common connection to the boat's *common ground point* or bus bar (see below). This separation is maintained because the DC negative conductors are subject to a certain amount of voltage drop when conducting, so different parts of the DC negative circuit will at different times be at different voltages (not quite at ground potential). If the DC negative circuits were to be tied to the grounding circuits at more than one spot, this would encourage small circulating currents within these circuits which could cause stray-current corrosion.

The purpose of the various normally non-current-carrying grounding systems is to provide a path to ground *within the boat's wiring* for AC fault currents, stray currents, and lightning. In order to do this it is *not* necessary to have separate AC grounding, bonding, and lightning conductors fastened to all major metal objects—in theory the same cable can serve all three purposes, *as long as it is rated for the job*.

However, in practice the AC grounding cable is always run as a separate circuit to all AC appliances and outlets, terminating at the AC grounding bus, from where a connection is made to the common ground point or bus bar. In most circumstances, the #6 AWG cable required for lightning grounding is then more than adequate for combined lightning and bonding purposes, the exception being heavy-draw DC equipment, notably starter motors, on which any bonding cable must be at least as large as the DC negative cable (see page 144). When a heavier cable is required for bonding purposes than is needed for lightning protection, the bonding cable serves also for lightning protection.

The cables on those items that require bonding (for cathodic protection) but do not need to be tied into the lightning grounding system (for example, some bilge pumps) are sized as described on page 144.

The various *current-carrying DC negative cables* are brought to one or more *DC negative buses*. There is normally an *(accessory)* bus close to the DC distribution panel, which in turn is connected to a heavy-duty *(main negative)* bus to which are fastened the battery negative, the engine ground strap, and any other heavy-duty DC negative cables (for example, a direct connection to an alternator case, or the negative

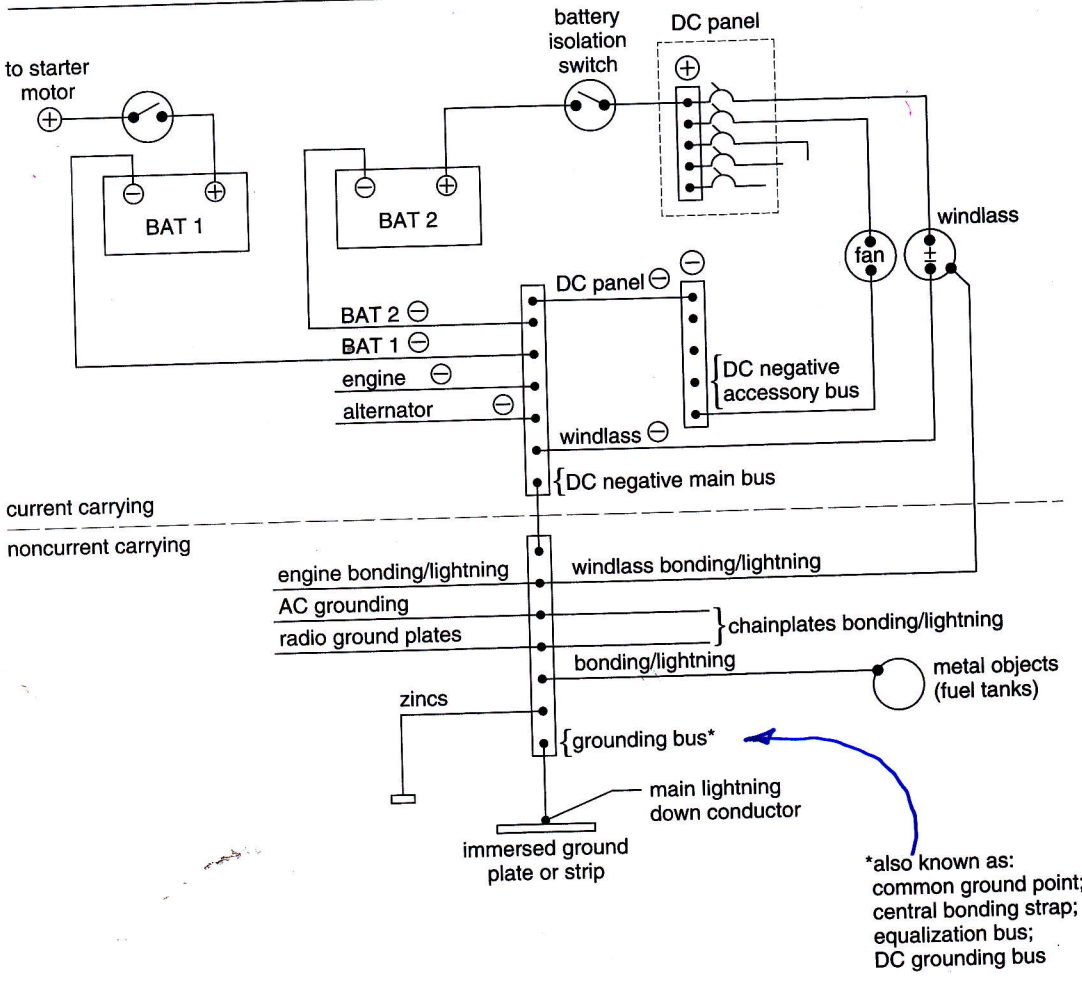

Figure 4-25. Common ground point.