ATLAS MDT Electronics Status

- **ASD Chip Design (with Harvard) and Production**
  - Full Rad-Hard test campaign completed
  - Production order for 67,400 parts placed 10/1
  - Automatic tester designed and prototyped

- **Mezzanine PCB Design and Production (w/ Harvard)**
  - Rad-Hard test campaign for all components underway
  - Test / Burn-in station design underway

- **Other Responsibilities:**
  - CSM Adapter, Hedgehog testing, Test beam support
**MDT ASD Chip**

- Full custom CMOS layout in Agilent (HP) 0.5µm
  - Designed by: Hazen and Posch (BU) and Oliver (Harvard)

- Full custom design (standard cells in serial data interface)
- I/O pads ESD protected
- Die 3.2 × 3.7 mm, 70 bonding pads
- QFP80 package

Fabrication process:
- 0.5 µm CMOS, triple-metal, 1 poly, N-well, Analog option with linear capacitor, silicide block for poly resistors (HP AMOS14TB)

![Diagram of MDT ASD Chip](image)
Mezzanine PCB

- 24 channel board
- All components must be rad-certified
  - Test program underway at BU
- Several hundred produced so far
- Volume production to start in early '03
Mezzanine Board Burn-In

- Burn-in Facility needed for 300 cards
- Elevated / Cycling temperature to reduce infant mortality
- Design underway at BU: set-up may be duplicated at CERN for non-US chambers
Signal Hedgehog PCBs

Unshielded Design
(by BU)

Shielded Design
(Production Candidate - Rome)

Shielding Improves Immunity
to Pick-up noise

MDT Resolution essentially
unaffected by Shielding
(tests at CERN)

“unshielded” &
shielded

Production Prototypes
Under test in Computer-
controlled test facility
(at BU)
Other Test Hardware

- CSM Adapter (BU Design)
  - Adapt production electronics to prototype VME readout
  - Producing (40) for use at all chamber production sites

- ASD Chip Tester (BU/Harvard)
  - Complete, automatic test of all ASD parameters in 2-3 seconds
  - Screen good/bad/marginal ASDs
  - Record all parameters in permanent database
Radiation Testing

- Radiation Test Hardware
  - ASD Chip Test
  - LVDS Driver Test
  - Voltage Regulator Test
- All boards built at BU
- Several test campaigns at Harvard Cyclotron, Prospero Neutron facility (France)
Radiation Test Results

ASD Parameters
Essentially Unchanged up to 300 kRad
SEE Results okay
(many more detailed results not shown...)

Voltage Regulator LP3964 (Nat'l Semi)
OK to 60 kRad
Neutron Results okay
(Neutron, SEE results not shown...)
FY03 Plans

- Finish commissioning of ASD tester and test ~70k production chips (BU/Harvard)
- Design and build Mezzanine board burn-in setup for 300 boards (BU/Harvard)
- Oversee Initial production and testing of final Mezzanine boards (BU/Harvard)
- Complete the radiation hardness assurance testing of all mezzanine board components (BU)
- Participate as required in the completion of the on-chamber system, including power, cabling and EMC (electromagnetic compatibility)
- Participate as required in test-beam efforts at CERN