SEPAC CORP.

ISO 9001 No. FM 23624

SERVIDOR DE INGENIERIA Y MANTENIMIENTO

SEPAC PRODUCTS LINE

- *1.- Local Monitoring Systems*
- *2.- Supervisory Control and Data Acquisition (SCADA's)*
- *3.- Integral Systems for Substation Automation*
- *4.- Integral Systems for Power Plant Automation*
- *5.- Panels for Protection, Control and Metering*
- *6.- Excitation Systems for Synchronous Machines*
- *7.- Operation / Engineering Consoles*
- *8.- Rectifiers*

SIMPAC SISIPAC

DESCRIPCION GENERAL Y FUNCIONALIDAD

1-COMPAÑIA-AMPLIA INTEGRACION DELSISTEMA

La administración de las compañias de electricidad se basa en un amplio uso de las comunicaciones y de los sistemas informáticos para la colección y el procesamiento de datos en tiempo real.

Eso se ha hecho disponibles gracias a la mejora en nuevas tecnologías, a la multiplicación del uso de DEI's, al progreso en las comunicaciones de datos y a la llegada de los nuevos protocolos seriales de datos.

Durante años, los procedimientos de operación, el análisis de fallas y la administración del mantenimiento en subestaciones eléctricas no ha resultado fácil debido a: la distribución geográfica de las instalaciones, del funcionamiento desatendido, reducción del número de cuadrillas de mantenimiento y operación.

Sin embargo, los sistemas de la automatización de la subestación se han desarrollado para recoger la información valiosa que la mayoría del tiempo no se entrega a las destinaciones derechas, por ejemplo: jefaturas distritales, regionales o nacionales, en donde se localizan los especialistas.

De acuerdo con ese requisito, SEPAC ofrece a las compañias de electricidad el nuevo servidor de ingeniería y mantenimiento: SIMPAC-SISIPAC, capaz de archivar y de procesar datos históricos de diversas subestaciones, para ofrecer a los especialistas de la dirección herramientas como por ejemplo:

- Imagen instantánea en tiempo real de los equipos,
- estrategias para el mantenimiento predictivo:
  - Monitoreo en línea
  - Planeamient de interrupciones
  - Analisis de Fallas
  - Cálculo de costos
  - Análisis de la eficacia de la operación

El sistema se basa en dos aspectos principales:

- El gateway local instalado en cada de las subestaciones.
- El software empresarial de amplia integración de sistemas cargado en el servidor de la dirección.

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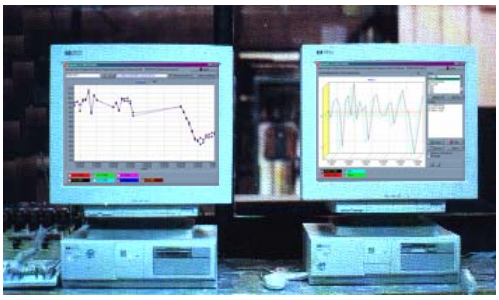
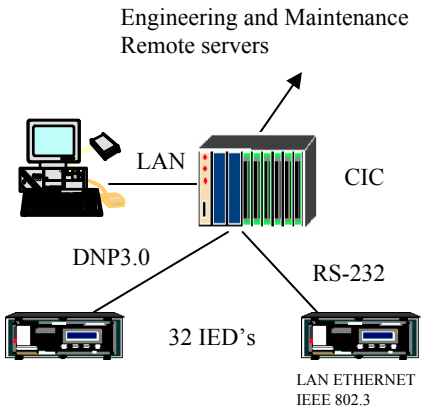


El servidor se basa en una estación de trabajo HP que contiene todo el software necesario para supervisar y controlar sistemas de automatización de subestaciones a nivel regional o nacional.

Usando como front-end el procesador controlador de comunicaciones SIMPAC CIC XAR2-4, la información es adquirida delos DEIs y después se transmite localmente y/o remotamente a las consolas de ingeniería.
Local access is done typically using a LAN Ethernet.

Las capacidades de comunicación del CIC XAR2-4's permiten un acceso remoto confiable a través de la WAN, radio u otros medios disponibles.



2. GATEWAY DE LA SUBESTACION

En la arquitectura antes mencionada, el CIC-XAR2-4 se convierte en el corazón del sistema. Tiene la capacidad de manejar hasta 32 canales independientes RS232. Cada canal puede manejar un protocolo de comunicación diferente, permitiendo así tener acceso a relés de protección, multímetros y dispositivos de instrumentación de diversas marcas.

Otra opción para la arquitectura básica es construir diversas redes de comunicaciones. Cada red tiene un protocolo de comunicación diferente. DEIs con el mismo protocolo se pueden conectar en la misma red en daisy chain.

El CIC-XAR2-4 también tiene la capacidad de aceptar la UTRs antiguas en caso de ser necesario para adquirir la información digital de E/S para las funciones de supervisión. De esa manera, el sistema ofrece una solución atractiva para la expansión de las antiguas UTRs. Tomando en cuenta que los nuevos DEI's traen conexión Ethernet, el CIC Xra2-4 se ha desarrollado para ofrecer conectividad con Ethernet IEEE 802.3 del LAN.

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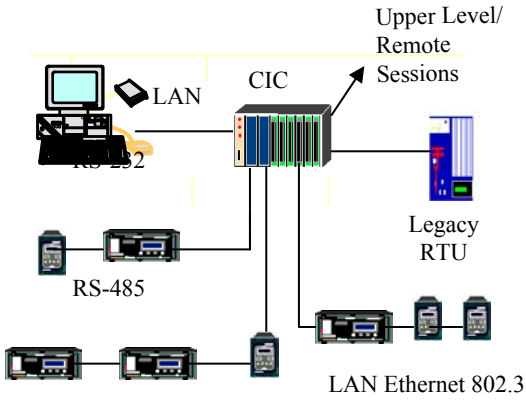
Depending on the IED's individual connectivity capabilities, equipment from the same OEM can be in a single RS-485 network or IEDs that have the same protocol can also be on the same network.

Depending on the user's specifications and time responses for SCADA applications, either array is possible. The system's flexibility is an advantage for the user, for he can choose the most convenient way of connecting the devices.



The CIC is based on Motorola Computer Group's embedded boards on a PC/104 platform: a pentium single board computer @ 350 MHz, 64 MB RAM. It has RS232/485 serial port for configuration, a parallel port to support a printer, keyboard jack and optional 3" floppy drive.

A typical CIC-XAR2-4 configuration is as follows:

- Power Supply
- Pentium processor board
- Watchdog board
- LAN board
- RS232 or RS485 boards
- IRIG-B connection jack

The CIC –XAR2-4 is configured and built to each system's specific needs or user requirements, so optimal size is achieved, avoiding unnecessary "extra" hardware costs.

3 – **SERVER SOFTWARE**

The system runs either under SCO-UNIX or Windows NT.

The programming structure of the software is divided into three blocks.

Each of these blocks represents the application and function level of each software module that comprises the entire engineering station.

The system's philosophy comprises different programming modules that act independently and perform their links to the rest of the system through a relational data base and the different routines on the operative system.

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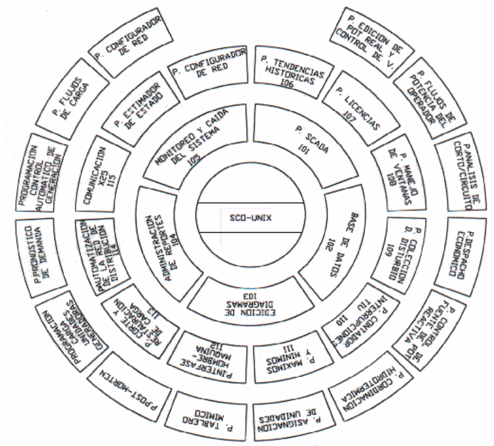

These three blocks are:

a) The first block of the system constitutes the basic programming modules, fundamental for the system's operation.

- -data base
- -communication module
- -diagram editor
- -function and report management
- -system monitoring

b)The second block comprises the man-machine interface configuration.

- -diagram creation
- -report creation
- -panel creation
- -screen personalization
- -function personalization
- -logger management
- -trend and statistics management

c) The third and last block of the system, is comprised by the applications that personalize and are specific to the system involved, they could be:

- -operating parameters analysis
- -overload cycles
- -IED setting changes
- -load flow
- -voltage flow control
- -fault information
- -post-mortem analysis
- -IED oscillography
- -down-time management
- -maintenance modules
- -on- line monitoring

4- APPLICATIONS MODULES

a) THROUGH PORT

The Through Port function allows the user to access the protection Relay as if connecting directly with a Lap-top.

The system emulates the hyperterminal function and runs the licenced proprietary OEM software for each relay.

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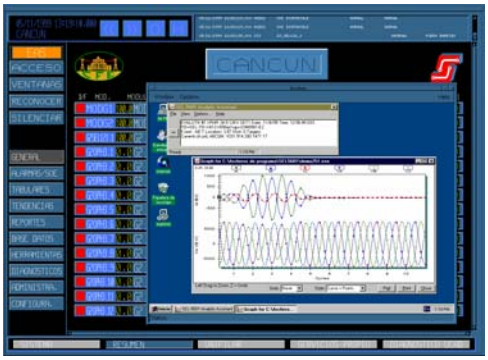
This function can be invoked either locally or remotely.

Setting adjustments, event register, metering, oscillography and all other information is obtained using the through port.



If the system is running under SCO-UNIX, a Windows session will be loaded. Then the proprietary software for the relay wanted will run on Windows.

The above example is the demo oscillography display for the SEL relays. All information is presented using the software developed for this use by the OEMs.

B) EXPOPAC: FAULT ANALYSIS SYSTEM

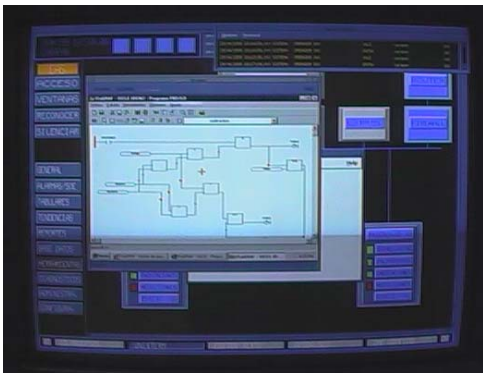
The ExpoPac software presents all the information available from any IED in the same format. Particulary, oscillography is displayed in a unique format, regardless of the Relay or Meter brand. This option is completely customizable as to the information that needs to be acquired.

Downloads can be done by setting a trigger if a certain variable reaches "x" value and/or by programming it on a timely basis and/or by operator request.

Also information to download is configurable. The operator can select which variables he needs to see, choosing from a wide range of different graphic displays.

c) AUTOMATIC SEQUENCES

This is a powerful tool for simulation and analysis. The



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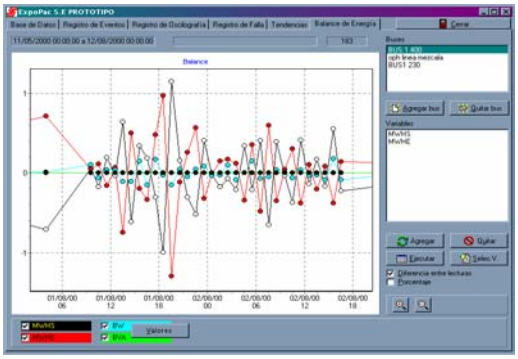
PLC ISAGraph functions allow the user to write automation sequences.

If a specific failure occurs, an automatic sequence can be written to change the settings of the protection relays parameters according to the new substation scheme. This can be done automatically or it can trigger a system alarm for a human decision.

d) ENERGY BALANCE

This analysis tool helps the user have an overview of the balance of energy in each substation or on the network.



This graphic environment helps visualize losses in the substation and efficiency of the transformation process under the different circumstances analyzed.

e) SEQUENCE OF EVENTS

The sequence of events has a 1 millisecond resolution.

Event display and acquisition is configurable by the user. Information can be acquired by exception, on a timely basis and/or by operator request. The information to be acquired is also configurable.

f) TREND GRAPHS

Another powerful monitoring and analysis tool. The graphs are also customizable, permitting the user to select the variables that are needed, the sample frequency and amount as well as the format to present them.

g) PREDICTIVE AND PREVENTIVE MAINTENANCE

SEPAC has developed software for monitoring transformers and breakers. These functions acquire information from the system's data-base and instrumentation on field to provide information on equipment status. This is a tool used for predictive and preventive maintenance. It can print work orders and reports.

For transformers, besides the mandatory electric

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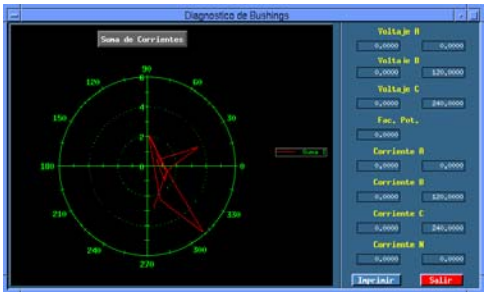
measurements, partial discharges, oil quality, bushings contamination and over-temperature cycles are monitored. Alarms and reports are configurable according to user's needs.

For breakers, I^2T is calculated, as well as remaining duty life monitored for each pole. The system is then configured to alarm and report according to user's specification or maintenance policies.



The above example is a bushing sum of currents polar graphic. Graphs are also configurable to the user's liking.

5- CONCLUSIONS

Enterprise wide data integration system gives new perspectives to run safely, economically and rationally the electric sector.

The data diffusion on headquarters networks, the availability of on line data extracted from substation automation systems, the broadcasting of specific reports on web pages will have the following benefits:

Improvement in safety
Improvement in quality
Reduction in service interruption
Lower operation costs
Greater maintenance focus
Better management of assets
Increased longevity
Lower maintenance cost

Enterprise wide integration systems are nowadays a reality.
Electric utilities have this powerful tool available right now. Decision making and management will be better and better.

The concurrence will force sooner or later electric utilities to use this kind of systems in order to improve security and availability, and to reduce operation and maintenance costs.

SEPAC is proud to collaborate to this world wide effort, announcing its new engineering & maintenance headquarter server:

SIMPAC-SISIPAC

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