BP-3600 Automated Programming System

- BP Microsystems' *Sixth Generation Technology*
- Superior device support:
  - Very Low Voltage Support (down to 1.5V)
  - Flash memories, EPROMs, antifuse FPGAs, PLDs, and microcontrollers
  - µBGA, SOIC, PLCC, TSOP, DIP and fine-pitch QFP
- On-the-fly vision centering without reduction in throughput

- Automatic self-teaching
- 4-site Concurrent Programming System®
- Throughput of up to 700 devices per hour
- Tray shuttles provide true non-stop operation
- Variety of input/output media: trays, tubes, or tape and reel
- Optional integrated label printer and applicator
- Optional laser marking system
- Fast and easy job changeovers

BP MICROSYSTEMS

Company Background

For over fifteen years, BP Microsystems has led the way in advanced device programming and customer-focused support. We've introduced industry-leading technologies before any of our competitors that provide our customers with the most flexible, value-focused programmers available. From the first high-level programming language for algorithms, and concurrent programmer, to the first In-Line Programming System, BP Microsystems has proven itself to be the innovator of the programming industries' revolutionary products which have increasingly changed the face of device programming technology.

Today, BP supports virtually every programmable device available and continues to release new programming algorithms every six weeks via the Internet.

BP Microsystems provides comprehensive technical support and user training in more than 32 countries around the world. By incorporating our proprietary high level programming language in all our programmers, the same algorithms run on BP engineering programmers as well as production programmers, ensuring a smooth and rapid transition from prototype to production.

Sixth Generation Technology

The BP-3600 incorporates BP's *Sixth Generation Technology* for the fastest programming in the industry. The BP-3600 is ideal for production environments where speed and flexibility are critical. This breakthrough technology programs near the theoretical limits of the device while closely following the semiconductor manufacturer's specifications.

With BP's *Sixth Generation Technology*, the BP-3600's programming sites have become the most advanced in the industry. By incorporating on-the-fly, vision centering and *Sixth Generation Technology* the BP-3600 is unsurpassed in programming speed, flexibility, and reliability.

The BP-3600 System

The BP-3600 is the first automated programming system to incorporate self-teaching and non-stop operation. It is designed to be the most convenient way to program all varieties of surface mount devices.

The BP-3600 design is based on the experience that comes from having installed more vision-based programming systems worldwide than all other manufacturers combined. Engineered to make programming efficient and convenient, the BP-3600 is ideally suited for in-house programming requirements. The

The BP-3600 has been designed to be the most simple and efficient programming system for medium to high-volume production environments.

system also comes with device support that sets the standard. The BP-3600 is a powerful tool capable of accurately programming up to 700 devices per hour.

Since the BP-3600 uses BP's latest Sixth Generation Programming Technology, just four sites are required to produce an accurate and high throughput of up to 700 devices per hour. While other programmers may require the operator to stop programming to reload devices, the BP-3600 can use its automated tray shuttles to program non-stop.

The BP-3600 has been designed to be the most simple and efficient programming system for medium to high-volume production environments. Designed for easy service and maintenance, several troubleshooting features have been carefully designed to eliminate potential causes of downtime and loss of profits due to electrical problems, defective parts, or mechanical failures.

The BP-3600 performs a continuity test on every pin before programming which produces high yields by eliminating defective devices before programming commences. The self-teaching function takes less than five minutes to set up a *new* job, and unlike other competitive systems, 95% of the electronics are contained in the e-box. Should a problem occur, a simple change of the e-box ensures high uptime.

Perfect for medium to high-volume programming environments, it has the smallest footprint of any vision-based automated programmer. The BP-3600 will keep you on the cutting edge of technology—with programming accuracy, reliability and cost efficiency—well into the future.

Revolutionary Combination of Technology

The BP-3600's remarkable performance, reliability and flexibility are the result of integrating several revolutionary technologies: vision centering, self teaching, fault tolerance, concurrent programming, laser marking and labeling.

· Vision Centering

Vision Centering is a leading-edge technology that precisely measures, aligns on four axes—X, Y, Z and θ—and places components into system sockets without touching the leads. This results in highly accurate part placement. Since alignment is performed on-the-fly, throughput is not degraded by the vision centering operation. To assure precision over time, the BP-3600 features closed-loop positioning. This self-calibrating mechanism assures accurate part placement by automatically compensating for variations and wear.

· Self-teaching

A cornerstone of the BP-3600 is its self-teaching capability. The system automatically self-teaches new socket modules or input/output locations in seconds with 10 micron resolution. The BP-3600 then knows where to pick up, program, mark and output parts. Files store the learned information so the teaching configuration process is required only when socket modules are used for the first time. By eliminating human judgment from the teaching process, the BP-3600 achieves unmatched teaching accuracy and convenience.

Sophisticated optical, magnetic and electronic positioning technologies then accomplish the pick-and-place job in a single operation. Coupled with BP's Concurrent Programming System®, this feature cuts job time and costs to a minimum.

· Concurrent Programming System

Not only does the BP-3600 support a host of devices —including flash memories, microcontrollers, FPGAs, and PLDs and SMT packages like μBGA, SOIC, DIP, PLCC, TSOP and QFP—it programs devices concurrently for higher throughput. With our proprietary Concurrent Programming System, four high-speed device-programming sites coexist within a single BP-3600 chassis—as separate and distinct workstations. That's like having four independent, universal programmers under one hood. Here is how the system works:

1. A device is inserted into one of four BP-3600 sites
2. Once that device passes a stringent continuity test, programming begins
3. Other devices are inserted into remaining sockets, any time, according to each site's independent programming cycle
4. Once a device is programmed, it's removed and a blank is inserted, regardless of where the other devices are in the programming process.

The result—programming goes on concurrently and unlike gang programmers, programming can continue even as sites are being reloaded. And, should one site fail, the Concurrent Programming System's **fault-tolerant architecture** ensures that programming continues on the remaining sites.

Non-stop programming

BP-3600's advanced JEDEC tray shuttles allow true non-stop programming. The system can be set up to place programmed devices back into the same tray or into the other empty tray. When a full tray of programmed parts is ejected, programming can continue non-stop using the other tray.

· Variety of input/output media

The tube feeder uses a vibration system to automatically move blank components from input tubes and programmed components into output tubes. The optional tape and reel input/output system provides both flexibility and efficiency, while minimizing device handling. In a single operation, devices are programmed, marked and taped with precision.
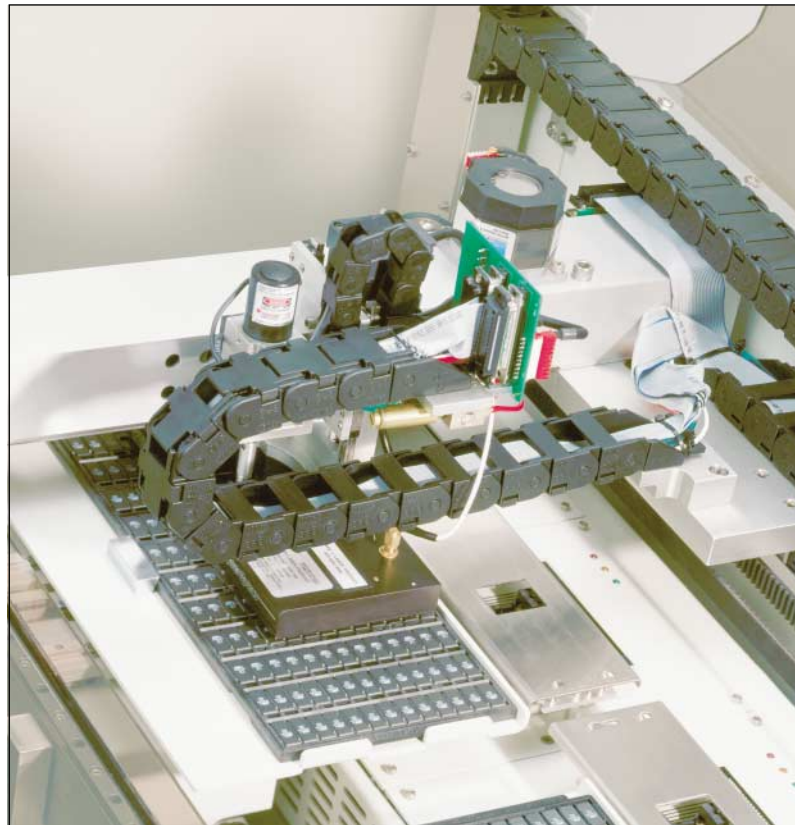
The BP-3600 incorporates BP's Sixth Generation Technology and only requires four sites to reach a maximum throughput of 700 devices per hour.

Features designed with you in mind

The BP-3600 has been designed and manufactured with features that make it easier to use and maintain, and it is flexible enough for all your automated programming needs. These include:

· Reliability designed in
The BP-3600 is designed with reliability built-in by using simple robust mechanical assemblies and few moving parts.

· Maximum flexibility
The BP-3600 comes with options designed to give you maximum flexibility:

· Laser Marker
An optional laser marking system permanently scribes part numbers on devices after programming. HEPA and charcoal air filters and safety interlocks make the system safe in any environment. The entire laser subsystem is contained inside the BP-3600 chassis so no additional floor space is required.

· Label Printer
An optional thermal-dye transfer label printer prints high-contrast labels that the system applies to devices after programming. The printer's zero-queue design prints labels on demand. The printer is compatible with paper, mylar, kapton, and polyester label stock.

· Minimal training
Minimal training is required since a single Windows® program allows control of the entire system and teaching is performed automatically.

· Easy maintenance
Maintenance is minimal, requiring periodic greasing of the rails, replacing air filters and keeping the critical components clean and free of dust.

High Programming Yield

BP programmers are engineered to achieve uncompromised programming yield. Only manufacturer certified or qualified algorithms are used and BP's pin drivers deliver high-fidelity programming waveforms through striplines free from the effects of overshoot, noise, and ground bounce. Devices must pass a rigorous visual inspection and continuity test before programming begins. And, by using the same test and burn-in sockets that semiconductor manufacturers use, compatibility is assured.

Easy transition from design to production

BP supports your design throughout its life. Our engineering and production programmers both run the same algorithms to ensure a rapid transition from design to production.

Total Control

JobMaster™ proprietary automated production software gives you total control of device programming operations so that you can set up jobs to precise specifications, save the process to the system's internal hard drive or your network and repeat the same jobs easily. You can also monitor programming via the control software, which displays the status and throughput yield of each site, as well as job throughput, in large, easy-to-read, colorful graphics.

Technical Support & Training

For each system, BP field service engineers install, test and train users on proper system operation and various configuration options. In addition, every system comes with:
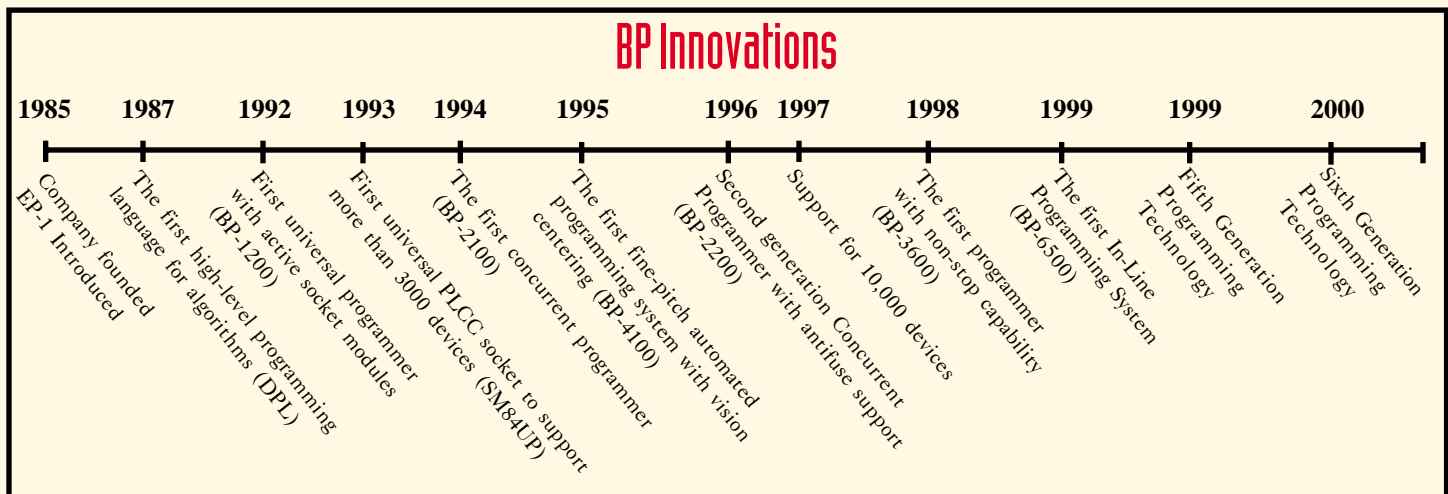
- Lifetime technical support (including free software updates for the first year)
- A one-year comprehensive warranty
- Options for extended warranty and maintenance agreements
- A detailed users' guide
- 24/7 emergency support

Additional training is also available to customers on system operation, configuration and maintenance.

Providing customers with excellent technical support is so important at BP Microsystems, we make it a top priority, dedicating a first-of-its-kind toll-free technical support line. You can reach it by calling 1-800-225-2102 or (713) 688-4600.

Setting the Standard in Device Programming

For more than a decade, BP Microsystems has led the way in advanced device programming and customer-focused support. We've introduced industry-leading technologies before any of our competitors that provide our customers with the most flexible, value-focused programmers available.

BP Innovations

1985	1987	1992	1993	1994	1995	1996	1997	1998	1999	1999	2000
Company founded EP-1 Introduced	The first high-level programming language for algorithms (DPL)	First universal programmer with active socket modules (BP-1200)	First universal programmer more than 3000 devices	The first universal PLCC socket to support more than 3000 devices (SM84UP)	The first concurrent programmer (BP-2100)	The first fine-pitch automated programming system with vision centering (BP-4100)	Second generation Concurrent Programmer with antifuse support (BP-2200)	The first programmer with non-stop capability Support for 10,000 devices (BP-3600)	The first In-Line Programming System (BP-6500)	Fifth Generation Programming Technology	Sixth Generation Programming Technology

Today, we support virtually every device available and release new programming algorithms every six weeks via the Internet.

BP Microsystems provides comprehensive technical support and user training in more than 32 countries around the world. Our modular design means that the same algorithms run on BP engineering programmers and production programmers, ensuring a smooth and rapid transition from prototype to production. Access our web site at www.bpmicro.com for the latest news on device support and new products, or contact your local representative.

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BP MICROSYSTEMS
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VIBRATORY TUBE FEEDERS (Optional)

Type: unidirectional vibratory feeders
Functions: two types of feeders can either load or unload parts
Adjustment: amplitude and frequency for fine-tuning feeder operation

VIBRATORY TUBE FEEDER TOPS (Optional)

Size: platforms are 3.5 in. (89mm) wide
Functions: two types of platforms either load or unload parts
Capacity: a platform can support 8 lanes of SOIC parts, 5 lanes of PLCC parts up to PLCC-32, 5 lanes of SOLIC parts, 5 lanes of SOJ-20 parts, 3 lanes of PLCC parts up to PLCC-52, 2 lanes of PLCC parts up to PLCC-84. Multiple platform configurations available.

TAPE INPUT FEEDERS (Optional)

Type: programmable electronic feeder
Capacity: 13 in. reels
Sizes: 8, 12, 16, 24, 32 and 44mm. One feeder required for each tape width

TAPE AND REEL OUTPUT (Optional)

Type: programmable electronic tape loader
Functions: heat sealing or pressure sensitive sealing heads available on the same tape loader
Pressure Seal: Universal pressure seal head for all tape widths
Heat Seal: Individual heat seal heads required for each tape width
Input Capacity: 13 or 22 in. reels
Output Capacity: 13 in. reels
Sizes: 8, 12, 16, 24, 32 and 44mm.

PICK AND PLACE SYSTEM

Maximum Programming Rate: 700 devices per hour
Component Processing Range: 8-pin SOIC to 208-pin QFP
Packages: SOIC, TSOP, TSSOP, QFP, TQFP, PQFP, SSOP, VSOP, PLCC, DIP and µBGA
Laser Alignment: component range– 8-pin SOIC to 208-pin QFP, minimum pitch 0.020 in. (0.500mm)
Placement Force: 60-600 grams positional control
Dimensions: length 50 in. (127cm), width 24 in. (61cm), and height 45 in. (114.3cm)
Weight: 400 lbs. (182kg)
Shipping Weight: 650 lbs. (295kg)
Shipping Dimensions: length 64 in. (162cm), width 38 in. (96cm), and height 60 in. (162cm)
Self Test: power supplies, CPUs, memory, X, Y, Z, Θ motion systems, spindle runout and height, vacuum system

POSITIONING SYSTEM

X-Y Drive System: high-performance stepper motor-driven precision belt
X-Y Encoder Type: linear magnetic scale
X-Y Axis Resolution: 0.0002 in. (0.0050mm)
X-Y Axis Maximum Velocity: 30 in/sec (76cm/s)
Z Drive System: high-performance stepper motor driven lead screw
Theta Drive System: precision stepper motor-driven direct drive assembly
Theta Axis Resolution: 0.014°
Placement Accuracy: 90µ @ 4 sigmas, 67µ @ 3 sigmas

VISION CENTERING

CyberOptics Laser Align system
Component location resolution: 1 micron

PROGRAMMING SYSTEM

Architecture: Concurrent, independent universal programmer at each site
Devices Supported: PROM, EPROM, EEPROM, flash EEPROM, microcontrollers, SPLD, CPLD, FPGA
Technologies Supported: TTL, CMOS, ECL, BiCMOS, Flash, EPROM, EEPROM, fuse, anti-fuse, (including FPGAs)
Included System Controller: Pentium PC, VGA monitor, keyboard, mouse
Calibration: automatic self-calibration
Diagnostics: pin continuity test, RAM, ROM, CPU, pin drivers, power supply, communications, cable, calibration, timing, ADC, DAC, leakage current

Memory: up to 66 MB DRAM (16.5 MB per site, 512 KB minimum per site, adequate for 128 MB devices)
Pin Controllers: one CPU with hardware accelerator per site
Programming Sites: 4

PIN DRIVERS

Quantity: 240 per socket
Voltage: 0 to 25.00V in 6.25mV steps
Current: 0-1A, 15µA resolution
Slew rate: 0.001 to 2500 V/µs
Rise Time: 1ns
Overshoot: none
Timing: 1µs–1s, ±1µs, ±0.01%
Clocks: continuously variable 390 KHz to 30 MHz
Protection: overcurrent shutdown, power failure shutdown
Independence: pin drivers and waveform generators are fully independent and concurrent on each site

SOFTWARE

Device File Type: binary, Intel, JEDEC, Motorola, POF, RAM, straight hex, hex-space, ASCIIHEX, Tekhex, Extended Tekhex, SDSMAC, Fairbug, OMF, AFM, LOF, MER, and others; automatic file type recognition
Device Commands: blank, checksum, compare, options, program, test, verify
Features: graphic display of job status, JobMaster™ control software, data editor, revision history, session logging, on-line help, device and algorithm information
Operating system: Windows 95/98/NT

SYSTEM REQUIREMENTS

Air Pressure: 80 psi (5.56 bars)
Air Flow: 2.0 SCFM (50.1 l/min)
Operational Temperature Range: 55° to 90° F (13°–32° C)
Relative Humidity: 30–80%
Minimum Floor Space (without tape and reel attachment): length 72 in. (182.9cm) and width 42 in. (106.6cm)
Input Line Voltage: 100-130/200-260 VAC
Input Line Frequency: 50/60 Hz
Power Consumption: 1 KVA

CE