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[54] **POSITION INDICATION AND CONTROL SYSTEM FOR RAIL VEHICLE**
 12 Claims, 3 Drawing Figs.

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[50] Field of Search..... 340/23, 22;
 246/122, 124, 187(C), 3(C), 63, 63(I), 187

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ABSTRACT: An electronic train position indicator system for indicating in each train unit and in each station along a route a train unit position with respect to a base station and with respect to the train unit immediately ahead and the train unit immediately behind. A carrier wire antenna extends alongside the track and has magnetic inducers spaced at predetermined intervals therealong to activate an "own train" counter and a radio transmitter in each train unit to register its position and transmit through the carrier wire antenna upper or lower side band signals of modulation frequencies distinctively identifying each train unit and its direction of travel for reception and activation of counters in the immediately ahead and behind train units and in stations.

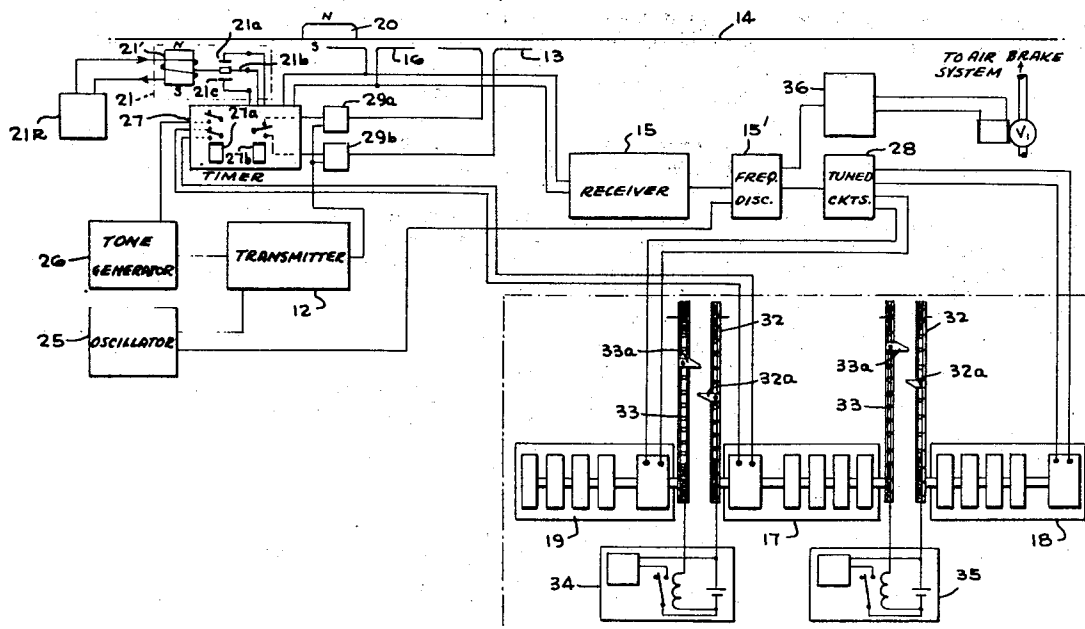


FIG-1

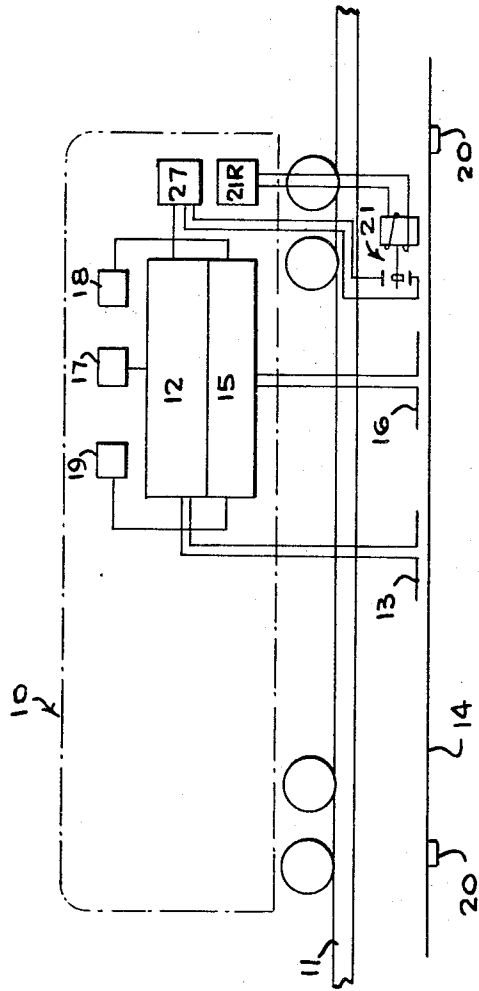
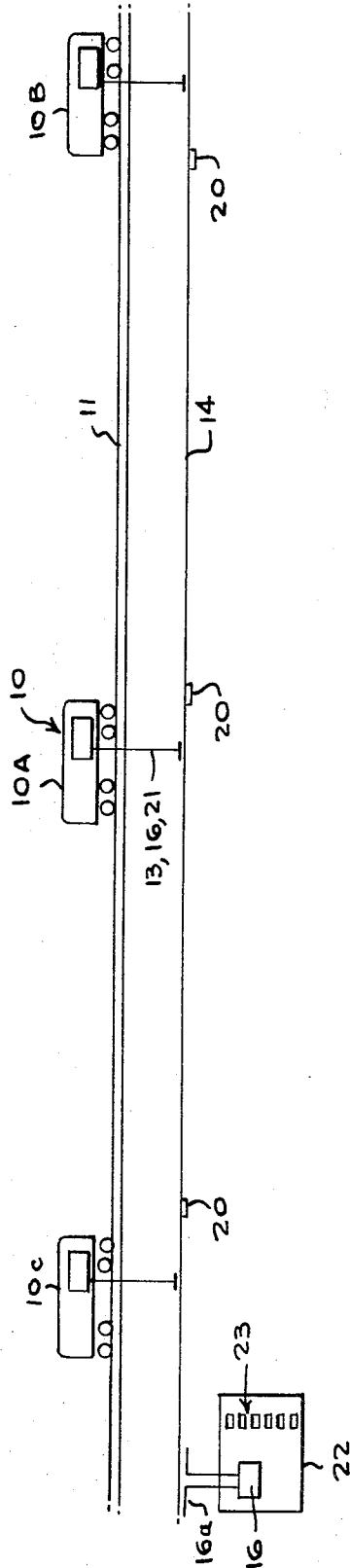


FIG-2

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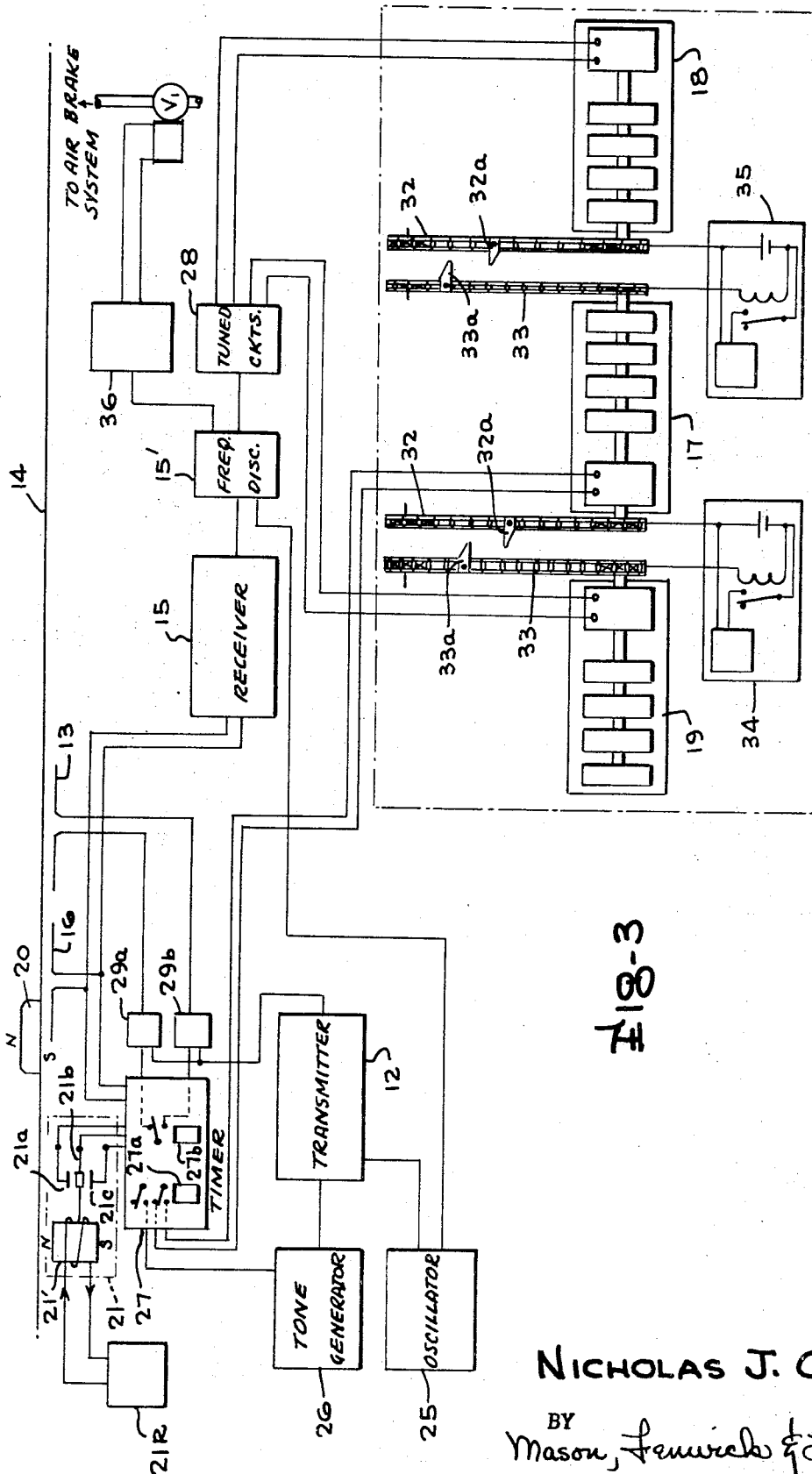


Fig. 3

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POSITION INDICATION AND CONTROL SYSTEM FOR RAIL VEHICLE

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to automatic signaling and train control systems for railroads, especially high speed rail routes, and more particularly to systems for automatically indicating the position of each railway unit, such as independently operating railway cars or trains, along a route between two terminal stations and for automatically controlling the railway units to maintain a selected minimum distance between them.

Many automatic train signaling systems used heretofore to indicate train location for coordination and control of railway traffic have been based fundamentally upon the block system, wherein occupancy or nonoccupancy of particular insulated length of track, known as blocks, provides the means by which the train location is detected. Indications as to train occupancy of such blocks and movement of trains from one block to the other is customarily transmitted to a central office to be monitored by a dispatcher who controls signal circuits in the field to provide traffic directions to the train operators. The advent of high speed rapid transit has imposed heavy demands to decrease the headway between trains traveling at high rates of speed far beyond the safe capacity of such block type signal control systems. Various systems have been devised to indicate train distance from a base station by means of odometers or cyclometers to give more accurate indications of train positions than are attainable with block signaling systems, and radio link systems have been employed to transmit the distance information from such distance measuring devices to central control stations and other trains along the track. However, such train-carried distance measuring devices are inherently susceptible to errors and failures, particularly wear or slip errors in the odometer or cyclometer, destroying the reliability of the system and making such systems particularly unsafe for high speed rapid transit system control. Also, the use of ordinary antennas in radio link systems for railway traffic control makes the transmissions subject to interference, to fluctuations in level due to difference between day and night signal strength, and to blackout when trains pass through tunnels or electrical shadow areas caused by mountain or high building complexes. Elaborate computerized systems have also been devised to monitor information as to train information through a radio link system and transmission of information from a central control point to regulate speed and position of the trains along the track. However, such systems are exceedingly expensive and complex and require elaborate programing for attainment of automatic train speed control.

An object of the present invention is the provision of a simple and reliable system for indicating the positions of each independently operating train or motorized railway car, hereinafter generically referred to as a train unit, along a track system between two terminal stations by activating counters in each train unit indicating the position of that train unit and of the train units immediately ahead and behind with sufficient accuracy to provide safe high speed train operation.

Another object of the present invention is the provision of a novel system for automatically and continuously indicating railway car position along a track system between terminal stations, of the type described in the immediately preceding paragraph, wherein automatic control means are provided to modify the speed of a particular railway train unit when the separation between two independent train units reduces to a selected minimum safe distance to automatically preserve a selected separation between such independent train units.

Another object of the present invention is the provision of a system for automatically indicating the position of independent railway train units on a track system, wherein communication between trains and a central control station is by train carried radiofrequency transmitters and receivers linked with a carrier wire antenna extending along the length of the track system, and wherein the transmitters and receivers in the in-

dividual train units all operate on a selected carrier frequency modulated by a distinctive identifying tone frequency assigned to each individual train unit, each train unit having a tone generator for producing its assigned tone frequency activated by magnetic inducers installed along the length of the track system to operate counters signifying the locations of the train units.

Another object of the present invention is the provision of a novel system for automatically indicating the position of individual railway train units along a track system, wherein train position information is transmitted along a carrier wire antenna to plural train units along the track system and to a central station with one radiofrequency carrier in which the upper sideband is used to convey information regarding train travel in one direction and the lower sideband is used to convey information regarding train travel in the opposite direction, and wherein distinctive tone frequencies assigned to each train unit are used to modulate the carrier for transmission throughout the system to identify the particular train unit and establish its position.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a schematic block diagram of a train unit position indicator system embodying the present invention;

FIG. 2 is a diagrammatic representation, to enlarged scale, of one of the train units of the present invention; and

FIG. 3 is a block diagram of the position indicator system components employed in one of the train units.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several FIGS., the electronic train position indicator system of the present invention is illustrated in an assumed installation for a high speed rapid transit railway route between two cities, for example, a route between New York City and Washington, D. C. wherein New York City serves as the base station. The position indicator system is particularly adapted for use in a very high speed train system, wherein high speed train units or individual and independent cars, such, for example, as the "air rail" cars, may be operating at 5 minute intervals on such a route at speeds providing a trip time from New York to Washington of 1 hour and 20 minutes. In such case, 16 cars would be operating simultaneously on one track in one direction at intervals of about 16 miles.

In such a system, schematically indicated in FIGS. 1, 2 and 3, each of the train units, or cars, indicated generally by the reference character 10, would operate on a track 11 extending in one direction from the base station, for example, New York to Washington, and on another track (not shown) for return from Washington to New York. Each of such train units or cars 10 would be equipped with a crystal controlled radiofrequency transmitter 12 operating on an assigned carrier and modulated by a tone frequency derived from a tone generator in the train unit 10 operating at a specified tone frequency assigned to that train unit. A transmitter antenna 13 coupled to the transmitter 12 in each respective train unit extends to a position alongside the track 11 and is capacitively coupled to a carrier wire antenna 14 extending alongside the track 11 continuously from the base station to the terminal station to apply the distinctive tone frequency modulated signals from the transmitter 12 of the train unit 10 to the carrier wire antenna 14. Each train unit would also be equipped with a radiofrequency receiver 15 having respective receiver antennas 16 also capacitively coupled to the carrier wire antenna 14 to pick up from the carrier wire the radio frequency signals modulated by the tone signals from other train units

and demodulate the carrier to make available the assigned frequency tone signals from the other train units.

Each train unit 10, three of which are shown by way of example, indicated by reference characters 10A, 10B, and 10C, would also be provided with a minimum of three readout counters 17, 18, and 19 to indicate the position of its own train unit and the positions of the train units immediately ahead and immediately behind. Since counter 17 is used only to indicate its own train position, greater reliability can be achieved by activating it directly from pickup unit 21 as hereinafter described, without requiring a tone signal. Counters 18 and 19 are coupled to the receiver 15 to be activated by tone signals distinctively identifying the car ahead and the car behind.

To activate the transmitters 12 of the train units 10 to indicate car position, magnetic inducers 20 are installed at fixed locations along the entire length of the line at predetermined intervals, for example, every one-tenth mile. These magnetic inducers 20 are positioned immediately adjacent the carrier wire antenna 14 and activate a pickup unit 21 carried by the respective train units 10 adjacent the antennae 13 and 16 when the train unit passes by the location of each magnetic inducer. The activation of the pickup unit 21 by passage of the same with the associated train unit 10 adjacent one of the magnetic inducers 20 closes electrical contacts which activate its associated "own" train unit counter 17 to advance the latter one count. Closure of these contacts also actuates the tone generator of the associated transmitter 12 to modulate the transmitter and send out a distinctive tone frequency through the carrier wire antenna 14 along the entire line or route. This tone pulse represented by the tone frequency modulated carrier will be received by the receivers 15 of the other train units along the track and will activate selective tuned circuits coupled to those receivers and tuned to that tone frequency to trigger counters 18 or 19 of the train unit ahead and the train unit behind the train unit whose transmitter emitted the tone pulse. Also, a radio frequency receiver 15a at a central station unit 22 having a receiver antenna 16a capacitively coupled to the carrier wire antenna 14 and having counters 23 controlled by tuned relays coupled to the receiver 15a and tuned to the tone frequencies of each of the respective train units on the route will be activated to also register the number of tone pulse signals produced by each train unit transmitter responsive to passage by a magnetic inducer.

Consequently, as any selected train unit, such, for example, as the train unit 10A, passes by one of the magnetic inducers 20, that train unit's distinctive assigned tone frequency is triggered into the entire system, and will register one unit count on every readout counter whose selective circuit, for example, a control relay, is tuned to that train unit's distinctive tone frequency, in each of the pertinent other train units, as well as the counter 23 monitoring that particular train unit in the central station unit 22. The train unit's own counter 17, as described earlier, is activated directly from pickup unit 21. In other words, the activation of the pickup when the train unit 10A passes by one of the magnetic inducers 20, will produce activation of the counter 17 of train unit 10A and of its tone generator, and the tone pulse signal produced will trigger the "train behind" counter 19 of the train unit 10B and will trigger the "train ahead" counter 18 of the train unit 10C, if the train units 10A, 10B and 10C are in the relative positions illustrated in FIG. 1, and will also trigger the counter 23 of the central station unit 22 which monitors the position of the train unit 10A. Similarly, as the train unit 10B passes each magnetic inducer unit 20, its distinctive tone pulse signal thus produced will trigger the counter 18 of the train unit 10A to register the position of the train unit 10B and when the train unit 10C passes each magnetic inducer, its distinctive tone pulse signal will trigger the counter 19 of the train unit 10A to register the position of the train unit 10C. As each train unit increases its distance from its base station, the totaling units of its "own train unit" counter 17 will indicate its exact position on the route within one-tenth of a mile, for example. This resolution, of course, can be increased to one-hundredth of a mile, or

smaller, if necessary, by placing the magnetic inducers more closely together.

Referring now to the block diagram of FIG. 3 illustrating the components of the car positioned indicator system carried by each one of the train units 10, it will be noted that the electronic system includes the radiofrequency frequency transmitter 12, linked to a crystal controlled oscillator 25 establishing the carrier frequency with the desired precision, and designed to be operated suppressed carrier, that is, with the carrier frequency absent, and capable of producing an output which is either the upper sideband signal or the lower sideband signal. Also linked to the transmitter 12 is a tone generator 26 designed to produce the specific tone frequency assigned to the train unit 10 carrying these components. The tone generator 26, when activated, modulates the carrier signal. When train 10 is moving in one direction, the upper sideband is transmitted. When train 10 is moving in the opposite direction, the lower sideband is transmitted. The selection is made by pickup 21. If the upper sideband is transmitted, receivers 15 and frequency discriminators 15' in 10B and 10C produce a signal of a polarity such that counters 19 and 18 advance one count for each tone pulse from 26. If the lower sideband is transmitted, counters 19 and 18 in 10B and 10C decrease by one count for each tone pulse from 26 because the polarity of the operating signal from 15' is opposite. Transmitter 12 driven push-push by oscillator 25 and push-pull by the tone generator 26 operates suppressed carrier. With train unit 10 and therefore pickup 21 moving in one direction, contacts 21b and 21a close. As revealed in the later description of timer unit 27, that closure operates a relay which connects a filter in the output of 12 to pass the upper sideband (for example). With 10 and 21 moving in the opposite direction, contacts 21b and 21c close every time 21 passes an inducer on 14. That closure operates a relay which connects a filter in the output of 12 to pass the lower sideband. The frequency discriminator 15' at the output of receiver 15 reproduces the original tone pulse to actuate the counter circuits tuned to it and also establishes the polarity based on whether the upper or the lower sideband had been transmitted to either advance the counters one count per tone signal or decrease the counters one count per tone signal. Also linked to both the transmitter 12 and the tone generator 26 is a timer unit 27 containing a plurality of relays. The transmitter antenna 13 extends from the transmitter circuitry 12 externally of the train unit to a position appropriate for capacitive coupling with the carrier wire antenna 14. Each respective train unit 10 also includes radiofrequency receiver 15 having its antenna 16 extending to an appropriate position for capacitive coupling with the carrier wire antenna 14. The receiver is designed to pick up the upper or lower sidebands transmitted from the train unit immediately ahead and the train unit immediately behind and provide a receiver output which is fed to a frequency discriminator circuit 15', into which the carrier frequency is injected, using the crystal controlled oscillator 25 of its associated train unit, by which the upper and lower sidebands in the received signal are separated and applied to selective tuned circuits 28, such as tuned relays, tuned to the assigned tone frequency signals for the train unit ahead, for example 10B, and the train unit behind, for example, train unit 10C, to activate the associated counters 18 and 19. Thus, by these selective circuits 28, a control signal, for example a d.c. control, is applied to the associated counters 18 and 19 to advance the same one count if, and only if, the tone frequency to which the selective circuits 28 are responsive is present in the discriminator either as a upper sideband or a lower sideband.

Each train unit would have the magnetic pickup unit 21 carried thereby disposed adjacent the carrier wire antenna 14, the pickup unit 21 being a bipolar device which would operate either one or another set of its contacts depending on the direction of approach of the associated train unit 10 toward a magnetic inducer 20. The magnetic inducers 20 may, for example, be permanent magnets which are brazed or welded to the carrier wire antenna 14 and permanently magnetized at

right angles to the wire with poles N and S, as shown in FIG. 3. The pickup unit 21 may be an electromagnet coil 21' controlling a movable contact 21b associated with stationary contacts 21a and 21c. The coil 21' is magnetized by a d.c. power source, the polarity of which is established by a switching relay 21R operated by the train controller. When the direction of the train unit is reversed, the relay 21R reverses the d.c. power applied to the pickup unit 21. When the train unit, and therefore the pickup 21, is moving from left to right as viewed in FIG. 3, and with the magnetizing current flow through the coil 21' as shown, contact closure would occur between contact 21b and 21a. With the train unit direction reversed, and therefore the magnetizing current for the coil 21' reversed, contact closure would occur between contacts 21b and 21c. In the event the train unit is turned end for end at the end of the route for the return trip, a similar pickup unit like the pickup unit 21 and located on the opposite side of the train unit would come into use and would be arranged so that contact closure for contacts 21B and 21C would occur for each inducer passed.

The timer unit 27 is connected to the pickup unit 21 and includes a first polarized relay 27A coupled to the advancing mechanism of the counter 17 and polarized in a sense established by the contacts 21a, b and c of the pickup unit to increase the count on counter 17 for each pass of a magnetic inducer 20 when the train unit 10A travels in one direction and to decrease the count on counter 17 when the train unit moves in the opposite direction. The same polarized relay 27A also operates the tone generator 26 to modulate the transmitter 12 for a specified time interval every time the pickup unit 21 of the associated train unit passes an inducer 20 on the carrier wire antenna 14. The output of the transmitter 12 contains both the upper and lower sidebands. A second polarized relay 27B in the timer unit 27 switches a band pass filter 29a to pass the upper sideband to the transmitter antenna 13 when the train unit is traveling in one direction and switches a second band pass filter 29b to pass the lower sideband to the transmitter 12 when the train unit travels in the opposite direction. Thus, for each pass of an inducer, the polarized relays of the timer 27 advance the "own train unit" counter 17 one count, and activate the tone generator 27 to modulate the transmitter and produce the upper and lower sidebands modulated at the designated tone frequency, the second relay 27B of the timer unit effecting switching of the appropriate band pass filter 29a, 29b, between the transmitter and its antenna to transmit either the upper or the lower sideband depending on the direction of travel of the train unit.

Similarly, as the train unit 10B immediately ahead, or the train unit 10C immediately behind, passes an inducer 20, their associated transmitters are caused to transmit an upper sideband or a lower sideband signal, depending upon their direction of travel, modulated by their distinctive identifying tone frequencies, which signals are received by the receiver 15 of the train unit 10A, the upper and lower sidebands are separated by the frequency discriminator 15', associated with the receiver, and the upper sideband receiver output containing the assigned tone frequencies for the train unit 10B or 10C provides a d.c. output to move the counters 18 and 19 in one direction, while the lower sideband containing the assigned tone frequencies for the train units 10B and 10C provide a d.c. output to control movement of these same counters in the opposite direction, depending upon the direction of travel of these train units.

With the counters calibrated in terms of mileage, a mileage reading on any counter would give the position of the train unit identified thereby, and an increasing or a decreasing count would indicate whether the train unit was moving away from the observer at the counter location or toward him. The counters 18 and 19 may be of the type driven by permanent magnetic field step-type motors. The assigned tone signals identifying the particular train units may be audio-frequency tone signals which are passed by the tuned circuit of the particular selective circuits 28 connected to the receiver output

and converted to a direct current pulse applied through appropriate leads to the counter motor to rotate the motor and the counter wheel one step clockwise or counterclockwise depending upon whether the tone signal was derived from an upper sideband or a lower sideband.

In addition, means are provided in the system for effecting automatic deceleration in the event one train unit approaches another within a distance less than an established safe distance. This automatic deceleration means is indicated generally by the reference character 31 in FIG. 3 and comprises, for example, a chain driven contact arrangement in the form of endless chains 32 and 33 driven by sprockets geared to the step-type motors associated with the respective counters and arranged side-by-side having electrical contacts 32a and 33a thereon spaced a selected distance apart and designed to engage each other when the distance between the train unit associated with the counter 17 and the train units designated by the counters 18 and 19 diminish to the minimum safe distance. In the event the minimum safe distance between train unit 10A and train unit 10B or 10C is reached, the electrical contact resulting from engagement of the contact members 32a and 33a would activate a distinctive tone signal generator 34 or 35 which would be placed on the carrier wire antenna 14 by the transmitter 12 of the train unit 10A. This tone signal may, for example, be a signal having a duration approximately three times normal and each of the train units may have a decelerator circuit 36 which responds to such a prolonged tone signal of the frequency assigned to that train unit, to provide a control signal for operating a valve V1 in the air brake system of that train unit to release the air pressure in the brake system and thereby apply braking to the train unit. This control signal can also be applied to the propulsion power system of the train unit to initiate power removal when the prolonged tone is received.

For example, in the event the minimum safe distance between the train unit 10C and the train unit 10A is reached, the electrical signal resulting from engagement of the contacts 32a and 33a of the train unit 10A would initiate such a prolonged tone signal which would be placed on the carrier wire and received by the receiver of unit 10C to effect power shutoff and braking of the immediately trailing car 10C. The closure of the contacts 32a and 33a of the train unit 10C may also provide a control signal to operate a valve in the airbrake system of that train unit 10C to release the air pressure and apply braking to the car 10C. The previously described production of the prolonged tone signal put on the carrier wire antenna 14 by the train unit 10A when the train unit 10C approached too closely, would also serve as a backup system, since the prolonged tone signal would provide a control signal out of the discriminator of the receiver in car 10C which would also operate on the valve in the air-braking system of train unit 10C in the event circuit closure from its own contacts 32a and 32b did not effect operation of its airbrake system valve. It will be apparent that by the above-described system, the operator of each train unit, for example, the train unit 10A, may by a glance at his counters 17, 18 and 19 obtain instantly and continuously the following information:

1. The distance of his own train unit 10A from the base station.
2. The distance from the base station of the immediately preceding train unit 10B and the immediately following train unit 10C.
3. The approximate speed or motion status of the train unit 10B ahead and the train unit 10C behind, as, for example, at a traveling speed of 240 miles per hour, each train unit 10B, 10C would induce a count on their corresponding counters in train unit 10A every 1.5 seconds, at inducer intervals of one-tenth mile. If either train unit 10B or 10C slowed down or stopped, its corresponding counter in unit 10A would slow down or stop and that fact would be made visible to the operator in train unit 10A as well as the train units immediately ahead and behind, and to the operator in the base station 22.
4. The distance between the train unit 10A and the train units 10B and 10C.

5. The exact time of arrival at the terminal of the immediately ahead train unit 10B.

Also, by transmitting the radiofrequencies along a carrier wire antenna 14, no fading difficulties or large signal fluctuations from other causes will occur, and because no mechanical contact is required between the carrier wire antenna and the capacitively coupled transmitter and receiver antennas 13 and 16, the frictional wear and contact surface problems associated with the use of contact shoes are avoided.

I claim:

1. An electronic train position indicating system for train units traveling along a selected length of track, comprising a carrier wire antenna positioned alongside the track having a plurality of separate magnetic inducer means spaced at predetermined intervals therealong, a plurality of train units each having radio transmitter and receiver means and antenna means for coupling signals between said transmitter and receiver means and said carrier wire antenna, modulator means for each transmitter for modulating carrier signals produced thereby with a distinctive tone frequency identifying the associated train unit to produce and selectively apply to said carrier wire antenna upper or lower sideband tone frequency modulated signals signifying the direction of travel of the associated train unit, means responsive to passage adjacent each of said magnetic inducers to activate said modulator means, a plurality of counters in each train unit including an "own train" counter activated responsive to passage by said inducers and a "train ahead" counter and a "train behind" counter activated selectively responsive to received upper and lower sideband signals transmitted by the train units immediately ahead of and behind the train unit receiving the same to register counts signifying the number of inducers passed by the associated train units.

2. An electronic train position indicating system as defined in claim 1, wherein each train unit includes means responsive to the direction of travel of the train unit relative to said inducers to automatically selectively activate said "own train" counter in increasing and decreasing count directions in accordance with the direction of travel of the train unit.

3. An electronic train position indicating unit as defined in claim 2, wherein said magnetic inducers are spaced apart selected, uniform increments of distance in a series starting from a selected reference location whereby the counts registered on said "own train" counter upon passage by said inducers indicate the distance from said reference location.

4. An electronic train position indicating system as defined in claim 1 including selective circuit means coupled to the receiver means of each train unit selectively responsive to the upper sideband modulated signals and lower sideband modulated signals containing the assigned tone frequencies of the immediately ahead and behind train units to activate the "train ahead" and "train behind" counters in directions corresponding to their associated train units.

5. An electronic train position indicating system as defined in claim 3 including selective circuit means coupled to the receiver means of each train unit selectively responsive to the upper sideband modulated signals and lower sideband modulated signals containing the assigned tone frequencies of the immediately ahead and behind train units to activate the "train ahead" and "train behind" counter in directions corresponding to their associated train units.

6. An electronic train position indicating system as defined in claim 1 wherein said modulator means for each train unit includes a normally inactive tone generator for producing a distinctive tone frequency signifying the identity of the as-

sociated train unit, and each train unit including pickup means having plural contacts electromagnetically controlled thereby in accordance with its direction of travel past said inducers and sideband control means controlled by said contacts and regulating the transmitter means to transmit only said upper sideband modulated signals to the carrier wire antenna during travel in a first direction and to transmit only said lower sideband signals during travel in a second and opposite direction.

7. An electronic train position indicating system as defined in claim 3 wherein said modulator means for each train unit includes a normally inactive tone generator for producing a distinctive tone frequency signifying the identity of the associated train unit, and each train unit including pickup means having plural contacts electromagnetically controlled thereby in accordance with its direction of travel past said inducers and sideband control means controlled by said contacts and regulating the transmitter means to transmit only said upper sideband modulated signals to the carrier wire antenna during travel in a first direction and to transmit only said lower sideband signals during travel in a second and opposite direction.

8. An electronic train position indicating system as defined in claim 4 wherein said modulator means for each train unit includes a normally inactive tone generator for producing a distinctive tone frequency signifying the identity of the associated train unit, and each train unit including pickup means having plural contacts electromagnetically controlled thereby in accordance with its direction of travel past said inducers and sideband control means controlled by said contacts and regulating the transmitter means to transmit only said upper sideband modulated signals to the carrier wire antenna during travel in a first direction and to transmit only said lower sideband signals during travel in a second and opposite direction.

9. An electronic train position indicating system as defined in claim 1, including sensing means coupled to said "own train" counter and one of said "train ahead" and "train behind" counters for automatically reducing the speed of the trailing train unit of two successive train units when the count conditions of said one counter and "own train" counter signify a selected minimum spacing between said trailing train unit and the leading train unit of said two train units.

10. An electronic train position indicating system as defined in claim 3, including sensing means coupled to said "own train" counter and one of said "train ahead" and "train behind" counters for automatically reducing the speed of the trailing train unit of two successive train units when the count conditions of said one counter and "own train" counter signify a selected minimum spacing between said trailing train unit and the leading train unit of said two train units.

11. An electronic train position indicating system as defined in claim 4, including sensing means coupled to said "own train" counter and one of said "train ahead" and "train behind" counters for automatically reducing the speed of the trailing train unit of two successive train units when the count conditions of said one counter and "own train" counter signify a selected minimum spacing between said trailing train unit and the leading train unit of said two train units.

12. An electronic train position indicating system as defined in claim 6, including sensing means coupled to said "own train" counter and one of said "train ahead" and "train behind" counters for automatically reducing the speed of the trailing train unit of two successive train units when the count conditions of said one counter and "own train" counter signify a selected minimum spacing between said trailing train unit and the leading train unit of said two train units.