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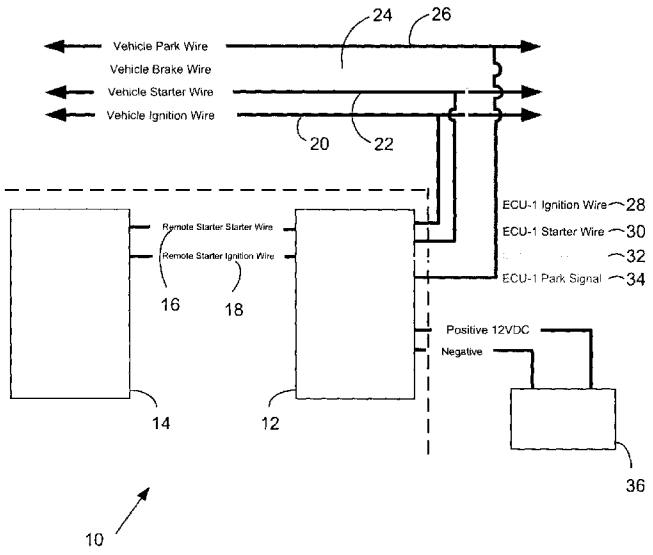

FIG. 1

(57) Abstract: A vehicle shutoff system for disconnecting an ignition system from engine running circuits of a vehicle can include at least one switching apparatus for connection along an ignition signal wire between the ignition system and the engine running circuits. The switching apparatus can have open and closed modes for disabling and enabling the ignition system, respectively. A computer connected to the switching apparatus can include a plurality of inputs for receiving information from the vehicle. The computer can initiate a first time interval in response to detecting a start condition, and after duration of the first time interval transition the switching apparatus to the open mode to disable the ignition system.

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TITLE: VEHICLE SHUTOFF SYSTEMS

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application No. 61/022,646 filed on January 22, 2008, which is hereby incorporated by reference in its entirety.

FIELD

This specification relates to apparatuses and methods for reducing undesired idling of motor vehicles.

BACKGROUND

The following paragraphs are not an admission that anything discussed in them is prior art or part of the knowledge of persons skilled in the art.

United States Patent No. 6,595,180 (Thompson et al.) discloses an idle shutdown override with defeat protection. A system and method for controlling a compression ignition internal combustion engine has an electronic control module with an idle shutdown feature to automatically stop the engine after idling for a period of time include determining whether the engine is being loaded and overriding the idle shutdown feature to keep the engine running when the engine is being loaded. In one embodiment, the teachings includes monitoring operating conditions to determine that the vehicle is stationary, monitoring the engine to determine the engine is idling, initiating a timer/counter to provide an indication of idling time, determining that the engine is operating in an auxiliary power mode, determining engine load, and automatically stopping the engine when the idling time exceeds a first threshold and the engine load is less than a second threshold. The teachings makes it more difficult for engine operators to defeat the idle shutdown feature by detecting current engine operating conditions to verify that the selected operating mode is consistent with current engine operating conditions.

United States Patent No. 6,768,221 (Klinger et al.) discloses an electrical load management in conjunction with idle shutdown. A motor vehicle engine is under control of an engine control system that performs an idle shutdown function to shut down the engine via a programmable output of an electronic module of the control system after the engine has been idling for some amount of time. An ignition switch is turned on and off for signaling the engine control system to turn the engine on and off. Relays are connected between the ignition switch and load circuits of the vehicle electrical system and to the programmable output of the module to allow the load circuits to be fed when the ignition switch is on and the programmable output of the module is not signaling an idle shutdown and to disallow feeding when the programmable output of the module is signaling an idle shutdown.

United States Patent Application No. 20070288154 (Letang) discloses a method and system to control internal combustion engine idle shut down. A method for controlling a compression ignition electronic control module equipped compression ignition internal combustion engine installed in a vehicle to permit engine idling to conform to requirements of a geographical location.

SUMMARY

The following introduction is intended to introduce the reader to this specification but not to define any invention. One or more inventions may reside in a combination or sub-combination of the apparatus elements or method steps described below or in other parts of this document. The inventor does not waive or disclaim his rights to any invention or inventions disclosed in this specification merely by not describing such other invention or inventions in the claims.

A vehicle shutoff system, for disconnecting an ignition system from engine running circuits of a vehicle, can comprise: at least one switching apparatus for connection along an ignition signal wire between the ignition system and the engine running circuits, the switching apparatus having open and closed modes for disabling and enabling the ignition system, respectively;

a computer connected to the switching apparatus, the computer including a plurality of inputs for receiving information from the vehicle; and a memory including software instructions that instruct the computer to initiate a first time interval in response to detecting a start condition, and after duration of the first time interval transition the switching apparatus to the open mode to disable the ignition system.

Other aspects and features of the specification will become apparent, to those ordinarily skilled in the art, upon review of the following description of the specific examples of the specification.

DRAWINGS

The drawings included herewith are for illustrating various examples of articles, methods, and apparatuses of the present specification and are not intended to limit the scope of what is taught in any way. In the drawings:

FIG. 1 is schematic view of a system;

FIG. 2 is a schematic view of a control unit of the system shown in FIG 1;

FIG. 3 is a circuit diagram of the system shown in FIG. 1;

FIG. 4 is a flow chart;

FIG. 5 is schematic view of another system;

FIG. 6 is a schematic view of a control unit of the system shown in FIG 5;

FIG. 7 is a circuit diagram of the system shown in FIG. 5; and

FIG. 8 is a flow chart.

DESCRIPTION OF VARIOUS EMBODIMENTS

Various apparatuses or processes will be described below to provide an example of an embodiment of each claimed invention. No embodiment described below limits any claimed invention and any claimed

invention may cover processes or apparatuses that are not described below. The claimed inventions are not limited to apparatuses or processes having all of the features of any one apparatus or process described below or to features common to multiple or all of the apparatuses described below. It is possible that an apparatus or process described below is not an embodiment of any claimed invention. The applicant(s), inventor(s) and/or owner(s) reserve all rights that they may have in any invention disclosed in an apparatus or process described below that is not claimed in this document, for example the right to claim such an invention in a continuing application and do not intend to abandon, disclaim or dedicate to the public any such invention by its disclosure in this document.

The idling of vehicles is common, particularly in colder climates. However, idling also wastes fuel and generates unnecessary harmful pollutant exhaust gasses. Minimization of unnecessary idling will have a beneficial impact both financially and environmentally.

The applicant's teachings relate to systems for monitoring and automatically time limiting excessive engine idling, thus reducing green house gas emissions. In particular, the applicant's teachings relate to systems having at least one switching apparatus governed by a control unit and used to shutoff a vehicle's engine when idling conditions are detected. The vehicle engine can be shutoff off after the duration of a first time interval.

In various examples, the vehicle shutoff systems can operate whenever the engine is running and monitor the brake pedal, hand brake, transmission setting and/or vehicle speed sensor, and allow the engine to run for the predetermined period of time (e.g., three minutes) after idling conditions are met, after which the engine is automatically shut off. Should any of the monitored conditions for idling cease to be satisfied prior to engine shut down, the engine shut down timer will be reset, thereby allowing the engine to continue running, and will start counting again once the monitored idling conditions are again satisfied. Once the engine has been shut down,

the systems may require the user to switch off the key and then start the vehicle using the usual start up sequence.

In various examples, the monitored conditions to start the engine shut off timer can be as follows. For vehicles with an automatic transmission, idling conditions can be met by following requirements: (i) the vehicle not be moving (speed reading zero) after a positive speed reading (speed reading not zero); (ii) the transmission be set in "Park" position (such that the driving wheels are locked at the transmission and the vehicle is unable to move); (iii) the brake pedal is not engaged; and (iv) the throttle position is zero percent. For vehicles with a manual transmission, idling conditions can be met by following requirements: (i) the vehicle not be moving (speed reading zero) after a positive speed reading (speed reading not zero); (ii) the hand brake is engaged; (iii) brake pedal is not engaged; (iv) clutch pedal is not engaged; (v) throttle position is zero percent; and (vi) gear is in the neutral position. Vehicles with automatic transmissions may require one switching apparatus, whereas vehicles with manual transmissions may require two apparatuses.

Referring to FIG. 1, in a first particular example, a vehicle shutoff system 10 is provided with a control unit 12 for use with vehicles in combination with a remote vehicle starter 14. The control unit 12 can be placed between the vehicle ignition system (not shown) and the remote vehicle starter 14 in order to disconnect the remote vehicle starter 14 after a set amount of time using at least one switching apparatus.

To disconnect the remote vehicle starter 14, the control unit 12 is placed in series with the starter signal wire 16 and the ignition signal wire 18 from the remote vehicle starter 14 to the vehicle ignition system. In particular, the control unit 12 may be connected to the vehicle ignition wire 20, the vehicle starter wire 22, the vehicle brake wire 24, and/or the vehicle park wire 26 by the respective control unit ignition wire 28, the control unit starter wire 30, the control unit brake wire 32, and/or the control unit park wire 34.

Depending on the make and model of the vehicle, there may be more than one ignition line that will need to be disconnected to shut down the engine.

If the car has a manual transmission, the vehicle park wire 26 may be a vehicle parking brake wire. With a manual transmission, to activate the remote vehicle starter a sequence may have to be input before leaving the vehicle (such as hitting the brakes twice and then taking the key out while the hand brake is on). This prevents accidental activation during vehicle operation, and is common for remote vehicle starters for manual transmissions.

The control unit 12 may be powered by the vehicle's battery 36. Alternatively the control unit 12 may have its own power supply, which may be shared with the remote vehicle starter 14.

An optional manual override disable switch (not shown) may also be included on the control unit 12 in order to disable the control unit 12 for vehicle servicing, failure of the control unit 12, or other emergency.

Although FIG. 1 depicts the remote vehicle starter 14 and the control unit 12 as separate entities, these two components can be provided as a single integrated unit within a common housing.

Referring to FIG. 2, the control unit 12 may comprise a computer 38 and at least one switching apparatus 40,42. The computer 38 can be a microcontroller, for example. The switching apparatuses 40,42 are connected to and governed by the computer 38. The switching apparatuses 40,42 can be a relay or a solid state switch, for example. In some particular examples, the switching apparatuses 40,42 can be electromechanical automotive grade relays. The switching apparatuses 40,42 are normally in closed modes. According to this particular example, a first switching apparatus 40 is connected between the remote starter wire 16 and the vehicle starter wire 30; and a second switching apparatus 42 is connected between the remote starter ignition wire 18 and the vehicle ignition wire 28.

The control unit 12 includes a plurality of inputs or connections 44. The inputs or connections 44 may include a power source, ground wire, and connections to receive input information from the vehicle, such as connections to the vehicle park wire, vehicle brake wire, vehicle drive mode selector, gear shifter, ignition key switch, power locks, etc. The control unit 12 may also include one or more display devices such as, for example, LEDs 46 for providing status information regarding the system 10. The LEDs 46 can be housed in a display unit (not shown) inside the vehicle, for example, mounted to the dashboard.

Referring to FIG. 3, an example circuit diagram is provided for the system 10.

Referring to FIG. 4, the system 10 may operate as follows. The control unit 12 once turned on will start in a "standby mode", with the vehicle turned off and set in park. The computer 38 waits to receive a start signal on the wire 16 from the remote vehicle starter 14, the signal indicative of a start condition. Once a start signal is detected by the computer 38, the control unit 12 in response switches to a "run mode". Once in the run mode, the computer 38 initiates a first time interval.

The first time interval can be, for example, 3 to 5 minutes. During the first time interval the vehicle may remain running. However, while in run mode during first time interval, if a drive condition is detected then the control unit 12 will switch to a "reset mode" to reset counters for the first time interval, and then will return to the standby mode. A drive condition is detected if, for example, the brake is depressed (the brake signal on the brake signal wire will be detected by the computer 38), or the key is inserted in to the ignition (the key signal on the key active wire will be detected by the computer 38).

If the first time interval has elapsed and no drive condition is detected, the computer 38 will switch to a "shutdown mode". In the shutdown mode, the computer 38 commands the switching apparatuses 40,42 to transition to open modes to disable the ignition system of the vehicle. In

particular, once the switching apparatuses 40,42 are in open modes, the starter signal wires 16,30 are disconnected and the ignition signal wires 18,28 are disconnected, thereby shutting down the vehicle's engine. Once in shutdown mode, the computer 38 optionally initiates a second time interval.

During the optional second time interval, the control unit 12 maintains the disconnection (i.e. the switching apparatuses 40,42 remain in open modes) to lock out the remote vehicle starter 14 to prevent the vehicle engine from being started for a set amount of time. The second time interval serves to deter and discourage idling. The second time interval can be, for example, 5 to 10 minutes.

However, similar to the run mode, while in the shutdown mode during the second time interval, if a drive condition is detected then the control unit 12 will switch to a "reset mode" to reset counters for the second time interval, and then will return to the standby mode. A drive condition is detected if, for example, the brake is depressed (the brake signal on the brake signal wire 24 will be detected by the computer 38), or the key is inserted in to the ignition (the key signal on the key active wire will be detected by the computer 38).

Once the second time interval has elapsed, the computer 38 switches to the reset mode to reset counters for the second time interval, and then will return to the standby mode. In the reset mode, the computer 38 commands the switching apparatuses 40,42 to transition to closed modes to enable the ignition system (i.e. the engine is capable of being started). In particular, once the switching apparatuses 40,42 are in closed modes, the starter signal wires 16,30 are connected and the ignition signal wires 18,28 are connected, thereby enabling the vehicle's engine to be startable.

The first and second time intervals can be preset or pre-selected within the computer 38 of system 10, or, alternatively, these values can be adjustable by the user. If adjustable, the time intervals can be adjusted by a control or input device (not shown) connected to the control unit 12.

Since the control unit 12 typically maintains the switching apparatuses 40,42 in closed modes, the system 10 may require less power to operate and may be more energy efficient than other solutions. If the switching apparatuses 40,42 are relays, for example, no energy is required to maintain the relays in a closed mode. The relays in the control unit 12 would only need to be opened to shut down the vehicle engine.

Referring to FIG. 5, in another example, a vehicle shutoff system 50 is provided with a control unit 52 for use with vehicles with or without a remote vehicle starter (not shown). The control unit 52 can be placed between the vehicle ignition system (not shown) and the vehicle's engine running circuits (not shown). The control unit 52 disconnects the engine running circuits and therefore turns off the vehicle's engine (not shown) after an amount of time that the vehicle has elapsed while the vehicle is turned on and set in park using at least one switching apparatus (not shown).

To disconnect the engine running circuits, the control unit 52 is placed in series with the ignition signal wire 54 between the ignition system and the engine running circuits (i.e. leading to spark plugs for gas engines, or glow plugs for diesel engines). Depending on the make and model of the vehicle, there may be more than one ignition line that will need to be disconnected to shut down the engine. The control unit 52 may also be connected to the vehicle brake wire 56, and/or the vehicle park wire 58.

The control unit 52 may be powered by the vehicle's battery 60. Alternatively the control unit 12 may have its own power supply.

An optional manual override disable switch 62 may also be included on the control unit 52 in order to disable the control unit 52 for vehicle servicing, failure of the control unit 52, or other emergency.

Referring to FIG. 6, the control unit 52 may comprise a computer 64 and at least one switching apparatus 66. The computer 38 can be a microcontroller, for example. The switching apparatus 66 is connected

to and governed by the computer 64. The switching apparatus 66 can be a relay or a solid state switch, for example. In some particular examples, the switching apparatus 66 can be an electromechanical automotive grade relay. The switching apparatus 66 is normally in a closed mode. According to this particular example, the switching apparatus 66 is connected along the vehicle ignition wire 54.

The control unit 52 includes a plurality of inputs or connections 68. The inputs or connections 68 may include a power source, ground wire, and connections to receive input information from the vehicle, such as connections to the vehicle park wire, vehicle brake wire, drive mode selector, gear shifter, ignition key switch, power locks, etc. The control unit 52 may also include one or more display devices such as, for example, LEDs 70 for providing status information regarding the system 50. The LEDs 70 can be housed in a display unit (not shown) inside the vehicle, for example, mounted to the dashboard.

Referring to FIG. 7, an example circuit diagram is provided for the system 50.

Referring to FIG. 8, the system 50 may operate as follows. The control unit 12 once turned on will start in a "standby mode", with the vehicle turned off and set in park. The computer 64 waits to receive a park signal on the wire 58 and an ignition signal on the wire 54, the signals being indicative of a start condition. Once the park and ignition signals are detected by the computer 64, the control unit 52 in response switches to a "park mode". Once in the park mode, the computer 64 initiates a first time interval.

The first time interval can be, for example, 3 to 5 minutes. During the first time interval the vehicle may remain running. However, while in park mode during first time interval, if a drive condition is detected then the control unit 52 will switch to a "reset mode" to reset counters for the first time interval, and then will return to the standby mode. A drive condition is detected if, for example, the brake is depressed (the brake signal on the

brake signal wire will be detected by the computer 64), or the drive mode selector or gear selector is moved.

If the first time interval has elapsed and no drive condition is detected, the computer 64 will switch to a "shutdown mode". In shutdown mode, the control unit 52 disconnects the ignition wire 54 by transitioning the switching apparatus 66 to an open mode, thereby shutting down the vehicle's engine. Once in shutdown mode, the computer 64 optionally initiates a second time interval.

During the optional second time interval, the control unit 52 may maintain the disconnection (i.e. the switching apparatus 66 remains in the open mode) to prevent the vehicle engine from being started for a set amount of time. The second time interval serves to deter and discourage idling. The second time interval can be, for example, 5 to 10 minutes.

However, similar to the run mode, while in the shutdown mode during the second time interval if a drive condition is detected then the control unit 52 will switch to a "reset mode" to reset counters for the second time interval, and then will return to the standby mode. A drive condition is detected if, for example, the brake is depressed (the brake signal on the brake signal wire 56 will be detected by the computer 64).

Once the second time interval has elapsed, the computer 64 switches to reset mode to reset counters for the second time interval, and then will return to the standby mode. In the reset mode, the computer 64 commands the switching apparatus 66 to transition to the closed mode to enable the engine to be restarted.

The first and second time intervals can be preset or pre-selected within the computer 64 of system 52, or, alternatively, these values can be adjustable by the user. If adjustable, the time intervals can be adjusted by a control or input device (not shown) connected to the control unit 52.

In some examples, vehicle shutoff systems can include a security feature to prevent vehicle theft. The security feature may be

configured to detect an unauthorized activation of the vehicle (e.g., start of ignition absent use of a key, or after detection of window breaking) and disable the vehicle by preventing interrupting the ignition. The operator could have an associated key fob to control and monitor the security feature, whether armed or disarmed. The control unit would work in a similar manner. If the unit is armed, it will not allow the ignition to function preventing someone from stealing the vehicle. Once it is disarmed, the system will work normally and the emission savings device will be activated.

In some examples, vehicle shutoff systems can include sensors for monitoring temperature in order to disable the vehicle shutoff system in extreme climatic conditions, for example, if the temperature is below minus 25 degrees Celsius, or above 35 degrees Celsius. The temperature window can be preset or can be adjustable by the operator. This temperature-monitoring feature may be practical for use in certain regions that have by-laws that allow vehicles to idle when certain temperature conditions are met.

In some examples, vehicle shutoff systems can include a display unit having three integrated LEDs. The first LED can be a system status LED for indicating module status (e.g., red indicates internal problems, yellow indicates fault in operation or wiring, and green is all OK). The second LED can be an engine shutdown timer status LED for indicating the state of the engine shutdown timer (e.g., green indicates that all of the monitored conditions for engine shut off are satisfied and the time is running, the LED turns yellow shortly before the engine shut down timer period is about to run out, and red indicates that the engine has been turned off).

The third LED can be a cumulative idling LED for indicating the vehicle's cumulative idling status. This timer can begin counting once the vehicle has stopped and the engine is idling, regardless of whether the conditions to shut down the engine have been met. Once the vehicle stops moving this LED can turn green and the associated timer begins to count for as long as the vehicle is stationary and the engine is idling. After, for example, three minutes of stationary idling the third LED will go yellow and

after another three minutes (six minutes in total) then the third LED will turn red (thus indicating that the operator had been idling for more than six minutes). The third LED will not stop the vehicle from idling or cause any other changes in its operation, and once the vehicle starts moving, the idle timer will count backwards toward zero, thus preventing the operator from putting the vehicle in drive, moving it a short distance, and then parking it again to reset the LED. This timer and LED will alert the vehicle operator to the cumulative idling time, less any time in motion, and highlight the opportunity to achieve fuel savings by stopping the vehicle in a manner which allows the vehicle shutoff system to automatically shut down the engine.

While the above description provides examples of one or more processes or apparatuses, it will be appreciated that other processes or apparatuses may be within the scope of the accompanying claims.

CLAIMS

I claim:

1. A vehicle shutoff system for disconnecting an ignition system from engine running circuits of a vehicle, comprising:

a) at least one switching apparatus for connection along an ignition signal wire between the ignition system and the engine running circuits, the switching apparatus having open and closed modes for disabling and enabling the ignition system, respectively;

b) a computer connected to the switching apparatus, the computer including a plurality of inputs for receiving information from the vehicle; and

c) a memory including software instructions that instruct the computer to initiate a first time interval in response to detecting a start condition, and after duration of the first time interval transition the switching apparatus to the open mode to disable the ignition system.

2. The apparatus of claim 1, wherein the software instructions further instruct the computer to initiate a second time interval upon duration of the first time interval, and after duration of the second time interval, transition the switching apparatus to the closed mode to enable the ignition system.

3. The system of claim 2, wherein the software instructions further instruct the computer to, if during the first time interval a drive condition is detected by the inputs, transition the switching apparatus to the closed mode to enable the ignition system.

4. The system of any one of claims 2 or 3, wherein the software instructions further instruct the computer to, if during the second time interval a drive condition is detected by the inputs, transition the switching apparatus to the closed mode to enable the ignition system.

5. The system of any one of claims 1 to 4, wherein the computer comprises a microcontroller.

6. The system of any one of claims 1 to 5, wherein the at least one switching apparatus comprises a relay or a solid state switch.

7. The system of any one of claims 1 to 6, wherein the control unit receives inputs including vehicle speed, transmission position, brake position, and throttle position.

8. The system of any one of claims 1 to 6, wherein the control unit receives inputs including vehicle speed, transmission position, brake position, hand brake position, clutch position and throttle position.

9. The system of claims 7 or 8, wherein the start condition is detected by monitoring at least one of the inputs.

10. The system of 1, wherein duration of the first time interval is preset or adjustable.

11. The system of 2, wherein duration of the second time interval is preset or adjustable.

12. The system of any one of claims 1 to 11, further comprising a manual disable switch.

13. The system of any one of claims 1 to 12, wherein the software instructions further instruct the computer to detect an unauthorized activation of the vehicle, and in response transition the switching apparatus to the open mode to disable the ignition system.

14. The system of any one of claims 1 to 13, further comprising a temperature sensor, wherein the software instructions further instruct the computer to receive a signal from the temperature sensor and transition the switching apparatus to the open mode to disable the ignition system if the signal is outside a predetermined window.

15. The system of any one of claims 1 to 14, further comprising a display unit connected to the computer for displaying status information of the system, the display unit mountable inside the vehicle.

16. The system of claim 15, wherein the display unit comprises at least one LED.

17. The system of claim 16, wherein the display unit comprises a first LED for indicating system status, a second LED for indicating the state of the engine shutdown timer, and a third LED for indicating the vehicle's cumulative idling status.

18. In combination, the system of any one claims 1 to 17 and a motor vehicle.

19. A vehicle shutoff system substantially as hereinbefore described with reference to or as shown in the accompanying drawings.

20. A method of monitoring a vehicle engine and shutting off the vehicle engine to prevent excessive idling substantially as hereinbefore described with reference to or as shown in the accompanying drawings.

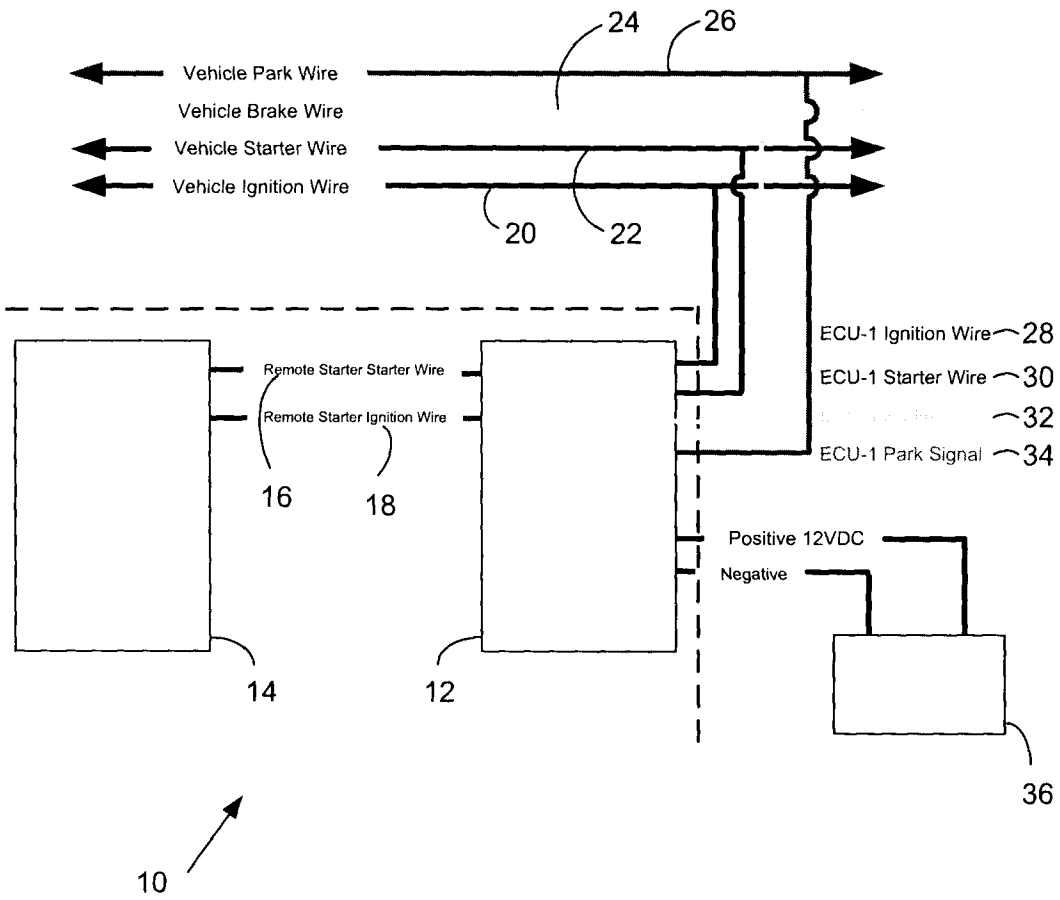
24
26
Vehicle Park Wire
Vehicle Brake Wire
Vehicle Starter Wire
Vehicle Ignition Wire
20
22
ECU-1 Ignition Wire
28
ECU-1 Starter Wire
30
32
ECU-1 Park Signal
34
Remote Starter Starter Wire
Remote Starter Ignition Wire
16
18
Positive 12VDC
Negative
14
12
36
10

FIG. 1

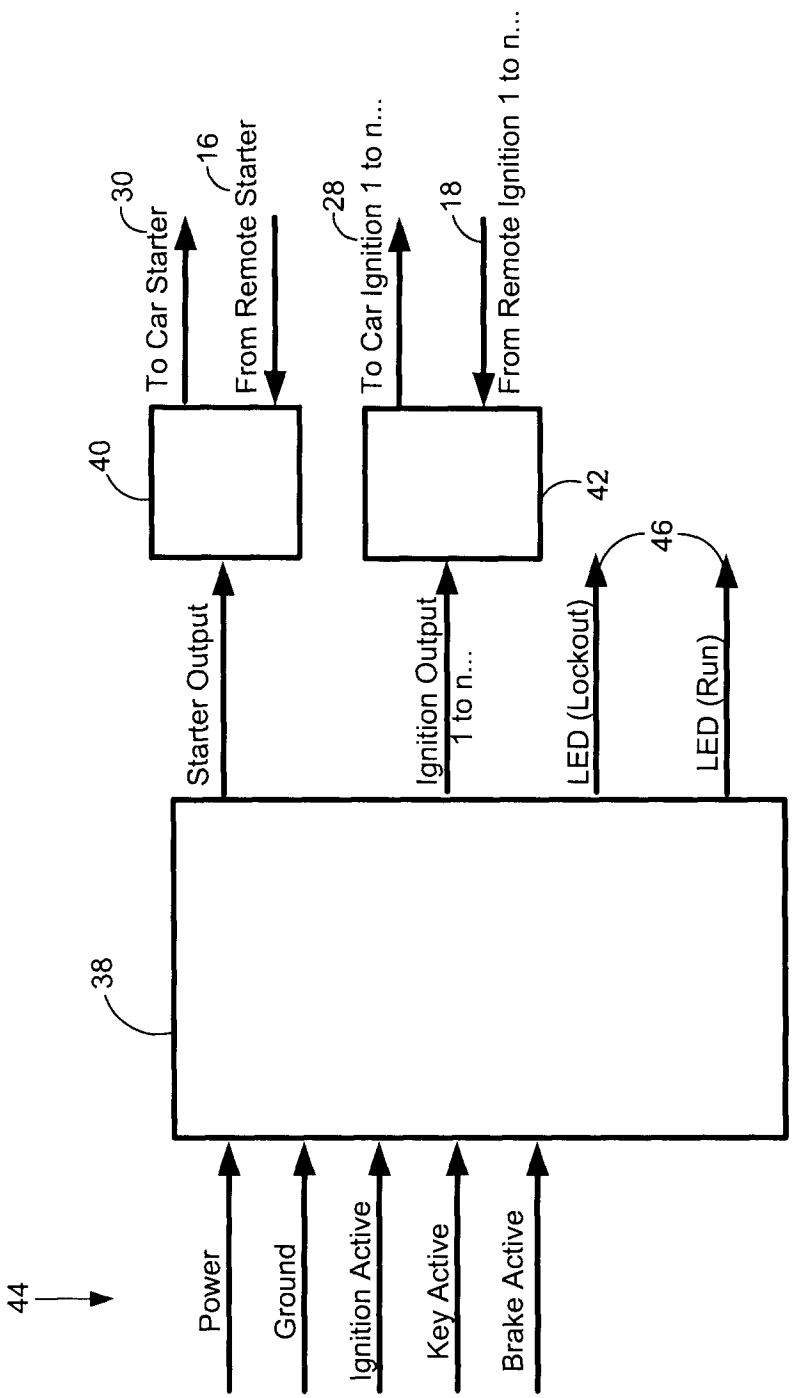
44
Power
Ground
Ignition Active
Key Active
Brake Active
38
Starter Output
Ignition Output 1 to n...
LED (Lockout)
LED (Run)
46
40
42
To Car Starter
30
From Remote Starter
16
To Car Ignition 1 to n...
28
From Remote Ignition 1 to n...
18

FIG. 2

3/8

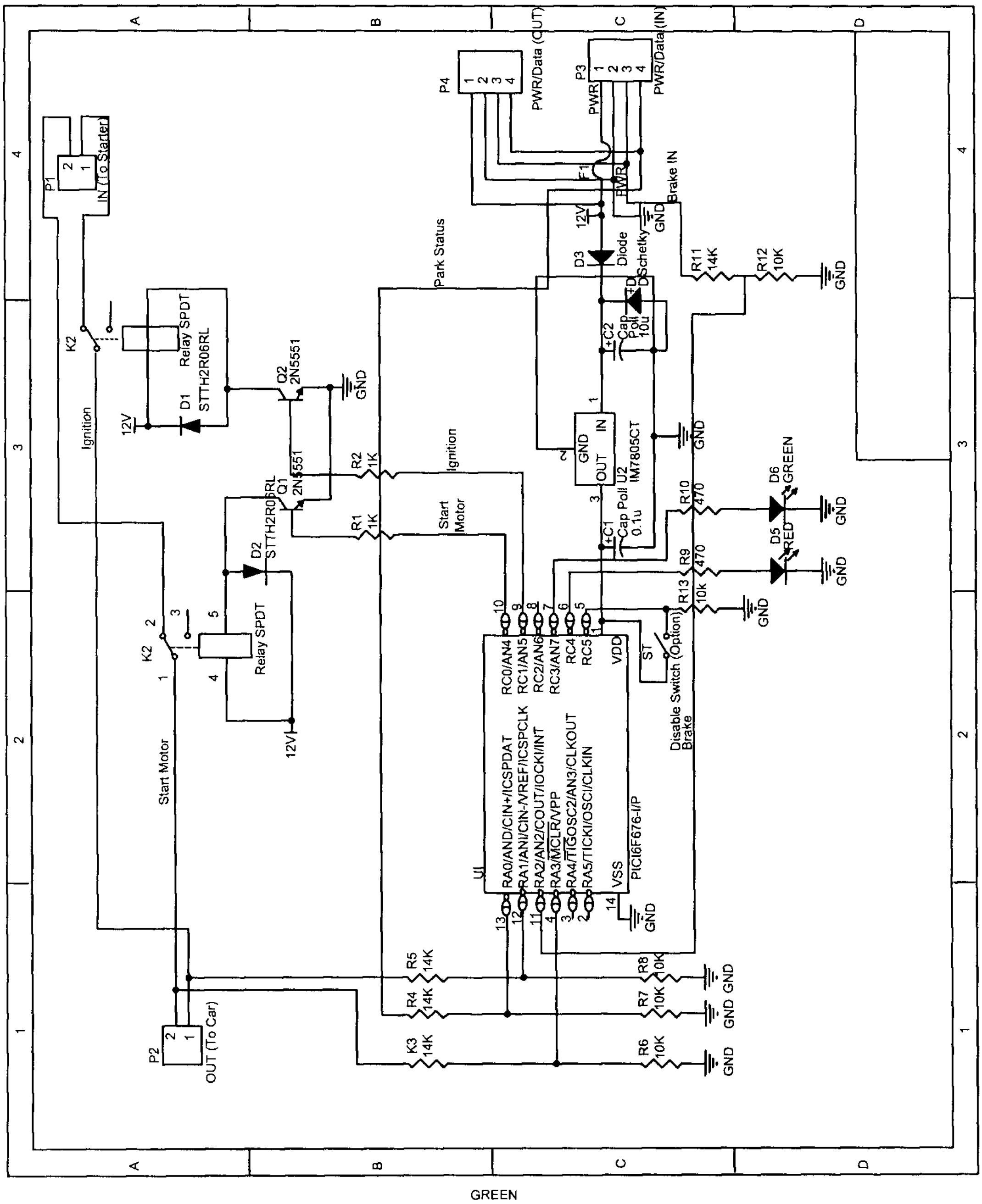
P1
IN (To Starter)
K2
Relay SPDT
D1
STTH2R06RL
12V
Ignition
Q2
2N5551
GND
Q1
2N5551
D2
STTH2R06RL
R2
1K
R1
1K
Start Motor
Park Status
P4
PWR/Data (OUT)
P3
PWR
PWR/Data (IN)
F1
PWR
Brake IN
D3
Diode
Schotky
C2
Cap Poll
10u
R11
14K
R12
10K
U2
IM7805CT
C1
Cap Poll
0.1u
R10
470
R9
470
D6
GREEN
D5
RED
R13
10k
Disable Switch (Option)
Brake
ST
U1
PIC16F676-I/P
P2
OUT (To Car)
K3
14K
R4
14K
R5
14K
R6
10K
R7
10K
R8
10K
GREEN

FIG. 3

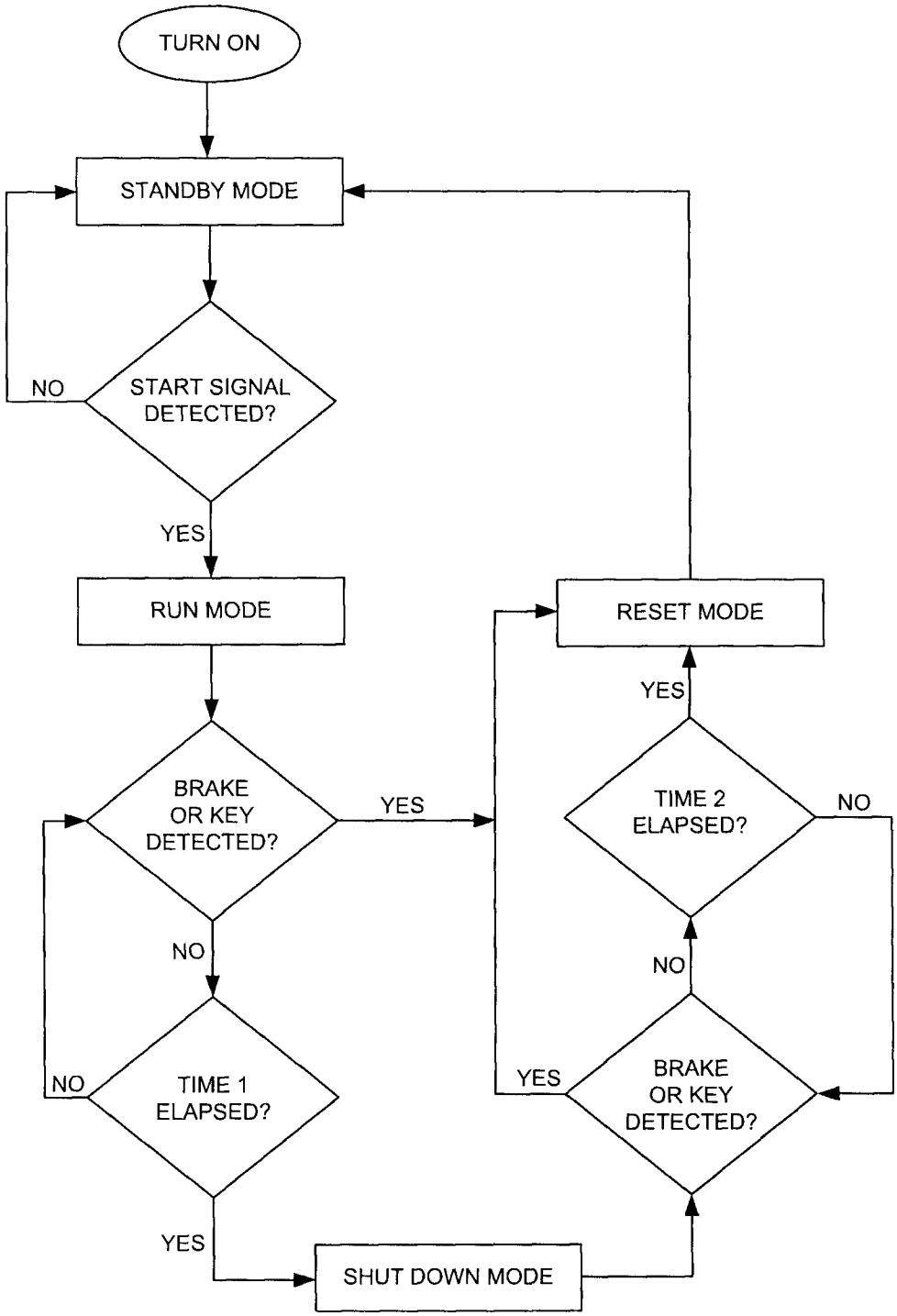
TURN ON
STANDBY MODE
NO
START SIGNAL DETECTED?
YES
RUN MODE
BRAKE OR KEY DETECTED?
YES
NO
NO
TIME 1 ELAPSED?
YES
SHUT DOWN MODE
RESET MODE
YES
TIME 2 ELAPSED?
NO
NO
YES
BRAKE OR KEY DETECTED?

FIG. 4

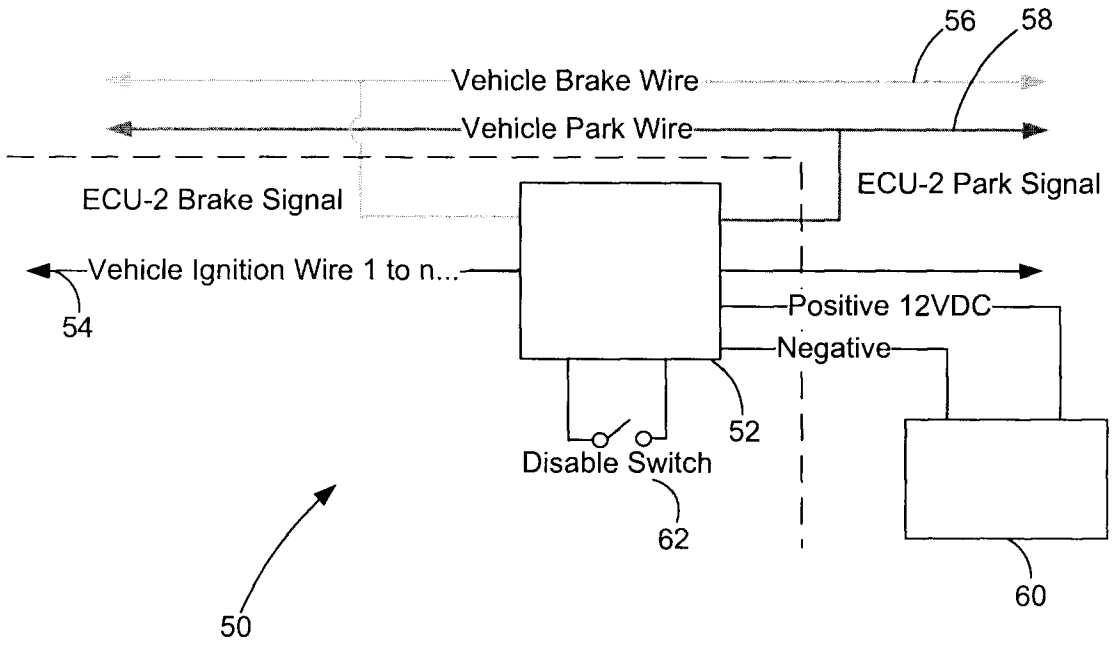
56
58
Vehicle Brake Wire
Vehicle Park Wire
ECU-2 Brake Signal
ECU-2 Park Signal
Vehicle Ignition Wire 1 to n...
54
Positive 12VDC
Negative
52
Disable Switch
62
60
50

FIG. 5

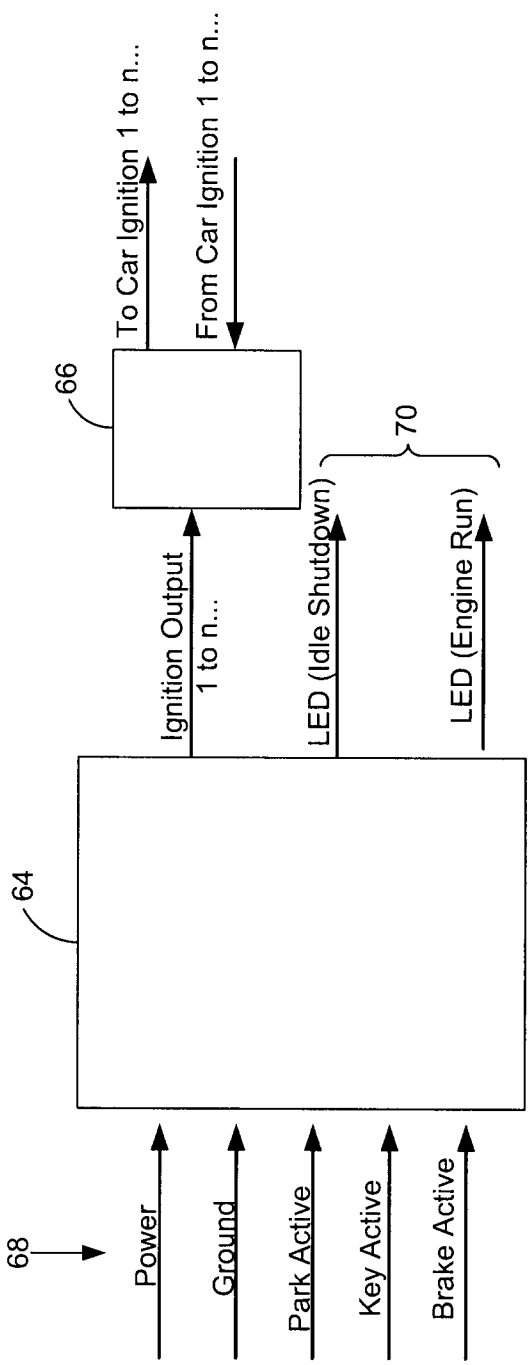
To Car Ignition 1 to n...
From Car Ignition 1 to n...
66
70
Ignition Output 1 to n...
LED (Idle Shutdown)
LED (Engine Run)
64
68
Power
Ground
Park Active
Key Active
Brake Active

FIG. 6

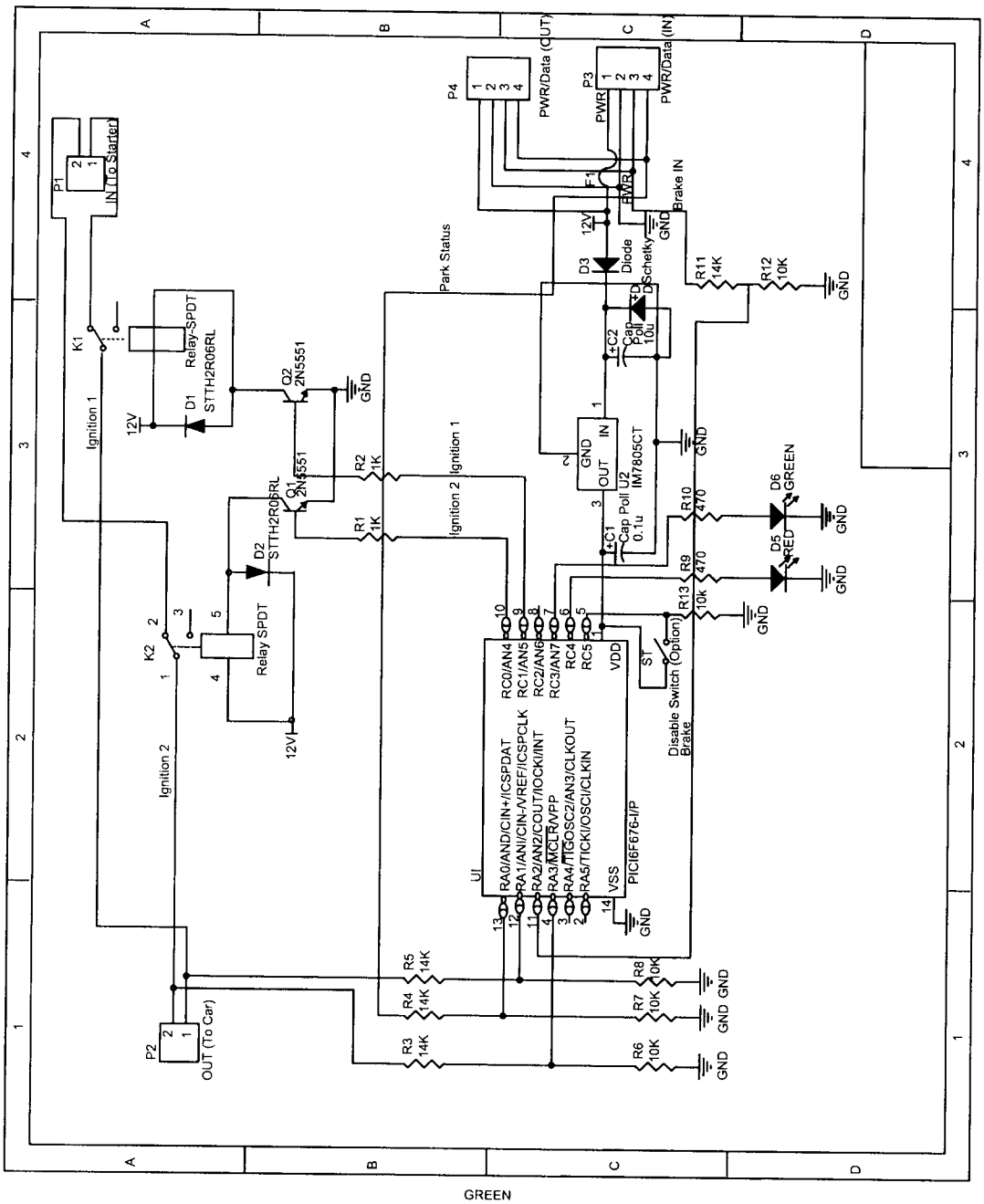
P1
IN (To Starter)
K1
Ignition 1
Relay-SPDT
STTH2R06RL
D1
12V
Q2
2N5551
GND
Q1
2N5551
R2
1K
R1
1K
Ignition 2
D2
STTH2R06RL
K2
Relay SPDT
12V
Ignition 2
P2
OUT (To Car)
R3
14K
R4
14K
R5
14K
P4
PWR/Data (OUT)
P3
PWR/Data (IN)
PWR
F1
PWR
Brake IN
12V
GND
D3
Diode Schottky
Park Status
R11
14K
R12
10K
GND
C2
Cap Poli
10u
U2
IM7805CT
GND
OUT
IN
C1
Cap Poli
0.1u
R10
470
D6
GREEN
GND
D5
RED
R9
470
GND
R13
10k
GND
ST
Disable Switch (Option)
Brake
U1
PIC16F676-I/P
RA0/AND/CIN+/ICSPDAT
RA1/ANI/CIN-/VREF/ICSPCLK
RA2/AN2/COUT/IOCKI/INT
RA3/MCLR/VPP
RA4/T1GOSC2/AN3/CLKOUT
RA5/T1CKI/OSCI/CLKIN
RC0/AN4
RC1/AN5
RC2/AN6
RC3/AN7
RC4
RC5
VDD
VSS
GND
R8
10K
R7
10K
R6
10K
GND
GND
GND
A
B
C
D
GREEN

FIG. 7

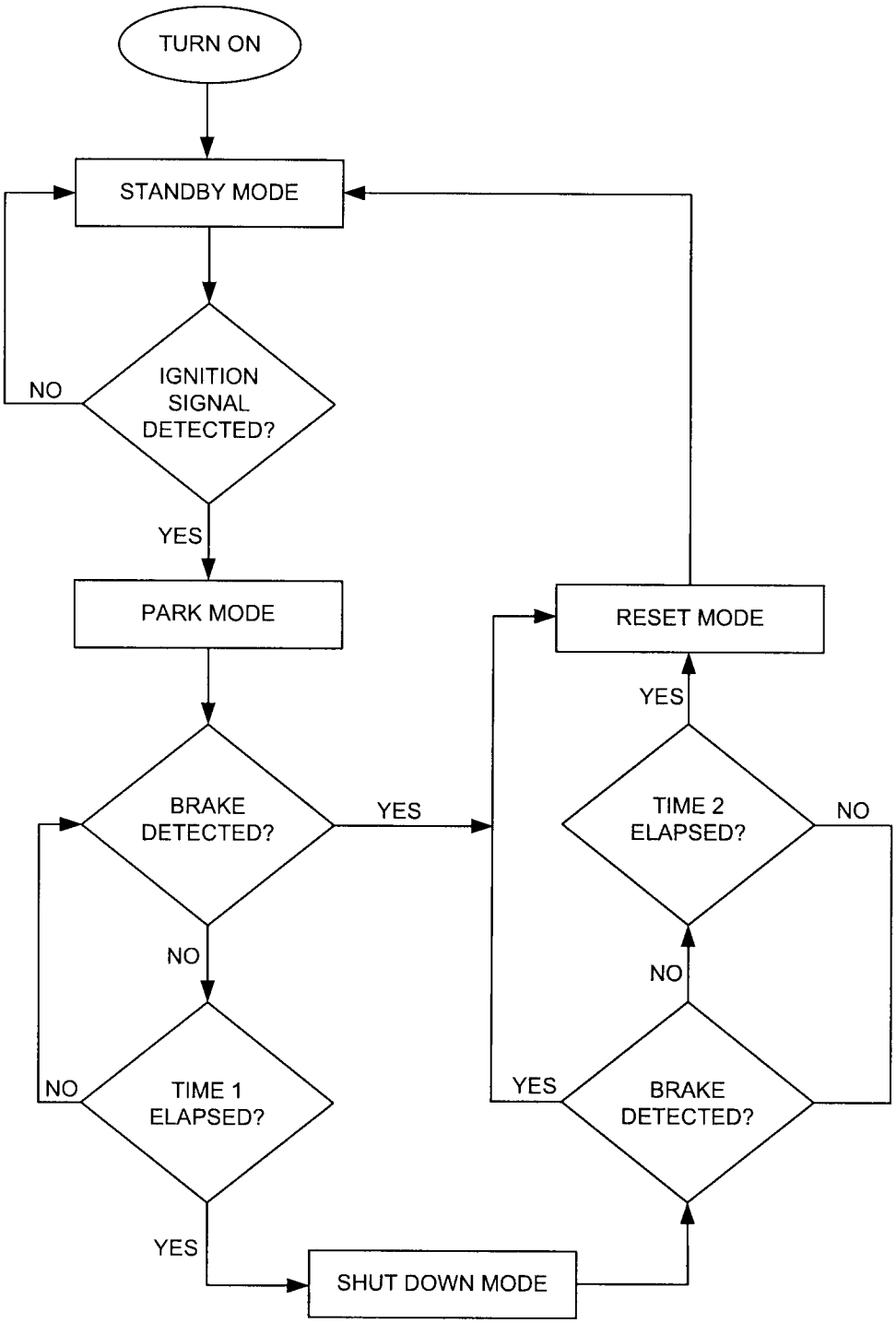
TURN ON
STANDBY MODE
IGNITION SIGNAL DETECTED?
NO
YES
PARK MODE
BRAKE DETECTED?
YES
NO
TIME 1 ELAPSED?
NO
YES
SHUT DOWN MODE
RESET MODE
YES
TIME 2 ELAPSED?
NO
NO
YES
BRAKE DETECTED?

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2009/000051

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***F02D 41/04*** (2006.01) , ***F02D 17/04*** (2006.01) , ***F02D 41/08*** (2006.01) , ***F02N 11/08*** (2006.01) , ***G05B 19/042*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC (2006.01) : ***F02D***, ***F02N***, ***G05B***

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

Databases searched: Delphion

Keywords: idle, idling, ignition, auto, vehicle, disable, shutoff, timer, interval, turn off, shutdown, computer, microcontroller, ECU

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7,091,629 (HAWKINS) 15 August 2006 (15-08-2006) column 5, line 44 - column 7, line 67 figures 3 and 4	1 - 20
Y	US 6,768,221 (KLINGER et al.) 27 July 2004 (27-07-2004) abstract column 1, line 15 - column 2, line 34 column 2, line 49 - column 4, line 59 figure 1	1 - 20
Y	US 6,060,981 (LANDES) 9 May 2000 (09-05-2000) column 12, line 40 - column 13, line 50 figures 3 and 4	13
A	US 6,595,180 (THOMPSON et al.) 22 July 2003 (22-07-2003) the entire document	1 - 20
A	US 7,310,576 (LETANG) 18 December 2007 (18-12-2007) the entire document	1 - 20

[ ] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 April 2009 (01-04-2009)	22 April 2009 (22-04-2009)

Name and mailing address of the ISA/CA	Authorized officer
Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Timothy Kotylak 819- 934-5150

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2009/000051

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US 6060981A	09-05-2000	None	
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		WO 0166922A1	13-09-2001
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		US 2007288154A1	13-12-2007