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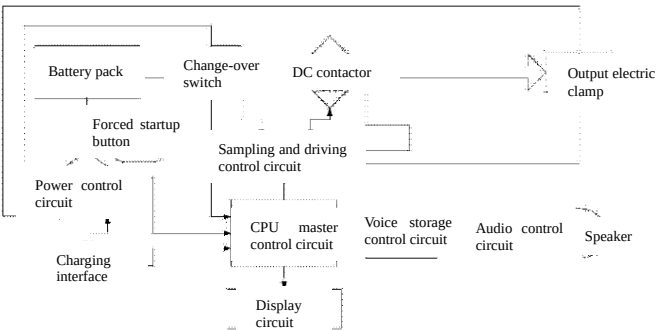
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(54) Name of utility new model

An intelligent emergency starting power supply with voice prompt function

(57) Abstract

The utility model discloses an intelligent emergency starting power supply with voice prompt function, wherein it includes a battery pack, the power supply end of the battery pack being connected with a change-over switch, the change-over switch being connected to the output electric clamp via a DC contactor, and it also includes a CPU master control circuit, the output end of the CPU master control circuit being connected with an audio playback system; the input end of the CPU master control circuit being connected with a sampling and driving control circuit, which is connected with a change-over switch, a DC contactor and an output electric clamp; the battery pack being connected with the charging interface via the power control circuit, and the power control circuit and the charging interface being connected to the CPU master control circuit; the output electric clamp and the change-over switch being respectively connected with the power control circuit; the output end of the CPU master control circuit also being connected with a display circuit; the sampling and driving control circuit being connected with a forced startup button. The emergency starting power supply can timely and accurately transmit the relevant operation information to the users under different use environments.



1. An intelligent emergency starting power supply with voice prompt function, wherein it includes a battery pack, the power supply end of the battery pack being connected with a change-over switch, and the change-over switch being connected to the output electric clamp via a DC contactor,

it also includes a CPU master control circuit, the output end of the CPU master control circuit being connected with an audio playback system;

The input end of the CPU master control circuit being connected with a sampling and driving control circuit, which is connected with a change-over switch, a DC contactor and an output electric clamp;

The battery pack being connected with the charging interface via the power control circuit, the power control circuit and the charging interface being connected to the CPU master control circuit;

The output electric clamp and the change-over switch being respectively connected with the power control circuit;

The output end of the CPU master control circuit also being connected with a display circuit;

The sampling and driving control circuit being connected with a forced startup button.

2. The intelligent emergency starting power supply with voice prompt function according to claim 1, wherein the audio playback system comprises a voice storage control circuit, the input end of the voice storage control circuit being connected to the CPU master control circuit, the output end being connected to the audio control circuit, and the audio control circuit being connected to the speaker.

3. The intelligent emergency starting power supply with voice prompt function according to claim 1, wherein the display circuit comprises an LED nixie tube display and LED indicator lights of different colors.

An intelligent emergency starting power supply with voice prompt function

Technology

[0001] The utility model relates to an emergency starting power supply, in particular to an intelligent emergency starting power supply with voice prompt function.

Background

[0002] 12V/24V conversion emergency starting power supply is difficult to be 100% correct only by manual control operation under different use environments. Without any protection and prompt, any misoperation may cause permanent damage to the product, even lead to battery explosion and endanger the personal and property safety of users in serious situations. Although some of the existing products are provided with operation instructions and some simple audible and visual alarm functions, the simple buzzer alarm and wear in use can lead to the missing or unclear operation prompt contents, resulting in the lack of necessary safety instructions for the emergency starting power supply, and at the same time, it also puzzles the users who cannot find the reason in time after problems occur in operation. If necessary voice prompts and photoelectric instructions are provided to each operation of the user, it can not only reduce the influence to the user under different environments, but also timely and directly inform the user of the real-time operation state, more effectively prevent errors, and make the user's operation more direct and clearer. Therefore, it is necessary to optimize the structure of the existing emergency starting power supply.

Contents of the utility model

[0003] The purpose of the utility model is to provide an intelligent emergency starting power supply with voice prompt function, which uses voice to prompt the user's current operation, so as to reduce misoperation, ensure the safety protection of the emergency starting power supply during operation and prolong its service life.

[0004] The technical solution adopted by the utility model to solve its technical issues is as follows.

[0005] An intelligent emergency starting power supply with voice prompt function, wherein it includes a battery pack, the power supply end of the battery pack being connected with a change-over switch, the change-over switch being connected to the output electric clamp via a DC contactor, and it also includes a CPU master control circuit, the output end of the CPU master control circuit being connected with an audio playback system, the audio playback system including a voice storage control circuit, the input end of the voice storage control circuit being connected to the CPU master control circuit, the output end being connected to the audio control circuit, and the audio control circuit being connected to the speaker;

[0006] The input end of the CPU master control circuit is connected with a sampling and driving control circuit, wherein the sampling and driving control circuit is connected with a change-over switch, a DC contactor and an output electric clamp; the battery pack is connected with the charging interface via the power control circuit, and the power control circuit and the charging interface are connected to the CPU master control circuit; the output electric clamp and the change-over switch are respectively connected with the power control circuit; the output end of the CPU master control circuit is also connected with a display circuit, wherein the display circuit comprises an LED nixie tube display and LED indicator lights of different colors; the sampling and driving control circuit is connected with a forced startup button.

[0007] The utility model has the advantages that the emergency starting power supply can provide safety protection for level selection, correct connection, wrong connection, low voltage or high voltage, and at the same time, the corresponding voice prompt and photoelectric prompt are added in the aspects of charging level selection, battery low-voltage early warning, output overcurrent protection, electric clamp output short-circuit protection and manual forced startup safety prompt; in different service environments, it can timely and accurately transmit the relevant operation information to the users, so that the users can obtain the operation information via different types of prompts such as sound and light prompts, so that the users can more intuitively know the real-time operation and the causes of service errors, so as to better carry out the next operation or take timely and effective corrective measures to ensure the personal safety of the users, and make the whole product more humanized and intelligent.

Description of drawings

[0008] Figure 1 is the electrical schematic diagram of the emergency starting power supply proposed by the utility model;

[0009] Figure 2 is a power control circuit diagram;

[0010] Figure 3 is the circuit diagram of the CPU master control circuit and the LED nixie tube display;

[0011] Figure 4 is a voice storage and audio control circuit diagram;

[0012] Figure 5 is a sampling and driving control circuit diagram.

Specific embodiments

[0013] In order to make the technical means, creative features, purpose and efficacy of the utility model easy to understand, the utility model is further described below in combination with the drawings and specific embodiments.

[0014] As shown in Figure 1, the intelligent emergency starting power supply with voice prompt function proposed by the utility model includes a battery pack, wherein the power supply end of the battery pack is connected with a change-over switch, the change-over switch is connected to the output electric clamp via a DC contactor, and it also includes a CPU master control circuit, wherein the output end of the CPU master control circuit is connected with an audio playback system, the audio playback system includes a voice storage control circuit, the input end of the voice storage control circuit is connected with the CPU master control circuit, the output end is connected with the audio control circuit, and the audio control circuit is connected with the speaker;

[0015] The input end of the CPU master control circuit is connected with a sampling and driving control circuit, wherein the sampling and driving control circuit is connected with a change-over switch, a DC contactor and an output electric clamp; the battery pack is connected with the charging interface via the power control circuit, and the power control circuit and the charging interface are connected to the CPU master control circuit; the output electric clamp and the change-over switch are respectively connected with the power control circuit; the output end of the CPU master control circuit is also connected with a display circuit, wherein the display circuit comprises an LED nixie tube display and LED indicator lights of different colors; the sampling and driving control circuit is connected with a forced startup button.

[0016] Nowadays, automotive batteries are mainly divided into models of 12V and 24V. In the circuit design, 12 VDC battery is used for 0 VDC - 15.5 VDC by default; and 24 VDC battery is used for 15.5 - 30.0 VDC by default. The change-over switch realizes two batteries in parallel or in series, so that it can realize the function of two voltage outputs with one unit. At the same time, two small linkage switches are built in the change-over switch, and the linkage switch is synchronized with the 12 V and 24 V level, that is to say, when the change-over switch is in the 12 V or 24 V level, the linkage switch is also closed synchronously, and when it is in the OFF level, the linkage switch is also disconnected automatically, which is used to judge the input or disconnection of the external connection signals.

[0017] The emergency starting power supply uses the high-power DC contactor as the automatic control electronic switch to control its on and off state via the circuit. At the same time, the circuit judges the voltage drop at both ends of the DC contactor after being pulled in, which is one of the conditions to judge whether the output electric clamp is short circuited.

[0018] The emergency starting power supply takes samples from the two ends of the battery pack, the small tooth of the electric clamp, the output end of the change-over switch, the two ends of the DC contactor, the charging interface, the internal voltage test reset switch, the forced startup button and other key points respectively and sends them to the CPU master control circuit for processing and judgment, so as to know the user's operation information and send the corresponding pulse signal to the voice storage control circuit, and after the pre-stored voice content is retrieved and amplified by the audio control circuit, the speaker sends out the corresponding voice message. The emergency starting power supply can provide safety protection for level selection, correct connection, wrong connection and low or high voltage. At the same time, the corresponding voice prompt and photoelectric prompt are added in the aspects of the charging level selection, battery low-voltage early warning, output overcurrent protection, electric clamp output short-circuit protection and manual forced startup safety prompt. The voice is clear, loud and standard. Under the 40 dB noise environment, the effective sound transmission distance is more than 5 m. In addition to standard English prompts, two other languages are also available, namely French and Spanish. The users can switch freely via simple key operations to improve the universality of the product.

[0019] In one embodiment, the circuit structure of the emergency starting power supply is shown in Figure 2, Figure 3, Figure 4 and Figure 5. In this embodiment, the main key parts used in the emergency starting power supply include: IC1-7805 three terminal integrated voltage regulator, IC2-MC96f32Q single chip microcomputer, IC3-BLA4208 voice storage integrated chip, IC4-TDA2822 integrated audio power amplifier, LS1 full band speaker 2W/8Ω, LED-LG5631AH seven-segment nixie tube display, IC5 (IC6)- PC817 optocoupler, IC7-LM358 integrated operational amplifier, high-power DC contactor, high current change-over switch (for 12/24V level switching), linkage switch, forced startup button, output positive and negative clamps.

[0020] In this embodiment, the main functions of the emergency starting power supply include:

[0021] 1. During the operation of the emergency starting power change-over switch, the 12 V / 24 V level is automatically identified and prompted, the corresponding level voice prompt is given and the LED3/LED4 light up for indication;

[0022] 2. Automatic alarm prompt for low voltage of the emergency starting power supply battery. When the battery voltage is lower than $8.0 \leq U < 10.0$ V, automatic voice alarm prompt will be sent out;

[0023] 3. Automatic shutdown protection and prompt when the battery voltage of the emergency starting power supply is too low. When the battery voltage is constantly lower than 8 V, the emergency starting power supply will automatically shut down the output circuit of the electric clamp and send a low-voltage shutdown protection voice prompt at the same time;

[0024] 4. Prompt for correct connection and continuity of the output electric clamp. When it is connected correctly, it will be automatically pulled in and be in continuity, with voice prompt and LED4 lighting prompt;

[0025] 5. Shutdown protection and prompt for wrong reverse polarity connection of the output electric clamp. When the polarity of the output electric clamp is reversed, the DC contactor will produce a shutdown protection, and send the corresponding voice message prompt and the reverse connection indicator LED 7 lighting prompt, and the nixie tube flashes to display the error code "Er1" message;

[0026] 6. Shutdown protection and prompt for connection voltage error of the output electric clamp, that is, the internal and external connected battery voltage does not match, which generally refers to the wrong connection between the 12V and 24V batteries or the 24V connected to batteries with the external voltage higher than 30.0V, the emergency starting power supply will automatically send out the voice message prompt for wrong connection and the wrong connection indicator LED 6 lighting prompt, and at the same time the nixie tube flashes to display the error code "Er2" message;

[0027] 7. Overload shutdown protection and prompt of the output electric clamp. When the output electric clamp has a too high current, it will automatically shut off the output and provide protection. The emergency starting power supply will send out the corresponding voice message prompt and the nixie tube will flash to display the overload protection code "P1" message;

[0028] 8. Automatic shutdown protection and prompt for short circuit of the output electric clamp. When the output electric clamp is short circuited again when being pulled in and in continuity, it will automatically shut off the output and provide protection. At the same time, it will send out the corresponding voice message prompt and the nixie tube will flash to display the short circuit protection code "P2" message;

[0029] 9. Charging level prompt and charging state indication. The charging of the conversion emergency starting power supply is only at the 12V level, that is, the two batteries shall be charged together after being connected in parallel to ensure the charging voltage balance of the two batteries, that is, after inserting the charger, if the change-over switch is not at the 12V level, the emergency starting power supply will automatically send out a voice message prompt, and at the same time the charging indicator light will not light up, until the level selection is correct, and the indicator light LED2 is on when the charging is in progress, and the LED1 is on when the charging is over;

[0030] 10. Forced startup output function. When there is no external battery voltage input or the input voltage signal is too low, and the emergency starting power supply cannot be normally identified automatically, after artificial judgment and correct and reliable connection, press the forced startup button to make the emergency starting power supply be pulled in and in continuity. When the forced startup button is pressed, the emergency starting power supply will automatically send out the safety warning message voice and the nixie tube will synchronously display the countdown time counting prompt message of "10-9-8- ... 0" to the user to remind the user to note the polarity and safe working voltage of the external load. The emergency starting power supply will not be automatically pulled in until it is pressed down for 10 s, to ensure that the user has enough time to confirm the safety of the connection.

[0031] In this embodiment, the voice contents stored in the voice storage control circuit are as follows (take the English version as an example):

[0032] A. 12V

[0033] B. 24V

[0034] C. Low voltage, recharging recommended

[0035] D. Power is connected

[0036] E. Wrong Voltage

[0037] F. Wrong Polarity

[0038] G. Recharging ON, Turn the switch at back to 12V

[0039] H. charge immediately

[0040] I. Overload

[0041] J. Short Circuit

[0042] The specific working process is as follows:

[0043] 1. When the change-over switch is turned from the OFF level to the 12V or 24V level, the change-over switch sends the voltage of the battery pack in parallel or in series to the input end of the DC contactor, and at the same time the "OUT+" end has a high level (the OUT+ sampling point is actually connected to the input end of the DC contactor, and the "BAT/External" is connected to the output end of the DC contactor), and after the voltage is limited by the diode D1, the current limiting resistor R1 and the voltage stabilizing diode DW1, the switching tube Q1 is driven by the resistor R2 to make the relay JK1 be pulled in and in continuity; the battery BAT+ voltage is added to the input end of the three terminal integrated voltage regulator 7805 via diode D4, so that pin 3 outputs a stable 5 VDC voltage to supply power to the CPU and the other circuits;

[0044] When the external electric clamp is correctly connected and the voltage is greater than 1.5V, the voltage at the "BAT/External" end is also added to the base pole of the switching tube Q1 after passing through the diode D6 to make the relay be pulled in and in continuity, so as to make 7805 enter the normal working state; similarly, when the charging interface "CH+" is connected to the power supply, the 7805 also enters the normal working state.

[0045] 2. After the single chip microcomputer is powered on and works, first check whether the change-over switch is turned on. When the voltage detected at the "OUT+" end is less than 15.5 VDC, compare it with the voltage obtained at the positive "BAT1+" end of the single battery. When the voltages at the two reference points are basically the same, the CPU deems by default that the change-over switch has been set to the 12V level at this time; on the contrary, when the voltage at this point is $\geq 15.5V$ and there is a large difference from the voltage at the "BAT1+" end, the CPU deems by default that the change-over switch has been set to the 24V level; after determining the level, the single chip microcomputer outputs a high level from the P52 port or the P53 port to drive the corresponding level indicator light LED3 or LED4 to light up; at the same time, a pulse signal is output from the P21 port or the P23 port to drive the voice chip to extract the corresponding voice message, and report the corresponding level message to the user via the power amplifier, the speaker and the other devices;

[0046] When the single chip microcomputer detects that the voltage of the "OUT+" is too low, and the voltage at the 12V level is lower than 10.0 VDC (the voltage at the 24V level is lower than 20.0 VDC), the emergency starting power supply automatically deems by default that the battery has been discharged and should not be used again, and the power should be supplemented in time; the P16 pin of the single chip microcomputer will automatically cycle the output pulse signal to the voice storage chip to extract the low-voltage alarm prompt voice, and timely report the low-voltage message to the user via the speaker; at the same time, it will automatically turn off all loads, that is, turn off the output of the cigarette lighter and the DC contactor;

[0047] When the single chip microcomputer detects that the voltage of the "OUT+" is 0V and a certain positive voltage is detected at the "OUT+/External" end, it means that the change-over switch of the emergency starting power supply is not turned on, but only the user has correctly connected the output electric clamp to the external battery; at this time, the emergency starting power supply deems by default that the user wants to test the external battery voltage via the digital display voltmeter of the JS, that is, the single chip microcomputer automatically displays the actual voltage value read from the "OUT+/External" end via the nixie tube;

[0048] When the single chip microcomputer detects that the voltage of "OUT+" is 0V and at the same time it is detected that the charger has access voltage at the "CH+" end, it means that the change-over switch is not turned on at this time, but only the charger has been connected. At this time, the single chip microcomputer will automatically output a pulse signal to the voice storage chip to extract the charging level position limit prompt voice, and tell the user to place the change-over switch at the 12V level when charging. If the change-over switch

is in the other level, the single chip microcomputer will automatically cycle the output trigger signal until the user turns the change-over switch to the correct 12V level; when the emergency starting power supply enters normal charging, the single chip microcomputer carries out judgment by detecting the voltage drop at the sampling resistance R31. When the charging current is less than 300 mA, the voltage drop at the resistor is 0.03V, indicating that the charging is over, otherwise, it indicates that the charging is in progress. When the LED2 is on, it indicates that the charging is in progress, and when the LED1 is on, it indicates that the charging is over.

[0049] 3. Startup. Its working principle is as follows:

[0050] 3.1 Correct connection, continuity and prompt of the 12V level: When the change-over switch is set to the 12V level and the single chip microcomputer detects that the voltages of the "OUT+" and the "BAT1+" points are within the range of the 12V level, the emergency starting power supply will automatically send out the 12V level prompt voice; at the same time, the voltage at both ends of the external 12V battery is sampled in two ways, one of which is connected to the output end of the DC contactor, so that the single chip microcomputer detects the effective voltage value within the range of the 12V level at the "BAT+/External" point; the other way is sampled via the small tooth of the electric clamp, and the internal wire of the electric clamp cable is connected to the "J1" port of the control board. After the correct connection signal is converted via R5, D8 and IC5, the external correct connection signal "RIGHT-Ctrl" is sent to the P13 port of the single chip microcomputer. The single chip microcomputer judges that the emergency starting power supply has been turned to the 12V level, and at the same time the electric clamp has been correctly and reliably connected, and at this time, the single chip microcomputer outputs a high level to the DC contactor control circuit to make it be pulled in and in continuity, sends a pulse signal to the voice chip to extract the prompt voice of correct connection and continuity, and tells the user the correct connection message in time; Other indications: The 12V level indicator light is on; the corresponding correct connection indicator light is on; the nixie tube automatically displays the comprehensive voltage value after the internal and external battery are connected in parallel.

[0051] 3.2 Protection and prompt of reverse polarity connection of the 12V level: The change-over switch is turned to the 12V level, and the corresponding level detection and prompt contents are the same as above; at the same time, the voltage at both ends of the external 12V (or 24V) battery is sampled via the small tooth of the electric clamp, and the internal wire of the electric clamp cable is connected to the "J1" port of the control board. After the reverse connection signal is converted via D9, IC6 and R5, the external reverse signal "Reverse-Ctrl" is sent to the P12 port of the single chip microcomputer. The single chip microcomputer judges that the emergency starting power supply has been turned to the 12V level, and at the same time detects that the polarity of the external battery is reversed, and at this time, the DC contactor will remain in the off state, continuously send pulse signals to the voice chip to extract the reverse connection prompt voice message, and tell the reverse connection message to the user in time; Other indications: The 12V level indicator light is on; the reverse connection alarm indicator light LED7 is on; the nixie tube displays the reverse connection error code "Er1" flashing.

[0052] 3.3 Protection and prompt for too high external voltage error of the 12V level: The change-over switch is turned to the 12V level, and the corresponding detection and prompt contents are the same as above; at the same time, the voltage at both ends of the external battery is connected by the electric clamp to the output end of the DC contactor, so that when the single chip microcomputer detects at the "BAT+ /External" point that at this time the connected battery voltage has exceeded the safety range of the "12V" level, the single chip microcomputer deems directly by default that the external battery voltage does not match the level selected by the emergency starting power supply, and the DC contactor remains shut down for protection; and continuously sends pulse signals to the voice chip to extract the voice message of voltage error connection prompt, and tells the user the wrong connection message in time; Other indications: The 12V level indicator light is on; the voltage error connection alarm indicator light LED6 is on; the nixie tube displays the reverse connection error code "Er2" flashing.

[0053] 3.4 Correct connection and continuity and prompt of the 24V level: When the change-over switch is set to the 24V level, the single chip microcomputer detects that the voltage at the "OUT+" point and the "BAT1+" point is relatively high, and it should belong to the 24V level. The emergency starting power supply automatically sends out the 24V level prompt voice; at the same time, the voltage at both ends of the external 24V battery is sampled in two ways, one of which is connected to the output end of the DC contactor, so that the single chip microcomputer detects at the "BAT+/External" point the effective voltage value within the range of the 24V level; the other way is sampled via the small tooth of the electric clamp, and the internal wire of the electric clamp cable is connected to the "J1" port of the control board. After the correct connection signal is converted via R5, D8 and IC5, the external correct connection signal "RIGHT-Ctrl" is sent to the P13 port of the single chip microcomputer. The single chip microcomputer judges that the emergency starting power supply has been turned to the 24V level, and at the same time the electric clamp has been correctly and reliably connected, and at this time, the single chip microcomputer outputs a high level to the DC contactor control circuit to make it be pulled in and in continuity, sends a pulse signal to the voice chip to extract the prompt voice of correct connection and continuity, and tells the user the correct connection message in time; Other indications: The 24V level indicator light is on; the corresponding correct connection indicator light is on; the nixie tube automatically displays the comprehensive voltage value after the internal and external battery are connected in parallel.

[0054] 3.5 Protection and prompt of reverse polarity connection of the 24V level: The change-over switch is turned to the 24V level, and the corresponding level detection and prompt contents are the same as above; at the same time, the voltage at both ends of the external 24V (or 12V) battery is sampled via the small tooth of the electric clamp, and the internal wire of the electric clamp cable is connected to the "J1" port of the control board. After the reverse connection signal is converted via D9, IC6 and R5, the external reverse connection signal "Reverse-Ctrl" is sent to the P12 port of the single chip microcomputer. The single chip microcomputer judges that the emergency starting power supply has been turned to the 24V level, and at the same time detects that the polarity of the external battery is reversed, and at this time, the DC contactor will remain in the off state, continuously send pulse signals to the voice chip to extract the reverse connection prompt voice message, and tell the reverse connection message to the user in time; Other indications: The 24V level indicator light is on; the reverse connection alarm indicator light LED7 is on; the nixie tube displays the reverse connection error code "Er1" flashing.

[0055] 3.6. Protection and prompt of too low (or too high, more than 30.0V) external voltage error of the 24V level: The change-over switch is turned to the 24V level, and the corresponding level detection and prompt contents are the same as above; at the same time, the voltage at both ends of the external battery is connected by the electric clamp to the output end of the DC contactor, so that when the single chip microcomputer detects at the "BAT+/External" point that the connected battery voltage has exceeded the safety range of "24V" at this time, if the external voltage is lower than 15.5V or higher than 30.0V, the single chip microcomputer deems directly by default that the external battery voltage does not match the level selected by the emergency starting power supply, and the DC contactor remains shut down for protection. It continuously sends pulse signals to the voice chip to extract the voice message of voltage error connection prompt, and tells the user the wrong connection message in time; Other indications: The 24V level indicator light is on; the voltage error connection alarm indicator light LED6 is on; the nixie tube displays the reverse connection error code "Er2" flashing.

[0056] 4. Automatic shutdown protection for startup overload: When the emergency starting power supply starts at the moment of starting, a very high current is generated in the whole starting system, the emergency starting power supply reads the voltage drop between the big tooth of the black electric clamp and the negative pole of the internal battery by sampling from the small tooth of the black electric clamp, sends it to the "J1" port via the small tooth of the black clamp and the internal signal wire, and then amplifies it via D0, IC7 and other circuits, and sends the overcurrent signal "OVERLOAD-TEST" to the P11 port of the single chip microcomputer. When the voltage value continues to be higher than a certain set value within a certain time (the resistance between the big tooth of the black electric clamp and the negative terminal of the battery is tested in advance, and the reference voltage value of overcurrent protection is calculated by referring to the maximum discharge capacity of the battery of the emergency starting power supply), the emergency starting power supply deems by default that the external connection load is too high, and when the maximum bearing range of the whole system has been exceeded, the single chip microcomputer shuts off the control signal of the DC contactor to force the DC contactor to turn off the output; at the same time, the single chip microcomputer extracts the corresponding overcurrent protection prompt voice message from the voice chip, and tells the user the message in time; Other indications: The nixie tube displays the over-current protection code "P1" flashing.

[0057] 5. Automatic shutdown protection for short circuit of electric clamp output: When the electric clamp is short circuited after the emergency starting power supply is pulled in and in continuity, a very high current is generated in the whole starting system. The emergency starting power supply also reads the voltage drop between the big tooth of the black electric clamp and the negative pole of the internal battery by sampling from the small tooth of the black electric clamp, and sends it to the "J1" port via the small tooth of the black electric clamp and the internal signal wire, and after being amplified by D0, IC7 and other circuits, the overcurrent signal "OVERLOAD-TEST" is sent to the P11 port of the single chip microcomputer; at the same time, the single chip microcomputer judges the voltage difference between the "OUT+" and "BAT/External" point at both ends of the DC contactor. When the two voltage values continue to be higher than a certain set value within a certain time, the emergency starting power supply deems by default that short circuit fault occurs in the external electric clamp connection; the single chip microcomputer will immediately shut off the control signal of the DC contactor to force the DC contactor to shut off the output; at the same time, the single chip microcomputer extracts the corresponding short-circuit protection prompt voice message from the voice chip, and tells the user the message in time; Other indications: The nixie tube displays the over-current protection code "P2" flashing.

[0058] 6. Forced startup output: When the external battery voltage is too low or there is no battery, the user can first turn the change-over switch to the required voltage level (at this time, the corresponding level detection and prompt contents are the same as above), and then connect the positive and negative electric clamp to the positive and negative pole of the input power supply of the load respectively. Note that large and small tooth of the electric clamp are reliably connected at the same time, and confirm that the power required by the load is consistent with the voltage level selected by the emergency starting power change-over switch; press down the forced startup switch, and the forced startup switch will short-circuit the "J3" port, so that the internal 5V power supply will be sent to the P25 port of the single chip microcomputer after partial voltage sampling via resistors R15 and R16. The single chip microcomputer will automatically start timing and extract the forced startup voice safety prompt from the voice chip. After pressing down the forced startup switch for 10 S, the single chip microcomputer will automatically send the continuity command, to make the DC contactor be forcibly pulled in and in continuity; when the connection of the emergency starting power supply is abnormal (such as reverse connection, wrong connection of high voltage) before automatic pull-in (within 10 S), the single chip microcomputer will

automatically judge that the forced startup operation is invalid and it is needed to be recovered after troubleshooting; ensure the operation safety of the users; Other prompts: After pressing this switch, the nixie tube flashes "10s countdown timer" within 10 s. After being pulled in and in continuity, the emergency starting power supply will send a voice prompt for correct continuity, and at the same time the prompt light LED5 for correct connection will light up.

[0059] 7. Working principle of voice control circuit: Firstly, all functional voices are stored in the voice storage chip in the PCM compression mode. The voice chip is BLA4208 chip of the BLA series, which supports a total voice length of 42s and can store 30 segments of different voices at most; the voice reading is controlled by 8 separate trigger pins of S1-S8. At the same time, it also supports different pins to trigger in different combinations, so that it can support the needs of 30 segments of voice triggering; then, the CPU control is used to randomly extract each segment of the voice contents, the voice signal is output via the pin 8, and the speaker SL1 is directly driven to send out voice after being amplified by the audio power amplifier IC4; the voice trigger signal is effective for high level. Every time the single chip microcomputer sends out a pulse trigger signal, the voice chip will automatically extract the corresponding voice content for broadcasting once; when the trigger is of continuous high level, the chip will automatically broadcast the same voice content in a circular manner.

[0060] 8. Working principle of the sampling circuit and control circuit: As shown in Figure 5, J1 is the sampling signal input end of the small tooth of the positive and negative electric clamp. When the external connection is correct, the voltage is converted via resistors R5, D8 and IC5, and the AD signal is sent to the P31 port of the single chip microcomputer as the basis for judging whether the external electric clamp is correctly connected or disconnected; when the voltage polarity of the external battery is reversed, the single chip microcomputer cannot directly read the negative voltage at the "BAT/External" end, but after conversion via J1, D9, IC6 and R5, the reverse connection signal is sent to the P12 port of the single chip microcomputer as the basis for judging the reverse polarity connection of the external electric clamp; when the load current of the output electric clamp cable is too high, the high current will produce a certain voltage drop on the negative electric clamp cable. This voltage will be extracted via the small tooth of the negative electric clamp and sent to D0, R11 and IC7. After amplification, it will be sent to the P11 pin of the single chip microcomputer for judgment. When it is detected that the voltage continues to be greater than a set value within 1 S, the single chip microcomputer deems by default that the external load is too high and immediately shuts off the DC contactor for protection; similarly, when it is detected that the voltage value is higher than another set value in an instant, and the voltage drop detected from both ends of the DC contactor is also greater than a set value, the emergency starting power supply will automatically deem by default that there is a short circuit in the output electric clamp, and immediately shut off the DC contactor for protection;

[0061] J5 is the charging power access end; J6 is the input end of the internal output voltage detection and the external voltage detection, and it is also the sampling point of voltage drop at both ends of the DC contactor; J7 is the control coil interface of the DC contactor; the cigarette lighter output control circuit is composed of main components R25, R26, Q2, JK2 and RT1; the buzzer alarm control circuit is composed of main components R29, R30 and Q3; the DC contactor control circuit is composed of main components R27, R28 and Q3; the charging power sampling and charging current sampling circuit is composed of main components R17, R18, R31, C25 and C21, which is used to judge the connection of the charger and the detection of the charging state; the internal and external battery voltage sampling circuit and the change-over switch level judgment sampling circuit are composed of main components R19, R20, R21, R22, R23, R24, C22, C23 and C20; the digital display control circuit is composed of main components LED, Q5, Q6, Q7, etc.

[0062] Shown and described above are the basic principles, main features and advantages of the utility model. Those skilled in the art should understand that the utility model is not limited by the above embodiments. The above embodiments and the instructions in the description are only intended to explain the principles of the utility model. Without departing from the spirit and scope of the utility model, the utility model can have various changes and improvements, which shall fall within the scope of the utility model required to be protected. The scope of protection claimed by the utility model is defined by the appended claims and their equivalents.

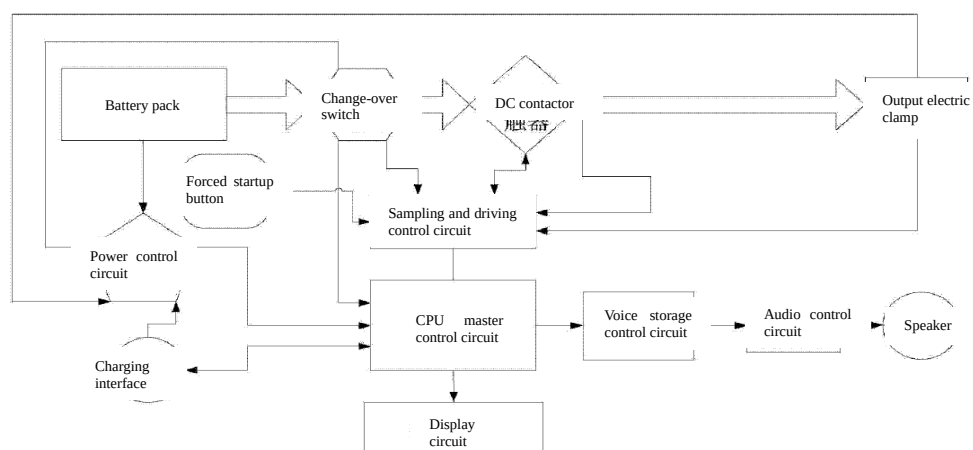


Figure 1

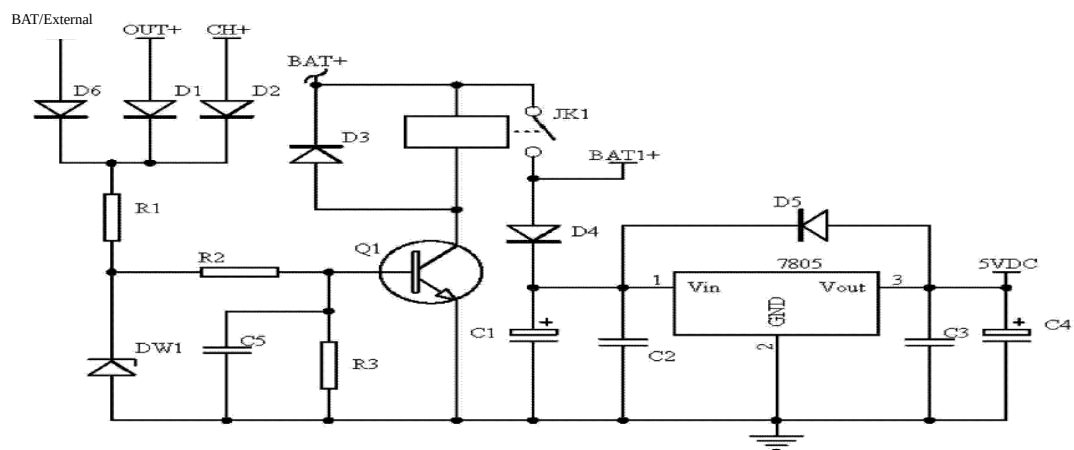


Figure 2

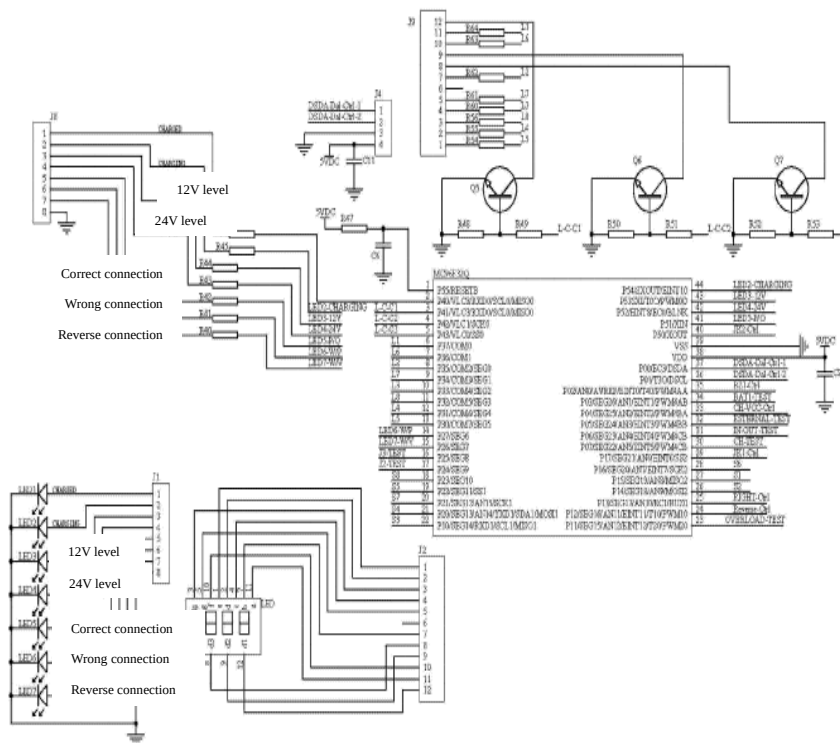


Figure 3

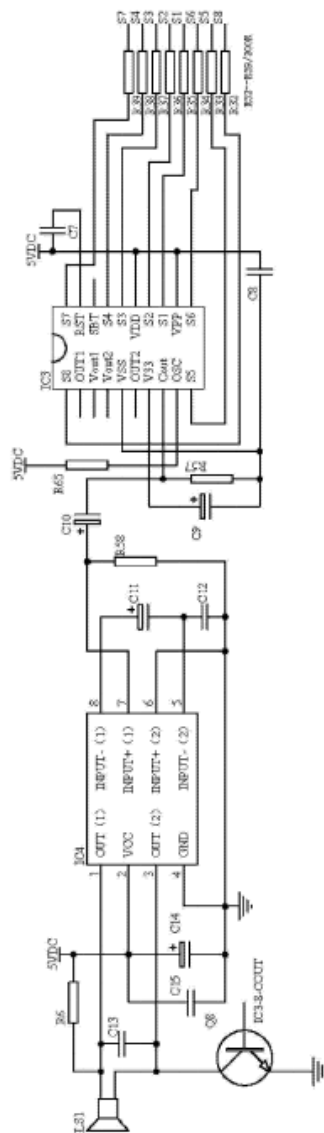


Figure 4

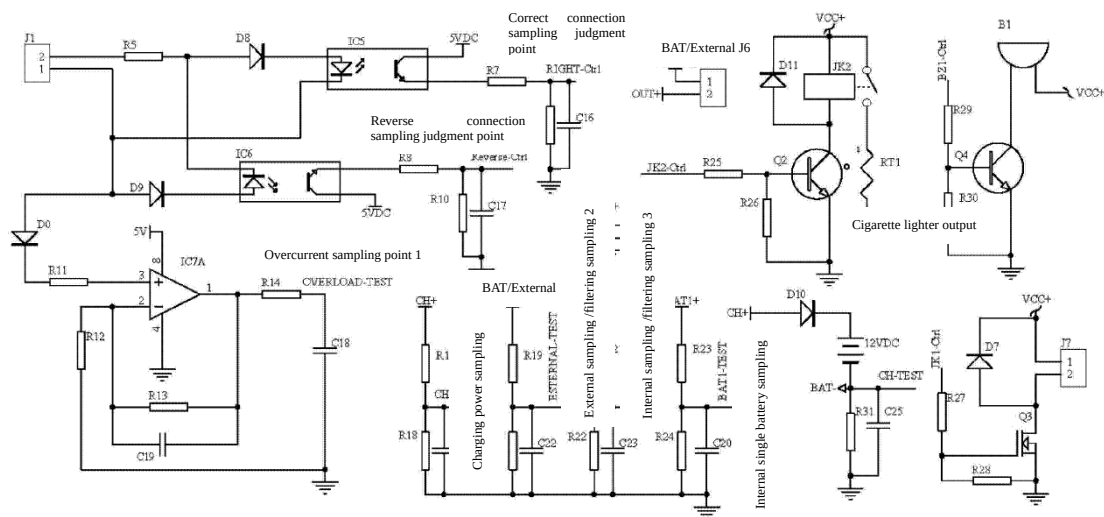


Figure 5



(12) 实用新型专利

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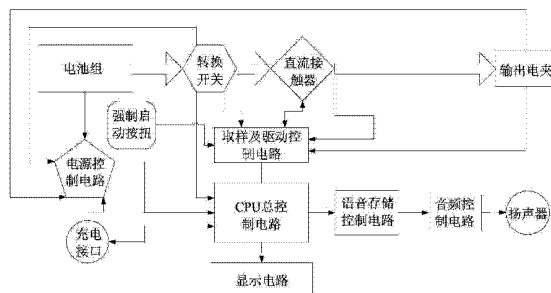
权利要求书 1 页 说明书 7 页 附图 4 页

(54) 实用新型名称

一种自带语音提示功能的智能型应急启动电源

(57) 摘要

本实用新型公开一种自带语音提示功能的智能型应急启动电源,包括有电池组,电池组的供电端连接有转换开关,转换开关通过直流接触器连接至输出电夹,还包括有 CPU 总控制电路,该 CPU 总控制电路的输出端连接有音频播放系统;CPU 总控制电路的输入端连接有取样及驱动控制电路,该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连;电池组通过电源控制电路与充电接口相连,电源控制电路与充电接口连接至 CPU 总控制电路;输出电夹及转换开关分别与电源控制电路相连;CPU 总控制电路的输出端还连接有显示电路;取样及驱动控制电路连接有强制启动按钮。该应急启动电源在不同的使用环境下,都能够及时准确地向用户传递相关操作信息。



1. 一种自带语音提示功能的智能型应急启动电源,包括有电池组,该电池组的供电端连接有转换开关,转换开关通过直流接触器连接至输出电夹,其特征在于,

还包括有 CPU 总控制电路,该 CPU 总控制电路的输出端连接有音频播放系统;

所述 CPU 总控制电路的输入端连接有取样及驱动控制电路,该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连;

所述电池组通过电源控制电路与充电接口相连,电源控制电路与充电接口连接至 CPU 总控制电路;

所述输出电夹及转换开关分别与电源控制电路相连;

所述 CPU 总控制电路的输出端还连接有显示电路;

所述取样及驱动控制电路连接有强制启动按钮。

2. 根据权利要求 1 所述的一种自带语音提示功能的智能型应急启动电源,其特征在于,所述音频播放系统包括语音存储控制电路,该语音存储控制电路的输入端连接于 CPU 总控制电路,其输出端连接于音频控制电路,音频控制电路与扬声器相连。

3. 根据权利要求 1 所述的一种自带语音提示功能的智能型应急启动电源,其特征在于,所述显示电路包括 LED 数码管显示器和不同颜色的 LED 指示灯。

一种自带语音提示功能的智能型应急启动电源

技术领域

[0001] 本实用新型涉及应急启动电源，尤其涉及一种自带语音提示功能的智能型应急启动电源。

背景技术

[0002] 12V/24V 转换应急启动电源在不同的使用环境下，单靠人为控制操作难以做到百分之百正确。在没有任何保护和提示的前提下，任何出现一次误操作都将可能给产品带来永久损坏，严重时甚至可导致电池爆炸，危及到用户的人身财产安全。虽然现有的部分产品设有操作指导说明和一些简单的声光报警功能，但由于简单的蜂鸣器报警和使用的磨损导致操作提示内容的缺损或模糊，使应急启动电源缺少必要的安全指示，同时也给用户操作出现问题后却无法及时找到原因而困惑。如果在用户每一项操上同时增加必要的语音提示和光电指示，这样既能减少不同环境给用户带来的影响，同时也能及时地直接告知用户实时的操作状况，更能有效地预防失误的产生，让用户操作更直接、更清楚。因此，有必要对现有应急启动电源的结构进行优化。

实用新型内容

[0003] 本实用新型的目的是提供一种自带语音提示功能的智能型应急启动电源，用语音对用户的当前操作给予提示，以减少误操作，使应急启动电源在操作时得到安全防护，延长其使用寿命。

[0004] 本实用新型为解决其技术问题所采用的技术方案是，

[0005] 一种自带语音提示功能的智能型应急启动电源，包括有电池组，该电池组的供电端连接有转换开关，转换开关通过直流接触器连接至输出电夹，还包括有 CPU 总控制电路，该 CPU 总控制电路的输出端连接有音频播放系统，该音频播放系统包括有语音存储控制电路，语音存储控制电路的输入端连接于 CPU 总控制电路，其输出端连接于音频控制电路，音频控制电路与扬声器相连；

[0006] 所述 CPU 总控制电路的输入端连接有取样及驱动控制电路，该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连；所述电池组通过电源控制电路与充电接口相连，电源控制电路与充电接口连接至 CPU 总控制电路；所述输出电夹及转换开关分别与电源控制电路相连；所述 CPU 总控制电路的输出端还连接有显示电路，该显示电路包括 LED 数码管显示器和不同颜色的 LED 指示灯；所述取样及驱动控制电路连接有强制启动按钮。

[0007] 本实用新型的优点在于，该应急启动电源可对档位选择、正确连接、错误连接和电压过低或电压过高等进行安全保护，同时在充电档位选择、电池低压预警、输出过流保护、电夹输出短路保护以及人为强制启动安全提示等方面都加入相应的语音提示和光电提示；在不同的使用环境下，都能够及时准确地向用户传递相关操作信息，使用户通过声、光等不同类型的提示方式获取操作信息，使用户更加直观地了解实时的操作情况及使用错误的原因，便于更好地进行下一步操作或及时有效地纠正措施，确保使用者的人身安全，使整个产

品更具人性化、智能化。

附图说明

- [0008] 图 1 是本实用新型提出的应急启动电源的电气原理图；
[0009] 图 2 是电源控制电路图；
[0010] 图 3 是 CPU 总控制电路及 LED 数码管显示器电路图；
[0011] 图 4 是语音存储及音频控制电路图；
[0012] 图 5 是取样及驱动控制电路图。

具体实施方式

[0013] 为了使本实用新型实现的技术手段、创作特征、达成目的与功效易于明白了解，下面结合图示与具体实施例，进一步阐述本实用新型。

[0014] 如图 1 所示，本实用新型提出的自带语音提示功能的智能型应急启动电源包括有电池组，该电池组的供电端连接有转换开关，转换开关通过直流接触器连接至输出电夹，还包括有 CPU 总控制电路，该 CPU 总控制电路的输出端连接有音频播放系统，该音频播放系统包括有语音存储控制电路，语音存储控制电路的输入端连接于 CPU 总控制电路，其输出端连接于音频控制电路，音频控制电路与扬声器相连；

[0015] 所述 CPU 总控制电路的输入端连接有取样及驱动控制电路，该取样及驱动控制电路与转换开关、直流接触器及输出电夹相连；所述电池组通过电源控制电路与充电接口相连，电源控制电路与充电接口连接至 CPU 总控制电路；所述输出电夹及转换开关分别与电源控制电路相连；所述 CPU 总控制电路的输出端还连接有显示电路，该显示电路包括 LED 数码管显示器和不同颜色的 LED 指示灯；所述取样及驱动控制电路连接有强制启动按钮。

[0016] 目前汽车电池主要分为 12V 和 24V 两种，在电路设计中以 0VDC ~ 15.5VDC 以内默认为是 12VDC 电池；以 15.5 ~ 30.0VDC 内默认为是 24VDC 电池。转换开关将两个电池实现并联或串联两种方式，使之能够实现一机两个电压输出的功能。同时在转换开关上镶入两个联动小开关，联动开关与 12V 档和 24V 档保持同步，即转换开关在 12V 或 24V 档时，联动开关也同步闭合，在 OFF 档时，联动开关也自动断开，用于实现外部连接信号的输入或断开等判断。

[0017] 该应急启动电源利用大功率直流接触器作为自动控制电子开关，通过电路进行控制其通和断两种状态，同时电路在吸合后判断直流接触器两端电压降，作为判断输出电夹是否出现短接的条件之一。

[0018] 应急启动电源分别从电池组两端、电夹小齿、转换开关输出端、直流接触器两端、充电接口、内部电压测试复位开关、强制启动按钮等关键点分别取样送至 CPU 总控制电路处理、判断，从而得知用户的操作信息后，将对应的脉冲信号发到语音存储控制电路，调取预先保存好的语音内容，再经过音频控制电路功率放大后，由扬声器发出相应的语音信息。该应急启动电源可对档位选择、正确连接、错误连接和电压过低或过高等进行安全保护，同时在充电档位选择、电池低压预警、输出过流保护、电夹输出短路保护以及人为强制启动安全提示等方面都加入相应的语音提示和光电提示。语音清晰、响亮，发音标准，在 40dB 噪声环境下，声音有效传输距离在 5 米以上。语音种类除了标准的英语提示外还预备另外两个

语种,即法语和西班牙语,用户可直接通过简单的按键任意切换,提高产品的通用性。

[0019] 在一个实施例中,该应急启动电源的电路构成如图2、图3、图4、图5所示。本实施例中,该应急启动电源采用的主要关键器件有:IC1-7805 三端集成稳压器、IC2-MC96F32Q 单片机、IC3-BLA4208 语音存储集成芯片、IC4-TDA2822 集成音频功放、LS1-全频段扬声器 2W/8 欧、LED-LG5631AH 七段数码管显示器、IC5 (IC6)-PC817 光耦、IC7-LM358 集成运放、大功直流接触器、大电流转换开关(12/24V 档切换用)、联动开关、强制启动按钮、输出正、负极电夹。

[0020] 本实施例中,该应急启动电源可实现的主要功能有:

[0021] 1、应急启动电源转换开关操作时 12V/24V 档位自动识别提示,对应的档位语音提示及 LED3/LED4 点亮指示;

[0022] 2、应急启动电源电池低压自动报警提示,当电池电压低于 $8.0 \leq U < 10.0V$ 时,语音自动报警提示;

[0023] 3、应急启动电源电池电压过低自动关断保护及提示,当电池电压持续低于 8V 时,应急启动电源自动关断电夹输出回路,同时发出低压关断保护语音提示;

[0024] 4、输出电夹正确连接导通提示,正确连接时自动吸合导通,并带语音提示及 LED4 灯点亮提示;

[0025] 5、输出电夹连接极性反向错误关断保护和提示,输出电夹极性接反时,直流接触器产关断保护,同时发出相应的语音信息提示及反接指示 LED7 灯点亮提示,同时数码管闪烁显示错误代码“Er1”信息;

[0026] 6、输出电夹连接电压错误关断保护和提示,即,内外连接的电池电压不匹配,一般指 12V 与 24V 电池对接错误或 24V 接外部电压高于 30.0V 的电池,应急启动电源自动发出错误连接语音信息提示和错接指示 LED6 灯点亮提示,同时数码管闪烁显示错误代码“Er2”信息;

[0027] 7、输出电夹过载关断保护和提示,当输出电夹出现电流过大时,自动关断而保护,应急启动电源发出相应的语音信息提示及数码管闪烁显示过载保护代码“P1”信息;

[0028] 8、输出电夹短路自动关断保护和提示,在吸合导通下,当输出电夹再次出现短接时,自动关断输出而保护,同时发出相应的语音信息提示及数码管闪烁显示短路保护代码“P2”信息;

[0029] 9、充电档位提示及充电状态指示,转换款应急启动电源充电仅现于 12V 档充电,即要把两电池并联后再一起充电,以确保两电池的充电电压平衡,即,插入充电器后,如转换开关不在 12V 档位时,应急启动电源自动发出语音信息提示,同时充电指示灯也不会点亮,直到档位选择正确为止,正在充电指示灯 LED2 点亮、充电结束时 LED1 点亮;

[0030] 10、强制启动输出功能,当外部没有电池电压输入或输入电压信号过低,应急启动电源无法正常自动识别时,通过人为判断并正确可靠连接后,按下强制启动按钮,使应急启动电源强制吸合导通。当按下强制启动按钮后,应急启动电源自动发出安全预警信息语音和数码管同步显示“10—9—8—.....0”倒数时间计数提示信息给用户,提醒用户注意外接负载的极性和安全工作电压,需要持续按下 10s 后,应急启动电源才自动吸合,确保用户有足够的时间再对连接进行安全确认。

[0031] 本实施例中,语音存储控制电路中存储的语音内容如下(以英文版为例):

- [0032] A. 12V
- [0033] B. 24V
- [0034] C. Low voltage, recharging recommended
- [0035] D. Power is connected
- [0036] E. Wrong Voltage
- [0037] F. Wrong Polarity
- [0038] G. Recharging ON, Turn the switch at back to 12V
- [0039] H. charge immediately
- [0040] I. Overload
- [0041] J. Short Circuit

[0042] 其具体工作过程如下：

[0043] 1、当转换开关由 OFF 档转入 12V 或 24V 档位时，转换开关将电池组并联或串联后的电压送至直流接触器的输入端，同时“OUT+”端有高电平（OUT+ 取样点实际连接于直流接触器的输入端，“BAT/ 外部”连接于直流接触器的输出端），并通过二极管 D1、限流电阻 R1 和稳压二极管 DW1 限压后，由电阻 R2 驱动开关管 Q1，使继电器 JK1 吸合导通；电池 BAT+ 电压经过二极管 D4 加入三稳集成稳压器 7805 的输入端，使 3 脚输出一个稳定的 5VDC 电压给 CPU 及其他电路供电；

[0044] 当外部电夹正确连接且电压大于 1.5V 时，“BAT/ 外部”端电压经过二极管 D6 后，同样也加到开关管 Q1 的基极使继电器吸合导通，从而使 7805 进入正常工作状态；同理，当充电接口“CH+”接入电源时，7805 也进入正常工作状态。

[0045] 2、单片机上电工作后，首先检测转换开关是否打开，当“OUT+”端检测到电压 < 15.5VDC 时再与单电池正极“BAT1+”端取到的电压进行对比，当两个参考点的电压基本相同时，CPU 默认此时转换开关已置于 12V 档位；反之，当该点电压 ≥ 15.5V 且与“BAT1+”端的电压值相差较大时，CPU 默认转换开关已置于 24V 档；确定好档位后，单片机由 P52 端口或 P53 端口输出高电平，驱动对应的档位指示灯 LED3 或 LED4 点亮；同时由 P21 端口或 P23 端口输出一个脉冲信号驱动语音芯片，提取对应的语音信息经功放、扬声器等器件将对应的档位信息报告给用户；

[0046] 当单片机检测到“OUT+”的电压过低时，12V 档电压低于 10.0VDC（24V 档电压低于 20.0VDC）时，应急启动电源自动默认为电池已经涸电，不宜再使用，应及时补充电量；单片机 P16 脚将自动循环输出脉冲信号给语音存储芯片，提取低压报警提示语音，并通过扬声器及时地把低压信息报告给用户；同时将自动关断所有负载，即关闭点烟器和直流接触器的输出；

[0047] 当单片机检测到“UOT+”的电压为 0V，同时在“OUT+/ 外部”端检测到一定的正电压时，则表示应急启动电源的转换开关没有开，只是用户将输出电夹与外部电池已正确连接上；此时，应急启动电源默认用户想通过 JS 的数显电压表去测试外部电池电压，即单片机自动将从“OUT+/ 外部”端读到的实际电压值通过数码管显示出来；

[0048] 当单片机检测到“UOT+”的电压为 0V，同时在“CH+”端检测到充电器有接入电压时，表示此时转换开关没有开，只是充电器已接入，此时单片机自动将输出一个脉冲信号给语音存储芯片，提取充电档位位置限制提示语音，告诉用户充电时请将转换开关置于 12V 档，

如转换开关在其他档位时,单片机将自动循环输出触发信号,直到用户将转换开关转到正确的12V档位为止;当应急启动电源进入正常充电后,单片机通过检测取样电阻R31上的压降进行判断,当充电电流小于300mA时该电阻上的压降为0.03V,表示充电结束,反之则表示正在充电,当LED2点亮表示正在充电,当LED1点亮时表示充电结束。

[0049] 3、启动,其工作原理如下:

[0050] 3.1、12V档正确连接导通和提示:转换开关置于12V档,单片机检测到“OUT+”点和“BAT1+”点的电压均在12V档范围内时,应急启动电源自动报12V档位提示语音;同时外部12V电池两端电压分两路取样,一路接入直流接触器的输端,使单片机在“BAT+/外部”点检测到12V档范围内的有效电压值;另一路通过电夹小齿取样、电夹线内部导线接至控制板的“J1”端口,使正接信号通过R5、D8和IC5进行转换后,将外部正接信号“RIGHT-Ctrl”送至单片机的P13端口,单片机判断应急启动电源已转到12V档,同时电夹已经正确可靠连接,此时单片机再向直流接触器控制电路输出高电平使其吸合导通,并向语音芯片发送一个脉冲信号提取正确连接及导通提示语音,将正确连接信息及时地告诉用户;其他指示:12V档位指示灯点亮;对应的正确连接指示灯点亮提示;数码管自动显示内、外池电并联后的综合电压值。

[0051] 3.2、12V档极性反向连接保护和提示:转换开关转到12V档,相应的档位检测和提示内容同上;同时外部12V(或24V)电池两端电压通过电夹小齿取样、电夹线内部导线接至控制板的“J1”端口,使反接信号通过D9、IC6和R5进行转换后,将外部反接信号“Reverse-Ctrl”送至单片机的P12端口,单片机判断应急启动电源已转到12V档,同时检测到外部电池极性接反,此时直流接触器将保持断开状态,并向语音芯片连续发送脉冲信号提取反接提示语音信息,并将反接信息及时地告诉用户;其他指示:12V档位指示灯点亮;反接报警指示灯LED7点亮;数码管显示反接错误代码“Er1”闪烁。

[0052] 3.3、12V档外接电压过高错误保护和提示:转换开关转到12V档,相应的检测和提示内容同上;同时电夹从外部电池两端电压接入直流接触器的输端,使单片机在“BAT+/外部”点检测到此时连接的电池电压已超出“12V”的安全范围内时,单片机直接默认外接电池电压与应急启动电源所选择的档位不匹配,直流接触器保持关闭保护;并向语音芯片连续发送脉冲信号提取电压错误连接提示语音信息,并将错接信息及时地告诉用户;其他指示:12V档位指示灯点亮;电压错误连接报警指示灯LED6点亮;数码管显示反接错误代码“Er2”闪烁。

[0053] 3.4、24V档正确连接导通和提示:转换开关置于24V档,单片机检测到“OUT+”点和“BAT1+”点的电压相关较大,应属于24V档位。应急启动电源自动报24V档位提示语音;同时外部24V电池两端电压分两路取样,一路接入直流接触器的输端,使单片机在“BAT+/外部”点检测到24V档范围内的有效电压值;中一路通过电夹小齿取样、电夹线内部导线后接至控制板的“J1”端口,使正接信号通过R5、D8和IC5进行转换后,将外部正接信号“RIGHT-Ctrl”送至单片机的P13端口,单片机判断应急启动电源已转到24V档,同时电夹已经正确可靠连接,此时单片机再向直流接触器控制电路输出高电平使其吸合导通,并向语音芯片发送一个脉冲信号提取正确连接及导通提示语音,将正确连接信息及时地告诉用户;其他指示:24V档位指示灯点亮;对应的正确连接指示灯点亮提示;数码管自动显示内、外池电并联后的综合电压值。

[0054] 3.5、24V 档极性反向连接保护和提示：转换开关转到 24V 档，相应的档位检测和提示内容同上；同时外部 24V（或 12V）电池两端电压通过电夹小齿取样、电夹线内部导线后接至控制板的“J1”端口，使反接信号通过 D9、IC6 和 R5 进行转换后，将外部反接信号“Reverse-Ctrl”送至单片机的 P12 端口，单片机判断应急启动电源已转到 24V 档，同时检测到外部电池极性接反，此时直流接触器将保持断开状态，并向语音芯片连续发送脉冲信号提取反接提示语音信息，并将反接信息及时地告诉用户；其他指示：24V 档位指示灯点亮；反接报警指示灯 LED7 点亮；数码管显示反接错误代码“Er1”闪烁。

[0055] 3.6、24V 档外接电压过低（或过高，超过 30.0V 时）错误保护和提示：转换开关转到 24V 档，相应的档位检测和提示内容同上；同时电夹从外部电池两端电压接入直流接触器的输端，使单片机在“BAT+/ 外部”点检到此时连接的电池电压已超出“24V”的安全范围内时，如外部电压低于 15.5V 或高于 30.0V 时，单片机直接默认外接电池电压与应急启动电源所选的档位不匹配，直流接触器保持关闭保护。并向语音芯片连续发送脉冲信号提取电压错误连接提示语音信息，并将错接信息及时地告诉用户；其他指示：24V 档位指示灯点亮；电压错误连接报警指示灯 LED6 点亮；数码管显示反接错误代码“Er2”闪烁。

[0056] 4、启动过载自动关断保护：当应急启动电源在启动的瞬间，整过启动系统中产生很大电流，应急启动电源通过从黑电夹小齿上取样，读取黑电夹的大齿到内部电池负极之间的压降，通过黑电夹小齿、内部信号线送到“J1”端口，再经过 D0、IC7 等电路放大后，将过流信号“OVERLOAE-TEST”送到单片机的 P11 端口，当该电压值在一定时间内持续高于某一设定值（预先测试出黑电夹大齿到电池负极端子之间的电阻，参考应急启动电源电池最大放电能力计算出过流保护的参考电压值）时，应急启动电源就默认外部连接负载过重，已超出整个系统最大承受范围时，单片机切断直流接触器控制信号，使直流接触器强制关断输出；单片机同时向语音存片提取对应的过流保护提示语音信息，并将信息及时告知用户；其他指示：数码管显示过流保护代码“P1”闪烁。

[0057] 5、电夹输出短路自动关断保护：当应急启动电源在吸合导通后电夹出现短路时，整过启动系统中产生很大电流，应急启动电源同样通过从黑电夹小齿上取样，读取黑电夹的大齿到内部电池负极之间的压降，通过黑电夹小齿、内部信号线送到“J1”端口，再经过 D0、IC7 等电路放大后，将过流信号“OVERLOAE-TEST”送到单片机的 P11 端口；同时单片机判断直流接触器两端“OUT+”和“BAT/ 部外”两点之间压差，当这两个电压值在一定时间内持续高于某一设定值时，应急启动电源就默认外部电夹连接出现短路故障；单片机将立即切断直流接触器控制信号，使直流接触器强制关断输出；单片机同时向语音存片提取对应的短路保护提示语音信息，并将信息及时告知用户；其他指示：数码管显示过流保护代码“P2”闪烁。

[0058] 6、强制启动输出：当外部电池电压过低或没有电池时，用户可以先将转换开关打开到所需的电压档位（此时相应的档位检测和提示内容同上），再将正、负极电夹分别接到负载的输入电源正、负极上，注意电夹的大小齿同时可靠连接，并确认负载所需电源与应急启动电源转换开关选择的电压档位一致后；按持续按下强制启开关，强制启动开关将“J3”端口短接，使内部 5V 电源通过电阻 R15、R16 分压取样后，送至单片机的第 P25 端口，单片机将自动开始计时，并向语音芯片提取强制启动语音安全提示，持续按下 10S 后，单片机将自动发出接通指令，使直流接触器强制吸合导通；当应急启动电源在动自吸合之前（10S 内）

出现连接异常(如、反接、高压错接)时,单片机将自动判断强制启动操作无效,需要排除故障后恢复;确保用户的操作安全;其他提示:按下此开关后,在 10s 内数码管显示“10s 倒计时器”闪烁,吸合导通后,应急启动电源将发出正确导通语音提示,同时正确连接提示灯 LED5 点亮。

[0059] 7、语音控制电路工作原理:首先把所有的功能语音以 PCM 压缩模式存入语音存储芯片中,语音芯片选用 BLA 系列的 BLA4208 芯片,该芯片总共支持语音长度为 42s,最多可存储 30 段不同的语音内容;语音的读取是通过 S1-S8 共 8 个单独触发引脚控制,同时还支持不同引脚以不同的组合方式进行触发,使其能够支持 30 段语音触发的需要;再通过 CPU 控制任意提取每一段语音内容,通过第 8 脚输出语音信号,经过音频功放 IC4 放大后,直接驱动扬声器 SL1 发音;语音触发信号为高电平有效,单片机每发出一个脉冲触发信号,语音芯片将自动提取一次相应的语音内容进行播报;当触发为持续高电平时,芯片将自动循环播报相同语音内容。

[0060] 8、取样电路及控制电路工作原理:如图 5 所示,J1 为正、负极电夹小齿取样信号输入端,当外部正接时,电压通过电阻 R5、D8 及 IC5 进行转换后,将 AD 信号送入单机的第 P31 端口,作为判断外部电夹是否正接或断开的依据;当外接电池电压极性反向时,单片机无法直接读取“BAT/ 外部”端的负压,而通过 J1、D9、IC6、R5 进行转换后,将反接信号送入单片机的第 P12 端口,作为判断外部电夹连接极性反向依据;当输出电夹线出现负载电流过大时,大电流将会在负极电夹线上产生一定压降,这个电压将通过负极电夹的小齿取出送至 D0、R11 和 IC7 放大后送入单片机的第 P11 脚进行判断,当检测到该电压在 1s 内持续大于某一设定值时,单片机就默认为外接负载过重,立即关断直流接触器进行保护;同理,当检测到该电压值在瞬间内高于另一设定值,同时又分别从直流接触器两端检测到的压降也大于某一设定值时,应急启动电源就自动默认为输出电夹存在短路现象,立即关断直流接触器而保护;

[0061] J5 为充电电源接入端;J6 为内输出电压检测和外部电压检测输入端,同时也是直流接触器两端压降的取样点;J7 为直流接触器控制线圈接口;其中由主要元件 R25、R26、Q2、JK2、RT1 组成点烟器输出控制电路;由主要元件 R29、R30、Q3 组成蜂鸣器报警控制电路;由主要元件 R27、R28、Q3 组成直流接触器控制电路;由主要元件 R17、R18、R31、C25、C21 组成充电电源取样及充电电流取样电路,用于判断充电器的接入以及充电状态的检测;由主要元件 R19、R20、R21、R22、R23、R24、C22、C23、C20 组成了内、外电池电压取样电路及转换开关档位判断取样电路;由主要元件 LED、Q5、Q6、Q7 等组成数码显示控制电路。

[0062] 以上显示和描述了本实用新型的基本原理、主要特征和本实用新型的优点。本行业的技术人员应该了解,本实用新型不受上述实施例的限制,上述实施例和说明书中描述的只是说明本实用新型的原理,在不脱离本实用新型精神和范围的前提下本实用新型还会有各种变化和改进,这些变化和改进都落入要求保护的本实用新型范围内。本实用新型要求保护范围由所附的权利要求书及其等同物界定。

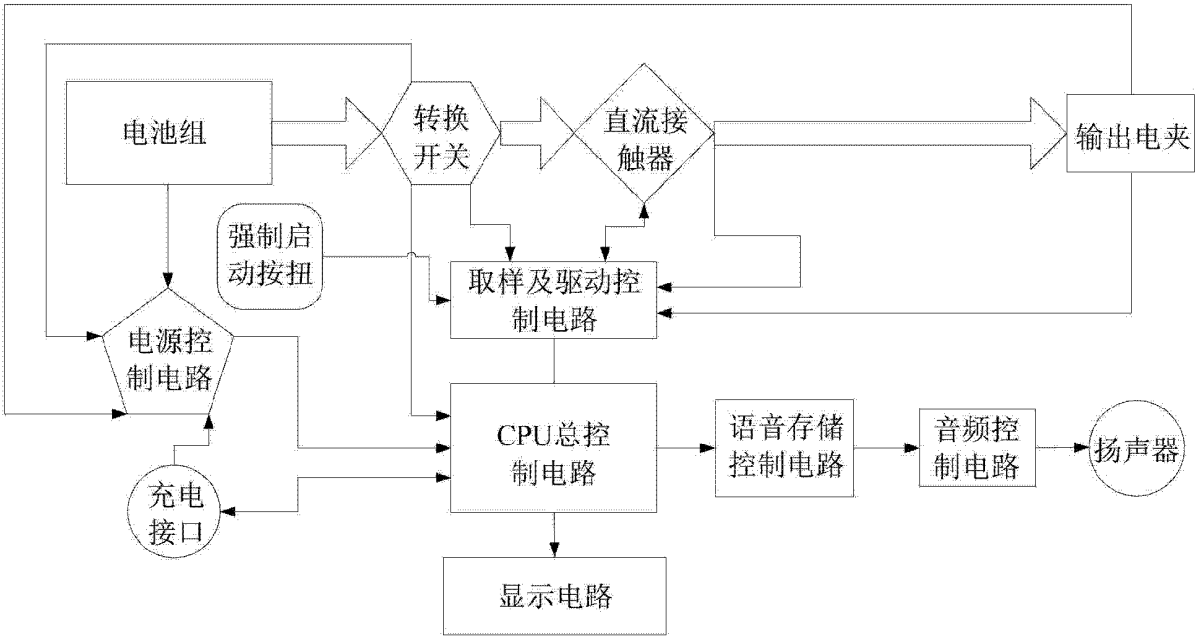


图 1

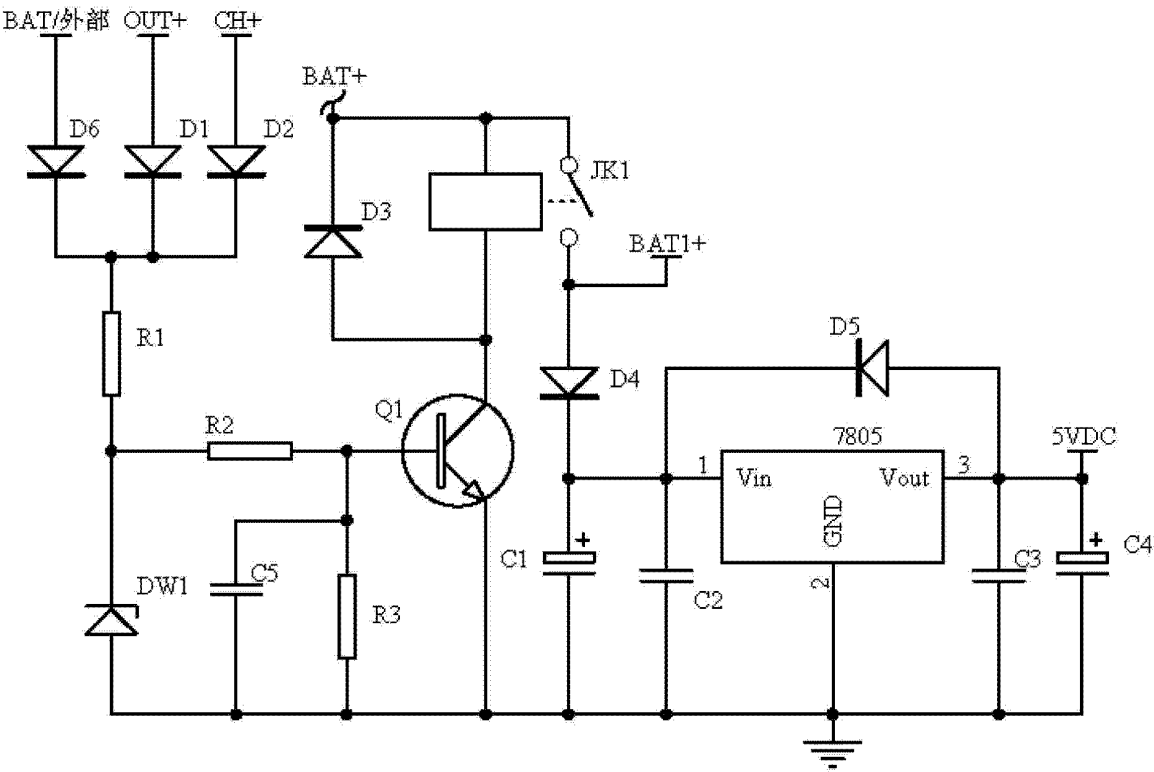


图 2

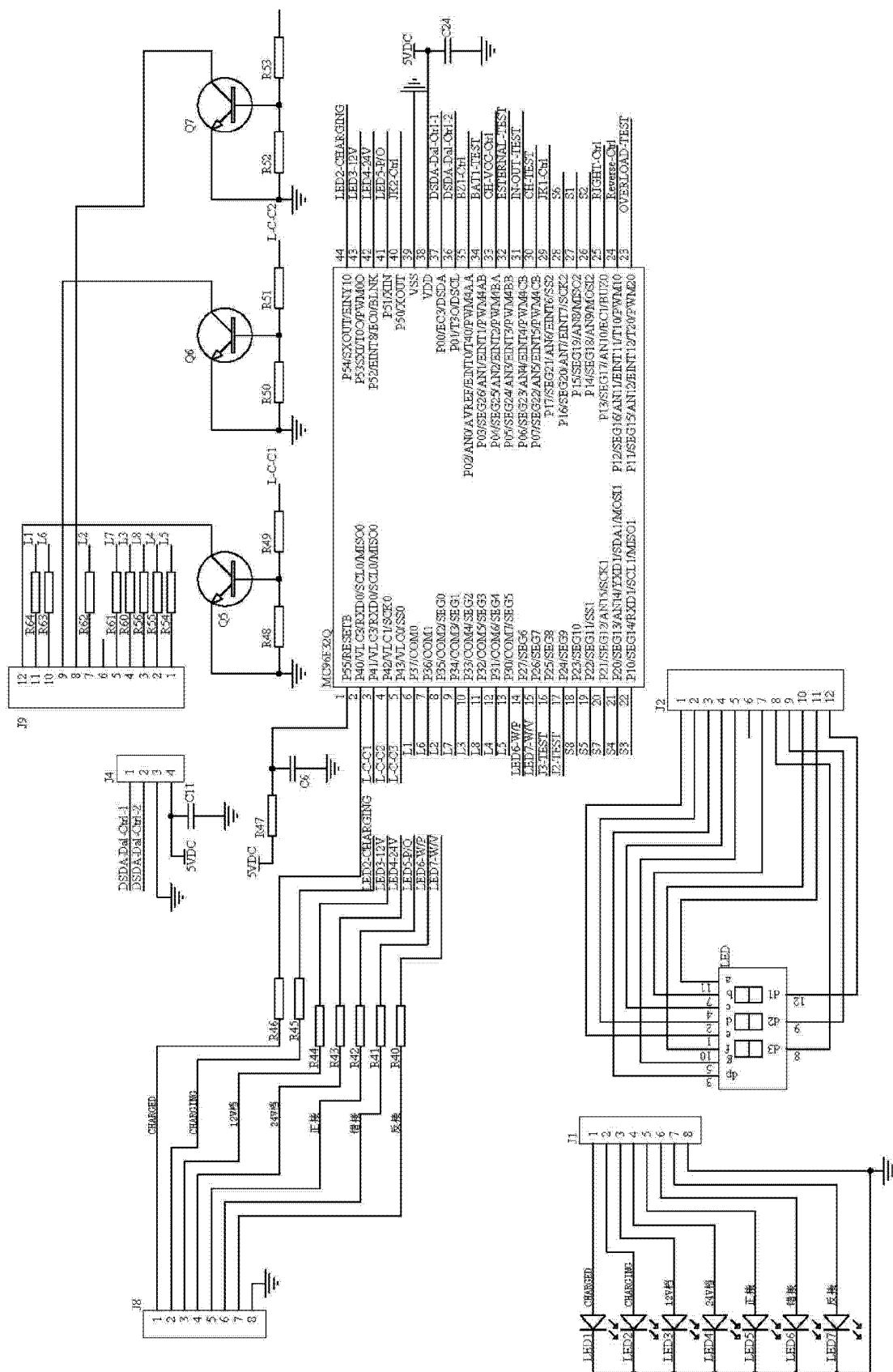


图 3

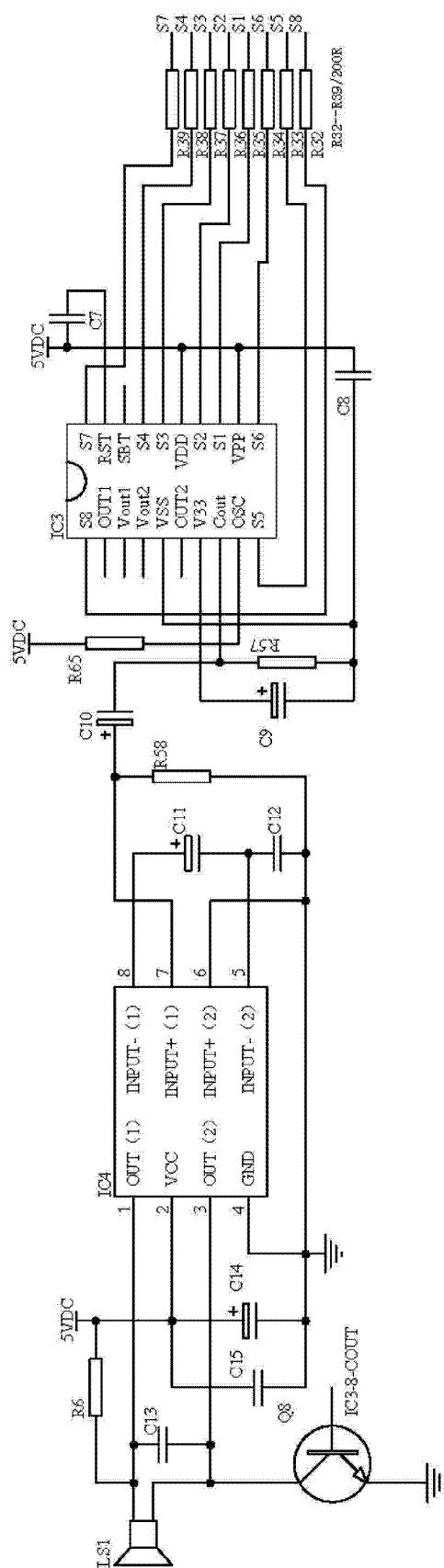


图 4

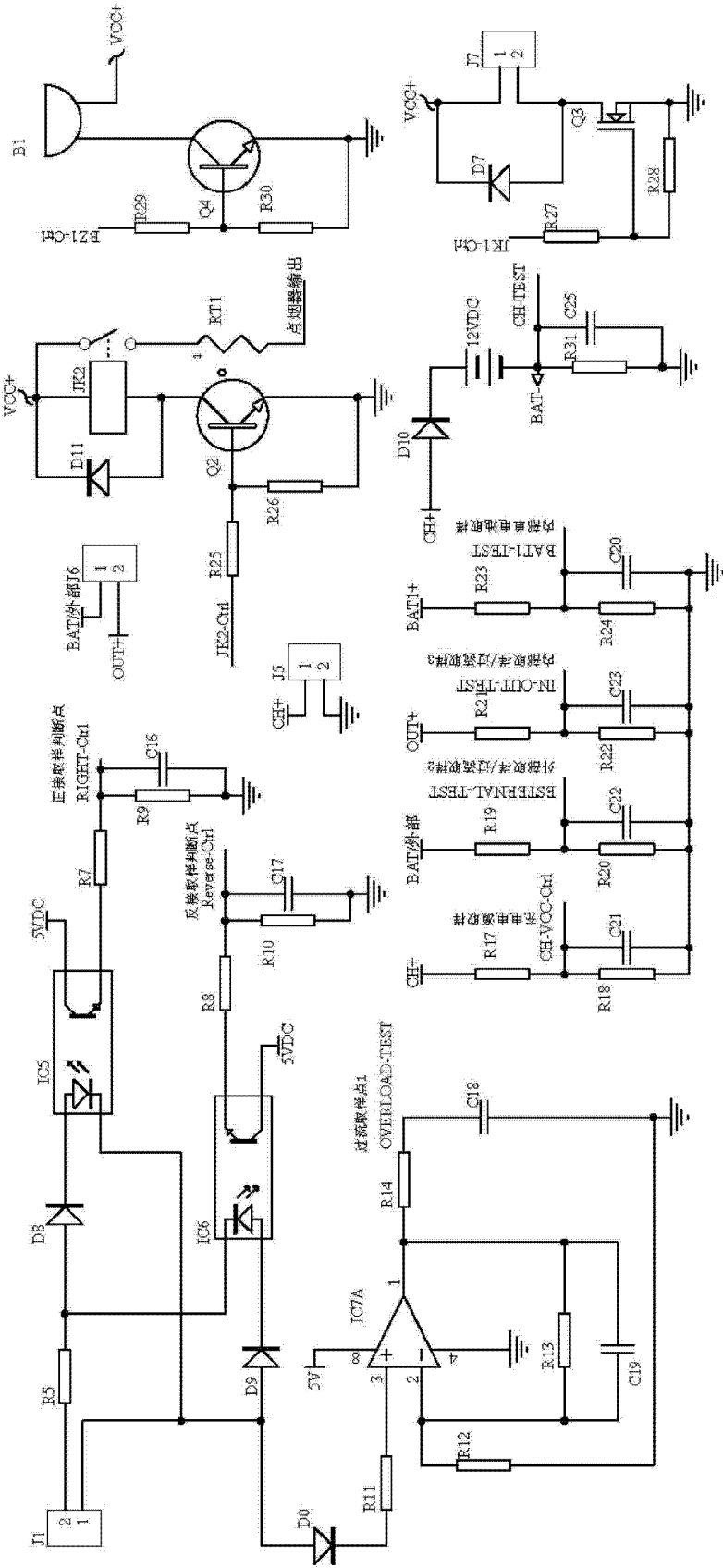


图 5