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## A SEARCH FOR RADIO PULSARS IN THE NORTHERN SKY: DISCOVERY OF A PULSAR IN A UNIQUE BINARY SYSTEM

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### Abstract

A sensitive search for pulsars has been conducted using the 92-meter transit telescope of the National Radio Astronomy Observatory. Nearly 50% of the sky north of +20(DEGREES) declination was searched, using an on-line computer to process all search data in real time. The search program was sensitive to pulsars in the period range 0.0333 to 3.9 seconds, with dispersion measures between 0 and 130 cm<sup>(-3)</sup>pc. The limiting flux density reached was approximately 10 mJy at 390 MHz. ^ Twenty-three previously unknown pulsars were discovered in the course of the search, and three of these are noteworthy. PSR 0320+39, 28with a pulse period of 3.0321 seconds, has recently been found to exhibit subpulses which drift exclusively from the leading to the trailing edge of the pulse profile. The position and dispersion measure of PSR 0458+46 are consistent with a physical association between that pulsar and the supernova remnant HB 9. PSR 0655+64 has been found to be a member of a binary system. ^ The pulsar parameters and orbital elements of the PSR 0655+64 system were determined through an extensive series of pulse timing observations at the NRAO 43-meter telescope. The orbital eccentricity is unmeasurably small, with an upper limit of 4 x 10<sup>(-5)</sup>, and the pulsar's period derivative is smaller than any previously known. Evolutionary considerations have suggested that the pulsar's companion might be a visible star, and an extremely faint star has been identified optically at the pulsar position. Observations with the Einstein X-ray satellite have detected no X-rays from the system. The available evidence indicates that the pulsar's companion may be an unusually faint dwarf star. ^

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