

January 1988

MEETING NOTICE

The next meeting will be Jan. 15th, at CRAGIN FEDERAL SAVINGS & LOAN 333 W. Wesley St. Wheaton, Ill. - Time - 7:30 P.M. sharp. Guests are welcome and need not be members to attend the meeting.

THE PRES SAYS

Happy new year to all. This months meeting we hope to wind up the discussion we have had for the last two or three meetings on the battery charger (kit), and the voltage upgrading of the present controller in the Club Car and in some members cars.

Also on the adjenda is an open line for discussion of subjects which members may wish to have brought up at future meetings. Lets have some fresh and stimulating ideas. This is your club.

Membership renewals are PAST DUE. As of this writing, only half of last years members have reinstated. (possible subject for discussion ? - Membership Drive).

Bill



FOX VALLEY ELECTRIC  
AUTO ASSOCIATION

624 Pershing St. Wheaton, Il 60187

FIRST CLASS

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REQUESTED

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Minutes: FVEAA...Meeting December 18, 1987 at Cragin Federal Savings & Loan Assn, Wheaton, Illinois.

President W. H. Shafer called the meeting to order at 7:35 P.M.

There were approximately 16 members present.

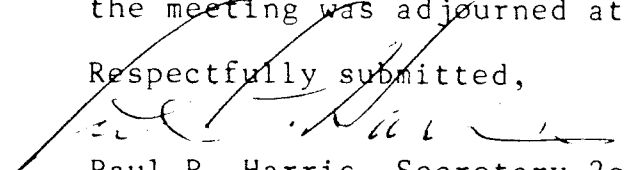
As our treasurer was still absent there was no treasurer's report. There was a discussion about the battery charger boards which are being designed...more info at the next meeting....the boards will probably be about \$10.00 each..in a quantity of 10. It will be an all purpose board. The choice of the transformer to be used will be left up to the individual.

Pres. Bill Shafer talked about the Club Car and problems with the steering.. turns out that "the car was probably in a wreck" per the Goodyear mechanic. There are rusted out parts and the undercarriage caused the steering problem. A shop near his home suggested a \$600.00 to \$900.00 price tag to repair the rusted out section and the steering...Resolved....Frank Delmonico is to take a shot at "CUSTOM REPAIRING" the problem...but cannot do anything till spring. Frank is to go to Bills house to appraise the job. Ken Myers also to look at and give us his opinion.

A discussion was continued on the upgrading of the voltage to 48 volts from 36 volts, with four (4) twelve (12) volt batteries in front and eight (8) six (6) volt batteries in the rear. That would result in a 48 volt system. The easiest conversion is to have a different transistor, the MJ10021 drop in the slot. Then the controller can operate at the higher voltage. Each unit would use 11 transistors at approximately \$10.00 each or a total of \$110.00. Paul Harris was able to get Bell Industries to sell these to the club at a little under \$10.00 each so the club members could benefit from the club buying power because this would be the 100 lot price. Dana Mock feels we should also look into trying to design and/or build a "State of the Art" type controller with the new MOSFETS. John Emde would like to upgrade with the MJ10021. John Stockberger and John Newton feel some research and development work with the new MOSFETS while we still upgrade with the MJ10021. Lad Kucera questioned the heat sink required. We can use the MJ10021 with very minor changes in the driver etc..and on the board and then testing the individual units for spikes. John Stockberger talked on checking the vehicle for spikes..to protect the investment...this is a crucial element in testing and is to match the correct resistor to each transistor. The Club Car is to be used as a test bed. Bill Shafer asked if 'Dynamic braking' can be incorporated in the controller. John Stockberger said in a compound motor the field voltage would have to be increased.

There was a motion to adjourn by Dana Mock , which was carried and the meeting was adjourned at 9:52 P.M.

Respectfully submitted,

  
Paul P. Harris, Secretary.2g

Minutes: FVEAA...Meeting November 20, 1987 at Cragin Federal Savings & Loan Assn, Wheaton, Illinois.

President W. H. Shafer called the meeting to order at 7:35 P.M.\*

There were approximately 19 members present.

Our Treasurer V. Vana was not present but the income and expenses remained the same. Acting Treasurer, John Emde collected some dues and requested members to send their dues directly to V. Vana.

Discussion regarding new electric license plates . We decided that we will not do anything to try to change the design of the new plates. Ken Woods is to investigate a design and cost of a bumper sticker for any members' car.

Ken Myers gave us a further discussion and information on the battery charger he designed. John Stockberger talked a little about his Bradley car. A motion by John Newton and seconded by Ken Woods is to authorize Ken Myers to proceed to design two (2) circuit boards. One for the regular power controller batteries and the other for the accessory battery power, which is an adaptation of the Bruce McCaski system in the November bulletin. More information at the next meeting. The boards should be available in probably two months. The motion was carried by a unanimous vote.

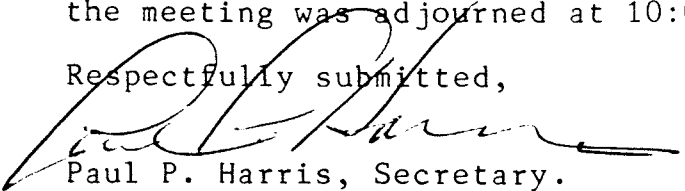
Pres. Bill Shafer, in discussing the Club Car, told us that he has 130 miles on it and still has a problem with the brakes, also still has a tendency to pull to the left, He may bring it into Goodyear. Frank Delmonico offered to correct it when he comes there to repair the brake problems. Bill temporarily corrected the spring problem, but also found the car to have a leaky master cylinder, which has to be replaced. The range on the car is now at 27 miles. Ken Woods and Dana Mock are to provide the winter storage quarters for the Club Car....AFTER Frank and Bill do some repairs

Dana Mock is looking for a volunteer to make a tow bar for the Club Car....as a future project.

The main discussion was held in upgrading the voltage on the club car. John Emde brought a controller to show. Ken Myers discussed the operation of the controller and John Stockberger joined in to explain some of the problems in increasing the voltage. John Newton also had something to say on the subject. Chris Barshi suggested we use the MJ14002 transistors at approximately \$5.00 each. Dana Mock commented that Bell Industries has the MJ10021 transistors at about \$15.00 each. Paul Harris said that he knows someone at Bell and would find out what kind of a deal we could get and report at the next meeting.

There was a motion to adjourn by John Emde, which was carried and the meeting was adjourned at 10:00 P.M.

Respectfully submitted,

  
Paul P. Harris, Secretary.

# NO LOSERS IN SOLAR RACE

The World Solar Challenge, a race among Sun-powered - photo-voltaic - electric cars across almost 2000 miles (3200 Km.) of Australia's Desert, from Darwin in the North to Adelaide in South Australia, is a benchmark event..

To those who favor Electric Cars, it is the event of the year. To those who have to devise a strategy to overcome the pollution of our air, the successful completion of that race is the Silver Lining behind the Smog Cloud!

The Solar-powered car is no longer a distant dream of those who walk with their heads in the clouds. It's for real! It WORKS!"

Those fortunate folks who have access to plenty of sunshine are possible and likely beneficiaries - in the fullness of time. What can we do to bring that day closer?

If the elected officials and public servants, who are concerned with clean air and the question of meeting Federal Standards for clean air, - already past due, - are listening, ... this is the drum beat by which they can march to Kill the Giant!

Let them listen to the voice in the Desert.  
That voice is the clarion call to action:

Enact and regulate the photovoltaic cell to such mass use that it will become inexpensive, - - cheap, readily available, so that we can use it in our cars and homes, - wherever the sun shines, and we need electric power, without burning fossils. That WILL CLEAN THE AIR!"

We who live in the South Western United States and have seen what a million tons of burned oil can do to our air - hope that the message comes through LOUD AND CLEAR!"

Every Photovoltaic Car driven across Australia, the full length of the Stuart Highway is a winner in the race to liberate us from dependence on oil. The large Auto Manufacturers deserve our thanks for the long view they have taken of the future of their industry, by participating in the race. The two High School-College Teams, who participated, also deserve our applause. The twelve students in Sonderborg, Denmark, who selected a solar powered car as a graduation project in time for this race, volunteered their time and the work they did in designing and building the car. Parts and material were donated.

The passion, skill and commitment that have been invested along with money in this event are encouraging. The victory of crossing the desert by solar power, faster than a camel, makes this the event of the year for us Electric Vehicle people. The oil people may well ask themselves, if this was their Waterloo.

## Hints for Safe Winter Travel

—From the office of Secretary of State Jim Edgar.

- If you are driving on the highway during the winter, seek shelter immediately if a sudden storm develops. Heavy snow and high winds can reduce your visibility to zero and force you off the road.
- If you are stranded in a blizzard, turn on your emergency flashers, raise the hood, and attach a cloth to the antenna or window. If help is not nearby, stay inside your car where you will have some shelter and are more likely to be found. Turn on the dome light at night to increase your chances of being seen.
- Beware of carbon monoxide poisoning. Keep a downwind window slightly open for fresh air and run the engine and heater sparingly. Make sure that snow has not blocked the exhaust pipe.
- Put several plastic garbage bags in your car. They make excellent wind breakers and provide additional warmth inside the vehicle. When you get out of the vehicle to check the exhaust pipe or for any other reason, simply cut head and arm holes in a bag and pull it over your clothes.
- Try not to fall asleep. If more than one person is in the car, take turns keeping watch. To help maintain adequate body heat, clap your hands and move your arms and legs. But do not overdo it. Exercise warms you and helps to relieve tense muscles, but too much exercise can result in body heat loss.
- Finally, do not try to shovel snow away from your car and push it out of a drift. Overexertion and exposure during a severe winter storm can cause a heart attack, even for persons in apparently good physical condition.

## ENGINEERING NEWS

### Battery runs on aluminum, air, and salt water. . .

**Bernardsville, NJ**—Batteries that generate electricity by adding a salt water solution that reacts with a special aluminum alloy anode and an air cathode might sound revolutionary. But major aluminum producers and various governments have conducted research on such batteries for more than 20 years, with patents issued in the U.S., Japan, and several European countries. However, one firm has developed the batteries for commercial use—Alupower Inc., a subsidiary of Alcan Aluminum Ltd.

The batteries operate like this. During use, the aluminum reacts with oxygen in the air to form aluminum hydroxide in the salt water electrolyte. Periodically, the aluminum hydroxide is flushed out. Once the aluminum plates are consumed, they can be replaced to allow for continued operation. No recharging is needed.

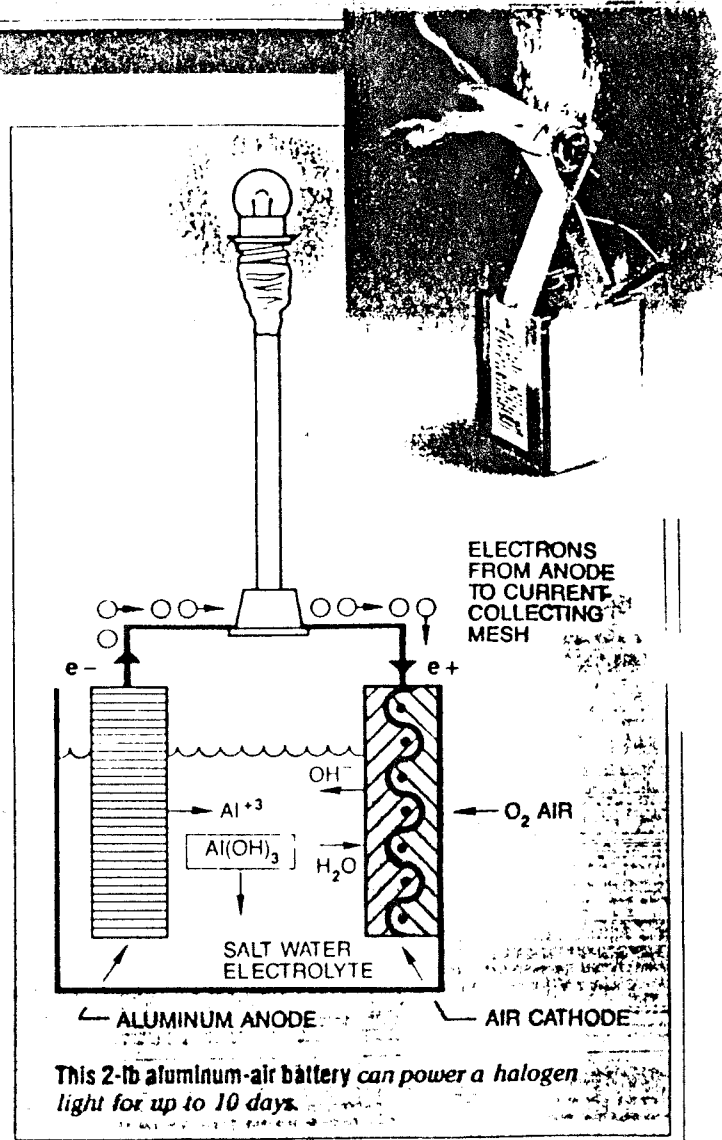
"There are inherent advantages in this type of battery," says Dr. Robert P. Hamlen, the firm's president. "It has virtually infinite shelf life and very low weight prior to activation. Because it contains no dangerous electrolyte, it can be shipped safely by air to remote locations for emergency power generation."

Hamlen reports that Alcan recently made a prototype battery to operate a test golf cart in Canada. The battery configuration took up about the same amount of space as three standard lead-acid batteries. It was used to recharge the lead-acid units in one test, and to serve as the sole power source in another test. It produced 28V at 20A for 15 hours.

The firm's NightStar Reserve Light® also illustrates the versatility of the battery. It provides 0.8A at 2V to power a halogen bulb for up to 10 days. Because of the flat, long discharge, the bulb's brightness remains relatively constant over the discharge period. The unit can run continuously or be used intermittently by emptying, rinsing, and adding fresh salt water when ready to re-activate. Measuring 6 × 8 × 11 inches, the unit weighs only 2 lbs before activation. It has an indefinite storage life.

Other commercial units available or under development include the:

- Reserve Light One®, a small light that uses about a cup of salt water.
- Reserve Light Strobe®, a similar product that operates a strobe.
- NightStar Barge Mooring Light®, suited for use on barges that, when moored, have no electricity capabilities.



Other advantages of the aluminum-air system are its flexibility with regard to the sizes of potential products, and the possible use of caustic electrolytes for extra output. Higher power systems are under development in joint programs with the U.S. and Canadian governments. Recently, Alupower contracted with a European firm to supply the aluminum-air batteries for back-up reserve power supplies at remote data transmission stations. And Hamlen says their use is being discussed to replace lead-acid units for underwater exploration operations.

## Most powerful magnet of all found

Scientists analyzing a new superconducting material have discovered that it can be made into magnets far more powerful than any now in existence, according to unpublished data from a half-dozen laboratories in the United States and China. The material, a hard, dark ceramic discovered less than three months ago, has already astounded scientists with its ability to carry electric current with no loss of energy at record high temperatures. Researchers who are investigating the electrical properties of the material now find that it is also capable of sustaining unexpectedly large magnetic fields.

*From wire reports*

## State Road Reports

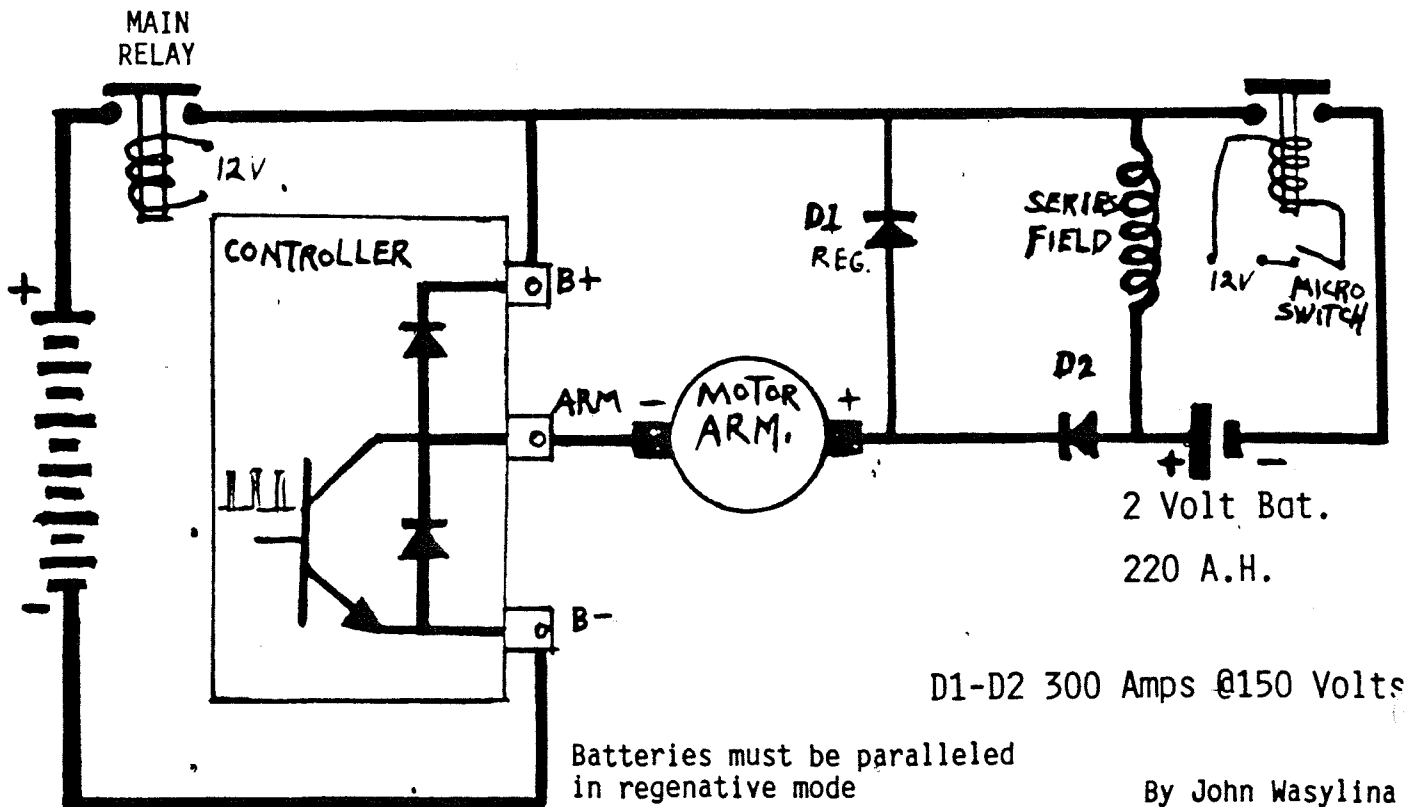
The Illinois State Police now has special road condition telephone lines in operation, according to State Police Director Jeremy D. Margolis.

Margolis said, "The special telephone lines provide pre-recorded highway condition information to help make winter driving as safe as possible for Illinois motorists." The recorded information is updated daily at 5 a.m., 11 a.m., 3:30 p.m., 8:30 p.m., and at all other times when definite changes occur.

The special telephone lines will help keep regular State Police phone lines open to receive emergency calls. Motorists who want to find out what road conditions are should call their nearest State Police headquarters at the following numbers:

District—City	Number
1—Sterling	815/625-6015
2—Elgin	312/742-7642
3—Chicago	312/283-6204
4—Crestwood	312/385-3770
5—Joliet	815/727-5471
6—Pontiac	815/842-4346
7—East Moline	319/755-7011
8—Peoria	309/673-8245
8—Metamora	309/383-4334
9—Springfield	217/782-5730
10—Pesotum (Champaign)	217/352-6705
11—Collinsville	618/346-3636
12—Effingham	217/536-5185
13—Duquoin	618/542-8432
13A—Cairo	618/734-3890
14—Macomb	309/833-4613
15—TOLL ROAD	312/572-0100
16—Pecatonica	815/962-7051
17—Lasalle	815/224-3030
18—Litchfield	217/324-3100
19—Carmi	618/382-8878
20—Pittsfield	217/285-5445
21—Ashkum	815/698-2112

## REGENERATION FOR SERIES MOTOR



# The Proper Use of Wires,

In many cases, 12-volt-DC accessories will not function as well as they could when the wrong wiring techniques are used during installation as discussed in this month's "Maintenance Plus" segment. A large part of the problem can be attributed to the use of a wire gauge that is too small and/or the application of improperly crimped electrical connectors.

Primary wire (22-10 gauge) is the heart of any 12VDC electrical system. And crimping, as opposed to twisting and taping or soldering, is the method of choice for attaching terminals and connectors for most wiring professionals, including those who work in the aircraft industry.

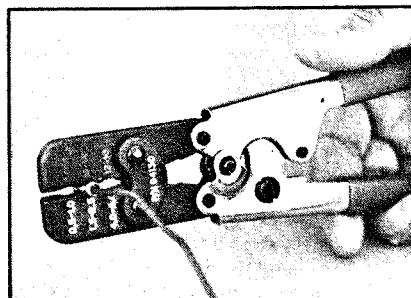
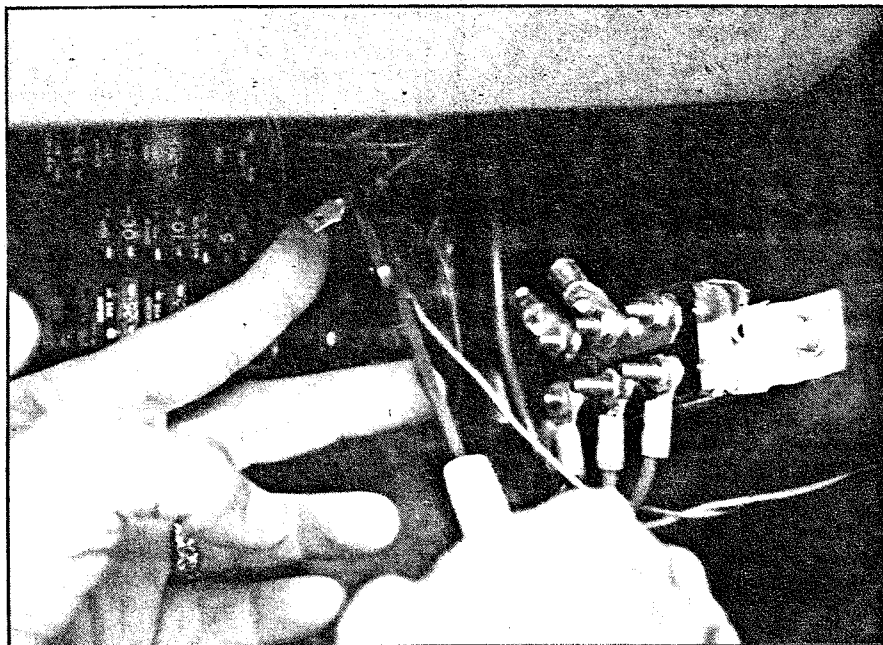
In order to select the proper wire size for fixing problems, you must consider two items: the current or amp requirements of the appliance, and the length of the wire used to complete the circuit. If wire size is insufficient or terminals are improperly attached, the resulting voltage drop can, for example, cause a motor to burn out or a refrigerator to operate inefficiently on 12VDC power. In extreme cases, poor wiring or an attempt to save a few pennies by cutting corners can result in a tragic fire.

Whenever possible, wiring should be routed inside conduit or a wiring loom. When going through a wall or bulkhead, grommets are necessary for abrasion protection. For an authoritative reference on the subject, go to your local library and look up the section on "Wiring and Electrical Devices" in the *Society of Automotive Engineers* handbook.

## Wire Terminals

When choosing wire terminals, keep in mind that a poor connection can ruin all of your hard work. The industry standards for terminal color coding are as follows: Red indicates 22-18 wire gauge, blue is 16-14 gauge, and yellow represents 12-10 gauge. Terminals are available in a variety of styles and types; however, you can look for some common characteristics that help to indicate quality. A crimp terminal is made of three or four parts: the wire barrel, the tongue, the insulation and, in certain brands, a strain-relief sleeve.

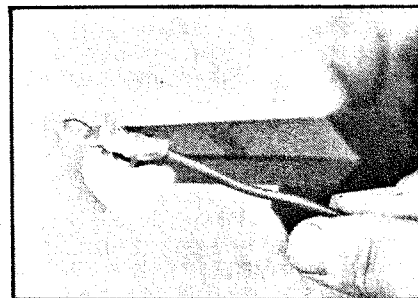
The wire barrel of the terminal, when crimped, tends to spread at the seam; therefore, look for a terminal in which



*A controlled-cycle crimping tool uses a ratchet mechanism to assure proper connection of the terminal to the wire.*

the seam has been braised shut or one that has a seamless sleeve installed over the barrel. This provides a method to keep the seam closed and a place to make a second crimp on the wire insulation for strain relief. The tongue of the terminal might be a ring, a fork or other design, depending on the application. Make sure that the terminal fits. Use quick disconnects only when necessary, not just for convenience.

Insulation for automotive-type terminals is either nylon or polyvinyl chloride (PVC). Although nylon is eas-

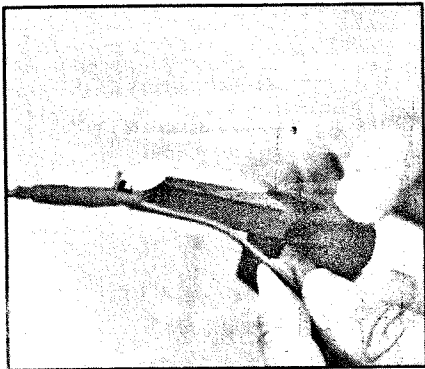


*Crimp 'n Seal connectors have built-in heat-shrink tubing designed to protect from moisture and corrosion.*

ier to work with and allows you to see through the insulation, PVC seems to work better because it does not cut as easily and it is not as susceptible to moisture. In some applications, nylon is essential because of the shape of the terminal and its resistance to certain chemicals such as some fuel additives.

For the most effective crimp, choose a tool made by the manufacturer of the terminal, since all terminals are not made to the same dimensions. Tools are available from an inexpensive stamped-steel version to a ratcheted

# Cables and Connectors



*Heat-shrink tubing is available in various sizes, with and without sealant.*

model with certified crimping pressure used by the best professional electricians. In no case should a tool be used that punctures the insulation on the terminal.

The wire is next stripped to a length that, upon full insertion of the wire in the terminal, allows approximately  $\frac{1}{32}$  to  $\frac{1}{16}$ -inch of the wire to protrude past the wire barrel of the terminal. Some crimping tools have a gauge stamped on the tool itself.

Choose the correct die of the crimp tool according to the wire size, place the terminal in the tool, insert the wire into the terminal, and close the tool completely to achieve the correct crimp. If you have chosen a terminal that has the additional sleeve for strain relief, move the crimp tool to the sleeve area and crimp the sleeve around the wire insulation.

There are terminals available to which shrink tubing already has been applied. If you are using this type of terminal, heat the tubing with a small propane torch or electric heat source after crimping, being careful not to melt or burn anything. Stop heating when the sealant inside the tubing begins to ooze out of the end of the shrink tubing.

There is a continuing controversy over whether crimping or soldering is the best method for attaching terminals or splices. Most professionals prefer crimping because, if the proper procedures are followed, the final product will consistently be the best compromise between electrical

performance and tensile strength of the connection. Also, when crimping there is no danger of burning yourself, shorting out devices by melting the wire insulation or creating a cold solder joint. Nevertheless, a quality solder job will outperform a crimped terminal in RV applications over the long run.

## The Battery Cable

After the correct battery has been chosen and installed in a secure hold-down, the cable choice becomes important. A cable that is too small and/or has terminals that are corroded or improperly attached can cause several problems. At the least, a no-start situation can occur; at worst, the starter motor's life can be reduced substantially.

How do you go about selecting the proper size for the battery cables? There is an organization made up of the maintenance supervisors of major truck fleets called the Truck Maintenance Council (TMC) of the American Trucking Industry. The TMC meets periodically and issues a set of recommended practices for truck maintenance. These recommendations are helpful for motorhome applications.

To select the cable size, you must first know the total cable length, in inches, from the battery to the starter motor and back to the battery, including any frame member that is used in the ground side of the circuit. The best ground results are obtained when the cable is run directly from the engine block to the battery.

Battery cables are available as ready-made or custom assemblies. Ready-made cables are available from various sources; however, the cable gauge is rarely obvious. A cable that appears to be of proper size may be concealing a smaller gauge wire under a very thick insulation. For best results, if you can't determine the size of the cable, ask a battery specialist or electric shop to make cables for you.

## Custom Battery Cables

There are three ways of making custom battery cables. The first is by using bolt-on terminals commonly used for emergency applications. This method should be avoided except when no other options are available. These terminals do not allow for proper attachment to the cable and cannot be sealed

to block out corrosion. Once started, corrosion can travel the entire length of the cable and eventually damage the starter.

The second method, and the one that has been around the longest, is soldering. Soldering integrity is subject to the ability of the mechanic to perform the procedure correctly. A good quality solder connection should hold for the life of the cable, but a cold solder joint can cause resistance problems down the road.

The third method is crimping. When used to connect battery-cable terminals, though, crimping should be performed by a competent mechanic who has the proper tools and experience. Battery-terminal crimping tools can cost hundreds of dollars and are not likely to be part of a Saturday mechanic's toolbox.

When a terminal is applied to a cable, three factors need be considered: the tensile strength of the connection, the ability of the terminal to stay on the cable when a pulling force is applied, and the electrical performance of the connection. In order to achieve the goals of tensile strength and electrical performance, the cable maker must select the proper-size cable and terminal. The best terminals are those made of a plated copper alloy that is malleable, like those made by Quick Cable Corporation, of Racine, Wisconsin. Once the proper die setting on the crimping tool has been selected in accordance with the terminal and cable size, the cable maker need only close the tool to perform a reliable crimp. After applying the terminals to the cables, make sure the installer covers approximately  $1\frac{1}{2}$  inches of the cable and terminal junction with thick-wall heat-shrink tubing containing a sealant that melts and flows when the tubing is heated, completely sealing the joint. You should now have a set of battery cables that will give years of reliable service.

It is very easy to use the right components when wiring new accessories or solving a low-voltage problem on your motorhome. Choose your supplies carefully, use the correct tools, keep the job neat, and don't be afraid to seek expert advice when necessary. Amazingly, wiring is simple to understand but is often abused in practice. □

—Jack Pierce