



Neutron Electronics

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6th October 2005

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Introduction



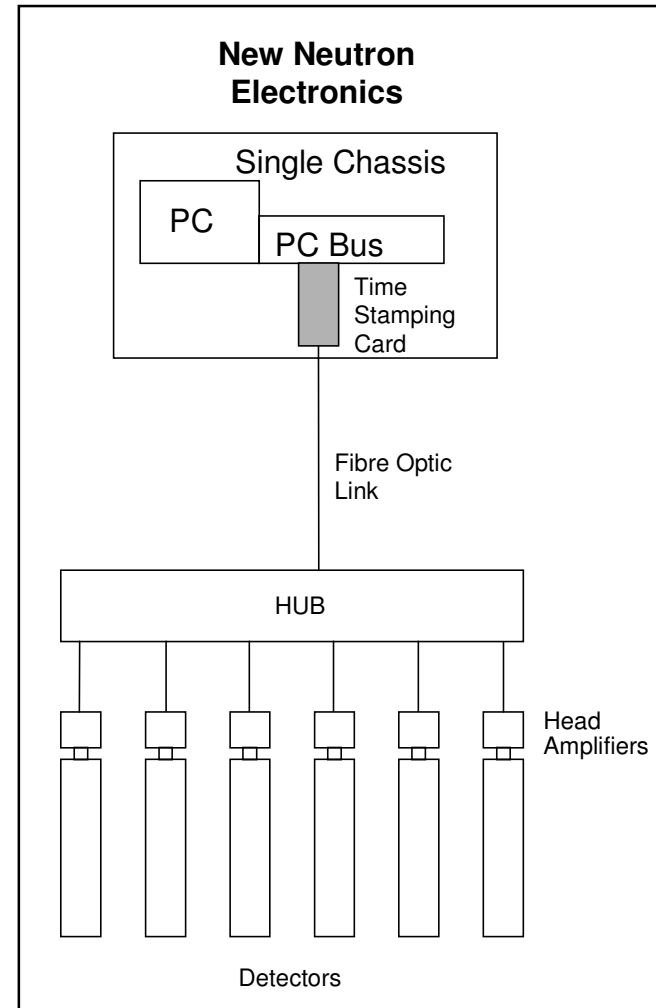
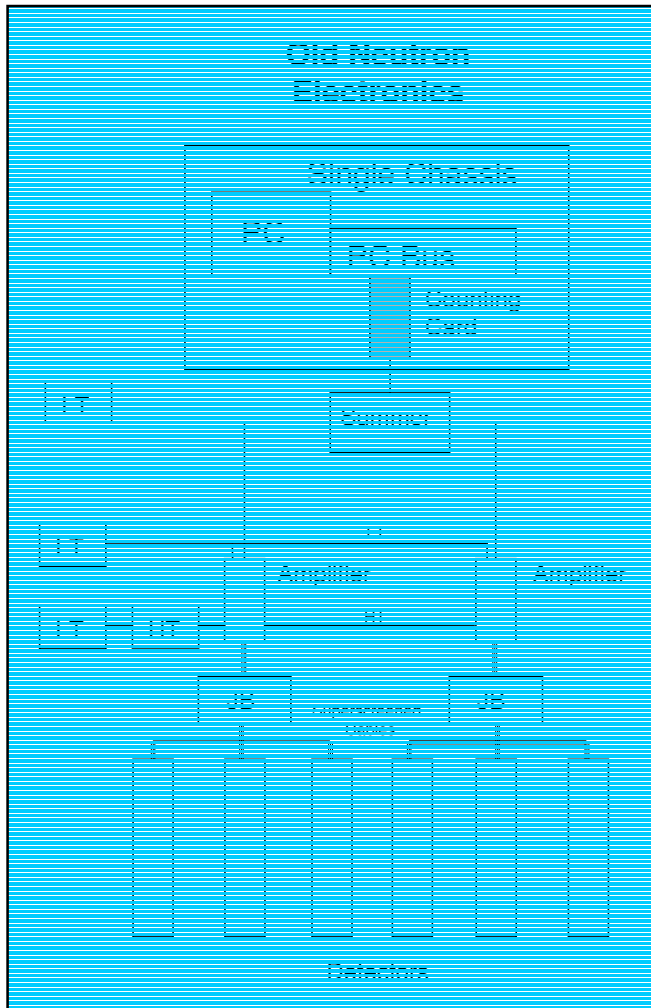
- BIL Solutions Ltd. – formally BNFL Instruments
- Specialist business within the BNFL Group that is focused on the design and application of detection, monitoring and measurement instrumentation and services to support nuclear, defence, civil, environmental and industrial sectors.
- Use of neutron electronics is fundamental to our business - extensive research and development taken place in this area.

Neutron Counting Electronics



- Neutron counting electronics patent granted in Europe, China and USA
- Covers neutron detection signal handling and processing technology based upon the “timestamping” of pulses
- Neutron technology deployed in the latest neutron assay instruments
- Suitable for replacing obsolete electronics on existing systems

Old → New



Amplifiers



- Amplifiers and connectors filled with electrical potting compound
- No operator access of user adjustable parts



HUB



- Primary function to assign digital word indicating channel legitimate neutron event detected by head amplifier
- Two secondary functions:-
 - to derive from mains all HT and LT power supplies used internally and by amplifier
 - to provide system and maintenance engineer with appropriate health and status information
- Fibre optic connectors provide communication link from HUB modules to timestamp PC



Timestamper

- Incoming neutron timestamped pulse train generated by the timestamper unit from the neutron counting chain
- Each neutron will have an associated time of arrival and channel (location)
- Timestamped neutron events analysed using software

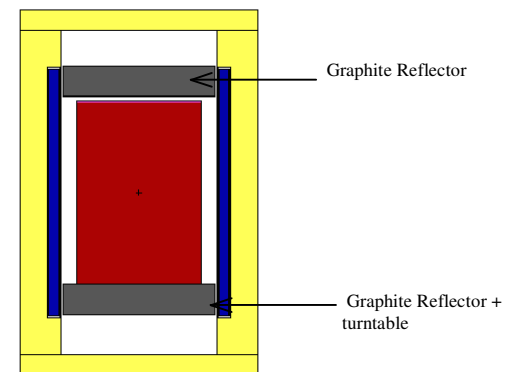
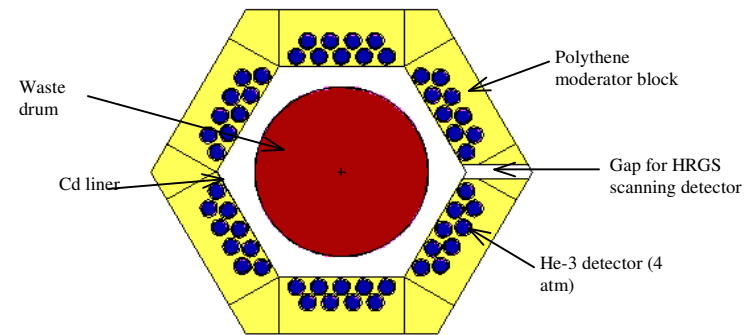
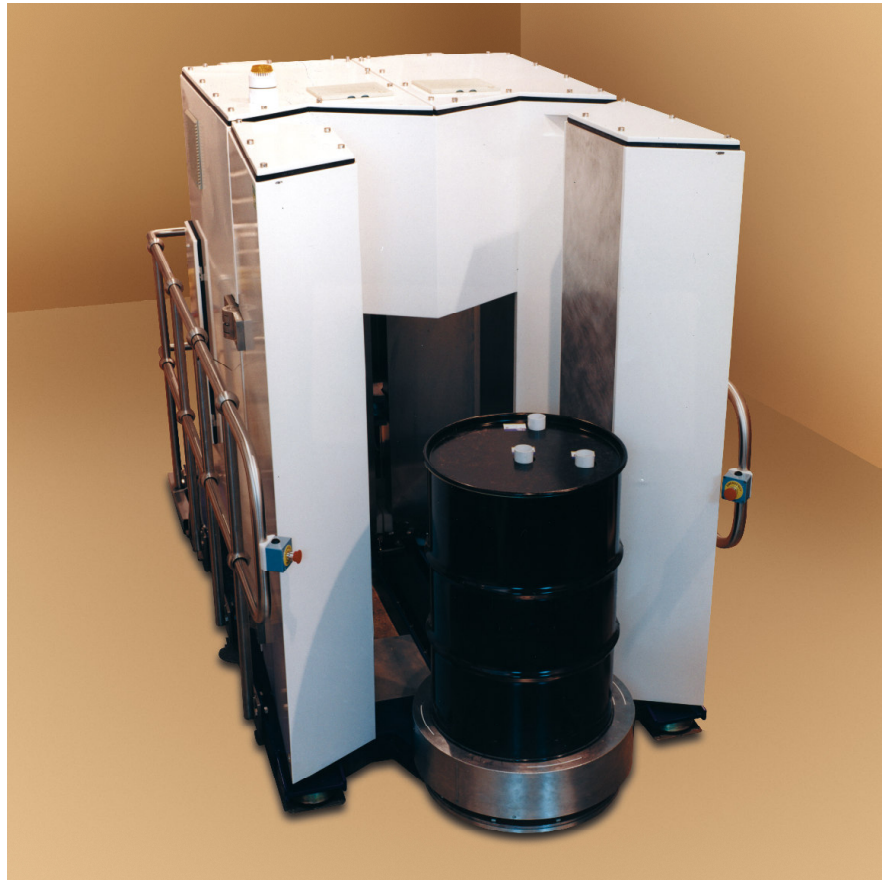




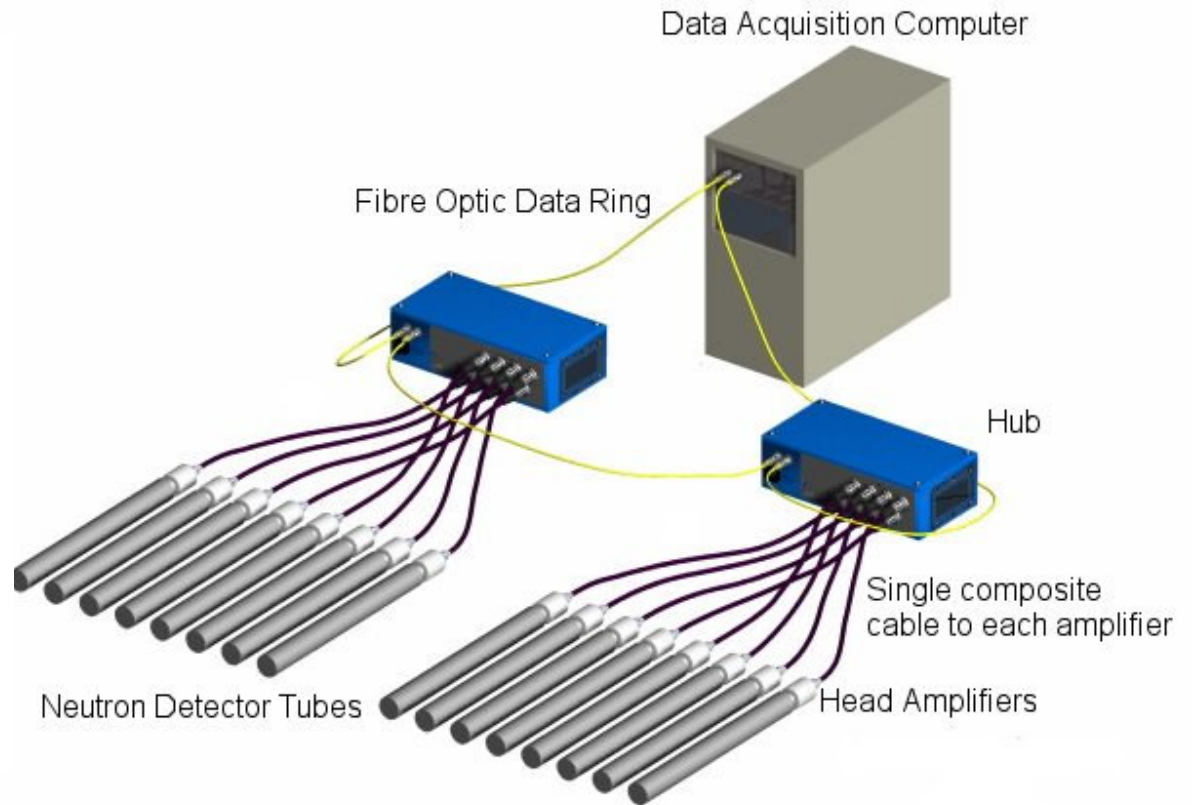
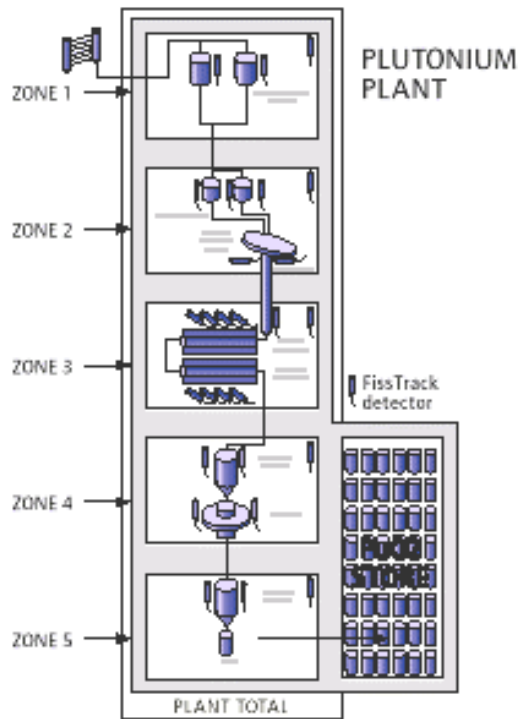
Summary of Features

- Simplified installation
- Detector address provided
- Very good EMC performance
- Modular design with only three components; Amplifier, Hub and Timestampper
- Highly robust amplifiers
- Remote diagnostic and status

TRU-D[®] DRUM High Performance Pu Drum Monitor



FissTrack[®] PIMS (Plutonium Inventory Measurement System)



DISPIM[®] Modular Mobile Pu Monitor



Imaging DISPIM - [System Test:1]

Operator Item Gamma Database Maintenance Window Help

Neutron Measurement

Item ID : System Test

Deployment ID : System Test_4

Operation ID : 0000410

Date and Time : 26/04/2004 11:02:11

Number of Segments : 100

Time per Segment(s) : 36

Equivalent Pu Mass of Item(g) : 15.4

Error on Equivalent Pu Mass of Item(g) : 1.1

Chi Squared Value : 19.95831

Chi Squared Check Passed : TRUE

Validation Status : valid

Hotspot Data

Hotspot ID	X Co-ordinate (m)	Error on X Co-ordinate (m)	Y Co-ordinate (m)	Error on Y Co-ordinate (m)	Z Co-ordinate (m)	Error on Z Co-ordinate (m)	Eq Mass (g)	Error on Eq Mass (g)
0000015	0.612	0.031	0.389	0.026	0.153	0.039	8.1	0.7
0000016	1.339	0.049	0.801	0.031	0.010	0.025	7.3	1.1

BNFL

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Ready Neutron Operation IDLE Gamma Operation IDLE NUM