

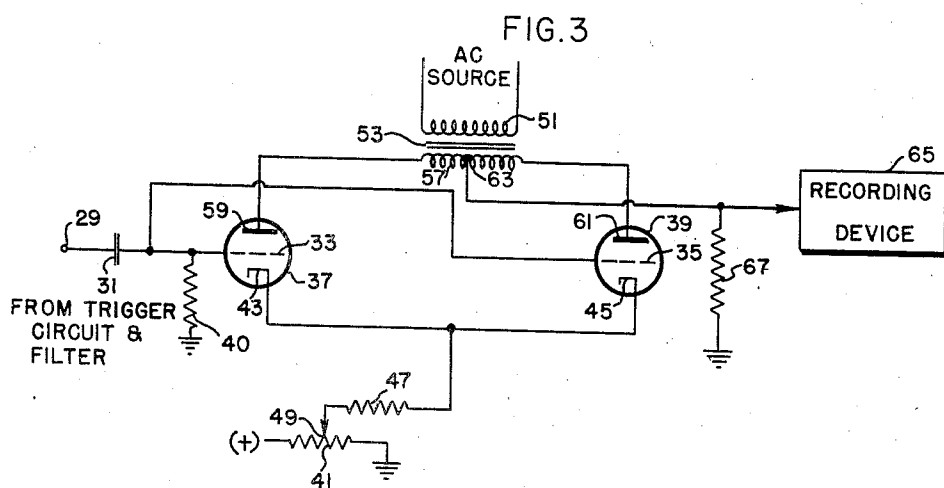
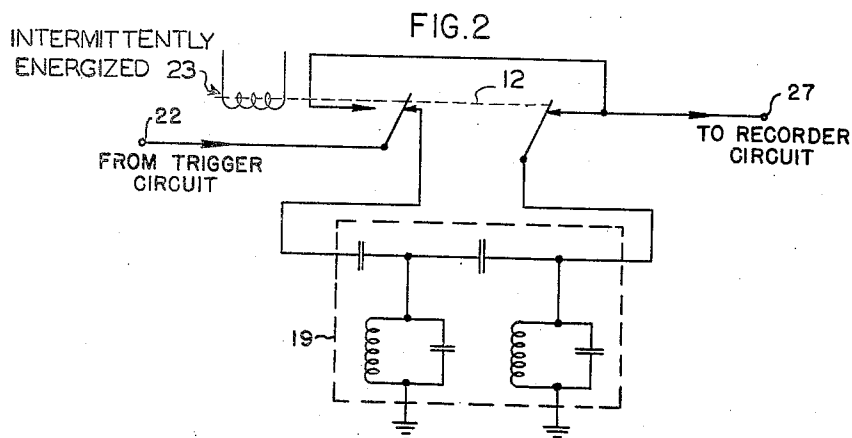
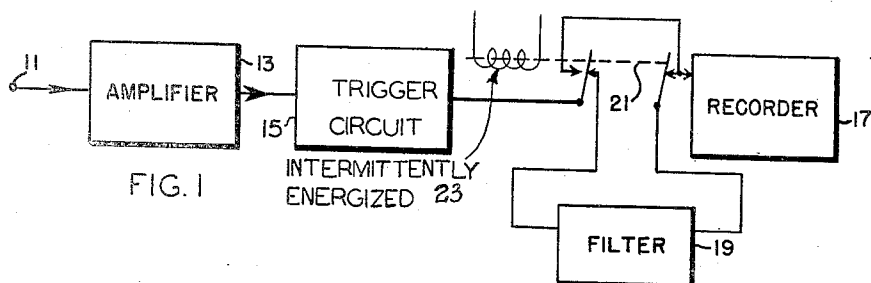
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2,436,512

PULSE FREQUENCY SELECTIVE RECORDER

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PULSE FREQUENCY SELECTIVE RECORDER

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1 Claim. (Cl. 234—1.5)

1

This invention relates, in general, to electrical circuits and more particularly to circuits for differentiating between pulsed signals of differing pulse repetition frequencies.

It is often desirable to provide a circuit which will give an indication when receiving pulsed signals of a particular pulse repetition frequency, hereinafter referred to as P. R. F., and another indication when receiving pulsed signals of other P. R. F.'s. It is an object, therefore, of this invention to provide a circuit which will produce an indication when pulsed signals of a particular P. R. F. are received.

It is a further object of this invention to provide a circuit which will give a differing indication when pulse signals of P. R. F.'s other than the desired are being received.

It is a still further object of this invention to provide a circuit which will be activated only by the fundamental frequency of the pulse signals and not by harmonics thereof.

In general, this invention utilizes a trigger circuit followed by a conventional band-pass filter. Incoming pulses cause the trigger circuit to operate, thereby producing a square wave output, each half cycle being initiated by each incoming pulse. The filter is tuned to the square wave voltage frequency, which in turn is one half the pulse frequency of the desired incoming signals. Only pulses of twice the resonant frequency of the filter circuit will cause an indication.

Other objects features and advantages of this invention will suggest themselves to those skilled in the art and will become apparent from the following description of the invention taken in connection with the accompanying drawing in which:

Fig. 1 is a schematic block diagram showing broadly my invention;

Fig. 2 is a schematic circuit diagram of a filter circuit; and

Fig. 3 is a schematic circuit diagram of a recorder circuit.

Referring now more particularly to Fig. 1, pulses from an external source appear at point 11 and are applied to amplifier 13. The output of the amplifier is applied to a trigger circuit 15 whose output in turn is applied to a recorder 17. A filter circuit 19 may be switched in and out of the output of the trigger circuit 15 by means of the switch 21.

The filter circuit might be, for example, similar to the one shown in Fig. 2 in which the output from the trigger circuit 15 appears at terminal 22 and is connected through switching

2

means 21 to filter circuit 19 which is normally of the band-pass type. Output is taken at terminal 27. Switching means 21 is used to switch the filter 19 in and out of the circuit.

The recorder 17 might be, for example, similar to the one shown in Fig. 3 in which the output of the trigger circuit 15 appears at terminal 29, being coupled through capacitor 31 to the grids 33 and 35 of thyratrons 37 and 39, respectively. Resistor 40 returns the grids 33 and 35 to ground. Potentiometer 41 is connected between a source of positive potential and ground. The cathodes 43 and 45 of thyratrons 37 and 39 are connected together and connected through resistor 47 to arm 49 of potentiometer 41. An A. C. voltage source is applied to primary winding 51 of transformer 53. The secondary winding 57 is connected between plates 59 and 61 of thyratrons 37 and 39. The voltage at center tap 63 of secondary 57 is applied to recording device 65. Resistor 67 is connected between the center tap 63 and ground.

In operation, pulse signals from an external source are applied to the amplifier 13, amplified, and applied to the trigger circuit 15. The output of the trigger circuit is a square-wave voltage each half cycle of which is initiated by each of the incoming pulses. Therefore, the frequency of the square-wave voltage is one-half that of the frequency of the incoming pulses. If switch 21 is closed and the filter circuit 19 is tuned to the square-wave voltage, the filter 19 will transfer voltage of the fundamental frequency of the square-wave voltage to its output connections. Therefore the fundamental frequency voltage will appear at the input of the recorder 17 with substantially no attenuation. At other frequencies, however, the filter 19 will not transfer voltage to its output connections and substantially no signal will appear at the input to the recorder 17. In the event that the resonant frequency of the filter 19 coincides with a harmonic frequency of the square-wave voltage, the recorder 17 will not be actuated since it is designed to respond only to signals above a particular level.

Referring now to Fig. 3, with the filter 19 switched out, the square-wave output of the trigger circuit appears at point 29 and at the grids 33 and 35. The plates 59 and 61 are fed in push-pull, that is, the voltage at plate 59 will be 180° out of phase with plate 61. Each thyatron will conduct when its grid voltage is above cut-off and its plate voltage reaches the ignition voltage at the beginning of a positive cycle. Conduction will continue during the positive cycle at the plate un-

3

til the extinction voltage is reached. Tube currents flow through resistor 67 causing a pulsed voltage at twice the frequency of the A. C. source to appear at the input of the recording device 65. It will be seen that potentiometer 41 may be adjusted so that tubes 37 and 39 will conduct only after the grid voltage has exceeded a particular value.

In practice, the recording device 65 may be a paper-tape device and a stylus which is actuated by the pulsed voltage appearing at the input of the recording device 65. If desired, visual indication means may be used. Also, in practice, the filter 19 is switched in and out of the circuit at a regular rate by means of switch 21 controlled by intermittently energized relay coil 23. It will be seen then that when a pulsed signal, at a P. R. F. for which this circuit was designed, is received, switching the filter 19 in and out of the circuit will have essentially no effect and the recording device 65 will record substantially a solid line. However, if the pulsed signals received are at another P. R. F., the output of the recorder 17 will be a series of regularly spaced dashes, since the filter 19 attenuates the output of trigger circuit 12 and effectively removes the input to the recorder 17 when the switch 21 is in the position indicated in the drawings.

It should be noted that the amplitude of the output of the trigger circuit 15 is of a constant value regardless of the amplitude of its input. The output being essentially a square-wave voltage will contain only odd-order harmonics and the third harmonic will have an amplitude one-third the amplitude of the fundamental. Therefore, if the potentiometer 41 is set so that

4

only signals above a value one-third of the fundamental frequency will cause the tubes 37 and 39 to conduct, no harmonics will actuate the recorder 17.

While there has been described what is at present considered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as set forth in the appended claim, and I claim all such changes and modifications as fall fairly within the spirit and scope of the invention.

What is claimed is:

A combination for recording pulse signals including signals of predetermined pulse frequency, comprising a square wave generator controlled by successive pulses to generate successive half cycles of square wave output, means to apply the output of said square wave generator to a recorder alternately directly and through a filter, said filter having a pass band of one-half the predetermined pulse frequency, whereby signals of said predetermined pulse frequency are continuously recorded and signals of other pulse frequencies are intermittently recorded.

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