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# PERFORMANCE ESTIMATION FOR A HIGHLY LOADED EIGHT-BLADE PROPELLER COMBINED WITH AN ADVANCED TECHNOLOGY TURBOSHAFT ENGINE

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# PERFORMANCE ESTIMATION FOR A HIGHLY LOADED EIGHT-BLADE PROPELLER COMBINED WITH AN ADVANCED TECHNOLOGY TURBOSHAFT ENGINE

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## SUMMARY

Performance estimation, weights, and scaling laws for an eight-blade highly loaded propeller combined with an advanced turboshaft engine are presented. The data are useful for planned aircraft mission studies using the turboprop propulsion system. Comparisons are made between the performance of the 1990+ technology turboprop propulsion system and the performance of both a current technology turbofan and an 1990+ technology turbofan.

## INTRODUCTION

Recent predicted improvements in the propulsive efficiency of highly loaded propellers at cruise Mach numbers of 0.8 have led to increased interest (ref. 1) in the use of these devices to propel advanced aircraft. Early studies indicate that, compared to a high bypass turbofan, turbine-propeller systems offer a potential reduction of 15 to 30 percent in fuel consumption, a reduction in direct operating cost of approximately 10 percent, and a reduction in aircraft gross weight of approximately 20 percent for long endurance missions. The recent increased emphasis on reduction in fuel consumption created by decreasing supplies and increasing cost of fuel make this concept very timely. While near field noise, passenger comfort, and maintenance remain as potential problems, the possible benefits of this concept have lead to system studies of possible future propeller powered aircraft. These system studies require that the weight, scaling, and performance of the concept be known.

The purpose of this report is document the predicted performance, scaling, and weight of an eight-blade highly-loaded propeller (propfan) combined with an advanced turboshaft engine (the Pratt and Whitney STS 487 of reference 2), and to compare these results directly with an advanced high-bypass ratio turbofan. The approach used herein combines predicted propeller data with the engine characteristics to yield the uninstalled performance of the propeller-engine combination in terms identical to those by which turbofan performance characteristics are generally presented.

Few large commercial propeller-driven aircraft have been designed in the last two decades; thus, computer programs equivalent to those for jet aircraft often do not exist for sizing and predicting the performance of turboprop aircraft. The present paper provides a means of converting propeller and engine data to a common basis with turbofan engines. The converted data may be used directly in available programs, thus eliminating the need for developing new computer software.

## SYMBOLS

| | |
|---|---|
| $C_p$ | propeller power coefficient, $(P/D^2)/\rho(ND)^3$ |
| $C_T$ | propeller thrust coefficient, $T/(\rho(ND)^2 D^2)$ |
| D | propeller diameter, m(ft) |
| g | gravitational constant, 1.0(32.2 ft/s$^2$) |
| GR | gearbox gear ratio |
| HV | fuel lower heat value; 42.717 x $10^6$ J/kg (18,400 Btu/lbm) |
| J | propeller advance ratio, (V/ND) |
| JC | conversion factor; 1.0(778 ft lbf/Btu) |
| $K_1$ | constant in equation (10); 0.6325 (0.0935) |
| $K_2$ | constant in equation (11); 1.0203 x $10^{-2}$ (5.115 x $10^{-3}$) |
| $K_3$ | constant in equation (12); 6.3483 x $10^{-2}$ (0.1044) |
| M | mass, kg (lbm) |
| N | propeller revolutions per unit time, revolutions/s |
| P | engine shaft power, kw (hp) |
| T | net uninstalled thrust, N (lbf) |
| TSFC | thrust specific fuel consumption, (kg/hr)/N ((lbm/hr)/lbf) |
| V | velocity, m/s (ft/s) |
| W | weight, N (lbf) |

$W_f$ fuel flow, kg/s (lbm/s)

$\rho$ density, kg/m$^3$ (slugs/ft$^3$)

$\eta$ efficiency

Subscripts:

G/B gearbox

jet jet exhaust

net net uninstalled

NOM nominal

o free stream

ov overall

p propulsive

prop propeller

t thrust

tip propeller tip

## RESULTS AND DISCUSSION

The Pratt and Whitney STS 487 turboshaft data (ref. 2) was matched with eight-blade propfan data (ref. 3) to calculate the uninstalled net thrust, fuel flow, thrust specific fuel consumption, and overall efficiency of the combined propulsion system. These parameters, and other associated engine and propeller parameters, are obtained as functions of Mach number, altitude, and power setting for both standard day and nonstandard day atmospheres. The propeller is first sized at a selected operating condition. The sizing data required are the design values of Mach number, altitude, shaft horsepower, residual jet thrust, propeller tip speed, power coefficient, and delta temperature above a standard day.

First, the free stream velocity and density are obtained for the known Mach number, altitude and ambient temperature, then the propeller diameter can be obtained as

$$D = \left[ \frac{P}{C_p \, \rho (ND)^3} \right]^{1/2} \tag{1}$$

where

$$ND = V_{tip}/3.1416 \tag{2}$$

The advance ratio (J) is

$$J = V/ND \tag{3}$$

The thrust coefficient $C_T$ can be obtained from the tables of reference 3 as a function of Mach number, advance ratio, and power coefficient. Finally, the propeller thrust can be computed from the thrust coefficient and the results of equations (1) and (2) as

$$T_{prop} = C_T \rho(ND)^2D^2 \tag{4}$$

The net thrust can be calculated by adding the residual jet thrust, which is obtained from the engine specifications, to the net propeller thrust

$$T_{net} = T_{prop} + T_{jet} \tag{5}$$

The fuel flow is known from the engine data of reference 2, and when combined with the results of equation (5), the equivalent thrust specific fuel consumption is calculated as

$$TSFC = W_f/T_{net} \tag{6}$$

Finally, the efficiencies are obtained from their definitions (ref. 4) as

$$\eta_{ov} = \frac{T_{net}\, V_o}{W_f\, JC\, HV + V_o^2/2g} \tag{7}$$

$$\eta_p = \frac{C_T J}{C_p} \tag{8}$$

For the off-design cases, the propeller diameter is fixed from the design computation and the power coefficient is computed from the known engine shaft power, the propeller diameter, the specified propeller rotational tip speed, and equation (2),

$$C_p = \frac{P/D^2}{\rho(ND)^3} \tag{9}$$

Then, the advance ratio $J$ is computed from equation (3) using the velocity corresponding to the specified Mach number, altitude, and temperature. Using these values of $C_p$ and $J$, and the tables of reference 3, the off-design thrust coefficient $C_T$ can be computed. Equations (4) to (8) are then used to compute the remaining off-design parameters.

The propeller, gearbox, and turboshaft engine weights are estimated using the methods of reference 3 for the propeller and gearbox and reference 2 for the turboshaft engine. Curve fits of the methods described in these references result in the following approximate expressions:

$$WT_{prop} = K_1 D^{2.48808} V_{tip}^{0.30} (P/D^2)^{0.2925} \tag{10}$$

$$WT_{GB} = K_2 \left[\frac{GR}{8}\right]^{1/2} \left[\frac{P}{D^2}\right] D^3 \tag{11}$$

$$WT_{ENG} = K_3 (P/D^2) D^2 \tag{12}$$

The total uninstalled weight is the sum of equations (10), (11), and (12). It is recommended in reference 3 that this uninstalled weight be multiplied by 1.3 to account for installation. The nominal engine and propeller sizes can be scaled using the equations of references (2) and (3) (Appendix A). It is recommended that the engine scale factor be limited to the range between 0.7 and 1.45. In equation (10, (11), and (12), the power loading $(P/D^2)$ has been expressed separately because, for a given design Mach number and altitude, the power loading (or power coefficient) is held constant as the engine size is scaled to match the required mission thrust. Furthermore, at the design Mach

number and altitude, and a constant specified tip speed, a constant power loading ($P/D^2$) uniquely fixes the advance ratio, the power coefficient, the thrust coefficient, the propulsive efficiency, the overall efficiency, and the thrust specific fuel consumption as the engine is scaled.

## Sample Calculation

This procedure will now be illustrated by some numerical results which assumes that the eight-bladed propeller of reference 3 is matched to the turboshaft engine of reference 2. The tip speed is to be held constant at 244 m/s (800 ft/s). The propeller is to be sized for a Mach number of 0.8 at 11 km (36,089 ft). The propeller power coefficient at the design point is selected to be 1.692 with $P/D^2$ of 281 kw/m$^2$ (35 hp/ft$^2$). The propeller propulsive efficiency is 0.817 at the design conditions. The resulting design-size information is summarized in Table 1. Typical sea-level-static performance is also shown in Table I. The resulting propeller diameter for the baseline size of 15,238 kw (20,438 hp) at sea-level-static maximum-power condition was 4.519 m (14.825 ft). Note that the data from Table I indicates that the propeller was not able to absorb all the power available at sea level static conditions because of propeller stall. This phenomena is also shown in figure 1 which presents the thrust specific fuel consumption versus the uninstalled net thrust for the nominally sized propfan propulsion system. The total weight of the uninstalled engine, gearbox, and propeller using the nominal 15,238 kw (20,438 hp) engine size is estimated at 2653 kg (5851 lbm). The propeller tip speed of 244 m/s (800 ft/s) results is a propeller which has 1,030 revolutions per minute and a gearbox gear ratio of approximately 8.25.

Figure 1 summarizes the performance of the nominally sized propfan propulsion system. This figure presents the uninstalled thrust specific fuel consumption versus uninstalled net thrust for several different Mach numbers and altitude combinations.

A comparison of the turboprop (propfan) performance and the performance of the Pratt and Whitney JT9D-25 turbofan (ref. 5) is shown in figure 2. The turboprop has been scaled to match the maximum thrust of the JT9D-25 at Mach number 0.8 and 9.144 km (30,000 ft.). The JT9D-25 engine represents 1965 to 1970 technology while the turboprop gas generator represents 1990+ technology. Data for the 1990+ technology Pratt and Whitney STF-477 turbofan (ref. 6) has also been scaled to the same conditions and is shown in figure 2 to provide a more valid comparison of systems at the identical level of technology. It can be seen from figure 2 that the turboprop propulsion system reduces the cruise thrust specific fuel consumption at a Mach number of 0.8, 30,000 feet by about 27 percent when compared with the 1965 to 70 technology JT9D-25, and by about 22 percent compared with the 1990+ technology STF-477 turbofan.

A comparison of selected engine performance parameters for each of these scaled propulsion concepts are shown in Table II. Estimated weight scaling laws for the turboprop (propfan) engine concept are shown in figure 3. Note that the

turboprop weights increase more rapidly with size increase than does a typical turbofan which are also shown on this figure. This difference would impose an increased penalty on the turboprop as it was scaled upward and would tend to drive aircraft configurations towards a large number of small engine rather than a small number of large engines. The same conclusion may be reached by considering how the weights for the propeller and gearbox scale using equations (10) and (11), respectively. Of course, cost, complexity and availability would also be considerations in any choice of propulsion systems.

A summary of the performance data for the eight-blade turboprop (propfan) combined with an advanced turboshaft engine is presented as Appendix B.

## CONCLUDING REMARKS

Performance estimations, weights, and scaling laws for an eight-blade high-loaded propeller combined with an advanced turboshaft engine have been presented. The data is useful for planned aircraft mission studies using this propulsion system. Comparisons are made between the performance and weight of the 1990+ technology turboprop propulsion system and the performance and weight of a current technology turbofan and a 1990+ technology turbofan.

At Mach numbers of 0.8 and 9,144 meter altitude, the 1990+ technology turboprop produced thrust specific fuel consumption values about 27 percent less than the current technology turbofan and about 22 percent less than the 1990+ advanced technology turbofan. These benefits must be measured against the increased system weight, potential increased maintenance problems, and noise and passenger acceptance considerations before any conclusions can be made.

This report proports to furnish the necessary propulsion data to enable evaluation of air transportation systems using these turboprop propulsion system. The data is presented in a format compatible with existing mission programs.

## REFERENCES

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## Appendix A

## SCALING LAWS FOR TURBOPROP ENGINE

Engine:

Nominal Engine Length = 2.240 m (7.350 ft)
Nominal Engine Maximum Diameter = 0.914 m (3 ft)
Nominal Engine RPM = 8500
Nominal Engine Takeoff Power = $P_{NOM}$ = 15.23 Mw (20424 hp)

Configuration:

Two spool gas generator with free turbine and third coaxial shaft technology level 1990+ (in service)

Scaling:

$$D_{eng} = \left[\frac{P_{Takeoff}}{P_{NOM}}\right]^{0.5} D_{eng_{NOM}}$$

$$Length_{eng} = \left[\frac{P_{Takeoff}}{P_{NOM}}\right]^{0.43} Length_{eng_{NOM}}$$

Propeller

$$D = D_{NOM} \left[\frac{P_{Takeoff}}{P_{NOM}}\right]^{1/2}$$

Free tubine RPM

$$RPM = RPM_{NOM} \left[\frac{P_{NOM}}{P_{Takeoff}}\right]^{0.5}$$

## Appendix B

## TYPICAL PROPFAN PERFORMANCE OUTPUT

### Eight-Blade Propeller

SIZE POINT

| | | |
|---|---|---|
| Mach Number | = | 0.80 |
| Altitude | = | 11 km (36089 ft) |
| Delta Temperature | = | $10^{o}$F |
| J | = | 3.081 |
| $C_p$ | = | 1.692 |
| $C_T$ | = | 0.4485 |
| $\eta_p$ | = | 0.8167 |

## DEFINITIONS FOR COMPUTER OUTPUT

| | |
|---|---|
| XM | Mach number |
| ALT | altitude (feet) |
| DELT | delta temperature above standard day ($^{o}F$) |
| SHP | engine shaft horsepower (hp) |
| T | propeller net thrust (lbf) |
| T + FRES | propeller + residual jet net thrust (lbf) |
| ETAP | propulsive efficiency $\left(C_T J/C_p\right)$ |
| $C_p$ | propeller power coefficient |
| $C_T$ | propeller thrust coefficient |
| J | propeller advance ratio |
| WFT | engine fuel flow (lbm/hr) |

# TYPICAL PROPFAN PERFORMANCE OUTPUT

NOTE: ERROR MESSAGE "ERROR CP OUT OF RANGE OF TABLE" indicates that the engine is producing more power at the considered power setting than the propeller can absorb.

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 0. | 0.0 | 20438.1 | 0.0 | 1955.0 | 0.0000 | 1.3042 | 0.0000 | 0.000 | 6258.08 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 0. | 0.0 | 18001.4 | 0.0 | 1665.6 | 0.0000 | 1.1487 | 0.0000 | 0.000 | 5556.48 |
| 0.00 | 0. | 0.0 | 15694.7 | 16335.3 | 17752.3 | 0.0000 | 1.0015 | .4819 | 0.000 | 4899.55 |
| 0.00 | 0. | 0.0 | 13421.4 | 18780.0 | 19961.9 | 0.0000 | .8565 | .5540 | 0.000 | 4277.88 |
| 0.00 | 0. | 0.0 | 11303.5 | 18777.4 | 19750.1 | 0.0000 | .7213 | .5539 | 0.000 | 3713.18 |
| 0.00 | 0. | 0.0 | 9364.9 | 18275.0 | 19067.6 | 0.0000 | .5976 | .5391 | 0.000 | 3201.46 |
| 0.00 | 0. | 0.0 | 7545.0 | 17122.9 | 17752.4 | 0.0000 | .4815 | .5051 | 0.000 | 2725.72 |
| 0.00 | 0. | 0.0 | 5907.5 | 15452.0 | 15941.9 | 0.0000 | .3770 | .4558 | 0.000 | 2294.92 |
| 0.00 | 0. | 0.0 | 4540.2 | 13502.7 | 13888.8 | 0.0000 | .2897 | .3983 | 0.000 | 1923.00 |
| 0.00 | 0. | 0.0 | 3442.1 | 11498.7 | 11792.1 | 0.0000 | .2197 | .3392 | 0.000 | 1610.87 |
| .10 | 0. | 0.0 | 20547.6 | 24432.3 | 26157.0 | .2410 | 1.3112 | .7208 | .438 | 6280.25 |
| .10 | 0. | 0.0 | 18062.7 | 23402.6 | 24849.4 | .2626 | 1.1526 | .6904 | .438 | 5568.06 |
| .10 | 0. | 0.0 | 15798.3 | 22371.7 | 23589.7 | .2870 | 1.0081 | .6600 | .438 | 4919.77 |
| .10 | 0. | 0.0 | 13480.6 | 21028.5 | 22019.1 | .3162 | .8602 | .6204 | .438 | 4288.04 |
| .10 | 0. | 0.0 | 11350.5 | 19659.0 | 20458.8 | .3510 | .7243 | .5800 | .438 | 3721.41 |
| .10 | 0. | 0.0 | 9420.9 | 18045.0 | 18681.2 | .3882 | .6012 | .5323 | .438 | 3213.26 |
| .10 | 0. | 0.0 | 7580.1 | 15973.6 | 16460.3 | .4271 | .4837 | .4712 | .438 | 2731.81 |
| .10 | 0. | 0.0 | 5939.5 | 13668.7 | 14030.9 | .4664 | .3790 | .4032 | .438 | 2300.64 |
| .10 | 0. | 0.0 | 4568.8 | 11352.8 | 11625.4 | .5036 | .2915 | .3349 | .438 | 1928.33 |
| .10 | 0. | 0.0 | 3466.1 | 9194.5 | 9387.5 | .5377 | .2212 | .2712 | .438 | 1615.43 |
| .20 | 0. | 0.0 | 20866.2 | 22221.7 | 23739.4 | .4317 | 1.3315 | .6556 | .877 | 6344.78 |
| .20 | 0. | 0.0 | 18268.2 | 21258.2 | 22500.0 | .4717 | 1.1658 | .6271 | .877 | 5606.16 |
| .20 | 0. | 0.0 | 15963.8 | 20082.7 | 21104.6 | .5100 | 1.0187 | .5925 | .877 | 4948.09 |
| .20 | 0. | 0.0 | 13643.9 | 18550.6 | 19365.2 | .5512 | .8707 | .5473 | .877 | 4317.13 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .20 | 0. | 0.0 | 11504.6 | 16799.0 | 17431.6 | .5919 | .7341 | .4956 | .877 | 3748.02 |
| .20 | 0. | 0.0 | 9534.2 | 14872.1 | 15352.3 | .6323 | .6084 | .4387 | .877 | 3230.59 |
| .20 | 0. | 0.0 | 7702.6 | 12771.5 | 13116.2 | .6721 | .4915 | .3768 | .877 | 2752.28 |
| .20 | 0. | 0.0 | 6030.6 | 10565.4 | 10804.6 | .7102 | .3848 | .3117 | .877 | 2316.58 |
| .20 | 0. | 0.0 | 4663.5 | 8522.6 | 8676.1 | .7408 | .2976 | .2514 | .877 | 1945.43 |
| .20 | 0. | 0.0 | 3539.4 | 6659.4 | 6754.3 | .7627 | .2259 | .1965 | .877 | 1629.42 |
| .30 | 0. | 0.0 | 21362.6 | 20363.9 | 21683.4 | .5796 | 1.3632 | .6007 | 1.315 | 6442.07 |
| .30 | 0. | 0.0 | 18676.9 | 19010.8 | 20059.1 | .6189 | 1.1918 | .5608 | 1.315 | 5682.76 |
| .30 | 0. | 0.0 | 16316.0 | 17589.8 | 18425.2 | .6555 | 1.0412 | .5189 | 1.315 | 5008.37 |
| .30 | 0. | 0.0 | 13927.4 | 15898.0 | 16533.7 | .6941 | .8888 | .4690 | 1.315 | 4366.21 |
| .30 | 0. | 0.0 | 11752.4 | 14127.5 | 14598.7 | .7309 | .7500 | .4168 | 1.315 | 3791.15 |
| .30 | 0. | 0.0 | 9737.1 | 12164.0 | 12495.8 | .7596 | .6214 | .3588 | 1.315 | 3264.89 |
| .30 | 0. | 0.0 | 7879.9 | 10192.5 | 10398.8 | .7865 | .5028 | .3007 | 1.315 | 2783.35 |
| .30 | 0. | 0.0 | 6183.9 | 8261.3 | 8377.9 | .8123 | .3946 | .2437 | 1.315 | 2342.95 |
| .30 | 0. | 0.0 | 4798.6 | 6483.5 | 6531.9 | .8216 | .3062 | .1913 | 1.315 | 1969.94 |
| .30 | 0. | 0.0 | 3662.4 | 4996.7 | 4992.0 | .8296 | .2337 | .1474 | 1.315 | 1652.43 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 5000. | 0.0 | 17849.7 | 0.0 | 1741.4 | 0.0000 | 1.3219 | 0.0000 | 0.000 | 5465.86 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 5000. | 0.0 | 16420.6 | 0.0 | 1573.7 | 0.0000 | 1.2160 | 0.0000 | 0.000 | 5009.87 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 5000. | 0.0 | 14267.2 | 0.0 | 1324.5 | 0.0000 | 1.0566 | 0.0000 | 0.000 | 4404.92 |
| 0.00 | 5000. | 0.0 | 12381.3 | 15744.8 | 16867.5 | 0.0000 | .9169 | .5390 | 0.000 | 3876.79 |
| 0.00 | 5000. | 0.0 | 10450.2 | 16238.1 | 17161.6 | 0.0000 | .7739 | .5559 | 0.000 | 3365.56 |
| 0.00 | 5000. | 0.0 | 8741.0 | 15968.7 | 16722.6 | 0.0000 | .6473 | .5467 | 0.000 | 2913.86 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 5000. | 0.0 | 7106.8 | 15198.2 | 15800.7 | 0.0000 | .5263 | .5203 | 0.000 | 2489.58 |
| 0.00 | 5000. | 0.0 | 5595.6 | 13931.6 | 14406.2 | 0.0000 | .4144 | .4770 | 0.000 | 2098.93 |
| 0.00 | 5000. | 0.0 | 4297.0 | 12236.4 | 12601.0 | 0.0000 | .3182 | .4189 | 0.000 | 1751.99 |
| 0.00 | 5000. | 0.0 | 3250.1 | 10453.2 | 10738.6 | 0.0000 | .2407 | .3579 | 0.000 | 1462.47 |
| .10 | 5000. | 0.0 | 17969.4 | 21205.1 | 22751.6 | .2350 | 1.3307 | .7260 | .431 | 5490.01 |
| .10 | 5000. | 0.0 | 16497.0 | 20597.2 | 21981.3 | .2487 | 1.2217 | .7052 | .431 | 5024.61 |
| .10 | 5000. | 0.0 | 14332.2 | 19683.9 | 20829.4 | .2735 | 1.0614 | .6739 | .431 | 4416.51 |
| .10 | 5000. | 0.0 | 12434.7 | 18643.7 | 19598.8 | .2986 | .9209 | .6383 | .431 | 3886.35 |
| .10 | 5000. | 0.0 | 10495.6 | 17465.1 | 18237.8 | .3314 | .7773 | .5979 | .431 | 3374.83 |
| .10 | 5000. | 0.0 | 8761.9 | 16144.3 | 16762.0 | .3670 | .6489 | .5527 | .431 | 2917.62 |
| .10 | 5000. | 0.0 | 7135.7 | 14511.7 | 14988.8 | .4050 | .5284 | .4968 | .431 | 2494.57 |
| .10 | 5000. | 0.0 | 5622.9 | 12556.3 | 12917.8 | .4448 | .4164 | .4299 | .431 | 2103.68 |
| .10 | 5000. | 0.0 | 4314.3 | 10483.0 | 10760.9 | .4840 | .3195 | .3589 | .431 | 1756.49 |
| .10 | 5000. | 0.0 | 3272.3 | 8544.5 | 8740.5 | .5201 | .2423 | .2925 | .431 | 1466.56 |
| .20 | 5000. | 0.0 | 18310.6 | 19295.3 | 20681.4 | .4198 | 1.3560 | .6606 | .862 | 5562.23 |
| .20 | 5000. | 0.0 | 16727.1 | 18794.8 | 20004.7 | .4476 | 1.2387 | .6434 | .862 | 5069.73 |
| .20 | 5000. | 0.0 | 14527.5 | 17799.3 | 18778.5 | .4881 | 1.0758 | .6094 | .862 | 4451.34 |
| .20 | 5000. | 0.0 | 12589.0 | 16631.0 | 17428.3 | .5262 | .9323 | .5694 | .862 | 3914.07 |
| .20 | 5000. | 0.0 | 10631.1 | 15178.5 | 15805.0 | .5687 | .7873 | .5196 | .862 | 3398.62 |
| .20 | 5000. | 0.0 | 8894.0 | 13640.4 | 14122.7 | .6109 | .6586 | .4670 | .862 | 2941.88 |
| .20 | 5000. | 0.0 | 7232.6 | 11847.7 | 12203.3 | .6525 | .5356 | .4056 | .862 | 2511.34 |
| .20 | 5000. | 0.0 | 5706.1 | 9882.5 | 10134.0 | .6899 | .4226 | .3383 | .862 | 2118.23 |
| .20 | 5000. | 0.0 | 4395.6 | 7987.9 | 8154.9 | .7239 | .3255 | .2735 | .862 | 1769.83 |
| .20 | 5000. | 0.0 | 3338.7 | 6309.4 | 6418.9 | .7528 | .2472 | .2160 | .862 | 1479.04 |
| .30 | 5000. | 0.0 | 18909.7 | 17874.4 | 19114.0 | .5648 | 1.4004 | .6119 | 1.292 | 5688.80 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 5000. | 0.0 | 17092.4 | 17014.0 | 18052.6 | .5948 | 1.2658 | .5825 | 1.292 | 5138.53 |
| .30 | 5000. | 0.0 | 14854.5 | 15763.0 | 16584.3 | .6341 | 1.1001 | .5397 | 1.292 | 4510.46 |
| .30 | 5000. | 0.0 | 12842.0 | 14470.4 | 15117.9 | .6733 | .9510 | .4954 | 1.292 | 3960.18 |
| .30 | 5000. | 0.0 | 10859.2 | 12905.9 | 13390.2 | .7101 | .8042 | .4418 | 1.292 | 3438.69 |
| .30 | 5000. | 0.0 | 9076.5 | 11280.2 | 11632.1 | .7426 | .6722 | .3862 | 1.292 | 2972.35 |
| .30 | 5000. | 0.0 | 7393.4 | 9585.1 | 9821.7 | .7746 | .5475 | .3282 | 1.292 | 2538.86 |
| .30 | 5000. | 0.0 | 5848.9 | 7812.2 | 7951.9 | .7981 | .4331 | .2675 | 1.292 | 2142.26 |
| .30 | 5000. | 0.0 | 4520.7 | 6176.7 | 6248.1 | .8164 | .3348 | .2115 | 1.292 | 1792.34 |
| .30 | 5000. | 0.0 | 3450.3 | 4770.7 | 4792.7 | .8262 | .2555 | .1633 | 1.292 | 1499.58 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 10000. | 0.0 | 15256.5 | 0.0 | 1506.1 | 0.0000 | 1.3181 | 0.0000 | 0.000 | 4688.87 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 10000. | 0.0 | 14363.6 | 0.0 | 1409.6 | 0.0000 | 1.2410 | 0.0000 | 0.000 | 4374.86 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 10000. | 0.0 | 12995.7 | 0.0 | 1252.5 | 0.0000 | 1.1228 | 0.0000 | 0.000 | 3963.64 |
| 0.00 | 10000. | 0.0 | 11210.3 | 12981.8 | 14026.3 | 0.0000 | .9686 | .5185 | 0.000 | 3466.14 |
| 0.00 | 10000. | 0.0 | 9621.8 | 13921.7 | 14798.8 | 0.0000 | .8313 | .5561 | 0.000 | 3041.47 |
| 0.00 | 10000. | 0.0 | 8034.9 | 13840.1 | 14556.1 | 0.0000 | .6942 | .5528 | 0.000 | 2626.27 |
| 0.00 | 10000. | 0.0 | 6591.9 | 13319.8 | 13898.5 | 0.0000 | .5695 | .5320 | 0.000 | 2252.42 |
| 0.00 | 10000. | 0.0 | 5250.0 | 12362.1 | 12821.6 | 0.0000 | .4536 | .4938 | 0.000 | 1908.67 |
| 0.00 | 10000. | 0.0 | 4040.9 | 11019.1 | 11371.4 | 0.0000 | .3491 | .4401 | 0.000 | 1590.65 |
| 0.00 | 10000. | 0.0 | 3048.2 | 9463.1 | 9733.1 | 0.0000 | .2634 | .3780 | 0.000 | 1321.16 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| .10 | 10000. | 0.0 | 15363.0 | 18196.7 | 19543.4 | .2317 | 1.3273 | .7268 | .423 | 4711.71 |
| .10 | 10000. | 0.0 | 14459.0 | 17822.6 | 19074.2 | .2411 | 1.2492 | .7119 | .423 | 4394.90 |
| .10 | 10000. | 0.0 | 13062.9 | 17237.1 | 18331.1 | .2581 | 1.1286 | .6885 | .423 | 3976.77 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .10 | 10000. | 0.0 | 11263.6 | 16357.4 | 17258.0 | .2841 | .9732 | .6533 | .423 | 3476.40 |
| .10 | 10000. | 0.0 | 9664.8 | 15410.7 | 16151.6 | .3119 | .8350 | .6155 | .423 | 3049.06 |
| .10 | 10000. | 0.0 | 8072.6 | 14337.4 | 14930.8 | .3474 | .6975 | .5727 | .423 | 2633.02 |
| .10 | 10000. | 0.0 | 6622.3 | 13057.4 | 13524.6 | .3857 | .5722 | .5215 | .423 | 2257.77 |
| .10 | 10000. | 0.0 | 5264.4 | 11445.9 | 11802.1 | .4253 | .4548 | .4572 | .423 | 1909.68 |
| .10 | 10000. | 0.0 | 4061.9 | 9659.3 | 9923.1 | .4651 | .3509 | .3858 | .423 | 1594.19 |
| .10 | 10000. | 0.0 | 3071.2 | 7903.8 | 8093.8 | .5034 | .2653 | .3157 | .423 | 1325.70 |
| .20 | 10000. | 0.0 | 15687.1 | 16578.5 | 17795.1 | .4134 | 1.3554 | .6622 | .846 | 4783.29 |
| .20 | 10000. | 0.0 | 14739.3 | 16297.9 | 17411.2 | .4326 | 1.2735 | .6510 | .846 | 4453.73 |
| .20 | 10000. | 0.0 | 13240.6 | 15704.0 | 16651.5 | .4640 | 1.1440 | .6272 | .846 | 4009.76 |
| .20 | 10000. | 0.0 | 11420.5 | 14748.8 | 15515.1 | .5052 | .9867 | .5891 | .846 | 3505.67 |
| .20 | 10000. | 0.0 | 9772.1 | 13634.2 | 14249.8 | .5458 | .8443 | .5446 | .846 | 3068.49 |
| .20 | 10000. | 0.0 | 8183.7 | 12296.9 | 12773.6 | .5878 | .7071 | .4912 | .846 | 2652.89 |
| .20 | 10000. | 0.0 | 6709.9 | 10789.7 | 11149.2 | .6290 | .5797 | .4310 | .846 | 2272.08 |
| .20 | 10000. | 0.0 | 5342.5 | 9139.9 | 9398.2 | .6693 | .4616 | .3651 | .846 | 1923.06 |
| .20 | 10000. | 0.0 | 4127.7 | 7459.8 | 7637.9 | .7070 | .3566 | .2980 | .846 | 1606.04 |
| .20 | 10000. | 0.0 | 3128.2 | 5931.6 | 6046.5 | .7418 | .2703 | .2369 | .846 | 1336.21 |
| .30 | 10000. | 0.0 | 16233.1 | 15421.8 | 16520.7 | .5575 | 1.4025 | .6160 | 1.269 | 4899.55 |
| .30 | 10000. | 0.0 | 15188.9 | 14938.3 | 15926.1 | .5771 | 1.3123 | .5967 | 1.269 | 4545.53 |
| .30 | 10000. | 0.0 | 13466.4 | 14052.7 | 14856.9 | .6123 | 1.1635 | .5613 | 1.269 | 4048.19 |
| .30 | 10000. | 0.0 | 11689.1 | 12961.3 | 13602.0 | .6506 | 1.0099 | .5177 | 1.269 | 3556.59 |
| .30 | 10000. | 0.0 | 9977.8 | 11706.8 | 12198.3 | .6885 | .8621 | .4676 | 1.269 | 3104.77 |
| .30 | 10000. | 0.0 | 8382.5 | 10376.2 | 10735.5 | .7264 | .7242 | .4144 | 1.269 | 2688.58 |
| .30 | 10000. | 0.0 | 6864.8 | 8862.4 | 9118.6 | .7575 | .5931 | .3540 | 1.269 | 2299.64 |
| .30 | 10000. | 0.0 | 5471.5 | 7314.5 | 7478.7 | .7844 | .4727 | .2922 | 1.269 | 1945.68 |
| .30 | 10000. | 0.0 | 4245.4 | 5859.9 | 5947.9 | .8099 | .3668 | .2341 | 1.269 | 1626.66 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 10000. | 0.0 | 3224.2 | 4509.2 | 4550.5 | .8207 | .2786 | .1801 | 1.269 | 1353.76 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 15000. | 0.0 | 12880.6 | 0.0 | 1294.1 | 0.0000 | 1.3058 | 0.0000 | 0.000 | 3983.22 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 15000. | 0.0 | 12211.5 | 0.0 | 1219.1 | 0.0000 | 1.2380 | 0.0000 | 0.000 | 3736.53 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 15000. | 0.0 | 11421.8 | 0.0 | 1129.0 | 0.0000 | 1.1579 | 0.0000 | 0.000 | 3468.73 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 15000. | 0.0 | 10116.5 | 0.0 | 975.7 | 0.0000 | 1.0256 | 0.0000 | 0.000 | 3090.80 |
| 0.00 | 15000. | 0.0 | 8705.2 | 11688.0 | 12505.6 | 0.0000 | .8825 | .5478 | 0.000 | 2713.35 |
| 0.00 | 15000. | 0.0 | 7337.9 | 11840.0 | 12515.1 | 0.0000 | .7439 | .5549 | 0.000 | 2355.21 |
| 0.00 | 15000. | 0.0 | 6039.0 | 11550.9 | 12095.5 | 0.0000 | .6122 | .5413 | 0.000 | 2019.48 |
| 0.00 | 15000. | 0.0 | 4840.0 | 10858.2 | 11291.6 | 0.0000 | .4907 | .5089 | 0.000 | 1713.88 |
| 0.00 | 15000. | 0.0 | 3766.9 | 9785.5 | 10120.5 | 0.0000 | .3819 | .4586 | 0.000 | 1435.60 |
| 0.00 | 15000. | 0.0 | 2839.3 | 8470.4 | 8724.8 | 0.0000 | .2878 | .3970 | 0.000 | 1188.85 |
| .10 | 15000. | 0.0 | 12971.5 | 15490.0 | 16652.2 | .2292 | 1.3150 | .7260 | .415 | 4002.18 |
| .10 | 15000. | 0.0 | 12298.6 | 15210.9 | 16299.9 | .2374 | 1.2468 | .7129 | .415 | 3754.95 |
| .10 | 15000. | 0.0 | 11490.2 | 14872.0 | 15872.3 | .2485 | 1.1649 | .6970 | .415 | 3482.12 |
| .10 | 15000. | 0.0 | 10156.5 | 14284.0 | 15134.0 | .2700 | 1.0296 | .6694 | .415 | 3098.16 |
| .10 | 15000. | 0.0 | 8747.5 | 13468.9 | 14170.6 | .2956 | .8868 | .6312 | .415 | 2721.21 |
| .10 | 15000. | 0.0 | 7364.4 | 12621.4 | 13189.9 | .3290 | .7466 | .5915 | .415 | 2359.45 |
| .10 | 15000. | 0.0 | 6069.2 | 11585.7 | 12033.8 | .3664 | .6153 | .5430 | .415 | 2025.09 |
| .10 | 15000. | 0.0 | 4870.3 | 10284.7 | 10629.1 | .4054 | .4937 | .4820 | .415 | 1719.40 |
| .10 | 15000. | 0.0 | 3785.9 | 8786.8 | 9044.0 | .4455 | .3838 | .4118 | .415 | 1438.85 |
| .10 | 15000. | 0.0 | 2855.7 | 7218.0 | 7404.8 | .4852 | .2895 | .3383 | .415 | 1191.95 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .20 | 15000. | 0.0 | 13251.1 | 14131.3 | 15187.0 | .4094 | 1.3434 | .6623 | .830 | 4065.08 |
| .20 | 15000. | 0.0 | 12560.2 | 13929.6 | 14908.4 | .4258 | 1.2733 | .6528 | .830 | 3810.75 |
| .20 | 15000. | 0.0 | 11701.2 | 13639.7 | 14525.8 | .4475 | 1.1862 | .6392 | .830 | 3525.02 |
| .20 | 15000. | 0.0 | 10268.4 | 12942.8 | 13675.9 | .4839 | 1.0410 | .6066 | .830 | 3118.76 |
| .20 | 15000. | 0.0 | 8873.9 | 12062.3 | 12655.9 | .5219 | .8996 | .5653 | .830 | 2744.93 |
| .20 | 15000. | 0.0 | 7461.6 | 10965.1 | 11430.9 | .5642 | .7564 | .5139 | .830 | 2376.80 |
| .20 | 15000. | 0.0 | 6157.5 | 9741.3 | 10096.8 | .6074 | .6242 | .4565 | .830 | 2040.85 |
| .20 | 15000. | 0.0 | 4938.1 | 8365.1 | 8627.2 | .6503 | .5006 | .3920 | .830 | 1731.45 |
| .20 | 15000. | 0.0 | 3843.1 | 6913.7 | 7098.4 | .6907 | .3896 | .3240 | .830 | 1449.49 |
| .20 | 15000. | 0.0 | 2906.5 | 5494.0 | 5614.6 | .7257 | .2947 | .2575 | .830 | 1201.22 |
| .30 | 15000. | 0.0 | 13724.0 | 13180.2 | 14145.2 | .5530 | 1.3913 | .6177 | 1.246 | 4168.82 |
| .30 | 15000. | 0.0 | 12995.9 | 12836.7 | 13720.9 | .5688 | 1.3175 | .6016 | 1.246 | 3902.82 |
| .30 | 15000. | 0.0 | 12037.7 | 12357.9 | 13139.8 | .5912 | 1.2204 | .5792 | 1.246 | 3593.14 |
| .30 | 15000. | 0.0 | 10474.4 | 11451.1 | 12074.1 | .6296 | 1.0619 | .5367 | 1.246 | 3157.52 |
| .30 | 15000. | 0.0 | 9074.4 | 10532.0 | 11022.1 | .6684 | .9199 | .4936 | 1.246 | 2781.64 |
| .30 | 15000. | 0.0 | 7625.0 | 9358.0 | 9724.8 | .7068 | .7730 | .4386 | 1.246 | 2405.90 |
| .30 | 15000. | 0.0 | 6308.2 | 8099.9 | 8362.3 | .7394 | .6395 | .3796 | 1.246 | 2067.07 |
| .30 | 15000. | 0.0 | 5057.9 | 6774.6 | 6954.5 | .7713 | .5128 | .3175 | 1.246 | 1752.53 |
| .30 | 15000. | 0.0 | 3948.4 | 5480.1 | 5586.3 | .7993 | .4003 | .2568 | 1.246 | 1467.74 |
| .30 | 15000. | 0.0 | 2991.7 | 4228.1 | 4284.1 | .8139 | .3033 | .1982 | 1.246 | 1216.71 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 0. | 25.0 | 20224.0 | 0.0 | 1900.3 | 0.0000 | 1.3528 | 0.0000 | 0.000 | 6277.24 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 0. | 25.0 | 17719.6 | 0.0 | 1605.5 | 0.0000 | 1.1853 | 0.0000 | 0.000 | 5554.93 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| 0.00 | 0. | 25.0 | 15523.8 | 0.0 | 1375.1 | 0.0000 | 1.0384 | 0.0000 | 0.000 | 4923.94 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 0. | 25.0 | 13289.2 | 17664.9 | 18813.2 | 0.0000 | .8889 | .5462 | 0.000 | 4294.43 |
| 0.00 | 0. | 25.0 | 11265.1 | 17958.0 | 18907.8 | 0.0000 | .7535 | .5553 | 0.000 | 3739.21 |
| 0.00 | 0. | 25.0 | 9394.5 | 17586.3 | 18360.0 | 0.0000 | .6284 | .5438 | 0.000 | 3237.00 |
| 0.00 | 0. | 25.0 | 7619.2 | 16680.7 | 17300.6 | 0.0000 | .5096 | .5158 | 0.000 | 2764.96 |
| 0.00 | 0. | 25.0 | 6011.9 | 15200.5 | 15687.5 | 0.0000 | .4021 | .4700 | 0.000 | 2337.62 |
| .10 | 0. | 25.0 | 20325.0 | 23541.6 | 25211.9 | .2404 | 1.3595 | .7280 | .449 | 6297.51 |
| .10 | 0. | 25.0 | 17796.2 | 22501.0 | 23892.6 | .2624 | 1.1904 | .6958 | .449 | 5569.95 |
| .10 | 0. | 25.0 | 15601.6 | 21575.7 | 22749.7 | .2870 | 1.0436 | .6672 | .449 | 4939.59 |
| .10 | 0. | 25.0 | 13345.4 | 20306.1 | 21267.6 | .3157 | .8927 | .6279 | .449 | 4304.19 |
| .10 | 0. | 25.0 | 11314.4 | 19038.0 | 19815.5 | .3492 | .7568 | .5887 | .449 | 3747.84 |
| .10 | 0. | 25.0 | 9415.5 | 17518.6 | 18143.8 | .3861 | .6298 | .5417 | .449 | 3239.99 |
| .10 | 0. | 25.0 | 7653.1 | 15654.7 | 16133.5 | .4245 | .5119 | .4841 | .449 | 2770.76 |
| .10 | 0. | 25.0 | 6043.2 | 13506.3 | 13867.1 | .4638 | .4042 | .4176 | .449 | 2343.16 |
| .20 | 0. | 25.0 | 20595.7 | 21333.5 | 22792.9 | .4299 | 1.3776 | .6597 | .898 | 6351.49 |
| .20 | 0. | 25.0 | 18036.1 | 20456.5 | 21648.4 | .4707 | 1.2064 | .6326 | .898 | 5616.04 |
| .20 | 0. | 25.0 | 15798.6 | 19348.4 | 20332.7 | .5083 | 1.0568 | .5983 | .898 | 4975.20 |
| .20 | 0. | 25.0 | 13520.8 | 17912.4 | 18695.2 | .5498 | .9044 | .5539 | .898 | 4334.68 |
| .20 | 0. | 25.0 | 11460.7 | 16300.3 | 16915.2 | .5903 | .7666 | .5040 | .898 | 3773.67 |
| .20 | 0. | 25.0 | 9542.9 | 14523.2 | 14990.8 | .6316 | .6383 | .4491 | .898 | 3261.64 |
| .20 | 0. | 25.0 | 7782.6 | 12604.2 | 12940.3 | .6721 | .5206 | .3898 | .898 | 2793.16 |
| .20 | 0. | 25.0 | 6138.7 | 10476.7 | 10714.2 | .7083 | .4106 | .3240 | .898 | 2359.98 |
| .30 | 0. | 25.0 | 21004.4 | 19544.5 | 20799.9 | .5793 | 1.4050 | .6044 | 1.347 | 6430.47 |
| .30 | 0. | 25.0 | 18433.5 | 18327.9 | 19331.5 | .6190 | 1.2330 | .5667 | 1.347 | 5691.90 |
| .30 | 0. | 25.0 | 16126.0 | 16953.8 | 17753.5 | .6545 | 1.0787 | .5243 | 1.347 | 5034.34 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 0. | 25.0 | 13821.3 | 15403.7 | 16012.8 | .6938 | .9245 | .4763 | 1.347 | 4386.41 |
| .30 | 0. | 25.0 | 11704.0 | 13720.7 | 14174.9 | .7298 | .7829 | .4243 | 1.347 | 3816.09 |
| .30 | 0. | 25.0 | 9748.6 | 11874.2 | 12193.8 | .7583 | .6521 | .3672 | 1.347 | 3296.36 |
| .30 | 0. | 25.0 | 7949.7 | 10043.5 | 10249.9 | .7865 | .5318 | .3106 | 1.347 | 2821.81 |
| .30 | 0. | 25.0 | 6312.1 | 8199.6 | 8305.9 | .8087 | .4222 | .2536 | 1.347 | 2389.30 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 5000. | 25.0 | 18736.2 | 17194.1 | 18396.5 | .5618 | 1.4568 | .6180 | 1.324 | 5710.77 |
| .30 | 5000. | 25.0 | 16705.7 | 16272.8 | 17253.9 | .5964 | 1.2989 | .5849 | 1.324 | 5108.34 |
| .30 | 5000. | 25.0 | 14635.2 | 15161.2 | 15947.4 | .6343 | 1.1379 | .5450 | 1.324 | 4517.86 |
| .30 | 5000. | 25.0 | 12664.8 | 13937.2 | 14551.1 | .6738 | .9847 | .5010 | 1.324 | 3959.99 |
| .30 | 5000. | 25.0 | 10746.9 | 12455.4 | 12920.4 | .7096 | .8356 | .4477 | 1.324 | 3444.05 |
| .30 | 5000. | 25.0 | 9015.4 | 10945.9 | 11284.4 | .7433 | .7010 | .3934 | 1.324 | 2983.67 |
| .30 | 5000. | 25.0 | 7402.8 | 9359.5 | 9587.3 | .7741 | .5756 | .3364 | 1.324 | 2560.26 |
| .30 | 5000. | 25.0 | 5901.6 | 7681.7 | 7817.4 | .7969 | .4589 | .2761 | 1.324 | 2169.25 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 10000. | 25.0 | 16156.2 | 14839.4 | 15912.0 | .5527 | 1.4681 | .6234 | 1.302 | 4933.27 |
| .30 | 10000. | 25.0 | 14983.7 | 14344.2 | 15290.8 | .5761 | 1.3616 | .6026 | 1.302 | 4546.16 |
| .30 | 10000. | 25.0 | 13126.6 | 13409.1 | 14168.5 | .6147 | 1.1928 | .5633 | 1.302 | 4017.47 |
| .30 | 10000. | 25.0 | 11488.6 | 12426.1 | 13033.1 | .6509 | 1.0440 | .5220 | 1.302 | 3549.23 |
| .30 | 10000. | 25.0 | 9793.6 | 11234.8 | 11699.9 | .6903 | .8899 | .4720 | 1.302 | 3088.74 |
| .30 | 10000. | 25.0 | 8250.1 | 9977.8 | 10322.9 | .7278 | .7497 | .4192 | 1.302 | 2680.40 |
| .30 | 10000. | 25.0 | 6820.2 | 8581.9 | 8823.2 | .7572 | .6198 | .3605 | 1.302 | 2306.31 |
| .30 | 10000. | 25.0 | 5469.0 | 7136.9 | 7292.3 | .7853 | .4970 | .2998 | 1.302 | 1956.92 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 15000. | 25.0 | 13664.3 | 12656.1 | 13597.3 | .5475 | 1.4597 | .6250 | 1.279 | 4197.61 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 15000. | 25.0 | 12915.2 | 12357.9 | 13214.5 | .5656 | 1.3797 | .6103 | 1.279 | 3923.56 |
| .30 | 15000. | 25.0 | 11795.1 | 11811.7 | 12552.2 | .5920 | 1.2600 | .5833 | 1.279 | 3575.77 |
| .30 | 15000. | 25.0 | 10242.4 | 10941.1 | 11525.5 | .6315 | 1.0942 | .5403 | 1.279 | 3139.86 |
| .30 | 15000. | 25.0 | 8859.8 | 10052.4 | 10512.3 | .6707 | .9465 | .4964 | 1.279 | 2754.73 |
| .30 | 15000. | 25.0 | 7451.8 | 8935.6 | 9279.7 | .7088 | .7961 | .4413 | 1.279 | 2385.39 |
| .30 | 15000. | 25.0 | 6189.7 | 7769.0 | 8019.9 | .7420 | .6612 | .3837 | 1.279 | 2055.98 |
| .30 | 15000. | 25.0 | 5005.1 | 6554.3 | 6721.8 | .7741 | .5347 | .3237 | 1.279 | 1750.42 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .30 | 0. | 0.0 | 20971.2 | 20174.3 | 21457.8 | .5849 | 1.3382 | .5952 | 1.315 | 6332.15 |
| .30 | 0. | 0.0 | 18354.8 | 18829.2 | 19843.3 | .6238 | 1.1713 | .5555 | 1.315 | 5588.89 |
| .30 | 0. | 0.0 | 15970.1 | 17376.1 | 18178.6 | .6616 | 1.0191 | .5126 | 1.315 | 4912.43 |
| .30 | 0. | 0.0 | 13611.4 | 15645.3 | 16255.0 | .6989 | .8686 | .4615 | 1.315 | 4282.37 |
| .30 | 0. | 0.0 | 11456.0 | 13858.9 | 14307.9 | .7356 | .7310 | .4088 | 1.315 | 3713.27 |
| .30 | 0. | 0.0 | 9473.1 | 11903.7 | 12212.8 | .7641 | .6045 | .3512 | 1.315 | 3195.62 |
| .30 | 0. | 0.0 | 7602.1 | 9876.2 | 10074.6 | .7899 | .4851 | .2914 | 1.315 | 2712.95 |
| .30 | 0. | 0.0 | 5969.1 | 8008.0 | 8111.1 | .8157 | .3809 | .2362 | 1.315 | 2285.73 |
| .30 | 0. | 0.0 | 4630.7 | 6264.4 | 6297.4 | .8226 | .2955 | .1848 | 1.315 | 1922.54 |
| .30 | 0. | 0.0 | 3512.9 | 4788.0 | 4777.6 | .8288 | .2242 | .1412 | 1.315 | 1609.62 |
| .40 | 0. | 0.0 | 21541.3 | 18226.3 | 19306.9 | .6860 | 1.3746 | .5377 | 1.754 | 6438.06 |
| .40 | 0. | 0.0 | 18892.2 | 16808.7 | 17640.7 | .7213 | 1.2056 | .4959 | 1.754 | 5688.33 |
| .40 | 0. | 0.0 | 16422.7 | 15342.0 | 15965.1 | .7574 | 1.0480 | .4526 | 1.754 | 4991.12 |
| .40 | 0. | 0.0 | 14027.9 | 13796.7 | 14240.9 | .7974 | .8952 | .4070 | 1.754 | 4356.25 |
| .40 | 0. | 0.0 | 11802.5 | 11897.3 | 12184.6 | .8173 | .7532 | .3510 | 1.754 | 3773.39 |
| .40 | 0. | 0.0 | 9737.6 | 9877.9 | 10042.5 | .8224 | .6214 | .2914 | 1.754 | 3238.84 |
| .40 | 0. | 0.0 | 7844.2 | 8061.3 | 8123.7 | .8332 | .5006 | .2378 | 1.754 | 2753.32 |
| .40 | 0. | 0.0 | 6184.4 | 6456.2 | 6436.2 | .8464 | .3946 | .1905 | 1.754 | 2322.49 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .40 | 0. | 0.0 | 4818.4 | 4983.7 | 4914.6 | .8386 | .3075 | .1470 | 1.754 | 1956.39 |
| .40 | 0. | 0.0 | 3683.0 | 3715.7 | 3605.4 | .8179 | .2350 | .1096 | 1.754 | 1641.01 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .40 | 5000. | 0.0 | 19441.1 | 16272.0 | 17341.5 | .6668 | 1.4397 | .5571 | 1.723 | 5769.47 |
| .40 | 5000. | 0.0 | 17162.4 | 15096.9 | 15937.9 | .7008 | 1.2710 | .5168 | 1.723 | 5119.24 |
| .40 | 5000. | 0.0 | 15033.1 | 13893.5 | 14539.1 | .7363 | 1.1133 | .4756 | 1.723 | 4514.02 |
| .40 | 5000. | 0.0 | 12903.6 | 12516.8 | 12987.5 | .7728 | .9556 | .4285 | 1.723 | 3943.92 |
| .40 | 5000. | 0.0 | 10915.5 | 11067.6 | 11391.9 | .8078 | .8083 | .3789 | 1.723 | 3424.15 |
| .40 | 5000. | 0.0 | 9082.2 | 9300.7 | 9510.5 | .8158 | .6726 | .3184 | 1.723 | 2951.08 |
| .40 | 5000. | 0.0 | 7377.8 | 7663.9 | 7769.2 | .8276 | .5464 | .2624 | 1.723 | 2515.59 |
| .40 | 5000. | 0.0 | 5838.7 | 6157.3 | 6176.7 | .8402 | .4324 | .2108 | 1.723 | 2122.07 |
| .40 | 5000. | 0.0 | 4527.0 | 4798.2 | 4766.2 | .8444 | .3352 | .1643 | 1.723 | 1777.95 |
| .40 | 5000. | 0.0 | 3468.0 | 3600.5 | 3528.0 | .8271 | .2568 | .1233 | 1.723 | 1489.56 |
| .50 | 5000. | 0.0 | 20258.1 | 14988.8 | 15923.8 | .7368 | 1.5002 | .5131 | 2.154 | 5935.05 |
| .50 | 5000. | 0.0 | 17793.1 | 13684.5 | 14365.2 | .7659 | 1.3177 | .4685 | 2.154 | 5235.47 |
| .50 | 5000. | 0.0 | 15591.0 | 12365.3 | 12860.4 | .7898 | 1.1546 | .4233 | 2.154 | 4612.86 |
| .50 | 5000. | 0.0 | 13358.9 | 10890.1 | 11213.1 | .8118 | .9893 | .3728 | 2.154 | 4022.93 |
| .50 | 5000. | 0.0 | 11321.7 | 9430.9 | 9617.9 | .8295 | .8384 | .3229 | 2.154 | 3494.90 |
| .50 | 5000. | 0.0 | 9433.9 | 7982.7 | 8053.5 | .8427 | .6986 | .2733 | 2.154 | 3009.44 |
| .50 | 5000. | 0.0 | 7671.0 | 6563.5 | 6543.2 | .8521 | .5681 | .2247 | 2.154 | 2563.96 |
| .50 | 5000. | 0.0 | 6085.3 | 5213.5 | 5123.5 | .8532 | .4506 | .1785 | 2.154 | 2163.26 |
| .50 | 5000. | 0.0 | 4769.7 | 4026.2 | 3882.3 | .8406 | .3532 | .1378 | 2.154 | 1819.92 |
| .50 | 5000. | 0.0 | 3666.6 | 3006.3 | 2842.5 | .8165 | .2715 | .1029 | 2.154 | 1524.70 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| .50 | 5000. | 0.0 | 2753.1 | 0.0 | -182.9 | 0.0000 | .2039 | 0.0000 | 2.154 | 1269.57 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .40 | 10000. | 0.0 | 16843.4 | 14137.2 | 15128.7 | .6567 | 1.4553 | .5647 | 1.692 | 5011.72 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .40 | 10000. | 0.0 | 15531.1 | 13510.8 | 14358.3 | .6806 | 1.3419 | .5396 | 1.692 | 4592.79 |
| .40 | 10000. | 0.0 | 13544.2 | 12410.0 | 13061.5 | .7169 | 1.1702 | .4957 | 1.692 | 4035.50 |
| .40 | 10000. | 0.0 | 11797.2 | 11323.8 | 11818.7 | .7510 | 1.0193 | .4523 | 1.692 | 3554.70 |
| .40 | 10000. | 0.0 | 10016.2 | 10100.0 | 10449.2 | .7889 | .8654 | .4034 | 1.692 | 3090.41 |
| .40 | 10000. | 0.0 | 8402.5 | 8657.0 | 8892.9 | .8061 | .7260 | .3458 | 1.692 | 2672.97 |
| .40 | 10000. | 0.0 | 6869.2 | 7210.2 | 7348.7 | .8212 | .5935 | .2880 | 1.692 | 2283.38 |
| .40 | 10000. | 0.0 | 5458.2 | 5815.4 | 5873.0 | .8336 | .4716 | .2323 | 1.692 | 1927.38 |
| .40 | 10000. | 0.0 | 4240.6 | 4599.5 | 4593.1 | .8486 | .3664 | .1837 | 1.692 | 1611.55 |
| .40 | 10000. | 0.0 | 3236.8 | 3449.8 | 3406.7 | .8339 | .2797 | .1378 | 1.692 | 1344.49 |
| .50 | 10000. | 0.0 | 17795.1 | 13170.0 | 14078.3 | .7238 | 1.5375 | .5260 | 2.115 | 5214.70 |
| .50 | 10000. | 0.0 | 16110.0 | 12330.7 | 13054.4 | .7485 | 1.3919 | .4925 | 2.115 | 4705.34 |
| .50 | 10000. | 0.0 | 14069.2 | 11181.5 | 11706.6 | .7772 | 1.2156 | .4466 | 2.115 | 4130.56 |
| .50 | 10000. | 0.0 | 12231.5 | 10005.2 | 10370.2 | .8000 | 1.0568 | .3996 | 2.115 | 3632.97 |
| .50 | 10000. | 0.0 | 10385.3 | 8707.3 | 8937.8 | .8200 | .8973 | .3478 | 2.115 | 3154.64 |
| .50 | 10000. | 0.0 | 8723.6 | 7454.8 | 7576.2 | .8357 | .7537 | .2978 | 2.115 | 2727.80 |
| .50 | 10000. | 0.0 | 7134.8 | 6193.3 | 6225.2 | .8489 | .6164 | .2474 | 2.115 | 2327.15 |
| .50 | 10000. | 0.0 | 5682.2 | 4954.6 | 4916.3 | .8528 | .4909 | .1979 | 2.115 | 1964.59 |
| .50 | 10000. | 0.0 | 4437.7 | 3850.8 | 3758.7 | .8486 | .3834 | .1538 | 2.115 | 1645.64 |
| .50 | 10000. | 0.0 | 3420.8 | 2894.8 | 2768.9 | .8276 | .2956 | .1156 | 2.115 | 1377.20 |
| .65 | 10000. | 0.0 | 19344.2 | 12171.1 | 12942.1 | .7999 | 1.6713 | .4861 | 2.750 | 5531.92 |
| .65 | 10000. | 0.0 | 17064.3 | 10980.9 | 11506.6 | .8181 | 1.4743 | .4386 | 2.750 | 4879.86 |
| .65 | 10000. | 0.0 | 15051.6 | 9863.0 | 10203.5 | .8331 | 1.3004 | .3939 | 2.750 | 4305.82 |
| .65 | 10000. | 0.0 | 12996.7 | 8666.1 | 8844.8 | .8477 | 1.1229 | .3461 | 2.750 | 3763.21 |
| .65 | 10000. | 0.0 | 11091.8 | 7500.6 | 7549.0 | .8597 | .9583 | .2996 | 2.750 | 3274.91 |
| .65 | 10000. | 0.0 | 9324.7 | 6355.0 | 6297.6 | .8665 | .8056 | .2538 | 2.750 | 2826.19 |
| .65 | 10000. | 0.0 | 7639.0 | 5198.6 | 5065.0 | .8652 | .6600 | .2076 | 2.750 | 2408.49 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 10000. | 0.0 | 6128.2 | 4111.1 | 3915.8 | .8529 | .5295 | .1642 | 2.750 | 2036.03 |
| .65 | 10000. | 0.0 | 4840.8 | 3148.8 | 2913.0 | .8270 | .4182 | .1258 | 2.750 | 1712.84 |
| .65 | 10000. | 0.0 | 3767.2 | 2301.8 | 2051.3 | .7768 | .3255 | .0919 | 2.750 | 1436.37 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .40 | 15000. | 0.0 | 14286.8 | 12104.8 | 12983.0 | .6506 | 1.4484 | .5673 | 1.661 | 4274.71 |
| .40 | 15000. | 0.0 | 13477.9 | 11731.7 | 12521.4 | .6683 | 1.3664 | .5498 | 1.661 | 3988.34 |
| .40 | 15000. | 0.0 | 12243.5 | 11064.7 | 11721.6 | .6939 | 1.2412 | .5186 | 1.661 | 3613.03 |
| .40 | 15000. | 0.0 | 10598.6 | 10118.7 | 10616.7 | .7331 | 1.0745 | .4742 | 1.661 | 3162.80 |
| .40 | 15000. | 0.0 | 9134.0 | 9089.1 | 9460.0 | .7641 | .9260 | .4260 | 1.661 | 2776.17 |
| .40 | 15000. | 0.0 | 7657.9 | 7919.6 | 8177.8 | .7941 | .7763 | .3712 | 1.661 | 2396.12 |
| .40 | 15000. | 0.0 | 6310.9 | 6661.9 | 6829.8 | .8105 | .6398 | .3122 | 1.661 | 2054.22 |
| .40 | 15000. | 0.0 | 5052.8 | 5439.8 | 5526.8 | .8266 | .5122 | .2549 | 1.661 | 1737.97 |
| .40 | 15000. | 0.0 | 3937.2 | 4320.6 | 4344.8 | .8426 | .3991 | .2025 | 1.661 | 1453.20 |
| .40 | 15000. | 0.0 | 2996.0 | 3271.7 | 3254.3 | .8385 | .3037 | .1533 | 1.661 | 1207.05 |
| .50 | 15000. | 0.0 | 15146.6 | 11323.7 | 12144.6 | .7175 | 1.5355 | .5307 | 2.076 | 4461.49 |
| .50 | 15000. | 0.0 | 14208.4 | 10877.1 | 11588.2 | .7347 | 1.4404 | .5098 | 2.076 | 4138.47 |
| .50 | 15000. | 0.0 | 12654.3 | 10047.3 | 10598.9 | .7621 | 1.2829 | .4709 | 2.076 | 3688.48 |
| .50 | 15000. | 0.0 | 11016.1 | 9036.9 | 9433.4 | .7873 | 1.1168 | .4235 | 2.076 | 3239.58 |
| .50 | 15000. | 0.0 | 9457.1 | 7969.4 | 8238.9 | .8088 | .9587 | .3735 | 2.076 | 2832.66 |
| .50 | 15000. | 0.0 | 7957.7 | 6859.3 | 7020.6 | .8273 | .8067 | .3215 | 2.076 | 2448.48 |
| .50 | 15000. | 0.0 | 6560.3 | 5755.5 | 5830.8 | .8420 | .6651 | .2697 | 2.076 | 2096.17 |
| .50 | 15000. | 0.0 | 5259.6 | 4667.1 | 4671.6 | .8517 | .5332 | .2187 | 2.076 | 1772.98 |
| .50 | 15000. | 0.0 | 4110.5 | 3649.7 | 3600.5 | .8522 | .4167 | .1711 | 2.076 | 1482.94 |
| .50 | 15000. | 0.0 | 3158.4 | 2752.3 | 2664.5 | .8364 | .3202 | .1290 | 2.076 | 1236.28 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 20000. | 0.0 | 12697.0 | 9628.2 | 10358.1 | .7137 | 1.5197 | .5327 | 2.036 | 3769.11 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 20000. | 0.0 | 12043.2 | 9312.9 | 9965.1 | .7278 | 1.4414 | .5153 | 2.036 | 3528.53 |
| .50 | 20000. | 0.0 | 11197.5 | 8871.3 | 9422.2 | .7457 | 1.3402 | .4909 | 2.036 | 3251.08 |
| .50 | 20000. | 0.0 | 9790.7 | 8044.8 | 8455.5 | .7734 | 1.1718 | .4451 | 2.036 | 2860.58 |
| .50 | 20000. | 0.0 | 8506.6 | 7198.4 | 7493.4 | .7965 | 1.0181 | .3983 | 2.036 | 2519.80 |
| .50 | 20000. | 0.0 | 7173.4 | 6231.8 | 6421.3 | .8177 | .8586 | .3448 | 2.036 | 2178.02 |
| .50 | 20000. | 0.0 | 5958.7 | 5285.0 | 5390.6 | .8348 | .7132 | .2924 | 2.036 | 1871.11 |
| .50 | 20000. | 0.0 | 4811.6 | 4336.6 | 4373.7 | .8483 | .5759 | .2400 | 2.036 | 1586.34 |
| .50 | 20000. | 0.0 | 3773.6 | 3413.3 | 3397.7 | .8514 | .4517 | .1889 | 2.036 | 1327.75 |
| .50 | 20000. | 0.0 | 2888.1 | 2587.0 | 2534.2 | .8431 | .3457 | .1431 | 2.036 | 1102.19 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .40 | 10000. | 18.0 | 17512.7 | 14058.0 | 15112.3 | .6396 | 1.5695 | .5824 | 1.724 | 5300.91 |
| .40 | 10000. | 18.0 | 16488.7 | 13646.3 | 14581.5 | .6595 | 1.4777 | .5654 | 1.724 | 4937.50 |
| .40 | 10000. | 18.0 | 14813.9 | 12820.5 | 13584.5 | .6896 | 1.3276 | .5312 | 1.724 | 4438.28 |
| .40 | 10000. | 18.0 | 12937.7 | 11788.1 | 12375.0 | .7260 | 1.1595 | .4884 | 1.724 | 3910.95 |
| .40 | 10000. | 18.0 | 11211.4 | 10707.5 | 11144.4 | .7610 | 1.0047 | .4436 | 1.724 | 3427.24 |
| .40 | 10000. | 18.0 | 9501.9 | 9569.3 | 9875.8 | .8025 | .8515 | .3965 | 1.724 | 2978.29 |
| .40 | 10000. | 18.0 | 7953.3 | 8116.7 | 8316.7 | .8132 | .7128 | .3363 | 1.724 | 2574.27 |
| .40 | 10000. | 18.0 | 6486.4 | 6713.5 | 6825.3 | .8247 | .5813 | .2781 | 1.724 | 2197.90 |
| .40 | 10000. | 18.0 | 5153.7 | 5409.1 | 5443.3 | .8363 | .4619 | .2241 | 1.724 | 1856.72 |
| .40 | 10000. | 18.0 | 3996.6 | 4253.5 | 4236.5 | .8480 | .3582 | .1762 | 1.724 | 1556.42 |
| .50 | 10000. | 18.0 | 18536.5 | 13181.1 | 14159.0 | .7083 | 1.6612 | .5461 | 2.155 | 5524.96 |
| .50 | 10000. | 18.0 | 17283.6 | 12634.4 | 13468.9 | .7281 | 1.5489 | .5234 | 2.155 | 5102.67 |
| .50 | 10000. | 18.0 | 15300.7 | 11633.2 | 12260.6 | .7573 | 1.3712 | .4820 | 2.155 | 4527.75 |
| .50 | 10000. | 18.0 | 13445.1 | 10573.2 | 11033.6 | .7833 | 1.2049 | .4380 | 2.155 | 4002.30 |
| .50 | 10000. | 18.0 | 11602.6 | 9390.3 | 9702.8 | .8061 | 1.0398 | .3890 | 2.155 | 3494.80 |
| .50 | 10000. | 18.0 | 9870.6 | 8165.0 | 8354.6 | .8239 | .8846 | .3383 | 2.155 | 3043.01 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 10000. | 18.0 | 8255.0 | 6953.3 | 7044.1 | .8390 | .7398 | .2881 | 2.155 | 2625.63 |
| .50 | 10000. | 18.0 | 6759.6 | 5774.0 | 5780.4 | .8508 | .6058 | .2392 | 2.155 | 2244.46 |
| .50 | 10000. | 18.0 | 5372.1 | 4600.2 | 4544.2 | .8529 | .4814 | .1906 | 2.155 | 1894.07 |
| .50 | 10000. | 18.0 | 4190.2 | 3556.3 | 3461.2 | .8453 | .3755 | .1473 | 2.155 | 1589.99 |
| .65 | 10000. | 18.0 | 20428.1 | 12446.4 | 13327.9 | .7889 | 1.8307 | .5157 | 2.801 | 5933.48 |
| .65 | 10000. | 18.0 | 18510.5 | 11504.0 | 12162.6 | .8047 | 1.6589 | .4766 | 2.801 | 5344.50 |
| .65 | 10000. | 18.0 | 16331.9 | 10368.4 | 10810.2 | .8220 | 1.4636 | .4296 | 2.801 | 4720.43 |
| .65 | 10000. | 18.0 | 14339.8 | 9265.7 | 9537.2 | .8367 | 1.2851 | .3839 | 2.801 | 4157.29 |
| .65 | 10000. | 18.0 | 12361.1 | 8119.0 | 8244.0 | .8505 | 1.1078 | .3364 | 2.801 | 3624.03 |
| .65 | 10000. | 18.0 | 10543.6 | 7012.5 | 7021.6 | .8612 | .9449 | .2905 | 2.801 | 3155.82 |
| .65 | 10000. | 18.0 | 8838.0 | 5916.5 | 5833.1 | .8668 | .7921 | .2451 | 2.801 | 2722.11 |
| .65 | 10000. | 18.0 | 7230.7 | 4817.8 | 4668.3 | .8627 | .6480 | .1996 | 2.801 | 2319.69 |
| .65 | 10000. | 18.0 | 5812.5 | 3803.8 | 3595.1 | .8474 | .5209 | .1576 | 2.801 | 1965.52 |
| .65 | 10000. | 18.0 | 4606.5 | 2914.5 | 2670.8 | .8192 | .4128 | .1207 | 2.801 | 1659.33 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 5000. | 18.0 | 21538.9 | 15221.4 | 16278.8 | .7163 | 1.6524 | .5398 | 2.193 | 6393.55 |
| .50 | 5000. | 18.0 | 19327.3 | 14216.6 | 15044.5 | .7456 | 1.4827 | .5042 | 2.193 | 5733.41 |
| .50 | 5000. | 18.0 | 17044.3 | 12981.9 | 13587.9 | .7720 | 1.3076 | .4604 | 2.193 | 5078.17 |
| .50 | 5000. | 18.0 | 14868.2 | 11665.6 | 12092.6 | .7953 | 1.1406 | .4137 | 2.193 | 4465.84 |
| .50 | 5000. | 18.0 | 12735.7 | 10251.7 | 10523.7 | .8159 | .9770 | .3636 | 2.193 | 3887.74 |
| .50 | 5000. | 18.0 | 10790.6 | 8869.5 | 9015.0 | .8331 | .8278 | .3146 | 2.193 | 3379.86 |
| .50 | 5000. | 18.0 | 8981.0 | 7484.9 | 7526.1 | .8447 | .6890 | .2655 | 2.193 | 2912.05 |
| .50 | 5000. | 18.0 | 7292.3 | 6129.7 | 6093.2 | .8520 | .5594 | .2174 | 2.193 | 2480.18 |
| .50 | 5000. | 18.0 | 5792.9 | 4873.4 | 4769.7 | .8527 | .4444 | .1728 | 2.193 | 2096.74 |
| .50 | 5000. | 18.0 | 4530.7 | 3740.0 | 3604.8 | .8367 | .3476 | .1326 | 2.193 | 1766.87 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 15000. | 18.0 | 15678.2 | 11273.1 | 12148.4 | .7033 | 1.6509 | .5488 | 2.116 | 4703.55 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 15000. | 18.0 | 14864.6 | 10923.3 | 11699.5 | .7188 | 1.5653 | .5317 | 2.116 | 4402.09 |
| .50 | 15000. | 18.0 | 13703.2 | 10377.3 | 11024.0 | .7408 | 1.4430 | .5052 | 2.116 | 4029.08 |
| .50 | 15000. | 18.0 | 11981.6 | 9437.9 | 9913.8 | .7705 | 1.2617 | .4594 | 2.116 | 3544.89 |
| .50 | 15000. | 18.0 | 10479.2 | 8502.2 | 8845.1 | .7936 | 1.1035 | .4139 | 2.116 | 3120.78 |
| .50 | 15000. | 18.0 | 8918.9 | 7429.5 | 7651.2 | .8148 | .9392 | .3617 | 2.116 | 2714.13 |
| .50 | 15000. | 18.0 | 7511.4 | 6387.8 | 6513.2 | .8318 | .7910 | .3110 | 2.116 | 2350.25 |
| .50 | 15000. | 18.0 | 6173.2 | 5338.2 | 5385.4 | .8459 | .6500 | .2599 | 2.116 | 2009.99 |
| .50 | 15000. | 18.0 | 4936.4 | 4302.2 | 4287.1 | .8525 | .5198 | .2094 | 2.116 | 1699.81 |
| .50 | 15000. | 18.0 | 3857.7 | 3357.3 | 3291.6 | .8513 | .4062 | .1634 | 2.116 | 1424.93 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .50 | 20000. | 18.0 | 13108.5 | 9553.6 | 10319.1 | .6996 | 1.6321 | .5499 | 2.077 | 3961.10 |
| .50 | 20000. | 18.0 | 12488.6 | 9287.4 | 9980.6 | .7139 | 1.5549 | .5346 | 2.077 | 3725.18 |
| .50 | 20000. | 18.0 | 11790.7 | 8969.4 | 9579.6 | .7303 | 1.4680 | .5163 | 2.077 | 3473.38 |
| .50 | 20000. | 18.0 | 10686.9 | 8387.6 | 8875.3 | .7534 | 1.3306 | .4828 | 2.077 | 3139.51 |
| .50 | 20000. | 18.0 | 9285.6 | 7554.7 | 7910.0 | .7810 | 1.1561 | .4348 | 2.077 | 2747.69 |
| .50 | 20000. | 18.0 | 7997.8 | 6697.7 | 6945.1 | .8039 | .9958 | .3855 | 2.077 | 2406.49 |
| .50 | 20000. | 18.0 | 6731.9 | 5777.0 | 5928.6 | .8238 | .8382 | .3325 | 2.077 | 2080.60 |
| .50 | 20000. | 18.0 | 5574.1 | 4873.3 | 4950.0 | .8393 | .6940 | .2805 | 2.077 | 1785.34 |
| .50 | 20000. | 18.0 | 4479.6 | 3973.1 | 3990.4 | .8514 | .5577 | .2287 | 2.077 | 1511.74 |
| .50 | 20000. | 18.0 | 3511.2 | 3119.1 | 3087.9 | .8528 | .4372 | .1795 | 2.077 | 1268.62 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 15000. | 0.0 | 16779.7 | 10665.0 | 11420.2 | .7930 | 1.7011 | .4998 | 2.699 | 4813.09 |
| .65 | 15000. | 0.0 | 15352.8 | 9934.3 | 10522.6 | .8074 | 1.5564 | .4656 | 2.699 | 4368.27 |
| .65 | 15000. | 0.0 | 13459.1 | 8897.2 | 9291.9 | .8248 | 1.3645 | .4170 | 2.699 | 3833.36 |
| .65 | 15000. | 0.0 | 11775.9 | 7924.6 | 8168.7 | .8396 | 1.1938 | .3714 | 2.699 | 3376.29 |
| .65 | 15000. | 0.0 | 10068.5 | 6888.1 | 7002.8 | .8536 | 1.0207 | .3228 | 2.699 | 2937.11 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 15000. | 0.0 | 8515.8 | 5895.0 | 5909.5 | .8637 | .8633 | .2763 | 2.699 | 2542.81 |
| .65 | 15000. | 0.0 | 7039.7 | 4898.0 | 4829.6 | .8681 | .7137 | .2296 | 2.699 | 2175.17 |
| .65 | 15000. | 0.0 | 5654.1 | 3905.2 | 3778.5 | .8618 | .5732 | .1830 | 2.699 | 1836.56 |
| .65 | 15000. | 0.0 | 4457.3 | 3003.8 | 2832.7 | .8408 | .4519 | .1408 | 2.699 | 1540.48 |
| .65 | 15000. | 0.0 | 3468.1 | 2225.7 | 2030.5 | .8007 | .3516 | .1043 | 2.699 | 1289.14 |
| .75 | 15000. | 0.0 | 17990.6 | 10131.5 | 10837.4 | .8108 | 1.8239 | .4748 | 3.114 | 5066.69 |
| .75 | 15000. | 0.0 | 16062.3 | 9198.0 | 9682.6 | .8244 | 1.6284 | .4311 | 3.114 | 4502.08 |
| .75 | 15000. | 0.0 | 14178.9 | 8240.5 | 8534.5 | .8367 | 1.4374 | .3862 | 3.114 | 3963.12 |
| .75 | 15000. | 0.0 | 12349.5 | 7269.9 | 7407.6 | .8475 | 1.2520 | .3407 | 3.114 | 3476.35 |
| .75 | 15000. | 0.0 | 10584.8 | 6292.5 | 6303.0 | .8559 | 1.0731 | .2949 | 3.114 | 3025.38 |
| .75 | 15000. | 0.0 | 8959.5 | 5345.6 | 5256.0 | .8590 | .9083 | .2505 | 3.114 | 2615.81 |
| .75 | 15000. | 0.0 | 7407.8 | 4395.1 | 4228.1 | .8542 | .7510 | .2060 | 3.114 | 2233.26 |
| .75 | 15000. | 0.0 | 5966.7 | 3474.3 | 3256.6 | .8383 | .6049 | .1628 | 3.114 | 1884.65 |
| .75 | 15000. | 0.0 | 4742.7 | 2654.5 | 2399.4 | .8058 | .4808 | .1244 | 3.114 | 1585.99 |
| .75 | 15000. | 0.0 | 3727.4 | 1960.7 | 1685.9 | .7573 | .3779 | .0919 | 3.114 | 1331.90 |
| .80 | 15000. | 0.0 | 18580.3 | 9852.8 | 10517.2 | .8143 | 1.8836 | .4618 | 3.322 | 5184.05 |
| .80 | 15000. | 0.0 | 16448.1 | 8857.7 | 9286.6 | .8270 | 1.6675 | .4151 | 3.322 | 4572.54 |
| .80 | 15000. | 0.0 | 14567.9 | 7945.7 | 8189.3 | .8376 | 1.4769 | .3724 | 3.322 | 4032.07 |
| .80 | 15000. | 0.0 | 12663.3 | 6980.2 | 7061.1 | .8465 | 1.2838 | .3271 | 3.322 | 3529.13 |
| .80 | 15000. | 0.0 | 10874.5 | 6026.1 | 5980.6 | .8510 | 1.1024 | .2824 | 3.322 | 3073.19 |
| .80 | 15000. | 0.0 | 9195.1 | 5086.7 | 4943.1 | .8495 | .9322 | .2384 | 3.322 | 2652.52 |
| .80 | 15000. | 0.0 | 7614.5 | 4167.9 | 3949.9 | .8406 | .7719 | .1953 | 3.322 | 2265.70 |
| .80 | 15000. | 0.0 | 6163.5 | 3289.9 | 3021.2 | .8197 | .6248 | .1542 | 3.322 | 1915.80 |
| .80 | 15000. | 0.0 | 4909.4 | 2513.2 | 2210.7 | .7861 | .4977 | .1178 | 3.322 | 1612.48 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| .80 | 15000. | 0.0 | 3872.9 | 0.0 | -316.5 | 0.0000 | .3926 | 0.0000 | 3.322 | 1355.22 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 20000. | 0.0 | 14146.6 | 9122.8 | 9813.1 | .7891 | 1.6932 | .5048 | 2.647 | 4087.71 |
| .65 | 20000. | 0.0 | 13340.4 | 8709.8 | 9300.9 | .7989 | 1.5967 | .4819 | 2.647 | 3803.48 |
| .65 | 20000. | 0.0 | 12030.4 | 8002.3 | 8442.7 | .8139 | 1.4399 | .4428 | 2.647 | 3411.52 |
| .65 | 20000. | 0.0 | 10487.3 | 7121.9 | 7413.4 | .8310 | 1.2552 | .3941 | 2.647 | 2990.42 |
| .65 | 20000. | 0.0 | 9073.3 | 6271.7 | 6442.6 | .8458 | 1.0860 | .3470 | 2.647 | 2620.32 |
| .65 | 20000. | 0.0 | 7678.4 | 5389.3 | 5458.7 | .8588 | .9190 | .2982 | 2.647 | 2266.25 |
| .65 | 20000. | 0.0 | 6387.8 | 4525.2 | 4513.6 | .8668 | .7646 | .2504 | 2.647 | 1943.07 |
| .65 | 20000. | 0.0 | 5175.5 | 3662.8 | 3589.2 | .8660 | .6195 | .2027 | 2.647 | 1646.95 |
| .65 | 20000. | 0.0 | 4078.0 | 2837.8 | 2721.8 | .8515 | .4881 | .1570 | 2.647 | 1378.93 |
| .65 | 20000. | 0.0 | 3163.1 | 2122.3 | 1975.6 | .8210 | .3786 | .1174 | 2.647 | 1149.78 |
| .75 | 20000. | 0.0 | 15331.6 | 8753.5 | 9430.6 | .8061 | 1.8350 | .4843 | 3.054 | 4345.25 |
| .75 | 20000. | 0.0 | 14257.1 | 8235.0 | 8775.8 | .8155 | 1.7064 | .4557 | 3.054 | 3990.63 |
| .75 | 20000. | 0.0 | 12558.7 | 7385.2 | 7741.5 | .8303 | 1.5031 | .4086 | 3.054 | 3507.25 |
| .75 | 20000. | 0.0 | 11064.2 | 6600.5 | 6810.1 | .8423 | 1.3243 | .3652 | 3.054 | 3095.70 |
| .75 | 20000. | 0.0 | 9523.7 | 5754.4 | 5836.8 | .8531 | 1.1399 | .3184 | 3.054 | 2697.76 |
| .75 | 20000. | 0.0 | 8093.6 | 4926.9 | 4911.0 | .8595 | .9687 | .2726 | 3.054 | 2336.37 |
| .75 | 20000. | 0.0 | 6742.8 | 4100.9 | 4007.5 | .8587 | .8070 | .2269 | 3.054 | 2002.34 |
| .75 | 20000. | 0.0 | 5462.9 | 3285.9 | 3136.2 | .8492 | .6538 | .1818 | 3.054 | 1692.65 |
| .75 | 20000. | 0.0 | 4329.3 | 2532.5 | 2343.9 | .8259 | .5182 | .1401 | 3.054 | 1418.86 |
| .75 | 20000. | 0.0 | 3390.0 | 1874.8 | 1662.0 | .7808 | .4058 | .1037 | 3.054 | 1187.39 |
| .80 | 20000. | 0.0 | 15979.0 | 8593.8 | 9269.1 | .8099 | 1.9125 | .4755 | 3.258 | 4486.57 |
| .80 | 20000. | 0.0 | 14655.1 | 7975.0 | 8484.0 | .8195 | 1.7541 | .4413 | 3.258 | 4070.20 |
| .80 | 20000. | 0.0 | 12901.5 | 7129.6 | 7449.7 | .8322 | 1.5442 | .3945 | 3.258 | 3571.39 |
| .80 | 20000. | 0.0 | 11363.7 | 6362.1 | 6529.3 | .8431 | 1.3601 | .3520 | 3.258 | 3149.33 |
| .80 | 20000. | 0.0 | 9772.5 | 5518.9 | 5556.3 | .8505 | 1.1697 | .3054 | 3.258 | 2739.95 |
| .80 | 20000. | 0.0 | 8317.2 | 4706.3 | 4646.2 | .8522 | .9955 | .2604 | 3.258 | 2373.48 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 20000. | 0.0 | 6921.8 | 3901.5 | 3766.4 | .8489 | .8285 | .2159 | 3.258 | 2030.31 |
| .80 | 20000. | 0.0 | 5628.4 | 3121.7 | 2930.1 | .8353 | .6737 | .1727 | 3.258 | 1718.71 |
| .80 | 20000. | 0.0 | 4467.6 | 2384.2 | 2159.7 | .8037 | .5347 | .1319 | 3.258 | 1440.69 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| .80 | 20000. | 0.0 | 3516.0 | 0.0 | -245.5 | 0.0000 | .4208 | 0.0000 | 3.258 | 1208.13 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 25000. | 0.0 | 11749.0 | 7703.2 | 8320.1 | .7861 | 1.6713 | .5066 | 2.594 | 3425.73 |
| .65 | 25000. | 0.0 | 11170.6 | 7405.6 | 7948.6 | .7949 | 1.5890 | .4870 | 2.594 | 3211.32 |
| .65 | 25000. | 0.0 | 10456.7 | 7018.3 | 7473.7 | .8048 | 1.4875 | .4615 | 2.594 | 2970.97 |
| .65 | 25000. | 0.0 | 9258.5 | 6341.9 | 6666.6 | .8213 | 1.3170 | .4171 | 2.594 | 2629.93 |
| .65 | 25000. | 0.0 | 8051.9 | 5622.3 | 5831.3 | .8372 | 1.1454 | .3697 | 2.594 | 2310.26 |
| .65 | 25000. | 0.0 | 6852.8 | 4869.8 | 4981.3 | .8521 | .9748 | .3202 | 2.594 | 2003.20 |
| .65 | 25000. | 0.0 | 5723.5 | 4121.0 | 4155.0 | .8633 | .8142 | .2710 | 2.594 | 1720.52 |
| .65 | 25000. | 0.0 | 4664.2 | 3375.1 | 3348.8 | .8676 | .6635 | .2220 | 2.594 | 1461.04 |
| .65 | 25000. | 0.0 | 3697.4 | 2653.0 | 2580.8 | .8603 | .5260 | .1745 | 2.594 | 1225.32 |
| .65 | 25000. | 0.0 | 2853.9 | 1989.4 | 1886.8 | .8358 | .4060 | .1308 | 2.594 | 1017.89 |
| .75 | 25000. | 0.0 | 12773.1 | 7417.0 | 8035.2 | .8034 | 1.8170 | .4878 | 2.993 | 3653.83 |
| .75 | 25000. | 0.0 | 12107.0 | 7093.6 | 7622.9 | .8106 | 1.7222 | .4665 | 2.993 | 3412.04 |
| .75 | 25000. | 0.0 | 11129.3 | 6613.9 | 7021.0 | .8222 | 1.5832 | .4349 | 2.993 | 3103.89 |
| .75 | 25000. | 0.0 | 9728.6 | 5882.0 | 6141.8 | .8365 | 1.3839 | .3868 | 2.993 | 2717.23 |
| .75 | 25000. | 0.0 | 8493.6 | 5203.8 | 5346.1 | .8476 | 1.2082 | .3422 | 2.993 | 2390.50 |
| .75 | 25000. | 0.0 | 7207.6 | 4465.1 | 4506.4 | .8571 | 1.0253 | .2936 | 2.993 | 2063.96 |
| .75 | 25000. | 0.0 | 6045.6 | 3761.2 | 3727.1 | .8607 | .8600 | .2473 | 2.993 | 1775.00 |
| .75 | 25000. | 0.0 | 4934.7 | 3055.4 | 2963.6 | .8566 | .7020 | .2009 | 2.993 | 1505.63 |
| .75 | 25000. | 0.0 | 3920.4 | 2379.4 | 2247.8 | .8397 | .5577 | .1565 | 2.993 | 1261.74 |
| .75 | 25000. | 0.0 | 3050.9 | 1767.8 | 1608.4 | .8017 | .4340 | .1163 | 2.993 | 1050.71 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 25000. | 0.0 | 13343.0 | 7305.7 | 7932.9 | .8080 | 1.8981 | .4804 | 3.192 | 3782.21 |
| .80 | 25000. | 0.0 | 12612.8 | 6959.7 | 7483.2 | .8143 | 1.7942 | .4577 | 3.192 | 3519.65 |
| .80 | 25000. | 0.0 | 11422.5 | 6391.6 | 6771.2 | .8258 | 1.6249 | .4203 | 3.192 | 3159.78 |
| .80 | 25000. | 0.0 | 10009.2 | 5681.4 | 5911.5 | .8376 | 1.4238 | .3736 | 3.192 | 2770.02 |
| .80 | 25000. | 0.0 | 8709.3 | 4998.0 | 5108.1 | .8469 | 1.2389 | .3287 | 3.192 | 2428.91 |
| .80 | 25000. | 0.0 | 7420.2 | 4288.7 | 4296.5 | .8529 | 1.0555 | .2820 | 3.192 | 2101.54 |
| .80 | 25000. | 0.0 | 6212.0 | 3594.0 | 3525.9 | .8538 | .8837 | .2363 | 3.192 | 1801.97 |
| .80 | 25000. | 0.0 | 5082.2 | 2908.9 | 2783.2 | .8447 | .7229 | .1913 | 3.192 | 1529.27 |
| .80 | 25000. | 0.0 | 4053.8 | 2255.3 | 2088.6 | .8210 | .5767 | .1483 | 3.192 | 1282.99 |
| .80 | 25000. | 0.0 | 3167.5 | 1673.6 | 1482.9 | .7797 | .4506 | .1101 | 3.192 | 1069.93 |
| .85 | 25000. | 0.0 | 13951.0 | 7204.2 | 7842.1 | .8097 | 1.9846 | .4738 | 3.392 | 3918.83 |
| .85 | 25000. | 0.0 | 13100.2 | 6829.0 | 7348.2 | .8174 | 1.8635 | .4491 | 3.392 | 3624.00 |
| .85 | 25000. | 0.0 | 11698.0 | 6180.6 | 6527.2 | .8284 | 1.6641 | .4065 | 3.392 | 3210.33 |
| .85 | 25000. | 0.0 | 10304.2 | 5514.5 | 5713.9 | .8391 | 1.4658 | .3626 | 3.392 | 2824.68 |
| .85 | 25000. | 0.0 | 8942.0 | 4828.3 | 4901.6 | .8466 | 1.2720 | .3175 | 3.392 | 2468.61 |
| .85 | 25000. | 0.0 | 7627.7 | 4129.7 | 4101.8 | .8489 | 1.0851 | .2716 | 3.392 | 2136.21 |
| .85 | 25000. | 0.0 | 6401.5 | 3450.6 | 3345.6 | .8452 | .9106 | .2269 | 3.392 | 1833.27 |
| .85 | 25000. | 0.0 | 5238.5 | 2778.7 | 2618.1 | .8317 | .7452 | .1827 | 3.392 | 1553.91 |
| .85 | 25000. | 0.0 | 4184.2 | 2148.4 | 1950.5 | .8051 | .5952 | .1413 | 3.392 | 1303.43 |
| .85 | 25000. | 0.0 | 3284.6 | 1609.5 | 1389.8 | .7683 | .4672 | .1058 | 3.392 | 1088.70 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 30000. | 0.0 | 9635.5 | 6437.5 | 6978.3 | .7843 | 1.6409 | .5068 | 2.539 | 2839.60 |
| .65 | 30000. | 0.0 | 9185.2 | 6201.4 | 6682.4 | .7926 | 1.5642 | .4882 | 2.539 | 2667.79 |
| .65 | 30000. | 0.0 | 8700.6 | 5935.4 | 6354.7 | .8009 | 1.4817 | .4673 | 2.539 | 2493.26 |
| .65 | 30000. | 0.0 | 8044.4 | 5567.5 | 5909.9 | .8125 | 1.3699 | .4383 | 2.539 | 2284.03 |
| .65 | 30000. | 0.0 | 6998.1 | 4947.9 | 5181.3 | .8300 | 1.1917 | .3895 | 2.539 | 2005.32 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 30000. | 0.0 | 6038.5 | 4349.2 | 4498.2 | .8455 | 1.0283 | .3424 | 2.539 | 1755.67 |
| .65 | 30000. | 0.0 | 5046.1 | 3695.8 | 3765.9 | .8598 | .8593 | .2910 | 2.539 | 1505.82 |
| .65 | 30000. | 0.0 | 4142.1 | 3064.6 | 3074.5 | .8686 | .7054 | .2413 | 2.539 | 1282.67 |
| .65 | 30000. | 0.0 | 3301.6 | 2436.1 | 2400.1 | .8662 | .5622 | .1918 | 2.539 | 1077.80 |
| .65 | 30000. | 0.0 | 2546.6 | 1837.7 | 1769.1 | .8472 | .4337 | .1447 | 2.539 | 893.74 |
| .75 | 30000. | 0.0 | 10491.2 | 6207.8 | 6761.3 | .8015 | 1.7866 | .4887 | 2.930 | 3035.97 |
| .75 | 30000. | 0.0 | 9998.2 | 5967.6 | 6447.5 | .8085 | 1.7026 | .4698 | 2.930 | 2847.14 |
| .75 | 30000. | 0.0 | 9435.3 | 5691.0 | 6097.5 | .8170 | 1.6068 | .4480 | 2.930 | 2648.98 |
| .75 | 30000. | 0.0 | 8527.3 | 5217.1 | 5517.6 | .8287 | 1.4521 | .4107 | 2.930 | 2379.54 |
| .75 | 30000. | 0.0 | 7399.6 | 4602.1 | 4785.7 | .8425 | 1.2601 | .3623 | 2.930 | 2080.16 |
| .75 | 30000. | 0.0 | 6358.3 | 4007.4 | 4096.6 | .8537 | 1.0828 | .3155 | 2.930 | 1811.35 |
| .75 | 30000. | 0.0 | 5336.2 | 3394.1 | 3408.6 | .8616 | .9087 | .2672 | 2.930 | 1555.98 |
| .75 | 30000. | 0.0 | 4389.7 | 2792.3 | 2747.8 | .8616 | .7475 | .2198 | 2.930 | 1324.27 |
| .75 | 30000. | 0.0 | 3507.0 | 2200.2 | 2114.4 | .8498 | .5972 | .1732 | 2.930 | 1112.13 |
| .75 | 30000. | 0.0 | 2720.1 | 1650.4 | 1534.7 | .8219 | .4632 | .1299 | 2.930 | 923.17 |
| .80 | 30000. | 0.0 | 10970.6 | 6120.0 | 6684.7 | .8060 | 1.8682 | .4818 | 3.125 | 3145.91 |
| .80 | 30000. | 0.0 | 10448.2 | 5872.6 | 6359.5 | .8121 | 1.7792 | .4623 | 3.125 | 2946.65 |
| .80 | 30000. | 0.0 | 9812.5 | 5571.5 | 5971.0 | .8204 | 1.6710 | .4386 | 3.125 | 2728.09 |
| .80 | 30000. | 0.0 | 8730.8 | 5026.6 | 5301.7 | .8319 | 1.4868 | .3957 | 3.125 | 2417.58 |
| .80 | 30000. | 0.0 | 7622.9 | 4447.9 | 4609.3 | .8431 | 1.2981 | .3502 | 3.125 | 2122.59 |
| .80 | 30000. | 0.0 | 6531.8 | 3853.4 | 3917.6 | .8524 | 1.1123 | .3034 | 3.125 | 1842.21 |
| .80 | 30000. | 0.0 | 5494.5 | 3255.5 | 3242.1 | .8561 | .9357 | .2563 | 3.125 | 1582.77 |
| .80 | 30000. | 0.0 | 4522.6 | 2666.4 | 2595.0 | .8518 | .7702 | .2099 | 3.125 | 1346.40 |
| .80 | 30000. | 0.0 | 3628.9 | 2100.3 | 1986.6 | .8363 | .6180 | .1653 | 3.125 | 1132.33 |
| .80 | 30000. | 0.0 | 2813.6 | 1558.3 | 1419.9 | .8002 | .4791 | .1227 | 3.125 | 938.86 |
| .85 | 30000. | 0.0 | 11487.7 | 6054.7 | 6635.2 | .8091 | 1.9563 | .4767 | 3.321 | 3264.72 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .85 | 30000. | 0.0 | 10926.6 | 5804.3 | 6299.9 | .8155 | 1.8607 | .4569 | 3.321 | 3053.38 |
| .85 | 30000. | 0.0 | 10176.3 | 5454.1 | 5844.7 | .8228 | 1.7330 | .4294 | 3.321 | 2803.33 |
| .85 | 30000. | 0.0 | 8952.8 | 4868.5 | 5116.7 | .8348 | 1.5246 | .3833 | 3.321 | 2458.39 |
| .85 | 30000. | 0.0 | 7856.1 | 4324.9 | 4460.6 | .8451 | 1.3378 | .3405 | 3.321 | 2165.64 |
| .85 | 30000. | 0.0 | 6721.9 | 3724.0 | 3758.9 | .8505 | 1.1447 | .2932 | 3.321 | 1875.62 |
| .85 | 30000. | 0.0 | 5673.1 | 3140.8 | 3096.8 | .8499 | .9661 | .2473 | 3.321 | 1613.03 |
| .85 | 30000. | 0.0 | 4663.4 | 2560.5 | 2459.8 | .8429 | .7942 | .2016 | 3.321 | 1369.15 |
| .85 | 30000. | 0.0 | 3742.1 | 2004.5 | 1865.1 | .8224 | .6372 | .1578 | 3.321 | 1150.27 |
| .85 | 30000. | 0.0 | 2919.0 | 1494.5 | 1330.9 | .7860 | .4971 | .1177 | 3.321 | 956.17 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 36089. | 0.0 | 7424.9 | 5086.3 | 5534.4 | .7828 | 1.5910 | .5039 | 2.472 | 2221.79 |
| .65 | 36089. | 0.0 | 7094.5 | 4906.4 | 5309.7 | .7903 | 1.5202 | .4860 | 2.472 | 2092.69 |
| .65 | 36089. | 0.0 | 6747.6 | 4715.7 | 5072.4 | .7986 | 1.4459 | .4671 | 2.472 | 1963.42 |
| .65 | 36089. | 0.0 | 6359.0 | 4492.8 | 4803.2 | .8073 | 1.3626 | .4451 | 2.472 | 1827.90 |
| .65 | 36089. | 0.0 | 5825.3 | 4177.5 | 4426.6 | .8195 | 1.2483 | .4138 | 2.472 | 1670.05 |
| .65 | 36089. | 0.0 | 5021.2 | 3676.8 | 3840.9 | .8367 | 1.0760 | .3642 | 2.472 | 1458.19 |
| .65 | 36089. | 0.0 | 4260.8 | 3177.4 | 3275.4 | .8521 | .9130 | .3148 | 2.472 | 1263.61 |
| .65 | 36089. | 0.0 | 3495.2 | 2644.5 | 2684.2 | .8646 | .7490 | .2620 | 2.472 | 1074.17 |
| .65 | 36089. | 0.0 | 2791.1 | 2120.1 | 2118.5 | .8680 | .5981 | .2100 | 2.472 | 905.67 |
| .75 | 36089. | 0.0 | 8098.7 | 4914.5 | 5381.0 | .8001 | 1.7354 | .4868 | 2.852 | 2380.29 |
| .75 | 36089. | 0.0 | 7740.3 | 4739.0 | 5151.1 | .8072 | 1.6586 | .4694 | 2.852 | 2239.22 |
| .75 | 36089. | 0.0 | 7359.6 | 4544.3 | 4902.5 | .8141 | 1.5770 | .4502 | 2.852 | 2097.00 |
| .75 | 36089. | 0.0 | 6901.4 | 4304.6 | 4605.9 | .8224 | 1.4789 | .4264 | 2.852 | 1942.08 |
| .75 | 36089. | 0.0 | 6170.0 | 3905.6 | 4123.7 | .8346 | 1.3221 | .3869 | 2.852 | 1738.05 |
| .75 | 36089. | 0.0 | 5327.0 | 3425.8 | 3556.4 | .8479 | 1.1415 | .3394 | 2.852 | 1516.80 |
| .75 | 36089. | 0.0 | 4495.7 | 2928.5 | 2984.8 | .8589 | .9634 | .2901 | 2.852 | 1305.19 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .75 | 36089. | 0.0 | 3711.2 | 2431.1 | 2432.0 | .8637 | .7952 | .2408 | 2.852 | 1112.44 |
| .75 | 36089. | 0.0 | 2982.2 | 1943.2 | 1902.7 | .8591 | .6390 | .1925 | 2.852 | 936.52 |
| .80 | 36089. | 0.0 | 8478.5 | 4849.5 | 5329.4 | .8044 | 1.8168 | .4804 | 3.042 | 2469.93 |
| .80 | 36089. | 0.0 | 8098.7 | 4669.8 | 5092.6 | .8109 | 1.7354 | .4626 | 3.042 | 2320.91 |
| .80 | 36089. | 0.0 | 7698.8 | 4477.4 | 4840.6 | .8179 | 1.6497 | .4435 | 3.042 | 2171.96 |
| .80 | 36089. | 0.0 | 7182.3 | 4213.4 | 4508.8 | .8250 | 1.5390 | .4174 | 3.042 | 2000.20 |
| .80 | 36089. | 0.0 | 6322.0 | 3764.4 | 3963.0 | .8374 | 1.3547 | .3729 | 3.042 | 1766.42 |
| .80 | 36089. | 0.0 | 5492.5 | 3314.0 | 3427.9 | .8486 | 1.1770 | .3283 | 3.042 | 1548.31 |
| .80 | 36089. | 0.0 | 4624.3 | 2817.2 | 2853.9 | .8568 | .9909 | .2791 | 3.042 | 1328.26 |
| .80 | 36089. | 0.0 | 3828.4 | 2330.8 | 2311.9 | .8563 | .8204 | .2309 | 3.042 | 1132.68 |
| .80 | 36089. | 0.0 | 3068.0 | 1847.1 | 1787.5 | .8467 | .6574 | .1830 | 3.042 | 952.40 |
| .80 | 36089. | 0.0 | 2393.8 | 1398.0 | 1308.8 | .8214 | .5129 | .1385 | 3.042 | 790.43 |
| .85 | 36089. | 0.0 | 8884.2 | 4812.9 | 5312.3 | .8095 | 1.9037 | .4768 | 3.232 | 2567.09 |
| .85 | 36089. | 0.0 | 8492.4 | 4629.0 | 5063.2 | .8145 | 1.8198 | .4586 | 3.232 | 2411.29 |
| .85 | 36089. | 0.0 | 8061.1 | 4425.3 | 4795.1 | .8203 | 1.7273 | .4384 | 3.232 | 2252.00 |
| .85 | 36089. | 0.0 | 7456.7 | 4134.6 | 4423.8 | .8286 | 1.5978 | .4096 | 3.232 | 2057.13 |
| .85 | 36089. | 0.0 | 6513.3 | 3664.4 | 3847.5 | .8407 | 1.3957 | .3630 | 3.232 | 1804.07 |
| .85 | 36089. | 0.0 | 5655.8 | 3211.7 | 3307.1 | .8486 | 1.2119 | .3182 | 3.232 | 1578.19 |
| .85 | 36089. | 0.0 | 4767.0 | 2720.0 | 2736.5 | .8526 | 1.0215 | .2694 | 3.232 | 1353.62 |
| .85 | 36089. | 0.0 | 3952.1 | 2250.0 | 2210.0 | .8507 | .8469 | .2229 | 3.232 | 1153.84 |
| .85 | 36089. | 0.0 | 3186.0 | 1787.7 | 1706.8 | .8385 | .6827 | .1771 | 3.232 | 970.68 |
| .85 | 36089. | 0.0 | 2483.5 | 1338.1 | 1229.4 | .8051 | .5322 | .1326 | 3.232 | 805.45 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 40000. | 0.0 | 6892.0 | 3957.0 | 4339.6 | .8072 | 1.7800 | .4725 | 3.041 | 2022.70 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 40000. | 0.0 | 6571.6 | 3805.4 | 4141.5 | .8142 | 1.6973 | .4544 | 3.041 | 1899.30 |
| .80 | 40000. | 0.0 | 6224.1 | 3632.2 | 3918.5 | .8205 | 1.6075 | .4337 | 3.041 | 1772.55 |
| .80 | 40000. | 0.0 | 5717.8 | 3373.2 | 3597.1 | .8295 | 1.4767 | .4028 | 3.041 | 1613.48 |
| .80 | 40000. | 0.0 | 4954.6 | 2967.5 | 3107.5 | .8421 | 1.2796 | .3543 | 3.041 | 1408.88 |
| .80 | 40000. | 0.0 | 4264.1 | 2583.3 | 2654.9 | .8518 | 1.1013 | .3084 | 3.041 | 1227.98 |
| .80 | 40000. | 0.0 | 3553.2 | 2166.5 | 2179.6 | .8573 | .9177 | .2587 | 3.041 | 1049.07 |
| .80 | 40000. | 0.0 | 2896.4 | 1760.2 | 1732.0 | .8545 | .7481 | .2102 | 3.041 | 888.57 |
| .80 | 40000. | 0.0 | 2284.3 | 1361.4 | 1303.0 | .8379 | .5900 | .1625 | 3.041 | 741.67 |
| .80 | 40000. | 0.0 | 1734.5 | 984.8 | 906.4 | .7983 | .4480 | .1176 | 3.041 | 610.47 |
| .85 | 40000. | 0.0 | 7225.8 | 3926.4 | 4324.7 | .8117 | 1.8662 | .4688 | 3.231 | 2102.62 |
| .85 | 40000. | 0.0 | 6896.3 | 3770.8 | 4115.3 | .8168 | 1.7811 | .4502 | 3.231 | 1972.97 |
| .85 | 40000. | 0.0 | 6515.1 | 3590.8 | 3880.4 | .8233 | 1.6827 | .4287 | 3.231 | 1836.16 |
| .85 | 40000. | 0.0 | 5909.8 | 3293.2 | 3505.3 | .8325 | 1.5263 | .3932 | 3.231 | 1651.40 |
| .85 | 40000. | 0.0 | 5120.7 | 2892.4 | 3020.3 | .8438 | 1.3225 | .3453 | 3.231 | 1441.40 |
| .85 | 40000. | 0.0 | 4396.5 | 2507.5 | 2562.5 | .8520 | 1.1355 | .2994 | 3.231 | 1252.10 |
| .85 | 40000. | 0.0 | 3670.4 | 2095.8 | 2092.7 | .8530 | .9480 | .2502 | 3.231 | 1069.91 |
| .85 | 40000. | 0.0 | 2996.8 | 1697.3 | 1652.5 | .8461 | .7740 | .2027 | 3.231 | 905.97 |
| .85 | 40000. | 0.0 | 2369.8 | 1310.2 | 1235.7 | .8260 | .6120 | .1564 | 3.231 | 756.24 |
| .85 | 40000. | 0.0 | 1806.0 | 946.3 | 853.2 | .7827 | .4664 | .1130 | 3.231 | 622.78 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 45000. | 0.0 | 5243.3 | 3028.8 | 3312.2 | .8122 | 1.7204 | .4594 | 3.041 | 1559.48 |
| .80 | 45000. | 0.0 | 4989.4 | 2905.2 | 3150.9 | .8187 | 1.6371 | .4407 | 3.041 | 1461.79 |
| .80 | 45000. | 0.0 | 4662.8 | 2738.2 | 2939.4 | .8256 | 1.5299 | .4153 | 3.041 | 1350.50 |
| .80 | 45000. | 0.0 | 4094.4 | 2440.6 | 2577.8 | .8381 | 1.3434 | .3702 | 3.041 | 1187.65 |
| .80 | 45000. | 0.0 | 3548.2 | 2142.9 | 2223.5 | .8491 | 1.1642 | .3250 | 3.041 | 1040.33 |
| .80 | 45000. | 0.0 | 2959.4 | 1804.4 | 1834.1 | .8573 | .9710 | .2737 | 3.041 | 889.98 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 45000. | 0.0 | 2427.3 | 1477.7 | 1469.7 | .8559 | .7964 | .2241 | 3.041 | 756.66 |
| .80 | 45000. | 0.0 | 1916.4 | 1149.4 | 1113.6 | .6432 | .6288 | .1743 | 3.041 | 632.27 |
| .80 | 45000. | 0.0 | 1449.6 | 834.0 | 779.4 | .8089 | .4756 | .1265 | 3.041 | 519.81 |
| .80 | 45000. | 0.0 | 1058.8 | 561.3 | 495.7 | .7454 | .3474 | .0851 | 3.041 | 424.13 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| .80 | 45000. | 0.0 | 746.2 | 0.0 | -71.1 | 0.0000 | .2449 | 0.0000 | 3.041 | 344.96 |
| .85 | 45000. | 0.0 | 5506.7 | 3005.1 | 3299.2 | .8152 | 1.8068 | .4558 | 3.231 | 1621.57 |
| .85 | 45000. | 0.0 | 5232.7 | 2875.7 | 3128.3 | .8210 | 1.7169 | .4362 | 3.231 | 1517.44 |
| .85 | 45000. | 0.0 | 4856.7 | 2694.4 | 2894.0 | .8288 | 1.5935 | .4087 | 3.231 | 1392.12 |
| .85 | 45000. | 0.0 | 4238.2 | 2386.0 | 2514.5 | .8410 | 1.3906 | .3619 | 3.231 | 1216.15 |
| .85 | 45000. | 0.0 | 3668.6 | 2084.8 | 2155.3 | .8489 | 1.2037 | .3162 | 3.231 | 1063.57 |
| .85 | 45000. | 0.0 | 3067.8 | 1751.2 | 1769.6 | .8527 | 1.0066 | .2656 | 3.231 | 910.54 |
| .85 | 45000. | 0.0 | 2519.1 | 1432.8 | 1412.0 | .8496 | .8266 | .2173 | 3.231 | 773.06 |
| .85 | 45000. | 0.0 | 1993.8 | 1114.3 | 1066.7 | .8349 | .6542 | .1690 | 3.231 | 646.06 |
| .85 | 45000. | 0.0 | 1518.5 | 807.5 | 741.0 | .7943 | .4983 | .1225 | 3.231 | 532.19 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| .85 | 45000. | 0.0 | 1119.0 | 0.0 | -76.5 | 0.0000 | .3672 | 0.0000 | 3.231 | 435.31 |
| ERROR, CP OUT OF RANGE OF TABLE | | | | | | | | | | |
| .85 | 45000. | 0.0 | 798.4 | 0.0 | -81.3 | 0.0000 | .2620 | 0.0000 | 3.231 | 354.93 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 30000. | 18.0 | 9892.6 | 6415.8 | 6981.0 | .7778 | 1.7583 | .5272 | 2.594 | 2970.49 |
| .65 | 30000. | 18.0 | 9455.4 | 6191.0 | 6699.8 | .7853 | 1.6806 | .5087 | 2.594 | 2798.67 |
| .65 | 30000. | 18.0 | 9002.9 | 5958.2 | 6405.3 | .7937 | 1.6001 | .4896 | 2.594 | 2625.57 |
| .65 | 30000. | 18.0 | 8467.4 | 5670.1 | 6051.8 | .8031 | 1.5050 | .4659 | 2.594 | 2439.57 |
| .65 | 30000. | 18.0 | 7567.7 | 5166.7 | 5449.0 | .8188 | 1.3450 | .4245 | 2.594 | 2175.51 |
| .65 | 30000. | 18.0 | 6571.6 | 4576.9 | 4760.0 | .8353 | 1.1680 | .3761 | 2.594 | 1906.63 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .65 | 30000. | 18.0 | 5596.2 | 3968.8 | 4072.1 | .8506 | .9946 | .3261 | 2.594 | 1655.42 |
| .65 | 30000. | 18.0 | 4673.5 | 3361.2 | 3398.1 | .8626 | .8306 | .2762 | 2.594 | 1422.05 |
| .65 | 30000. | 18.0 | 3811.5 | 2758.5 | 2744.8 | .8680 | .6774 | .2267 | 2.594 | 1208.50 |
| .65 | 30000. | 18.0 | 3015.2 | 2166.6 | 2115.1 | .8618 | .5359 | .1780 | 2.594 | 1014.02 |
| .75 | 30000. | 18.0 | 10771.9 | 6186.4 | 6768.3 | .7947 | 1.9146 | .5083 | 2.993 | 3177.09 |
| .75 | 30000. | 18.0 | 10292.9 | 5968.7 | 6483.7 | .8025 | 1.8294 | .4904 | 2.993 | 2988.61 |
| .75 | 30000. | 18.0 | 9779.7 | 5719.9 | 6162.6 | .8094 | 1.7382 | .4700 | 2.993 | 2796.34 |
| .75 | 30000. | 18.0 | 9065.3 | 5372.9 | 5726.0 | .8202 | 1.6112 | .4415 | 2.993 | 2563.58 |
| .75 | 30000. | 18.0 | 7949.9 | 4792.3 | 5022.6 | .8342 | 1.4130 | .3938 | 2.993 | 2246.35 |
| .75 | 30000. | 18.0 | 6938.7 | 4241.4 | 4375.9 | .8459 | 1.2333 | .3485 | 2.993 | 1974.87 |
| .75 | 30000. | 18.0 | 5893.2 | 3645.4 | 3695.0 | .8560 | 1.0474 | .2995 | 2.993 | 1707.80 |
| .75 | 30000. | 18.0 | 4949.6 | 3078.9 | 3063.7 | .8608 | .8797 | .2530 | 2.993 | 1470.11 |
| .75 | 30000. | 18.0 | 4038.4 | 2503.8 | 2440.5 | .8580 | .7178 | .2057 | 2.993 | 1247.07 |
| .75 | 30000. | 18.0 | 3210.3 | 1952.1 | 1853.0 | .8415 | .5706 | .1604 | 2.993 | 1046.70 |
| .80 | 30000. | 18.0 | 11266.1 | 6099.7 | 6696.0 | .7992 | 2.0024 | .5012 | 3.193 | 3293.62 |
| .80 | 30000. | 18.0 | 10767.3 | 5884.1 | 6405.6 | .8067 | 1.9137 | .4835 | 3.193 | 3096.24 |
| .80 | 30000. | 18.0 | 10205.1 | 5621.4 | 6064.1 | .8131 | 1.8138 | .4619 | 3.193 | 2889.26 |
| .80 | 30000. | 18.0 | 9339.7 | 5211.0 | 5544.8 | .8236 | 1.6600 | .4282 | 3.193 | 2618.59 |
| .80 | 30000. | 18.0 | 8174.9 | 4628.5 | 4836.6 | .8357 | 1.4530 | .3803 | 3.193 | 2288.75 |
| .80 | 30000. | 18.0 | 7136.1 | 4087.0 | 4193.7 | .8454 | 1.2683 | .3358 | 3.193 | 2010.76 |
| .80 | 30000. | 18.0 | 6078.9 | 3511.6 | 3532.2 | .8527 | 1.0804 | .2885 | 3.193 | 1740.75 |
| .80 | 30000. | 18.0 | 5105.1 | 2955.2 | 2912.2 | .8545 | .9074 | .2428 | 3.193 | 1496.86 |
| .80 | 30000. | 18.0 | 4170.7 | 2390.1 | 2299.0 | .8459 | .7413 | .1964 | 3.193 | 1269.07 |
| .80 | 30000. | 18.0 | 3322.1 | 1855.2 | 1730.2 | .8243 | .5905 | .1524 | 3.193 | 1065.06 |
| .85 | 30000. | 18.0 | 11794.8 | 6034.4 | 6650.3 | .8024 | 2.0964 | .4958 | 3.393 | 3419.26 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .85 | 30000. | 18.0 | 11268.0 | 5808.5 | 6341.9 | .8085 | 2.0027 | .4773 | 3.393 | 3210.53 |
| .85 | 30000. | 18.0 | 10637.9 | 5535.1 | 5978.1 | .8161 | 1.8907 | .4548 | 3.393 | 2983.47 |
| .85 | 30000. | 18.0 | 9589.3 | 5050.3 | 5360.8 | .8260 | 1.7044 | .4150 | 3.393 | 2666.98 |
| .85 | 30000. | 18.0 | 8423.0 | 4497.0 | 4682.4 | .8373 | 1.4971 | .3695 | 3.393 | 2334.92 |
| .85 | 30000. | 18.0 | 7333.3 | 3956.9 | 4036.2 | .8462 | 1.3034 | .3251 | 3.393 | 2045.85 |
| .85 | 30000. | 18.0 | 6253.4 | 3384.6 | 3378.6 | .8489 | 1.1114 | .2781 | 3.393 | 1770.70 |
| .85 | 30000. | 18.0 | 5260.3 | 2836.6 | 2765.0 | .8457 | .9349 | .2331 | 3.393 | 1522.87 |
| .85 | 30000. | 18.0 | 4305.0 | 2290.3 | 2172.0 | .8344 | .7652 | .1882 | 3.393 | 1291.13 |
| .85 | 30000. | 18.0 | 3438.2 | 1772.3 | 1621.7 | .8084 | .6111 | .1456 | 3.393 | 1083.89 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 20000. | 18.0 | 16543.8 | 8635.1 | 9371.3 | .8017 | 2.0598 | .4970 | 3.323 | 4734.38 |
| .80 | 20000. | 18.0 | 15517.1 | 8193.8 | 8795.4 | .8111 | 1.9320 | .4716 | 3.323 | 4379.02 |
| .80 | 20000. | 18.0 | 13866.1 | 7431.8 | 7842.0 | .8232 | 1.7264 | .4278 | 3.323 | 3890.70 |
| .80 | 20000. | 18.0 | 12287.1 | 6676.1 | 6921.1 | .8346 | 1.5298 | .3843 | 3.323 | 3436.69 |
| .80 | 20000. | 18.0 | 10725.6 | 5902.0 | 6008.7 | .8452 | 1.3354 | .3397 | 3.323 | 3005.60 |
| .80 | 20000. | 18.0 | 9221.4 | 5105.1 | 5098.2 | .8503 | 1.1481 | .2938 | 3.323 | 2618.24 |
| .80 | 20000. | 18.0 | 7824.6 | 4329.7 | 4235.5 | .8499 | .9742 | .2492 | 3.323 | 2266.15 |
| .80 | 20000. | 18.0 | 6505.3 | 3575.9 | 3413.3 | .8443 | .8099 | .2058 | 3.323 | 1939.28 |
| .80 | 20000. | 18.0 | 5279.5 | 2839.5 | 2632.7 | .8261 | .6573 | .1634 | 3.323 | 1642.71 |
| .80 | 20000. | 18.0 | 4195.0 | 2168.0 | 1933.3 | .7938 | .5223 | .1248 | 3.323 | 1380.34 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 25000. | 18.0 | 13744.6 | 7300.9 | 7973.1 | .8001 | 2.0371 | .5002 | 3.258 | 3973.32 |
| .80 | 25000. | 18.0 | 13078.4 | 7013.9 | 7587.4 | .8078 | 1.9384 | .4806 | 3.258 | 3718.74 |
| .80 | 25000. | 18.0 | 12156.5 | 6590.3 | 7046.4 | .8166 | 1.8017 | .4516 | 3.258 | 3414.05 |
| .80 | 25000. | 18.0 | 10729.5 | 5910.4 | 6206.4 | .8298 | 1.5902 | .4050 | 3.258 | 3004.65 |
| .80 | 25000. | 18.0 | 9459.7 | 5281.2 | 5449.6 | .8410 | 1.4020 | .3619 | 3.258 | 2643.34 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 25000. | 18.0 | 8147.2 | 4591.0 | 4648.4 | .8488 | 1.2075 | .3146 | 3.258 | 2302.13 |
| .80 | 25000. | 18.0 | 6947.7 | 3930.3 | 3900.4 | .8521 | 1.0297 | .2693 | 3.258 | 1997.30 |
| .80 | 25000. | 18.0 | 5799.8 | 3274.3 | 3179.8 | .8504 | .8596 | .2243 | 3.258 | 1712.34 |
| .80 | 25000. | 18.0 | 4724.4 | 2628.2 | 2485.1 | .8380 | .7002 | .1801 | 3.258 | 1450.98 |
| .80 | 25000. | 18.0 | 3757.1 | 2019.9 | 1845.7 | .8098 | .5569 | .1384 | 3.258 | 1218.19 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 30000. | 18.0 | 11266.1 | 6099.7 | 6696.1 | .7992 | 2.0024 | .5012 | 3.193 | 3293.63 |
| .80 | 30000. | 18.0 | 10767.1 | 5884.1 | 6405.7 | .8067 | 1.9137 | .4835 | 3.193 | 3096.25 |
| .80 | 30000. | 18.0 | 10205.1 | 5621.4 | 6064.1 | .8131 | 1.8138 | .4619 | 3.193 | 2889.26 |
| .80 | 30000. | 18.0 | 9339.7 | 5211.0 | 5544.8 | .8236 | 1.6600 | .4282 | 3.193 | 2618.59 |
| .80 | 30000. | 18.0 | 8174.9 | 4628.5 | 4836.6 | .8357 | 1.4530 | .3803 | 3.193 | 2288.75 |
| .80 | 30000. | 18.0 | 7136.1 | 4087.0 | 4193.7 | .8454 | 1.2683 | .3358 | 3.193 | 2010.76 |
| .80 | 30000. | 18.0 | 6078.9 | 3511.6 | 3532.2 | .8527 | 1.0804 | .2885 | 3.193 | 1740.75 |
| .80 | 30000. | 18.0 | 5105.1 | 2955.2 | 2912.2 | .8545 | .9074 | .2428 | 3.193 | 1496.86 |
| .80 | 30000. | 18.0 | 4170.7 | 2390.1 | 2299.0 | .8459 | .7413 | .1964 | 3.193 | 1269.07 |
| .80 | 30000. | 18.0 | 3322.1 | 1855.2 | 1730.2 | .8243 | .5905 | .1524 | 3.193 | 1065.06 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 36089. | 18.0 | 8675.4 | 4819.5 | 5319.8 | .7991 | 1.9447 | .4995 | 3.112 | 2576.19 |
| .80 | 36089. | 18.0 | 8309.6 | 4653.5 | 5097.5 | .8055 | 1.8627 | .4822 | 3.112 | 2427.48 |
| .80 | 36089. | 18.0 | 7923.5 | 4470.6 | 4858.3 | .8116 | 1.7762 | .4633 | 3.112 | 2278.41 |
| .80 | 36089. | 18.0 | 7487.7 | 4264.2 | 4589.3 | .8192 | 1.6785 | .4419 | 3.112 | 2121.21 |
| .80 | 36089. | 18.0 | 6776.3 | 3906.5 | 4145.1 | .8293 | 1.5190 | .4048 | 3.112 | 1905.54 |
| .80 | 36089. | 18.0 | 5887.8 | 3444.7 | 3589.3 | .8416 | 1.3199 | .3570 | 3.112 | 1664.42 |
| .80 | 36089. | 18.0 | 5060.0 | 2996.1 | 3063.8 | .8517 | 1.1343 | .3105 | 3.112 | 1448.99 |
| .80 | 36089. | 18.0 | 4242.5 | 2525.5 | 2531.2 | .8563 | .9510 | .2617 | 3.112 | 1243.28 |
| .80 | 36089. | 18.0 | 3489.4 | 2069.1 | 2027.2 | .8530 | .7822 | .2144 | 3.112 | 1057.60 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 36089. | 18.0 | 2776.5 | 1617.6 | 1542.6 | .8380 | .6224 | .1676 | 3.112 | 886.28 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .80 | 40000. | 18.0 | 7044.9 | 3932.4 | 4332.2 | .8027 | 1.9035 | .4912 | 3.111 | 2108.73 |
| .80 | 40000. | 18.0 | 6734.8 | 3786.1 | 4140.0 | .8084 | 1.8197 | .4729 | 3.111 | 1984.70 |
| .80 | 40000. | 18.0 | 6412.0 | 3633.2 | 3937.6 | .8149 | 1.7325 | .4538 | 3.111 | 1859.98 |
| .80 | 40000. | 18.0 | 5984.6 | 3425.8 | 3673.4 | .8232 | 1.6170 | .4279 | 3.111 | 1715.40 |
| .80 | 40000. | 18.0 | 5269.9 | 3062.6 | 3228.3 | .8357 | 1.4239 | .3825 | 3.111 | 1509.52 |
| .80 | 40000. | 18.0 | 4591.3 | 2701.6 | 2797.8 | .8462 | 1.2405 | .3375 | 3.111 | 1323.46 |
| .80 | 40000. | 18.0 | 3873.1 | 2300.4 | 2335.0 | .8541 | 1.0465 | .2873 | 3.111 | 1139.39 |
| .80 | 40000. | 18.0 | 3219.3 | 1915.6 | 1904.6 | .8557 | .8698 | .2393 | 3.111 | 975.01 |
| .80 | 40000. | 18.0 | 2591.7 | 1527.8 | 1482.7 | .8478 | .7003 | .1908 | 3.111 | 821.28 |
| .80 | 40000. | 18.0 | 2022.7 | 1158.3 | 1088.6 | .8235 | .5465 | .1447 | 3.111 | 683.98 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .10 | 0. | 18.0 | 20407.2 | 23791.7 | 25480.7 | .2404 | 1.3474 | .7262 | .446 | 6298.79 |
| .10 | 0. | 18.0 | 17880.2 | 22750.0 | 24157.6 | .2623 | 1.1806 | .6944 | .446 | 5573.26 |
| .10 | 0. | 18.0 | 15666.6 | 21798.3 | 22984.5 | .2869 | 1.0344 | .6654 | .446 | 4938.87 |
| .10 | 0. | 18.0 | 13400.5 | 20513.9 | 21484.1 | .3156 | .8848 | .6262 | .446 | 4300.59 |
| .10 | 0. | 18.0 | 11343.4 | 19223.4 | 20007.0 | .3494 | .7490 | .5868 | .446 | 3744.83 |
| .10 | 0. | 18.0 | 9439.7 | 17679.6 | 18305.2 | .3861 | .6233 | .5397 | .446 | 3237.68 |
| .10 | 0. | 18.0 | 7650.0 | 15763.4 | 16245.1 | .4248 | .5051 | .4812 | .446 | 2763.76 |
| .10 | 0. | 18.0 | 6026.8 | 13568.4 | 13930.1 | .4642 | .3979 | .4142 | .446 | 2334.36 |
| .10 | 0. | 18.0 | 4668.9 | 11354.5 | 11619.7 | .5014 | .3083 | .3466 | .446 | 1965.21 |
| .10 | 0. | 18.0 | 3558.3 | 9256.4 | 9452.8 | .5363 | .2350 | .2825 | .446 | 1650.88 |
| .20 | 0. | 18.0 | 20690.8 | 21579.7 | 23058.0 | .4301 | 1.3662 | .6587 | .892 | 6355.30 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .20 | 0. | 18.0 | 18159.4 | 20709.4 | 21912.2 | .4702 | 1.1990 | .6321 | .892 | 5625.85 |
| .20 | 0. | 18.0 | 15871.1 | 19560.2 | 20555.6 | .5082 | 1.0479 | .5971 | .892 | 4977.08 |
| .20 | 0. | 18.0 | 13573.5 | 18100.8 | 18891.7 | .5499 | .8962 | .5525 | .892 | 4330.91 |
| .20 | 0. | 18.0 | 11483.0 | 16444.0 | 17065.3 | .5905 | .7582 | .5019 | .892 | 3769.10 |
| .20 | 0. | 18.0 | 9547.5 | 14625.0 | 15099.3 | .6316 | .6304 | .4464 | .892 | 3254.67 |
| .20 | 0. | 18.0 | 7775.6 | 12668.8 | 13007.3 | .6718 | .5134 | .3867 | .892 | 2785.14 |
| .20 | 0. | 18.0 | 6120.8 | 10524.1 | 10762.1 | .7090 | .4041 | .3212 | .892 | 2350.90 |
| .20 | 0. | 18.0 | 4751.5 | 8514.0 | 8672.5 | .7389 | .3137 | .2599 | .892 | 1980.43 |
| .20 | 0. | 18.0 | 3635.0 | 6734.0 | 6831.1 | .7639 | .2400 | .2056 | .892 | 1665.33 |
| .30 | 0. | 18.0 | 21128.2 | 19778.7 | 21061.2 | .5790 | 1.3951 | .6037 | 1.338 | 6441.76 |
| .30 | 0. | 18.0 | 18533.9 | 18530.1 | 19547.8 | .6184 | 1.2238 | .5656 | 1.338 | 5697.84 |
| .30 | 0. | 18.0 | 16192.9 | 17135.4 | 17946.0 | .6545 | 1.0692 | .5230 | 1.338 | 5032.64 |
| .30 | 0. | 18.0 | 13878.7 | 15560.4 | 16176.0 | .6935 | .9164 | .4750 | 1.338 | 4384.50 |
| .30 | 0. | 18.0 | 11736.3 | 13854.6 | 14314.4 | .7302 | .7749 | .4229 | 1.338 | 3813.49 |
| .30 | 0. | 18.0 | 9762.3 | 11969.4 | 12292.1 | .7584 | .6446 | .3654 | 1.338 | 3291.40 |
| .30 | 0. | 18.0 | 7944.9 | 10100.5 | 10307.1 | .7863 | .5246 | .3083 | 1.338 | 2814.14 |
| .30 | 0. | 18.0 | 6278.0 | 8217.6 | 8333.5 | .8096 | .4145 | .2508 | 1.338 | 2378.18 |
| .30 | 0. | 18.0 | 4892.1 | 6503.3 | 6554.1 | .8222 | .3230 | .1985 | 1.338 | 2005.53 |
| .30 | 0. | 18.0 | 3762.2 | 5038.8 | 5037.3 | .8284 | .2484 | .1538 | 1.338 | 1688.51 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .10 | 5000. | 18.0 | 17925.7 | 20667.1 | 22189.9 | .2337 | 1.3752 | .7330 | .439 | 5522.66 |
| .10 | 5000. | 18.0 | 16312.8 | 20001.9 | 21345.3 | .2486 | 1.2515 | .7094 | .439 | 5023.52 |
| .10 | 5000. | 18.0 | 14186.9 | 19112.2 | 20228.8 | .2731 | 1.0884 | .6778 | .439 | 4423.29 |
| .10 | 5000. | 18.0 | 12318.0 | 18153.0 | 19084.3 | .2987 | .9450 | .6438 | .439 | 3888.85 |
| .10 | 5000. | 18.0 | 10426.9 | 17010.0 | 17765.6 | .3307 | .7999 | .6033 | .439 | 3381.10 |
| .10 | 5000. | 18.0 | 8734.8 | 15769.4 | 16375.3 | .3660 | .6701 | .5593 | .439 | 2929.60 |

| XM | ALT | DELT | SHP | T | T+FRES | ETAP | CP | CT | J | WFT |
|---|---|---|---|---|---|---|---|---|---|---|
| .10 | 5000. | 18.0 | 7153.6 | 14260.7 | 14730.6 | .4041 | .5488 | .5058 | .439 | 2512.42 |
| .10 | 5000. | 18.0 | 5667.6 | 12413.6 | 12770.8 | .4440 | .4348 | .4403 | .439 | 2124.88 |
| .10 | 5000. | 18.0 | 4376.0 | 10435.5 | 10697.6 | .4834 | .3357 | .3701 | .439 | 1780.89 |
| .10 | 5000. | 18.0 | 3335.1 | 8559.2 | 8755.5 | .5202 | .2559 | .3036 | .439 | 1492.22 |
| .20 | 5000. | 18.0 | 18265.7 | 18753.3 | 20111.4 | .4163 | 1.4013 | .6651 | .877 | 5595.57 |
| .20 | 5000. | 18.0 | 16503.6 | 18215.2 | 19386.4 | .4475 | 1.2661 | .6460 | .877 | 5060.43 |
| .20 | 5000. | 18.0 | 14383.0 | 17284.2 | 18237.3 | .4872 | 1.1034 | .6130 | .877 | 4460.18 |
| .20 | 5000. | 18.0 | 12477.7 | 16186.2 | 16960.3 | .5259 | .9572 | .5741 | .877 | 3917.22 |
| .20 | 5000. | 18.0 | 10564.5 | 14819.6 | 15430.9 | .5687 | .8105 | .5256 | .877 | 3405.62 |
| .20 | 5000. | 18.0 | 8857.2 | 13344.1 | 13817.1 | .6108 | .6795 | .4733 | .877 | 2951.40 |
| .20 | 5000. | 18.0 | 7252.6 | 11641.3 | 11990.3 | .6508 | .5564 | .4129 | .877 | 2529.65 |
| .20 | 5000. | 18.0 | 5757.2 | 9777.2 | 10021.0 | .6885 | .4417 | .3468 | .877 | 2139.72 |
| .20 | 5000. | 18.0 | 4449.6 | 7940.9 | 8107.3 | .7236 | .3414 | .2816 | .877 | 1794.11 |
| .20 | 5000. | 18.0 | 3405.3 | 6341.6 | 6449.3 | .7550 | .2612 | .2249 | .877 | 1505.16 |
| .30 | 5000. | 18.0 | 18811.8 | 17386.9 | 18596.6 | .5621 | 1.4432 | .6166 | 1.316 | 5711.09 |
| .30 | 5000. | 18.0 | 16835.3 | 16485.4 | 17483.1 | .5955 | 1.2916 | .5847 | 1.316 | 5121.91 |
| .30 | 5000. | 18.0 | 14705.9 | 15330.9 | 16129.4 | .6340 | 1.1282 | .5437 | 1.316 | 4520.72 |
| .30 | 5000. | 18.0 | 12734.2 | 14094.3 | 14717.4 | .6731 | .9769 | .4999 | 1.316 | 3961.41 |
| .30 | 5000. | 18.0 | 10789.8 | 12587.2 | 13058.6 | .7095 | .8278 | .4464 | 1.316 | 3445.34 |
| .30 | 5000. | 18.0 | 9052.0 | 11056.2 | 11396.5 | .7428 | .6944 | .3921 | 1.316 | 2984.90 |
| .30 | 5000. | 18.0 | 7414.2 | 9441.4 | 9672.3 | .7744 | .5688 | .3348 | 1.316 | 2557.32 |
| .30 | 5000. | 18.0 | 5895.5 | 7726.8 | 7864.9 | .7971 | .4523 | .2740 | 1.316 | 2163.95 |
| .30 | 5000. | 18.0 | 4574.2 | 6152.6 | 6225.1 | .8180 | .3509 | .2182 | 1.316 | 1816.30 |
| .30 | 5000. | 18.0 | 3517.2 | 4773.4 | 4796.3 | .8254 | .2698 | .1693 | 1.316 | 1526.06 |

Table I. - Propeller Design Information

DESIGN

| | | |
|---|---|---|
| Mach Number | = | 0.80 |
| Altitude | = | 11,000 km (36,089 ft.) |
| P | = | 5.740 Mw (7698.8 hp) |
| Propeller Net Thrust | = | 19.6 kN (4414 lbf) |
| Residual Thrust | = | 1.615 kN (363 lbf) |
| Total Net Thrust | = | 21.25 kN (4777.6 lbf) |
| $P/D^2$ | = | 35.03 |
| $\eta_p$ | = | 0.817 |
| J | = | 3.081 |
| $C_p$ | = | 1.692 |
| $C_T$ | = | 0.4485 |
| $W_f$ | = | 984.98 kg/hr (2171.96 lbm/hr) |
| TSFC | = | 0.046 kg/hr/N (0.455 lbm/hr/lbf) |
| $\eta_{ov}$ | = | 0.434 |
| T/P | = | 3.705 N/kw (0.621 lbf/hp) |
| Propeller Diameter | = | 4.519 m (14.825 ft.) |
| Number of Blades | = | 8 |

SLS/MAX THRUST

| | | |
|---|---|---|
| P | = | 14.0 Mw (18,780 hp); maximum available = 15.23 Mw (20,424 hp) |
| Net Thrust | = | 88.79 kN (19,961 lbf) |
| $C_p$ | = | 0.8565 |
| $C_T$ | = | 0.5540 |
| J | = | 0.0 |
| $W_f$ | = | 1.940 Mg/hr (4277.9 lbm/hr) |
| T/P | = | 6.342 N/kw (1.063 lbf/hp) |
| TSFC | = | 0.022 kg/hr/N (0.214 lbm/hr/lbf) |
| $P/D^2$ | = | 490.1 $kw/m^2$ (61.067 $hp/ft^2$) |

Note: Maximum sea-level-static (SLS) thrust does not occur at maximum engine horsepower because of propeller blade stall.

Table II. Comparison of Selected Engine Parameters

| Engine Type | Engine Thrust - Weight Ratio | | | TSFC | $\eta_{ov}$ |
|---|---|---|---|---|---|
| | Sea Level Static | M = 0.3 Sea Level | M = 0.8 9144 m | Cruise Performance (M = 0.8, 9144 m altitude) | |
| (1) Turboprop (Propfan) | 3.41 | 3.71 | 1.14 | .456 | .438 |
| (2) Pratt and Whitney JT9D-25 Turbofan | 5.50 | 4.22 | 1.43 | .631 | .309 |
| (3) Pratt and Whitney STF-477 Turbofan | 6.74 | 4.89 | 1.88 | .575 | .339 |

Note: All engines are sized to produce net thrust equal to that of the JT9D-25 at M = 0.8, 9144 m altitude.

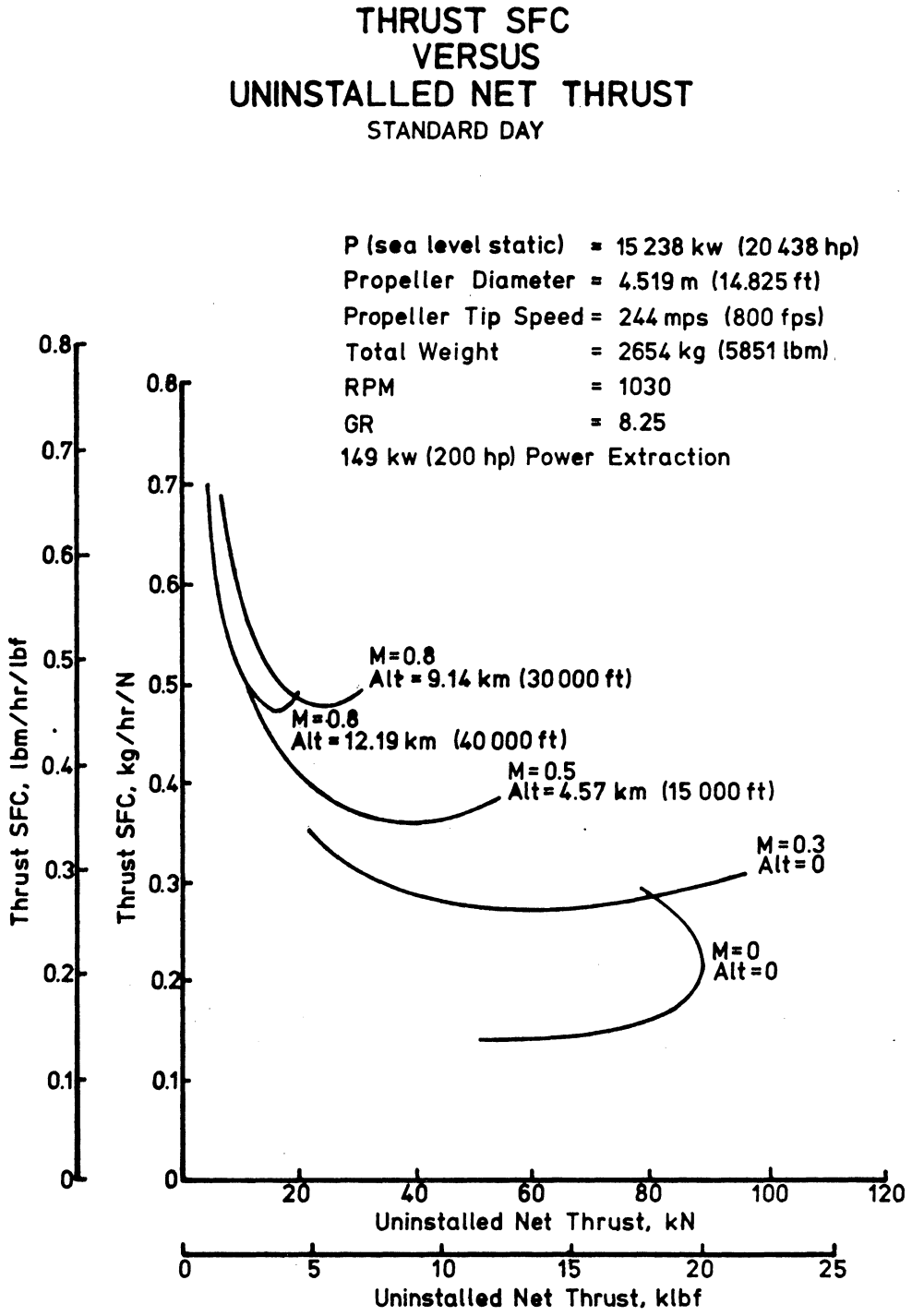



Figure 1. - Propfan performance.

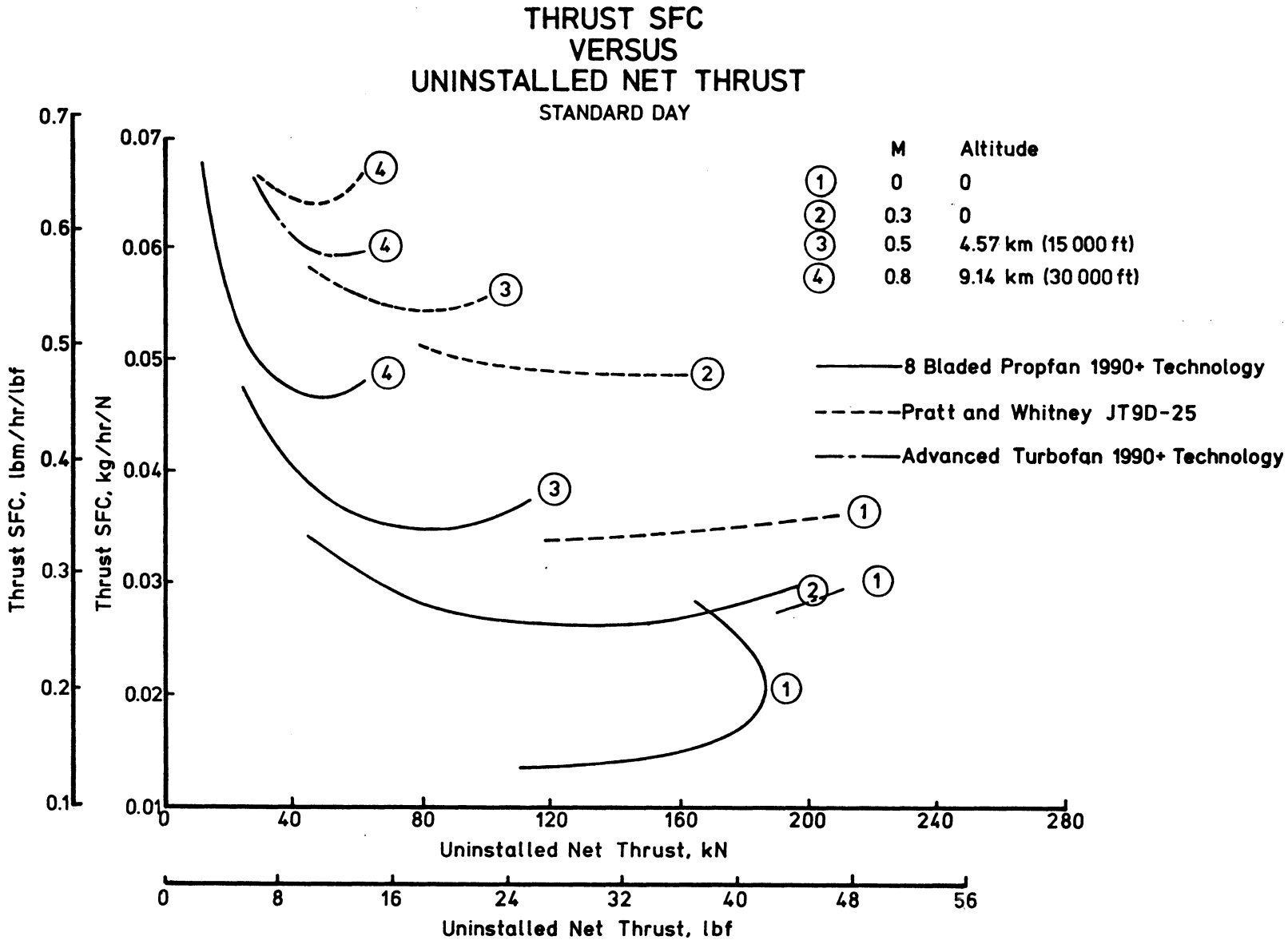
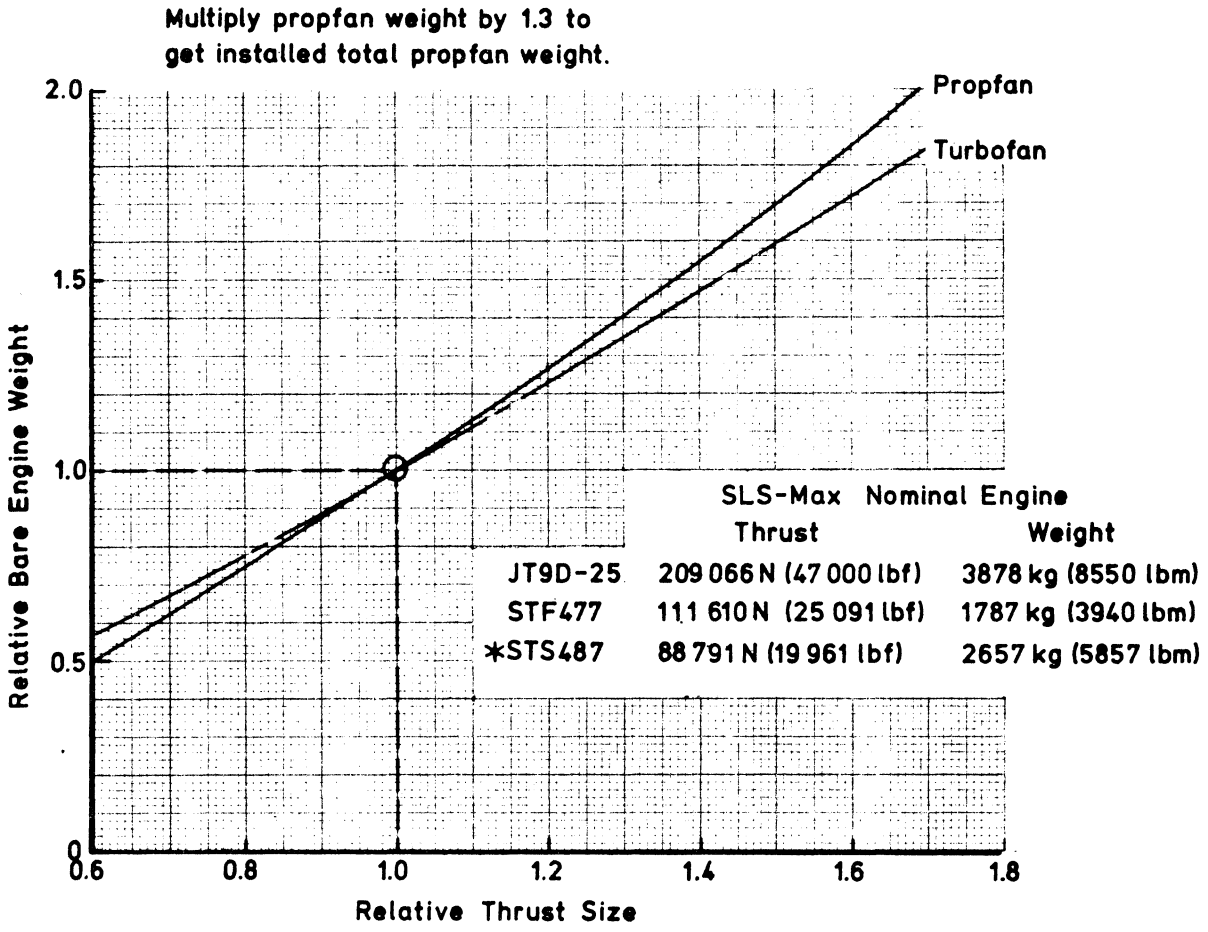



Figure 2. - Performance comparison




*Maximum thrust SLS not at maximum power because of propeller stall.

Figure 3. - Weight scaling for bare engine.

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|---|---|---|
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15. Supplementary Notes

Pratt and Whitney representatives have reviewed the data in this report and have indicated that this data is neither classified nor proprietary.

16. Abstract

Performance estimation, weights, and scaling laws for an eight-blade highly loaded propeller combined with an advanced turboshaft engine are presented. The data are useful for planned aircraft mission studies using the turboprop propulsion system. Comparisons are made between the performance of the 1990+ technology turboprop propulsion system and the performance of both a current technology turbofan and an 1990+ technology turbofan.

| 17. Key Words (Suggested by Author(s)) | 18. Distribution Statement |
|---|---|
| Propfan<br>Air Breathing<br>Propulsion<br>Propeller<br>Turboshaft<br>Engines<br>Gas Turbine<br>Turbofan | UNCLASSIFIED - UNLIMITED<br><br>Star Category 07 - Aircraft Propulsion and Power |

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