

Control & Automation from L & T

L&T offers system solutions for control, regulation and monitoring. It plans and implements drive controls and automation projects from concept to commissioning.

Spectrum includes system analysis, project planning, hardware selection, application engineering, application software, manufacture, procurement, testing, integration, commissioning, training, spares and after-sales service.

Applications



Iron and Steel *

- .. Sponge iron plants
- .. Blast furnaces/arc furnaces
- .. Continuous casting plants
- .. Wire rod mills
- .. Annealing furnaces
- .. Cold rolling mills
- .. Process and finishing lines



Cement *

Plant wide drives, control and instrumentation from crusher to packing.

SPRS for ID, FD fans, classifier fans



Paper *

- .. Sectional paper machines
- .. Super calendars
- .. Slitters
- .. Rewinders



Material Handling *

- .. Port - based long conveyers
- .. Stacker reclaimers
- .. Bagging plants

* Exhaustive reference lists are available.



Chemical *

- .. LPG/gas sweetening
- .. Distillation column control
- .. Naphtha cracker and aromatic plants
- .. Lactum and anone plants



Power *

- .. Boiler interlocks, burner management
- .. Water treatment
- .. Coal & ash handling

Range of Equipment

Drive Systems

based on



- .. Fully digital DC drives - ACEREG
- .. High performance, *vector control* AC drives with powerpack from YASKAWA ELECTRIC, Japan
- .. Slip **P**ower **R**ecovery Systems (SPRS)
- .. Transformers, motors, control desks, sensors and other electrics

Automation Systems

based on



- .. High-end 'Quantum' process controllers & accessories from SCHNEIDER AUTOMATION, U.S.A.
- .. Mid-size 'GL' process controllers & accessories from YASKAWA ELECTRIC, Japan

Both with full range of 1000/1600 I/O modules and panels.

- .. Windows[®] 95/NT based 'Panorama' supervisory colour graphic operator stations. Network hardware and integration
- .. Programming packages, sensors, instruments, consoles and other accessories

* Exhaustive reference lists are available.



Quantum process controller provides a high standard of performance and reliability.

- “ **High speed** scan rates to increase system throughput. (0.1 - 0.5 ms/k)
- “ On board maths co-processors for more decision-making with **DCS functionality**.
- “ Tightly integrated **communications & control functions** for highest system throughput.
- “ **Up to 2 kV isolation levels** for noise immunity in electrically severe environments.
- “ **'Hot Swap'** design for simplified maintenance and highest system availability during hardware replacement on line.

Redundant CPUs, power suppliers and I/O* cabling together provide highest availability for critical applications.

Flexibility & Scale



- “ **Quantum** process controller supports memory sizes from 256K bytes to 2M bytes to handle the most demanding control schemes.
- “ **Quantum** process controller provides enterprise level up to 8 networks with Ethernet™.

In today's demanding automation market, no single architecture meets all requirements for cost-effective performance the way **Quantum** process controller does. **Quantum** process controller is ideal for applications calling for redundancies, large I/O count and third party connectivity.

* I/O = Input/output

L&T provides a powerful range of cost-effective solutions configurable from centralised process controller with plant wide remotely distributed I/O stations to peer-to-peer configurations, networking and integration of fieldbus I/O data.



C ONTROLLERS



Compact **single** slot CPU containing executive memory, application memory and communication ports.

Key Features



Unique

- .. **Flash memory** technology to support executive memory and instruction set. This non-volatile memory technology facilitates field-upgrades through Modbus or Modbus Plus communication port (instead of replacing an EPROM chip or cartridge). When new features or maintenance updates are released, use of this technology greatly simplifies and significantly **reduces field maintenance costs.**



Unique

- .. **Write protect function** prevents inadvertent overwriting from the source to an internally reserved area in destination **Quantum** process controller connected on network. With the programming software, it is possible over the network, to set up an *enabled* area for access of coil and data references from the network. The flip side of this feature is that, whatever is not '*enabled*' becomes *disabled* from network access.

This fencing option provides **excellent security against programming mistakes.**



- .. Application programs stored in **battery-backed RAM.**



- .. The battery is serviceable while the process controller is in operation. `MEMORY PROTECT' switch protects the application program from **inadvertent on line changes.**



- .. **Modbus** and **Modbus Plus** communication ports as standard on the CPU module.



- .. Optional **NOM modules** enable addition of communication ports.

Technical Information

<i>Model</i>	<i>140 CPU 113 02 Quantum</i>	<i>140 CPU 113 03 Quantum</i>	<i>140 CPU 213 04 Quantum</i>	<i>140 CPU 424 02 Quantum</i>
<i>CPU Parameters</i>				
Memory - RAM	256k bytes	512k bytes	768k bytes	2M bytes
Reference Capacity				
- Digital	8,192	8,192	65,535	65,535
- Analog	9,999	9,999	57k or 28k words	57k words
Scan Performance				
- Logic solve time (min)	0.3 ms/k	0.3 ms/k	0.3 ms/k	0.1 ms/k
Redundancy	Y	Y	Y	Y
<i>Remote I/O Configurations</i>				
R I/O stations	31	31	31	31
Redundancy	Y	Y	Y	Y
<i>Communication Ports</i>				
Modbus	1	1	1	1
Modbus Plus	1	1	1	2
Redundancy	Y	Y	Y	Y
Maximum number of NOM, NOE modules (total combined)	2	2	2	6
Programming S/w	Modsoft or Taylor	Modsoft or Taylor	Modsoft or Taylor	Modsoft or Taylor

R E M O T E I/O



For applications requiring

- Large I/O count
- Remotely located I/O stations

Overview

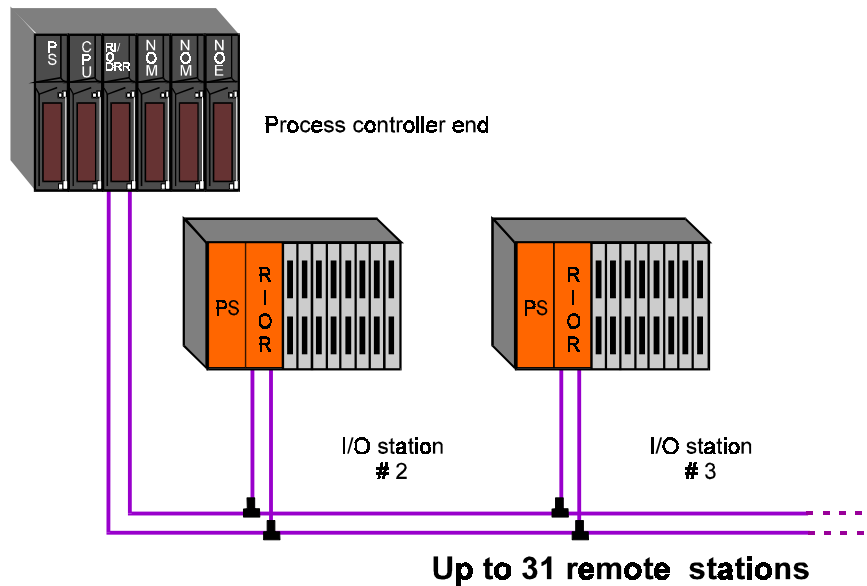
Protocol	Max. distance	I/O Data speed	Cable	Dual cable option
S908	10Km	1.544 Mb/sec	Coaxial & optical	Yes

Dual Remote I/O Cable



For systems requiring high availability, a dual cable option protects the system from single cable breaks or damaged connectors ensuring **uninterrupted communications**.

Status LEDs and internal health diagnostics identify unhealthy remote station/cable up to I/O module level.

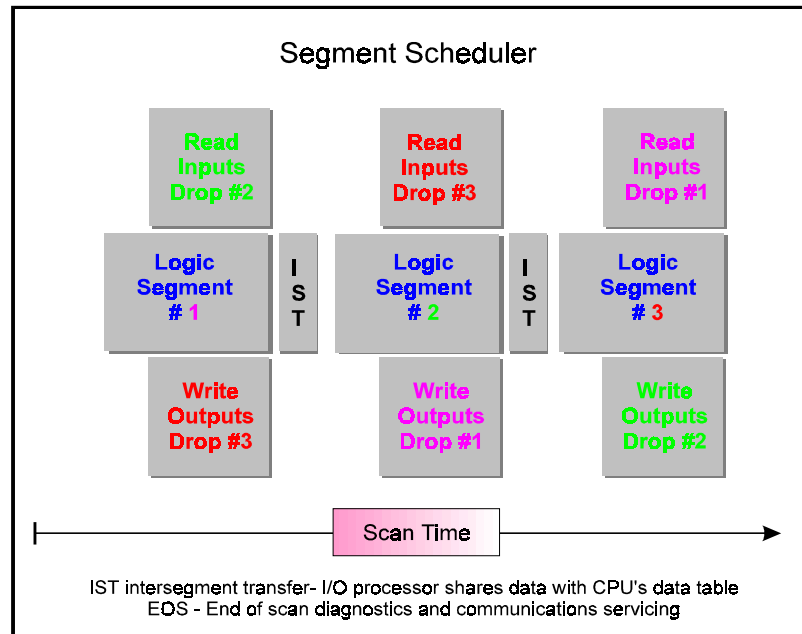


Enhanced Distance Capabilities



Fibre optic repeaters are available for increased cable distances up to 45,000 feet. Repeaters convert cable to standard 65.2/125 micron fibre while maintaining the full dynamic range of the network, increasing the flexibility of the remote I/O system.

Segment Scheduler™



The soft configurable Segment Scheduler™ in **Quantum** process controller complements the high performance of the network by interleaving I/O servicing and logic solving through parallel processing to provide the highest system throughput.

The Segment Scheduler™ breaks application programs into logical segments and schedules I/O servicing to occur in conjunction with that logic solving.

Inputs are read just prior to the logic getting solved and outputs are written just after.

This improvement in throughput through **adjustable scan time** results in higher output and efficient remote I/O networks.



The I/O family comprises the full range of high performance I/O modules designed to interface with a wide variety of field devices.

Software addressing of I/O module enables locating any module in any slot regardless of module type.

Corresponding to every module configured, the system sets **flag** in the process controller to reflect the presence of the module and its communication with the process controller.

Module LED indications aid in troubleshooting and maintenance.



I/O Module Library

Type	Function	Points/Channels	Features
Discrete In			
B1651	110Vac	16	80 to 130 V; 2 groups of 8 points
B1653	110 Vdc	16	80 to 150V; 2 groups of 8 points
B1655	240Vac	16	160 to 270 V; 2 groups of 8 points
B1657	48 Vdc	16	30 to 60 V; 2 groups of 8 points
B1659	24 Vdc	16	15 to 30 V; 2 groups of 8 points
B1665	24 Vdc	32	15 to 30 V; 2 groups of 16 points
Discrete Out			
B1650	110 Vac	16	80 to 130 V; 5A per 8 outputs
B1654	240 Vac	16	160 to 270 V; 5A per 8 outputs
B1656	48 Vdc	16	38 to 58 V; 5A per 8 outputs
B1658	24 Vdc	16	19 to 29 V; 5A per 8 outputs
B1664	24 Vdc	32	19 to 29V; 0.3A per output
B1694	Relay	8	2.5 A per point
Register In			
B1671	Register Input	8	BCD 4-digit or 16-bit binary
Register Out			
B1670	Register Output	8	BCD 4-digit or 16-bit binary
Analog In			
B1673	0-10 Vdc -10~10 Vdc 4-20 mA 1-5 Vdc	16	10/12 Bit Resolution
B1675	0-10 Vdc -10~10 Vdc 4-20 mA 1-5 Vdc	8	10/12 Bit Resolution
Analog Out			
B1674	0-10 Vdc -10~10 Vdc 4-20 mA	4	10/12 Bit Resolution
Counter Modules			
B1681	Reversible Counter	1	40 KHz
B1682	Preset Counter	1	40 KHz
RTD Module			
B1676	RTD Pt 100 : 0°C ~ 150° C -100°C~200°C 100°C~600°C	8	RTD Mux Module
Thermocouple Module			
B1677	T/C: J, K, R, S T, B, N, E, and mV	7	0.1°C/1°C Resolution



For complex math-intensive applications. **Quantum** process controller provides math co-processor hardware as standard. This hardware feature significantly improves execution time and offers **Process Control Function Library (PCFL)** and **Equation Editor** for improved application performance for process algorithms and complex math calculations, bringing DCS functionality to **Quantum** process controller as standard.

- .. Data is available in '**real time**' in engineering units.
- .. Eliminates complexity of **multiple math blocks**.
- .. Eliminates problems of **data conversion**.
- .. Utilises **floating point** math.

Category	Purpose	Functions
Signal processing	Manipulate process & derived process values	A_IN, A_OUT, LIM_V, LIMIT, RAMP, RMPLN, MODE, SEL, INTEG, RATE, DELAY, L_LAG, LKUP
Advanced calculations	General mathematical purposes	AVER, CALC, EQN
Regulatory functions	Closed loop control	PID, ON/OFF

Functions



A_IN	Converts inputs to scaled engineering units with process square root
A_OUT	Converts floating point variables to output module integer format
ALARM	Alarm block with LL, L, H, HH limits for deviation, process variable
DELAY	Delays queue for up to 10 input samples at user specified sampling interval
LKUP	Look up tables with linear interpolation up to 8 points
INTEG	Integrates an input at user specified interval
L_LAG	First order lead lag filter
LIMIT	Limits process variable between user specified high & low values
LIM_V	Limits velocity rate of change for input between high & low values
MODE	Acts as an auto/manual station to transfer data to next block

Functions



RAMP	Linearly ramps set point at user specified rate to target
RMPLN	Logarithmically ramps set point at user specified rate to target
RATE	Calculates rate of change over last two sampled input values
SEL	Compares four inputs & selects the highest lowest or average
AVE	Average of up to four weighted inputs
CALC	Calculation of predefined formula (13 to choose from) with up to 4 inputs
EQN	Calculation of user defined formula with up to 4 inputs
ONOFF	Thermostat type control to control an input signal between two limits
PID	Floating point proportional integral-derivative control

Process Control As Easy As 1-2-3



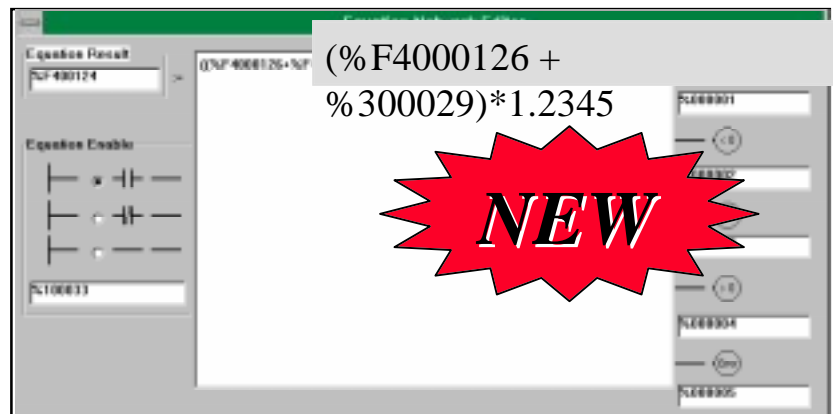
.. Select the function you want and fill in the blanks!



Equation Editor



.. Equation editor makes powerful math operation simple!



HOTSTANDBY

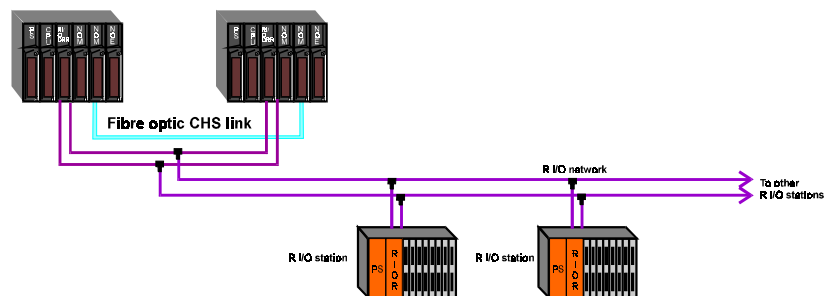


Quantum hot standby delivers high system availability to meet critical applications. One process controller acts as **primary** while the other is **standby**, ready to take ownership of the system upon any switch-over of controls in a completely **seamless fashion**.

Key Features/benefits



- Hot standby is available to the entire line of **Quantum** process controller.
- Switch-over time of **13 ms** (typical) for hot standby to assume control.
- High speed fibre optic link** between process controllers provides fast response time and enables separation of primary and standby up to 1 km.
- Fibre optic CHS link and R I/O* cable are used to pass diagnostic information between process controllers in hot standby system. In the event of failure of one communication channel, a **logical decision** can be made as to which process controller is capable of serving the I/O.
- Periodic hardware tests** are performed on the R I/O to verify the hot standby system's capability to drive R I/O, ensuring higher reliability.
- Hot standby has the capability of transferring the entire data table from primary & standby **every scan automatically**.
- Hot standby status is available to the system. This makes **preventive maintenance simple**.



* R I/O = Remote Input/Output



For open, standards-based networking, third party and fieldbus connectivity, the **Quantum** process controller offers multiple solutions:

- Modbus
- Modbus Plus
- Ethernet
- LonWorks
- INTERBUS-S

Combinations of these protocols provide simple, high performance network architectures.

The LonWorks network functionality ranges from individual device connections linked with intelligent sub-systems to stand alone dedicated controllers and computers.

INTERBUS-S is a fieldbus network designed for I/O blocks and intelligent devices used in manufacturing.

MB Plus Networking



Modbus Plus combines **high speed**, reliable **peer-to-peer** communication and easy installation features. This combination of features makes Modbus Plus a **de facto industry standard protocol**.

Key Features



- High performance open architecture network system- **over just a twisted pair cable** - with products of several leading manufacturers integrated.
- Each individual network supports up to 64 addressable node devices. **Isolation of one node does not affect the others.**
- **Deterministic protocol** as compared to other high speed data highways which are probabilistic. Actual access time can be calculated between two nodes on a network.
- The network provides **Global Database** feature for high-speed data transmission.

Key Features



- Support for programming up to 8 automation systems on a single network provided.
- Peer-Cop** to configure communication among multiple automation systems on a single network. When Global Database is combined with Peer-cop, configuration of a **'Virtual' controller** is possible.

Performance Specifications

Number of nodes • 32 devices on a single network (without a repeater)

• 64 devices with one repeater

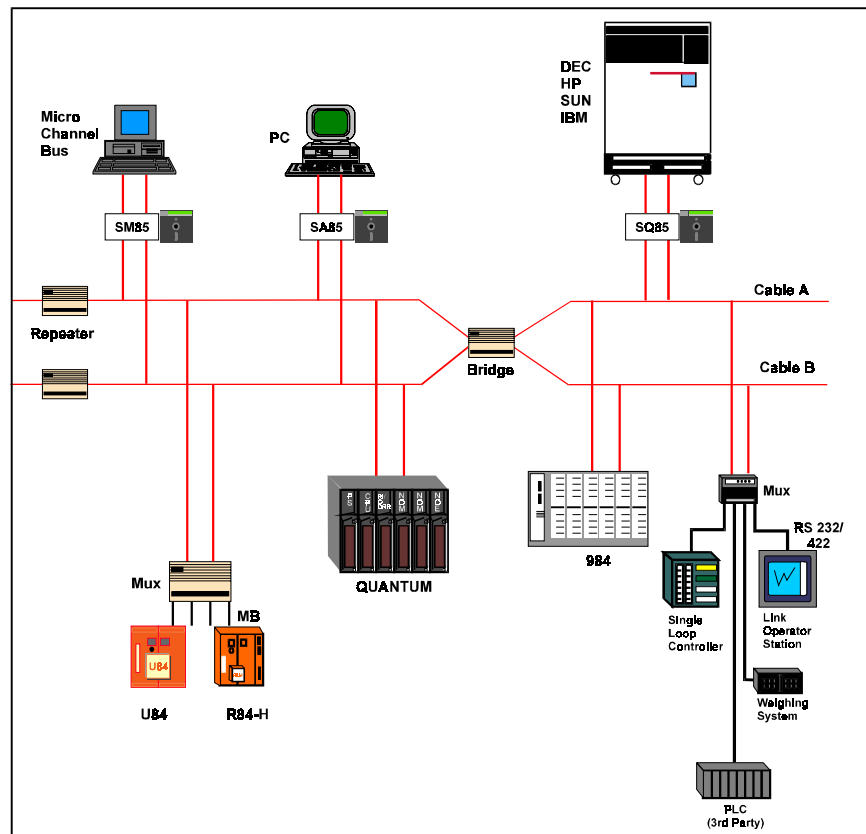
Distance • 1500 feet for a single cable segment

• 6500 feet for a cable segment with repeaters

• 30,000 feet for a linear network with four bridges & repeaters

• 45,000 feet with total end to end distance, over fibre optic cable

Dual Modbus Plus Network



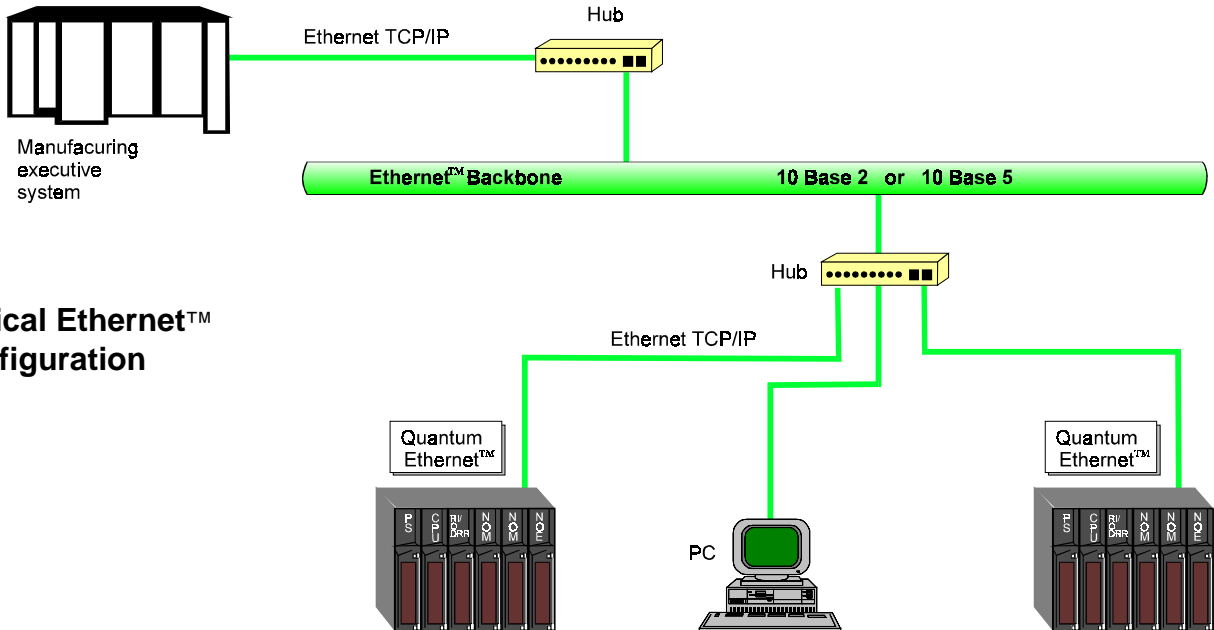


The Ethernet™ module offers user-friendly, inexpensive 'plug and play' connectivity solutions between host systems and **Quantum** process controller with no additional software to load. It also comes with all necessary hardware.

Key Features



- *Common design features*
 - Industry standard TCP/IP protocol gives wide networking flexibility.
 - Easy integration with Modbus and Modbus Plus networks for real time control applications.
- *Popular media support*
 - Twisted pair (10 Base T via RJ-45 connector)
 - Fibre optic (10 Base FL via ST connector)
- *Module configuration*
 - Module is activated by software set-up screen.
 - Configuration through Modbus or Modbus Plus.
- *Multiple Ethernet™ modules supported*
 - Up to 6 modules with **Quantum** process controller.
 - Hot swap - no problem !!



Typical Ethernet™ Configuration