separate agreement, the USAF also provides aerial-refuelling support on a commercial basis.

For the Desert Falcon test programme (and contrary to previous F-16 models), standard production aircraft are used in the form of the first three production F-16F aircraft. The first test aircraft is the two-seat F-16F that made its maiden flight at Forth Worth, Texas, on 6 December 2003 with Lockheed Martin F-16E/F chief test pilot Steve Barner at the controls. The second aircraft, RF-2, flew in April 2004, followed by RF-3 joining the test programme in June 2004. All three are in common flight test configuration with Lockheed Martin's own instrumentation equipment installed, and these test aircraft rotate back and forth to Fort Worth on a regular basis for upgrades or the installation of test-specific instrumentation. All three have received modifications and fortifications to the aft upper and under surface for the installation of the emergency spin/departure recovery system for high angle-of-attack tests.

The Block 60 capabilities are being gradually developed, tested and delivered in blocks or Standards. Standard 0 was the initial release and, for instance, only included basic air-to-air and air-to-ground radar modes of the APG-80 radar. Upon verification of all the contractually defined functionalities, the first production aircraft were delivered in this Standard for training in Tucson. Standard 0 testing started in mid-2004 and ended in early 2005.

Standard 1 is the full hardware configuration and provides capabilities basically equivalent to the F-16 Block 50/52. The following Standards are mainly software upgrades to extend the aircraft's capabilities in stages, reaching its full operational capability in Standard 3. Currently the development is at Standard 2 and projected to be completed in February 2006, adding additional system and weapons capabilities to the Desert Falcon. A new contract is currently drawn to stay at Holloman until Standard 3 is reached, scheduled to be achieved by mid-2007.

The Desert Falcon Flight Test Team at Holloman encompasses some 34 people, pilots not included. The contract with Lockheed Martin stipulates to provide the Test Team with buildings and general support, but also that the 586th Flight Test Squadron is the Participation Test Organization (PTO) for the Block 60 tests performed by the Desert Falcon Flight Test Team operating from Holloman's north ramp. The Flight Test Squadron has the government oversight for security, safety review and risk management boards fulfilling a government requirement allowing Lockheed Martin to test the Desert Falcon at WSMR.

As a consequence, Lockheed Martin is also able to use the range telemetry system and coordinate with the 46th Test Group all its safety and risk management boards prior to testing, as the military have accepted some level of accountability. However, Lockheed Martin also has its own telemetry ground station for real-time time-synchronised data collection, and this data is not shared with the Air Force. Being fully independent, Lockheed Martin does not require any other support from the Air Force such as chase aircraft.

Test Group approval

The risk management board approves the risk level (whether it is low, medium or high). Lockheed Martin requires formal approval from the Test Group to do high-risk level testing at WSMR. The board reviews what loading and configuration Lockheed Martin is testing, what envelope is being pursued, what are the "knock-it-off" criteria and as the manuals (Dash 1) are progressively drafted, how the obtained test result is weighed into the next tests by discussing the decision tree and test cards before going to the next test.

A typical example of the tests undertaken by the Desert Falcon Flight Test Team at Holloman are the Flutter Excitation Tests for the Block 60 running from September 2005 to March 2006. The F-16E/F is 70 per cent different compared to its predecessors, and all envelopes and configurations have to be newly defined and validated.

These tests are aimed to clear an envelope in a specific configuration and a flutter excitation system is used, entailing a special control panel to be installed in the cockpit. During the flight a programmed mode is excited to monitor the aircraft's response and verify whether the response is within the safety margins. The parameters usually measured and recorded during a flutter excitation test are airspeed, pressure altitude, outside air temperature, flutter exciter, elevator position, aileron position, rudder position, wing tip accelerations and wing strain gauges. Real time analysis is necessary to assess the results from each individual excitation in order to decide whether to proceed to the next test point.

A single flutter excitation test will identify the frequency and damping data for one structural surface at one flight condition of Mach number. The flight test engineer will establish a table of flight conditions where a series of flutter excitation tests are desired. The test series will start at a moderate airspeed, well below the expected flutter boundary, in order to establish a baseline damping level for the surface. The tests will progress in small increments toward the predicted boundary, with data analysis occurring between each excitation. This is then performed for all the different possible configurations.

Upon completion of the test schedule in the USA, all three aircraft will be handed over to the UAE with the instrumentation equipment still installed. The gun pack, which is currently replaced by instrumentation, will be delivered in a box for installation *in situ* if required.