Small unmanned aerial vehicles require a large degree of fault-tolerance in order to fulfil their duties in an satisfactory way, both with respect to economy and safety in operation. Small aerial vehicles are commonly constructed without much redundancy in hardware, primarily for reasons of cost but also weight. Single point of failure solutions are therefore commonly used and operation is typically allowed only in closed airspace. In order to enhance dependability, fault prognosis and diagnosis are needed. This paper explores principal redundancies at a very overall level, whether based on hardware or are analytical, and formulates residuals from which faults can be prognosed or diagnosed. An approach is suggested where detailed modelling is not needed but normal behaviour is learned from short segments of flight data using adaptive methods for learning. Statistical characterisation of distributions and change detection methods are employed to reach decisions about not-normal behaviour and it is shown how control surface faults can be diagnosed for a specific UAV without adding additional hardware to the platform. Only telemetry data from the aircraft is used together with a basic model of relations between signals within the aircraft. Frequency domain methods are shown to be robust in exploring relevant properties of the signals. The detection is shown to work on data from a real incident where an aileron gets stuck during launch of a UAV.