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**Proper Motion of the GP-B Guide Star** IRWIN SHAPIRO, DANIEL LEBACH, MICHAEL RATNER, NORBERT BARTEL, RYAN RANSOM, MICHAEL BIETENHOLZ, JERUSHA LEDERMAN, JEAN-FRANCOIS LESTRADE, Harvard-Smithsonian Center for Astrophysics — We discuss Gravity Probe B’s (GP-B’s) guide star: the process for its selection, the determination of its proper motion, and the error analysis of the resultant estimate. With the Stanford GP-B team, we chose an optically-bright binary system, IM Peg (HR 8703), as the guide star. This system emits radio radiation, thus allowing us to determine IM Peg’s proper motion with respect to extremely distant radio sources. In each of 35 sessions of 8.4 GHz VLBI observations spread between 1997 and mid 2005, we obtained the sky position of IM Peg’s radio emission, relative to 2, and sometimes 3, extragalactic radio sources nearby on the sky. We detail the random and systematic errors in these position determinations and give our final value of the standard error in the resultant estimate of IM Peg’s proper motion. This standard error is less than our project-specified goal of 0.15 milliarcseconds per year. We will not disclose our value for IM Peg’s proper motion until the GP-B data analysis is completed, since this GR test is to be as (nearly) “double blind” as feasible.

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