

July 11, 1967

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3,330,905

TELEGRAPH POLAR ADAPTER

Filed Oct. 4, 1963

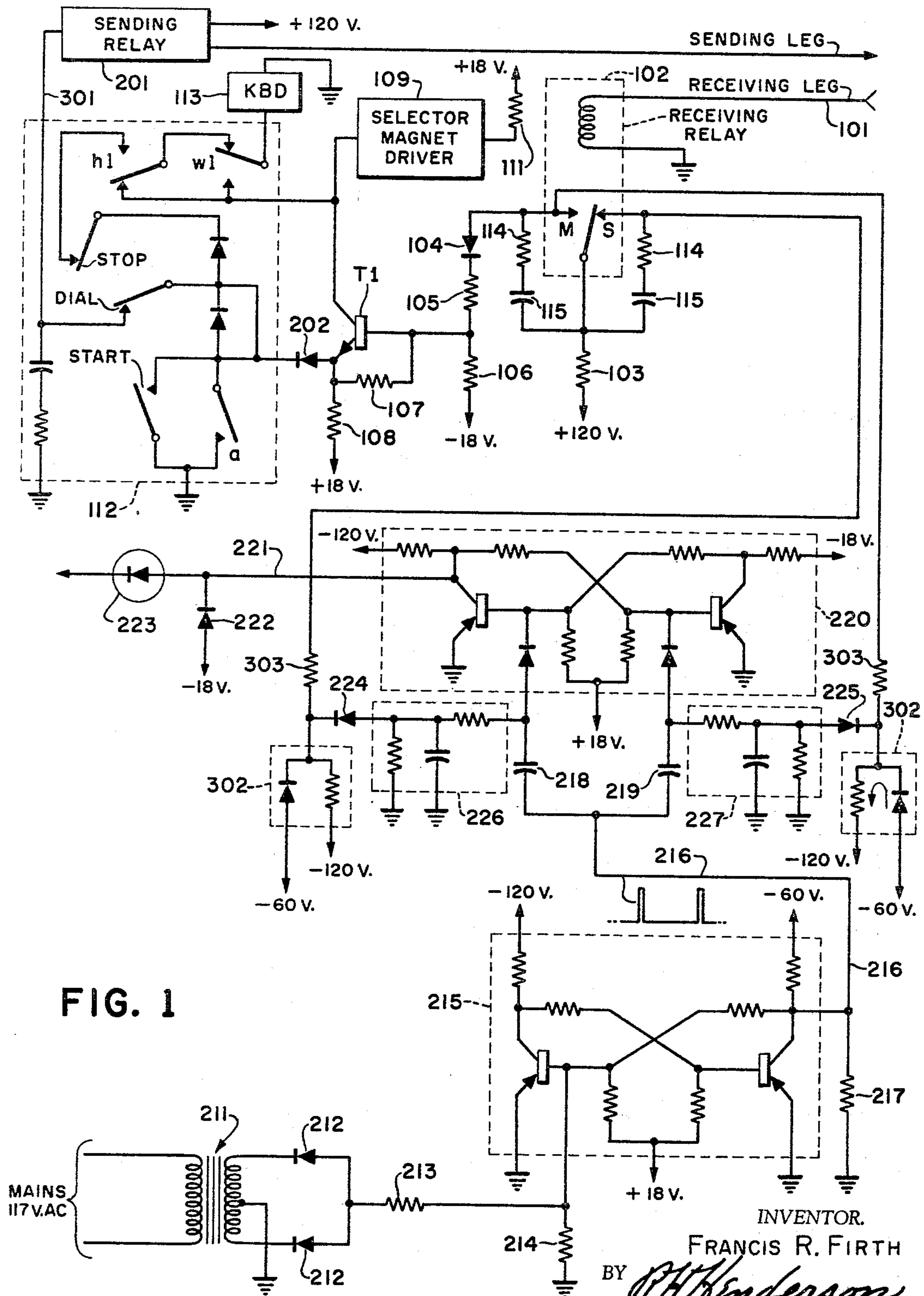


FIG. 1

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TELEGRAPH POLAR ADAPTER

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Filed Oct. 4, 1963, Ser. No. 313,888

5 Claims. (Cl. 178-4)

This invention relates to the telegraph art, and more particularly to novel means for adapting teleprinters of the start-stop type to the requirements of dial switching automatic service on polar telegraph circuits.

In summary, this invention contemplates the regeneration of polar line signals and their conversion to start-stop form by a flip-flop whose period is controlled approximately by a tuning circuit, but also is controlled with precision, to an integral number of timing periods by a second and more accurate flip-flop which is continuously generating a multiplicity of short timing period pulses.

There is described in the U.S. Patent to Cohen and Firth, No. 3,264,406, issued Aug. 2, 1966, a Teleprinter Control Unit involving novel arrangements for operating such a transmission and page printing device on lines carrying unidirectional telegraph currents. Where, for reasons of improved radius of transmission and reception, it becomes desirable to institute polar operation of the lines, means must be provided to translate between the polar signals of the line and the requirements of the teleprinter. This commonly has been accomplished by means of a polar relay, well known in the art to be effective and practical. The mechanical contacts and moving mass of such a relay, however, place a practical upper limit on the speed of transmission to which it will respond properly, and in addition thereto, the rather complex functional requirements of a customer-operated automatic dial switching system make it necessary to provide means for modifying the relay function during setup of the circuit, and at the conclusion of transmission, in order that a correctly arranged sequence of accurately timed control signals, safely guarded by their special nature against any likely failures, may be employed.

A distinct recent tendency to provide equipment capable of higher speed of operation has become evident, so that former speeds of 60 words per minute have given way to 100, and even greater speeds are achieved by many items of equipment.

It is therefore an object of the present invention to provide a polar adapter for a dial switching teleprinter system which will substantially increase the operating speed of the equipment.

It is another object of the invention to provide such a polar adapter wherein reliability of the device is maximized by the employment of solid state components arranged and connected for "worst case" operation—that is, so that reliable operation may be had from situations where all of the variable parameters affecting the operation of the unit are simultaneously at the most unfavorable limit of their allowable tolerances.

Another object of the present invention is to provide a polar adapter which is indifferently capable of operating in conjunction with a wide variety of models of teleprinting equipment and of encountered line conditions.

Still another object of the invention is to provide a polar adapter having no need for mechanical adjustment or readjustment.

Still another object is to provide a polar adapter capable of satisfactorily operating a system under conditions of signal bias which otherwise would be grossly excessive, and as high as forty percent bias.

Still another object is to provide a polar adapter capable of a high degree of convenience and versatility in ter-

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minating any dial patron's teleprinter drop, whether polar, make-break or carrier operated.

These as well as other purposes served by the invention will become apparent by reference to the following detailed description of a specific illustrative example thereof, comprising the best known and preferred practice of the invention, when taken in conjunction with the drawings, wherein:

FIG. 1 is a circuit diagram of the invention.

Turning now to the drawing, there is seen in FIG. 1 a line wire marked "receiving leg 101" connected to the coil of a relay 102 whereby +120 volt energization is applied through a limiting resistor 103 and through the blocking rectifier 104 and protective resistor 105 to the base of transistor T1, theretofore biased to cutoff by negative voltage applied thereto with respect to its emitter by the voltage divider comprising resistors 106, 107, and 108 and connected between the +18 volt and -18 volt supplies not shown.

Selector magnet driver 109 is thereby energized by the consequent collector current through limiting resistor 111 and transistor T1 to actuate the receiving teleprinter according to the marking pulses received over receiving leg 101 by relay 102. This can occur only at times when the emitter of transistor T1 is grounded, as occurs when the control circuits of that portion of a remote control unit 112 have their relay contacts *wl* in the receptive condition shown and *hl* in the energized position oppositely to that shown as well as having their push button switches marked "stop" and "dial" appropriately in their normal back contacting condition as shown for clarity only since remote control unit 112 constitutes no part of this invention.

Resistors and capacitors such as 114 and 115 act as spark suppressors for the contacts of the receiving relay 102, the said relay 102 being of conventional kind, and comprising no part of the present invention.

The function signals essential to operation of an automatic remote controlled teleprinting unit are translated between line polar and make-break form in the bistable circuitry to be described.

A transformer 211 energized from the 117 volt A.C. mains provides 18 volts output which is full wave rectified by the diodes 212 and a portion thereof as determined by the voltage divider comprising resistors 213 and 214 is applied to the flip-flop 215 which is a conventional bistable triggered multivibrator. The output therefrom on the line 216 is a probe pulse having a value determined in part by the resistor 217, and is determinative of the timing of events occurring in subsequent circuitry.

Said probe pulse is delivered through the capacitors 218 and 219 to the conventional biased multivibrator 220 in such a manner as to trigger it, under appropriate circumstances as hereafter described, to produce an output pulse on the line 221, clamped to -18 volts by the diode 222 and limited to an appropriate value by the voltage reference diode 223.

Transmission is accomplished through the sending relay 201 connected to the external remote control unit 112. For transmission the relay contact *hl* is found in the up position; whereby +120 volts is seen to be applied across the contacts of keyboard 113 to ground over wire 301 from sending relay 201. At the same time current impelled by +18 volts, connected through limiting resistor 111 to the selector magnet driver 109 flows through transistor T1 and diode 202 through the operated *hl* contacts of unit 112 and the keyboard 113 to ground causing operation of selector magnet driver 109 when keyboard 113 is operated as required for printing of the transmitted message at the transmitting station. Operation of keyboard 113 actuates sending relay 201 over the wire 301

from the remote control unit 112 to transmit the message.

Circuits 302 are clamps, effective to block the input capacitors 218 and 219 of flip-flop 220 at -60 volts in the absence of signal from relay 102, and thus swamp and prevent the passage of probe pulses on the wire 216 whose peak derives from the 18-volt output of transformer 211. This comprises an inhibit function hereinafter referred to.

Either a mark or a space signal received by relay 102 and transmitted to the flip-flop 220 is effective to block one or the other of diodes 224 or 225, whereupon the inhibit voltage level present in the associated one of the conventional R.C. timing circuits 226 or 227 is thus allowed to decay to the point where probe pulses over line 216 will trigger the flip-flop 220. Consequently, operating function signal output over wire 221 to the remote control unit comprises a signal received by relay 102, but delayed and expanded a definite through imprecise amount as determined by the discharge time constants of circuits 226 and 227, but as further rendered precise by their ability to include only a preselected integral number of precisely timed probe pulses, after having been unclamped by the relay 102.

Resistors 303 limit the flow of regenerated signal current to values appropriate to the nature of the connected equipment.

Although this invention has been described in terms of a specific illustrative example thereof, it will be obvious to those skilled in the art that certain modifications and elaborations may be made therein without departing, however, from the essential spirit of the invention, and it therefore is intended that the invention be limited only by the appended claims.

What is claimed is:

1. In a polar adapter for connecting a printing telegraph instrument of the make-break type to a polar telegraph line having signal conductors wherein dial switching and function signals as well as intelligence signals are transmitted on the line, means for code conversion and signal shaping, comprising means to produce a continuous series of accurately timed probe pulses, second multivibrator means connected to and triggerable by said first multivibrator means to produce a shaped bimodal output, inhibiting voltage supplying means for the said second multivibrator means comprising an electrical clamp circuit, connected to the said second multivibrator means and effective to prevent the triggering thereof by said first multivibrator means during the application of inhibiting voltage thereto, and discharge means connected to said inhibiting voltage applying means effective to discharge the inhibiting voltage thereof within a predeter-

mined period of time during which the said accurately timed probe pulses are rendered ineffective to trigger the said second multivibrator means, the said discharge means being connected to and the operation thereof initiated by the voltage of a telegraph signal conductor and comprising an R.C. circuit.

2. A polar adapter for interconnecting between make-break and polar portions of a printing telegraph line switching subscriber system which comprises semiconductor means to produce a continuous series of timed probe pulses, semiconductor multivibrator means connected thereto and triggerable thereby to determine an output wave comprising an integral number of periods of said timed probe pulses, means connected to said multivibrator means and responsive to a telegraph signal to initiate said output wave and to produce a turn-off signal, and means responsive to said turn-off signal and connected to said multivibrator means, comprising a pair of R.C. time delay circuits having a predetermined period of delay and effective after the lapse of said period of delay to enable said semiconductor means to trigger said semiconductor multivibrator means.

3. The invention of claim 2 wherein said time delay circuits each comprise an R.C. circuit consisting of a resistor and a capacitor.

4. The invention of claim 3 wherein said time delay circuits each comprise a resistor and a capacitor and a diode in a clamping circuit.

5. A polar adapter for making connection between a polar telegraph line and dial switching make-break printing equipment operating therefrom comprising signal translating and improving means including semiconductor multivibrator signal shaping means, continuously operating pulse generator means for producing a timed sequence of pulses and effective to terminate the "on" period of said shaping means when electrically connected thereto, connecting means therebetween comprising semiconductor diode means in an inhibiting circuit, and time delay means connected to and effective to delay the action of said diode means for preventing the connection of said pulse generator means to said signal shaping means during a predetermined period of time, which comprises and R.C. timing circuit.

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