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(56) Documents cited
EP 0018702 A1 **US 4856084 A** **US 4236254 A**
US 3195052 A

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INT CL[5] **H04B**
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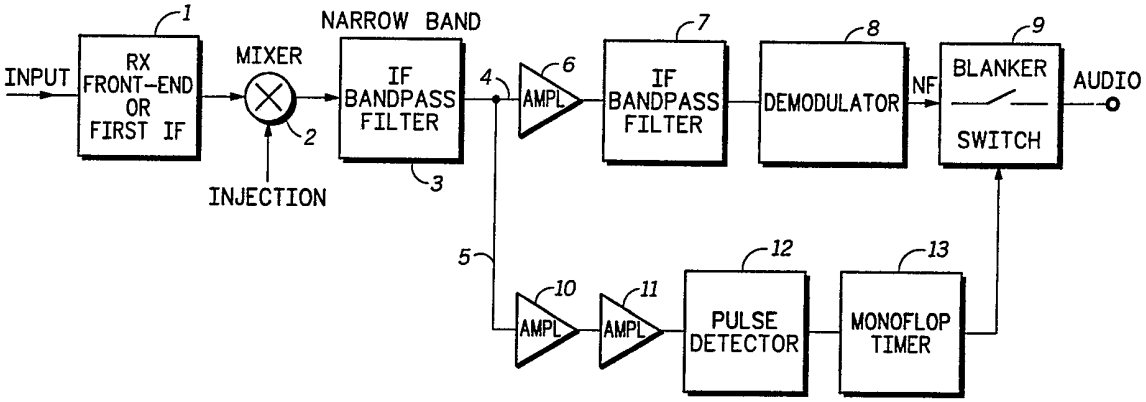
(54) Radio receiver with noise blanker

(57) A noise blanker detects noise pulses in the IF band, demodulates the signal with the noise pulses to provide an audio signal and blanks the noise pulses in the audio band.



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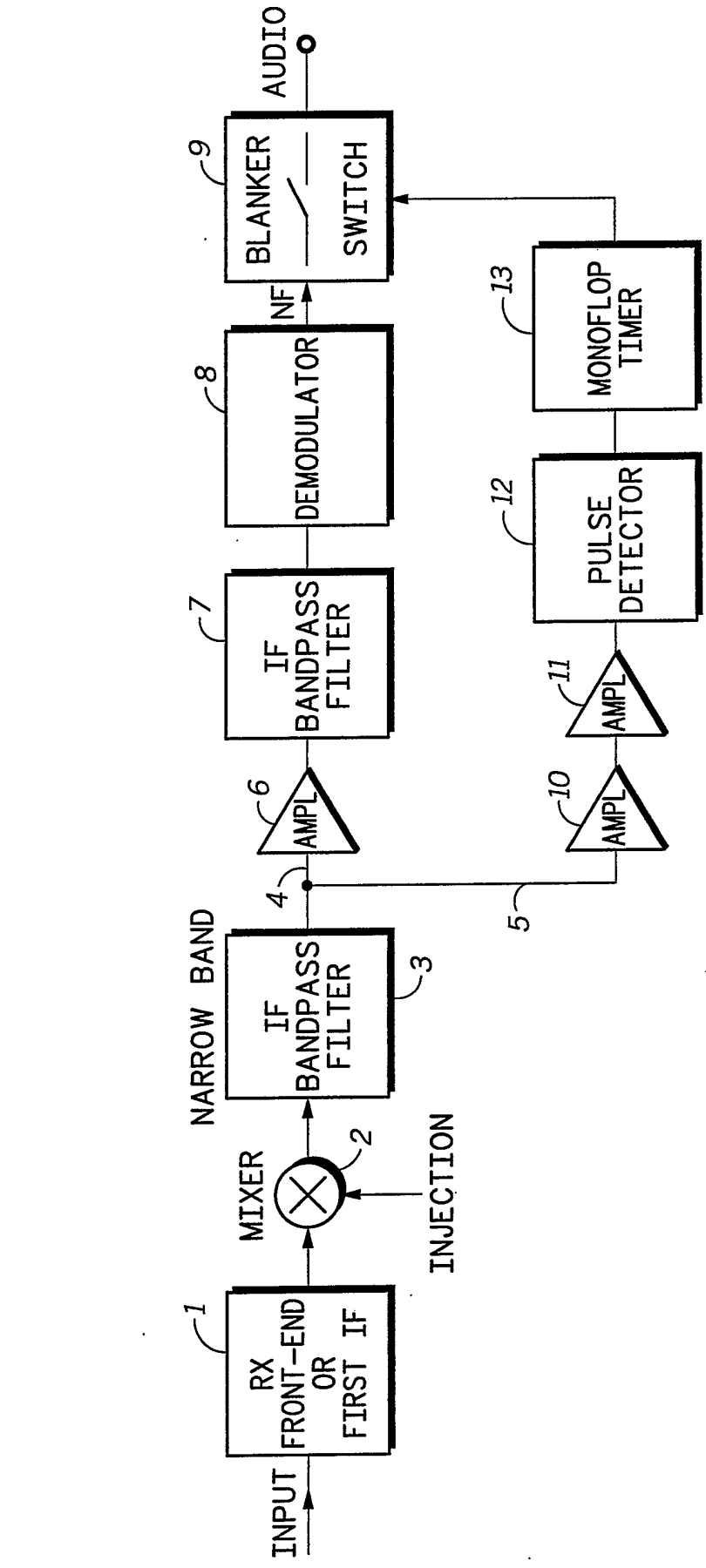
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.


INPUT
RX FRONT-END OR FIRST IF
1
MIXER
2
INJECTION
NARROW BAND IF BANDPASS FILTER
3
4
5
AMPL
6
IF BANDPASS FILTER
7
DEMODULATOR
8
NF
BLANKER SWITCH
9
AUDIO
AMPL
10
AMPL
11
PULSE DETECTOR
12
MONOFLOP TIMER
13

FIGURE

RADIO RECEIVER WITH NOISE BLANKER

Background of the Invention

This invention relates to radio receivers having means for detecting and suppressing noise pulses, generally known as noise blankers.

Summary of the Prior Art

Prior art receivers with noise blankers require extensive complex hardware, mainly in the RF and/or IF. This hardware is difficult to design and implement in the receiver.

Alternative concepts are not robust against RF disturbances or modulation frequencies.

European Patent Application EP-A-0132307 of Motorola GmbH describes a communications system receiver having a noise blanker. In the noise blanker described, noise pulses are detected in an intermediate frequency (IF) stage of an auxiliary channel. Upon detection of a noise pulse, a blanker switch is opened in the IF stage of the receiver channel of interest.

A disadvantage of the above described blanker is the need for a bulky and expensive IF balanced filter to perform the function the blanking switch.

Noise blankers are also known which detect noise in the audio signal and blank the audio signal. Such noise blankers are crude and inefficient and are liable to blank audio signals which are not in fact noise spikes especially for narrow bandwidth applications. Alternatively, complex audio circuitry would be required to analyse the audio signal for improved performance.

Summary of the Invention

It is an object of the present invention to provide a compact, low cost noise blanker having good performance, and which is robust against RF disturbances and modulation frequencies.

According to the present invention, a radio receiver is provided comprising means for detecting noise pulses in a first signal in a first frequency band, means for demodulating the first signal with the noise pulses to provide an audio frequency signal and means for blanking the audio frequency signal to suppress the noise pulses.

The first frequency band is preferably an intermediate frequency band.

An intermediate frequency band pass filter may be used to provide a time delay to delay the intermediate frequency signal. Alternatively, a low pass audio filter may be used to delay the audio signal prior to blanking.

Brief Description of Drawing

Figure 1 shows a block circuit diagram of the radio receiver in accordance with the preferred embodiment of the invention.

Detailed Description of the Preferred Embodiment

Referring to Figure 1, there is shown a front-end tuner 1, which receives a radio frequency signal from an antenna (not shown). The unit 1 may alternatively be a first IF stage of a radio receiver. The signal from unit 1 is fed to a mixer 2 in which a local oscillator injects an RF signal. The resultant IF signal is fed to narrow band IF band pass filter 3 and from there the signal passes to a received channel 4 and a pulse detector channel 5. On the received channel, the signal is amplified in amplifier 6 and passed through an IF band pass filter 7 to a demodulator 8. In demodulator 8, the signal is demodulated to audio frequency and passed to an audio blanker 9. The blanker 9 takes the form of a simple electronic switch. The output from blanker 9 is the noise blanked audio signal. On the pulse detector channel 5, the signal is amplified in amplifiers 10 and 11 and fed to a pulse detector 12 including a pulse shaper in the form of a high pass filter which can react only to very fast changes in the IF. The pulse detector

12 may readily be implemented by one skilled in the art. The pulse detector 12 provides a signal to a mono-flop timer 13 whenever a noise pulse is detected. The mono-flop timer 13 controls the opening of blanker 9. The operation of the circuit is straightforward. Noise pulses in the IF band are amplified by the amplifiers 10 and 11 with automatic gain control. The pulse detector 12 detects noise pulses and triggers the monostable pulse 13, which is adjusted for optimised timing of the opening of blanker 9 in the receiver audio stage.

IF band pass filter 7 provides time delay (and selectivity if desired) in the IF stage of the receiver channel, delaying the signal sufficiently to allow pulse detector 12 to detect noise pulses and to allow blanker 9 to open at an optimum time in advance of a noise pulse (i.e. at the start of a noise pulse). With band pass filter 7 having a bandwidth of $8KH_Z$, the monostable pulse length is 400 microseconds.

Instead of providing time delay by means of IF band pass filter 7, an audio frequency low pass filter could be provided between demodulator 8 and blanker 9.

The invention has the advantage of providing a very low cost and universally usable circuit with low size. The circuit can be produced without any alignment procedures and can be integrated into known IF integrated circuits.

By means of a simple audio blanker switch 9, the need for a large and expensive IF balanced IF filter with a blanker switch is avoided.

CLAIMS

1. A radio receiver comprising means for detecting noise pulses in a first signal in a first frequency band, means for demodulating the first signal with the noise pulses to provide an audio frequency signal and means for blanking the audio frequency signal to suppress the noise pulses.

2. A radio according to claim 1, wherein the first frequency band is an intermediate frequency band between radio frequency and audio frequency.

3. A radio receiver according to claim 1 or 2, wherein the first signal with the noise pulses is amplified with automatic gain control.

4. A radio receiver according to claim 2 or 3, wherein an intermediate frequency bandpass filter is used to provide a time delay to delay the first signal sufficiently to blank the audio frequency signal in advance of each noise pulse.

5. A radio receiver according to claim 1, 2 or 3, wherein a low pass audio filter is used to provide a time delay to delay the signal sufficiently to blank the audio frequency signal in advance of each noise pulse.

6. A radio receiver substantially as hereinbefore described and as shown in the accompanying drawing.

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