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- (72) **Inventor; and**
- (71) **Applicant : JABER, Alexander** [DE/DE]; Konigstrabe 28, 22767 Hamburge (DE).
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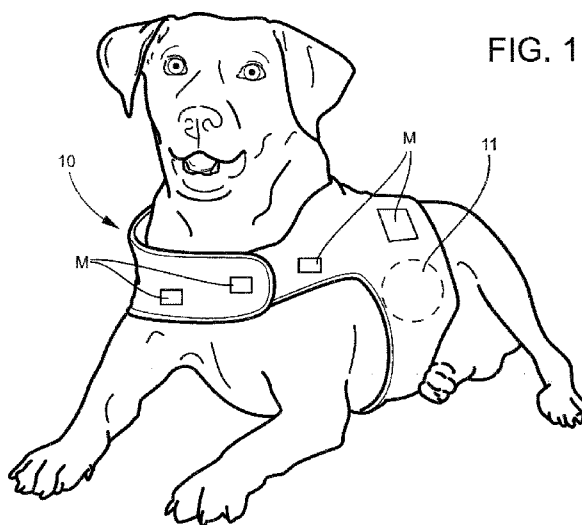
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- (54) **Title:** TACTICAL SURVEILLANCE AND MONITORING SYSTEM DESIGNED FOR BEING CARRIED BY AN ANIMAL



(57) **Abstract:** A tactical animal harness incorporates a tactical surveillance and monitoring system. The exemplary system comprising an electronic central communication base module, and a plurality of electronic peripheral surveillance modules operatively connected to the base module. The surveillance modules are adapted for collecting realtime surveillance data, and communicating the surveillance data to the base module. A wireless communications device transmits the surveillance data captured by the surveillance modules to the base module. An electronic storage medium is integrated with the base module for locally storing the surveillance data. A second wireless communications device transmits the surveillance data from the base module to a remote command center terminal.



TACTICAL SURVEILLANCE AND MONITORING SYSTEM DESIGNED FOR BEING CARRIED BY AN ANIMAL

Technical Field and Background of the Invention

[0001] This invention relates broadly and generally to a tactical surveillance and monitoring system designed for being carried by an animal.

[0002] Animals, especially dogs, are becoming an increasingly valuable asset across many industries. By studying the various tasks commonly assigned to service animals, typical working environments, and unique animal movements, the present invention offers a unique and powerful tactical surveillance and monitoring tool applicable for handling by a service dog (or other animal)—referred to herein as KSS. The exemplary KSS equips the dog with advanced sensors and surveillance capabilities, making the dog itself a valuable information center. The command center is able to gather detailed information about the animal's environment while also being able to closely monitor the animal's health and safety.

Summary of Exemplary Embodiments

[0003] Various exemplary embodiments of the present invention are described below. Use of the term "exemplary" means illustrative or by way of example only, and any reference herein to "the invention" is not intended to restrict or limit the invention to exact features or steps of any one or more of the exemplary embodiments disclosed in the present specification. References to "exemplary embodiment," "one embodiment," "an embodiment," "various embodiments," and the like, may indicate that the embodiment(s) of the invention so described may include a particular feature, structure, or characteristic,

but not every embodiment necessarily includes the particular feature, structure, or characteristic. Further, repeated use of the phrase "in one embodiment," or "in an exemplary embodiment," do not necessarily refer to the same embodiment, although they may.

[0004] It is also noted that terms like "preferably", "commonly", and "typically" are not utilized herein to limit the scope of the claimed invention or to imply that certain features are critical, essential, or even important to the structure or function of the claimed invention. Rather, these terms are merely intended to highlight alternative or additional features that may or may not be utilized in a particular embodiment of the present invention.

[0005] According to one exemplary embodiment, the present disclosure comprises a tactical animal harness incorporating a tactical surveillance and monitoring system. The exemplary system comprising an electronic central communication base module, and a plurality of electronic peripheral surveillance modules operatively connected to the base module. The surveillance modules are adapted for collecting realtime surveillance data, and communicating the surveillance data to the base module. Wireless communication means are provided for transmitting the surveillance data captured by the surveillance modules to the base module. An electronic storage medium is integrated with the base module for locally storing the surveillance data. Wireless communication means are provided for transmitting the surveillance data from the base module to a remote command center terminal.

[0006] The term "harness" refers broadly and generally herein to any restraint,

equipment, gear, collar, or the like adapted for being worn or carried by an animal.

[0007] The term “tactical” refers broadly and generally herein to any system, assembly, component, or device used either alone or in combination with other systems, assemblies, components, or devices for surveillance.

[0008] The term "surveillance" refers broadly and generally herein to any observing, analyzing, monitoring, communicating, or maintaining supervision.

[0009] The term “command center” or “remote command center” refers broadly and generally herein to any distant or remote terminal (e.g, computer workstation) separate from the hardware components of the KSS.

[0010] According to another exemplary embodiment, the central communication base module comprises a multi-axis sensor for measuring at least one of movement direction and acceleration.

[0011] According to another exemplary embodiment, the multi-axis sensor comprises an accelerometer.

[0012] According to another exemplary embodiment, the central communication base module further comprises a digital display.

[0013] According to another exemplary embodiment, the digital display comprises an OLED display.

[0014] According to another exemplary embodiment, the central communication base module further comprises a panic button adapted to wirelessly transmit an alert to the remote command center terminal.

[0015] According to another exemplary embodiment, the means for transmitting

surveillance data from the surveillance modules to the base module comprises at least one wireless communications card.

[0016] According to another exemplary embodiment, the wireless communications card comprises at least one of Bluetooth and Near Field Communication technology.

[0017] According to another exemplary embodiment, the means for transmitting surveillance data from the base module to the remote command center terminal comprises a wireless communications modem.

[0018] According to another exemplary embodiment, the wireless communications modem comprises WIFI wireless technology.

[0019] According to another exemplary embodiment, the means for transmitting surveillance data from the base module to the remote command center terminal comprises a wireless communications modem utilizing a mobile data communications service.

[0020] According to another exemplary embodiment, the wireless communications modem utilizes GSM communications protocol.

[0021] According to another exemplary embodiment, the peripheral surveillance module comprises a camera module.

[0022] According to another exemplary embodiment, the peripheral surveillance module comprises a vitality module.

[0023] According to another exemplary embodiment, the vitality module incorporates at least one of a body temperature sensor and heart rate sensor for measuring body temperature and/or heart rate of the animal.

[0024] According to another exemplary embodiment, the peripheral surveillance

module comprises an environment module.

[0025] According to another exemplary embodiment, the environment module incorporates at least one of a humidity sensor, temperature sensor, and atmospheric pressure sensor.

[0026] According to another exemplary embodiment, the peripheral surveillance module comprises a hazardous surroundings module.

[0027] According to another exemplary embodiment, the hazardous surroundings module incorporates a gas detection sensor.

[0028] According to another exemplary embodiment, the hazardous surroundings module further incorporates a radiation detection sensor.

Brief Description of the Drawings

[0029] Exemplary embodiments of the present invention will hereinafter be described in conjunction with the following drawing figures, wherein like numerals denote like elements, and wherein:

[0030] Figure 1 illustrates an exemplary animal harness incorporating a tactical surveillance and monitoring system (KSS) according to one embodiment of the present disclosure;

[0031] Figure 2 is a block diagram representing various hardware components of the exemplary KSS central communication base module (CCBM);

[0032] Figure 3 is a block diagram representing certain peripheral modules interconnected to the CCBM, and illustrating two-way wireless communication between the exemplary modules and CCBM, and remotely via WIFI and GSM/GPRS between the

CCBM and command base;

[0033] Figure 4 is a board diagram of the exemplary Camera Module sensor;

[0034] Figure 5 is a board diagram of the exemplary Vitality Module sensors;

[0035] Figure 6 is a board diagram of the exemplary Environmental Module sensors;

[0036] Figure 7 is a board diagram of the exemplary Hazardous Environment Module sensors;

[0037] Figure 8 is flow diagram illustrating data communication (message handling) from and between various components of the CCBM;

[0038] Figure 9 is a second flow diagram illustrating data communication (message handling) from and between various components of the CCBM;

[0039] Figure 10 is a flow diagram representing operation, features, and communication of GSM and GPS components of the CCBM;

[0040] Figure 11 is a flow diagram illustrating local time configuration for the exemplary KSS;

[0041] Figure 12 is a flow diagram representing operation of the KSS panic button, and its on and off states; and

[0042] Figure 13 is a further detailed flow diagram illustrating operation of the KSS panic button.

Description of Exemplary Embodiments and Best Mode

[0043] The present invention is described more fully hereinafter with reference to the accompanying drawings, in which one or more exemplary embodiments of the invention are shown. Like numbers used herein refer to like elements throughout. This

invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be operative, enabling, and complete. Accordingly, the particular arrangements disclosed are meant to be illustrative only and not limiting as to the scope of the invention, which is to be given the full breadth of the appended claims and any and all equivalents thereof. Moreover, many embodiments, such as adaptations, variations, modifications, and equivalent arrangements, will be implicitly disclosed by the embodiments described herein and fall within the scope of the present invention.

[0044] Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation. Unless otherwise expressly defined herein, such terms are intended to be given their broad ordinary and customary meaning not inconsistent with that applicable in the relevant industry and without restriction to any specific embodiment hereinafter described. As used herein, the article "a" is intended to include one or more items. Where only one item is intended, the term "one", "single", or similar language is used. When used herein to join a list of items, the term "or" denotes at least one of the items, but does not exclude a plurality of items of the list.

[0045] For exemplary methods or processes of the invention, the sequence and/or arrangement of steps described herein are illustrative and not restrictive. Accordingly, it should be understood that, although steps of various processes or methods may be shown and described as being in a sequence or temporal arrangement, the steps of any such processes or methods are not limited to being carried out in any particular sequence or

arrangement, absent an indication otherwise. Indeed, the steps in such processes or methods generally may be carried out in various different sequences and arrangements while still falling within the scope of the present invention.

[0046] Additionally, any references to advantages, benefits, unexpected results, or operability of the present invention are not intended as an affirmation that the invention has been previously reduced to practice or that any testing has been performed. Likewise, unless stated otherwise, use of verbs in the past tense (present perfect or preterit) is not intended to indicate or imply that the invention has been previously reduced to practice or that any testing has been performed.

1.0 OVERVIEW

[0047] Referring now specifically to the drawings, Figure 1 illustrates an exemplary animal garment (e.g., harness) 10 incorporating a tactical surveillance and monitoring system (or "KSS") according to one embodiment of the present disclosure. The exemplary KSS comprises a wearable customized surveillance and monitoring tool which wirelessly incorporates any number of different electronic surveillance modules designed to gather and disseminate information to and from the field in real time. The KSS comprises a lightweight and rugged central communication base module (CCBM) 11 serving as the foundation for the system. Additional user-selected peripheral modules "M" are wirelessly integrated into the system via NFC and Bluetooth technology to provide advanced environmental awareness, environmental readings, and two way data communication. Information can be both stored locally and communicated to a remote terminal (e.g., command center) over WIFI or mobile data.

[0048] The animal's CCBM 11 and other peripheral modules "M" of the KSS are lightweight, rugged, and compact, and designed for convenient carrying in K-9 harness pouches, belts, and other such gear. As discussed further below, exemplary features of the KSS include a base video display, camera and microphone, vitality sensors, accelerometer, toxic gas and natural gas sensors, pressure sensors, radiation detector, active and/or passive radio frequency identification (RFID) tags, positioning information, and panic button. The system components use NFC and Bluetooth technology to communicate with each other and the CCBM 11, and data readings can be stored both locally and communicated to the remote command center over WIFI or mobile data. Local storage enables the CCBM 11 to continue gathering and saving information in the event the CCBM 11 and/or one or more peripheral modules go offline.

2.0 KSS CENTRAL COMMUNICATION BASE MODULE (CCBM) 11

[0049] The CCBM 11 is the foundation of the KSS and features a protective IP67 housing and a visual display. This module functions as a central hub by integrating network, location, communication, display and sensor modules. The exemplary CCBM 11 has a panic alert button, which immediately sends vital information to the remote command center, and features a cancellation window to minimize false alarms or accidental triggers. The visual display expands communication capabilities and provides system status information with features such as basic two-way messaging and sensor and battery indicators. An accelerometer detects changes in the animal's orientation or directional heading, pace, sudden changes in movement, free falls, intense vibrations or shocks. The CCBM 11 also features an extensive communication package, which incorporates both

outdoor GPS and indoor IPS location tracking systems. Tracking information is further enhanced when detailed maps and building schematics are uploaded to the remote command center. An RFID tag can be used to identify the animal (KSS handler), store useful information, and track the animal at checkpoints and through rounds. This can improve personnel efficiency, and help monitor the animal's mobility.

[0050] Exemplary hardware components of the CCBM 11 are represented in the diagram of Figure 2. The CCBM features a battery 21, GSM/GPRS modem 22, OLED display 23, CPU 24, Bluetooth and WIFI cards 25, 26, and three-axis sensor 27. The battery 21 operatively connects to internal regulation and booster components 28, 29, and serves to supply power to all electronics of the CCBM 11. The exemplary battery comprises a 3.7V lithium ion polymer battery (2400mAh or higher), such as that designed by SAMSUNG for mobile applications. The GSM/GPRS component enables wireless two-way communication for sending and receiving data, and operatively connects to GSM and GPS antennas 31, 32. The GSM/GPRS 22 may also feature a Micro SIM card 33 for data storage.

[0051] The OLED display 23 comprises a single-chip driver, such as SSD1326, with controller for 16 gray scale levels. The OLED driver communicates with the CPU via I2C protocol. The exemplary CPU comprises a 32-bit microcontroller (PIC32MX795F512L) featuring 128Kb RAM, 80MHz, 100 pin, and 512Kb FLASH. The exemplary PCB design comprises a two layer board, 35 micron copper thickness on both sides, black lack, 0.2mm minimum copper width traces, and 1.55mm board thickness.

[0052] KSS components communicate with the CPU 24 wirelessly via microchip RN

42 Bluetooth card 25 (or ANT+ technology) and WIFI card 26. The Bluetooth card 25 uses UART protocol at a speed of 1+Mb/s. The exemplary WIFI card 26 comprises MRF24WG0MA microchip technology, and comprises an SPI interface, up to 40Mb/s, with sufficient speed for streaming compressed audio video information and sensor information. A 64 GB (or higher) MicroSD card 35 may connect to the CPU using SPI serial protocol to store KSS data.

[0053] The three-axis sensor 27 (e.g., MMA8452QT) communicates with the CPU 24 and functions to measure movement direction and acceleration. The exemplary sensor comprises a low-power, digital output 3-axis linear accelerometer with a I2C interface and embedded logic used to detect events and notify an external microprocessor over interrupt lines. Sensor functionality includes: 8-bit or 12-bit data which includes High-Pass Filtered data, 4 different over-sampling options for compromising between resolution and current consumption based on application requirements, additional low-noise mode that functions independently of the oversampling modes for higher resolution, Low Power and Auto-WAKE/SLEEP modes for conservation of current consumption, Single-/Double-pulse with directional information 1 channel, Motion detection with directional information or Freefall 1 channel, Transient detection based on a high-pass filter and settable threshold for detecting the change in acceleration above a threshold with directional information 1 channel, Portrait/Landscape detection with trip points fixed at 30° and 60° for smooth transitions between orientations.

[0054] In addition to the CCBM 11, the exemplary KSS may comprise other electronic modules including (but not limited to) a Camera Module 40, Video Monitor

Module 50, Environmental Module 60, Hazardous Environment Module 70, and Thermal Imaging Module (not shown). Each of these peripheral modules is discussed separately below. Sensor readings and data gathered by the various modules are stored both locally on the CCBM 11 and communicated directly to the remote command center (terminal). Local storage enables the KSS to continue gathering and saving information in the event one or more of the modules goes offline. Once the module goes back online, the readings and data are wirelessly sent automatically (via WIFI) to the remote command center where it can be accessed and stored. Bluetooth standards and near field communication (NFC) technology are utilized for convenient and reliable pairing of all sensors and modules.

3.0 KSS CAMERA MODULE 40

[0055] Referring to Figures 3 and 4, the exemplary KSS Camera Module 40 wirelessly connects to the CCBM 11, and comprises a small WIFI camera and microphone unit that can be clipped or affixed onto the animal's harness to provide eyes and ears to the remote command center (terminal). This module can offer full 1080p HD at 30 fps and 16x digital zoom. The Camera Module is specially designed for a snug fit on the animal with minimal picture shake through movement. The Camera Module communicates with the CCBM via Bluetooth, has a built-in microphone to relay sound to the remote command center, and has both day and night mode capabilities. The Camera Module may also feature an Omnivision CMOS sensor for video and photograph recording, CMOS sensor for video stream, compass sensor, and two-way WIFI stream to the CCBM and/or remote command center or other terminal(s). The added features of sight and sound provide the remote command center with more insight into the animal's surroundings in real time.

[0056] Camera Module hardware is represented in Figure 4. The hardware shown includes a battery 41, voltage converters 42, CMOS video sensor 43, a first CPU 44, a second CPU 45, WIFI card 46, microphone 47, and preamplifier 48. The exemplary battery comprises a 3.7V, 3000 mAh, lithium ion polymer battery. The CMOS video sensor comprises an Omnivision OVM7690—capture VGA sensor with 7-bit digital output. The first CPU comprises a 32 BIT CPU (PI32MX795F512) including CMOS sensor capture with 2 DMA channels. The second CPU comprises a 32 BIT CPU (PIC32MZ or ARM9) featuring h.264/h.265 encoder with 2 DMA channels and WiFi communication. The WIFI card comprises a MRF24WG0MA microchip WIFI module with SPI. The microphone is an ultra-compact, low-power, omnidirectional, digital MEMS microphone (MP34DT01) built with a capacitive-sensing element and an IC interface.

[0057] Alternatively, or in addition, the exemplary KSS may comprise an ultra-low-power intelligent audio and video, LX5x series WIFI camera module. This module is a fully compliant with IEEE802.11b/g/n wireless protocol. The exemplary module integrates audio-video image capturing, compression coding, and transmission. The module is an efficient hard-coded, strong WIFI communicating module, ensuring clarity and fluency of video, as well as precise audio and video playback and display by any intelligent terminal such as Android, iPhone, PC and other devices. It provides several function expansion interfaces, such as GPIO, PWM, ADC, SDIO, USB, UART, and others.

4.0 VIDEO MONITOR MODULE 50

[0058] Referring to Figures 3 and 5, the exemplary KSS incorporates a Video Monitor Module 50 wirelessly connects to the CCBM 11, and incorporates a battery 51,

voltage regulator 52, WIFI module 53, and video monitor 54. The module 50 may comprise an 8" industrial embedded touch PC, CPU Samsung s3c 6410 (Model No. W859) featuring the following specifications: 667MHz, Memory DDRII SDRAM 256MB(MAX to 512MB), Nand Flash 2GB(MAX to 4GB), LCD Screen Resolution: 800X480, DOT pitch: 0.0642(W) × 0.1790(H) mm, brightness: 450 CD/m², contrast: 500:1, view angle: 70/70 (L/R) 50/70(U/D), operation system WINDOW CE 6.0, Mini USB Input USB Device 2.0 input for PC, Memory Card Insert SD Card Insert, Max to 32G, WIFI RT2870 Wireless Adaptor, support IEEE802.11b/g(Standard) IEEE802.11g (6M/S), Bluetooth V2.0, 2.4GHz for Data Transmission, Li-Battery 7.4V 2500mAh; Working Hour: 4 hours, Interface: Mini USB 2.0(OTG)1, USB Host 1.12, LAN Port RJ451, RS2322, Support Visual Basic, EVC, Visual Studio, net frameworking 3.5, support keyboard, mouse and U disk, Support RS232, TTL Input Voltage: 9V-24V, Max Consumption: 8 W, Working Temperature: 0° C~ 50° C 0~85% RH, Storage Temperature: -10° C~ 60° C 0~75% RH, Unit Size: 195Lx120Wx30H(mm), and Unit Weight: 560g.

5.0 KSS ENVIRONMENTAL MODULE 60

[0059] Referring to Figures 3 and 6, the Environmental Sensor Module 60 wirelessly connects to the CCBM 11, and contains sensors that provide the CCBM and command center with real time readings on environmental conditions. While K-9s have several heightened senses, detection alone has its limitations. The added detection and communication capabilities of the Environmental Sensors Module provides current environmental readings to the CCBM and the command center, from which nearby personnel can be alerted of unsafe readings, quickly removing people and animals from

danger.

[0060] An air quality sensor provides continuous readings on often-undetectable dangers such as carbon monoxide and oxygen levels. A temperature sensor included in the module records ambient temperature, and a pressure sensor measures atmospheric pressure which can be used to detect sudden weather changes and air pressure changes that result from blasts and explosions. All readings by the environmental sensors are transmitted to the CCBM via Bluetooth (or ANT+ wireless device) and to the remote command center via WIFI when the sensors detect unsafe levels.

[0061] Environment Module hardware is represented in Figure 6. The hardware shown includes a battery 61 connected to voltage converters 62, Bluetooth card/module 63, humidity sensor 64, temperature sensor 65, pressure sensor 66, and CPU 67. The exemplary battery comprises a 3.7V, 300 mAh, lithium ion polymer battery (cell model PCF582124). The exemplary humidity sensor comprises a HIH 4030/4031 series integrated circuit humidity sensor by Honeywell. The exemplary temperature sensor comprises a precision integrated-circuit temperature sensor (LM60/LM60-Q1) that can sense a -40°C to $+125^{\circ}\text{C}$ temperature range, while operating from a single +2.7V supply. The exemplary pressure sensor is designed to sense absolute air pressure in altimeter or barometer (BAP) applications. Freescale's BAP sensor integrates on-chip, bipolar op amp circuitry and thin film resistor networks to provide a high level analog output signal and temperature compensation. As previously described, the exemplary Bluetooth card may comprise a microchip RN 42 module (or ANT+ technology) which uses UART communication protocol at a speed of 1+Mb/s. The CPU may comprise a 32-bit CPU.

6.0 KSS HAZARDOUS SURROUNDINGS (ENVIRONMENT) MODULE 70

[0062] Referring to Figures 3 and 7, the exemplary KSS may also provide tools for detecting hazardous environmental materials, many of which are often undetectable by humans. The Hazardous Environment Module 70 wirelessly connects to the CCBM 11, and equips the animal with gas sensors that will alert the CCBM and command center to the presence of propane, butane, methane, and natural gas readings at unsafe levels.

[0063] The module may also comprise a radiation sensor to monitor radiation levels in areas of known exposure, as well as in a precautionary capacity to alert the CCBM and command center to the presence of harmful radiation levels. The potential for harmful radiation exposure is a devastating byproduct of damage to nuclear energy facilities and uncertain radiation distribution channels from known areas of concentration.

[0064] The combined capabilities of the Hazardous Environment Module 70 can also be a valuable tool for first responders and medical personnel engaged in disaster relief by removing uncertainty as to the safety of their environment and allowing them to focus on providing aid to others. All module readings are communicated via Bluetooth (or ANT+ technology) to the CCBM for local storage and wirelessly via WIFI to the command center.

[0065] Hazardous Environment Module hardware is represented in Figure 7. The hardware shown includes a battery 71 connected to voltage converters 72, Bluetooth card/module 73, monoxide gas sensor 74, butane/propane gas sensor 75, radiation sensor 76, and CPU 77. The exemplary battery comprises a 3.7V, 300 mAh, lithium ion polymer battery (cell model PCF582124). The monoxide gas sensor may comprise an MQ-7

sensor, while the butane /propane sensor may comprise an MQ-6 gas sensor. The radiation sensor (e.g., RD2014) is based on an array of customized PIN diodes, and comprises an integrated pulse discriminator with a temperature compensated threshold level. The RD2014 sensor is capable of detecting beta radiation (electrons), gamma radiation (photons) and X-rays. The exemplary Bluetooth card may comprise a microchip RN 42 module (or ANT+ technology) which uses UART communication protocol at a speed of 1+Mb/s. The CPU may comprise a 32-bit CPU

[0066] In addition to the above, the exemplary KSS may incorporate other peripheral modules (not shown), such as a thermal imager camera (TIC). The TIC takes readings of infrared radiation and produces a visible light display on the CCBM or directly to the remote command center. Using the TIC, images can be detected through smoke, heat-permeable barriers, and in darkness. Heat signatures can also be used to identify animals, people and objects. The added benefits of the TIC span applications such as faulty electrical connections, detecting wildlife, aiding first responder and rescue operations to locate trapped victims and pets, and can be used as a stealth detection tool in surveillance.

7.0 POWER SUPPLY

[0067] The exemplary KSS features an interchangeable battery design for cross-compatibility with the wirelessly connected modules. For the modules that naturally draw more power, the batteries are removable to facilitate on-the-go battery exchanging. The batteries are compact and lightweight so as to allow the user to carry extras, as needed. All external batteries are exchangeable and rechargeable, and have an average

battery life of 10 hours on a full charge. For more compact modules that have smaller power requirements, the batteries feature a fixed internal mount. Internal batteries are rechargeable and have an average battery life of 16 hours, depending on specific usage.

[0068] All batteries used in the KSS are rechargeable via an external battery charger with a single charging bay, or a multi-charging bay that can charge up to 5 batteries simultaneously. A single-bay vehicle charger may be used for charging on-the-go. KSS Modules with internal mount batteries may be charged wirelessly. For renewable energy recharging, single pack solar and kinetic chargers may also be used. Battery health and charging status can be monitored through each of the charging units.

8.0 KSS MESSAGE HANDLING

[0069] Figures 8 and 9 demonstrate exemplary processes for handling the communication of messages between the CCBM, wirelessly connected peripheral modules, and remote command center (terminal).

I – external manual interrupt source

A – external automatic interrupt source

9.0 GSM AND GPS COMMUNICATION

[0070] Figure 10 demonstrates process flow for GSM and GPS communication in the exemplary KSS.

10.0 REAL TIME CLOCK

[0071] KSS CCBM incorporates a real time clock for time-stamping all recorded activity and events, including sensor data transmitted by each of the modules and panic alerts. Figure 11 demonstrates one exemplary process for KSS local time configuration.

11.0 KSS PANIC BUTTON COMMUNICATION

[0072] Activation and operation of the panic button in the exemplary KSS, and resulting message communication is demonstrated in the flow diagrams of Figures 12 and 13.

[0073] For the purposes of describing and defining the present invention it is noted that the use of relative terms, such as "substantially", "generally", "approximately", and the like, are utilized herein to represent an inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. These terms are also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

[0074] For the purposes of describing and defining the present invention it is noted that the use of relative terms, such as "substantially", "generally", "approximately", and the like, are utilized herein to represent an inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. These terms are also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

[0075] Exemplary embodiments of the present invention are described above. No element, act, or instruction used in this description should be construed as important, necessary, critical, or essential to the invention unless explicitly described as such. Although only a few of the exemplary embodiments have been described in detail herein,

those skilled in the art will readily appreciate that many modifications are possible in these exemplary embodiments without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention as defined in the appended claims.

[0076] In the claims, any means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents, but also equivalent structures. Thus, although a nail and a screw may not be structural equivalents in that a nail employs a cylindrical surface to secure wooden parts together, whereas a screw employs a helical surface, in the environment of fastening wooden parts, a nail and a screw may be equivalent structures. Unless the exact language "means for" (performing a particular function or step) is recited in the claims, a construction under §112, 6th paragraph is not intended. Additionally, it is not intended that the scope of patent protection afforded the present invention be defined by reading into any claim a limitation found herein that does not explicitly appear in the claim itself.

What is Claimed:

1. A tactical animal harness incorporating a tactical surveillance and monitoring system, comprising:
 - an electronic central communication base module;
 - a plurality of electronic peripheral surveillance modules operatively connected to said base module, and adapted for collecting realtime surveillance data and communicating the surveillance data to said base module;
 - means for transmitting the surveillance data captured by said surveillance modules to said base module;
 - an electronic storage medium integrated with said base module for locally storing the surveillance data; and
 - means for transmitting the surveillance data from said base module to a remote command center terminal.
2. The tactical animal harness according to claim 1, wherein said central communication base module comprises a multi-axis sensor for measuring at least one of movement direction and acceleration.
3. The tactical animal harness according to claim 2, wherein said multi-axis sensor comprises an accelerometer.

4. The tactical animal harness according to claim 1, wherein said central communication base module further comprises a digital display.
5. The tactical animal harness according to claim 4, wherein said digital display comprises an OLED display.
6. The tactical animal harness according to claim 1, wherein said central communication base module further comprises a panic button adapted to wirelessly transmit an alert to the remote command center terminal.
7. The tactical animal harness according to claim 1, wherein said means for transmitting surveillance data from said surveillance modules to said base module comprises at least one wireless communications card.
8. The tactical animal harness according to claim 7, wherein said wireless communications card comprises at least one of Bluetooth and Near Field Communication technology.

9. The tactical animal harness according to claim 1, wherein said means for transmitting surveillance data from said base module to the remote command center terminal comprises a wireless communications modem.
10. The tactical animal harness according to claim 9, wherein said modem comprises WIFI wireless technology.
11. The tactical animal harness according to claim 1, wherein said means for transmitting surveillance data from said base module to the remote command center terminal comprises a wireless communications modem utilizing a mobile data communications service.
12. The tactical animal harness according to claim 11, wherein said wireless communications modem utilizes GSM communications protocol.
13. The tactical animal harness according to claim 1, wherein said peripheral surveillance module comprises a camera module.

14. The tactical animal harness according to claim 1, wherein said peripheral surveillance module comprises an environment module.

15. The tactical animal harness according to claim 14, wherein said environment module incorporates at least one of a humidity sensor, temperature sensor, and atmospheric pressure sensor.

16. The tactical animal harness according to claim 1, wherein said peripheral surveillance module comprises a hazardous surroundings module.

17. The tactical animal harness according to claim 16, wherein said hazardous surroundings module incorporates a gas detection sensor.

18. The tactical animal harness according to claim 17, wherein said hazardous surroundings module further incorporates a radiation detection sensor.

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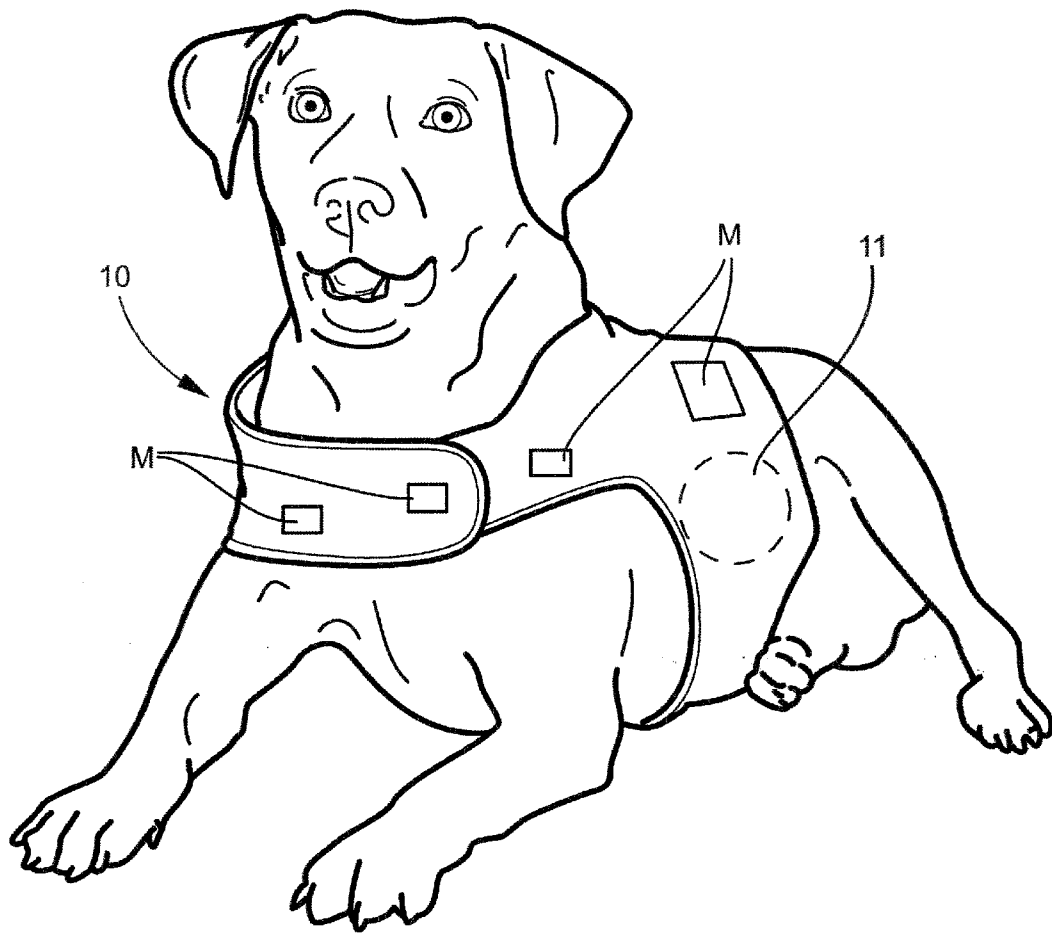
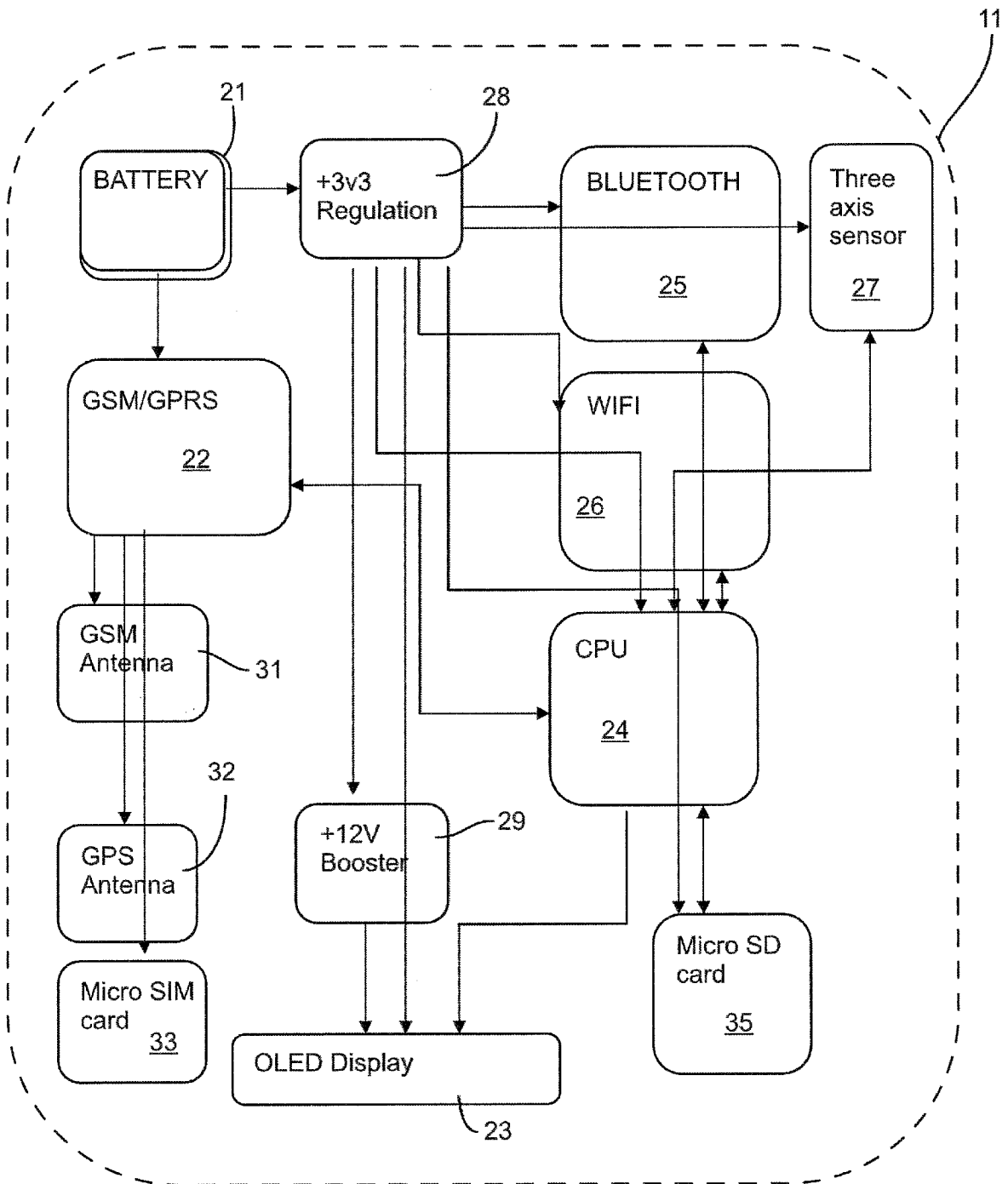


FIG. 1

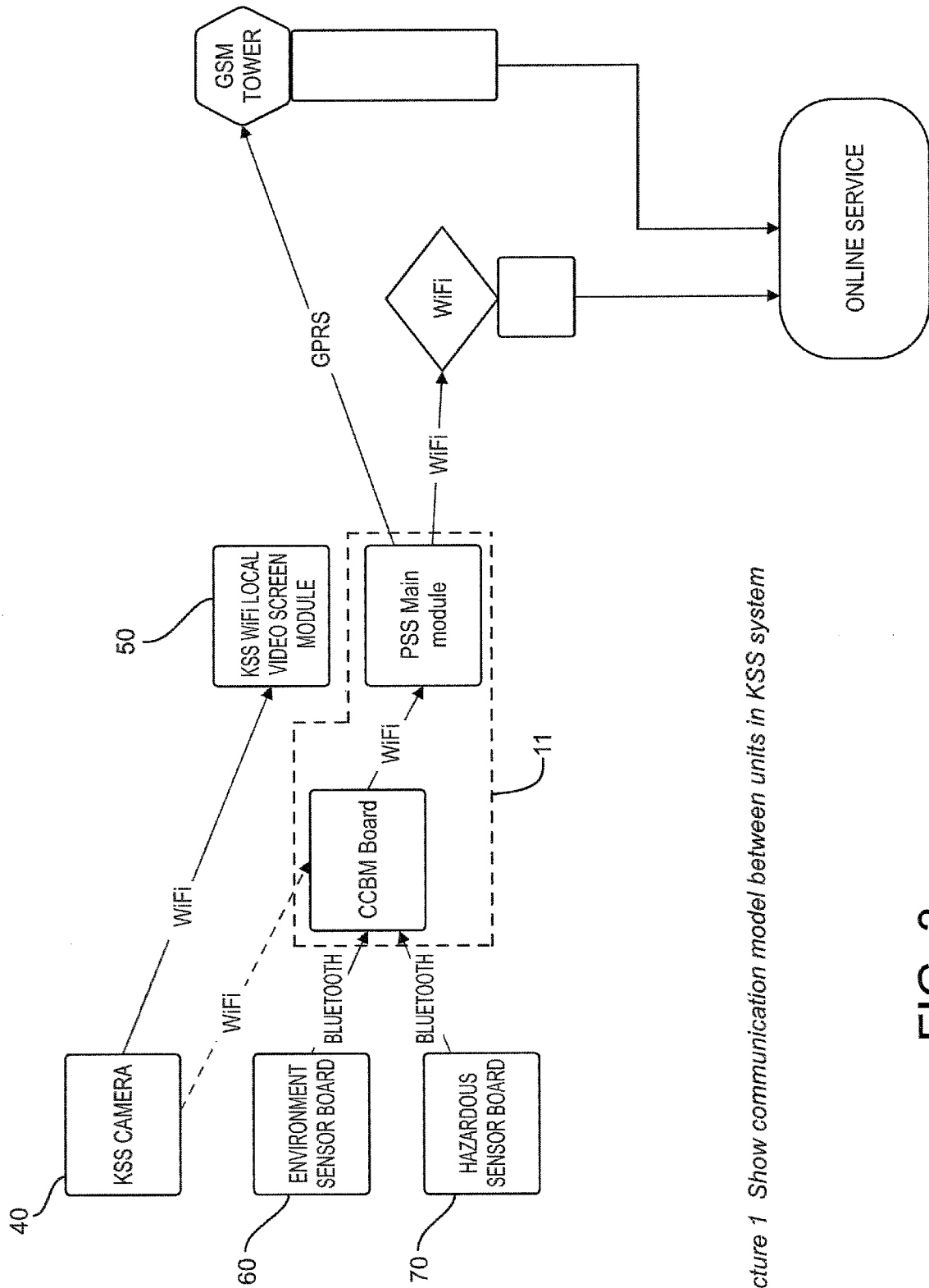
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Picture 3.1. Shows internal block diagram of CCBM and interconnections between modules

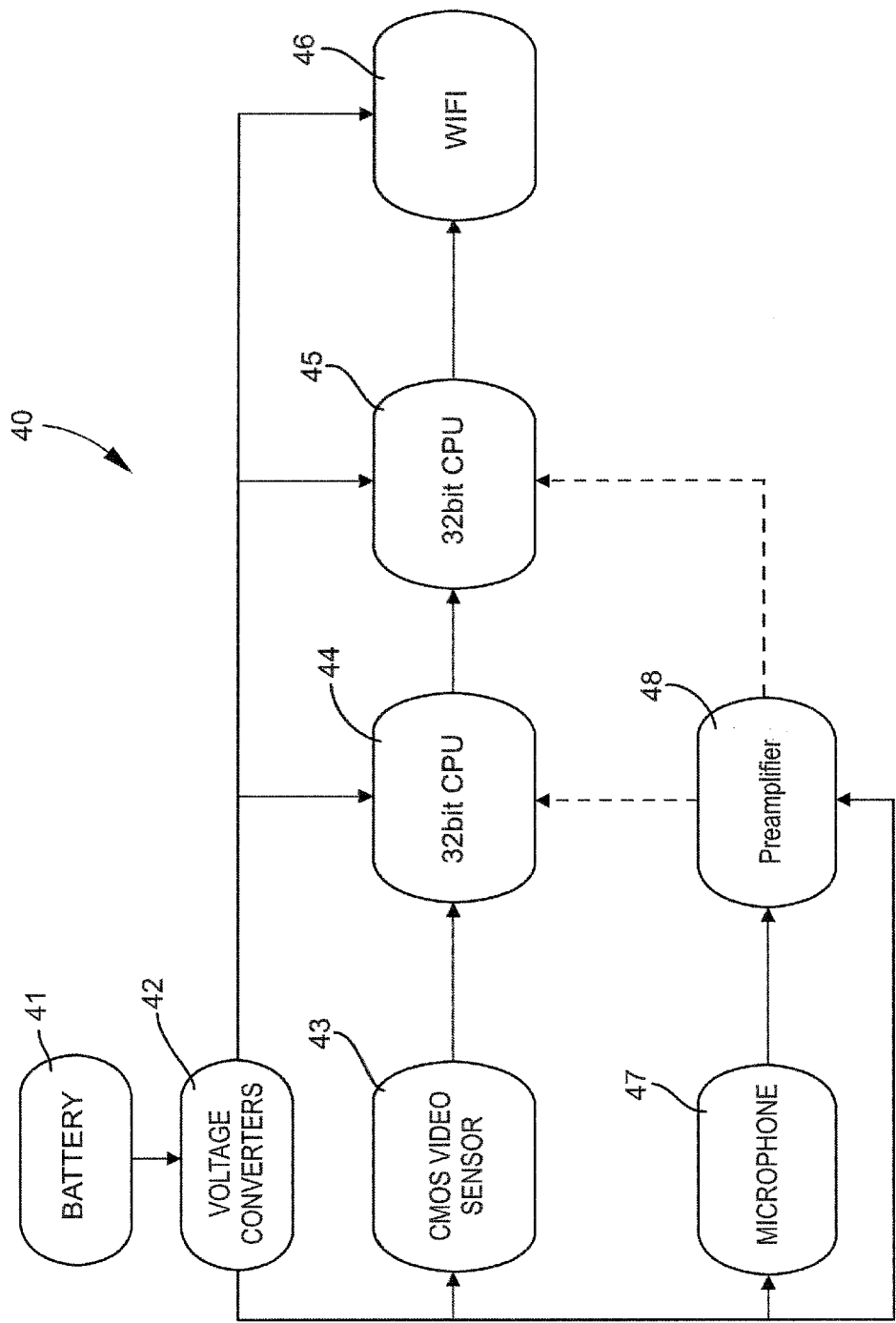
FIG. 2

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Picture 1 Show communication model between units in KSS system

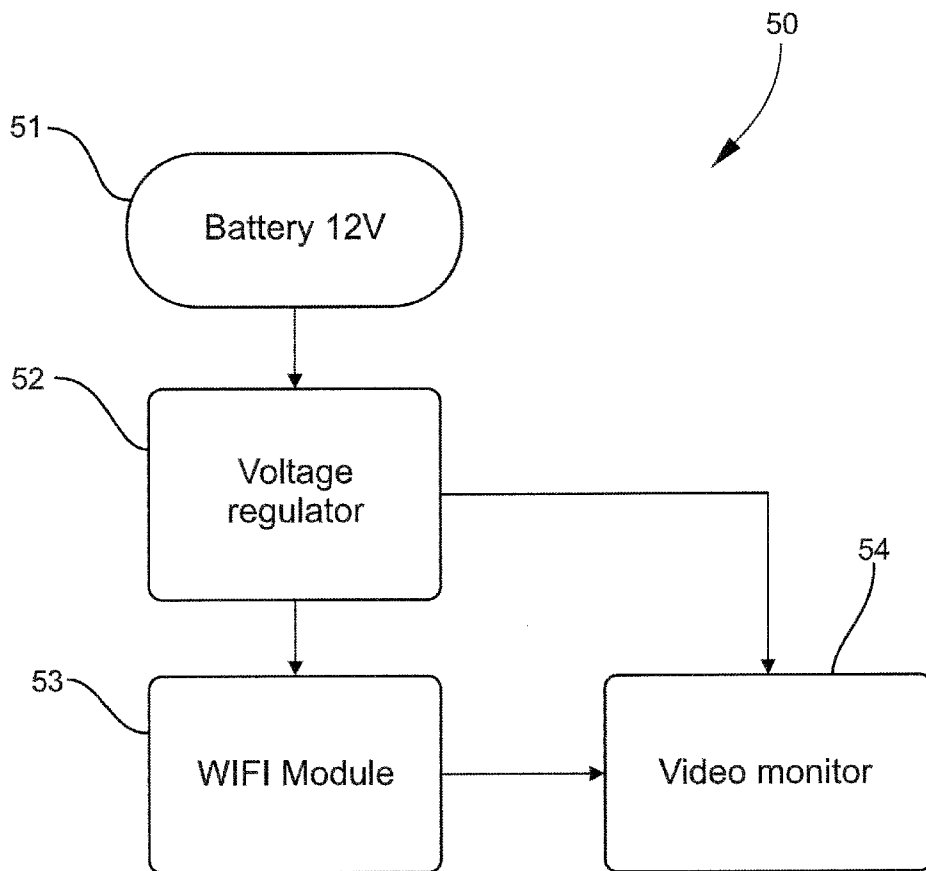
FIG. 3



Picture 6.1. Camera sensor model board diagram

FIG. 4

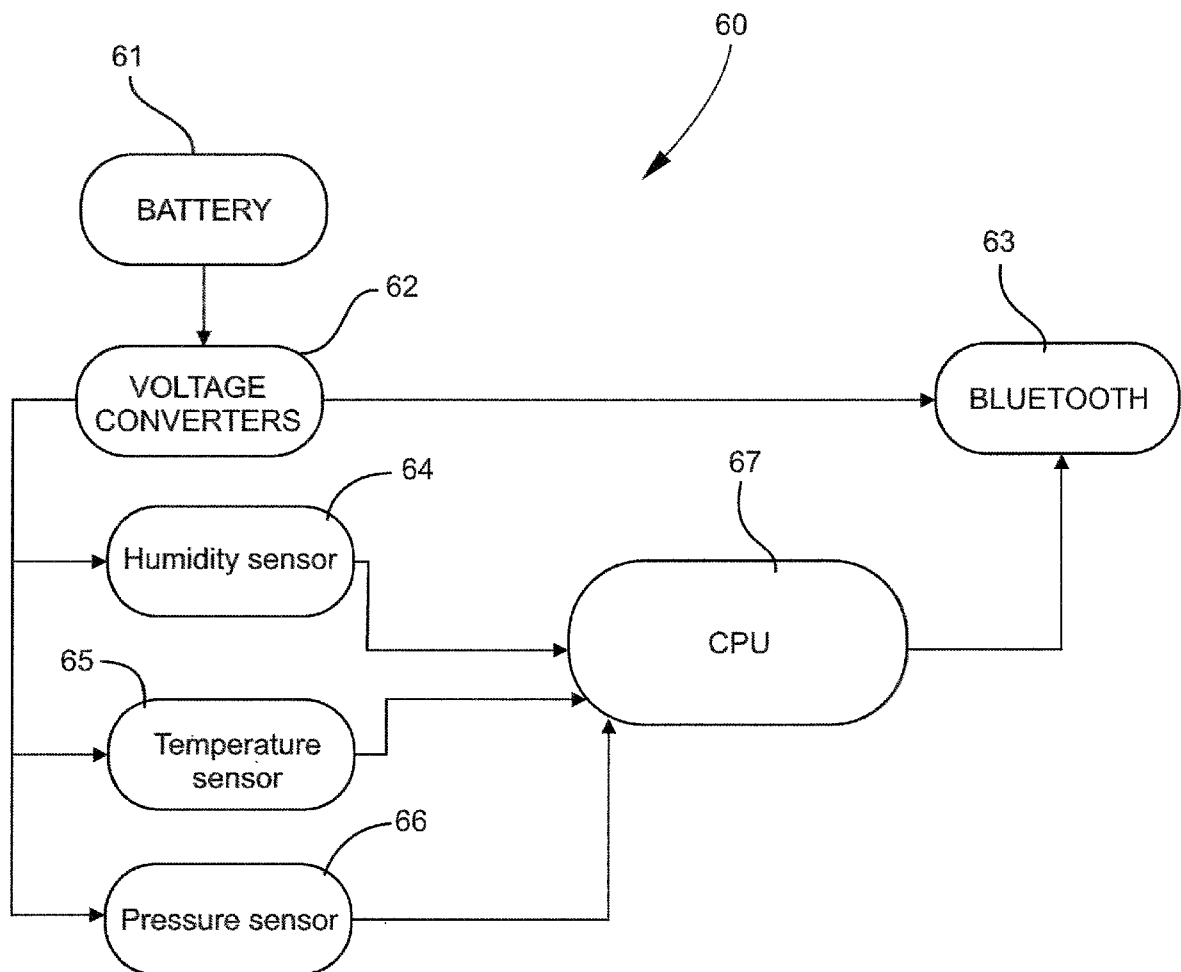
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Picture 4 Video monitor model

FIG. 5

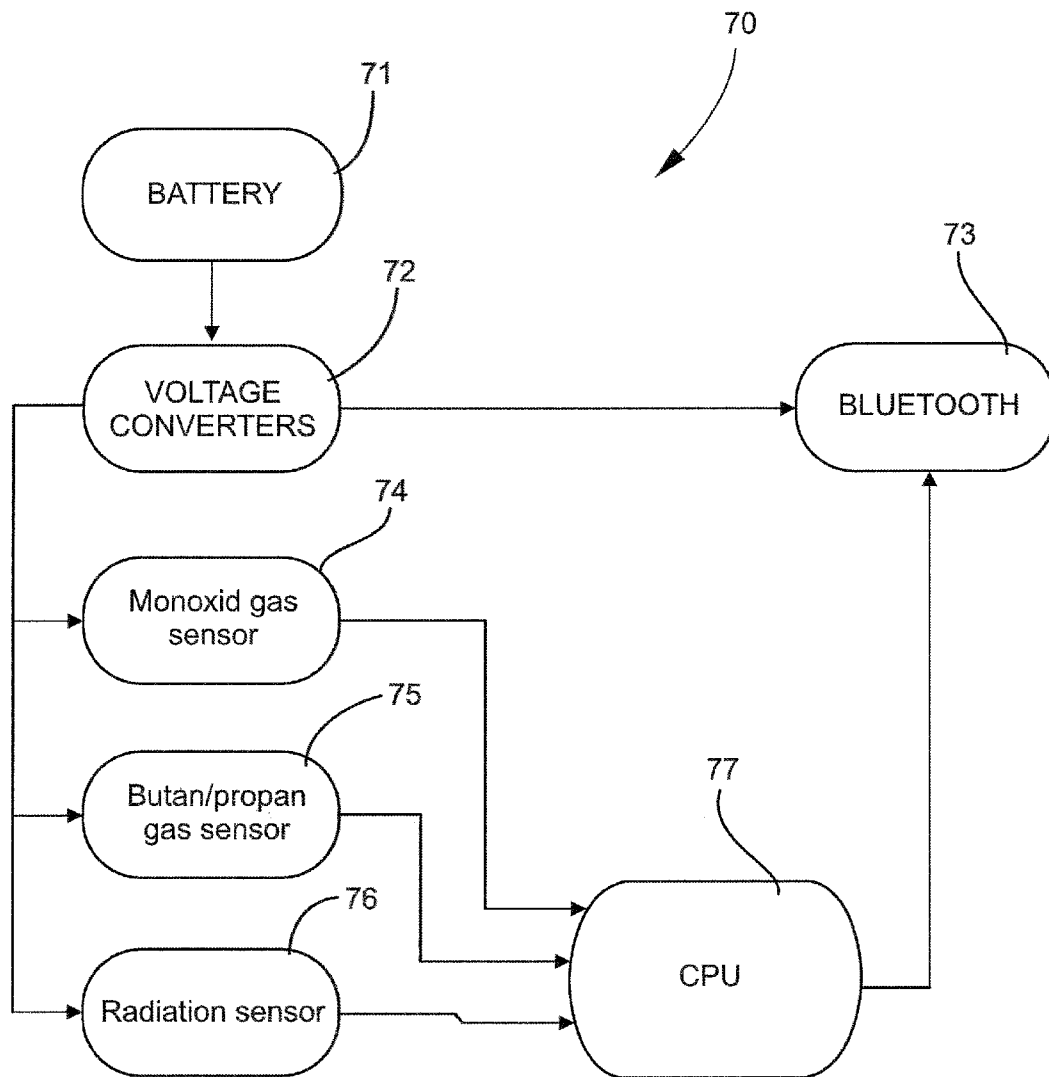
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Picture 2 Environment sensor board

FIG. 6

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*Picture 2 Hazardous sensor board***FIG. 7**

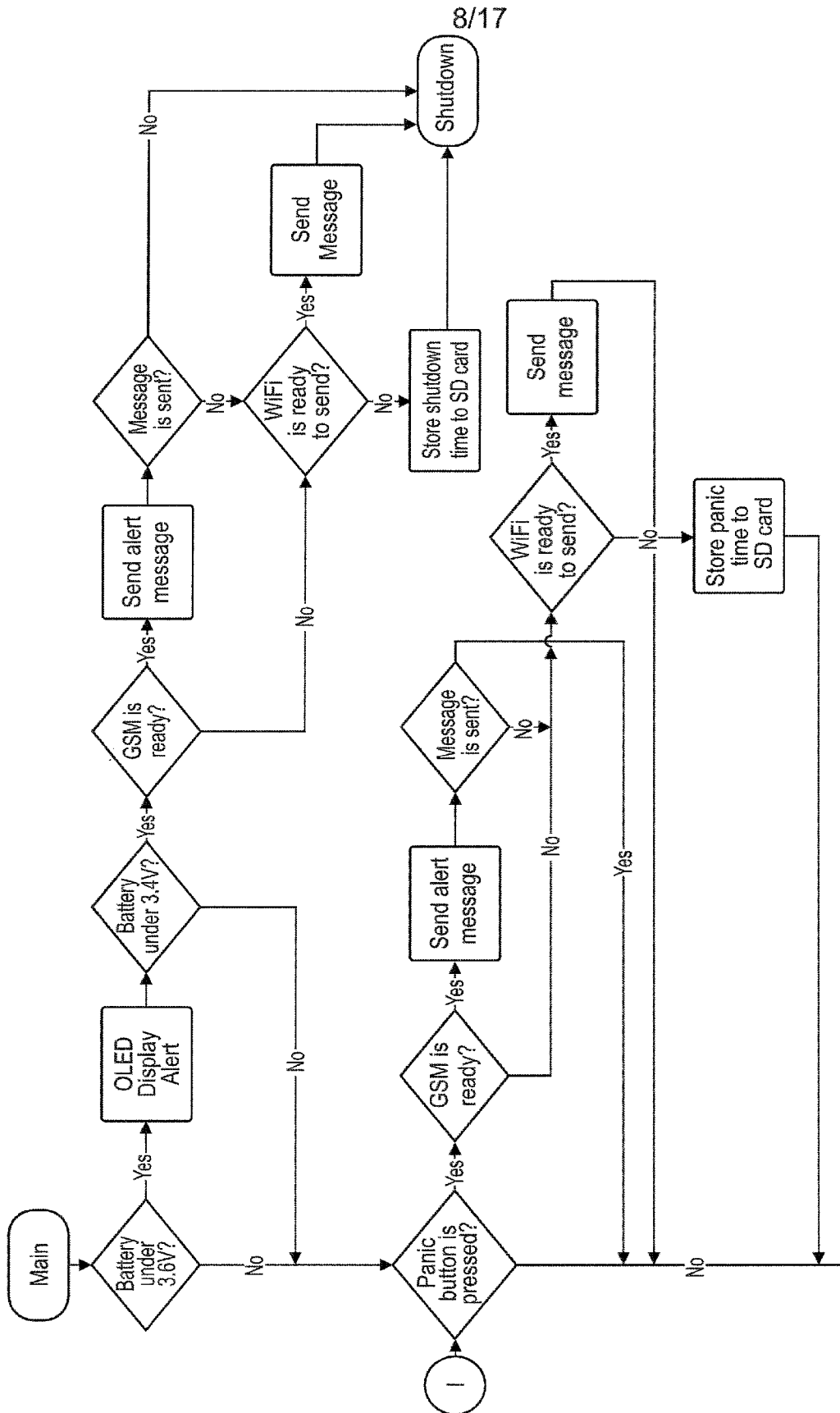
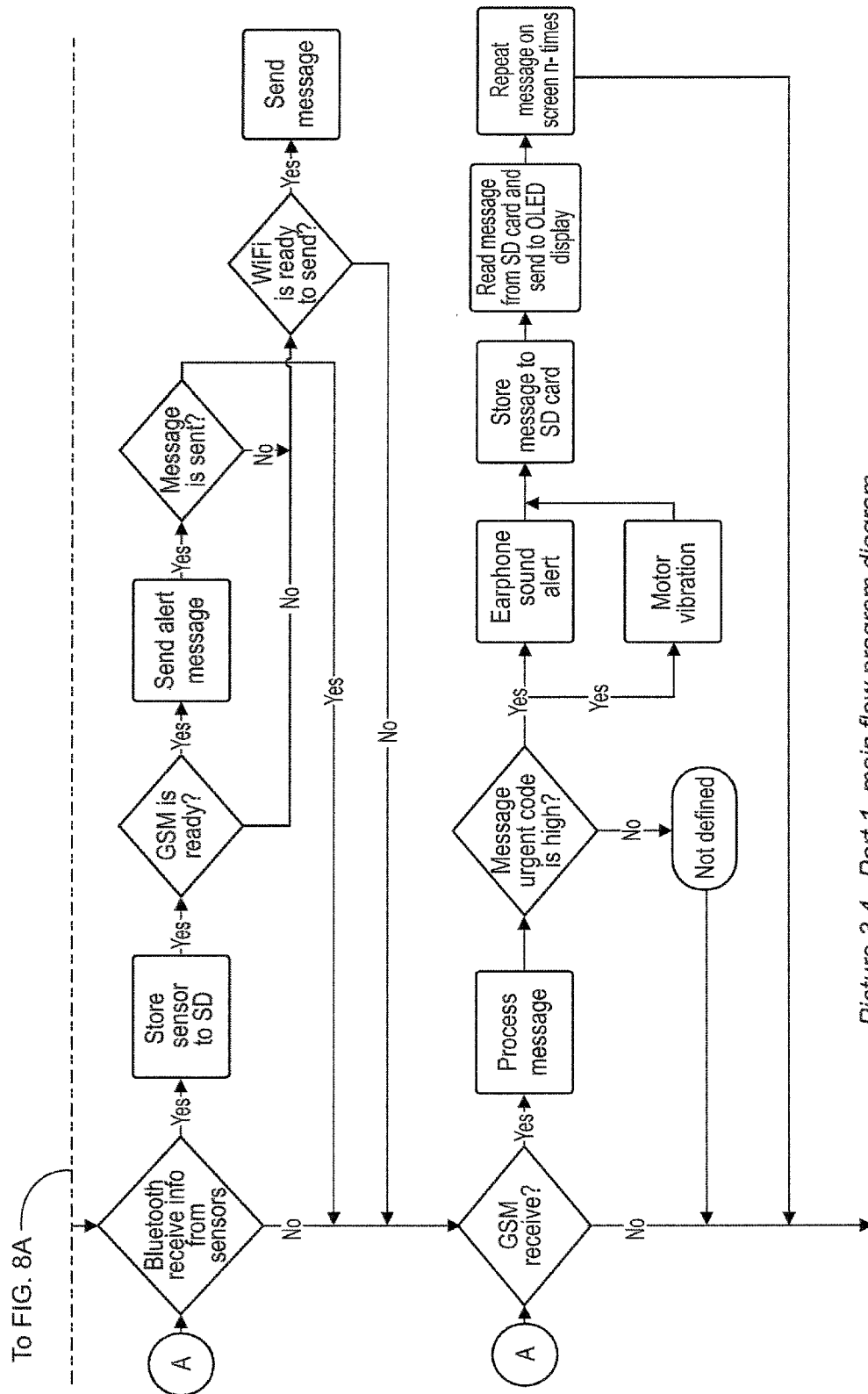


FIG. 8A

Picture 3.4. Part 1, main flow program diagram

To FIG. 8B

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Picture 3.4. Part 1, main flow program diagram

FIG. 8B

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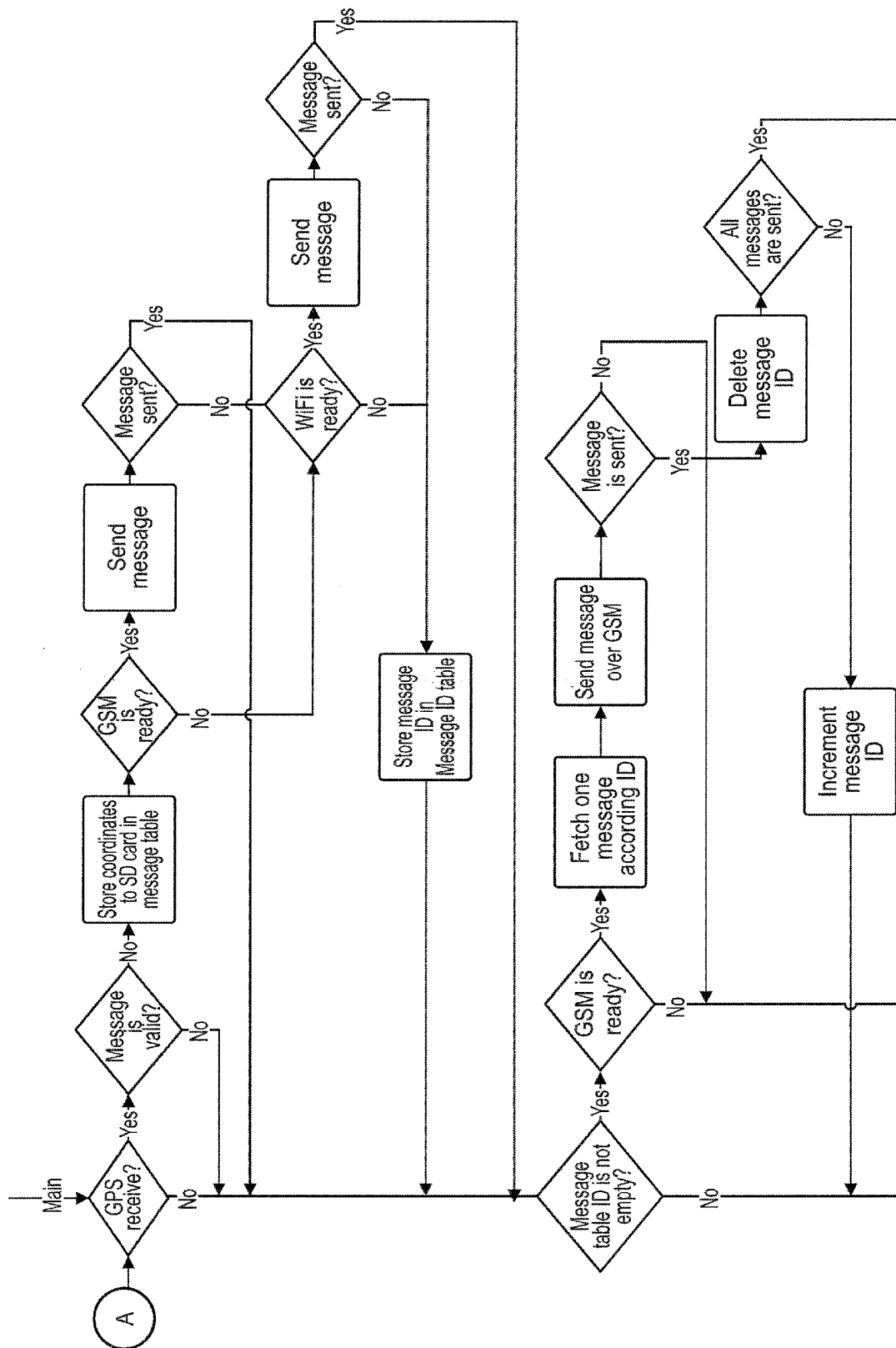
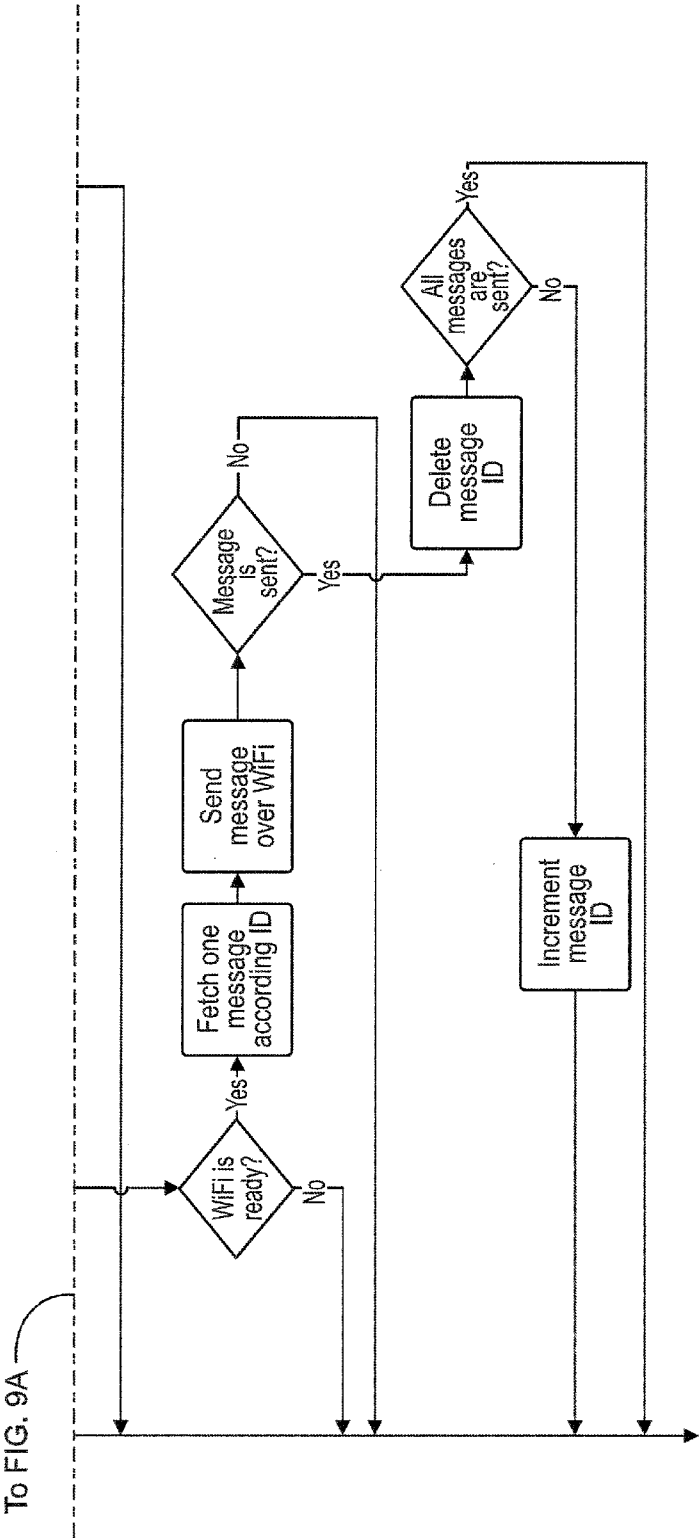


FIG. 9A

Picture 3.5. Part 2, main flow program diagram (handling messages)

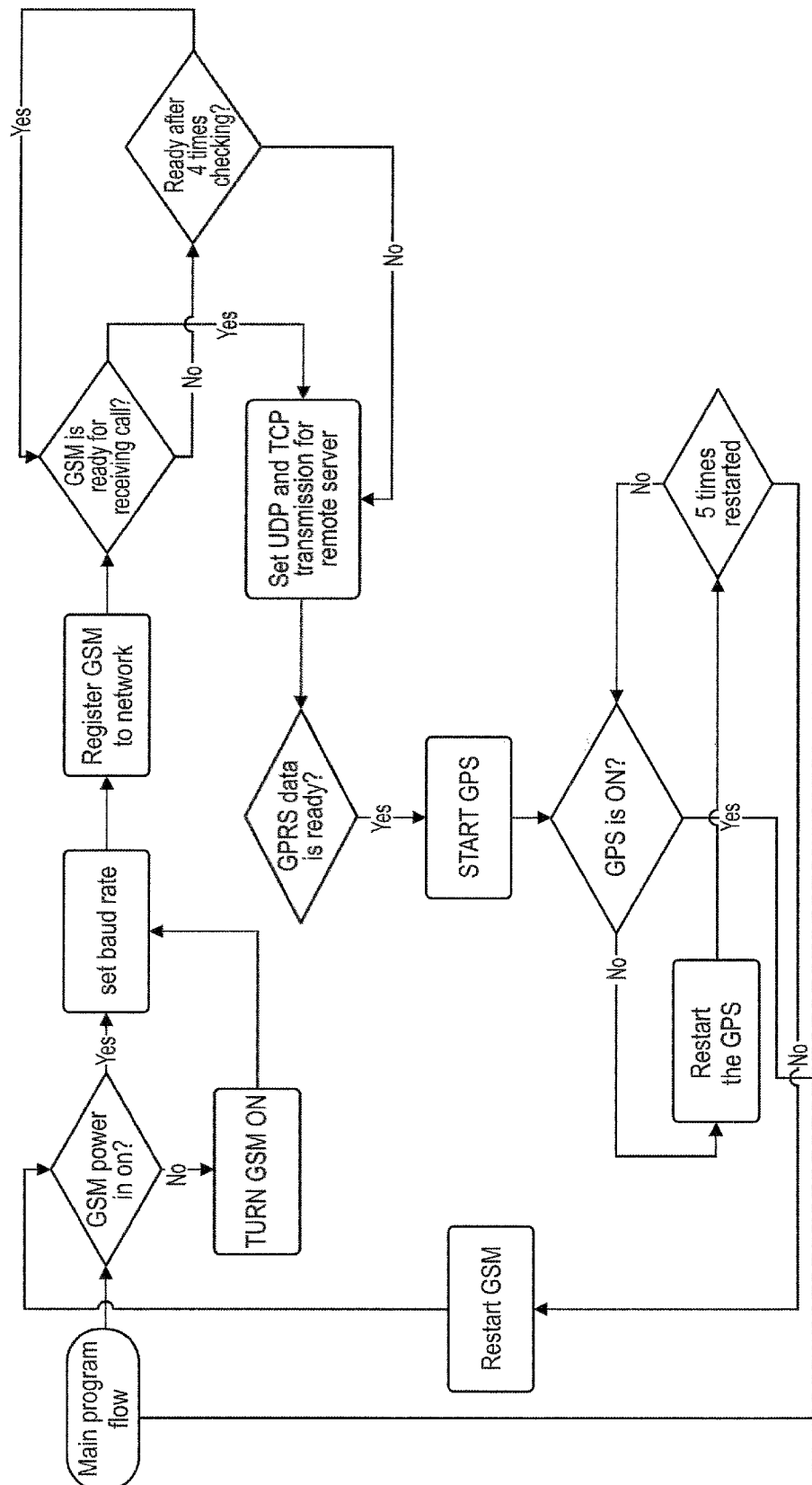
To FIG. 9B



Picture 3.5. Part 2, main flow program diagram (handling messages)

FIG. 9B

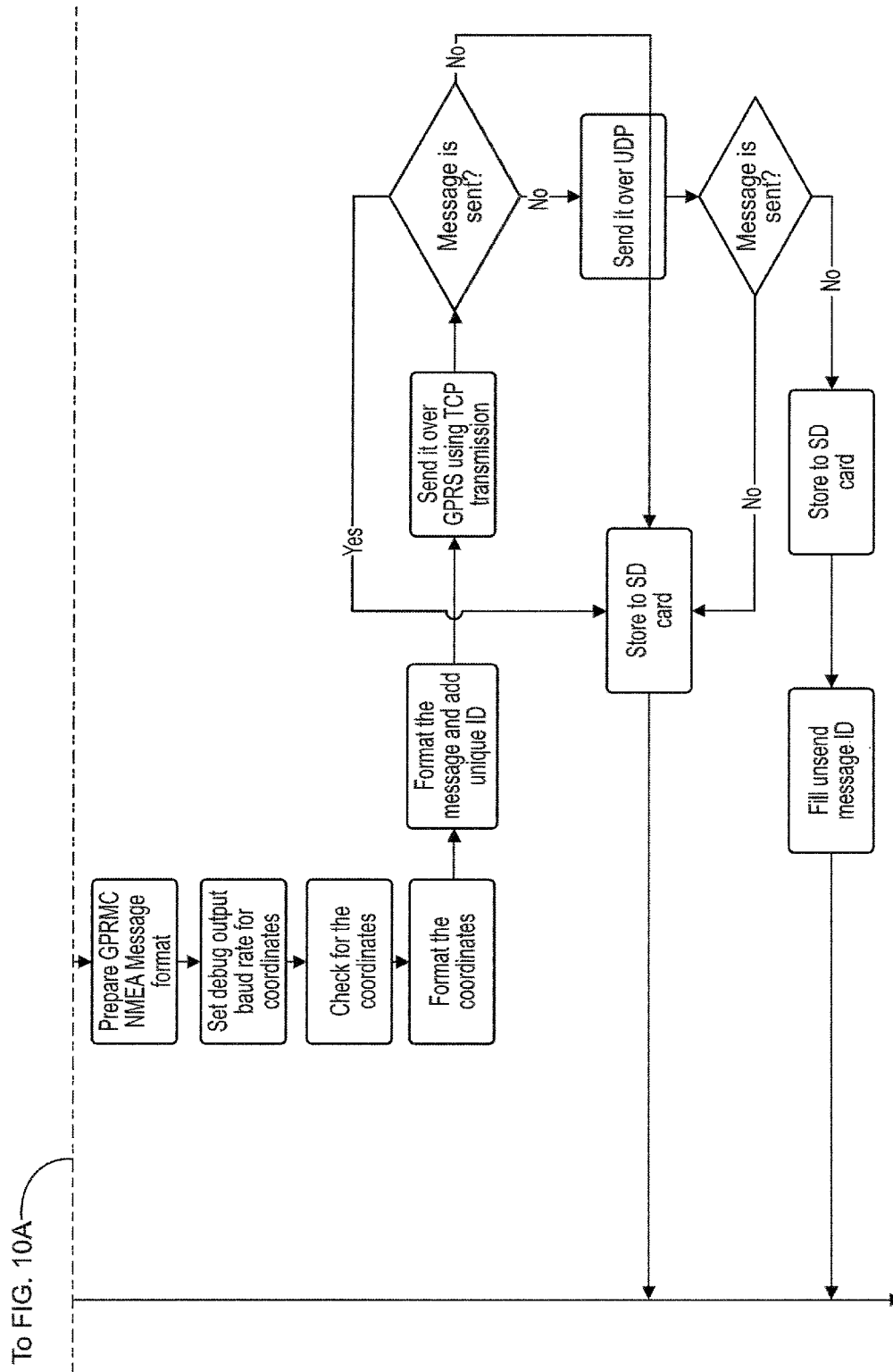
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Picture 7.1. Flow diagram for GSM and GPS model

FIG. 10A

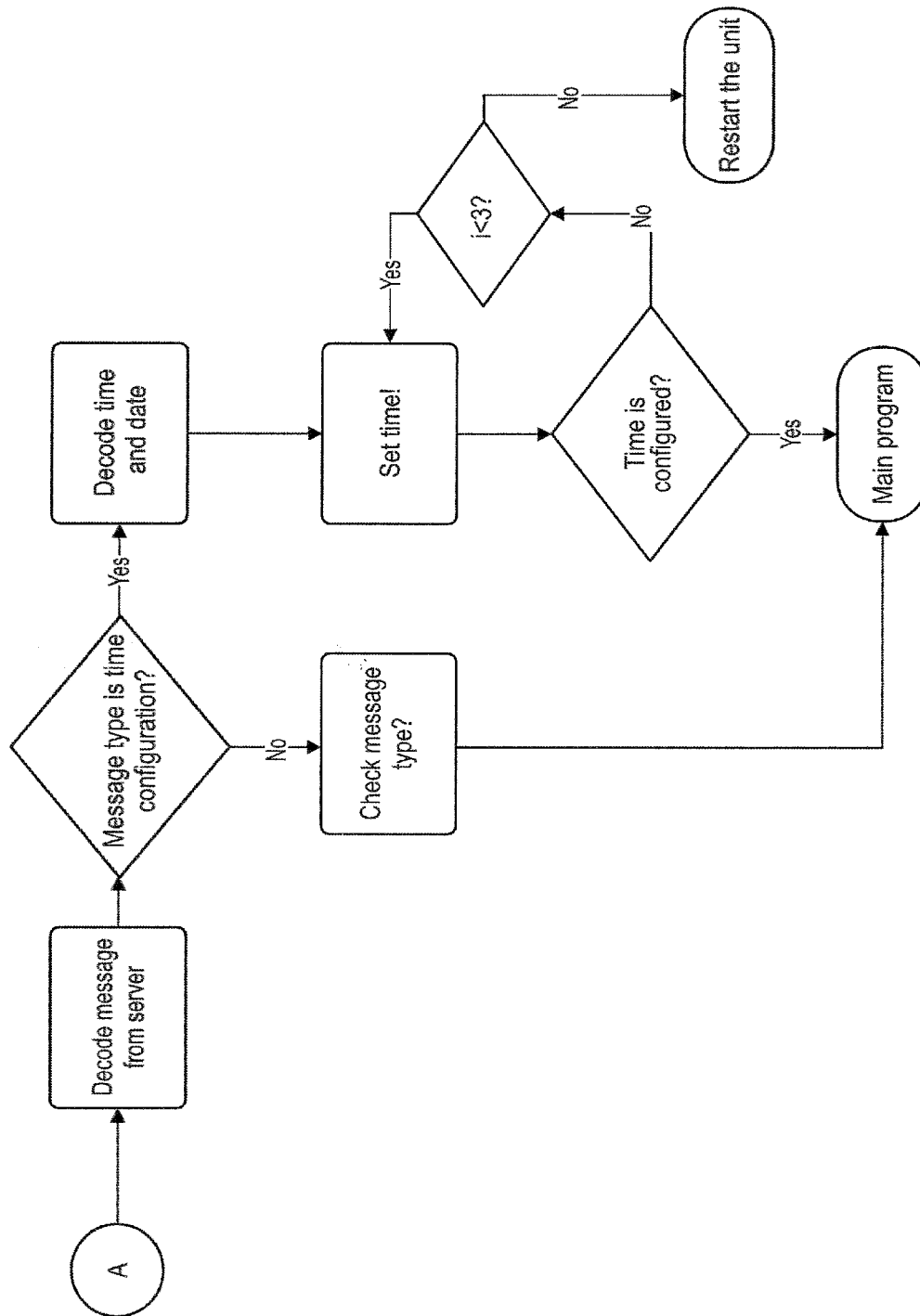
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Picture 7.1. Flow diagram for GSM and GPS model

FIG. 10B

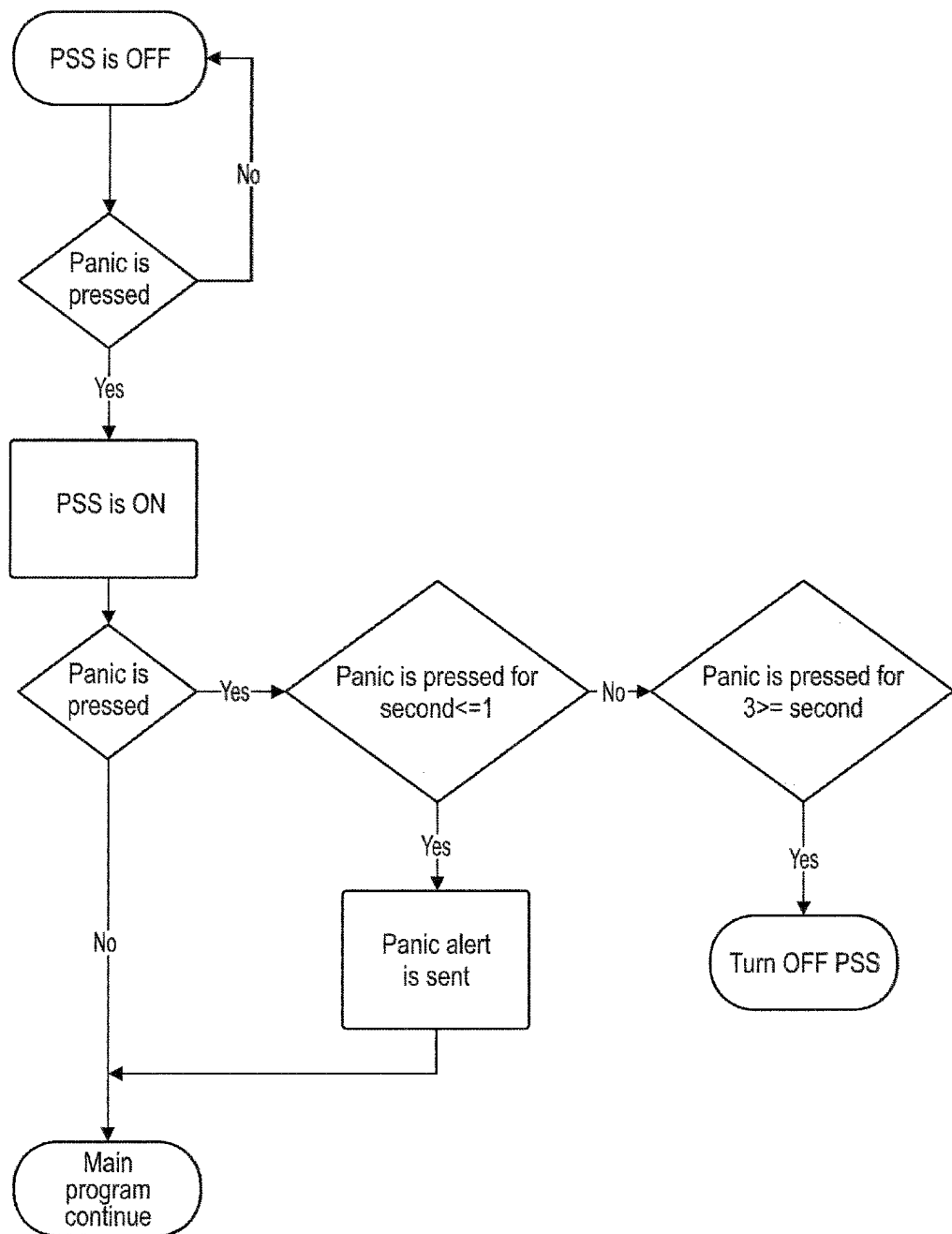
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Picture 9.1 Shows program flow diagram for PSS local time configuration

FIG. 11

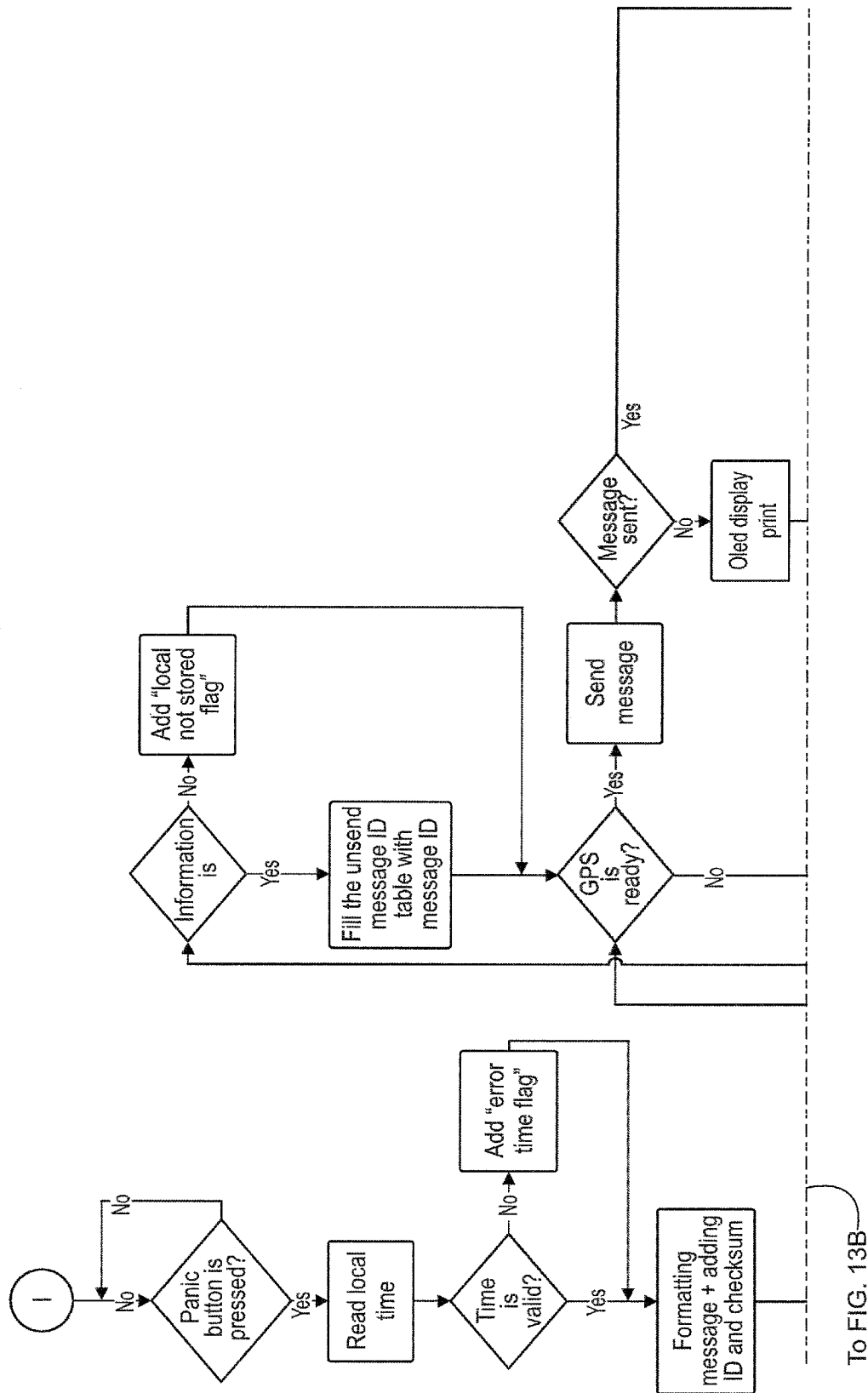
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Picture 5.1. Program flow diagram for PSS on and off state

FIG. 12

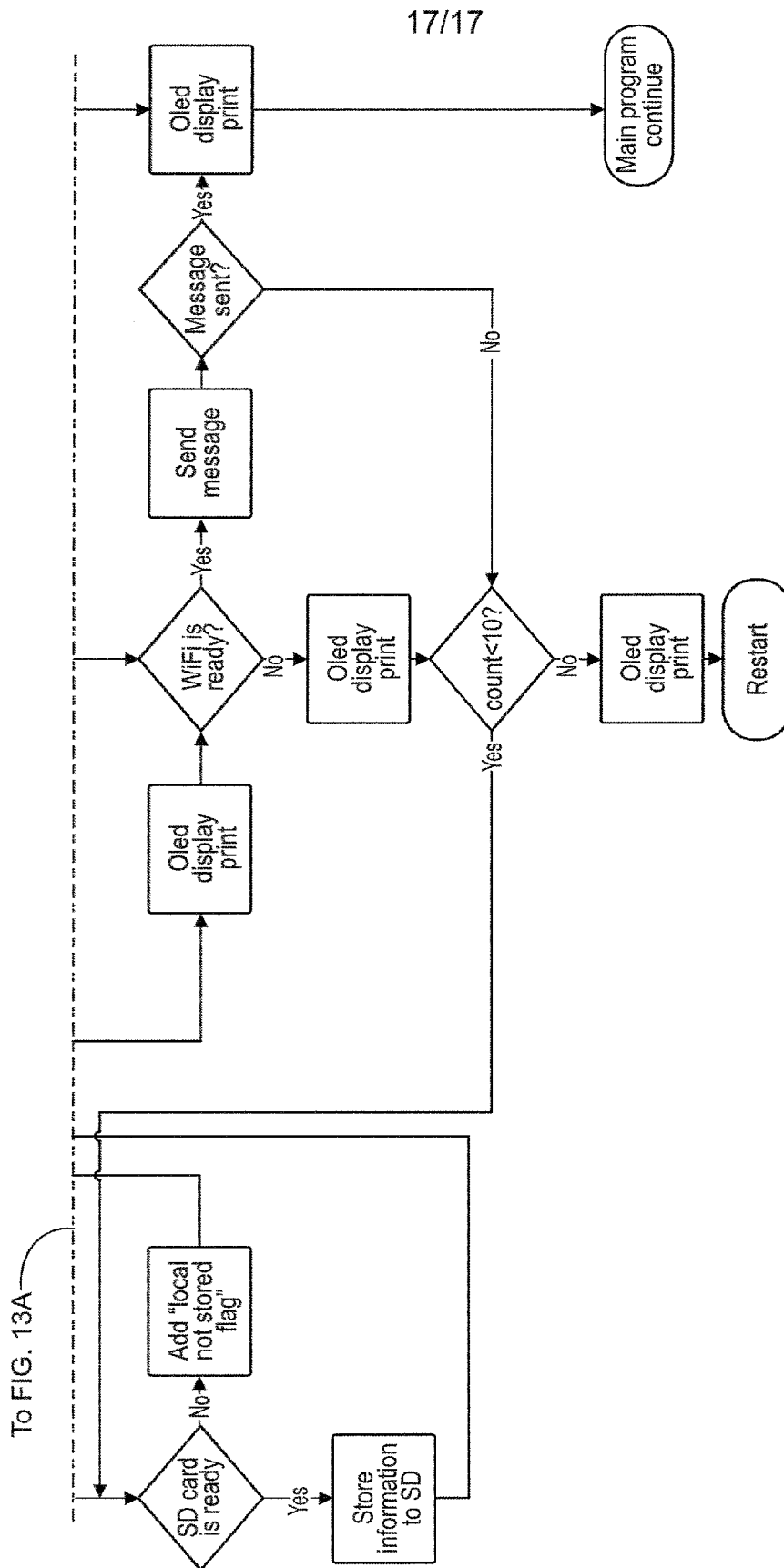
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Picture 9.2. Panic button main flow program diagram during PSS on

FIG. 13A

To FIG. 13B



Picture 9.2. Panic button main flow program diagram during PSS on

FIG. 13B