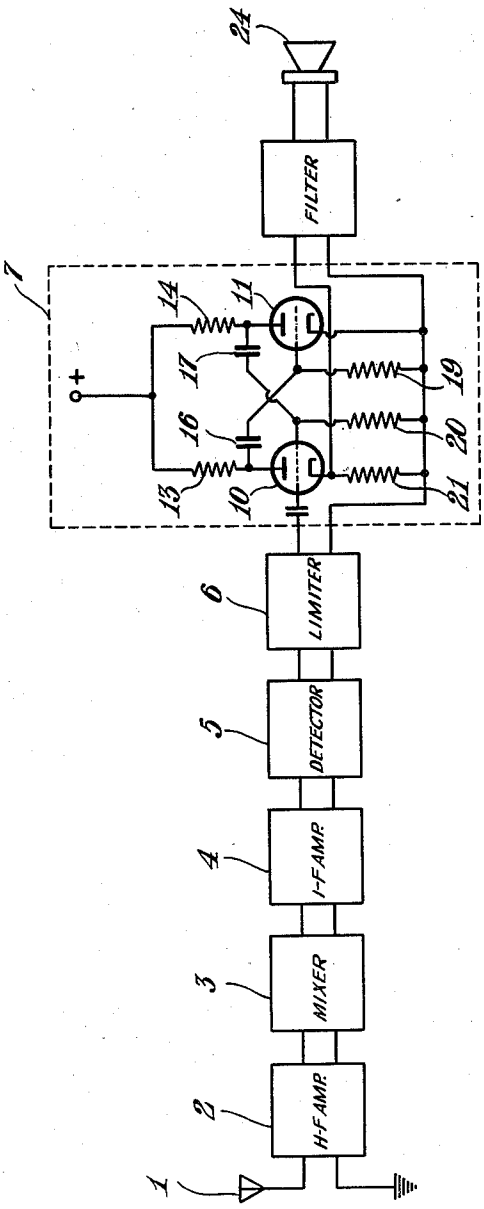
May 8, 1951 H. RINIA 2,552,496

RECEIVER FOR MODULATED RADIO FREQUENCY PULSES

Filed Dec. 6, 1947



INVENTOR.
HERRE RINIA
BY Fred M Vogel
AGENT.

Patented May 8, 1951 2,552,496

UNITED STATES PATENT OFFICE

2,552,496

RECEIVER FOR MODULATED RADIO-FREQUENCY PULSES

Herre Rinia, Eindhoven, Netherlands

Application December 6, 1947, Serial No. 790,095
In the Netherlands November 30, 1942

2 Claims. (Cl. 250—20)

1

This invention relates to a device for the reception of signals characterized by impulses of constant duration and variable spacing.

In order to improve the signal-to-noise ratio in such systems it is known to make the incoming pulses trigger an impulse repeater, i. e., a local impulse-generator.

According to the invention the signal-to-noise ratio is materially improved with respect to the conventional devices by making use of an impulse repeater which, due to its response characteristic, exhibits an appreciable sensitivity decrease below the maximum value for a time corresponding at least to one cycle of the average impulse-repeating frequency of the incoming impulses.

Immediately after the occurrence of a repeated impulse, the impulse repeaters used in conventional devices regain their normal maximum sensitivity so that, for instance, a noise-impulse appearing midway between two successive signal impulses may bring about a repeated impulse.

In a circuit arrangement according to the invention, any response to such a noise-impulse is in general avoided, thereby improving the noise-level.

Since the impulse repeater, notwithstanding its reduced sensitivity, might respond to noise impulses of excessive amplitude, it is advantageous to limit the amplitude of the impulses applied to the impulse-repeater.

The invention will now be described more fully with reference to the accompanying drawing forming a part of the specification and showing a schematic diagram of a circuit arrangement according to the invention.

In the form of construction represented the carrier-wave impulses picked up by an antenna are supplied to a high-frequency amplifier 2 which is connected in cascade with a mixer stage 3, an intermediate-frequency amplifier 4 and a detector 5. The pulse voltage obtained after detection is fed, preferably through a limiter 6, to a pulse repeater, that is a local impulse-generator 7 which is known per se.

The local impulse-generator 7 consists of a multivibrator circuit arrangement comprising two discharge tubes 10 and 11, the anodes of which are connected across resistors 13 and 14 to a source of anode potential (not shown). The grids 25 and 26 of discharge tubes 11 and 10 are grounded through grid leak resistors 19 and 20 respectively and coupled by means of capacitors 16 and 17 to the anodes 27 and 28 respectively. The repeated pulses taken from the cathode-

2

resistor 21 are fed to a device 23 by which these pulses are converted into the signal to be utilized. Subsequently, the signal to be utilized is applied to a reproducing device 24.

The local impulse-generator has two positions of equilibrium. In one of these positions of equilibrium tube 11 is conducting and tube 10 is cut off, whereas in the other position of equilibrium tube 10 is conducting and tube 11 is cut off. The time during which the tubes are cut off is mainly determined by the time constant of the capacitor 16 and resistor 19, and the capacitor 17 and resistor 20 respectively.

In this circuit arrangement the time constant of resistor 20 and capacitor 17 is such that whenever tube 11 is cut off, it will remain cut off at least for a time corresponding to the average impulse repeating frequency, whereas the time constant of capacitor 16 and resistor 19 is comparatively small and determines the duration of the repeated impulse.

Transition from one position of equilibrium to the other is effected by applying a pulse voltage of positive polarity and of such value to the grid of the non-conducting discharge tube 10 that the ignition voltage of this tube is attained.

Assume, in effect, that tube 10 is cut off at a given instant. In this position of equilibrium the negative grid bias of tube 10 will decrease from the instant of cut off according to a discharge curve which is determined by the values of capacity of capacitor 17 and resistance of resistor 20, the time constant being chosen in a manner such that this tube is cut off at least for a time corresponding to one cycle of the average impulse repeating frequency. Consequently, ignition of tube 10 requires a voltage exceeding the momentary difference between ignition voltage and grid voltage, which means that noise impulses having a momentary amplitude smaller than said difference have no influence whatsoever. Due to this reduced sensitivity of the local impulse-generator the signal-to-noise ratio is materially improved.

At the presence of a signal impulse on the grid of tube 10, the local impulse-generator will not have reached its maximum sensitivity, but the ignition voltage of the local impulse-generator is exceeded, as a result of which tube 10 tends to draw current. The time during which tube 10 draws current is determined by the time constant of capacitor 16 and resistor 19. A renewed impulse is consequently taken from the cathode resistor 21, the duration of which impulse corre-

sponds to the time during which tube 10 is conducting.

I claim:

1. Apparatus for receiving a transmitted wave modulated by successive pulses the duration of which is constant and the spacing of which varies in accordance with an intelligence signal, said apparatus comprising a detector to demodulate said wave to derive said pulses therefrom, and a pulse-responsive generator coupled to said detector to repeat said derived pulses, said generator being constituted by a multivibrator system comprising first and second electron discharge tubes having a cathode a grid and an anode, means to cross couple said tubes including a first capacitor connected between the anode of the first tube and the grid of the second tube and a second capacitor connected between the anode of the second tube and the grid of the first tube, a bias resistance connected between the grid of the first tube and ground to maintain said first tube normally non-conductive, the cathode of said second tube being grounded whereby said second tube is normally conductive, a first resistor connected between the grid of the first tube and ground, a second resistor connected between the grid of the second tube and ground, means to apply said derived pulses to the grid of said first tube to render said tube conductive whereby said second tube is rendered non-conductive to develop a repeat pulse, said second capacitor in combination with said first resistor having a time constant at which subsequent to the occurrence of a repeat pulse said first tube is maintained

insensitive to voltages below the amplitude of said derived pulse for a period corresponding to the duration of one cycle of the average repetition frequency of said derived pulses, and a limiter interposed between said detector and said generator.

2. Apparatus, as set forth in claim 1, further including means coupled to the output of said generator to convert the repeated pulses issuing therefrom into a signal whose amplitude varies in accordance with the spacing of said repeated pulses.

HERRE RINIA.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,262,838	Deloraine et al.	Nov. 18, 1941
2,333,395	Bartelink	Jan. 4, 1944
2,361,437	Trevor	Oct. 31, 1944
2,416,308	Greig	Feb. 25, 1947
2,419,569	Labin	Apr. 29, 1947
2,419,570	Labin	Apr. 29, 1947
2,430,725	Miller et al.	Nov. 11, 1947
2,431,832	Schlesinger	Dec. 2, 1947
2,468,059	Grieg	Apr. 26, 1949

FOREIGN PATENTS

Number	Country	Date
509,820	Great Britain	July 19, 1939