Attributing aeromagnetic anomalies to intrasedimentary normal faults is common practice, yet their magnetic sources are not well documented. In the Rio Grande rift, USA, detailed geophysical and rock-magnetic property studies at several exposures show that subtle curvilinear aeromagnetic anomalies relate to contrasts in the primary magnetization of clastic sediments juxtaposed at intrasedimentary normal faults. To evaluate whether these kinds of sources could be identified outside the Rio Grande rift, we examined geophysical variables required to produce detectable anomalies in comparison to measured volume magnetic susceptibilities. The main variables are magnetic-susceptibility contrast of, depth to, and vertical extent (related to fault throw) of juxtaposed strata along the fault. Plots of magnetic-susceptibility contrast versus vertical extent for different depths help determine the criteria for aeromagnetic expression of faulted strata. For example, assuming a magnetic survey flown 100 m above ground in an area of high latitude, a fault with 50 m of throw requires contrasts of at least 0.0003 to 0.0010 (SI) at depths of 0 to 300 m, respectively, to produce anomaly amplitudes >1 nT. These contrasts are within ranges of magnetic susceptibilities compiled for clastic rocks worldwide and from detailed studies of individual stratigraphic units from several areas in North America. The units generating the highest contrasts (~0.0010 SI) typically formed in Mesozoic and younger, tectonically active areas that had volcanic and/or basement source areas rich in magnetic minerals. Thus, faulted strata should be considered as likely sources of subtle, curvilinear aeromagnetic anomalies in extensional terranes in general.