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Manual

UHF AMPLIFIER

VH 501 A1

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UHF Amplifier VH501A1

1 Characteristics

1.1 Uses

Depending on the system configuration, UHF Amplifier VH501 is used as a vision or sound amplifier in TV transmitters of band IV/V. It operates as a wideband amplifier over the full frequency band so that no adjustment is required after a channel change.

1.2 Description

See also block diagram Fig. 1-1.

The input power is amplified in the predriver and driver and then applied to two further driver stages via a 2-way splitter. The output power of the driver stages is routed via a 4-way splitter to the eight output stages. The power from the eight output stages is combined in two 4-way and one 2-way combiners.

The transistors of the predriver and driver stages operate in the A mode, all other transistors in the AB mode.

In addition to coupling, correction and matching networks, the amplifier comprises circuits for stabilizing the operating point of RF transistors and guard circuits for monitoring essential operating parameters (temperatures, supply voltages, etc.).

The guard circuit collects all fault messages and operating parameters arriving at the amplifier and signals them to the front panel of the plug-in. The messages are also output for external devices.

The amplifier comprises an independent control circuit. The amplifier output power is regulated as a function of temperature, output power of the individual amplifier modules and the reflection at the output. The control circuit prevents overdriving of the amplifier input in the case of transistor failure, overtemperature or excessive reflection. The reflection cutoff circuitry protects the unit against inadmissibly high reflection ($s > 1.5$) at the output. A rectifier provides an analog voltage proportional to the output power for monitoring whether the output power is too low and for external indication.

Output power, phase response and underpower threshold can be set on the amplifier front panel with the aid of three potentiometers.

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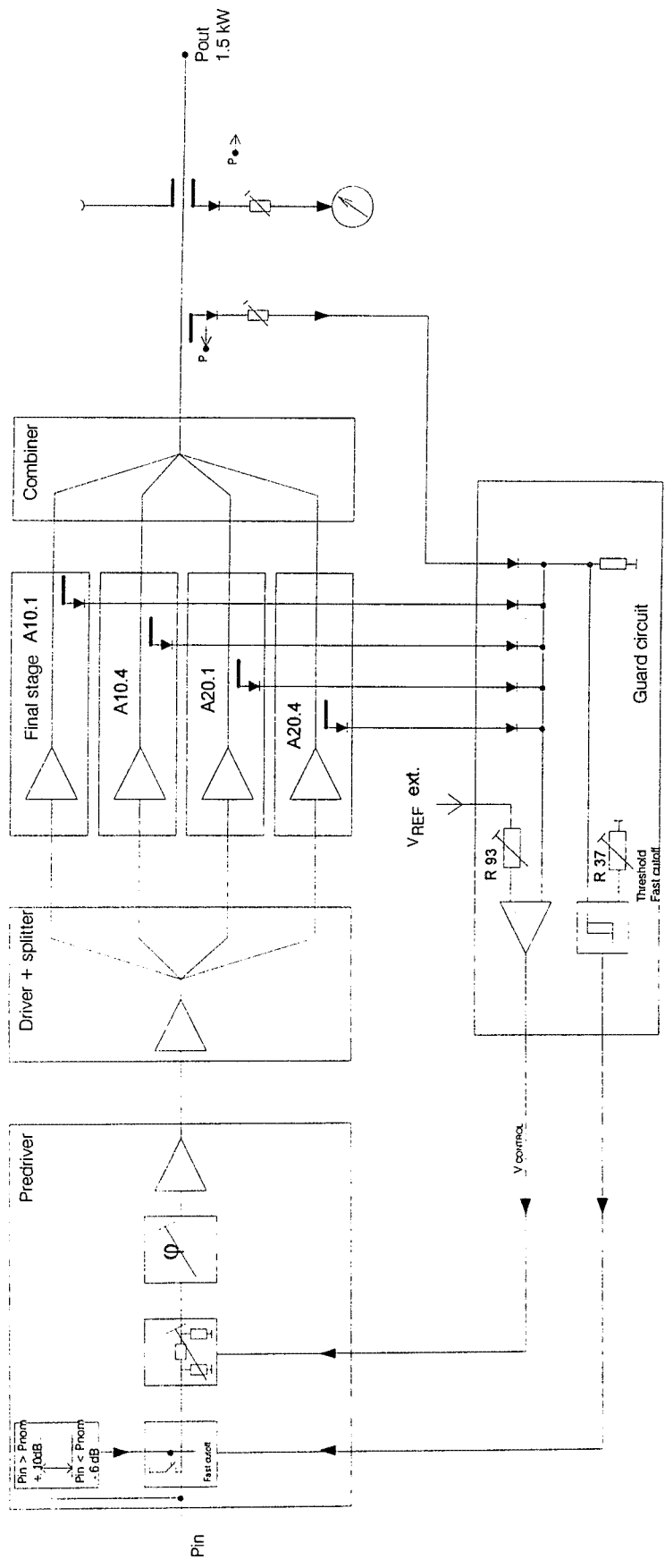


Fig. 1-1 Block diagram with control and protection circuit

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1.3 Typical Operating Parameters

Frequency rangeband IV/V, 470 to 860 MHz

Output power

Output power, vision 1.5 kW
(sync peak power with split amplification
and standard specifications)

Output power, sound

Mono 900 W
Dual sound 600 W / 120 W

Typical Values (black level)

Line-time nonlinearity (uncorrected) typ. ≤ 0.85
Differential gain (uncorrected) typ. $\leq 10\%$
Differential phase (uncorrected) typ. $\leq 10\%$
Sync crushing (uncorrected) typ. $\leq 7\%$

Transistor currents

Quiescent currents

Class-A driver, double transistor 6,5 A
Class-A driver, single transistor 3,25 A
Class-AB driver, double transistor 1 A
Class-AB driver, single transistor 0,5 A
Class-AB Endstufe, dual transistor 1,2 A
Class-AB-Endstufe, single transistor 0,6 A

Operating currents

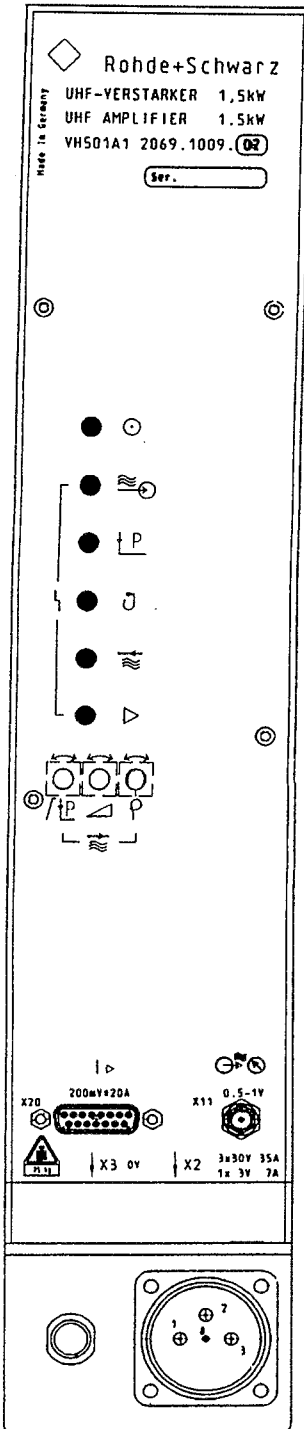
Class-AB driver and output stage ca. 10 A (black level)
Current difference of the transistors ca. 30 %

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2 Preparation for Use and Operation

During normal operation no manual control is required. The green front-panel LED "Amplifier on" is on and all other LEDs are off. Malfunctions are signalled by red LEDs on the front panel.

2.1 Legend for Front-Panel Elements



LEDs

Amplifier on

Fault: RF input power: $P > 200 \text{ mW}_{\text{sync}}$ or $P < 5 \text{ mW}_{\text{sync}}$

Fault: RF output power: $P < 500 \text{ to } 800 \text{ W}_{\text{sync}}$

Overtemperature

Fault: Reflection at output: $s > 1,5$

Amplifier failure

Control elements

Left:

Setting the threshold for underpower signalling
 ΔP approx. $\pm 2 \text{ dB}$

Center: Setting the RF output power

P_{out} approx. $\pm 1 \text{ dB}$
 (gain matched to that of other amplifier plug-ins)

Right: Setting the phase response

$\Delta \phi$ approx. 80°

X11: RF monitoring output

3 Maintenance and Repair

3.1 Quiescent Current Setting

Before the quiescent current can be set for the class-AB amplifiers, the line to the junction pad (see component location plan) between the two quiescent-current potentiometers has to be removed. The sum of the currents through transistors A and B is measured.

Quiescent current for model 02:

Class-A driver	2 × 3.25 A
Class-AB driver	2 × 0.5 A
Class-AB output stage	2 × 0.6 A

Quiescent current for model 12:

Class-A driver	2 × 3 A
Class-AB driver	2 × 0.754 A
Class-AB output stage	2 × 0.75 A

CAUTION: Even if the potentiometers are fully turned to the left, there still is a quiescent current of 0.2 A to 0.5 A. If, for example, the quiescent current in the output stages is 0.4 A, the quiescent current for each output-stage transistor has to be increased by 0.4 A, ie the current is set to 0.8 A by means of the first potentiometer and to 1.2 A using the second potentiometer.

After the quiescent current has been set, the line to the junction pad between the potentiometers has to be soldered back in place.

3.2 Replacement of RF Power Transistor

To change the RF power transistor proceed as follows:

- Remove the 2 screws at the transistor flange.
- Then remove the 2 screws which are located beside the flange at the position where the flange is underneath the PCB.

CAUTION: Do not damage the capacitors of the base and collector circuits nor change their position during soldering.

NOTE: If RF chip capacitors are replaced, measure or mark the location of the capacitors and insert the new capacitors at the same position.

- Use a braiding to remove the solder from the base and collector lugs and carefully lift lugs off the PCB using flat pliers.
- Remove old heat-conducting paste using cotton swab and alcohol.
- Exchange current-control transistor BCP 68 (see component location plan):
 - Output stage: V4, V2, V12, V10, V18, V28, V26
 - Driver: V12, V10, V20, V18

The collector lug of the current-control transistor is connected to the 3 V junction pad for the auxiliary voltage.
- Turn the two quiescent-current potentiometers fully to the left.

CAUTION: Do not alter the position of the capacitors when replacing the RF power transistor.

- Bend lugs of RF transistor by 90° at approx. 1.5 mm from the enclosure and insert transistor after having applied a thin layer of heat-conducting paste to it.