Technical Brief:
Applications of ACR and Multi-Program Multi-Output Chargers

This is the third technical brief related to applications of automatic charging relays (ACR) and battery chargers. Automatic charging relays can be an excellent solution for distributing charge to two battery banks when there is a single source of charging such as an alternator on a single engine. But what happens when you add an ACR to a system that already has a multi output charger? This series of technical briefs helps to identify some of the considerations that should be made with some of the types of battery chargers on the market today. Click to read about other ACR/charger applications—ACR and charger float mode, ACR and charger noise.

The primary function of an automatic charging relay (ACR) is to combine two battery banks so that they can share the output of a single charge source. When the ACR senses a charge applied to one battery bank, it connects both battery banks.

Multi-Output Chargers. Many shore chargers have multiple outputs. Typical multi-output chargers apply a single charging profile to each battery bank. When all battery banks reach the end of a stage, they are advanced to the next stage. An ACR is not needed to distribute the output from such multi-output chargers, but in most cases, the ACR does not interfere with the charger operation. Connecting batteries together when they are being charged by such multi-output chargers makes little or no difference. The starting battery may remain in the absorption stage longer than it might need to while the house batteries are being fully charged. If the charging profile is not too aggressive, no damage will occur to the battery bank.

Multi-Program Multi-Output Chargers. However, there may be interference between ACRs and certain chargers. Multi-program multi-output chargers can run different charging profiles on separate outputs to facilitate different battery chemistries—flooded, gel, AGM, lead-calcium, or custom battery types. The user can set the charging profile for each battery bank independently based on its battery chemistry. Some of these devices have independent regulators and others may have a sequential behavior where one battery is charged for a period, and then the next battery is charged, and each battery is supplied with controlled voltage and current according to a separate profile.

ACR/Charger Interference. If two battery banks, with different chemistries are connected together, through an ACR, then two charging profiles are applied to each battery bank. An ACR that combines battery banks under these circumstances may interfere with the charging performance, and reduce any benefit from running these programs. A charging profile that is ideal for one battery chemistry may be too aggressive and therefore harmful to another. This is especially a problem when different battery types are used in the system, such as a conventional flooded cell starting battery and an AGM or Gel deep cycle house battery bank. The solution is to prevent the ACR from connecting the batteries when the shore charger is active.

Click to read solving ACR/multi-program multi-output charger interference.