

THE VERSIONS OF CARPET

URL'S DOWNLOAD SITE

The executable can be downloaded from <http://denv.telecom.tno.nl/carpet2/carpet2.13.zip>
Install files can be downloaded from <http://denv.telecom.tno.nl/carpet2/carpet2.zip>

CARPET 1.0

A graphical DOS application, released by Artech House since 1993.

CARPET 2.0

Released by TNO-FEL since April 2003.

1. The propagation code distinguishes an optical interference region, an intermediate region and a diffraction (or troposcatter) region, see figure 1.

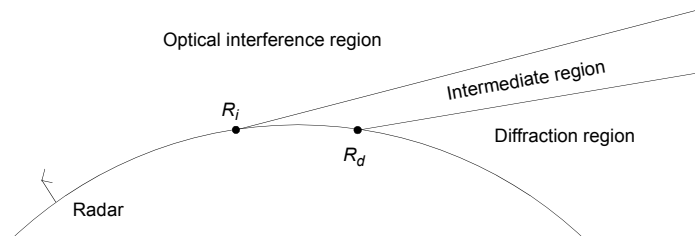


Figure 1: The three regions.

In the optical interference region, the Kerr-expression is used to calculate the pattern propagation factor, F . This expression is valid if at least one of the following two criteria is met:

- The path-length difference between the reflected and the direct ray is greater than or equal to $\pi/2$, i.e. one quarter wavelength.
- The grazing angle is larger or equal than the so-called Reed-Russell grazing angle, ψ_{lim} , which is given by:

$$\psi_{lim} = \text{atan}\left(\sqrt[3]{\frac{\lambda}{2\pi a_e}}\right) \quad (1)$$

In order to determine if a target is in the optical interference region, ground ranges are associated with the two criteria, which are denoted by $R_{1/4\lambda}$ and by R_s , respectively. In CARPET 1.0, a target is said to be in the optical interference region if its range, R , is less then the minimum of these two ranges:

$$R < R_i = \min(R_{1/4\lambda}, R_s) \quad (2)$$

This is not correct, it should be the maximum:

$$R < R_i = \max(R_{1/4\lambda}, R_s) \quad (3)$$

Especially near the target horizon, different results between CARPET 1.0 and CARPET 2.0 may show up.

With the release of CARPET 2.0, apart from patching the code, the manual was corrected as well.

2. The application is now a true Windows API.
3. Colour scheme of the blindzone and vertical coverage diagram has been altered. True Colour is now required.
4. Several diagrams can sit on the desktop, the maximum is 5.
5. The numerical values of the graphical output can be saved into a text file.
6. Settings that are entered in a Worksheet can be copied to the main list of settings.
7. CARPET 2.0 can import antenna patterns that are specified by the user.
8. Minimum and maximum allowable values of certain parameters have been enlarged in order to meet user demands.
9. Non SI-units are available: target altitude in feet, range in nautical miles, speed in knots.

CARPET 2.01

Trouble with license file under Win98. Solved.

CARPET 2.02

Released since 20-05-2003. Problem with direct printing. Solved.

CARPET 2.03

Released since 6-6-2003.

1. Toggle Write Diagram is set to false after start-up. In previous versions, this toggle was un-initialised. Note: this toggle is not saved in the settings-file.
2. Jammer altitude is set to 3 km after start-up. In previous versions, this parameter was un-initialised. Note: this parameter is not saved in the settings-file.
3. Jammer Parameters dialogbox: 'm' changed to 'ft'.
4. Jammer Parameters dialogbox: 'dBm' changed to 'dBW' (which appears to be more commonly used).

CARPET 2.04

Released since 19-08-2003. The value of parameter Layout - Nr of Steps is left in tact after start-up. In previous versions it was 'clipped' to 200.

CARPET 2.05

Install-problems if the Windows program file folder is not C:\Windows\Program Files, e.g. when German or Portuguese versions of Windows are used. Solved.

CARPET 2.06

Released since 20-10-2003. Improved texts in pop-up dialogboxes related to the creation of the license file.

CARPET 2.07

Released since 17-02-2004.

1. After an e-mail correspondence with SPAWAR, it became clear that the sea clutter reflectivity is not modified correctly if evaporation duct is switched on. It should be noted that equation 152 in the EREPS 3.0 manual (downloaded in August 2003) is erroneous, which actually set us on the wrong track. This mistake was also in the previous EREPS manuals. Equation 152 of the CARPET manual should read:

$$\sigma^0(R) = \sigma^0(R_{ci}) - \alpha \frac{R - R_{ci}}{L} . \quad (4)$$

The propagation code has been changed accordingly.

2. Contour plot added for the blindzone and coverage diagram. Note: the P_d and the contour-switch are not saved into the settings file.
3. Two graphicsbox sizes are now available: 640 × 480 and 800 × 600, see Parameters - Layout.
4. The copying to the clipboard has been improved. 'Drag' a rectangular area with the left mouse button down. Give Control-C. The selected region can be pasted (e.g. into a Word document) with Control-V.
5. License policy changed. No need to build separately for each serial number, which eases the distribution of upgrades.

CARPET 2.08

Released since 20-02-2004.

1. Comboboxes with only two entries (in parameters - Layout) don't unroll well. Fixed.
2. Contourcolour changed from black to green.
3. User input is sometimes neglected. Solved.



4. Contour in vertical coverage diagram scales wrongly when altitude unit is ft. Fixed.

CARPET 2.09

Released since 14-03-2004. An error in the calculation of the imaginary part of the dielectric constant of water was fixed. This may have a slight impact on the shape of the lobing pattern in maritime scenarios.

CARPET 2.10

Released since 29-03-2004. The volume of rain or chaff in the main beam was calculated wrongly if part of the main beam is below the earth's surface. Patched.

CARPET 2.11

Released since 08-06-2004.

1. The height gain function used in the calculation of the pattern propagation factor when evaporation duct is present appeared to be wrongly implemented. Users are advised to redo calculations if evaporation duct is present.
2. All previous versions of CARPET assume that pulse compression is applied when the product of the pulse length, τ , and the instantaneous bandwidth, B , exceeds unity. A pulse compression gain, $G_{PC} = \tau B$, will then play a role. Consequently, when the bandwidth is increased in a scenario without clutter, both the noise power (kTB) and the target power increase, proportional to the bandwidth. Thus, the SNR and the detection probability will stay the same. However, in a scenario with clutter, the situation changes. While both the noise power and the target power increase proportionally to the bandwidth, the clutter power stays the same because the increase in the pulse compression gain (τB) and the decrease in clutter area after pulse compression (inversely proportion to B) compensate each other. The net effect is that the signal-to-interference ratio in clutter increases when the bandwidth increases, which leads to an improved detection probability.
Not all CARPET users appeared to be pleased with this behaviour and we have therefore added a Pulse Compression toggle in the Toggles - Radar dialogbox.
If the toggle is on, CARPET functions as described above. If the toggle is off, CARPET assumes that there is no pulse compression. A τB -product greater than unity then implies a poorly matched receiver and (only) the noise power will increase with bandwidth; the detection capability will degrade, regardless of the presence of clutter.
Note: this parameter is saved in the settings-file.
3. In previous versions, Troposcatter and Atmospheric Attenuation were switched off if Free Space was selected (Propagation Toggles dialogbox). This behaviour has now been undone.

CARPET 2.13, RELEASE DATE 30-JAN-2007

Prior to 30-1-2007, version 2.13- β was released, which already contained most of the extra functionality described below.

1. CARPET produced erroneous results if the target altitude is larger than the ceiling of the column of precipitation. To mend this, atmospheric losses are now calculated along the direct and the indirect paths separately.
2. The volume of the resolution cell holding volume clutter is calculated more accurately. Compared to the previous release, the detection capability in precipitation has improved slightly.
3. Parameter Processing Losses has been added (Receiver dialogbox).
4. A parameter that reflects the reduction of target RCS in case of circular polarization has been added (Target dialogbox).
5. Writing to file numerical values for the contoured presentation of a Vertical Coverage or a Blind-zone Diagram has been implemented.
6. The elevation span of an antenna diagram has been 'clipped'. It now cannot exceed the span from -90 to 90 degrees.
7. Antenna tilt is supported with an imported antenna diagram.
8. HPGL code generation has been added.
9. The antenna voltage-gain can be plotted.
10. Next and Previous buttons were added to various dialogboxes.
11. A multipath toggle has been added. When switched off, the indirect signal component is neglected.
12. All program settings are stored in the settings file.



13. Handling of extremely long file names has been improved.
14. A release date has been added to the About box.
15. The text of the disclaimer has been updated to reflect TNO's name change.
16. The CARPET manual has been updated. Most noticeable is the description of the CARPET 2 DLL.

CARPET 2.13, RELEASE DATE 9-FEB-2007

1. Toggle Propagation Antenna Noise was not properly retrieved when loading a settings file. Fixed.
2. Certain dimensions of the column of precipitation resulted in a program halt. Fixed.
3. Annotation of the Doppler filter diagram has been improved.

CARPET 2.13, RELEASE DATE 20-FEB-2007

Annotations 'Attenuation' and 'Swirling Case' appeared to be written twice. Fixed.

CARPET 2.13, RELEASE DATE 22-MAR-2007

1. Number of bursts is added to the annotation.
2. Toggle Free Space will be switched off when either sea or landclutter is switched on.

CARPET 2.13, RELEASE DATE 10-APR-2007

1. Empty file as well as a wrong file name when the values of a Signal-to-Interference diagram are dumped to file. Patched.
2. Wrong file name when a BMP file of a Signal-to-Interference diagram is created. Patched.
3. Some wrong values when the plot points of a Received Powers diagram are written to file. Mended.