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Notes and Observations

Battery Modifications for Autogenic Systems Inc., Equipment

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The Autogenic Systems Inc. (ASI) biofeedback units have auxilary power jacks on the rear panels to allow an external power supply to be used instead of the internal alkaline batteries. An external rechargable battery pack is the ideal source for power since it has no 60-Hz noise and has no connection with 110 VAC that is present in the traditional power supply. In addition, the authors have found that university laboratory students often fail to turn the power off and the cost of the 9-volt batteries has become exorbitant.

A regulated ± 12-volt power supply is required to operate the Autogen 120A (EEG) biofeedback units, but while the other (ASI) units require only ± 9 volts, they will work properly with a higher voltage. Standard wet cells made for motorcycles were chosen for the new power pack because of their small size, their light weight, and the availability of 6- and 12-volt models. A 12- and 6-volt battery in series when fully charged provides 18 volts that can be regulated by a 12-volt semiconductor regulator. Therefore, the combined battery voltage can drop by 6 volts before recharging is required. Since ± 12 volts are required, four batteries are required for each power pack.

Figure 1 shows the circuit used to connect the four batteries to the regulators and to a 2-amp. battery charger. The simplified circuit in Figure 2 shows how the batteries are connected to the regulators while the pack is being used (relays not energized). Figure 3 shows how the relays connect the

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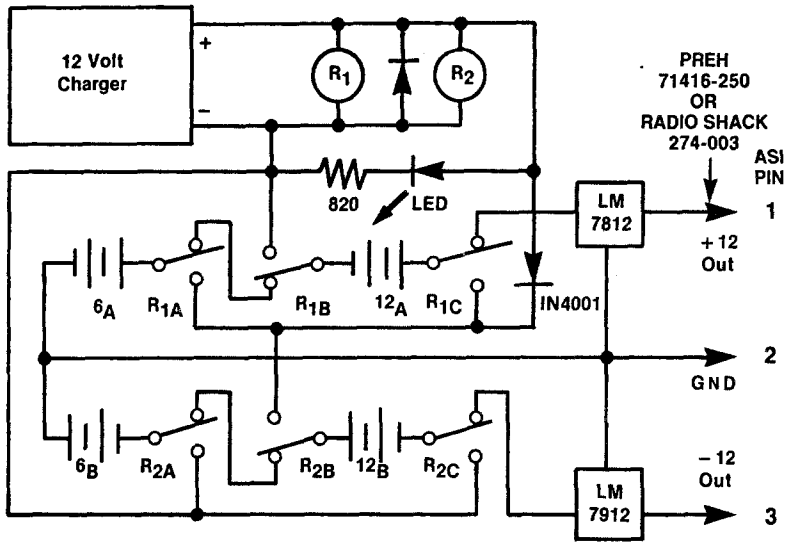

Fig. 1. Circuit diagram of ASI battery pack.

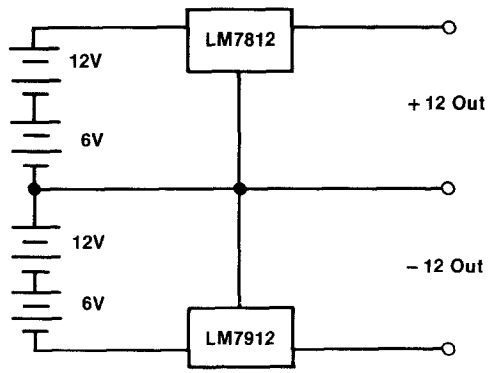

Fig. 2. Simplified circuit diagram of the regulating circuit.

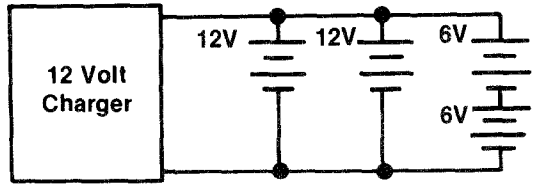

Fig. 3. Simplified circuit diagram of the charging circuit.

batteries to the charger (relays energized). While the batteries are being charged, they are disconnected from the regulators by the energized relays and, therefore, from the ASI equipment and subject. This is illustrated in Figure 1. When R_1 and R_2 are energized by the charger, the relay contacts R_{1c} and R_{2c} disconnect LM 78/2 and LM 7912, which are the regulators that energize the ASI equipment. The motorcycle batteries need replacing only approximately every 18 months, thus reducing battery costs by 20 times that of the alkaline batteries. Also, if the user does not use the ASI 120A EEG unit, then only two 12-volt batteries and two 9-volt regulators are required.

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