Technical Note TN-775

Tait Orca and T3000 Charger Software & Hardware Changes

21 July 2003

Applicability

This technical note applies to all versions of the Tait T3002 Fast Charger, Tait Orca Fast Charger (TOPA-CH-200) and the Tait Orca Multiway Charger (TOPA-CH-300) unless stated otherwise.

1. Introduction

Background

This document has been written to aid in the understanding of the changes the Tait produced batteries and chargers have gone through during the product life cycle.

References

For assistance identifying the software version in a particular charger see TN-771 – Identifying Serial Numbers and Product Codes on Tait Product.

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2. Charger Software Versions

Software v1.01

T3002 Fast Charger
Release Status: First Release of Fast Charger Software. Full Approval.
Release Date: **11 October 1995**

Features included:

- This software was based on the dual-slot T3004 v1.02 release of rapid charger software. This software has been altered to accommodate T3002 specifications.
- New end-of-charge algorithm to improve handling of NiMH battery types.
- Discharge before charge function.
- Conditioning and capacity check mode.
- Improved spurious transient voltage handling.
- Improved handling of batteries that are already charged.

LED indicators (normal operation):

- Off = Charging suspended
- Amber = Waiting (battery being tested, or until the battery is within correct temperature range for charging)
- Green flashing = Discharging
- Red = Fast charge
- Green = Standby charge (trickle charge in progress)
- Red flashing = Fault (charge suspended)

LED indicators (cycle and capacity check):

- Amber = Waiting (battery being tested, or until the battery is within correct temperature range for charging)
- Green flashing = Discharging
- Amber flashing = Low capacity (battery is less than 70% of the rated capacity, and will be left discharged)
- Green = Capacity adequate (battery capacity is adequate. Trickle charge is in progress)

Known limitations:

- The X command when used with the data monitor (only used in development software) only works after software reset.

Compatibility:

- This software is compatible with the T3002-0000 hardware.

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Software v2.00

T3002 and Tait Orca Fast Charger Software
Release Status:
Full Approval
Release Date: **4 June 1997**

Changes Made:

- Improved automatic restart performance.
- Improved performance for false end of charge detection for old discharged batteries.
- Fixed a bug discovered during test where the discharge port would stay on if the battery was removed during discharging.

Known limitations:

- If used directly in the T3002 without the hardware modification, older batteries with the internal diode will cause problems with the battery always restarting charge when the fast charge cycle has finished.

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a voltage feedback resistor is fitted.

Software v2.01

T3002 and Tait Orca Fast Charger Software
Release Status: Full Approval
Release Date: **16 July 1997**

Changes Made:

- The threshold for battery measurement without charge current to determine if the battery is flat (and thus ignore unusual negative ΔV characteristics) was changed from 6.0V to 7.5V.

Known limitations:

- If used directly in the T3002 without the hardware modification, older batteries with the internal diode will cause problems with the battery always restarting charge when the fast charge cycle has finished.

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

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Software v2.02

T3002 / Tait Orca Fast Charger Software
Release Status: Full Approval
Release Date: **23 April 1998**

Changes Made:

- Disabled all Negative ΔV end of charge detection.

Known limitations:

- If used directly in the T3002 without the hardware modification, older batteries with the internal diode will cause problems with the battery always restarting charge when the fast charge cycle has finished.

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

Software v2.03

T3002 / Tait Orca Fast Charger Software
Release Status: Restricted Approval - TCL and EMCOM
Release Date: **7 May 1998**

Changes Made:

- During trickle charge mode, changed the indicator from steady green, to flash red/green (the LED cycles red for 1s and green for 1s).

Known limitations:

- If used directly in the T3002 without the hardware modification, older batteries with the internal diode will cause problems with the battery always restarting charge when the fast charge cycle has finished.

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

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Software v2.04

Tait Orca Fast Charger Software
Release Status: Full Approval (for Orca charger only)
Release Date: **4 June 1998**.

Changes Made:

- Increase low voltage restart threshold from 6.9V to 7.7V
- Increase NiCd trickle charge time from 60mins to 180mins.
- Increase NiMH trickle charge time from 120mins to 180mins.
- Increase NiMH trickle charge rate from 50mA to 115mA.
- Decrease high temperature End-Of-Charge from 55°C to 50°C

Known limitations:

- None

Compatibility:

- This software is compatible with Tait Orca hardware only.

Software v2.05

T3002 and Tait Orca Fast Charger Software
Release Status: Full Approval
Release Date: **30 June 1998**.

Changes Made:

- Increase NiCd trickle charge time from 60mins to 90mins.
- Increase standby charge rate from approx 2mA to 67mA.
- Change LED indications to:
  Fast Charging = Red steady
  Trickle Charging = Green flashing (0.2s on, 0.2s off)
  Charge complete = Green steady
  Condition (discharge) = Amber flashing (1s on, 1s off)
  Condition / Analyse = Amber flashing (1s on, 1s off)
  Fault = Red flashing (1s on, 1s off)
  Capacity Fault = Red flashing (1s on, 1s off)

- Condition / Analyse cycle now charges the battery first.
- Increase low voltage restart from 6.9V to 7.7V
- Decrease high temperature End-Of-Charge from 55°C to 50°C
- Decrease NiMH trickle charge time from 120mins to 90mins
- Increase NiMH trickle charge rate from 50mA to 115mA.

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Software v2.05 (continued)

Known limitations:

- If used directly in the T3002 without the hardware modification, older batteries with the internal diode will cause problems with the battery always restarting charge when the fast charge cycle has finished.

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

Software v2.06

T3002 / Tait Orca Fast Charger Software
Release Status: Full Approval
Release Date: **4 October 1999**

Changes Made:

- Minor changes to allow the use of the MC68HC05P6A variant which supersedes the obsolete MC68HC05P6
- Mask Option Register (MOR) location moved.
- Interrupt / pull up options for port A disabled in MOR.
- EPROM security enabled in MOR

Known limitations:

- None

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

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Software v2.07

T3002 / Tait Orca Fast Charger Software
Release Status: Full Approval
Release Date: **17 March 2000**

Changes Made:

- In testing the new 1500mAhr NiMH pack TOPB400 and TOPB700, it was found that these packs would fail the 'battery short circuit test' at the transition from discharge to charge during the long condition cycle
- The short circuit test parameters were modified as follows:
- Decreased threshold_NiMH from 7.3V to 7.2V
- Increased battery short circuit test time from 19 to 30 seconds

Known limitations:

- None

Compatibility:

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

Software v3.09

T3002 / Tait Orca Fast Charger Software
Release Status: Full Approval
Release Date: **28 September 2001**

Changes Made:

- Rapid charge time for NiMH increased to 207 minutes
- Added rest to standby temperature of 40°C
- Rest time of 30 minutes after rapid charging added
- Trickle charge for NiMH reduced to 50mA
- Trickle charge time reduced to 60 minutes
- Standby charge time changed to 12 hours
- Standby charge reduced to 50mA
- Added maintenance charge of 13mA
- Test of dead short circuit removed
- No NiCd / NiMH indication

Known limitations:

- None

Compatibility :

- This software is compatible with the Tait Orca hardware.
- This software is compatible with the T3002-0000 hardware provided a 1k5 voltage feedback resistor is fitted to R85.

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3. Tait Orca Charger Hardware Changes

16 May 1998

Change:
- New outside pin and V2.02 software (negative ΔV disabled)

Change introduced in Serial Number:
- 16001868

27 October 1998

Change:
- New PCB and plastics

Change introduced in Serial Number:
- 16009341

16 April 1999

Change:
- New charger pin IPN 356-01073-01

Change introduced in Serial Number:
- 16020983

8 October 1999

Change:
- Software V2.06 introduced and new labels

Change introduced in Serial Number:
- 16031704

20 June 2000

Change:
- All four charger pins changed to IPN 356-01079-00

Change introduced in Serial Number:
- 16052900 approximately

21 July 2000

Change:
- Software V2.07 introduced

Change introduced in Serial Number:
- 16053200 approximately

9 March 2001

Change:
- Charger lid with more clearance on multiway chargers (IPN 312-01069-02)

Change introduced in Serial Number:
- 16080154

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22 May 2001

Change:
- Charger lid with more clearance on standard chargers (IPN 312-01069-02)

Change introduced in Serial Number:
- 16087251

1 October 2001

Change:
- Software V3.09 introduced

Change introduced in Serial Number:
- 16100207

4. Tait Orca Battery Hardware Changes

17 June 1998

Change:
- New battery base introduced, added support flanges to prevent rattle

28 August 1998

Change:
- Battery clip IPN 303-30071-01 introduced

16 December 1998

Change:
- New battery base introduced

21 January 1999

Change:
- Battery clip IPN 303-30071-02 introduced, tooling change to make clip easier to assemble

8 February 2000

Change:
- Stopped using double-sided tape in assembly of TOPB200 / 300. Tape was used to tape mylar sheath to the cell

25 May 2000

Change:
- Introduced use of Teflon tape to keep tracks in place

9 October 2000

Change:
- Introduction of TOPB500 2000mAh NiMH battery

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24 October 2000

Change:

- Introduction of TOPB400 1500mAh NiMH battery

7 November 2000

Change:

- Introduction of TOPB600 1100mAh NiCd battery
- Introduction of TOPB700 1500mAh NiMH battery

23 November 2000

Change:

- Ceased use of Teflon tape to keep tracks in place

20 August 2001

Change:

- New steps used in production of TOPB200 battery pack to alleviate problem of 'cell rattle'
- A foam insert is placed into the back cover
- Four special pre-made straps are welded over several of the welds already placed on the battery cells by the cell manufacturer.
- Once welding is completed, a Mylar card is placed on the battery cell and stuck there with double-sided adhesive.

Refer to Technical Note TN-683 for more information.

5 March 2002

Change:

- Shrink wrap of cells in TOPB200, done by cell manufacturer, to reduce chance of 'cell rattle' (removed need for steps listed as implemented on 20 August 2001)

Refer to Technical Note TN-710 for more information.

4 April 2002

Change:

- Shrink wrap of cells in TOPB500, done by cell manufacturer, to reduce chance of 'cell rattle'

Refer to Technical Note TN-710 for more information.

July 2002

Change:

- Introduction of Intrinsically Safe version of the TOPB200 battery.

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Compliance	None
CSO Instruction	**CSO's** – This Technical Note is intended for technical staff as a historical reference, when older chargers come in for repair.

5. Issuing authority

Name and position of issuing officer	Tim Lummis Technical Support Engineer		
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