

Coherent Laser Training Catalog Customer and Service Training Program

*Description of Courses
for OEM Laser Sources (OLS)*

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TABLE OF CONTENTS

Introduction	vii
Training leads to productivity!	vii
Instructors	vii
Course Features	vii
Prerequisites	viii
Tuition	viii
Schedule	ix
Training Locations	ix
Remote Training	ix
Registration	ix
Training Terms and Conditions	xi
Terms of Certification	xi
Terms of Payment	xi
Training Agreement Expiration	xi
Cancellations by Trainees	xi
Cancellations by Coherent	xi
Reading the Course Descriptions	xiii
Continuous-Wave Lasers	1
OEM Courses	1
Azure OEM Course*	1
Verdi V-Family OEM Course*	1
Service Courses	2
Azure Service Course	2
Monolith Service Course	2
Verdi V-Family Service Course	3
Excimer Lasers	4
Operator Courses	4
COMPex Level-A Course (Operation)*	4
ExciStar XS/ExciStar Level-A Course (Operation)*	4
Indystar Level-A Course (Operation)*	5
LEAP Level-A Course (Operation)*	5
Lambda SX Level-A Course (Operation)*	6
Vyper Level-A Course (Operation)*	6
Maintenance Courses	7
COMPex Level-B Course (Maintenance)*	7
ExciStar XS/ExciStar Level-B Course (Maintenance)*	7
Indystar Level-B Course (Maintenance)*	8
LEAP Level-B Course (Maintenance)*	8
Lambda SX Level-B Course (Maintenance)*	9
UVMaP 42/50 Level-B Course (Operation, Maintenance)*	9
Vyper Level-B Course (Maintenance)*	10
Service Courses	11
COMPex Level-C Course (Service)*	11
ExciStar XS/ExciStar Level-C Course (Service)*	11

Coherent Laser Training Catalog

Indystar Level-C Course (Service)*	12
LEAP Level-C Course (Service)*	12
Lambda SX Level-C Course (Service)*	13
UVMap 42/50 Level-C Course (Service)*	13
Vyper Level-C Course (Service)*	14
Ion Lasers	15
Customer Courses	15
Innova 70C, 90C, 300C Customer Course	15
Innova 90C or 300C FreD/MotoFreD Customer Course	15
Innova Sabre Customer Course	16
Innova Sabre FreD/MotoFreD Customer Course	16
Service Courses	17
Innova 70C/StarC Service Course	17
Innova 90C/300C Service Course	17
Innova 90C FreD/300C MotoFreD Service Course	18
Innova Sabre Service Course	18
Innova Sabre MotoFreD Service Course	19
Q-Switched and NS Lasers	20
OEM Courses	20
Avia OEM Course	20
Avia NX OEM Course	20
Matrix OEM Course	21
Service Courses	22
Avia Low Power (266-3, 355-7/10/14, 532-23) Service Course	22
Avia High Power (355-20/23/28 & 532-30/38/45) Service Course	22
Avia NX Service Course	23
Matrix Service Course	23
Short-Pulsed Lasers	24
Customer Courses	24
Hyper Rapid NX/NXT Customer Course	24
Monaco Customer Course	24
Rapid NX Customer Course	25
OEM Courses	25
Hyper Rapid NX/NXT OEM Support Service Course*	25
Monaco OEM Course	26
Paladin OEM Course*	26
Rapid NX OEM Support Service Course*	27
Service Courses	27
Classic Rapid Series Service Course	27
Hyper Rapid NX/NXT Service Course*	28
Monaco Service Course*	28
Paladin Service Course*	29
Rapid NX Service Course*	29
Ultrafast Amplifiers Lasers	30
Customer Courses	30
Evolution 15/30/45 Customer Course	30
Evolution 75/90/HE Customer Course	30
Legend (Any Version) Customer Course	31

OPerA Solo Customer Course	31
RegA 9000 or 9050 Customer Course	32
RegA OPA Customer Course	32
Revolution Customer Course	33
Topas-Prime Customer Course	33
Service Courses	34
Evolution 15/30/45 Service Course	34
Evolution 75/90/HE Service Course	34
OPerA Solo and Topas-Prime Service Course	35
RegA 9000 Service Course	35
RegA 9050 Service Course	36
RegA OPA Service Course	36
Revolution Service Course	37
Ultrafast Amplifier Level I (Legend, Libra, Astrella) Service Course	37
Ultrafast Amplifier Level II (Legend, Libra, Astrella) Service Course	38
Ultrafast Oscillators Lasers	39
Customer Courses	39
Chameleon Discovery Customer Course	39
Chameleon Ultra/Ultra II/Vision/Vision-S Customer Course	39
Mira (Femto or Pico) Customer Course	40
Mira (Dual) Customer Course	40
Mira Accessories (Pulse Picker, Synchrolock AP, Harmonic Generator or Pulseswitch) Customer Course	41
Mira-OPO (Any Version) Customer Course	41
Service Courses	42
Chameleon Discovery Service Course	42
Chameleon Ultra/Ultra II/Vision/Vision-S Service Course	42
Chameleon Compact OPO Service Course	43
Mira Service Course	43
Mira Accessories Service Course	44
Mira-OPO Service Course	44
Vitara-T & Vitara-T HP & Vitara-S Hybrid and CPC II Service Course	45
Vitara-S Service Course	45
Vitara CEP Service Course	46

INTRODUCTION

Training leads to productivity!

Coherent offers training courses in our Laser Training Center or at your facility. Training can help to maintain optimum laser performance, increase the life of your laser, and improve your product quality. In addition, we offer custom courses tailored to your specific requirements – preventative maintenance, process optimization, application development, and much more.

We offer:

- Customer basic training to ensure the best operation of your system
- Customer advanced training to ensure the highest productivity of your system
- Customized training adapted to your needs

Participants who successfully complete a laser training course will gain a level of knowledge and skill that will allow them to effectively and efficiently operate, optimize, and maintain their laser system.

The customer must have purchased and received a Coherent laser system before attending a training course.

Instructors

Our instructors have extensive knowledge and experience in their areas of product specialty. They have gained their expertise through formal education and by working in various fields, such as manufacturing, customer service, and engineering. Each instructor creates a professional and comfortable environment that is ideal for learning.

Course Features

Our courses are unique and can be a powerful tool to increase your performance and effectiveness in the workplace. Key features and benefits of the Coherent laser training program include:

- Individually tailored courses designed to meet the specific needs of our trainees.
- Small course sizes, ensuring a generous amount of individualized attention and hands-on experience with the laser system.

- Emphasis on laser safety
- Professional, experienced instructors
- For factory training: dedicated training laboratories
- Emphasis on hands-on lab time and formal lectures during the theoretical portion of the courses.
- Course materials -- including manuals, books, videos and, in some cases, tools -- are included in the course tuition.
- Official certification upon successful course completion

Prerequisites

- The customer must have purchased and received a Coherent laser system before attending a training course.
- Trainees should be able to read and speak English or German. A good knowledge of how to read schematics and/or block diagrams is also very helpful.
- A pre-course questionnaire must be completed and returned to Coherent at least two weeks before the start of the course.
- Trainees must complete the on-line laser safety training provided by Coherent and must pass the quiz that follows, prior to attending a training course.
- For on-site training, a system and a proper training room needs to be made available for the duration of the training course.
- Training at Göttingen and Hamburg: trainees from Germany need EFK qualification and all others need an electrical qualification.

Tuition

- Customer's site: is billed at a daily training fee plus a travel charge.
Courses are performed at the Customer's site, using the customer's equipment. The laser must be available during the entire training and not installed in any equipment.
- Factory: is billed at a daily training fee.
Courses are performed at one of the Coherent Laser Training Centers factory sites, location will be listed. Trainees will be taught on a representative laser system.

Schedule

- All courses are scheduled upon a customer request.

Training Locations

- Santa Clara, California
- Plymouth, Michigan
- Göttingen, Germany
- Hamburg, Germany
- Kaiserslautern, Germany
- Mainz, Germany
- Munich, Germany
- Belp, Switzerland
- Tampere, Finland
- Shanghai, China
- Tokyo, Japan
- Anseong, Korea

Remote Training

Some of our courses are now offered either partially or entirely remote for your safety and convenience. For example, the Hybrid classes are divided by their naming convention of 'Hybrid I' and 'Hybrid R' to show an in-person portion (I) and a remote portion (R). You need to take both the Hybrid R and Hybrid I course to be certified entirely on the system. There are also some courses that are entirely remote. These courses are denoted by an asterisk (*) at the end of the title and an additional line in the description to indicate that the course has been adjusted.

For questions, please contact your local Training Coordinator.

Registration

To register for a course, contact one of our Coherent Laser Training Centers. You can find the contact information here:

www.coherent.com/support/main/training

Or fill out our Training Course Inquiry Form here:

www.surveymonkey.com/r/Training_Course_Inquiry_Form

Did you find the course you wanted?

If you do not find a course you are looking for, there are some courses available that do not appear in the catalog. We can prepare special courses to meet specific laser training needs.

A minimum of 8 weeks prior notification is required to process requests for special courses. This includes requests to conduct standard laser training courses, courses listed in this catalog, and courses intended to take place away from a Coherent Laser Training Centers. All courses are scheduled at a customer request.

TRAINING TERMS AND CONDITIONS

Terms of Certification

Certification for courses attended will apply only while you are under the employment of the company for which you trained. When/if you are no longer employed by that company, your certification will no longer be valid or recognized by Coherent.

Terms of Payment

The invoiced amount, or purchase order number, is due at registration.

Training Agreement Expiration

Paid training must be taken within 1 year of the purchase of the laser system and training. Discounted training must be taken within 6 months of the purchase of the laser system and training.

Cancellations by Trainees

If you need to cancel your participation in a laser training course, the following fees will apply:

- **For cancellation notice received more than 20 business days before the scheduled course**, no fee is charged.
- **Between 10 and 20 business days before the scheduled course**, a 25% cancellation fee is charged.
- **Fewer than 10 business days before the scheduled course**, 100% of the fee is charged. We recommend you substitute another individual in your place. Participation substitution is acceptable anytime, without penalty.
- **Cancellation notice of a discounted course must be received 20 business days before the scheduled course**, or the discount will be forfeit and the standard training fee will be charged for the rescheduled course.

Cancellations by Coherent

There is a minimum required number of trainees per course. Courses not meeting the attendance requirement are subject to cancellation. Coherent will notify trainees of a course cancellation no fewer than 15 days prior to course start date. At that time, alternative course dates or a priority position on the laser training course waiting list will be provided to the trainee.

In general, Coherent cannot guarantee that a course will proceed as scheduled. We strongly advise that Trainees purchase trip insurance as Coherent accepts no financial responsibility in the event that a training course is canceled.

READING THE COURSE DESCRIPTIONS

1 → **Monaco OEM Course**

2 → **Location:** Customer's Site(or Factory

3 → Santa Clara, CA, USA

4 → **Audience:** OEMs and end customers

5 → **Part #:** 1391849(or 1391850

6 → **Course length:** 1 day

7 → **Day(s):** Upon availability

8 → **Begin:** 9:00 AM **End:** 5:00 PM

9 → **Number of Students:** minimum-2 per system / maximum-4

10 → **Course Description:** The Monaco Customer course prepares trainees to install, operate, optimize, and maintain the laser. Firmware upgrade, computer control, datalogs and remote diagnostics and adjustments are also covered.

11 → **Key Topics:** Laser, electrical, and lab safety; ESD awareness; thermal management; laser head overview; laser installation and operation; RS-232/USB/Ethernet operation; shutter replacement; firmware upgrade; fault code identification and service response

12 → **Prerequisites:** An understanding of basic laser theory and electro-optic devices is recommended. An understanding of basic AC/DC electronics is also helpful. Complete product knowledge requires a good understanding of various electronic and optical devices and their role in the circuit.

#	LABEL	DESCRIPTION
1	—	Title of laser training course.
2	Location	Indicates if the training is at the factory or at the customer's site.
3		Indicates the location of the factory Laser Training Center.
4	Audience	Who the course is intended for.
5	Part #	Part number of the training course.
6	Course length	Number of full days for standard training course.
7	Day(s)	The courses are normally offered on business days. Trainees will be notified at time of registration of any changes.
8	Begin – End	The course start and end time, local time. Trainees will be notified at time of registration of any changes.
9	Number of Students	Minimum and maximum number of students per course.
10	Course Description	Overview of educational objectives for the training course.
11	Key Topics & Optional Topics	Specific topics addressed during the training course. Requests for training on any of the listed optional topics should be made at least 30 days prior to the scheduled course start date.
12	Prerequisites	Pre-training and knowledge requirement list for the selected training course. Contact the Coherent Laser Training Center if you have any questions or would like additional information.

CONTINUOUS-WAVE LASERS

OEM Courses

Azure OEM Course*

Location: Customer's Site or Factory **Part #:** 1391708 or 1391709 **Course length:** 1 day **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: This Azure OEM course is for OEMs and end customers. The course covers all procedures needed to operate and maintain the Azure laser. This course is a lecture based course, but includes lab exercises and demonstrations.

Key Topics: Laser, electrical, and lab safety; basic theory of operation; optical cavity and identification of components; specifications; installation; operation and electronics troubleshooting; troubleshooting performance issues.

Prerequisites: Trainees must have an electronics troubleshooting background, basic theoretical understanding of optics, and nonlinear processes, and some exposure to ring lasers and optically pumped lasers.

* **Remote Training Option:** 75% remote option (6) hours over 1 day with 2-hours in-person for the remaining 25%. All topics covered except the FRU Replacement and Installation of hardware.

Verdi V-Family OEM Course*

Location: Customer's Site or Factory **Part #:** 1391956 or 1391957 **Course length:** 2 days **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Verdi OEM course is for OEMs and end customers. The course prepares trainees to install, operate, and maintain the laser. Trainees will learn how to teach others to control and operate the laser. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser.

Key Topics: Laser, electrical, and lab safety; thermal management; FAP diagnosis, replacement, and calibration; SHG temperature optimization; head-power supply swaps; RS-232 operation; software upgrades.

Prerequisites: Some experience with lasers and laser safety is ideal. An understanding of optics and electronics is recommended.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except the FRU replacement and installation of hardware.

Service Courses

Azure Service Course

Location: Factory Santa Clara, CA, USA	Part #: 1391710	Course length: 2 days	Day(s): Upon availability
		Begin: 9:00 AM	End: 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Azure Service course covers all procedures needed to operate and service the Azure laser. This course is primarily a hands-on course, including extensive lab exercises. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; optical cavity and identification of components; specifications; installation; operation and electronics troubleshooting; troubleshooting performance issues.

Prerequisites: Successful completion of the Verdi Service course. An electronics troubleshooting background, basic theoretical understanding of optics, and nonlinear processes is ideal, and some exposure to ring lasers and optically pumped lasers.

Monolith Service Course

Location: Factory Santa Clara, CA, USA	Part #: 1391854	Course length: 2 days	Day(s): Upon availability
		Begin: 9:00 AM	End: 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Monolith Service course prepares trainees to install, operate, optimize, troubleshoot to the controller or laser head level of the full Monolith range of products; Mephisto (all variants), Prometheus, MOPA (all variants) and how to maintain the lasers. Course content ranges from theory of operation, understanding the full product portfolio and legacy, to basic troubleshooting. Upon successful completion of the course, trainees should be able to train others to control and operate the lasers.

Key Topics: Laser, electrical, and lab safety; thermal management; laser layout; laser head overview; previous versions; controller overview; laser installation; key laser parameters; customer test-sheet parameter overview; monitor signals; optimization and troubleshooting routines.

Prerequisites: Some experience with lasers and laser safety is recommended.

Verdi V-Family Service Course

Location: Factory Santa Clara, CA, USA	Part #: 1391955	Course length: 5 days	Day(s): Monday – Friday
		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps		Number of Students: minimum-2 / maximum-4	

Course Description: The Verdi Service course prepares trainees to install, operate, troubleshoot to the board level, repair, and maintain the Verdi family of lasers. Course content ranges from theory of operation to electronic troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; thermal management; power supply layout; circuit familiarization; head design; FAP diagnosis, replacement, and calibration; performing electrical measurements and calibrations; troubleshooting procedures; head-power supply swaps; RS-232 operation; fiber optic inspection; photocell calibrations; current calibrations; PCBA replacement; Servo-Loop analysis; software upgrades.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of the printed circuit boards and any other applied circuitry. An understanding of basic laser theory is recommended.

EXCIMER LASERS

Operator Courses

COMPex Level-A Course (Operation)*

Location: Factory Göttingen, Germany	Part #: 1391725	Course length: 2 days	Day(s): Upon availability
		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers	Number of Students: minimum-2 / maximum-4		

Course Description: The COMPex A-Level course prepares trainees to operate the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function to operation. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating the laser safely.

Key Topics: Function of all main modules like laser tube, HV circuit, Thyatron, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check.

Prerequisites: Complete product knowledge requires a basic understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Some basic knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

ExciStar XS/ExciStar Level-A Course (Operation)*

Location: Factory Göttingen, Germany	Part #: 1391748	Course length: 2 days	Day(s): Upon availability
		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers	Number of Students: minimum-2 / maximum-4		

Course Description: The ExciStar XS/ExciStar A-Level course prepares trainees to operate the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function to operation. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check.

Prerequisites: Complete product knowledge requires a basic understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Some basic knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Indystar Level-A Course (Operation)*

Location: Factory	Part #: 1391779	Course length: 2 days	Day(s): Upon availability
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers	Number of Students: minimum-2 / maximum-4		

Course Description: The Indystar A-Level course prepares trainees to operate the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function to operation. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check.

Prerequisites: Complete product knowledge requires a basic understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Some basic knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

LEAP Level-A Course (Operation)*

Location: Factory	Part #: 1391799	Course length: 2 days	Day(s): upon availability
Göttingen, Germany & Anseong, Korea		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers	Number of Students: minimum-2 / maximum-4		

Course Description: The LEAP A-level course prepares trainees to operate the laser. Trainees will be informed about safety aspects at the laser, and main sources of hazard. Course content ranges from basic theory of laser function to operation. Extensive hands-on laboratory time allows trainees to test their knowledge and to develop skills to ensure that they are capable of operating the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitor and internal and external communication; Safety aspect and source of hazard; Operation of the laser in different work modes; Performance check.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. The trainee should be able to read schematics and block diagrams and relate them to actual assembly of printed circuit boards and any other applied circuitry. Trainee should be able to read and speak English or German.

* **Remote Training Option:** 50% remote option (8) hours over 1 days with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Lambda SX Level-A Course (Operation)*

Location: Factory **Part #:** 1391794 **Course length:** 2 days **Day(s):** Upon availability
Göttingen, Germany; Anseong, Korea
and Shanghai, China **Begin:** 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 / maximum-4

Course Description: The Lambda SX A-Level course prepares trainees to operate the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function and operation. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles.

Prerequisites: Complete product knowledge requires a basic understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Some basic knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Vyper Level-A Course (Operation)*

Location: Factory **Part #:** 1391970 **Course length:** 2 days **Day(s):** Upon availability
Göttingen, Germany; Anseong, Korea
and Yokohama, Japan **Begin:** 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 / maximum-4

Course Description: The Vyper A-Level course prepares trainees to operate the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function and operation. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles.

Prerequisites: Complete product knowledge requires a basic understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Some basic knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Maintenance Courses

COMPex Level-B Course (Maintenance)*

Location: Factory	Part #: 1391726	Course length: 4 days	Day(s): Upon availability
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers	Number of Students: minimum-2 / maximum-4		

Course Description: The COMPex B-Level course prepares trainees to operate and maintain the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser safely.

Key Topics: Function of all main modules like laser tube, HV circuit, Thyatron, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange.

Prerequisites: Complete product knowledge requires an extended understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (16) hours over 2 days with 2-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

ExciStar XS/ExciStar Level-B Course (Maintenance)*

Location: Factory	Part #: 1391749	Course length: 3 days	Day(s): Upon availability
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers	Number of Students: minimum-2 / maximum-4		

Course Description: The ExciStar XS/ExciStar B-Level course prepares trainees to operate and maintain the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange.

Prerequisites: Complete product knowledge requires an extended understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (12) hours over 1.5 days with 1.5-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Indystar Level-B Course (Maintenance)*

Location: Factory	Part #: 1391780	Course length: 4 days	Day(s): Upon availability
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers		Number of Students: minimum-2 / maximum-4	

Course Description: The Indystar B-Level course prepares trainees to operate and maintain the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange.

Prerequisites: Complete product knowledge requires an extended understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (16) hours over 2 days with 2-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

LEAP Level-B Course (Maintenance)*

Location: Factory	Part #: 1391800	Course length: 5 days	Day(s): Upon availability
Göttingen, Germany & Anseong, Korea		Begin: 9:00 AM	End: 5:00 PM
Audience: OEMs and end customers		Number of Students: minimum-2 / maximum-4	

Course Description: The LEAP B-level course prepares trainees to operate the laser. Trainees will be informed about safety aspects at the laser, and main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and to develop skills to ensure that they are capable of operating and maintaining the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitor and internal and external communication; Safety aspect and source of hazard; Operation of the laser in different work modes; Performance check; laser maintenance procedures like New Fill, optic cleaning and exchange, alignment, calibration and halogen filter exchange.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. The trainee should be able to read schematics and block diagrams and relate them to actual assembly of printed circuit boards and any other applied circuitry. Trainee should be able to read and speak English or German.

* **Remote Training Option:** 50% remote option (20) hours over 2.5 days with 2.5-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Lambda SX Level-B Course (Maintenance)*

Location: Factory **Part #:** 1391795 **Course length:** 5 days **Day(s):** Upon availability

Göttingen, Germany; Anseong, Korea
and Shanghai, China

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 / maximum-4

Course Description: The Lambda SX B-Level course prepares trainees to operate and maintain the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, Cryo-function, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry. An understanding of basic laser theory is recommended.

*** Remote Training Option:** 50% remote option (20) hours over 2.5 days with 2.5-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

UVMap 42/50 Level-B Course (Operation, Maintenance)*

Location: Factory **Part #:** 1430111 **Course length:** 1 day **Day(s):** Upon availability

Göttingen, Germany; Shanghai, China

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 / maximum-4

Course Description: The UVMap 42/50 B-Level course prepares trainees to operate and maintain the optional Excimer laser accessory. Trainees will be informed about safety aspect at the accessory and all sources of hazard. Course content ranges from basic theory of transmission measurement, beam pass design, operation of the equipment, evaluation of the measurement and simple maintenance actions. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the transmission measurement tool safely.

Key Topics: Function of all main module; Safety aspect and sources of hazard; Installation; Warm-up; Operation; Software control; Transmission measurement; Maintenance procedures like illumination check, diode current check, Calibration and data saving.

Prerequisites: A successful training participation requires an extended understanding of electronic and optical systems. The trainees should be able to read and speak English or German. Knowledge of how to read schematics and/or block diagrams would be very helpful.

*** Remote Training Option:** 50% remote option (4) hours over 0.5 day with 0.5-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Vyper Level-B Course (Maintenance)*

Location: Factory **Part #:** 1391971 **Course length:** 5 days **Day(s):** Upon availability

Göttingen, Germany; Anseong, Korea
and Yokohama, Japan

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 / maximum-4

Course Description: The Vyper B-Level course prepares trainees to operate and maintain the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, Cryo-function, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange.

Prerequisites: Complete product knowledge requires an extended understanding of electronic and optical systems. Trainees should be able to read and speak English or German. Knowledge of how to read schematics and/or block diagrams would be very helpful.

*** Remote Training Option:** 50% remote option (20) hours over 2.5 days with 2.5-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Service Courses

COMPex Level-C Course (Service)*

Location: Factory	Part #: 1391727	Course length: 5 days	Day(s): Monday – Friday
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps	Number of Students: minimum-2 / maximum-4		

Course Description: The COMPex C-Level course prepares trainees to operate, maintain, and service the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from theory of laser function, laser operation, laser maintenance to service procedures, and troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating, maintaining, and servicing the laser safely.

Key Topics: Function of all main modules like laser tube, HV circuit, Thyatron, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange; service procedures like measuring HV curve, pulse duration, jitter and delay; use of service tools for troubleshooting; exchange of all modules, including the laser tube.

Prerequisites: Complete product knowledge requires a good understanding of electronic and optical systems. Trainees should be able to read and speak English or German. A good knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (20) hours over 2.5 days with 2.5-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Excistar XS/Excistar Level-C Course (Service)*

Location: Factory	Part #: 1391750	Course length: 4 days	Day(s): Monday – Friday
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps	Number of Students: minimum-2 / maximum-4		

Course Description: Excistar XS/Excistar C-Level course prepares trainees to operate, maintain, and service the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from theory of laser function, laser operation, laser maintenance to service procedures, and troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating, maintaining, and servicing the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange; service procedures like measuring HV curve, pulse duration, jitter and delay; using of service tools for troubleshooting; exchange of all modules, including the laser tube.

Prerequisites: Complete product knowledge requires a good understanding of electronic and optical systems. Trainees should be able to read and speak English or German. A good knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (16) hours over 2 days with 2-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Indystar Level-C Course (Service)*

Location: Factory	Part #: 1391781	Course length: 5 days	Day(s): Monday – Friday
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps	Number of Students: minimum-2 / maximum-4		

Course Description: The Indystar C-Level course prepares trainees to operate, maintain, and service the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from theory of laser function, laser operation, laser maintenance to service procedures, and troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating, maintaining, and servicing the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, and halogen filter exchange; service procedures like measuring HV curve, pulse duration, jitter and delay; using of service tool for troubleshooting; exchange of all modules including the laser tube.

Prerequisites: Complete product knowledge requires a good understanding of electronic and optical systems. Trainees should be able to read and speak English or German. A good knowledge of how to read schematics and/or block diagrams would be very helpful.

*** Remote Training option:** 50% remote option (20) hours over 2.5 days with 2.5-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

LEAP Level-C Course (Service)*

Location: Factory	Part #: 1391801	Course length: 10 days	Day(s): Monday – Friday
Göttingen, Germany		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps	Number of Students: minimum-2 / maximum-4		

Course Description: The LEAP C-level course prepares trainees to operate the laser. Trainees will be informed about safety aspects at the laser, and main sources of hazard. Course content ranges from basic theory of laser function, laser operation to laser maintenance procedures. Extensive hands-on laboratory time allows trainees to test their knowledge and to develop skills to ensure that they are capable of operating, maintaining and servicing the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitor and internal and external communication; Safety aspect and source of hazard; Operation of the laser in different work modes; Performance check; laser maintenance procedures like New Fill, optic cleaning and exchange, alignment, calibration and halogen filter exchange; Service procedures like measuring advanced function parameter, using service tool and exchange of complete modules, including the laser tube.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. The trainee should be able to read schematics and block diagrams and relate them to actual assembly of printed circuit boards and any other applied circuitry. Trainee should be able to read and speak English or German.

*** Remote Training Option:** 50% remote option (40) hours over 5 days with 5-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Lambda SX Level-C Course (Service)*

Location: Factory **Part #:** 1391796 **Course length:** 10 days **Day(s):** Monday – Friday (2 weeks)

Göttingen, Germany; Anseong, Korea and Shanghai, China **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Lambda SX C-Level course prepares trainees to operate, maintain, and service the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from theory of laser function, laser operation, laser maintenance to service procedures, and troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating, maintaining, and servicing the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, Cryo-function, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, halogen filter exchange, and cold start; service procedures like measuring HV curve, pulse duration, jitter and delay; using of service tools for troubleshooting; exchange of all modules, including the laser tube.

Prerequisites: Complete product knowledge requires a good understanding of electronic and optical systems. Trainees should be able to read and speak English or German. A good knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (40) hours over 5 days with 5-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

UVMap 42/50 Level-C Course (Service)*

Location: Factory **Part #:** 1430112 **Course length:** 2 days **Day(s):** Upon availability

Göttingen, Germany; Shanghai, China **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The UVMap 42/50 C-Level course prepares trainees to install, operate, maintain and service the Excimer laser accessory. Trainees will be informed about safety aspect at the accessory and all sources of hazard. Course content ranges from basic theory of transmission measurement, beam pass design, operation of the equipment, evaluation of the measurement and simple maintenance actions. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the transmission measurement tool safely.

Key Topics: Function of all main module; Safety aspect and sources of hazard; Installation; Warm-up; Operation; Software control; Transmission measurement; Maintenance procedures like illumination check, diode current check, Calibration and data saving. Software upgrade and settings; Optic alignment; electrical troubleshooting.

Prerequisites: A successful training participation requires an extended understanding of electronic and optical systems. The trainees should be able to read and speak English or German. Knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (8) hours over 1 day with 1-day in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

Vyper Level-C Course (Service)*

Location: Factory **Part #:** 1391972 **Course length:** 10 days **Day(s):** Monday – Friday (2 weeks)

Göttingen, Germany; Anseong, Korea **Begin:** 9:00 AM **End:** 5:00 PM
and Yokohama, Japan

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Vyper C-Level course prepares trainees to operate, maintain, and service the laser. Trainees will be informed about the safety aspect at the laser, and all main sources of hazard. Course content ranges from theory of laser function, laser operation, laser maintenance to service procedures, and troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating, maintaining, and servicing the laser safely.

Key Topics: Function of all main modules like laser tube, ASSP, gas handling, water cooling, energy monitoring, Cryo-function, and internal and external communication; safety aspect and sources of hazard; operation of the laser in different working modes and duty cycles; performance check; laser maintenance procedures like new fill, optic cleaning/exchange, alignment, calibration, halogen filter exchange, and cold start; service procedures like measuring HV curve, pulse duration, jitter and delay; using of service tools for troubleshooting; exchange of all modules, including the laser tube.

Prerequisites: Complete product knowledge requires a good understanding of electronic and optical systems. Trainees should be able to read and speak English or German. A good knowledge of how to read schematics and/or block diagrams would be very helpful.

* **Remote Training Option:** 50% remote option (40) hours over 5 days with 5-days in-person for the remaining 50%. All topics covered except for advanced practical exercises of spare part exchange and troubleshooting.

ION LASERS

Customer Courses

Innova 70C, 90C, 300C Customer Course

Location: Customer's site **Part #:** 1391782 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Innova 70C, 90C, 300C Customer course prepares trainees to operate, troubleshoot, repair common problems, and maintain the laser. Trainees will learn how to teach others to control and operate the laser. Course content ranges from basic theory of operation to basic optical troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field.

Key Topics: Laser and electrical safety; complete optical alignment, head and power supply layout; electrical measurements and calibrations not requiring a service EPROM.

Prerequisites: Basic electronics, and familiarity with basic laser theory.

Innova 90C or 300C FreD/MotoFreD Customer Course

Location: Customer's site **Part #:** 1391785 **Course length:** 3 days **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Innova 90C or 300C FreD/MotoFreD Customer course prepares trainees to operate, troubleshoot, repair common problems, and maintain the laser. Trainees will learn how to teach others to control and operate the laser. Course content ranges from basic theory of operation to basic optical troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field.

Key Topics: Laser and electrical safety; complete optical alignment; head and power supply layout; electrical measurements and calibrations not requiring a service EPROM.

Prerequisites: Successful completion of the installation and on-site training course, basic electronics, and familiarity with basic laser theory.

Innova Sabre Customer Course

Location: Customer's site **Part #:** 1391789 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Innova Sabre Customer course prepares trainees to operate, troubleshoot, repair common problems, and maintain the laser. Trainees will learn how to teach others to control and operate the laser. Course content ranges from basic theory of operation to optical troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field.

Key Topics: Laser and electrical safety; complete optical alignment; head and power supply layout; electrical measurements and calibrations not requiring a service EPROM.

Prerequisites: Basic electronics, and familiarity with basic laser theory.

Innova Sabre FreD/MotoFreD Customer Course

Location: Customer's site **Part #:** 1391787 **Course length:** 3 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Innova Sabre FreD/MotoFreD Customer course provides instruction on the correct procedures for aligning, operating, and maintaining the laser. Course lectures detail how specific undesirable characteristics in the laser output can be traced to the misalignment or failure of specific assemblies and/or modules within the laser cavity. Extensive laboratory time is spent operating and optimizing the laser in the SHG and the fundamental configurations.

Key Topics: Introduction to the theory of frequency doubling; laser installation; doubling hardware; alignment; calibration and operation; crystal maintenance. Included is an introduction to the Innova Sabre laser head, resonator, tube, and magnet assembly; optics and alignment; optics cleaning; walking and aligning the laser for best mode and power.

Optional Topics: Fault message troubleshooting to the major assembly level, including reintegration of the faulty assembly (head, power supply, heat exchanger, and remote), available upon advance request.

Prerequisites: Some prior working experience with lasers, laser theory, and general laboratory safety practices is ideal, but not required. A basic theoretical understanding of optics is ideal.

Service Courses

Unless otherwise stated in the course Prerequisite section, all Ion Service courses require that the trainee possess a full understanding of electronic devices and their roles in electronic circuitry. Trainees should be able to read schematics and block diagrams and relate them to actual printed circuit board assemblies, and any other applied circuitry. A basic theoretical understanding of optics is ideal.

Innova 70C/StarC Service Course

Location: Factory **Part #:** 1391783 **Course length:** 5 days **Day(s):** Monday – Friday

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, and reps

Number of Students: minimum-2 / maximum-2

Course Description: The Innova 70C/StarC Service course prepares trainees to install, operate, maintain, and service the Innova 70C and StarC Ion lasers. Trainees will be instructed on the correct methodology for troubleshooting the electronics (to the board-level) and isolating failures to major optical and/or electronic assemblies. Extensive hands-on laboratory time is provided to allow trainees to both test their knowledge and to develop the skills required to support the I-70C and StarC Ion laser in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; introduction to the I-70C and StarC Ion laser, head layout, and power supply layout; use of laser flowcharts and block diagrams for troubleshooting; the interlock chain; optics cleaning using acetone and methanol; window cleaning using Ammonium Bifluoride; tube, magnet and cartridge replacement; optical alignment and optic replacement; walking and aligning the laser resonator for best mode and power; performing electrical measurements and calibrating the power supply.

Optional Topics: The following topics will be covered upon advance request: Instruction specific to the Innova SkyLight™ and Innova SkyLight Star™ Ion lasers, instruction about window cleaning using Ammonium Bifluoride.

Prerequisites: See introductory statement at start of Ion Service course section.

Innova 90C/300C Service Course

Location: Factory **Part #:** 1391786 **Course length:** 5 days **Day(s):** Monday – Friday

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, and reps

Number of Students: minimum-2 / maximum-2

Course Description: The Innova 90C/300C Service course prepares trainees to install, operate, maintain, and service the Innova 90C and 300C Ion lasers. Trainees will be instructed on the correct methodology for troubleshooting the electronics (to the board-level) and isolating failures to major optical and/or electronic assemblies. Extensive hands-on laboratory time is provided to allow trainees to both test their knowledge and to develop the skills required to support the I-90C and I-300C Ion lasers in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; introduction to the I-90C and I-300C Ion lasers, head layout, and power supply layout; use of laser flowcharts and block diagrams for troubleshooting; the interlock chain; tube and magnet replacement; optical alignment and optic replacement; walking and aligning the laser resonator for best mode and power; calibrating the laser; single-frequency operation; introduction to the small frame heat exchanger.

Optional Topics: Instruction about window cleaning using Ammonium Bifluoride provided upon advance request.

Prerequisites: See introductory statement at start of Ion Service course section.

Innova 90C FreD/300C MotoFreD Service Course

Location: Factory **Part #:** 1391784 **Course length:** 3 days **Day(s):** Monday – Wednesday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Innova 90C FreD/300C MotoFreD Service course covers the correct procedures for aligning, operating, maintaining, and servicing the lasers. Course lectures cover the fundamentals of operation and detail how specific undesirable characteristics in the laser output can be traced to the misalignment or failure of specific components in the SHG assembly. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; introduction to the Innova 90C FreD and 300C MotoFreD lasers; brief theoretical overview of frequency doubling; functional overview; laser installation, doubling hardware, alignment, calibration, and operation; crystal maintenance; overview of the 300C FreD “High Power” option; board-level troubleshooting of the MotoFreD electronics; single-frequency operation.

Prerequisites: Successful completion of the Innova 90C/300C Service course and have at least 3 months of field experience troubleshooting and repairing these lasers. Upon formal request these requirements may be waived for OEM clients who are service certified on the Innova 300C Ion laser. Contact Coherent’s Laser Training Center for additional information. See introductory statement at start of Ion Service course section.

Innova Sabre Service Course

Location: Factory **Part #:** 1391790 **Course length:** 5 days **Day(s):** Monday – Friday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Innova Sabre Service course covers the correct procedures for aligning, operating, maintaining, and servicing the laser. The course covers fundamentals of the different modes of operation and how their failure can be traced to a specific board, module, or Field Replaceable Unit (FRU) within the laser. Emphasis is placed on how to make quick and efficient repairs in the field to minimize customer downtime. Trainees will learn the correct approach to board-level troubleshooting. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; introduction to the Innova Sabre Ion laser; head layout, power supply layout, heat exchanger layout; use of laser flowcharts and block diagrams for troubleshooting; the interlock chain; tube replacement/conversion, both standard (DBW) and sealed mirror (SM); resonator alignment “walk-in” procedure for best mode and power; automatic/TEM₀₀ aperture calibration; calibrating the laser; single-frequency operation; external computer-controller options.

Optional Topics: Instruction about optics cleaning using Ammonium Bifluoride provided upon advance request.

Prerequisites: See introductory statement at start of Ion Service course section.

Innova Sabre MotoFreD Service Course

Location: Factory **Part #:** 1391788 **Course length:** 4 days **Day(s):** Monday – Thursday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Innova Sabre Service course covers the correct procedures for aligning, operating, maintaining, and servicing the laser. Course lectures cover the fundamentals of operation and detail how specific undesirable characteristics in the laser output can be traced to the misalignment or failure of specific components in the SHG assembly. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; introduction to the Innova Sabre MotoFreD laser; brief theoretical overview of frequency doubling; functional overview; laser installation, doubling hardware, alignment, calibration, and operation; crystal maintenance; board-level troubleshooting of the MotoFreD electronics.

Prerequisites: Successful completion of the Innova Sabre Service course. Potential trainees must have at least 3 months of field experience working on small frame FreD lasers. These requirements may be waived for OEM clients who are Service-certified on the Innova Sabre Ion laser. Contact Coherent's Laser Training Center for additional information. See introductory statement at start of Ion Service course section.

Q-SWITCHED AND NS LASERS

OEM Courses

Avia OEM Course

Location: Customer's Site or Factory **Part #:** 1391706 or 1391707 **Course length:** 2 days **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Avia OEM course prepares trainees to install, operate, and maintain the laser. Trainees will learn how to teach others to control and operate the laser. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser.

Key Topics: Laser, electrical, and lab safety; thermal management; FAP diagnosis, replacement, and calibration; performance verification; ThermaTrack; SHG/THG/FHG temperature optimization; head-power supply swaps; RS-232 operation; software upgrades.

Prerequisites: Some experience with lasers and laser safety is ideal. An understanding of optics, and electronics is recommended.

Avia NX OEM Course

Location: Customer's Site or Factory **Part #:** 1391703 or 1391704 **Course length:** 2 days **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Avia NX OEM course prepares trainees to install, operate, optimize, troubleshoot to the board or laser head level, repair, and maintain the laser. Course content ranges from theory of operation to electronic troubleshooting.

Key Topics: Laser, electrical, and lab safety; ESD awareness; thermal management; laser head overview; head-power supply swap; RS-232/USB/Ethernet operation; photocell calibration; PCBA replacement; emphasis on low power optimization, including ThermaTrack optimization; SHG/THG temperature optimization; crystal spot change (laser specific); output window cleaning; shutter replacement; firmware upgrade; fault code identification and service response.

Prerequisites: Complete product knowledge requires a understanding of different electronic devices and their role in the circuit. An understanding of basic laser theory is recommended.

Matrix OEM Course

Location: Customer's Site or Factory **Part #:** 1391820 or 1391821 **Course length:** 1 day **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Matrix OEM course familiarizes trainees with the laser components and optional accessories. It demonstrates installation, operation, and troubleshooting on a user level.

Key Topics: Laser, electrical, and lab safety; determine if the laser operates normally under nominal conditions, specifically verification of laser pulse parameters; most relevant interface functions; use of RS-232 commands and graphical interface; understand possible pitfalls and capture mandatory information to allow factory support assisting to solve configuration issues; head-power supply swaps; software upgrades.

Prerequisites: Trainees should have a general understanding of laser beam parameters, Q-switched laser principle, basic electronics knowledge, and hands-on experience in oscilloscope measurements.

Service Courses

Avia Low Power (266-3, 355-7/10/14, 532-23) Service Course

Location: Factory **Part #:** 1391702 **Course length:** 4 days **Day(s):** Tuesday – Friday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Avia Low Power Service course prepares trainees to install, operate, optimize, troubleshoot to the board or laser head level, repair, and maintain the laser. Course content ranges from theory of operation to electronic troubleshooting. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; ESD awareness; thermal management; power supply layout; laser head overview; head-power supply swap; RS-232 operation; software upgrades; fiber optic inspection; photocell calibration; PCBA replacement; emphasis on low power optimization, including ThermaTrack optimization; SHG/THG/FHG temperature optimization; crystal spot change (laser specific); output window cleaning, and FAP diagnosis, including replacement and current and voltage calibration; performing electrical test-point measurements for Servo-loop and low-voltage analyses.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. Trainees should be able to read schematics and block diagrams, and relate them to the actual assembly of printed circuit boards and any other applied circuitry. An understanding of basic laser theory is recommended.

Avia High Power (355-20/23/28 & 532-30/38/45) Service Course

Location: Factory **Part #:** 1391701 **Course length:** 4 days **Day(s):** Tuesday – Friday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Avia High Power Service course prepares trainees to install, operate, optimize, troubleshoot to the board level, repair, and maintain the laser. Course content ranges from theory of operation to electronic troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; ESD awareness, thermal management; power supply layout; circuit familiarization; head design; FAP evaluation, replacement, and calibration; ThermaTrack and SHG/THG temperature optimization; pulse measurements and performance verification; Q-switching; fiber optic inspection; photocell calibrations; current calibrations; PCBA replacement; servo-loop analysis and troubleshooting; performing electrical measurements and calibrations; electrical and optical troubleshooting procedures; head-power supply swaps; RS-232 operation; software upgrades.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry. An understanding of basic laser theory is recommended. Successful completion of the Avia Low Power course and perform field work on the Low Power Avia for some length of time before attending the Avia High Power course.

Avia NX Service Course

Location: Factory **Part #:** 1391705 **Course length:** 2 days **Day(s):** Upon availability
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM
Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Avia NX Service course prepares trainees to install, operate, optimize, troubleshoot to the board or laser head level, repair, and maintain the laser. Course content ranges from theory of operation to electronic troubleshooting. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; ESD awareness; thermal management; power supply layout; laser head overview; head-power supply swap; RS-232 operation; photocell calibration; PCBA replacement; emphasis on low power optimization, including ThermaTrack optimization; SHG/THG/FHG temperature optimization; crystal spot change (laser specific); output window cleaning; firmware upgrade; fault code identification and service response; Pulse and beam profile measurements,

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. Trainees should be able to read schematics and block diagrams, and relate them to the actual assembly of printed circuit boards and any other applied circuitry. An understanding of basic laser theory is recommended.

Matrix Service Course

Location: Factory **Part #:** 1391822 **Course length:** 1 day **Day(s):** Upon availability
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM
Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Matrix Service course familiarizes trainees with the laser components and optional accessories. It demonstrates installation, operation, and troubleshooting on the user level. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; determine if the laser behaves normally under nominal conditions, specifically verification of laser pulse parameters; most relevant interface functions; usage of RS-232 commands and graphical interface; understand possible pitfalls and capture mandatory information to allow factory support assisting to solve configuration issues; head-power supply swaps; software upgrades.

Prerequisites: Trainees should have a general understanding of laser beam parameters, Q-switched laser principle, basic electronics knowledge, and hands-on experience in oscilloscope measurements.

SHORT-PULSED LASERS

Customer Courses

Hyper Rapid NX/NXT Customer Course

Location: Customer's site **Part #:** 1391774 **Course length:** 1 to 2 days **Day(s):** Upon availability
or 1391775 depends upon scope of
customer request

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Hyper Rapid NX/NXT Customer course prepares trainees to set-up, operate, trouble-shoot and maintain the laser as defined in the Hyper Rapid NX/NXT Operator's Manual.

Key Topics: Laser, electrical, and lab safety; laser installation; communication with the laser; GUI operation; laser I/O connections; log file analysis; chiller maintenance; Operation modes; troubleshooting.

Prerequisites: Basic computer skills and a basic understanding of industrial equipment operation.

- Please review the Operator's Manual before attending the course.

- Please bring a laptop with USB ports available, Ethernet port and DE9 / DSUB (or a USB-serial dongle adapter) for RS-232 communications.

Monaco Customer Course

Location: Customer's site **Part #:** 1391848 **Course length:** 1 day **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Monaco Customer course prepares trainees to install, operate, optimize, and maintain the laser system. Computer control, datalogs and remote diagnostics and adjustments are also covered.

Key Topics: Laser, electrical, and lab safety; ESD awareness; thermal management; laser head overview; laser installation and operation; RS-232/USB/Ethernet operation; data backup; fault code identification and service response.

Prerequisites: An understanding of basic laser theory and electro-optic devices is recommended. An understanding of basic AC/DC electronics is also helpful. Complete product knowledge requires a good understanding of various electronic and optical devices and their role in the circuit.

Rapid NX Customer Course

Location: Customer's site **Part #:** 1391881
or 1391882 **Course length:** 1 to 2 days **Day(s):** Upon availability
depends upon scope of
customer request

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Rapid NX Customer course prepares you to set-up, operate, troubleshoot and maintain the laser as defined in the Rapid NX Operator's Manual.

Key Topics: Laser and electrical safety; laser Installation; communication with the laser; GUI operation; laser I/O connections; log file analysis; chiller maintenance; Operation modes; troubleshooting.

Prerequisites: Basic computer skills and a basic understanding of industrial equipment operation.

- Please review the Operator's Manual before attending the course.

- Please bring a laptop with USB ports available, Ethernet port and DE9 / DSUB (or a USB-serial dongle adapter) for RS-232 communications.

OEM Courses

Hyper Rapid NX/NXT OEM Support Service Course*

Location: Customer's Site **Part #:** 1391776 **Course length:** 3 days **Day(s):** Upon availability
or Factory or 1391777

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The outcome of the Hyper Rapid NX/NXT OEM Support Service course will result in a trained OEM service engineer who replace all OEM level parts and work in conjunction with a Coherent FSE to diagnose failures and perform calibrations" to "Upon completion of the course the trained OEM Service engineer will be able to diagnose problems, replace and calibrate all OEM level parts independently and work with support from a Coherent engineer to diagnose complex problems.

Key Topics: Laser, electrical, and lab safety; installation; GUI operation; log file analysis and remote diagnostics; error interpretation and diagnosis; FRU replacement and calibration; beam profiling; RS-232 operation; seed laser replacement; PCB replacement; AOM and LD driver replacement; cabling replacement.

Prerequisites: The ability to use hand tools, a DMM, a windows laptop, a power meter. A basic understanding of ultrafast lasers, optics and non-linear processes laser operating principles, basic optics handling and simple optics cleaning and alignment methods. The trainee should be able to read wiring diagrams and block diagrams and relate them to actual circuits and board interconnects.

- Please bring a laptop with USB ports available, Ethernet port and DE9 / DSUB (or a USB-serial dongle adapter) for RS-232 communications.

*** Remote Training Option:** 75% Remote option (16 hours over 2 days with 8 hours of on-line independent study. All topics covered except for Integration Operation, Principle of Operation, GUI Operations, calibration, troubleshooting, and log file analysis.

Monaco OEM Course

Location: Customer's Site or Factory **Part #:** 1391849 or 1391850 **Course length:** 1 day **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Monaco Customer course prepares trainees to install, operate, optimize, and maintain the laser. Firmware upgrade, computer control, datalogs and remote diagnostics and adjustments are also covered.

Key Topics: Laser, electrical, and lab safety; ESD awareness; thermal management; laser head overview; laser installation and operation; RS-232/USB/Ethernet operation; shutter replacement; firmware upgrade; fault code identification and service response.

Prerequisites: An understanding of basic laser theory and electro-optic devices is recommended. An understanding of basic AC/DC electronics is also helpful. Complete product knowledge requires a good understanding of various electronic and optical devices and their role in the circuit.

Paladin OEM Course*

Location: Customer's Site or Factory **Part #:** 1391861 or 1391862 **Course length:** 2 days **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-1 per system / maximum-4

Course Description: The Paladin OEM course prepares trainees to install, operate, perform limited troubleshooting, and maintain the laser. Course content includes basic theory of operation and basic troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field.

Key Topics: Laser, electrical, and lab safety; thermal management; laser head, power supply, and chiller layout; FAP assembly replacement; performing output power calibration; limited troubleshooting procedures; desiccant chamber(s) removal and replacement; Brewster window cleaning; head, power supply, and chiller swaps; RS-232 operation; modem programming.

Prerequisites: Complete product knowledge requires a general understanding of different optical and electronic devices and their role within the laser. Trainees should be able to read block diagrams.

- Personal laptop for course participation is strongly suggested.

*** Remote Training Option:** 50% remote option (2-3) hours over 2-3 days with 1-day in-person for the remaining 50%. All topics covered except the FRU replacement and installation of hardware.

Rapid NX OEM Support Service Course*

Location: Customer's Site or Factory **Part #:** 1391883 or 1391884 **Course length:** 3 days **Day(s):** Upon availability

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Rapid NX OEM Support Service course prepares the trainee to install, operate, troubleshoot, repair and maintain the laser as defined in the Rapid NX service strategy for RNX OEM Field Support Level 2. The outcome of the course will result in a trained OEM service engineer who can replace all OEM level parts and work in conjunction with a Coherent FSE to diagnose failures and perform calibrations.

Key Topics: Laser and electrical safety; Installation; GUI operation; log file analysis and remote diagnostics; error interpretation and diagnosis; FRU replacement and calibration; beam profiling; RS-232 operation; seed laser replacement; PCB replacement; pump diode; PSU; shutter module; AOM and cabling replacement.

Prerequisites: The ability to use hand tools, a DMM, a windows laptop, a power meter. A basic understanding of ultrafast lasers, optics and non-linear processes laser operating principles, basic optics handling and simple optics cleaning and alignment methods. The trainee should be able to read wiring diagrams and block diagrams and relate them to actual circuits and board interconnects.

- Please bring a laptop with USB ports available, Ethernet port and DE9 / DSUB (or a USB-serial dongle adapter) for RS-232 communications.

*** Remote Training Option:** 75% Remote option (16 hours over 2 days with 8 hours of on-line independent study. All topics covered except for Integration Operation, Principle of Operation, GUI Operations, calibration, troubleshooting, and log file analysis.

Service Courses

Classic Rapid Series Service Course

Location: Factory **Part #:** 1391716 **Course length:** 10 days **Day(s):** Monday – Friday (2 weeks)

Kaiserslautern, Germany

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, and reps

Number of Students: minimum-2 / maximum-4

Course Description: The Classic Rapid Series Service course is designed to train on the correct procedures for installing, maintaining, and troubleshooting a Classic Rapid Series laser for all customer applications. The trainees will learn the correct approach to installation, performance verification (pulse energy stability, beam profile and power measurements), power supply troubleshooting and seeder intracavity alignment and internal pulse picker maintenance of the laser. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; overall laser layout; installation; GUI operation (user and service mode); chiller maintenance; laser monitoring features including status reports and logfile analysis; remote-login capabilities; power supply troubleshooting; power supply sub-component replacement procedures; pump diode diagnosis, replacement and calibration; fiber optic inspection; laser head board replacement procedures; photocell calibration; S-Control operation and troubleshooting; SESAM replacement and calibration; seeder sub-assembly replacement including crystal and picomotors; internal pulsepicker alignment and replacement; shutter and power attenuator troubleshooting and replacement; harmonics temperature optimization; software backup and updates; beam profile measurement procedures.

Prerequisites: Complete product knowledge requires a full understanding of different electronic devices and their role in the circuit. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of PCBs. Basic theoretical understanding of ultrafast lasers, optics and non-linear processes is recommended. Hands-on experience in basic laser alignment procedures is recommended.

Hyper Rapid NX/NXT Service Course*

Location: Factory **Part #:** 1391778 **Course length:** 5 days **Day(s):** Monday – Friday
plus 2 days self-study

Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Hyper Rapid NX/NXT Service course prepares the trainee to install, operate, troubleshoot, repair and maintain the laser. Course content ranges from basic theory of operation to FRU (Field Replaceable Unit) troubleshooting and replacement as well as performance verification (pulse energy stability, beam profile and power measurements). Extensive hands-on laboratory time allows the trainee to test the trainers knowledge and develop skills to ensure that the trainee are capable of supporting the product. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; installation; GUI operation; log file analysis and remote diagnostics; error interpretation and diagnosis; FRU replacement and calibration; beam profiling; RS-232 operation; software upgrades.

Prerequisites: The ability to use hand tools, a DMM, a windows laptop, a power meter. A basic understanding of ultrafast lasers, optics and non-linear processes laser operating principles, basic optics handling and simple optics cleaning and alignment methods. The trainee should be able to read wiring diagrams and block diagrams and relate them to actual circuits and board interconnects.

- Please bring a laptop with USB ports available, Ethernet port and DE9 / DSUB (or a USB-serial dongle adapter) for RS-232 communications.

*** Remote Training Option:** 75% Remote option (24 hours over 3 days with 16 hours of on-line independent study. All topics covered except for Integration Operation, Principle of Operation, GUI Operations, calibration, troubleshooting, and log file analysis.

Monaco Service Course*

Location: Factory **Part #:** 1391851 **Course length:** 2.5 days **Day(s):** Upon availability

Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Monaco Service course prepares trainees to install, operate, optimize, and maintain the laser. Firmware upgrades, computer control, datalogs, and remote diagnostics and adjustments are covered. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; ESD awareness; thermal management; laser head overview; RS-232/USB/Ethernet operation; photocell calibration; head board replacement; shutter replacement; firmware upgrade; fault code identification and service response.

Prerequisites: An understanding of basic laser theory and electro-optic devices is recommended. An understanding of basic AC/DC electronics is helpful. Complete product knowledge requires a good understanding of different electronic and optical devices and their role in the circuit.

*** Remote Training Option:** 75% remote option (16) hours over 2 days with 4-hours in-person for the remaining 25%. All topics covered except the FRU replacement and installation of hardware.

Paladin Service Course*

Location: Factory or **Part #:** 1391863 **Course length:** 4 days **Day(s):** Tuesday – Friday
Customer Site

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, reps, **Number of Students:** minimum-1 / maximum-4
and OEMs

Course Description: The Paladin Service course prepares trainees to install, operate, troubleshoot, upgrade, repair, and maintain the laser. Course content includes theory of operation and basic electronic troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; thermal management; laser head, power supply, and chiller layout; FAP diagnosis, replacement, and calibration; performing laser upgrades and output power calibrations; troubleshooting procedures; laser head, power supply and chiller swaps; desiccant chamber (s) removal and replacement; Brewster window cleaning; RS-232 operation; software upgrades and remote troubleshooting procedures via modem; modem programming and hyper-terminal setup.

Prerequisites: Complete product knowledge requires a full understanding of different optical and electronic devices and their role within the laser. Trainees should be able to read block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry.

- A personal laptop for course participation is highly recommended.

* **Remote Training Option:** 75% remote option (5) hours over 3 days with 1-day in-person for the remaining 25%. All topics covered except the FRU Replacement and Installation of hardware.

Rapid NX Service Course*

Location: Factory **Part #:** 1391885 **Course length:** 5 days **Day(s):** Monday – Friday
plus 2 days self-study

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Rapid NX Service course prepares the trainee to install, operate, troubleshoot, repair and maintain the laser. Course content ranges from basic theory of operation to FRU (Field Replaceable Unit) troubleshooting and replacement as well as performance verification (pulse energy stability, beam profile and power measurements). Extensive hands-on laboratory time allows the trainee to test their knowledge and develop skills to ensure that the trainee are capable of supporting the product. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser and electrical safety; Installation; GUI operation; log file analysis and remote diagnostics; error interpretation and diagnosis; FRU replacement and calibration; beam profiling; RS-232 operation; software upgrades.

Prerequisites: The ability to use hand tools, a DMM, a windows laptop, a power meter. A basic understanding of ultrafast lasers, optics and non-linear processes laser operating principles, basic optics handling and simple optics cleaning and alignment methods. The trainee should be able to read wiring diagrams and block diagrams and relate them to actual circuits and board interconnects.

- Please bring a laptop with USB ports available, Ethernet port and DE9 / DSUB (or a USB-serial dongle adapter) for RS-232 communications.

* **Remote Training Option:** 75% Remote option (24 hours over 3 days with 16 hours of on-line independent study. All topics covered except for Integration Operation, Principle of Operation, GUI Operations, calibration, troubleshooting, and log file analysis.

ULTRAFAST AMPLIFIERS LASERS

Customer Courses

Evolution 15/30/45 Customer Course

Location: Customer's site **Part #:** 1391744 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: This Evolution 15/30/35 Customer course is designed to train trainees on the correct procedures for maintaining an Evolution 15/30 laser. Emphasis is placed on quick and efficient repairs in the field that minimize customer downtime. Trainees will learn the correct approach to the optical optimization, troubleshooting procedures, and performance verification of the laser.

Key Topics: Laser, electrical, and lab safety; brief overview of laser theory; installation procedures and facility requirements; daily operation; optical optimization; LBO temperature optimization; electronic and optical troubleshooting; head and power supply swaps; diode temperature optimization.

Prerequisites: Complete product knowledge requires a good understanding of different electronic and optical devices, optically pumped laser theory, and non-linear optical processes.

Evolution 75/90/HE Customer Course

Location: Customer's site **Part #:** 1391746 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: This Evolution 75/90/HE Customer course is designed to train trainees on the correct procedures for maintaining an Evolution 75/90/HE laser. Emphasis is placed on quick and efficient repairs in the field that minimize customer downtime. Trainees will learn the correct approach to the optical optimization, troubleshooting procedures, and performance verification of the laser.

Key Topics: Laser, electrical, and lab safety; brief overview of laser theory; installation procedures and facility requirements; daily operation; optical optimization; LBO temperature optimization; electronic and optical troubleshooting; head and power supply swaps, diode temperature optimization.

Prerequisites: Complete product knowledge requires a good understanding of different electronic and optical devices, optically pumped laser theory, and non-linear optical processes.

Legend (Any Version) Customer Course

Location: Customer's site **Part #:** 1391802 **Course length:** 3 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Legend Customer course prepares trainees to better operate, maintain, and troubleshoot their laser. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the laser. After the presentation the, instructor walks the trainees through the optical alignment of the stretcher, Regen cavity, and compressor. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve.

- The course does not cover the Seed or Pump laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser basics; theory of operation, including the concept of Chirped Pulse Amplification; review of optical beam paths; demonstration of alignment optimization; laser optimization; maintenance procedures; optics cleaning; SDG timing; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the Legend pump (Evolution) and seed (Mira or Chameleon) lasers. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

OPerA Solo Customer Course

Location: Customer's site **Part #:** 1391860 **Course length:** 2 days
3 days with accessories **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The OPerA Solo Customer course prepares trainees to better operate, maintain and troubleshoot their OPerA Solo and accessories (if present). The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the OPA. After the presentation, the instructor walks the trainees through the optical alignment of OPA and accessories (if present). Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve.

- The course does not include the KHz amplifier, its seed laser, or any pump lasers.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser and OPA basics; theory of operation; review of optical beam paths; demonstration of alignment optimization; wavelength tuning and calibration; laser optimization; software control and instructions; maintenance procedures; optics cleaning; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the course for their KHz amplifier and all of its prerequisites. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

RegA 9000 or 9050 Customer Course

Location: Customer's site **Part #:** 1391886 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The RegA Advanced Customer course prepares trainees to better operate, maintain, and troubleshoot their laser. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the laser. After the presentation, the instructor walks the trainees through the optical alignment of the stretcher (for 9050, not 9000), Regen cavity, and compressor. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve.

- The course does not cover the Seed or Pump laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser basics; theory of operation, including the concept of chirped pulse amplification; review of optical beam paths; demonstration of alignment optimization; laser optimization; maintenance procedures; optics cleaning; using the control box; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the RegA seed (Mira) Customer course. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

RegA OPA Customer Course

Location: Customer's site **Part #:** 1391889 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The RegA OPA Customer course prepares trainees to better operate, maintain, and troubleshoot the RegA OPA. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the OPA. After the presentation, the instructor walks the trainees through the optical alignment of OPA. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve.

- The course does not include the RegA, its seed laser or any pump lasers.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser and OPA basics; theory of operation; review of optical beam paths; demonstration of alignment optimization; wavelength tuning; laser optimization; maintenance procedures; optics cleaning; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the RegA Customer course and all of its prerequisites. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Revolution Customer Course

Location: Customer's site **Part #:** 1391891 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Revolution Customer course is designed to train trainees on the correct procedures for maintaining an Revolution laser. Emphasis is placed on quick and efficient repairs in the field that minimize customer downtime. Trainees will learn the correct approach to the optical optimization, troubleshooting procedures, and performance verification of the laser.

Key Topics: Laser, electrical, and lab safety; brief overview of laser theory; installation procedures and facility requirements; daily operation; optical optimization; LBO temperature optimization; electronic and optical troubleshooting; head and power supply swaps; diode temperature optimization.

Prerequisites: Complete product knowledge requires a good understanding of different electronic and optical devices, optically pumped laser theory, and non-linear optical processes.

Topas-Prime Customer Course

Location: Customer's site **Part #:** 1391941 **Course length:** 2 days
3 days with accessories **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Topas-Prime Customer course prepares trainees to better operate, maintain, and troubleshoot their OPA and accessories (if present). The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the OPA. After the presentation, the instructor walks the trainees through the optical alignment of OPA and accessories (if present). Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve.

- The course does not include the KHz amplifier, its seed laser, or any pump lasers.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser and OPA basics; theory of operation; review of optical beam paths; demonstration of alignment optimization; wavelength tuning and calibration; laser optimization; software control and instructions; maintenance procedures; optics cleaning; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the course for their KHz amplifier and all of its prerequisites. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Service Courses

Evolution 15/30/45 Service Course

Location: Factory **Part #:** 1391745 **Course length:** 3 days **Day(s):** Tuesday – Thursday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Evolution 15/30/45 Service course covers theory, operation, and maintenance of the internally doubled Evolution pulsed Nd:YLF laser. Instruction is provided on the correct procedures for aligning, operating, and maintaining the Evolution laser. Extensive hands-on laboratory time is provided to develop and hone both electronic and optical troubleshooting skills. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; installation procedures and facility requirements; daily operation; full optical alignment; LBO temperature optimization; repetition rate conversion; Q-switch replacement; diode replacement; electronic and optical troubleshooting; external triggering and fiber delivery.
- Note, a fiber delivery system may not be available – confirm if this is a requirement.

Prerequisites: Complete product knowledge requires a full understanding of different electronic and optical devices. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry. They should be familiar with AOM Q-switches and have a basic theoretical understanding of nonlinear processes.

Evolution 75/90/HE Service Course

Location: Factory **Part #:** 1391747 **Course length:** 3 days **Day(s):** Tuesday – Thursday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Evolution 75/90/HE Service course covers the correct procedures for maintaining and servicing an Evolution 75/90/HE laser. Emphasis is placed on quick and efficient repairs in the field that minimize customer downtime. Trainees will learn the correct approach to the optical alignments and performance verification of the laser. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; installation procedures and facility requirements; daily operation; full optical alignment; LBO temperature optimization; Q-switch replacement; diode replacement; electronic and optical troubleshooting; external triggering and fiber delivery.
- Note, a fiber delivery system may not be available – confirm if this is a requirement.

Prerequisites: Complete product knowledge requires a full understanding of different electronic and optical devices. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry. They should be familiar with AOM Q-switches and have a basic theoretical understanding of nonlinear processes.

- A flow hood is required for optical repairs. If a flow hood is not going to be available (i.e., if the end customer, subsidiary or representative does not have one), then the head may not be opened. In that case, the course would take only 1 day.

OPerA Solo and Topas-Prime Service Course

Location: Factory **Part #:** 1391859 **Course length:** 10 days **Day(s):** Monday – Friday (2 weeks)
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The OPerA Solo and Topas-Prime Service course covers in depth the theory, installation, operation, and maintenance of the OPerA Solo, Topas-Prime, and all their wavelength extensions. It is for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; theory of operation; optical layout and identification of components; optical alignment of OPA and wavelength extensions; power and spectrum optimization; wavelength calibration; daily operation; wavelength tuning; laser optimization; software control and instructions; maintenance procedures; optics cleaning; turn on/off procedures; electronics; installation; operational and component differences between the OPerA Solo and Topas-Prime; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the Ultrafast Amplifier Level I Service course and all of its prerequisites. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

RegA 9000 Service Course

Location: Factory **Part #:** 1391887 **Course length:** 5 days **Day(s):** Monday – Friday
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The RegA 9000 Service course covers in depth the theory, installation, operation, and maintenance of the RegA 9000 laser. It is for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios. The course *does not* cover the RegA 9050, the RegA 9050 Expander/Compressor, Mira-Seed. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; optical cavity and identification of components; daily operation and maintenance; built-in diagnostics; optical alignment; Q-switching; cavity dumping; injection alignment; compressor alignment; pulsewidth optimization; tools and practices; installation; electronic control box setup and troubleshooting; Verdi vs. Argon pumping; troubleshooting procedures.

Prerequisites: Successful completion of the Verdi and Mira Service courses. A theoretical understanding of optics and nonlinear processes is required.

RegA 9050 Service Course

Location: Factory **Part #:** 1391888 **Course length:** 3 days **Day(s):** Monday – Wednesday

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The RegA 9050 Service course covers in depth the theory, installation, operation, and maintenance of the RegA 9050 laser. The course is a continuation of the RegA 9000 service course and focuses on the differences of the two lasers, such as the Mira Seed and the external Expander/Compressor system. It is for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser and electrical safety; theory of operation; specifications; Mira-Seed Optical cavity and identification of components; Mira-Seed optical alignment; Mira-Seed modelocking and bandwidth optimization; Seed pulse expansion optical alignment and injection; RegA pulse compression optical alignment; daily operation and maintenance; tools and practices; troubleshooting procedures.

Prerequisites: Successful completion of the Verdi, Mira, and RegA 9000 Service courses. A theoretical understanding of optics and nonlinear processes is required.

RegA OPA Service Course

Location: Factory **Part #:** 1391890 **Course length:** 3 days **Day(s):** Monday – Wednesday

Santa Clara, CA, USA

Begin: 9:00 AM

End: 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The RegA OPA Service course covers in depth the theory, installation, operation, and maintenance of the OPA 9400, 9450, 9800, and/or 9850. It is for advanced laser engineers with strong laser and optical backgrounds. It is typically offered the week after a RegA Service course. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; optical cavity and identification of components; daily operation and maintenance; optical alignment; wavelength tuning; power and spectrum optimization; installation; operational and component differences of the four OPA versions.

Prerequisites: Successful completion of the Verdi, Mira, and RegA 9000 Service courses. A theoretical understanding of optics and nonlinear processes is required.

Revolution Service Course

Location: Factory **Part #:** 1391892 **Course length:** 4 days **Day(s):** Monday – Thursday
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM
Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Revolution Service course covers theory, operation, and maintenance of the internally doubled Revolution pulsed Nd:YLF laser. Instruction is provided on the correct procedures for aligning, operating, and maintaining the Revolution laser. Extensive hands-on laboratory time is provided to develop and hone both electronic and optical troubleshooting skills. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; installation procedures and facility requirements; daily operation; full optical alignment; LBO temperature optimization; repetition rate conversion; Q-switch replacement; diode replacement; electronic and optical troubleshooting; external triggering; field upgrade procedure.

Prerequisites: Previous Evolution Service course strongly recommended. Complete product knowledge requires a full understanding of different electronic and optical devices. Trainees should be able to read schematics and block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry. They should be familiar with AOM Q-switches and have a basic theoretical understanding of nonlinear processes.

Ultrafast Amplifier Level I (Legend, Libra, Astrella) Service Course

Location: Factory **Part #:** 1391942 **Course length:** 10 days **Day(s):** Monday – Friday (2 weeks)
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM
Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Ultrafast Amplifier Level I course covers the theory, installation, alignment, operation, and maintenance of all Legend (except Duo, USX, and Pico), Libra, and Astrella laser systems to a basic level of competency. It is intended for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Week one is centered on Legend and Libra, week two is centered on Astrella. Training takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” complete re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; tools and practices; installation; Regen cavity alignment; identification of components; daily operation and maintenance; Q-switching; cavity dumping; stretcher and compressor alignment; injection alignment; pulse width optimization; beam profile optimization; pre/post pulse contrast ratio optimization; component replacement; electronic and optical troubleshooting techniques; customer training.

Prerequisites: Successful completion of a Pump laser (Evolution acceptable; Revolution preferred) and oscillator (Vitara preferred) service courses. Approval from the Regional Service Manager and the RLS Product Support Manager. Complete product knowledge requires a thorough understanding of various optical/electronic components and their roles in the system. You should be able to read schematics as well as block diagrams and relate them to actual assembly. This course is by invitation only.

Ultrafast Amplifier Level II (Legend, Libra, Astrella) Service Course

Location: Factory **Part #:** 1391943 **Course length:** 10 days **Day(s):** Monday – Friday (2 weeks)
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-4

Course Description: The Ultrafast Amplifier Level II Service course covers the theory, installation, alignment, operation and maintenance of all Legend (including Duo, USX and Pico), Libra, and Astrella laser systems to an advanced level of competency. It is intended for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below.; most exercises are conducted on a Legend Duo laser system. Training takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” complete re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; tools and practices; installation; Ultrafast Amplifier Level I refreshment; Spatial chirp correction; astigmatism correction; advanced measurements; SSF (Spectral Shaping Filter) alignment; SPA (Single-pass Amplifier) alignment; high rep-rate amplifiers; rep-rate conversion; electronic and optical troubleshooting techniques; customer training.

Prerequisites: Ultrafast Amplifier Level I Service course (including prerequisites). Approval from the Regional Service Manager and the RLS Product Support Manager. This course is by invitation only.

ULTRAFAST OSCILLATORS LASERS

Customer Courses

Chameleon Discovery Customer Course

Location: Customer's site **Part #:** 1391712 **Course length:** 1 day **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Chameleon Discovery Customer course prepares trainees to install, operate, optimize, and maintain the laser. Course content includes theory of operation, GUI instructions and basic troubleshooting procedures.

Key Topics: Laser, electrical, and lab safety; thermal and humidity management; alignment of specialist tooling, GUI management, running laser performance measurement software programs, calibration routines and data logging, maintenance routines with key focus on remote diagnostics support; laser acceptance verification.

Prerequisites: Some experience with lasers, optics, power measurement tools, spectrometers and laser safety is recommended.

Chameleon Ultra/Ultra II/Vision/Vision-S Customer Course

Location: Customer's site **Part #:** 1391714 **Course length:** 1 day **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Chameleon Ultra/Ultra II/Vision/Vision-S Customer course prepares trainees to install, operate, and maintain the laser.

Key Topics: Laser, electrical, and lab safety; thermal and humidity management; re-centering PZT's; monitoring wavelength calibration with an optional Spectrometer; customer RS-232 operation.

Prerequisites: Some experience with lasers and laser safety is recommended.

Mira (Femto or Pico) Customer Course

Location: Customer's site **Part #:** 1391842 **Course length:** 2 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Mira Customer course prepares trainees to better operate, maintain, and troubleshoot their laser. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the laser. After the presentation, the instructor walks the trainees through the optical alignment of the oscillator cavity. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve. The course typically does not include the pump laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser basics; theory of operation including the concept of dispersion compensation and modelocking; review of optical beam paths; demonstration of alignment optimization in CW and main cavity; modelocking the laser; pulsedwidth optimization; wavelength tuning; laser optimization; using the Mira Optima control box; maintenance procedures; optics cleaning; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Mira (Dual) Customer Course

Location: Customer's site **Part #:** 1391841 **Course length:** 3 days **Day(s):** Upon availability

Begin: 9:00 AM

End: 5:00 PM

Audience: OEMs and end customers

Number of Students: minimum-2 per system / maximum-4

Course Description: The Mira Customer course prepares trainees to better operate, maintain, and troubleshoot their laser. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the laser. After the presentation, the instructor walks the trainees through the optical alignment of the oscillator cavity. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve. The course typically does not include the pump laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser basics; theory of operation, including the concept of dispersion compensation and modelocking; review of optical beam paths; demonstration of alignment optimization in CW and main cavity; modelocking the laser; pulsedwidth optimization; wavelength tuning; laser optimization; using the Mira Optima control box; maintenance procedures; optics cleaning; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Mira Accessories (Pulse Picker, Synchrolock AP, Harmonic Generator or Pulseswitch) Customer Course

Location: Customer's site **Part #:** 1391843 **Course length:** 1 day **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Mira Accessory Customer course prepares trainees to better operate, maintain, and troubleshoot their Mira Accessory. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation or discussion of the accessory. After the presentation, the instructor walks the trainees through the optical alignment of the accessory. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve. The course does not include the Mira or its pump laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; theory of operation; review of optical beam paths; demonstration of alignment; laser optimization; using the laser's control box; maintenance procedures; optics cleaning; turn on/off procedures; discussion of available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the Mira Customer courses. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Mira-OPO (Any Version) Customer Course

Location: Customer's site **Part #:** 1391846 **Course length:** 3 days **Day(s):** Upon availability

Begin: 9:00 AM **End:** 5:00 PM

Audience: OEMs and end customers **Number of Students:** minimum-2 per system / maximum-4

Course Description: The Mira OPO Customer course prepares trainees to better operate, maintain, and troubleshoot their Mira OPO. The course content is flexible and often customized to the needs and interest of the trainees attending. A typical course covers the key topics listed below, tailored to a level that is appropriate for the trainees. The course begins with a presentation on laser safety followed by a presentation on the Mira OPO. After the presentation, the instructor walks the trainees through the optical alignment of OPO. Different troubleshooting procedures are discussed at this time. The optical hands-on is limited to a few basic adjustments in order to preserve the current operating condition of the installed laser. If time permits, different troubleshooting scenarios will be staged by the instructor for the trainees to resolve. The course does not include the Mira or its pump laser.

Key Topics: Laser, electrical, and lab safety; review of specifications and typical operating conditions; laser and OPO basics; theory of operation; review of optical beam paths; demonstration of alignment optimization of both YAG and OPO cavities; pulsewidth optimization; wavelength tuning; laser optimization; using the OPO control box and diagnostics; maintenance procedures; optics cleaning; turn on/off procedures; discussion of additional available/typical diagnostics; troubleshooting scenarios.

Prerequisites: Successful completion of the Mira Customer course. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Service Courses

Chameleon Discovery Service Course

Location: Factory **Part #:** 1391713 **Course length:** 5 days **Day(s):** Monday – Friday

Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Chameleon Discovery Service course prepares trainees to install, operate, optimize, troubleshoot to the board level, repair, and maintain the laser. Course content ranges from theory of operation to electronic troubleshooting. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of supporting the product in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; thermal and humidity management; laser layout; module replacement, optimization and calibration routines; remote diagnostic procedures; replacement of FRUs and their functions; mechanical assembly and disassembly; troubleshooting theory; service manual procedures; photocell calibrations; wavelength calibration routines; software upgrades.

Prerequisites: An understanding of basic laser theory is required. Trainees who are previously trained on Chameleon installation and service is recommended.

Chameleon Ultra/Ultra II/Vision/Vision-S Service Course

Location: Factory **Part #:** 1391715 **Course length:** 4 days **Day(s):** Tuesday – Friday

Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Chameleon Ultra/Ultra II/Vision/Vision-S Service course prepares trainees to install, operate, maintain, troubleshoot, and repair the laser. Course content ranges from theory of operation to wavelength calibration. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; thermal and humidity management; power supply layout; circuit familiarization; head layout; troubleshooting procedures; re-centering PZT's; wavelength calibration with an optional Spectrometer; service RS-232 operation, software upgrades; laser acceptance verification.

Prerequisites: Successful completion of the Verdi Service course. Trainees should be able to read block diagrams and relate them to the actual assembly of printed circuit boards and any other applied circuitry.

Chameleon Compact OPO Service Course

Location: Factory **Part #:** 1391711 **Course length:** 3 days **Day(s):** Tuesday – Thursday
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Chameleon compact OPO Service course prepares trainees to install, operate, troubleshoot, repair and maintain the OPO. The trainee will learn how to teach others to control and operate the laser. Course content ranges from basic theory of operation, and laser alignment through to optical troubleshooting. Extensive hands-on laboratory time allows the trainee to test their knowledge and develop skills to ensure that the trainees are capable of supporting the product in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; thermal management; electronic control system; circuit familiarization; OPO head design; laser alignment, OPO peripherals, parts replacement, and calibration; performing electrical measurements and calibrations; troubleshooting procedures; RS-232 operation; software upgrades.

Prerequisites: Successful completion of the Chameleon/Chameleon Vision Service course. A full understanding of different electronic devices and their role in the circuit. The trainee should be able to read schematics and block diagrams and relate them to actual assembly of printed circuit boards and any other applied circuitry.

Mira Service Course

Location: Factory **Part #:** 1391845 **Course length:** 5 days **Day(s):** Monday – Friday
 Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Mira Service course covers in depth the theory, installation, operation, and maintenance of the Mira laser. It is for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; optical cavity and identification of components; daily operation and maintenance; X-wave optical alignment; built-in diagnostics; modelocking; wavelength tuning; bandwidth and pulsewidth optimization; tools and practices; Installation; femto to pico conversion; electronic control box setup and troubleshooting; Verdi vs. Argon pumping; troubleshooting procedures.

- See the “Mira Accessories Service course” for training on the Mira ELW optics set.

- Note, the course does not cover the Mira Seed.

Prerequisites: Successful completion of the Verdi Service courses. A theoretical understanding of optics and nonlinear processes is required.

Mira Accessories Service Course

Location: Factory **Part #:** 1391844 **Course length:** 5 days **Day(s):** Monday – Friday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM
Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Mira Accessories Service course covers in depth the theory, installation, operation, and maintenance of 2 to 3 different Mira Accessories. The list of possible accessories include: Mira Synchrolock AP, Pulseswitch (Cavity Dumper), 9200 Pulse Picker, Mira Extended Long Wave operation, Mira Long Pulse Pico-second operation, or Short Pulse Option (SPO1). It is for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; optical cavity and identification of components; daily operation and maintenance; laser optimization, tools and practices; installation, electronic control box setup and troubleshooting; troubleshooting procedures.

Prerequisites: Successful completion of the Mira Service course and all of its prerequisites. A basic theoretical understanding of optics and lasers is strongly recommended, but not required.

Mira-OPO Service Course

Location: Factory **Part #:** 1391847 **Course length:** 5 days **Day(s):** Monday – Friday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM
Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: The Mira-OPO Service course covers in depth the theory, installation, operation, and maintenance of the Mira-OPO laser. It is for advanced laser engineers with strong laser and optical backgrounds. The course focuses on the key topics listed below. Most of the course takes place in the laboratory and consists of extensive hands-on optical alignment covering the range of daily optimization to “worst-case,” full re-alignment scenarios for most of the Mira-OPO versions. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; specifications; linear and ring optical cavity and identification of components; daily operation and maintenance; YAG crystal optical alignment and operation; OPO crystal (pp830, pp775) optical alignment and operation; crystal conversion procedures; wavelength tuning; femto and pico operation; control box overview and setup; basic and advanced stabilization procedures; femto to pico conversion; pulsewidth and bandwidth optimization; tools and practices; troubleshooting procedures.

Prerequisites: Successful completion of the Verdi and Mira Service courses. A theoretical understanding of optics and nonlinear processes is required.

Vitara-T & Vitara-T HP & Vitara-S Hybrid and CPC II Service Course

Location: Factory Santa Clara, CA, USA	Part #: 1391966	Course length: 5 days	Day(s): Monday – Friday
		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps	Number of Students: minimum-2 / maximum-2		

Course Description: The Vitara and CPC-II Service course covers the theory, installation, operation, and maintenance of the Vitara oscillator, including pump replacement and troubleshooting for: no output, no lasing, low mode-locking power, and narrow bandwidth. Trainees will operate the laser with the latest factory software and spectrometer.

This course will certify engineers to service the following part number Vitara-T, Vitara-T-HP, and Vitara-S Hybrid systems: 1206860, 1206861, 1206862, 1206863, 1206864, 1206865, 1206868, 1206870, 1206871, 1264694, 1264700, 1325178, 1325824, 1327660, 1327661

The last day of the course will cover the basics for the installation, operation and maintenance of the compact pulse compressor (CPC-II). The course is for advanced laser engineers with strong optical backgrounds. Hands-on experience is heavily emphasized, from daily operation to full realignment methods. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; ultrafast oscillator theory and operation; modelocking; specifications; optical cavity layout; daily operation and maintenance; wavelength and bandwidth adjustments via the control software; troubleshooting procedures; full realignment; installation; customer training.

Prerequisites: Approval from a Regional Service Manager and the RLS Product Support Manager.

Vitara-S Service Course

Location: Factory Santa Clara, CA, USA	Part #: 1391965	Course length: 5 days	Day(s): Monday – Friday
		Begin: 9:00 AM	End: 5:00 PM
Audience: Coherent FSEs, subs, and reps	Number of Students: minimum-2 / maximum-2		

Course Description: The Vitara-S Service course covers the theory, installation, operation, and maintenance of the Vitara oscillator, including pump replacement and troubleshooting for: no output, no lasing, low mode-locking power, and narrow bandwidth. Trainees will operate the laser with the latest factory software and spectrometer. The course is for advanced laser engineers with strong optical backgrounds. Hands-on experience is heavily emphasized, from daily operation to full realignment methods. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

This course will certify engineers to service the following part number Vitara-S systems: 1217004, 1225041, 1225042, 1264697, 1264702

Key Topics: Laser, electrical, and lab safety; ultrafast oscillator theory and operation; modelocking; specifications; optical cavity layout; daily operation and maintenance; auto-modelocking via the control software; troubleshooting procedures; full realignment; installation; customer training.

Prerequisites: Approval from a Regional Service Manager and the RLS Product Support Manager.

Vitara CEP Service Course

Location: Factory **Part #:** 1391964 **Course length:** 3 days **Day(s):** Monday – Wednesday
Santa Clara, CA, USA **Begin:** 9:00 AM **End:** 5:00 PM

Audience: Coherent FSEs, subs, and reps **Number of Students:** minimum-2 / maximum-2

Course Description: This Vitara CEP Service course prepares trainees to operate and maintain the Vitara CEP (Carrier Envelop Phase) seeded by a Vitara laser. Course content ranges from basic theory of operation to daily operation and performance improvements. Extensive hands-on laboratory time allows trainees to test their knowledge and develop skills to ensure that they are capable of operating and maintaining the laser in the field. Upon successful completion of the course, trainees should be able to train others to control and operate the laser.

Key Topics: Laser, electrical, and lab safety; theory of operation; optical components and alignment; f-2f interferometer; PCF alignment and supercontinuum generation; optimization of the beat-note; laser locking and electronics; tools and practices; troubleshooting procedures; customer training.

Prerequisites: Successful completion of the Vitara Service courses. Approval from a Regional Service Manager and the RLS Product Support Manager.



Coherent Laser Training Catalog

Customer and Service Training Program, Description of Courses for OEM Laser Sources (OLS)

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