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Installation Guide
BLA-RF-CAT14

Contents

Overview

The BLA-RF-CAT14 is a high-performance BLAKE TRIPLE FILTERED™ distribution amplifier that allows you to send RF signals (TV, FM, and DAB) over structured network cabling (CAT5/6).

It's the perfect solution for modern installations where traditional coaxial cable is not available or practical.

It takes a single RF input, filters and amplifies the signal, and distributes it to four RJ45 outputs. Each output has its own independent gain control, allowing you to perfectly balance the signal for different cable run lengths.

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Key Features

- **4-Way Distribution**: Sends an RF signal from one F-connector input to four RJ45 outputs.
- **Wideband Amplification**: Covers the full 47-694MHz frequency range, making it ideal for TV, FM, and DAB signals.
- **Built-in BLAKE TRIPLE FILTERED™**: Includes integrated Class 1 5G/LTE filtering to reject signals above 694MHz, preventing mobile signal interference and LF filtering for frequencies below 30MHz.
- **Full Signal Control**: Features a main gain attenuator (0-20dB) and a slope (tilt) control (0-18dB) to manage the primary signal feed.
- **Independent Output Control**: Each of the four RJ45 outputs has its own independent 0-20dB gain attenuator, allowing you to balance signal levels for varying cable run lengths.
- **Robust & Screened**: Built into a sturdy, fully screened diecast housing to prevent interference and ensure signal integrity.
- **Professional Test Port**: Includes a test port for easy signal verification on-site.

Before You Begin

Before installing your BLA-RF-CAT14, please ensure you have all the components:

- The BLA-RF-CAT14 amplifier unit.
- The included 5V DC power adapter.
- Three RJ45 RF terminators for any output ports that will not be used.
- One 1.5m RJ45 to IEC TV Plug Balun Lead (available to order BLA-RF-CAT-LEAD)

Physical Installation

1. **Mount the unit**: Choose a dry, well-ventilated indoor location. Secure the amplifier to a wall or panel using the two integrated mounting lugs on the sides of the diecast case.

2. **Connect RF input**: Screw your RF aerial feed cable securely onto the F-connector port labelled RF. This input port has a 75Ω impedance. Ensure the connection is finger tight.

3. **Connect outputs**: Plug your CAT network cables firmly into the RJ45 output ports (labelled OUT1 to OUT4). These output ports have a 100Ω impedance to match the network cable.

4. **Connect power**: Insert the 5V DC power adapter cable into the port labelled DC 5V. Plug the adapter into a mains socket. The POWER LED should illuminate red, indicating the unit is active.

5. **Connect TV**: Connect the RJ45 end of the IEC Balun lead to the designated RJ45 wall socket and the IEC (coaxial) end of the lead to the television's aerial/RF input.

Important:
Terminating Unused Ports

It is **essential** to terminate any unused RJ45 output ports to ensure optimal performance.

- Plug an **RJ45 RF terminator** (BLA-RF-CAT-TERM) into every empty RJ45 slot.

Reason: This prevents signal reflections and external noise (ingress) from entering the amplifier through the open ports, which is crucial for maintaining a clean, stable signal for all active outputs. Failure to terminate unused ports can lead to signal degradation and poor reception.

Test Port:

A second F-connector labelled TEST and marked "-20dB" is provided.

- You can connect a signal meter here to measure the incoming RF signal strength without disconnecting your main feed.

Adjusting the Amplifier Controls (Overall and Per-Port)

Your amplifier features comprehensive controls for precise signal management.

Overall (Main) Controls:

- **MAIN GAIN (0-20dB)**: This knob controls the **overall** amplification level for **all four output ports simultaneously**. It features a 20dB adjustment range, allowing you to boost or reduce the base signal across all outputs uniformly.
- **TILT/SLOPE (0-18dB)**: This is a critical "slope" control. It's used to compensate for the natural tendency of higher frequencies to lose more signal over longer cable runs than lower frequencies. Turning this up boosts higher frequencies more, effectively flattening the signal response at the end of a long cable.

Independent (Per-Port) Controls:

- **Four Individual GAIN controls**: Each of the four RJ45 output ports has its own independent gain control. These are primarily used to "balance" the signal levels between different cable lengths.

Managing Different Cable Lengths & Signal Balancing

CAT cables, like any cable, attenuate the signal over distance, with higher frequencies experiencing more loss.

- **Step 1**: **Initial Setup**: Start with all GAIN and TILT/SLOPE controls at a mid-point.

- **Step 2**: **Optimise for Longest Run**: Identify your longest CAT cable run. Adjust the main TILT/SLOPE control first to ensure that the higher frequencies (e.g., 694MHz) are adequately boosted. Then, use the MAIN GAIN to get a good overall signal level at the end of that longest cable.

- **Step 3**: **Balance Shorter Runs**: Your shorter cable runs will now likely have a signal that is too strong. Use the individual GAIN knob for each of these shorter runs to adjust the signal level (attenuate it) until it reaches the desired optimal level (e.g., 50-65 dBµV).

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The BLA-RF-CAT14 is equipped with advanced **BLAKE TRIPLE FILTERED™** technology, essential for modern RF environments:

- **Frequency Range**: The unit operates from **47-694MHz**. This passband is optimised for terrestrial digital TV (DVB-T/T2) and radio signals (FM/DAB), effectively defining the signals it amplifies.
- **BLAKE TRIPLE FILTERED™**: The device is fully compliant with **EN 303 354: Class 1** for 5G LTE filtering. This is a critical feature, as it means the amplifier provides **very high attenuation (typically 30-40dB or more)** for frequencies immediately above 694MHz, such as those used by 5G and some 4G LTE mobile phone transmissions (e.g., 698MHz to 900MHz). This rejection prevents cellular interference from degrading your TV picture.
- **Low Frequency Filtering**: The amplifier also features a robust input filter providing over **40dB of rejection** for all frequencies **below 30MHz**. This is vital for stopping low-frequency noise and interference (e.g., from VDSL broadband, power line noise, or return path signals in some systems) from entering and contaminating your desired TV signal.

Fault Finding & Optimisation

The BLA-RF-CAT14 incorporates our advanced BLAKE TRIPLE FILTERED™ design, providing robust protection against common interference issues. This means in many cases, external filtering may not be needed. However, if you experience signal problems, consider the following:

Interference (4G/5G)

Despite the BLA-RF-CAT14 advanced 5G/LTE filtering EN 303 354: Class 1, with >40dB rejection below 30MHz and high attenuation above 694MHz, severe local interference from mobile phone masts can occasionally necessitate additional measures.

Symptoms of 4G/5G Interference

- Intermittent picture breakup or freezing, especially on higher frequency channels.
- Loss of signal on specific multiplexes (groups of channels).
- Sound dropouts.

Solutions for 4G/5G Interference

- **Use Setback 4G/5G Filters**: These are small filters that connect directly before the RF Input of the BLA-RF-CAT14. They provide an additional layer of protection if the local 5G/4G signal is powerful and overloading the aerial or amplifier's front end. This is usually the first step if the internal filtering isn't quite enough.
- **Masthead 4G/5G Filters**: In very extreme cases, where the interference is so strong that it overloads even the TV signal itself (before it reaches the BLA-RF-CAT14), a masthead filter fitted directly at the aerial may be necessary. This prevents the interfering signal from even entering the coaxial cable.

Signal Too Weak or No Signal

- **Check Connections**: Ensure all F-connectors and RJ45 cables are securely fastened. A loose connection can cause significant signal loss.

- **Verify Power**: Confirm the **POWER** LED on the BLA-RF-CAT14 is illuminated red. If not, check the power adapter and mains socket.

- **Adjust Gain/Tilt**: (Adjusting Amplifier Controls).
  - If the overall signal is weak, slowly increase the MAIN GAIN.
  - If higher frequency channels are weaker than lower ones, increase the **TILT/SLOPE** control.
  - If only one output is weak, adjust its **individual GAIN control**.

- **Using a Masthead Amplifier**: If your aerial signal is consistently weak before it even reaches the BLA-RF-CAT14 (e.g., due to a very long aerial downlead or being in a very poor reception area), a separate BLAKE TRIPLE FILTERED™ masthead amplifier may be required. This should be installed as close to the aerial as possible to amplify the signal before losses accumulate in the downlead. The BLA-RF-CAT14 can then take this stronger input and distribute it.

Signal Too Strong (Overload)

Symptoms of signal overload

- Picture pixelation, especially on all channels, but can also lead to complete signal loss or erratic behaviour. This can happen if the input signal is too high for the amplifier, or the output signal is too high for the TV/receiver.

Solutions for signal overload

- **Reduce Gain**: Use the MAIN GAIN control on the BLA-RF-CAT14 to reduce the overall output.
- **Reduce Individual Gain**: If only specific outputs are too strong, use the **individual GAIN controls** for those ports to attenuate the signal.
- **Check Maximum Recommended Input**: Remember the BLA-RF-CAT14 has a maximum recommended input of 75 dBµV. If your aerial provides a signal significantly higher than this, even before amplification, you might need an attenuator before the BLA-RF-CAT14 or consider a lower gain aerial.

Importance of Advanced BLAKE TRIPLE FILTERED™ Design

The BLA-RF-CAT14 design incorporates:

1. **Low-Frequency Filter**: Strong rejection below 30MHz (e.g., VDSL/return path noise).
2. **Precise Band Pass Filter**: Optimised 47-694MHz range, cutting off signals outside TV broadcast.
3. **High-Performance 4G & 5G/LTE Filter**: Dedicated high attenuation for mobile signals above 694MHz.

This integrated approach provides excellent protection, simplifying most installations by reducing the need for external filters. Only in challenging signal environments might additional external filtering or amplification be necessary.

Interference (TETRA - Optional Filter)

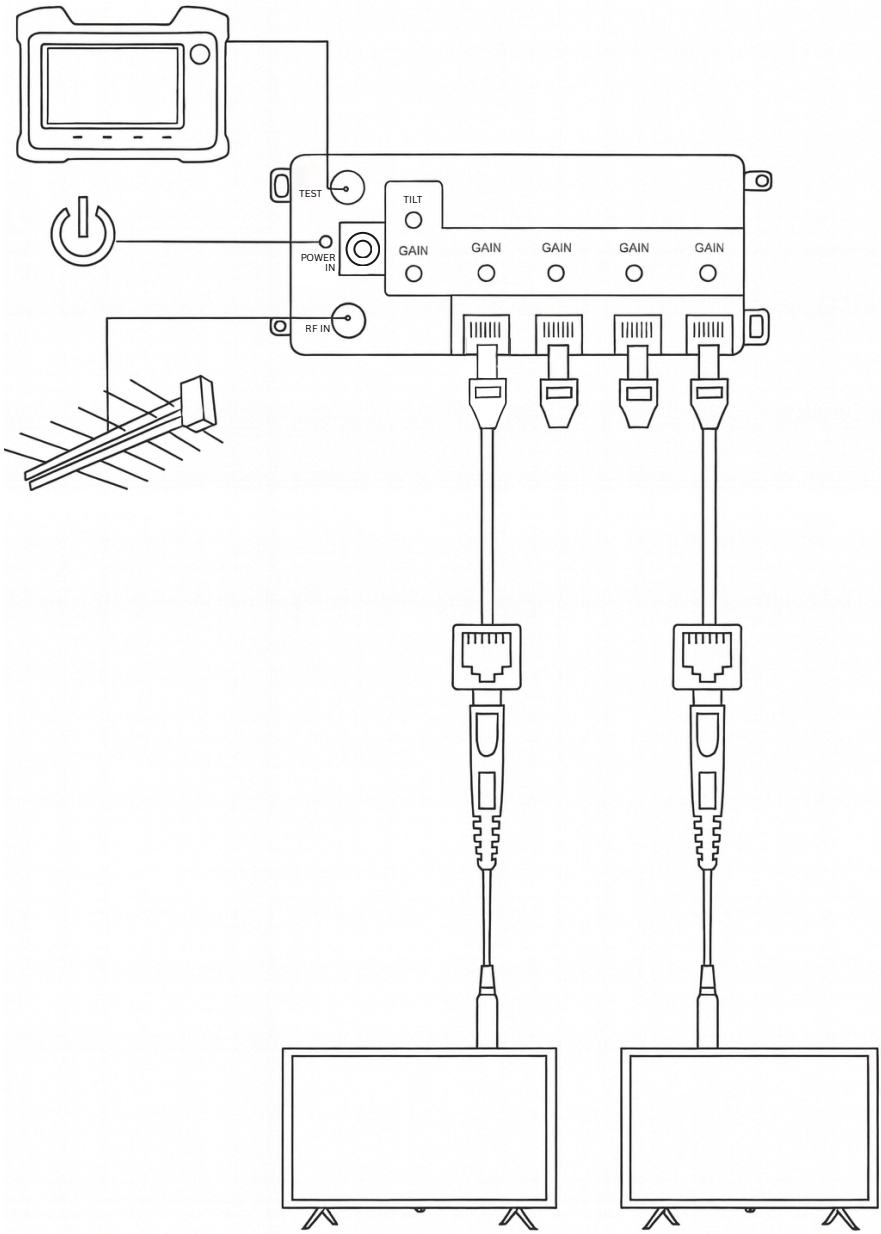
TETRA (Terrestrial Trunked Radio) is a digital radio standard used by emergency services, public safety networks, and some industrial users, often operating in bands like 380-400MHz or 450-470MHz. While the BLA-RF-CAT14 standard filtering is excellent, very strong local TETRA transmitters can, in rare instances, cause issues.

Symptoms of TETRA Interference

- Similar to 4G/5G but potentially affecting channels within the amplifier's 47-694MHz passband.
- More localised interference, often linked to proximity to emergency services transmitters or industrial sites.

Solution for TETRA Interference

- **Optional TETRA Filter**: If you suspect TETRA interference, an **optional external TETRA filter is available (BLA-RF-CAT-TETRA)**. This specific filter connects directly before the **RF Input** of the BLA-RF-CAT14 and is designed to provide targeted, high attenuation for TETRA frequencies without significantly affecting desired TV signals. Consult your supplier for this specialised Blake filter if required.


TEST
TILT
GAIN
GAIN
GAIN
GAIN
GAIN
POWER IN
RF IN

Technical Specification

Feature	*Specification*
Product	BLA-RF-CAT14: RF-over-CAT Amplifier
Inputs / Outputs	1 Input / 4 Outputs
Input Connector	F-Type (75Ω)
Output Connectors	4 x RJ45 Female (100Ω)
Frequency Range	47 – 694 MHz
Gain (MAX)	34 dB
Gain Adjustment (Overall)	0 - 20 dB
Gain Adjustment (Per Port)	0 - 20 dB
Slope / Tilt Adjustment	0 - 18 dB
Max Output Level (IMD3=60dB)	109 dBµV
Maximum Recommended Input	75 dBµV
Noise Figure	2.5 dB (typical) / 4.0 dB (max)
Return Loss	10 dB (typical) / 8 dB (min)
Isolation Between Outputs	>30 dB
5G/LTE Filtering	EN 303 354: Class 1 (High attenuation >694MHz)
Low Frequency Filter	>40 dB rejection for all frequencies < 30 MHz
Power Requirement	5V DC (350 mA)
Dimensions	144 x 66 x 37 mm
Weight	265g
Operating Temperature	-20 to +50 °C
Safety Standard	EN IEC62368-1:2020+A11:2020
EMC Standard	Class 1, EN 50083-2: 2012 + A1: 2015

Notes

Blake UK Ltd.
177-187 Rutland Road, Sheffield, S3 9PT
0114 223 5000
sales@blake-uk.com
www.blake-uk.com