STREET TRAFFIC SIGNAL SYSTEM

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ABSTRACT
A street traffic signalling system having signal units disposed at the respective sides of an intersection and controllable in response to traffic detectors also disposed at the sides of such intersection, a measuring device being provided for each traffic flow monitored by a traffic detector, with each measuring device being adapted to evaluate and store criteria representative of the occupied or unoccupied condition of the associated detector, and to effect a signal change when predetermined occupied-unoccupied conditions exist representing an optimum period duration, or when the occupied periods reach a magnitude representing traffic congestion. The respective measuring devices may be so coupled that related traffic flows are controlled in dependence upon optimum conditions at all flows so related, or when congestion is indicated with respect to any one such flow.

17 Claims, 5 Drawing Figures
Fig. 3

Diagram showing a circuit with labeled components and connections.
Fig. 4

\[ \text{Diagram of signal waveforms} \]
STREET TRAFFIC SIGNAL SYSTEM

BACKGROUND OF THE INVENTION

The invention is directed to a street traffic signalling system having signal units disposed at the respective sides of an intersection and controllable in response to traffic detectors also disposed at the sides of such an intersection. A time-spacing method is known in connection with street intersections which are regulated fully in dependence upon traffic, in which the "green" or "go" period is interrupted when the time interval between two successive vehicles exceeds a fixed predetermined value at the detector, or possibly a value which decreases with continuing green time.

While this simple method can be utilized quite well during flowing traffic, it is unsatisfactory for example, in times of heavy column traffic. The time spacing fluctuates considerably, for example, due to starting delays where columns of vehicles are involved, and consequently does not form a representative evaluation. As a result, such time spacings present very little variation to those occurring during fast flowing traffic. Consequently, the time-spacing method does not supply a decisive and accurate criterion for the traffic flow. In an effort to avoid the above difficulties, the detectors for the utilization of the time-spacing method must be disposed considerably ahead, or before the normal vehicle stoppage line behind a "red" or "stop" light, and since such stoppage may extend rearwardly for some distance, the detectors must be arranged at least fifty meters behind the stopping line of the respective traffic flow at the traffic signal, at which point it is hoped that the traffic still possesses good flow characteristics.

However, such displacement of the detectors creates additional disadvantages. For example, a fixed starting period at the beginning of a "green" signal must be provided to insure that all of the vehicles entering the space between the stopping line and the detector during a red signal can pass through the intersection safely. Furthermore, a fixed terminal period must be provided before the end of the green condition which must be of sufficient duration that even slow vehicles can still cross the intersection after they have once passed the detector, before it has been determined that the maximum duration of the green condition has been reached.

These initial and terminal periods, however, require additional technical circuitry and expense for effecting control at the intersection. Furthermore, the requirement of additional corresponding safety features practically negate the advantages of a relatively sensitive regulation. While the negative effects of a constant starting period can be partially reduced by the expediency of counting the vehicles which have entered the intervening space before the signal condition is terminated and utilizing the counting results to accordingly control the time, again the solution requires additional circuitry and expense.

Another prior art method for traffic-dependent intersection control evaluates the traffic density, i.e., the amount of traffic per km. In this method an inductive loop of about 20 to 50 meters in length is utilized as a detector, extending as far as the vehicle stopping line at the intersection. With a large traffic density, and thus with less vehicle spacing, one vehicle will always be on the loop, but as the traffic density decreases the distance of the vehicles will be greater than the loop length. Thus, a shortening or lengthening of the duration of the green condition may be effected in dependence upon whether the loop is occupied or not.

The last-mentioned method thus is able to differentiate only between a traffic density (traffic per km) above or below a magnitude determined by the loop length and thus does not provide a continuous indication of the traffic density. In addition to this disadvantage, the traffic density at the intersection must be known when the loops are installed in order to provide a loop length which will produce the desired regulation characteristics. This, however, will often present considerable difficulties.

BRIEF SUMMARY OF THE INVENTION

The present invention is directed to the elimination of the disadvantages of the two above mentioned methods whereby the detectors may be arranged substantially directly at the stopping line, eliminating an uncontrolled space, and at the same time, providing measuring results which can be evaluated, even with heavy columnar traffic. This is achieved in accordance with the invention, by controlling the traffic signal units, disposed at the sides of an intersection, by means of traffic detectors, also provided thereat, and providing a measuring device with at least one storage means for each traffic flow which is to be controlled by a detector, storing criteria of the effective periods of occupation and non-occupation of the associated detector, effecting a comparison therebetween, with the measuring device producing an optimum "green" or "go" period, or a "congestion" signal, from the relation between occupied periods and unoccupied periods, controlling the associated signal units accordingly.

By means of the totalling of the individual occupied periods during a "green" condition, while utilizing an average vehicle length as a basis, an evaluation for the average speed of the vehicles during the "green" condition may be obtained. Since there is a relation between average speed and traffic density as will hereafter be apparent from the diagrams provided, the total of the occupied periods is thus a relative evaluation of the traffic density. The present measuring device also evaluates the occupied periods of the detectors, apart from the unoccupied periods, and thus the density of the traffic for all vehicles entering the intersection during the "green" signal. The unoccupied periods therefor are a sufficiently accurate evaluation of the traffic density during low density periods with the high driving speeds which are typical thereof. The occupied periods however, have little influence on the length of the green time.

With greater traffic density, columnar traffic will exist whereby the unoccupied periods changes only a very little with different traffic densities but the driving speeds determine the quality of the traffic. Thus, the occupied periods of the detectors have a dominating influence upon the dimensioning of the optimum green period.

However, if a detector is occupied practically constantly during a "green" condition, the traffic has stopped, creating a congestion the indication of which may be derived from the measuring device and accordingly evaluated. Since the detectors employed with such measuring devices can be positioned close to the stopping lines and may employ detectors of a normal
size, representing the average length of the usual passenger vehicle, specific starting and terminating periods are not required, which is technically advantageous. Finally, the continuous evaluation of the traffic density enables a relatively accurate matching of the operation of the system to traffic conditions, by the selection of the parameters involved with respect to the occupied and unoccupied periods.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings wherein like reference characters indicate like or corresponding parts;

FIG. 1 diagrammatically illustrates a street intersection with associated signal units and detectors;

FIG. 2 illustrates a preferred type of embodiment of a system employing the present invention;

FIG. 3 is a schematic figure of the circuit of a measuring device utilisable in the present system;

FIG. 4 is a time diagram illustrating occupied-unoccupied relation; actuated and unactuated switch times and storage operation existing with a flowing traffic; and

FIG. 5 is a similar diagram of conditions existing when the vehicles are practically at a standstill.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, there is illustrated a simple street intersection at which are disposed respective signal units Sg1 through Sg4 and co-operative traffic detectors D1 through D4, each arranged adjacent a respective side of the intersection and associated with respective traffic flows 1 through 4, with the respective traffic detectors measuring the individual flows which are correspondingly controlled by the respective signal units as determined by respective measuring devices.

FIG. 2 illustrates a circuit arrangement utilisable at the intersection of FIG. 1 for the control of the respective signal units and the detectors, the circuit being illustrated in an inoperative state and adapted to be actuated by closure of the main switch Sch, operative to supply power from a suitable voltage source Sp to the circuit.

In the arrangement illustrated the signal units Sg1 and Sg3 are illustrated as being simultaneously operated by suitable switching means G1 for determining the "red" (stop) or "green" (go) condition of the respective signal units. In like manner the signal units Sg2 and Sg4 are adapted to be simultaneously controlled by suitable switching means G2.

The reference characters M1-M4 designate respective measuring devices, illustrated in FIG. 2 in block form, each of which is adapted to be connected to a respective traffic detector D1-D4 and connecting evaluating means A1-A4.

FIG. 3 illustrates the details of the respective measuring devices M, each of which, in the embodiment illustrated contains two storage means, which in such embodiment are in the form of respective capacitors C1 and C2. As will be apparent, the capacitor C1 is shunted by an operational amplifier V1, a diode Rs1 and shunting contacts s1. The input side of the storage capacitor and associated elements, is connected through a single-pole double-throw set of contacts s1 to the operational amplifier to selectively connect the input to respective voltage sources of opposite polarities, which are adapted to be connected through respective adjustable resistance R1 and R2. The output side of the storage capacitor C1 and associated elements is connected to one input of suitable comparing means K1 the opposite input of which is operatively connected to a voltage source V2 adapted to supply a voltage +Ug1, the magnitude of which may be varied. The comparing means K1 is operable to compare the magnitude of the charge (summing result) on the capacitors C1 with the voltage +Ug1 and to provide an output signal at the terminal 3 when the storage voltage reaches the threshold +Ug1.

The storage capacitor C2 is like manner shunted by an operational amplifier V2, diode Rs2 and shunt contact s2, the input likewise being connected over single-pole double throw contacts s1 and respective adjustable resistances W3 and W4 to voltage sources of opposite polarity, with the output connected to similar comparing means K2 and associated voltage source V2 to supply a threshold voltage Ugs2 and the output of the comparing means brought out to terminal 4. The respective pairs of contacts s1 and s2 are adapted to be actuated from the rest positions illustrated to their opposite actuated positions by a solenoid winding S1 which may be energized by the application of a signal to terminal 1. The winding S1 is illustrated in deenergized condition whereby the contact s1 and s2 are illustrated in their rest positions, representative of an unoccupied period of the associated detector. The contacts s1 and s2 are adapted to be actuated by a solenoid winding S2 with the latter being operative when energized by the application of voltage to terminal 2, to actuate the respective contacts from their rest positions to their open positions, thus, rendering the storage capacitors C1 and C2 in operative condition.

The operation of the measuring device M will be explained in detail with the aid of FIGS. 4 and 5, with the top diagrams D indicating a plurality of occupied and unoccupied periods of a detector M. In like manner, the diagrams s1 and s2 illustrate the relative positions of contacts s1 or s2, in correspondence upon the state existing at the detector, and diagrams M(C1) and M(C2) illustrate the charge conditions appearing on the storage capacitors C1 and C2 respectively. Since the upper portion of the circuit of FIG. 3 is adapted to record the normally flowing traffic, this portion of the circuit will be explained in connection with FIG. 4,

Assuming that the detector D connected to the terminal 1 of the measuring device is occupied, the winding S1 will be energized and contacts s1 will be in a position to connect positive voltage over resistance W1 to the input side of storage capacitor C1, so that the capacitor would tend to charge over the adjustable resistor W1 and the operational amplifier V1. However, as the voltage of the output of the operational amplifier V1 is not supposed to become negative, a crystal diode I is shunted across the capacitor to eliminate the application of such charging current to the capacitor. If the detector becomes unoccupied, the contacts s1 will return to their rest positions illustrated in FIG. 3 whereby the storage capacitor C1 is now charged over the resistor W2 and the operational amplifier V1, (with opposite sign), the voltage of the output of the operational amplifier V1 thus increasing positively. If a vehicle then occupies the detector, the contacts s1 will again be actuated whereby the capacitor C1 will tend to discharge over the resistor W1 and the operational amplifier V1, thereby decreasing the positive voltage at the output of the operational amplifier.


As will be apparent from the inclination of the charge and discharge lines of the storage capacitor \( C_1 \) illustrated in FIG. 4, the various parameters are adjusted, by means of resistances \( W_1 \) and \( W_2 \), to obtain a favorable relationship between occupied and unoccupied periods at the detector. It will be apparent that as long as the occupied and unoccupied periods of the detector follow one another in a more or less certain rhythm, the charge of the storage capacitor \( C_1 \) will fluctuate only within narrow limits. However, if the charge of the storage capacitor \( C_1 \) so increases during the unoccupied periods that it finally exceeds the discharge resulting from vehicle occupation, as illustrated in FIG. 4, the output of the operational amplifier \( V_1 \) will become more and more positive and ultimately reach the threshold voltage \( +U_g_1 \) of the voltage source \( Q_1 \), resulting in the comparing device \( K_1 \) generating an output signal at the terminal (3) as long as such condition is maintained.

As previously mentioned, the lower part of the circuit illustrated in FIG. 3 is adapted to record traffic congestion, i.e., the associated detector being occupied most or all of the time, and the operation of the circuit may be explained in connection with FIG. 5, in which it is assumed that the detector \( D \) associated therewith is initially occupied and consequently the contacts \( S_1 \) are in their actuated position whereby the storage capacitor \( C_2 \) is being charged over the adjustable resistor \( W_3 \) and as the operational amplifier \( V_2 \) is to become negative, and not positive as in the upper circuit, the crystal diode \( R_3 \) is correspondingly poled, i.e., reversed to the diode \( R_1 \) in the upper part of the circuit.

Consequently, as long as the detector \( D \) remains occupied, the voltage at the output of the operational amplifier \( V_2 \) will progressively decrease and thus become more and more negative. If the detector \( D \) now becomes unoccupied after a time period, the contacts \( S_1 \) will return to their rest positions and the storage capacitor \( C_2 \) will discharge during this period over the resistor \( W_4 \) and the operational amplifier \( V_2 \). Since under the conditions here involved operation of the detector is supposed to greatly exceed the unoccupied time, as illustrated in FIG. 5, the output of the operational amplifier \( V_2 \) will ultimately become so negative that it reaches the threshold voltage \( -U_g_2 \) of the voltage source \( Q_2 \). As a result, a signal appears at the output (4) of the comparing device \( K_2 \) as long as such operational condition exists.

As previously mentioned, the crystal diodes \( R_{i1} \) and \( R_{i2} \) thus insures the desired polarities at the respective outputs of the operational amplifiers \( V_1 \) and \( V_2 \).

Considering the operation of the respective measuring devices of FIG. 3, the circuit of FIG. 2 and its operation may be considered in detail.

As previously mentioned, the overall operation of the device is controlled by the switch \( S_h \), with the respective lights in the signal units \( S_g_1 \) and \( S_g_3 \) being controlled by the switching device \( G_1 \) and the lights in the signal units \( S_g_2 \) and \( S_g_4 \) by means of a similar switching device \( G_2 \). The overall control of the two switching devices \( G_1 \) and \( G_2 \) is effected through contacts \( s_3 \) which in turn are controlled by the dual wound solenoid \( S_3 \), with the contact \( s_3 \) being illustrated in rest position in view of the open switch \( S_h \). As previously mentioned, only the red and green lights are illustrated in the signal units \( S_g_1 \) through \( S_g_4 \), as they are sufficient for an understanding of the operation of the system.

Any necessary additional transition signal lights can, of course, be suitably actuated through corresponding timing circuits in the switching devices \( G_1 \) and \( G_2 \) after receipt of signals thereat for effecting a light change. The contact \( s_3 \) also controls the actuation of the respective measuring devices through the associated windings \( S_2 \) by connection of the associated inputs (2) with the input of the associated switching device \( G_1 \) or \( G_2 \). Thus, in the embodiment of the invention illustrated in FIG. 2, the windings \( S_2 \) of the measuring devices \( M_1 \) and \( M_3 \) are operatively connected with the input of the switching device \( G_1 \) while the windings \( S_2 \) of the measuring devices \( M_2 \) and \( M_4 \) are operatively connected with the input of the switching device \( G_2 \).

Referring to FIG. 2, it will be noted that each traffic detector \( D_1 \)–\( D_4 \) is connected over a corresponding evaluation device \( A_1 \)–\( A_4 \) with the input terminal (1) of the associated measuring device \( M_1 \)–\( M_4 \). As the signals units \( S_g_1 \) and \( S_g_3 \) are jointly operated under the control of both signal detectors \( D_1 \) and \( D_3 \), the output terminals 3 of the measuring devices \( M_1 \) and \( M_3 \) are connected to respective inputs of an AND gate \( U_1 \), the output of which is connected to one input of an OR gate \( O_1 \), the other inputs of which are connected to respective terminals 4 of the measuring devices \( M_1 \) and \( M_3 \). The output of the OR gate \( O_1 \) is connected with the energizing winding of the solenoid \( S_3 \) adapted to actuate the contacts \( s_3 \) to the opposite position illustrated in FIG. 2. In like manner, the outputs 3 of the respective measuring devices \( M_2 \) and \( M_4 \) are connected to the inputs of an AND gate \( U_2 \), the output of which is connected to one input of the OR gate \( O_2 \) with the outputs 4 of the measuring devices \( M_2 \) and \( M_4 \) being connected to the remaining input illustrated of the OR gate \( O_2 \), with the output of the latter being connected to the other winding of the solenoid \( S_3 \).

Assuming the contacts \( s_3 \) are in the position illustrated in FIG. 2, the green light of the signal units \( S_g_1 \) and \( S_g_3 \) will be illuminated and at the same time the contacts \( s_2^1 \) and \( s_2^2 \) of the respective measuring devices \( M_1 \) and \( M_3 \) will be in open positions due to the energization of the respective windings \( S_2 \).

Assuming that both traffic flow densities relatively high traffic speeds and thus correspondingly short occupied periods and longer unoccupied periods will result at the detectors \( D_1 \) and \( D_3 \). Consequently, the critical threshold voltage represented by the voltage \( +U_g_1 \) at the measuring devices \( M_1 \), \( M_3 \) will be rapidly reached to apply respective signals at the inputs of the AND gate \( U_1 \), whereby a signal is transmitted through the OR gate \( O_1 \) and the associated winding of the solenoid \( S_3 \) energized to shift the contacts \( s_3 \) to the positions opposite to that shown in FIG. 2. Consequently, the windings \( S_2 \) of the measuring devices \( M_1 \), \( M_3 \) will deenergize and the switching device \( G_1 \) will ultimately turn off the green lights of the signal units \( S_g_1 \) and \( S_g_3 \) and turn on the red lights thereof. At the same time, the switching device \( G_2 \) will be actuated to ultimately turn off the red lights of the signal units \( S_g_2 \) and \( S_g_4 \) and turn on the green lights thereof. Simultaneously therewith, the solenoid windings \( S_2 \) of the measuring devices \( M_2 \), \( M_4 \) will be energized opening the switches \( s_2^1 \) and \( s_2^2 \) of such measuring devices to place the latter in operation. At the same time, the energization of the solenoid windings \( S_2 \) of the measuring devices \( M_1 \), \( M_3 \) will result in closure of the contacts \( s_2^1 \) and \( s_2^2 \) thereof rendering the storage
means thereof inoperative and thus the measuring devices themselves.

Again assuming the original condition with the signal units Sg1 and Sg3 having their green lights illuminated, but now assuming, for example, that the traffic flow I is of low traffic density while the traffic flow II is of high traffic density, only the measuring device M1 will rapidly reach the critical voltage +Ug1 and emit a signal at its output (3). However, as a result of the greater traffic density at the detector D3 a lower traffic speed will be involved with longer periods of occupation of the detector and correspondingly shorter unoccupied periods. As a result, the voltage buildup to the critical voltage +Ug1 in the measuring device M3 will lag such buildup in the measuring device M1 and a signal will appear at the output 3 of the voltage device M3 at some later time, with the switch-over thus being delayed until signals appear at both inputs of the associated AND gate U1, at which time the associated winding of the solenoid S3 is energized over the OR gate O1, as previously described.

If, however, the traffic flow I should become more dense, prior to the appearance of a signal at the output (3) of the measuring device M3, thus requiring a green period of greater time, this will result in longer occupied periods and shorter unoccupied periods at the detector D1 with the result that the voltage will decrease at the comparing means K1 to a value below the critical voltage +Ug1, resulting in the disappearance of a signal at the output (3). In this case, the green lights for the traffic flows I and III, in the absence of other provisions, could only be turned off when the outputs (3) of both measuring devices M1 and M3 emit a signal. Of course, the system would normally include master timing means which would switch the lights of the respective signal units after a predetermined maximum green period, irrespective of the traffic flows.

In any case, the traffic flows II and IV of the cross direction will eventually receive a green light. Assuming now that the traffic flow IV is so dense that it practically stops resulting in congestion, the detector D4 would be practically steadily occupied which in turn would result in an undesirably long green period. However, referring to FIG. 5, such long periods of occupation of the detector D4 will result in the capacitor C2 associated with the measuring device M4 ultimately reaching the critical voltage −Ug2, as illustrated in the bottom diagram of FIG. 5. In turn this will result in a signal at the output (4) of the measuring device M4 which signal will be conducted through the OR gate O2 to the associated winding of the solenoid S3 resulting in actuation thereof to return the contacts s3 to their original position illustrated in FIG. 2. In this case the measuring values in the measuring device M2 responsive to the detector D2 remains of no importance in the presence of the congestion signal from the measuring device M4.

As previously mentioned, usually in such type of systems, the green lights of a pair of signal units are ultimately turned off following a reasonable maximum time, irrespective of the traffic conditions, as indicated by the respective traffic detectors, and it is believed apparent that an over-riding control can readily be additionally provided which will effect such switching over when a predetermined maximum green period for certain signal units has been reached.

It will be apparent from a reference to FIG. 3 that the relative magnitudes of the voltages representing occupied and unoccupied periods of the detectors can be readily controlled and varied by means of the adjustible resistances W1 through W4 whereby the operational characteristics of the system can be readily adapted to the traffic requirements thereof. Likewise, the threshold voltages +UG1 and −UG2 for the respective comparing means K1 and K2 can be selected as desired by adjustment of the voltage sources Q1 and Q2.

It will be appreciated from the above description that while some of the switching members have been illustrated as relays, and capacitors have been illustrated as the storage members, the invention can be practiced with other types of components for achieving the desired control results. For example, shift registers and counters could be employed as the storage means, in particular, counters which can be stepped in either direction by different impulses whereby the impulses form the time criteria. In the latter case, a signal would always be emitted from measuring device M when the counters serving as the storage means have reached a predetermined level.

Likewise, with respect to various details of construction illustrated, for example only in block form in the drawings, those skilled in the art will have no difficulty in determining suitable known components which may be employed therefor.

For example, the operation amplifiers V1, V2, may be of a type corresponding to integrated circuit No. LM 107, and the comparing means K1, K2, of a type corresponding to integrated circuit No. LM 106, both manufactured by National Semiconductor.

Similarly, the loop detectors D1, etc. and evaluation devices A1, etc. may, for example, employ circuitry of the type illustrated in U.S. Pat. Nos. 2,917,732; 3,164,802; 3,397,364; and 3,451,041.

Having thus described my invention, immaterial changes and modifications may be made in the invention by those skilled in the art without departing from the spirit and scope thereof, and it is to be understood that I intend to include within the purview and scope hereof all such changes and modifications as may reasonably and properly be included within the scope of my contribution to the art.

What we claim is:

1. In a street traffic signalling system having signal units disposed at the sides of an intersection and controllable in response to traffic detectors also disposed at the sides of such intersection, the combination of a measuring device, having at least one storage means, for each traffic flow monitored by a traffic detector, with the storage means being operable, in response to operation of said traffic detectors, to receive signals respectively representing occupied and unoccupied periods reported by the associated detector, means for summing the signals representing occupied and unoccupied periods of the associated detector, and means responsive to a predetermined summing value, operative to provide an optimum "go" or "green" period of an associated signal unit, or a predetermined control of the duration of the "go" or "green" period in the presence of a predetermined comparison relationship, in dependence upon predetermined signals, received by one of such related storage means from the associated
3,833,881

9 detector, representing traffic congestion at such detector.

2. A system according to claim 1, wherein said storage means of a measuring device is operative to determine the duration of a "green" or "go" period irrespective of optimum periods, in the presence of traffic congestion, represented by a predetermined summing, in dependence upon occupation of an associated detector and is arranged to receive signals, in the form of voltages, representing occupied and unoccupied periods, and including means for supplying such voltages thereto with opposite identifying polarities, with a congestion signal being derived in said storage means as a difference between said voltages of opposite polarities.

3. A system according to claim 1, wherein such storage means of a measuring device is operative to determine the duration of the optimum "green" or "go" period, and is arranged to receive voltages representing occupied and unoccupied periods, and including means for supplying such voltages thereto with opposite identifying polarities, with the optimum period being derived in said storage means as a difference and means defining an operative threshold for determining the voltage representative of such optimum period.

4. A system according to claim 3, wherein each measuring device has two such storage means, the second of which such storage means is operative to determine the duration of a "green" or "go" period, irrespective of optimum periods, in the presence of traffic congestion, represented by a predetermined summing value in dependence upon occupation periods of an associated detector, and is arranged to receive voltages representing occupied and unoccupied periods, and including means for supplying such voltages thereto with opposite identifying polarities, with a congestion signal being derived in said storage means as a difference.

5. A system according to claim 1, comprising in further combination, blocking means for the respective storage means arranged to prevent the stored content of such storage means from exceeding a threshold value, preferably zero value.

6. A system according to claim 1, wherein the respective storage means include a chargeable capacitor as the storage member, and an operational amplifier, the output voltages of the latter being stored in said storage member.

7. A system according to claim 1, comprising in further combination, adjustable means for independently adjusting relative voltages representative of occupied and unoccupied periods, to enable desired proportionate evaluation of occupied and unoccupied periods.

8. A system according to claim 1, comprising in further combination, means linking the measuring devices of respective selected traffic flows whereby optimum "green" or "go" time of the selected traffic flows is terminated only when the optimum periods for such selected traffic flows have been reached.

9. A system according to claim 8, wherein said linking means comprises AND gates.

10. A system according to claim 8, comprising in further combination, means linking the measuring devices of respective selected traffic flows whereby termination of "green" or "go" periods for such selected traffic flows will take place in the presence of a congestion signal at any one of the measuring devices for such selected flows.

11. A system according to claim 10, wherein said linking means comprises OR gates.

12. A system according to claim 1, wherein means is provided for controlling the operation of the respective measuring devices whereby the storage means thereof is inoperable when the associated signal unit is "red" or "stop" and operable when such signal unit is "green" or "go."

13. A system according to claim 12, wherein each of said storage means comprises a storage capacitor and said operation-determining means comprises shunt contact adapted to shunt the associated storage capacitor when the associated signal unit is "red" or "stop."

14. A system according to claim 1, wherein means is provided for terminating a "green" or "go" period after a predetermined maximum time, independently of the determination of the end of an optimum period.

15. A system according to claim 1, wherein the respective traffic detectors comprise inductive loops of about the same length as the average personal car length, and disposed at a distance of about such a car length from the associated stop line at the intersection.

16. A system according to claim 4, wherein each measuring device is provided with two storage means, each of which comprise a storage capacitor, respectively designated as "optimum" and "congestion" capacitors, each capacitor being operatively shunted by an operational amplifier, a blocking diode, and operation-determining shunt contacts, comparing means at the output side of each capacitor for comparing the charge thereon with a threshold voltage, adjustable means associated with each comparing means for selectively supplying a threshold voltage thereto, means at the input side of each capacitor and amplifier and including adaptable contacts for selectively supplying voltages of predetermined values and polarities to the associated capacitor and amplifier, means for selectively actuating said shunt contacts to open the same when the traffic unit associated therewith designates a "green" or "go" period and closed when a "red" or "stop" period is designated thereby, and means for selectively actuating said input contacts in dependence upon the or absence of a signal from the associated detector.

17. A system according to claim 16, in which two traffic flows are to be linked, wherein the output of the comparing means associated with "optimum" capacitors of the measuring devices of such linked flows, is connected with a respective input of an OR gate, the output of which and the outputs of the other comparing means associated with the "congestion" capacitors of such measuring devices, conducted to respective inputs of an OR gate, the output signal of which is adapted to effect termination of a "green" or "go" period of the associated signal units.