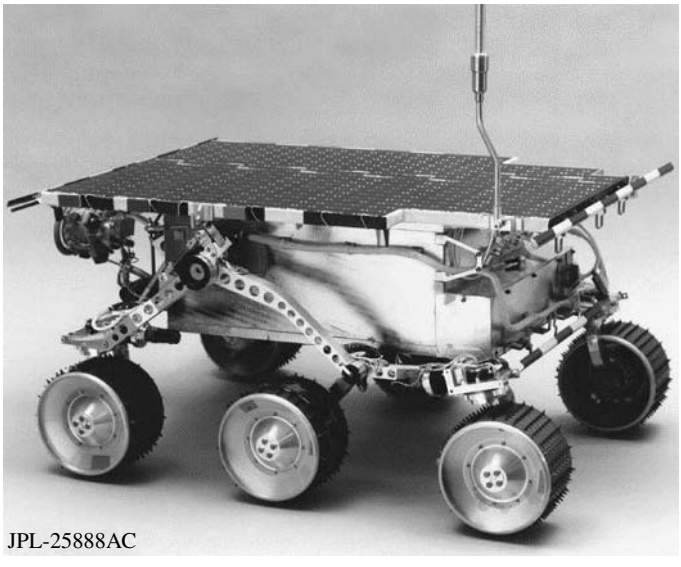

Figure 10.10 Body-mounted array on the Mars sojourner rover. (Picture courtesy of NASA JPL)

are hinged such that they can be folded against the side of the spacecraft during launch (see Figure 10.11). Each panel is rigid and quite strong, but can add considerably to the overall weight of the array. There has been much development recently on panels of materials other than aluminum (i.e. graphite/epoxy sheets and ribbons). Hybrid panels with aluminum honeycombs and epoxy/glass face sheets have also been developed. The folded arrays are deployed by means of pyrotechnic, paraffin, or knife blade actuators and damper-controlled springs.

The BOL power density of the rigid panel array is extremely dependent on the type of solar cell used. BOL power densities range from 35 to 65 W/kg for silicon cells and 45 to 75 W/kg for GaAs/Ge cells. The panel assembly of a rigid array accounts for 75 to 80% of the total mass, with the stowed and deployment structure making up the balance [16]. The Tropical Rainfall Measuring Mission (TRMM) and Rossi X-Ray Timing Explorer (XTE) both employ rigid panel arrays. Available power supplied by typical rigid panel arrays range from very small to in excess of 100 kW.

10.5.3 Flexible Fold-out Arrays

Flexible fold-out arrays are attractive for missions that require several kilowatts of power because of their high specific power, high packaging efficiency (low stowed volume), and simple deployment system. These arrays are generally designed in two basic configurations:

1. Flexible flat panel array with linear deployment as shown in Figure 10.12.
2. Flexible round panel array with circular deployment as shown in Figure 10.13.

These arrays have flexible or semiflexible panels that are stowed for launch with accordion folds between each panel. On reaching an appropriate orbit, these are unfurled