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ROHDE&SCHWARZ

OPERATING MANUAL

TWO CHANNEL UP/DOWN CONVERTER UX 001

666.8011.02
666.8011.03

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1. Characteristics

1.1 Uses

The Two-Channel Up/Down Converter UX 001 converts any receiver intermediate frequency in the range 10 to 160 MHz to one of five selectable, standardized frequencies for recording on magnetic tape. Alternatively, with signal flow in the opposite direction, the UX 001 converts frequencies received from a magnetic-tape unit to a centre frequency between 10 and 160 MHz, which can then be processed by a receiver or demodulator.

The converter has two signal channels available, making it suitable to be used between a dual-channel receiving equipment and a two-track tape unit, or reversely between a two-track unit and a predetection combiner with a receiver/demodulator.

1.2 Description

1.2.1 Operation

(Refer to Fig. 1-2)

The operation of the Two-Channel Up/Down Converter UX 001 may be compared with that of a triple-heterodyne receiver. The unit is able to operate as an up or down converter in both channels. In order to increase the clarity of presentation, changeover between up and down conversion is not shown in the block diagram. If the converter is operating as a down converter, intermediate frequencies between 10 and 160 MHz can be converted. The frequencies given refer to the IF centre frequency.

If, for example, an intermediate frequency (IF) of 70 MHz with 2 MHz bandwidth is to be supplied to the converter in channel 1 from a receiver, the IF must be set using the numeric keyboard on the front panel of the converter and, with a separate key, the tape centre frequency of 1.075 MHz. If the IF signal is adequate and constantly available, setting of the optimum processing level is by means of the continuously adjustable down controller of the activated channel at the allocated meter. On the other hand, in

the case of pulse-modulated IF signals with an extremely low pulse duty factor of 1:100 of 1:1000, for example, level adjustment is possible via the panorama display.

The receiver IF signal is mixed with the synthesizer frequency in the first mixer of the RF section. Under microprocessor control, the synthesizer generates the necessary mixture frequencies to convert the various intermediate frequencies to the appropriate tape centre frequencies. It operates according to the PLL (Phase-Locked Loop) principle in the frequency range 220.537 to 374.3 MHz. Its reference frequency is derived from a high-precision temperature-stabilized 10-MHz crystal oscillator. All conversion frequencies are generated only once and used jointly for both signal channels of the converter.

Assuming a 70-MHz signal, the synthesizer operates at a frequency of 281.075 MHz. The 211.075-MHz difference frequency of the two RF signals is fed from the output of the first mixer via an approx. 8-MHz wide bandfilter to the second mixer. This is where mixing takes place with the 200-MHz frequency, which is again derived from the temperature-stabilized 10-MHz crystal oscillator with a multiplier. The 11.075-MHz mixture frequency generated in this way reaches the video section via a broadband filter. After mixing with the 10-MHz reference frequency, the frequency of 1.075 MHz is obtained, which is suitable for recording on magnetic tape. This centre frequency, with a bandwidth of 150 kHz to 2 MHz in accordance with the standard, is supplied to the magnetic-tape unit connected.

The purpose of the panoramic display is to show the video signal which is being recorded or played back from the magnetic-tape unit. The selectable dual-trace display on the screen permits simultaneous observation either of both signal channels or of the recorded and played-back video-tape signal of the same channel (tape monitoring). The width of the frequency spectrum displayed on the screen automatically corresponds to the width of the selected video tape, and the display centre to the set tape centre frequency. With reference to the above numeric example, the left-hand side of the screen corresponds to the frequency 150 kHz, the right-hand side to 2 MHz and the screen to 1.075 MHz. The resolution bandwidths are available for frequency resolution.

Presentation of the amplitude is either logarithmic or linear.

If the converter is operating as an up converter, signal conversion is in the opposite direction to that described above, from the magnetic-tape to the IF frequency. In this mode of operation, a major role is played by the single-sideband or image-reject mixer in the video sections. With the aid of the mixer, it is possible to convert a very low magnetic-tape frequency, for example 75 kHz, to 10.075 MHz with the 10-MHz crystal frequency while avoiding the occurrence of the image frequency of 9.925 MHz at the same amplitude. Image rejection is achieved in this case by phase suppression, since separation by filter is not possible due to the close frequency spacing.

All functions of the converter are microprocessor-controlled. The built-in processor governs the input and output of information relating to the device and to signals via the interface and the front panel. All setting data are held in a non-erasable store in the event of a failure of the power supply.

In order to obtain even greater frequency accuracy or to synchronize the 10-MHz crystal oscillator, the converter can be connected to an external frequency standard. The design of the crystal oscillator is such that even with a noisy external standard, a spectrally pure 10-MHz signal is generated for internal processing.

The power supply to the converter may be provided from the AC supply (100 V, 120 V, 220 V, 240 V) and/or from a floating 19-to 30-V DC source with automatic switchover in the event of AC supply failure.

Built-in test equipment (BITE) provides constant monitoring of the Two-channel Up/Down Converter. In the event of a change in internal test criteria, an error message appears with a digit indicating the nature of the error. When TEST key is pressed, a loop test is initiated with a test frequency of 10 MHz in which first the signal paths are checked and subsequently a lamp test (LEDs) is carried out. The test also shows slight deviations which do not necessarily signify inoperability of the device.

1.2.2 Design

(Refer to Fig. 1-3)

In converter is of modular design, consisting of 16 subassemblies, most of which are plug-in boards. Some of the subassemblies are mounted on a swivel frame, thus making servicing much easier and faster.

The converter is made up of the following subassemblies!

- Panoramic receiver, 10.7 MHz	GH 051 B1
- Video processing section	GH 051 V1
- Panoramic display	GH 051 B3
- Front panel	UX 001/F
- Processor	GP 101
- RF section (2x)	GF 038
- Video section (2x)	GF 039
- Crystal oscillator, 10 MHz	GF 050 A5
- Synthesizer	GF 051 V1
- Multiplier	UX 001/V
- Power supply	IN 051 B1
- Interface	GP 101/I
- Frame	UX 001/G
- Rear panel	UX 001/R

The swivel frame contains a motherboard which interconnects the subassemblies of the converter. All of the subassemblies are arranged in such a way that they can be removed easily from the unit once a small number of screws have been slackened. As a result, servicing requirements are low.

1.3 Specifications

1.3.1 Up/Down Converter

Frequency range	10 to 160 MHz, selectable with 1-kHz resolution
Tape centre frequencies	0.537/1.075/2.150/3.225/ 4.300 MHz, selectable
Recording/playback ranges. . . .	0.075 to 1.0 MHz, 0.150 to 2.0 MHz, 0.300 to 4.0 MHz, 0.450 to 6.0 MHz, 0.600 to 8.0 MHz, depending on tape unit
Frequency setting	via keyboard on front panel
Frequency error	$\leq 2.5 \times 10^{-8}$ (0 to +50 °C) $\leq 1 \times 10^{-7}$ (10 minutes after switching on at 25 °C) $\leq 1 \times 10^{-9}$/day (after 90 days) supply of an external referency frequency of 1/2.5/5/10 MHz possible
Number of parallel channels . .	2
Level indication	on moving-coil instrument for each channel and on panoramic display
Level adjustment	by manual control at input/output
Video spectrum display	on panoramic screen, level either logarithmic or linear
Frequency response in recording range	$\leq$ 2 dB
Group delay fluctuation within 50% of bandwidth	< ± 500 ns
Crosstalk attenuation between two channels	> 60 dB, typ. 75 dB
Image-frequency rejection . . .	> 35 dB, typ. 50 dB

Third-order intermodulation
(for signal-level indication "0 dB")
Spurious
(signal-level indication "0 dB")

Harmonics	> 40 dB, typ. 50 dB
Nonharmonics	> 50 dB, typ. 60 dB
Connectors	BNC female

1.3.2 Down Converter

Input level	> -27 dBm (for signal-level indication "0 dB")
Input impedance	50 Ω
VSWR	≤ 2
Noise figure	≤ 18 dB
Intermodulation intervall 3d order	> 50 dB, typ. 60 dB (for signal-level indication "0 dB")
Output EMF	≥ 1 V (at signal-level indication "0 dB" and RECORD LEVEL at MAXIMUM)
Output impedance	75 Ω

1.3.3 Up Converter

Input voltage	> 0.5 V (for signal-level indication "0 dB")
Input impedance	75 Ω
Intermodulation intervall 3d order	> 50 dB, typ. 57 dB (for signal-level indication "0 dB")

Output EMF	> 1 mV (for signal-level indication "0 dB")
Number of outputs	3 per channel (decoupled)

1.3.4 General Data

Operating temperature range . .	0 to +50 °C
Storage temperature range . . .	-40 to +70 °C
Relative humidity	0 to 90 %
Electromagnetic compatibility (EMC)	interference grade K of VDE 0875
Power supply	100/120/220/240 V +10/-12 %, 47 to 440 Hz (50 VA), VDE 0411, class I (IEC 348) or +19 to +30 V, 40 W
Mechanical stress capacity	
Shock	DIN-IEC 68-2-27
Vibration	DIN-IEC 68-2-6
Overall dimensions (WxHxD)	
19" bench model	492 mm x 161 mm x 514 mm
19" rackmount	483 mm x 132 mm x 511 mm
Weight, bench model/rackmount .	22/20 kg
Ordering designation	Two-channel Up/Down Converter UX 001
19" bench model	666.8011.02
19" rackmount	666.8011.03

2.1 Legend for Fig. 2-1

Item	Inscription	Function
1		Screen for display of the video signal (the signal to be recorded on magnetic tape REC 1/2 and/or played back from tape PLAY 1/2). The centre of the frequency axis automatically corresponds to the selected tape centre frequency and the display width to the associated standardized video signal widths 0.925/1.85/3.7/5.55/7.4 MHz.
2	REC 1 PLAY 1 REC 2 PLAY 2	The keys are used for selection of the display on the screen 1. With dual-trace display, the recorded and played-back signals can be displayed at the same time. The selection of two channels, e.g. REC 1 and REC 2, is also possible. The activated function is indicated by a red LED lighting up in the key.
3	SIGNAL LEVEL CHANNEL 1 CHANNEL 2	Level meters for channels 1 and 2 to indicate optimum IF level adjustment (0 dB) made with controls 14 and 15. When the TEST key 9 is pressed, the pointer must be in the green range after completion of the loop test if the converter is in correct working order.
4	RECEIVER IF	LED lights up after the read-in of the receiver IF entered via the keyboard 7 by pressing key 12.
5	MHz	6-digit seven-segment display for receiver IF and error indications (e.g. Error 1).

Item	Inscription	Function
6	KEYBOARD	LED lights up during entry of the receiver IF via the keyboard 7.
7	0 ... 9 . CE	Keyboard for entry of receiver IF in MHz, with a resolution of 1 kHz. When the CE key is pressed, the frequency entered up until that point is deleted and the previous, still valid frequency is shown on the display 5.
8	NO EXT. SYNC.	LED lights up if there is no external synchronization.
9	TEST	Key to initiate a loop test. If the converter is in working order, the pointers of the level meters 3 are in the green range. If the key is pressed for longer than 4 sec., all seven-segment and LED displays light up.
10	POWER	Device on/off switch for AC supply and battery operation.
11	DOWN UP FUNCTION	Keys for presetting the converter as an up or down converter. For operation as a down converter, press DOWN key and for up conversion press UP key. The integrated LED lights up to indicate the selected operating mode. The operating mode is activated when the ENTER key is pressed.
12	ENTER	When this key is pressed, the converter is set the receiver IF entered on the keyboard 7, or TCF or UP/DOWN FUNCTION is executed.

Item	Inscription	Function
13	TAPE CENTER FREQUENCY 0.537; 1.075; 2.150; 3.225; 4.300 MHz	Keys to select the standardized tape centre frequency. The integrated LED lights up to indicate the selected centre frequency. The tape centre frequency is accepted after the ENTER key is pressed.
14	UP	Control for setting optimum conversion level for up conversion. The meter indication 3 should be set to 0 dB.
15	DOWN	Control for setting conversion level for down conversion. The meter indication 3 should be set to 0 dB.
16	RECORD LEVEL	Screw-head control for adjusting the converter output level in down-conversion mode for matching magnetic-tape unit (only required when first connecting a tape unit).
17	LIN GAIN	Control for adjusting the gain with linear display on screen 1.
18	LIN LOG	Key for changing over between linear and logarithmic display on screen 1. The integrated LED lights up to indicate linear display.
19	RESOLUTION BANDWITH 4.5; 15; 100 kHz	Keys to select the IF bandwidth on the panoramic display. The integrated LED lights up to indicate the IF bandwidth selected.
20	INTENSITY	Control for adjusting brightness of screen 1.

Pos.	Beschriftung	Funktion
21	FOCUS	Control for adjusting the focus of screen 1.
22		Spare fuses
23	100 V/120 V 220 V/240 V 47 ... 440 Hz	Power connector with AC supply voltage selector and fuse.
24	19 ... 30 V (-) ⊥	Connector for external battery. Negative terminal is connected to ground of unit.
25	T10 BATT.	Fuse for battery voltage.
26	IF OUTPUTS	If outputs for operation as up converter.
27	FROM TAPE	Inputs for connection of a magnetic-tape unit when in up converter mode.
28	TO TAPE	Outputs for connection of a magnetic-tape unit when in a down converter mode.
	IF INPUT	If inputs for operation as a down converter.
30	INPUT/f_{sync} 1/10 MHz	Input for a standard frequency (1/2/2.5/5/10 MHz) for synchronization of the 10-MHz crystal oscillator.

2.2 Preparations for Use

(Refer to Fig. 2-1)

2.2.1 Adjustment to the Available AC Supply Voltage

When it leaves the manufacturer, the converter is set to an operating voltage of 220 V AC. The unit may also be operated at 110, 120 or 240 V provided the AC supply voltage selector 23 is correctly set. To do this, it is necessary to lever out the voltage selector, including the fuse.

Insert the new fuse for the selected AC supply voltage. The voltage selector must be inserted such that the required AC supply voltage value (printed on the voltage selector) points to the arrow mark.

Fuse required for 110/120 V: T 2.0 D
for 220/240 V: T 1.0 B

The fuses used are in accordance with DIN 41571. The AC supply is connected via the power connector 23. Deviation of the AC voltage by up to -12 % and 10 % from the nominal value in each case has no detrimental effect on the characteristics of the converter as listed in Section 1.3, Specifications.

If the fluctuation in the AC supply voltage exceeds the above tolerances to a considerable degree, a line voltage stabilizer must be provided in order to avoid problems occurring as a result of voltage dips.

2.2.2 Setting up the Unit

CAUTION

Power switch 10 must be in OFF position.

2.2.2.1 General

The converter can be operated in any position without impairing its characteristics. The shocks associated with normal transport also have no detrimental effects on operation. The limit values

given in Section 1.3, Specifications, apply with regard to ambient temperature.

2.2.2.2 Bench Model

The bench model comprises the basic unit, fitted with covers, side strips and a hinged carrying handle. The latter facilitates setting the unit down and also serves as a prop stand.

If several converters are stacked, the carrying handle can be folded beneath the device. To change the position of the carrying handle, simultaneously press the pivot points of the carrying handle and swivel in the desired direction.

The handle may also be removed completely if required. To do this, remove the screws, one each on the left and right of the pivot mounting.

2.2.2.3 19" Rackmount

Insert the 19" rackmount unit into the intended position in the 19" rack and fix in position with two screws at each handle.

The bench model may easily be converted to a 19" rackmount. First, remove the covers, carrying handle and side strips. After equipping the unit with a 19" adapter (in the simplest case, four parts), it may then be installed in a 19" rack like a 19" unit.

2.2.3 Cabling the Unit

All interfaces are located at the rear of the converter. The minimum cabling configuration comprises connecting the converter to the IF ouptut of a receiver via a BNC cable (50 Ω) and to at least one magnetic-tape unit (75-Ω BNC cable). Explanations regarding interface levels for the connection to external equipment, etc., are to be found in the description of the interfaces in Section 2.5 of this operating manual.

Additional cabling may be required in accordance with the function of the converter.

2.2.4 Connection to the Supply Voltage

The converter may obtain its supply of power either from the AC supply (100 V, 120 V, 220 V, 240 V) or from a 19 to 30 V DC source.

CAUTION

The unit must always be switched off when it is connected up to the power supply, i.e. the on/off switch for AC supply and battery operation 10 must not be pressed in.

2.2.4.1 AC Supply Operation

Connection to the local AC network is made with the power cable (R&S Part No. 025.2365.00) via connector 22.

The device complies with the safety regulations according to VDE 0411, safety class I. Safety class I requires isolation of the power circuits and a highly conductive, permanent connection between all accessible conductive parts of the unit which may carry voltage directly in the event of a fault, and between these parts and the non-fused earth conductor.

CAUTION

Always insert the plug of the power cable in a socket provided with a non-fused earth contact. If a binding post is provided, it must be permanently connected to a non-fused earth conductor.

Deviation of the AC supply voltage by -12 to +10 % from the nominal value in each case does not impair the characteristics of the converter as listed in Section 1.3, Specifications. If the fluctuation in the AC supply voltage exceeds the above tolerances, a line voltage stabilizer must be provided in order to prevent malfunctions in the event of voltage dips.

2.2.4.2 Battery Operation

The battery connector 24 (- ⊥ = negative terminal and instrument ground and + = positive terminal) is fitted as standard for a DC voltage of between 19 and 30 V. This type of power supply is of particular advantage when the converter is used for mobile applications.

Fuse required for battery operation:

T 10 D fuse according to DIN 41571.

2.2.5 Switching on the Unit

Before switching on for the first time, ensure that the AC supply voltage set on the converter corresponds with the available local supply (refer to Section 2.2.1).

Switch on the unit using the power switch 10. The converter is ready for operation immediately once switched on. Settings which were in effect before the unit was last switched off are automatically reinstated on power-up. The LED RECEIVER IF 4 lights up and the last valid receiver IF is displayed. A frequency which was entered before switching off but not confirmed as the receiver IF with the ENTER key 12 is displayed (LED KEYBOARD 6 lights up).

If the converter is being put into operation for the first time (cold start: contents of the internal RAMs undefined), the following settings apply:

- Receiver IF: 21.4 MHz
- Direction of operation (FUNCTION): DOWN
- Tape centre frequency: 2.150 MHz
- IF bandwidth (RESOLUTION BANDWIDTH): 15 kHz
- IF display (AMPL.): LOG
- Recording channel: REC 1 top, REC 2 bottom

2.2.6 Functional Check (TEST)

The functions of the converter can be checked with the aid of the built-in test equipment (BITE) by pressing the TEST key 9. The frequency 10.000 MHz then appears as the receiver IF in the 6-digit seven-segment display 5 for the loop test. The conversion direction set automatically for the test is FUNCTION DOWN and the tape centre frequency 0.537 MHz. The pointers of the level meters 3 are in the green range. If an error is detected, an error message appears in the 6-digit seven-segment display in the form of letters and digits, e.g. CF 64. The number displayed can be used to locate the faulty subassembly, as described in Section 2.4. If the TEST key is pressed for longer than 4 seconds, all seven-segment displays and LEDs light up.

Once the TEST key is released, the device reverts to the operating condition before initiation of the test if no defective subassemblies are indicated.

2.3 Operating Instructions

(Refer to Fig. 2-1)

2.3.1 Setting the Intermediate Frequency

IF range: 10 to 160 MHz

The IF of the receiver connected to the converter is entered on the numeric keyboard 7 in MHz and displayed on the seven-segment display 5 (resolution 1 kHz). If entered without point, the string of digits represents a frequency in MHz. Only a maximum of three digits may be entered at the start of input followed by input of a decimal point. No further digits are accepted following the input of a maximum of three digits after the decimal point. The KEYBOARD LED 6 lights up during entry of the IF. Once input is completed, press the ENTER key 12. The IF appears in standardized form in the 6-digit seven-segment display 5. (In this case, standardized means that the decimal point is after the 1-MHz position and there are three positions after the decimal point; leading zeros are suppressed.) The RECEIVER IF LED 4 lights

up. The converter has accepted and set the entered IF.

Correction of the IF value is possible using the CE key 7 provided the ENTER key has not yet been pressed. When the CE key is pressed, the frequency just entered is deleted and the previous frequency, which is still valid, is displayed on the 6-digit seven-segment display. Simultaneously, the KEYBOARD LED 6 goes out and the RECEIVER IF LED 4 lights up. A new intermediate frequency can now be entered, as described above.

If the frequency range is over-or underranged, the converter does not accept the frequency. An error message is issued on the seven-segment display 5, Error 1 or Error 2 (see Section 2.4). The previous frequency is retained and can be recalled by pressing the CE key 7.

2.3.2 Selection of the Tape Centre Frequency

The converter may be switched between five tape centre frequencies (0.537, 1.075, 2.150, 3.225 and 4.300 MHz). Selection of the desired centre frequency is by pressing the TAPE CENTER FREQUENCY key 13 and then ENTER 12. The LED integrated in the previously pressed key goes out and the LED in the key which has now been chosen lights up. Only one centre frequency can be selected.

2.3.3 Switchover between Up and Down Conversion (FUNCTION UP/DOWN)

When the DOWN key 11 is pressed followed by ENTER 12, the converter operates as a down converter and the LED integrated in the key lights up.

When the UP key 11 is pressed followed by ENTER 12, the converter operates as an up converter and the LED integrated in this key lights up.

2.3.4 Level Adjustment for Up and Down Conversion

The UP 14 and DOWN 15 controls are used to obtain the optimum setting of the signal level to be processed by the converter.

If the converter is functioning as a down converter, the display of the level meter 3 must be set to 0 dB with the DOWN control 15 if the IF signal is adequate and constantly available. In the case of pulse-modulated IF signals with an extremely low pulse duty factor (1:100 or 1:1000), level adjustment can be carried out via the panoramic display; with the LOG display, the full height of the screen approximately corresponds to the "0 dB" position of the level meter.

When operated as an up converter, the converter must be set to an IF signal of 0 dB with the UP control 14.

When operated as a down converter, the converter must be matched with the tape unit to which it is connected by means of the screw-head controls for setting the record level 16 (only necessary when first connecting a tape unit).

2.3.5 Panoramic Display

2.3.5.1 General

The screen 1 serves to display the video signal (of the REC 1/2 signal to be recorded on magnetic tape and/or the PLAY 1/2 signal played back from the tape unit.). Of the four signal sources available, therefore, either two (dual display) or one (signal display) signal source can be shown on the screen. The centre of the frequency axis corresponds automatically to the chosen tape centre frequency with control 13, and the display width corresponds to the standardized and allocated video-signal widths of 0.925, 1.85, 3.7, 5.55 or 7.4 MHz.

2.3.5.2 Selection of Signal Sources and Display Mode

Selection of the signal sources and display mode (single or dual display) is by means of the record/play keys 2 (REC 1 or 2 and PLAY 1 or 2). These keys are arranged in two rows. Only one key can be switched on in each row (integrated LED lights up). If only one of the eight keys is switched on, a single-trace panoramic display is shown. If one key is switched on in each row, a dual-trace display is the result.

Selection may be made between display of the video tape to be recorded (REC 1 and/or REC 2) and display of the video signal to be played back from magnetic tape (PLAY 1 and/or PLAY 2). The digits 1 and 2 refer to the channel numbers.

In order to switch over from 2-channel to single-channel display, switch off the display which is no longer required by pressing the key once more. If none of the keys are lit, the panoramic display is switched off (reducing wear of the tube).

2.3.5.3 Display and Resolution of Amplitude

Depending on whether the LIN/LOG key 18 is pressed (the integrated LED lights up in LIN mode), screen 1 shows the IF spectrum on a linear or logarithmic level scale. If shown on a linear scale, gain can be adjusted with the LIN GAIN control 17.

The resolution bandwidth can be selected with keys 19 (4.5, 15 and 100 kHz). The integrated LED of the selected key lights up.

The focus and brightness of the amplitude displayed can be continuously adjusted with controls 20 and 21.

2.3.6 Test

Refer to Section 2.2.6.

2.3.7 Switching off the Unit

The converter can be switched off in any operational state by means of power switch 10.

2.4 Error List

Note: The error list contains the codes which are displayed on the 6-digit seven-segment display.

The CF error messages indicate the possible location of the fault to the operator.

The remedying of error is described in the Service Manual.

OPERATING ERRORS:

If an incorrect frequency is entered for the receiver IF via the keyboard, an error message appears on the 6-digit seven-segment display.

- If frequency input < 10 MHz, the following indication appears:

E r r o r 1

- If frequency input > 160 MHz, the following indication appears:

E r r o r 2

FAULTS IN SUBASSEMBLIES

If a fault occurs in one of the subassemblies, a coded error message appears on the 6-digit seven-segment display. The error message has the following format:

C F X X X

where XXX represents a number between 2 and 126.

Each subassembly is given a weighting as shown in the table below. If the processor detects that one of the subassemblies is faulty, the error message CF with the appropriate number appears on the display. If a fault occurs in several subassemblies simultaneously, the total of the relevant numbers is displayed.

Weighting	Subassembly
2	Video section 1
4	RF section 1
8	Unassigned
16	Video section 2
32	RF section 2
64	Synthesizer

Example: CF 48

This error message indicates that video section 2 and RF section 2 are defective and must be replaced.

2.5 Description of Connectors

All connectors of the converter are located on the rear of the unit.

The connectors described in this section define the inputs and outputs for the connection of peripheral devices.

<table>
<tr><th>Connector designation</th><th>Inscription</th><th>Input
Output</th><th>Type of connector</th><th>Remarks</th></tr>
<tr><td></td><td>TO TAPE</td><td>O</td><td>BNC</td><td>V_{out} > 1 V EMF
Z_s = 75 Ω
<table><tr><th>f_{centre}</th><th>Bandwidth</th></tr><tr><td>0.537 MHz</td><td>0.925 MHz</td></tr><tr><td>1.075 MHz</td><td>1.850 MHz</td></tr><tr><td>2.150 MHz</td><td>3.700 MHz</td></tr><tr><td>3.225 MHz</td><td>5.550 MHz</td></tr><tr><td>4.300 MHz</td><td>7.400 MHz</td></tr></table></td></tr>
<tr><td></td><td>FROM TAPE</td><td>I</td><td>BNC</td><td>$V_{in} \geq$ 0.5 V (75 Ω)
f_{centre} and bandwidth
as for TO TAPE</td></tr>
<tr><td></td><td>IF OUTPUT</td><td>O</td><td>BNC</td><td>Selected receiver IF for up conversion
V_{out} > 1 mV EMF
Z_s = 50 Ω</td></tr>
<tr><td></td><td>IF INPUT</td><td>I</td><td>BNC</td><td>Receiver IF,
-17 dBm ±10 dB
Z_s = 50 Ω
VSWR $\leq$ 2</td></tr>
</table>

Connector designation	Inscription	Input Output	Type of connector	Remarks
	INPUT/ f_{sync} 1/10 MHz	I	BNC	f_{in} = 1/2/2.5/5/ 10 MHz, 0 dBm Z_s = 50 Ω