

JOINT LASER PROJECT EXECUTIVE COMMITTEE  
REPORT ON TENDER EXERCISES

Note by Secretary

Attached are the following documents:

- (a) Specifications 1, 2 and 3 (see JLP-EC1) for the glass laser systems modified as a result of the 10 February meeting (see JLPEC/M1).
- (b) A note on the tender exercise for diagnostic and experimental equipment.

14 February 1975.

SPECIFICATION NO. 1

A Medium power neodymium glass laser system

Neodymium glass laser system to deliver an energy of about 10 joules in an approximately Gaussian pulse with a full width of 100 picoseconds at the half maximum intensity level (fwhm), and 20 joules in an approximately Gaussian pulse with a fwhm of 300 picoseconds.

The laser will be used to produce a high intensity focal spot on a reflecting target and must be protected by suitable isolators against retro-reflection of 30% of the incident energy.

Beam quality is of utmost importance and the intensity x length integral must be minimised to ensure that not less than 90% of the radiated energy in a collimated beam is contained in a 0.5 milli-radian full angle cone. The beam quality will be measured by focussing the output of the final laser stage, using a lens of 10m focal length, onto an aperture 5mm in diameter. 90% of the radiated energy will be required to enter the aperture.

The repetition rate must not be less than one pulse per 10 minutes, the capacitor bank charging time must not be greater than 1 minute. For electrical tests the capacitor and pulse forming networks must be capable of sustaining a firing rate of once per minute. The laser must be provided with a single mode TEM<sub>00</sub> oscillator capable of providing pulses with adjustment in the range fwhm 30 picoseconds to 5 nanoseconds. The stability of the oscillator shall ensure that in 100 consecutive pulses the energy in any single pulse shall not deviate by more than 15% from the mean value under the standard operating conditions.

The equipment supplied should include all necessary benches, supports, cooling and control systems needed to operate the laser system.

Delivery, installation and commissioning costs should be quoted separately. The cost of an itemised list of recommended spares should be quoted separately.

SPECIFICATION NO. 2

A high power medium energy laser system

Neodymium glass laser system to deliver an energy of about 500 joules in two beams in an approximately Gaussian pulse with a full width of 300 picoseconds at the half maximum intensity level (fwhm).

The laser will be used to produce a high intensity focal spot on a reflecting target and must be protected by suitable isolators against retro-reflection of 30% of the incident energy.

Beam quality is of utmost importance and the intensity x length integral must be minimised to ensure that not less than 70% of the radiated energy in a collimate beam is contained in a 0.5 milli-radian full angle cone. The beam quality will be measured using a plane beam splitter to deflect a small fraction (e.g. about 5%) of the output of the final laser state and by focussing this fraction with a 10m focal length lens onto a circular aperture 5mm in diameter. 70% of the energy of this deflected beam will be required to enter this aperture.

The repetition rate must not be less than one pulse per 20 minutes, the capacitor bank charging time must not be greater than 3 minutes. For electrical tests the capacitor and pulse forming networks must be capable of sustaining a firing rate of once per 3 minutes. The laser must be provided with a single mode TEM<sub>00</sub> oscillator capable of providing pulses with adjustment in the range fwhm 30 picoseconds to 5 nanoseconds. The stability of the oscillator shall ensure that for 100 consecutive pulses the energy in any single pulse shall not deviate more than 15% from the mean value under the standard operating conditions.

The equipment supplied should include all necessary cooling and control systems needed to operate the laser system.

The cost of laser support tables is to be quoted separately.

Delivery, installation and commissioning costs should be quoted separately. The cost of an itemised list of recommended spares should be quoted separately.

SPECIFICATION NO. 3

A high power laser amplifier

Neodymium glass laser system consisting of only that part of the system described in Spec. 2 after the last Neodymium rod amplifier. The output is to be as specified in Spec. 2, the input to be specified by the supplier but capable of being delivered by a laser conforming to the specification in Spec. 1 with an appropriate setting of the oscillator pulse width. The electrical and optical interface at the input of this amplifier to be the responsibility of the purchaser.

The cost of laser support tables is to be quoted separately.

Delivery, installation and commissioning costs should be quoted separately. The cost of an itemised list of recommended spares should be quoted separately.

DIAGNOSTIC AND EXPERIMENTAL EQUIPMENT

A provisional list of Experimental and diagnostic equipment has been prepared and firm prices are being obtained where possible.

Invitations to tender for the following components have been activated.

	<u>Estimated Cost</u> £
1. 20 Vacuum photodiodes	4,663
2. 20 Solid state photodiodes	1,684
3. 4 Streak cameras	100,000
4. 2 1m reflection grating spectrographs	6,600
5. 2 CW YAG Lasers	14,000
6. 3 Real time digitisers	40,000
7. 2 50cms reflection grating spectrographs	6,600
8. Optical mounts	20,000
9. Oscilloscopes	73,440
Total	<u>£254,387</u>



*Tendered amount  
going on*

The total estimated price of the equipment that has so far been identified is ~£450,000.

Firm quotations have been received for items 1, 2, 6 and 9.

*no breakdown of  
time*

P.R. Williams

14th February 1975

*Shipping cost covered at  
- w p people nominated by  
Steering Committee.*

*is breakdown of  
sub heads which  
is different from  
AIA paper*

*Must be careful of  
transferring*

*Plan* *status copy*

EXPERIMENTAL AND DIAGNOSTIC EQUIPMENT

		UNIT PRICE +VAT 8%	NUMBER	TOTAL
1.	LASER DIAGNOSTICS			
	Vacuum Photodiodes, S1 response 200ps rise time eg ITL Type FD 125(M1)	<del>233.17</del>	20	4663.44
2.	SOLID STATE DIODES			
	S1 eg ITL Type ITL - 12LD	84.24	20	1684.80
3.	CALORIMETERS			
	19mm Quantronix Model 500	245.35	6	1472.08
	64m Cilas Model CG 64	542.35	5	2711.73
4.	STREAK CAMERAS			
	< 5ps Time Resolution			
	Electro Photonics Model 1CC 512	~23,000	2	49,680
	or Hadland Model Imacon 600	24,840		
5.	TWO PHOTON FLUORESCENCE CAMERAS (In House Assembly)	700 est	3	2,100
6.	SPECTROMETERS			
	1) Echelle Resolution $\sim .1\text{\AA}$ (In House Assembly)	4,000 (est)	1	4,000
	2) 1m Reflection Grating			
	Rank Hilger Model "Monospec"	3,300	2	6,600
7.	BEAM PROFILE MONITORS			
	4 Film Backs (Polaroid Sheet Film Holder)	100	4	400
	Linear Diode Array Integrated Photomatrix	2,000 (est)	4	8,000
				81,311

Board

*danger*

*higher than approval figures*

*danger is will generate inconsistent lists & then work by lists*

ALIGNMENT

	UNIT PRICE	NUMBER	TOTAL
1) Krypton Laser TEM <sub>00</sub> Mode 6471Å 2 watts eg Control Laser Model 902 (Electrophotonics)	~4,148	1	4,148
2) CW YAG Laser TEM <sub>00</sub> Mode 1.06μm ~ 1.5w eg General Photonics TWO-15 PQ	7,000	2	14,000
3) HeNe Low Power ~ 2mw < 1mr divergence TEM <sub>00</sub> eg Metrologic ML 920	189	10	1,890
4) HeNe High Power ~ 15mw ~ 1mr divergence TEM <sub>00</sub> eg Spectra Physics Model 120	610	2	1,220
5) Infra-red Viewers - Plasma Electronics Ltd	420	5	2,100
6) 3 Axis Autocollimating Theodolite	2,000	1	2,000
7) Micro-Alignment Autocollimator			
112/537-5	640.00	1	
Base 112/656	52.00		
Telescope Lamphouse	75.00		
112/376 Mounting Sphere	45.00		
117/35 Cabinet	60.00		
112/645 Adjusting Brackets	52.00		
112/471 Flage Cup	15.00		
	+ 8%		
	1,014.12		1,014.12
			26,372

INPUT BEAM DIAGNOSTICS

	UNIT PRICE	NUMBER	TOTAL
1) Far Field Camera with 1 Dimensional Diode Readout	~2,000	3	6,000
2) Near Field Camera (Polaroid) or (Film)	500	3	1,500
3) Real Time Digitisers Tektronix Type R7912	Q 13,230	2	26,460
4) Streak Camera Electro Photonics Model ICC512 Hadland Imacon 600	Pr ~23,000 24,840	r 1	24,840
5) Spectrometer Rank Precision Industries Model Monospec	Pr ~3,300	1	3,300
6) Two Photon Fluorescence Camera	~700	1	700
			62,800

TARGET AREA

	UNIT PRICE	NUMBER	TOTAL
1) Target Chamber 1.5TW		1	
2) Target Chamber 100GW		1	
3) Questar Telescopes		2	
4) Target 3 Dimensional Manipulator	2,000	2	4,000
5) Second Harmonic Illumination		1	
6) X-ray Streak Camera	~30,000	1	~30,000
7) X-ray Crystal Spectrometer < 2 <sup>o</sup>	4,000	1	4,000
8) Grazing Incidence Spectrograph 5 <sup>o</sup> -500 2.2m Rank Hilger E 580	~12,500	1	12,500
9) Normal Incidence Spectrograph 500-3000 <sup>o</sup> resolution <sup>o</sup> Rank Hilger E 766	10,584	1	10,584
10) X-ray Detectors Array Silicon Diode			
11) Channeltrons (Focal Plane of Spectrograph)			
12) Visible Streak Camera	24,840	1	24,840
13) Data Handling Computer - PDP 11/45, GEC 4080, etc	~45,000	1	~45,000
14) Neutron Detectors		8	
15) Pulsed Laser Schlieren System		1	
16) 1m Optical Spectrograph eg Rank Industries Monospec	3,300	1	3,300

Target Area Continued

	UNIT PRICE	NUMBER	TOTAL
17) Ion Collectors and Charge Amplifiers		4	
18) TLD Readout System		1	
19) Ion Mass Spectrometer		1	
20) Reflected Energy Power Measurement	~4,000	1	4,000
21) Instrument Calibration Sources X-ray generator .50KV 80mm .1% stab.	6,190	1	6,190
22) Optical Processing Instrumentation			
a) Comparator Microscope	1,675	1	1,675
b) Microdensitometer Joyce Loebler 3CS	5,883	1	5,883
c) Projection comparator	653	1	653
23) Real time digitiser	13,230	1	13,230
			165,855

TEKTRONIX OSCILLOSCOPES

		Unit Price + VAT	Number	Total
1	7904 MAIN FRAME	~2,526	7	17,685
2	7A19 500 MHZ AMPLIFIER MODULE	511	8	4,093
3	7A24 350 MHZ DUAL INOUT MODULE	698	5	3,492
4	7AZIN DIRECT ACCESS 1 GHZ MODULE	315	3	946
5	7B92 FAST TIME BASE	979	8	7,838
6	P6056 PASSIVE PROBE	43.20	8	345
7	P6201 ACTIVE PROBE	297	4	1,188
8	204 SCOPE MOBILE	163	7	1,145
9	C51-R CAMERA	837.7	8	7,134
10	7603 MAIN FRAME	1,029	5	5,146
11	7A18 DUAL CHANNEL AMPLIFIER	360	10	3,607
12	7B53A DUAL CHANNEL TIME BASE	541	10	5,410
13	203 SCOPE MOBILE	156	8	1,252
14	P6011 - 6' CABLE PASSIVE PROBE	18.36	20	367
15	7633 MAIN FRAME - 100 MHZ STORAGE SCOPE	2,575	3	7,727
16	R7903 MAIN FRAME	2,227	1	2,227
17	R7603 MAIN FRAME	1,196	1	1,196
18	R7633	2,642	1	2,642

£73,440