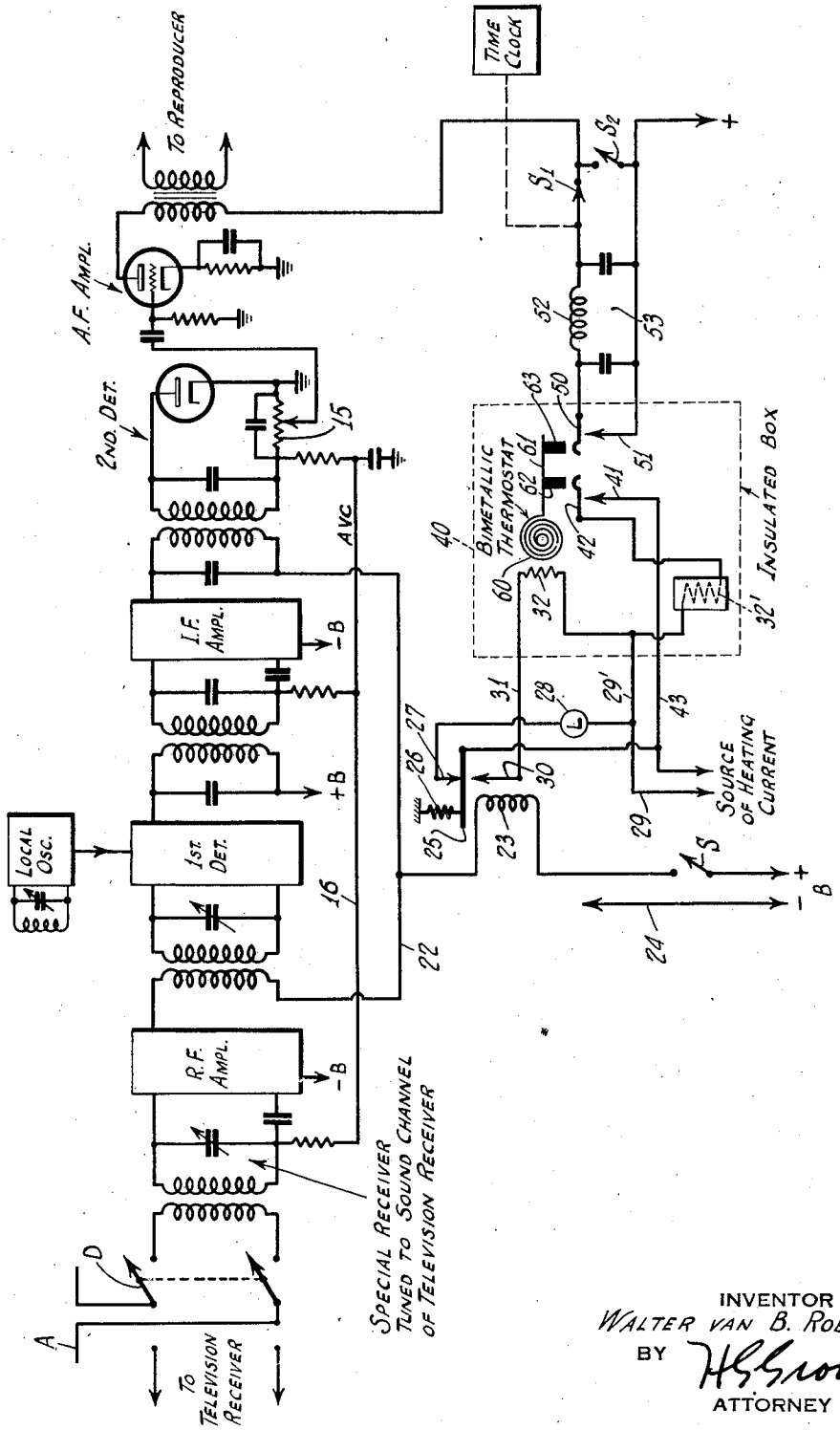
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RADIO PROGRAM SAMPLER SYSTEM

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RADIO PROGRAM SAMPLER SYSTEM

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The present invention relates to a radio receiving system arranged to provide intermittent reception of radio transmission from a given station.

While the arrangement of the invention may be used in other ways as will be indicated later, for the present it will be explained with particular reference to its use in connection with television reception. In the case of television transmissions there are certain scheduled hours for transmissions, and programs are distributed or published in newspapers so that the owner of a television receiver will be apprised in advance of what is going to be available. In addition to such scheduled transmissions, however, there may be unscheduled transmissions of events of great interest, such as conflagrations or the like which obviously cannot be scheduled in advance. The owner of a television receiver has no way to know it when such transmissions are taking place, and therefore is unlikely to be benefited by them. This difficulty is overcome in accordance with the present invention by providing, in addition to the regular television receiver, a special receiver adapted to receive only the sound channel of the television transmission.

This receiver is designed for low power consumption, and may be left running all the time. Then, in case an unscheduled transmission takes place from a television transmitter this special receiver will reproduce the sound channel. If there is anyone in the vicinity he will realize that a television transmission is taking place, and he can go and turn on his television receiver if he judges from the nature of the sound program that something is going on that he would like to see as well as hear.

In accordance with a further feature of my invention the special sound receiver is arranged to operate only for a short time such as, for example, half a minute starting from the time when the unscheduled television program has begun. It then automatically shuts itself off for a relatively long period such as, for example, 15 minutes, at the end of which time it again turns itself on for another half minute and so on. Thus, the owner of the television receiver hears periodic samples of the sound program of the television station so long as the unscheduled program is on the air. The advantage of receiving only periodic short samples is that in case the program does not sound interesting it is not necessary to turn off the special receiver. The latter will turn itself off automatically anyway about as soon as the operator could make up his mind that he is not interested in the program.

Accordingly it is the object of this invention to provide in a radio receiving system, means operating upon the reception of a sound modulated carrier wave for intermittently reproducing short samples of the transmitted sound with relatively long intervals between samples.

The novel features which I believe to be characteristic of my invention are set forth in particularity in the appended claims; the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically a circuit organization whereby my invention may be carried into effect.

The detailed operation of the invention will be better understood by reference to the accompanying drawing, which shows the application of the invention to the automatic sampling of the sound channel of a television station. The reference letter A represents a receiving antenna which is connected to a double-throw switch D. In this way the antenna may be connected either to the input of an ordinary television receiver; or to the input of a special television sound channel receiver arranged to reproduce intermittent samples of the sound channel. The construction and operation of the special receiver are entirely conventional. It may comprise the various cascaded stages shown in the drawing. For the purpose of explaining the present invention it is sufficient to note that in the absence of any transmission from the television transmitter the automatic volume control (AVC) voltage developed across detector load resistor 15 falls to a very low value. As a result the direct current in relay coil 23, through which plate currents flow from the R. F. and I. F. amplifier stages, rises to a relatively high value. When, however, the television transmitter goes on the air the received sound carrier causes the development of a considerable AVC bias thereby reducing the current flow through relay winding 23. By way of illustration, the receiver is shown as one in which superheterodyne reception is employed. Of course, the frequencies employed may be varied to suit the purpose of the set designer. To secure the I. F. (intermediate frequency) the local oscillator is provided to feed local oscillations to the first detector. The tunable circuit of the oscillator will, of course, be tuned to a frequency which differs from the received carrier

frequency by the value of the operating I. F. The first detector has its input circuit tunable to the received carrier. A tunable radio frequency amplifier is coupled to the first detector. The I. F. output circuit of the first detector has developed across it voltage of the sound carrier, but with the carrier frequency reduced to the operating I. F. value. The I. F. amplifier has its input circuit and its output circuit each tuned to the operating I. F. value. The demodulator, or second detector, may comprise any type of detection device.

In this case, a simple diode is shown with its input circuit tuned to the operating I. F. value. The audio voltage is produced across the load resistor 16 arranged in series between the input circuit and the grounded cathode, the load resistor being by-passed for the I. F. currents. The direct current, or uni-directional, voltage component developed across load resistor 15 is utilized for automatic volume control action. Hence, the lead 16, designated AVC, is shown connected to the anode end of resistor 15 through a filter resistor whose lower end is connected to ground through a condenser. The AVC filter network functions to filter alternating current components from the rectified voltage. The AVC connection 16 is made to the low potential sides of each of the controlled amplifier input circuits. The sound modulation, or audio voltage, is taken off from the load resistor 15, and is applied to the input grid of the audio amplifier. The audio amplifier may employ one or more stages of audio amplification, and each of them will be of the well known and conventional form. Any well known type of sound reproducer will be coupled to the plate circuit of the audio amplifier.

According to my invention, the received carrier energy cooperates with the power supply circuit to provide the transmission sampling action which has been described above. The B supply source is schematically represented. The plate circuit connections 22 are shown made to the plus terminal of the B supply through the electromagnet winding 23. The connection to the plus terminal includes the switch S. It will be understood that the minus terminal of the B supply will be connected through connection 24 to the controlled amplifiers as schematically represented by the designation —B. It will be understood, of course, that the switch S will be closed in order to energize the electrode circuits of the receiver.

A metallic, pivoted contact arm 25 is arranged to be biased by spring 26 into normal position away from winding 23. In this normal biased position, contact arm 25 is in electrical contact with contact point 27. The latter is electrically connected, through an indicator lamp 28 and connection 29, to a source of heating current. In opposition to contact point 27, there is provided a second contact point 30. The latter is also connected to the heating current source through a path which includes lead 31, heater resistor 32, lead 29' and lead 29.

Armature 25 is pulled into the upward position when the current in winding 23 is small, and is attracted downward against contact 30 when the current in winding 23 is large. Therefore, so long as there is no program being transmitted armature 25 will be held against contact 30. This completes the heating circuit through lead 31, resistor 32, lead 29' and a source of 110 volts heating current. The heater unit 32 is intimately associated with a spiral bimetallic thermostat element 60, and keeps the thermostat element heated so long as no signal is being received.

The thermostat is so arranged that when it is hot the arm 61, attached thereto, rises and maintains contacts 42—41 and contacts 50—51 in their normal "open" condition. Now, let it be supposed that the television transmitter goes on the air with the result that the current in relay winding 23 diminishes. Armature 25 rises thus leaving contact 30, and moving up against contact 27. By making this connection to contact 27 the indicator light 28 is connected to the 110 volt source to indicate visually that the television transmitter is on the air. At the same time, as armature 25 leaves contact 30 it interrupts the circuit through heater 32 and the thermostat begins to cool off.

Since heater 32 is in close thermal contact with the thermostat the cooling will be rapid, and within a very short time after the television station has gone on the air the thermostat lowers contacts 42 and 50. The respective insulation studs 62 and 63 on the lower face of arm, or bar, 61 press against each of contacts 42 and 50 respectively. By pressing contact 50 against contact 51 the plate circuit of the last audio tube is completed, and the audio program will be heard. At the same time the closing of contactor 42 against contact 41 completes a circuit from the 110 volt source through resistor 32' which is also a heating element. This latter heater, however, is not closely associated with the thermostat, so that although it may develop heat very rapidly there will be a certain delay before the thermostat is much affected. This delay may be, for example, of the order of a minute or less. At the end of this delay, however, the thermostat becomes hot enough to raise arm 61, and break the connection from 50 to 51 thus interrupting the reproduction of sound. At approximately the same time the contact between 42 and 41 is also interrupted thus terminating the generation of heat in 32'.

If the enclosing container 40, shown as a dotted rectangle, were provided with a perfect heat insulation the thermostat would remain hot indefinitely. Actually only such insulation is provided that the combination of heat capacity of the contents of the control unit and the heat insulation of the control unit housing permits the thermostat to cool off in some desired time, such as about 15 minutes. Hence, at the end of 15 minutes arm 61 again comes down, and the cycle of operation just described is repeated. The resistor 32' may be of resistance wire imbedded in a refractory material to provide a body of large thermal capacity. The element 32' is located in the far corner of the box 40. The heating circuit for heater 32' comprises 42 to 32' to 29' to the heating source, then to lead 43 back to contact 41.

The filter 52—53 is provided to soften the otherwise sharp noise that would be produced by the abrupt opening and closing of the plate circuit of the audio output tube. The switch S_2 is provided in case the owner wishes to hear more of the sound program than is provided by the automatic samples. So long as switch S_2 is closed the receiver operates continuously to reproduce sound. This switch is, of course, left open when automatic sampling is desired. Switch S_1, on the other hand, may be opened to prevent even automatic sampling from taking place. Switch S_1 might be opened, for example, while the television receiver is being operated, or at any time when the owner does not wish to hear samples.

This switch may be controlled, as indicated in the drawing, by a time clock so that no samples would be produced during normal scheduled television operation, in case the owner of the receiver makes up his mind by reference to the published programs whether he wishes to use the receiver or not for the scheduled program, and therefore does not wish to be bothered by hearing samples. It will be realized that with such an arrangement the owner would not be bothered by hearing program samples except in the case of unscheduled transmissions, in which case he desires to hear the samples or he would not want to use the present invention at all.

While the operation of the present invention has been discussed up to this point with special reference to television reception, it should now be pointed out that the invention could be employed in connection with ordinary radio reception as well. Thus, any receiver which includes AVC could be converted to provide automatic sampling, simply by inserting a relay winding, such as **23**, into the plate supply leads of the AVC-controlled amplifier tube or tubes, and by breaking the plate circuit of the output stage (or any other circuit in the audio system) to insert the switching arrangements S_1, S_2, **50** and **51** therein. By adding the automatic sampling system to such a conventional receiver as above described, the receiver may be left tuned to any type of radio transmission, especially a station whose schedule of operation and/or program is not fully known. This applies, at the present time, to the transmission of some frequency modulation stations, and some international short wave broadcasting stations. In addition to indicating unscheduled transmissions it may also be convenient at times to leave the receiver arranged for intermittent sampling on the continuously operating stations in the broadcast band simply for the purpose of hearing short samples of what is being broadcast, so that if an interesting program is heard the switch S_2 can be closed and the program will be received continuously. It should be noted that the time interval between samples may be adjusted somewhat by adjusting contact **41**, while the length of the sample may be adjusted by adjusting contact **51**.

While I have indicated and described a system for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organization shown and described, but that many modifications may be made without departing from the scope of my invention, as set forth in the appended claims.

What is claimed is:

1. A radio transmission sampling system comprising means responsive to transmitted modulated carrier energy to render a receiver operative to translate carrier energy, a timing device responsive to said carrier energy to maintain the receiver operative for a predetermined period of time after its operation has been initiated, and additional means adapted upon cessation of receiver operation after said predetermined period to operate automatically to prevent operation of the receiver for a second predetermined period of time.

2. In a receiving system adapted to receive audio modulated carrier energy, means responsive to variations in the amplitude of the carrier energy for providing a variable current, means responsive to a value of said current on one side of a predetermined threshold value for rendering the receiver operative to reproduce the audio modulation on the carrier, and additional means, responsive to a value of said current on the other side of said threshold value for simultaneously rendering said receiver operative to reproduce the modulation for a predetermined sampling period and thereafter rendering said receiver inoperative for a period of time relatively longer than said sampling period.

3. In combination with a radio receiver having a plurality of signal transmission stages, a direct current source for energizing said stages, means responsive to carrier reception for controlling at least certain of the stages in a sense to minimize the direct current flow from said source, means, in the absence of received carrier energy, for rendering the receiver operative to reproduce received modulated carrier energy, and additional means responsive to minimum direct current flow from said source, and in the presence of received carrier energy, for overcoming the action of said first means for a predetermined period of time and thereafter for a longer period of time rendering said receiver inoperative.

4. In a radio receiver having at least one modulated energy carrier amplifier, a demodulator and a modulation voltage amplifier, a direct current source for energizing said carrier amplifier, an automatic gain control circuit, responsive to carrier amplitude changes, for controlling the gain of said carrier amplifier thereby to vary the direct current flow from said direct current source, a control device for permitting automatic sampling of transmissions received by the receiver, said control device comprising a heat-responsive control element, a first means for controlling the output circuit of said modulation amplifier, a first heater element located adjacent said heat-responsive element for maintaining it in a normal inoperative position, a second heater element, means responsive to a minimum direct current flow between said direct current source and said carrier amplifier for maintaining said first heater element energized from said direct current source, additional means, responsive to a maximum condition of said direct current flow, for de-energizing said first heater element and energizing said second heater element from said direct current source, a second switch control device, adapted to be actuated by said heat-responsive control element, for controlling the circuit including said first heater element, and said heat-responsive control element being adapted concurrently to close both said control switches in the absence of energization of both said heater elements.

5. A radio sampling system comprising means responsive to transmitted modulated carrier energy to render a receiver operative to translate carrier energy, a device responsive to said carrier energy to maintain the receiver operative for a predetermined period of time after its operation has been initiated, and means adapted upon cessation of receiver operation after said predetermined period to operate automatically to prevent operation of the receiver for a second and longer predetermined period of time.

6. In a receiving system adapted to receive audio modulated carrier energy, means responsive to variations in the amplitude of the carrier energy for providing a variable direct current, means responsive to a maximum value of said direct current for rendering the receiver operative to reproduce the audio modulation on the carrier, and additional means, responsive to a minimum value of said direct current, for simultaneously ren-

dering said receiver operative to reproduce the modulation for a predetermined sampling period and thereafter rendering said receiver inoperative for a period of time relatively longer than said sampling period.

7. In combination with a radio receiver having a plurality of signal amplifier stages, a direct current source for energizing said amplifier, means responsive to a received carrier for controlling at least certain of the stages in a sense to minimize the direct current flow from said source, means, in the absence of received carrier energy, for rendering the receiver operative to reproduce received modulated carrier energy, additional means responsive to minimum direct current flow from said source, and in the presence of received carrier energy, for overcoming the action of said first means for a predetermined period of time and thereafter for a longer period of time rendering said receiver inoperative, and said additional means being constructed to repeat its control actions in cyclic manner.

8. In a radio receiver having at least one modulated carrier amplifier, a demodulator and a modulation voltage amplifier, a direct current source for energizing said carrier amplifier, a gain control circuit, responsive to carrier amplitude changes, for controlling the gain of said carrier amplifier thereby to vary the direct current flow from said direct current source, a control device for permitting automatic sampling of transmissions received by the receiver, said control device comprising a thermostatic control element, a first means for controlling the output circuit of said modulation amplifier, a first heater element located adjacent said thermostatic element for maintaining it in an inoperative condition, a second heater element adjacent said control element, means responsive to a minimum direct current flow between said direct current source and said carrier amplifier for maintaining said first heater element energized from said direct current source, and additional means, responsive to maximum direct current flow, for de-energizing said first heater element and energizing said second heater element from said direct current source.

9. In a radio receiver having at least one modulated carrier amplifier, a demodulator and a modulation voltage amplifier, a direct current source for energizing said carrier amplifier, a gain control circuit, responsive to carrier amplitude changes, for controlling the gain of said carrier amplifier thereby to vary the direct current flow from said direct current source, a control device for permitting automatic sampling or transmissions received by the receiver, said control device comprising a thermostatic control element, a first means for controlling the output circuit of said modulation amplifier, a first heater element located adjacent said thermostatic element for maintaining it in an inoperative condition, a second heater element adjacent said control element, means responsive to a minimum direct current flow between said direct current source and said carrier amplifier for maintaining said first heater element energized from said direct current source, and additional means, responsive to maximum direct current flow, for de-energizing said first heater element and energizing said second heater element from said direct current source, a second switch control device, adapted to be actuated by said thermostat control element, for controlling the circuit including said first heater element, and said control element being adapted concurrently to close both said control switches in the absence of energization of both said heater elements.

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