Summary Description

BQM-167i Target

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BQM-167i TARGET

The BQM-167i is a high performance remotely controlled sub-scale aerial target as shown in Figure 1 below. The target, manufactured by Composite Engineering, inc. (CEi), is a semi-monocoque, swept-wing monoplane with conventional aircraft style empennage. A Microturbo TRI60-5+ turbojet engine powers the BQM-167i. The target is capable of nominal speeds from 230 to 560 knots true airspeed at sea level (±2 percent) with a maximum sustained speed of Mach 0.90. The BQM-167i has a primarily digital electronics architecture based on a GPS augmented Autopilot Sensor (APS) with an internal INS (Inertial Navigation System). Its mission is to provide a realistic and economical aerial target, capable of simulating the performance of enemy aircraft and missiles, to aid in research, development, test, and evaluation of surface-to-air and air-to-air weapons systems. Onboard systems aid in visual identification of the aircraft, augment the radar signature, provide scalar or vector Doppler scores of the effectiveness of ordnance fired at the target, and include a homing beacon to aid in post-mission recovery. The Scalar Doppler Score Systems called MDOPS (Micro Doppler System) uses 3245 MHz for scoring sensors and either the 317 MHz (Primary) or the 322 MHz (Back-up) frequency for telemetry. The Vector Doppler Score Systems called VDOPS uses 2431.5 or 2433.4 MHz for scoring sensors and a frequency in the 2200 – 2300 MHz range for telemetry. The Beacon transmitter uses a 1 MHz bandwidth centered at 235 MHz. Ancillary equipment includes passive radar signature augmentation, an L-band radar transponder, Identification Friend or Foe (IFF), and TRX-4A tow targets. The IFF uses the 1090 MHz frequency for transmit and the 1030 MHz frequency for receive signals. Flight control is accomplished by telemetry uplinked from a remote control station. Uplink telemetry commands received and decoded by onboard systems are relayed through the digital autopilot to flight controls. Telemetry downlinked from the target and received by the ground station provides continuous information on target status. The telemetry and command signals use a frequency in the 380 – 400 MHz range. The target is capable of maintaining continuous straight and level flight at altitudes between a maximum of 50,000 feet MSL and a minimum of 50 feet above the water during any firing presentation. Upon ground station command, the aircraft can execute preprogrammed G-turn maneuvers up to 9g, automated recovery, and preprogrammed missions. A 4-stage recovery parachute system can be deployed by the operator up to 35,000 feet in altitude and Mach 0.85, but is automatically deployed after a time delay following Loss of Carrier (LOC) or when electrical power is lost.

The target manufactured and tested in the US will be used and operated in South Korea. The following two different test sites will be used to test the target:

1) Manufacturing and Testing Facility at 5381 Raley Blvd., Sacramento, CA

2) A location within 50 km range of the Sacramento Facility.

The first test site is indoor, where the target will be tested. At this facility the RF

emissions will be kept very low and the building structures will provide additional signal attenuation to the outside. Hence, there is extremely low possibility that these tests will cause any interference to other systems.

The second test site will be an open air test, where the target will be attached to a helicopter and flown at a distance of about 50 km from the Sacramento Facility. The ground Control Station will be on the roof-top of the facility and the target will be transmitting at the following frequencies:

1) Telemetry to the Ground Control Station at a frequency in the 380 to 400 MHz range.

2) VDOPS Telemetry at a frequency in the 2200 to 2300 MHz range, most probably at 2350 MHz.

3) MDOPS Telemetry at 317 MHz or 322 MHz.

The Ground Control Station will be transmitting the Commands to the target at a frequency in the 380 to 400 MHz range.

Figure 1: BQM-167i Representation

Table 1 below provides a summary of the transmitters, their associated frequencies, Emission Designators, and Peak and Average EIRP values. It also shows which transmitters are tested at each one of the two test sites.

Transmitter Name	Frequency (MHz)	Emission Designator	Peak Transmit Power		Antenna Type	Peak Antenna Gain (dBi)	Min. Loss TX to Ant. (dB)	Peak EIRP (dBW)	Duty Cycle (%)	Duty Cycle (dB)	Average EIRP (dBW)	Average ERP (dBW)	TX Used at Site 1? (Y/N)	TX Used at Site 2? (Y/N)
			(W)	(dBW)										
MONTAGE	380 - 400	20K0F1D	2.5	4.0	Monopole	0.0	-1.0	3.0	100	0.0	3.0	0.8	Y	Y
MONTAGE GS	380 - 400	20K0F1D	5.0	7.0	Sector	6.0	-1.0	12.0	100	0.0	12.0	9.8	Y	Y
IFF	1090	6M00M3N	501.0	27.0	¼λ Monopole	6.0	-1.0	32.0	0.315	-25.0	7.0	4.8	Y	N
IFF Tester	1030	5M00P0N	0.0002	-37.0	¼λ Monopole	0.0	0.0	-37.0	0.05	-33.0	-70.0	-72.2	Y	N
VDOPS TM	2200 - 2300	5M40F1D	5.0	7.0	Stub	5.0	-4.3	7.7	100	0.0	7.7	5.5	Y	Y
VDOPS Sensor	2431.5 / 2433.4	21M4P0N	1.0	0.0	Patch	0.0	-4.8	-4.8	6	-12.2	-17.0	-19.2	Y	Y
MDOPS TM	317 / 322	30K0F1D	5.0	7.0	Dipole	6.0	-1.0	12.0	100	0.0	12.0	9.8	Y	Y
MDOPS Sensor	3245	150KP0N	1.0	0.0	Dipole	0.0	-1.0	-1.0	7	-11.5	-12.5	-14.7	Y	Y
Radar Altimeter	4300	45M0P3N	100.0	20.0	Flat Microstrip	10.7	-1.0	29.7	0.0455	-33.4	-3.7	-5.9	Y	N
Beacon	235	1M00W3N	2.0	3.0	Monopole	0.0	-1.0	2.0	100	0.0	2.0	-0.2	Y	N
GPS Repeater	1575.42	20M4W7D	0.0	-107.0	Monopole	0.0	-1.0	-108.0	100	0.0	-108.0	-110.2	Y	N

Table 1: Summary Characteristics of Transmitters Used with BQM-167i