AT10.1/AT30 SERIES

MICROPROCESSOR-CONTROLLED FLOAT BATTERY CHARGER

FORCED LOAD SHARING OPTION

CONTENTS

INTRODUCTION

Multiple battery chargers are sometimes employed in dc power systems to provide redundancy. Two (2) or more chargers of the same voltage rating can be connected in parallel, each of them capable of powering the connected dc load and charging the battery. If a battery charger should fail during normal operation, the parallel charger can continue to supply the entire required dc load current, and maintain charge on the battery.

When two (2) chargers operate in parallel, they normally will not share the load current equally. Since any two chargers will always have slightly different characteristics, one of the two chargers in a system will always have a slightly higher dc output voltage, and will therefore assume more of the burden of providing the necessary load current. This instruction describes an optional accessory for AT Series chargers, which ***forces*** units to share dc load equally. The bagged accessory kit (ordering p/n EJ5126-##) consists of an interconnecting cable to provide such communications, two (2) ⚠ WARNING labels (p/n FK5046-00), and this ***Installation & Operating Instructions***.

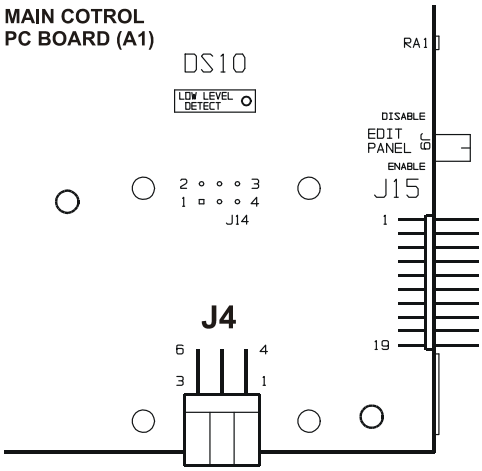
SYSTEM REQUIREMENTS

- Both units must be AT10.1 or AT30 Series microprocessor-controlled float battery chargers. This option will not work with the SCR/SCRF Series battery chargers.
- The load share option is designed to work with only two (2) battery chargers. You cannot force load sharing with three (3) or more chargers.
- Both chargers must have the same dc voltage & current rating, and have the same dc filtering level.
- Both chargers must feature "**Rev. 8**" or higher revisions of the Main Control pc board (A1).
- Both chargers must be using version "**6.00**" or later of the control program (firmware). To view the program version number, press the **LAMP TEST** button on the front panel of the charger. When the button is released, the version number is shown on the front panel display for 2 seconds.
- The manufacturer recommends that both chargers use the same program version, since the forced load sharing option has ***not*** been tested using a different program version in each charger.
- The interconnecting cable length should be no more than 50ft (15m). A 15ft (4.6m) cable is supplied with the standard load sharing option. See "Ordering Parts" to order cable assemblies of different lengths.

INSTALLING THE INTERCONNECTION CABLE

The control circuit boards in the AT Series battery chargers contain CMOS circuitry, which is sensitive to damage from static discharge. Please ground yourself before performing this procedure. You should not remove the AT Series Main Control pc board (A1) from the charger's front panel to perform this installation. All steps can be performed without any disassembly. Refer to the interconnection diagram on page 3 and follow these steps:

1. Open both font panel circuit breakers (CB1/CB2), and wait several minutes for internal voltages in the dc filter electrolytic capacitors (C1/C2) to bleed off. **⚠ WARNING** Hazardous voltages still exist at certain points inside the battery charger, particularly the I/O panel (TB1). If possible, disconnect and lock out all external power sources to the charger.
2. Open the charger front panel door. On the back of the Main Control PC Board (A1), in the lower right corner, locate the white 6-pin connector (J4) as shown in the figure to the right. If there is no connector, verify the revision level marked on the left edge of the board. If it is lower than "**Rev. 8**", an upgrade to the control board is needed in order to utilize forced load sharing. Contact your sales representative to obtain a Main Control PCB upgrade (p/n EN5002-00), and refer to ***Service Instruction*** (JD5012-00).



3. The AT Series forced load sharing option is normally supplied by the factory with a standard 15ft (4.5m) signal interconnection cable (p/n EH5041-00). Other cable lengths, up to 50ft (15.2m) are also available. The cable is terminated at each end with a six-pin ***male*** connector which mates with the white plastic ***female*** connector (J4) on the Main Control PC Board (A1). One end of the cable features an extra jumper in the connector, and should be identified for use with the ***Secondary*** charger. The other end connects to the ***Primary*** charger. Either charger may be selected as Primary or Secondary, but a charger that is more accessible might preferably be the Primary. The Primary charger controls the dc output voltage of both units.
4. You may run the interconnection cable through conduit if necessary. However, do not run the cable in the same conduit with ac or dc power wiring. Do not remove the white connector plugs in order to "fish" the cable through conduit. Maximum pulling tension is 46 lb (20.9 kg). The cable has a plenum-rated outer jacket, and passes the NFPA 262 flame propagation test. Install the cable between the chargers, and anchor it in place, before connecting it to the control cards. After the cable is in place, connect each end to the Main Control pc board, inserting the connector into A1-J4 until it is completely seated.

   NOTICE External ***power*** cabling for the dc bus (battery charger, battery, and dc load interconnection) is ***not*** supplied by the charger manufacturer with the AT Series Forced Load sharing option. All user-supplied system wiring should meet National Electric Code (NEC) standards, as well as local/site codes. Confirm polarity (+/-) of all dc cabling before making connections.

OPERATING CHARGERS WITH LOAD SHARING

Restore external power connections to both battery chargers, and restart according to the normal procedure in the AT Series Battery Charger Operating and Service Instructions. Close the dc circuit output breakers (CB2) ***first***, followed by the ac input circuit breakers (CB1) ***second***. After the two chargers restart, the Primary charger attempts to establish communication with the Secondary. If communication is successful, the chargers behave as follows:

- The Primary charger displays the message **LS-P** (Load Share, Primary) on the front panel meter, alternating with the normal display of output voltage and current.
- The secondary charger displays the message **LS-S** (Load Share, Secondary) on the front panel, alternating with the normal display of output voltage and current.

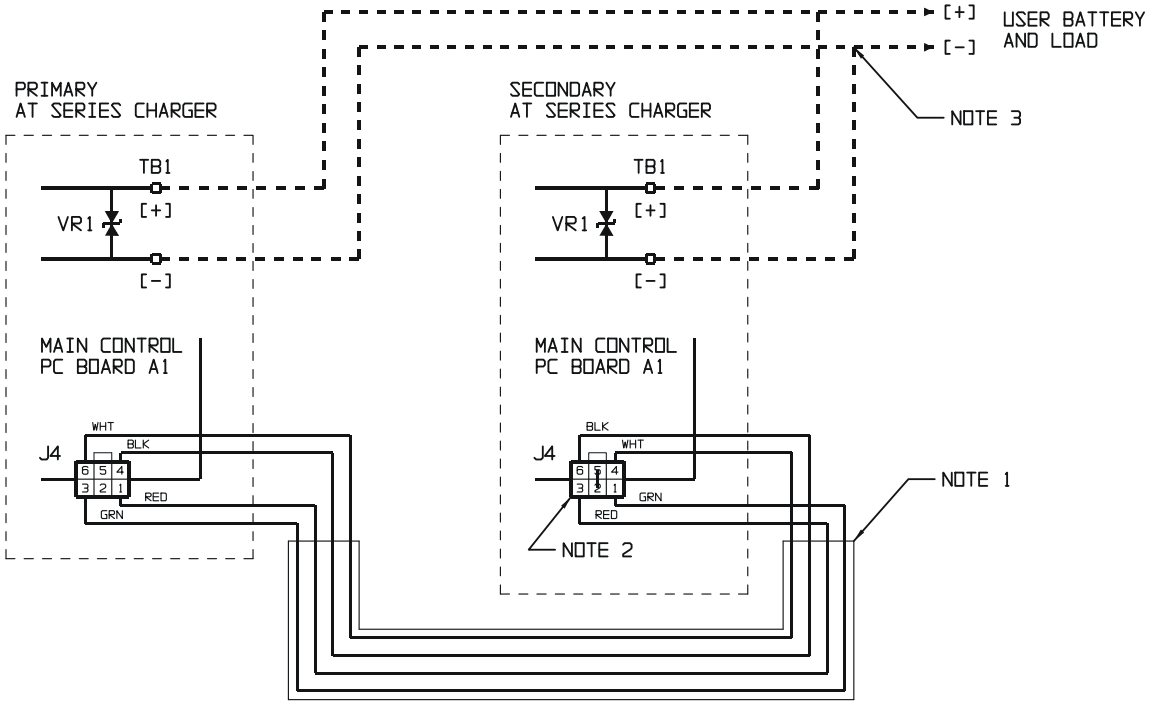
- The Primary charger transfers ***all*** its set points (float, equalize, alarms, etc.) to the Secondary. The Primary charger also ***controls*** all set points for both chargers. While in Forced Load Sharing mode, you may adjust any set points (of the charger pair) at the front panel of the Primary. The front panel of the Secondary charger won't allow ***any*** settings to be changed.
- If one charger loses ac power (or is turned off), the remaining charger returns to independent operation, whether it was originally the Primary or Secondary.
- In the event of a fault in the interconnection, or any other problem with communication, the chargers return to independent operation, and the front panel on each charger displays the message **E 14**, indicating the fault.
- There is a delay (up to 4 seconds) for chargers to establish load sharing communication. If communication is broken (or power is lost for one charger), there is a 2-4 second delay for the other charger to resume independent operation.
- If you need to interchange the Primary and Secondary chargers, simply reverse the interconnection cable.
- The presence of the interconnection signal cable (with proper orientation) forces the two chargers into load sharing. Controlling load sharing from the front panel is neither necessary nor possible.

⚠ CAUTION

NEVER SEPARATE THE AT SERIES CHARGER FROM THE DC BUS WHILE IN FORCED LOAD SHARING MODE

- When AT chargers are operating in Load Share Mode, they ***must*** both be connected to the same dc bus. If your application and system includes disconnects, whereby chargers may be isolated from each other, the Forced Load Sharing must first be disabled by disconnecting the load share cable or interrupting the load share communications. Failure to disable forced load sharing when the chargers are not connected to the same dc bus will result in an undesirable operation, whereby the battery may become ***discharged***.

INTERCONNECTION DIAGRAM (http://www.ATSeries.net/PDFs/JE5154-00.pdf)



NOTES

1. For two (2) units to force load share, connect A1-J4 of "Primary" charger to A1-J4 of "Secondary" charger, using supplied interconnection cable (p/n EH5041-XX).
2. J4-2 and J4-5 are factory-jumpered on the "Secondary" end of the supplied interconnection cable.
3. Battery and load inter-connection cabling not supplied with charger or load sharing option (may be supplied by battery manufacturer or other party).

WHEN TEMPERATURE COMPENSATION IS INSTALLED

The AT Series forced load sharing feature is compatible with the external temperature compensation accessory. It is recommended that each AT charger have a tempco probe, and that the probes be located as close as possible to each other. When the AT chargers are load sharing, the primary charger will determine the temperature compensated voltage and adjust the output voltage accordingly. The primary charger and secondary charger will display the set point voltage, not the temperature compensated output voltage. The voltage displayed by the master and secondary may be different, if either temperature probe is not installed or defective. A slight difference in the displayed voltages may also occur if the two (2) probes are not located in close proximity of each other. Refer to ***Application Note*** (**JD5003-00**) for further details regarding temperature compensation.

TROUBLE SHOOTING

If the AT Series Forced Load Sharing Option is installed, but the output currents of the chargers are unequal, refer to the following table.

PROBABLE CAUSE	RECOMMENDED ACTION
1. Connection cable missing or installed incorrectly.	1. Ensure that the interconnection signal cable assembly is properly installed, and that the connector for the **Secondary** charger has the jumper as described in the middle of page 2.
2. Incorrect connections to ac power sources.	2. Ensure that both chargers are connected to the same ac supply. For three phase input, ensure source phase rotation is the same for both AT30s.
3. Defective Man Control circuit board (A1)	3. Replace the two (2) Main Control pc boards (A1) in one charger at a time to restore correct load sharing operation.

ORDERING PARTS

You may order longer interconnection cables, replacement circuit boards, or full field installation kits through your sales representative. Please use the part numbers shown in the table below.

ORDERING PART No.	DESCRIPTION
EH5041-30	15ft (4.6m) interconnection cable assembly field kit
EH5041-31	25ft (7.6m) interconnection cable assembly field kit
EH5041-32	50ft (15.2m) interconnection cable assembly field kit
EN5002-00.	spare AT Series Main Control pc board (A1)
EJ5126-20 (field replacement kit)	two (2) programmed AT Series Control PC Board (A1) with one (1) 15ft (4.6m) interconnection cable assembly
EJ5126-21 (field replacement kit)	two (2) programmed AT Series Control PC Board (A1) with one (1) 25ft (7.6m) interconnection cable assembly
EJ5126-22 (field replacement kit)	two (2) programmed AT Series Control PC Board (A1) with one (1) 50ft (15.2m) interconnection cable assembly

DOCUMENT INFORMATION

Document Number: **JA5054-00**
Revision Level: **9D**
Electronic Filename: [JA5054-00.Rev9D.ATForcedLoadSharing.doc]
Last Date Saved: [8/9/2021 5:32 PM]
Last Date Printed: [8/9/2021 5:34 PM]

ON-LINE AVAILABILITY

An electronic copy of these instructions is available at **http://www.ATSeries.net/PDFs/JA5054-00.pdf**, along with standard drawings for the AT10.1 and AT30 Series Battery Chargers. Saved online in Adobe Acrobat Portable Document Format (PDF), they are readily available for downloading and printing.