Input Output Processor-B (IOP-B)  
FA-8303  

Breakpoint Module (BPM)  
FA-8313

• Designed for use as a multiprocessor or a stand-alone processor  
• General purpose 30-bit processor  
• Up to 16 input/output (I/O) channels  
• Relative addressing and memory protect circuitry  
• Addressing to 262,144 words of memory (30-bit words)  
• Parity on all data transfer to memory or I/O  
• I/O chaining and automatic buffer capability  

• Externally Specified Index (ESI) I/O channel capability  
• Allows stopping the Input/Output Processor (IOP) on a selected condition or at a specific address  
• Valuable maintenance and debug aid which can facilitate checkout of software or aid in solving difficult hardware problems  
• Address selection and conditions set by manual switches
General Characteristics (IOP-B)
- Real-time 30-bit multiprocessor
- Single address instructions:
  - 74 processor instructions
  - 7 I/O chain instructions
- Arithmetic section:
  - One's complement integer binary
  - 30-bit subtractor type adder
  - Fixed point
- Memory addressing to 262,144 memory locations
- Relative addressing and memory protection hardware registers (2048 word segments)
- Control memory provides fast access for:
  - Seven index registers for address modification
  - Program control storage
  - Clock storage
  - I/O chain addresses
  - Buffer control words
- Multilevel interrupt processing
- Basic instruction execution times:
  - Enter — .750 usec
  - Store — 1.47 usec
  - Add — 1.47 usec
  - Subtract — 1.47 usec
  - Multiply — 5.82 · 13.02 usec
  - Divide — 13.02 usec
- Up to 16 parallel I/O channels
- Special processor interfaces
- Parity on all data transfers between memory and I/O
- Real-time clock:
  - 30-bit incremental
  - Internal: 1024 Hz, ± 0.02%
  - External: 1024 Hz, clock from WWV time synchronization subsystem
- Monitor clock:
  - 30-bit decremental
  - Same frequency source as real-time clock
- Power failure detection and automatic restart
- Read Only Memory (ROM):
  - Initial load
  - Failsafe/soft recovery system
  - 1024 words, furnished in standard configuration
  - *4096 words

General Characteristics (BPM)
- Breakpoint Module (BPM) contains 18 breakpoint data switches and 6 condition switches (3 compare and 3 sequence) to select the breakpoint desired
- Breakpoint data switches are compared with the lower 18 bits of the IOP Display Register selected in the IOP Display Select
- Compare switch settings
  - Less than
  - Equals
  - Greater than
- Any one or combination of compare switches may be used
- Sequence switch settings
  - Instruction
  - Fetch
  - Store
- Any one or combination of sequence switches may be used
- Plug-in interface to IOP
- Mounted in a processor cabinet below the IOP maintenance panel
- Temperature and Humidity requirements are compatible with the IOP

Special Multiprocessing Features
- Relative addressing and memory protection
- Relative interrupt steering
- Table access control
- Processor sensitive load and store instructions

Processor Interface Channels
- Memory interface through either:
  - Memory modules (FA-8304 and FA-8304B)
  - Central Memory Access (CMA) (FA-8311)
  - Allows access up to 262,144 words of memory
- *Interprocessing signal interface for multiprocessor communication for itself and up to 7 other processors
- *External oscillator interface for accepting oscillator signals from eight sources (i.e., itself RTC or other processors)
- *Reconfiguration and Fault Detection Unit (RFDU) (FA-8309)
- *Minimum Safe Altitude Warning interface provides interface to four (expandable to six) MSAW alarms (FA-9481A)
- *Remote Scatter Recovery Alarm (RALM) (FA-8314) interface provides an interface to an aural alarm control which controls remote scatter recovery alarm

Input/Output
- Maximum of 16 I/O channels (up to 4 Type B (logic level) and 12 Type A (long cable))
- Maximum I/O rate — 1.3 million 30 bits word/sec
- I/O channel interfaces available:
  - Type A, -3V 1108 30-bit parallel (Unisys SB 10205)
  - *Type A, -3V NTDS 30-bit parallel (DS-4772)
  - Type B, logic level (Unisys SB 10205)
Power
• Voltage
  — 120 VAC single phase
• Frequency
  — 60 Hz
• IOP-B Power
  — 960 watts
• Cabinet Power
  — 440 watts

Physical
• Up to 2 IOPB’s may be mounted in a single processor cabinet (FAA type FA-8301)
• Operating temperature
  — +50° F to 90° F
• Operating humidity
  — 20% to 80%
• Atmospheric pressure
  — sea level to 7000 feet above sea level
• Cabinet size (inches):
  — Height - 70.4”
  — Width - 37.3” (with side skins)
  — Depth - 25.5”
  — Service Area - 37.3”W x 72.5”D
• IOP-B cabinet area contains:
  — Logic chassis
  — Maintenance panel
  — AC-DC converters
  — DC-DC converters
  — I/O connector assembly

Software
• Standard 30-bit support software:
  — Librarian
  — Macro Assembler
  — Linking Loader
  — Debug aids
  — Utility routine
  — Jovial compiler
• Assembler, simulator, builder and JOVIAL compiler
  operating on Unisys 1100 series systems
• Multiprocess Executive:
  — Scheduling and dispatching
  — Executive service
  — Debug aids
• Air Traffic Control functions include:
  — Radar and beacon tracking
  — MSAW
  — Collision avoidance
  — Continuous recording
  — Display function
• Failure recovery programs

Applications (IOP-B)
• Terminal Air Traffic Control
• Enroute Air Traffic Control
• Beacon and Radar Training
• General Purpose Commercial Applications
• Military Applications Not Requiring Ruggedized Hardware

Applications (BPM)
• Debug and maintenance aid for IOP