Supervisory Computer System

Since the late 70's the growth of the Programmable Controller industry has been explosive.

In just about every industry sector this technology is accepted as an important element of process plant design.

Along roughly the same time scale, the acceptance of video based operator devices, predominantly interfaced with process control equipment, is fast becoming the norm.

Against this background, Bateman Instrumentation embarked in 1981 upon a programme calculated to produce a fully configurable video interface supervisory system.

ELCON is the culmination of development work carried out exclusively by a team of our Engineers to meet the needs of the User. Being the Leader in the PC market with MODICON we were ideally positioned to study and implement the requirements of such a supervisory computer system.

We listened to the needs of our clients and engineered a modular, flexible system that is USER CONFIGURABLE, requiring no previous knowledge of any computer languages.

The major design criteria of the system were:

- Utilise standard, reliable, well proven, readily available hardware
- Provide multiple video displays and communicate with multiple MODICON PC's.
- Hardware and Software security.

Full colour interactive displays.

- User friendly to both engineers and operators
- Fast response times.
- Expandable architecture.

All the design criteria have been realised – the system is fully deliverable off-the-shelf with standard software packages out of the price book.

Todays trend is to replace the conventional MIMIC PANEL with graphic displays. We did not stop there – we provided the following standard functions.

- SYSTEM OVERVIEW DISPLAY
- CONFIGURABLE ACTIVE MIMIC DISPLAYS WHICH TYPICALLY DEPICT PLANT VARIABLES, ANALOG BAR GRAPHS AND PLANT STATUS.
- ANALOG CONTROLLER FACEPLATE EMULATION.
- ANALOG CONTROLLER SINGLE LOOP ENGINEERING DISPLAY WITH TUNING FACILITIES; ALARM PARAMETERS AND CURRENT TREND OF MEASURED VARIABLES.
- HISTORICAL TRENDING WITH HARD COPY.
- ALARM DISPLAY AND LIST.
- STATUS DISPLAY AND LIST.
- ALARM AND EVENT REPORTING.
- DATA LOGGING AND REPORTING PACKAGE.
- DEVICE CONTROL DISPLAY.
- MATHEMATICAL CALCULATIONS PACKAGE.

As ELCON is a software package running on STANDARD DEC (TM) hardware, it has the advantage of being fully supported (both HARDWARE and SOFTWARE) Worldwide.

Bateman Instrumentation already have an extensive track record of installed ELCON systems and a full hands-on demonstration can be arranged at our user support facility.

SYSTEM CONFIGURATION

The ELCON system has been designed to cater for single PC systems or complex networks of multiple PC's.

The size of the systems effects computer hardware only.

The computer hardware is selected from the standard range of DEC PDP 11 (TM) computer systems, the most commonly used industrial mini-computer worldwide.

The standard DEC RSX11M (TM) operating system is used allowing all the software to be fully transportable between computers. Hence, the stand-alone system software is identical to that in a complex distributed network.

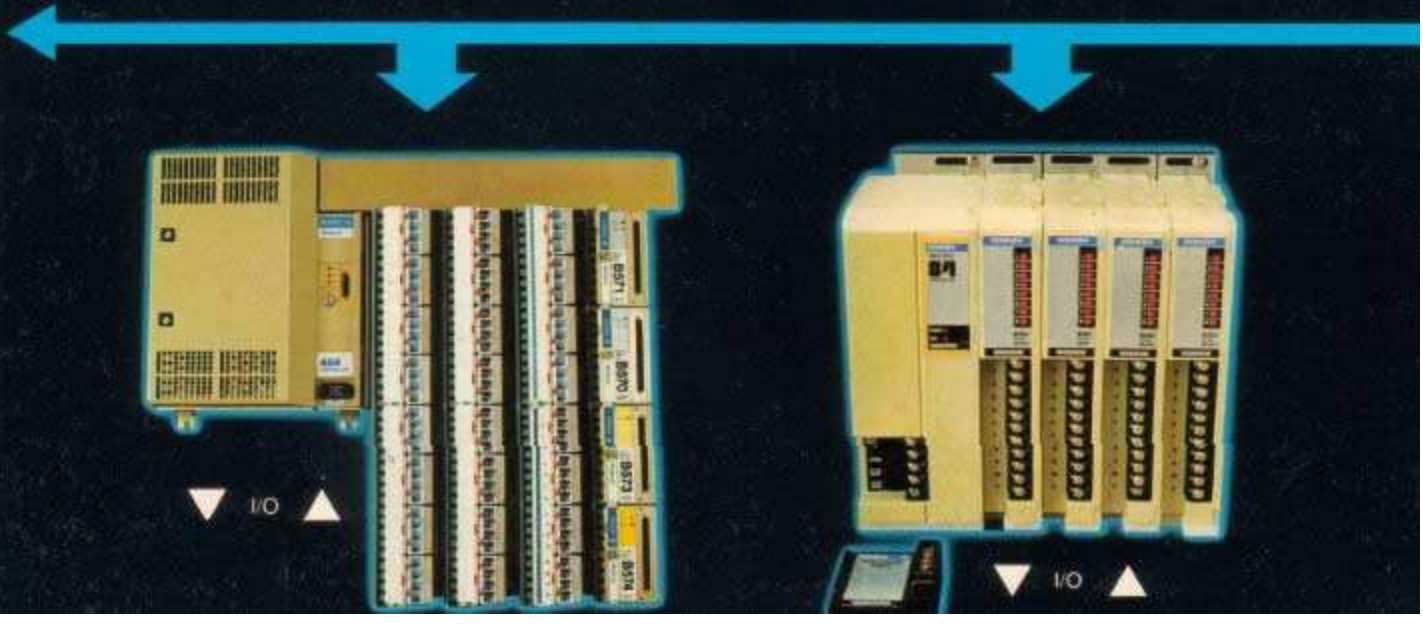
COMMUNICATIONS

MODICON's standard MODBUS communications system is used to interface with the PC's. MODBUS is a powerful communication Protocol with extensive error checking, including framing, parity and C.R.C. checks to detect possible corrupted data transfers.

This package is entirely transparent to the User.

DEFINING THE SYSTEM DATABASE

Data base configuration is a simple prompt/response technique whereby the USER defines the discrete and Analog I/O



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to the system using unique TAG numbers. Once a TAG number is assigned, reference need only be made to this TAG number to access the data.

PICTURE BUILD

A facility is provided for Graphics to be built "on-screen" using a functional keyboard defining STATIC and DYNAMIC functions.

The following functions are used for the static template or mask: lines, triangles, boxes, bins, pipes messages, valves, arrows, circles.

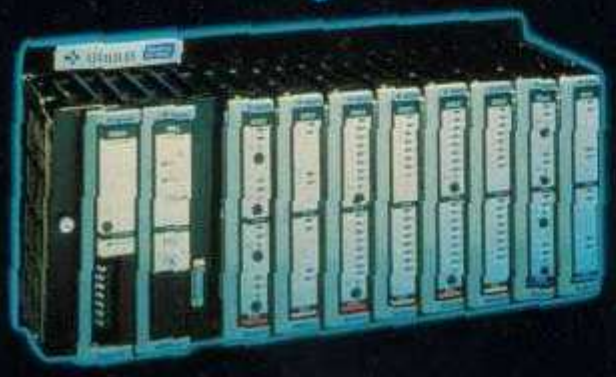
The dynamic portion of the display may contain the following items, which are linked to the data base via TAG numbers.

Valves, arrows, motors, digital alarms, analog alarms, vertical and horizontal bar graphs, loops and rectangles.

All these functions are built up simply and rapidly by the operator using screen prompts.

Extensive use is made of "HELP" functions which facilitate self training.

The ELCON design culminates in a system which removes the realisation of a functional package from the realm of the computer professional and puts it back where it belongs – with electrical instrumentation engineers and metallurgists.



▼ I/O ▲

MODICON 884
PROGRAMABLE CONTROLLER

▼ I/O ▲

MODICON 584M
PROGRAMABLE CONTROLLER

▼ I/O ▲

MODICON 584L
PROGRAMABLE CONTROLLER

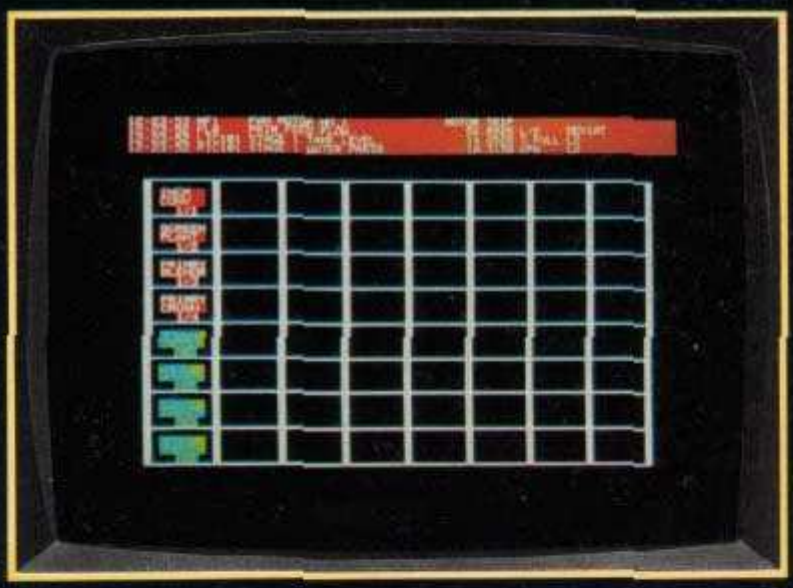
Graphic Displays

The primary interfaces between the plant operator and the MODICON PC's are single or multiple Colour VDU's, these are used to display plant variables, analog "faceplates", plant alarms and status lists in the form of standard and configurable DYNAMIC GRAPHIC MIMIC displays.

Displays consist of a static portion or template and a dynamic portion that is continually updated as plant conditions change. Displays are stored in a library on hard disc or diskette, and are output on request by the operator via the keyboard.

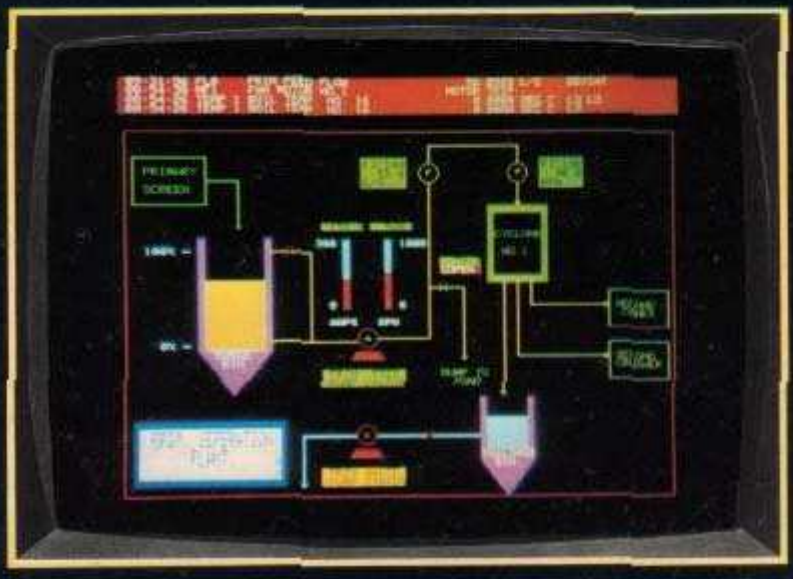
SYSTEM OVERVIEW DISPLAY

- A grid of plant areas with group sub division, emulating a typical alarm annunciator panel.
- Up to 64 groups may be configured.
- Any point allocated to an alarm function will cause the associated group window to flash red on alarm state.
- User defineable group descriptors.
- Plant status and variables from any PC can be allocated to any group.
- Last 4 current alarm points indicated on top 4 lines.



DYNAMIC MIMIC DISPLAY.

- Analog values digital quantities, arrows, valves and other plant items such as pumps are displayed.
- User configurable, interactive on-line graphic display building by users.
- Tag numbers and engineering units assigned.
- Real time representation of process variables.



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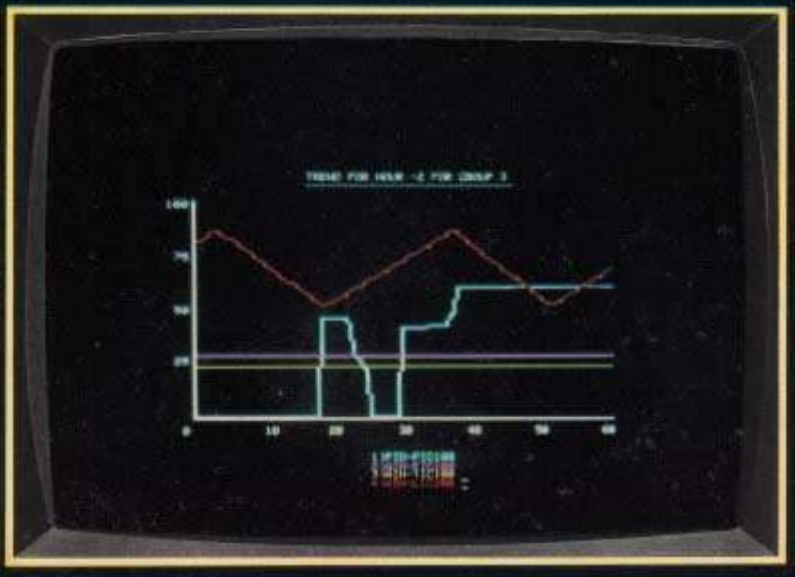
8 LOOP DISPLAY

- 2 pages of conventional analog PID faceplate displays per group (128 total).
- PID control indication and analog measurement indication.
- Alarm limits and status display.

SINGLE LOOP TUNING DISPLAY

- "Zoom" from multiple loop display to single loop tuning display.
- Detailed display of all tuning and alarm parameters.
- Password protected values can be changed and automatically down-loaded to the relevant PC.
- 5 minute current trend of measured variables sampled every 5 seconds.



HISTORICAL TREND DISPLAY

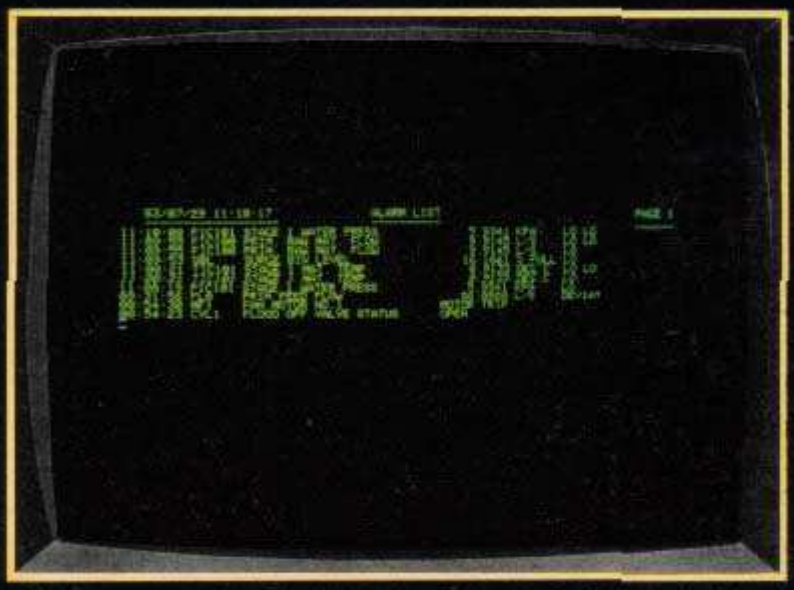
- Process variables in the to data-base are historically trended for up to 48 hours.
- 4 points per screen display.
- Any one hour period in preceeding 48 hours recallable.
- Ideal for process plant monitoring under changing conditions.

Reports and Lists

Under operator control and automatically in the case of status changes and alarms, variables may be logged by the system and output to various screen displays and to printers, for archival storage.

ALARM LIST DISPLAY

- 2 pages of current alarms.
- 45 alarms per page.
- Time-stamped alarms.
- Tag number and process descriptor.
- Engineering value and units shown.
- Alarm status e.g. hi, lo, hi hi, lo lo etc.
- Screen display may be printed.



STATUS LIST DISPLAY

- Status list on a per group basis.
- Multiple pages available.
- Digital and analog points displayed.
- Screen display may be printed.

ALARM AND EVENT REPORT

- Hard copy reporting of alarms and events on a continuous basis.

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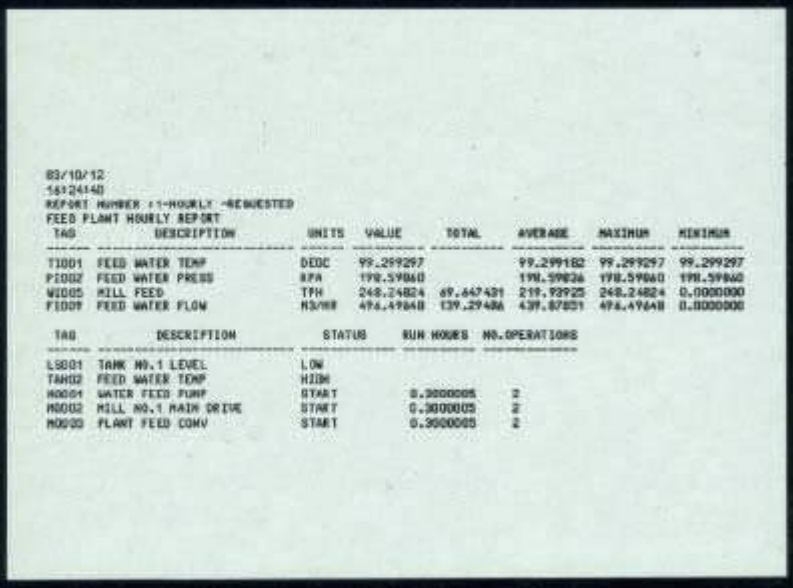

83/10/12
16:24:40
REPORT NUMBER (1=HOURLY -REQUESTED
FEED PLANT HOURLY REPORT

TAG	DESCRIPTION	UNITS	VALUE	TOTAL	AVERAGE	MAXIMUM	MINIMUM
T1001	FEED WATER TEMP	DEGC	99.299297		99.299182	99.299297	99.299297
P1002	FEED WATER PRESS	KPA	198.59860		198.59826	198.59860	198.59860
W1005	MILL FEED	TPH	248.24824	69.647431	219.93925	248.24824	0.0000000
F1009	FEED WATER FLOW	M3/HR	496.49648	139.29486	439.87851	496.49648	0.0000000

TAG	DESCRIPTION	STATUS	RUN HOURS	NO.OPERATIONS
LS001	TANK NO.1 LEVEL	LOW		
TAH02	FEED WATER TEMP	HIGH		
M0001	WATER FEED PUMP	START	0.3000005	2
M0002	MILL NO.1 MAIN DRIVE	START	0.3000005	2
M0020	PLANT FEED CONV	START	0.3000005	2

DATA LOGGING REPORT

- Comprehensive on-line editing features for reports.
- Reports, averages, maxima, minima, running hours, MCC motor operations etc.

DATA BASE BUILD

- User configurable data base.
- Prompt/response technique used throughout.
- Extensive use of 'HELP' function.
- Variables referenced by tag number.
- All points can be assigned to the status and alarm lists.
- Complete data base can be printed out providing a self documenting system.

OPERATORS KEYBOARD

- Operators keyboard with a limited number of function keys.
- Access control functions via passwords.
- Designed for simple, easy to learn keystroke operations.

ENGINEERS KEYBOARD

- Dedicated keys for data base build (DBLD); Picture Build (PBLD); Loop Build (LBLD); Report Build (RBLD) and Trend Build (TBLD) Functions.
- Colour coded key layout.