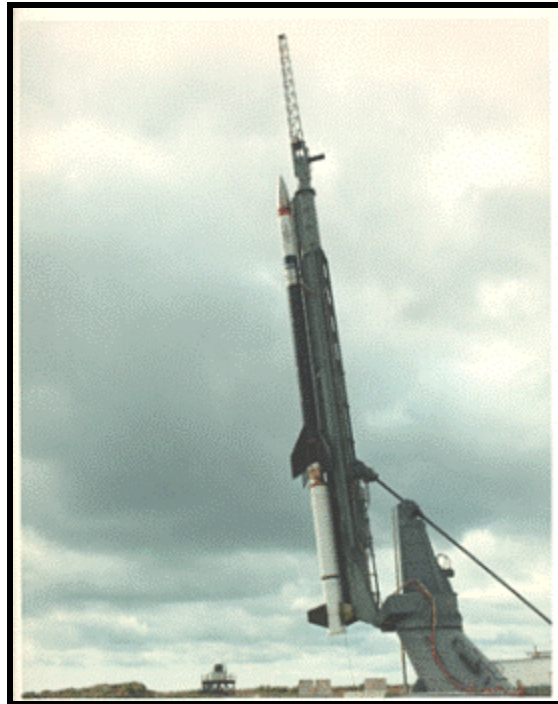


## **Terrier-Black Brant IX Launch Vehicle (36.XXX)**

### **General**

The Black Brant IX vehicle system (Figure G.5-1) is the fourth in the group of rocket systems using the 17.26 inch diameter Black Brant V rocket motor. This vehicle fulfills a weight to altitude requirement for the scientific community which is not met by other NASA vehicle systems.



**Figure F.5-1: Black Brant IX Launch Vehicle**

There are three versions of the BBIX vehicle used. Each vehicle configuration is flight qualified and is available for mission selection:

- BBIX Mod 0: Terrier MK 12 – BBVC
- BBIX Mod 1: Terrier Mk 70 – BBVC
- BBIX Mod 2: Terrier Mk 70 – BBVC (with extended cone).

### **Vehicle Performance**

The first stage booster consists of either a Terrier MK 12 Mod 1 rocket motor or a Terrier MK 70 rocket motor, both of which are equipped with four 340 square inch fin panels arranged in a cruciform configuration. The Terrier booster has a diameter of 18 inches.

The 26 KS 20,000 Black Brant VC rocket motor produces an average thrust level of 17,005 pounds and an action time of 26.9 seconds. The primary diameter of the Black Brant VC is 17.26 inches and it is

210 inches long. Loaded weight of the motor including hardware is 2,789 pounds which includes 2,198 pounds of propellant.

**Payload**

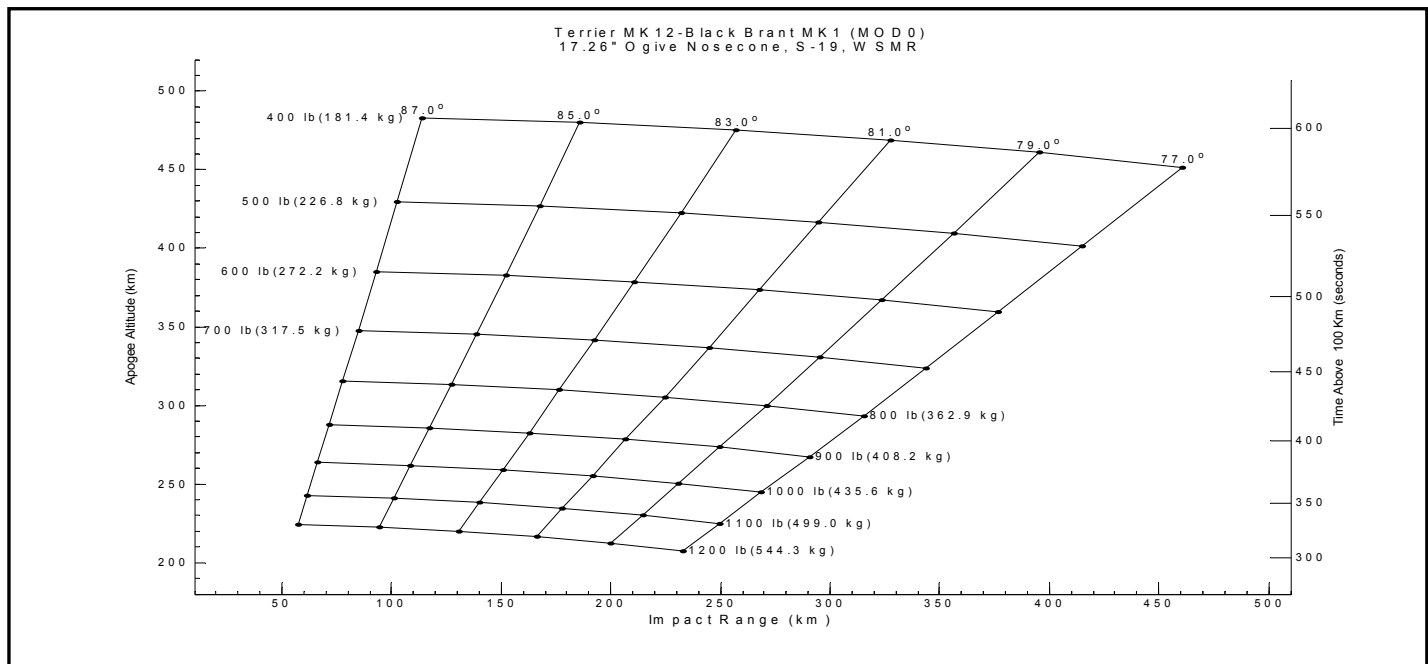
The standard payload configuration for the Black Brant IX vehicle is 17.26 inches in diameter with a 3:1 ogive nose shape. Payload length and weight limits are not defined as they are for the Black Brant V and specific limitations will be determined as the situation warrants. The burnout roll rate for the second stage Black Brant is three to four cycles per second. The SPARCS can be flown on this vehicle. See Section 5 for additional information regarding SPARCS.

Standard hardware systems that are available for Black Brant V motors include aft recovery systems for 750 lb., 1000 lb. or 1250 lb. recovered weights, Ogive Recovery System Assembly (ORSA) for the same weight ranges, payload separation systems (including High Velocity Separation System) and despinn systems. These units are modular "stackable" such that a great deal of flexibility exists in meeting experiment requirements.

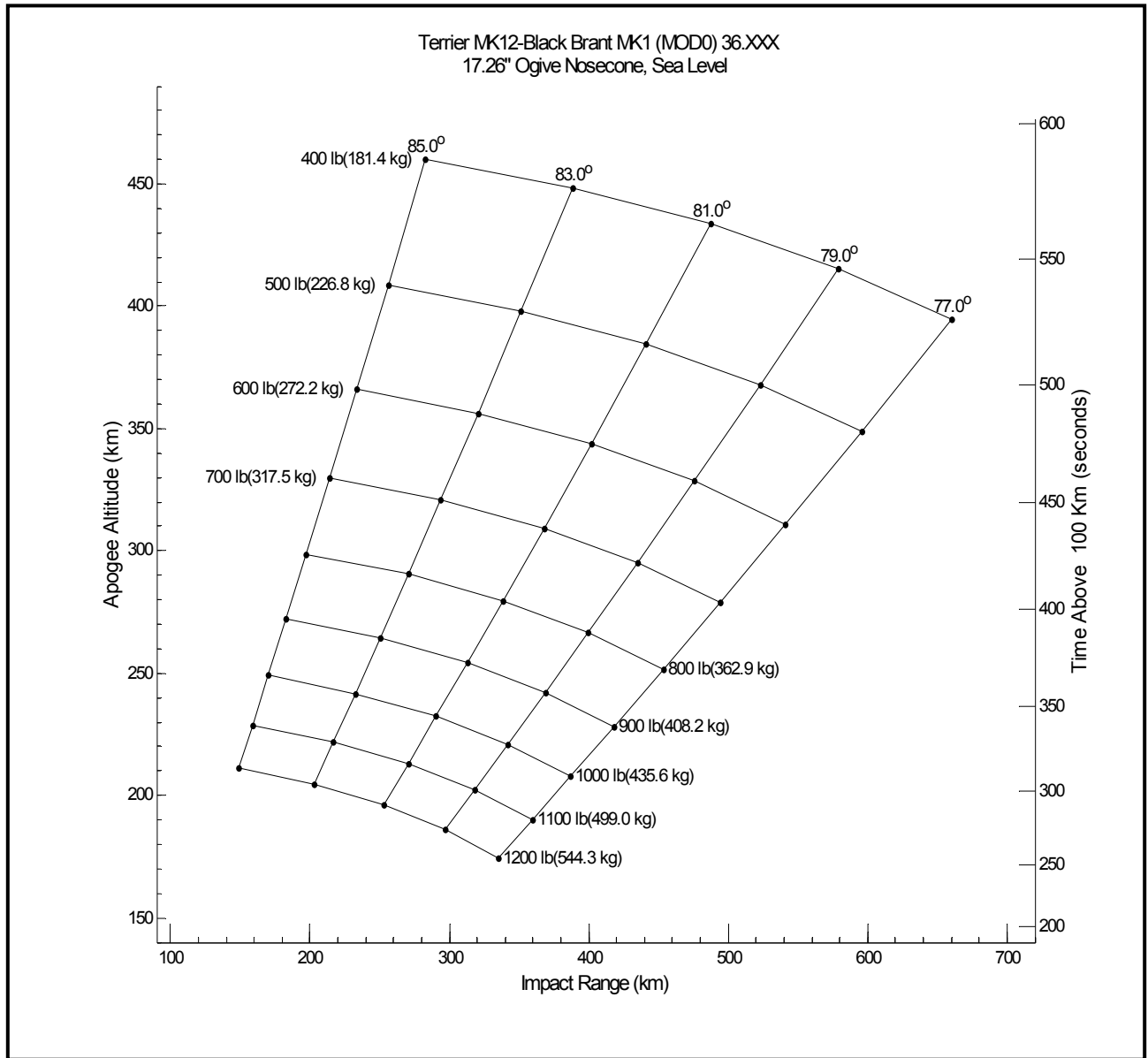
**Performance Graph**

Performance Graphs showing the launch vehicle apogee altitude and impact range at various launch elevation angles and payload weights for the BB IX Mod 0, BBIX Mod 1, and BBIX Mod 2 follow.

**MOD 0**

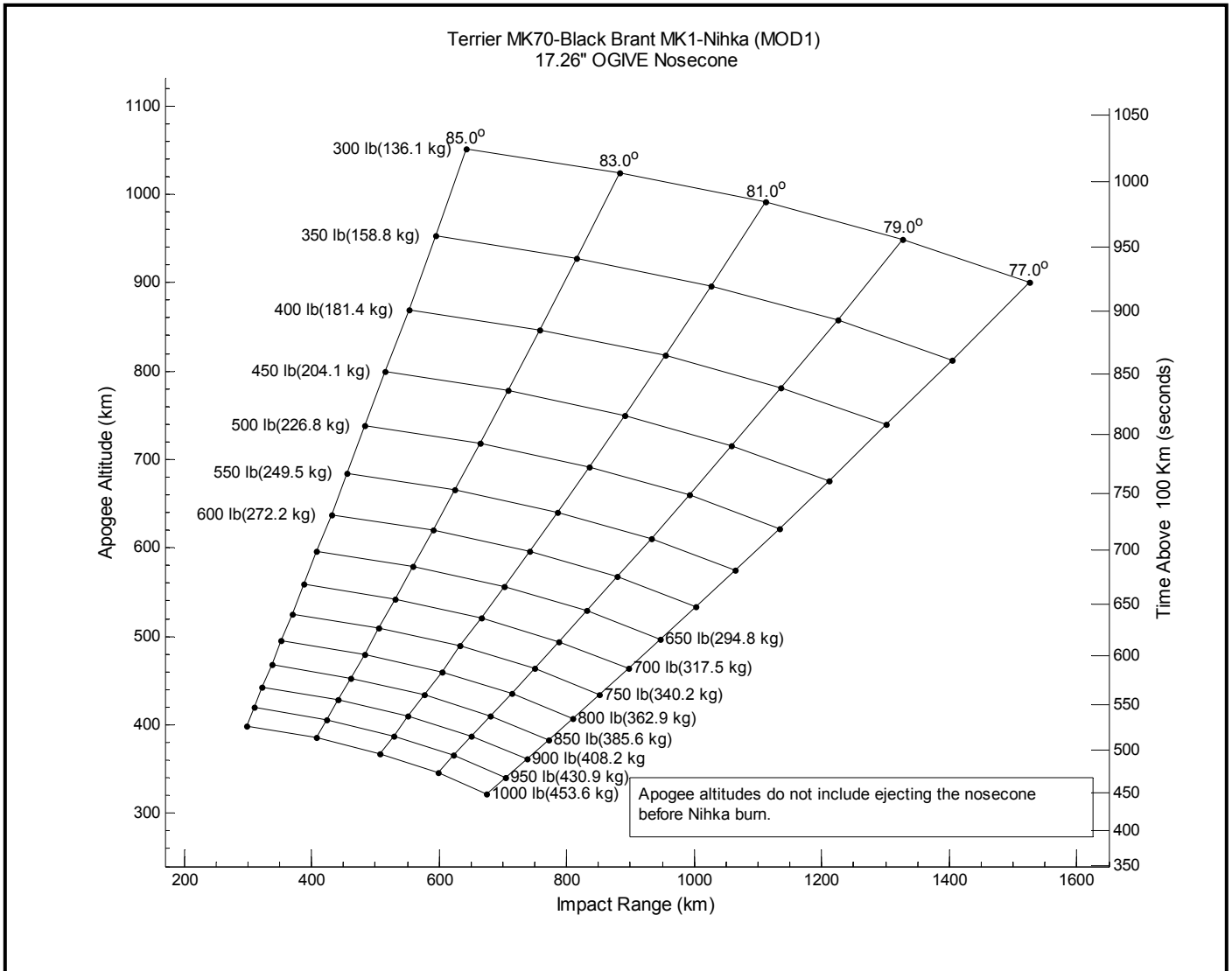


**Figure F.5-2: Terrier MK 12 Black Brant MK 1 (WSMR)**



**Figure F.5-3: Terrier MK12-Black Brant MK 1 (Sea Level)**

**MOD 1**



**Figure F.5-4: Terrier MK70-Black Brant MK 1-Nihka**

MOD 2

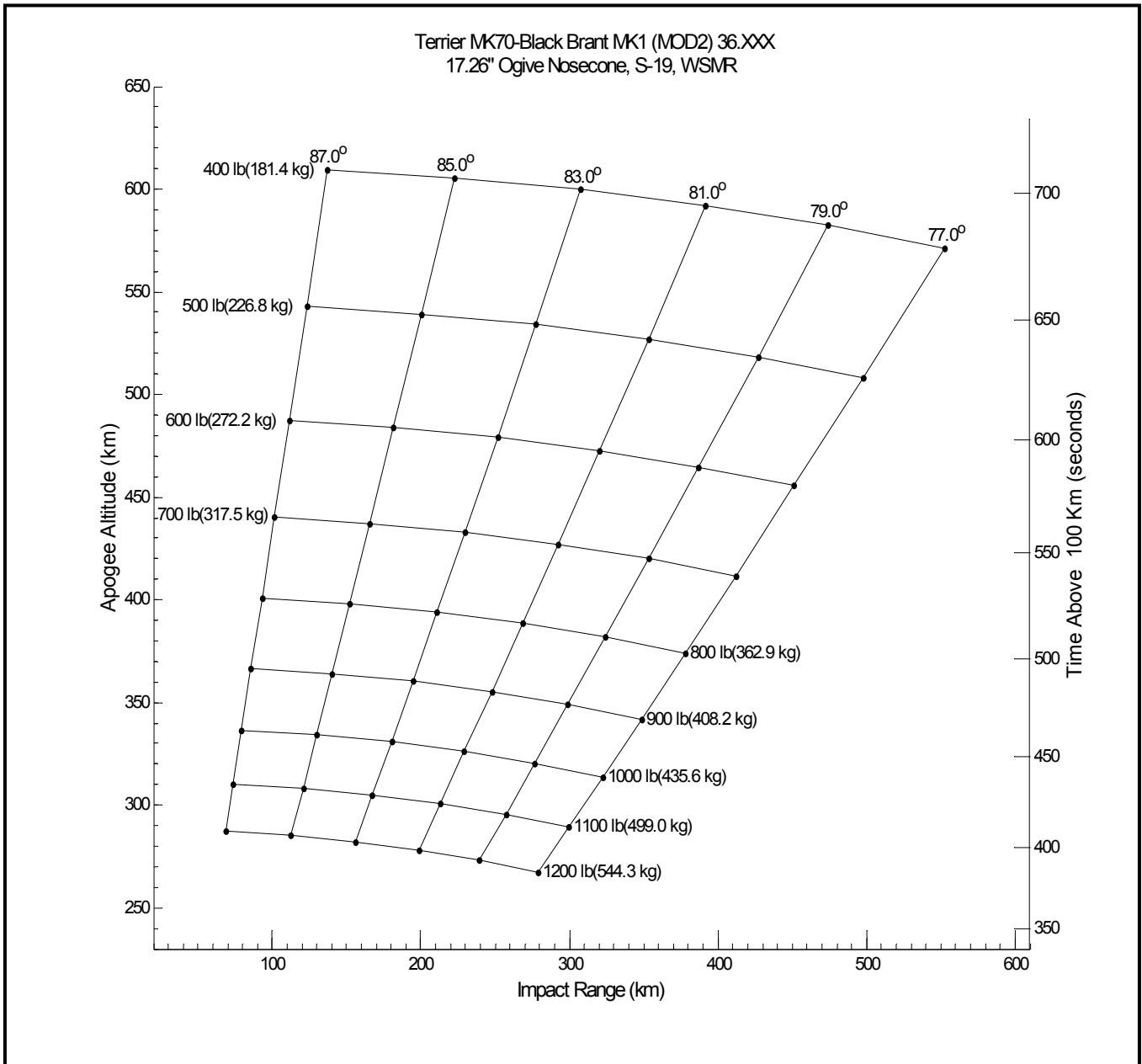
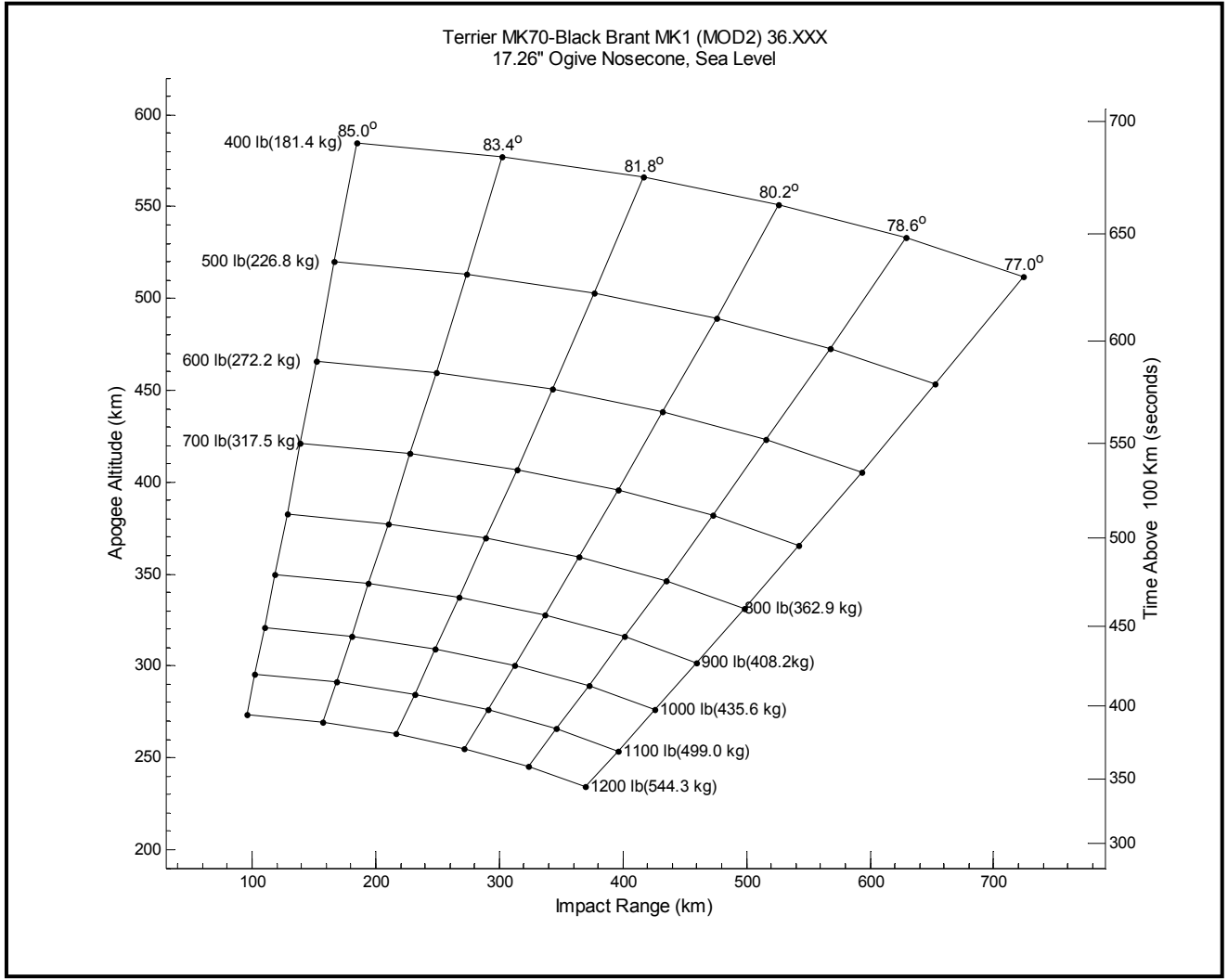


Figure F5-5: Terrier MK70 –Black Brant MK 1 (WSMR)



**Figure F.5-6: Terrier MK70-Black Brant MK1 (Sea Level)**