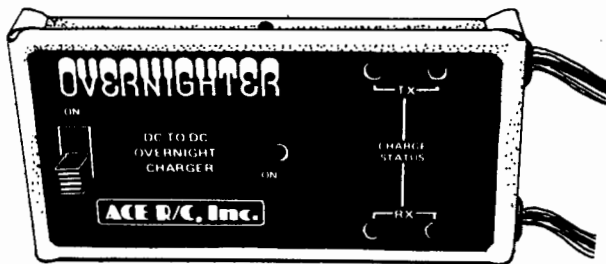


ASSEMBLY and OPERATION MANUAL OVERNIGHTER

34K50 Overnighter, kit / 34K50C Overnighter, Assbld.

Designed by Mike Dorffler



I. INTRODUCTION

The Ace Overnighter charger was designed for overnight charging of one or two 8 cell transmitters and one or two 4 cell receiver packs from a 12 volt car, van, RV, truck or any other large rechargeable battery source. It is not to be used with a small 12V flight box battery.

It was created for R/C modelers who go to an event where household current is not readily available for normal charging or it is more convenient to leave the model in the vehicle. Charge rates are programmable to accommodate most currently used ni-cd battery sizes, large or small.

This fully regulated device will operate properly whether the vehicle is running or not so you can charge while going down the road or pulled in for the night. Its small size allows it to be mounted almost anywhere in the vehicle and its attractive appearance does not detract from the most plush interior.

If you have a kit, proceed to the Construction section of these instructions and return to the Connector Wiring and Operation section after completion.

If you have an assembled unit, refer first to the Connector Wiring section and proceed to the Operation section for proper use of the Overnighter.

II. CONNECTOR WIRING

CAUTION: Proper polarity **MUST** be maintained at all times. If it is reversed at the source battery or at the batteries being charged, severe damage can result to the Overnighter or the batteries.

Copper Colored Wires = Positive (+, red)
Silver Colored Wires = Negative (-, black)

A. WIRE IDENTIFICATION AND PREPARATION

As you face the Overnighter, the cable coming out of the left of the case is the Power Input Cable; the top ones on the right are the Transmitter Output Cables; and the lower right cables are the Receiver Output Cables.

NOTE: If your situation requires longer wire than supplied with the Overnighter, use wire that is **AT LEAST** as heavy as the wire supplied, especially for the Power Input Cable.

B. POWER INPUT HOOKUP (FIG. 1)

The power cable can be hooked up directly to the 12V electrical system or you may want to install a cigarette lighter plug, banana plugs, or alligator clips to facilitate hooking and unhooking the Overnighter to the power source. In any event, always make sure proper polarity is maintained and all joints are secure and well insulated.

Copper Colored Wire = Positive (+, red)
Silver Colored Wire = Negative (-, black)

If you are hooking directly into the vehicle's electrical system, do not hook up directly to the battery; make sure the point you hook up to is properly fused; i.e., there is a .5A or larger fuse between the hookup point and the battery. A good place to do this is at the fuse block on the cigarette lighter circuit.

C. RECEIVER CONNECTOR HOOKUP (FIG. 1)

CAUTION: Connector wiring shown is for current Ace Silver Seven only. Check your Receiver and Transmitter wiring and maintain proper polarity and connector wiring.

Copper Colored Wire = Positive (+, red)
Silver Colored Wire = Negative (-, black)

Solder the appropriate male charge connector to mate with your receiver charge receptical onto each of the Receiver Output cables. If the connector is not the solderable type, it will be necessary to splice it on. **ALWAYS MAKE SURE PROPER POLARITY IS MAINTAINED.** Check the joints to make sure they are secure and well insulated.

D. TRANSMITTER CONNECTOR HOOKUP (9.6V Transmitters Only) FIG. 1

As with the receiver, solder the appropriate male charge connectors to mate with your transmitter's charge receptical. Watch for proper polarity and solid, insulated joints.

NOTE: If your transmitter has a built-in internal charger, it must be by-passed so the Overnighter hooks directly to the 9.6V pack. Use of a Dean's Charge Connector is recommended if this is necessary. (Ace No. 19K55)

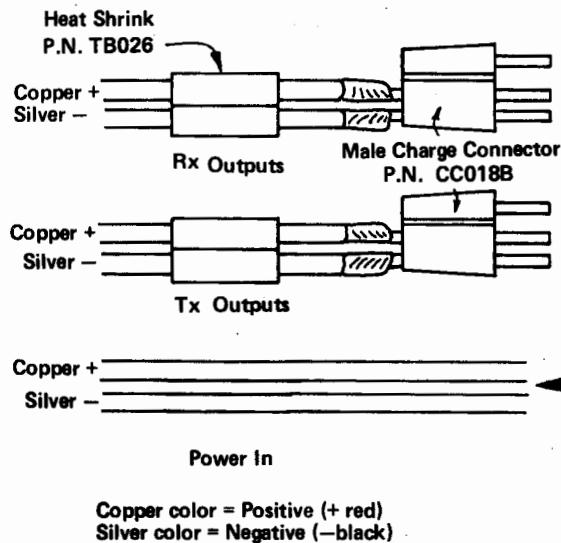
If your situation requires longer wire than supplied with the Overnighter, use wire at least as heavy as the cables furnished.

III. OPERATION

A. OVERNIGHT CHARGE RATE

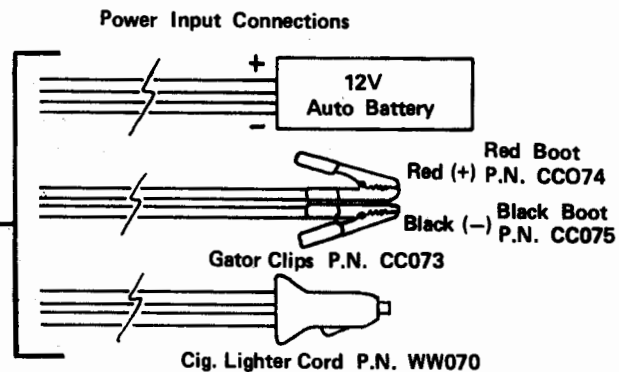
The Overnighter is designed to charge at the overnight charge rate (14-16 hrs. for full charge). This rate is determined by dividing the capacity of the batteries being charged by 10. So, for a 500 mah pack, the rate would be 50 ma...for 900 mah it would be 90 ma...1200 mah, 120 ma, etc.

If you have a stock assembled Overnighter, all four outputs are set at 50 ma, the charge rate for 450-550 mah batteries. This charge rate is indicated by the sticker at the end of the output cable. If you need to change this charge rate, it will be necessary to go into the unit and change the appropriate resistor. Refer to the following section.



NOTE: RX and TX connectors are shown for current Silver Seven only.

(Check grounding of auto's system ... make sure negative goes to negative and positive goes to positive)



NOTE: Ace Part Numbers are furnished for the connectors illustrated. We also carry charge connectors for various other manufacturers. Write or call for details.

FIGURE 1 CONNECTOR WIRING

B. REPROGRAMMING THE CHARGE RATE

Remove the back from the unit. Referring to Fig. 7, identify the location of the four charge rate resistors. RT1 controls the TX 1 output; RT2 controls the TX 2 output; RR1 controls the RX 1 output; RR2 controls the RX 2 output:

Resistor	Output	RESISTOR VALUE (RR1,RR2, RT1,RT2)	ACE PART NO.	CHARGE RATE
		20 OHM	R4-200	25 ma
RT1	- TX 1	(red,blk,blk)		
RT2	- TX 2	10 OHM	R4-100	50 ma
RR1	- RX 1	(brn,blk,blk)		
RR2	- RX 2	5.6 OHM	R4-56X	90 ma
		(grn,blu,gld)		
		3.9 OHM	R4-39X	120 ma
		(orn,wht,gld)		

FIGURE 2 RESISTOR CHART

Refer to the chart, Fig. 2, to determine the value of the resistor needed for the charge rate required for your application. Several resistors are supplied to reprogram your unit—if you need more, the Ace part number is supplied so you can order from Ace or they can be obtained from an electronics parts supplier such as Radio Shack. Ask for a 1/4W, 5% resistor of the appropriate value.

Desolder and remove the existing resistor (solder wick is handy here to remove the solder.) Referring to Fig. 10, prepare the new resistor then install and solder it into

the proper place—make sure the joint is secure and doesn't bridge over to a adjacent PC land. Change the sticker on the end of the proper cable to reflect the new charge rate. (Stickers for 25 ma are not supplied...peel off the existing "50" and leave it blank to remember). Reinstall the back on your Overnighter.

C. OVERNIGHT CHARGING

The Overnighter works similar to any standard charger supplied with your radio. Hook the unit up to the 12V source and always operate in the following sequence:

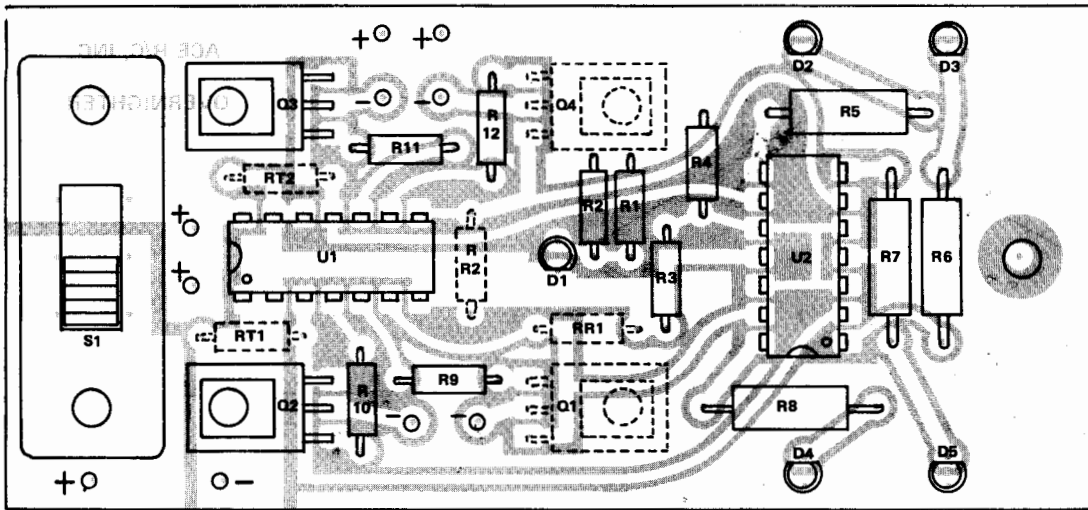
1. Turn the unit On. Note the LED lights.
2. Plug battery packs in, noting that the appropriate LED lights.
3. After charging 14-16 hrs., unplug the battery packs.
4. Turn the unit Off. "ON" LED goes out.

If this sequence isn't followed, it may be confusing and unintentional discharging may occur due to the nature of the circuit. For example, if the unit is off and a transmitter is plugged in, the "ON" LED will light because the transmitter is discharging thru the LED. If you then plug a receiver pack, the charge LED for that pack will light because current is flowing from the transmitter pack into the receiver pack. This is normal for this circuit but is no problem as long as the proper procedure and sequence is followed.

Do not leave any battery packs hooked up to the Overnighter with the unit off. If you do so, they will eventually discharge.

IV. PARTS LIST

Resistors (1/4W, 5% Unless Specified)	LED's, IC's, and Transistors	() 1 RP003 No. 0 Grommet
() 4 R2-102 1K 1/2W (Brn,Blk,Red)	() 5 SS074 Small Red LED	() 2 RP015 No. 1 Grommet
() 4 R4-100 10 ohm (Brn,Blk,Blk)	() 4 SS000B MJE180 Power Transistor	() 2 HW139 Mica Insulator
() 2 R4-200 20 ohm (Red,Blk,Blk)	() 1 SS101 LM3900N IC	() 2 HW082B 4-40 x 1/4 F.H. Bolt
() 2 R4-56X 5.6 ohm (Grn,Blu,Gld)	() 1 SS087 LM324N IC	() 2 HW010E 3mm x 6mm Phillips Head Bolt
() 2 R4-39X 3.9 ohm (Orn,Wht,Gld)	Misc. and Hardware	() 1 HW084A 4-40 x 5/8 F.H. Bolt
() 1 R4-913 91K (Wht,Brn,Orn)	() 1 SW001 Noble DPDT Slide Switch	() 2 HW111 #2 X 3/16 S.T. Screw
() 7 R4-202 2K (Red,Blk,Red)	() 1 PC160 Overnighter PC Board	() 3 HW002 4-40 Nuts
	() 1 LB105 Overnighter Label	() 1 HW212 3/8" Nylon Spacer
	() 1 SM196 Overnighter Metal Case	() 2 TB026 3/32 X 3 Heat Shrink
		() 126" Two Conductor Wire
		() 24" Solder



DO NOT Install RR1, RR2, RT1, RT2, Q1 & Q4 Until Instructed To Do So !

FIGURE 3 OVERLAY DRAWING

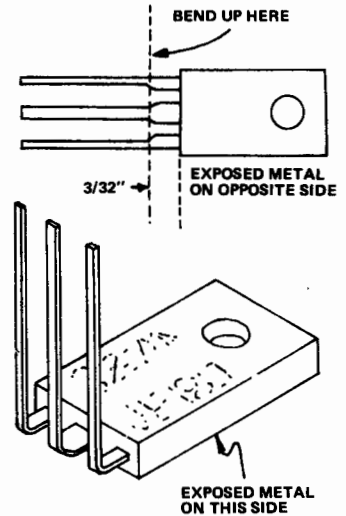


FIGURE 4 TRANSISTOR BENDING

PARTS ID LEGEND

- R1,R2,R3 -2K 1/4W (Red,Blk,Red)
- R4 -91K 1/4W (Wht,Brn,Orn)
- R5,R6,R7,R8 -1K 1/2W (Brn,Blk,Red)
- R9,R10,R11,R12-2K 1/4W (Red,Blk,Red)
- D1,D2,D3,D4,D5-Small Red LED (Note Flat Side also Elevate 1/8" from board. (Fig. 5))
- S1 -Noble DPDT Slide Switch
- U1 -LM3900N IC (Note Orientation of Pin 1)
- U2 -LM324 IC (Note Orientation of Pin 1)
- Q1,Q2,Q3,Q4 -MJE180 (Bend leads per Fig. 4. DO NOT INSTALL Q1 and Q4 until instructed.)

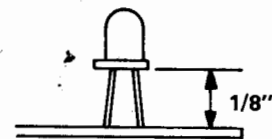


FIGURE 5 LED INSTALLATION

B. WIRING

- () Measure and cut the two conductor cable furnished into two 36" and three 18" pieces.
- () Cut between the wires on one end of each of the five pieces of cable and separate them for about 3/4" Strip about 3/16" insulation off each end and tin.
- () Referring to Fig. 6, install and solder all five cables into the PC board. Make sure the copper and silver colors get installed in the proper holes.

V. CONSTRUCTION

Read the "Kit Builder's Hints" before beginning construction.

A. PC BOARD ASSEMBLY

- () Using the Overlay Drawing and Parts ID Legend (Fig 3) assemble the PC board following the suggested procedure. Always observe the special instructions in the Parts ID Legend concerning specific installation of parts.
- () Referring to the Overlay, Fig. 3, install and solder all resistors EXCEPT RR1, RR2, RT1, and RT2. Keep the parts down tight on the board.
- () Install and solder IC's U1 and U2. Double check for proper orientation of pin 1 before soldering.
- () Referring to Fig. 4, bend the leads of transistors Q1, Q2, Q3, and Q4. to the dimensions shown. Make sure the exposed metal on the transistor is positioned as shown.
- () Install and solder Q2 and Q3 ONLY on the PC board as indicated on Fig. 3. Make sure they are flat on the board.
- () Referring to the Overlay (Fig. 3) and Fig. 5, install and solder all 5 LED's (D1-D5).
- () Install and solder the S1 switch on the PC board, making sure it is pushed all the way down on the board and standing perpendicular.

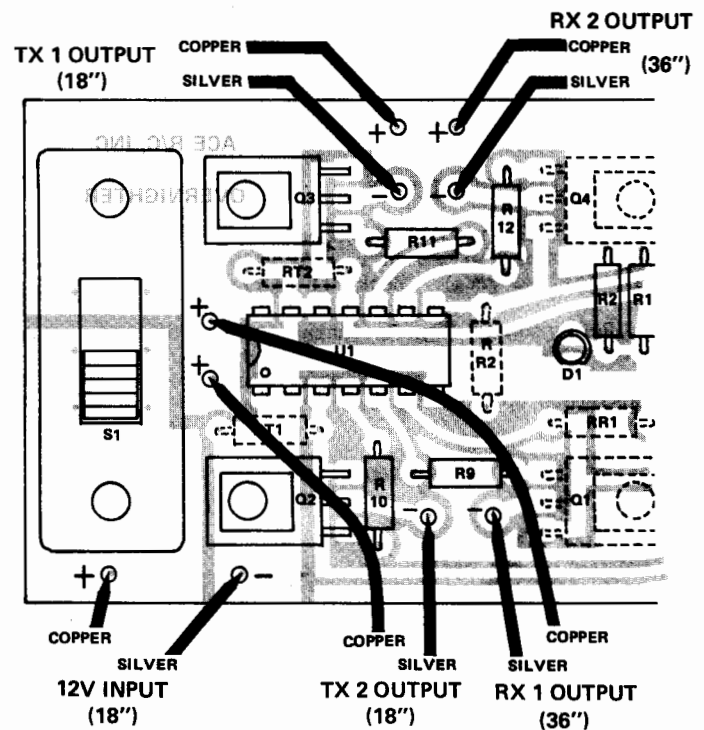


FIGURE 6 WIRING

FIGURE 7 MECHANICAL ASSEMBLY

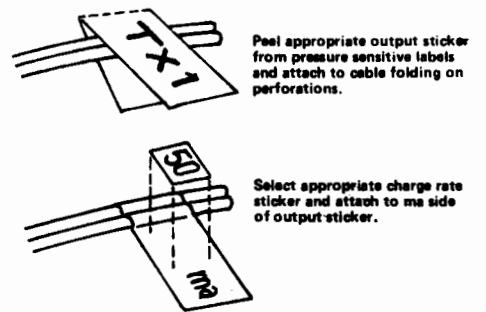
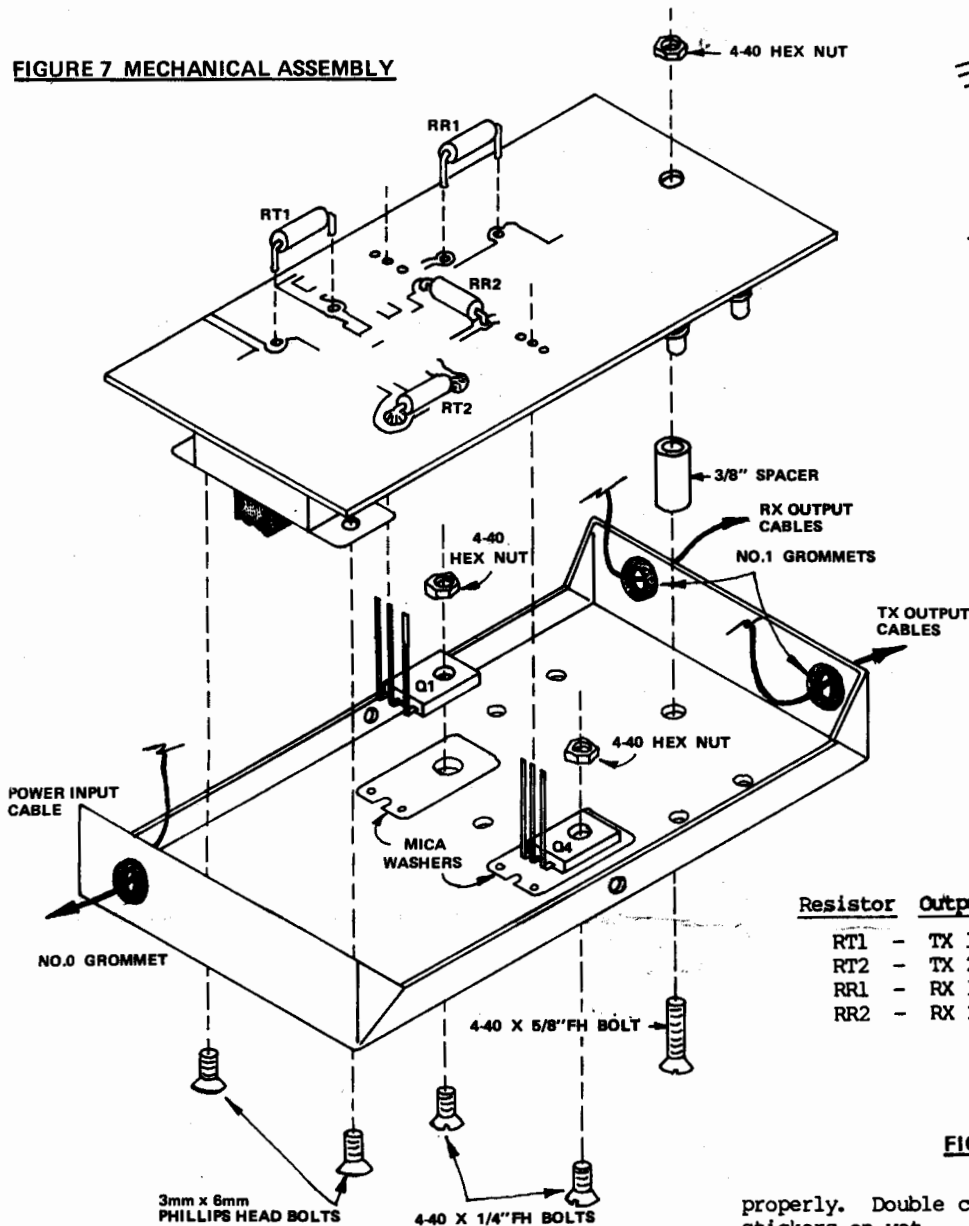


FIGURE 8 CABLE LABELS

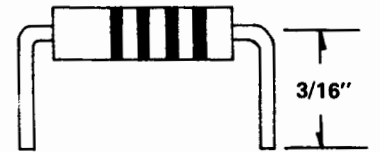


FIGURE 10 RESISTOR PREP

Resistor	Output
RT1	- TX 1
RT2	- TX 2
RR1	- RX 1
RR2	- RX 2

RESISTOR VALUE (RR1,RR2, RT1,RT2)	ACE PART NO.	CHARGE RATE
20 OHM (red,blk,blk)	R4-200	25 ma
10 OHM (brn,blk,blk)	R4-100	50 ma
5.6 OHM (grn,blu,gld)	R4-56X	90 ma
3.9 OHM (orn,wht,gld)	R4-39X	120 ma

FIGURE 9 RESISTOR CHART

properly. Double check. Don't put the small "ma" stickers on yet.

() Slip the 4-40 X 5/8 FH bolt and spacer in place. (Fig. 7) Use a piece of scotch tape in the front to temporarily hold the bolt in place.

() Lower the board into the case lining up the leads of Q1 and Q4 with the holes in the PC board while pulling out the slack in the cables. Be sure the cables aren't trapped between the LED's and the case.

() Work the leads of Q1 and Q4 into the board and start the nut on the 4-40 x 5/8" F.H. Bolt. Install two 3mm x 6mm Phillips Head Bolts into the switch and checking the alignment of the LED's, tighten securely.

() Solder the Q1 and Q4 leads and cut off the excess.

() Referring to the chart (Fig. 9), select the proper resistor values for the charge rates desired. Refer to the Operation Section for discussion on the selection of these values.

() Prepare these resistors by bending and clipping the leads to 3/16" long. (Fig. 10)

() Install and solder them into the appropriate place as shown in Fig. 7.

C. INSTALLING IN THE CASE

() Carefully inspect the board for properly placed components and wires. (RT1, RT2, RR1, RR2, Q1, and Q4 are NOT installed yet.) Check all solder joints.

() Referring to Fig. 7, install transistors Q1 and Q4 in the case using 4-40 bolts and nut. Be sure to put a mica washer between the transistor and the case. Line the transistors up parallel with the case and tighten securely.

() Route the proper cables thru the appropriate holes in the case.

() Slip a large No.1 grommet over the ends of the two receiver output cables and install the grommet in the case. Repeat for the transmitter cables and put a No.0 grommet over the power input cable in the same manner.

() Separate the ends of each of the cables for an inch or so and strip off 3/16" insulation. Tin the wires.

() As shown in Fig. 8, put the tags a few inches from the end of each output cable. Use the wiring diagram, Fig. 6, to trace the cables and make sure they are marked

() Stick the small "ma" sticker onto the label at the end of each cable to indicate the charge rate you have selected for each particular output. If 25 ma is used, since no sticker is supplied for this rate, just leave it off so you can remember. (Fig. 8)

() Slide the back on the case and secure with two No. 2 X 3/16" self tap screws.

() Refer to the Connector Wiring section and install the appropriate connectors on the ends of the power input, receiver and transmitter outputs.

VI. CHECKOUT

() Hook the Overnighter up to the 12V source and turn the unit on. The "on" LED should light.

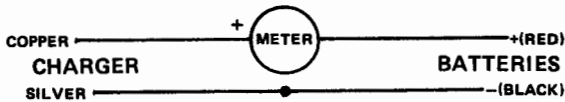


FIGURE 11 CHECKOUT

() Check each output for proper current flow by plugging in a battery pack with a milliammeter in series with the hookup. (Fig. 11). The appropriate LED should light and the current should be within 10% of what it is supposed to be.

If the unit fails to operate properly, disassemble and recheck for proper parts location and good solder joints. Make sure the LED's are properly installed, the IC's are oriented properly, and the transistors are bent so that the exposed metal of the transistor faces you as you look down on the component side of the PC board.

If the unit remains inoperable, refer to the "Kit Builder's Hints" for service policies.

() If everything checks out OK, peel the backing off the faceplate label and stick it on the front of the case, lining up the switch and LED holes.

Refer to the Operation section for proper use of your Overnighter. Your comments are appreciated on this unit. We need your feedback for any improvements or other products needed.

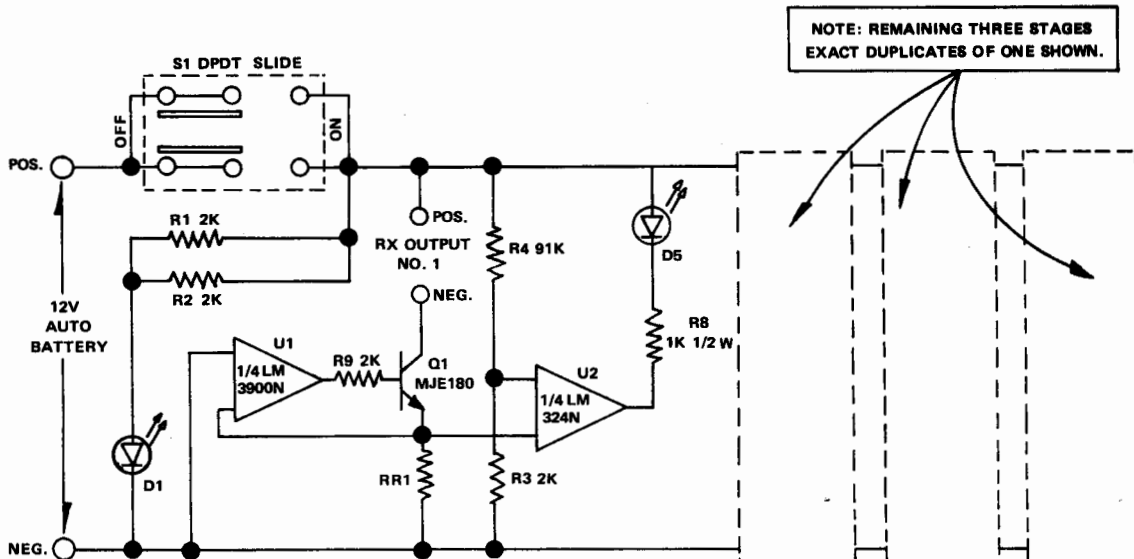
VII. CIRCUIT DESCRIPTION

The circuit employs constant current charging practices by using Op-Amp controlled NPN power transistors. The LM3900 IC contains four op-amps, one for each charge circuit. By tying the + input of each to ground, a 0.5V reference is established on each. A resistor for each transistor emitter to ground is then selected that will provide 0.5V at the desired charge current. The op-amps then drive each transistor until the voltage across these resistors equal 0.5V which is the established reference to them. In doing so, the charge current through each battery will remain constant.

Due to the low voltage differential between the auto battery and a fully charged transmitter battery, the LED indicators cannot be included in the charge path. To indicate when charging is occurring, an addition op-amp is included for each charge output which drives an LED apart from the charge circuit itself. All the + inputs of the four LM324 op-amps are tied together to a common voltage reference of about 0.3V. The (-) input of each is then tied to one emitter of the four transistors. When a charge circuit is not being used, the emitter voltage will be less than 0.3V so the LED won't light. When the charge circuit is used, this voltage exceeds the 0.3V, so the LED lights.

The receiver charge circuit transistors are bolted to the metal case so dissipate the heat. This is not necessary for the transmitter transistors.

An additional LED is provided to indicate "on". This is only valid if no batteries are hooked up at the time the unit is turned on.



116 W. 19th St., P.O. Box 511, Higginsville, MO 64037
 Technical Support (Electronic & Aircraft): 816.584.6303