Results of an experiment involving the synchronous satellite relay of digital information at L-band between a ground station and a jet aircraft are described. Specific tests studied the performance of PSK signalling in conjunction with three distinct detection strategies for both the classical additive noise channels and the composite multipath channel (direct signal plus multipath). Tests were conducted at various signal-to-noise ratios and direct signal-to-multipath ratios. Reasonable agreements with available non-fading and Rician fading channel theory is shown. Implications for the operational aeronautical satellite case are discussed.