



Technical Note TN-688

Handportable Battery Facts and Figures

24th September, 2001

Applicability

This Technical Note applies to all Tait Handportable radio batteries

1. Information

Background

This technical note aims to help the reader understand the reasons why correct battery selection for a user is so important. If the user (or Tait Staff) selected a battery type that is not correct for the end user, the customer will become dissatisfied with the performance of the product and the Tait product range, as a whole, will suffer.

Battery performance is affected by many factors. Some of these factors are not able to be controlled by the user. However, the battery service life and shift life is very dependent on the user treatment and management of the batteries.

Main Points

1. Battery shift life reduces with age. Expect the battery capacity to **reduce by 20% per annum** in a high use application.
2. Battery manufacturers recommend that the users leave a residual charge of 20% of the total battery capacity at the end of their shift. Repeated full discharge (i.e pack discharged to 6V) **halves the service life** of the battery compared to one that is only 70% discharged.
3. Battery storage, charging and discharging, in a warm environment (35°C) **reduces service life by approximately 50%**. Combining the effects of deep discharge and a warm environment results in a much reduced service life.

2. Customer Requirements and Expectations

Details

It is very important that the customer's usage regime is investigated before a battery type is sold to them. Some careful research prior to making the sale can prevent customer frustration in the future.

- Battery Shift life is generally quoted in a 5/5/90 usage regime (ie 5% transmit, 5% receive and 90% standby). However, rarely does the actual usage regime match this. Careful effort is required to ensure that the battery pack eventually sold to the customer has ample capacity for the customer's application.
- Early battery failure is often an indication that an inappropriate battery was sold to the customer, since battery service life dramatically degrades if the pack is run flat each day.
- The Customer must be educated on how to care for the battery BEFORE the sale. This is to get the best performance from the battery for both shift and service life. Discussing these issues with the customer prior to sale helps to educate and manage their expectations.
- If the customer complains that the shift life of the battery has reduced, re-iterate the points in this document or ask them to return the battery to the CSO to be evaluated (as per GR0353)
- Sell the highest capacity battery available.
- Battery shift performance reduces with age. Expect the battery capacity to **reduce by 20% per annum** even if all the points in this document are followed.

3. Battery Management

Details

Managing the charging regime of a battery or fleet of batteries will add many months to the life cycle of the battery cells. Key things to note are:

- The battery contacts should be cleaned regularly with either a fiberglass pen or 4H (#4) or harder pencil.
- Where possible, battery chargers should be kept in a room where the ambient temperature is between 10°C and 25°C.
- Batteries should not be charged if they have had little or no use since their last charge.
- To maximise shift life, batteries should remain on the charger until a charge cycle has been completed (the LED shows steady green).
- Radio should be turned off whilst in the charger.
- If a new battery, stored battery or a battery experiencing short shift life is to be used, they should be long conditioned. The long condition takes approximately 24hrs.
- Batteries should be short conditioned once a week whenever possible.
- If actual cell capacity needs to be measured, the battery needs to be long conditioned in a Tait produced fast charger first then placed on a recommended battery analyser. Please refer to **GR0353** for the procedure.

4. Handportable Radio Use

Details

Educate the end user about when to replace the battery and possible side effects of not following the correct radio use. Also what features can be added to extend the shift life.

- Use the Economy mode (conventional radios) where possible. This will increase the shift life of the battery.
- Use Low power transmission whenever possible or program the radio to have low power permanently on.
- Use Backlighting Timer if backlighting is a requirement. This will turn the backlighting off after the timer has elapsed.
- **Batteries should be replaced or recharged as soon as the low battery warning beeps are heard. Continued use past this point dramatically reduces service life.**
- **Battery manufacturers recommend that the battery users leave a residual charge of 20% of the total battery capacity. Discharging to 1V cell voltage will cause the service life of the cells to decrease by half compared to one that is only 70% discharged.**
- The residual charge mentioned above could result in memory effect, but this is avoided by using the short condition function on a weekly basis.

5. Environmental Considerations

Details

The temperature of the usage environment plays a critical part in deciding which battery is best suited for the customer type.

- Battery Pack service life degrades by 30% at temperatures of 30°C when compared with 15°C. Therefore, battery charging and storage should preferably be in air-conditioned environments between 10°C and 25°C.
- Users operating the radio in temperatures below 10°C will experience a reduction in shift life because of increased internal impedance.
- Users operating the radio in high temperature environments (greater than 30°C) will experience reduced service life due to faster battery age related deterioration.
- **NOTE:** When a radio is used in a warm environment (over 30°C) and is operated until the battery is flat, the cells would only be expected to last approximately 375 cycles (1 year) before becoming unusable.

6. Storage

Details

NiCd batteries can be stored for several years without significant loss of present capacity.

- The maximum recommended temperature for long term storage is approx 30°C.
- Where possible, for long-term storage keep batteries in a cool dry environment, preferably between 5°C and 15°C. This slows any natural chemical deterioration.
- Once removed from storage or after a period of inactivity longer than a couple of weeks, it is strongly recommended to carry out a long condition cycle to restore capacity. In some cases, after prolonged storage, two long conditioning cycles may be necessary.

7. Issuing Authority

Name and Position of Issuing Officer

Barry Crates
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