Precise attitude determination with low-cost GPS receivers requires integer ambiguity resolution and reliable cycle slip correction. In this paper, a tree search of cycle slips is proposed, which combines double difference GPS carrier phases from all visible satellites, gyroscope and acceleration measurements, and a priori information on the baseline length between both GPS receivers. The proposed method was verified in both a slalom drive with high dynamics and a drive below trees with shadowed GPS signals: The residuals of the fixed phase measurements were reduced to less than 15 cm throughout the measurement period.