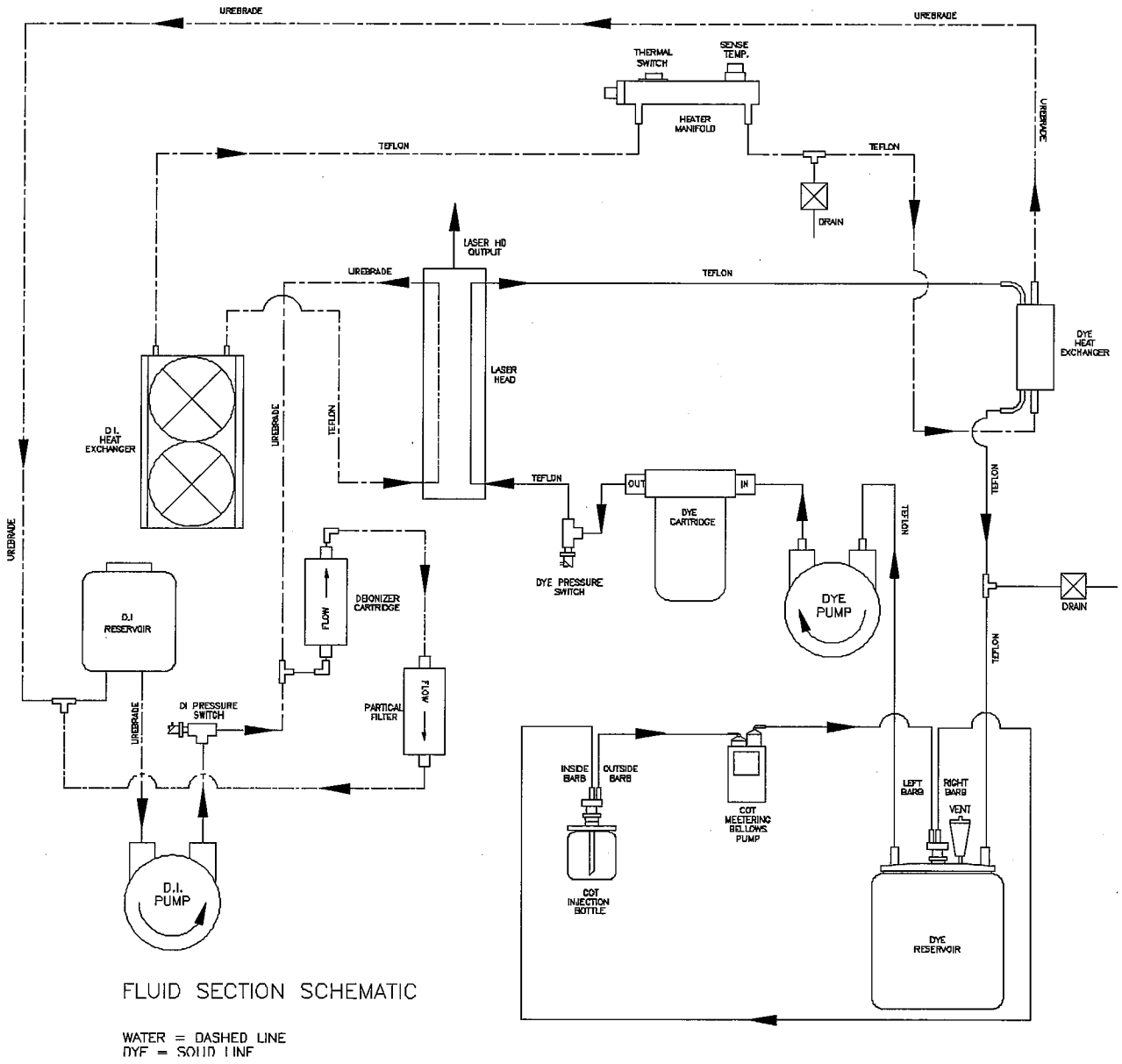
Control System Block Diagram



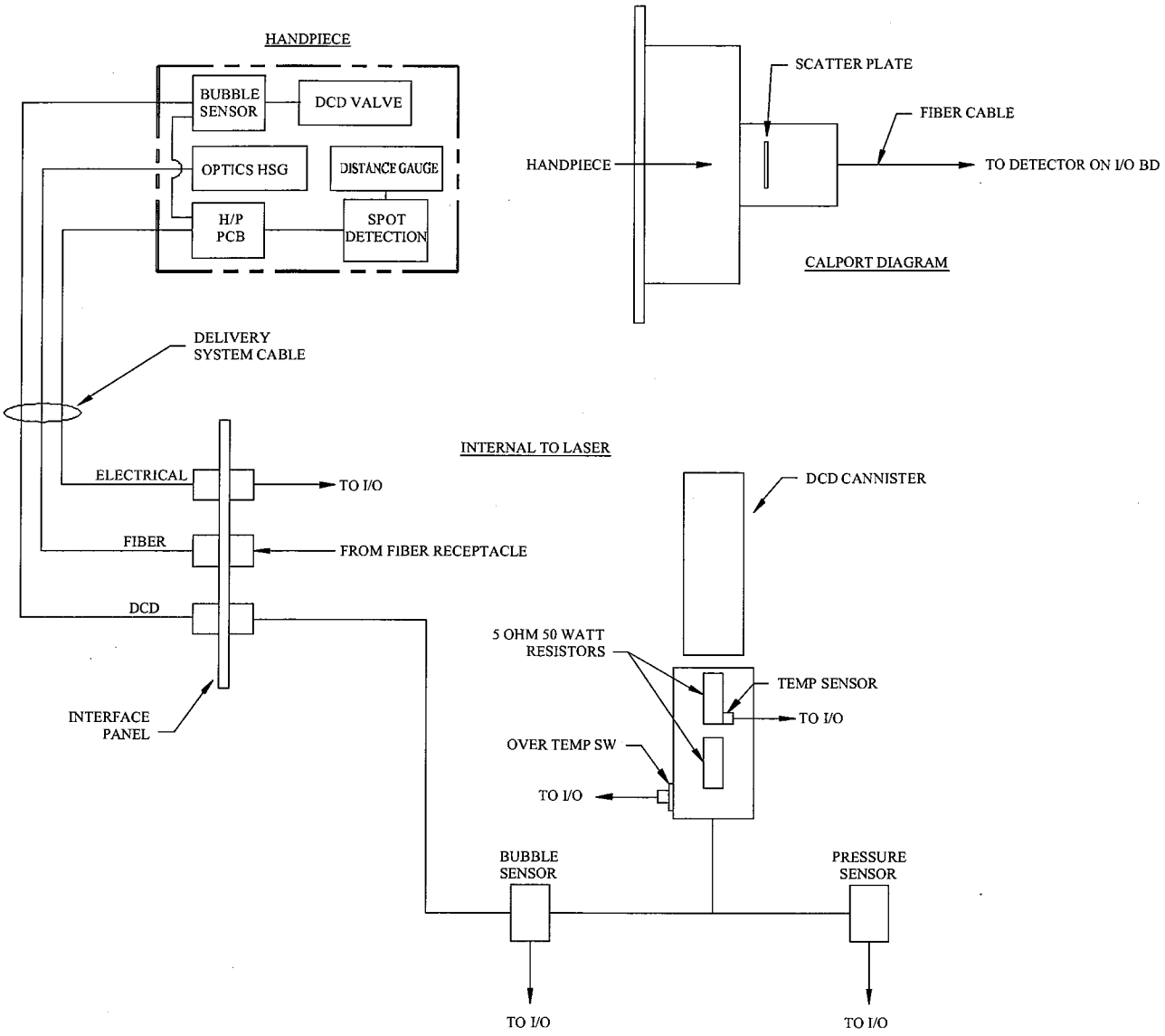
Optical Block Diagram



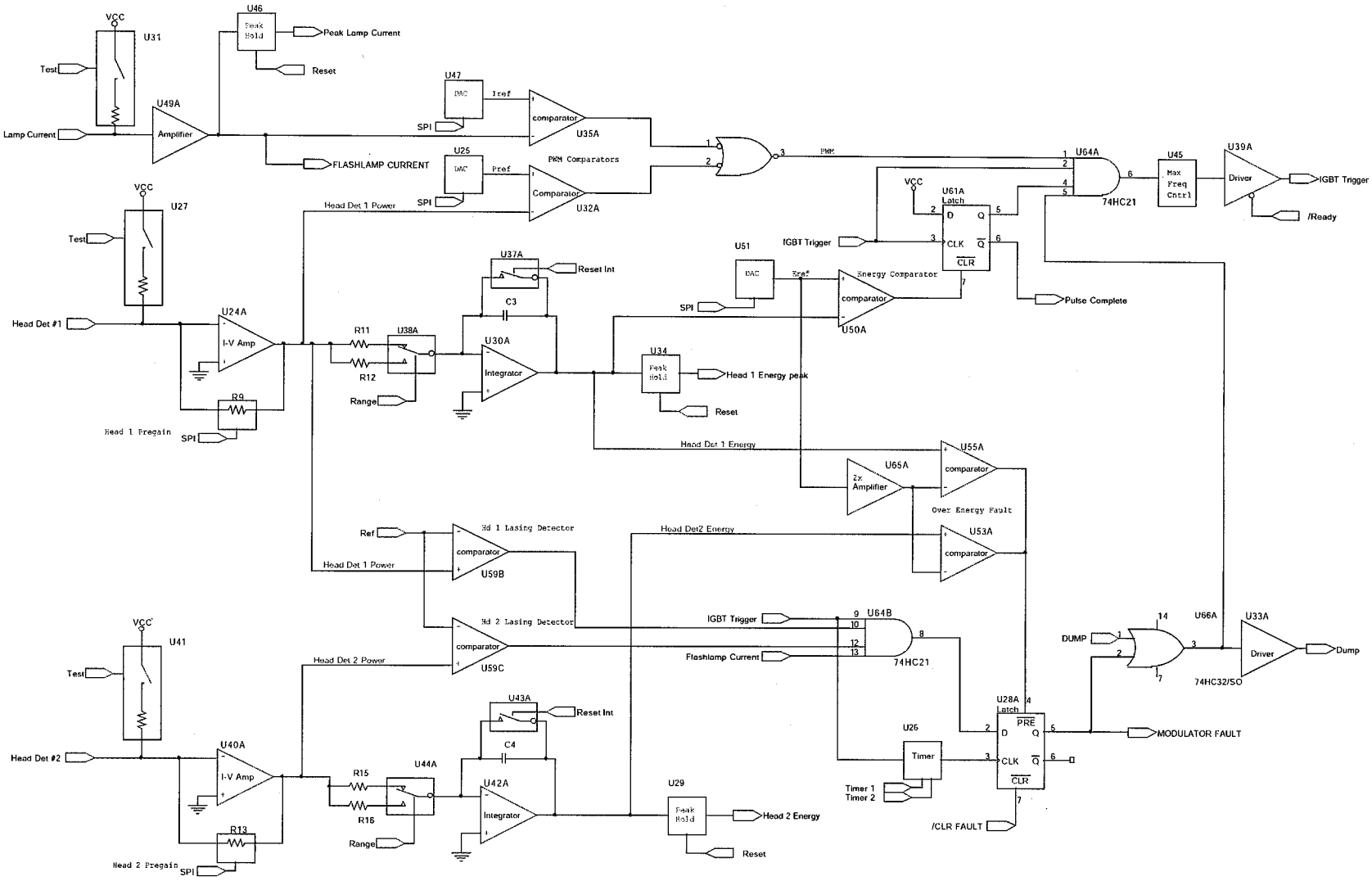
Fluid System Block Diagram



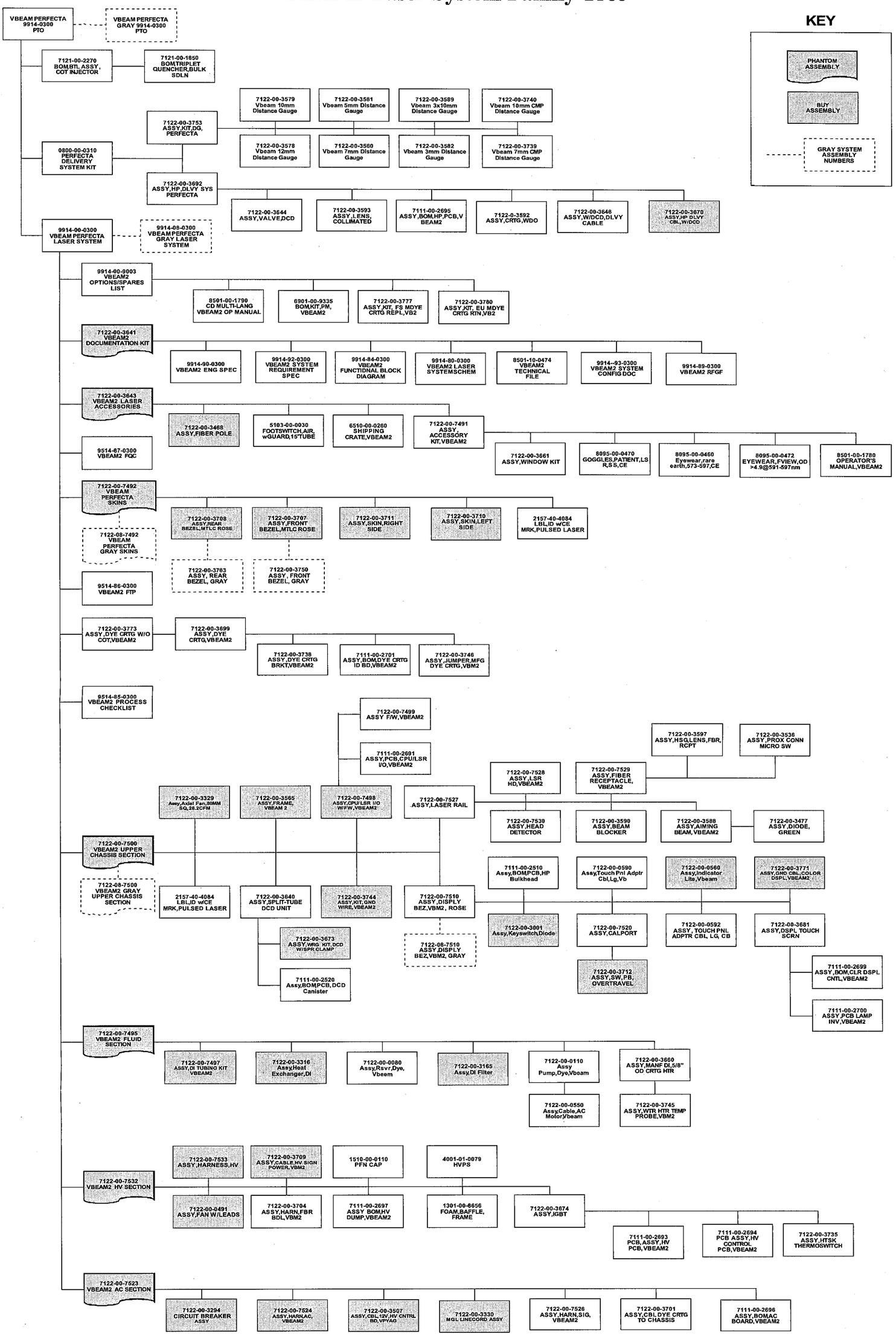
Dynamic Cooling Device/Delivery System Block Diagram



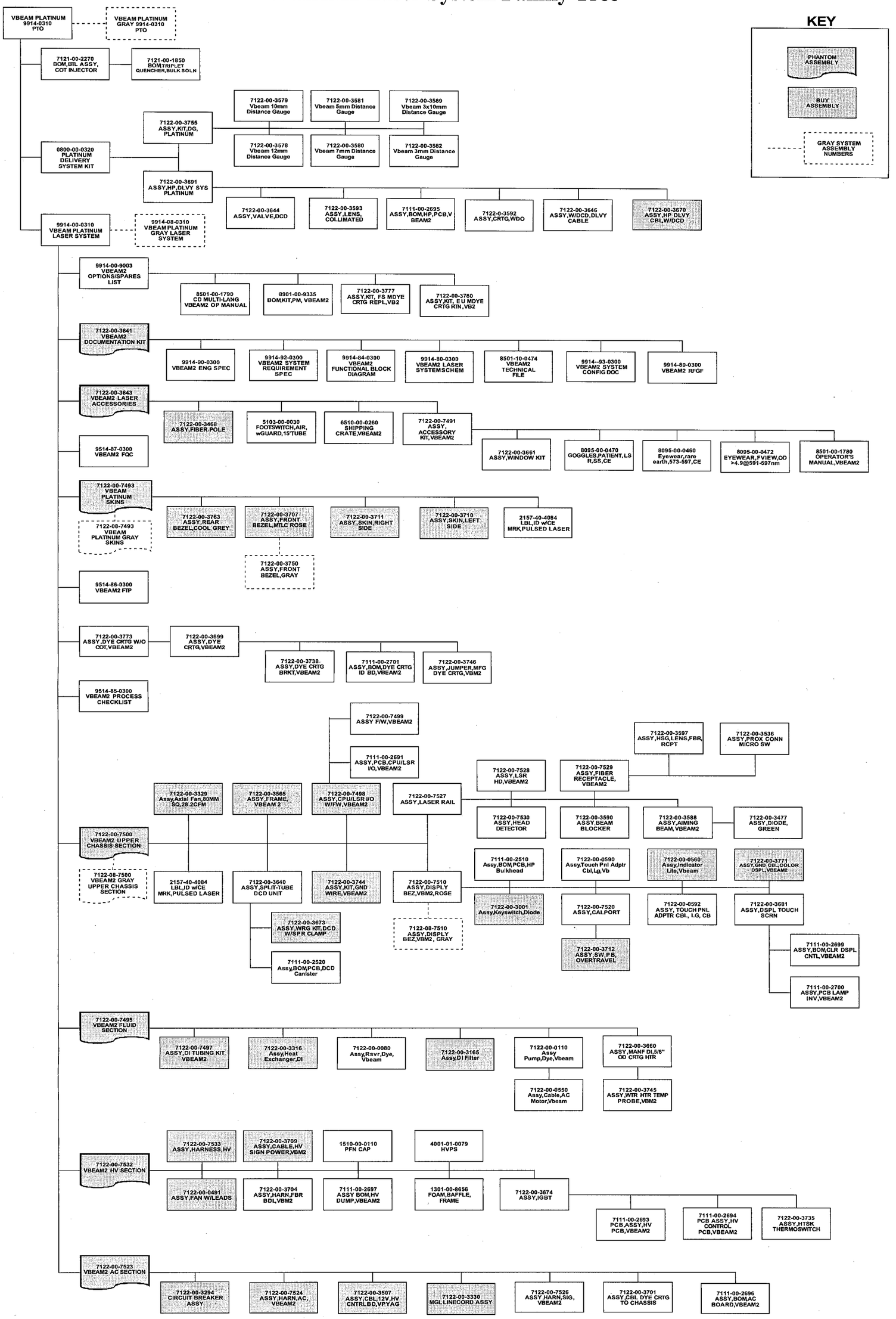
Modualtor Control Block Diagram



VBEAM2 Laser System Family Tree



VBEAM2 Laser System Family Tree



VBEAM2 Laser System Family Tree