



ROHDE & SCHWARZ

SERVICE INSTRUCTIONS

Analog Unit

802.8435.02

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Component lists
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(See circuit diagram 802.8435 S and block diagrams 5-1 to 5-5)

5.1 Function Description

The analog unit is divided into the following function units:

- RF amplifier
- LO conditioning
- Demodulator
- AF conditioning
- DC amplifier

It conditions the signals to be measured according to the requirements and converts them into corresponding DC voltages. The analog unit is driven via two separate data channels.

5.1.1 RF Amplifier

(See circuit diagram 802.8435 S, sheet 1 and Fig. 5-1)

The RF amplifier controls the RF signals applied to the two selectable inputs to a constant level and then applies them to the RF counter and the RF input of the mixer. Amplifiers and attenuator pads connected in series suppress the LO mixer signal sufficiently at the inputs of the RF amplifier.

The signal from the power distributor is switched off by a diode switch in order to reduce the crosstalk between the inputs if the switchover relay is switched to the other input. A selectable attenuator pad is connected ahead of the following PIN diode attenuator to increase the dynamic range. The attenuator pad is switched on or off according to the result of the power measurement. A temperature-compensated peak-value rectifier detects the RF signal at the RF counter output and applies it to the integrator to generate the PIN attenuator voltage. The integrator operates with a selectable time constant and reference voltage depending on the type of modulation (FM, Φ M or AM).

The output signal of the rectifier is compared with a reference and a signal is then generated which informs the controller if the signal at the input is too small for the RF counter. The monoflop in this signal path bridges the dips which result with amplitude modulation.

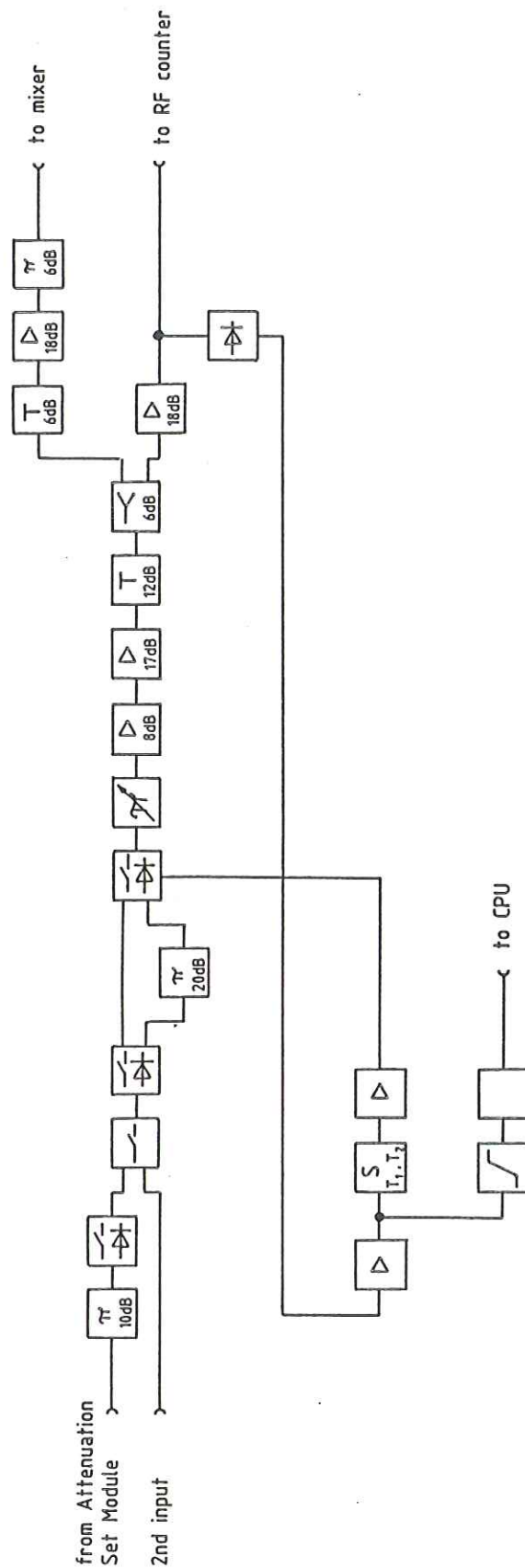


Fig. 5-1 Block diagram of the RF amplifier

5.1.2 LO Conditioning

(See circuit diagram 802.8435 S, sheet 4 and Fig. 5-2)

The RF synthesizer in the instrument generates frequencies in the range from 31.25 MHz to 1 GHz with a level of -6 dBm $\pm$ 3 dB for frequency conversion. The LO conditioning circuit generates the level required for mixing and divides the LO frequency to enable evaluation of frequencies <30.795 MHz.

The LO conditioning circuit also generates the test signal for the demodulators. This test signal is generated by dividing the LO frequency to the IF of 455 kHz. This signal path is also used to calibrate the deviation of the RF synthesizer.

The LO signal present at connector X4 is directly applied to the mixer for frequencies >31.25 MHz via a selectable amplifier and a PIN diode switch. Frequencies in the range from 31.25 MHz to 62.5 MHz are amplified to TTL level and applied to the frequency dividers. A 1:2 divider is connected in series with the programmable 7-bit divider in order to achieve a duty factor of 0.5. This arrangement enables dividing factors of $1/2$, $1/4$, $1/4(N+1)$, ($N=0$ to 127) to be set. Unrequired dividers are switched off to suppress subharmonics.

The output signal of the programmable divider is applied to the test generator. This divides the frequency to 455 kHz and passes it on to the demodulators via a selectable voltage divider. The voltage divider can be bypassed using a switch which is opened and closed at the rate of 222 Hz (455 kHz : 2048). The result is amplitude modulation with a modulation frequency of approx. 110 Hz and a modulation depth of approx. 45%. If the RF demodulator is to be tested, permanently close the switch and frequency-modulate the input signal to the LO conditioning circuit.

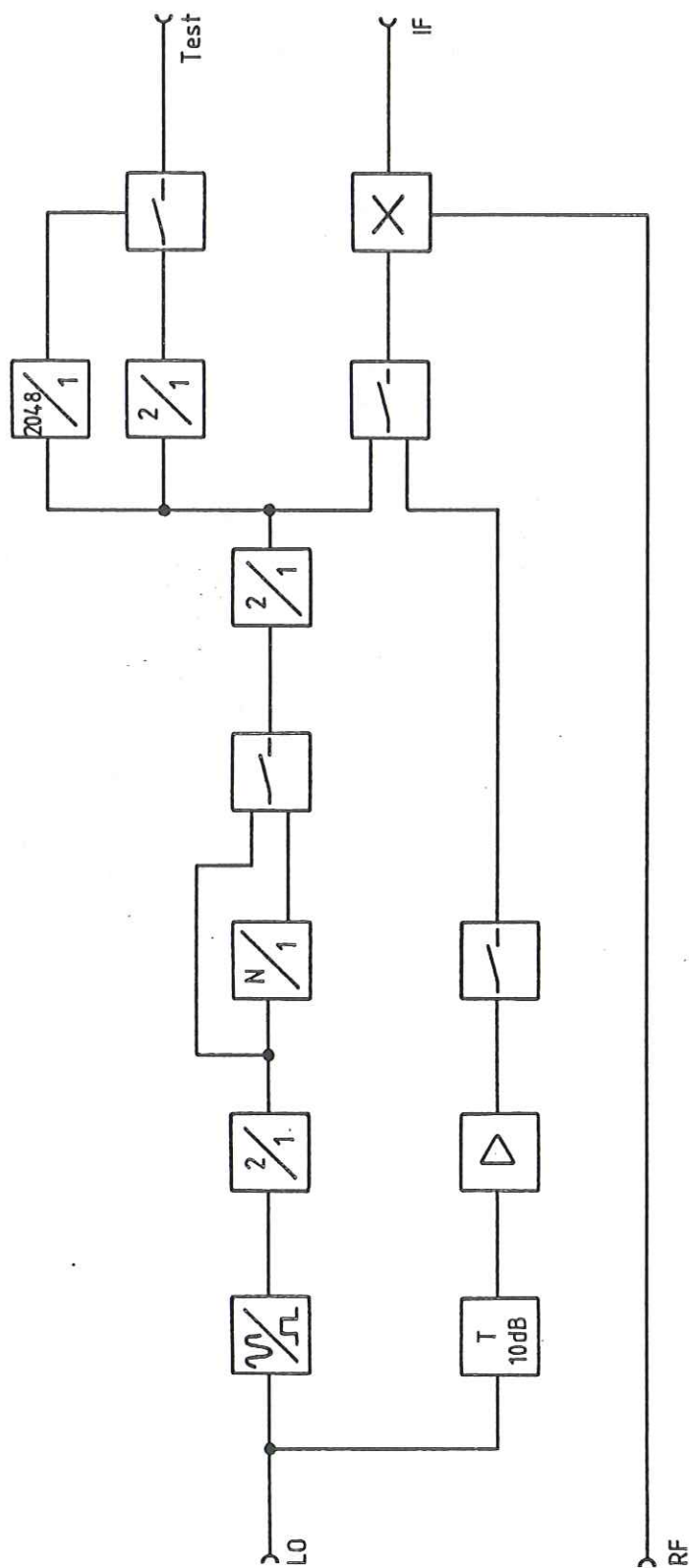


Fig. 5-2 Block diagram of the LO conditioning circuit

5.1.3 Demodulators

(See circuit diagram 802.8435 S, sheet 3 and Fig. 5-3)

This section conditions the frequency and level of the RF signals converted in the mixer and demodulates them according to the type of modulation AM, FM, ϕ M.

The RF signal converted in the mixer to the IF centre frequency of 455 kHz is applied to the first low-noise amplifier stage via a 725-kHz lowpass which suppresses undesired mixer products. The signal is then applied directly or via a further amplifier with a series-connected 25-kHz bandpass filter to the regulated (AM) or limiting amplifier (FM, ϕ M). The bandpass filter is used for selection with remote measurements and adjacent-channel power measurements.

5.1.3.1 FM (ϕ M) Demodulator

The FM demodulator operates according to the principle of a counter discriminator. The FM signal is converted in a limiter into squarewave pulses of constant width (monoflop); both the positive and negative edges of the FM signal are used for triggering. Twice the IF, in this case 910 kHz, is thus present at the monoflop output. If the pulses of constant width are integrated, a DC voltage is produced which is proportional to the number of pulses per unit of time and thus the frequency of the input signal; the AC voltage component is the required demodulated AF voltage. Since the phase modulation corresponds to the frequency modulation when the modulated signal is integrated, the counter discriminator is also suitable for demodulating phase-modulated signals. A suitable filter corrects the frequency response of the demodulated signal.

The FM demodulator is frequency-linear up to 20 kHz; deemphasis with a time constant of 750 μ s can be connected if required.

5.1.3.2 AM Demodulator

The AM demodulator operates as a bidirectional rectifier with subsequent lowpass filters. The AC voltage components are filtered out from the output signal of the rectifier and the remaining DC voltage applied via an integrator to the controlled amplifier; the DC voltage is used with FM to switch the signal path on and off (squench function) since it is a measure of the signal strength of the IF.

5.1.4 AF Conditioning

(See circuit diagram 802.8435 S, sheet 2 and Fig. 5-4)

The AF conditioning circuit processes the two main AF paths in the instrument (demodulated and externally applied AF signals), weights them and applies them to the meter rectifiers, the oscilloscope (if fitted), the loudspeaker amplifier, the tone sequence decoder and the AF counter.

5.1.4.1 Signal Distribution

The external AF signal is applied directly to the main signal switch via a selectable 20-dB attenuator pad and also via the selectable CCITT filter.

The demodulated signal is applied to the main signal switch directly via a selectable 300-Hz highpass filter to suppress any pilot tones and/or via the selectable CCITT filter. The following combinations are therefore possible at the output of the switch:

AF external	Demodulated signal
Demodulated signal	-
AF external, CCITT	Demodulated signal
Demodulated signal, CCITT	Demodulated signal
AF external	AF external, CCITT
AF external	Demodulated signal, CCITT

Using further selectors it is possible to apply each of these signals to the peak-value meter, rms meter, SINAD meter, tone sequence decoder, AF counter, loudspeaker and oscilloscope.

5.1.4.2 RMS Path

The rms signal to be evaluated is applied to the 150-Hz highpass filter via a selectable 40/0-dB amplifier whose gain is determined from the result of the rms measurement. The highpass filter is connected when measurements are made in FAST mode (cf. Section 5.1.5, DC Amplifier). The signal is applied to the DC amplifier via three calibration switches which are required to determine the offset and gain errors of the rms meter.

5.1.4.3 Peak-value Path

The peak-value path is similar to the rms path. A signal inverter is fitted instead of the 150-Hz highpass filter so that the positive and negative peaks of the signal can be measured in the case of demodulation since the peak-value meter only detects positive signals.

Prior to the inverter, the external modulation signal connected via the modulation control is applied to the peak-value meter via a selector to enable calibration if necessary.

5.1.4.4 SINAD/Distortion

The SINAD/distortion meter is basically a controlled amplifier with a series-connected notch filter. A constant rms value is used as the setpoint; the output signal of the amplifier is square-rooted, integrated and applied to the controller, an OTA in the negative feedback path of the amplifier. The fundamental frequency (1 kHz) is subsequently filtered and the rms weighted from the regulated signal. A three-pole notch filter with pole frequencies at 990 Hz, 1 kHz and 1.01 kHz is used as the filter in order to intercept small differences between the fundamental frequency and the pole frequency.

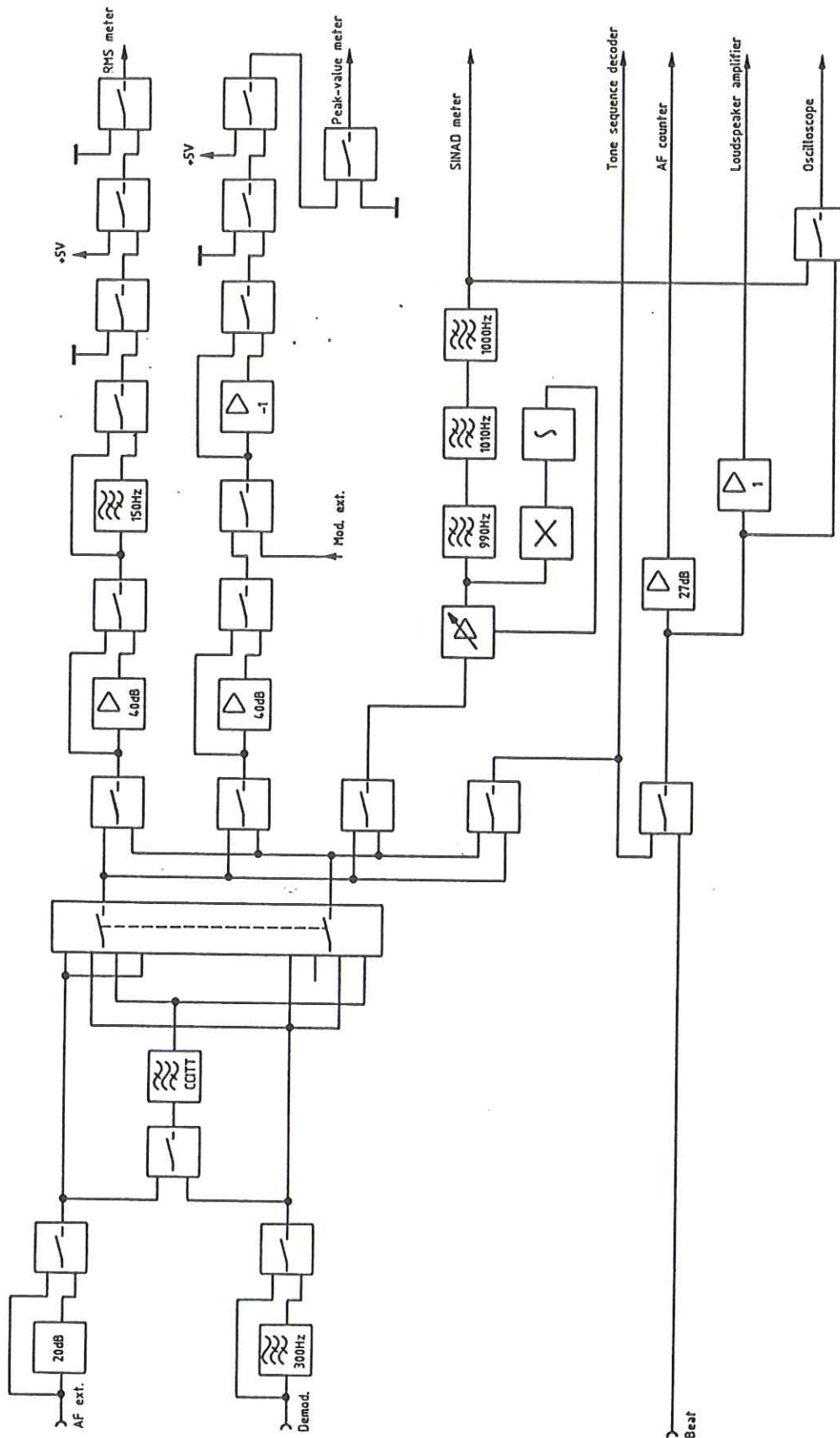


Fig. 5-4 Block diagram of the AF conditioning circuit

5.1.5 DC Amplifier

(See circuit diagram 802.8435 S, sheet 5 and Fig. 5-5)

The DC amplifier circuit conditions the incoming AC and DC voltages for the subsequent A/D converter.

5.1.5.1 RMS Meter

The rms meter is an IC which basically multiplies the input signal and subsequently generates the mean value. The rms meter is operated in two modes, fast and slow, in order to achieve a higher measuring rate. The selection of the two modes involves, on the one hand, changing the charging capacitor required to generate the mean value and, on the other, the switchover of the cut-off frequency of a 4th order lowpass filter with an optimized transient response connected in series with the IC. The cut-off frequencies of the input voltages are 50 Hz in the slow mode and 150 Hz in the fast mode. A 2nd order highpass filter is connected ahead of the rms meter to prevent AC voltages to be superimposed on the DC output voltage at input voltages <150 Hz in the fast mode (see Section 5.1.4.2, RMS Path).

5.1.5.2 DC Multiplexer

All DC voltages to be measured are combined and cyclically scanned on the DC multiplexer. A selectable amplifier ensures that the subsequent A/D converter operates in a high resolution range as far as possible.

The DC voltages applied to the DC multiplexer are:

- Peak-value meter (demodulation, MOD.EXT. input)
- RMS meter (AF voltmeter, spurious modulation)
- Distortion/SINAD meter
- Power measurement
- AM demodulator
- Adjacent-channel power meter
- +5-V calibration voltage
- PIN control voltage of the RF amplifier
- Self-test voltages
- RF millivoltmeter
- Ground

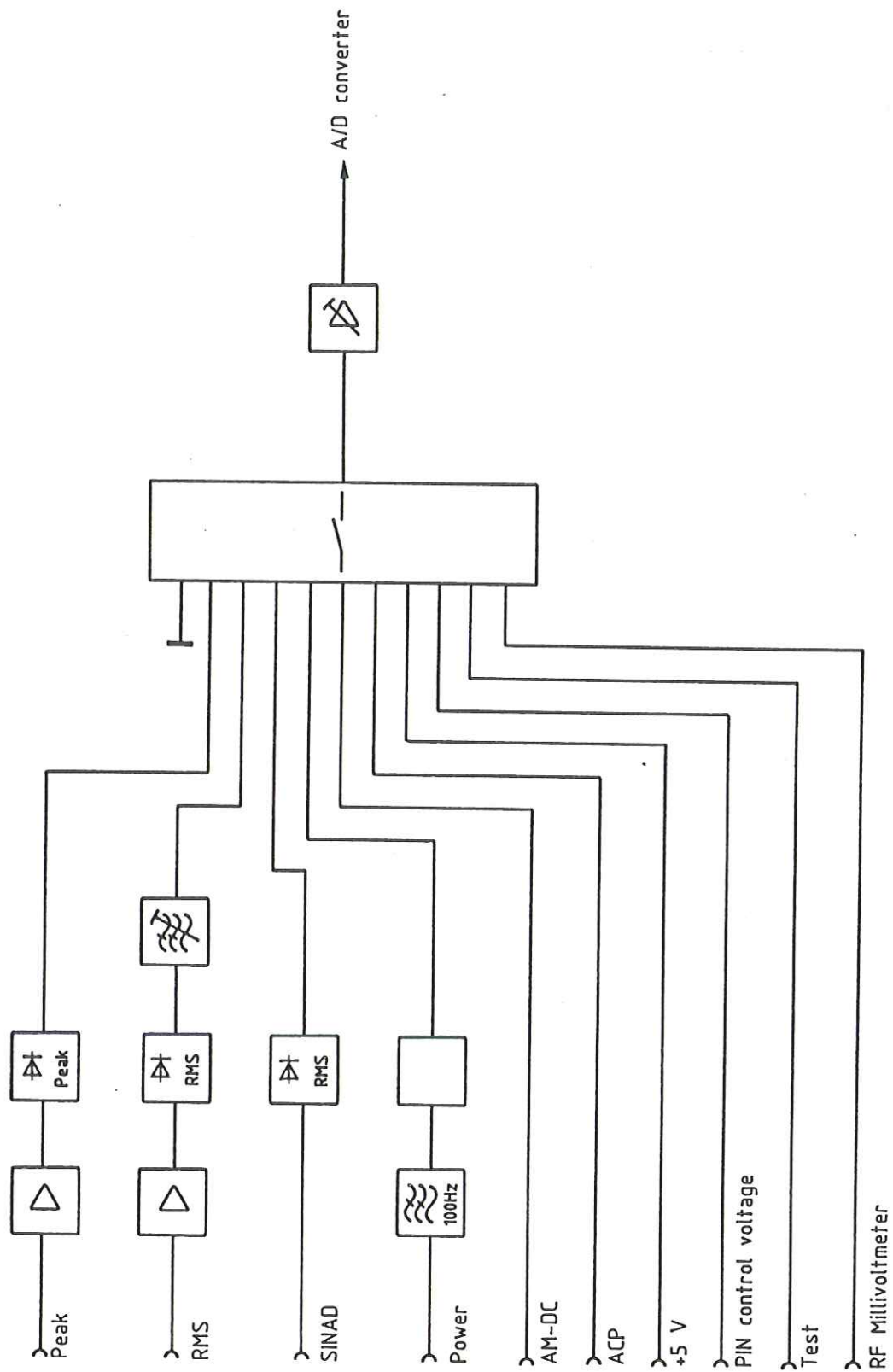


Fig. 5-5 Block diagram of the DC amplifier

5.1.6 Calibration

The analog unit of the instrument contains a number of calibration routines which counteract influences such as aging and temperature fluctuations.

The main calibration routines are:

Calibration of the

- RF synthesizer
- peak-value meter
- rms meter
- DC multiplexer.

5.1.6.1 Calibration of the RF Synthesizer

The RF synthesizer is calibrated with respect to the FM characteristics; a specific deviation is set at a defined RF frequency, measured by the analog unit and stored as a reference value. The signal required in the transmitter test for mixing is divided on the LO conditioning circuit to the IF of 455 kHz, applied to the FM demodulator via the test generator and then measured and stored in the usual way.

5.1.6.2 Calibration of the DC Multiplexer, Peak-value Meter and RMS Meter

The corresponding IC is calibrated by connecting its input to ground via a switch and then measuring the offset voltage. In order to correct gain errors, an extremely accurate reference voltage of +1 V_{DC} is applied, measured and stored as a correction factor. For measuring the offset voltage, the input of the corresponding IC is connected to ground. In addition, an AC voltage of 40 mV is applied to the rms meter from outside. Since offset voltages can be strongly temperature-dependent, this calibration is carried out immediately after the instrument is switched on and repeated cyclically at extended intervals of time.

5.2 Testing and Adjustment

Basic setting of the module is to be performed before each adjustment:

*

1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

1	1	0	1	1	1	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

* 1st bit of the shift register,
last bit to be shifted in.

The designations of the adjustments refer to the front panel labels.

5.2.1 LEVEL FM R87 Adjustment

(See circuit diagram 802.8435 S, sheet 1)

Setting: Bit No. 1=H, 2=H, 3=H, 4=H

- Terminate X609 with 50 Ω .
- Apply 500 MHz, 20 mV to X601.
- Adjust level at X610 to 150 mV $\pm$ 10 mV using R87.

5.2.2 LEVEL AM R88 Adjustment

(See circuit diagram 802.8435 S, sheet 1)

The LEVEL FM R87 adjustment must have been carried out before starting this adjustment.

Setting: Bit No. 3=L, 4=L

- Terminate X609 with 50 Ω .
- Apply 500 MHz, 20 mV to X601.
- Adjust level at X610 to 75 mV $\pm$ 5 mV using R88.

5.2.3 LO TTL R102 Adjustment

(See circuit diagram 802.8435 S, sheet 4)

Setting: Bit No. 48=H, 49=H

- Apply 62.5 MHz -3 dBm $\pm$ 3 dB to X608.
- Set TTL level at D100/3 using R102.
- Check whether TTL level with half the input frequency is present at P30.

5.2.4 FM DC R213 Adjustment

(See circuit diagram 802.8435 S, sheet 3)

Setting: Basic setting

- Apply 500 MHz, 20 mV to X601.
- Apply 500.455 MHz, -6 dBm ± 3 dBm to X608.
- Terminate X610 with 50 Ω .
- Connect X609 to X607.
- Apply 10 V ± 0.5 mV to X1.A21.
- Adjust DC voltage at X602 to 0 V ± 5 mV using R213.

5.2.5 DEMOD LEVEL R304 Adjustment

(See circuit diagram 802.8435 S, sheet 3)

Setting: Basic setting

Repeat the first five steps given in 5.2.4:

- Apply 500 MHz, 20 mV, 100 kHz deviation and 1 kHz AF to X601.
- Adjust rms voltage at X602 to 3.535 V ± 1 mV
(corresp. to 5 V_p) using R304.

5.2.6 AM LEVEL R197 Adjustment

(See circuit diagram 802.8435 S, sheets 3/5)

Setting: Bit No. 3=L, 4=L, 35=H, 36=L, 37=L
Same as in 5.2.4 except:

- Apply 500 MHz, 20 mV, 99% AM and 1 kHz AF to X601.
- Adjust DC level at D680/1 to 250 mV ± 2 mV using R197.

This adjustment influences the AM DC R275 and AM SYMMETRY R254 adjustments and these must therefore be readjusted.

5.2.7 AM SYMMETRY R254 Adjustment

(See circuit diagram 802.8435 S, sheet 3)

Setting: As in 5.2.6

Same as in 5.2.6.

- Connect oscilloscope to X602.
- Adjust the limitation of the bottom 1-kHz half-wave to
a minimum using R254.

This adjustment influences the AM DC R275 adjustment and this must therefore be readjusted.

5.2.8 AM DC R275 Adjustment

(See circuit diagram 802.8435 S, sheet 3)

The DEMOD LEVEL R304, AM LEVEL R197 and AM SYMMETRY R254 adjustments must already have been carried out.

Setting: As in 5.2.6

Same as in 5.2.6.

- Adjust rms voltage at X602 to $3.535 \text{ V} \pm 1 \text{ mV}$ (corresp. to 5 V_p) using R275.
- Check the AM LEVEL R197 adjustment.

5.2.9 CCITT R388 Adjustment

(See circuit diagram 802.8435 S, sheet 2)

Setting: Bit No. 17=L, 18=H

- Apply 800 Hz, 1 V_{rms} to X603.
- Adjust the rms voltage at P15 to $1 \text{ V} \pm 1 \text{ mV}$ using R388.

5.2.10 LEVEL R543 Adjustment

(See circuit diagram 802.8435 S, sheet 2)

Setting: Basic setting

- Apply 1 kHz, 500 mV to X22/2.
- Adjust rms voltage at X23/1 to $1 \text{ V} \pm 5 \text{ mV}$ using R543.

5.2.11 BALANCE R542 Adjustment

(See circuit diagram 802.8435 S, sheet 2)

Setting: Basic setting

- Apply 1 kHz, 500 mV to X22/2.
- Adjust an accurate $\sin^2$ using R542.

5.2.12 1 kHz R557, R556 Adjustment

(See circuit diagram 802.8435 S, sheet 2)

Setting: Basic setting

- Apply 1 kHz, 1 V to X23/2.
- Adjust the minimum voltage at P24 using R556 and R557 alternately.

5.2.13 990 Hz R566 Adjustment

(See circuit diagram 802.8435 S, sheet 2)

Setting: Basic setting

- Apply 1 V, 990 Hz to X23/2.
- Adjust to minimum voltage at P25 using R566.

5.2.14 1010 Hz R571 Adjustment

(See circuit diagram 802.8435 S, sheet 2)

Setting: Basic setting

- Apply 1 V, 1010 Hz to X23/2.
- Adjust to minimum voltage at P26 using R571.

5.2.15 POWER METER Adjustment

(See circuit diagram 802.8435 S, sheet 5)

The adjustment is made in the instrument (see Service Manual for Complete Instrument, Section 4).

5.3 Troubleshooting

5.3.1 Removal and Installation of ICs

The analog unit is a multilayer module, i.e. the printed circuit consists of several boards adhered together. Great care must therefore be taken when removing ICs. The ICs must be completely freed from tin using a desoldering tool and gently removed from the holes since the lead-through bushes could otherwise be torn and thus lines detached from the central layers.

The solder side of the module contains chip capacitors, chip resistors and chip ICs. Since these ICs are also adhered (automatic fitting), they should only be unsoldered if known for certain to be faulty; the ICs are often mechanically damaged because of the high soldering temperatures required so that corresponding spare parts should be available. New ICs should first be fixed using a non-conducting adhesive and then soldered at a low temperature using a very fine soldering iron.

An important indication of a mechanical defect in ICs (break in the substrate support, splitting or overheating of the soldered connections) is the function of the IC at frequencies above approx. 100 MHz; this particularly applies to chip capacitors.

5.3.2 Data Channels of the Analog Unit

The analog unit is addressed by the controller via two separate data channels (56-bit and 12-bit wide). The following tables listing the IC connections and the function can be used to test these data channels.

Table 5-1 Slow data channel

Component	Function	Function with H level
D97/4	Selection of X601 or X604 as input	X601
D97/5	Switch on/off the 20-dB attenuator pad	Switched off
D97/6	FM/AM time constant of control	FM
D97/7	RF level at X609 / 50 mV or 25 mV corresp. to FM or AM, respectively	50 mV, FM
D97/14	None	---
D97/13	None	---
D97/12	None	---
D97/11	None	---
D465/4	Connect calibration switch A ahead of rms meter to continuity or ground	Ground
D465/5	Connect calibration switch B ahead of rms meter to continuity or +5 V	+5 V
D465/6	Switch on/off 40-dB amplifier in peak-value path	40 dB switched on
D465/7	Connect MOD. EXT signal to peak-value meter	Switched off
D465/14	None	---
D465/13	Switch on/off 40-dB amplifier in rms path	40 dB switched on
D465/12	Switch on/off 150-Hz HP in rms path	150-Hz HP switched on
D465/11	None	---
D466/4	Switch on/off 20-dB attenuation at AF input	20 dB switched on
D466/5	Connect AF or demodulation signal to CCITT filter	AF signal
D466/6	Switch on/off 300-Hz HP in demodulation branch	Switched off
D466/7	None	---
D466/14	Connect beat or AF/demodulation signal to loudspeaker, AF counter, oscilloscope	Beat signal
D466/13	Connect AF or demodulation signal to peak-value path	AF signal
D466/12	Main distribution switch	See Table 5-2
D466/11	Main distribution switch	See Table 5-2

Component	Function	Function with H level
D467/4	Connect AF/demodulation/beat or pole filter signal to oscilloscope	Pole filter signal
D467/5	Connect calibration switch C ahead of rms meter to continuity or ground	Ground
D467/6	Connect rms or peak-value path to loudspeaker, AF counter, oscilloscope	Peak-value path
D467/7	Connect rms or peak-value path to distortion control	rms path
D467/14	Connect calibration switch C ahead of peak-value meter to continuity or ground	Ground
D467/13	Connect calibration switch B ahead of peak-value meter to continuity or +5 V	+5 V
D467/12	Connect calibration switch A ahead of peak-value meter to continuity or ground	Ground
D467/11	Connect AF or demodulation signal to rms path	AF signal
D320/4	IF distribution switch	See Table 5-3
D320/5	IF distribution switch	See Table 5-3
D320/6	Switch on/off FM demodulator	Switched off
D320/7	Selection of demodulation	See Table 5-4
D320/14	Selection of demodulation	See Table 5-4
D320/13	Switch on/off demodulation signal	Switched on
D320/12	Switch on/off automatic IF level system (squelch)	Switched off
D320/11	Gain of demodulation signal, $G = 1$ or $G = 4$	$G = 4$
D104/4	None	---
D104/5	None	---
D104/6	Switch on/off calibration generator	Switched off
D104/7	Modulation of calibration generator, AM or FM	AM
D104/14	None	---
D104/13	Divider factor of LO conditioning	See table 5-5
D104/12	Divider factor of LO conditioning	See table 5-5
D104/11	Switch on/off first divider in LO branch	Switched on
D105/4	LO frequency < 31.25 MHz or > 31.25 MHz	> 31.25 MHz

Table 5-2 Main distribution switch

D466/12	13	Function	
		RMS path	Peak-value path
L	L	AF signal	Demodulation signal
L	H	Demodulation signal	Ground
H	L	CCITT filter	Demodulation signal
H	H	AF signal	CCITT filter

Table 5-3 IF distribution switch

D320/4	5	Function
L	L	IF narrowband, 25 kHz
L	H	IF wideband
H	L	Calibration of RF synthesizer, test
H	H	Calibration of adjacent-channel power filter

Table 5-4 Selection of demodulation

D320/7	14	Function
L	L	AM demodulation
L	H	FM demodulation with deemphasis
H	L	ϕ M demodulation
H	H	FM demodulation

Table 5-5 Divider factor of LO conditioning

D104/13	12	Function
L	L	Divider factor : 2
L	H	Switched off
H	L	Divider factor : 4
H	H	Divider factor : 4 (N+2)

The divider factor N is determined by the data at D105;
H level corresponds to divider factor 0.
The MSB is D105/5, the LSB is D105/11; the data width is 7 bit.

Table 5-6 Gain of DC amplifier

D698/4	5	6	Function
L	L	L	0 dB
L	L	H	6 dB
L	H	L	16 dB
L	H	H	26 dB
H	L	L	36 dB
H	L	H	46 dB
H	H	L	56 dB
H	H	H	inpermissible

Table 5-7 DC multiplexer

D698/7	14	13	Function
L	L	L	Peak value
L	L	H	rms value
L	H	L	Distortion
L	H	H	Power
H	L	L	AM DC
H	L	H	RF millivoltmeter
H	H	L	Adjacent-channel power
H	H	H	Test voltages

Table 5-8 Peak-value meter

D698/12	11	Function
L	L	Measure peak value
L	H	Hold peak value
H	L	Reset peak value
H	H	---

Table 5-9 Premultiplexer

D697/5	4	Function
L	L	Test voltages / slow rms measurement
L	H	Ground / slow rms measurement
H	L	PIN control voltage / fast rms measurement
H	H	+5-V calibration voltage/ fast rms measurement

D697/4: Switchover to positive or negative peak value.
L level corresponds to negative peak value.

5.3.3 Test Points

Circuit diagram 802.8435 S, sheet 3 (demodulators)

- P1** Amplified output signal of mixer.
In normal mode, frequency $f_{IF} = 455$ kHz,
level approx. 135 mV (typical).
- P2** Control voltage for controlled amplifier.
In normal mode with AM demodulation approx. 2 to 6
V_{DC}, with FM demodulation approx. 2 V.
- P3, P4** Difference outputs of controlled amplifier.
In normal mode with AM demodulation, no clipped
signal $V_{pp} \approx 1$ V; with FM demodulation, squarewave
signal of approx. 2.8 V_{pp} .
- P5** Sum of signals at P3 und P4.
- P6** Voltage of -5 V generated from the 10-V reference
voltage.
Tolerance $\pm 1\%$ + tolerance of reference.
- P7** +5 V, otherwise as P6.
- P8** Output signal of FM demodulator.
TTL level, frequency 910 kHz.
- P10** Amplified signal of P9.
Level: $V_{pp} = 10$ V corresponding to tolerance of
reference voltage.

- P11 Output signal of Φ M filter.
- P12 Output signal of AM demodulator.
Positive full-wave rectified signal of P5.
- P13 Signal to switch the demodulated signal on/off.

Circuit 802.8435 S, sheet 2 (AF conditioning)

- P14 AF signal at X603 divided by 1 or 10.
- P15 Output signal of CCITT filter.
- P16 Selectable input/output signal of 300-Hz highpass.
- P17 Output signal of 150-Hz highpass.
- P18 Signal to rms meter.
- P19 Signal to peak-value meter.
- P20 Negative operating voltage to supply the CMOS switches,
 $V_{DC} = -10 \text{ V} \pm 5\%$ + tolerance of -15 V operating
voltage.
- P21 Positive operating voltage to supply the CMOS switches,
 $V_{DC} = 6 \text{ V} \pm 10\%$
- P24 Output signal of 1-kHz notch filter.
- P25 Output signal of 990-Hz notch filter.
- P26 Output signal of 1010-Hz notch filter.

Circuit diagram 802.8435 S, sheet 4 (LO conditioning)

- P30 Frequency at X608 divided by 2.
Frequency range 15.625 to 31.25 MHz,
level: TTL.

5.3.4 Interfaces (Pin Assignments)

5.3.4.1 Coaxial Connectors

- X601** Low level range input of RF amplifier.
Impedance: 50 Ω
Level: 5 to 500 mV
Frequency: 1 to 1000 MHz
- X602** Demodulated signal.
Impedance: 600 Ω
Frequency: DC to 20 kHz
Level: 5 V_p corresp. to 100 kHz ΔF
5 V_p corresp. to 100% AM
5 V_p corresp. to 25 rad $\Delta\phi$

With ϕM , frequency range 300 Hz to 10 kHz.
- X603** AF voltmeter input.
Impedance: >100 k Ω
Frequency: 50 Hz to 50 kHz
Level: 100 μV to 35 V
- X604** High level range input of RF amplifier.
Impedance: 50 Ω
Frequency: 1 to 1000 MHz
Level: 31.6 mV to 1.58 V
- X605** Output for oscilloscope.
- X606** IF output for adjacent-channel power.
Impedance: 1.5 k Ω
Frequency: 455 kHz ± 12.5 kHz
Level: approx. 250 mV
- X607** RF input of mixer.
Impedance: 50 Ω
Frequency: 1 to 1000 MHz
Level: 50 mV ± 3 dB FM
25 mV ± 3 dB AM

X608 LO input.
Impedance: 50 Ω
Frequency: 31.25 to 1000 MHz
Level: -3 dBm $\pm$ 3 dB 31.25 $\leq f \leq$ 62.5 MHz
-6 dBm $\pm$ 3 dB 62.5 $\leq f \leq$ 1000 MHz

X609 RF output of RF amplifier.
Impedance: 50 Ω
Frequency: 1 of 1000 MHz
Pegel: 50 mV $\pm$ 3 dB FM
25 mV $\pm$ 3 dB AM

X610 Counter output of RF amplifier.
Impedance: 50 Ω
Frequency: 1 to 1000 MHz
Level: 150 mV $\pm$ 3 dB FM
75 mV $\pm$ 3 dB AM

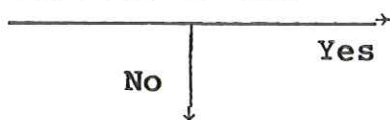
5.3.4.2 64-contact Multipoint Connector

1a	Output for controller: RF level too small (CMOS level)
1b	Power supply +5 V
3a	Strobe for fast data channel
3b	Clock for fast data channel
4a	Strobe for slow data channel
4b	Data for fast data channel
8a	Data for slow data channel
10a,b	Clock for slow data channel
12a,b	Power supply +5 V
17a,b	Power supply +15 V
18b	Output for AF counter
19a,b	Power supply -15 V
21a	10-V reference voltage input
25a	Output for loudspeaker amplifier
26a	Input to measure MOD.EXT.
27a	Self-test voltages input
27b	Power measurement input
28a	RF millivoltmeter input
29a	Adjacent-channel power meter input
30a,b	Output of signal ground for A/D converter
31b	Output of DC voltage for A/D converter

5.3.5 Troubleshooting Diagram

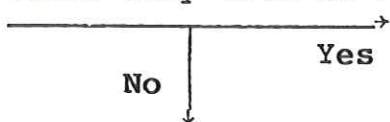
Incorrect or no demodulation measurement

Correct demod.
signal at X602 ?
5 V_p corresp. to
100 kHz,
100% AM, 25 rad



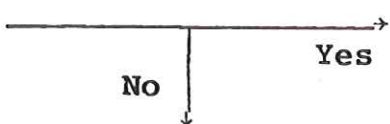
DC amplifier
AF conditioning

Fault only with AM ?



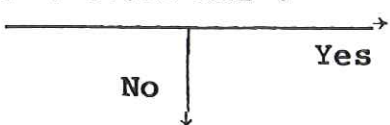
RF amplifier
AM demodulation

IF of 455 kHz
at P1 ?



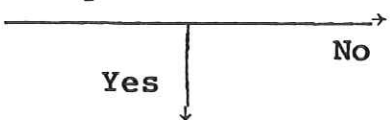
FM demodulator,
squelch,
controlled amplifier

Fault only with
F < 31.25 MHz ?



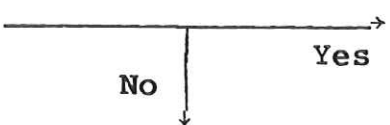
Divider in
LO conditioning

RF synthesizer OK ?



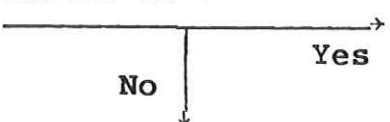
RF synthesizer

Frequency counter
OK ?



Mixer,
LO conditioning

Demodulation via
INPUT2 OK ?



RF amplifier, switchover

RF amplifier

