

Los Angeles City Fire Department

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VEHICLE BATTERY SYSTEMS

The "Six-Battery System" evolved from the need of an electrical system which was capable of maintaining the 800 MHz Radio, the Mobil Data Terminal (MDT) and the Blaupunkt Travel Pilot (ETAC), while having enough amperes to supply the rest of a vehicle's electrical requirements.

This system has been installed in all heavy apparatus and consists of six (two sets of three), lead acid 12 volt batteries. These batteries are rated at 950 cold crank amperes at 0 degrees F.; they have a reserve capacity of 190 minutes at 25 amperes draw per hour. Diesel engines draw approximately two amperes per cubic inch when starting (i.e., a 1990 Detroit Diesel BV 92 Engine with 736 cubic inches takes about 1472 amperes to start).

The batteries are connected in parallel to the rest of the electrical system. This configuration allows the alternator or the on board battery charger to charge all batteries simultaneously. Five of the six batteries are used to start the apparatus. The sixth battery (right rear) is not connected to the starting circuit and is strictly used to keep the 800 MHz Radio, the MDT, and the ETAC powered at all times.

There are four modifications that have been made on all heavy apparatus equipped with the new Six-Battery System:

1. The battery selector switch has been changed to a simple "on-off" switch. This new switch is located in proximity to the old battery switch.

2. The combined use of the 800 MHz Radio, the ETAC, and the MDT units, causes a constant eight amperes per hour draw on the battery system. Due to this constant drain, an automatic onboard (40 amp) battery charger has been installed on each apparatus. This charger is connected to the "engine block" heater receptacle (110 volt shore power). **Heavy apparatus must be plugged in when the vehicle, is in quarters.** When the battery charger is in operation, the amount of charge will be shown on the ammeter located on the left front side of the charger. (The ammeter on the right front side is disconnected.) When the batteries are at full charge, the charger will automatically shut off. The ammeter will show a reading of zero and the green indicator light on the front of the charger will activate.

NOTE: When the apparatus is out of service for an extended period of time (over ten hours or the on-board battery charger cannot be plugged in, the radio "cut off switch" must be turned off to avoid running down the batteries. This switch is located inside the radio compartment.

3. All apparatus have been installed with a "low voltage warning system." An audible warning device activates anytime the batteries fall below 12.2 volts. When the device activates, the apparatus must either be started or the on-board battery charger must be plugged in.
4. A digital voltmeter has been installed on either the dashboard or the center console. This voltmeter should be monitored to insure that a minimum of 12.2 volts are available from the batteries at all times.

The Four-Battery System

This system is designed for Los Angeles Fire Department Rescue Ambulances. It consists of two batteries under the hood and two batteries in the (left) side compartment of the vehicle. All four batteries are connected in parallel. This means that all four batteries are used to start the vehicle and operate the electrical equipment. Additionally, the alternator or the on-board battery charger will charge all batteries simultaneously.

There are three specific features to the Four-Battery System:

1. A battery charger is located under the passenger seat of the ambulance. This charger is the same 40 amperes charger used on heavy apparatus. It is connected to the "engine block" heater receptacle. Rescue Ambulances must be plugged in when the vehicle is in quarters.

2. A radio "cut off switch" is located under the bench seat in the cabin of the ambulance. When the ambulance is out of service for over ten hours or the battery charger cannot be plugged in, the radio "cut off switch" shall be turned off to prevent the batteries from being drained.
3. Ambulances have been fitted with a low voltage warning buzzer. An audible warning will sound when the batteries fall below 12.2 volts. Just as the heavy apparatus, when this device activates, the vehicle must either be started or the on-board battery charger must be plugged in.

The Two-Battery System

This system is designed for emergency sedans and suburbans. It employs two batteries under the hood, (one on each side of the engine) with both batteries connected in parallel.

There are three features to the Two-Battery System:

1. Emergency sedans have a 40 amperes battery charger in the trunk and a charger plug located on the left rear fender. Suburbans have a charger in the rear storage area and a charger plug on the left front fender. **Emergency sedans must be plugged in when the vehicle is in quarters.**
2. Emergency sedans have a radio "cut off switch" located in the trunk. Suburbans have a radio "cut off switch" located on the center console between the driver and passenger seat.
3. Both vehicles have a low voltage warning device that will sound an audible warning if the batteries fall below 12.2 volts. When the buzzer activates, the vehicle must either be plugged in or the engine must be started.

CONCLUSION

The Two-, Four-, and Six-Battery Systems are designed to meet the increasing needs for an electrical system capable of supporting the high tech radio and mapping equipment being fitted on Fire Department vehicles. This training bulletin will familiarize members with these new systems.