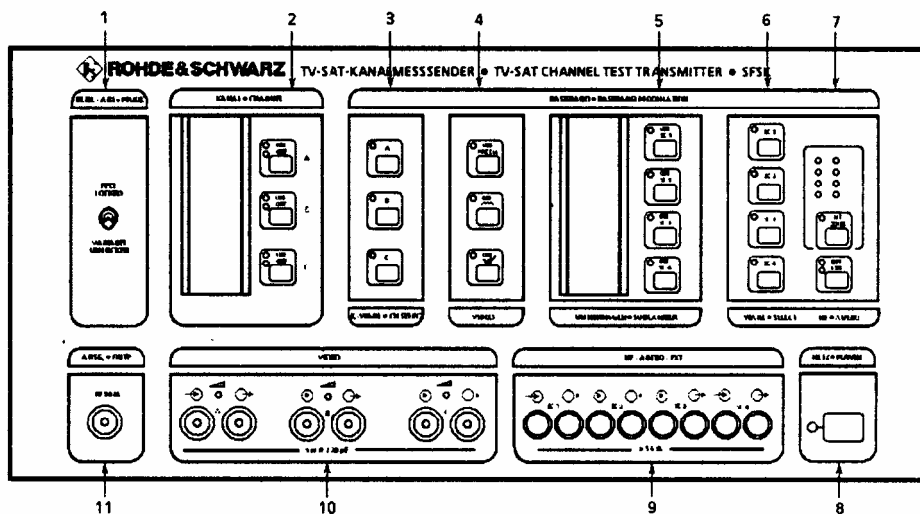


SFSK TV-Sat Channel Test Transmitter

1 Characteristics

1.1 Uses

To ensure precise assessment of electrical quality data, special test transmitters are required in the development, production and servicing of FM-demodulation equipment for satellite receiving stations and domestic TV sets fitted with a satellite receiving section. The TV-Sat Channel Test Transmitter SFSK is an instrument which produces standard IF receiver signals for the FM-demodulation equipment used with all European communication satellites as well as for high-performance satellites. The high-quality frequency-modulated TV signals meet the various TV standards (PAL, SECAM, NTSC and D2-MAC). Depending on the function groups fitted, the Test Transmitter SFSK generates three standard TV-channel signals in the IF range from 900 to 1800 MHz where each TV channel can be modulated with up to four sound subcarriers. The modular design makes flexible test setups possible; it is also possible to connect the tunable Satellite IF Test Transmitter SFSZ (see Section 2.2 for exact description).



Front view

- Three TV channels in the IF range 900 to 1800 MHz
- Four sound subcarriers
- Modular design allowing customized configuration
- Frequency setting via synthesizer
- External sound subcarriers can be added
- Input for tunable Satellite IF Test Transmitter SFSZ

1.2 Description

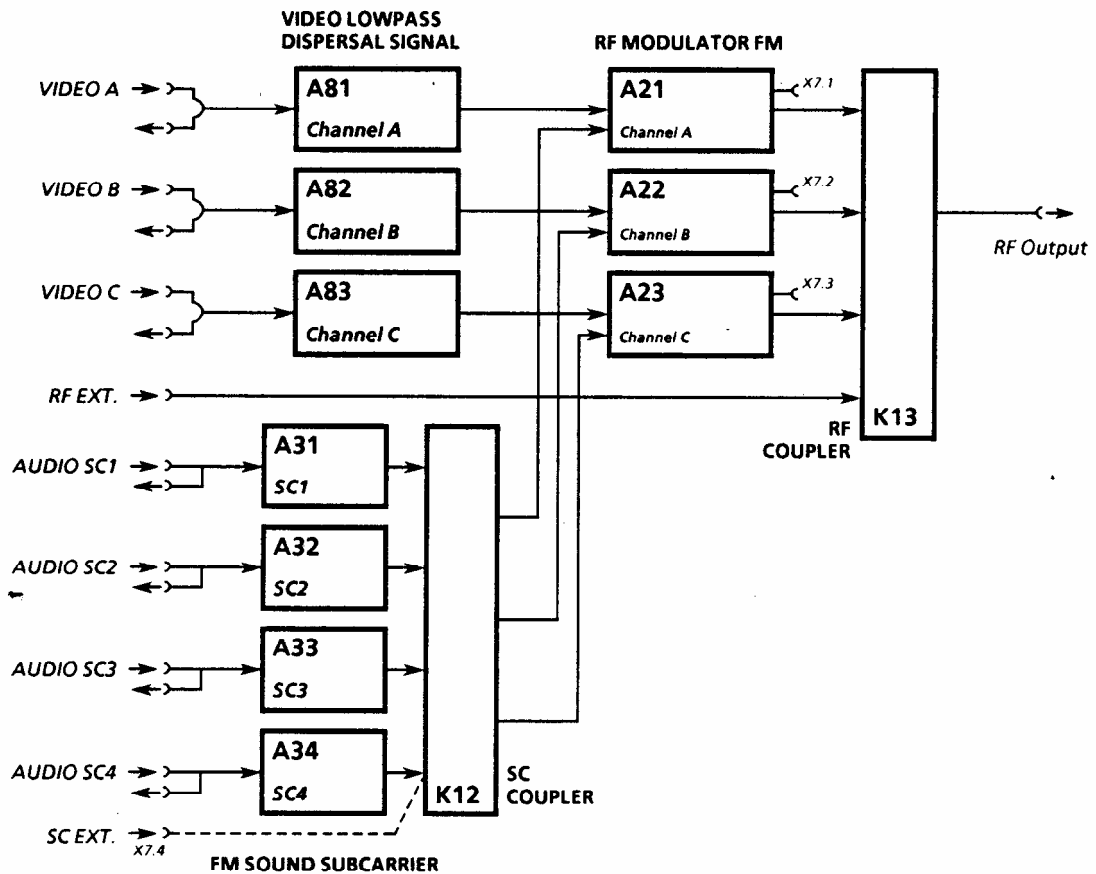
The TV-Sat Channel Test Transmitter SFSK generates three FM-modulated carrier signals in the 900 to 1800 MHz range for the testing and development of satellite receiving equipment. The carrier can be set in three subranges:

- 900 to 1200 MHz
- 1200 MHz to 1450 MHz and
- 1450 MHz to 1800 MHz.

A combining network adds the three IF carriers together to yield a common output signal. The IF carriers can be modulated with external video signals and internal sound subcarrier signals giving a total deviation of 25 MHz_{pp}. A switchable energy dispersal signal is superimposed on the video signals and on the subcarrier modulated by audio signals.

The energy dispersal signal modulates the IF carriers with a deviation of 2 MHz if a video signal is present and with a deviation of 4 MHz in absence of the video signal.

Group-delay-compensated lowpass filters limit the transmission bandwidth of the video signal to 5 MHz. Any low-frequency interfering signals (hum) superimposed on the video signals are suppressed by a clamping circuit. A maximum of four internal sound subcarriers may be added to each of the three channels (external video signals) and can be switched as required. One of the sound subcarrier signals can be replaced by an external source (subcarrier). The subcarriers can be modulated by internal or external audio (signal) sources and are provided with (three) internal selected preemphasis circuits. The operating modes selected on the front panel can be protected against inadvertent change of settings with the aid of a switch.



Block diagram

1.3 Specifications

1.3.1 Technical Data

Frequency range	900 to 1800 MHz
3 subranges, 1 carrier per range	900 to 1200 MHz
<i>(can be combined as desired)</i>	1200 to 1450 MHz
	1450 to 1800 MHz
Output level per channel	
after combining network	0 dBm \pm 0.5 dB
Baseband modulation	
Suppression of intermodulation products	\geq 50 dB
Modulation deviation + dispersal deviation	27 MHz _{pp} \pm 5%
Dispersal deviation	2 MHz _{pp} \pm 5%
Nonlinear distortion	
Differential gain at 25 MHz _{pp} deviation	\leq 3%
Differential phase at 25 MHz _{pp} deviation	\leq 3°
Modulation signal, video	1 V _{pp} \pm 2% for 25 MHz _{pp} deviation
Preemphasis	CCIR405/1 (625 lines) or MAC
Video band limiting, with group delay correction	5 MHz
Modulation deviation, video	calibration via MPX output (1 V _{pp} corresponding to 25 MHz _{pp} deviation)
Variation of video level control	+ 1 to -6 dB on front panel
S/N ratio of video signal	
referred to 18 MHz _{pp} deviation	\geq 70 dB, weighted to CCIR
Subcarriers	
Subcarrier deviation	4 in range 6 to 8 MHz, internally adjustable
Modulation deviation of subcarriers	2 to 7 MHz _{pp} , internally adjustable
Modulation bandwidth	\pm 30 to \pm 300 kHz, internally adjustable
Modulation distortion	30 Hz to 100 kHz, roll of < 1 dB
Preemphasis	\leq 0.5% with max. deviation
Modulation signal for internal subcarrier	50 μ s, 75 μ s, J17, internally selectable
Energy dispersal signal (PAL)	40 Hz, 100 Hz, 400 Hz, 1 kHz, 5 kHz, 10 kHz, 15 kHz, OFF
S/N ratio of sound subcarrier signal	
referred to 50 kHz deviation	50-Hz triangular signal
	\geq 70 dB, weighted and unweighted

1.3.2 General Data

Rated temperature range	+ 5 to + 35 °C
Operating temperature range	+ 5 to 45 °C
Storage temperature range	-20 to + 70 °C
Power supply	100/120/220/240 V -10/ + 15 %
Dimensions, 19-inch bench unit (W x H x D)	426 mm x 176 mm x 475 mm
Weight 25 kg	

SFSK

1.3.3 Ordering information

Order designation	TV-Sat Channel Test Transmitter SFSK
Mainframe with IF channel combining network and sound sub- carrier coupling network for accommodation of up to 3 <i>Video Lowpass Dispersal Signal</i> modules, up to 3 <i>RF Modulator FM</i> modules and up to 4 <i>FM Sound Subcarrier</i> modules	837.6300.02
Optional modules:	
RF Modulator FM, 900 to 1200 MHz	837.8402.02
RF Modulator FM, 1200 to 1450 MHz	837.8402.03
RF Modulator FM, 1450 to 1800 MHz	837.8402.04
Video Lowpass Dispersal Signal	824.1810.02
Sound Subcarrier 6 to 8 MHz	837.8502.02

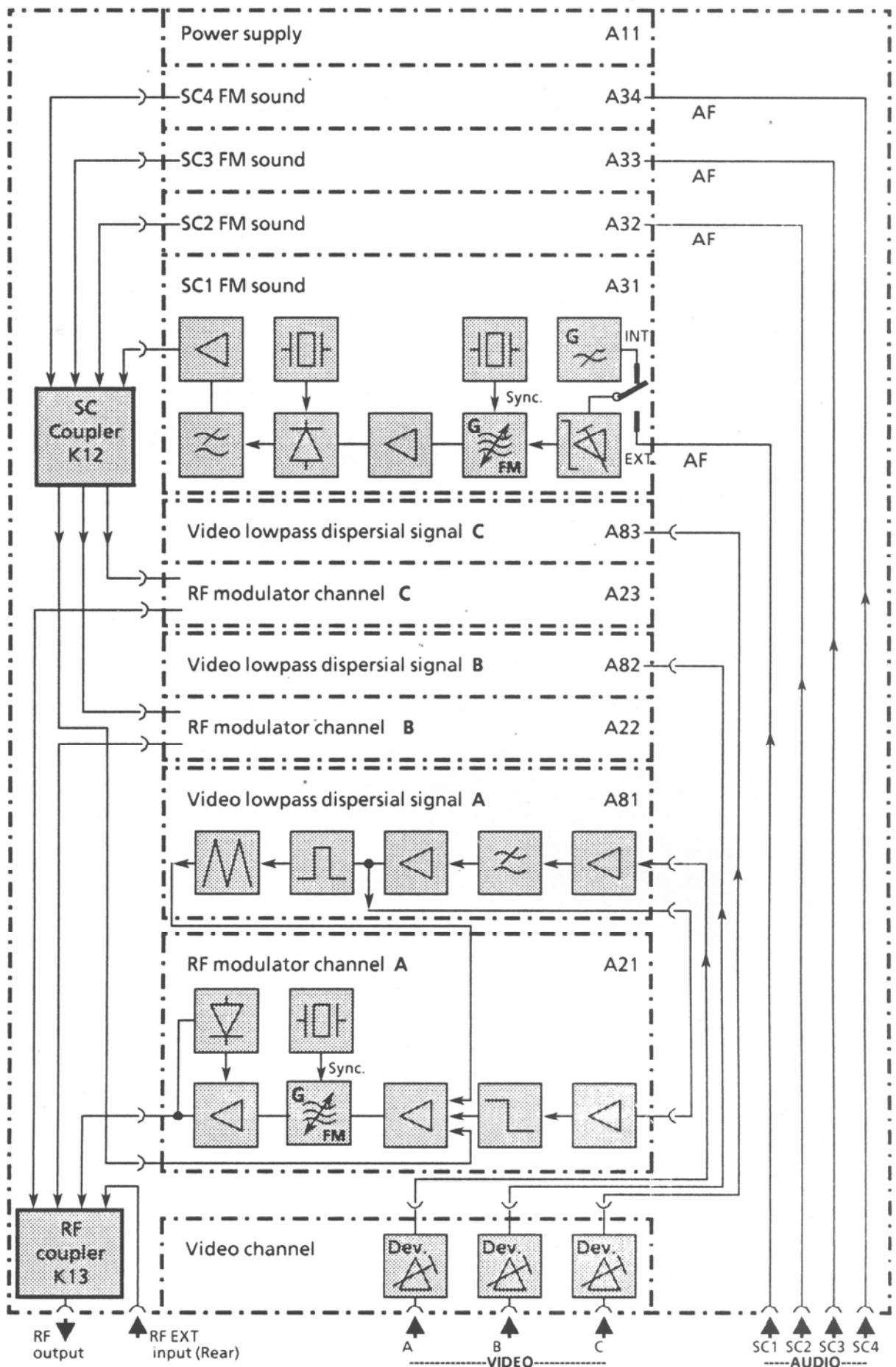
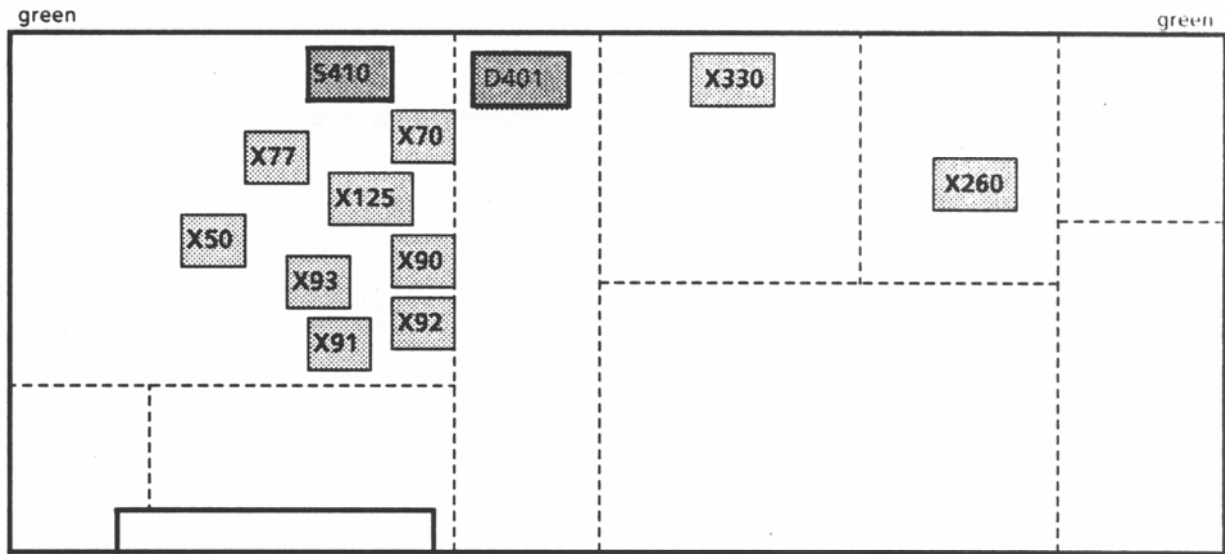
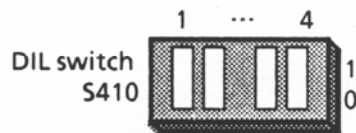


Fig. 2-3 Block diagram (maximum configuration)



= designation for 1



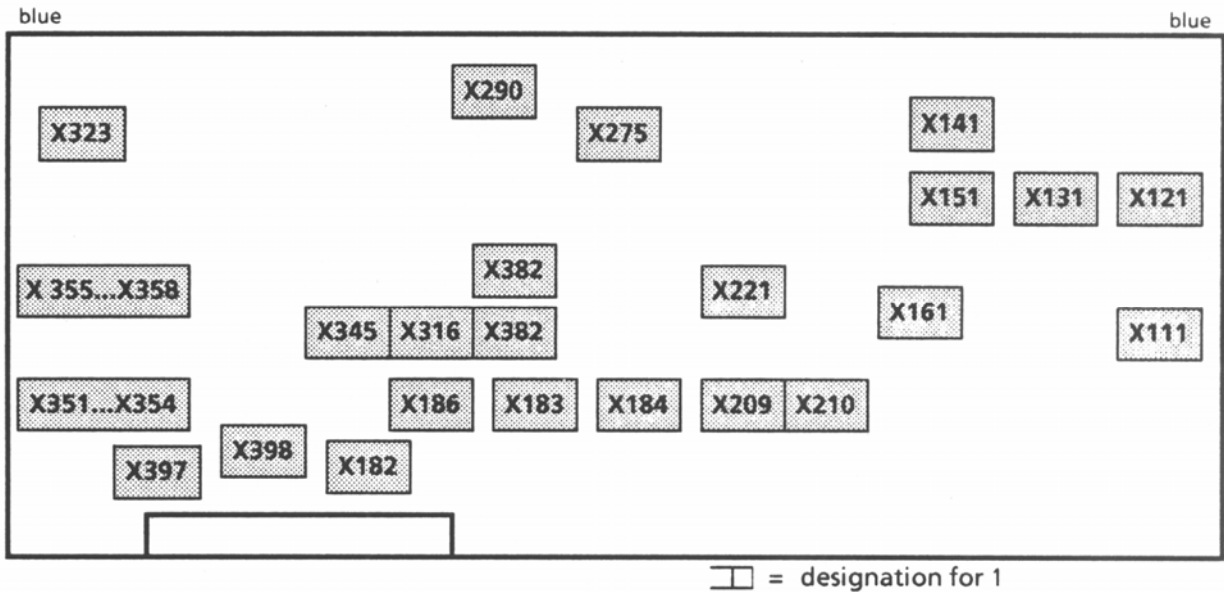
EPROM (D401) labeling:
837.8548.02
D401
V 1.00

Subcarrier frequency [MHz]	RF carrier frequency [MHz]	DIL switch S410				Sub-carrier No.:
		1	2	3	4	
5.5	94.5	1	1	1	1	0
5.5	94.5	1	1	1	0	8
5.8	94.2	0	1	1	1	1
5.8	94.2	0	1	1	0	9
6.5	93.5	1	0	1	1	2
6.6	93.4	0	0	1	1	3
6.6	93.4	0	0	1	0	B
6.65	93.35	1	1	0	1	4
6.65	93.35	1	1	0	0	C
6.8	93.2	1	0	1	0	A
7.02	92.98	0	1	0	1	5
7.02	92.98	0	1	0	0	D
7.2	92.80	1	0	0	1	6
7.2	92.80	1	0	0	0	E
7.56	92.44	0	0	0	1	7
8.0	92.0	0	0	0	0	F

Link	Pos.	Function
X50		Adjusting Wien amplitude
X70	1-2	AF signal-path
X77	open	Deviation × 2
X90	1-2	Preemphasis 50 μs ON
	2-3	Preemphasis 50 μs OFF
X91	1-2	Preemphasis 25 μs ON
	2-3	Preemphasis 25 μs OFF
X92	1-2	Preemphasis J17 ON
	2-3	Preemphasis J17 OFF
X93	1-2	Preemphasis ON for external AF modulation
	2-3	Preemphasis OFF for internal and external AF modulation
X230	2-3	Control voltage
X260	2-3	FM oscillator
X360	1-2	External 4 MHz
S410		DIL switch for sound subcarrier input (see Table to the left)

Coding of sound subcarrier frequencies

Fig. 2-4 Coding summary, FM SOUND SUBCARRIER 837.8502.02



Link	Position	Function
▶ X111-X161	1-2	For testing the lowpass and all-pass filters
▶ X261	1-2	Hum compensation FINE
▶ X275	2-3	Clamping ON/OFF control on front panel
▶ X290	1-2	Use of internal 4-MHz crystal
	2-3	Use of central 4-MHz in subcarrier coupler
▶ X382/X385	1-2	Lowpass switched off, wide frequency response
	2-3	Lowpass switched on
▶ X351 to X358		Links for period setting (see Table)
▶ X330, X316		Type of energy-dispersal signal (see Table)
▶ X345		Amplitude of energy-dispersal signal (see Table)

Period of energy-dispersal signal :

$$P = (S_1 \times 1 + S_2 \times 2 + S_3 \times 4 + S_4 \times 8 + S_5 \times 16 + S_6 \times 32 + S_7 \times 64 + S_8 \times 128) + 2$$

Links for period setting:

X351	X352	X353	X354	X355	X356	X357	X358
S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8

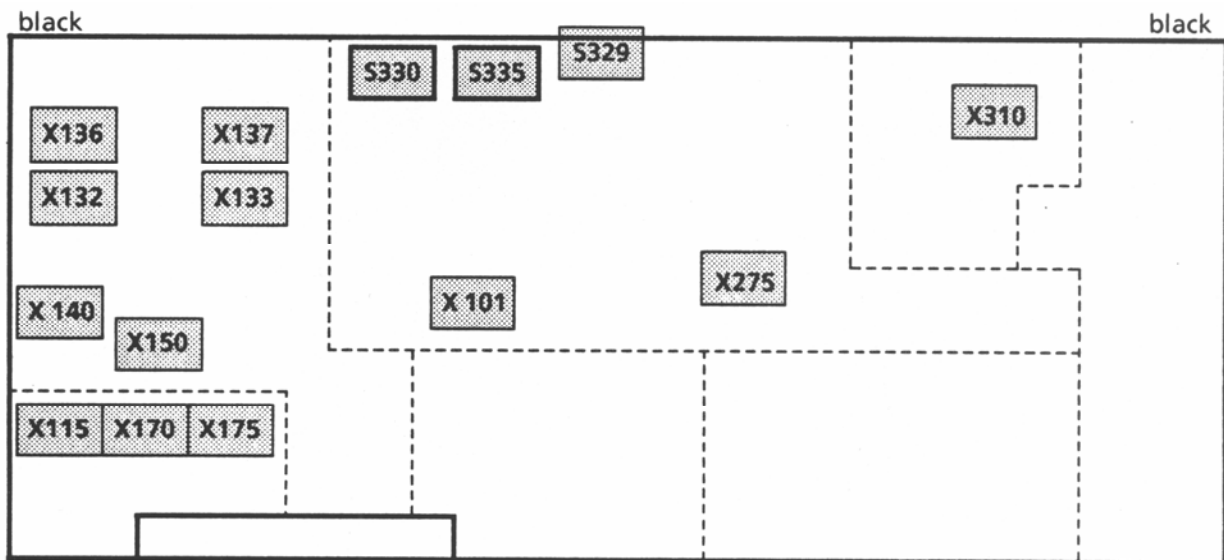
Type of energy-dispersal signal

X330	X316	Mode	At positive peak	At centre of edge (edge with 1/2 slope)
1-2	1-2	old	Odd field	---
2-3	1-2	old	Even field	---
1-2	2-3	new (R&S)		Even field
2-3	2-3	new (R&S)		Odd field

Amplitude of energy-dispersal signal

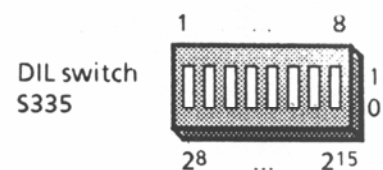
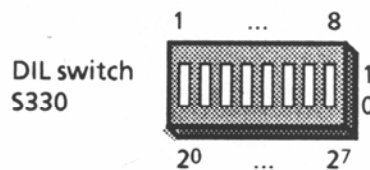
X345 in position:	Function:
1-2	No amplitude doubling on program failure
2-3	Amplitude doubling on program failure

Fig. 2-6 Coding summary, VIDEO LOWPASS DISPERSAL SIGNAL 824.1810.01



= designation for 1

Link	Position	Function
▶ X101	2-3	C coupling input
▶ X115	2-3	Video deviation
▶ X115	1-2	Video deviationX2
▶ X132/133	1-2	Attenuator for preemphasis OFF
▶ X140/X150	1-2	Preemphasis CCIR 625
	2-3	Preemphasis D2-MAC
▶ X170	2-4	Preemphasis ON/OFF control, front panel
▶ X175	1-2	positive video deviation
	2-3	negative video deviation
▶ X275	2-4	Control line from front panel for channel ON/OFF
▶ X310	1-2	4-MHz subcarrier switching matrix
▶ S330		Synthesizer frequency coding
▶ S335		Synthesizer frequency coding
▶ S339		Reset key



Frequency [MHz]	DIL switch S330								DIL switch S335							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	20	21	22	23	24	25	26	27	28	29	210	211	212	213	214	215
960 MHz	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0
1350 MHz	0	0	0	0	1	1	0	0	0	1	0	1	0	1	0	0
1740 MHz	0	0	0	0	0	1	1	0	0	1	1	0	1	1	0	0

0 = switch open (down) 1 = switch closed (up)

Fig. 2-5 Coding summary, RF MODULATOR FM 837.8402.02/.03/.04