The Market for Business Jet Aircraft

Product Code #F613

A Special Focused Market Segment Analysis by:

FORECAST INTERNATIONAL
Analysis 3
The Market for Business Jet Aircraft
2010-2019

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*     *     *

December 2010
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- Boeing 737 BBJ
- Bombardier Challenger
- Bombardier Challenger 300
- Bombardier Global 5000
- Bombardier Global Express
- Cessna Citation Excel/XLS
- Cessna Citation X
- Cessna CJ1/CJ2/CJ3/CJ4
- Cessna Encore
- Cessna Mustang
- Cessna Sovereign
- Dassault Falcon 900/7X/SMS
- Dassault Falcon 2000
- Diamond D-JET
- Eclipse Aviation 500
- Embraer Legacy 450/500
- Embraer Legacy 600/650
- Embraer Phenom 100
- Embraer Phenom 300
- Grob SPn
- Gulfstream G150/G200/G250
- Gulfstream G350/G450
- Gulfstream G500/G550
- Gulfstream G650
- Hawker Beechcraft 750/850XP/900XP
- Hawker Beechcraft Hawker 400XP/450XP
- Hawker Beechcraft Hawker 4000
- Hawker Beechcraft Premier IA
- Honda Aircraft HondaJet
- Learjet 40/45/60/85
- Piper Aircraft PiperJet
Introduction

Despite a few hopeful signs to the contrary, the business jet market remains mired in a pronounced slump. The market experienced dramatic growth in the period between 2004 and 2008, as manufacturers aggressively ramped up production rates while order backlogs grew fat. However, the boom times came to a sudden halt in the second half of 2008, amidst general economic decline and collapsing financial markets.

Demand for business aircraft essentially evaporated in late 2008 and early 2009. Not only did new orders dry up, but customers canceled or deferred existing orders in droves. Once-healthy order backlogs, accumulated during the boom years, rapidly shrunk in size.

Manufacturers had been counting on those backlogs to act as a cushion against the ill effects of a market downturn. And, indeed, they would have been a significant buffer against a normal cyclical industry downturn. However, the suddenness and severity of the downturn that hit in late 2008 resulted in a wave of cancellations that cut deeply into the mountain of unfilled orders on which the OEMs had been sitting.

In order to protect the dwindling order backlogs, manufacturers slashed production rates, reduced the size of their workforces, and postponed plans for facility expansion. Such retrenchment activity continued well into 2010. In October 2010, Cessna laid off an additional 700 employees; the company has cut its workforce roughly in half since November 2008.

Also in October 2010, Hawker Beechcraft announced layoffs of 350 employees, taking the number of workers cut by the company since the start of 2009 past the 3,000 mark. Hawker Beechcraft added that 800 more jobs would be eliminated over the next six to 18 months.

While it can legitimately be said that the worst of the industry downturn is over, real market improvement is not yet under way. The global economic recession is over, but the economic recovery is sluggish and halting, especially in the key business jet markets of North America and Europe. Corporate profits, normally a prime leading indicator of improved business jet sales, are on the rise. However, corporations are opting to hold onto their profits, as they are hesitant to make major expenditures in a time of economic instability and uncertain government policies.

Within the business jet market, the massive wave of order cancellations and deferrals experienced in late 2008 and the first half of 2009 appears to be over. Nevertheless, new order intake remains quite weak and, in some portions of the market, is nearly nonexistent.

The good news is that some market indicators are looking up. Business aircraft utilization is increasing, and the used business jet market is stabilizing, both of which are factors that point toward rising sales of new business jets.

Operator surveys indicate that considerable latent demand exists in the market for business jets. The purchase of a business jet is one of those major investments that corporations are unwilling to make in the current economic, regulatory, and tax environment. Continued economic improvement, though, will help free up some of the huge amounts of cash now being safeguarded in corporate coffers, with business jet sales being one of the beneficiaries. (On the other hand, a double dip back into economic recession, a possibility that cannot be entirely discounted, would wreak havoc on the business jet market.)

Meanwhile, the business jet industry has increasingly become a tale of two markets. In terms of sales and deliveries, large-cabin and long-range business jets are doing considerably better than light and mid-size business jets. Manufacturers have reduced production of all business jet types from 2008 levels, but build rates for light and medium jets have been slashed much deeper than those of larger jets. In addition, demand is already recovering for the larger types, but remains moribund for the smaller models.

The main reason for this disparity has to do with the different types of customers that typically purchase these aircraft. In general, the customer base for large-cabin and long-range jets is composed of wealthy individuals and large corporations. While these types of buyers have certainly been hurt by the economic downturn and its aftermath, their wealth and position mean that they are insulated from general economic and financial conditions to a much greater degree than are the types of customers that typically buy light and medium business jets. Buyers of smaller jets tend to be less wealthy individuals, small or mid-size companies, and fleet operators such as fractional providers, air taxi services, and charter outfits.

Another reason for the divergent fortunes of the top end and lower end of the business jet market is the fact that the customer base for the larger jets is much more geographically diverse than is the customer base for the smaller jets. The latter is heavily concentrated in the U.S. Regional economies are recovering from the global economic downturn at significantly varying rates, and a number of regions are recovering more quickly and...
Embraer Phenom 100

Outlook

- More than 100 Phenom 100s are now in service
- Embraer continues to develop new features for the Phenom 100

Orientation

Description. Twin-turbofan-powered, eight-seat business/personal jet aircraft.

Sponsor. The Phenom 100 is sponsored privately by Embraer.

Status. Production

Total Produced. Through 2009, Embraer produced 103 Phenom 100s.

Application. Business/executive aircraft; air taxi/air limousine; personal transport; flight training.

Price Range. $3.60 million to $3.68 million in 2009 U.S. dollars.

Unit Production Forecast 2010-2019

Phenom 100

Source: Embraer
Embraer Phenom 100

Contractors

Prime

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Website</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embraer - Empresa Brasileira de Aeronáutica SA</td>
<td><a href="http://www.embraer.com">http://www.embraer.com</a>, Av Brigadeiro Faria Lima, 2170, São José dos Campos, 12227-901 São Paulo, Brazil, Tel: + 55 12 3927 1000, Prime</td>
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Subcontractor

<table>
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<tr>
<th>Contractor</th>
<th>Website</th>
<th>Address</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Astronics Corp</td>
<td><a href="http://www.astronics.com">http://www.astronics.com</a>, 130 Commerce Way, East Aurora, NY 14052 United States, Tel: + 1 (716) 805-1599 (Exterior Lighting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eaton Aerospace</td>
<td><a href="http://www.aerospace.eaton.com">http://www.aerospace.eaton.com</a>, 9650 Jeronimo Rd, Irvine, CA 92618 United States, Tel: + 1 (949) 452-9500, Fax: + 1 (949) 452-9555 (Hydraulic Power Generation Package; Flap Drive System; Throttle Control Quadrant; Landing Gear Control Lever; Landing Gear Control Hydraulic Components; Secondary Power Distribution Unit; Cockpit Control Panel; Flap Selector Control Lever)</td>
<td></td>
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</tr>
<tr>
<td>Garmin International Inc</td>
<td><a href="http://www.garmin.com">http://www.garmin.com</a>, 1200 E 151st St, Olathe, KS 66062 United States, Tel: + 1 (913) 397-8200, Fax: + 1 (913) 397-8282 (G1000 Avionics Suite)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honeywell Aerospace</td>
<td><a href="http://www51.honeywell.com/aero">http://www51.honeywell.com/aero</a>, 1944 E Sky Harbor Circle, Phoenix, AZ 85034 United States, Tel: + 1 (602) 231-1000, Fax: + 1 (602) 365-2075 (Cabin Pressure Control and Monitoring System)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-3 Communications - Aviation Recorders</td>
<td><a href="http://www.l-3ar.com">http://www.l-3ar.com</a>, 6000 Fruitville Rd, Sarasota, FL 34232 United States, Tel: + 1 (941) 371-0811, Fax: + 1 (941) 377-5598 (Combination Voice &amp; Data Recorder; Cockpit Voice Recorder; Flight Data Recorder)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meggitt Aircraft Braking Systems</td>
<td><a href="http://www.meggitt-mabs.com">http://www.meggitt-mabs.com</a>, 1204 Massillon Rd, Akron, OH 44306-4186 United States, Tel: + 1 (330) 796-4400, Fax: + 1 (330) 796-9805 (Brakes; Wheels)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pratt &amp; Whitney Canada</td>
<td><a href="http://www.pwc.ca">http://www.pwc.ca</a>, 1000 Marie-Victorin Blvd, Longueuil, J4G 1A1 Quebec, Canada, Tel: + 1 (450) 677-9411, Fax: + 1 (450) 647-3620 (PW617F Turbofan Engine)</td>
<td></td>
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</tr>
<tr>
<td>Saint-Gobain Aerospace Flight Structures Operation</td>
<td><a href="http://www.radome.com">http://www.radome.com</a>, 335 N Diamond St, Ravenna, OH 44266 United States, Tel: + 1 (330) 298-4105 (Nose Radome)</td>
<td></td>
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</tr>
<tr>
<td>Tactair Fluid Controls Inc</td>
<td><a href="http://www.tactair.com">http://www.tactair.com</a>, 4806 W Taft Rd, Liverpool, NY 13088 United States, Tel: + 1 (315) 451-3928, Fax: + 1 (315) 451-8919, Email: <a href="mailto:info@tactair.com">info@tactair.com</a> (Emergency/Park Brake Control System; Passenger Door Damper)</td>
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</table>

Comprehensive information on Contractors can be found in Forecast International’s “International Contractors” series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

Design Features. Straight wing design. The wing is mounted low on the fuselage, and uses an Embraer-developed airfoil section designed to provide docile flying qualities for less-experienced pilots. The tail of the aircraft has a swept fin and swept horizontal stabilizers. The aircraft features tricycle type landing gear.

The Phenom 100 has the same cockpit and cabin cross-section as Embraer's Phenom 300 light business jet. Originally, the cabin cross-section of the two aircraft had a circular shape. However, the use of mock-ups revealed a need for more foot room for passengers. Embraer subsequently changed the cross-section to an egg-shaped design that added 5 inches of foot room without compromising other dimensions of the cabin. Composite materials account for 20 percent of the structure of the aircraft, not including the aircraft interior.

On the Phenom 100, twin Pratt & Whitney Canada PW617F turbofan engines are mounted in nacelles on the aft fuselage. The PW617F features Full Authority Digital Engine Control (FADEC).

July 2010
The Phenom 100 is equipped with the Garmin G1000 all-glass, fully integrated avionics suite. The system has three interchangeable 12-inch displays, including two primary flight displays and one multifunction display. The G1000 installation on the aircraft is called the Prodigy Flight Deck.

The interior of the Phenom 100 was designed by BMW Group DesignworksUSA. The aircraft can be configured for six occupants with an enclosed aft lavatory, or for eight people with no lavatory.

### Dimensions

<table>
<thead>
<tr>
<th>Metric</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>12.82 m</td>
</tr>
<tr>
<td>Height</td>
<td>4.35 m</td>
</tr>
<tr>
<td>Wingspan</td>
<td>12.30 m</td>
</tr>
<tr>
<td>Cabin height</td>
<td>1.50 m</td>
</tr>
<tr>
<td>Cabin width</td>
<td>1.55 m</td>
</tr>
<tr>
<td>Cabin volume</td>
<td>7.99 cu m</td>
</tr>
</tbody>
</table>

### Weight

- Maximum takeoff weight (MTOW): 4,750 kg / 10,472 lb

### Performance

- Maximum operating speed: Mach 0.70
- Maximum operating altitude: 12,500 m / 41,000 ft
- Standard takeoff field length (ISA, MTOW, SL): 1,036 m / 3,400 ft
- IFR range(a): 2,182 km / 1,178 nm

### Propulsion

- Phenom 100 (2) Pratt & Whitney Canada PW617F-E turbofan engines rated 7.53 kN (1,695 lb st) each.

### Seating

The Phenom 100 can carry up to eight people, including crew.

(a) NBAA IFR reserves (35 minute) with 100-nautical-mile alternate; four occupants.

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**Program Review**

**Background.** In May 2005, Embraer launched two new business jet programs. At the time of the launch, the company simply referred to the aircraft as the Very Light Jet and the Light Jet, respectively. These names denoted the segments of the business jet market at which the new models were aimed. The two aircraft shared the same cabin cross-section and cockpit.

For more than a year prior to the launch of the programs, Embraer had conducted various market surveys and studies regarding the business aviation market. The Very Light Jet and Light Jet designs resulted from these studies. In April 2005, the projects were approved by Embraer's board of directors.

In conjunction with the May launch announcement, Embraer also announced the selection of Pratt & Whitney Canada to supply engines for both aircraft. The new PW617F turbofan was chosen as the powerplant for the twin-engine Very Light Jet. The PW617F is essentially a scaled-up version of the PW610F that powered the Eclipse 500 and the PW615F that powers the Cessna Mustang.

Besides the PW617F, Embraer had also considered the General Electric/Honda HF118 and the Williams FJ33 to power the Very Light Jet.

In October 2005, Embraer selected BMW Group DesignworksUSA to design the interior of its two new business jets. Full-scale mock-ups of the interiors were displayed at the National Business Aviation Association (NBAA) convention in Orlando, Florida, in November 2005. Onboard amenities in the BMW design include a private lavatory, a refreshment center, an executive table, and passenger entertainment and communications systems. Also in November, Embraer selected Garmin to supply its G1000 integrated avionics suite for the two aircraft.
Embraer Phenom 100

Very Light Jet Becomes Phenom 100
Embraer took the occasion of the November 2005 NBAA convention to announce the new names of its two new business jets. The Very Light Jet was dubbed the Phenom 100, while the Light Jet was named the Phenom 300.

Program Schedule. Preliminary design of the Phenom 100 was completed by May 2005. Embraer began taking orders for its two new business jets in June 2005.

Initial flight of the Phenom 100 occurred in July 2007. Four Phenom 100s were utilized in the development program. The first two were built at Embraer's main plant in Sao Jose dos Campos, Brazil, while the third and fourth aircraft were completed at the company's new facility in Gaviao Peixoto.

In December 2008, the Phenom 100 was awarded certification by Brazil's Agencia Nacional de Aviacao Civil (ANAC) and by the U.S. Federal Aviation Administration (FAA). Entry into service also occurred that month. The aircraft received European Aviation Safety Agency (EASA) certification in April 2009.

Related News

Delivery of 100th Aircraft – In January 2010, Embraer delivered its 100th Phenom 100. The aircraft was delivered to JetSuite Air, a private jet charter company, and was the sixth Phenom 100 delivered to this customer.

Based in Long Beach, California, JetSuite serves the western United States with its fleet of new Phenom 100s. The company's major markets include the Los Angeles and San Francisco areas, Las Vegas, and Phoenix/Scottsdale. JetSuite can provide nonstop or one-stop service to nearly all U.S. destinations west of the Mississippi River.

(Embraer, 2/10)

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Funding

Combined development cost of the Phenom 100 and the Phenom 300 was an estimated $235 million.

Timetable

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Major Development</th>
</tr>
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<tbody>
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<td>May</td>
<td>2005</td>
<td>Embraer launched Very Light Jet program</td>
</tr>
<tr>
<td>Jun</td>
<td>2005</td>
<td>Embraer began accepting Very Light Jet orders</td>
</tr>
<tr>
<td>Nov</td>
<td>2005</td>
<td>Embraer Very Light Jet named Phenom 100</td>
</tr>
<tr>
<td>Jul</td>
<td>2007</td>
<td>First flight</td>
</tr>
<tr>
<td>Dec</td>
<td>2008</td>
<td>Brazilian ANAC and U.S. FAA certification; Service entry</td>
</tr>
<tr>
<td>Apr</td>
<td>2009</td>
<td>EASA certification</td>
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</table>

Forecast Rationale

Phenom 100 deliveries began in December 2008, and two of the aircraft were delivered by the end of that year. Embraer set itself a goal of delivering 110 Phenom 100s in 2009, a considerable task in a badly depressed business jet market. The company started the year slowly, delivering only six Phenom 100s in the first quarter. After three quarters, Embraer had delivered only 43 of the aircraft since the start of the year. Company CEO Frederico Curado said at the time that Embraer had no difficulties in ramping up production, but that "commercial issues" were hampering deliveries. These issues mainly involved an inability on the part of some customers to accept aircraft deliveries, due to financial reasons.

Nevertheless, Embraer persevered and managed to deliver an impressive 54 Phenom 100s in the fourth quarter, for an overall 2009 delivery total of 97 aircraft.
In 2010, Embraer plans to deliver 120 Phenoms, including both 100s and 300s. The company declines to specify the numerical split between the two models within this total, though the vast majority are to be 100s.

Fleet operators, such as air taxi services and other commercial operators, have been among the hardest hit entities in the present market downturn. In March 2010, the start-up European air taxi operator JetBird canceled orders for 50 Phenom 100s, due to funding problems. JetBird is negotiating a new contract with Embraer, however.

Phenom 100 final assembly takes place at Embraer's facility in Gavião Peixoto, where interior completion work is also performed. Components and subassemblies are built at Embraer's Botucatu plant.

Embraer is constructing a new aircraft assembly plant at Melbourne International Airport in Melbourne, Florida. This plant will house a final assembly line for Phenom 100s and 300s, as well as a paint shop and a delivery and customer design center. Phenom deliveries from the plant are scheduled to begin in 2012. Up to eight Phenoms per month are to be assembled at the Melbourne facility, supplementing output from the Gavião Peixoto plant. Combined, the two plants will have a total capacity of 22 Phenoms per month.

Meanwhile, product improvement efforts regarding the Phenom 100 are ongoing. New cabin seats for the aircraft were certified in late 2009. The seats, which are now standard on production Phenom 100s, are designed to provide improved seating comfort. They also incorporate retractable armrests and a partial foldover capability, and provide more aisle room. Owners of existing Phenom 100s can have the new seats retrofitted into their aircraft free of charge. The seats are produced by DeCrane Aerospace Aircraft Seating.

New avionics features have also been developed for the Phenom 100, including an improved menu layout, improved synoptic pages, an electronic checklist, and TCAS I and TCAS II traffic collision avoidance systems.

An improvement now under development is a belted lavatory seat. This seat will increase the aircraft's passenger capacity by permitting a passenger to take off and land while seated there.

The customer base for the Phenom 100 includes individual owner/operators as well as fleet operators. As of April 2010, Embraer had an order backlog for some 600 Phenoms, including both 100s and 300s. The company does not break down the total between the two models.

**VLJ Plus**

In general, the Phenom 100 competes in the Very Light Jet (VLJ) segment of the business jet market, albeit at the very top of the category. Its most direct sales competitor is Honda Aircraft's new HondaJet, which is slated to enter service in 2011. In terms of price, performance, and cabin size, these two aircraft stand out from the rest of the VLJ class, and can even be said to constitute their own market class.

Indeed, much of the sales competition to the Phenom 100 and the HondaJet comes from light business jets such as the Cessna CJ1+ and the Hawker Beechcraft Premier IA. The Cessna Mustang is the only VLJ that poses any real sales competition to the Embraer and Honda aircraft.

## Ten-Year Outlook

### ESTIMATED CALENDAR YEAR UNIT PRODUCTION

<table>
<thead>
<tr>
<th>Designation or Program</th>
<th>High Confidence</th>
<th>Good Confidence</th>
<th>Speculative</th>
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<tr>
<td>Embraer - Empresa Brasileira de Aeronáutica SA</td>
<td></td>
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<tr>
<td>Phenom 100 ↔ PW617F</td>
<td>103</td>
<td>99</td>
<td>92</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>99</td>
<td>92</td>
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</tbody>
</table>
# ORDER FORM

FOR PROPER SHIPPING, PLEASE PROVIDE ALL OF THE FOLLOWING INFORMATION.

Name ________________________________  Title ____________________________

Company ________________________________________________________________

Street Address __________________________

City __________________ State/Prov. _____  Country ______________  Zip __________

Phone ____________________  Fax ________________________________

E-Mail _________________________________________________________________

Cardholder Name __________________________

Card# ________________________________  Exp. ______  csc# __________

Billing Address (if different from above) ______________________________________

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<thead>
<tr>
<th>Name of Product/Service</th>
<th>Code</th>
<th>E-Mail Address</th>
<th>Qty.</th>
<th>Price</th>
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Please include your e-mail address to receive twice-weekly E-Market Alert Newsletters.

**E-Market ALERT**

SUBTOTAL  

Shipping __________

In Connecticut add 6% sales tax

GRAND TOTAL  

<table>
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<th>U.S.</th>
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| **Market Intelligence Services**  
Binder $45 $85  
DVD $50 $95  
Binder & DVD $95 $180  
Binder & RT $45 $85  
**Worldwide Inventories**  
**Aerospace Systems**  
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**Weapons Systems**  
Hard Copy $45 $85  
CD $50 $95  
**Power Systems**  
Hard Copy $45 $85  
**Focused Market Segment Analyses**  
Hard Copy $25 $45 |

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| **Market Intelligence Libraries**  
Complete Library (Civil/Commercial & Military)  
Binder $1,575 $2,975  
DVD $50 $95  
**Military Market Library**  
Binder $1,440 $2,720  
DVD $50 $95  
**Civil/Commercial Library**  
Binder $360 $680  
DVD $50 $95  
**Market Intelligence Group Libraries**  
**Aerospace**  
Binder $360 $680  
DVD $50 $95  
**Electronics**  
Binder $360 $680  
DVD $50 $95 |

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| **U.S. Governments & Industries**  
Binder $540 $1,020  
DVD $50 $95  
**International Military Markets** (A Subset of G&I above)  
Binder $270 $510  
DVD $50 $95  
**Naval**  
Binder $90 $170  
DVD $50 $95  
**Power**  
Binder $90 $170  
DVD $50 $95  
**Weapons**  
Binder $180 $340  
DVD $50 $95  
*NOTE: No charge for Real-Time format.* |

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$5.95 $12.95

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