UNIDYNAMICS/PHOENIX

27 JUNE 1991

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LASER INITIATED ACTUATOR STUDY
LOS ALAMOS NATIONAL LABORATORY
SUBCONTRACT 9-X5D-4135F-1
UNIDYNAMICS CONTRACT 225-01

Prepared for:

Los Alamos National Laboratories
P. O. Box 1663
Los Alamos, NM 87545
Attention: Dave Ceman

Prepared by: Bruce Watson
B. Watson
Sr. Development Engineer

Reviewed by: Ed Spomer
Ed Spomer
Sr. Development Engineer

Approved by: Bob Smith
Bob Smith
Staff Scientist

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Unidynamics/Phoenix
P. O. Box 46100
Phoenix, Arizona
85063-6100

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INTRODUCTION

The program task was to design and study a Laser Initiated Actuator.

The work was conducted on the Los Alamos National Laboratory subcontract 9-X5D-4135F-1.

Unidynamics/Phoenix account 225-01.

The contract was initiated October 19, 1988 for the study of laser diode initiated 2SL and 3E2 devices which led to additional work on the laser initiated 5E1. The work completed on these three devices was summarized in a report titled "Laser Diode Initiation Studies of the 3E2, 2SL and 5E1 Devices" dated 8 April 1991 and written by Ed Spomer.

This program culminated in the study of the Laser Initiated Actuator, UPHX P/N X51-8284.

DESIGN DISPOSITION

The Laser Initiated Actuator Design (X51-8284) is shown on the following page. A complete drawing package is contained in Appendix A.

The actuator is comprised of the fiber and body subassemblies. The fiber subassembly begins with preparation of the fiber optic cable. The input end had an SMA 906 connector attached. The cable was cut to approximately three feet with the output end prepared as shown on the second following page. The jacket was stripped from the last three inches and the buffer removed from the last .20 inch. A length of shrink sleeving was applied to act as a strain relief to minimize handling damage. The fiber was potted within the insert using BFG A-1177-B epoxy. After curing the fiber/insert was polished. The fiber was then tested to evaluate transmissivity, with an acceptance limit set at -1db loss maximum. This provided the information to calculate the power available at the output end of the fiber. The mylar window of 0.001 inch thick tape was applied to the insert face. The purpose of this window was to provide thermal insulation between the insert and the powder surface to aid initiation.

The body subassembly begins with welding the closure disk to the body to provide a hermetic seal at the output end. The piston was then installed in the body bore. The body and piston both have a shoulder positioned to control piston stroke to 0.10 inch. The cavity is then loaded with approximately 8.0 milligrams of titanium/potassium perchlorate and consolidated to 5,000 psi. The fiber/insert was then threaded into the loaded body.

REVISIONS			
ZONE/REV	DESCRIPTION	DATE	APPROVED
X1		01-08-24	BW

1	V			FIBER OPTIC	125 MICRON	8
1	V		51-8286	INSERT		7
A/R	B			EPOXY	BFG A-1177-B	6
1	V		51-8288	WINDOW		5
TBD	X			TI/KC104		4
1	V		51-8289	DISC, CLOSURE		3
1	V		51-8287	PISTON		2
1	V		51-8285	BODY		1
QTY	SYM	CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL/SPECIFICATION	ITEM NO.

PARTS LIST

-1 FINAL		FINAL	APPROVED FOR RELEASE	DATE	BY	CRANE UNIDYNAMICS/PHOENIX
NEXT ASSY		USED ON	TITLE		PISTON ACTUATOR LASER INITIATED	
APPLICATION		SCALE		CH2079		X51-8284
				SCALE 10/1		SHEET 1 OF 1

ENGINEERING SKETCH
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UNIDYNAMICS CAD SYSTEM DRAWING

FIBER OPTIC CABLE
PREPARATION

LASER DIODE FIRESSET

The energy source for all experiments was a Spectra Diode 2200-H2 laser diode. The diode is directly coupled to a 100 micron core, .3 numerical aperture fiber optic terminated with an SMA connector. At the maximum current of 2 amps the diode generates 1 watt from the fiber. The fireset controls the power and pulse width of the diode and houses it. A standard SMA bulkhead connector provides the interconnect for the diode and the device under test.

A 400 micron .37 numerical aperture fiber is connected to the fireset for the acquisition of pretest data. The pretest data recorded includes three measurements of laser diode power and the current pulse. A Laser Precision RjP 7100 readout and a RjP 365 radiometer measure the laser power at the end of the 400 micron fiber. During the testing of a component the diode current pulse is stored and compared to pretest data. If the current remained unchanged from the pretest data, the pretest power level was assumed to be the input power for that test. Test currents ranged from 1.73 to 1.97 amps resulting in input powers of 564 to 690 milliwatts respectively. Pulse widths ranged from 9.7 to 10.3 milliseconds.

TEST DISCUSSION

A summary of the unit configuration and performance data is shown in the table on the following two pages. A description of the tests as well as the rationale follows. The second column of the table lists the technician request which controlled the assembly process and these are contained in Appendix B.

SN 001-006. These units were to evaluate the effect of powder consolidation on function time. All had approximately 12.0 milligrams of powder, the first three were pressed at 5,000 psi while the last three were at 10,000 psi. S/N 001 and 006 (low and high consolidation pressures, respectively) actuated, but with rather long function times. A post mortem of the units which failed to function revealed that during the pressing operation powder was squeezed into the body thread undercut. When the insert was installed it pushed this powder ahead of it. out of the threads and onto the fiber side of the window. Upon initiation this powder burned and damaged the fiber end and the window precluding any laser energy from reaching the main powder charge. The two that functioned bulged the body at the thread undercut increasing its outside diameter from 0.124 to 0.129 inch. This variation in performance was attributed to assembly problems--specifically the load tooling and procedures.

S/N 007-010. These units had a reduced powder quantity of approximately 8.2 milligrams (at 10,000 psi) to eliminate the body deformations experienced previously. In addition, it was assured that the powder was all in the bore (not in the threads) to keep the fiber side of the window clean. Only one unit functioned, and that was with 548 mJ at the window interface (all previous tests were at 509 mJ, or less). The reduced powder quantity helped because no bulging of the housing was observed.

LASER INITIATED ACTUATOR
ACCOUNT: 225-010

200 MICRON FIBER

ACTUATOR S/N	ASSEMBLY INFORMATION							FUNCTION INFORMATION					
	TECH REQ NO.	FIBER S/N	FIBER LOSS	IGNITION CHARGE MATL	CHARGE QTY	NOMINAL LOAD PRESSURE	CALC. DENSITY	LASER CURRENT	PULSE WIDTH	INPUT POWER	INTERFACE POWER	INITIATION ENERGY	FUNCTION TIME
			(dB)		(mg)	(ksi)	(gm/cc)	(A)	(ms)	(mW)	(mW)	(mJ)	(ms)
001	798	001	-1.07	Ti/KP	12.4	5.0		1.76	9.85	572	447	3.859	8.632
002	798	002	-1.03	Ti/KP	12.1	5.0		1.76	9.85	572	451	X	X
003	798	003	-1.15	Ti/KP	11.7	5.0		1.76	9.83	572	439	X	X
004	798	004	-0.51	Ti/KP	10.7	10.0		1.76	9.76	572	509	X	X
005	798	005	-1.09	Ti/KP	12.0	10.0		1.73	9.68	582	453	X	X
006	798	009	-0.76	Ti/KP	11.9	10.0		1.73	9.70	564	473	2.880	6.082
007	815	003	-1.15	Ti/KP	8.3	10.0		1.84	10.18	616	473	X	X
008	815	004	-0.51	Ti/KP	8.6	10.0		1.85	10.13	616	548	4.168	7.610
009	815	005	-1.09	Ti/KP	8.4	10.0		1.85	10.10	616	479	X	X
010	815	006	-2.83	Ti/KP	8.0	10.0		1.85	10.08	616	321	X	X
011	818	013	-1.06	Ti/KP	9.9	5.0		1.80	9.87	600	470	X	X
012	818	014	-0.72	Ti/KP	8.6	5.0		1.79	9.82	600	508	X	X
013	818	015	-1.10	Ti/KP	8.7	5.0		1.79	9.71	600	466	3.769	8.092
014	818	016	-0.52	Ti/KP	8.5	5.0		1.92	9.59	652	578	4.150	7.174
011A	818	013	-1.06	Ti/KP	9.9	5.0		1.85	9.76	652	511	X	X
012A	818	014	-0.72	Ti/KP	8.6	5.0		1.92	9.59	652	552	4.972	9.000
015	821	017	-1.36	HMX/3%C	6.5	10.0		1.94	9.97	666	487	X	X
016	821	018	-1.19	HMX/3%C	5.4	10.0		1.94	9.97	666	506	X	X
017	821	019	-3.69	HMX/3%C	6.0	10.0		1.94	10.00	666	285	X	X
018	821	011	-2.54	HMX/3%C	5.9	10.0		1.94	9.98	666	371	X	X
11B	818	013	-1.06	Ti/KP	9.9	5.0		1.94	9.97	666	522	X	X

SHEET 1 OF 2

X indicates unit did not function.

125 MICRON FIBER

ACTUATOR S/N	ASSEMBLY INFORMATION							FUNCTION DATA					
	TECH REQ NO.	FIBER S/N	FIBER LOSS (dB)	IGNITION CHARGE MATL	CHARGE QTY (mg)	NOMINAL LOAD PRESSURE (ksi)	CALC. DENSITY (gm/cc)	LASER CURRENT (A)	PULSE WIDTH (ms)	INPUT POWER (mW)	INTERFACE POWER (mW)	INITIATION ENERGY (mJ)	FUNCTION TIME (ms)
019	822	019	-0.16	Ti/KP	7.8	5.0		1.94	10.08	670	646	X	X
021	822	021	-0.83	Ti/KP	9.0	5.0		1.95	10.03	670	553	1.697	3.066
020	822	019	-0.16	Ti/KP	8.4	5.0		1.95	9.91	670	646	0.818	1.266
025	830	028	-0.56	Ti/KP	8.6	5.0		1.95	9.97	690	607	0.731	1.204
026	830	026	-0.02	Ti/KP	7.1	5.0		1.95	9.99	690	687	4.057	5.906
028	830	022	-0.30	Ti/KP	8.4	5.0		1.95	10.05	690	644	0.633	0.98
029	830	023	-0.36	Ti/KP	8.0	5.0		1.97	10.10	690	635	0.452	0.712
030	830	024	-0.47	Ti/KP	8.3	5.0		1.97	10.25	690	620	0.557	0.898
031	830	025	-0.98	Ti/KP	7.8	5.0		1.97		690	551	X	X
033	830	027	-0.40	Ti/KP	7.9	5.0		1.97	10.40	690	629	1.066	1.694
034	835	030	-0.87	Ti/KP	7.9	5.0	1.62	1.94	10.06	684	560	X	X
035	835	031	-0.67	Ti/KP	8.5	5.0	1.71	1.94	10.02	684	586	X	X
036	835	032	-0.46	Ti/KP	8.4	5.0	1.62	1.94	10.00	684	615	1.710	2.780
038	835	034	-0.79	Ti/KP	8.4	5.0	1.66	1.94	9.98	684	570	X	X
039	840	035	-0.16	Ti/KP	7.9	5.0	1.80	1.97	9.97	681	627 [1]	N/D	N/D
040	840	036	-0.64	Ti/KP	7.2	5.0	1.81	1.97	9.95	681	564 [1]	0.687	1.218
041	840	037	-0.38	Ti/KP	7.3	5.0	1.85	1.97	9.94	681	650 [1]	0.754	1.160
042	840	038	-0.37	Ti/KP	7.9	5.0	1.88	1.97	9.95	681	601 [1]	0.676	1.124
043	840	039	-0.65	Ti/KP	7.5	5.0	1.88	1.98	9.94	681	568 [1]	0.660	1.162
044	840	040	-0.65	Ti/KP	7.4	5.0	1.79	1.97	9.94	681	573 [1]	0.774	1.350
047 [2]	854	045	-0.39	Ti/KP	8.4	5.0	1.82	1.95	10.24	685	626 [1]	0.710	1.134
048 [2]	854	046	-0.75	Ti/KP	8.6	5.0	1.82	1.95	10.18	685	576 [1]	0.643	1.116
049 [2]	854	047	-0.75	Ti/KP	7.6	5.0	1.80	1.95	10.15	685	576 [1]	0.714	1.238
051 [3]	854	049	-1.15	Ti/KP	8.1	5.0	1.83	1.95	10.31	687	527 [1]	0.581	1.102
052 [3]	854	050	-1.18	Ti/KP	8.5	5.0	1.80	1.95	10.29	687	524 [1]	0.747	1.426
053 [3]	854	051	-1.10	Ti/KP	7.4	5.0	1.84	1.95	10.26	687	533 [1]	0.477	0.894

SHEET 2 OF 2

N/D = NO DATA RECORDED

[1] MEASURED AT OUTPUT OF WINDOW (ALL PREVIOUS DATA DOES NOT INCLUDE WINDOW LOSS).

[2] TESTED AT -65C AFTER 1 HOUR CONDITION.

[3] CONDITIONED AT 75C FOR 1 HOUR, THEN CONDITIONED AT -65 FOR 1 HOUR, THEN FUNCTIONED AT -65C.

S/N 011-014. These units were similar to the last four but were loaded at 5,000 psi, because the reduced loading pressure should help initiation. Also, these were the first to use welded closure disks. Due to schedule conflicts the ten previous units had the pistons secured with a small amount of epoxy. But this was questioned because slight movement of the piston would disrupt the powder consolidation--so all units, starting with these, had a welded closure disk to retain the piston. S/N 011 and 012 had encountered test problems and retested as 011A and 012A. In essence, three of the four units functioned, but at rather long times.

S/N 015-018. A suggestion was made to investigate using HMX with 3% carbon black in place of the titanium/potassium perchlorate due to promising results in another laser actuated device. None of these functioned, with the failures attributed to the fact that HMX must be fully "contained" for it to function properly. In this application, the powder is not "contained" because upon initiation the piston will begin to move which will effectively extinguish the HMX charge.

Along with these four units, S/N 011 was attempted a third time (designated 011B) but again it failed to function.

Discussions on the performance of the first eighteen units centered on the energy density delivered to the powder interface. Two ways to increase this would be to increase the laser diode power (but this adversely affects the system level application) or to go to a smaller fiber diameter. The latter was chosen because we could obtain smaller fiber easily and quickly. All previous tests use 200 micron fiber, we chose to now proceed with 125 micron fiber which increased the energy density by 61 percent. In addition, the laser diode energy was increased slightly, from 600-652 milliwatts for tests of S/N 007-014 to 670 milliwatts for the next units.

S/N 019-021. These units were loaded with approximately 8.4 milligrams of titanium/potassium perchlorate at 5,000 psi. S/N 020 and 021 functioned at 1.266 and 3.066 milliseconds, respectively (a vast improvement over the 6.082 to 9.000 milliseconds experienced up to this point).

S/N 025-033. Of these seven units, all but S/N 031 functioned, and three of them were in less than 1.0 millisecond. This performance improvement was attributed to a gradual improvement in the assembly process as well as the increased energy density from the smaller fiber and slightly higher laser diode output.

S/N 034-038. The next step to increasing the energy density was to eliminate the window and its associated losses. This would also evaluate the insulating contribution of this component.

Only one of the four functioned. A post mortem of the hardware revealed a charred cavity in each powder face approximately 0.13 inch in diameter. Apparently the powder was ignited but the heat sink effect of the insert face would not allow the ignition to continue.

So it does appear that the thermal insulating properties of the window overshadows the attendant optical losses.

With the window necessity established, the next step was to minimize it as much as possible. The windows used have all been 0.003 inch thick mylar. The next logical step would be to use a thinner material, and the thinnest readily available was a 0.001 inch thick mylar tape. The adhesive backing also helped in that "tape" window could be attached directly to the fiber/insert and the output measured would be that actually available to the powder. (Previous measurements were of the fiber only while the window contribution was not quantified).

S/N 039-044. These units used the 0.001 inch thick mylar tape for a window. All six functioned (although data was lost on the first) and the consistency was vastly improved--ranging from 1.124 to 1.350 milliseconds. We apparently had the "recipe".

S/N 047-053. These were identical to the last six, however, the testing was changed to demonstrate performance while cold as well as after exposure to a temperature cycle from high to low and functioned while still cold. The first three were conditioned at -65°C for two hours and all functioned between 1.116 and 1.238 milliseconds. The last three started at ambient and then conditioned at 75°C for two hours, then conditioned at -65°C for two hours. All three were tested while cold and functioned between 0.894 and 1.426 milliseconds.

CONCLUSION

The successful Laser Initiated Actuator design is shown in drawing X51-8242, (Appendix A) with the following specifics:

1. 8.0 milligrams of titanium/potassium perchlorate powder.
2. Consolidated at 5,000 psi.
3. Mylar window of 0.001 inch thick tape.
4. 125 micron fibers optic cable.
5. Shrink sleeving for a strain relief of the fiber optic.

RECOMMENDATIONS

In reviewing the problems and failures encountered throughout the program, there were four topics which should be studied further.

1. Optimum powder consolidation pressure.

The last successful units were loaded at 5,000 psi, but installation of the insert caused the closure disk to dome outward. This may be evidence that the powder was reconsolidated, but needs to be investigated as to how much and at what effect.

2. Ignition Threshold

The first twelve tests appeared to be at the ignition threshold as evidenced by the numerous no-fires and the long function times. This threshold should be established for the current design with the smaller fiber and improved window.

3. Window

The tape window appears to be a vast improvement over the previous disk design and this may be due to the adhesive filling in imperfections and providing better coupling from the fiber to the window. But, what is the long aging term effect of the adhesive on the powder? Would a 0.001 inch thick mylar film with no adhesive work as well or is the adhesive the big improvement?

4. Improved Insert

The need to change the insert design. The current design uses a slot in the insert to torque it into the body. But the slot is small and requires a delicate tool. A change to add a hex or wrench flats would be a definite improvement. A letter addressing this problem in more detail is provided in Appendix C.

APPENDIX A
DRAWING PACKAGE

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	X1		01-09-21	DW

1	V			FIBER OPTIC	125 MICRON	8
1	V		51-8286	INSERT		7
A/R	B			EPOXY	DFG A-1177-B	6
1	V		51-8288	WINDOW		5
TBD	X			TI/KC104		4
1	V		51-8289	DISC, CLOSURE		3
1	V		51-8287	PISTON		2
1	V		51-8285	BODY		1
QTY	SYM	CODE	PART OR	NOMENCLATURE OR	MATERIAL/SPECIFICATION	ITEM
REQD		IDENT	IDENTIFYING NO.	DESCRIPTION		NO.

PARTS LIST

			APPROVED FOR		CRANE UNIDYNAMICS/PHOENIX	
			DATE		PISTON ACTUATOR	
			BY		LASER INITIATED	
			CHECKED		CH20791 X51-8284	
			DATE		SCALE 10/1	
			BY		SHEET 1 OF 1	
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REVISIONS			
ZONE	REV	DESCRIPTION	DATE
		APPROVED

ENGINEERING SKETCH

SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER DOD-STD-100	CONTRACT NO.	CRANE	UNIDYNAMICS/PHOENIX	PHOENIX ANTENNA		
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: DEC .XX±.03 .XXX±.010 ANGLES ±2°	DESIGN E. SPOMER				REV.	
			MATERIAL: VASCO MAX C-250 (C-300 OPTIONAL)					TITLE	BODY
-1	51-8284	51-8284							ITEM OR PART NO.
DASH NO.	NEXT ASSY	USED ON				B12079		X51-8285	
APPLICATION						SCALE 10/1	WT		
						SHEET 1 OF 1			

DWG NO. 51-8286 941

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

ENGINEERING SKETCH

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UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER DOD-STD-100	CONTRACT NO.	CRANE UNIDYNAMICS/PHOENIX	
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	E. SPOMER	TITLE	
			TOLERANCES ON:		INSERT, FIBER	
			DEC .XX±.03 .XXX±.010		SIZE 12079 X51-8286	
			ANGLES ±2°		SCALE 10/1 WT	
DASH NO.	NEXT ASSY	USED ON	MATERIAL: VASCO MAX C-250 (C-300 OPTIONAL)		SHEET 1 of 1	
APPLICATION

SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER DOD-STD-100	CONTRACT NO.		CRANE	UNIDYNAMICS/PHOENIX	PHOENIX ART 2004
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: DEC .XX±.03 .XXX±.010 ANGLES ±2°	DESIGN	E. SPOMER		TITLE	
				REV			PISTON	
				REV				
-1	51-8284	51-8284	MATERIAL: VASCO MAX C-250 (C-300 OPTIONAL)	NO			SIZE: CRK CHS DRW NO:	
DASH NO.	NEXT ASSY	USED ON		REV			B12079	X51-8287
	APPLICATION			REV			SCALE 10/1 WT	SHEET 1 OF 1

DWG NO. 51-8288

REVISIONS			
ZONE	REV	DESCRIPTION	DATE

ENGINEERING SKETCH

SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER DOD-STD-100	CONTRACT NO.		CRANE	UNIDYNAMICS/PHOENIX	PHOENIX ARIZONA
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: DEC .XX±.03 .XXX±.010 ANGLES ±2°	E. SPOMER				
-1	51-8284	51-8284	MATERIAL:			TITLE		
DASH NO.	NEXT ASSY	ED ON	MYLAR			WINDOW		
APPLICATION						SIZE 12079		
						DWG NO. 51-8288		
						SCALE 20/1		
						SHEET 1 OF 1		

DES NO. 51-8289

REVISIONS			
ZONE	REV	DESCRIPTION	DATE
			APPROVED

ENGINEERING SKETCH

SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER ODD-STD-100	CONTRACT NO.	CRANE UNIDYNAMICS/PHOENIX	
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	E. SPOMER	TITLE	
			TOLERANCES ON: DEC .XX±.03 .XXX±.010		DISC, CLOSURE	
			ANGLES ±2°		SIZE 12079 X 51-8289	
-1	51-8284	51-8284	MATERIAL: CRES 304L		SCALE 10/1	
DASH NO.	NEXT ASSY	USED ON			SHEET 1 OF 1	
APPLICATION						

APPENDIX B
TECHNICIAN REQUESTS

763
788
798
815
816
818
821
822
830
835
840
854

CRANE

UNIDYNAMICS/PHOENIX

DISTRIBUTION:

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Ann Walker

Other Distribution _____

SHEET 1 OF 3

REQUEST FOR TECHNICIAN SERVICES

NO. 763CHARGE CODE M225010 CUSTOMER LANCREQUESTED BY B. WATSON DATE 11 OCT 90ESTIMATED HOURS 40 REQ'D COMPLETION DATE 9 NOVUNITS TO BE SHIPPED: ~~YES~~ NO X ACTUAL COMPLETION DATE Nov 20TECHNICIAN SIGNATURE Gray Mosier

TASK DESCRIPTION:

LASER INITIATED PISTON ACTUATOR X51-8284-112 FIBER OPTIC ASSYS6 COMPLETE ACTUATOR ASSYS

I. PREPARE FIBER FOR ASSEMBLY (12 ASSEMBLIES)

A. REMOVE CABLE JACKET FOR ^{3.50}_{3.00} INCHES FROM END.B. REMOVE FIBER BUFFER FOR ²⁶₂₄ INCH FROM END

(REF SKETCH)

II POT FIBER (12 ASSEMBLIES)

A. FILL "FIBER INSERT" (X51-8286-1) CAVITY WITH "ADHESIVE"
(BFGOODRICH A-1177-B) UP TO THE BOTTOM OF SCREWDRIVER SLOTB. DIP APPROXIMATELY .25 INCH OF END OF FIBER TO "WET" IT
WITH THE "ADHESIVE".C. PLACE "FIBER INSERT" INTO FIXTURE - SEATED IN C'BORE. THEN
INSTALL THE "FIBER". FEED THE "FIBER" UNTIL IT BOTTOMS IN
THE FIXTURE (IT SHOULD EXTEND ~.131 INCH OUT END OF "INSERT").
THIS SHOULD ASSURE THAT THE "FIBER" BUFFER JUST CONTACTS
THE "ADHESIVE" IN THE "FIBER INSERT" CAVITY.D. STRING OPPOSITE END OF "FIBER CABLE" INTO HAIRPIN OF
FIXTURE, SO IT IS SUSPENDED VERTICALLY.

(REF SKETCH).

E. CURE AT ROOM TEMPERATURE FOR 8 HOURS, MINIMUM.

F. CUT END OF "FIBER"; SO JUST ~.050 PROTRUDES FROM "INSERT".

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 3

TECH REQUEST NO. _____ CHARGE CODE 225010

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

III. POLISH CABLE END. (12 ASSEMBLIES)

- A. INSTALL "ALIGNMENT TOOL" (X51-8303-1) INTO THE "BASE PLATE" (X51-8301-1) SUCH THAT THE "TOOL" END PROTRUDES FROM THE FLAT-SIDE OF THE "PLATE".
- B. PLACE "LOCATOR DISK" (X51-8302-1) INTO SHALLOW C'BORE OF THE "PLATE". ADJUST THE "TOOL" UNTIL THE "DISK" JUST LIES FLAT WITHIN ITS C'BORE.
- C. POSITION AND ALIGN THE "BASE PLATE" ON THE POLISHING MACHINE
- D. REMOVE "ALIGNMENT TOOL" AND REPLACE WITH THE "FACE/INSERT ASSY".
- E. POLISH FACE OF FACE - ROUGH POLISH w/ 3 MICRON SICILIAN CARBOR - FINISH POLISH w/ .3 MICRON ALUMINUM OXIDE

IV ASSEMBLE ACTUATOR (SIX ASSEMBLIES)

- A. INSTALL "PISTON" (X51-8287-1) INTO "BODY" (X51-8285-1) AND ASSURE PROPER/SMOOTH MOTION.
- B. REMOVE "PISTON".
- C. WELD "DISK" (X51-8289-1) ONTO END OF "BODY".
- D. RE-INSTALL "PISTON"

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 3 OF 3

TECH REQUEST NO. _____ CHARGE CODE 225010

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

IV. LOAD ACTUATOR (SIX ASSEMBLIES)

A. LOAD TWO UNITS WITH 10 MG OF Ti/KLOY (BE SURE TO SUPPORT THE DISK)

- RECORD 1/4 OF MAT'L

- RECORD COLUMN HEIGHT 10K

- DESIGNATE AS S/N 1,2

B. LOAD TWO UNITS WITH SUPERLOSS TO A COLUMN HEIGHT OF (25%) OF THAT IN S/N 1 & 2 ABOVE.

THEN LOAD WITH 7.5 MG OF Ti/KLOY

- RECORD 1/4 OF SUPERLOSS

- RECORD COLUMN HEIGHT OF SUPERLOSS AND TOTAL COLUMN HEIGHT

- DESIGNATE AS S/N 3,4

C. LOAD TWO UNITS WITH SUPERLOSS TO A COLUMN HEIGHT OF (50%) OF THAT IN S/N 1 & 2 ABOVE.

THEN LOAD WITH 5.0 MG OF Ti/KLOY

- RECORD COLUMN HEIGHT OF SUPERLOSS AND TOTAL COLUMN HEIGHT

- DESIGNATE AS S/N 5,6

D. INSTALL "WINDOW" (X57-8288-1) INTO ALL SIX ASSEMBLIES

E. APPLY "ADHESIVE" (BFG A-1177-B) TO THREADS OF "FIBER/INSERT"

THREAD INTO "BODY", TORQUE FINGER TIGHT.

REVISIONS			
NO.	DESCRIPTION	DATE	APPROVED

1	V			FIBER OPTIC	200 MICRON	8
1	V		51-8286	CONNECTOR	VASCO MAX C-250	7
A/R	B			EPOXY		6
1	V		51-8288	WINDOW	MYLAR	5
TBD	X			TI/C104		4
1	V		51-8289	DISC, CLOSURE	CRES 304L	3
1	V		51-8287	PISTON	VASCO MAX C-250	2
1	V		51-8285	BODY	VASCO MAX C-250	1
QTY	SYN	CODE	PART OR	NOMENCLATURE OR	MATERIAL/SPECIFICATION	ITEM
REQD		IDENT	IDENTIFYING NO.	DESCRIPTION		I.D.

PARTS LIST

CRANE UNIDYNAMICS PROBEX			
PISTON ACTUATOR LASER INITIATED			
C120791 51-8284			
DATE 10/1/77			

ENGINEERING SKETCH
SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAP SYSTEM DRAWING

POTTING THE FIBER OPTIC CABLE
INTO THE INSERT

SHEET 1 OF 2**REQUEST FOR TECHNICIAN SERVICES**NO. 788CHARGE CODE 225-01 CUSTOMER LANLREQUESTED BY B. WATSONDATE 27 NOV 90ESTIMATED HOURS 5REQ'D COMPLETION DATE 28 NOVUNITS TO BE SHIPPED: ~~YES~~NO ☒ACTUAL COMPLETION DATE 12-5-90TECHNICIAN SIGNATURE Jerry Mosier**TASK DESCRIPTION:**LASER INITIATION ACTUATORLOAD STUDY

THIS WILL EVALUATE VARIOUS LOAD PRESSURES, POWDER QUANTITIES
AND PROCESSES.

1. ASSEMBLY

A. INSTALL "PISTON" (X51-8287) INTO THE "HOUSING" (X57-8285)

B. INSTALL "HOUSING" ONTO THE LOAD TOOL FUNNEL (20-8395)

SUCH THAT THE FUNNEL'S THREADED END IS $\frac{132}{128}$ INSIDE THE
"HOUSING".

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 2

TECH REQUEST NO. 1788 CHARGE CODE 225-01

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

2. LOAD

A. LOAD FOR THE FOLLOWING TABLE

UNIT	LOAD	LOAD ①
S/N	QTY	PRESSURE
	(MG)	(PSE)
1-4	9	10K
5-8	10	10K
9-12	8	5K
13-16	9	5K

① CONSOLIDATE WITH FUNNEL/RAM AT PRESSURE SHOWN.
 RE CONSOLIDATE WITH 1/2 INCH DIAMETER RAM AT
 THE SAME PRESSURE (WHICH REQUIRES A HIGHER FORCE)

3. WEIGH BACK AND RECORD

PROCESS AND CONFIGURATION RECORD (PCR)				Unidynamics Phoenix, Inc.		CODE IDENT. 12079		TECH REQ NO. # 788	
PART NO. X51-8395-1		DWS REV	NOMENCLATURE LANL LASER OPTIC INITIATOR			CUSTOMER AFB ATOMOS		CHARGE CODE M225010	
SERIAL NO.		POWDER: LOT NO.	T.1/K004	POWDER: LOT NO.	NA	POWDER: LOT NO.		NA	
S/N 1 THRU 16		BW TYPE:	NA	S2 PER FT:	NA	DIAM:		NA	
LOAD TOOL NO. 20-8395		DWELL TIME:	15 sec	CONSOLIDATED PRESSURE: (psi)			RAM 1 (10000 (5000) 10,000 5000		DATE STARTED: 12-3-90
		LOAD FORCE: (lbs)	21 10	44 22				DATE COMPLETED: 12-3-90	

[illegible]

CRANE

UNIDYNAMICS/PHOENIX

DISTRIBUTION:

Original - D. Richardson

Q.C. Eng. M. DEERENBAUGH

Ann Walker

Other Distribution _____

SHEET 1 OF 1

REQUEST FOR TECHNICIAN SERVICES

NO. 798CHARGE CODE 225-01 CUSTOMER LANLREQUESTED BY B. WATSONDATE 17 DEC 90ESTIMATED HOURS 6REQ'D COMPLETION DATE 11 DEC 90UNITS TO BE SHIPPED: ~~YES~~ NO XACTUAL COMPLETION DATE 12-11-90TECHNICIAN SIGNATURE J. Mosier

TASK DESCRIPTION:

FIBER OPTIC ACTUATOR

BUILD 6 ASSEMBLIES - 3 AT 5000 PSI CONSOLIDATION

3 AT 10,000 PSI CONSOLIDATION

1. LOAD SIX ASSEMBLIES^① AS FOLLOWS (REF X51-8284)

A. THREE WITH 12MG (NOM) AND CONSOLIDATE AT 5000 PSI (S/N 1-3)

B. THREE WITH 12MG (NOM) AND CONSOLIDATE AT 10,000 PSI (S/N 4-6)

(APPLY A COAT OF 5 MIN EPOXY TO RETAIN "PISTON FUSION BODY")

2. INSTALL FIBERS^②

A. TEST FIBERS FOR "LOSS" (ATTACH DATA) (BUILT ON TECH REQ #763)

(USE THE SIX BEST FOR THE UNITS)

B. INSTALL MYLAR WINDOW, X51-8288

C. INSTALL FIBER/INSERT

TORQUE FINGER TIGHT

ACTUATOR S/N	LOADING ^① PISTON/BODY S/N	FIBER ^② S/N
1	1	4
2	2	1
3	3	2
4	4	9
5	5	3
6	6	5

ITEM(S) UNDER STUDY

PART NO.

LOT NO.

SERIAL NO.

DATE

Fiber loss measurement
SCOPE OF EFFORT

Cat Fiber

Pulse width

1.212 ns

.711 A

.552 $\times 10^{-4}$ J

1.220 ns

.712 A

.560 $\times 10^{-4}$

1.212 ns

.711 A

.558 $\times 10^{-4}$ J

1 1.220

.711 A

.435 $\times 10^{-4}$

2 1.226

.718 A

.439

3 1.208

.712 A

.428

4 1.212

.712

.446

5 1.210

.713 A

.433

6 1.210

.712 A

.290

7 1.210

.713

.238

8 1.200

.713

.108

9 1.210

.713

.168

10 1.204

.713

.100

ENGINEERING LABORATORY				U. S. Dynamics Phoenix, Inc.		CODE IDENT. 12079	TECH REQ NO.
PROCESS AND CONFIGURATION RECORD (PCR)							
PART NO. X51-8395-1	DWS REV NOMENCLATURE LANL Laser Optic Initiator			CUSTOMER Alamos		CHARGE CODE M225010	
SERIAL NO. S/N 01	POWDER: T/KC104 LOT NO. 06	POWDER: NA LOT NO. NA	BW TYPE: NA Ω PER FT: NA	DIAM: NA		LOADED BY: J. Moody	
LOAD TOOL NO. 20-8395	DWELL TIME: 15 sec	CONSOLIDATED PRESSURE: (psi) 5000 10000 5000 10000		DATE STARTED: 12-7-90		DATE COMPLETED:	
		LOAD FORCE: (lbs)		10 21 22 44			

		12mg	12mg	12mg	DATA RECORD		
UNIT SERIAL NO.	5K	01	02	03			
Gross Weight		4612	4562	4603			
Tare Weight		4488	4441	4486			
Net Weight		0124	0121	0117			
Piston Height		+000	+000	+000			
Tunnel Gap		+002	+002	+001			
Free Space		+125	+130	+130			
		14mg	14mg	14mg			
Unit Serial No. 10K		04	05	06			
Gross Weight		4625	4588	4555			
Tare Weight		4518	4468	4436			
Net Weight		0107	0120	0119			
Piston Height		+000	+000	+000			
Funnel Gap		025	027	026			
Free Space		+132	+130	+131

1	V			FIBER OPTIC	200 MICRON	8
1	V		51-8288	CONNECTOR	VASCO MAX C-250	7
A/R	B			EPOXY		6
1	V		51-8288	WINDOW	MYLAR	5
TBD	X			TI/C104		4
1	V		51-8289	DISC, CLOSURE	CRES 304L	3
1	V		51-8287	PISTON	VASCO MAX C-250	2
1	V		51-8285	BODY	VASCO MAX C-250	1
QTY	SYN	CODE	PART OR	NOMENCLATURE OR	MATERIAL/SPECIFICATION	ITEM
REQD		IDENT	IDENTIFYING NO.	DESCRIPTION		NO.

PARTS LIST

CRANE UNIDYNAMICS PHOENIX		
PISTON ACTUATOR LASER INITIATOR		
CH20791 51-8284		
DATE 10/1/77		
1	FINAL	1-1NA
2	NECK ASBY	USED ON
3	APPLICATION	

ENGINEERING SKETCH
SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

CRANE

UNIDYNAM CS/PHOENIX

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Ann Walker

Other Distribution _____

SHEET 1 OF 1

REQUEST FOR TECHNICIAN SERVICES

NO. 815CHARGE CODE 225-01 CUSTOMER LANEREQUESTED BY B. WATSONDATE 10 Jan 91ESTIMATED HOURS 8REQ'D COMPLETION DATE 14 Jan 91UNITS TO BE SHIPPED: ~~YES~~ NO ☒ACTUAL COMPLETION DATE 10 JanTECHNICIAN SIGNATURE BHW

TASK DESCRIPTION:

FROM OPTIC ACTUATORBUILD 4 ASSEMBLIES

1. LOAD 4 ASSEMBLIES AS FOLLOWS (REF XST-8284)

A. LOAD WITH 8 MOUNGRAMS (NOMINALLY)

B. APPLY A DAB OF 5-MIN EPOXY TO THE END OF THE UNIT
PRIOR TO LOADING TO RESTAIN PISTON IN BODY/HOUSING.

2. INSTALL FIBERS

A. INSTALL MYLAR WINDOW (XST-8288)

B. THREAD IN THE FIBER
TORQUE FINGER TIGHT.

ACTUATOR S/N	LOADED PISTON BODY S/N	FIBER S/N
7	007	5
8	008	3
9	009	6
10	010	4

CRANE

UNIDYNAMICS/PHOENIX

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SHEET 1 OF 1**REQUEST FOR TECHNICIAN SERVICES**NO. 816

CHARGE CODE 225-01 CUSTOMER LANL
REQUESTED BY R. WATSON DATE 12 JAN 91
ESTIMATED HOURS 2 REQ'D COMPLETION DATE 16 JAN
UNITS TO BE SHIPPED: ~~YES~~ **NO** ACTUAL COMPLETION DATE _____
TECHNICIAN SIGNATURE _____

TASK DESCRIPTION:LASER INITIATED ACTUATOR

THE "FUSION, FIBERS" (X57-8286-1) ARE NOT TO PRINT
IN THAT THE THREADS ARE BAD.

OBTAIN A 3-56 UNF-3A THREAD DIE AND R ALL THE
DISCREPANT PARTS THROUGH TO CHANGE THE THREADS.

VERIFY THE REWORK WAS COMPLETE BY CHECKING ABOUT
10% IN THE 3-56 UNF-3A THRU GO/NO-GO GAG.

SHEET 1 OF 2

REQUEST FOR TECHNICIAN SERVICES

NO. 818CHARGE CODE 225-01 CUSTOMER LANLREQUESTED BY B. WATSONDATE 18 JAN 91ESTIMATED HOURS 3REQ'D COMPLETION DATE 21 JANUNITS TO BE SHIPPED: ~~YES~~NO XACTUAL COMPLETION DATE 21 JanTECHNICIAN SIGNATURE T. Mosier

TASK DESCRIPTION:

LASER INITIATED ACTUATORBUILD 4 ASSEMBLIES1. LOAD 4 ASSEMBLIES AS FOLLOWS.A. REF XST-8284B. USE UNITS WITH A WELDED CLOSURE DISKC. LOAD WITH 8 MG OF TIG H/KC104 (MAXIMAL QTY)- DO NOT STOP THE LEAD RAM IN THE FUNNEL.- REMOVE RAM/FUNNEL- USE ϕ .076 RAM AND CONSOLIDATE AT 5,000 PSI (22.7 LBS)D. INSTALL MYLAR WINDOW (XST-8288)E. MEASURE HEIGHT FROM TOP OF HOUSINGTO THE WINDOW, AND RECORD F. MEASURE HEIGHT OF INSERT,
AND RECORD. G. CALCULATE THE INSTALLATION DEPTH OF THE INSERT.

UNIT S/N = . 11 12 13 14

Dimension "a" = .

Dimension "b" =

a-b =

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 2

TECH REQUEST NO. _____ CHARGE CODE 225-01

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

H. MEASURE AND RECORD FIBER TRANSMISSIVITY. (120 μ m)

I. INSTALL FIBER/INSERT TO LIGHT FINGER TIGHT (17 IN-02).

J. MEASURE DISTANCE FROM TOP OF HOUSING (BODY) TO BACK OF INSERT. (THIS VALUE SHOULD BE CLOSE TO THAT VALUE FOUND IN STEP G).

K. RECORD CONFIGURATION.

ACTUATOR S/N	LOADED PISTON/BODY S/N *	FIBER S/N	FIBER TRANSMISSIVITY
11	11	13	.783 (1.06)
12	12	14	.847 (0.72)
13	13	15	.777 (1.10)
14	14	16	.887 (0.52)

(dB LOSS)

* THESE ARE THE FIRST TO HAVE A WELDED CLOSURE DISK.

L. X-RAY UNITS

ENGINEERING LABORATORY PROCESS AND CONFIGURATION RECORD (PCR)				Unidyna Phoenix, Inc.		CODE IDENT. 12079	TECH REQ NO.	
PART NO. X51-8284		DWS REV NA	NOMENCLATURE LANL Laser Optic Initiator			CUSTOMER Los Alamos	CHARGE CODE M225010	
SERIAL NO. S/N 11 THRU 14		POWDER: LOT NO. Ti/KClO ₄	POWDER: LOT NO. na	POWDER: LOT NO. na	BW TYPE: N/A Ω PER FT: N/A	DIAM: N/A	LOADED BY: Jerry Mosier	
LOAD TOOL NO. 20-8395-1		DWELL TIME: 15 sec.	CONSOLIDATED PRESSURE: (psi) / 5000 LOAD FORCE: (lbs) / 22.7			DATE STARTED: DATE COMPLETED:		
<div style="text-align: center;">8mg 8mg 8mg 8mg DATA RECORD</div>								
UNIT SERIAL NO.	11	12	13	14				
Gross Weight (g)	.4578	.4625	.4613	.4571				
Tare Weight (g)	.4479	.4545	.4526	.4496				
Net Weight (g)	.0099	.0086	.0087	.0085				
42								
Fiber Serial No.	13	14	15	16				
Fiber Transmissivity	.783	.847	.777	.887				
dB Loss	1.06	.072	1.10	.052				
Dimension A	.143	.142	.141	.139				
Dimension B	.143	.142	.139	.137				
(A-B)	-.000	-.000	-.002	-.002				
Distance below Flush								
IT ³	-.000	-.000	-.003	-.003				

DISTRIBUTION:
Original - D. Richardson
Q.C. Eng. M. DEFFENBAUGH
Ann Walker
Other Distribution _____

SHEET 1 OF 2

REQUEST FOR TECHNICIAN SERVICES NO. 821

CHARGE CODE 225-01 CUSTOMER LANC
REQUESTED BY B. WATSON DATE 28 JAN 91
ESTIMATED HOURS 3 REQ'D COMPLETION DATE 29 JAN
UNITS TO BE SHIPPED: YES ~~NO~~ ACTUAL COMPLETION DATE 31 Jan
TECHNICIAN SIGNATURE To Motion

TASK DESCRIPTION:
LASER INITIATED ACTUATOR
BUILD 4 ASSEMBLIES (w/HMX)
1. LOAD 4 ASSEMBLIES AS FOLLOWS:
A. REF X57-8284
B. USE UNIT WITH A WOOD CLOSURE DISK.
C. LOAD WITH APPROX 8 MG OF HMX w/ CARBON BLACK (E285053)
- DOWN STOP THE LOAD RAM IN THE FUNNEL
- REMOVE RAM/FUNNEL
- USE Ø.076 RAM AND CONSOLIDATE AT 10,000 psi (45.4 lbs)
D. INSTALL WINDOW (X57-8288)
E. MEASURE HEIGHT FROM TOP OF HOUSING TO THE WINDOW AND RECORD.
(DIMENSION "a")
F. MEASURE HEIGHT OF INSERT AND RECORD.
(DIMENSION "b")
G. CALCULATE THE INSTALLATION DEPTH OF THE INSERT
UNITS S/N 15 16 17 18
DIMENSION "a" =
DIMENSION "b" =
"a" - "b" =

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 2

TECH REQUEST NO.

CHARGE CODE

225-01

REQUESTED BY

B. WATSON

CUSTOMER

LAW

TASK DESCRIPTION (CONTINUED)

H. Measure And Record Fiber Transmissivity
 I. Insert Fiber/Insert To Light Fiber Light (714-02)
 J. Measure Distance From Top Of Housing To Back
 OF INSERT. (This Value Should Be Close To That
 Value Found In Step G, "a-b").
 K. Record Configuration

Average S/N

LO NOEN FISHY/BOOY S/N

MAX S/N

Fiber Transmissivity (THOU)

15

15

17

1731

16

16

18

1761

17

17

19

1428

18

18

11

1557

L. Do Not X-Ray (Can't See Much).

Bruce Watson

ENGINEERING LABORATORY PROCESS AND CONFIGURATION RECORD (PCR)				Unidyne Co. Phoenix, Inc.		CODE IDENT. 12079	TECH REQ NO.	
PART NO. X51-8284		DWS REV N/A	NOMENCLATURE LANL LASER OPTIC ACTUATOR			CUSTOMER K&B Alamos		CHARGE CODE M225010
SERIAL NO.		POWDER: LOT NO. HMx/3% Carbon Black	POWDER: LOT NO. N/A	POWDER: LOT NO. N/A	BW TYPE: N/A	LOADED BY:		
S/N THRU					W PER FT: N/A	DIAM: N/A		Mosier
LOAD TOOL NO. 20-8395-1		DWELL TIME: 20 SEC		CONSOLIDATED PRESSURE: (psi) 10,000 LOAD FORCE: (lbs) 45			DATE STARTED: 1-28-91 DATE COMPLETED: 1-30-91	

LOAD Study for HMx/Carbon Black 3%

DATA RECORD

UNIT SERIAL NO.	01	02	03	04	05	06	07	08	09	10
Gross Weight	.4585	.4553	.4571	.4557	.4490					
Tare Weight	.4520	.4499	.4511	.4498	.4429	.4499	.4488	.4501	.4481	.4533
Net Weight	.0065	.0054	.0060	.0059	.0061					
45										
Actuator S/N	15	16	17	18						
Load Piston/Body	15	16	17	18						
Fiber S/N	17	18	19	11						
Fiber Transmissivity	.731	.761	.428	.657						
GAP Measurement										
DIMENSION "A"	.046	.048	.049	.047						
DIMENSION "B"	.045	.049	.051	.048						
DIMENSION "A-B"	-.001"	+.001"	+.002"	+.001"						
Firing										
Pass										
Fail	✓	✓	✓	✓						

SHEET 1 OF 2

REQUEST FOR TECHNICIAN SERVICES

NO. 822CHARGE CODE 225-01 CUSTOMER LANLREQUESTED BY B. WATSONDATE 4 FEB 91ESTIMATED HOURS 5REQ'D COMPLETION DATE 6 FEBUNITS TO BE SHIPPED: ~~YES~~NOACTUAL COMPLETION DATE 5 FEB 91TECHNICIAN SIGNATURE T. Mosier

TASK DESCRIPTION:

LASER INITIATED ACTUATORSBUILD 4 ASSEMBLIES (w/ Ti/KClO₄ & 100 MICRON FIBERS)1. BUILD A MINIMUM OF FOUR (4) FIBER OPTIC CABLES USING 100 MICRON FIBERS.2. LOAD 4 ASSEMBLIES AS FOLLOWS:A. REF X51-8284B. USE "BODIES" WITH A WOODEN CLOSURE DISK.

EL 9251

C. LOAD "BODY" WITH APPROXIMATELY 8 MG OF Ti/KClO₄ (2.250g)- DRAIN STOP THE LOAD RAM IN THE FUNNEL- REMOVE RAM & FUNNEL- USE Ø.076 RAM AND CONSOLIDATE AT 5000 PSI (22.7 lbs)D. INSTALL "WINDOW".E. MEASURE HEIGHT FROM TOP OF "BODY" TO THE "WINDOW" AND RECORD (DIM 'a'). F. MEASURE OVERALL HEIGHT OF THE INSULT AND RECORD (DIM 'b').

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 2

TECH REQUEST NO. _____ CHARGE CODE 225-01

REQUESTED BY B. WATSON CUSTOMER B. WATSON

TASK DESCRIPTION (CONTINUED)

G. CALCULATE THE INSTALLATION DEPTH OF THE INSERT

UNIT S/N	19	20	21	22
DIMENSION "a" =				
DIMENSION "b" =				
"a" - "b" =				

H. MEASURE AND RECORD FIBER TRANSMISSIVITY

I. INSTALL FIBER/INSERT TO LIGHT FINGER TIGHT (7 INCH)

J. MEASURE DISTANCE FROM TOP OF HOUSING TO BACK OF INSERT. (THIS MEASURED VALUE SHOULD BE CLOSE TO THE VALUE FOUND IN STEP G = "a" - "b").

K. RECORD CONFIGURATION

ACTUATOR S/N	LOADING POSITION/BOOM S/N	FIBER S/N	FIBER TRANSMISSIVITY (INCH)
19	19	19	
20	20	20	
21	21	21	
22	22		

L. DO NOT X-RAY.

ENGINEERING LABORATORY PROCESS AND CONFIGURATION RECORD (PCR)				University Phoenix, Inc.		CODE IDENT. 12079		TECH REQ NO.	
PART NO. X51-8284		DWS REV		NOMENCLATURE LNLA Laser Initiated Actuators				CUSTOMER Los Alamos	
SERIAL NO.		POWDER: LOT NO. T ₁ /KClO ₄		POWDER: LOT NO. N/A		POWDER: LOT NO. N/A		BW TYPE: N/A	
S/N THRU		EL 90511				Ω PER FT: N/A		DIAM: N/A	
LOAD TOOL NO.		DWELL TIME: 20 sec		CONSOLIDATED PRESSURE: (psi) 5,000				DATE STARTED:	
				LOAD FORCE: (lbs) 23				DATE COMPLETED:	
								MOBIL	

[illegible]

CRANE

UNIDYNAM CM/PHOENIX

DISTRIBUTION:

Original - D. Richardson

Q.C. Eng. M. DEFFENBAUGH

Ann Walker

Other Distribution _____

SHEET 1 OF 3

REQUEST FOR TECHNICIAN SERVICES

NO. 830CHARGE CODE 225-01 CUSTOMER LANLREQUESTED BY B. WATSONDATE 22 FEB 91ESTIMATED HOURS 6REQ'D COMPLETION DATE 25 FEBUNITS TO BE SHIPPED: ~~YES~~NO XACTUAL COMPLETION DATE 27 FebTECHNICIAN SIGNATURE Jerry Mosier

TASK DESCRIPTION:

LASER INITIATED ACTUATORSI. BUILD 10 FIBER OPTIC CABLES w/ 100µm FIBERS (3/4 22-)A. STRIP FIBERS WITH THE NEWLY ACQUIRED "KLEIN" STRIPPERSB. PUT "FIBERS" INTO THE "INSERTS" WITH BFG A-1177-B. CURE AT ROOM AMBIENT. THE POINTING SHOULD CONTACT THE BARE GLASS OF THE "FIBER" TO ASSURE ADHESION.C. POLISH THE FIBER ENDS. BE SURE TO CLEAN THE FIBERS AFTER USING THE COARSE ABRASIVE PAD AND PRIOR TO THE FINE ABRASIVE PAD. CLEAN THOROUGHLY AFTER POLISHING AND VISUALLY INSPECT FOR FIBER TIP QUALITY.II. LOAD 6 ASSEMBLIES AS FOLLOWS:A. REF XST-8284 (ASSY DWG)B. USE "BOOIES" WITH WELDED "CLOSURE DISKS". (DIA'd)C. MEASURE "BODY" BORE w/ DECAUNICS PINS TO .0001 INCH AND REGRIND.D. MEASURE AND REGRIND HEIGHT FROM "CLOSURE DISK" END TO TOP OF PISTON (DIMENSION "b").E. LOAD WITH APPROXIMATELY 8 MG OF Ti/KClO₄ (0.90509).- DO NOT LOAD RAM IN FUNNEL- REMOVE RAM AND FUNNEL- USE 0.076 RAM AND CONSOLIDATE AT 5000 PSI (22.7 LOS).

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 3

TECH REQUEST NO. _____ CHARGE CODE 225-01

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

G. EVEN SO CHECK, USE A $\sim \phi .070$ INDICATOR END TIP TO MEASURE THE HEIGHT FROM THE "CLOSURE DISK" END TO THE TOP OF THE WINDOW, AND RECORD (DIMENSION 'E').

F. MEASURE WINDOW THICKNESS AND RECORD (DIMENSION 'D').
INSTALL WINDOW.

H. MEASURE AND RECORD OVERALL HEIGHT OF THE INSERT (DIMENSION 'E'),
CALCULATE THE INSTALLATION DEPTH OF THE INSERT (DIMENSION 'F').

I. MEASURE AND RECORD FIBER TRANSMISSIVITY

J. INSTALL "FIBER/INSERT" INTO "BODY" TO A LIGHT FINGER TIGHT (7 IN-02).

K. MEASURE DISTANCE FROM THE "CLOSURE DISK" END TO THE TOP OF THE "INSERT" (DIMENSION 'G').

(THIS DIMENSION 'G' SHOULD BE CLOSE TO DIMENSION 'F' TO ASSURE PROPER INSTALLATION).

L. RECORD CONFIGURATION

	ACTUATOR	LOADED PISTON/BODY	FIBER
	S/N	S/N	S/N
Begin	22		22

M. DO NOT X-RAY.

SHEET 3 OF 3

LASER INITIATED ACTUATOR
X51-B284-1

LASER INITIATED ACTUATOR

ASSEMBLY DATA SHEET

ACCT: 225-010

TECH REQ NO: _____

DIMENSION	ASSEMBLED UNIT S/N									
a BODY BORE										
b TO TOP OF PISTON										
c TO TOP OF POWDER										
d WINDOW THICKNESS										
e INSERT LENGTH										
f (c+d+e)										
g* TO TOP OF INSERT										
POWDER WEIGHT (gms)										
POWDER DENSITY wt / [(c-b)(a)(a)pi/4]										
FIBER TRANSMISSIVITY										

* THIS VALUE SHOULD BE WITHIN .001 TO .002 INCH OF THE VALUE OF DIMENSION "f" TO ASSURE PROPER INSTALLATION OF THE INSERT.

LASER INITIATED ACTUATOR

ASSEMBLY DATA SHEET

ACCT: 225-010

TECH REQ NO: 830

Fiber serial No. 22 23 24 25 26 27 28

DIMENSION	ASSEMBLED UNIT S/N									
UNIT SERIAL No.	028	029	030	031	026	033	025			
a BODY BORE	.0786	.0785	.0787	.0786	.0785	.0786	.0786			
b TO TOP OF PISTON	.206	.204	.205	.205	.204	.206	.205			
c TO TOP OF WINDOW	.2690	.2700	.2670	.2640	.2610	.2660	.2720			
d WINDOW THICKNESS	.003	.003	.003	.003	.003	.003	.003			
e INSERT LENGTH	.150	.150	.148	.150	.151	.151	.150			
f (c+e)	.419	.420	.415	.414	.412	.417	.422			
g TO TOP OF INSERT	.419	.417	.411	.425	.411	.4135	.423			
POWDER WEIGHT (gms)	.0084	.0080	.0083	.0078	.0071	.0079	.0086			
POWDER DENSITY % wt / [(c-b)(a)(a)pi/4]	1.677	1.528	1.679	1.663	1.571	1.656	1.614			
FIBER TRANSMISSIVITY										

* THIS VALUE SHOULD BE WITHIN .001 TO .002 INCH OF THE VALUE OF DIMENSION "f" TO ASSURE PROPER INSTALLATION OF THE INSERT.

B. Watson LANL LASER INITIATOR

SHEET 1 OF 4**REQUEST FOR TECHNICIAN SERVICES**NO. 835CHARGE CODE 235-01 CUSTOMER LANCREQUESTED BY B. WATSONDATE 8 MAR 91ESTIMATED HOURS 6REQ'D COMPLETION DATE 11 MARUNITS TO BE SHIPPED: ~~YES~~ NO XACTUAL COMPLETION DATE 13 MARCH 91TECHNICIAN SIGNATURE Jerry Mosier**TASK DESCRIPTION:**LASER INITIATED ACTUATORS

- 120
I. BUILD 6 FIBER OPTIC CABLES W/ 100UM FIBERS AND SERIALIZE.
A. STRIP FIBERS WITH "KUN" TOOLS.
B. ATTACH/SHRINK SLEEVING AS SHOWN BELOW:

- C. PUT "FIBERS" INTO THE "INSERTS" WITH BFG A-117-B. CURE AT ROOM TEMPERATURE FOR 8 HOURS OR AT 150°F FOR 2 HOURS. THE PUTTING MUST CONTACT THE GLASS TO ASSURE ADHESION.
D. POLISH THE FIBER ENDS. BE SURE TO CLEAN THE FIBERS AFTER THE COARSE ABRASIVE PAD AND PRIOR TO THE FINE ABRASIVE PAD. CLEAN THOROUGHLY AFTER POLISHING AND VISUALLY INSPECT FOR FIBER TIP QUALITY.

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 4

TECH REQUEST NO. _____ CHARGE CODE 225-01

REQUESTED BY B. WATSON CUSTOMER LAIL

TASK DESCRIPTION (CONTINUED)

I. See 1 Assembles As Follows:

A. REFERENCE DRAWING 151-8324

B. USE "RINGS" WITH WELDED "CLOSURE DISK".

C. MEASURE "BODY" BORE WITH ELECTRONICS PINS TO .0001 INCH AND RECORD (DIM "a").

D. MEASURE AND RECORD LENGTH FROM "CLOSURE DISK"-END TO TOP OF PISTON (DIM "b").

E. LOAD WITH APPROXIMATELY 9 MILLIGRAMS OF T1/KClO4 (290509).

- DEAD STOP RAM IN FUNNEL

- REMOVE RAM AND FUNNEL

- USE A Ø.076 RAM AND CONSOLIDATE AT 5000 PSI (22.7 LBS)

F. MEASURE "WINDOW" THICKNESS AND RECORD (DIM "c").

G. PLACE "WINDOW" ON TOP OF POWDER CHARGE.

MEASURE THE HEIGHT FROM THE "CLOSURE DISK"-END TO TOP OF THE "WINDOW" AND RECORD (DIM "d").

REMOVE THE "WINDOW".

H. MEASURE AND RECORD OVERALL LENGTH OF THE "INSERT" (DIM "e").

I. CALCULATE THE "INSTALLATION HEIGHT" OF THE INSERT (DIM "f").

J. MEASURE AND RECORD FIBER TRANSMISSIVITY

K. INSTALL "FIBER/INSERT" INTO THE "BODY" TO A LIGHT FINGER TIGHT (APPROX 7 IN-OZ).

L. MEASURE DISTANCE FROM "CLOSURE DISK"-END TO TOP OF "INSERT" (DIM "g").

M. VERIFY THAT DIMENSIONS "f" AND "g" ARE WITHIN .003 INCH OF EACH OTHER TO ASSURE PROPER INSTALLATION.

N. RECORD CONFIGURATION ON DATA SHEET

(ie, ACTIVATOR S/N, FIBER S/N, etc).

O. DO NOT X-RAY (NOT MUCH CAN BE SEEN).

Laser Initiated Activator
XSI-8284-1

ASSEMBLY DATA SHEET

TECH REQ NO: _____

Sheet 4 of 4

ASSEMBLY S/N										
FIBER S/N										
a BODY BORE										
b TO TOP OF PISTON										
c WINDOW THICKNESS										
d TO TOP OF WINDOW										
e INSERT LENGTH										
f (calculation = d-c+e)										
g TO TOP OF INSTALLED INSERT										
VERIFY PROPER INSTALLATION* (f)-(g)										
POWDER WEIGHT wt (gms)										
POWDER DENSITY wt / [(d-c)(a)(a)(pi/4)]										
FIBER TRANSMISSIVITY										

* THIS CALCULATED VALUE MUST BE LESS THAN +/- .003 TO ASSURE PROPER
PROPER INSTALLATION OF THE INSERT WITHIN THE BODY.

TECH REQ NO.

CODE IDENT.

Unit Dynamics
Pneumatics Inc.

ENGINEERING LABORATORY
PROCESS AND CONFIGURATION RECORD (PCR)

ART NO.

CHARGE CODE

12079

1225010

CUSTOMER
Alamos

LOADED BY:
J. Mosier

DIAM: na

BW TYPE: na
Ω PER FT: na

DATE STARTED:
DATE COMPLETED:

LANL Laser Initiators

POWDER:
LOT NO. na

POWDER:
LOT NO. na

CONSOLIDATED PRESSURE: (psi) 5,000
LOAD FORCE: (lbs) 22

POWDER: T/KCLO4
LOT NO. EL90509

DWELL TIME:
20 Sec.

THRU

OAD TOOL NO.

20-8395-1

Bruce Watson

UNIT SERIAL NO.

8mg 8mg 8mg 8mg 8mg

Gross Weight(5)

Tare Weight(5)

Net Weight

4593 .4621 .4591 .4602 .4584
4514 .4536 .4507 .4521 .4500
0079 .0085 .0084 .0081 .0084

ASSEMBLY DATA SHEET

TECH REQ NO: 835

ASSEMBLY S/N	34	35	36	37	38					
FIBER S/N	030	031	032	033	034					
a BODY BORE	.0781	.0782	.0781	.0781	.0783					
b TO TOP OF PISTON	.202	.202	.201	.202	.201					
c WINDOW THICKNESS	.003	.003	.003	.003	.003					
d TO TOP OF WINDOW	.367	.368	.370	.368	.368					
e INSERT LENGTH	.048	.046	.050	.047	.050					
f (calculation = d-c+e)	.412	.411	.417	.412	.415					
g TO TOP OF INSTALLED INSERT	.410	.417	.415		.412					
34, 36 VERIFY PROPER INSTALLATION* (f)-(g)	.002 ✓	.006 ✓	.002 ✓		.003 ✓					
POWDER WEIGHT wt (gms)	.0079	.0085	.0084	.0081	.0084					
POWDER DENSITY wt / [(d-c)(a)(pi/4)]	1.6231	1.7142	1.6212	1.6376	1.6634					
FIBER TRANSMISSIVITY										

129 1 140
* THIS CALCULATED VALUE MUST BE LESS THAN +/- .003 TO ASSURE PROPER
PROPER INSTALLATION OF THE INSERT WITHIN THE BODY.

hwhh-0000

SHEET 1 OF

4

REQUEST FOR TECHNICIAN SERVICES

NO. 840

CHARGE CODE 225-01 CUSTOMER LANCREQUESTED BY B. WATSONDATE 27 MAR 91ESTIMATED HOURS 8REQ'D COMPLETION DATE 29 MARUNITS TO BE SHIPPED: ~~YES~~NO ☒ACTUAL COMPLETION DATE 23 APRIL 91

TECHNICIAN SIGNATURE

BLW

TASK DESCRIPTION:

LASER INITIATED ACTUATORSI. BUILD 6 FIBER OPTIC CABLES W/ 120 μ m FIBERS AND SOLDER.

A. STRIP FIBERS WITH "KLEIN" TOOLS

B. ATTACH STRIP SLEEVING AS SHOWN BELOW:

C. POT "FIBERS" INTO THE "INSULATORS" WITH BEG A-1177-B. CURE AT ROOM TEMPERATURE FOR 8 HOURS -OR- AT 150°F FOR 2 HOURS.

THE POTTING MUST CONTACT BARE GLASS TO ASSURE ADHESION.

D. POLISH THE FIBER ENDS. BE SURE TO CLEAN THE FIBERS AFTER THE COARSE ABRASIVE WHEEL AND PRIOR TO USING THE FINE ABRASIVE WHEEL. CLEAN THOROUGHLY AFTER POLISHING AND VISUALLY INSPECT FOR FIBER TIP QUALITY.

(1) NOTE: THESE INSULATORS SHOULD HAVE BEEN ALREADY THREADED INTO 'BODIES' TO ASSURE THREAD MATING. THESE PARTS SHALL BE TRACED AS "MATCHED SETS" TO IMPROVE ASSEMBLY YIELD.

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 4

TECH REQUEST NO. _____ CHARGE CODE 225-01

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

II. LOAD 6 ASSEMBLIES AS FOLLOWS:

A. REFERENCE DRAWING X57-8284

B. USE "BODIES" WITH WOODEN "CLOSURE DISKS".

C. MEASURE "BODY" BORE WITH DELTRONICS PINS TO .0001 INCH AND RECORD (DIM "a").

D. MEASURE AND RECORD HEIGHT FROM "CLOSURE DISK"-END TO TOP OF PISTON (DIM "b").

E. LOAD WITH APPROXIMATELY 8 MILLIGRAMS OF $Ti/KClO_4$ (2290509)

- DEAD STOP RAM IN FUNNEL

- REMOVE RAM AND FUNNEL

- USE $\phi .076$ RAM TO CONSOLIDATE AT 5000 PSI (22.7 LBS)

F. MEASURE "WINDOW" THICKNESS AND RECORD (DIM "c")

G. PLACE "WINDOW" ON TOP OF POWDER CHARGE.

MEASURE THE HEIGHT FROM THE "CLOSURE DISK"-END TO THE TOP OF THE "WINDOW" AND RECORD (DIM "d").

REMOVE THE "WINDOW".

H. MEASURE AND RECORD THE OVERALL LENGTH OF THE "INSERT" (DIM "e").

I. CALCULATE THE "INSTALLATION HEIGHT" OF THE "INSERT" (DIM "f").

J. MEASURE AND RECORD THE FIBER TRANSMISSIVITY.

K. ATTACH THE TAPE "WINDOW", .001 INCH THICK MYLAR TAPE.

CUT TAPE "WINDOW" ROUND TO MATCH END OF THE "INSERT".

L. INSTALL "FIBER/INSERT/WINDOW" INTO "BODY" TO A LIGHT FINGER TIGHT (APPROX 7 IN-OZ).

M. MEASURE DISTANCE FROM "CLOSURE DISK"-END TO THE TOP OF "INSERT" (DIM "g").

N. VERIFY THAT DIMENSIONS "f" AND "g" ARE WITHIN .003 INCH.

O. RECORD CONFIGURATION ON DATA SHEET.

(IE, ACTUATOR S/N, FIBER S/N, ETC)

P. DO NOT X-RAY (NOT MUCH CAN BE SEEN)

SHEET 3 OF 4

LASER INITIATED ACTUATOR
X51-B284-1

ASSEMBLY DATA SHEET

TECH REQ NO: 840

ASSEMBLY S/N	37	40	41	42	43	44				
FIBER S/N	35	36	37	38	39	40				
a BODY BORE	.0786	.0720	.0776	.0777	.0780	.0779				
b TO TOP OF PISTON	.204"	.204	.205"	.205"	.205"	.205"				
c WINDOW THICKNESS	.003"	.003	.003	.003	.003	.003				
d TO TOP OF WINDOW	.263"	.259"	.259"	.262"	.259	.261				
e INSERT LENGTH	.053	.054	.052	.052	.052	.054				
f (calculation = d-c+e+.001)	.314	.311	.309	.312	.309	.313				
g TO TOP OF INSTALLED INSERT	.305	.311	.302	.310	.306	.309				
VERIFY PROPER INSTALLATION* (f)-(g)	.009	.000	.006	.002	.003	.004				
POWDER WEIGHT wt (gms)	.0079	.0072	.0073	.0079	.0075	.0074				
POWDER DENSITY wt / [(d-c)(a)(a)(pi/4)(16.39)]	1.80	1.81	1.85	1.88	1.88	1.79				
FIBER TRANSMISSIVITY										

* THIS CALCULATED VALUE MUST BE LESS THAN +/- .003 TO ASSURE PROPER
PROPER INSTALLATION OF THE INSERT WITHIN THE BODY.

SHEET 1 OF

REQUEST FOR TECHNICIAN SERVICES

NO. 854

CHARGE CODE 225-01 CUSTOMER LANL

REQUESTED BY B. WATSON

DATE 1 MAY 91

ESTIMATED HOURS 6

REQ'D COMPLETION DATE 3 MAY

UNITS TO BE SHIPPED: YES ☒

ACTUAL COMPLETION DATE 8 May

TECHNICIAN SIGNATURE Jerry Mosier

TASK DESCRIPTION:

LASER INITIATED ACTUATORSI. BUILD 9 FIBER OPTIC CABLES W/ 120 μ m FIBERS

A. SOLARIZE AS 3/4 41 thru 49

B. STRIP FIBERS WITH "KLEIN" TOOLS

C. ATTACH SHRINK SLEEVING AS SHOWN BELOW

D. CHECK THAT THE "INSERTS" WILL FULLY THREAD INTO THE "BODIES".

THESE WILL THEN BE MATCHED-SETS TO IMPROVE ASSEMBLY YIELD.

E. POT "FIBERS" INTO THE "INSERTS" WITH BFG A-1177-B.

CURE AT 150°F FOR 2 HOURS, MINIMUM.

THE POTTING MUST CONTACT BARE FIBER GLASS TO ASSURE ADHESION.

F. POLISH THE "FIBER" ENDS.

BE SURE TO CLEAN THE FIBERS AFTER USING THE COARSE ABRASIVE WHEEL AND PRIOR TO USING THE FINE ABRASIVE WHEEL. CLEAN THOROUGHLY AFTER POLISHING AND VISUALLY INSPECT FOR FIBER TIP QUALITY.

REQUEST FOR TECHNICIAN SERVICES CONTINUATION SHEET

SHEET 2 OF 2

TECH REQUEST NO. _____ CHARGE CODE 225-010

REQUESTED BY B. WATSON CUSTOMER LANL

TASK DESCRIPTION (CONTINUED)

II. LOAD 9 ASSEMBLIES AS FOLLOWS

- A. REFERENCE DRAWING X57-8284
- B. USE "BODIES" WITH WELDED "CLOSURE DISKS".
- C. MEASURE "BODY" BORE WITH DETRONICS PINS TO .0001 INCH AND RECORD (DIM "a").
- D. MEASURE AND RECORD HEIGHT FROM "CLOSURE DISK"-END TO TOP OF PISTON (DIM "b").
- E. LOAD WITH APPROXIMATELY 8 mg OF $Ti/KClO_4$ (2290509)
 - DEND STEP RAM IN FUNNEL
 - REMOVE RAM AND FUNNEL
 - USE A $\phi .076$ RAM AND CONSOLIDATE AT 5000 PSI (22.7 LBS)
- F. MEASURE "WINDOW" THICKNESS AND RECORD (DIM "c").
- G. PLACE "WINDOW" ON TOP OF POWDER CHARGE.
 - MEASURE THE HEIGHT FROM THE "CLOSURE DISK"-END TO THE TOP OF THE "WINDOW" AND RECORD (DIM "d").
 - REMOVE THE WINDOW ←
- H. MEASURE AND RECORD THE OVERALL LENGTH OF THE "INSERT" (DIM "e").
- I. CALCULATE THE INSTALLATION HEIGHT OF THE "INSERT" (DIM "f").
- J. HAVE ED SMO MEASURE AND RECORD FIBER TRANSMISSIVITY.
- K. ATTACH THE "TAPE-WINDOW" - .001 INCH THICK MYLAR TAPE.
 - CUT THE "TAPE-WINDOW" ROUND TO MATCH THE "INSERT" END.
- L. INSTALL "FIBER/INSERT/WINDOW" INTO THE "BODY" TO FINGER TIGHT (APPROX 7 OZ-IN).
- M. MEASURE DISTANCE FROM "CLOSURE DISK"-END TO THE TOP OF THE "INSERT" AND RECORD (DIM "g").
- N. VERIFY THAT THE DIMENSIONS "f" AND "g" ARE WITHIN .003.
- O. RECORD CONFIGURATION ON DATA SHEET
 - (IE, ACTUATOR S/N, FIBER S/N, ETC).
- P. DO NOT X-RAY (NOT MUCH CAN BE SEEN).

SHEET 3 OF 3

LASER INITIATED ACTUATOR
X51-8284-1

ASSEMBLY DATA SHEET

TECH REQ NO: 854

ASSEMBLY S/N	45	46	47	48	49	50	51	52	53	
FIBER S/N	41	42	43	44	45	46	47	47	49	
^a BODY BORE	.0785	.0784	.0786	.0783	.0786	.0787	.0783	.0785	.0783	
^b TO TOP OF PISTON	.205	.205	.205	.205	.206	.205	.205	.205	.205	
^c WINDOW THICKNESS	.003	.003	.003	.003	.003	.003	.003	.003	.003	
^d TO TOP OF WINDOW	.265	.257	.264	.266	.260	.268	.262	.264	.257	
^e INSERT LENGTH	.153	.154	.149	.152	.151	.153	.151	.154	.148	
^f (calculation = d-c+e+.001)	.416	.409	.411	.416	.409	.419	.411	.418	.403	
^g TO TOP OF INSTALLED INSERT	.416	.410	.416	.416	.418	.417	.413	.420	.415	
VERIFY PROPER INSTALLATION* (f)-(g)	.000	.001	.005	.000	.009	.002	.002	.002	.012	
POWDER WEIGHT wt (gms)	.0085	.0091	.0084	.0086	.0086	.0081	.0081	.0085	.0074	
POWDER DENSITY wt / [(d-c)(a)(a)(pi/4)(16.39)]	.41221	.45648	.40789	.41758	.37631	.41603	.39443	.41063	.37215	
FIBER TRANSMISSIVITY										

* THIS CALCULATED VALUE MUST BE LESS THAN +/- .003 TO ASSURE PROPER
PROPER INSTALLATION OF THE INSERT WITHIN THE BODY.

APPENDIX C
IMPROVED INSERT DISCUSSION

CRANE

UNIDYNAMICS/PHOENIX

UNIDYNAMICS/PHOENIX

• POST OFFICE BOX 46100 •

PHOENIX, ARIZONA 85063-6100

Refer to: P1-243

17 June 1991

Los Alamos National Laboratory
P. O. Box 1663
Los Alamos, NM 87545

Attention: Dave Ceman

Subject: Laser Initiated Actuator

Dear Mr. Ceman:

As part of the follow on program for the Laser Initiated Actuator we had requested that the unit overall length to be increased by .125 inch to improve assembly.

This increased length was to provide a hex on the end of the "fiber insert". As can be seen in the attached assembly drawing 51-8284, the "fiber insert" is completely recessed within the "body". This provides a very compact design but complicates the assembly procedure because of the limited access for torquing during installation.

The current installation tool has two prongs which were designed to fit between the minor diameter of the "body" threads and still clear the central optic fiber. This limits the prong dimensions to a .025 inch X .015 inch cross-section with .025 inch depth of engagement. This is a relatively small, delicate tool.

The current actuator assembly and insert design is shown on drawings X51-8284 and X51-8286, respectively. The proposed design for the actuator assembly and insert is shown on drawings X51-8720 and X51-8709.

By extending the "insert" length a number of benefits are derived.

1. The current "insert" design incorporates a slot. The recurring assembly problem encountered with the last program was that the vast majority of the inserts were rejects. Apparently the slotting of the part allowed it to deform due to residual machining stresses causing the threads to run oversize and bind during assembly.

Los Alamos National Laboratory
SUBJ: Laser Initiated Actuator

14 June 1991
Page 2

2. The slot feature of the current "insert" intersects the bore containing the fiber. When installing the fiber it is nearly impossible to restrict the adhesive from the slot. To allow for proper tool engagement during assembly tedious removal of the potting is required with the attendant risk of damage to the fiber.
3. The incorporation of a hex would allow use of a more standardized tool to improve installation torque. The installation torque is critical because if too high, can affect the powder consolidation and thereby its performance--and if too low will not provide a proper fiber/powder interface.
4. The extended "insert" could incorporate a shoulder to allow a fillet of sealant between it and the "body" to provide a better seal. (As opposed to the current design which requires the sealant to bridge across the two irregular surfaces of the terminating threads).

Sincerely,

Bruce Watson
Sr. Development Engineer

:aw

CURRENT DESIGN

I	V			FIBER OPTIC	200 MICRON	8
I	V		51-8286	CONNECTOR	VASCO MAX C-250	7
A/R	B			EPOXY		6
I	V		51-8288	WINDOW	MYLAR	5
TBD	X			Ti/C104		4
I	V		51-8289	DISC, CLOSURE	CRES 304L	3
I	V		51-8287	PISTON	VASCO MAX C-250	2
I	V		51-8285	BODY	VASCO MAX C-250	1
QTY REQD	SYM	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE Or. DESCRIPTION	MATERIAL/SPECIFICATION	ITEM NO.

PARTS LIST

UNIDYNAMICS CAD SYSTEM DRAWING			UNIDYNAMICS/PHOENIX		CRANE	
TITLE			PISTON ACTUATOR LASER INITIATED			
PART NO.			51-8284			
SCALE			10/1			
SHEET			1 OF 1			

ENGINEERING SKETCH
SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

DES NO. 51-8286 (B1)

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
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ENGINEERING SKETCH

SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER QDD-STD-100	CONTRACT NO.		CRANE UNIDYNAMICS/PHOENIX
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: DEC .XX±.03 .XXX±.010 ANGLES ±2°	E. SPOMER		
DASH NO.	NEXT ASSY	USED ON	MATERIAL: VASCO MAX C-250 (C-300 OPTIONAL)			TITLE INSERT, FIBER
APPLICATION						SCALE 10/1 WT

SIZE 12079 X51-8286

SHEET 1 OF 1

PROPOSED DESIGN

NOTES: UNLESS OTHERWISE SPECIFIED

- 1 CONSOLIDATE 8.0±1.0 MILLIGRAMS OF ITEM 4 TO TBD PSI USING TOOL 20-8375.

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	X

AR	B			SLEEVE	RAYCHEM	9
1				FIBER OPTIC	125 MICRON	8
1			51-8720	INSERT	VASCO MAX C-250	7
AR	B			EPOXY	MM-A-134 TYPE-1	6
1				WINDOW	MYLAR	5
1	X			Ti/KClO4		4
1			51-8289	DISC, CLOSURE	CRES 304L	3
1			51-8287	PISTON	VASCO MAX C-250	2
1			51-8285	BODY	VASCO MAX C-250	1
QTY	SYM	CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL/SPECIFICATION	ITEM NO.
-1						

PARTS LIST

-1 FINAL FINAL		CRANE UNIDYNAMICS/PHOENIX	
NEXT ASSY USED ON		PISTON ACTUATOR LASER INITIATED	
APPLICATION		CH2079 X51-8720	
		SCALE 10/1	

ENGINEERING SKETCH
SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

51-8720 11

51-8709

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

ENGINEERING SKETCH

SUBJECT TO CHANGE WITHOUT NOTICE
UNIDYNAMICS CAD SYSTEM DRAWING

			INTERPRET THIS DRAWING PER 000-STD-100	CONTRACT NO.		CRANE	UNIDYNAMICS/PHOENIX	PHOTOGRAPHIC REPRODUCTION
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON: DEC .XX±.03 .XXX±.010 ANGLES ±2°	DESIGN	B. WATSON			
								INSERT, FIBER
-1	51-8284	51-8284	MATERIAL: VASCO MAX C-250 (C-300 OPTIONAL)				SIZE CASE CODE	INS NO.
DASH NO.	NEXT ASSY	USED ON					B12079	X51-8709
APPLICATION							SCALE 10/1	SHEET 1 OF 1

DATE

FILMED

2/23/94

END