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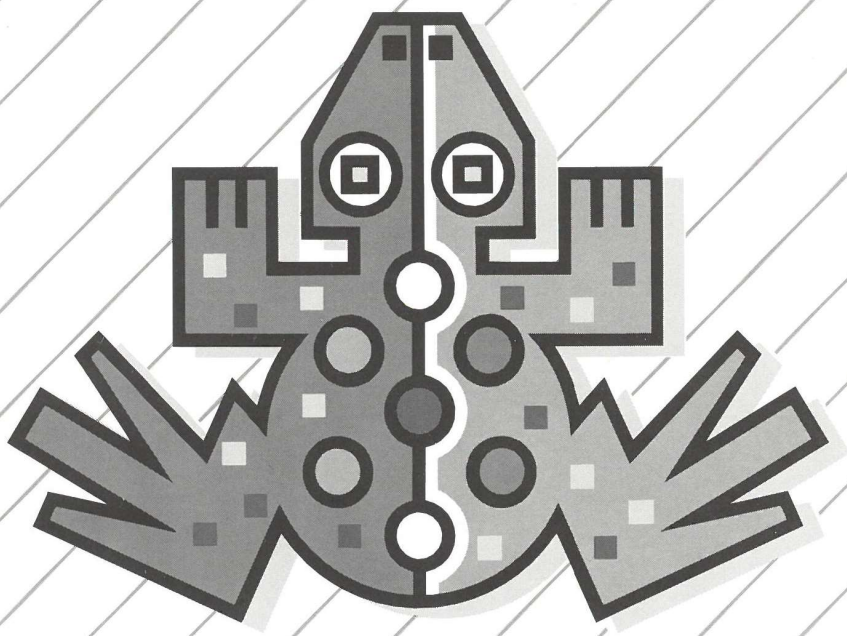
Operating Manual
RE 8408 & RE 8418
Dual Sound In Sync System



RE TECHNOLOGY

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RE 8408 & RE 8418
Dual Sound In Sync System

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RE 8408 & 8418 Dual Sound In Sync System (DSIS)

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1. GENERAL INTRODUCTION

1.1 Introduction

This manual describes the RE TECHNOLOGY Dual Sound In Sync (DSIS) system.

The name DSIS implies that a 728 kbit/s data signal, carrying two audio channels, is coded into the line syncs of a video signal in the DSIS Encoder Terminal and decoded again in the DSIS Decoder Terminal.

SECTION 1

First a general description of the DSIS system will be given. The paths for the data and the video signal are followed from input to output in order to give a precise understanding of the system concept.

This is followed by the equipment specifications, and finally a description of each module in the DSIS Encoder Terminal and DSIS Decoder Terminal.

SECTION 2

This section provides information on installation and operation of the DSIS equipment.

1.2 DSIS System Description

The basic Dual Sound In Sync system comprises a DSIS Encoder Terminal, a DSIS Decoder Terminal and a video transmission path, capable of carrying Sound In Sync (SIS) coded video signals. The actual implementation of the transmission path is outside the scope of this manual and will not be discussed in the following.

The DSIS Encoder Terminal accepts a 728 kbit/s data signal or up to two analog audio signals which are A to D converted and coded into the standard 728 kbit/s frame structure. The 728 kbit/s data signal is then inserted into the line sync pulses of a baseband video signal using a four level encoding.

The DSIS Decoder Terminal extracts the digital signal from the input video signal (carrying SIS) and recovers the original 728 kbit/s data signal.

If the 728 kbit/s data signal is coded according to the EBU recommendation SPB 424 (specification for transmission of two-channel digital sound with terrestrial television systems B, G, H and I, July 1989), and if an audio decoder is installed, the DSIS Decoder Terminal decodes the 728 kbit/s data signal and provides an analog stereo audio (two channels) and a mono audio output.

Fig. 1.1 and fig. 1.2 show schematic block diagrams of the DSIS Encoder and DSIS Decoder Terminals.

1.2.1 The Data Path

In the two RE 822-02 Audio ADCs, the two analog audio signals are lowpass-filtered to 15 kHz by antialiasing filter before entering the A/D converters which sample at 32 kHz and each deliver 14-bit linear PCM output to the RE 824-17 Audio Encoder.

The 14 bits are reduced to 10 bits and one bit of parity is added. The two resulting 11-bit data signals, one for each audio channel, are multiplexed according to EBU rec. SPB 424, forming a 728 kbit/s serial data signal, which together with a 728 kHz clock is passed to the RE 864-01 SIS buffer.

The 728 kbit/s serial data signal from the Audio Encoder (or from an external source) is stored in 2-bit parallel format in the RE 864-01 SIS Buffer. When a line sync is present, the data is read in a burst and transferred to the RE 864-02 SIS Encoder.

In the RE 864-02 SIS Encoder the 2-bit words are coded into one of four levels after appropriate filtering. The four level data bursts are amplified to a 700 mVpp amplitude and transferred to the RE 864-08 SIS Inserter.

The RE 864-08 SIS Inserter inserts the data bursts into the line syncs of the video signal and low-pass filters the resulting DSIS video signal to be within the video bandwidth of 6 MHz.

In the DSIS Decoder Terminal the RE 865-07 SIS Stripper separates the four level encoded data bursts from the video signal. The data signal is transferred to the RE 865-02 SIS Decoder, where the signal is amplitude and DC-level controlled. The insertion clock frequency is recovered and each four level data is converted into 8-bit binary numbers by means of an A/D Converter and fed to the RE 865-01 SIS Buffer.

In the RE 865-01 SIS Buffer the 8-bit binary numbers are decoded into 2-bit numbers and stored in a FIFO. A regenerated 728 kHz clock reads the FIFO which outputs the serial 728 kbit/s data signal.

From the RE 865-01 SIS Buffer the 728 kbit/s data and clock signals can be fed directly to the output terminals of the DSIS Decoder Terminal and to the RE 825-25 Audio Decoder.

If the RE 865-05 Reframer Module is fitted, the 728 kbit/s data and clock signals from the RE 865-01 SIS Buffer can be fed via the RE 865-05 Reframer Module to the output terminals of the DSIS Decoder Terminal and/or to the RE 825-25 Audio Decoder.

The RE 865-05 Reframer Module locks to the incoming 728 kbit/s data signal. If the RE 865-05 Reframer detects a phase shift in the 728 kbit/s data signal, due to switching in the network carrying DSIS coded video (i.e. route switching or insertion of commercials), it will switch the output 728 kbit/s signal from the incoming 728 kbit/s signal to its internal generated dummy 728 kbit/s signal.

The internal generated dummy frame simulates audio silence (mute).

While outputting the dummy frame, the RE 865-05 Reframer will lock to the new 728 kbit/s input signal. The phase difference between the internal dummy frame and the incoming 728 kbit/s signal is equalized by delaying the incoming 728 kbit/s data signal.

When the phase difference is equalized, the RE 865-05 Reframer will switch the output from the internal dummy frame to the incoming 728 kbit/s data signal ensuring a clean audio cut.

The RE 825-25 Audio Decoder recovers the left and right audio channels plus an audio mono signal. The three audio signals are connected to the output terminals.

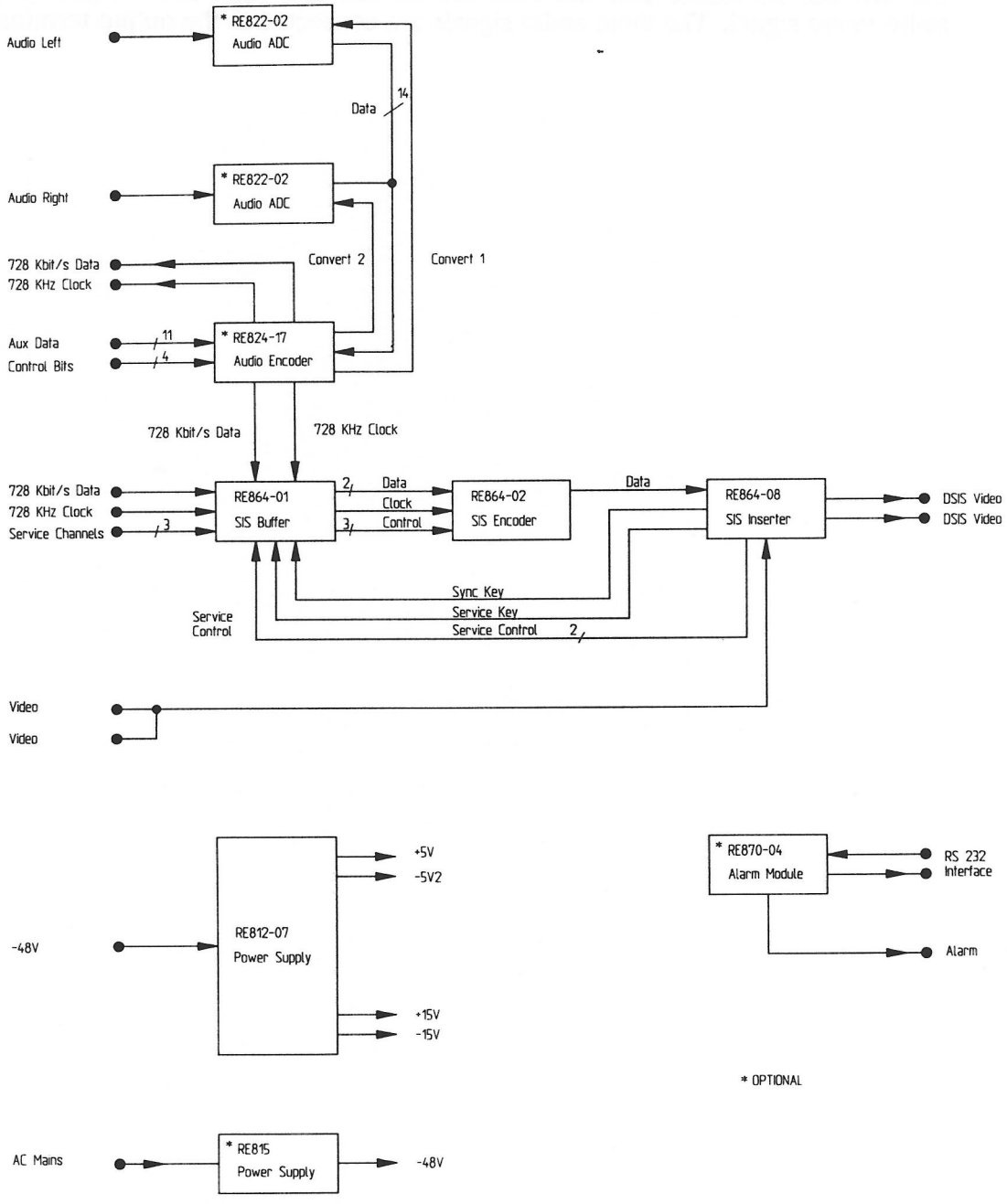

Fig. 1.1 Schematic Block Diagram of the DSIS Encoder Terminal

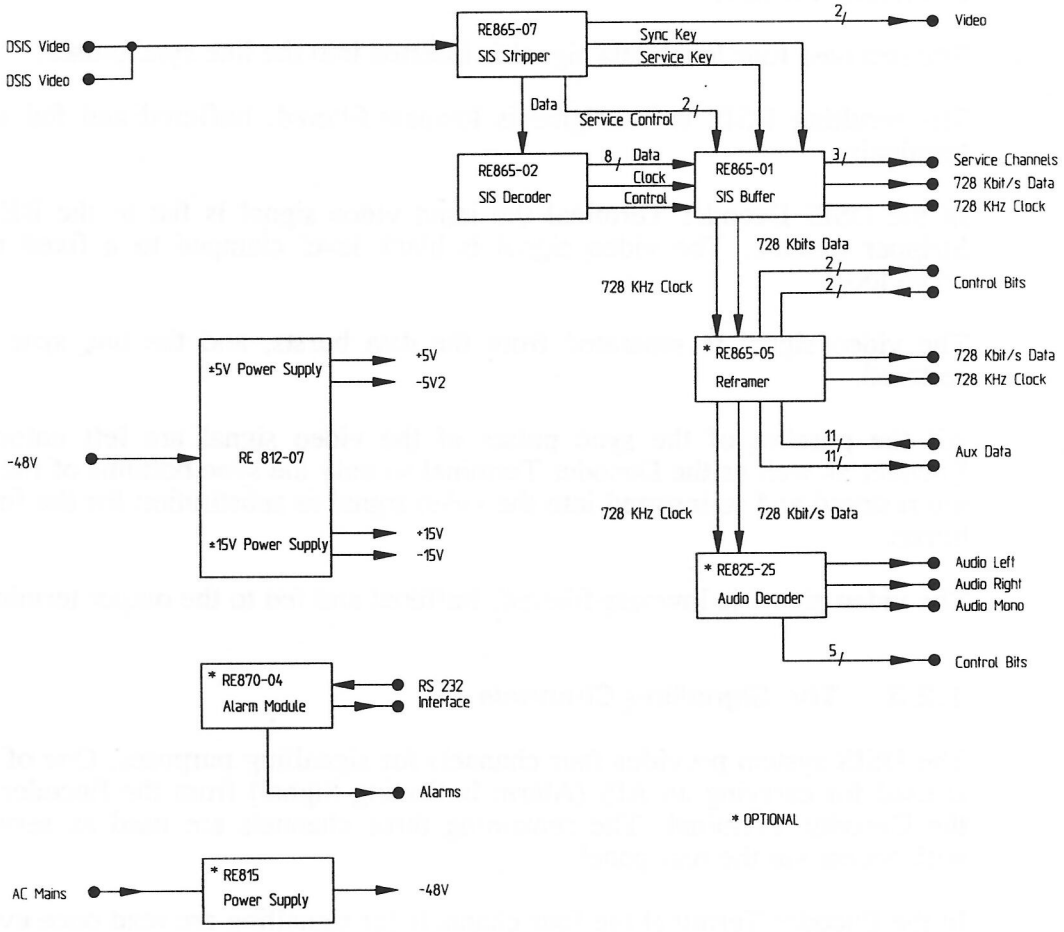

Fig. 1.2 Schematic Block Diagram of the DSIS Decoder Terminal

1.2.2 The Video Path

The video signal is basically passed unaffected through the system.

In the DSIS Encoder Terminal the input video signal is fed to the RE 864-08 SIS Inserter module. The video signal is black level clamped to a fixed voltage by a servo loop.

Line sync pulses are stripped from the video signal and transferred to the RE 864-01 SIS Buffer module.

The received four level data signal is inserted into the line sync pulses.

The resulting DSIS video signal is lowpass-filtered, buffered and fed to the output terminals.

In the DSIS Decoder Terminal the input video signal is fed to the RE 865-07 SIS Stripper module. The video signal is black level clamped to a fixed voltage by a servo loop.

The video signal is separated from the data bursts, and the line sync bottoms are restored.

All the porches of the sync pulses of the video signal are left untouched in the Encoder as well as the Decoder Terminal so only the sync bottoms of the video signal are restored and re-inserted into the video signal as substitution for the four level data bursts.

The video signal is lowpass-filtered, buffered and fed to the output terminals.

1.2.3 The Signalling Channels

The DSIS system provides four channels for signalling purposes. One of the channels is used for carrying an AIS (Alarm Indicating Signal) from the Encoder Terminal to the Decoder Terminal. The remaining three channels are used as service channels with access via the rear panel.

In the Encoder Terminal the four channels for signalling are read once every 40 ms in the RE 864-01 SIS Buffer. The collected bits are transferred to the RE 864-02 SIS Encoder when an appropriate line in the input video signal is present. The encoded channels for signalling are inserted into the video signal by the RE 864-08 SIS Inserter and fed to the output terminals.

In the Decoder Terminal the four channels are separated from the video signal by the RE 865-07 SIS Stripper. The channels are fed to the RE 865-02 SIS Decoder, where the channels are A to D converted and transferred to the RE 865-01 SIS Buffer module.

In the RE 865-01 SIS Buffer the signalling channels are separated from data bursts and the three service channels are transferred to the output terminals. The AIS signal can be strapped by means of a jumper to suppress Decoder alarms. When the AIS signal from the Encoder terminal is on, a yellow LED at the front of the Decoder Terminal will light up.

1.3 Specifications

The specifications given for video and audio performance are for a complete system consisting of one DSIS Encoder Terminal and one DSIS Decoder Terminal coupled back to back via a 75 Ω coaxial cable.

1.3.1 Video Specifications

Nominal input/output level	:	1 Vpp
Max. input/output level	:	2.5 Vpp (equivalent to at least 6 dB overload margin relative to 1.234 Vpp)
Min. input/output level	:	0.6 Vpp (equivalent to at least 6 dB attenuation relative to 1.234 Vpp)
Insertion gain	:	0 dB $\pm$ 0.2 dB
Pulse response K_{2T}	:	< 0.5%
Pulse to Bar ratio K_{2T}	:	< 0.5%
Tilt (50 Hz)	:	< 0.5%
Frequency response (0 - 5.5 MHz)	:	0 dB $\pm$ 0.2 dB
Group delay variations	:	$\pm$10 ns
Luminance non-linearity	:	< 1.0%
Differential gain	:	< 0.5%
Differential phase	:	$< 0.5^{o}$
Signal to noise ratio (weighted)	:	> 70 dB
Signal to noise ratio (unweighted) 10 kHz - 5.5 MHz	:	> 60 dB
Re-inserted sync pulse amplitude error	:	< 1.0%

1.3.2 Audio Specifications

Number of audio outputs (15 kHz)	:	3 (one mono and one stereo output)
Type of conversion	:	728 kbit/s according to EBU rec. SPB 424.
Resolution	:	14-bit
Sampling frequency	:	32 kHz
Input impedance	:	600 Ω, balanced or > 12 kΩ, balanced
System gain	:	0 dB ±0.2 dB
Clipping level (Max. undistorted input)	: :	+14.8 dBm0 @ 2 kHz in acc. with CCITT rec. J.17. Other levels at request.
Output impedance	:	< 100 Ω, transformer balanced
Output load impedance	:	≥ 300 Ω
Total harmonic distortion 1 kHz + 9 dBm0	:	> -65 dB
Frequency response 20 Hz - 14 kHz 14 kHz - 15 kHz	: :	±0.2 dB +0.2/-1.4 dB
Interchannel phase difference 20 Hz - 200 Hz 200 Hz - 4 kHz 4 kHz - 15 kHz	: : :	 < 10° < 5° < 10°
Group delay variation 20 Hz - 10 kHz 20 Hz - 14 kHz 20 Hz - 15 kHz	: : :	 < 0.05 ms < 0.5 ms < 1 ms
Crosstalk between channels	:	< -80 dB
Idle channel noise unweighted (20 Hz - 15 kHz) quasipeak, weighted, CCIR	: : :	 < -63 dBm0 < -60 dBq0ps

1.3.3 Clock and Data Specifications

Nominal input/output level	:	+2.5 V into 75 Ω (1 equals + 2.5 V 0 equals - 2.5 V)
Max. input attenuation	:	12 dB at 364 kHz
Clock frequency (external source)	:	728 kHz ± 10 ppm
Clock frequency (internal source)	:	728 kHz ± 1 ppm
Input jitter at 728 kHz	:	Acc. to CCITT rec. G.742 for 2048 kbit/s
Jitter transfer	:	Acc. to CCITT rec. G.742 for 2048 kbit/s
Clock-data timing (input/output)	:	Leading clock edge in center of data ± 0.3 us.

1.3.4 Mechanical Specifications

The following specifications apply to a fully equipped DSIS Encoder Terminal or a fully equipped DSIS Decoder Terminal.

The equipment practice is 19" standard.

Dimensions

Height	:	132 mm (5.2")
Width	:	484 mm (19")
Total depth including handles and connectors on the front and rear sides	:	270 mm (10.6")
Required depth for installation	:	232 mm (9.1")
Weight, including AC mains supply	:	Approx. 9 kg (20 lbs)
Weight, -48 V supply	:	Approx. 7 kg (15 lbs)
Cooling requirements	:	Convection cooling

1.4 Encoder Equipment

1.4.1 RE 800-78 Encoder Subrack

The RE 800-78 is a 19" 3 HE subrack for a DSIS Encoder Terminal. The subrack contains a motherboard with all the necessary electrical connections between the plug-in-modules.

The motherboard also contains the necessary connections for alarms (and LED indicators) to overrule and suppress consequent alarms. Whenever an alarm occurs in the Encoder subrack, the motherboard informs the RE 864-01 SIS Buffer. The RE 864-01 SIS Buffer will generate an AIS (Alarm Indicating Signal).

All electrical connections to the RE 800-78 Encoder subrack are routed via the rear panel.

The RE 800-78 Encoder subrack is powered from a -48 V DC supply, but as an option a RE 815 AC mains supply will accept 120 V, 220 V or 240 V AC mains input voltage.

The following modules can be installed in the RE 800-78 Encoder Subrack (order from right to left as seen from the front panel) as shown in table 1.1.

Position	Module type
1	RE 812-07 Power Supply
2	Blind Plate
3	RE 870-04 Alarm Module *
4	RE 824-17 Audio Encoder *
5	RE 822-02 Audio ADC *
6	RE 822-02 Audio ADC *
7	RE 864-01 SIS Buffer
8	RE 864-02 SIS Encoder
9	RE 864-08 SIS Inserter

Table 1.1 Modules and Positions in an Encoder Subrack

* RE 824-17 Audio Encoder, RE 822-02 Audio ADCs and the RE 870-04 Alarm module are optional and are not needed for basic encoding of a 728 kbit/s data signal into the line sync pulses of a video signal.

1.4.2 RE 812-07 Power Supply

The RE 812-07 Power Supply is a DC-DC converter of the switch mode type. The switch frequency is approximately 115 kHz, thus avoiding any problems with acoustic noise in the audible frequency range.

The RE 812-07 should be fed from a -35 V to -80 V DC source with the plus pole to ground.

The converter is overload- and overvoltage-protected, has slow-start facilities and includes input as well as output filters to avoid conducted noise into connected circuitry. Green light emitting diodes on the front plate indicate when power is applied.

1.4.3 RE 822-02 Audio ADC, 15 kHz, 14-bit

The RE 822-02 Audio ADC module converts an analog input signal into PCM data words on a parallel bus.

The audio input signal pass through an input transformer, an amplifier with selectable gain and a phase corrected low-pass filter of 11th order to prevent aliasing products. The signal then passes a pre-emphasis networks before entering the A/D converter which samples at 32 kHz and delivers 14-bit linear PCM outputs. The combined 14-bit words are delivered to the RE 824-17 Audio Encoder.

1.4.4 RE 824-17 Audio Encoder

The RE 824-17 Audio Encoder receives the two digitized audio channels from the two RE 822-02 Audio ADCs. The two audio inputs, together with 11 times 1 kbit/s auxiliary data channels, are scrambled and encoded to a 728 kbit/s data signal according to the EBU recommendation SPB 424.

The coding process can be controlled by setting the control bits C_1, C_2, C_3 and C_4 via the rear panel (refer to section 2, page 11).

The outputs from the RE 824-17 Audio Encoder is a 728 kbit/s data signal with associated clock signal.

1.4.5 RE 864-01 SIS Buffer

RE 864-01 SIS Buffer module receives a 728 kbit/s data signal from the RE 824-17 Audio Encoder or from the input terminals.

The data is loaded into a FIFO, 2 bits at a time.

The data insertion frequency of 6.552 MHz is generated by a phase locked loop locked to the incoming 728 kHz clock signal.

The insertion clock signal reads 24 2-bit words from the FIFO, when a line sync pulse is present. The data words are scrambled by a pseudo random scrambler locked to the video signal and finally a marker pulse is added.

The read rate of the FIFO is slightly higher than the write rate, so when the "half full" flag of the FIFO goes low, the insertion clock will read only 20 words instead of 24 words from the FIFO in order to equalize the two rates.

Four line sync pulses in the video signal are used to carry 3 service channels and the AIS signal. When a video frame begins, the 4 channels are read and inserted in the data burst signal from the FIFO.

The resulting data burst signal is fed to the RE 864-02 SIS Encoder.

1.4.6 RE 864-02 SIS Encoder

The RE 864-02 SIS Encoder receives the data bursts from the RE 864-01 SIS Buffer. The data is digitally shaped (filtered) in order to remove high-frequency contents, before the data words are D to A converted into one of four levels.

The analog four level signal is lowpass-filtered and buffered, before it is transferred to the RE 864-08 SIS Inserter.

1.4.7 RE 864-08 SIS Inserter

The RE 864-08 SIS Inserter module black level clamps the input video signal to a fixed voltage by means of a servo loop. The video signal is stripped for line sync pulse information used to collect data to insert from the RE 864-01 SIS Buffer module.

The received four level coded data signal is DC level controlled to keep the same sync pulse amplitude as the applied video signal.

The video signal and the four level data signal are routed to a video switch, multiplexing the two signals to form the DSIS video signal. The resulting DSIS video signal is lowpass-filtered and buffered, before it is transferred to the output terminals.

When 24 symbols plus marker are to be inserted, the marker pulse will be inserted approximately 0.3 us. after the line time reference point (i.e. the half-amplitude point of the sync pulse front porch). When 20 symbols puls marker are to be inserted, the marker pulse will be inserted approximately 0.75 us. after the line time reference point.

1.4.8 RE 870-04 Alarm Module

The RE 870-04 Alarm module will monitor power supply voltages and up to eight alarm outputs from other modules in the subrack.

The RE 870-04 can be programmed to perform any logical combination of the alarm outputs that are monitored, i.e. letting some alarms overrule others.
The power supply voltages are monitored to be within $\pm 10\%$ of their nominal value. If a voltage exceeds this limit, an A-alarm (prompt) will be generated.

All other alarm situations can be selected to give either A-alarm, B-alarm (deferred) or C-alarm (in station) by means of jumpers on the printed circuit board. An "Earth Free Loop" output is provided for each of the three alarms.

The RE 870-04 includes a "Receiving Attention Key" facility with the associated annunciating light emitting diodes and earth free loop terminals.

The RE 870-04 has a microprocessor circuit installed. This circuit enables automatic fault reporting to a remote printer via a RS232-interface. A number of RE 870-04 alarm modules can be cascaded to report to the same printer, in which case each module is strapped to send an identification number in the range 0-15 to clearly identify the origin of the message.

1.5 Decoder Equipment

1.5.1 RE 800-79 Decoder Subrack

The RE 800-79 is a 19" 3 HE subrack for a DSIS Decoder Terminal. The subrack contains a motherboard with all the necessary electrical connections between the plug-in-modules.

The motherboard also contains the necessary connections for alarms (and LED indicators) to overrule and suppress consequent alarms.

The received AIS from the DSIS Encoder Terminal is used to disable all alarms in the Decoder Terminal. This function can be disabled by a jumper on the mother-board in the Decoder Terminal. Whenever the DSIS Decoder Terminal receives an AIS, a yellow LED at the front will be turned on.

All electrical connections to the RE 800-79 Decoder subrack are routed via the rear panel.

The RE 800-79 Decoder subrack is powered from a -48 V DC supply, but optional a RE 815 AC mains supply can be fitted into the rear panel. The RE 815 AC mains supply will accept 120 V, 220 V or 240 V AC mains input voltage.

The following modules can be installed in the RE 800-79 Decoder Subrack (order from right to left as seen from the front panel) as shown in table 1.2.

Position	Module type
1	RE 812-07 Power Supply
2	Blind Plate
3	RE 870-04 Alarm Module *
4	Blind Plate
5	RE 865-05 Reframer *
6	RE 825-25 Audio Decoder *
7	RE 865-01 SIS Buffer
8	RE 865-02 SIS Decoder
9	RE 865-07 SIS Stripper

Table 1.2 Modules and Positions in a Decoder Subrack

* RE 825-25 Audio Decoder, RE 865-05 Reframer and the RE 870-04 Alarm module are optional and are not needed for basic decoding of a 728 kbit/s data signal from the line sync pulses of a video signal.

1.5.2 RE 812-07 Power Supply

The RE 812-07 Power Supply is a DC-DC converter of the switch mode type. The switch frequency is approximately 115 kHz, thus avoiding any problems with acoustic noise in the audible frequency range.

The RE 812-07 should be fed from a -35 V to -80 V DC source with the plus pole to ground.

The converter is overload- and overvoltage-protected, has slow-start facilities and includes input as well as output filters to avoid conducted noise into connected circuitry. Green light emitting diodes on the front plate indicate when power is applied.

1.5.3 RE 825-25 Audio Decoder

The RE 825-25 Audio Decoder receives a 728 kbit/s data signal and clock from either the RE 865-05 Reframer or the RE 865-01 SIS Buffer. The module locks to the 728 kbit/s frame and decodes the frame according to the frame structure. The audio samples are expanded from 10 to 14 bits and converted to analog signals.

If the audio is encoded as a pair of stereo channels, the RE 825-25 derives a mono signal.

If two independent signals or one mono signal are encoded, the mono output will be a duplicate of the left audio signal.

1.5.4 RE 865-01 SIS Buffer

The RE 865-01 SIS Buffer receives 8-bit data words converted from the four level data signal in the RE 865-02 SIS Decoder.

A microprocessor uses the converted signal to adjust the gain and DC offset in the amplifier in front of the data A to D converter to optimize the four level data signal to the slicing levels.

The marker pulse position relative to the line time reference point is used to detect, whether the line sync pulse is carrying 24 or 20 symbols. The marker pulse is stripped from the data, and the data is descrambled and stored in a FIFO, 2 bits at a time.

The three service channels and the AIS are demultiplexed. The service channels are transferred to the output terminals and the AIS is sent to the motherboard.

The insertion clock frequency of 6.552 MHz is divided by 9 recovering the 728 kHz clock signal.

The 728 kHz clock is used to read the FIFO and serialize the data, hereby regenerating the 728 kbit/s data signal. The data and clock signals are transferred to the output terminals and to the RE 825-25 Audio Decoder or RE 865-05 Reframer module.

1.5.5 RE 865-02 SIS Decoder

The RE 865-02 SIS Decoder adjusts the amplitude and DC level of the four level data burst signal to be within the dynamic range of an A to D Converter.

Then the signal is A to D converted with 8-bit resolution.

The insertion clock frequency of 6.552 MHz is regenerated by a phase locked loop locked to the Marker pulse.

1.5.6 RE 865-07 SIS Stripper

The RE 865-07 SIS Stripper module black level clamps the input video signal to a fixed voltage by means of a servo loop. The video signal is stripped for line sync pulse information, used to separate the video signal and the four level data signal.

The sync bottoms in the video signal are restored. The video signal is lowpass-filtered and buffered, before it is routed to the output terminals.

The four level data signal is transferred to the RE 865-02 SIS Decoder module for decoding.
If a video input loss is detected, the video output of the RE 865-07 SIS Stripper and hereby the output of the DSIS Decoder Terminal will automatically be switched to 0 V DC.

1.5.7 RE 865-05 Reframer

The RE 865-05 Reframer module is inserted between the RE 865-01 SIS Buffer and the RE 825-25 Audio Decoder.

The RE 865-05 Reframer module will reframe the received frame structure, if the 728 kbit/s data signal is coded according to the EBU rec. SPB 424.
It is possible to monitor and change the control bits and auxiliary bits, before the 728 kbit/s frame is transferred to the RE 825-25 Audio Decoder and to output terminals.

The RE 865-05 Reframer contains an internal 728 kbit/s frame generator. The frame generator generates a frame according to the EBU rec. SPB 424 containing audio data, which simulates audio silence.

The RE 865-05 Reframer locks to the incoming 728 kbit/s frame. The input 728 kbit/s frame is delayed to be in phase with the internal generated frame.

When a phase shift (due to switching in the network carrying the SIS coded video signal, i.e. route switching or insertion of local commercials) is detected, the output from the RE 865-05 Reframer is switched to the in phase internal frame generator. The RE 865-05 Reframer will relock to the input 728 kbit/s frame, and when the phase equalization is achieved, the output is switched back to the input 728 kbit/s frame.

The result at the output of RE 865-05 Reframer is a clean mute during changeover from one data source to another.

1.5.8 RE 870-04 Alarm Module

The RE 870-04 Alarm module will monitor power supply voltages and up to eight alarm outputs from other modules in the subrack.

The RE 870-04 can be programmed to perform any logical combination of the alarm outputs that are monitored, e.g. letting some alarms overrule others.

The power supply voltages are monitored to be within $\pm 10\%$ of their nominal value. If a voltage exceeds this limit, an A-alarm (prompt) will be generated.

All other alarm situations can be selected to give either A-alarm, B-alarm (deferred) or C-alarm (in station) by means of soldered joints on the printed circuit board. An "Earth Free Loop" output is provided for each of the three alarms.

The RE 870-04 includes a "Receiving Attention Key" facility with the associated annunciating light emitting diodes and earth free loop terminals.

The RE 870-04 has a microprocessor circuit installed. This circuit enables automatic fault reporting to a remote printer via a RS232-interface. A number of RE 870-04 alarm modules can be cascaded to report to the same printer, in which case each module is strapped to send an identification number in the range 0-15 to clearly identify the origin of the message.

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Section Two

2. INSTALLATION AND OPERATION

2.1 Introduction

This part of the manual provides information on installation and operation of the DSIS Encoder and Decoder Terminals.

2.2 Installation

2.2.1 Initial Inspection

When unpacking the DSIS modules the packing material should be visually inspected for physical damage. If the modules are damaged, notify the carrier and your local RE TECHNOLOGY representative or the factory. The packing material should be retained for inspection by the carrier in the case of complaint.

2.2.2 Mechanical Installation

The subracks are intended for mounting in a 19" rack. The subracks are fastened by means of screws through the holes under the handles.

Fig. 2.1 shows the front view of a DSIS Encoder Subrack and fig. 2.2 shows the front view of a DSIS Decoder Subrack.

Fig. 2.3 shows the rear view of the DSIS Encoder Subrack and fig. 2.4 shows the rear view of the DSIS Decoder Subrack.

IMPORTANT

The DSIS modules shall be installed in the correct slots as shown in table 1.1 in section 1, page 10 and table 1.2 in section 1, page 14.

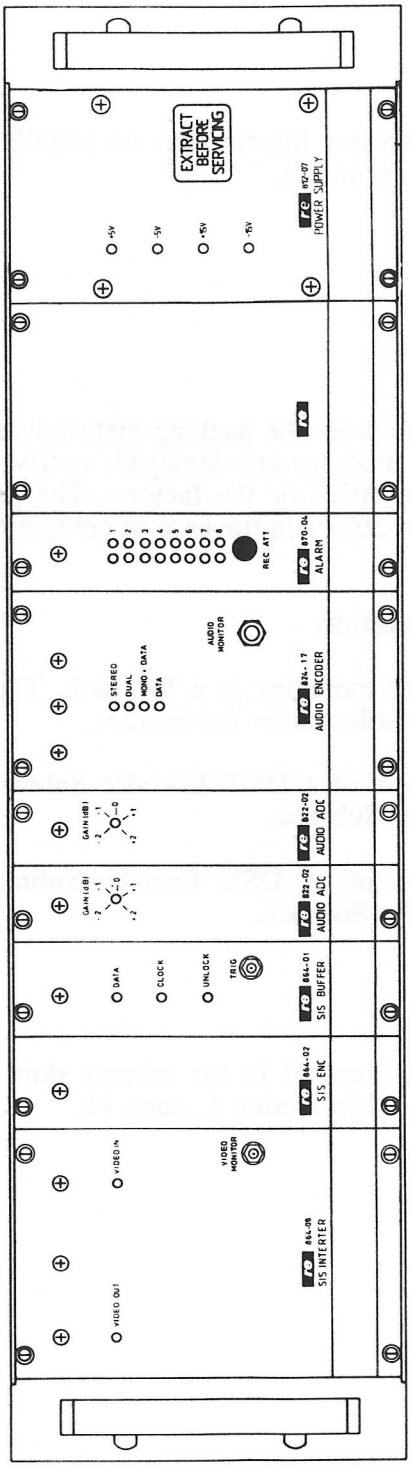

Fig. 2.1 Front View of the DSIS Encoder Terminal

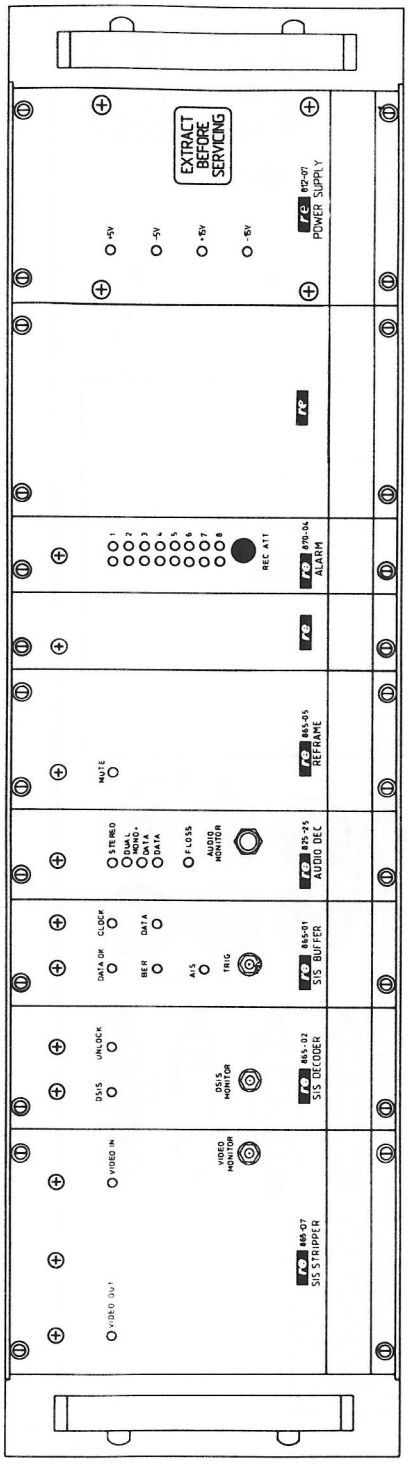

Fig. 2.2 Front View of the DSIS Decoder Terminal

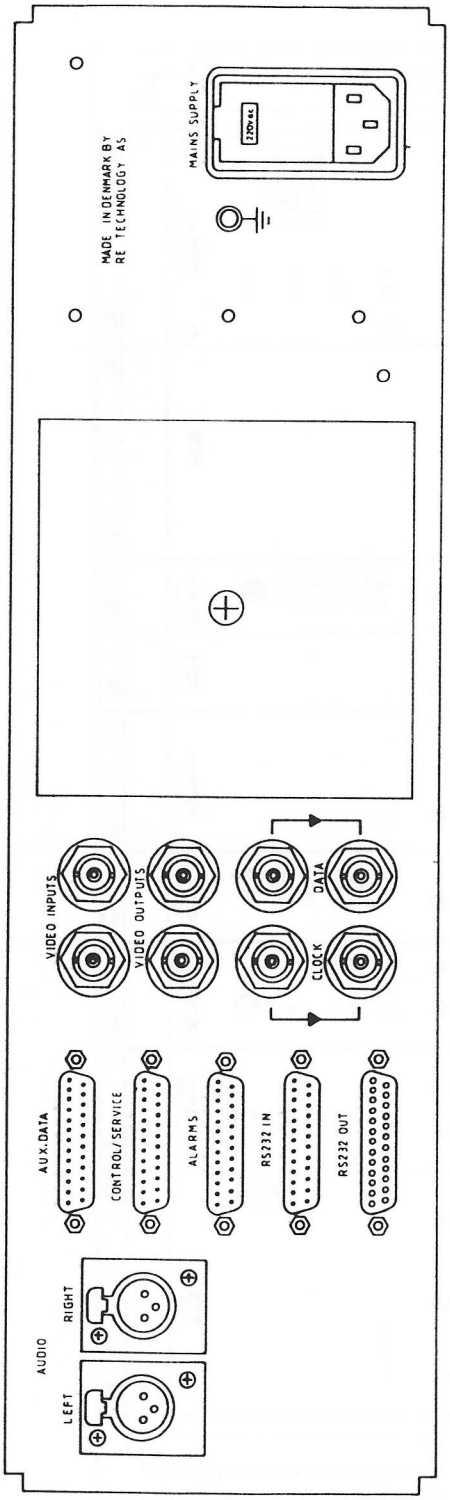

Fig. 2.3 Rear Panel of DSIS Encoder Terminal

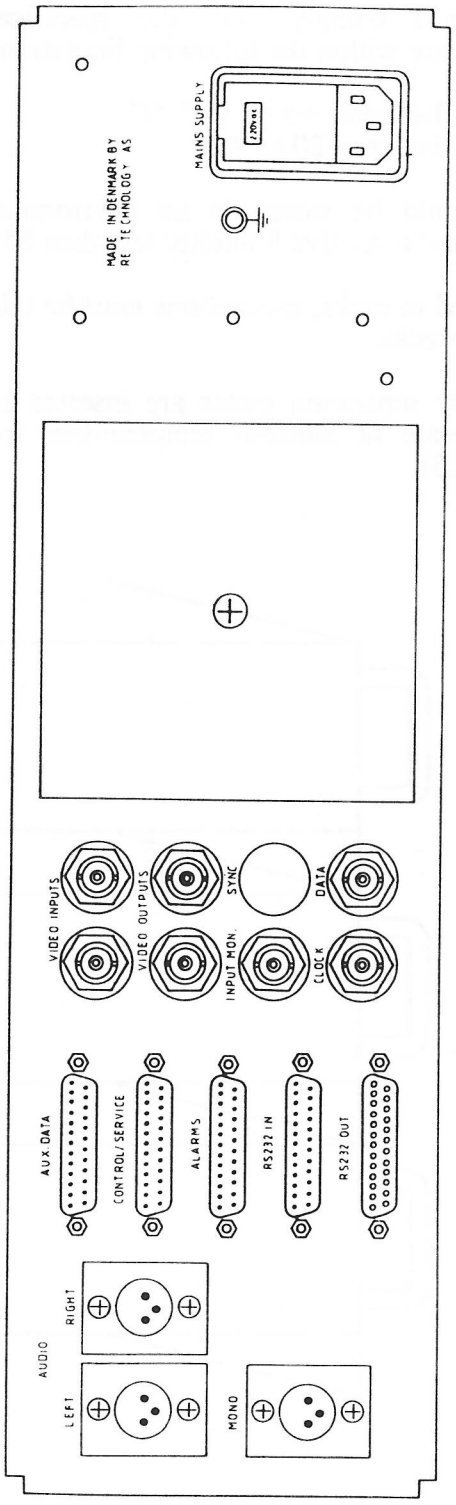

Fig. 2.4 Rear Panel of DSIS Decoder Terminal

2.2.3 Environmental Requirements

The DSIS terminals will comply with the specifications given, when the environmental conditions are within the following limitations.

Ambient temperature	between +5 to +45 °C
Relative humidity	between 20 to 85%

The DSIS terminals should be stored in an environment having a temperature between -40 to +70 °C and a relative humidity less than 85%.

When subracks are stacked in racks, precautions must be taken to avoid thermal stress on modules in the top subracks.

If thermally insulating air separation plates are inserted between the subracks, the DSIS modules will operate at ambient temperatures from +5 to 45 °C with selfconvection (see fig. 2.5).

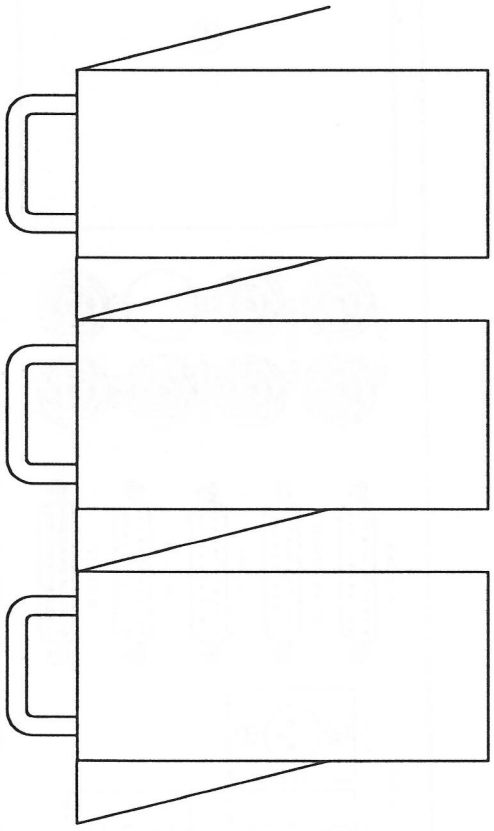

Fig. 2.5 Selfconvection Arrangement of Stacked Subracks

2.2.4 Electrical Installation

All electrical connections except monitor points are accessible at the rear panel of the subrack, and a specification of these connectors follows:

Video input/output		
Connector type	:	Suhner BNC
Output impedance	:	75 Ω relative to ground
Input impedance	:	High Z, (> 4 kΩ to ground) external termination
Nominal input/output level	:	1 Vpp
Max. input/output level	:	2.5 Vpp (equivalent to at least 6 dB overload margin relative to 1.234 Vpp)
Return loss (0-6 MHz)	:	> 30 dB
Audio input/output		
Connector type	:	XLR
Analog ground	:	pin 1
Input/output +	:	pin 2
Input/output -	:	pin 3
Clock-data input/output		
Connector type	:	Suhner BNC
Impedance	:	75 Ω relative to ground
Clock frequency (external source)	:	728 kHz ±10 ppm
Clock frequency (internal source)	:	728 kHz ±1 ppm
Nominal input/output level	:	±2.5 V (1 equals +2.5 V, 0 equals -2.5 V)
Max. input attenuation	:	12 dB at 364 kHz
Input jitter at 728 kHz	:	acc. to CCITT rec. G.703 for 2048 kbit/s
Jitter transfer	:	acc. to CCITT rec. G.742 for 2048 kbit/s

Return loss (0-728 kHz)	:	> 18 dB

Input power -48 V DC

Connector type	:	AMP, 9 poles
0 V	:	pin 1 and 4
-48 V DC	:	pin 2 and 7
Input voltage	:	-40 V to -70 V DC
Typical current at -48 V	:	1.0 A

Input power AC Mains
(when RE 815 Power Supply is installed)

Input voltage	:	110 V/220 V/240 V ±20%

Alarms

Connector type	:	25 pin D male
Prompt alarm (from RE 870-04)	:	pin 9 and 21 (Earth free loop) active = 0 Ω
Deferred alarm (from RE 870-04)	:	pin 10 and 22 (Earth free loop) active = 0 Ω
In Station alarm (from RE 870-04)	:	pin 11 and 23 (Earth free loop) active = 0 Ω
Receiving attention (from RE 870-04)	:	pin 12 and 24 (Earth free loop) active = 0 Ω

The alarm outputs from RE 870-04 are closed for normal operation, which means that a power supply failure will give alarm.

Major alarm (independent of RE 870-04)	:	Pin 2 and 14 (Earth free loop) active = 0 Ω
	:	Pin 1 and 14 (Earth free loop) inactive = 0 Ω
Minor alarm (independent of RE 870-04) (only in Decoder)	:	Pin 3 and 16 (Earth free loop) active = 0 Ω
	:	Pin 3 and 15 (Earth free loop) inactive = 0 Ω

Video input loss (independent of RE 870-04)	:	Pin 5 and 17 (Earth free loop) active = 0 Ω
	:	Pin 4 and 17 (Earth free loop) inactive = 0 Ω
DSIS input loss (independent of RE 870-04) (only in Decoder)	:	Pin 6 and 19 (Earth free loop) active 0 Ω
	:	Pin 6 and 18 (Earth free loop) inactive = 0 Ω
AIS (independent of RE 870-04) (only in Decoder)	:	Pin 8 and 20 (Earth free loop) active = 0 Ω
	:	Pin 7 and 20 (Earth free loop) inactive = 0 Ω
Alarms disable (LS-TTL input)	:	Pin 13 active, when connected to GND
GND	:	Pin 25

All alarms (independent of RE 870-04) are closed for normal operation, which means that a power supply failure will give alarm.

RS232 IN (to the RE 870-04)

This part is left open or connected to "RS232 OUT" on another subrack.

Connector type	:	25 pin D male
Data IN	:	pin 3
Ready OUT	:	pin 20
Signal ground	:	pin 7
Data rate	:	300 baud, 8 bits, no parity

RS232 OUT (from RE 870-04)

This part is connected to "RS232 IN" on another subrack or to a printer.

Connector type	:	25 pin D female
Data OUT	:	pin 3
Ready IN	:	pin 20
Signal ground	:	pin 7

Data rate : 300 baud, 8 bits, no parity

AUX DATA

Connector type : 25 pin D male

INPUTS

	INPUT	PIN
AD 0	LS-TTL	1
AD 1	LS-TTL	2
AD 2	LS-TTL	3
AD 3	LS-TTL	4
AD 4	LS-TTL	5
AD 5	LS-TTL	6
AD 6	LS-TTL	7
AD 7	LS-TTL	8
AD 8	LS-TTL	9
AD 9	LS-TTL	10
AD 10	LS-TTL	11

OUTPUTS (Decoder only)

	OUTPUT	PIN
AD 0	LS-TTL	14
AD 1	LS-TTL	15
AD 2	LS-TTL	16
AD 3	LS-TTL	17
AD 4	LS-TTL	18
AD 5	LS-TTL	19
AD 6	LS-TTL	20
AD 7	LS-TTL	21
AD 8	LS-TTL	22
AD 9	LS-TTL	23
AD 10	LS-TTL	24

AD-CLOCK (1 ms) LS-TTL : Pin 12
(Leading clock edge approximately in center of data)

GND : 25 pin D male

In the DSIS Decoder Terminal, the AUX. DATA is only available, when the RE 865-05 Reframer is installed. The outputs are for monitoring of the received bits. The inputs are inserted in the output 728 kbit/s data signal. If the connector is left open, the outputs will internally be looped through to the inputs.

Control/Service

Connector type			:25 pin D male
Service	Channel A	LS-TTL	:Pin 1
Service	Channel B	LS-TTL	:Pin 2
Service	Channel C	LS-TTL	:Pin 3

Control bits (Encoder only, when the RE 824-17 Audio Encoder is installed).

C1	Input	LS-TTL	:Pin 10
C2	Input	LS-TTL	:Pin 11
C3	Input	LS-TTL	:Pin 12
C4	Input	LS-TTL	:Pin 13
+5 V/1 mA			:Pin 14

Control bits (Decoder only, when the RE 825-25 Audio Decoder is installed).

C0	Output	LS-TTL	:Pin 9
C1	Output	LS-TTL	:Pin 10
C2	Output	LS-TTL	:Pin 11
C3	Output	LS-TTL	:Pin 12
C4	Output	LS-TTL	:Pin 13

Control bits (Decoder only, when the RE 865-05 Reframer is installed).

C3	Output	LS-TTL	:Pin 14
C3	Input	LS-TTL	:Pin 15
C4	Output	LS-TTL	:Pin 16
C4	Input	LS-TTL	:Pin 17

The C3 and C4 outputs are for monitoring of the received bits. The C3 and C4 inputs are inserted in the output 728 kbit/s data signal. If the connector is left open, the outputs will internally be looped through to the inputs.

Mute control (Decoder only, when the RE 865-05 Reframer is installed).

Mute (digital mute of the Audio in the 728 kbit/s data signal)	LS-TTL	:Pin 24 active, when connected to GND.
GND		:Pin 25

2.3 Monitor Points and Alarms

2.3.1 Monitor Point in the DSIS Encoder

Table 2.1 below presents a list of the monitor points in the DSIS Encoder Terminal. All monitor points are accessible on the front plates of the modules.

Function	Designation	Level	Connector
VIDEO INPUT	VIDEO MONITOR	1 Vpp into 75 Ω AC coupled to ground	SMC
TRIGGER SIGNAL	TRIG.	HCT-MOS 4.5 us. high level synchronous with every data burst in the output video signal	SMC
AUDIO INPUTS	AUDIO MONITOR	600 Ω unbalanced -5 dBr	6.5 mm stereo headphone jack

Table 2.1 Monitor Points in the Encoder Terminal

2.3.2 Alarms in the DSIS Encoder

Red light emitting diodes on the front plates of the modules indicate malfunction. Table 2.2 below gives a list of the available alarm indicators.

If the RE 870-04 Alarm Module is installed, it will supervise the listed alarms and report to a remote printer via the RS232-interface.

Function	Designation	Type of Alarm	Alarm No.
Clock input loss	728 Clock loss	A	1
Data input loss	728 Data loss	A	2
DSIS video output fail	Video out fail	A	3
Video input loss	Video in loss	A	4
Unable to synchronize to input 728 kHz clock	Inst. Ck. unlock	A	6
Alarms off	Alarms off	-	8

Table 2.2 Available Encoder Alarm Indicators

2.3.3 Monitor Points in the DSIS Decoder

Table 2.3 below contains a list of the monitor points in the Decoder Terminal. All monitor points are accessible via the front plates of the modules.

Function	Designation	Termination	Connector
DSIS video input	VIDEO MONITOR	1 Vpp into 75 Ω to GND AC coupled	SMC
TRIGGER SIGNAL	TRIG.	HCT-MOS 4.5 us. high level every data burst in the input video signal	SMC
Four level data	DSIS MONITOR	2 Vpp into 1 MΩ to GND	SMC
AUDIO INPUTS	AUDIO MONITOR	600 Ω unbalanced -5 dBr	6.5 mm stereo headphone jack

Table 2.3 Monitor Points in the Decoder Terminal

2.3.4 Alarms in the DSIS Decoder

Red light emitting diodes on the front plates of the modules indicate malfunction. Table 2.4 below gives a list of the available alarm indicators.

If the RE 870-04 Alarm Module is installed, it will supervise the listed alarms and report to a remote printer via the RS232-interface. -

Function	Designation	Type of Alarm	Alarm No.
Clock output fail or data output fail	Ck/Data out error	A	1
AIS received	AIS on	-	2
Video output fail	Video out fail	A	3
DSIS video input loss	Video in loss	A	4
Four level data input loss	DSIS in loss	A	5
Insertion clock unlock alarm	Inst. Ck. unlock	A	6
Bit errors/Mute	Mute/ BER on	A	7
Alarms off	Alarms off	-	8

Table 2.4 Available Decoder Alarm Indicators

2.3.5 Alarm Settings in the DSIS Encoder

The DSIS Encoder comprises a separate relay output for the alarm VIDEO IN-PUT LOSS, and another relay output for all alarms in the ENCODER Subrack. The alarms can be enabled to activate this relay output by means of jumper settings on the motherboard. The jumper settings for enabling and disabling of the various alarms in the Encoder Subrack are shown in table 2.5.

(Standard settings are marked by an asterisk).

ALARM	JUMPER	ENABLED	DISABLED
Unused	JP 1		* 1 - 2
728 Data input	JP 2	* 2 - 3	1 - 2
Video output	JP 3	* 2 - 3	1 - 2
728 clock input	JP 4	* 2 - 3	1 - 2
Unlock	JP 5	* 2 - 3	1 - 2
Video input loss	JP 6	* 2 - 3	1 - 2
Unused	JP 7		* 1 - 2

Table 2.5 Alarm Settings in the DSIS Encoder

The jumpers are located between the RE 812-07 Power Supply and the RE 870-04 Alarm module.

As an option a RE 870-04 Alarm Module can be installed.

In the RE 870-04 Alarm Module the alarm outputs are set to either Prompt, Deferred or In Station according to table 2.6 given below:

(Standard settings are marked by an asterisk. No asterisk meaning no connection).

Front Plate Designation	Jumper in Number	Prompt	Deferred	In Station
1	SP 10	1 - 4 *	2 - 5	3 - 6
2	SP 11	1 - 4 *	2 - 5	3 - 6
3	SP 12	1 - 4 *	2 - 5	3 - 6
4	SP 13	1 - 4 *	2 - 5	3 - 6
5	SP 14	1 - 4	2 - 5	3 - 6
6	SP 15	1 - 4 *	2 - 5	3 - 6
7	SP 16	1 - 4	2 - 5	3 - 6
8	SP 17	1 - 4	2 - 5	3 - 6

Table 2.6 Alarm Selections in the RE 870-04 Alarm Module

The positions of the SPs are given in fig. 2.6 on the next page.

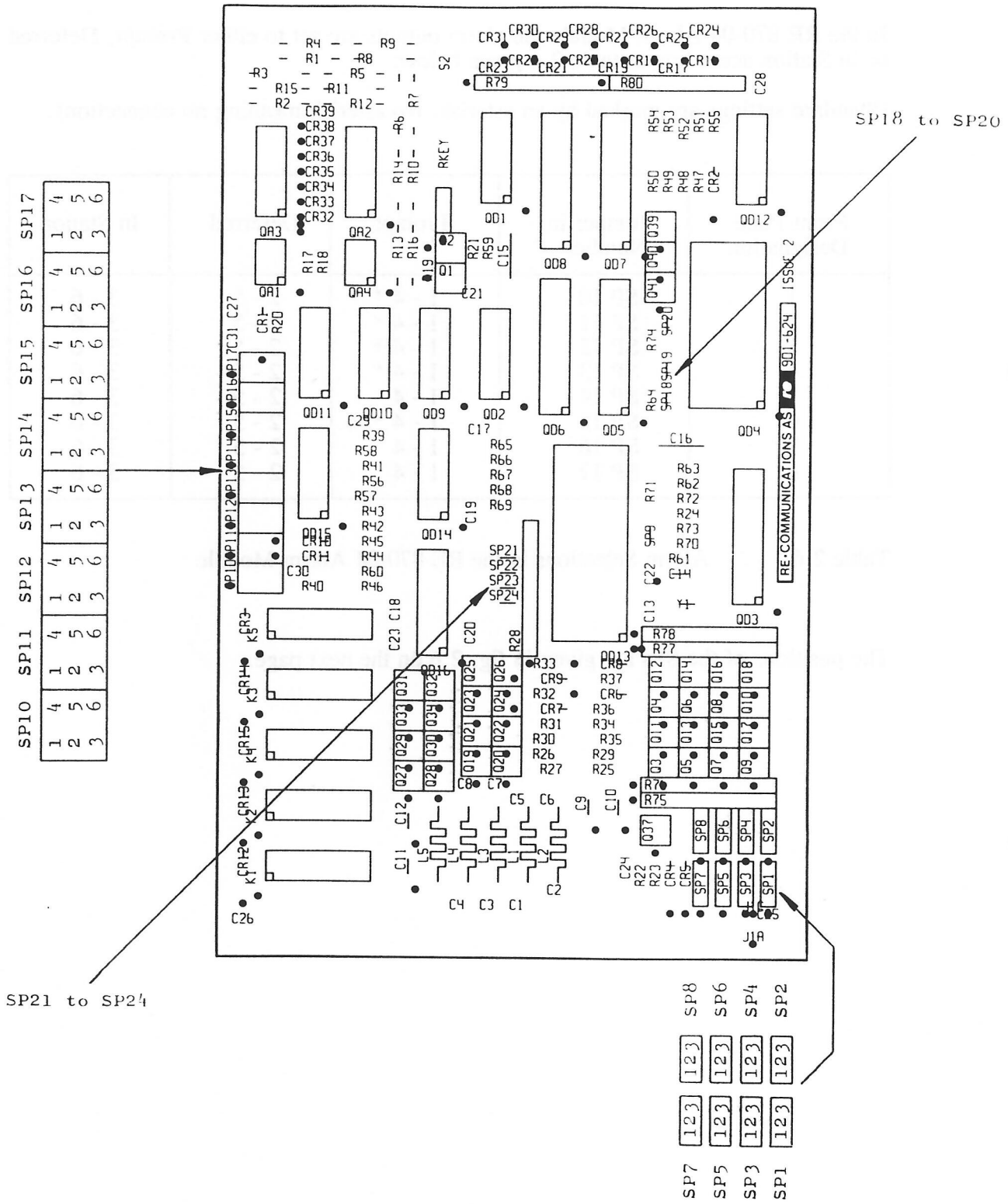

Fig. 2.6 Positions of SPs in the RE 870-04

2.3.6 Alarm Settings in the DSIS Decoder

The DSIS Decoder comprises separate relay outputs for the following alarms: VIDEO INPUT LOSS, DSIS INPUT LOSS and AIS ON.

Another two relay outputs (Major Alarm and Minor Alarm) are provided for all alarms in the Decoder Subrack. The alarms can be enabled to activate the two relay outputs by means of jumper settings on the motherboard.

The jumper settings for enabling and disabling of the various alarms in the Decoder Subrack are shown in table 2.7 and table 2.8.

(Standard settings are marked by an asterisk).

ALARM	JUMPER	ENABLED	DISABLED
DSIS input loss	JP 1	2 - 3 *	1 - 2
Unlock	JP 2	2 - 3 *	1 - 2
Video output	JP 3	2 - 3 *	1 - 2
Mute **	JP 4	2 - 3	1 - 2
Video input loss	JP 5	2 - 3 *	1 - 2
728 Clock/Data	JP 6	2 - 3 *	1 - 2
AIS	JP 7	2 - 3 *	1 - 2
BER	JP 8	2 - 3 *	1 - 2

Table 2.7 Alarm Settings for the Major Alarm in the Decoder Subrack

** If the RE 865-05 Reframer is installed the MUTE ALARM will be enabled.

The jumpers are located between the RE 812-07 Power Supply and the RE 870-04 Alarm Module.

ALARM	JUMPER	ENABLED	DISABLED
DSIS input loss	JP 11	2 - 3 *	1 - 2
Unlock	JP 12	2 - 3 *	1 - 2
Video output	JP 13	2 - 3 *	1 - 2
Mute **	JP 14	2 - 3	1 - 2 *
Video input loss	JP 15	2 - 3 *	1 - 2
728 Clock/Data	JP 16	2 - 3 *	1 - 2
AIS	JP 17	2 - 3 *	1 - 2
BER	JP 18	2 - 3 *	1 - 2

Table 2.8 Alarm Settings for the Minor Alarm in the Decoder Subrack

** If the RE 865-05 Reframer is installed, the MUTE ALARM will set in the enabled position.

The jumpers are located between the RE 812-07 Power Supply and the RE 870-04 Alarm Module.

As an option a RE 870-04 Alarm Module can be installed.

In the RE 870-04 Alarm Module the alarm outputs are set to either Prompt, Deferred or In Station according to table 2.9 given below:

(Standard settings are marked by an asterisk. No asterisk means no connection).

Front Plate Designation	Jumper in Number	Prompt	Deferred	In Station
1	SP 10	1 - 4 *	2 - 5	3 - 6
2	SP 11	1 - 4	2 - 5 *	3 - 6
3	SP 12	1 - 4 *	2 - 5	3 - 6
4	SP 13	1 - 4 *	2 - 5	3 - 6
5	SP 14	1 - 4 *	2 - 5	3 - 6
6	SP 15	1 - 4 *	2 - 5	3 - 6
7	SP 16	1 - 4 *	2 - 5	3 - 6
8	SP 17	1 - 4	2 - 5	3 - 6

Table 2.9 Alarm Selections in the RE 870-04 Alarm Module

The positions of the SPs are given in fig. 2.6 on page 18.

Section Three

re

Miscellaneous

Response Sheet

Your comments make it easier for us to improve our publications so that they can be more useful to you. Please complete this response sheet, fold it up and return it to your nearest RE representative or to:

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Product: _____

1. Did you have any difficulty in understanding or applying the material presented in this manual?

   ❑ none ❑ minimal difficulty ❑ difficulty ❑ considerable difficulty

   If you had any degree of difficulty, please identify the areas:

   _____

   _____

   _____

2. How would you rate the following:

	Excellent	Good	Adequate	Poor
The depth of coverage	❑	❑	❑	❑
The examples	❑	❑	❑	❑
The organization	❑	❑	❑	❑
The overall manual	❑	❑	❑	❑

   Please explain: _____

   _____

3. What did you find most helpful in this manual?

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