RADAR / LIDAR READY REFERENCE

Band	Beam Width	Frequency	Doppler Shift per m.p.h.	Doppler Shift per k.p.h.
X	18*	10.525 GHz	31.389 cps	19.50 cps
K	12*	24.150 GHz	72.023 cps	44.75 cps
KA	11-12*	33.400 - 36.000 GHz	102.296 cps	66.00 cps

(*check with manufacturer's specifications)

Speed of Light

186,282.4 miles per second
983,571,072 feet per second
.98357 feet per nanosecond

Converting Milliradians to Degrees

Angle in Radians = Angle in Degrees X Pi ÷ 180
Angle in Degrees = Angle in Radians X 180 ÷ Pi
Pi = 3.14159

A milliradian is a thousandth of a radian; therefore to convert radians to milliradians, move the decimal three positions to the left for 10th, 100th, 1,000th.

3.5 milliradians	=	.2005 degrees (half angle .10025)
3.0 milliradians	=	.1719 degrees (half angle .08595)
2.5 milliradians	=	.1432 degrees (half angle .0716)

Time-Distance Formulas

USA	Metric
Speed = Distance ÷ Time ÷ 1.4667	Speed = Distance ÷ Time ÷ 0.2778
Time = Distance ÷ Speed ÷ 1.4667	Time = Distance ÷ Speed ÷ 0.2778
Distance = Time X Speed X 1.4667	Distance = Time X Speed X 0.2778

Radar Beam Formulas

Beam Width = 2 x Distance X Tangent 1/2 Angle

Distance a target vehicle will exit main beam:
Distance = *Width ÷ Tangent 1/2 Angle
(*Width from patrol vehicle to target vehicle lane.)

Distance a target vehicle will travel through a 5 degree photo radar beam, angled at 22 degrees:
D = 2 X *Distance X Tan 1/2 Angle ÷ 22 degree Sin
(*Distance from the radar to the lane of travel.)
Then multiply the length of target vehicle by 1.9 and add that number to the above answer.

Cosine Formulas

Indicated Speed = True Speed X Cosine of Angle

True Speed = Indicated Speed ÷ Cosine of Angle

Double cosine effect during moving radar:
1. Target Speed Adjusted (TSA)
2. Patrol Speed Adjusted (PSA)
3. High Doppler (TSA + PSA)
4. Low Doppler (patrol window)
5. Target Window (HD - LD)

Note: The above information is designed to be photo copied and placed in your Traffic Evidence Kit.