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3,011,022

ELECTRONIC RECEIVING DISTRIBUTOR

Filed Nov. 1, 1957

4 Sheets-Sheet 1

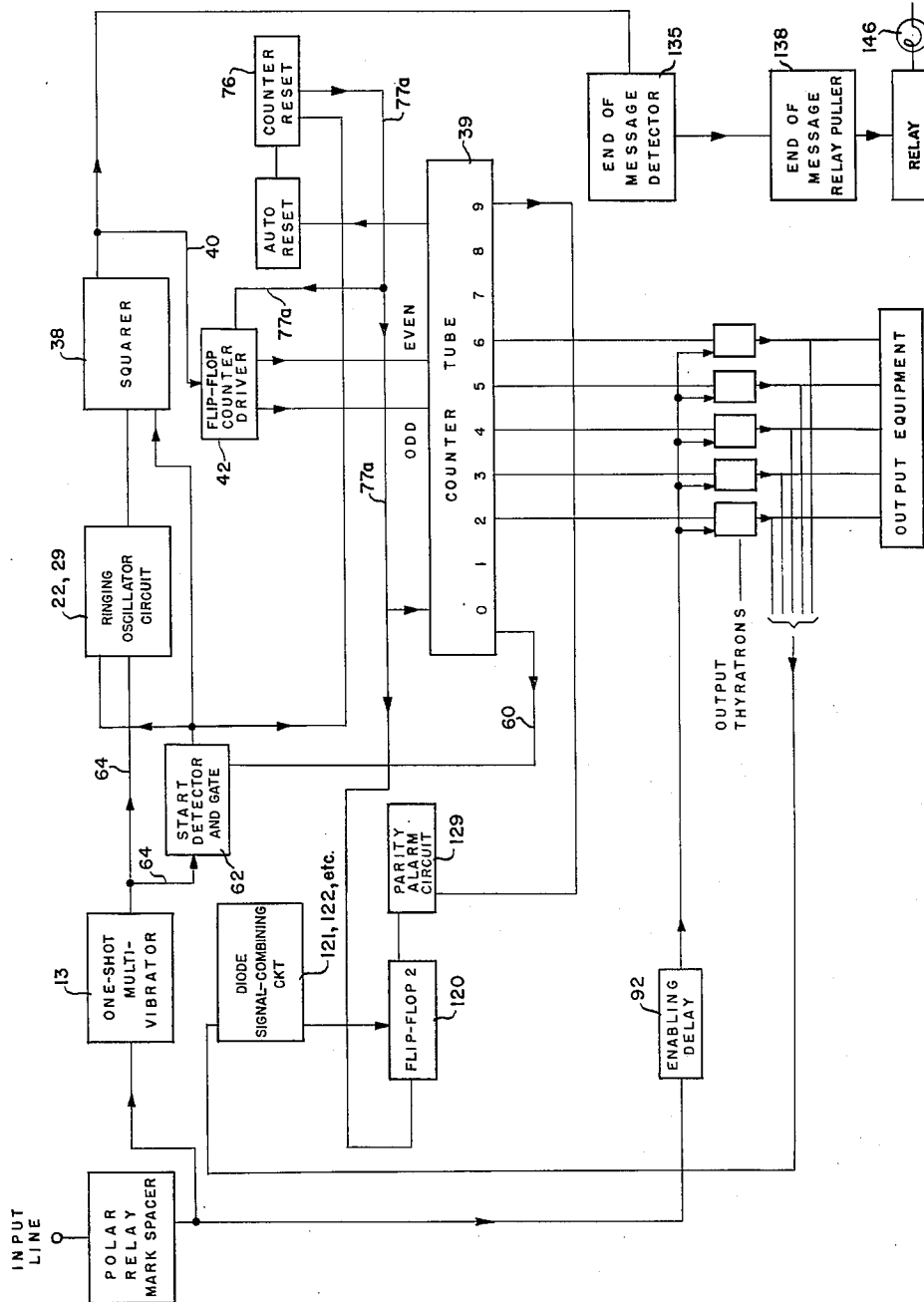


FIG. 1

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4 Sheets-Sheet 2

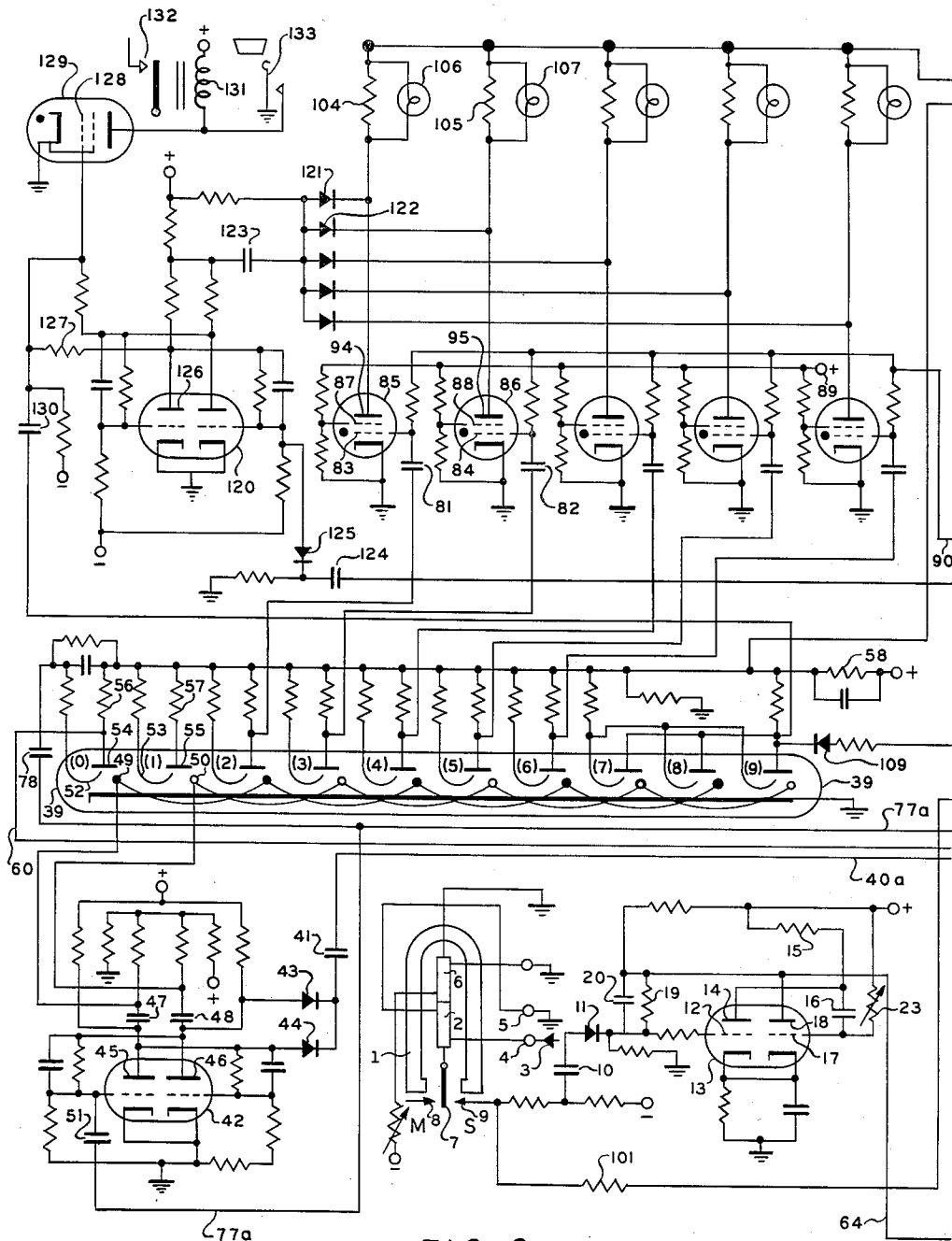


FIG. 2

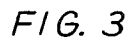
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4 Sheets-Sheet 4

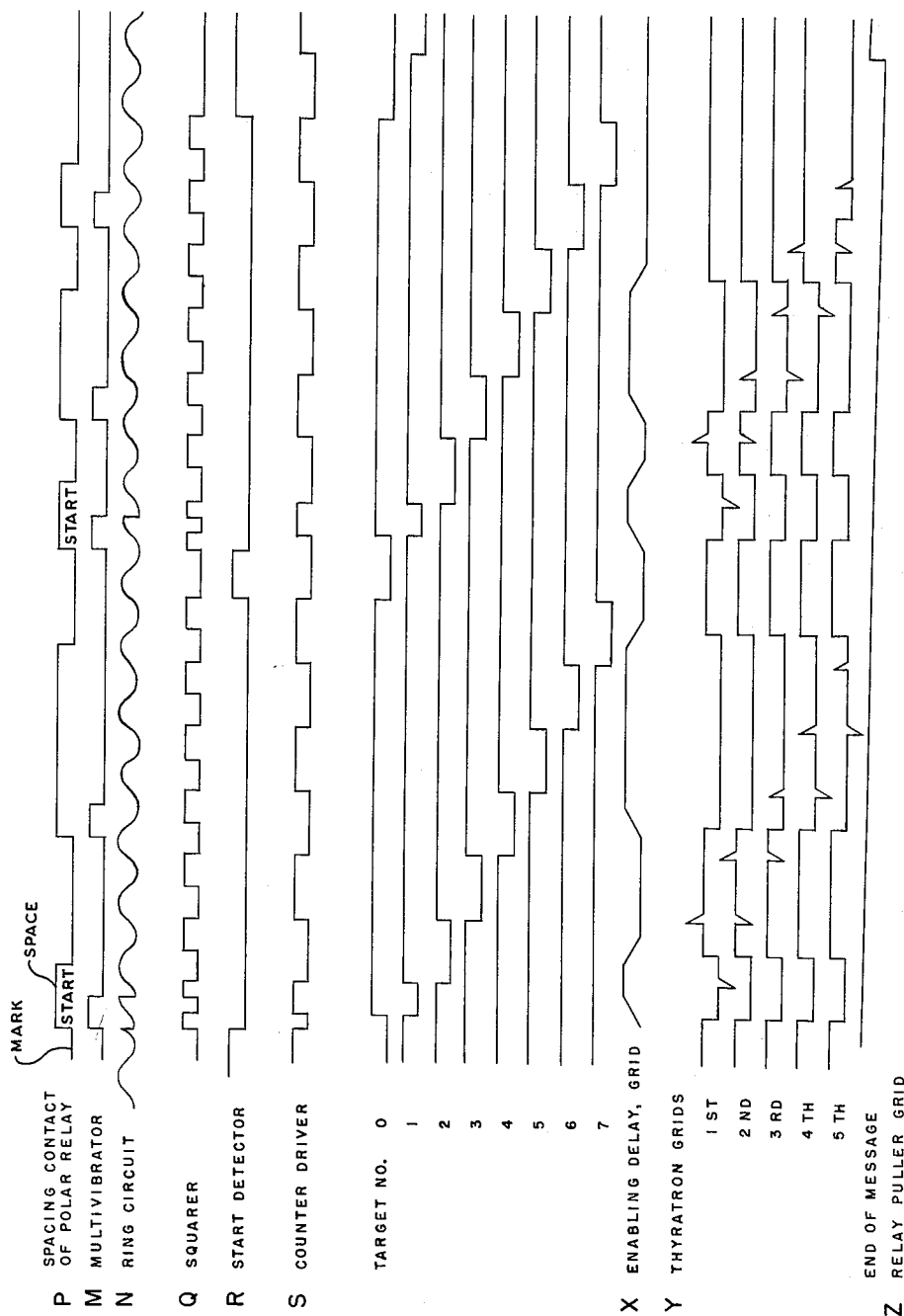


FIG. 4

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ELECTRONIC RECEIVING DISTRIBUTOR

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9 Claims. (Cl. 178—53.1)

This invention relates to an electronic distributor for receiving serially and synchronously pulse signals representative of characters or data codes transmitted over a single circuit, such as for example might be used for operation of teletype printers, and for converting these sequential pulses into equivalent parallel output coded signals in which form they may be easily introduced into various asynchronous terminal devices such as buffer storage units, selectors and decoders which are frequently associated with digital data processing systems.

More particularly the distributor of the present invention may be defined as primarily a synchronous electronic switch which is designed to perform the same functions as the more common electromechanical constructions involving rotating cam shafts or face plate brush arms with successive make contacts.

Large scale data processing systems frequently include input-output equipment remotely located with relation to a central computer or data storage element, these remote stations including such operational gear as keyboards, printers and visual information display devices. It is economical and convenient to connect the remote stations to the central location with data transmitting links using conventional teletype duplex or half duplex circuits operating with binary "mark" and "space" code signals and with the transmitting and receiving equipments synchronized by means of the familiar start-stop technique. Messages transmitted to and from the remote points generally comprise groups of characters, the number and sequence of the characters in the message having unique significance, such as for example one or more address characters followed by a number of information characters. At remote stations particularly, the equipment for receiving and decoding such messages are usually required to operate in business offices without cleaning or adjustments for extended periods, and it is desirable to provide units that are relatively insensitive to dust, mechanical wear, or changes in atmospheric conditions, and which operate without noise, vibration and lubrication.

In accordance with our invention a distributor is provided which has unique advantages for such data processing system applications and which is easily adjustable to operate over a wide range of speeds, for example from 60 to 100 words per minute in teletype equivalents, and furthermore is suitable for 5, 6 or 7 code units per character without mechanical redesign. This therefore is one object of our invention.

Another of the objects of this invention is to provide a device which is relatively stable and which will not require frequent mechanical or electrical servicing, such as adjustment or lubrication of gears, bearings, cams, electrical contacts, brushes and solenoids.

Still another object is to produce a distributor of novel design which has inherent high speed characteristics and is not limited by inertia of mechanical parts.

A further object is to provide a receiving teletype distributor which in case of a false signal on the line will automatically resynchronize within the time of one start-stop character interval.

Additionally an object is to provide a simple redundant code parity checking circuit as an ancillary function of the receiving distributor.

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Other objects, advantages and features of the invention will appear hereinafter.

The disposition of the various components and the manner of performance of the essential functions will best be understood by reference to the accompanying drawings in which:

FIG. 1 is a schematic block diagram of the complete distributor showing the principal functional components;

FIGS. 2 and 3 together comprise a circuit diagram of the distributor in which the synchronizing speed control is provided by a ringing circuit oscillator which drives a magnetron beam switching tube to perform the switching; and

FIG. 4 is a timing diagram indicating the form and relationship of current and voltages in the circuits of the receiving distributor and associated circuitry.

According to well known Teletype techniques the operation of the receiving distributor is controlled by combinations of pulses of two significant values transmitted over the line circuit to which the distributor is connected. For the purposes of the following description, it will be understood that the line signal code employed to transmit characters consists of five selecting pulses used in various combinations of "marking" and "spacing" intervals. Each group of five selecting pulses is preceded by a start pulse and followed by a rest pulse to maintain unison between the transmitting apparatus and the remote receiving distributor equipments. The rest pulse interval, as described herein, is one and one-half times as long as the selecting pulses, but as will be evident in the following description, the distributor will function properly with a rest pulse equal in length to the selecting pulses.

It will now be demonstrated how each incoming character code consisting of a combination of pulses extending serially over five successive time intervals are switched to energize five corresponding output circuits in parallel.

Referring to FIG. 1, the distributor comprises the following principal components:

(a) A polar relay having a winding in series with the input line and with a marking contact which is closed when current flows in the line from a negative potential source and a spacing contact which is closed when a positive current signal is being received.

(b) A one-shot or monostable multivibrator which is triggered or set when the spacing contact of the polar relay closes and resets to its normal or stable state after a time interval equal to approximately one-half a code signal. At the instant of reset a phasing signal is injected into the ringing circuit oscillator. The multivibrator also transmits a signal to a start detector coincidentally with the space contact trigger.

(c) The ringing oscillator which upon being excited and phased by the multivibrator generates a damped sine wave timing signal having a frequency closely adjusted to twice that of the incoming line signals and which is squared to enter a counter driver.

(d) A flip-flop counter driver connected to alternately pulse even and odd numbered grids of the magnetic beam counter tube, thus advancing the beam from one target plate to the next succeeding in synchronism with the line signals.

(e) The beam counter tube may be of a type manufactured under the trade name of "Haydu" or "Burroughs" with operational characteristics as completely set forth in an article in April 1956 "Electronics," page 122. The tube contains ten identical arrays of spades, targets and grids numbered 0 and 1 to 9 inclusive, symmetrically arranged around a central oxide-coated cathode and included in an axial magnetic field. As will be noted from FIG. 2, targets numbered 2 to 6, inclusive, are capacitively coupled to the grids of five output thyratrons, these grids also having a D.C. bias control applied thereto through an enabling delay circuit hereinafter described.

(f) A start detector in the form of an AND gate which recognizes a start signal and provides a preliminary excitation and phasing pulse to the ringing oscillator at the beginning of a start (space) pulse interval provided that the counter tube beam is on numbered target "0." The primary purpose of the start detector is to initiate resynchronism at the beginning of each character code group by means of a uniform and exact phasing of the ringing circuit oscillator regardless of the length of the stop intervals or possible effects of residual oscillations from a preceding character. In order to stop the counter at the end of each character code sequence the start detector is arranged with an output to gate off the squarer when the counter tube beam reaches "0" target and to hold it there pending the next succeeding start pulse regardless of the exact stop time in the transmitted signal code. Additionally, the start detector operates the counter reset as a precaution to insure that all circuits are in their normal or rest condition prior to the reception of a delayed multivibrator start pulse.

(g) An end-of-message circuit arranged to give an output signal from the distributor whenever there is an interval longer than normal between character sequences.

(h) A parity check and alarm circuit is included which gives an output signal which is useful to detect transmission errors when a parity code is used for transmitting numbers, as for example, two or four marking pulses only in a combination of five, applied respectively to diodes of a five-diode combination.

(i) An end of message relay which operates to produce a suitable visual indication when the message is ended. The detailed operation of the complete distributor will now be described.

Referring to FIG. 2, a polar relay 1 has one winding 2 connected in series with an incoming line 3 through terminals 4 and 5. The relay also has a bias winding 6 in accordance with well known constructions so that with a signal current of negative polarity flowing in the line and winding 2, the relay tongue 7 will be closed to the left hand "marking" contact 8, and conversely with a positive current the relay tongue swings over to "spacing" contact 9.

The rest or "stop" signal on the line is "marking" and accordingly the description of the distributor operation will start with the relay tongue 7 closed to contact 8 and all other circuits in their normal or resting state.

Upon receipt of a "start" (spacing) signal the relay tongue 7 closes to contact 9 which abruptly increases the potential of contact 9 from a negative value, for example, say -120 volts, to ground. This increase is transmitted through condenser 10 and diode 11 as a pulse to the grid 12 of tube 13, which is connected in a monostable circuit arrangement as a "one shot" multivibrator, well known in the art. The positive going pulse on grid 12 triggers the multivibrator causing plate 14 normally held off to conduct, resulting in a drop of potential through the plate resistor 15. This negative going pulse is in turn transmitted through condenser 16 to grid 17 of tube 13 which turns off plate 18 allowing its potential to rise. The rise in potential on plate 18 acts to sustain the positive potential at grid 12 through resistance 19 and condenser 20 but has no effect on grid 21 of tube 22, FIG. 3; this tube, a ringing circuit driver, is normally conducting. After an interval determined by the time constant of the RC circuit comprising condenser 16 and leakage resistance 23, the grid 17 becomes sufficiently positive to allow plate 18 to again conduct, which action causes the multivibrator to abruptly restore to its original stable state. This restoration time is adjusted to occur at an interval equal to one-half of the incoming line pulse interval. Coincidentally with the restoration of the multivibrator the negative output pulse is applied over lead 64 to condenser 25 and resistance 26 where it is differentiated and impressed on grid 21 of tube 22, the ringing circuit driver. Upon the cutoff of tube 22 by the

negative pulse on grid 21, a positive output pulse is transmitted through condenser 27 to grid 28 of tube 29, which is the phasing or exciting signal to the ringing circuit oscillator, tuned by plate circuit condenser 30 and reactance coil 31 to a frequency corresponding to the basic time interval of the input signals which may vary from approximately 21 cycles to 35 cycles per second for 60 and 100 words per minute Teletype transmission speed equivalents. The oscillations, a train of damped sine waves, are fed through condenser 32 to grid 33 of tube 29, and the amplified output from plate 34 is transmitted through condenser 35 and resistance 36 to grid 37 of tube 38, which is connected in the circuit as a Schmidt trigger to convert the sine wave into a nominal square wave. The signal at the grid 33 of tube 29 is reduced considerably in impedance by this tube as a cathode follower, which then drives the tuned circuit at the low impedance point or tap on reactance coil 31. Autotransformer action raises the voltage at the plate sufficiently to compensate for losses in the circuit such as coil losses, cathode follower losses, etc. By proper choice of resistor 31a between the cathode follower and the tap on reactance coil 31, decay of the oscillations may be very slight or zero.

The output of the squaring circuit is the basic timing and phasing signal for control of the multi-element magnetic beam counter tube 39, FIG. 2, which is required to switch sequentially in close synchronism with the incoming line signal pulses.

In order to more clearly define the time phase relationships of the above functions, reference is made to FIG. 4. In this diagram the voltage excursions of spacing contact 9, polar relay 1, FIG. 2, are indicated at P when receiving the numeral 1 followed by the numeral 4, for example. Correspondingly the output of the multivibrator is shown at M. The sine wave of the ringing oscillator plate output 34 is shown at N. By inversion and squaring at tube 38 a series of rectangular switching pulses, wave form Q, results which are at twice the incoming line pulse rate and out of phase therewith by approximately one-quarter of a cycle of the ringing oscillator frequency.

Referring again to FIG. 3, the negative going edges of the squared output from plate 40 of tube 38 is transmitted over lead 40a through condenser 41, FIG. 2, and this signal is employed to drive a flip-flop binary counter circuit tube 42 through diodes 43 and 44, providing alternate driving input couplings to the plates of the flip-flop. The square wave output S, FIG. 4, of this flip-flop counter driver, as will be evident hereinafter, is used to control the grids and thereby drive the magnetic beam counter switching tube 39 in unison with the ringing circuit oscillator which is time phased or synchronized with the line signals at least once during each start-stop cycle.

The tube 42 is connected in a conventional flip-flop bistable circuit well known in the art. Be it noted, however, that the tube is provided with a capacity coupled output from each plate 45 and 46 through condensers 47 and 48 to alternate number grids 49, 50, etc. of beam counter tube 39. The flip-flop counter driver 42 also is provided with a grid reset through condenser 51 from the counter reset circuit to be described later.

Proceeding to the operation of the counter tube 39 the ten identical positions include grids as 49 and 50, spades 52 and 53, and targets 54 and 55, serially numbered (0), (1) to (9) and are arranged with alternate numbered grids connected internally in two groups of five each, termed "even" and "odd" and designated respectively by black and open dots. The alternate stepping pulses from the flip-flop plates odd-even-odd, etc., applied to the grids causes the beam to advance from target to target one step for each pulse.

Each target is connected through individual "plate" resistors as 56 and 57 through a common voltage dropping resistor 58 to a source of positive potential. Therefore, as the beam is switched from the common cathode

onto a target, the target potential drops and again rises when the beam is switched off. It will be noted that target 54 for position "0" is connected over lead 60 to one grid 61 of start detector tube 62, FIG. 3, which is connected in an AND gate circuit, the other grid 63 being connected over lead 64 to plate 18 of one-shot multivibrator 13, FIG. 2, which goes positive upon the reception of a space signal by polar line relay contact 9 as previously described. If now the counter tube 39 beam is on target "0," grid 61, FIG. 3, of gate tube 62 is held negative, and if the polar relay tongue 7 is on mark contact 8, then grid 63 is also held negative and the start detector tube 62 is nonconductive and there is no potential drop through plate resistor 64a. It follows that grid 65 of gate tube 66 is held positive and plate 67 draws current through resistor 68 effectively preventing the transmission of the square wave pulses to counter driver 42, thereby holding the counter tube beam on target "0." If now a space start signal is received by polar relay 1, then the multivibrator plate 18 goes momentarily more positive which allows the start detector tube 62 to conduct transmitting a negative signal to the grid 65 of tube 66 which opens the pulsing circuit from plate 40 of tube 38 to the counter driver 42. Simultaneously with the transmission of the negative signal to tube 66 it is also impressed on the grid 68 of inverter tube 69 through condenser 70. A positive signal is thereupon transmitted from the plate 71 through condenser 72 to the grid 28 ringing circuit oscillator 29 and also through condenser 73 to the grid 74 of reset thyatron 76. The reset thyatron 76 has its plate 77 connected over lead 77a through condenser 51 to transmit a negative reset signal to counter driver flip-flop 42 and through condenser 78 to spade 52 of counter tube 39 as insurance that the beam remains in the "0" position as the counter driver is being reset. Thyatron 76 is self-extinguishing due to its comparatively large plate resistor 77b. As the positive signal from the plate 71 of tube 69 reaches the grid 28 of the ringing oscillator 29, a short pulse is generated through the squarer 38 at the trailing edge of which the counter driver 42 steps the beam counter tube 39 to target (1). Having been thus reset and the ringing oscillator initially phased by the start signal, all circuits are now in condition to switch in synchronism with incoming line signals beginning with the multivibrator reset pulse, which it will be recalled occurs one-half a line signal interval after the polar relay spacing contact closes.

Referring again to the beam switching tube 39, the restoration of potential to a normal positive value at each of the targets numbered (2) to (6) inclusive is used to apply a positive going differentiated pulse in turn through condensers 81, 82, etc. to the grids 83, 84 of five thyratrons 85, 86, etc. It will be noted that the shield grids 87, 88, etc. of thyratrons 85 and 86, etc. are connected in parallel to positive potential at 89 and the control grids 83, 84, etc. are connected by lead 90 in parallel to the plate 91 of enabling delay tube 92. In turn, the grid 93 of the enabling delay tube 92 is controlled by the spacing contact 9 of polar relay 1, FIG. 2, thus providing a means of biasing off thyratrons 85, 86, etc. when the line signal is spacing, but allowing the thyratrons to be fired from the target pulses from the counter tube 39 whenever a marking pulse is being registered. This then provides the parallel output code at the plates 94, 95, etc. of the five thyratrons 85, 86, etc.

The enabling delay circuit is for the purpose of placing the plateau of the enabling pulses from the polar relay squarely astride the firing pulses from the beam counter tube 39, the delay being variable by potentiometer 96 in the cathode circuit. The action of this circuit may be more clearly understood by reference to FIG. 4 wherein the grid voltage is shown at X being normally clamped by diodes 97 and 98 at a negative value with reference to the cathode 99 and moving positive when polar relay contact 9 is grounded to tongue 7, the rate being set by

the RC time constant of resistance 101 and condenser 102. The space signal therefore has the effect of turning tube 92 on and off following the marking and spacing position of the polar relay but with a timing delay to allow the spikes on the thyatron grid voltages to appear as at Y, FIG. 4.

As the five thyratrons 85, 86, etc. are fired or held off in response to the five selection signals comprising a character code, the plates 94, 95, etc. of those fired will conduct and draw current through resistors 104, 105, etc. causing a voltage drop. This voltage differential may thereupon be used to operate output devices, for example, to cause lamps 106, 107, etc. to be illuminated and thus indicate the code received and registered. It will be understood by those skilled in the art that various other devices such as rotary switches, relays or magnetic cores may be coupled to the output of the thyratrons 85, 86, etc. to store successively a complete message consisting of several successive character codes.

Following the receipt of the fifth selection pulse in each character the switching tube 39 beam switches to targets 7, 8 and 9 in parallel. These targets are connected through diode 109 and condenser 110 to the grid 111 of character sequence driver tube 112. This tube normally conducting has in its plate circuit 113 a relay 114 normally holding two pairs of contacts 115 and 116 closed. Upon the drop of potential of grid 111 when targets 7, 8 and 9 conduct, tube 112 cuts off and relay 114 releases, opening contact 115, which supplies plate current to the output thyratrons 85, 86, etc. The circuit restores after an interval determined by the RC constants of condenser 110 and resistance 117. The second contact 116 is provided on relay 114 as an auxiliary output from the distributor in case it is necessary to switch storage or other output registers between characters.

Under certain conditions of operation when receiving number codes it is desirable to provide a check and warning if code pulses are being mutilated or dropped by transmission circuits. One method in common use is to use only those codes having a uniform number of marking and spacing pulses in each character, for example, two marking and three spacing pulses in any combination of five selection signals.

An even-odd parity check and alarm circuit is provided by a flip-flop tube 120 with five plate driver circuits through diodes 121, 122, etc. connected to transmit negative pulses from the thyatron plates 94, 95, etc. through condenser 123. A negative reset is provided from the reset tube 76 through condenser 124 and diode 125 so that the plate 126 is set negative by the start signal preceding each character and with each even count of the flip-flop thereafter. If now none or an even number of thyratrons 85, 86 fire, a corresponding number of negative pulses will be transmitted to the flip-flop plates ending with plate 126 negative. If, however, an odd number is received, then plate 126 will complete the count positive and through resistance 127 will leave grid 128 biased in the positive direction as the beam switches from targets 7, 8 and 9 to target "0." The positive going edge of the pulse generated as the beam leaves targets 7, 8 and 9 is impressed on grid 128 of parity check alarm thyatron 129 through condenser 130 which added to the positive bias from plate 126 of the flip-flop fires the thyatron and operates plate circuit relay 131. This relay 131 may be provided with a contact 132 to operate visual and audible alarms which persist until the thyatron 129 is reset by manual push button 133.

An added function which has been found convenient to add to the electronic distributor when used for certain applications is an end-of-message indicator, which comprises a diode detector 135 so connected to the square wave timing signal plate output 40 through condenser 136 as to allow the grid 137 of thyatron 138 to drift positive with the absence of a signal for a given interval

of time as determined by the time constant of RC circuit condenser 139 and resistance 140. The plate circuit 141 of thyatron 138 is carried through condenser 142 and the operating or lower winding of relay 143 provided with a pair of contacts 144. Upon the firing of the thyatron 138, it closes a circuit through the holding winding 145 to operate the same and indicate by lamp 146 an end of message as measured by the interruption of line signals. This thyatron is self-resetting by reason of a large plate resistance 147. A manually operated push button 148 is provided to reset the end-of-message indicator.

Although a specific embodiment of the invention has been described and shown in the drawings, it is to be understood that the invention is not limited to this particular embodiment but is capable of being modified and various elements and circuits rearranged and changed without departing from the essential attributes and scope of the invention, and it is desired therefore that only such limitations be placed thereon as are imposed by the appended claims.

What is claimed is:

1. In an electronic receiving distributor, a source of code groups of signals of two line conditions with each group including a start pulse of one of said line conditions followed by a uniform number of permuted intelligence pulses of said two line conditions and terminated by a rest pulse of the one of said line conditions that is opposite to the line condition of said start pulse, said start and intelligence pulses being substantially of equal length, a multivibrator tube having a period substantially one-half the length of said start pulse, means for triggering said multivibrator at each transition from one to the other of said two line conditions, a ringing circuit having a predetermined frequency with respect to the frequency of said start and intelligence pulses, means coupled to said multivibrator for synchronizing said ringing circuit at each of said transitions from one to the other of said two line conditions, a beam counter tube having a plurality of count positions, means controlled by said ringing circuit for advancing the count along said beam counter tube, an output circuit for each intelligence pulse of said code groups and means including said counter tube for sequentially applying signals to said output circuits in accordance with said permuted code groups.

2. In an electronic receiving distributor, a source of code groups of signals of two line conditions with each group including a start pulse of one of said line conditions followed by a uniform number of permuted intelligence pulses of said two line conditions and terminated by a rest pulse of the one of said line conditions that is opposite to the line condition of said start pulse, said start and intelligence pulses being substantially of equal length, a multivibrator tube, electronic circuit means for triggering said multivibrator at each transition from one to the other of said two line conditions, a ringing circuit oscillator having a predetermined frequency with respect to the frequency of said start and intelligence pulses, means coupled to said multivibrator for synchronizing said ringing circuit oscillator at each of said transitions from one to the other of said two line conditions, a beam counter tube having a plurality of count positions, means controlled by said ringing circuit oscillator for advancing the count along said beam counter tube, an output circuit including an output tube for each intelligence pulse of said code groups, and means including said counter tube for sequentially operating said output tubes in accordance with said permuted code groups.

3. In an electronic receiving distributor, a source of code groups of signals of two line conditions with each group including a start pulse of one of said line conditions followed by a uniform number of permuted intelligence pulses of said two line conditions and terminated by a rest pulse of the one of said line conditions that is opposite to the line condition of said start pulse, said

start and intelligence pulses being substantially of equal length, a multivibrator tube, circuit means for triggering said multivibrator at each transition from one to the other of said two line conditions, a ringing circuit oscillator, means coupled to said multivibrator for synchronizing said ringing circuit oscillator at each of said transitions from one to the other of said two line conditions, a beam counter tube having a plurality of count positions, means controlled by said ringing circuit oscillator for advancing the beam along said positions in timed relation to the receipt of said start and intelligence pulses, an output circuit for each intelligence pulse of said code groups, and means including said counter tube for sequentially applying signals to said output circuits whereby an output circuit is activated for one line condition of its respective pulse and not activated for the other line condition.

4. In an electronic receiving distributor, a source of code groups of signals of two line conditions with each group including a start pulse of one of said line conditions followed by a uniform number of permuted intelligence pulses of said two line conditions and terminated by a rest pulse of the one of said line conditions that is opposite to the line condition of said start pulse, said start and intelligence pulses being substantially of equal length, a multivibrator tube, means operated by said start pulse and by each transition from one to the other of said two line conditions for triggering said multivibrator, a ringing circuit having a predetermined frequency with respect to said line signals, means coupled to said multivibrator for synchronizing said ringing circuit at each of said transitions from one to the other of said two line conditions, a beam switching tube having a plurality of positions, means controlled by said ringing circuit for switching the beam along said positions, an output tube for each intelligence pulse of said code group, means including said counter tube for sequentially applying signals to said output tubes in timed relation with respect to the receipt of respective pulses, an enabling circuit operated by said intelligence pulses, and means including said enabling circuit to operate said output tubes for a pulse of one line condition and not for a pulse of the other line condition.

5. In an electronic receiving distributor, a source of code groups of signals of two line conditions with each group including a start pulse of one of said line conditions followed by a uniform number of permuted intelligence pulses of said two line conditions and terminated by a rest pulse of the one of said line conditions that is opposite to the line condition of said start pulse, said start and intelligence pulses being substantially of equal length, a multivibrator tube having a cycle substantially one-half the length of said start pulse, a start pulse detector, a ringing circuit oscillator, a beam switching tube having a plurality of beam positions with one thereof a start-count position, means including said start pulse detector operative with said beam at said start-count position to phase said ringing circuit oscillator, means to phase said oscillator at each transition from one to the other of said two line conditions, means controlled by said ringing circuit oscillator for switching said beam from one position to another, an output circuit for each intelligence pulse of said code groups and means including said beam switching tube for distributing said pulses to respective output circuits.

6. The combination as set forth in claim 5, and including means for comparing the phase of said multivibrator tube with said ringing circuit oscillator and means controlled by said last mentioned means for resetting said beam switching tube to said start-count position.

7. The combination as set forth in claim 5, and including a counter reset circuit and means including said counter reset circuit and said start pulse detector for resetting said beam switching tube to a start-count position.

8. In an electronic receiving distributor, a source of code groups of signals of two line conditions with each group including a start pulse of one of said line conditions followed by a uniform number of permuted intelligence pulses of said two line conditions and terminated by a rest pulse of the one of said line conditions that is opposite to the line condition of said start pulse, said start and intelligence pulses being substantially of equal length, a multivibrator tube having a cycle substantially one-half the length of said start pulse, a start pulse detector, a ringing circuit oscillator, a beam switching tube having a plurality of beam positions with one thereof a start-count position, means including said start pulse detector operative with said beam at said start-count position to phase said ringing circuit oscillator, means to phase said oscillator at each transition from one to the other of said two line conditions, means controlled by said ringing circuit oscillator for switching said beam from one position to another, an output tube for each intelligence pulse of said code group and associated with a respective position of said beam switching tube, an enabling circuit for all of said output tubes controlled

by said intelligence pulses, and means for selectively operating said output tubes under the joint control of said beam switching tube and said enabling circuit in accordance with the line conditions of said intelligence pulses.

- 5 9. An electronic receiving distributor according to claim 8 in which said enabling circuit includes an adjustable time delay control for insuring that each of said output tubes becomes conductive at substantially the middle region of each of the corresponding intelligence
- 10 pulses.

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