SACO 64D4
Annunciator unit

User´s manual and Technical description

ABB

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SACO 64D4
Annunciator unit
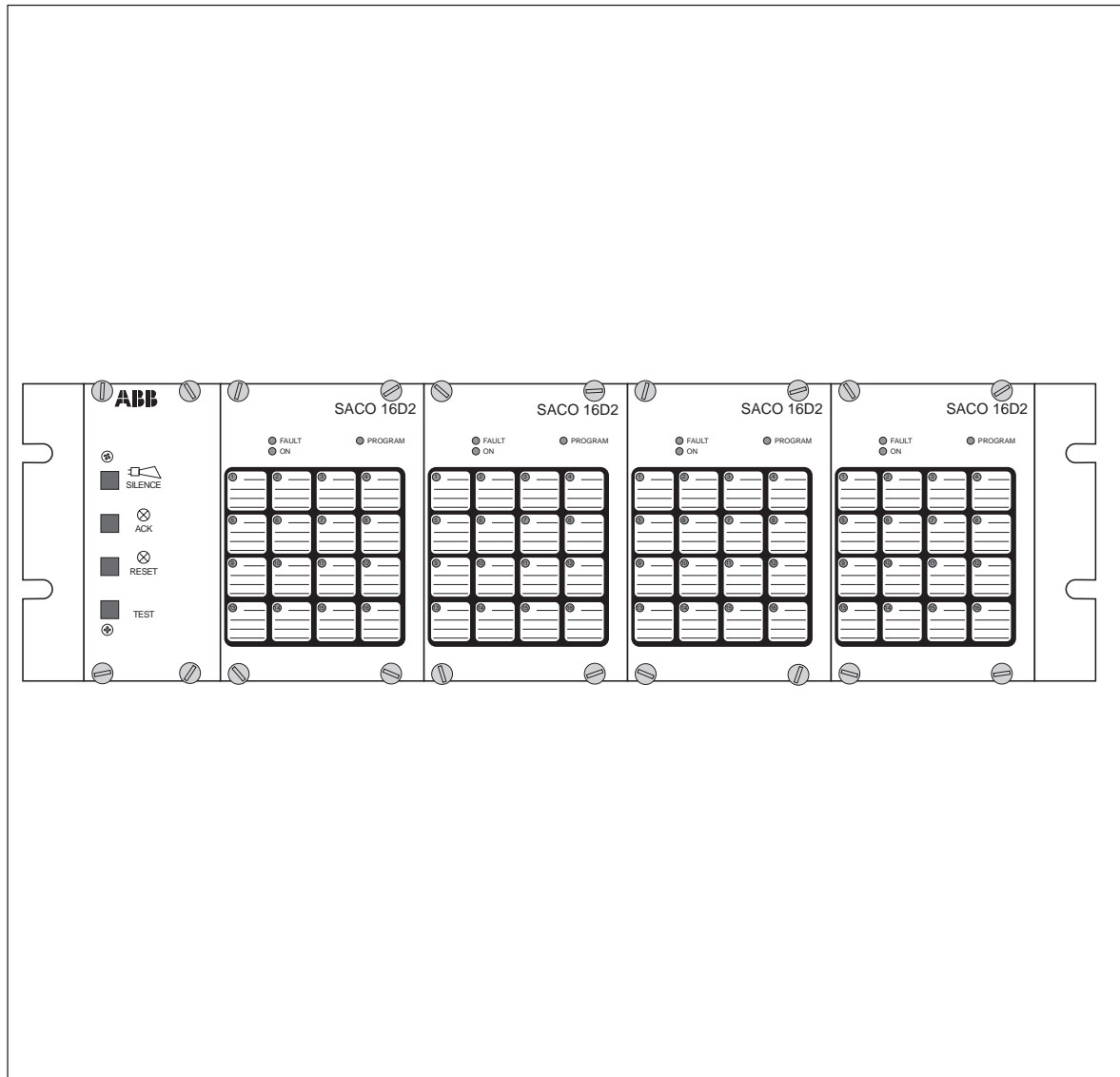
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Features

Complete annunciator unit with 64 channels for operation from NO or NC field contacts

Fibre-optic or electric data bus between the alarm units

Resolution better than 10 ms in the event recording

Independently operating alarm modules

Each module provided with a sophisticated self-supervision system

16 relay reflashes to be freely grouped

Easy programming via SMS Software or a separate programming module SACO 16PM

Sophisticated built-in self-supervision system for encreased reliability

General

The annunciator unit type SACO 64D4 is part of the SPACOM system, an integrated secondary equipment system for distribution networks.

The annunciator unit SACO 64D4 is an independently operating unit which includes four 16-channel annunciator modules and a power supply module. SACO 64D4 can be used as a stand-alone unit or combined with other SACO 64D4 subracks, as a pure signalling system. Further more it can be integrated into an event sequence reporting and signalling system. In such a case the units communicate with each other over a serial interface and the so called SPA-bus (or LON-bus), allowing a geographically distributed configuration of the units.

Serial communication contact with a station level computer or other higher-level equipment is also possible. In such a case SACO 64D4 can be used for data acquisition and even for control purposes.

Areas of application

The SPACOM components have been developed and manufactured to meet the most demanding requirements as to reliability in operation and immunity to interference.

Another significant feature is the system flexibility which allows a wide area of applications, e.g.
- electric power plants and substations
- industrial plants and processes
- marine and offshore installations
- technical installations in buildings
- water treatment plats etc

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The annunciator unit SACO 64 D4 is composed of four 16-channel alarm modules type SACO 16 D2B and a doubled power supply module. The unit is housed in a 19 inch rack with the height 3 U.

Apart from the 64 channels the unit contains inputs for resetting of audible device, acknowledgement of alarms, resetting of annunciator channels and for testing. When using the unit as a stand-alone annunciator system, an acknowledgement module type SWDM 3A1 can be connected to these inputs.

Alternatively, the channels 63 and 64 can be used as inputs for LOCAL/REMOTE functions.

The unit includes 16 output relays for freely programmable group realarms, so called reflash alarms. The output relays 15 and 16 can be used for internal self-supervision and for audible alarm.

Input signal follower, signal indicator follower or group alarm follower outputs for every channel are obtainable from the flat cable connector included in the unit. These outputs can be utilized by means of the relay unit SACO 128R4 which can hold up to eight 16-channel output auxiliary relay cards.

The serial interface connection to the SPA-bus (or LON-bus) is made either by means of a flat cable connector between subracks or fiber optic connection modules connected to the screw terminals. The former alternative is used for uniting units built together.
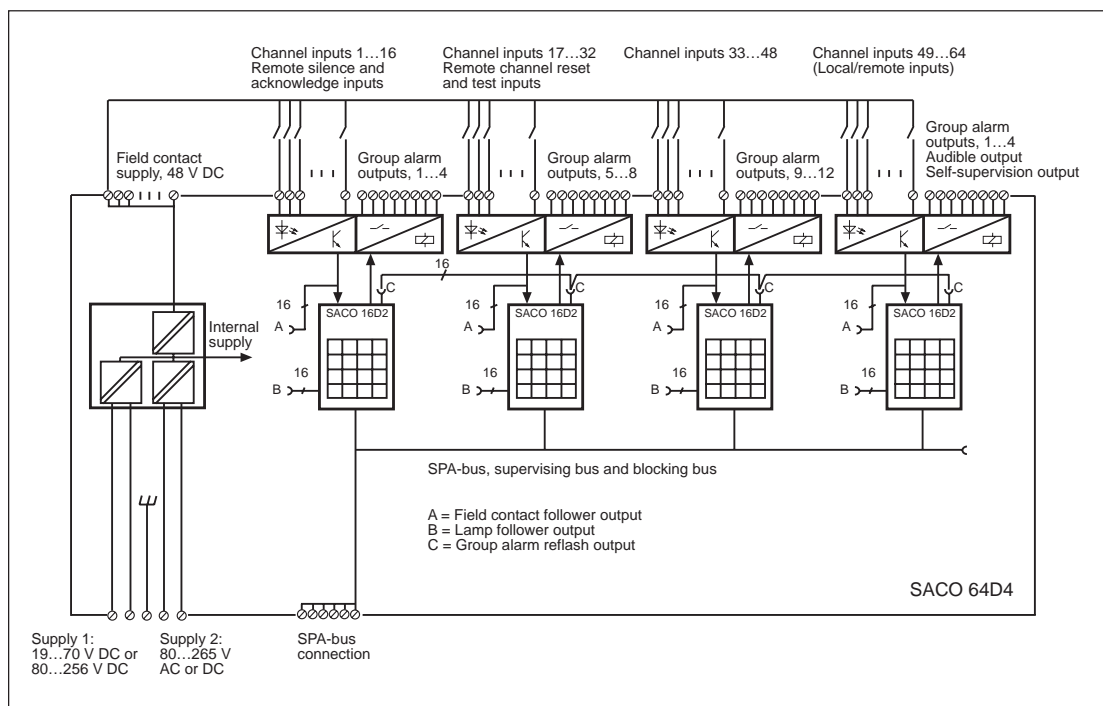

Fig 1. Block diagram for the annunciator unit SACO 64D4.

The same flat cable further contains a monitoring bus for internal faults and an interlocking bus for the transmission of interlocking signals between the annunciator modules. When several annunciator units SACO 64D4 are built together, the SPA-bus can be used for synchronizing the flashing sequence of the alarm indicators of the modules.

In a distributed system bus connection modules type SPA-ZC_ are used for connecting the annunciator unit to the SPA-bus. Bus connection modules are available for both optical and electrical data transmission. The transmission distances vary with the transmission media, the following values can be given:
- plastic-fibre: at least 30 m
- glass-fibre: at least 1 km
- pairs of twisted conductor without galvanic isolation: at least 30 m
- pairs of twisted conductor with galvanic isolation: at least 200 m

Fiber optic media is always recommended due to its good resistance to electromagnetical interference.

The setting values, groupings and interlockings of the annunciator modules are stored in non-volatile memories.

In a stand-alone annunciator system without a higher level system connected the modules can be programmed by temporarily connecting the programming module SACO 16PM to the annunciator modules SACO 16D2B.

If SACO 64D4 is connected to a higher level system, e.g MicroSCADA the programming might be made from there. A SMS software can also be used for programming the SACO 64D4.
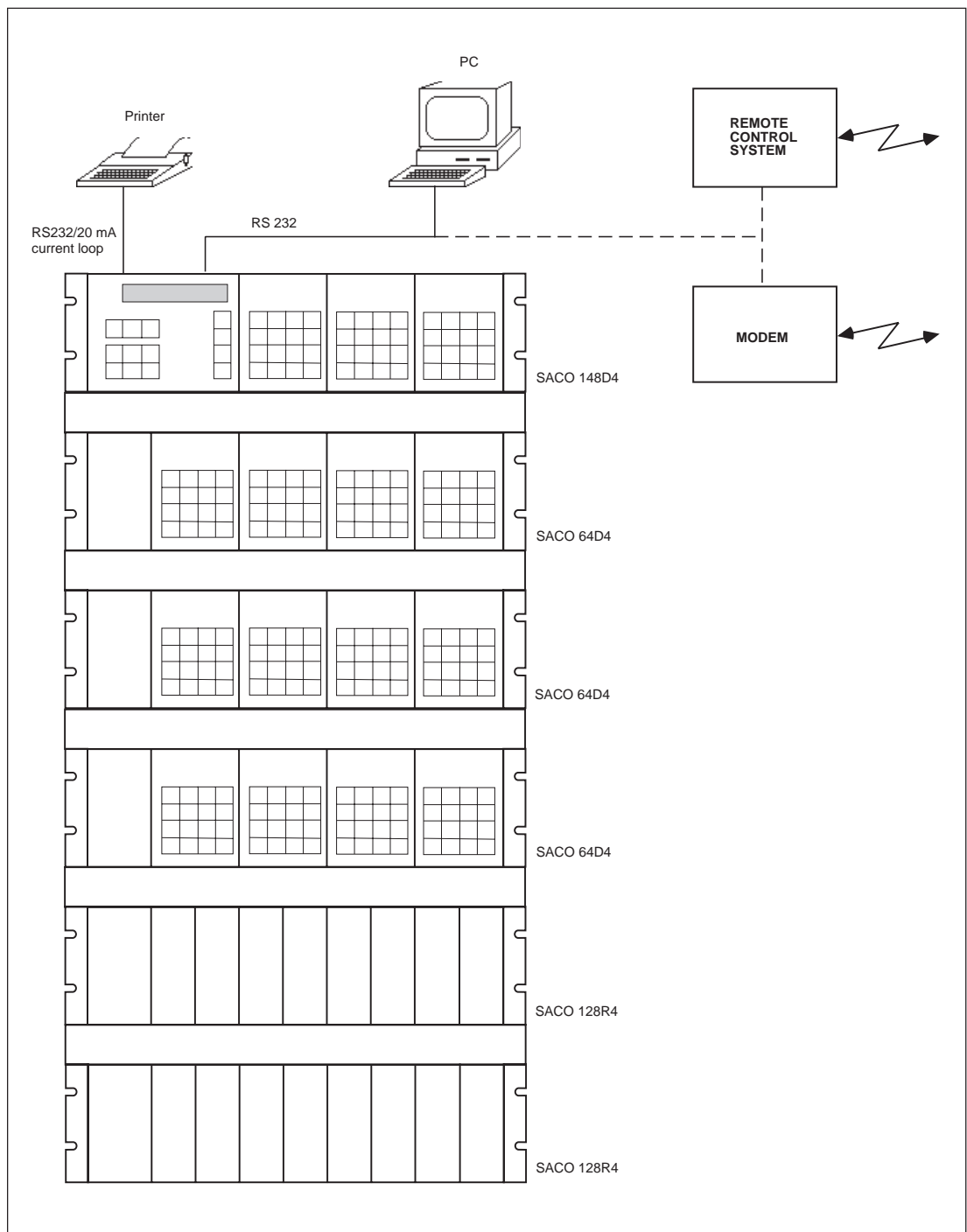
Fig 2. Centralized 240 channel annunciator system with field contact doubling outputs.

The maximum size of the alarm system is 35 annunciator modules with 16 channels each, i.e. a total of 560 channels.

By means of the SACO 148D4 or another highet level system and a local printer event reports with time markings can be listed and/or the information can be forwarded to other systems.

Without the relay unit SACO 128R4 the annunciator system comprises 16 builtin, freely groupable reflash relays per subrack. By using the relay unit with max. 128 relays the necessary number of contact multiplyings, parallel lamp outputs and group reflashes is provided for. Further, each output allows grouping of signals.
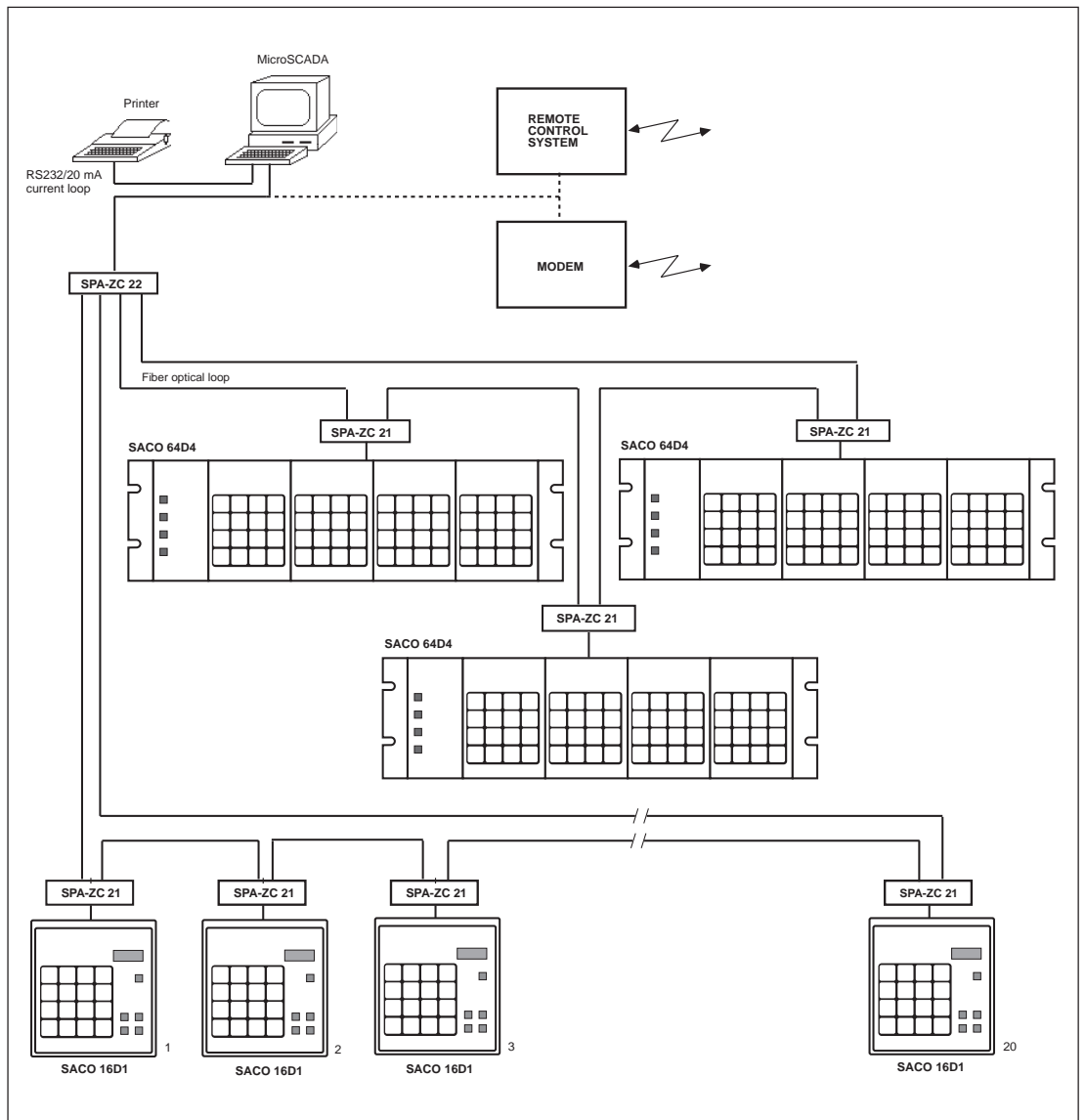
Fig 3. Distributed annunciator system with event sequence reporting.

The maximum size of the annunciator system is 35 modules with 16 channels each, i.e. a total of 560 channels.

By means of the SACO 148D4 or another highet level system and a local printer event reports with time marking can be listed and/or forwarded to otehr systems.

The annunciator modules can be connected to the control data communicator by means of fibre-optic loops. The individual units are self-contained and provided with outputs in the same way as a centralized system. The reflash grouping for the entire system is made on output contact level.

Mechanical design   The annunciator unit is composed of the fol-
                     lowing Euro-size withdrawable modules (100 x
                     160 mm):
                     - a power supply module SWSM 220A48 or
                       SWSM 220A220

- four microprocessor modules SWPM 1A1B
- four input/output modules SWIM 2A1B
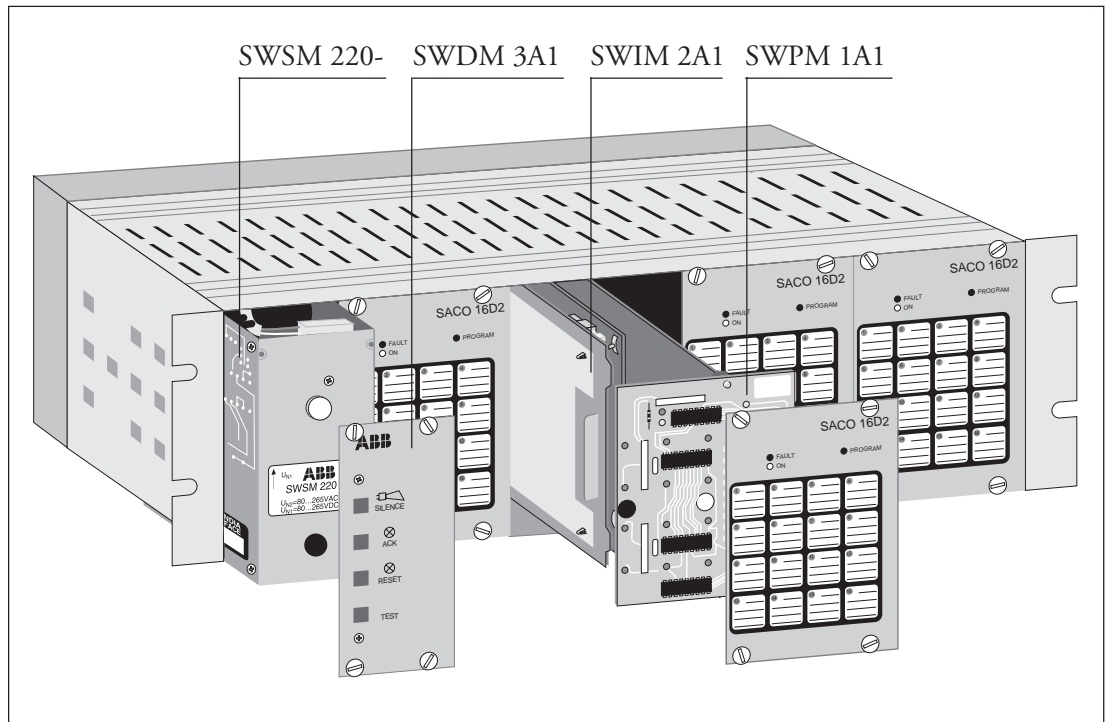
Fig 4. Mechanical design of SACO 64D4.

The modules are interconnected on the mother
PC-board. The mother PC-board also contains
the card connectors for the plug-in modules and
the wiring for the inputs and outputs.

The rack housing the modules is a 19 inch, so
called Euro-rack with a height of 3 U (about
133 mm).

When mounting several SACO 64D4 subracks
together or combining them with other
SPACOM subracks, a space of 1 U, i.e. about
44 mm, should be left between the subracks.

The subrack is suitable for mounting in a 19
inch frame or it may be flushmounted. At flush
mounting the depth behind the mounting sur-
face can be reduced by 40 mm by using a rais-
ing frame, type SRH-ZX1.

The subrack is made of anodized aluminium.
The rear panel and the ventilation grids are made
of galvanized sheet steel. The front panels are of
aluminium and covered by a plastic membrane.

At panel mounting the degree of protection by
enclosure will be IP 40.
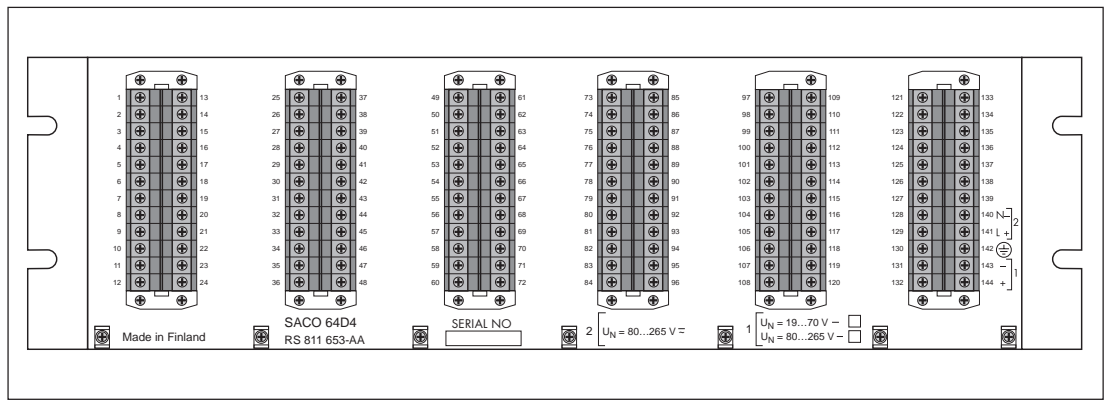
Fig 5. Rear view of SACO 64D4.

The rear part of the subrack holds the screw terminal blocks for the incoming and outgoing circuits. Each screw terminal is dimensioned for one or two multistrand conductors of max. 2.5 mm^2. In order to avoid too thick bunches conductors of 0.75 mm^2 are recommended.

The hinges of the rear part allow maintenance measures to be taken without loosening any wires.

SACO 64D4 is connected to the SPA-bus by means of SPA-ZC series connection modules.
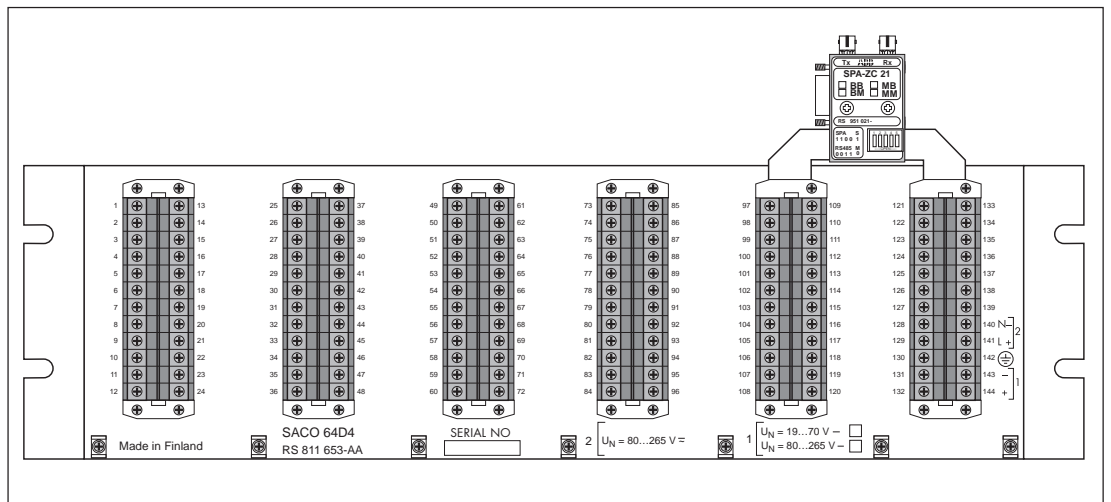
Fig 6. Connection module SPA-ZC 21 mounted on the SACO 64D4.

Function of the annunciator modules

SACO 16D2B is a versatile and flexible annunciator module with 16 channels. Its main function is to supply the user with information about changes in the signal contact states in the process to be supervised. The module is also used for fault signal and event sequence recording, a function which allows the origin and development of the fault to be analyzed afterwards.

The basic functions of the module is illustrated on page 10.

The central unit continuously compare new information with previously received information. When a change of state occurs, the channel starts, and if the duration of the change exceeds a preset input delay, the event will be recorded. The reflashes are activated according to a preset operational scheme. Further, the events are recorded in the internal event register.

When a PC (with e.g. SMS software) is included in the system, the settings are made over the SPA-bus. Alternatively, the setting can be made by using a portable programming module type SACO 16PM. All setting values are stored in non-volatile EEPROM type memories.

Alternatives for acknowledgement and resetting:

- By means of separate push-buttons via external acknowledge inputs
- The push-buttons in the acknowledge module SWDM 3A1 via external acknowledge inputs.

The acknowledgemodule SWDM 3A1 is, if included, located in front of the power supply module to the left in the rack.

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The electrical contacts of the devices sensing the process condition must be potential-free while the annunciator unit itself generates the 48 V dc field contact voltage. This specification also applies to the remote control inputs.

The power unit supplying voltage to the field contacts also provides a full galvanic isolation between the field contact circuits and the electronic circuits of the annunciator unit it self as well as the system earth. The channel inputs are provided with transient suppression circuits and input voltage limiters.

The alarm channels can be individually programmed for operation from normally closed (NC) or from normally open (NO) contacts. The annunciator is provided with an integrated field contact voltage supervision function. When a fault is detected the LED indicator marked "FAULT" on the front panel is switched on and internal supervision output relay operates. The fault message can also be transmitted over the serial communication link to the higher system levels.
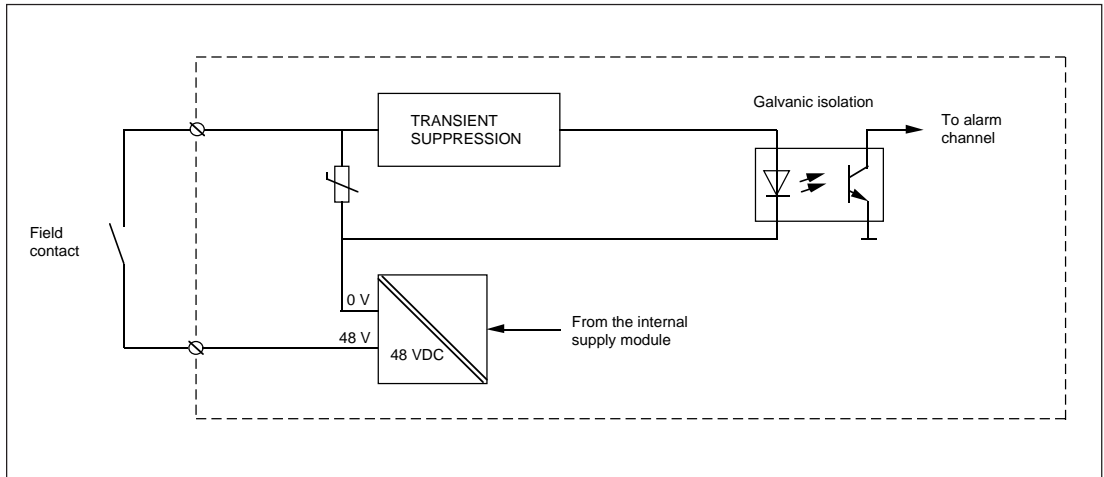
Fig. 7. Principle of alarm channel input.

An alarm channel is composed of a number of functional blocks illustrated below. The lists of variables underneath some of the blocks indicate that a certain parameter can be selected from a set of given values, i.e. the parameter can be programmed. The selected parameter is shown in the numerical display when called up during the programming.
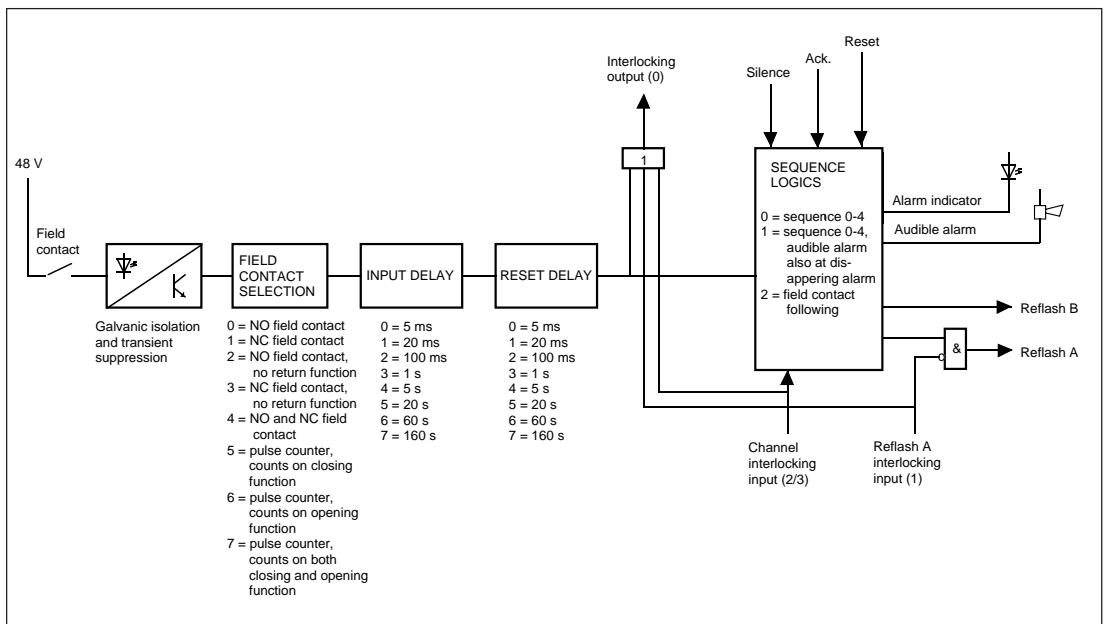

Fig. 8. Block schemating diagram for an alarm channel.

After the galvanic separation and the transient suppression the incoming field contact signal is analyzed and identified in respect of signal type. Seven input signal types are specified:

0 = signal from normally open contact, with return function
1 = signal from normally closed contact, with return function
2 = signal from raising edge only
3 = signal from falling edge only
4 = signal from raising and the falling edge
5 = pulse counter, counts by contact closing
6 = pulse counter, counts by contact opening
7 = pulse counter, counts by contact opening and closing.
Parameter S3

The input signal types 2, 3 and 4 are usually selected when event recording is used. For example the signal indicating that a circuit breaker has tripped is noticed and registered with its raising edge only.

The pulse counter is used only when the data is transferred to a higher level system. The pulse counter channels sequence logic is to be set to signal following without blinking and audible alarm functionality (S4 = 2). The reflash relays connected to the pulse counter channels are to be configured as ISR, Impulse Shaping Reflash (S1 or S2 = 2).

The channels configured as pulse counters counts pulses up to 3 Hz. The capacity of the counter is 0...29999. The counter is freely presettable within this range. When the pulse counter reaches 29999 it starts over again from 0.

The counter can be read and set only via the SPA bus with the channel specific parameter V5. When the parameter V5 is read the present value of the pulse counter is received, when written the preset (start) value for the pulse counter is given.

The counters memory circuit has no battery backup, hence the stored values are lost if the auxiliary power drops off and the counter starts over again from 0 or its preset value when the auxiliary power returns.

When a change of status has been detected for an incoming field contact signal and the new status exceeds the channel input delay in duration, the operation sequence memory is activated.

The channel input delay can be selected from a set of eight alternative values using the programming module SACO 16 PM:

0 =   5 ms
1 =   20 ms
2 = 100 ms
3 =   1 s

4 =   5 s
5 =   20 s
6 =   60 s
7 =   160 s
8 = another value, which is programmed via the serial interface

Via the serial interface the channel input delay can be freely programmed. Refer to the parameter list in the end of this manual.
Parameter S1

If the change-of-status of a field contact signal means that the signal returns to normal, the channel reset delay time must be exceeded before the change is registered. The delay time alternatives are the same as those for the input delay but the channel reset delay times are selected separately (S2).

When the operation sequence logic circuits are activated, the visual alarm displays start functioning according to the programmed operational sequence (flash sequence). The most suitable of five standard operational sequences is chosen by programming. All changes of status of the incoming signals are stored in the event register irrespective of the selected operational sequence for the visual alarm displays.

The sequence memory is acknowledged/reset in the following order:

SILENCE   = resets the audible alarm
ACKNOWLEDGE = indicates recognition of an alarm
RESET   = returns the channel to the normal state

The alarm channels each generate two reflash signals A and B which can be linked to the auxiliary reflash output relays, for details please refer to section "Group alarm reflash signals" on page 15.

Each alarm channel is also provided with two interlocking signal inputs and one interlocking signal output. The interlocking signal inputs/outputs are:

0 = interlocking signal output. Can be connected to the other channels
1 = interlocking signal input. Blocks the reflash signal A
2 = interlocking signal input. Blocks the whole alarm channel, returns as acknowledged alarm
3 = interlocking signal input. Blocks the whole alarm channel, returns as a new alarm.
Parameter S7 and S9

The interlocking signal output is also always activated by an interlocking signal input being activated in the same channel.

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*Visual alarm
indication*

The state of the alarm channel is indicated by super-bright LEDs. A legend plate of transparent film is inserted in a slot at the edge of the also transparent plastic overlay. For more information, see section "Legend plate", page 29.

Acknowledge and reset is done with a push-button located on in module SWDM 3A1 located, if included, to the left in the rack or with two external push-button. The reset indicator LEDs on the front panel marked SILENCE, ACK, RESET/TEST shows which of the actions is to be performed. The reset sequence depends on the operational sequences.
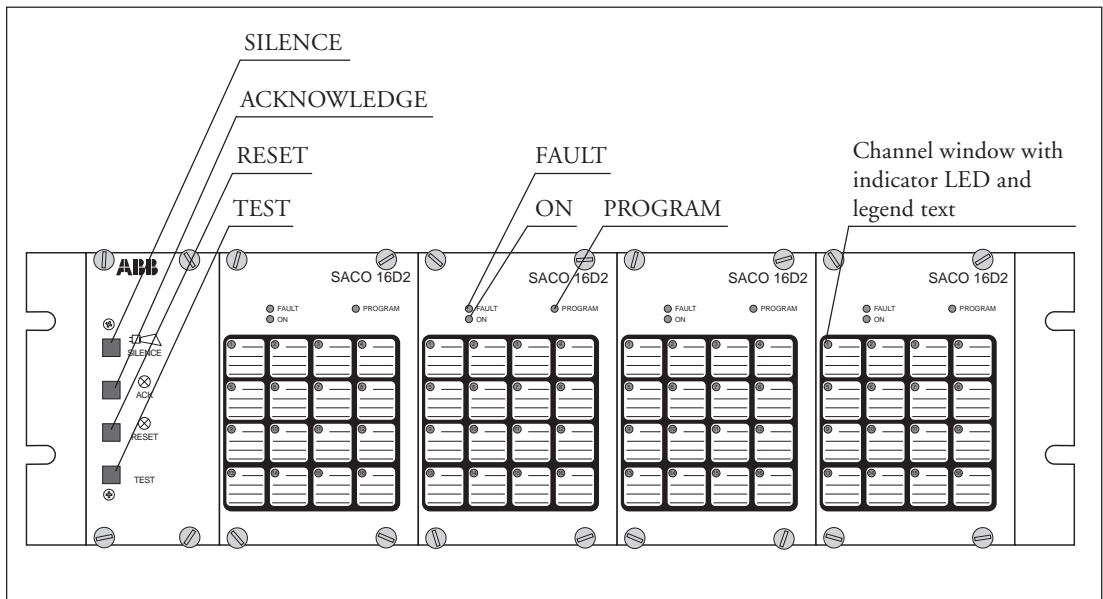
Fig. 9. Alarm indicators and push-buttons of the annunciator unit SACO 64D4.

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*Standardized
operational sequences*

The annunciator unit is supplied with five standardized field-selectable operational sequence alternatives of which the most adequate one for a certain application is selected for each annunciator module. The operational sequences are:
0 = ISA A, automatic reset
1 = ISA A-1, automatic reset, separate reset of audible alarm
2 = ISA M-1, manual reset, separate reset of audible alarm
3 = ISA R-1, manual reset, separate reset of audible alarm, visual ringback on return
4 = DIN 19235, manual reset after return to normal if acknowledged while alert, visual ringback on return if acknowledged before return to normal
Parameter S17

The above operational sequences are common to all the 16 channels in the module. However the sequences can be altered on a per-channel basis according to the following:
0 = indications according to the selected sequence

1 = indications according to the selected sequence but including audible alarm also on return. Valid only for sequences ISA R-1 and DIN 19235
2 = field contact following indication without audible alarm
Parameter S4

The acknowledge/reset operations required are determined by the annunciator unit itself. The annunciator unit is provided with two external control inputs, one for remote resetting of the audible device and an other for remote acknowledge/reset of the alarm channels.

NOTE!
There is also a Test pusch-button in the module SWDM 3A1. The test is accomplished by pressing the test button continually for approximately 1 second which causes all LED indicators to light up. The visual displays can not be tested if an alarm channel is unacknowledged or not reset. Pressing the test button for approximately 15 s activates the self-supervision auxiliary output relay and the FAULT LED.

ON
OFF — Field contact
ON
OFF — Visual alarm indicator
ON
OFF — Acknowledge
ON
OFF — Audible output

Automatic reset
ISA A

ON
OFF — Field contact
ON
OFF — Visual alarm indicator
ON
OFF — Acknowledge
ON
OFF — Reset of audible output (Silence)
ON
OFF — Audible output

Automatic reset, separate reset of audible output
ISA A-1

ON
OFF — Field contact
ON
OFF — Visual alarm indicator
ON
OFF — Acknowledge
ON
OFF — Reset
ON
OFF — Reset of audible output (Silence)
ON
OFF — Audible output

Manual reset, separate reset of audible output
ISA M-1

ON
OFF — Field contact
ON
OFF — Visual alarm indicator
ON
OFF — Acknowledge
ON
OFF — Reset
ON
OFF — Reset of audible output (Silence)
ON
OFF — Audible output

Manual reset, visual ringback and separate reset of audible output
ISA R-1

ON
OFF — Field contact
ON
OFF — Visual alarm indicator
ON
OFF — Acknowledge
ON
OFF — Reset
ON
OFF — Reset of audible output (Silence)
ON
OFF — Audible output

Manual reset, visual ringback if acknowledge is done before the alarminput returns
to normal state, separate reset of audible output
DIN 19235

Fig. 10. Selectable alarm sequences.

The annunciator unit incorporates an event register which contains information on the type of event and the channel number including a synchronous time stamp. This enables a higher level system to read out events from the annunciator over the SPA bus serial communication. The event register holds 50 events. The time stamps are relative and the time span is max. 60 s. The clocks of the interconnected units are synchronized, generally once per second, by the higher level system (the SPA bus master). The time resolution between the channels is 5 ms.

The annunciator unit also includes a channel matrix register which operates in parallel with the event register and in which each channel corresponds to one bit. If a channel is activated during an overflow situation of the even register, the corresponding bit in the matrix register is activated.

Fig. 11. Event registration in SPACOM systems.

The annunciator includes 16 auxiliary output relays. 14 output relays act as group alarm reflash output elements, one auxiliary output relay is dedicated for control of an audible device and one relay acts as an auxiliary output element for the internal self-supervision function. In a centralized system (i.e. when several SACO 64D4 are connected together) there might be no need to use the audible sevice output and the selfsupervision output on every unit separately, hence all 16 outputs can be used as Group Alarm Reflash outputs.
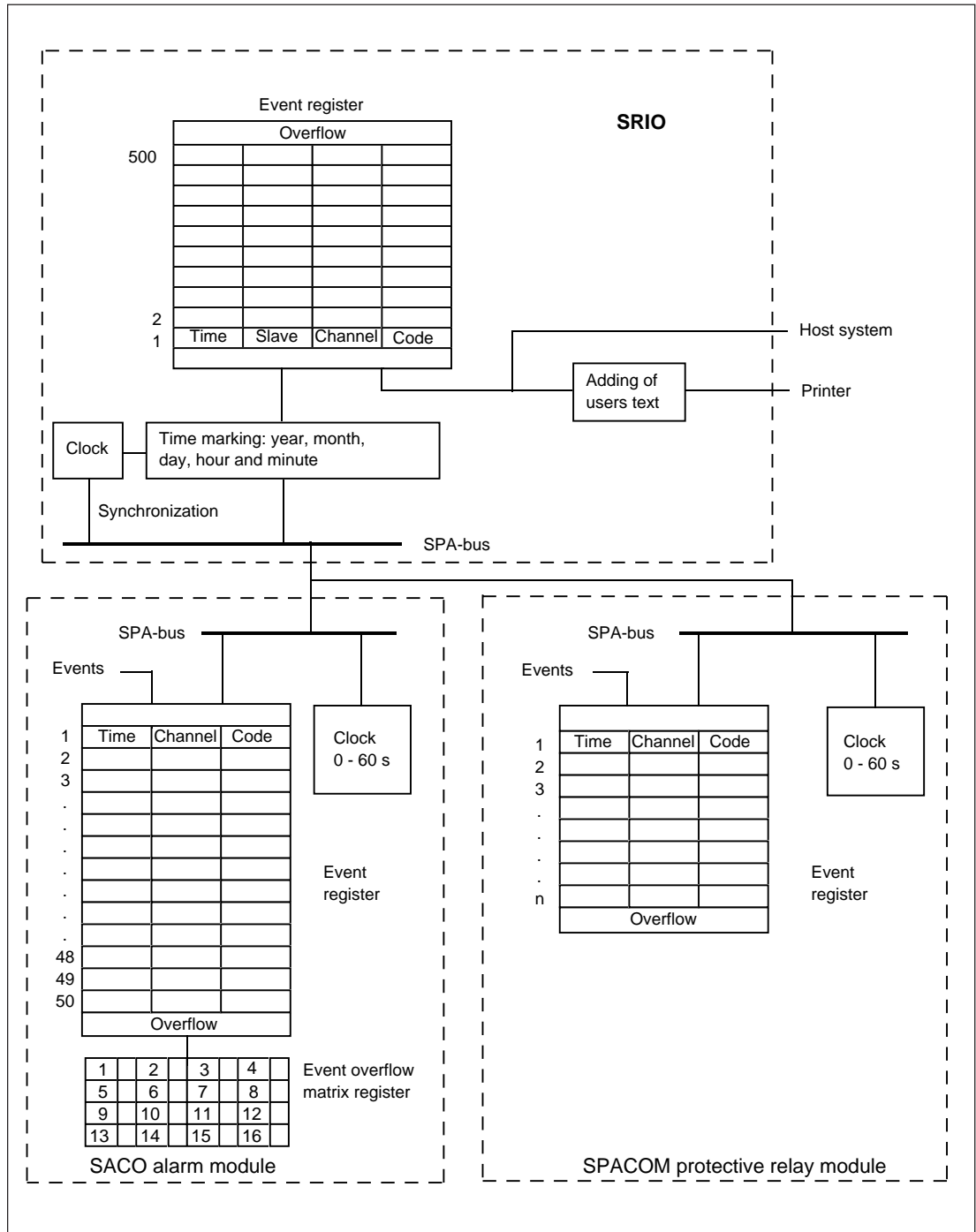
By using the relay unit SACO 128R4, which may accommodate a total of 128 output relays, and which is connected to the annunciator modules by means of flat cables, a total of 16 reflash group outputs, 16 contact doubler outputs and 16 paralell lamp outputs can be provided from each annunciator module. These outputs can also be grouped by means of the grouping module SACO 64C5

Group alarm reflash signals

Each alarm channel generates two reflash output signals, A and B, which can be freely linked to the reflash output relays to form group alarm reflash functions. The group alarm reflash output relays can be given one of the following modes of operation selectable by programming, separately for both of the output relays:
0 = FCFR, Field Contact Following Reflash
1 = AACR, Acknowledge Action Controlled Reflash

2 = ISR, Impulse Shaping Reflash
3 = FCFR + ISR, Field Contact Following Reflash with a 300 ms interruption of the reflash signal any time a new alarm signal joins in an already active group alarm bunch
4 = FCFR + AACR, Field Contact Following Reflash and Action Controlled Reflash (se figure below)
Parameter S1…S16 (Module related settings)
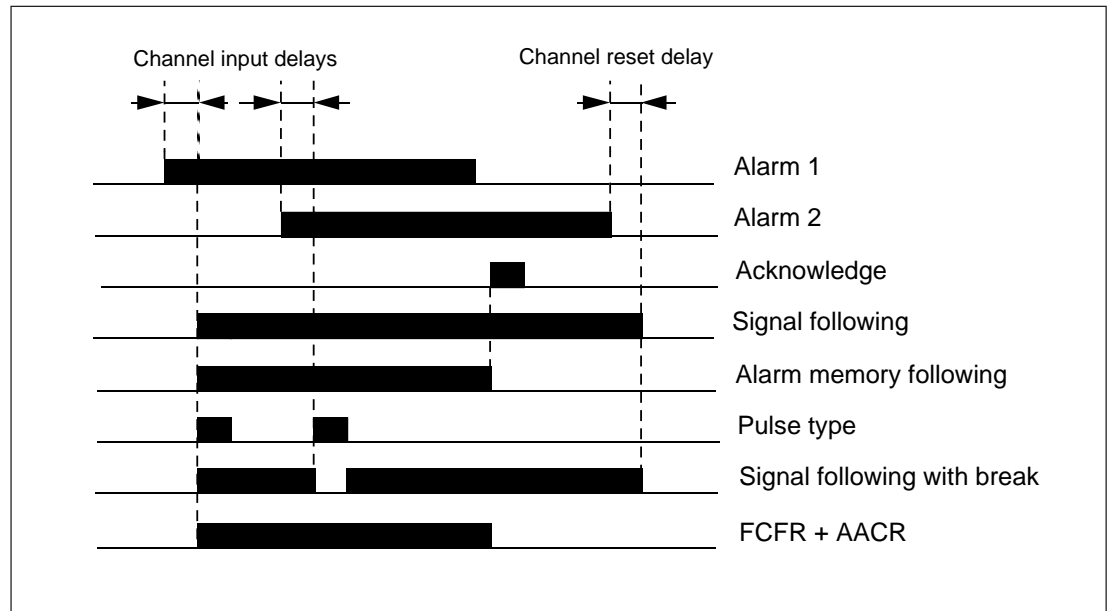
Fig. 12. Principle diagram for the different reflash signal types. The alarm signals 1 and 2 are grouped to the same group alarm reflash signal.

NOTE!
The reflash signals are always accompanied by a certain basic delay. The basic delay time depends on the number of incoming alarm signals per time unit and on the number of internal interlocking levels in use. The basic time delay of the reflash signal is 70 ms if only one alarm signal is received within a time period of 200 ms and if no interlockings are used.
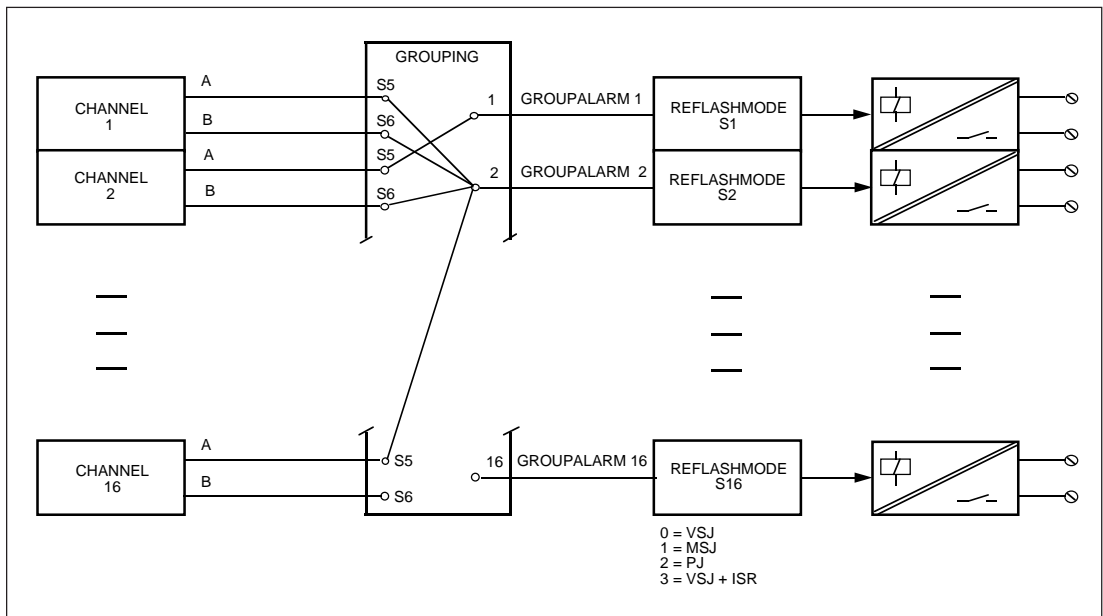
Fig 13. Principle diagram for building up group alarm functions. Output relay 15 and 16 are available for group reflash only in a multi rack system, for instance in a combination with Saco 128R4 relay rack. When SACO 64D4 is used standalone the output relays are used as internal fault and audible alarm outputs.

Field contact follower output

Each alarm input provides a control signal which can be used as a field contact follower signal. The signal which is instantaneous and activated when the field contact is closed, can be used to control an auxiliary relay in the relay unit SACO 128R4. Four 16-pole flat cable contacts are available for this purpose on the mother PC-board behind the rear panel of the rack.
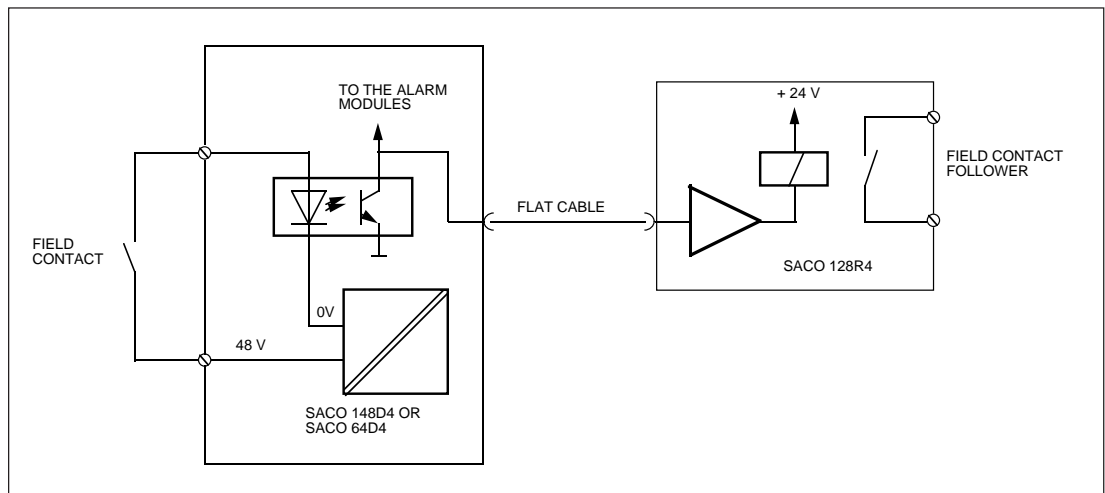
Fig 14. Principle diagram for a contact follower output.

Lamp follower output   Each annunciator module includes a 16-pole flat cable connector marked X2 holding the lamp follower control signals. By using the relay unit SACO 128R4 a lamp follower contact output can be obtained from each channel. The function of the output is identical with that of the built-in alarme indicator.
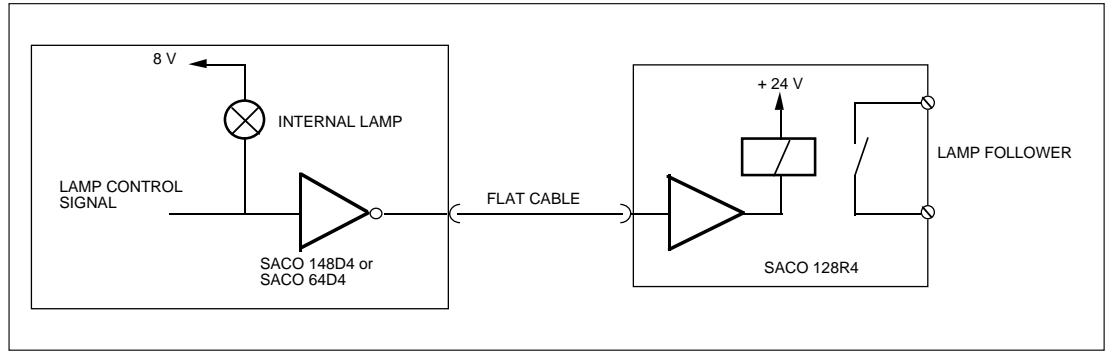
Fig 15. Principle diagram for a lamp follower output.

Audible device output   Generally the relay output for control of an audible device operates if one of the alarm channels is activated. Every channel can also be separately programmed to deliver an audible ringback when the alarm channel returns to normal state. If an alarm channel has been programmed for a sequence providing a field contact following visual indication only, no audible alarm will be generated, please refer to "Standardized operational sequences" on page 12.

The audible device can be silenced by means of the silence push-button or by means of an external control signal applied to the remote silence control input (128) of the annunciator unit.

An incoming alarm signal, for which only the audible alarm has been silenced but the alarm signal has not been acknowledged nor reset, will not produce a new audible alarm if the field contact starts "pumping".

The relay output for controlling of an audible device is blocked when the annunciator unit is in remote state. The audible alarm can also be sent over he serial communication interface.
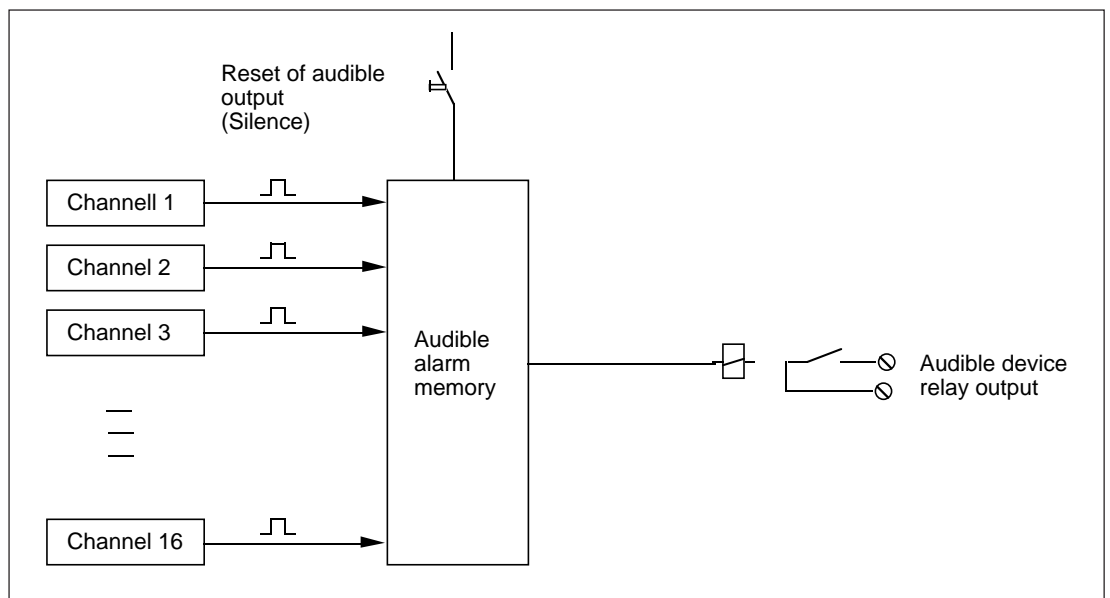
Fig. 16. Principle diagram for the audible alarm.

It has been mentioned in the section describing the functions of an alarm channel that each channel is provided with three interlocking input types, 1, 2 and 3, and one interlocking output type, 0.

The interlocking input type 1 prohibits, when energized, only the channel reflash signal type A from being transmitted, while the interlocking input type 2 blocks the whole alarm channel and if the blocking drops of while the channel is still active, the channel will be indicated as an acknowledged alarm. The interlocking input type 3 also blocks the whole channel but returns as a new alarm when the interlocking drops of. The interlocking output type 0 is activated by an alarm channel being activated or by one of the interlocking inputs being activated. The feature mentioned last enables the annunciator unit to be programmed with up to eight interlocking levels.

Note!
If more than three interlocking levels are used it will effect the resolution on the time stamp for the event register.

The interlockings are distributed between the different channels via eight internal interlocking lines, see figure on page 19. In addition the first four interlocking lines can be used for transmitting blocking signals between the annunciator modules.

Each channel can be connected to two interlocking lines. This means that alternatively both the interlocking inputs of an alarm channel are connected to two different interlocking lines, or the interlocking output and one of the interlocking inputs are connected to two different interlocking lines.

When an external interlocking signal is to be brought into the annunciator unit, one of the alarm channels can be used as an interlocking input. In this case the alarm channel may be given the field contact following visual indication sequence (S4 = 2) so no audible alarm will be generated from the channel, see page 12.
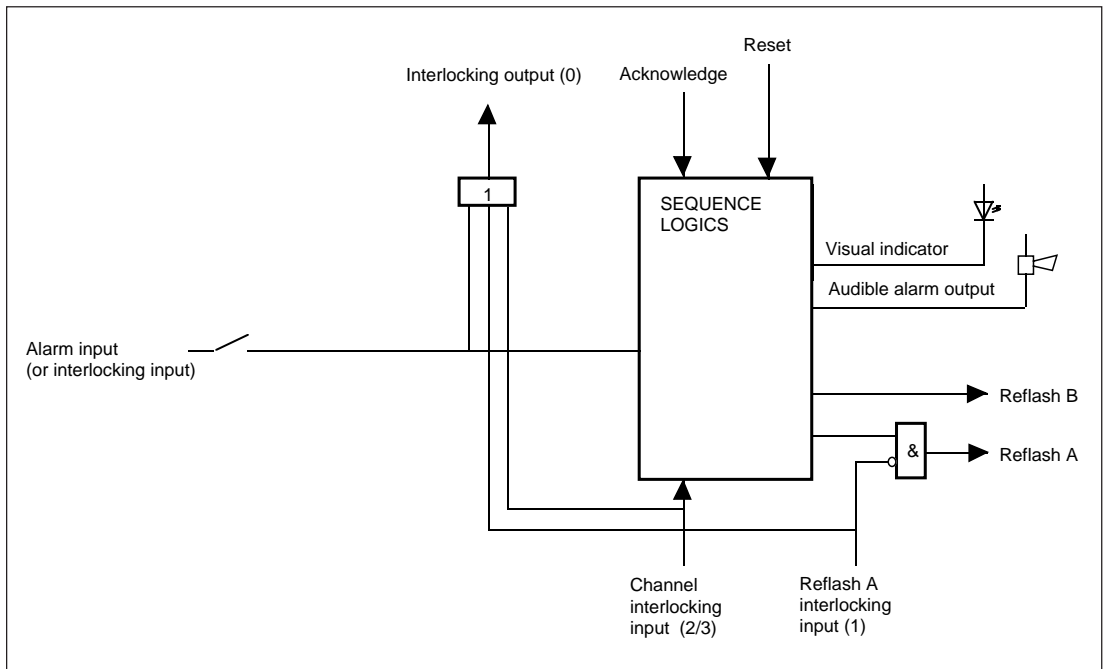
Fig. 17. Principles for the interlocking functions of an alarm channel.

An external interlocking signal is connected to input channel 1 which is configured to give a interlocking output to interlocking line 1. When active, line 1 interlocks channel 16 totally. Channel 16 gives also an interlocking output to line 2 which in turn interlocks channel 32.

The connections described above have been marked with dots on the corresponding lines in figure 18 below.

To give a good overview of the interlocking configuration the figure 32 on page 33 can be used when configuring the interlocking scheme.
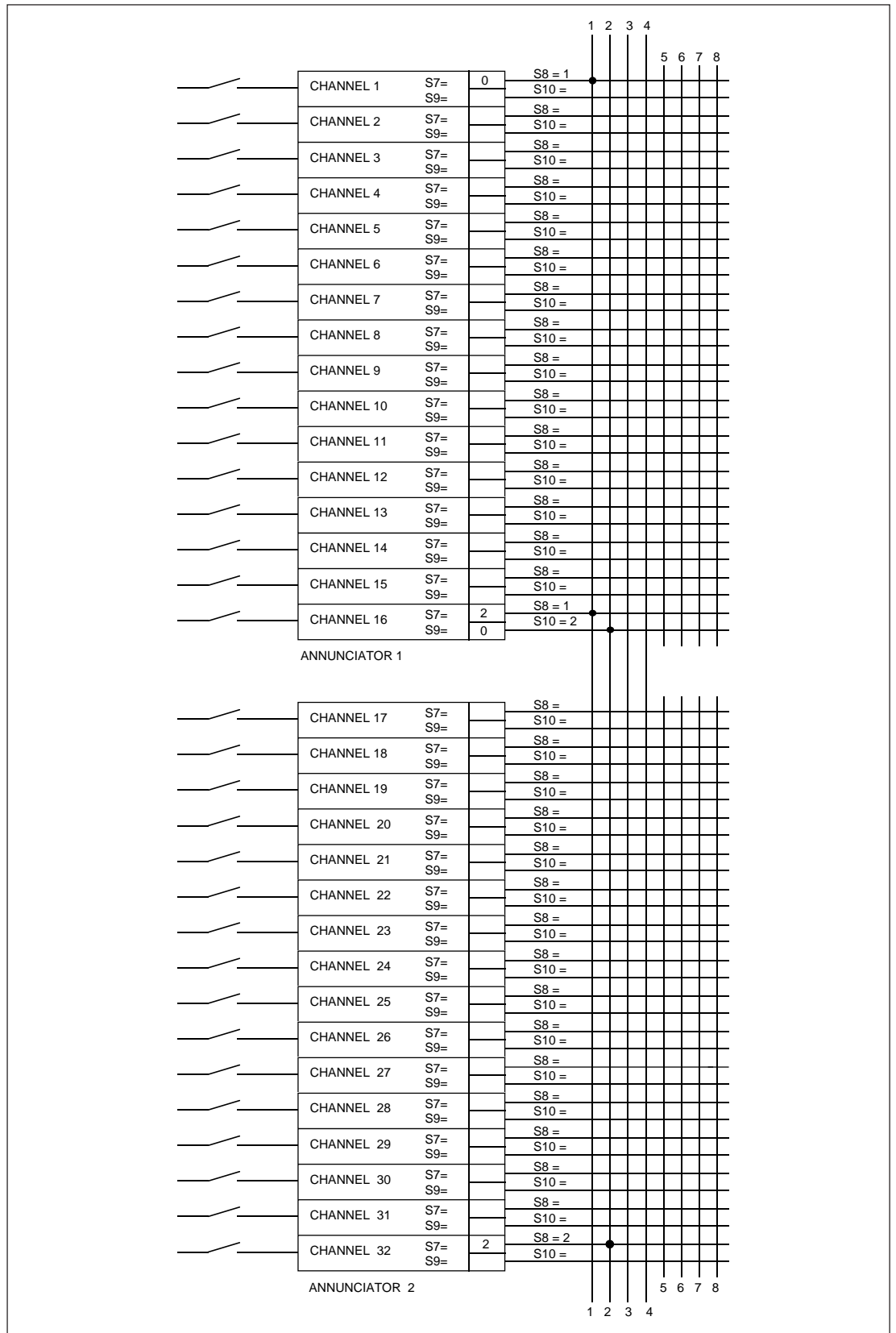
Fig. 18. Interlocking diagram.

The alarm annunciator unit comprises a serial communication port over which the unit can be connected to a local reporting and data communication system using the SPA bus protocol. The physical connection for the serial interface is located on the screw terminals on the back of the unit using terminals 121,122,123,133, and 134 (se figure 19) The serial interface is according to the RS 485 standard.

Using electrical connection the transfer distance is about 20 to 30 m depending on the interference level of the installation. The maximum allowed ground potential difference between the units is ±10V.

A fiber optical connection module, SPA-ZC 17 or SPA-ZC 21 is used to connect the unit to a fiber optical bus. The transfer distance using fiber optical media is approximately 30 m for plastic fiber and 2 km for glass fiber.

Note!
Because of the disturbant environment (like in substations) where the units are operating it is always recommended to use fiber optical communication.

By using the LON/SPA gateway, SPA-ZC 100, the alarm annunciator might also be connected to the LON bus.

The SPA bus protocol is described in the document SPA bus communication protocol V2.5, 34 SPACOM 2 EN1 and the LON Talk protocol is described in the document LON bus - LON Works network in protection and control systems; 1MRS750035-MTD EN

The speed of the serial communication is normally 9600 bits/s

Through the serial communication the following information is read from the unit:
- the event registers including the time markings
- the state of the channels and of the system
- the programmed parameter values
- pulse counter values

The following data can be written to the unit:
- time synchronization
- audible device reset
- alarm channels acknowledge and reset
- control of an alarm channel
- control of output relays
- control of the interlocking channels
- setting values
- testing of the unit
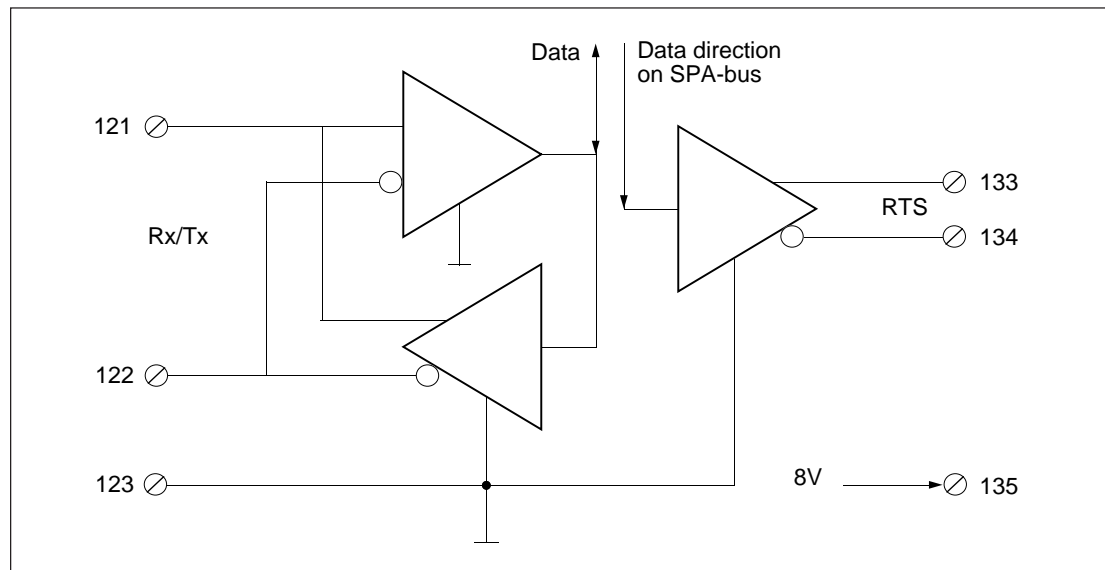
Fig. 19. Principle lay-out of the serial communication interface.

Synchronizing of the blinking sequence

If several units are located close to each other without any connection to a higher level system, it might be desired to synchronize the blinking sequences between the units. This is done by connecting the serial interfaces together and to configure one of the units to transmit a synchronizing signal (V201=1) and the others to receive that signal (V201 = 0).

V201 Setting of transmission rate

0 = 9600 bits/s, synch pulse receiver
1 = 9600 bits/s, synch pulse transmitter
2 = 9600 bits/s
3 = 4800 bits/s
4 = 2400 bits/s
5 = 1200 bits/s
6 = 300 bits/s

| Parameterization | The parameter values are stored in the unit in a non-volatile EEPROM memory. Thus the setting of parameter values can be performed and changed by means of the programming module SACO 16PM or via the serial communication using e.g. the SMS software. This means that | the annunciator unit is fully field-programmable.

For connecting a PC directly to the serial interface of the unit (for parameterization) the cables SPA-ZP 6A3 and SPA-ZP 21A are used. |

Auxiliary power supply system
(modified 03-10)

SACO 64 D4 can be supplied from two sources simultaneously. The supply inputs are galvanically isolated. Two standard versions of supply modules are available, type SWSM 220A48 and type SWSM 220A220:

Supply module SWSM 220A48
Supply input 1: 19... 70 V dc
Supply input 2: 80...265 V ac/dc

Supply module SWSM 220A220
Supply input 1: 80 ... 265 V dc
Supply input 2: 80 ... 265 V ac/dc

The supply modules are easily exchanged due to the plug-in construction. The insulation level between the supply inputs and the electronics and between the electronics and the field contact circuits is 2 W, 50 Hz, 1 min.

The system operates with one supply voltage too, but in such a case the signal contact of the internal fault relay closes. A supply module operating with one supply voltage, without providing a signal for internal system fault, is available on request.
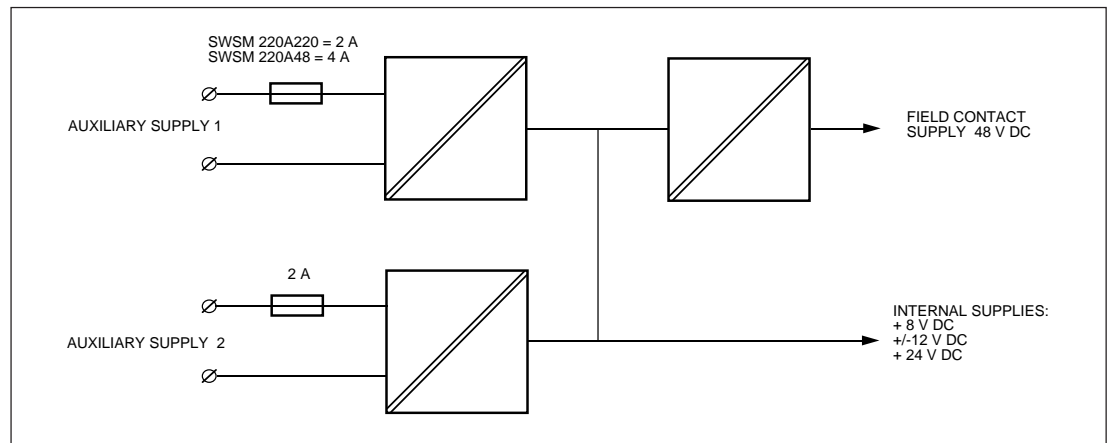
Fig 20. Principle diagram for the power supply module SWSM 220A48 and SWSM 220A220.

Under normal operating conditions only one of the supply inputs is used. The other input operates as a back-up supply and will be activated when a fault occurs in the main supply. Shifting from one supply to another is automatic and interruption-free.

The supply input to be used is selected by means of the programming pins located on the left power supply PC-board, close to the operation indicator. The terminals are short-circuited as shown below.
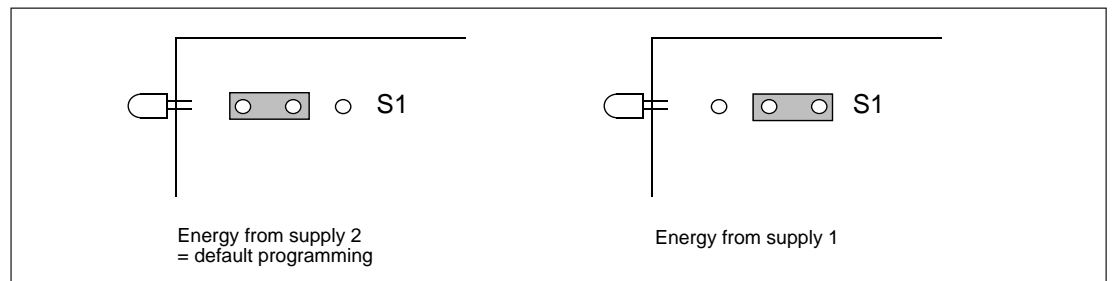
Fig 21. Selecting supply input to be used when both inputs are connected.

NOTE!
To obtain a closing function of the self-supervision relay at an internal fault, the soldered jumper W3 on the input/output module SWIM

2A1B located to the right in the rack, has to be shifted from a closing to an opening function.

Self-supervision output

The annunciator unit is provided with extensive self-supervision functionality which, in case of an internal fault or if an internal malfunction is detected, causes an operation of the self-supervision auxiliary output relay. The self-supervision system monitors continuously the internal voltages, the program execution and microprocessor logic. An internal malfunction of the unit produces an automatic restart attempt and if the reason for the malfunction has disappeared, the normal operation of the annunciator unit continues.

If the fault on the program, the microprocessor or the supply voltages is of a permanent nature, the LED indicator marked FAULT is switched on and the self-supervision auxiliary output relay drops off (normally energized). At the same time all the other auxiliary outputs are locked including the serial communication port. If the voltage of the logic circuits totally disappears, the LED indicators marked ON and FAULT are turned off, but in other respects the functions are as described above.

If a fault occurs in the 48 V DC field contact voltage, generated by the annunciator unit, the FAULT LED is switched on and the self-supervision auxiliary output relay drops off (normally energized). The fault information can be sent over the serial communication. If the control voltage of the auxiliary output relays disappears, the self-supervision auxiliary output relay drops off.
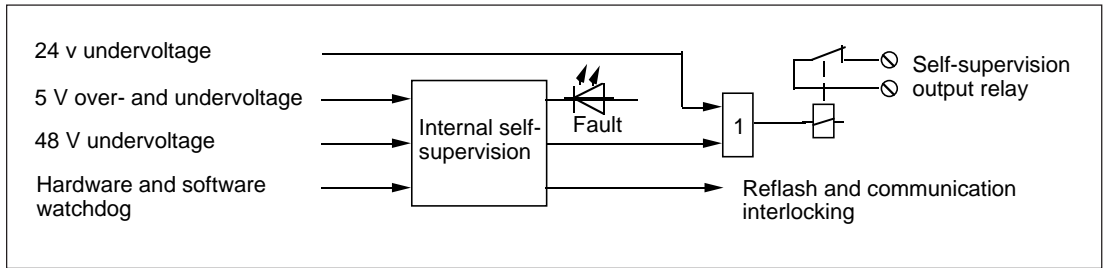
Fig. 22. Principle diagram for the self-supervision system.

To prevent a "pumping" field contact from blocking the communication to a higher level system, the unit is provided with a setting to indicate how many incoming alarms are allowed from one channel within one minute. In case the setting limit is exceeded the channel is blocked until the alarms per minute again goes below the set value. A channel with a "pumping" field contact is indicated as follows:

The indication is reset with the RESET push-button.

The "pumping" supervision is programmed by parameter S11 (channel related settings):

00   = "Pumping" supervision not in use
01...99   = Maximum alarms per minute

Application

Mounting

The annunciator unit SACO 64D4 is housed in a 19 inch Euro-subrack, height 3 U (133 mm).

The rack is intended for flush-mounting or to be fitted in a 19 inch instrument cabinet. The rack is fixed by means of M6 screws. At flush-mounting the mounting depth can be reduced by 40 mm by using a raising frame SRH-ZX1.

When combining several SACO 64D4 subracks to a system, or when using SACO 64D4 subracks together with other subracks of the SPACOM series, a space of 1 U, about 44 mm, should be left between the subracks. For this purpose 2 spacers, type SWSC 20, are included in every SACO 64D4 delivery. The spacers allow several annunciator units to be built together to a mechanical unit.
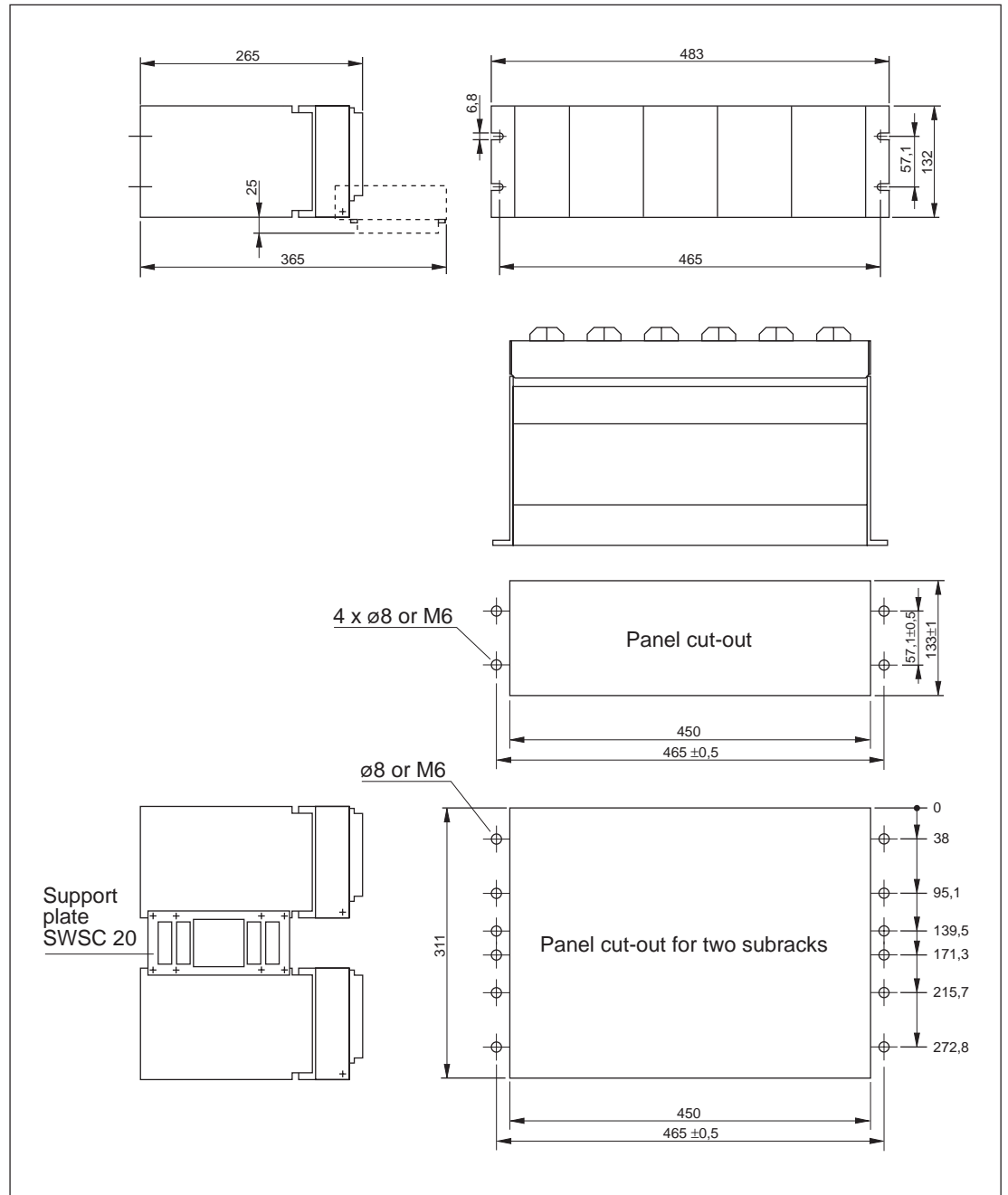
Fig 23. Dimension and mounting drawing for the annunciator unit SACO 64D4.
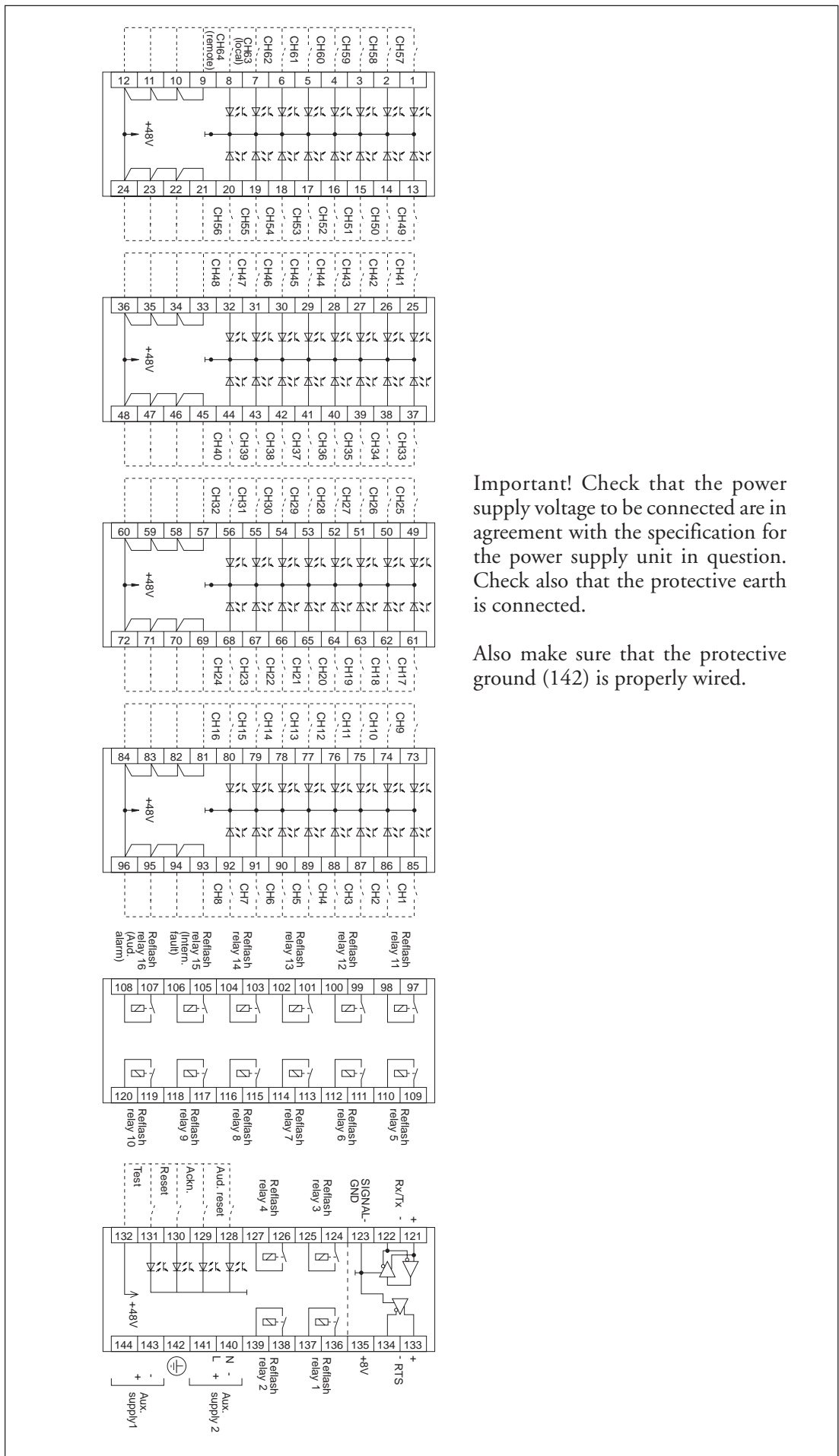
Important! Check that the power supply voltage to be connected are in agreement with the specification for the power supply unit in question. Check also that the protective earth is connected.

Also make sure that the protective ground (142) is properly wired.

Fig 24. Connection diagram for the SACO 64D4.

The screw terminal to facilitate all input and output connections are located on the rear panel of the annunciator case. Each screw terminal can accommodate one or two max. 2.5 mm^2 wires. No terminal lugs are needed.

Six terminals are used for connecting the SPA-bus. The connection cable for the fiber optic SPA-ZC module is attached to these terminals.

In an independent system the group alarm No 15 can be programmed for internal fault supervision and the group alarm No 16 for audible alarm. The programming is made by changing the jumper position on connector X44. The connector is located on the left side of the mother PC-board, seen from the rear.

Function	Jumper position X44
Group alarm output 15	Pin 1-2
Group alarm output 16	Pin 4-5
Output for audible alarm	Pin 5-6
Output for internal supervision	Pin 2-3

At an internal fault the relay output contact opens. A closing function is obtained by res-oldering a jumper on input/output module SWIM 2A1. The module is accessible after removing the annunciator module No. 4 to the right.

WARNING!
Although the supply voltages are switched off the output contacts on the input/output module concerned may contain external voltages.

The two boards can be separated from each other by pressing the snap-locks on the spacers and then separate them. The programming jumpers on the relay card are numbered as follows:

W1 = group alarm 13
W2 = group alarm 14
W3 = group alarm 15/internal fault
W4 = group alarm 16/audible alarm

The programming is made by moving the jumper for the concerned relay as illustrated in the printed scheme on the PC-board, so that the required contact function is achieved. The relay function of the other outputs are reprogrammed in the same way. Every input/output module includes four relays.

The alarm channels 63 and 64 can be reprogrammed to local/remote inputs. Then the channels 63 and 64 will operate as position indicators for the local/remote switch and are to be programmed for signal following indication (S4 = 2). The programming is made by changing the position of a jumper on connector X45. The connector is found to the left on the mother PCB, seen from the rear.

Function	Jumper position X45
Alarm channel 63	Pin 1-2
Alarm channel 64	Pin 4-5
Local position (channel 63)	Pin 2-3
Remote position (channel 64)	Pin 5-6

In distributed systems or in applications where SACO 64D4 is used as an independent annunciator system, push-buttons are required for acknowledging, resetting and testing purposes.

A convenient way of providing for the adequate push-buttons is by using the acknowledge module SWDM 3A1. The module,which contains four push-buttons is fitted in front of the voltage supply module on the left side of the SACO 64D4 rack. The module includes the wires required for connecting the push-buttons to the external acknowledge inputs of the annunciator unit.

The following push-buttons are included in the module:

- SILENCE, reset of audible device (V2)
- ACK, acknowledge of alarm (V3)
- RESET, reset of alarm (V100)
- TEST, testing (V4)

A system including several SACO 641D4 units needs one acknowledge module. The acknowledge functions are transmitted to the other units over flat cables SWIR 24…28 depending on the number of racks.
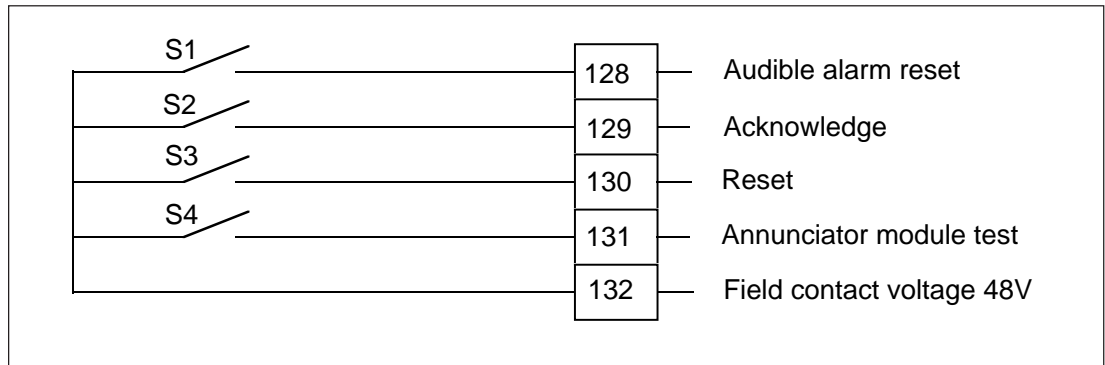
Fig 25. Connection diagram for the acknowledge module.

The acknowledge module SWDM 3A1 is mounted in place of the cover plate in front of the voltage supply module. The five connection cables are brought straight through the rack between the cover plate of the voltage supply module and the first annunciator module, through the opening between the rear panel and the bottom edge of the mother PC-board, up to the terminals inside the rear panel. The flat terminals are connected as shown in the above diagram.
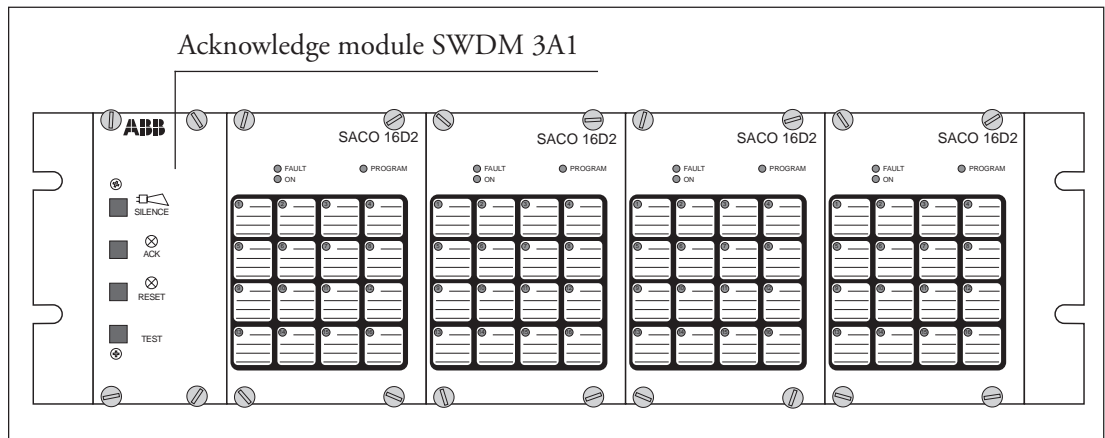
Fig 26. Acknowledge module SWDM 3A1 in the SACO 64D4 rack.

*Connection to a
distributed system
with or without event
sequence reporting*

When connecting a SACO 64D4 to another SACO 64D4 or to the control data communicator SACO 148D4, they can share the group alarm relays, the interlocking lines, the self-supervision relay and the audible alarm relay.

The units are interconnected by means of a flat cable and the connectors marked X16 on the mother PC-board of both units. The cables are brought in under the rear plate of the units through the cutout along the lower edge of the panel. When several units are to be connected to the SACO 148D4, the flat cables are to be chained together. The following cables are available for the purpose:

Cable type SWIR 24
  Intermediate cable for two racks
Cable type SWIR 25
  Intermediate cable for three racks
Cable type SWIR 26
  Intermediate cable for four racks
Cable type SWIR 27
  Intermediate cable for five racks
Cable type SWIR 28
  Intermediate cable for six racks

An already mounted system can be extended by using a flat cable extension module type SWCM 8A1. The extension module is attached to the last rack and the extension is made with a suitable cable. The mounting instructions are packed together with the extension module.

The group alarm reflash functions can be connected in parallel by fitting a flat cable to the terminals X21, X22, X23 and X24 of SACO 64D4. The cable is then extended to another SACO 64D4 or 148D4 to its X21…X24 terminals.. From a system united in this way 16 group alarm output contacts are obtained. The type designation of the cable is SWIR 23.

When the group alarms of several SACO 64D4 systems are to be parallelled, the output contacts are recommended to be parallelled.

In the last rack of the system the terminating resistors R1 and R2 of the SPAbus must be connected but from the other racks they ought to be removed. The resistors which are located on the mother PC-board are connected or disconnecting by means of a jumper on contact X46. R1 is connected by short-circuiting the poles 1-2 and R2 is connected by short-circuiting the poles 4-5.

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*Connection to a
distributed system*

The components in the SPACOM system are linked together, optically, over the SPA-bus.

The higher level system can obtain data for for event sequence reporting purposes. Remote settings can also be performed trough the serial communication interface.

For connecting the SACO 64D4 units to the fibre optical loop, bus connection modules are used. SACO 64D4 can be connected both to SPA-bus and LON-bus systems.

Connection of a relay output extension unit type SACO 128R4

A reflash signal for a parallel lamp indicator, for a contact doubler output and for group alarm output is obtainable from the annunciator module. Of these the group alarm outputs are connected in parallel from each annunciator module and put forward to common output relays. If requested, the group alarms, the parallel lamp outputs and the contact double outputs can be connected to individual output relays by using a 16-channel output relay module type SWOM 16A1. The extension unit type SACO 128R4 houses up to eight output relay modules.

By using a grouping module type SACO 64C5 a free cross connection of 64 incoming and 64 outgoing signals can be carried out. A flat cable is connected to the terminal X2 of the output relay module SWOM 8A1. The reflash signals from the SACO 64D4 system are made available at the following terminals:

Parallel lamp reflash output
    SWPM 1A1B , terminal X2
    (behind the front panel)
Contact doubler output
    Mother PC-board,
    terminals X17, X18, X19 and X20
Group alarm outputs
    Mother PC-board,
    terminals X21, X22, X23 and X24

The upper protective grille sheet and the rear panel have cutouts for taking outthe flat cables.

Start-up

When the auxiliary supply voltage is connected, all active alarm channels are indicated as already being acknowledged. These alarms are not to be found in the event register.

Operational test

When the annunciator unit SACO 64D4 has been mounted, the system configuration has been programmed and its incoming and outgoing cables have been connected, the unit can be tested. The unit is tested by first acknowledged/reset all alarms and then the test push-button, on module SWDM 3A1, is kept depressed for about 1 second. This move will cause all LED indicators, except the FAULT LED, to be switched on as long as the push-button is depressed. If the acknowledge/reset push-button is depressed for more than 15 s, the self supervision output relay drops of and the FAULT LED is lit. The test can also be performed over the external test input (131).

The operational test comprises the internal system circuitry. The field contact circuits and auxiliary devices must be tested separately.

Legend plate

The screened plastic overlay is provided with translucent windows for the 16 channels. The channel legend texts are applied on a drawing film also square-ruled to form 16 text fields. The drawing film can be inserted in a slot along the left-hand edge of the front plate, see figure 27. The front plate including the legend text film and the screened plastic overlay are kept in place by means of four finger screws.

The legend text may be written with a drawing ink pen or a typewriter. Together with the annunciator unit a sheet of drawing film comprising three legend plates is delivered.

The channel text surface comprises 20 mm x 20 mm and the text area is ruled with four lines.

NOTE!
The starting point for the first line of the channel legend text is intended a few millimeters from left in order not to cover the visual LED indicator of the channel.
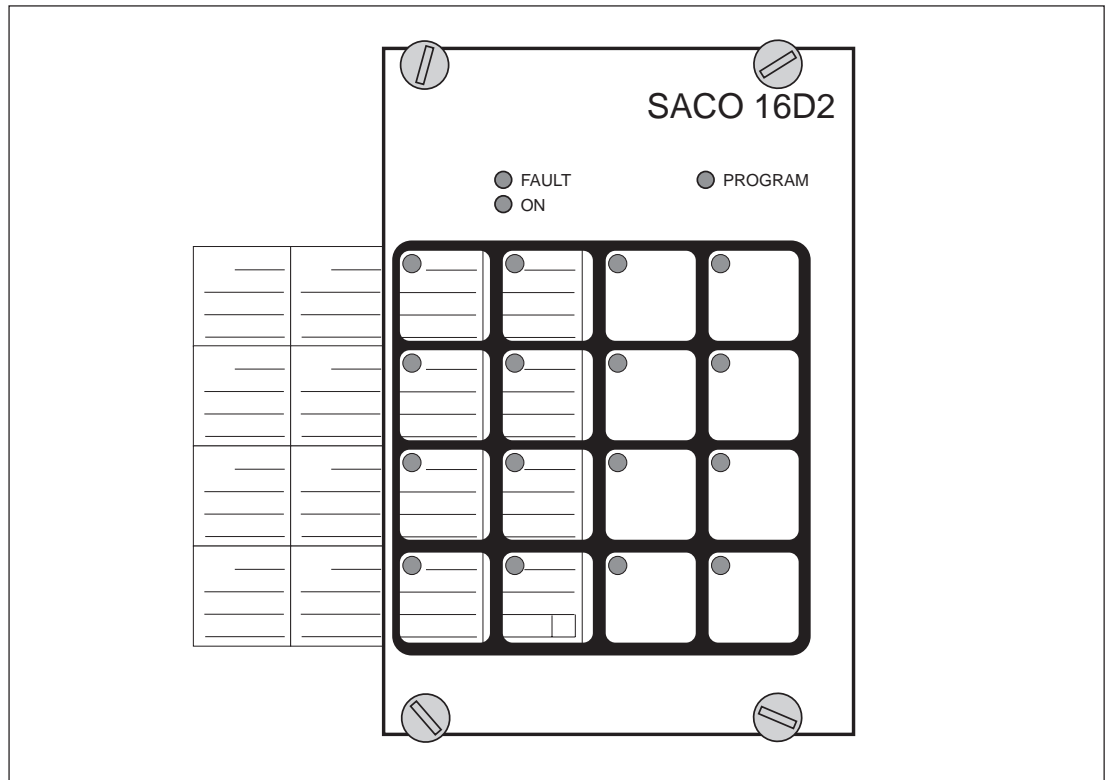
Fig. 27. Partially withdrawn a drawing film.
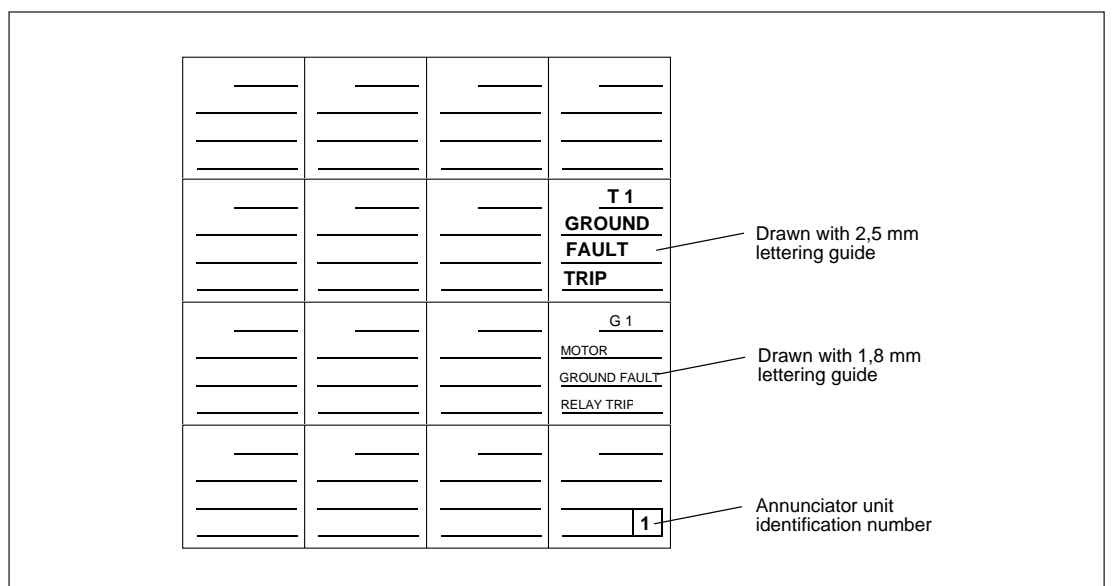
Fig. 28. Channel legend text drawing film.

Programming

SACO 64D4 can be operated and programmed over the serial communication port using e.g. SMS software, with a portable programming module type SACO 16PM. Testing, acknowledgeing and resettings are carried out locally by means of the push-buttons on the acknowledge module SWDM 3A1, or by using external push-buttons connected over the remote inputs (128 – 131).

If a SMS program is used for parameterization of the SACO 64D4 the program gives explanations and ranges (alternatives) for the different parameters. The front panel of SACO 16PM contains a display window with 4 alphanumeric characters, indicators for operation status, local/remote mode indicators, acknowledge and test push-buttons, and a set of push-buttons for programming and reporting purposes. A detailed description of SACO 16PM are given in the document 34 SACO 16PM 1 EN1.

The parameter codes and their ranges (alternatives) are given in the section "Remote information to and from the alarm annunciator" on page 34 of this manual.
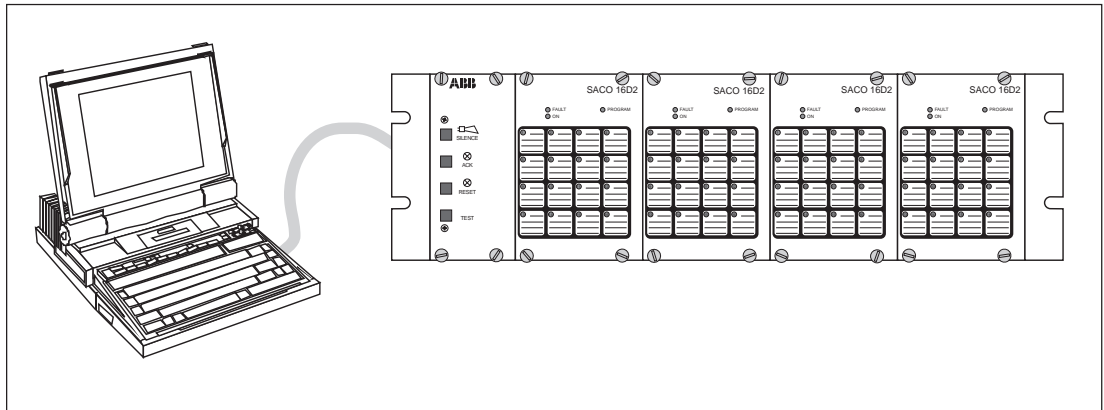
Fig 29. SACO 64D4 connected to a SMS PC.

The front panels of the annunciator modules contain indicators for operation status, alarm indicators, and indicators for programming and bus communication. The channel numbers 1...16 are printed in front of the alarm indicators. The identification number of the module can be marked in the square in the bottom right corner of the legend plate.

Signalling and reporting functions

Under normal conditions when no annunciator channels are alert and all acknowledgements have been made, only the green ON-indicators on the fronts of the annunciator modules are illuminated.

When a field contact signal is received by an annunciator channel, the channel logics and the alarm indicator respond in accordance with the programmed sequence scheme. If a higher level system with avent recording is connected an event report with time marking will be received. When the annunciator unit is in local mode or in the combined local/remote mode, an audible alarm will also be provided. The audible alarm relay can be reset by means of the reset push-button of the audible alarm relay. The alarm indicator is acknowledged and reset by means of the acknowledge and reset push-buttons. The available alarm sequence schemes are described on page 13.

The acknowledge and reset push-buttons are located on the modules SWDM 3A1 (if present). Alternatively with external push-buttons.

Parameter
selection key

PARAMETER \ DISPLAY	🯰	🯰	🯰	🯰
	Channel input delay	Channel reset delay	Contact type	Channel indication
⊗ **Input** Channel input settings	0 = 5 ms 1 = 20 ms 2 = 100 ms 3 = 1 s 4 = 5 s 5 = 20 s 6 = 60 s 7 = 160 s	0 = 5 ms 1 = 20 ms 2 = 100 ms 3 = 1 s 4 = 5 s 5 = 20 s 6 = 60 s 7 = 160 s	0= NO contact 1= NC contact 2= NO contact, no return 3= NC contact, no return 4= NO and NC contact Pulse counters: 5= NO contact 6= NC contact 7= NO and NC contact	0= seq. 0-4 1= seq. 0-4 audible also at return to normal 2= field cont. following, no flashing, or audible
			Channel-related anti-pumping	
			00= supervision disabled 00…99= allowed number of registrations per minute	
⊗ **Group** Reflash grouping	Channel reflash A		Channel reflash B	
	- - = no group alarm 01= group alarm 1 - - - 16= group alarm 16		- - = no group alarm 01= group alarm 1 - - - 16= group alarm 16	
⊗ **Interlock** Configuration of interlockings	Interlocking function 1		Interlocking function 2	
	Type of interlocking	Interlocking group	Type of interlocking	Interlocking group
	0= interlocking output 1= channel reflash A interlocked 2= channel interlocked 3= channel interlocked	- = not grouped 1= group 1 2= group 2 3= group 3 4= group 4 5= group 5 6= group 6 7= group 7 8= group 8	0= interlocking output 1= channel reflash A interlocked 2= channel interlocked 3= channel interlocked	- = not grouped 1= group 1 2= group 2 3= group 3 4= group 4 5= group 5 6= group 6 7= group 7 8= group 8
⊗ **Output** Group alarm settings	Group alarm number		Type of reflash relay function	
	01= group alarm relay 1 02= group alarm relay 2 - - - 16= group alarm relay 16			0= field contact following 1= alarm memory following 2= 300 ms pulse 3= 0 + 2
⊗ **Module** Annunciator module settings	Unit identification number		Sequence	Serial comm.
	01= number 1 02= number 2 - - - 99= number 99		0= ISA A 1= ISA A-1 2= ISA M-1 3= ISA R-1 4= DIN 19235	0= syncr. input 1= syncr. output 2= 9600 Bd 3= 4800 Bd 4= 2400 Bd 5= 1200 Bd 6= 300 Bd

M	Store (Reset)
Parameter selector ↓ ↑	Data value selector
Display cursor → ↻	Channel selector

Fig. 30. Parameter selection key for annunciator unit SACO 64D4. when using the SACO 16PM module.

Parameter chart

Alarm channel	Input				Group		Interlock			
	Channel input delay	Channel reset delay	Contact type	Channel indication	Channel reflash A	Channel reflash B	Interlock funct.1		Interlock funct.2	
							Type of interlocking	Interlocking group	Type of interlocking	Interlocking group
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										

Output

Group alarm number		Type of reflash relay function

Module

Unit identification number		Sequence	Serial communication

Fig. 31. Parameter chart.

Channel
interlocking scheme

TYPE OF INTERLOCKING
0 = interlocking output
1 = reflash A interlocking inpu
2 = channel interlocking input
3 = channel interlocking input

INTERLOCKING GROUPS

1 2 3 4   5 6 7 8

Channel 1/__	Function 1			
	Function 2			
Channel 2/__	Function 1			
	Function 2			
Channel 3/__	Function 1			
	Function 2			
Channel 4/__	Function 1			
	Function 2			
Channel 5/__	Function 1			
	Function 2			
Channel 6/__	Function 1			
	Function 2			
Channel 7/__	Function 1			
	Function 2			
Channel 8/__	Function 1			
	Function 2			
Channel 9/__	Function 1			
	Function 2			
Channel 10/__	Function 1			
	Function 2			
Channel 11/__	Function 1			
	Function 2			
Channel 12/__	Function 1			
	Function 2			
Channel 13/__	Function 1			
	Function 2			
Channel 14/__	Function 1			
	Function 2			
Channel 15/__	Function 1			
	Function 2			
Channel 16/__	Function 1			
	Function 2			

Alarm module No___

Fig. 32. Channel interlocking scheme for programming.

Remote information to and from the alarm annunciator	The following parameters can be read out or written down to the annunciator unit from a higher level device.

Code	Factory setting	Value and function
		Module related parameters (Channel No 0)
V205	-	Program version
S1…16	0	Reflash output 1 sequence 0 = FCFR 1 = AACR 2 = ISR 3 = FCFR + ISR 4 = FCFR + AACR
S17	3	Alarm sequences 0 = ISA A 1 = ISA A-1 2 = ISA M-1 3 = ISA R-1 4 = DIN 19235
S18	0	Specification of active channels to be printed out as a result when parameter A is read out 0 = both alarm and status channels are printed out 1 = only alarm channels are printed out 2 = no out printing

S19	0	Pumping supervision output relay
		00 = not connected
		01 = output relay 1
		02 = output relay 2
		   -
		   -
		16 = output relay 16

S33…48	0	Control of the output relay 1…16 over the SPA bus 0 = not active 1 = changing of state (on/off) 2 = pulse activation
S49…64	0	Pulse length of output relay 1…16 0,3...25,5 = pulse length in seconds
V1	-	Position of local/remote position 0 = local + remote position 1 = local position 2 = remote position
V2	-	Resetting of audible alarm output 1 = reset
V3	-	Acknowledge of alarm signal 1 = acknowledge
V4	-	Testing 0 = testing off 1 = testing on

Code	Factory setting	Value and function
V50	-	Status information of all 16 channels, HEX coded form 0000 = no active channels 0001 = channel 1 active 0002 = channel 2 active 0003 = channel 1 and 2 active 0004 = channel 3 active 0005 = channel 1 and 3 active 0006 = channel 2 and 3 active 0007 = channel 1,2 and 3 active 0008 = channel 4 active 0009 = channel 1 and 4 active 000A = channel 2 and 4 active 000B = channel 1,2 and 4 active 000C = channel 3 and 4 active 000D = channel 1,3 and 4 active 000E = channel 2,3 and 4 active 000F = channel 1,2,3 and 4 active - - - FFFF = all 16 channels active
V51	-	Status information of the overflow matrix register, HEX coded form 0000 = no active channels 0001 = channel 1 active 0002 = channel 2 active 0003 = channel 1 and 2 active 0004 = channel 3 active 0005 = channel 1 and 3 active 0006 = channel 2 and 3 active 0007 = channel 1,2 and 3 active 0008 = channel 4 active 0009 = channel 1 and 4 active 000A = channel 2 and 4 active 000B = channel 1,2 and 4 active 000C = channel 3 and 4 active 000D = channel 1,3 and 4 active 000E = channel 2,3 and 4 active 000F = channel 1,2,3 and 4 active - - - FFFF = all 16 channels active
V100	-	Reset of alarm channel 1 = reset
V151	-	Storing of information in non-volatile memory 1 = storing
V200	-	Module SPA slave address 1...99 = address number 1...99

Code	Factory setting	Value and function
V201	2	Setting of the data transfer rate 0 = 9600 bits/s, synch in 1 = 9600 bits/s, synch out 2 = 9600 bits/s 3 = 4800 bits/s 4 = 2400 bits/s 5 = 1200 bits/s 6 = 300 bits/s
I1	-	State of interlocking line 1 0 = not active state 1 = active state
I2	-	State of interlocking line 2
I3	-	State of interlocking line 3
I4	-	State of interlocking line 4
I5	-	State of interlocking line 5
I6	-	State of interlocking line 6
I7	-	State of interlocking line 7
I8	-	State of interlocking line 8
O1…16	-	Sate of output relay 1…16 0 = not active state 1 = active state
C	0	Status information of module 0 = when read normal state, when written resets the status register 1 = CPU reset has occurred 2 = overflow of the event register has occurred 3 = 1 + 2
F	SACO 16D2B	Type designation of module
T	-	Time setting 0.000...59.999 = time in seconds and milliseconds
L	-	Event sequence register Time, channel and event code
B	-	Repeated read out of event register Time, channel and event code
A	-	Active alarms Channel number and event code

Channel related parameters (alarm channels 1...16)

Code	Factory setting	Value and function
S1	0.02	Channel input delay 0.005...160.0 = reset delay 0.005 s steps
S2	0.02	Channel reset delay 0.005...160.0 = reset delay 0.005 s steps

Code	Factory setting	Value and function
S3	0	Field contact type 0 = NO contact, with return function 1 = NC contact, with return function 2 = raising edge only 3 = falling edge only 4 = raising and the falling edge 5 = pulse counter, counts by contact closing 6 = pulse counter, counts by contact opening 7 = pulse counter, counts by contact opening and closing
S4	0	Channel related sequence 0 = visual indication in accordance with selected sequence 1 = visual indication in accordance with selected sequence, but with audible alarm also on return to normal 2 = field contact following visual indication without audible alarm
S5	0	Channel reflash A 0 = not connected 1 = connected to reflash group 1 2 = connected to reflash group 2
S6	0	Channel reflash B 0 = not connected 1 = connected to reflash group 1 2 = connected to reflash group 2
S7	0	Interlocking signal 1, type specification 0 = interlocking output 1 = interlocking input, reflash A blocked 2 = interlocking input, entire channel, return as acknowledged alarm 3 = interlocking input, entire channel, return as new alarm
S8	0	Interlocking signal 1, grouping 0 = not connected 1...8 = connected to interlocking line 1...8
S9	0	Interlocking signal 2, type specification 0 = interlocking output 1 = interlocking input, reflash A blocked 2 = interlocking input, entire channel, return as acknowledged alarm 3 = interlocking input, entire channel, return as new alarm
S10	0	Interlocking signal 2, grouping 0 = not connected 1...8 = connected to interlocking line 1...8
S11	0	Pumping supervision 0 = not connected 1...99 = allowed events per minute
V5	0	Pulse counter 0...29999 = start value
I1	-	Sate of alarm channel 0 = not active 1 = active

Event codes

Code	Meaning

Module related event codes

E10	Module fault
E13	Events from the overflow matrix register
E50	Module reset
E51	Event register overflow

Channel related event codes

E1	Alarm channel active
E2	Alarm channel reset
E3	Alarm channel active, signal follower, no blink- or audible functionality
E4	Alarm channel reset, signal follower

Technical data
(modified 03-10)

Alarm channels

Number of alarm channels	16 channels
Type of field contact signal	Normally open contact *) Normally closed contact Raising and/or falling edge Pulse counter
Internally generated field contact voltage	48 V dc + 20 %
Loop current of closed field contact circuit	4 mA ±20%
Channel input and reset delay time, field-selectable	5 ms, 20 ms *), 100 ms, 1 s, 5 s, 20 s, 60 s or 160 s Other values possible over the serial communication
Max. counting frequency for pulse counter	3 Hz

*) = factory settings

External acknowledge/reset inputs

Channel acknowledge/ reset	Closing contact
Reset of audible device	Closing contact
The control voltage for the acknowledge/reset circuits is taken from the internal supply	48 V dc + 20 %

Reflash signal outputs

Fixed reflash group alarm outputs	14 relays
Paralell lamp output	64 (By using additional relays, e.g. SACO 128R4)
Audible device output	1 relay
Internal self-supervision output	1 relay
Output relay contact types	Normally open contacts, changeable to normally closed contacts by soldering
Additional group alarm or signal following outputs	16 relays (NO, not possible to change)
Rated contact current/breaking voltage	3 A/250 V, 50 Hz
Breaking capacity for dc currents when the load time-constant L/ R < 40 ms at the voltage levels 48/110/220 V dc	3 A/0.25 A/0.15 A

Serial communication port

Protocol	SPA bus
	LON-bus by using LON/SPA gateway
Interface	RS 485
Data interchange speed, selectable	9600 Baud
	4800 Baud
	2400 Baud
	1200 Baud
	300 Baud
Bus connection modules	SPA-ZC 17 or SPA-ZC 21
	SPA-ZC 100 (LON)

Auxiliary power supply

Internal power unit 1	80. . .265 V dc
	or 19...70 V dc
Internal power unit 2	80…265 V ac or dc
Power demand	~ 20W

Test voltages

Test voltages applied to the following points:
- alarm- and acknowledge/reset inputs to the frame
- output relay contacts to the frame
- auxiliary supply circuits to the frame
- inputs, outputs and supply circuits between themselves

Dielectric test voltage as per IEC 60255-5 and SS 436 15 03	2 kV, 50 Hz, 1 min.
Impulse test voltage as per IEC 60255-5 and SS 436 15 03	5 kV, 1.2/50 µs, 0.5 J
High-frequency interference test voltage as per IEC 60255-6 and SS 436 15 03	2.5 kV, 1 MHz

Environmental conditions

Service temperature range	-10. . . +55°C
Storage temperature range	-40. . . +70°C
Heat and damp as per I EC 68-2-3	< 95 % max. 56 d/y at +40 C
Degree of protection by enclosure	IP 40
Weight	8,1 kg

Testing

The alarm annunciator unit is provided with an automatic self-supervision system which monitors the internal system voltages as well as the function of the microprocessor and the logical circuits.

If an internal fault situation is detected, the contact of the output relay of the self-supervision system drops off and the FAULT LED is switched on.

The LED indicators can be tested by pressing the test push-button on the module SWDM 3A1, located to the left in the rack (if present), continuously for more than one second. Then all LED indicators, except the FAULT indicator, on the front panel are switched on. If the push-button is depressed for more than 15 seconds, the FAULT indicator also turns on and the output relay of the self supervision system drops off.

It is recommended that the function of the field contact circuits are tested by performing primary tests to the field contacts.

Maintenance and repair

When the annunciator unit is operating under normal service conditions as specified in the section "Technical data", the annunciator unit is practically maintenance free. The modules include no parts or components, which are subject to an abnormal physical or electrical wear under normal operating conditions.

If the environmental conditions at the operating site differ from those specified, as to ambient temperature, humidity or if the atmosphere around the annunciator unit holds chemically active gases or dust, the modules ought to be visually inspected in association with the secondary testing being performed or whenever the plug-in modules are withdrawn from the case. At the visual inspection the following things should be noted:
- possible mechanical damage of the mounting case, mounting brackets or frame, plastic lid or its rubber gasket, plug-in units or their connection sockets
- signs of oxidation on the PCBs, component legs and cups, screws and other metallic parts
- traces of dust and dirt accumulating inside the plastic lid, on the PCB or inside the case. Check the condition of the rubber gasket of the lid.

If the annunciator unit fails in operation or if the operating values differ from those specified, the annunciator unit should be checked and repaired by a competent specialist in an authorized repair shop.

Generally a fault can be eliminated by changing a plug-in module, please refer to the spare part list. When a new alarm module SWPM 3A1B is inserted, the programmed parameter memory of the old alarm module can be plugged to the new module. Thus the new alarm module is ready to work with the same operating values as the old one without being separately programmed. The parameter memory is marked D17.

IMPORTANT!
When the memory circuit is plugged in, the slot on the circuit should point towards the front panel of the module. In this way possible damage of the memory circuit can be avoided. Please always use EDS protection when handling the electronic circuit

Spareparts	Name	Type
	Annunciator unit, fully equipped	SACO 641D4
	Annunciator unit with 48 channels	SACO 64D4-3
	Annunciator unit with 32 channels	SACO 64D4-2
	Annunciator unit with 16 channels	SACO 64D4-1
	Power supply module	SWSM 220A48
	Power supply module	SWSM 220A220
	Microprocessor module for SACO 161D2B	SWPM 1A1
	Input/output module for SACO 16D2B	SWIM 2A1
	Acknowledge module	SWDM 3A1
	Programming module	SACO 16PM
	Legend text film with three text sheets	SYKU 639
	Raising frame, 40 mm	SRH-ZXI
	Cover plate, 1 U	B 463505
	(required for extending the SPACOM system)	
	Spacer for combining SPACOM racks	SWSC 20
	Extension module	SWCM 8A1

Intermediate cable for interlockings, internal
faults, acknowledgements etc.

Name	Type
- for 2 racks	SWIR 24
- for 3 racks	SWIR 25
- for 4 racks	SWIR 26
- for 5 racks	SWIR 27
- for 6 racks	SWIR 28

Flat cable for connecting the reflash groups
between several SACO 64D4   SWIR 23

Bus connection modules
SPA-Bus
  Electrical connection modules

Name	Type
- RS 485, two 9-pole D-type connectors	SPA-ZC3

  Fibre optical connection modules

Name	Type
- plastic out – plastic in	SPA-ZC 21 BB/S
- glass out – glass in	SPA-ZC 21 MM/S
- plastic out – glass in	SPA-ZC 21 BM/S
- glass out – plastic in	SPA-ZC 21 MB/S
- plastic out – plastic in	SPA-ZC 17 BB/S
- glass out – glass in	SPA-ZC 17 MM/S
- plastic out – glass in	SPA-ZC 17 BM/S
- glass out – plastic in	SPA-ZC 17 MB/S

LON-Bus
  Fibre optical connection modules

Name	Type
- plastic out – plastic in	SPA-ZC 100 BB
- glass out – glass in	SPA-ZC 100 MM

Plastic-fibre cable with connectors   SPA-ZF AA
Available lengths: 1, 3, 5, 10, 20 and 30 m

Glass-fibre cable with connectors   SPA-ZF LL
Available lengths: 1, 3, 5, 10, 15, 20, 25, 30,
40, 50, 60, 70, 80, 90 and 100 m.
Longer cables are available on request.

RS 485 cable with connectors   SPA-ZP 9P9S
Available lengths: 1, 3, 5, 10, 20 and 30 m.
Longer cables are available on request.

0rder information

Information to be supplied with order:
1. Quantity, type designation and order number
2. Auxiliary supply voltages
3. Accessories

Exemple:
1 Annunciator unit type SACO 64D4-3 with 48 channels, order number RS 811 643-BA
  U 1 48 V dc
  U 2 220 V, 50 Hz
1 acknowledge module type SWDM 3A1 , order number RS 962 031 -AA
1 programming module type SACO 16PM, order,number RS 891 071-AA

The following accessories are included in an annunciator unit delivery:
3 legend text films SYKU 639
1 cover plate 1 U (for extending the SPACOM system)
1 pair of spacers SWSC 20 (for combining SPACOM racks)
1 intermediate cable SWIR 24
4 fastening screws M6 x 20
1 product document

Troubleshooting

The faults that may appear in the annunciator unit can be classified as follows:
- power supply faults
- module faults

The faults can be located and repair measures can be taken using the following table:

Fault type	Recognition	Repair step
Supply missing	Supervision contact closed, power module indicator not glowing	Check and repair the power supply
Field contact voltage missing	Supervision contact closed, FAULT-indicator glowing on panel of annunciator module No. 1, no alarms obtained and remote acknowledge out of work	Replace the supply module Check the internal wiring
Relay control voltage missing	Supervision contact closed, no reflash signals obtained	Replace the supply module Check the internal wiring
Logic circuit voltage missing	Supervision contact closed, ON-indicators switched off	Replace the supply module Replace the microprocessor module Check the internal wiring
Microprocessor fault	Supervision contact closed and the FAULT-indicator of the concerned module switched on	Replace the microprocessor module
Data communication fault	PROGRAM-indicator blinking on module unable of obtaining contact. Output device prints out a fault code E53	Check the correct programming of the module Replace the concerned module Check the internal wiring

Fault type	Recognition	Repair step
Fault on input or output circuit	No alarm from a particular channel A certain output signal is missing A certain remote acknowledge function out of work	Check the interlocking settings Check the external wiring Replace the concerned input/output module Replace the concerned annunciator module Check the internal wiring

When replacing a microprocessor module, the programmed parameters can be moved to the new module by moving the parameter memory circuits from the old PC-boards to the new module. The parameters of the SWPM 1A1B module are stored in the circuit D7.

IMPORTANT!
The memory circuits have to be inserted in their sockets so that the slot of the casing faces the front side of the module. This will prevent the memory circuits from being damaged.

ABB