P-NET NEWS

News letter for International P-NET User Organization ApS. **1/1994 October.**

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A manufacturer of medical sensors for the home market are implementing a company wide data acquisition system.

New PC communication concept
A new PC communication concept using the OLE2 Automation features from Windows has been developed.

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P-NET Medisense Data Acquisition System

by Andrew Stanton, Medisense (UK) Inc.

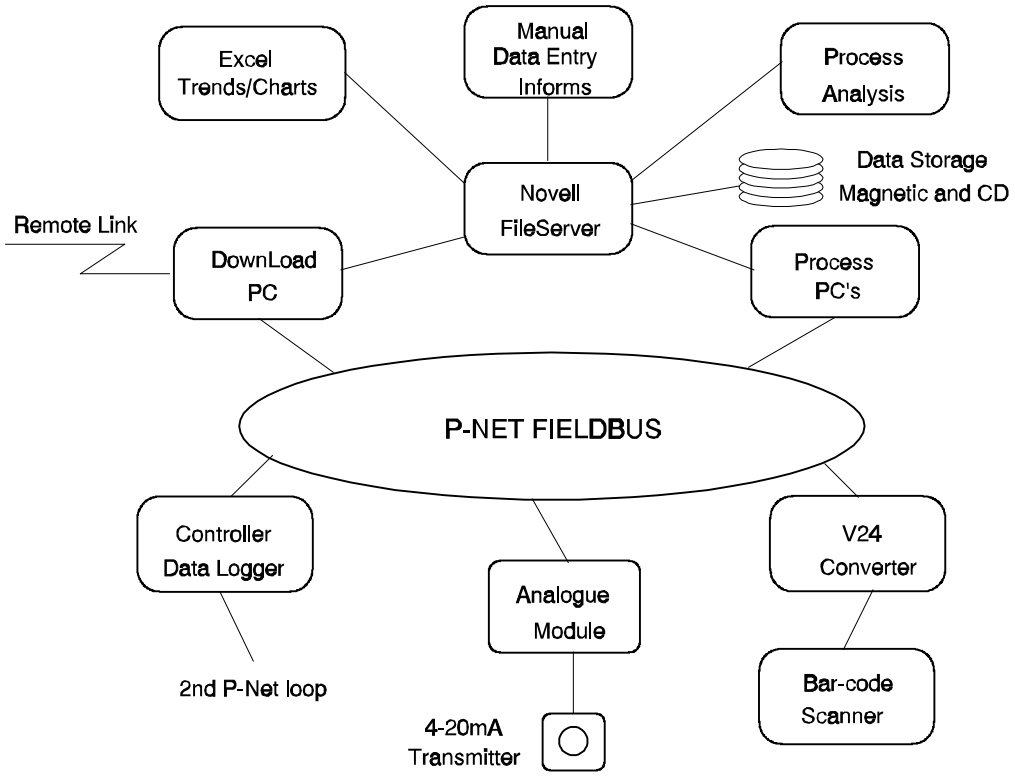
Medisense is the manufacturer and distributor of medical sensors for the home test market.

We are currently implementing a company wide data acquisition system, this will provide:

A process tracking system that logs to database key process parametrics beginning at the incoming raw materials stage through manufacturing, quality control to final product release.

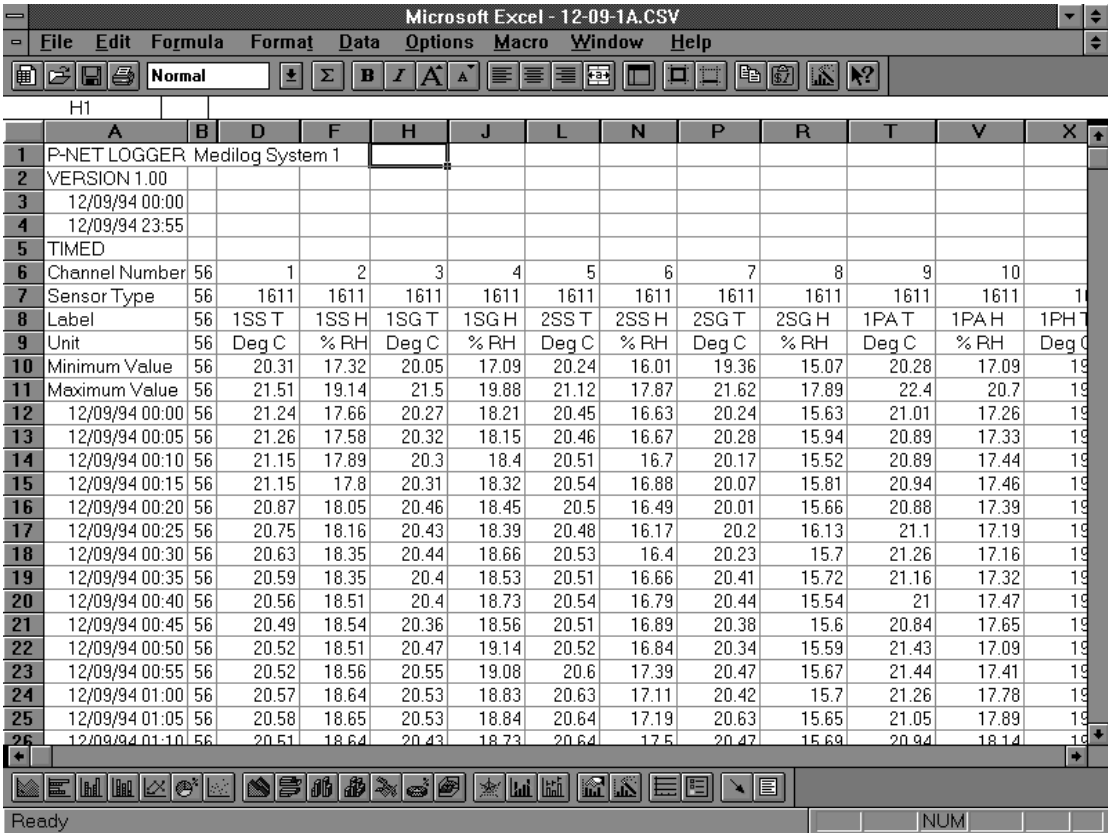
The ability to perform in-depth analysis of the database to identify key process dependencies and control limits.

To provide real-time process control feedback.



System schematic

The P-NET system currently comprises 2 loops bridged by a controller/data logger and 10 PC's. The data logger records up to 99 analogue inputs on a 5 minute timed interval, which provides 5 days maximum logging duration. Each channel in the logger has 4 state alarm monitoring i.e. Hi and Lo Warning, Hi and Lo Critical, a digital output channel can be enabled for an alarm level on each of the loggers channels. The logged data is automatically down loaded on a daily basis by a PC and the output file placed directly on a Novell file server in a format ready for charting by Microsoft Excel.


Microsoft Excel - 12-09-1A.CSV

File Edit Formula Format Data Options Macro Window Help

Normal

H1

	A	B	D	F	H	J	L	N	P	R	T	V	X
1	P-NET LOGGER	Medilog System 1											
2	VERSION 1.00												
3	12/09/94 00:00												
4	12/09/94 23:55												
5	TIMED												
6	Channel Number	56	1	2	3	4	5	6	7	8	9	10	
7	Sensor Type	56	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1
8	Label	56	1SS T	1SS H	1SG T	1SG H	2SS T	2SS H	2SG T	2SG H	1PA T	1PA H	1PH T
9	Unit	56	Deg C	% RH	Deg C	% RH	Deg C	% RH	Deg C	% RH	Deg C	% RH	Deg C
10	Minimum Value	56	20.31	17.32	20.05	17.09	20.24	16.01	19.36	15.07	20.28	17.09	19
11	Maximum Value	56	21.51	19.14	21.5	19.88	21.12	17.87	21.62	17.89	22.4	20.7	19
12	12/09/94 00:00	56	21.24	17.66	20.27	18.21	20.45	16.63	20.24	15.63	21.01	17.26	19
13	12/09/94 00:05	56	21.26	17.58	20.32	18.15	20.46	16.67	20.28	15.94	20.89	17.33	19
14	12/09/94 00:10	56	21.15	17.89	20.3	18.4	20.51	16.7	20.17	15.52	20.89	17.44	19
15	12/09/94 00:15	56	21.15	17.8	20.31	18.32	20.54	16.88	20.07	15.81	20.94	17.46	19
16	12/09/94 00:20	56	20.87	18.05	20.46	18.45	20.5	16.49	20.01	15.66	20.88	17.39	19
17	12/09/94 00:25	56	20.75	18.16	20.43	18.39	20.48	16.17	20.2	16.13	21.1	17.19	19
18	12/09/94 00:30	56	20.63	18.35	20.44	18.66	20.53	16.4	20.23	15.7	21.26	17.16	19
19	12/09/94 00:35	56	20.59	18.35	20.4	18.53	20.51	16.66	20.41	15.72	21.16	17.32	19
20	12/09/94 00:40	56	20.56	18.51	20.4	18.73	20.54	16.79	20.44	15.54	21	17.47	19
21	12/09/94 00:45	56	20.49	18.54	20.36	18.56	20.51	16.89	20.38	15.6	20.84	17.65	19
22	12/09/94 00:50	56	20.52	18.51	20.47	19.14	20.52	16.84	20.34	15.59	21.43	17.09	19
23	12/09/94 00:55	56	20.52	18.56	20.55	19.08	20.6	17.39	20.47	15.67	21.44	17.41	19
24	12/09/94 01:00	56	20.57	18.64	20.53	18.83	20.63	17.11	20.42	15.7	21.26	17.78	19
25	12/09/94 01:05	56	20.58	18.65	20.53	18.84	20.64	17.19	20.63	15.65	21.05	17.89	19
26	12/09/94 01:10	56	20.51	18.64	20.43	18.73	20.64	17.5	20.47	15.69	20.94	18.14	19

Ready NUM

Example - Logger data ready for charting in Microsoft Excel using macro language.

A high speed modem link to a PC in the manufacturing facility is used for remote access to the P-NET and Novell system from our Engineering building. This PC runs the Norton 'PC Anywhere' host program, any other program residing on this PC can be executed remotely, windows and mouse support is provided, this allows for example a modules calculator program to be modified remotely, transferred to the Host PC and then down loaded using the PD windows program 'Casm' to the module. 'WinMon' or 'Monitor' can be executed to view and modify P-NET variables.

Our production process incorporates approximately 35 stages of manufacture, during an early stage an Interleaved 2 of 5 bar-code identity number is etched

on to the product using a Nd:YAG laser marking system. This provides us with the ability to track and log key process parameters to each item as the product travels through the process. Allen Bradley high speed laser scanners and Ultrakust V24 converters are used to read and present the identity code to the P-NET system.

The process PC's are connected to both the P-NET system and the Novell network and are located near to the manufacturing operation. These systems monitor and record real-time parameters (Temperature, Humidity, Pressure, Airflow) for each item as it passes through the process. These values are directly recorded to Paradox database tables located on the file server. These tables can be accessed concurrently by other network users and high level analysis programs, control limits changed on the server are immediately acted upon by the PC's at the process level. In the event of a main network failure the tables are directed to the PC's local drive and transferred when the server next becomes available. The PC clocks are synchronised hourly with that of the loggers ensuring accurate recording of events over the system. The programs running on the PC's incorporate code from the PNET_C interface module, Borland's Paradox Engine for low level data base access and the Novell Software Developers Kit. All local process values are displayed by the PC's and will highlight all out of limit parameters, on-line trending of key parameters is also provided.

In addition the PC's collect machine utilisation and yield performance data. Digital channels within a module are used to detect when a machine has stopped, the operators are prompted to enter a utilisation code before the machine can be restarted. There are approximately 50 codes for each machine, and cover events such as normal running conditions, maintenance, set-up, machine faults etc. Each time a new code is entered the previous code and its time duration is recorded directly to a Paradox database table. Monthly charts are produced showing in detail the machines utilisation against each shift, attention is drawn to re-occurring problems and appropriate action can be taken to ensure high process yields are maintained.

Large over head message centers are used to inform the line operators of the current conditions e.g. 'Line Ready' and 'Temperature Critical', these displays are controlled by a UPI module, up to 240 pre-programmed messages can be placed in the message center, the required message number is loaded into the UPI module where it is decoded by the calculator channel and sent in a nibble format to the display using the modules digital outputs.

Manual entry into the database is performed using Informs for Windows. The operator is presented with a familiar looking form to that of the paper records, keyboard entries are directly placed into Paradox tables on the file server. Values that are obtained automatically by the P-NET system are read from the database and displayed in the appropriate place on the form, hard copies of batch records are produced for long term storage.

I have developed a windows Dynamic Data Exchange (DDE) P-NET server, this enables windows programs that support DDE to obtain their input data from the P-NET server, this server handles all the P-NET communications using DLL's (Dynamic Link Libraries) provided by Process Data. Control limits etc. can also be passed to the server through the DDE for the P-NET system to act upon.

A windows package, for example Microsoft's spread sheet Excel, supports DDE and can therefore act as a DDE client program. The P-NET server passes real-time data through the windows DDE to the client program when ever a change in value occurs. This results in the client program displaying real-time data directly in the spread sheet cell. This cell can be directly charted as a bar chart that will follow the changing P-NET input or can be trended using the macro language. The development of this server allows many 'off the shelf' windows products e.g. Statistical Process Control, to be used with the P-NET system without further development.

The P-NET system has provided us with the flexibility we require to adapt to new requirements and change. It can be adapted easily to replace other types of instrumentation previously installed. We monitor and record over 100 analogue measurements from 4-20mA transmitters, in the past a number of instruments were placed in series with each of these current loops, this provided for example local displays to operators, central chart recording, alarms facilities and central data logging, this resulted in miles of cabling, each instrument required individual calibration and many instruments performed similar tasks with little integration. The P-NET system has reduced the cabling, only one calibrated analogue channel is required for each 4-20mA measurement, this still provides the local display of data, alarm monitoring, plus the additions of on-line trending and statistical analysis, and data logging on both timed and event triggered basis. We are now beginning to achieve a fully integrated distributed control and measurement system throughout the facility.

Fieldbus and International Standardization

by Mr. Regnar Schultz, Danish Standards Association

Not only in Europe but worldwide big efforts are made to form a common standard for communication between process computers. Unfortunately, the goal is still far ahead.

What is the purpose of a Fieldbus standard?

Some, especially larger companies, do not seem to be interested in completing a common, international standard as soon as possible. An explanation could be that these companies believe that by sticking to their own product standard they can make the costumers dependant. However, it is a fact that most users (costumers) of today are well aware that it is a poor idea to be too dependant. This is one of the reasons why a standard for communication between process computers should be formed.

Smaller companies within the automation field are, on the contrary, very interested in completing the standard because it would mean an outstanding opportunity to market their products along side with the larger companies. Now it would be possible to integrate equipment of foreign makes in a process control system mainly from a single company.

This is where many small companies get their chance. A lot of good components for controlling and supervision are available but if they can’t communicate with other makes, it is difficult to integrate them. Many a solution has been tried e.g. converting to analogue or digital I/O signals. This kind of solutions are, of course, not only expensive and troublesome but also antiquated and inflexible.

When developing new products it is of great importance to keep up with the latest standards. The best way is to contribute to the standardizing work in order to put your finger print on the standard, either by joining a national or an international Working Group or by subscribing to the documents which the international committee releases for comments.

IEC-Fieldbus / Title.		Document number	Status.
Part 1:	Introductory guide	65C/WG6	Stand by. The document has not been released yet
Part 2:	Physical Layer Specification & Service Definition	IEC 1158-2	Approved and released in December 1993.
Part 3:	Data Link Layer Service Definition	65C(Secretariat)105	Has been released for voting and commenting. Comments from many National Committees. A revised draft is under preparation.
Part 4:	Data Link Layer Protocol Specification	65C(Secretariat)106	Has been released for voting and commenting. Comments from many National Committees. A revised draft is under preparation.
Part 5:	Application Layer Specification	65C(Secretariat)122	This is 2. draft. It is not compliant to the approved MMS-standard.
Part 6:	Application Layer Protocol Specification	65C(Secretariat)123	This is 2. draft. It is not compliant to the approved MMS-standard.
Part 7:	Network Management	65C(Secretariat)121	This is 2. draft. No result yet
Part 8:	Conformance testing	65C/WG6	Stand by. The document has not been released yet.

Figure 1: Structure and Status for the IEC 1158 Fieldbus

IEC 1158 Fieldbus

The international Fieldbus defined by IEC (International Electrotechnical Commission) consists of eight parts of which the Physical Layer (Part 2) has been adopted. Figure 1 shows the status of the individual Parts.

Prior to adoption of Part 2, two amendments were presented in order to include transmission on optical fibres and radio link.

Not only the Fieldbus standard, but also the combined IEC/ISO 9506-6 Manufacturing Message Specification (MMS) Part 6: Companion Standard for Process Control has been approved. This part of the standard specifies the use of MMS within a process control application.

EN 50170 Fieldbus

In 1993, efforts began in Europe within CENELEC to define a common European Fieldbus Standard. The idea was to use a collection of existing European standards or pre-standards. Within the Technical Committee TC 65CX we agreed to include the following standards: Profibus, WorldFIP and P-NET.

The document is divided into subparts, one for each bus type, and the individual sub-part is divided into parts corresponding to the structure of the IEC 1158 Fieldbus.

Some may think that it is a great disadvantage having more that one Fieldbus standard. It probably is. However, it provides a number of fixpoints. And with suitable gateways between standard busses and the company's own bus, the desired flexibility within the process control system will be achieved.

The goal is to migrate towards the IEC 1158 Fieldbus when it becomes approved and hence adopted in CENELEC.

Industry's task

As mentioned, it becomes necessary for process control vendors to develop fixed gateways by means of which products can take advantage of the standard busses in stead of spending money on developing special software every time a company has the opportunity to deliver equipment to an existing system.

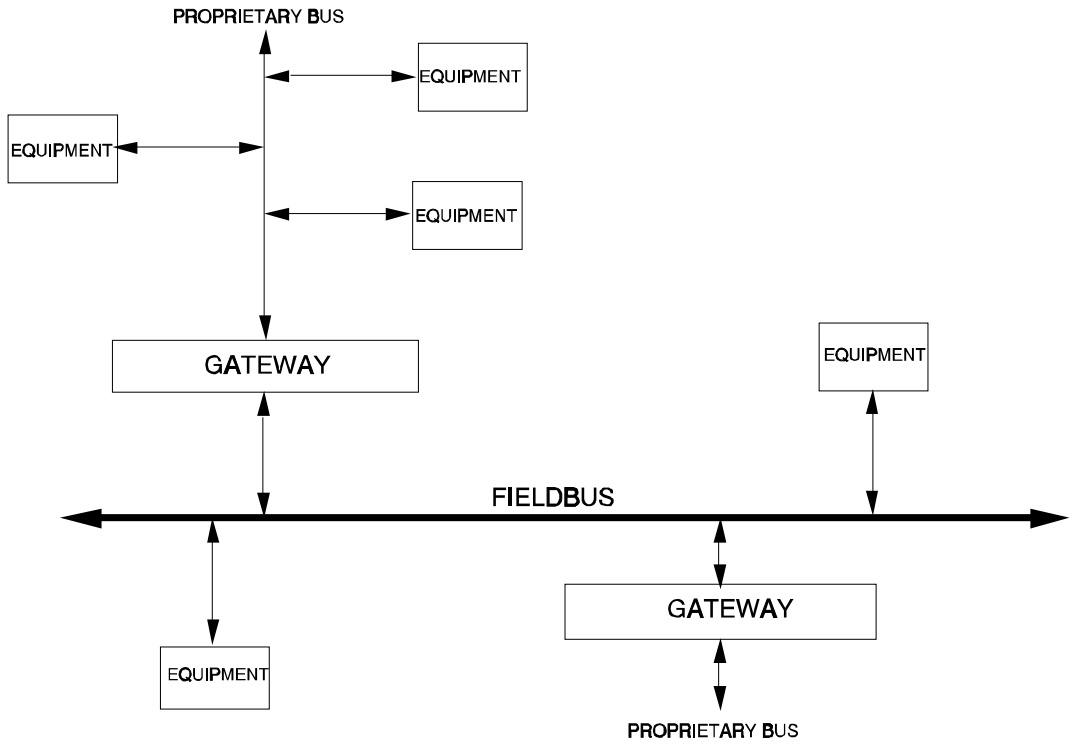
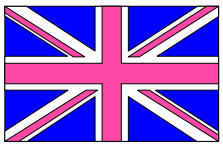


Figure 2: Example of Fieldbus with gateways.



NEWS FROM THE UK

by Chris Jenkins, local Chairman

Since the last Newsletter, P-NET has had representation at "Fieldbus ’94" conference in London, where a P-NET working demonstration was shown, and a paper presented by John Johansen on behalf of the IPOU.

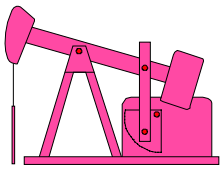
In addition, and in conjunction with the Control and Instrumentation (C&I) exhibition in Birmingham in May, Ole Cramer Nielsen presented a paper at the International Fieldbus Forum.

These events were attended by potential users, and current and future manufacturers of fieldbus equipment. Both conferences highlighted a degree of confusion as to the ultimate possibility of a single world standard, considering the continuing evolvement and amalgamation of various so called *de facto* standards. Various world and continental standards committees seem to be in a state of flux regarding agreement and timescale.

The two IPUO papers conveyed that P-NET is already a controlled *open* standard, which will continue to be enhanced for intrinsic safety and other communications media, such as, for example, radio and I.R.

It is understood that any future UK based fieldbus conferences will attempt to encourage papers from users, which should at least give the IPUO an opportunity to broadcast the many working applications which already exist.

The Institute of Petroleum are about to publish a Code of Practise for OTC (On Truck Computing), which will give guidance and recommendations to manufacturers and users of petroleum trucks, which incorporate on board electronics. There has always been a need to recommend a communications protocol, and P-NET has probably been the most widely discussed, following a number of comparative studies. Although the document will not specify a particular standard, at this point in time, there will be the necessity to do so, before the variety of road tanker, loading gantry and service station equipment manufacturers can communicate with one another.

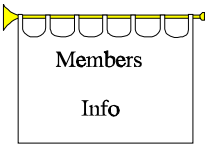


P-NET Units in North Sea

FMA continue to provide Measurement and Control Systems (MACS), using P-NET as the communication medium. A need has arisen in the Pipeline Sampling division, for an instrument to measure the contents of FMA Piston Internal Mixing Receivers. These PIMR's are units which are filled with samples of crude oil derived from an off shore pipeline, and are held under pressure for subsequent on shore analysis. The Contents Indicator unit has recently been launched, and is based entirely around a stand-alone Universal Process Interface (UPI) PD 3221, and fully utilises the digital and analogue interfaces, together with the Calculator and Pulse Processor channels. Development has been greatly assisted with the use of the Windows based calculator assembler.

One aspect of the development, and one which will affect all equipment manufacturers by the end of 1995, has been the necessity to meet the European directive on EMC. The fact that the UPI has already met these standards, has provided a more straightforward route in attaining the CE marking requirement.

For further information, contact FMA:
tel: +44 734 730100, fax: +44 734 328094



Information from the members

General error detection system for Process-Pascal
by Armindo Pinho, Tecnocon, Vale de Cambra (Portugal)

The idea has been to create a general error detection system and make it public to all people using Process-Pascal. The system is based on software components for each interface module, that are used when necessary. This will reduce the total development time because the code is already written and tested.

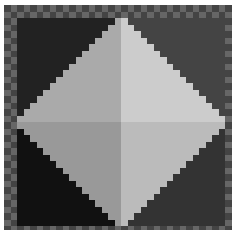
The error detection is enabled in one or several tasks by using the 'When Error Then' statement. When an error is detected, a common task, InterErr task, communicates the error using some global variables. These variables are then passed to a function 'AlarmSupervisor'. This function detects the type of the error and different procedures or functions are then called corresponding to the type of module and type of error.

The system is built as an error tolerant system, where a number of errors within a specified time are accepted without generating an alarm.

The base support for the error detection is found in two different files, one for PD3000 and another for PD4000. These files are made as a skeleton for implementing the error detection system.

Each PD module has separate files for the module definition and for functions and procedures related to the errors within the module.

The files will be available on the BBS.



New PC communication concept

by Ph.D. Carsten Nøkleby, Proces-Data (Denmark)

The PC communication concept is build up of two main components - Communication kernel (Codename VIGO) and Programming Interface (Codename VIGO2). The VIGO component is build for realization of real-time communication within the Windows environment. The VIGO2 component is made to make an easy to use interface, which satisfy the requirements from different applications.

VIGO and VIGO2 are together a communication concept for PC's running under the Microsoft Windows™ operatingsystem. VIGO2 is build on top of VIGO, that means VIGO2 is using the services of VIGO.

VIGO2 is a standardized interface for different networks using the Object Linking and Embedding (OLE2 automation) features from Windows.

VIGO2 is based on a technology that enables developers to create sophisticated and extensible applications that operate across multiple networks, platforms and conform to the programming model for the future versions of the Windows operating system. VIGO2 is the first step in presenting networks as a collection of independently installable components.

VIGO2 facilitates application integration by defining a set of standard interfaces, groupings of semantically related functions through which an application can access the services of any network. The concept of exposing functionality through interfaces makes VIGO2 an open, extensible system. It is open in the sense that anyone can provide a network implementation of a defined interface and anyone can develop an application that uses the communication functions of VIGO2. It is extensible because new network drivers can be defined and integrated into existing applications without requiring changes to existing application code.

The new and essential thing about VIGO2, is that any spread sheet, word processing program, database program, programming language which supports OLE Automation can interface to VIGO2 properties and methods in run-time mode. That means a spread sheet can within a cell specify a macro to read a specific temperature. In the following is showed how to use the VIGO2 interface from a macro language in an application. As an example is used the language Visual Basic.

Before using VIGO2 it is necessary for an application to get in contact with VIGO2. This is done by the standard OLE function call:

set MyObject = GetObject("VIGO2")

The GetObject function is necessary to use every time a new instance of VIGO2 is required, but for an application is it only necessary once.
When using VIGO2 is it necessary to specify the target which have to be operated on. For example will the temperature measured from a thermometer, or the position of a valve be a target. The target can be any variable or program within the process system. When the target is specified it is possible to operate on the target. It is for example possible to read or write to a variable. It is even possible to up- or download programmes, as well as start the execution of a program.

An example of specifying the target is shown below:

MyObject.TargetName = "Temperature"

The TargetName property will be set to the value "Temperature". The "Temperature" is an identifier in the process system, that points to the thermometer, where the temperature can be monitored.

By setting the TargetName property, VIGO2 will set up all necessary information to find the target within the distributed system known by the global name "Temperature". The target specification is to be found within a database, which contains a virtual model of the physical system.
After the selection of the target, it is possible to make an operation on the target. In the case of the "Temperature" it is only possible to read the current temperature. This is done by reading the TargetFloat property:

Temp = MyObject.TargetFloat

This reading of the property TargetFloat will assign a float value to the locale variable Temp. The temperature value is scaled and returned in engineering units.

The VIGO concept is developed for that special purpose where several applications are executed in parallel and where these applications needs to communicate via a Fieldbus (i.e. P-NET), Local Area Network (LAN) or internally with other applications. VIGO is able to handle that several applications are communicating simultaneously, that is several requests and responses are executed in parallel.

VIGO offers a standardized interface to applications, which needs to communicate together.

The VIGO concept will encourage the flexibility between suppliers, as different companies may develop, compile, link and add single applications (both network drivers and programs), each communicating together via VIGO. This is practicable because parts of VIGO are dynamically linked to the programmes which wants to make use of the procedures and functions found in VIGO.

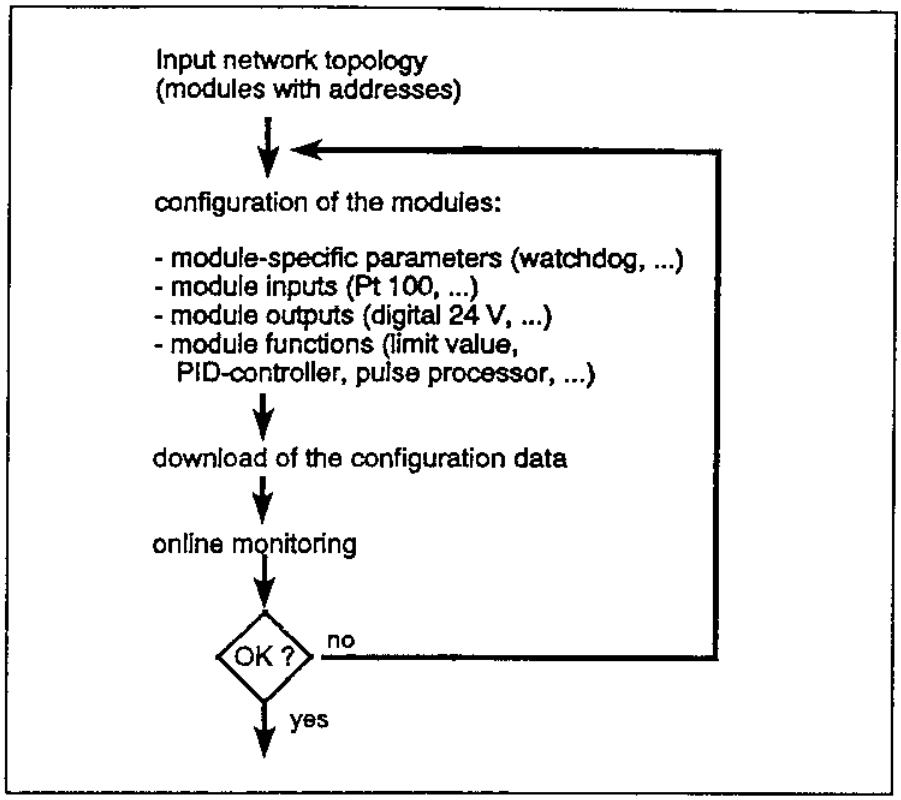
The essence of using the VIGO concept is that different applications on a PC only needs an interface to communicate together.

Why develop a new communication concept when Dynamic Data Exchange (DDE) is already available for Windows? Because the Windows DDE is not able to handle time critical communication since DDE always forces a task shift which results in unnecessary delays. The VIGO concept is designed for both time critical and non-time critical communication. The time critical communication is controlled by hardware interrupts, while the non-time critical communication is performed by means of messages in the Windows environment.

P_CONTROL- Configuration Tool for P-NET-Systems

With P_CONTROL it is possible to give solutions for different process-technical applications with a minimum in time expenditure. Based on standard-P-NET-modules, simple to complex systems may be configured in the language of the projecting person. Special knowledge about the fieldbus is not necessary for operating.
P_CONTROL runs on PCs under MS-Windows. Therefore, the PC has to be equipped with the P-NET - plug-in card PD 3920, which adapts the PC to the P-NET-system. All modules existing in this network may be initialized with P_CONTROL - also in mulinet-systems. By a menu-controlled dialog, the projecting person puts in, which functions (e. g. limit value monitoring, PID-regulation etc) in which of the connected modules and with which inputs and outputs shall be carried out. After a download, the modules operate independently, so that the PC may be disconnected from the power supply, if it is not yet required for other tasks in the system (visualization etc.).

In the delivery scope of P_CONTROL, a MS-windows DDE-driver is also contained. It allows connecting the P-NET-systems to any MS-windows-compatible application program as InTouch, MS-Excel, MS-WORD etc.. P_CONTROL itself also represents a MS-Windows-application, being able to run parallel to other applications.



Capabilities:

- Menu-control with context-sensitive program preset and help function.
- Input of the complete network topology with module name, P-NET-address, optional series number and module type.
- Definition of general module-specific parameters.
- Definition of module inputs and outputs.
- Definition of module functions (limit value message, PID-controller, batch-process, frequency measuring, actor feedback signals, counter functions, pulse widths modulation, filter, scaling etc.).
  All functions available with a P-NET-module may be initialized.
- Download of the system configuration into the P-NET-system.
- Remote reset of all modules or those which are selectable by the user.
- Watch function for online-observation of module in- and -outputs as well as module-internal arithmetic values.
- MS-windows-DDE-driver contained in the delivery scope.

Hardware- and Software-Prerequisites:

- **AT-compatible PC under MS-DOS and MS-windows (version 3.1 and higher)**
- **P-NET-plug-in card PD 3920 (order no. 880 3920)**
- **P_CONTROL (3 ½ " disc, order no. 001 889 1600 20)**

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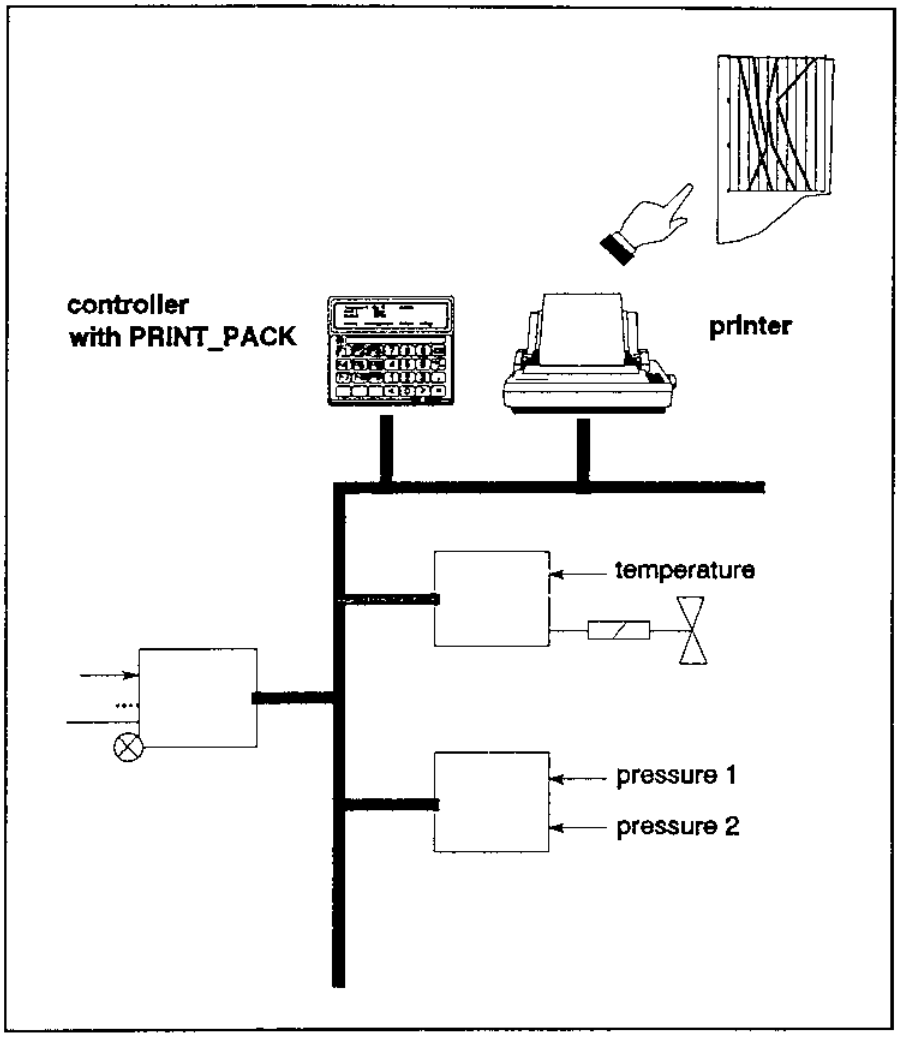
P-NET NEWS

PRINT_PACK - Data Acquisition with P-NET

With PRINT_PACK, the industrially projecting person has available an efficient software for a modular measuring data acquisition system, easy to be configured by the user-friendly dialog guidance. PRINT_PACK uses standard-P-NET-modules and this is why it may be adapted very flexibly to the special application.
For data acquisition with PRINT_PACK a Controller PD 4000 and a P-NET-capable printer EPSON LQ-570 PNET are necessary. PRINT_PACK will be written into the controller, whereby tools of a Public-Domain-Disc can be used. The installed programm remains in the controller memories, also after power failure.
Supported by clear menu standards, the projecting person now may configure a measuring data acquisition system, matching his application. During operation the measuring values, read in by any other modules connected via P-NET, are displayed at the controller. They also are put out on the printer in different, adjustable forms of representation (curve representation, text representation, limit value representation). In case of overflow or underflow of limit values to set by the user, it is optionally possible to switch control outputs at the same or other modules.



Capabilities:

- Dialog-conducted operation
- Max. 10 channels are configurable, whereby each channel, among other things, is assigned an upper and lower limit value, a limit value switch, a measuring value designation, a unit as well as an additive and multiplying scaling constant.
- Measuring operation manually or time-controled.
- Online-display of the actual measuring values incl. alarm indication and alarm acknowledgement.
- Printer output in curve representation (for max. 6 channels), text representation or limit value representation.
- Measuring interval in feed / time (curve representation) or scannings / time (text representation, limit value representation) may be put in.
- Continous or periodical printer output.
- Statistics functions (maximum- / minimum- / average value).
- Display and storage of real-time and date.

Hardware- and Software-Prerequisites:

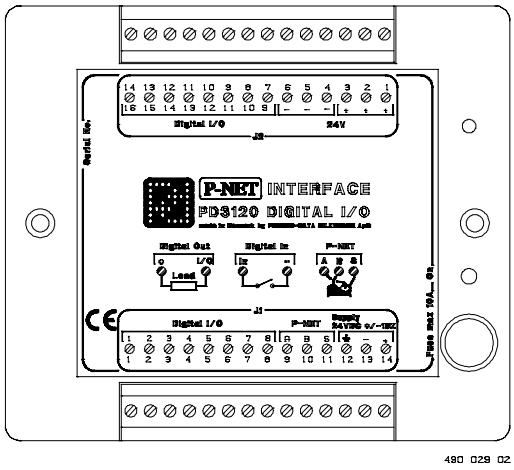
- **Controller PD 4000** (order no. 880 4000)
- **Printer EPSON LQ-570 PNET** (order no. 530 1x 68635)
- **PRINT_PACK** (3 ½ " - disc) (order no. 880 0 40006010)
- If there is no factory-side preconfiguration: PC with P-NET-Interface PD 3920 and fitting download software (e. g. of public-domain-disc / order no. 001880 163000210).

ULTRAKUST Electronic GmbH • Schulstr. 30 • 94239 Gotteszell • Telefon (09929) 301-0 • Fax (09929) 301-112 • Telex 69 124

PD 3120 DIGITAL I/O MODULE

FEATURES

* 16 Input/Output Channels (24 VDC)
* Pulse or Contact Counting
* Pulse and one-shot on all outputs
* Output Feedback Facility
* Automatic Output Functions
* Overload Protection
* Current measuring on each output
* Programmable Calculator
* Continuous Selftest
* P-NET Fieldbus Communication
* Watch Dog Timer
* Rail mounting module (DIN / EN)
* EMC approved (89/336/ECC)



APPLICATION

The PD 3120 Digital I/O Module is one of a collection of distributed process control units, intended for use within the P-NET Fieldbus system. It provides a versatile interface between valves, switches, pulses, lamps, alarms, motors, level detectors, etc., and distributed master control computers.

The module possesses a programmable Calculator, which can be purpose programmed to control the digital outputs and monitor the digital inputs. The Calculator operates with different types of variables, such as reals, integers, bytes, booleans, timers and arrays. With the utilization of user programmes, application specific functions, such as digital control loop and PLC functions may be set up for use in a wide variety of local autonomous process applications.

The compact design and the outstanding environmental specifications for the Digital I/O module, makes it an ideal process component in industrial as well as other environments.

SYSTEM DESCRIPTION

The PD 3120 Digital I/O Module is an intelligent module, provided with 16 input/output channels for 24 VDC, an interface for the P-NET Fieldbus and an internal programmable calculator for local control.

Various automatic functions can be selected on each digital channel, such as automatic feedback control (single as well as double), one-shot output and pulse output, to reduce the basic operations from the central control system or enable the unit to operate autonomously.

PD 3120 offers comprehensive self-testing features, which enables reporting of disconnection, overload and process failure. All outputs are protected against overload. The watchdog timer ensures the safe shut down of a process following a communication error or power failure.

The output current (Sink current) is measured continuously on each channel and can be read as a value in Amps. If the current exceeds the specified max value, the output is switched off and an error code (overload) is generated in the module. This feature may be used on purpose, eg. to open a window using a DC motor, where the motor is stopped automatically when reaching the end position because of the increasing current in the motor.

Each channel is automatically summarizing OperatingTime as a value in seconds and counting the number of pulses on the input. Data for maintenance may be stored directly on each channel.

A common channel in the module provides the possibility to read/set all inputs/outputs or error flags in one P-NET transmission.

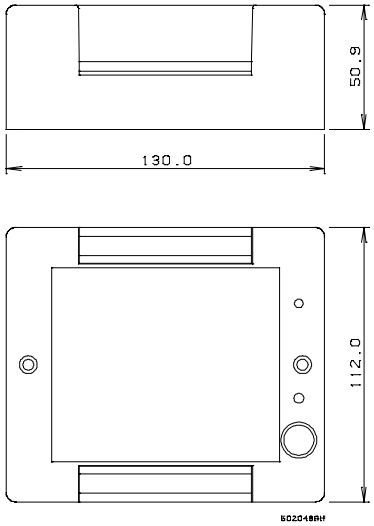
As a distributed module, the unit can be mounted close to the process. Data communications with Controllers are made with a single P-NET cable having a ring length of over 1 km. This reduces plant wiring costs to a minimum.

The module may be plugged directly onto a mounting rail (EN 50 022 / DIN 46277) in a panel configuration or in a box designed for the plant environment. The module may be removed for service without interference with operational activities on the rest of the network. 2 snap connectors provide the terminals for field connection, power and communication.

SPECIFICATIONS (all specifications are respected in the approved EMI conditions)**:**

Digital Input Channels:	
Switch Input	Nominal 24V DC
Frequency	50 Hz max
Digital Output Channels:	
Voltage	Nominal 24V DC
Current	max 1.0 A
Measuring accuracy	±19 mA
Calculator Program:	
Memory size	7000 bytes
Instruction time	0.3 ms typical
Power Supply:	
Voltage	24V DC ±15 %
Consumption	max. 3 W
Ambient Temperature:	
Operation	-25 °C to +70 °C
Storage	-40 °C to +85 °C

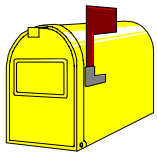
Scale Drawing (in mm)



PD 3120 is approved in compliance with the **EMC-directive no 89/336/ECC**. Test limits are determined by the generic standards **EN 50081-1** for emission and **PrEN 50082-2** for immunity.
PD 3120 is approved in compliance with the **IEC 68-2-6 Test Fc** standard for vibration.

Produced by:

PROCES-DATA SILKEBORG ApS
Navervej 10, DK-8600 Silkeborg, +4586814033



"Postbox 192"

It is the intention with this correspondence column to have a forum where members can bring up some news, problems and send in possible solutions to other members problems, or even how old problems have been solved. Each article in the postbox will get an unambiguous number. The number is constructed in the following way. 1/2/93 that means: article number 1 / P-NET News number 2 / Year 1993.
This makes it possible to refer to a particular article.

This "Postbox 192", has the following article:

1/1/94 A P-NET to Modbus gateway program has been designed in a PD3000 P-NET Controller. The Modbus communication is established on the RS-232 port for communication to any PLC's with Modbus interface. 8 basic Modbus functions are supported.

Data from the Modbus PLC may be accesses from P-NET and visa versa. Seen from the P-NET, the Modbus PLC is addressed and acts as a P-NET device, but the addresses must of course correspond to the address specification for the PLC.

Variables located in the Modbus PLC that must be accessed from the P-NET must be declared in the controller that wants the access. The following data types are available: boolean, byte, integer, word, longinteger and reals.

Variables located on the P-NET that must be accessed from the Modbus PLC must be declared in the gateway controller.

Additional information may be obtained by contacting Proces-Data,
tel: +45 86 81 40 33, fax: +45 86 81 40 88

Please send your article to
International P-NET User Organization

P-NET and EMC tests

by Jens Kiib, Proces-Data (Denmark)

In an attempt to reduce the electromagnetic interference between electrical devices, it has been decided by the European Union (EU) that electrical equipment distributed within the EU and the EFTA countries after 1st January 1996 must bear the CE conformity marking.

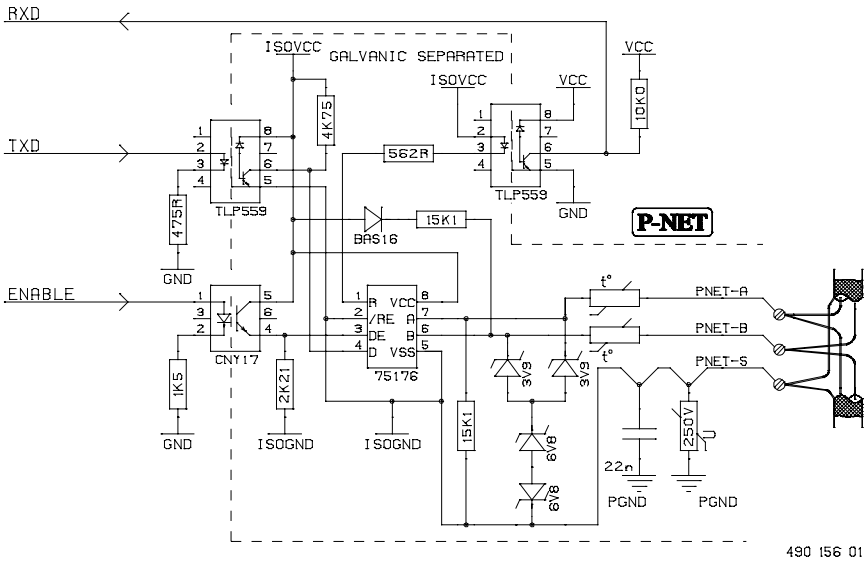
When CE marking electrical equipment the manufacturer or the importer confirms compliance with **Directive no: 89/336/EEC**.

To comply with the EMC-directive Proces-Data has been testing and CE marking all new products produced after 1st July 1993. In this connection a thorough examination of the compatibility of the P-NET interface port has been performed.

The test limits after which the electromagnetic compatibility (EMC) of the P-NET interface on these product has been tested is determined in the generic standards:

EN 50081-1 and **prEN 50081-2** for emission and
EN 50082-1 and **prEN 50082-2** for immunity.

The P-NET interface port comply with all four generic standards where both the performance criterion of the normative and of the informative annex has been tested.



The tests has shown that the P-NET interface, when it is designed as shown on the diagram above, has a very high resistance to the influence from an electromagnetic field as well as to the different sorts of transients, which can occur on the net.

To protect the interface port from destruction due to powerful transients such as those produced by a lightning, the shield of the P-NET cable has been decoupled to the protection ground with a 250 V varistor. After that the P-NET port has been tested with 2 kV surge pulses (1.2/50 µS) coupled directly to the shield, without any detection of faults or loss of function.

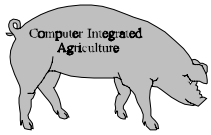
During the testing of the immunity due to fast transients (5/50 nS) on the P-NET interface port, the voltage level of the burst pulse was slowly increased in an attempt to find the error limit. As the generator reached its upper limit at a voltage of 4.6 kV (more than twice the voltage level of generic standard for industrial environment) there had still not been detected any faults.

For further information, contact Proces-Data:
tel: +45 86 81 40 33, fax: +45 86 81 40 88

EIAMUG Working Groups formed

An ESPRIT project has been started, called the **E**uropean **I**ntelligent **A**ctuators and **M**easurement **U**ser **G**roup, EIAMUG.

The Control and Automation industry is undergoing a period of dramatic technical change as field devices become intelligent and the functions of control, maintenance and management are redefined for implementation in systems using Fieldbus communications.
Fieldbus communications are only the first step to application of intelligence in field devices. Complementary work is now required to build on the capability of Fieldbus as an enabling technology.
EIAMUG is an independent and open forum to complement and work with existing Fieldbus activities. Furthermore EIAMUG is a forum to develop and promote a European vision for future applications of Intelligent Transmitters (IAT's) in response to specific user requirements for Intelligent Actuation and Measurement (IAM). It will enable real business benefits for the automation industry.
For further information, contact Proces-Data:
tel: +45 86 81 40 33, fax: +45 86 81 40 88

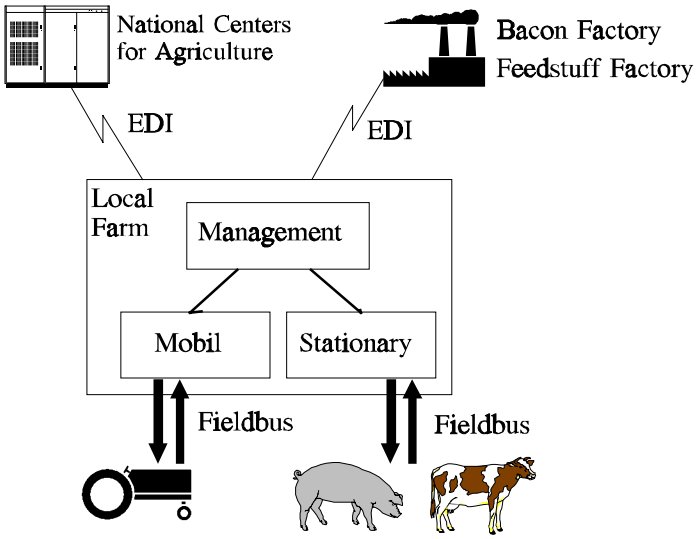


P-NET and CIA (ESPRIT project)

by Ph.D. Carsten Nøkleby, Proces-Data (Denmark)

An ESPRIT project has been created this year concerning the stationary automation at a farm. Proces-Data Silkeborg ApS, which is developing process automation equipment and Skiold-Datamix A/S, which is developing pig-feeding systems have been invited to be associated contractors within this ESPRIT project. The project name is "Computer Integrated Agriculture - CIA".

The project consortium is put together with members from Germany, the Netherlands and Denmark. From Denmark are also Skov A/S, LH Agro and the Danish Agricultural Advisory Centre participating. Proces-Data Silkeborg and Skiold-Datamix are working with the stationary automation.



The aim of the project is to have a total integration of the activities at a farm, as well as possibilities to get external data from national centres for agriculture and factories.

The goal is to build a concept, which will eliminates the need to create individual device interfaces by providing a single set of common services, which cover the need for data exchange in relation to application functionality.
Some of the essential features of the concept are:

- Not all have to be defined now, but can be developed in the future, and this is essential, because technology changes can be integrated within the model.
- The model components can be exchanged and added dynamic.
- The model gives a migration strategy for integration of all ready existing equipment.

- The dynamic build up of the model, is essential because different suppliers of farm applications can develop their interface and add it to the model. It is then possible with one interface to integrate feeding systems, climate control systems and other systems from different suppliers.
- Separation of application knowledge (feeding process, climate process, etc) and communication knowledge is given. This will give the user, as well as the suppliers, the opportunity to concentrate on improving overall functionality.
- Reduce systems specification, integration efforts and support costs by using a general standardized interface.
- Device independent communication services, which enables you to write management applications software without regard for specific protocols of proprietary networks.

The project consortium have chosen P-NET as the Fieldbus for integration of stationary equipment. The P-NET Fieldbus is chosen for the stationary automation, because it had the needed functionality, speed and capacity for real-time applications, and the P-NET Fieldbus is already well used and known within the agricultural sector. An other important factor was the hardware implementation costs are limited to very little.

The concept will also be validated according to the criteria:

Is the system competitive ?
Is the system open ?
Is the system modular ?

The final goal is to make an installation of the implemented results on a test farm in Denmark. This will be done august 1995.

The following is found somewhere on the Internet as a Tagline:

Theorie ist, wenn man alles weiss, aber nichts funktioniert.
Praxis ist, wenn alles funktioniert, aber niemand weiss warum.
Bei uns sind Theorie und Praxis vereint.
Nichts funktioniert und keiner weiss warum !

Editorial.

More and more vendors are now implementing the P-NET Fieldbus in their products resulting in still more devices coming up utilizing a Fieldbus interface.
New general purpose channel types have been suggested and are currently under compilation for standardisation. These channels include types such as communication and programming channels. Further use of these standardized P-NET channels gives a simple compatibility of nodes from different vendors.

The P-NET philosophy believe in standardized products with well defined behaviour, all specified in the standard channels. A further step in international standardisation has been reached since P-NET now is included in a new proposed EuroNorm, EN50170. This standard is expected in mid 1995 and may improve the users benefits of the Fieldbus concept and technology.
Once more a step in the right direction to disseminate the knowledge of the P-NET Fieldbus.

This issue of P-NET NEWS holds very different descriptions on how P-NET has been used in very different applications, both concerning application area and application size. Descriptions and reports concerning new P-NET modules and applications are welcomed by the editor. This enables YOU to influence and form the P-NET NEWS as a Users news letter.

Unfortunately, quite a long time has passed since the last issue of P-NET NEWS and once again I would appeal to the users of P-NET to give their contribution to P-NET NEWS. The future seems to be very bright for P-NET with additional participation in Fieldbus trade-fairs, work-shops and conferences.

P-NET NEWS

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Databit: 8, Stopbit: 1, Parity: None.

New members

Since the last publication of the members list, additionally 8 companies have joined the International P-NET User Organization:

ACRAM SRL	Italy
EILERSEN ELECTRIC A/S	Denmark
ZEUS GMBH	Germany
MICROTROL-FM GMBH	Germany
HS AUTOMATIC APS	Denmark
Technische Universität Wien	Austria
LIQUIP SALES PTY LIMITED	Australia
Frederiksberg Tekniske Skole	Denmark

We would like to welcome these companies.
The total number of members is now close to 70. The members list is found on the Bulletin Board System. The list is updated each month.

P-NET Conference 95'

Call for papers.

A new P-NET Conference is planned in April 1995 in Denmark. The conference is planned to be a 2-day conference with an adjoining exhibition for P-NET equipment.

The conference directs to both end users, contractors, vendors and anybody interested in the P-NET Fieldbus system. The Conference will include subjects as actual developments, standardization progress, actual applications, software and software tools.

The conference program is still open and we would like to call for papers to be presented at the conference. Any suggestions for papers or expressions for attendance in the conference or exhibition are welcomed by the International P-NET User Organization.