Product Training

2000 Course Catalog

UniversaL®
Customer Support Division
AUTOMATION IN ELECTRONIC ASSEMBLY

Surface Mount

GSM® Platform Level 1

GSM Platform Level 2

Recommended Training Courses by Job Function

Machine	Operation	Programming	Maintenance	Comments
Through Hole				
2596B/2596C Axial Sequencer	SEQ-O SDHV8-O	SDHV8-OP SV1 ERV	SDHV8-OM SV1 SV2 ERV	
2800 Series Expanded Range Verifier	ERV ERVIM8	ERV ERVIM8	ERV ERVIM8	operation, programming, and maintenance
3785B Single Table Interconnect Inserter and 6132B Single Table Positioning System	STPS	STPS	STPS	operation, programming, and maintenance
3785C Single Table Interconnect Inserter and 6132C Single Table Positioning System			IPS8-M	
3788B Dual Table Positioning System and 3789B Dual Table Interconnect Inserter	DTPS	DTPS	DTPS	operation, programming, and maintenance
6241B/C/D, 6242E, and 6248D VCD-Sequencer/Inserter	VS-O VS1	VS1 ERV PP12 PPU25	VS1 VS2 IMCTT BHIMC ERV	the ERV option is not available for the 6242E
6241F VCD/Sequencer 8 Axial Sequencer/Inserter	VS8-O	VS8-OP ERVIM8	VS8-OM IM8-L2 ERVIM8	
6287B/6687B SH VCD Axial Inserter	SV1	SV1 ERV PP12 PPU25	SV1 SV2 IMCTT ERV	
6292B/6298B DH VCD Axial Inserter	DH-O SDHV1	SDHV1 PP12 PPU25	SDHV1 SDHV2 IMCTT BHIMC	
6292C/6298C VCD DH 8 Axial Inserter	SDHV8-O	SDHV8-OP	SDHV8-OM IM8-L2	
6293B/6299B DH Jumper Wire Inserter	JW1	JW1 PP12 PPU25	JW1 JW2 IMCTT BHIMC	
6293C/6299C JW DH 8 Jumper Wire Inserter	JW8-O	JW8-OP	JW8-OM IM8-L2	
6360B/C/D/E, 6368D, 6369E Radial Sequencer/Inserter	RL-O RL1	RL1 ERV PP12 PPU25	RL-1 RL2 IMCTT BHIMC ERV	
6380A/6388A/6389A Radial 8 Sequencer/Inserter	RL8-O	RL8-OP ERVIM8	RL8-OM IM8-L2 ERVIM8	
6683C JW SH 8 Jumper Wire Inserter and 6687C SH VCD 8 Axial Inserter			SPG8-VCD/JW-M	
6772A Multi-Module DIP Inserter	MM-O MM1	MM1 DV22 PP12 PPU25	MM1 MM2 IMCTT	
Surface Mount: GSM Platform				
4556A Stackable Matrix Tray Feeder (SMTF)			SMTF-OM SMTF-M	
4559A Platform Tray Feeder (PTF)	PTF-O	PTF-P	PTF-OM PTF-M	
4675A GSM OFA2 Platform	GSM-O	GSM-P	GSM2-M GSM-L2 GSM-TP GSM-I	

Machine	Operation	Programming	Maintenance	Comments
4676A GSM2 Connector Platform	GSM-O	GSM-P	GSM2-M GSM-L2 GSM-TP GSM-I	
4681A GSM1 Platform	GSM-O	GSM-P GSM-APP GSM-TP FJ-OLB	GSM1-M GSM-L2 GSM-TP GSM-I	Also see GSM Platform head and feeder options training modules
4685A GSM1 Platform for Flexible Assembly	GSM-O	GSM-P GSM-APP GSM-TP	GSM1-M GSM-L2 GSM-I	
4686A Component Shuttle			SH-OM	
4688A GSM2 Platform	GSM-O	GSM-P GSM-APP GSM-TP FJ-OLB	GSM2-M GSM-L2 GSM-TP GSM-I	Also see GSM Platform head and feeder options training modules
4689A GSM OFA Platform	GSM-O	GSM-P GSM-APP GSM-TP	GSM1-M GSM-L2 GSM-TP GSM-I	
4695A Pneumatic Tape Feeder			TF-OM	
4697A Multipitch Tape Feeder (MPTF)			MPTF-OM	
4699A GSM2 Platform for Flexible Assembly	GSM-O	GSM-P GSM-APP GSM-TP	GSM2-M GSM-L2 GSM-TP GSM-I	Application-specific training is provided separately by product team personnel
4716A GDM Platform	GDM-O	GDM1	GDM1	Also see 4681A GSM1 Platform and GSM Platform head options training modules
5681A GSM*x*™ Platform	GSM-O	GSM-P GSM-APP GSM-TP	GSM1-M (delivered with GSM*x* Platform/GSM*xs* Platform customer training addendum) GSM-L2 GSM-TP GSM-I	Also see GSM Platform head and feeder options training modules
5685A GSM*x* Platform (Advanced Semiconductor Assembly Applications)	GSM-O	GSM-P GSM-APP GSM-TP	GSM1-M (delivered with GSM*x* Platform/GSM*xs* Platform customer training addendum) GSM-L2 GSM-TP GSM-I	Also see GSM Platform head and feeder options training modules Application-specific training is provided separately by product team personnel
5781A GSM*xs*™ Platform	GSM-O	GSM-P GSM-APP GSM-TP	GSM1-M (delivered with GSM*x* Platform/GSM*xs* Platform customer training addendum) GSM-L2 GSM-TP GSM-I	Also see GSM Platform head and feeder options training modules
5785A GSM*xs* Platform (Advanced Semiconductor Assembly Applications)	GSM-O	GSM-P GSM-APP GSM-TP	GSM1-M (delivered with GSM*x* Platform/GSM*xs* Platform customer training addendum) GSM-L2 GSM-TP GSM-I	Also see GSM Platform head and feeder options training modules Application-specific training is provided separately by product team personnel
GSM Platform Head Options Level 1 Training Modules		GSM-P (heads programming modules are offered as options in course GSM-P)	AD-OM FJ-OM FX/HF-OM NCC8-OM PD-OM UFP-OM	

Machine	Operation	Programming	Maintenance	Comments
GSM Platform Head Options *Level 2 Training Modules*			AD-M FJ-M FX/HF-M NCC8-M PD-M UFP-M (these modules can be scheduled as part of course Heads-M or upon request)	
GSM Platform Feeder Options *Level 1 Training Modules*	PTF-O	PTF-P	MPTF-OM PTF-OM SH-OM SMTF-OM TF-OM	
GSM Platform Feeder Options *Level 2 Training Modules*			PTF-M SMTF-M	

Surface Mount: HSP

4790/4791/4792 HSP	HP90-O	HP90-P	HP90-OM HP90-L2	
4795/4796 HSP	HP95-O	HP95-P HP95UPS-P HP95-DIF	HP95-OM HP95-L2	

Software

86741 UniScan		UNI		

At Universal's Product Training centers, our philosophy is based on two core concepts: performance-based instruction and skills-based objectives. Performance-based instruction means you work in a hands-on environment during training. Rather than spending most of your time attending a classroom lecture, you concentrate on working on machines. In addition, we give you practice time so you can hone your new skills.

The second core concept, skills-based objectives, ensures you practice necessary and useful skills. We realize the time you spend in training is valuable time away from your manufacturing responsibilities, and we want to make your training time as productive as possible. By providing you with skills to improve your ability to diagnose and maintain equipment, our skills-based objectives help you make the greatest positive impact on meeting machine uptime and mean-time-to-repair targets.

The two core training concepts are oriented toward providing you with new skills and evaluating the results of your training by having you perform those skills. To make this possible, all instruction at Universal's Product Training centers has been designed around four fundamental elements—objectives, content, activities, and evaluation.

Objectives define the specific outcome of your training. They identify what you will do to achieve success and what instruction is necessary to accomplish a given task. All Universal training courses are based on objectives.

Content is the material presented during instruction. Training course content is developed by drawing on the expertise of a variety of subject matter experts (field engineers, customers, manufacturing technicians and builders, design engineers, product specialists, and product managers), and is coordinated through the efforts of a full-time Instructional Design and Development Team.

Activities lead to the integration of knowing and doing. Our training courses require hands-on activities that enable you to demonstrate your newly acquired skills.

Evaluation determines the effectiveness of our training. This evaluation follows the completion of your training and takes the following two forms: (1) surveys distributed to you and your manager to identify the impact of our training, and (2) performance evaluations that require you to demonstrate the skills you have learned.

Levels of Training

Based on your requests and needs, Universal's Product Training Centers offer two general categories of training on most products. The first and most basic course is called Level 1 training. A Level 1 course is an introduction to the machine. Level 1 courses consist of distinct units pertaining either to machine operation and daily/weekly/monthly preventive maintenance or machine operation and programming. A Level 1 programming course teaches you how to create and edit programs; a Level 1 maintenance course teaches you how to perform daily, weekly, and monthly preventive maintenance tasks as defined in your machine's maintenance manual.

Level 2 programming courses address advanced topics for the seasoned programmer. Level 2 maintenance training courses cover advanced topics relating to mechanical or electrical maintenance and troubleshooting. These Level 2 maintenance courses integrate the ability to read and interpret diagnostic readouts, electrical or mechanical schematics, or prints with advanced maintenance skills. This provides you with the skills to perform maintenance and troubleshooting at an advanced level, and can save you precious production time if you do not have a maintenance service agreement in place.

Types of Training

Universal offers two types of training—regularly scheduled courses and customer-tailored courses.

Regularly-Scheduled Courses

Most Universal training courses consist of machine-specific basic introductory units composed of operation, preventive maintenance, and programming. Many machines also have an advanced (Level 2) course. Each Product Training Center distributes a schedule of courses offered, and descriptions of all courses are found in the course description portion of this catalog.

Customer-Tailored Courses

Any course can be customized to meet your specific needs. Examples of customer-tailored courses include the following:

- A course conducted solely for your company in a Product Training Center or at your facility
- Combinations of courses
- Training designed to address problems or situations unique to your company
- Training on equipment not listed in this catalog

To discuss customer-tailored courses, please contact your regional Universal Product Training Center (telephone numbers are listed on the inside back cover of this catalog). After working with you to identify your needs, Universal will give you a detailed quote.

Scheduling Courses

Course scheduling is based on forecasted demand, so the frequency of offerings varies from region to region. Schedules are available on-line at Universal's Web site (www.uic.com) or from your regional sales office, sales engineer, or any Universal Product Training Center.

If a course is canceled due to insufficient demand, confirmed students will be notified prior to the starting date. The class will be rescheduled or your tuition will be refunded.

Scheduling of customer-tailored training courses is handled by the manager of each Product Training Center.

Training Facilities

Universal operates Product Training Centers in the United States (California, Illinois, and New York), Singapore, Germany, England, Mexico, and China. Each location is staffed by professional trainers and equipped with the latest versions of Universal's equipment. Training centers enable you to practice your newly learned skills in a quiet environment, away from the activity and distraction of the manufacturing floor. Most importantly, our training facilities are located around the world to minimize your travel costs related to training.

Training Staff

Product Training maintains a full-time Instructional Design and Development staff as well as full-time staffs of professional instructors at each of its regional Product Training Centers. The instructor staff is drawn from various disciplines including manufacturing, engineering, field engineering, and education. If, for some reason, your instructor cannot answer a specific question, he or she will find a specialist with the information you need before you complete your training.

Universal recognizes the need to provide training in native languages, and has staffed its Product Training Centers accordingly. Additionally, translation services are available (at no extra charge) at the Product Training Centers in New York and England.

Daily Schedule

Course hours vary from location to location, so consult your course schedule or call a Product Training Center for information. If you would like a copy of Universal's most recent course schedule, call a Product Training Center using the telephone numbers listed on the inside back cover of this catalog.

Course Materials

Notetaking and training materials are provided as part of your training course.

What to Wear

Courses are conducted on an informal basis, and you should expect to become fully involved in all course tasks and activities. Therefore, dress casually and be prepared for the regional weather conditions at the Product Training Center you will be visiting.

Registration Information

You can enroll in a course by calling the appropriate Product Training Center to reserve a seat in the required course(s). Class size is limited, so it is important to register as far in advance as possible. If the course you request is full, we will make every effort to enroll you in the next available course.

Training Credits

Two training credits are included with the purchase of most Universal machines. The value of one training credit is US$1,000. These credits expire one year after the date of machine shipment if not used.

Tuition Costs

Tuition cost for most Level 1 courses is one training credit or US$1,000 per training seat. Tuition cost for most Level 2 courses is two training credits or US$2,000 per training seat. Tuition cost for customized and on-site training is quoted by a Product Training Center Manager.

Payment of Fees

If tuition is required, payment is due before you attend the course. Make checks or purchase orders payable to Universal Instruments. For your convenience, American Express®, MasterCard®, and VISA® credit cards are also accepted. Course prices are subject to change.

Cancellations

Before a program begins, Universal incurs substantial costs in reserving your seat in a course. Therefore, if you cancel your registration less than two weeks before the starting date of your course, you will forfeit 20% of the course fee. If you cancel within one week of the course, you will forfeit 50% of the course fee. If you cancel on the starting day of the course, you will forfeit the full course fee.

If you cannot attend the class you have registered for and want to send a substitute in your place, this is permissible as long as the substitute meets the prerequisites of the course(s). Product Training Center management must approve each substitute. There is no additional fee for a substitute.

Related Training Products

Universal offers three performance support products you might find helpful: Tech Advisor technical support product, Product Trainer computer-assisted training tool, and Train-the-Trainer courses. Information on these products is included in this catalog for your convenience. See the Table of Contents.

Guarantee

Universal guarantees you will be satisfied with your training, or we will refund your tuition.

IMCTT: Insertion Machine Control Theory and Troubleshooting

Course level: Level 2

Relevant product codes: All insertion machines

Document control identifier: CT.IMCTT.CD 26 Oct 99 **Software level:** UICS® **Course length:** 3 days

Overview: IMCTT provides prerequisite skills required for advanced (Level 2) maintenance courses for all Universal through hole equipment, but you need take the course only once since it addresses skills and knowledge common to all insertion machines.

Who should take this course? Mechanical and electrical technicians working on Universal through hole machines should take this course.

Prerequisites:

- Completion of any Level 1 through hole machine course or equivalent experience
- Experience with operation, programming, and preventive maintenance of any through hole machine
- Ability to use hand tools and digital voltmeters
- Ability to read electrical and pneumatic diagrams

During this course you will:

- Perform basic pattern program manipulations using the Universal Control Terminal
- Troubleshoot serial communication problems of the machine control system
- Troubleshoot machine I/O
- Use machine diagnostics
- Perform electrical setups common to all through hole machines
- Trace circuitry and check functionality of CE-marked E-stop/interlock system
- Troubleshoot a machine pneumatic problem
- Align the rotary table

Typical course schedule:

	Day 1	Day 2	Day 3
8am-12pm	UCT applications	troubleshoot I/O problems	electrical adjustments, troubleshoot pneumatic problems
1pm-4pm	troubleshoot serial communication problems	use machine diagnostics	align rotary table

IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting

Course level: Level 2

Relevant product codes: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter, 6292C/6298C VCD DH 8 Axial Inserter, 6293C/6299C JW DH 8 Jumper Wire Inserter, and 6380A/6388A/6389A Radial 8 Sequencer/Inserter

Document control identifier: CT.IM8-L2.CD 10 May 00 **Software level:** IM-USOS **Course length:** 4 days

Overview: IM8-L2 addresses machine control theory for all Universal's Generation 8 insertion machines. During the course you will also practice troubleshooting the electrical system common among this series of machines.

Who should take this course? Technicians who maintain any of Universal's Generation 8 machines should take this course.

Prerequisites:

- Ability to perform Level 1 machine course objectives for any Generation 8 machine
- Experience with operation, programming, and preventive maintenance of any Generation 8 machine
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to use hand tools and digital voltmeters

During this course you will:

- Troubleshoot power distribution circuits
- Troubleshoot the E-stop and interlock circuits
- Troubleshoot the VME chassis
- Troubleshoot axis problems
- Use insertion machine diagnostics to troubleshoot Generation 8 machines
- Troubleshoot UPS

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	overview sights and sounds	power distribution	E-stop and interlock/VME chassis	axis problems	IM diagnostics
1pm-4pm	reading schematics	power distribution/E-stop and interlock	VME chassis	axis problems/ IM diagnostics	UPS exit test

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

SEQ-O: 2596B/C Axial Sequencer: Operation

Course level: Level 1

Relevant product codes: 2596B/2596C Axial Sequencer

Document control identifier: CT.SEQ-O.CD 27 Oct 99 **Course length:** 4 hours

Overview: This course provides you with the skills required to operate Universal's 2596B/C Axial Sequencer. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? Anyone who must operate the machine for production should take this course. Typical titles of trainees attending this course are operators and maintenance technicians. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Perform product changeover
- Operate the machines
- Recover from machine interrupts

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

Suggested additional courses:
- ERV: Expanded Range Verifier
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

SDHV8-O: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation

Course Level: Level 1

Relevant product codes: 2596B/2596C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter

Document control identifier: CT.SDHV8-O.CD 27 Oct 99 **Software level:** IM-UPS **Course length:** 12 hours

Overview: This course provides the skills required to operate Universal's 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter. Extensive hands-on time with the machines ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? This course is designed for machine operators and others who need axial machine operation knowledge and skills.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform machine error recovery tasks
- Perform basic operation troubleshooting

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

Suggested additional courses:
- SDHV8-OP: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Programming
- SDHV8-OM: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Maintenance
- ERV: Expanded Range Verifier
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

SDHV8-OP: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Programming

Course level: Level 1

Relevant product codes: 2596B/2596C Axial Sequencer, 2800 Series Expanded Range Verifier, and 6292C/6298C VCD DH 8 Axial Inserter

Document control identifier: CT.SDHV8-OP.CD 26 Oct 99 **Software level:** IM-UPS **Course length:** 5 days

Overview: This course is designed for individuals who need to operate and program Universal's 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machine for production, maintenance, or troubleshooting, and anyone who must create/edit products should take this course. Typical titles of trainees attending this course include operators, programmers, and maintenance technicians.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Perform product changeover
- Operate the machines
- Recover from machine interrupts
- Program the machines

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	course overview and Sequencer operation	VCD DH 8 operation	VCD DH 8 programming	VCD DH 8 programming	VCD DH 8 programming
1pm-4pm	Sequencer programming	VCD DH 8 operation	VCD DH 8 programming	VCD DH 8 programming	VCD DH 8 programming

Suggested additional courses:
- SDHV8-OM: 2596B/C Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

SDHV8-OM: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Maintenance

Course level: Level 1

Relevant product codes: 2596B/2596C Axial Sequencer, 2800 Series Expanded Range Verifier, and 6292C/6298C VCD DH 8 Axial Inserter

Document control identifier: CT.SDHV8-OM.CD 10 Feb 00 **Software level:** IM-UPS **Course length:** 5 days

Overview: This course is designed for individuals who need to operate and maintain Universal's 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machines and perform mechanical or electrical adjustments to the machines should take this course. The adjustments covered by the course material are ones that are usually performed during the first 3-6 months after machine installation. A typical title of trainees attending this course is maintenance technician. This course is oriented toward hands-on experience with the machine at the maintenance level.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Practice operator tasks
- Perform daily, weekly, and monthly preventive maintenance of the machines
- Perform standard mechanical and electrical adjustments required to maintain machine performance for 3-6 months after machine installation

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	VCD DH 8 operation	VCD DH 8 maintenance	VCD DH 8 maintenance	Sequencer operation
1pm-4pm	VCD DH 8 maintenance	VCD DH 8 maintenance	VCD DH 8 maintenance	Sequencer maintenance

Suggested additional courses:
- SDHV8-OP: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Programming
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

SV1: 2596B/C Axial Sequencer and 6287B/6687B SH VCD Axial Inserter: Operation, Programming, and Maintenance

Course level: Level 1

Relevant product codes: 2596B/2596C Axial Sequencer, 2800 Series Expanded Range Verifier, and 6287B/6687B SH VCD Axial Inserter

Document control identifier: CT.SV1.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: This course is designed for individuals who need to operate, program, and maintain a 6287B/6687B SH VCD Axial Inserter and 2596 B/C Axial Sequencer.

Who should take this course? Operators, programmers, and maintenance technicians who work on these machines should take this course.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Operate the machines
- Program the machines
- Perform preventive maintenance and typical adjustments required during the first three months of machine use

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	Sequencer operation and programming	VCD operation	VCD programming	VCD preventive maintenance
1pm-4pm	Sequencer preventive maintenance	VCD programming	VCD preventive maintenance	VCD preventive maintenance

Suggested additional courses:
- SV2: 2596B/C Axial Sequencer and 6287B/6687B SH VCD Axial Inserter: Advanced Maintenance and Troubleshooting
- BHIMC: Board Handling for Insertion Machines
- ERV: Expanded Range Verifier
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

SV2: 2596B/C Axial Sequencer and 6287B/6687B SH VCD Axial Inserter: Advanced Maintenance and Troubleshooting

Course level: Level 2

Relevant product codes: 2596B/2596C Axial Sequencer, 2800 Series Expanded Range Verifier, and 6287B/6687B SH VCD Axial Inserter

Document control identifier: CT.SV2.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: This course is designed for individuals who need to maintain, troubleshoot, and repair a 6287B/6687B SH VCD Axial Inserter and 2596B/C Axial Sequencer.

Who should take this course? Mechanical and electrical maintenance technicians responsible for these machines should take this course.

Prerequisites:
- Completion of course SV1 or equivalent
- Completion of course IMCTT
- Ability to use a digital voltmeter, dial indicators, and calipers
- Ability to use machine diagnostics to read inputs and activate outputs
- Experience with operation, programming, and preventive maintenance of the machines

During this course you will:
- Perform corrective maintenance and mechanical and electrical troubleshooting associated with all the major machine subassemblies including: dispensing heads, chain system, Expanded Range Verifier, centering assembly, insertion head, cut and clinch assembly, servo systems, and interlock system

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	dispensing head assembly	Sequencer centering assembly and taping unit	VCD insertion head assembly	VCD cut and clinch assembly
1pm-4pm	Sequencer chain system and ERV	VCD insertion head assembly	VCD cut and clinch assembly	VCD electrical subsystems

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

IPS8-M: IM8 Special Products - Interconnect/Positioning System: Maintenance

Course level: Level 1

Relevant product codes: 3785C Single Table Interconnect Inserter and 6132 Single Table Positioning System

Document control identifier: CT.IPS8-M.CD 19 May 00 **Software level:** IM-UPS **Course length:** 3.5 days

Overview:

This course is designed for those primarily who need to maintain Universal's 3785C Single Table Interconnect Inserter and 6132 Single Table Positioning System machines. This positioning system is used on machines built by Universal's Special Products Group, such as the 3785C Single Table Interconnect Inserter (this machine inserts eyelets, pins, sockets, terminals, 2.5mm wire, and grippers) and Cambridge machines. The machine base is the same as the base used to manufacture Universal's 6241C VCD-Sequencer/Inserter.

This course builds upon the skills gained in the VS8-OP course. Extensive hands-on time with the machine will ensure that you have ample opportunity to practice the skills identified in the course objectives.

Who should take this course?

Anyone who is required to perform mechanical or electrical adjustments to the machine. The adjustments covered by the course material are ones that are usually performed during the first three to six months after machine installation. Typical titles of those attending this course include engineers and maintenance technicians. This course is oriented toward hands-on experiences.

Prerequisites:

- Ability to demonstrate safe and proper operation of the machine
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to read English
- Ability to use hand tools and mechanical and electrical measuring instruments

During this course you will:

- Perform daily, weekly, and monthly preventive maintenance of the the machine
- Perform standard mechanical and electrical adjustments required to maintain machine performance for three to six months after machine installation

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	check axes operation use IM-UPS	PM and setup the head	PM and setup anvil	BEC setup exit test
1pm-4pm	overview IM diagnostics	PM and setup the head	XY positioning system	

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

DTPS: 3788B Dual Table Positioning System

Course level: Level 1

Relevant product codes: 3788B Dual Table Positioning System and 3789B Dual Table Interconnect Inserter

Document control identifier: CT.3788B.CD 26 Oct 99 **Course length:** 5 days

Overview: This course includes operation, programming, and control theory and troubleshooting of the 3788B Dual Table Positioning System. This positioning system is used on machines built by Universal's Special Products Group, such as the 3789B Dual Table Interconnect Inserter (this machine inserts eyelets, pins, sockets, terminals, 2.5mm wire, and grippers) and Cambridge machines. The machine base is the same as the base used to manufacture Universal's 6292 DH VCD Axial Inserter.

Level 1 maintenance training on the head tooling must be arranged separately with the Special Products Group. Training on the Cambridge placement head is conducted by Cambridge. Contact the Binghamton Product Training Center or the Special Products Group for details.

Who should take this course? Anyone who is required to operate, program, and maintain these machines should take this course.

Prerequisites:

- Ability to recognize indicator lights on a control panel
- Ability to perform basic keyboard functions
- Ability to read English
- Ability to use hand tools and mechanical and electrical measuring instruments

During this course you will:

- Operate the machine
- Program the machine
- Perform mechanical and electrical adjustments
- Troubleshoot the machine

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	identify machine assemblies, prepare the machine for operation	use programming documentation, create a program on the machine terminal	UCT applications	troubleshoot I/O problems	electrical adjustments, troubleshoot pneumatic problems
1pm-4pm	operate the machine, recover from interrupts	verify pattern programs on the machine	troubleshoot serial communication problems	use machine diagnostics	align rotary table

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

STPS: 6132B Single Table Positioning System

Course level: Level 1

Relevant product codes: 3785B Single Table Interconnect Inserter and 6132B Single Table Positioning System

Document control identifier: CT.6132B.CD 26 Oct 99 **Software level:** UICS **Course length:** 5 days

Overview: This course includes operation, programming, and control theory and troubleshooting of the 6132B Single Table Positioning System. This positioning system is used on machines built by Universal's Special Products Group, such as the 3785B Single Table Interconnect Inserter (this machine inserts eyelets, pins, sockets, terminals, 2.5mm wire, and grippers) and Cambridge machines. The machine base is the same as the base used to manufacture Universal's 6241 VCD-Sequencer/Inserter.

Level 1 maintenance training on the head tooling must be arranged separately with the Special Products Group. Training on the Cambridge placement head is conducted by Cambridge. Contact the Binghamton Product Training Center or the Special Products Group for details.

Who should take this course? Anyone who is required to operate, program, and maintain these machines should take this course.

Prerequisites:
- Ability to recognize indicator lights on a control panel
- Ability to perform basic keyboard functions
- Ability to read English
- Ability to use hand tools and mechanical and electrical measuring instruments

During this course you will:
- Operate the machine
- Program the machine
- Perform mechanical and electrical adjustments
- Troubleshoot the machine

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	identify machine assemblies, prepare the machine for operation	use programming documentation, create a program on the machine terminal	UCT applications	troubleshoot I/O problems	electrical adjustments, troubleshoot pneumatic problems
1pm-4pm	operate the machine, recover from interrupts	verify pattern programs on the machine	troubleshoot serial communication problems	use machine diagnostics	align rotary table

VS-O: 6241B/C/D, 6242E, and 6248D VCD-Sequencer/Inserter: Operation

Course level: Level 1

Relevant product codes: 6241B/C/D VCD-Sequencer/Inserter, 6242E VCD-Sequencer/Inserter, and 6248D VCD-Sequencer/Inserter

Document control identifier: CT.VS-O.CD 01 Jun 00 **Course length:** 1 day

Overview: This course provides the skills required to operate Universal's 6241B/C/D, 6242E, and 6248D VCD-Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? This course is designed for machine operators and others who need VCD-Sequencer machine operation knowledge and skills.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform machine error recovery tasks
- Perform basic operation troubleshooting

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

VS1: 6241B/C/D, 6242E, and 6248D VCD-Sequencer/Inserter: Operation, Programming, and Maintenance

Course level: Level 1

Relevant product codes: 2800 Series Expanded Range Verifier, 6241B/C/D VCD-Sequencer/Inserter, 6242E VCD-Sequencer/Inserter, and 6248D VCD-Sequencer/Inserter

Document control identifier: CT.VS1.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: This course is designed for individuals who need to operate, program, and maintain a 6241, 6242, or 6248 VCD- Sequencer/Inserter.

Who should take this course? Operators, programmers, and maintenance technicians responsible for these machines should take this course.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Operate and program the machine
- Perform preventive maintenance and typical adjustments encountered during the first three months of machine use

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	overview of machine assemblies	creating a .PUT program	preventive maintenance	preventive maintenance
1pm-4pm	machine operation, recover from operation interruption	run and edit a .PUT program, SET parameters	preventive maintenance	preventive maintenance

Suggested additional courses:
- VS2: 6241B/C/D, 6242E, and 6248D VCD-Sequencer/Inserter: Advanced Maintenance and Troubleshooting
- BHIMC: Board Handling for Insertion Machines
- ERV: Expanded Range Verifier
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

VS2: 6241B/C/D, 6242E, and 6248D VCD-Sequencer/Inserter: Advanced Maintenance and Troubleshooting

Course level: Level 2

Relevant product codes: 2800 Series Expanded Range Verifier, 6241B/C/D VCD-Sequencer/Inserter, 6242E VCD-Sequencer/Inserter, and 6248D VCD-Sequencer/Inserter

Document control identifier: CT.VS2.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: This course is designed for individuals who need to maintain, troubleshoot, and repair a 6241, 6242, or 6248 VCD-Sequencer/Inserter.

Who should take this course? Mechanical and electrical maintenance technicians responsible for these machines should take this course.

Prerequisites:
- Completion of course VS1 or equivalent
- Completion of course IMCTT
- Ability to use a digital voltmeter, dial indicators, and calipers
- Ability to use machine diagnostics to read inputs and activate outputs
- Experience with operation, programming, and preventive maintenance of the machine

During this course you will:
- Perform corrective maintenance and mechanical and electrical troubleshooting associated with all the major machine subassemblies including: dispensing heads, chain systems, Expanded Range Verifier, insertion head, centering assembly, cut and clinch assembly, servo systems, and interlock system

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	dispensing head assembly	Sequencer chain system	insertion head assembly	cut and clinch assembly
1pm-4pm	Sequencer chain system	VCD chain system	insertion head assembly	electrical subsystems

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

VS8-O: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation

Course level: Level 1

Relevant product code: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter

Document control identifier: CT.VS8-O.CD 04 Nov 99 **Course length:** 8 hours

Overview: This course provides the skills required to operate Universal's 6241F VCD/Sequencer 8 Axial Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? This course is designed for machine operators and others who need machine operation knowledge and skills.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform machine error recovery tasks
- Perform basic operation troubleshooting

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

Suggested additional courses:
- VS8-OP: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation and Programming
- VS8-OM: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

VS8-OP: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation and Programming

Course level: Level 1

Relevant product code: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter

Document control identifier: CT.VS8-OP.CD 26 Oct 99 **Software level:** IM-UPS **Course length:** 5 days

Overview: This course is designed for individuals who need to operate and program Universal's 6241F VCD/Sequencer 8 Axial Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified in the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machine for production, maintenance, or troubleshooting, and anyone who must create/edit products should take this course. Typical titles of trainees attending this course include operators, programmers, and maintenance technicians. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Perform product changeover
- Operate the machine
- Recover from machine interrupts
- Program the machine

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	course overview and machine operation	programming	programming	programming	programming
1pm-4pm	machine operation	programming	programming	programming	programming

Suggested additional courses:
- VS8-OM: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

VS8-OM: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation and Maintenance

Course level: Level 1

Relevant product code: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter

Document control identifier: CT.VS8-OM.CD 26 Oct 99 **Software level:** IM-UPS **Course length:** 4 days

Overview: This course is designed for individuals who need to operate and maintain Universal's 6241F VCD/Sequencer 8 Axial Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machine and perform mechanical or electrical adjustments to the machine should take this course. The adjustments covered by the course material are ones that are usually performed during the first 3-6 months after machine installation. Typical titles of trainees attending this course include engineers and maintenance technicians.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors
- Ability to read machine manuals in English
- Ability to use hand tools, calipers, feeler gauges, and a digital multimeter

During this course you will:
- Operate the machine and recover from machine interrupts
- Perform daily, weekly, and monthly preventive maintenance
- Perform standard mechanical and electrical adjustments required to maintain machine performance for 3-6 months after machine installation

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	course overview and operation	maintenance	maintenance	maintenance
1pm-4pm	operation	maintenance	maintenance	maintenance

Suggested additional courses:
- VS8-OP: 6241F VCD/Sequencer 8 Axial Sequencer/Inserter: Operation and Programming
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

DHV8-O: 6292C/6298C VCD DH 8 Axial Inserter: Operation

Course level: Level 1

Relevant product codes: 6292C/6298C VCD DH 8 Axial Inserter

Document control identifier: CT.DHV8-O.CD 27 Oct 99 **Software level:** IM-UPS **Course length:** 1 day

Overview: This course is designed for individuals who need to operate Universal's 6292C/6298C VCD DH 8 Axial Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? Anyone who must operate the machine should take this course.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Practice operator tasks

Suggested additional courses:
- SDHV8-OP: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Programming
- SDHV8-OM: 2596B/C Axial Sequencer and 6292C/6298C VCD DH 8 Axial Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

JW-O: 6293B/6299B DH Jumper Wire Inserter: Operation

Course level: Level 1

Relevant product codes: 6293B/6299B DH Jumper Wire Inserter

Document control identifier: CT.JW-O.CD 21 July 99 **Course length:** 8 hours

Overview: This course provides the skills required to operate Universal's 6293B/6299B DH Jumper Wire Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? This course is designed for machine operators and others who need machine operation knowledge and skills.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform machine error recovery tasks
- Perform basic operation troubleshooting

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

JW1: 6293B/6299B DH Jumper Wire Inserter: Operation, Programming, and Maintenance

Course level: Level 1

Relevant product codes: 6293B/6299B DH Jumper Wire Inserter

Document control identifier: CT.JW1.CD 25 Oct 99 **Course length:** 4 days

Overview: This course provides the skills required to operate Universal's 6293B/6299B DH Jumper Wire Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? Anyone who must operate the machine for production, maintenance, troubleshooting, or verifying pattern programs, or anyone who plans to attend Level 2 training on the machines should take this course. Typical titles of trainees attending this course include operators, programmers, and maintenance technicians. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Perform product changeover
- Operate the machines
- Recover from machine interrupts
- Program the machines
- Perform preventive maintenance and typical adjustments required during the first six months of machine use

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	overview, operation	programming	preventive maintenance	preventive maintenance
1pm-4pm	operation	programming	preventive maintenance	preventive maintenance

Suggested additional courses:
- JW2: 6293B/6299B DH Jumper Wire Inserter: Advanced Maintenance and Troubleshooting
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- BHIMC: Board Handling for Insertion Machines
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

JW2: 6293B/6299B DH Jumper Wire Inserter: Advanced Maintenance and Troubleshooting

Course level: Level 2

Relevant product codes: 6293B/6299B DH Jumper Wire Inserter

Document control identifier: CT.JW2.CD 27 Oct 99 **Course length:** 4 days

Overview: In JW2 you learn to perform mechanical and electrical corrective maintenance and troubleshooting of Universal's 6293B/6299B DH Jumper Wire Inserter. This advanced course builds upon the skills gained in course JW1 and provides you with an opportunity to practice machine troubleshooting and corrective maintenance procedures.

Who should take this course? Anyone who must maintain the machine by troubleshooting mechanical and/or electrical problems, performing monthly/yearly preventive maintenance procedures, or performing corrective maintenance should take this course. A typical title of a trainee attending this course is maintenance technician.

Prerequisites:
- Completion of course JW1 or equivalent
- Completion of course IMCTT or equivalent
- Ability to use a digital voltmeter, dial indicators, and calipers
- Ability to use machine diagnostics to read inputs and activate outputs
- Ability to operate, program, and perform preventive maintenance tasks for the machine

During this course you will:
- Use machine documentation to perform adjustments and maintenance tasks on major assemblies
- Adjust the electrical system unique to the 6293B/6299B DH Jumper Wire Inserter

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	overview, insertion heads	cut and clinch	BEC	electrical system
1pm-4pm	insertion heads	cut and clinch	positioning system	troubleshooting

Suggested additional courses:
- BHIMC: Board Handling for Insertion Machines
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

JW8-O: 6293C/6299C JW DH 8 Jumper Wire Inserter: Operation

Course level: Level 1

Relevant product codes: 6293C/6299C JW DH 8 Jumper Wire Inserter

Document control identifier: CT.JW8-O.CD 25 Oct 99 **Software level:** IM-UPS **Course length:** 8 hours

Overview: This course provides the skills required to operate Universal's 6293C/6299C JW DH 8 Jumper Wire Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? This course is designed for machine operators and others who need machine operation knowledge and skills.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform machine error recovery tasks
- Perform basic operation troubleshooting

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

Suggested additional courses:
- JW8-OP: 6293C/6299C JW DH 8 Jumper Wire Inserter: Operation and Programming
- JW8-OM: 6293C/6299C JW DH 8 Jumper Wire Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- BHIMC: Board Handling for Insertion Machines

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

JW8-OP: 6293C/6299C JW DH 8 Jumper Wire Inserter: Operation and Programming

Course level: Level 1

Relevant product codes: 6293C/6299C JW DH 8 Jumper Wire Inserter

Document control identifier: CT.JW8-OP.CD 25 Oct 99 **Software level:** IM-UPS **Course length:** 4 days

Overview: This course is designed for individuals who need to operate and program Universal's 6293C/6299C JW DH 8 Jumper Wire Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machine for production, maintenance, or troubleshooting, and anyone who must create/edit products should take this course. Typical titles of trainees attending this course include operators, programmers, and maintenance technicians. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Perform product changeover
- Operate the machines
- Recover from machine interrupts
- Program the machines

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	operation	programming	programming	programming
1pm-4pm	operation	programming	programming	programming

additional courses:
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting

JW8-OM: 6293C/6299C JW DH 8 Jumper Wire Inserter: Operation and Maintenance

Course level: Level 1

Relevant product codes: 6293C/6299C JW DH 8 Jumper Wire Inserter

Document control identifier: CT.JW8-OM.CD 25 Oct 99 **Software level:** IM-UPS **Course length:** 4 days

Overview: This course is designed for individuals who need to operate and maintain Universal's 6293C/6299C JW DH 8 Jumper Wire Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machines and perform mechanical or electrical adjustments to the machines should take this course. The adjustments covered by the course material are ones that are usually performed during the first 3-6 months after machine installation. A typical title of trainees attending this course is maintenance technician. This course is oriented toward hands-on experience with the machine at the maintenance level.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Practice operator tasks
- Perform daily, weekly, and monthly preventive maintenance of the machines
- Perform standard mechanical and electrical adjustments required to maintain machine performance for 3-6 months after machine installation

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	operation	maintenance	maintenance	maintenance
1pm-4pm	operation	maintenance	maintenance	maintenance

Suggested additional courses:
- JW8-OP: 6293C/6299C JW DH 8 Jumper Wire Inserter: Operation and Programming
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

RL-O: 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter: Operation

Course level: Level 1

Relevant product codes: 6360B/C/D/E Radial Sequencer/Inserter, 6368D Radial Sequencer/Inserter, and 6369E Radial Sequencer/Inserter

Document control identifier: CT.RL-O.CD 27 Oct 99 **Course length:** 8 hours

Overview: This course provides the skills to operate Universal's 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? This course is designed for machine operators and others who need machine operation knowledge and skills.

Prerequisites:

- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors

During this course you will:

- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform machine error recovery tasks
- Perform basic operation troubleshooting

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the machine at your factory. Contact your regional Universal Product Training Center or service office for details.

Suggested additional courses:

- RL1: 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter: Operation, Programming, and Maintenance
- RL2: 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter: Advanced Maintenance and Troubleshooting
- BHIMC: Board Handling for Insertion Machines
- ERV: Expanded Range Verifier
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

RL1: 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter: Operation, Programming, and Maintenance

Course level: Level 1

Relevant product codes: 2800 Series Expanded Range Verifier, 6360B/C/D/E Radial Sequencer/Inserter, 6368D Radial Sequencer/Inserter, and 6369E Radial Sequencer/Inserter

Document control identifier: CT.RL1.CD 25 Oct 99 **Course length:** 4 days

Overview: This course provides the skills required to operate Universal's 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? Anyone who must operate the machine for production, maintenance, troubleshooting, or verifying pattern programs; or anyone who plans to attend Level 2 training on the machines should take this course. Typical titles of trainees attending this course include operators, programmers, and maintenance technicians. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:

- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:

- Perform product changeover
- Operate the machines
- Recover from machine interrupts
- Program the machines
- Perform preventive maintenance and typical adjustments required during the first six months of machine use

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	overview operation	programming	preventive maintenance	preventive maintenance
1pm-4pm	operation	programming	preventive maintenance	preventive maintenance

Suggested additional courses:

- RL2: 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter: Advanced Maintenance and Troubleshooting
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- BHIMC: Board Handling for Insertion Machines
- ERV: Expanded Range Verifier
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

RL2: 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter: Advanced Maintenance and Troubleshooting

Course level: Level 2

Relevant product codes: 2800 Series Expanded Range Verifier, 6360B/C/D/E Radial Sequencer/Inserter, 6368D Radial Sequencer/Inserter, and 6369E Radial Sequencer/Inserter

Document control identifier: CT.RL2.CD 27 Oct 99 **Course length:** 5 days

Overview: During this course you learn to perform mechanical and electrical corrective maintenance and troubleshooting of Universal's 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter machines. This advanced course builds upon the skills gained in course RL1, and provides you with an opportunity to practice machine troubleshooting and corrective maintenance procedures.

Who should take this course? Anyone who must maintain the machine by troubleshooting mechanical and/or electrical problems, performing monthly/yearly preventive maintenance procedures, or performing corrective maintenance should take this course. A typical title of a trainee attending this course is maintenance technician.

Prerequisites:

- Completion of course RL1 or equivalent
- Completion of course IMCTT or equivalent
- Ability to use a digital voltmeter, dial indicators, and calipers
- Ability to use machine diagnostics to read inputs and activate outputs
- Ability to operate, program, and perform preventive maintenance tasks for the machine

During this course you will:

- Use machine documentation or Tech Advisor to perform adjustments and maintenance tasks on major assemblies
- Adjust the electrical system unique to these machines

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	overview, chain system	cutter station	insertion head and head drive	cutter head	positioning system
1pm-4pm	dispensing head	verifier emitter/receiver, part detector, chain unloader	insertion head and head drive, CTA	clinch base	electrical system

Suggested additional courses:

- BHIMC: Board Handling for Insertion Machines
- ERV: Expanded Range Verifier
- PP12: Pattern Programming
- PPU25: Pattern Program Utility

RL8-O: 6380A/6388A/6389A Radial 8 Sequencer/Inserter: Operation

Course level: Level 1

Relevant product codes: 6380A/6388A/6389A Radial 8 Sequencer/Inserter

Document control identifier: CT.RL8-O.CD 25 Oct 99 **Software level:** IM-UPS **Course length:** 1 day

Overview: This course is designed for individuals who need to operate Universal's 6380A, 6388A, and 6389A Radial 8 Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course? Anyone who must operate the machine should take this course.

Prerequisites:

- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:

- Practice operator tasks

Suggested additional courses:

- RL8-OP: 6380A/6388A/6389A Radial 8 Sequencer/Inserter: Operation and Programming
- RL8-OM: 6380A/6388A/6389A Radial 8 Sequencer/Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

RL8-OP: 6380A/6388A/6389A Radial 8 Sequencer/Inserter: Operation and Programming

Course level: Level 1

Relevant product codes: 6380A/6388A/6389A Radial 8 Sequencer/Inserter

Document control identifier: CT.RL8-OP.CD 27 Oct 99 **Software level:** IM-UPS **Course length:** 5 days

Overview: This course is designed for individuals who need to operate and program Universal's 6380A, 6388A, 6389A Radial 8 Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machine for production, maintenance, or troubleshooting, and anyone who must create/edit products should take this course. Typical titles of trainees attending this course include operators, programmers, and maintenance technicians. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors

During this course you will:
- Perform product changeover
- Operate the machines
- Recover from machine interrupts
- Program the machines

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	course overview and machine operation	machine operation	programming	programming	programming
1pm-4pm	machine operation	programming	programming	programming	programming

Suggested additional courses:
- RL8-OM: 6380A/6368A/6389A Radial 8 Sequencer /Inserter: Operation and Maintenance
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
- ERV: Expanded Range Verifier

RL8-OM: 6380A/6388A/6389A Radial 8 Sequencer/Inserter: Operation and Maintenance

Course level: Level 1

Relevant product codes: 6380A/6388A/6389 Radial 8 Sequencer/Inserter

Document control identifier: CT.RL8-OM.CD 27 Oct 99 **Software level:** IM-UPS **Course length:** 5 days

Overview: This course is designed for individuals who need to operate and maintain Universal's 6380A, 6388A, 6389A Radial 8 Sequencer/Inserter. Extensive hands-on time with the machine ensures you have ample opportunity to practice the skills identified by the course objectives. Board handling training is not part of this course, but can be arranged separately.

Who should take this course? Anyone who must operate the machines and perform mechanical or electrical adjustments to the machines should take this course. The adjustments covered by the course material are ones that are usually performed during the first 3-6 months after machine installation. A typical title of trainees attending this course is maintenance technician. This course is oriented toward hands-on experience with the machine at the maintenance level.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Practice operator tasks
- Perform daily, weekly, and monthly preventive maintenance of the machines
- Perform standard mechanical and electrical adjustments required to maintain machine performance for 3-6 months after machine installation

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	operation maintenance	preventive maintenance	preventive maintenance	preventive maintenance	preventive maintenance
1pm-4pm	operation maintenance	preventive maintenance	preventive maintenance	preventive maintenance	preventive maintenance

Suggested additional courses:
- RL8-OP: 6380A/6368A/6389A Radial 8 Sequencer/Inserter: Operation and Programming
- IM8-L2: All Generation 8 Machines: Control Theory and Troubleshooting
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To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

SPG8-VCD/JW-M: IM8 Special Products - SPG8-VCD/JW 6683C JW SH 8 Jumper Wire Inserter and 6687C SH VCD 8 Axial Inserter: Maintenance

Course level: Level 1

Relevant product codes: 6683C JW SH 8 Jumper Wire Inserter and 6687C SH VCD 8 Axial Inserter

Document control identifier: CT.SPG8-VCD/JW-M.CD 30 Jun 00 **Software level:** IM-UPS **Course length:** 3.5 days

Overview:

This course is designed for individuals who need to maintain Universal's Generation 8 6683C JW SH 8 Jumper Wire Inserter and 6687C SH VCD 8 Axial Inserter machines. These machines are built by Universal's Special Products Group. The machine base is the same as the base used to manufacture Universal's 6292C VCD DH 8 Axial Inserter and 6293C DH 8 Jumper Wire Inserter.

This course builds upon the skills gained in courses SDHV8-OP and JW8-OP. Extensive hands-on time with the machine will ensure that you have ample opportunity to practice the skills identified in the course objectives.

Who should take this course?

Anyone who must perform mechanical or electrical adjustments to the machine. The adjustments covered by the course material are ones that are usually performed during the first three to six months after machine installation. Typical titles of trainees attending this course include engineers and maintenance technicians. This course is oriented toward hands-on experiences.

Prerequisites:

- Ability to demonstrate safe and proper operation of the machine
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to read English and to use hand tools and measuring instruments

During this course you will:

- Perform daily, weekly, monthly preventive maintenance of the machine
- Perform standard mechanical and electrical adjustments required to maintain performance for three to six months after machine installation

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	course overview and machine operation	machine operation	programming	programming	programming
1pm-4pm	machine operation	programming	programming	programming	programming

MM-O: 6772A Multi-Module DIP Inserter: Operation

Course level: Level 1

Relevant product code: 6772A Multi-Module DIP Inserter

Document control identifier: CT.MM-O.CD 1 Jun 00 **Software level:** UICS **Course length:** 1 day

Overview:

This course is designed for individuals who need to operate Universal's 6772A Multi-Module DIP Inserter. This course provides you with the skills required to operate the machine. Extensive hands-on time with the machine will ensure that you have ample opportunity to practice the skills identified by the course objectives.

Who should take this course?

Operators responsible for machine operation should take this course.

Prerequisites:

- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors

During this course you will:

- Review the theory of automatic insertion
- Perform normal machine operation tasks to set up and run a new board
- Perform Machine error recovery tasks
- Perform basic operation troubleshooting

PPU25: Pattern Program Utility

- MM2: 6772A Multi-Module DIP Inserter: Advanced Maintenance and Troubleshooting

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

MM1: 6772A Multi-Module DIP Inserter: Operation, Programming, and Maintenance

Course level: Level 1

Relevant product code: 6772A Multi-Module DIP Inserter

Document control identifier: CT.MM1.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: This course is designed for individuals who need to operate, program, and maintain a 6772A Multi-Module DIP Inserter.

Who should take this course? Operators, programmers, and maintenance technicians responsible for the machine should take this course.

Prerequisites:
- Ability to use keyboards and manipulate data on a personal computer
- Ability to recognize and read machine indicator lights and sensors
- Ability to use hand tools, calipers, and feeler gauges

During this course you will:
- Perform product changeover
- Operate the machine
- Recover from machine interrupts
- Program the machine
- Perform preventive maintenance and typical adjustments required during the first three months of machine use

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	overview of machine assemblies	structure of a pattern program, creating a .PUT program	preventive maintenance	preventive maintenance
1pm-4pm	machine operation, recover from operation interruption	run and edit a .PUT program, SET parameters	preventive maintenance	preventive maintenance

Suggested additional courses:
- IMCTT: Insertion Machine Control Theory and Troubleshooting
- PP12: Pattern Programming
- PPU25: Pattern Program Utility
- MM2: 6772A Multi-Module DIP Inserter: Advanced Maintenance and Troubleshooting

MM2: 6772A Multi-Module DIP Inserter: Advanced Maintenance and Troubleshooting

Course level: Level 2

Relevant product code: 6772A Multi-Module DIP Inserter

Document control identifier: CT.MM2.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: This course is designed for individuals who need to maintain, troubleshoot, and repair a 6772A Multi-Module DIP Inserter.

Who should take this course? Mechanical and electrical maintenance technicians responsible for the machine should take this course.

Prerequisites:
- Completion of course MM1 or equivalent
- Completion of course IMCTT
- Ability to use a digital voltmeter, dial indicators, and calipers
- Ability to use machine diagnostics to read inputs and activate outputs
- Experience with operation, programming, and preventive maintenance of the machine

During this course you will:
- Perform corrective maintenance and mechanical and electrical troubleshooting associated with all the major machine subassemblies including the carriage, magazine, spreader-pusher, slide, head, and cut and clinch

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	mechanical setups	mechanical setups	electrical setups	software setups
1pm-4pm	mechanical setups	electrical setups	pneumatic setups	troubleshooting practice

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

2596B/C Axial Sequencer and 6292B/6298B DH VCD Inserter: Operation, Programming, and Maintenance

Course code: SDHV1

This course provides you with the skills required to operate Universal's 2596B/C Axial Sequencer and 6292B/6298B Dual Head VCD Inserter. During this course you will perform product changeover, operate the machines, recover from machine interrupts, program the machines, and perform preventive maintenance and typical adjustments on the machines.

2596B/C Axial Sequencer and 6292B/6298B DH VCD Inserter: Advanced Maintenance and Troubleshooting

Course code: SDHV2

SDHV2 teaches you how to perform mechanical and electrical corrective maintenance and troubleshooting of Universal's 2596B/2596C Axial Sequencer and 6292B/6298B DH VCD Inserter. This advanced course builds upon the skills gained in course SDHV1, and gives you an opportunity to practice machine troubleshooting and corrective maintenance procedures.

DIP Verifier Programming

Course code: DV22

This course is designed for individuals who perform DIP verifier programming on Universal's Multi-Module DIP Inserter. This course gives you the opportunity to use the master table to create a verifier program, identify all verifier electrical assemblies, identify functions of .VER and .MAG pattern fields, write a .VER program, and use the test head and spreader-pusher assembly to verify DIP components.

6360A Radial III Sequencer/Inserter: Operation, Programming, and Maintenance

Course code: RLA1

This course is designed for individuals who need to operate, program, and maintain Universal's 6360A Radial III Sequencer/Inserter. During this course you will perform product changeover, operate the machine, recover from machine interrupts, program the machine, and perform preventive maintenance of the machine.

6360A Radial III Sequencer/Inserter: Advanced Maintenance and Troubleshooting

Course code: RLA2

RLA2 teaches you how to perform mechanical and electrical corrective maintenance and troubleshooting of Universal's 6360A Radial III Sequencer/Inserter. This advanced course builds upon the skills gained in course RLA1, and gives you an opportunity to practice machine troubleshooting and corrective maintenance procedures.

Dynapert UCSM-G: Level 1 Operation, Programming, and Maintenance

Course code: UCSM-G-L1

This course is designed for individuals who need to operate, program, and maintain the Dynapert UCSM-G machine. During this course you will perform product changeover, operate the machine, recover from machine interrupts, program the machine, and perform preventive maintenance of the machine.

Dynapert UCSM-G: Level 2 Advanced Maintenance and Troubleshooting

Course code: UCSM-G-L2

UCSM-G-L2 teaches you how to perform mechanical and electrical corrective maintenance and troubleshooting of Dynapert's UCSM-G machine. This advanced course builds upon the skills gained in course UCSM-G-L1, and gives you an opportunity to practice machine troubleshooting and corrective maintenance procedures.

Dynapert V12000: Level 1 Operation, Programming, and Maintenance

Course code: V12000-L1

This course is designed for individuals who need to operate, program, and maintain the Dynapert V12000 machine. During this course you will perform product changeover, operate the machine, recover from machine interrupts, program the machine, and perform preventive maintenance of the machine.

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

Dynapert V12000: Level 2 Advanced Maintenance and Troubleshooting

Course code: V12000-L2

V12000-L2 teaches you how to perform mechanical and electrical corrective maintenance and troubleshooting of the Dynapert V12000 machine. This advanced course builds upon the skills gained in course V12000-L1, and gives you an opportunity to practice machine troubleshooting and corrective maintenance procedures.

Dynapert VCD-G: Level 1 Operation, Programming, and Maintenance

Course code: VCD-G-L1

This course is designed for individuals who need to operate, write programs for, and provide routine maintenance for the Dynapert VCD-G Axial Inserter. During this course you will perform product changeover, operate the machine, recover from machine interrupts, program the machine, and perform preventive and corrective maintenance tasks.

Dynapert VCD-G: Level 2 Advanced Maintenance and Troubleshooting

Course code: VCD-G-L2

VCD-G-L2 teaches you how to perform mechanical and electrical corrective maintenance and troubleshooting of the Dynapert VCD-G machine. This advanced course builds upon the skills gained in course VCD-G-L1, and gives you an opportunity to practice machine troubleshooting and corrective maintenance procedures.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

ISMA: Introduction to Surface Mount Assembly

Course level: Level 1

Relevant product codes: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4683A GSM OFS Platform, 4684A GSM SMT/TAB Bonder Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, 4699A GSM2 Platform for Flexible Assembly, 4716 GDM Platform, 5681A/5685A GSM*x* Platform, and 5781A/5785A GSM*xs* Platform

Document control identifier: CT.ISMA.CD 27 Jun 00 **Course length:** 1/2 day

Overview: This course provides operators, programmers, and maintenance technicians with an introduction to the terminology, concepts, and generic information regarding surface mount machine operation and programming. This course is a prerequisite for all other courses related to Universal's surface mount assembly equipment, but you need take the course only once since it addresses skills and knowledge common to all surface mount machines. Completion of this course prior to training on any Universal surface mount equipment will enhance the effectiveness of that training.

Who should take this course? Anyone attending other courses on Universal's surface mount placement equipment, anyone who desires an understanding of the common terms and concepts associated with surface mount placement equipment, or anyone who is just getting started in surface mount assembly should take this course.

During this course you will:

- Review a typical surface mount assembly line and its variations
- Identify the acronyms, lead shape, pitch, and size/type of surface mount components (either chip or integrated circuit package)
- Identify and define packaging options for components; for example, tape, stick tube, tray, etc.
- Identify and define multicircuit panels, rotated images, reference points, and offsets
- Identify the shapes of, differences between, and uses of global and local fiducials

Typical course schedule: Contact the Binghamton Product Training Center for details.

PR1: Introduction to Surface Mount Processes

Course level: Level 1

Relevant product codes: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4683A GSM OFS Platform, 4684A GSM SMT/TAB Bonder Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, 4699A GSM2 Platform for Flexible Assembly, 4716 GDM Platform, 5681A/5685A GSM*x* Platform, and 5781A/5785A GSM*xs* Platform

Document control identifier: CT.PR1.CD 12 Oct 98 **Course length:** 1 day

Overview: This one-day course provides a comprehensive understanding of the processes and terminology used in the manufacture of printed circuit board assemblies using surface mount technology. The course includes a brief overview of printed circuit board manufacturing, but focuses on the terminology, materials, and processes involved with each step of the surface mount assembly process. Completion of this course prior to training on any Universal surface mount assembly equipment will enhance the effectiveness of that training.

Who should take this course? Anyone who has had exposure to specific steps of the surface mount assembly process and wishes to understand how the entire assembly process works, or anyone who would like a refresher course for current surface mount processes should take this course.

During this course you will:

- Identify the acronyms, lead shape, pitch, and size/type of surface mount components (either chip or integrated circuit package)
- Identify surface mount assemblies and processes
- Identify the key parameters in selecting and printing solder paste
- Identify the key parameters in selecting and dispensing adhesives
- Identify the key concepts in oven profiling

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

GSM-O: 4681A/4688A GSM Platform: Operation

Course Level: Level 1

Relevant product codes: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, and 4699A GSM2 Platform for Flexible Assembly

Document control identifier: CT.GSM-O.CD 07 Apr 00 **Software level:** UPS 3.x

Course length: 8-16 hours; a full class of six students with previous PCB assembly machine operation experience can complete this course in eight hours, a full class of six students with no machine experience can complete this course in 12-16 hours

Overview: This course provides the knowledge and hands-on skills necessary to operate Universal's GSM1 Platform and/or GSM2 Platform using the latest UPS software. If this course is taught on site at your factory, it focuses on the level of software currently loaded on your machine.

Who should take this course? This course is designed for machine operators and others who need GSM Platform operation knowledge and skills. Appropriate tasks from this course have been included in Universal's GSM Platform maintenance courses (GSM1-M and GSM2-M) for your convenience.

Prerequisites:

- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to identify your company's surface mount components by package and lead types

During this course you will:

- Review safety rules and ESD practices
- Review the GSM Platform theory of operation
- Locate on-line help information related to operation
- Perform normal GSM Platform operation tasks to set up and run a new product:
  - Power on/off the machine
  - Take a (floppy disk) product and prepare it for production
  - Load a product
  - Load and arrange feeders and verify component orientation
  - Adjust the height of a matrix tray platform feeder (optional)
  - Check nozzle configuration for a new product (optional)
  - Zero the machine
  - Run a product in dry cycle and step modes
  - Run and stop production, and stop for an emergency
  - Shut down UPS
- Perform GSM Platform error recovery tasks:
  - Recover from fiducial failures
  - Perform feeder error recovery tasks
  - Recover from board handling errors
  - Identify the normal effects of pushing E-stop during production
  - Run a segment repair product
- Perform FlexJet Head operation tasks (for FlexJet Head operators only):
  - Describe major parts and functions of the FlexJet Head
  - Identify high-speed feeders for use with the FlexJet Head
  - Manually change nozzles on the FlexJet Head
  - Clean nozzles
  - Verify nozzles on the head match the head configuration
  - Describe major parts of the FlexJet Head nozzle changer
  - Manually place nozzles in the FlexJet Head nozzle changer
  - Verify nozzles in the changer match the nozzle changer configuration
- Perform PTF operation tasks (for PTF operators only):
  - Locate assemblies and describe their function
  - State basic component, matrix tray, and pallet specifications
  - State the effects of the pre-orient and programmable tray and belt speeds on the PTF
  - Start and stop the PTF in emergency and non-emergency situations
  - Load trays when pallets are empty and not empty
  - Manually remove empty trays
  - Empty the purge pallet
  - Reload the PTF when it is operating in Exchange, Backup, and Independent modes (optional)
  - Intrepret and recover from operations related errors and error messages

Typical course schedule: This course is normally delivered by a Universal field engineer upon installation of the GSM Platform at your factory. Contact your regional Universal Product Training Center or service office for details.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

GSM1-M: 4681A GSM Platform: Operation and Maintenance

Course level: Level 1

Relevant product codes: 4681A GSM1 Platform, 4685A GSM1 Platform for Flexible Assembly, 4689A GSM OFA Platform, 4716 GDM Platform, 5681A/5685A GSM*x* Platform, and 5781A/5785A GSM*xs* Platform

Document control identifier: CT.GSM1-M.CD 06 Jan 2000 **Software level:** UPS 3.x **Course length:** 5 days

Overview: During the first 3 days of this course you receive the knowledge and skills necessary to operate and perform preventive maintenance on Universal's single-beam GSM Platform products. During the last 2 days of this course, you receive maintenance training on heads and feeders. Placement in the head and feeder modules is based on preferences you indicate on your Student Profile Form. Check with your regional Universal Product Training Center for details on the availability of head and feeder training modules at our worldwide Product Training locations.

Who should take this course? This course is designed for technicians responsible for preventive maintenance and checking setups on a Universal single-beam GSM Platform.

Prerequisites:

- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to identify your company's surface mount components by package and lead types

During this course you will:

- Identify the basic sequence of events for GSM Platform operation
- Working as a group, set up the GSM Platform to run a new product
- Working as a group, perform GSM Platform operation error recovery tasks
- Identify the contents of and use the various GSM Platform support tools/documents
- Identify the functions of the GSM Platform electrical subsystems
- Use the discrete I/O feature to check machine inputs and outputs
- Perform all single-beam GSM Platform preventive maintenance procedures

Note that head- and feeder-related training tasks are listed on separate course descriptions.

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	safety, demo, sequence of events, user interface, operation	operation, documentation and support	diagnostics and discrete I/O, preventive maintenance	head or feeder training*	head or feeder training*
1pm-4pm	operation	machine systems	preventive maintenance	head or feeder training*	head or feeder training*

**Universal reserves the right to change the scheduling of head and feeder option training based on the availability of resources and the combined needs of all of our enrolled customers.*

Suggested additional courses:

- GSM-L2: All GSM Platforms: Electrical Maintenance and Troubleshooting
- GSM-I: All GSM Platforms: Installation and Calibration
- GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor
- Advanced GSM Platform head maintenance courses

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

GSM2-M: 4688A GSM2 Platform: Operation and Maintenance

Course level: Level 1

Relevant product code: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4688A GSM2 Platform, and 4699A GSM2 Platform for Flexible Assembly

Document control identifier: CT.GSM2-M.CD 11Jan2000 **Software level:** UPS 3.x **Course length:** 5 days

Overview: During the first 3 days of this course you receive the knowledge and skills necessary to operate and perform preventive maintenance on Universal's dual-beam GSM Platform products. During the last 2 days of this course, you receive maintenance training on heads and feeders. Placement in the head and feeder training modules is based on preferences you indicate on your Student Profile Form. Check with your regional Universal Product Training Center for details on the availability of head and feeder training modules at our worldwide Product Training locations.

Who should take this course? This course is designed for technicians responsible for preventive maintenance and checking setups on Universal's dual-beam GSM Platform products.

Prerequisites:

- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to identify your company's surface mount components by package and lead types

During this course you will:

- Identify the basic sequence of events for GSM Platform operation
- Working as a group, set up the GSM Platform to run a new product
- Working as a group, perform GSM Platform operation error recovery tasks
- Identify the functions of the GSM Platform electrical subsystems
- Identify the contents of and use the various GSM Platform support tools/documents
- Use the discrete I/O feature to check machine inputs and outputs
- Perform all dual-beam GSM Platform preventive maintenance procedures

Note that head- and feeder-related training tasks are listed on separate course descriptions.

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	safety, demo, sequence of events, user interface, operation	operation, documentation and support	diagnostics and discrete I/O, preventive maintenance	head or feeder training*	head or feeder training*
1pm-4pm	operation	machine systems	preventive maintenance	head or feeder training*	head or feeder training*

**Universal reserves the right to change the scheduling of head and feeder option training based on the availability of resources and the combined needs of all of our enrolled customers.*

Suggested additional courses:

- GSM-L2: All GSM Platforms: Electrical Maintenance and Troubleshooting
- GSM-I: All GSM Platforms: Installation and Calibration
- GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor
- Advanced GSM Platform head maintenance courses

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

AD-OM: Archimedes Valve Dispense Head: Operation and Maintenance

Course level:	Level 1
Relevant product codes:	4681A GSM1 Platform, 4688A GSM2 Platform, and 4716 GDM Platform
Document control identifier:	CT.AD-OM.CD 8 Mar 00 Software level: UPS 3.x Course length: 1 day
Overview:	This course provides the knowledge and skills necessary to install, operate, and maintain the Archimedes Valve Dispense Head. This course does not cover basic GSM Platform operation and maintenance tasks.
Who should take this course?	Maintenance technicians who need to work on the Archimedes Valve Dispense Head, including installing and setting up the head, as well as operating and performing preventive maintenance on the head should take this course.
Prerequisite:	■ You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
During this course you will:	■ Describe the theory of operation ■ Install the head and perform setups ■ Perform operation tasks ■ Change pump setups to get good quality dots ■ Carry out preventive maintenance tasks
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.
Suggested additional course:	■ AD-M: Archimedes Valve Dispense Head: Maintenance

FJ-OM: FlexJet Head: Operation and Maintenance

Course level:	Level 1
Relevant product codes:	4681A GSM1 Platform and 4688A GSM2 Platform
Document control identifier:	CT.FJ-OM.CD 8 Mar 00 Software level: UPS 4.0 Course length: 1 day
Overview:	This course provides the knowledge and skills unique to operating and performing warranty period maintenance tasks on Universal's FlexJet Head. This course does not include many of the basic maintenance and operation tasks contained in the GSM1-M and GSM2-M courses.
Who should take this course?	This course is designed for GSM Platform technicians responsible for maintaining the FlexJet Head.
Prerequisite:	■ You should be able to perform all 1-M or GSM2-M course tasks that apply to your job
During this course you will:	■ Describe the theory of operation of the FlexJet Head and nozzle changer ■ Configure FlexJet Head-specific options on the GSM Platform ■ Perform all FlexJet Head operation and preventive maintenance tasks
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.
Suggested additional course:	■ FJ-M: FlexJet Head: Maintenance

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

FX/HF-OM: Flex/Hi-Force Head: Operation and Maintenance

Course level: Level 1

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.FX/HF-OM.CD 19 Jan 00 **Software level:** UPS 3.x **Course length:** 1 day

Overview: This course module provides the knowledge and skills unique to operating and performing warranty period tasks on Universal's four-spindle Flex Head (includes C4/Hi-Force Head) and nozzle changer. This course does not include basic GSM Platform maintenance and operation tasks.

Who should take this course? This course is designed for GSM Platform technicians responsible for maintaining the Flex Head.

Prerequisite:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job

During this course you will:
- Describe the Flex Head and nozzle changer parts, function, and theory of operation
- Perform all preventive maintenance tasks on the Flex Head and nozzle changer
- Replace a Flex Head nozzle adapter
- Install the head and configure the machine

Typical course schedule: This course module is taught as part of GSM1-M or GSM2-M training at your request.

Suggested additional course:
- FX/HF-M: Flex/Hi-Force Head: Maintenance

NCC8-OM: NCC8 Head: Operation and Maintenance

Course level: Level 1

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.NCC8-OM.CD 8 Mar 00 **Software level:** pre-UPS 3.0 **Course length:** 4-6 hours

Overview: This course module provides the knowledge and skills unique to operating and performing warranty period maintenance tasks on Universal's Noncontact Centering Head (NCC8 Head). This course does not include basic GSM Platform maintenance and operation tasks.

Who should take this course? This course is designed for GSM Platform technicians responsible for maintaining the NCC8 option on a GSM Platform.

Prerequisite:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job

During this course you will:
- Describe the head's theory of operation and perform setups on the head
- Perform NCC8 preventive maintenance tasks
- Configure the NCC8 for operation on the GSM Platform
- Remove and install the NCC8 Head
- Calibrate the NCC8 Head (optional)

Typical course schedule: This course module is taught as part of GSM1-M or GSM2-M training at your request.

Suggested additional course:
- NCC8-M: NCC8 Head: Maintenance

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

PD-OM: Positive Displacement Pump Head: Operation and Maintenance

Course level:	Level 1
Relevant product codes:	4681A GSM1 Platform, 4688A GSM2 Platform, and 4716 GDM Platform
Document control identifier:	CT.PD-OM.CD 8 Mar 00 Software level: UPS 3.x Course length: 1 day
Overview:	This course provides the knowledge and skills unique to operating and performing warranty period maintenance tasks on the Positive Displacement Pump Dispense Head. This course does not cover basic GSM Platform operation and maintenance tasks.
Who should take this course?	Maintenance technicians who work on the Positive Displacement Pump Dispense Head should take this course.
Prerequisite:	■ You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
During this course you will:	■ Describe the head's theory of operation ■ Install the head and perform setups on the head ■ Perform operation tasks ■ Change pump setups to get good quality dots ■ Carry out preventive maintenance tasks
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.
Suggested additional course:	■ PD-M: Positive Displacement Pump Dispense Head: Maintenance

UFP-OM: UFP300+ Head: Operation and Maintenance

Course level:	Level 1
Relevant product codes:	4681A GSM1 Platform and 4688A GSM2 Platform
Document control identifier:	CT.UFP-OM.CD 1 Nov 99 Software level: pre-UPS 3.0 Course length: 1 day
Overview:	This course module provides the knowledge and skills unique to maintaining and operating Universal's Ultrafine Pitch (UFP300+) Head. This course module does not include basic GSM Platform maintenance and operation tasks.
Who should take this course?	This course is designed for GSM Platform technicians responsible for maintaining the UFP300+ Head option on a GSM Platform.
Prerequisite:	■ You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
During this course you will:	■ Perform UFP300+ Head preventive maintenance tasks ■ Perform UFP300+ Head setup tasks ■ Configure the UFP300+ Head for operation on the GSM Platform ■ Remove and install the UFP300+ Head
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.
Suggested additional course:	■ UFP-M: UFP300+ Head: Maintenance

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

SMTF-OM: 4556A Stackable Matrix Tray Feeder: Operation and Maintenance

Course level: Level 1

Relevant product code: 4556A SMTF

Document control identifier: CT.SMTF-OM.CD 1 Nov 99 **Software level:** pre-UPS 3.0 **Course length:** 2 hours

Overview: This course provides the knowledge and skills necessary to operate, install, and perform preventive maintenance on Universal's Stackable Matrix Tray Feeder (SMTF) using the latest GSM Platform software. This course does not cover basic GSM Platform maintenance tasks.

Who should take this course? This course is designed for SMTF maintenance technicians who need to operate, set up, and maintain Universal's SMTF.

Prerequisite:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job

During this course you will:
- Install the SMTF on the GSM Platform
- Perform SMTF operations and error recovery tasks
- Perform preventive maintenance tasks on the SMTF

Typical course schedule: This course module is taught as part of GSM1-M or GSM2-M training at your request.

Suggested additional course:
- SMTF-M: 4556A Stackable Matrix Tray Feeder: Maintenance

PTF-O: 4559A Platform Tray Feeder: Operation

Course level: Level 1

Relevant product code: 4559A PTF

Document control identifier: CT.PTF-O.CD 8 Mar 00 **Software level:** UPS 3.x

Course length: 2.5 hours (if you have already taken course GSM-O or have equivalent experience)

Overview: This course provides the knowledge and skills necessary to operate Universal's Platform Tray Feeder (PTF) using the latest PTF and GSM Platform software. PTF-O does not include many of the basic operation skills contained in the GSM Platform operation course (GSM-O).

Who should take this course? This course is designed for GSM Platform operators who need to operate the PTF option.

Prerequisite:
- You should be able to perform all GSM-O course tasks that apply to your job

During this course you will:
- Operate the PTF
- Operate dual PTFs on the same GSM Platform (optional)
- Recover from operations related errors

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the PTF at your factory. Contact your regional Universal Product Training Center or service office for details.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

PTF-OM: 4559A Platform Tray Feeder: Operation and Maintenance

Course level:	Level 1
Relevant product code:	4559A PTF
Document control identifier:	CT.PTF-OM.CD 8 Mar 00 **Software level:** UPS 3.x **Course length:** 1 day
Overview:	This course provides the knowledge and skills necessary to operate and perform setups and warranty period maintenance tasks on Universal's Platform Tray Feeder (PTF) using the latest PTF and GSM Platform software. This course module does not include many of the basic maintenance tasks contained in the GSM1-M or GSM2-M classes.
Who should take this course?	This course is designed for PTF maintenance technicians who need to operate, set up, and maintain Universal's PTF.
Prerequisite:	■ You should be able to perform all GSM1-M and GSM2-M course tasks that apply to your job
During this course you will:	■ Describe the PTF's theory of operation and basic power distribution ■ Configure specific PTF options (optional) ■ Perform PTF operations and error recovery tasks ■ Perform dual PTF operation (optional) ■ Perform preventive maintenance tasks on the PTF ■ Use PTF setup software to verify the axes ■ Use PTF diagnostics to verify I/O functions
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.
Suggested additional course:	■ PTF-M: 4559A Platform Tray Feeder: Maintenance

SH-OM: 4686A Component Shuttle: Operation and Maintenance

Course level:	Level 1
Relevant product code:	4686A Component Shuttle
Document control identifier:	CT.SH-OM.CD 8 Mar 00 **Software level:** pre-UPS 3.0 **Course length:** 3 hours
Overview:	This training provides the knowledge and skills necessary to operate and perform warranty period maintenance tasks on Universal's Component Shuttle. This course does not cover basic GSM Platform operation and maintenance tasks.
Who should take this course?	Maintenance technicians who need to work on the Component Shuttle should take this course.
Prerequisite:	■ You should be able to perform all GSM1-M and GSM2-M course tasks that apply to your job
During this course you will:	■ Operate the feeder ■ Perform all regularly required maintenance tasks
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

TF-OM: 4695A Pneumatic Tape Feeder: Operation and Maintenance

Course level:	Level 1
Relevant product codes:	4681A GSM1 Platform, 4688A GSM2 Platform, and 4695A Pneumatic Tape Feeder
Document control identifier:	CT.TF-OM.CD 8 Mar 00 Course length: 2 hours
Overview:	This training provides the knowledge and skills necessary to install, operate, and maintain Universal's Pneumatic Tape Feeder.
Who should take this course?	Maintenance technicians who need to work on the Pneumatic Tape Feeder should take this course.
Prerequisite:	■ You should be able to perform all GSM-O course tasks that apply to your job
During this course you will:	■ Install the feeder on a GSM Platform ■ Operate the feeder ■ Perform all regularly required maintenance tasks ■ Perform selected corrective maintenance tasks
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.

MPTF-OM: 4697A Multi-Pitch Tape Feeder: Operation and Maintenance

Course level:	Level 1
Relevant product code:	4697A MPTF
Document control identifier:	CT.MPTF-OM.CD 8 Mar 00 Software level: UPS 3.x Course length: 2 hours
Overview:	This training provides the knowledge and skills necessary to install, operate, and perform warranty period maintenance tasks on Universal's Multi-Pitch Tape Feeder.
Who should take this course?	Maintenance technicians who need to work on the Multi-Pitch Tape Feeder should take this course.
Prerequisite:	■ You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
During this course you will:	■ Install the feeder on a GSM Platform ■ Operate the feeder ■ Perform all regularly required maintenance tasks ■ Perform selected corrective maintenance tasks
Typical course schedule:	This course module is taught as part of GSM1-M or GSM2-M training at your request.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

GSM-P: 4681A/4688A GSM Platform: Programming

Course level: Level 1

Relevant product codes: 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4684A GSM SMT/TAB Bonder Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4699A GSM2 Platform for Flexible Assembly, 5681A GSM*x* Platform, and 5781A GSM*xs* Platform

Document control identifier: CT.GSM-P.CD 28 Jun 00

Software level: UPS 4.0.x (Application-specific needs may exist for GSM*x* Platform customers who purchase various configuration options.)

Course length: 5 days

Overview: GSM-P provides the knowledge, skills, and hands-on experience necessary to program products on Universal's GSM1 Platform, GSM2 Platform, GSM*x* Platform, and GSM*xs* Platform machines using the most current Universal Platform Software. The default heads discussed are the Flex Head and the FlexJet Head. Options training may include any, but not all, of the following programming options depending on time and length of that particular option's module: Dispense Head (Positive Displacement Pump or Archimedes Valve), High Force Head, or the Ultra Fine Pitch Head; as well as feeder programming options for PTF, SMTF, or RAMTF.

Who should take this course? GSM-P is designed for GSM Platform programmers and anyone else who needs to create products on GSM Platforms. If you require more specific programming training for the 4685A GSM1 Platform for Flexible Assembly or 4716 GDM Platform, please contact your regional Universal Product Training Center.

Prerequisites:

- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to identify your own surface mount components by package and lead types

During this course you will:

- Perform machine operations tasks necessary to run a product
- Create and edit products, including CAD data products
- Define and edit feeder and component databases
- Work with Enhanced Product Setup

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	programming	programming	programming	programming	exit test
1pm-4pm	programming	programming	programming	programming	options

Suggested additional courses:

- GSM-APP: Troubleshooting and Optimizing GSM Platform Product Applications
- GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor
- FJ-OLB: FlexJet/Flex Head: Optimization and Line Balancing

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

FJ-P: FlexJet Head: Programming

Course level: Level 1

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.FJ-P.CD 8 Mar 00 **Software level:** UPS 4.0 **Course length:** 4 hours

Overview: This course module provides the knowledge and skills unique to programming Universal's seven-spindle FlexJet Head. It builds on the skills and knowledge taught in course GSM-P. FJ-P does not teach the basic programming skills common to the GSM Platform because you are expected to be proficient in GSM Platform programming before taking this course.

Who should take this course? This course is designed for GSM Platform programmers who need to create products using the FlexJet Head.

Prerequisite:
- You should be able to perform all GSM-P course tasks; refer to the GSM-P course description for details

During this course you will:
- Describe FlexJet Head design features and how they affect programming
- Configure a GSM Platform to use a FlexJet Head
- Create a product that uses a FlexJet Head
- Modify an existing Flex Head product to use a FlexJet Head (optional)
- Optimize using the Throughput Optimization Aid

Typical course schedule: This course is scheduled at your request.

Suggested additional course:
- FJ-OLB: FlexJet Head/Flex Head: Optimization and Line Balancing

PTF-P: 4559A Platform Tray Feeder: Programming

Course level: Level 1

Relevant product code: 4559A PTF

Document control identifier: CT.PTF-P.CD 8 Mar 00 **Software level:** UPS 3.x

Course length: 2-4 hours if you have already completed course GSM-P; note that the PTF-P module does not include many of the basic programming skills contained in the GSM Platform programming course (GSM-P)

Overview: This course provides the knowledge and skills necessary to program Universal's Platform Tray Feeder (PTF) using the latest PTF and GSM Platform software. Students who need to operate the PTF as a major part of their job should take PTF-O in addition to this class.

Who should take this course? This course is designed for GSM Platform programmers who need to program the PTF option.

Prerequisite:
- You should be able to perform all GSM-P course tasks that apply to your job

During this course you will:
- Configure the PTF
- Create/modify a product to use parts from the PTF
- Run and test a GSM Platform product that uses the PTF
- Program dual PTFs (optional)

Typical course schedule: This course is scheduled at your request.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

GDM-O: 4716A GDM Platform: Operation

Course level: Level 1

Relevant product code: 4716 GDM Platform

Document control identifier: CT.GDM-O.CD 8 Mar 00 **Software level:** pre-UPS 3.0

Course length: 7-10 hours; if students do not need training on process issues associated with using adhesive, the course can be taught in one day

Overview: This course provides the knowledge and skills necessary to operate the GDM Platform and the adhesive dispensing head (either Positive Displacement Pump Head or Archimedes Valve Head).

Who should take this course? This course is designed for anyone who needs to operate the GDM Platform and its associated adhesive head. If you have the Dispense Head option on your GSM Platform, you should not take this course because it does not provide training specific to the GSM Platform. Instead, you should request training on the Dispense Head in addition to GSM Platform training.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to identify your company's surface mount components by package and lead types

During this course you will:
- Describe the GDM Platform theory of operation
- Operate the GDM Platform
- Perform Dispense Head operation tasks
- Recover from operations-related errors
- Change process variables to improve dispense quality

Typical course schedule: This course is usually delivered by a Universal field engineer upon installation of the GDM Platform at your factory. Contact your regional Universal Product Training Center or service office for details.

GDM1: 4716A GDM Platform: Operation, Programming, and Maintenance

Course level: Level 1

Relevant product codes: 4716 GDM Platform

Document control identifier: CT.GDM-O/P/M.CD 8 Mar 00 **Software level:** UPS 3.0.0 **Course length:** 4.5 days

Overview: This course provides the knowledge and skills necessary to operate, program, and maintain the GDM Platform using the latest UPS software. Students individually and in small groups perform hands-on tasks. This course covers both Universal's Positive Displacement Pump Head and Archimedes Valve Head.

Who should take this course? This course is designed for anyone responsible for programming and/or maintaining the GDM Platform. If you have the Dispense Head option on a GSM Platform, you should not take this course because it does not provide training specific to the GSM Platform. Instead, you should request training on the Dispense Head in addition to GSM Platform training.

Prerequisites:
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Ability to identify your surface mount components by package and lead type

During this course you will:
- Describe how the GDM Platform and Dispense Head function
- Configure the GDM Platform and Dispense Head
- Perform GDM Platform operations tasks
- Create and run a product that contains dispense patterns for components
- Create a product with CAD data (optional)
- Check/adjust normal setups on the Dispense Head
- Adjust setups in response to different processes
- Remove, disassemble, and clean a pump assembly
- Perform preventive maintenance tasks on the GDM Platform and Dispense Head

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	overview	programming	process issues	CAD data products	maintenance
1pm-4pm	overview	operation	programming	maintenance	

Suggested additional courses:
- AD-M: Archimedes Valve Dispense Head: Maintenance
- PD-M: Positive Displacement Pump Dispense Head: Maintenance
- GSM-L2: All GSM Platforms: Electrical Maintenance and Troubleshooting

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

GSM-L2: All GSM Platforms: Electrical Maintenance and Troubleshooting

Course level: Level 2

Relevant product codes: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4683A GSM OFS Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, 4699A GSM2 Platform for Flexible Assembly, 4716 GDM Platform, 5681A/5685A GSM*x* Platform, and 5781A/5785A GSM*xs* Platform

Document control identifier: CT.GSM-L2.CD 02 Nov 99

Course length: 4 days

Overview: This course provides the knowledge and skills necessary to troubleshoot the base electrical subsystems common across many of Universal's GSM Platform products.

Who should take this course? This course is designed for maintenance technicians who require advanced electrical troubleshooting expertise on GSM Platform products. It should be considered a requirement for anyone who needs to electrically troubleshoot a GSM Platform.

Prerequisites:

- You should be able to perform all GSM1-M/GSM2-M and GSM-P course tasks; refer to the GSM1-M/GSM2-M and GSM-P course descriptions for details
- You should have 2-3 months experience working on the GSM Platform before taking this course

During this course you will:

- Identify the sights and sounds of normal GSM Platform operation
- Read GSM Platform electrical schematics
- Troubleshoot power distribution circuits
- Troubleshoot E-stop and interlock (safety) circuits
- Use LOGICOMM
- Troubleshoot the VME chassis
- Troubleshoot I/O circuits
- Use BUSPROBE
- Troubleshoot axes circuits

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	introduction, sights and sounds, reading electrical schematics	troubleshooting power distribution	using LOGICOMM, troubleshooting the VME	troubleshooting axes
1pm-4pm	troubleshooting power distribution	troubleshooting E-stop and interlock	troubleshooting I/O circuits	exit test

Suggested additional courses:

- GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor
- Advanced GSM Platform head maintenance courses

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

GSM-I: All GSM Platforms: Installation and Calibration

Course level: Level 2

Relevant product codes: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, 4699A GSM2 Platform for Flexible Assembly, 5681A/5685A GSM*x* Platform, and 5781A/5785A GSM*xs* Platform

Document control identifier: GSM-I.CD 02 Nov 99 **Course length:** 2 days

Overview: This course provides the knowledge and skills necessary to install, calibrate, and trim* GSM Platform products to manufacturing specifications (*using the Calibration Placement Enhancement Kit).

Who should take this course? This course is designed for maintenance technicians who must install, calibrate, and trim Universal's GSM Platform products. *Note that you must purchase the kits noted in the* Prerequisites *section to be able to perform the related training tasks at your factory.*

Prerequisites:

- You should be able to perform all GSM1-M/GSM2-M and GSM-P course tasks that are directly related to your job; refer to GSM1-M/GSM2-M and GSM-P course descriptions for details
- Material requirements for on-site course delivery and on-site performance of tasks:

  for installation:
  1. Precision Leveling Kit (Platform Installation Kit), part number 46139601 or later revision
  2. Platform Roller Kit, part number 46719001 or later revision

  for calibration:
  1. Standard Calibration Kit, part number 45235205 or later revision
  2. NCC8 Calibration Kit (NCC8 Calibration Accessory Kit), part number 46722101 or later revision

  for trimming:
  1. Calibration Placement Enhancement Kit, part number 47383801 or later revision

During this course you will:

- Install a GSM Platform using the installation toolkit
- Calibrate a GSM Platform using the calibration kit
- Trim a GSM Platform using the Calibration Placement Enhancement Kit
- Check operation of the GSM Platform

Typical course schedule:

	Day 1	Day 2
8am-12pm	installation	calibration
1pm-4pm	installation	calibration placement enhancement trimming

Suggested additional courses:

- GSM-L2: All GSM Platforms: Electrical Maintenance and Troubleshooting
- Advanced GSM Platform head maintenance courses

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

GSM-APP: Troubleshooting and Optimizing GSM Platform Product Applications

Course level: Level 2

Relevant product codes: 4675A GSM OFA2 Platform, 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, 4699A GSM2 Platform for Flexible Assembly, 5681A/5685A GSM*x* Platform, and 5781A/5785A GSM*xs* Platform

Document control identifier: CT.GSM-APP.CD 27 Oct 99

Software level: UPS 3.1.x (Application-specific needs may exist for GSM*x* Platform customers who purchase various configuration options.)

Course length: 32 hours

Overview: GSM-APP provides the advanced knowledge, skills, hands-on experience, and application-specific experience necessary to program and troubleshoot complex parts and concepts on GSM Platform machines.

Who should take this course? Programmers and process engineers responsible for programming the GSM Platform should attend this course. *Since this course targets specific applications, you are encouraged to bring specific components and products that can be used in class as examples from which to learn.*

Prerequisites:

- You should have successfully completed course GSM-P
- Before taking this course you should have at least six months experience programming the GSM Platform after attending course GSM-P

During this course you will:

- Use available tools such as Enhanced Product Setup and advanced vision diagnostics to troubleshoot specific, complex parts and applications
- Learn the basics of odd form assembly programming
- Learn best practices for manually optimizing a GSM Platform Flex/Hi-Force Head product and working with machine configurations
- Program a wide variety of complex components using the spectrum of component categories available on the GSM Platform
- Have the opportunity to share ideas and concepts with other members in your field

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	programming knowledge review	troubleshooting product applications	troubleshooting product applications	line balancing and platform optimization
1pm-4pm	troubleshooting product applications		line balancing and platform optimization	optional activities

Suggested additional courses:

- GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor
- FJ-OLB: FlexJet/Flex Head: Optimization and Line Balancing

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

FJ-OLB: FlexJet Head/Flex Head: Optimization and Line Balancing

Course level: Level 2

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.FJ-OLB.CD 1 Oct 99 **Software level:** UPS 4.0 **Course length:** 3 days

Overview: This course provides the knowledge and skills specific to optimization and line balancing for Universal's seven-spindle FlexJet Head. It is designed to build on the skills and knowledge taught in Universal's GSM Platform programming class, GSM-P. FJ-OLB does not teach the basic programming skills common to the GSM Platform since you are expected to be proficient in GSM Platform programming prior to taking this course. Line balancing exercises include Flex Head, Platform Tray Feeder, and other machine options.

Who should take this course? This course is designed for GSM Platform programmers who need to optimize FlexJet Head products to maximize machine throughput. The course is also designed for GSM Platform programmers who need to balance a product over a machine line that includes GSM Platform machines and generic surface mount equipment.

Prerequisites:

- You should be able to perform all GSM-P course tasks; refer to the GSM-P course description for details
- You should have 3-6 months experience working on the GSM Platform before taking this course

During this course you will:

- Use the FlexJet automatic optimizer to optimize a product that includes a Platform Tray Feeder
- Use the automatic line balancer to split and balance a product across three machines
- Manually optimize and balance products using procedures generated by Universal's Application Engineering Group (optional)

Typical course schedule:

	Day 1	Day 2	Day 3
8am-12pm	overview	throughput optimization	automatic line balancing
1pm-4pm	throughput optimization	optional: manual optimization	optional: manual line balancing

Suggested additional courses:

- GSM-APP: Troubleshooting and Optimizing GSM Platform Product Applications
- GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

GSM-TP: All GSM Platforms: Troubleshooting Products on the Production Floor

Course level: Level 2

Relevant product codes: 4676A GSM2 Connector Platform, 4681A GSM1 Platform, 4685A GSM1 Platform for Flexible Assembly, 4688A GSM2 Platform, 4689A GSM OFA Platform, and 5681A/5685A GSM*x* Platform

Document control identifier: CT.GSM-TP.CD 5 Apr 00

Software level: UPS 3.1.x (Application-specific needs may exist for GSM*x* Platform customers who purchase various configuration options.)

Course length: 4 days

Overview: GSM-TP provides production floor technicians and programmers with the hands-on skills necessary to troubleshoot products in a production environment where GSM Platform machines are used. GSM-TP is not intended to teach product creation, product importing, or optimization tasks and techniques, but focuses on the key aspects of troubleshooting products on the GSM Platform.

Who should take this course? Production technicians and programmers who work on the GSM Platform should take this course.

Prerequisite:

- You must have completed at least one of the following courses to enroll in GSM-TP:
  - GSM1-M: 4681A GSM1 Platform: Operation and Maintenance
  - GSM2-M: 4688A GSM2 Platform: Operation and Maintenance
  - GSM-P: 4681A/4688A GSM Platform: Programming
  - GSM-APP: Troubleshooting and Optimizing GSM Platform Product Applications

During this course you will:

- Review product creation concepts
- Troubleshoot programming errors related to boards, fiducials, feeders, and components
- Complete all machine-related troubleshooting activities

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	review product creation concepts, create a simple product with the instructor	troubleshooting boards	troubleshooting feeders	troubleshooting components, troubleshooting products
1pm-4pm	troubleshooting boards	troubleshooting fiducials	troubleshooting components	exit test

Heads-M: GSM Platform Heads: Maintenance

Course level: Level 2

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.Heads-M.CD 8 Mar 00 **Software level:** UPS 3.x

Course length: Course length varies depending on the head or combination of heads you select

Overview: This course provides the knowledge and skills necessary to install, operate, configure, and maintain heads for Universal's GSM Platforms. The course is composed of modules on the Flex/Hi-Force Head, FlexJet Head, NCC8 Head, Dispense Head (Positive Displacement Pump or Archimedes Valve), and UFP300+ Head.

Who should take this course? As heads for the GSM Platforms have evolved, the Product Training Center recognizes that you may not have received training on one or more of these heads. Depending on your needs, you can register for one or more of the modules that compose this course. You need attend training only on the days that training on the head you are interested in is offered.

Prerequisite:

- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job

During this course you will:

- Perform selected tasks from a comprehensive list of basic and advanced maintenance tasks on the head(s) you select. You can obtain a list of tasks from the Binghamton Product Training Center prior to scheduling the class.

Typical course schedule: Contact the Binghamton Product Training Center to schedule training on the head(s) in which you are interested.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

AD-M: Archimedes Valve Dispense Head: Maintenance

Course level: Level 2

Relevant product codes: 4681A GSM1 Platform, 4688A GSM2 Platform, and 4716 GDM Platform

Document control identifier: CT.AD-M.CD 31 Aug 99 **Software level:** UPS 3.x

Course length: 1 or 2 days depending on previous experience; if you have already taken course GDM1 or AD-OM, register for the one-day version of AD-M; if you have not taken course GDM1 or AD-OM, register for the two-day version of AD-M

Overview: This course provides the knowledge and skills necessary to install, operate, program, maintain, and troubleshoot the Archimedes Valve Dispense Head.

Who should take this course? Maintenance technicians who need to troubleshoot problems with the Archimedes Valve Dispense Head should take this course.

Prerequisite:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job

During this course you will:
- Describe the head's theory of operation
- Install the head and perform setups
- Perform operation tasks
- Modify a product to dispense with the head
- Alter valve setups to get good quality dots
- Carry out preventive maintenance tasks
- Troubleshoot head performance

Typical course schedule: This course module is scheduled at your request.

FJ-M: FlexJet Platform Head: Maintenance

Course level: Level 2

Relevant product codes: 4681A GSM1 Platform, 4688A GSM2 Platform, and 4716 GDM Platform

Document control identifier: CT.FJ-M.CD 8 Mar 00 **Software level:** UPS 4.0 **Course length:** 3 days

Overview: This course provides the knowledge and skills necessary to install, operate, maintain, and troubleshoot the FlexJet Head.

Who should take this course? Maintenance technicians who need to troubleshoot problems with the FlexJet Head should take this course.

Prerequisites:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
- You should have access to a Universal calibration kit

During this course you will:
- Describe the theory of operation of the FlexJet Head and nozzle changer
- Install the FlexJet Head and configure head-specific options on the GSM Platform
- Perform operation tasks
- Carry out setups and preventive maintenance tasks
- Carry out selected corrective maintenance tasks
- Troubleshoot head performance
- Calibrate the GSM Platform with a FlexJet Head

Typical course schedule: This course module is scheduled at your request.

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

FX/HF-M: Flex/Hi-Force Head: Maintenance

Course level: Level 2

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.FX/HF-M.CD 8 Mar 00 **Software level:** UPS 3.x **Course length:** 2 days

Overview: This course module provides the knowledge and skills necessary for maintaining Universal's four-spindle Flex Head (includes C4/Hi-Force Head) and nozzle changer. This course does not include basic GSM Platform maintenance and operation tasks. Contact the Binghamton Product Training Center for a detailed list of tasks; you may choose only those tasks you wish to receive training on.

Who should take this course? This course is designed for GSM Platform technicians responsible for advanced maintenance on the Flex Head.

Prerequisites:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
- You should have access to a Universal calibration kit

During this course you will:
- Describe the Flex Head parts and their functions and describe the head's theory of operation
- Install the head and configure Flex Head-specific options on the GSM Platform
- Perform selected tasks from the following list: spindle replacement, spindle alignment/ verification, theta alignment/verification, Z motor replacement, Z encoder replacement, manifold assembly replacement, clutch replacement, clutch wire rope replacement, linear slide replacement, and theta encoder replacement
- Perform electrical and mechanical troubleshooting
- Calibrate the GSM Platform with a Flex Head

Typical course schedule: This course module is scheduled at your request.

NCC8-M: NCC8 Head: Maintenance

Course level: Level 2

Relevant product codes: 4681A GSM1 Platform and 4688A GSM2 Platform

Document control identifier: CT.NCC8-M.CD 31 Aug 99 **Software level:** pre-UPS 3.0 **Course length:** 1 day

Overview: This course module provides the knowledge and skills necessary for maintaining Universal's NCC8 Head. This course does not include basic GSM Platform maintenance and operation tasks.

Who should take this course? Maintenance technicians who need to troubleshoot problems with the NCC8 Head should take this course.

Prerequisites:
- You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
- You should have access to a Universal calibration kit

During this course you will:
- Describe the head's theory of operation
- Install the head and configure the software
- Perform all preventive maintenance tasks
- Perform selected corrective maintenance tasks
- Troubleshoot the head
- Calibrate the GSM Platform with the NCC8 Head

Typical course schedule: This course module is scheduled at your request.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

PD-M: Positive Displacement Pump Dispense Head: Maintenance

Course level:	Level 2
Relevant product codes:	4681A GSM1 Platform, 4688A GSM2 Platform, and 4716 GDM Platform
Document control identifier:	CT.PD-M.CD 31 Aug 99 Software level: UPS 3.x
Course length:	1 or 2 days, depending on your previous experience; if you have taken course GDM1 or PD-OM you should register for the one-day version of PD-M; if you have not taken course GDM1 or PD-OM you should register for the two-day version of PD-M
Overview:	This course provides the knowledge and skills necessary to install, operate, program, maintain, and troubleshoot the Positive Displacement Pump Dispense Head.
Who should take this course?	Maintenance technicians who need to troubleshoot the Positive Displacement Pump Dispense Head should take this course.
Prerequisite:	■ You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job
During this course you will:	■ Describe the head's theory of operation ■ Install the head and perform setups ■ Perform operation tasks ■ Modify a product to dispense with the head ■ Alter pump/valve setups to get good quality dots ■ Carry out preventive maintenance tasks ■ Troubleshoot head performance
Typical course schedule:	This course module is scheduled at your request.

UFP-M: UFP300+ Head: Maintenance

Course level:	Level 2
Relevant product codes:	4681A GSM1 Platform and 4688AGSM2 Platform
Document control identifier:	CT.UFP-M.CD 8 Mar 00 Software level: UPS 3.x Course length: 1 day
Overview:	This course module provides the knowledge and skills necessary for maintaining Universal's Ultrafine Pitch (UFP300+) Head. This course does not include basic GSM Platform maintenance and operation tasks.
Who should take this course?	Maintenance technicians who need to troubleshoot the UFP300+ Head should take this course.
Prerequisites:	■ You should be able to perform all GSM1-M or GSM2-M course tasks that apply to your job ■ You should have access to a Universal calibration kit
During this course you will:	■ Describe the head's theory of operation ■ Install the head and configure the software ■ Perform all preventive maintenance tasks ■ Perform selected corrective maintenance tasks ■ Troubleshoot the head
Typical course schedule:	This course module is scheduled at your request.

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

SMTF-M: 4556A Stackable Matrix Tray Feeder: Maintenance

Course level: Level 2

Relevant product code: 4556A SMTF

Document control identifier: CT.SMTF-M.CD 8 Mar 00 **Software level:** pre-UPS 3.0 **Course length:** 4-6 hours

Overview: This training provides the knowledge and skills necessary to install, operate, maintain, and troubleshoot Universal's Stackable Matrix Tray Feeder (SMTF).

Who should take this course? Maintenance technicians who need to work on the SMTF should take this course.

Prerequisite:

- You should be able to perform all GSM1-M and GSM2-M course tasks that apply to your job

During this course you will:

- Install the feeder on a GSM Platform
- Load and reload the feeder in manual and automatic modes
- Perform all regularly required maintenance tasks
- Describe the feeder's sequence of events
- Use LOGICOMM to test assemblies and assembly inputs
- Perform selected tests and adjustments
- Load carriage axis motion parameters

Typical course schedule: This course module is scheduled at your request.

PTF-M: 4559A Platform Tray Feeder: Maintenance

Course level: Level 2

Relevant product code: 4559A PTF

Document control identifier: CT.PTF-M.CD 20 Sept 99 **Software level:** UPS 3.x **Course length:** 2 days

Overview: This course combines advanced maintenance and electrical troubleshooting tasks to provide you with the skills and knowledge to find and fix Platform Tray Feeder (PTF) problems.

Who should take this course? Maintenance personnel who need to troubleshoot the PTF should take this course.

Prerequisites:

- You should be able to perform all PTF-OM course tasks; refer to the PTF-OM course description for details
- You should have 2-3 months experience on the PTF before taking this course

During this course you will:

- Describe the PTF theory of operation
- Use PTF setup and diagnostic software to verify axes and I/O
- Set up and verify all axes home pulses
- Describe and troubleshoot the PTF power distribution
- Describe and troubleshoot the safety and elevator brake circuitry
- Describe and troubleshoot PTF axis controls and serial communication

Typical course schedule:

	Day 1	Day 2
8am-12pm	theory of operation	power distribution/safety and brake circuitry
1pm-4pm	setup/diagnostics and maintenance	axis control and serial communication

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

HP90-O: 4790/4791/4792 HSP: Operation

Course level: Level 1

Relevant product codes: 4790 HSP, 4791 HSP, and 4792 HSP

Document control identifier: CT.HP90-O.CD 31 Mar 98 **Course length:** 1.5 days

Overview: This course provides the skills needed to operate the 4790, 4791, and 4792 HSP machines. Emphasis is placed on the skills required to prepare, set up, and safely run the machine in a production environment. You are given ample hands-on time with the machine to practice the skills identified by the course objectives. This course is usually delivered by a Universal field engineer at the time of machine installation; however, it can also be scheduled at other times by contacting your regional Universal Product Training Center.

Who should take this course? Anyone who will be operating the machine during production should take this course. The typical title of an attendee is machine operator.

Prerequisites:
- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Proficiency with basic hand tools, such as screwdrivers and Allen wrenches

During this course you will:
- Identify machine functions and assemblies
- Load programs
- Set up the board transfer section
- Identify, adjust, load, and mount feeders
- Recover from component missing, feeder mis-set, E-stop, and fiducial errors
- Run sample boards
- Perform daily preventive maintenance tasks

HP90-OM: 4790/4791/4792 HSP: Operation and Maintenance

Course level: Level 1

Relevant product codes: 4790 HSP, 4791 HSP, and 4792 HSP

Document control identifier: CT.HP90-OM.CD 4Nov99 **Course length:** 5 days

Overview: This course is designed for individuals responsible for operating or maintaining the 4790, 4791, and 4792 HSP machines. Emphasis is placed on the skills required to set up, maintain, troubleshoot, and safely run the machine for production, maintenance, or programming purposes.

Who should take this course? Operators, maintenance technicians, and programmers who will be operating the machine, performing preventive maintenance, or troubleshooting the machine should take this course. This course should be considered a prerequisite for course HP90-P unless you have experience operating the machine. This course is oriented toward hands-on experience with the machine at the operation and maintenance levels.

Prerequisites:
- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Proficiency with basic hand tools
- An understanding of electrical schematics
- An understanding of pneumatic diagrams

During this course you will:
- Identify machine safety features
- Operate the machine
- Recover from component missing, feeder mis-set, E-stop, and fiducial error conditions
- Describe and demonstrate the turret functions
- Set up the transfer section
- Identify, adjust, load, and mount feeders
- Replace a head rotor assembly
- Replace cutter blades
- Trace pneumatic flow on a diagram and locate assemblies at the machine
- Trace electrical signal flow on a block diagram and locate assemblies at the machine
- Use input diagnostics
- Adjust photo-amplifier sensitivity
- Perform machine calibrations not requiring optional fixtures
- Interpret machine-generated data for troubleshooting
- Perform preventive maintenance tasks

Suggested additional courses:
- HP90-L2: 4790/4791/4792 HSP: Advanced Maintenance and Calibration
- HP90-P: 4790/4791/4792 HSP: Programming

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

HP90-P: 4790/4791/4792 HSP: Programming

Course level: Level 1

Relevant product codes: 4790 HSP, 4791 HSP, and 4792 HSP

Document control identifier: CT.HP90-P.CD 3 Dec 99 **Course length:** 5 days

Overview: This course is designed for individuals responsible for programming the 4790, 4791, and 4792 HSP machine. Emphasis is placed on the skills required for identifying/defining components in the component library and for writing pattern programs. Multiple personal computer setups at the Product Training Center allow you ample hands-on time.

Who should take this course? Anyone programming the machine for production or maintenance purposes should take this course. This course is oriented toward hands-on experience with the machine at the programming level.

Prerequisites:
- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Knowledge of the purpose of fiducials
- Knowledge of how to safely set up and operate the machine for production

These prerequisite skills can be acquired by taking course HP90-OM (4790/4791/4792 HSP: Operation and Maintenance).

During this course you will:
- Define at least one of each of the following types of components in the component library: square, cylindrical, leaded, flat packaged, and deformed
- Write a pattern program considering the following features: optimization, fiducials, bad board reject, multiple rotated offsets, and alternate feeder functions

Suggested additional course: HP90-OM: 4790/4791/4792 HSP: Operation and Maintenance

HP95-DIF: 4790 HSP Series and 4795 HSP Series Differences

Course level: Level 1

Relevant product codes: 4795 HSP and 4796 HSP

Document control identifier: CT.HP95-DIF.CD 4Nov99 **Course length:** 1 day

Overview: This course presents the operations and programming differences between the 4790/4791/4792 and 4795/4796 HSP machines. The maintenance differences can be learned by attending the final four days of an in-progress HP95-OM course, 4795/4796 HSP: Operation and Maintenance.

Who should take this course? Experienced 4790/4791/4792 HSP technicians and programmers who have attended the 4790/4791/4792 HSP Level 1 course and are responsible for running production, maintaining, or programming the 4795/4796 HSP should take this course.

Prerequisites:
- You should have successfully completed a 4790/4791/4792 HSP Level I course
- You should have at least three months experience on the 4790/4791/4792 HSP before taking this course

During this course you will:
- Identify machine safety features
- Operate the machine
- Interpret machine-generated data for troubleshooting
- Describe the programming differences between the 4790/4791/4792 and 4795/4796 HSPs
- Use UCT-52

Typical course schedule:

	Day 1
8am-12pm	operations, component library
1pm-4pm	programming

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

Suggested additional course:
- HP95-OM: 4795/4796 HSP: Operation and Maintenance

HP95-O: 4795/4796 HSP: Operation

Course level: Level 1

Relevant product codes: 4795 HSP and 4796 HSP

Document control identifier: CT.HP95-O.CD 31 Mar 98 **Course length:** 1.5 days

Overview: This course provides the skills needed to operate the 4795 and 4796 HSP machines. Emphasis is placed on the skills required to prepare, set up, and safely run the machine in a production environment. You are given ample hands-on time with the machine to practice the skills identified by the course objectives. This course is usually delivered by a Universal field engineer at the time of machine installation; however, it can also be scheduled at other times by contacting your regional Universal Product Training Center.

Who should take this course? Anyone who will be operating the machine during production should take this course. The title of a typical attendee is machine operator. This course is oriented toward hands-on experience with the machine at the operation level.

Prerequisites:
- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Proficiency with basic hand tools such as screwdrivers and Allen wrenches

During this course you will:
- Identify machine functions and assemblies
- Load programs
- Set up the board transfer section
- Identify, adjust, load, and mount feeders
- Recover from component missing, feeder mis-set, E-stop, and fiducial errors
- Run sample boards
- Perform daily preventive maintenance tasks

HP95-OM: 4795/4796 HSP: Operation and Maintenance

Course level: Level 1

Relevant product codes: 4795 HSP and 4796 HSP

Document control identifier: CT.HP95-OM.CD 4Nov99 **Course length:** 5 days

Overview: This course is designed for individuals responsible for operating or maintaining the 4795 and 4796 HSP. Emphasis is placed on the skills required to set up, maintain, troubleshoot, and safely run the machine for production, maintenance, or programming purposes.

Who should take this course? Operators, maintenance technicians, and programmers who will be operating the machine, performing preventive maintenance, or troubleshooting the machine should take this course. This course should be considered a prerequisite for course HP95-P unless you have experience operating the machine. This course is oriented toward hands-on experience with the machine at the operation and maintenance levels.

Prerequisites:
- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Proficiency with basic hand tools
- Knowledge of electrical schematics
- Knowledge of pneumatic diagrams

During this course you will:
- Identify machine safety features
- Operate the machine
- Recover from component missing, feeder mis-set, E-stop, and fiducial error conditions
- Describe and demonstrate the turret functions
- Set up the transfer section
- Identify, adjust, load, and mount feeders
- Replace nozzle miniature stroke bearing
- Replace cutter blades
- Trace pneumatic flow on a diagram and locate assemblies at the machine
- Trace electrical signal flow on a block diagram and locate assemblies at the machine
- Use input diagnostics
- Adjust front- and backlighting
- Teach photo-amp sensitivity
- Perform machine calibrations not requiring optional fixtures
- Interpret machine-generated data for troubleshooting
- Perform preventive maintenance tasks

Suggested additional courses:
- HP95-L2: 4795/4796 HSP: Advanced Maintenance and Calibration
- HP95-P: 4795/4796 HSP: Programming (UCT-52)
- HP95UPS-P: 4795/4796 HSP: Programming (UPS)

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

HP95-P: 4795/4796 HSP: Programming

Course level: Level 1

Relevant product codes: 4795 HSP and 4796 HSP

Document control identifier: CT.HP95-P.CD 3 Dec 99 **Software level:** UCT-52 **Course length:** 5 days

Overview: This course is designed for individuals responsible for programming the 4795 and 4796 HSP using UCT-52. Emphasis is placed on the skills required for identifying/defining components in the component library and for writing pattern programs. Multiple personal computer setups at the Product Training Center allow ample hands-on time.

Who should take this course? Anyone who will be programming the machine, either for production purposes or for maintenance reasons should take this course. This course is oriented toward hands-on experience with the machine at the programming level.

Prerequisites:

- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Knowledge of the purpose of fiducials
- Knowledge of how to safely set up and operate the machine for production

These prerequisite skills can be acquired by taking course HP95-OM (4795/4796 HSP: Operation and Maintenance).

During this course you will:

- Define at least one of each of the following types of components in the component library: square, cylindrical, leaded, flat packaged, and deformed
- Write a pattern program utilizing the following features: optimization, fiducials, bad board reject, multiple rotated offsets, unit programs, and alternate feeder functions

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4	Day 5
8am-12pm	component library	component library	component library	pattern programming	pattern programming
1pm-4pm	component library	component library	pattern programming	pattern programming	

Suggested additional course:

- HP95-OM: 4795/4796 HSP: Operation and Maintenance

HP95UPS-P: 4795/4796 HSP: Programming

Course level: Level 1

Relevant product codes: 4795 HSP and 4796 HSP

Document control identifier: CT.HP95-UPS.CD 19 Jan 98 **Software level:** HSP UPS 1.1.1 **Course length:** 5 days

Overview: This course is designed for individuals responsible for programming the 4795 and 4796 HSP using HSP-UPS. Emphasis is placed on the skills required for identifying/defining components in the component database and for creating a product. Multiple personal computer setups at the Product Training Center allow for ample hands-on time.

Who should take this course? Anyone who will be programming the machine, either for production purposes or for maintenance reasons should take this course. This course is oriented toward hands-on experience with the machine at the programming level.

Prerequisites:

- Ability to identify surface mount components by name
- Ability to identify by width and pitch the type of component packaging
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Knowledge of the purpose of fiducials
- Knowledge of how to safely set up and operate the machine for production

These prerequisite skills can be acquired by taking course HP95-OM (4795/4796 HSP: Operation and Maintenance).

During this course you will:

- Define at least one of each of the following types of components in the component database: square, cylindrical, leaded, flat packaged, and deformed
- Create a product utilizing the following features: optimization, fiducials, bad board reject, multiple rotated offsets, unit programs, and alternate feeder functions
- Perform CAD translation

Suggested additional course:

- HP95-OM: 4795/4796 HSP: Operation and Maintenance

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

HP90-L2: 4790/4791/4792 HSP: Advanced Maintenance and Calibration

Course level: Level 2

Relevant product codes: 4790 HSP, 4791 HSP, and 4792 HSP

Document control identifier: CT.HP90-L2.CD 11Nov99 **Course length:** 6 days

Overview: This course is designed for individuals responsible for maintaining the 4790, 4791, and 4792 HSP machines. Emphasis is placed on the skills required to maintain these machines after the warranty period, where optional jigs and fixtures are required to return the machine to original specifications. Most of the tasks covered in this course are not needed on a routine basis, and the training is provided "just in case" for anyone wanting more independence.

Who should take this course? Maintenance technicians and engineers monitoring the performance of these machines and having responsibility for ensuring the machines are running at maximum efficiency should take this course.

Prerequisites:

- Completion of a 4790/91/92 Level I operations and maintenance class
- Ability to operate a storage oscilloscope
- You should have at least six months experience performing routine and corrective maintenance on the 4790, 4791, or 4792 before taking this course
- Ability to set up and operate the machine for production
- Material requirements: The following jigs will be used in the class and must be purchased to perform the skills taught in the class:
  - 44560101 nozzle height and X/Y table chute block
  - JG-0029 PEC recognition calibration template
  - JG-0038 component recognition calibration jig set

During this course you will:

- Review all turret functions
- Set up the MZ/CZ axes
- Check heads and set head height
- Trace electrical signal flow through machine diagrams
- Use input and output diagnostics
- Adjust analog servo drivers
- Set up and calibrate all theta drivers
- Adjust front- and backlighting
- Calibrate the recognition camera
- Set and calibrate the PEC camera
- Set level axis offsets
- Check and adjust solenoid linkages
- Interpret management data
- Check and adjust component missing sensor

Suggested additional course:

- HP90-P 4790/4791/4792 HSP: Programming

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

HP95-L2: 4795/4796 HSP: Advanced Maintenance and Calibration

Course level: Level 2

Relevant product codes: 4795 HSP and 4796 HSP

Document control identifier: CT.HP95-L2.CD 16Nov99 **Course length:** 6 days

Overview: This course is designed for individuals responsible for maintaining the 4795 and 4796 HSP machines. Emphasis is placed on the skills required to maintain these machines after the warranty period. where optional jigs and fixtures are required to return the machine to original specifications. Most of the tasks covered in this course are not needed on a routine basis and the training is provided "just in case" for anyone wanting more independence.

Who should take this course? Maintenance technicians and engineers monitoring the performance of these machines and having responsibility for ensuring the machines are running at maximum efficiency should take this course.

Prerequisites:

- Completion of a 4795/96 Level I operations and maintenance class
- Ability to operate a storage oscilloscope
- Ability to set up and operate the machine in production
- You should have at least six months experience performing routine and corrective maintenance on the 4695/4796 before taking this course
- Material requirements: The following jigs will be used in the class and must be purchased to perform the skills taught in the class:
  - JG-0045 component recognition calibration jig set
  - JG-0046 master head
  - JG-0047 master nozzle
  - JG-0048 line sensor positioning jig
  - JG-0050 nozzle level jig (2 required)
  - JG-0051 PHS 19 level jig
  - JG-0052 nozzle storage positioning jig
  - JG-0055 nozzle height and X/Y table chute block
  - JG-0063 PEC recognition calibration template
  - JG-0089 top block jig
  - 46578901 spanner wrench for head cable assembly

During this course you will:

- Review all turret functions
- Set up the MZ/CZ axes
- Replace heads and head drive assemblies
- Set head height
- Trace electrical signal flow through machine diagrams
- Disassemble head communication assemblies
- Use input and output diagnostics
- Adjust analog servo drivers
- Adjust position of recognition cameras
- Calibrate the recognition cameras
- Position and calibrate the PEC camera
- Replace line sensor assembly
- Check and adjust solenoid linkages
- Position nozzle level detection sensors
- Adjust nozzle storage and selection plates
- Perform master head offset teach
- Set X/Y table offsets

Suggested additional courses:

- HP95-P: 4795/4796 HSP: Programming (UCT-52)
- HP95UPS-P: 4795/4796 HSP: Programming (UPS)

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

4555B Random Access Matrix Tray Feeder: Operation

Course code: RAMTF-O

RAMTF-O provides you with the knowledge and skills necessary to operate Universal's 4555B Random Access Matrix Tray Feeder (RAMTF). *Note that RAMTF-O does not include most of the basic operation skills taught in course GSM-O.*

4555B Random Access Matrix Tray Feeder: Operation and Maintenance

Course code: RAMTF-OM

RAMTF-OM provides you with the knowledge and skills necessary to operate and perform setups and preventive maintenance on Universal's 4555B Random Access Matrix Tray Feeder (RAMTF) using the latest RAMTF and GSM Platform software. *Note that RAMTF-OM does not include most of the basic maintenance skills taught in course GSM1-M or GSM2-M.*

This course is designed for GSM Platform maintenance technicians who need to operate, set up, and maintain Universal's RAMTF. In this course you will describe the operation of motors and sensors, perform RAMTF operation and error recovery tasks, set up and verify assemblies on the RAMTF, and perform preventive maintenance tasks on the RAMTF.

4555B Random Access Matrix Tray Feeder: Programming

Course code: RAMTF-P

RAMTF-P provides you with the knowledge and skills necessary to program Universal's 4555B Random Access Matrix Tray Feeder (RAMTF) using the latest RAMTF and GSM Platform software. You will perform hands-on programming tasks.

This course is designed for GSM Platform programmers who also need to program the RAMTF option. This course should be considered a requirement for anyone allowed to create or alter RAMTF products on the GSM Platform. In this course you will perform the feeder teach procedure for the RAMTF (from the GSM Platform), modify a product to use the RAMTF, and run and test a GSM Platform product that uses a RAMTF.

4683A GSM OFS Platform: Maintenance

Course code: OFS1-M

This course provides you with the knowledge and skills necessary to perform maintenance and check setups on Universal's GSM OFS Platform. Some basic operation and programming skills are included in the course.

This course is designed for machine technicians responsible for maintaining and checking setups on the GSM OFS Platform. Technicians who alter products on this machine should also take course OFS1-P.

4683A GSM OFS Platform: Programming

Course code: OFS1-P

This course provides you with the knowledge and skills to create programs using the latest UPS software applicable to the GSM OFS Platform. Operation skills have been included in this course so you can test your products using the GSM OFS Platform.

This course is designed for GSM OFS Platform programmers; however, this course should be considered a requirement for any person allowed to alter a product for use on this machine.

4785/4786 HSP: Operation, Programming, and Maintenance

Course code: HP85

This course is designed for individuals responsible for operating, programming, and maintaining the 4785 and 4786 HSP machines. Emphasis is placed on the skills required to set up, maintain, troubleshoot, and operate the machine, as well as to identify and define components and write pattern programs.

After completing this course, you will be able to define components; write pattern programs; identify machine assemblies; load programs; recover from component, fiducial, and feeder errors; and perform basic preventive and corrective maintenance tasks.

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

PP12: Pattern Programming

Course level: Level 1

Relevant product codes: All Universal through hole machines

Document control identifier: CT.PP12.CD 26 Oct 99 **Software level:** UICS **Course length:** 3 days

Overview: The Pattern Programming course is designed for individuals whose major responsibility is to create UICS programs for Universal's through hole equipment. The course addresses common programming terms and concepts, as well as machine-specific considerations for Universal's DIP, radial, and axial sequencing/insertion equipment.

Who should take this course? Programmers who have to program the entire range of Universal through hole machines should take this course.

Prerequisites:

- Ability to use computer keyboards and disk drives
- Basic knowledge of printed circuit board layout and assembly
- Ability to operate and identify the function of each Universal machine for which you will create a working pattern program

During this course you will:

- Review the general through hole pattern programming process
- Identify the functions of data fields of .PUT and .MAG pattern programs for through hole machines
- Create and debug pattern programs for a variety of through hole equipment
- Use autoadjust to correct pattern programs

Typical course schedule:

	Day 1	Day 2	Day 3
8am-12pm	general programming concepts	VCD programs	VCD Sequencer/ Inserter programs
1pm-4pm	use UICS commands, Sequencer programs	write, load, and run Multi-Module programs	Radial programs; use SET variables and BEC

Suggested additional course:

- PPU25: Pattern Program Utility

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

PPU25: Pattern Program Utility

Course level: Level 2

Relevant product codes: All Universal through hole machines

Document control identifier CT.PPU.CD 26 Oct 99 **Software level:** UICS **Course length:** 4 days

Overview: The Pattern Programming Utility (PPU) course is designed for individuals who will use PPU either to translate CAD data into UICS pattern programs or to convert existing third-party (Dynapert, TDK, or Panasonic) through hole patterns into UICS patterns.

Who should take this course? Programmers responsible for using PPU should take this course.

Prerequisites:

- Ability to use computer keyboards, disk drives, and MS-DOS
- Basic knowledge of CAD concepts and printed circuit board layout and assembly
- Ability to use UICS commands to write and edit pattern programs
- Ability to operate and identify the function of each Universal machine for which you will translate CAD data into a working pattern program

Note that you should bring a diskette containing sample files of CAD data from your manufacturing site to be used for translation and editing during the course. Assembly drawings, a sample board, and a bill of materials are also helpful in accomplishing course objectives. If you are interested in converting third-party patterns into UICS patterns, please bring sample patterns from your manufacturing site.

During this course you will:

- Install PPU
- Create UICS pattern programs using PPU's CAD translator
- Convert third-party pattern programs into UICS pattern programs
- Edit UICS patterns created by CAD translation or through hole conversion
- Edit and debug UICS patterns using PPU editors

Typical course schedule:

	Day 1	Day 2	Day 3	Day 4
8am-12pm	generic programming process and methods, analyze CAD samples	create customer CAD translation definition	translate CAD data into UICS patterns	edit translated or converted UICS pattern programs
1pm-4pm	identify minimum hardware and software requirements, install PPU	perform PPU tutorial	convert through hole third-party patterns into UICS patterns	debug edited UICS patterns on a machine

Suggested additional course:

- PP12: Pattern Programming

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

ERV: Expanded Range Verifier

Course level: Level 1

Relevant product codes: 2596B/2596C Axial Sequencer; 2800 Series Expanded Range Verifier; 6241B/C/D, and 6248D VCD Sequencer/Inserter; and 6360B/C/D/E, 6368D, and 6369E Radial Sequencer/Inserter

Document control identifier: CT.ERV.CD 26 Oct 99 **Software level:** UICS **Course length:** 3 days

Overview: This course is designed for individuals who program and/or maintain Universal's radial and axial sequencer/inserters and axial sequencer machines. The course provides the opportunity to create an Expanded Range Verifier (ERV) program for commonly used electrical components. Extensive hands-on time with the ERV on a machine ensures you will learn the basics of operation, programming, and introductory troubleshooting

Who should take this course? Programmers and maintenance technicians who wish to create ERV programs should take this course.

Prerequisites:

- Ability to use computer keyboards and access disk drives
- Ability to recognize and read machine indicator lights
- Ability to read and interpret numerical data
- Ability to identify the electrical characteristics of components
- Ability to use UICS commands to write and edit .PUT programs
- Ability to operate a through hole machine

During this course you will:

- Use ERV documentation to program the verifier
- Load and run ERV programs
- Load and run the performance check program
- Perform cable compensation
- Verify ERV circuit relay functions and use diagnostics to verify pushbutton/display operation

Typical course schedule:

	Day 1	Day 2	Day 3
8am-12pm	use ERV documentation to find programming data	write, load, and run ERV programs	write, load, and run ERV programs; performance check
1pm-4pm	write, load, and run ERV programs	write, load, and run ERV programs	cable compensation, verify relay functions, and use diagnostics

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

ERVIM8: Expanded Range Verifier for Generation 8 Machines

Course level: Level 1

Relevant product codes: 6241F VCD/Sequencer 8; 2800 Series Expanded Range Verifier; and 6380A/6388A/6389A Radial 8 Sequencer/Inserter

Document control identifier: CT.ERVIM8.CD 18 May 00 **Software level:** IM-UPS **Course length:** 3 days

Overview: This course is designed for individuals who program and/or maintain Universal's 2800 Series Expanded Range Verifier (ERV) for Generation 8 machines. The course provides the opportunity to enter programming data for commonly used electrical components into component databases. You are required to create and run a product on the machine with the ERV turned on. Extensive hands-on time with the ERV on a machine ensures you will learn the basics of operation, programming, and introductory troubleshooting

Who should take this course? Programmers and maintenance technicians who wish to create ERV programs should take this course.

Prerequisites:

- Ability to recognize and read machine indicator lights
- Ability to read and interpret numerical data
- Ability to identify the electrical characteristics of components
- Ability to use computer keyboard and mouse/trackball to navigate in a windowing environment
- Successfully complete either a RL8-OP or VS8-OP training class and be able to operate and program a Radial 8 Sequencer/Inserter or VCD/Sequencer 8 Axial Sequencer/Inserter machine (Note: Dual Head 8 machines do not have ERV as an option. The ERV is on the 2596C Sequencer, thus the ERV course is recommended)

During this course you will:

- Use ERV documentation to program the verifier
- Program components for Generation 8 machines
- Use the performance check program to verify ERV test specifications
- Perform cable compensation
- Troubleshoot the ERV

Typical course schedule:

	Day 1	Day 2	Day 3
8am-12pm	use ERV documentation to find programming data	program components for Generation 8 machines	perform cable compensation
1pm-4pm	use ERV documentation to find programming data; program components for Generation 8 machines	performance check program to verify ERV test specifications	troubleshoot ERV; exit test

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

UNI: UniScan

Course level: Level 1

Relevant product code: All Universal machines

Document control identifier: CT.UNI.CD 5 Dec 97 **Course length:** 3 days minimum

Overview: This course is presented by ScanCad International, Inc. A complete syllabus is available by contacting ScanCad International at (303) 697–8888 or www.scancad.com, or through Universal's System Applications Team.

The main objective of the UniScan training is to provide comprehensive functional knowledge of UniScan's operating features, which include pattern programming for surface mount and insertion machines, process documentation, PCB design inspection, stencil generation, and more.

Who should take this course? Anyone who must generate surface mount or insertion machine pattern program data for a number of Universal and other OEM equipment should take this course. A typical student attending this course would be a machine programmer with basic personal computer skills.

Prerequisites:

- Ability to identify and use computer keyboards and disk drives
- Knowledge of basic printed circuit board layout and assembly concepts
- Ability to operate and identify the function of each Universal machine for which you will create a working pattern program or CAD input file

During this course you will:

- Complete installation of the UniScan workstation
- Calibrate and maintain the scanner
- Scan printed circuit boards, artwork films, and paper drawings
- Generate assembly files from Gerber® input
- Generate assembly files from generic ASCII CAD input
- Generate stencil data files
- Output assembly files for the following machines: surface mount, insertion, dispensing, and inspection
- Create customized components/macros
- Import a bill of materials file
- Utilize quality check techniques
- Use an assembly file editor
- Perform inbound PCB inspection by comparing Gerber design to actual PCB, or PCB to PCB design on screen
- Output drill files
- Output Excellon files
- Output Sieb and Meyer files
- Output PCX and TIFF files for use in generating process documentation
- Output DXF and HPGL files
- Utilize rubber film techniques

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

BHIMC: Board Handling for Insertion Machines

Course level: Level 1

Relevant products: 6241B/C/D VCD-Sequencer/Inserter, 6242E VCD-Sequencer/Inserter, 6248D VCD-Sequencer/Inserter, 6287B/6687B SH VCD Axial Inserter, 6292B/6298B VCD DH 8 Axial Inserter, 6293B/6299B DH Jumper Wire Inserter, 6360B/C/D/E Radial Sequencer/Inserter, 6368D Radial Sequencer/Inserter, 6369E Radial Sequencer/Inserter, and 6772A Multi-Module DIP Inserter

Document control identifier: CT.BHIMC.CD 3 Apr 00 **Software level:** UICS

Course length: 2 days for single head board handling; 2 days for dual head board handling; 4 days if taken together

Overview: This course is designed for individuals who need to operate, program, and maintain a single or dual head Universal through hole machine with a mounted board handling system. The training also incorporates the 5425 Magazine Loader-Unloader System (through hole elevators). You can arrange to take single head board handling system training, dual head board handling system training, or both.

Who should take this course? Maintenance technicians who need to work on Universal's board handling system should take this course.

Prerequisites:

- Ability to use computer keyboards and disk drives
- Basic knowledge of printed circuit board layout and assembly concepts
- Ability to read and interpret machine indicator lights
- Ability to use a digital voltmeter, feeler gauges, and calipers
- Experience with electrical and pneumatic components

During this course you will:

- Operate and program the board handling system and elevators
- Perform all major machine setups and adjustments

Typical course schedule:

	Day 1	Day 2
8am-12pm	operation	maintenance
1pm-4pm	programming	maintenance

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

TTT: Train-the-Trainer

Course Level: Level 1

Relevant product codes: All Universal machines

Document control identifier: CT.TTT.CD 07 Oct 98 **Course length:** Variable

Overview: The Train-the-Trainer course is a customized program that prepares and qualifies a trainer to deliver a Universal Level 1 training course for a given product. This program provides a cost-effective solution for companies that require large numbers of employees to be trained. This program prepares trainers to deliver training in:

- Machine operation
- Level 1 machine maintenance
- Level 1 machine programming

Who should take this course? Customer trainers who need to deliver training on a given Universal product should attend this program. To obtain the maximum benefit from this program, the trainer who attends should deliver the applicable course(s) on a regular basis after this program is completed.

Prerequisites: Before taking this course, the trainer should have these traits and skills:

- Ability to support trainees by providing effective feedback
- Ability to enable learning by demonstrating tasks and then allowing trainees ample practice time to perform the tasks
- Demonstrated initiative in improving and developing abilities related to the course and training
- Effective communication skills in one-on-one or group situations
- Ability to communicate ideas clearly
- Ability to maintain a high level of energy and morale in the classroom

Universal's Train-the-Trainer program can accommodate individuals with a wide variety of training and machine-related skills. However, the program is most time-efficient if the individual has both presentation skills and considerable experience with the machine prior to attending the course.

During this course trainees will: The program can be customized according to students' backgrounds. Generally, the typical program will include:

- Trainer strategies and tools for introducing topics, maintaining student hands-on participation, and activity closure
- Feedback during each phase of the Train-the-Trainer process

Typical course schedule: This course is typically designed around and taught according to your needs.

To schedule a course, request an updated course schedule, or inquire about additional courses, please call one of Universal's Product Training Centers. Telephone numbers are listed on the inside back cover of this catalog.

TA: Tech Advisor

Relevant product codes: 6241D/6248D/6242E VCD-Sequencer/Inserter 5 and 6360B/C/D/E Radial IIIXQ/Radial 5

Overview: Tech Advisor is an electronic technical performance support product that provides you with information and assistance on Universal Instruments machine operation, troubleshooting, maintenance, and repair at the time of need right at the machine. This can decrease your machine downtime and increase your productivity.

Tech Advisor is an interactive system that provides you with as little or as much information as you desire. You can progress at your own speed, choosing among various screens to access needed information. Since information pathways are not sequential, Tech Advisor accommodates novice machine operators, as well as machine experts.

Examples of content:

- Job aids
- Adjustment procedures
- Troubleshooting guides
- Maintenance schedules

Benefits:

- Increases workforce competency, improving productivity
- Increases comprehension with user-selectable English, Chinese, or Spanish language
- Maximizes machine uptime by providing information quickly and easily
- Reduces training time and costs since information is available in the workplace

Features:

- Access information using menus, indexes, a system organization map, hot words within the text, or through prompts
- Select only information you need at that time
- Mark a display for quick return with electronic paper clips
- Write and save notes with notepad function
- Lookup information in the system glossary
- View hundreds of illustrations of machine components
- Designed and developed by a professional instructional design staff based on content created by subject matter experts
- Available for select through hole machines

Released Tech Advisors:

Product Name	Machine name and product code	Part number
Tech Advisor Axial	6241D/6248D/6242E VCD-Sequencer/Inserter 5 (English/Spanish/Chinese)	46563701
	6241D/6248D/6242E VCD-Sequencer/Inserter 5 *Demo* (English/Spanish/Chinese)	46872001
Tech Advisor Radial	6360B/C/D Radial IIIXQ/Radial 5 (English/Spanish)	45818901
	6360B/C/D Radial IIIXQ/Radial 5 (English/Chinese)	46125601
	6360E Radial 5 (English/Spanish/Chinese)	46769001
	6360B/C/D/E Radial IIIXQ/Radial 5 *Demo* (English/Spanish/Chinese)	46206702

Course content and course length are subject to change as Universal's Product Training Group continually updates courses.

PT: Product Trainer

Relevant product codes: 6241D/6248D/6242E VCD-Sequencer/Inserter, 6360B/C/D/E Radial IIIXQ/Radial 5, 4681A/4688A GSM1 Platform and GSM2 Platform, 4796A/B/L/R HSP, 6241F VCD/Sequencer 8, 6292C/6298C VCD DH 8 Axial Inserter, 6293C/6299C JW DH 8 Jumper Wire Inserter, and 6380A/6388A/6389A Radial 8

Overview: Product Trainer is a computer-assisted instructional tool you can use to increase the competency of your workforce and improve your machine productivity by meeting personnel training needs on machine operation tasks. Product Trainer provides the knowledge and skills necessary to operate certain Universal machines. The programs consist of self-paced lessons for machine operation, providing an overview of the machine, its assemblies, and safety considerations. Also included are how to power on/power off the machine, perform production setups, operate the machine, and recover from machine interrupts. Since Product Trainer provides performance support in the workplace, training time and costs are reduced. This is especially important if you have high operator turnover. You can also use the program to complement formal training.

Benefits:

- Assists you in learning machine operation
- A button on the menu bar lets you select English, Spanish, or Chinese language
- Interactive screens and nonsequential pathways let you access information or progress through the tutorial at your own pace
- Information is organized into modules that can be accessed through menus or through a progress map
- Pretests, self-tests, and progress reports identify areas of strength and weakness for future training
- Video clips aid the learning process

Features:

- Access information through a menu, the progress map, or hotwords
- Access specific information or progress through the tutorial at your own pace with interactive screens and nonsequential pathways
- Use self-tests and progress reports to help identify areas of strength and weakness for future training
- Choose the CD-ROM version for video-assisted learning
- Print screens for future reference
- Designed and developed by an instructional design staff based on content created by subject matter experts

Released Product Trainers:

Product Name	Machine name and product code	Part number
Product Trainer Operation and Preventive Maintenance	6241D/6248D/6242E VCD-Sequencer/Inserter (English/Spanish/Chinese)	46674301
	6360B/C/D/E Radial IIIXQ/Radial 5 (English/Spanish/Chinese)	46563801
Product Trainer Operation	4796 Series HSP (English/Spanish/Chinese)	48096701
	4681A/4688A GSM1 Platform/GSM2 Platform (English/Spanish/Chinese)	47798401
	6241F VCD/Sequencer 8 (English/Spanish/Chinese)	47940301
	6293C/6299C JW DH 8 Jumper Wire Inserter (English/Spanish/Chinese)	47798301
	6292C/6298C VCD DH 8 Axial Inserter (English/Spanish/Chinese)	47685201
	6380A/6388A/6389A Radial 8 (English/Spanish/Chinese)	47674501

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Product Training

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UNIVERSAL® Customer Support Division

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