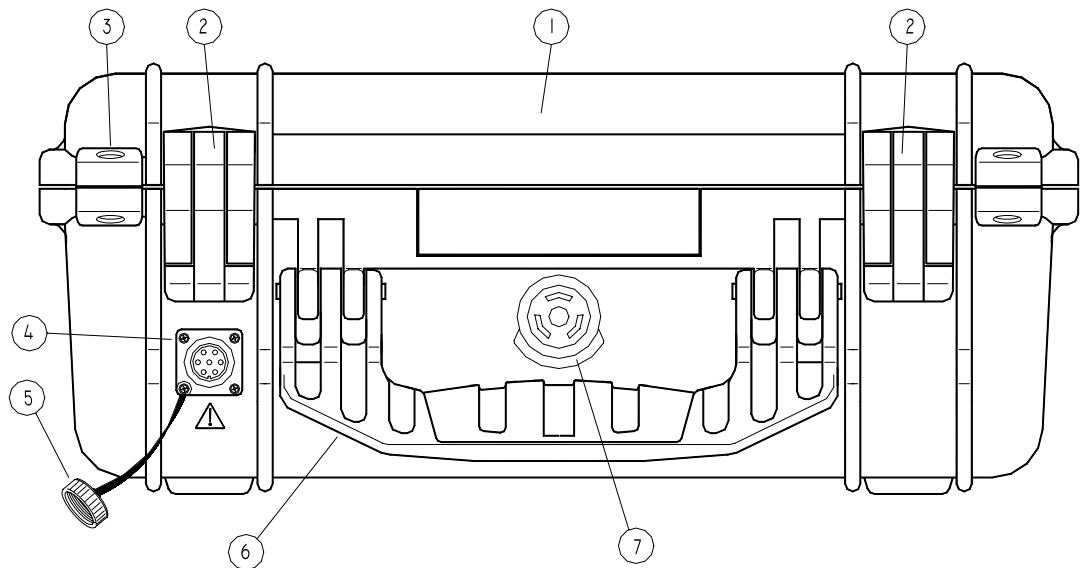


5.0 BPK-48A EMERGENCY BATTERY PACK










5.1 CASE AND FRONT- PANEL DIAGRAM

CASE



FRONT-PANEL



1. IP67 Ultra-High Impact Copolymer Polypropylene case. 34 x 29.5 x 15.2 cm
2. Double-step latches
3. Stainless steel reinforced padlock protector
4.  Waterproof 7-pole DIN connector for external emergency battery.
WARNING: the metallic contacts of this connector carry directly the batteries voltage and NO FUSE PROTECTION IS PROVIDED! AVOID ABSOLUTELY ANY ACCIDENTAL CONTACT OF THESE PINS EACH OTHER OR WITH OTHER METALLIC PARTS: THE CONTACTS WILL BE FUSED AND THE BATTERIES COULD BE PERMANENTLY DAMAGED!!! **USE ONLY THE SPECIAL CONNECTION CABLE (IP65) SUPPLIED WITH THIS UNIT.** **Exercise also the maximum care to maintain these contacts always PERFECTLY CLEAN AND DRY.**
5. Protection cap for the DIN connector.
6. Fold-down and rubberized handle
7. Automatic pressure equalization valve
8. Polycarbonate, silk-screen printed front-panel
9.   BATTERY 1 – SYSTEM (red/green). This bi-colour indicator LED blinks GREEN during the normal charging process and turns ON RED (steady) if the relative battery doesn't pass the initial test or the charging process is terminated with a FAULT condition.
10.   BATTERY 2 – FIRE (red/green). This bi-color indicator LED blinks GREEN during the normal charging process and turns ON RED (steady) if the relative battery doesn't pass the initial test or the charging process is terminated with a FAULT condition.
11.   BATTERY 3 – FIRE (red/green). This bi-color indicator LED blinks GREEN during the normal charging process and turns ON RED (steady) if the relative battery doesn't pass the initial test or the charging process is terminated with a FAULT condition.
12.  TEST OK/FAULT LED (yellow). This indicator LED blinks during the initial test of the internal batteries before the charging process takes place. The TEST LED is turned OFF if the TEST is passed for all the batteries and the charge starts normally. This LED is turned ON (STEADY, with the "FAULT" meaning) if otherwise one or more battery doesn't pass the initial test.
13.  CHARGE LED (red). This indicator LED turns ON after all the internal batteries have been successfully tested and the charging process is running.

14. OPTIONAL CONNECTOR for the EXTERNAL Battery Pack. 7-pole DIN connector male. Normally this connector IS NOT MOUNTED on the front-panel of the BPK-48A units: it is placed outside on the CASE front (see case diagram, point 4).
15. Insulated bipolar receptacle for the mains supply cable. **WARNING: the Unit is NOT PROVIDED WITH A GROUND CONNECTION (this condition is marked with the specific symbol). The user's protection is obtained using components with a DOUBLE INSULATION.**
16. ● Line LED (blue). This LED indicator turns ON whenever the Unit is connected to a suitable MAINS receptacle for battery charging. The charging process takes place automatically when the MAINS cable is plugged into a suitable line socket (110 – 240Va.c. 50 – 60Hz). No power switch is provided: the batteries are disconnected automatically from the external circuits during the charge process.

5.2 GENERAL DESCRIPTION

The Emergency Battery Pack **BPK-48A** is an **autonomous Unit containing the following elements**:

- TWO Batteries for the fire lines: 12V 1,2Ah. Lead-acid type, sealed with gel-immobilized electrolyte.
- ONE Battery for the System supply: 12V 5,7Ah. Lead-acid type, sealed with gel-immobilized electrolyte.
- Universal Line power supply (110 - 240Va.c 50-60Hz for the re-charge system.
- Automatic charging circuit, supervisor and battery status manager, **controlled by a dedicated microprocessor**.
- Highly impact-resistant plastic polymer case.
- Front-panel with LED indicators for the batteries charge status.
- 7-pole waterproof DIN connector to carry power to the external Units.

The Battery Pack can verify the charge status of all batteries (both System and Lines), to provide an optimal recharge of the batteries and to signal accurately any inconvenience detected during the charge or the test.

5.2.1 USE

The **BPK-48A** Emergency Battery Pack is intended to be used IN EMERGENCY when the INTERNAL BATTERIES of both TX5000 or RX48 Units should fail to pass the initial test or when the charge level is considered too low to grant a reliable performance during the whole show.

The **BPK-48A** Emergency Battery Pack can be immediately connected to the corresponding socket (placed OUTSIDE on the case near to the handle) of any TX5000 or RX48 Unit. Since all connectors are placed EXTERNALLY and the special cable supplied for the connection is WATERPROOF (IP65), all the Units can be used with the COVERS CLOSED AND LATCHED, thus maintaining a complete protection of the whole system against water penetration.

BEFORE CONNECTING the **BPK-48A Emergency Battery Pack to any Unit (TX5000 or RX48), MAKE SURE THE POWER SWITCH OF THE UNIT IS PLACED ON THE OFF/EXT position in order to AVOID POSSIBLE CONFLICTS BETWEEN THE INTERNAL BATTERIES AND THE POWER SUPPLIED BY THE **BPK-48A**.**

WHEN THE **BPK-48A IS CONNECTED TO AN EXTERNAL UNIT, THE LINE CORD MUST REMAIN DIS-CONNECTED (i.e.: the charge process IS NOT ALLOWED)**

5.3 OPERATION DESCRIPTION

5.3.1 TEST

The INTERNAL BATTERIES of the **BPK-48A** are tested by the circuits of the RX48 Unit when the connection is made. The **BPK-48A** doesn't have any internal circuit to detect the charge status of its batteries: it will be User's care to maintain always WELL CHARGED the batteries of the **BPK-48A** unit or to connecting it time to time (when not in use) to a RX48 Unit to monitor the residual battery charge.

5.3.2 TEST (UNIT CONNECTED TO MAINS)

When the mains cord is connected to a line receptacle, the **BPK-48A** internal circuits perform a minimum of test on the internal batteries before the charging cycle is started:

- The batteries must be present and have a minimum residual voltage (below a preset voltage or when NO VOLTAGE is detected, the battery is considered PERMANENTLY FAILED or ABSENT and the charging cycle WILL BE NOT INITIATED).
- The line voltage must be within the specified values (110 to 240Va.c.) otherwise the test and charging cycle will be INHIBITED.

5.3.3 TEST CONDITIONS

The test conditions are summarized in the table below:

PARAMETER	SYSTEM Battery	LINE Battery
TYPE	Sealed- Lead-acid	Sealed- Lead-acid
Nominal voltage	12V	12V
Charge capacity	5.7Ah	1.2Ah
CHARGE voltage	13.9V	14.2V
CHARGE limit current	700mA	300mA
FAILED Battery voltage	≤8.0V	≤8.0V
Battery "having to be charged" voltage	≤11.5V	≤11.5V
Battery "CHARGED" voltage	≥12.3V	≥12.3V
END-OF-CHARGE current	≤75mA	≤18mA
Max time with LIMIT CURRENT	∞	30'
Max charging time	12h	12h
OPEN-LOAD Percentage (TEST)	≤15%	≤20%
OPEN-LOAD Percentage (after charging)	≤10%	≤12%

5.3.4 CHARGE

The **BPK-48A** Battery Pack must be first connected to the mains with the line cord: the blue LINE LED will turn immediately ON and the TEST OK/FAULT yellow LED will start to blink. The BATTERY#1 (SYSTEM) LED will turn ON (green): during 10 seconds the battery is tested (the corresponding green LED is steady). If the battery is present and its voltage is above the minimum required voltage, the charge will start (the corresponding LED will start to BLINK). If otherwise the battery is NOT PRESENT or its open-circuit voltage is BELOW the minimum allowed limit, the LED will turn RED and this battery will be DISCONNECTED (the battery is not present or is failed and requires service).

The process described above is repeated for the BATTERY#2 and BATTERY#3 (FIRE batteries). When all batteries have been tested, all the battery LED should BLINK GREEN, the TEST OK/FAULT yellow LED is turned OFF and the red CHARGE led is turned ON. From this moment begins the charge cycle of 12 hours.

The charge cycle (independently for each battery) can terminate in two possible ways:

- The charging current remains BELOW the preset limit (preset end-of-charge minimum current) for at least 1 minute.
- The charge is terminated ANYWAY after 12 hours (even if the end-of-charge minimum current is not reached)

While the first case is the correct way to terminate the charge cycle, the second case should be regarded as quite irregular. In any case if a battery doesn't reach the end-of-charge minimum current within the allotted period of 12 hours, not necessarily this battery should be regarded as FAILED one. It is quite common for this type of batteries, after a long use and several charging cycles, TO HAVE THE CHARGE CAPACITY REDUCED: this battery can be still used but it will be User's care to replace this battery as soon as possible with a NEW ONE. Remember as a sealed Lead-Acid battery has a reliable mean life of TWO YEARS and it should be replaced ANYWAY after this period (even if apparently still efficient).

Since the BPK 48-A Unit IS NOT PROVIDED with a LINE SWITCH, the Unit itself, during the charging process, must be suitably placed in order to allow the easy removal of the LINE CORD at any moment, in case of emergency.

5.3.5 ERROR CONDITIONS LISTING

The table below resumes all the possible error conditions and the way they are indicated by the LED lamps on the front-panel of the Battery Pack. The same information is printed on the front-panel itself.

LED "TEST OK - FAULT" (YELLOW)	
CONDITION	MEANING
BLINKING	Test in progress
STEADY	Test OK
LED B#1 - B#2 - B#3 (Bi-color)	
CONDITION	MEANING
GREEN STEADY	Battery under test
GREEN BLINKING	Test OK - Battery under charge
RED STEADY	Charge NOT in progress: the pre-charge test FAILED
LED "CHARGE" (RED)	
CONDITION	MEANING
OFF	Test in progress
STEADY	Test OK – CHARGE IN PROGRESS

5.4 BATTERIES

All batteries used by the FIREMASTER IV "Millennium Tree" SYSTEM, are of SEALED lead-acid type with GEL solid electrolyte. These are very reliable batteries requiring very little precautions and need PRACTICALLY NO SERVICE.

Considering however as the good result of a pyrotechnic show of several thousands dollars value, depends for a large extent by the good battery behavior, it seems adequate to insist on the absolute necessity of ACCURATE AND FREQUENT CONTROLS of the battery situation. In particular:

- 1) Avoid exposing the battery to **extreme temperatures (below 0°C or OVER 45°C)** for long periods.
- 2) When the SYSTEM is NOT IN USE, provide to charge regularly the batteries: the lead-acid batteries have a much longer life if maintained ALWAYS FULLY CHARGED. It is suggested a charge cycle of **12 hours every 30 days**. The internal microprocessor system will take care to maintain the optimum charge level in any condition.
- 3) When the System is NORMALLY USED (periodic duty), it is suggested to have a 12-hour charge before all shows.
- 4) If the batteries have been DEEPLY DISCHARGED it is suggested to have a full charge for at least **24 hours** (eventually repeat TWICE the automatic charge cycle).
- 5) Make periodic controls of the battery status at least every 6 months by visual inspection after removing it from the container: if any swelling, spot, salt or liquid spills are noticed, DISCARD IMMEDIATELY THE SUSPECT DEVICE even if apparently it does still give energy enough.
- 6) If measured OPEN CIRCUIT (without any load applied) all lead-acid batteries, when a common voltmeter (tester) is used, **always give 12V even if quite completely discharged** . It will be then necessary to always measure the battery voltage while a suitable load is applied. To do that, REMOVE the batteries from the Unit case, measure the voltage across the terminal with a voltmeter and connect momentarily a load sinking about **1A current**. For a 12V battery a common wire-wound resistor rated **10ohm 10W** can be used or optionally a 12V car bulb (e.g.: the one used for the headlight). The DIFFERENCE between the voltage measured OPEN CIRCUIT and UNDER LOAD shouldn't be MORE THAN 10% - 15%. E.g.: if a battery measured OPEN CIRCUIT gives a reading of 12,2V and, when LOADED with the resistor or the lamp, the reading decreases to 11,5V, it can be still regarded as a GOOD ONE. On the contrary, if the voltage measured UNDER LOAD should fall below 11V (or less), it will be then necessary to have a full charge for at least 12 hours and then the test will be repeated. If, after the charge, the test above is

passed, OK: the battery was just discharged and can be still used. If otherwise the battery still exhibits an excessive voltage reduction under load, then it **MUST BE IMPERATIVELY DISCARDED** AND REPLACED WITH A NEW ONE.

NOTE: all batteries installed inside the RX48 Units, are AUTOMATICALLY TESTED with the above method.

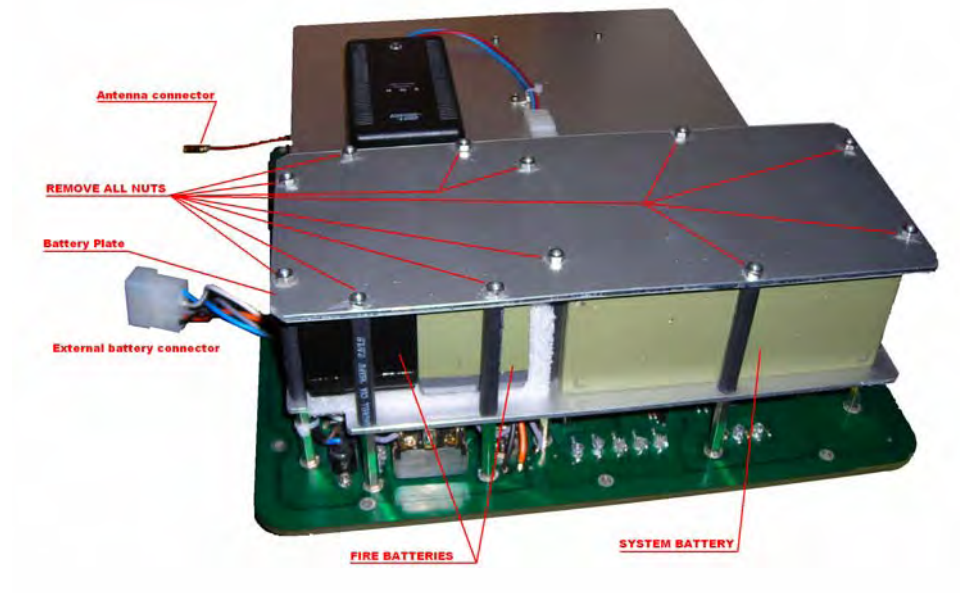
- 7) The MEAN LIFE of a lead-acid battery is ABOUT 2 YEARS or 500 charging cycles (whichever is less). It is thus suggested, in a prudential way, to CHECK YEARLY with great care all batteries and to replace all devices giving test results LESS THAN PERFECT (even if apparently acceptable). The recovered batteries, if still passing the load test, can be used as EMERGENCY EXTERNAL BATTERIES.

8)

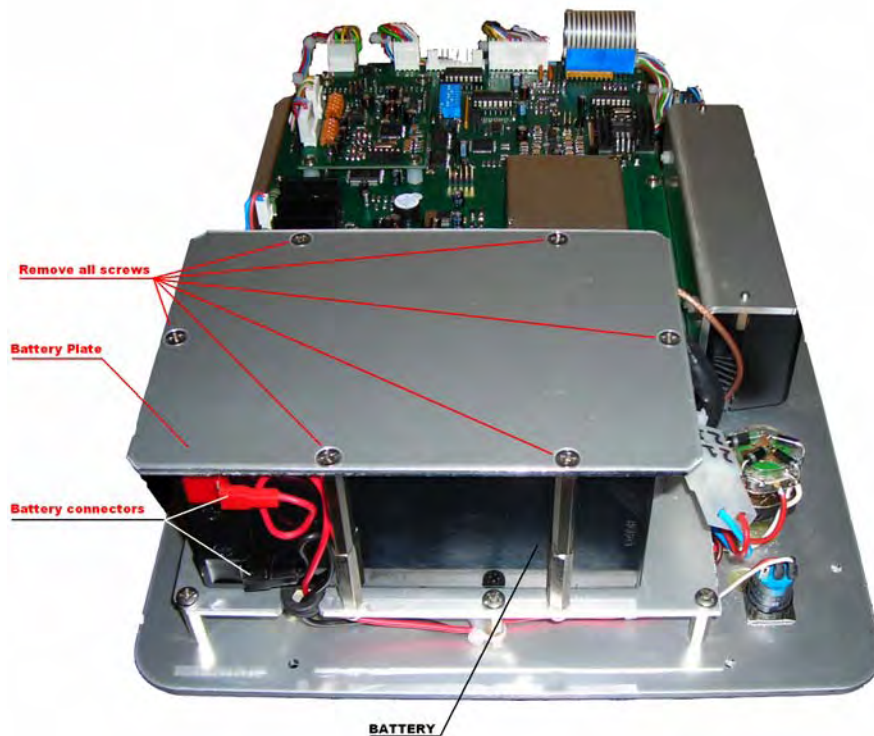


We recall here the RECYCLING RULES concerning the battery disposal: it must absolutely avoided to dispose the failed batteries with the common garbage, call instead a specialized collecting center enabled for the recycling of this polluting waste!

5.5 INTERNAL BATTERIES REPLACEMENT



RX 48 – INTERNAL VIEW – BATTERY REPLACEMENT



TX5000 – INTERNAL VIEW – BATTERY REPLACEMENT



BPK-48A – INTERNAL VIEW – BATTERY REPLACEMENT

When it is necessary to access the internal batteries for a check or replacement, proceed as follows:

- 1) If not already done, SWITCH OFF the Unit (Remote or Base).
- 2) Unscrew the top panel.
- 3) Remove VERY CAREFULLY the top panel. Disconnect the antenna coaxial cable and the external battery connection. During the above operations avoid any internal circuit or component touching the metal shields.
- 4) Unscrew the metal plates fastening the batteries
- 5) Disconnect the batteries from the circuits by removing the cable connectors (FASTON).
- 6) Check or replace all batteries needing service.
- 7) Restore the connections to all batteries **RESPECTING THE CORRECT POLARITY (CHECK MORE THAN ONCE FOR SAKE OF SAFETY!)**
- 8) Restore the rubber spacers placed between the batteries and the metal panel. Fasten the batteries with the metal plate and secure all screws.
- 9) Close the panel securing it to the case with the screws (don't forget the nylon washers!)
- 10) **When a battery replacement is needed, USE THE ORIGINAL SONNENSCHN - DRYFIT BATTERIES ONLY.**

The battery used on the FIREMASTER IV "*Millennium Three*" are the following types:

- **TRANSMITTER (TX5000): ONE 12V 5,7Ah battery series dryfit A300 SERIAL 07 191432 00 (optionally it can be used the same type series A200 SERIAL 07 191432 00)**
- **RICEIVERS (RX48): - ONE SYSTEM BATTERY 12V 5,7Ah series dryfit A300 SERIAL 07 191432 00 (optionally it can be used the same type series A200 SERIAL 07 191432 00) - TWO LINE (FIRE) BATTERIES 12V 1,1Ah series dryfit A300 SERIAL 07 191185 00 (optionally it can be used the same type series A200 SERIAL 07 190185 00)**

WARNING: using battery types **DIFFERENT FROM** the specified ones, other than **NOT GRANTING** a normal working autonomy, could also require a complete **RE-TUNING** of the recharge circuits: this operation requires the manufacturer intervention.

The charging voltage of the Sonnenschein dryfit batteries (limited current) is 13,9V/14,2V at 20°C: the internal charging circuits are set to this value. Batteries of different manufacturers, could require different charging values up to 14,9V.

The dryfit Sonnenschein batteries are **SOLID GEL IMMOBILIZED** and can be used without restrictions **IN ANY POSITION**. Several other **SEALED BATTERY** have a **LIQUID IMMOBILIZED** electrolyte: even if equivalent from a functional point of view, they **CANNOT OPERATE FOR LONG PERIODS LAID DOWN**, or a sudden **LOSS OF CHARGE CAPACITY** will be faced. In any case the **SYSTEM BATTERY** must be **NEVER** replaced with such a type, because it **PERMANENTLY OPERATES IN THIS POSITION**.