WAYPOINT MECHANISM

Pyros Lambert

PLEASE NOTE: The waypoint mechanism requires that any formation that has been assigned a waypoint path *MUST* have also been assigned a reaction value of 0. This is very important for CAMPAIGN LINKED SCENARIOS

Three methods have been developed to use the waypoints in the game

1. The basic (very simple) "three five" waypoint method,
   The advanced "three five" waypoint method and
2. The "Pyros" detailed formula

But before I start with the description of the waypoint methods, I should first define the variables and conditions of the waypoint mechanism. **Variables WP(n) (Waypoint Location):** This means Waypoint location No(n) (for example for the first waypoint location; n=1, WP(1)) **WP_n (Waypoint Mark):** The game allows for 125 waypoint marks; a waypoint mark is created when you click on the map using the waypoint tool. For example WP_5 is the fifth waypoint that you have clicked on the map. **Step:** This is the distance (interval in hexes) between WP(n) and WP(n+1); in other words this is the distance between two contiguous (adjacent) waypoint locations. **Dn (Density):** This is the number of waypoint marks located in a single waypoint location. **Sp (Speed)**: This is the speed of the vehicle as it is in the unit's data menu. **Sc (Speed Coefficient):** This is a special parameter defined by the type of the vehicle (explained later). **Tc (Terrain Coefficient)**: This is a special parameter defined by the type of terrain (explained later). **UTc (Unified Terrain Coefficient):** This is a special parameter defined by the unified terrain model (explained later). **Uc (Unit Coefficient)**: This is a special parameter defined by the type of unit (explained later). **Pr (Proximity Radius)**: This is the distance, in which the formation will delete any existing WP ma

Basic "Three - Five"

In order to explain you how simple is the first method, the basic "Three - Five", the only thing you need to do is to put a section of tanks (Td type: example, medium tank)) on a clear terrain and then assigning waypoint marks using this pattern: Every five hexes distance (Step of 5) you should click three times the waypoint tool on the same hex (Dn; Density of 3) see the the picture:
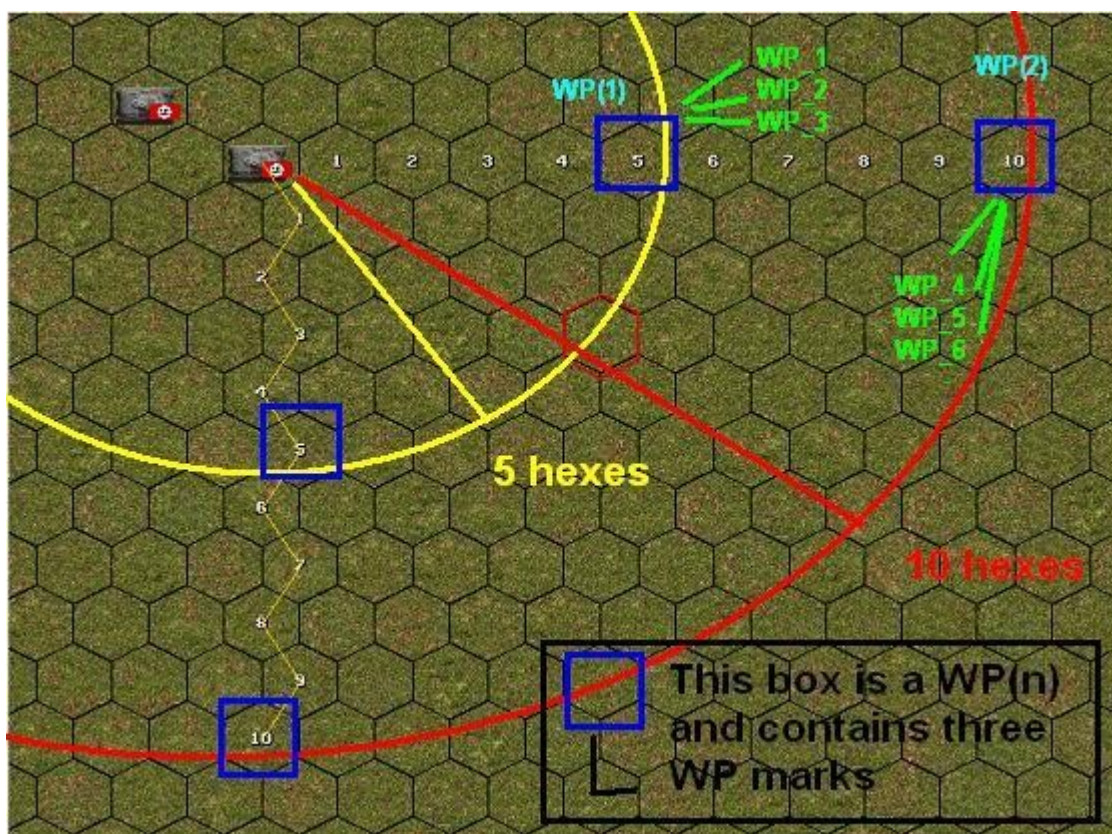
Advanced "three five" The advance three five is combination of the basic "3-5" and the Pyros formula The Density remains fix at the value of 3, and the only parameter that change is the Step, so its something like "3-Step" Step = 2 x Sp / UTc **Sp** is the speed of the unit. **UTc** is proportional percentage of Tc for the path area (the UTc mechanism is explained inside the Pyros formula section). **LIMITATIONS** 1. Dn = 3 2. The Step should be bigger or equal of 5 3. If UTc (Tc) is bigger than the Sp, then the Tc = Sp 4. For extremely rough terrain, the advanced extended leg technique is required. Tc (Terrain Coefficient) chart (also known as Terrain Cost)

These are the very basic values for Tc on a SUMMER MAP

- Road = RD
  Clear = CL
  Forest = FR
  Rough = RG
- Forest on Rough = RGF

Tracked

- RD = 1
  CL = 2
  FR = 4
  RG = 5
- RGF = 7

Foot / Cavalry

- RD = 2
  CL = 2
  FR = 3
  RG = 3
- RGF = 4

ALL Terrain Wheeled

- RD = 1
  CL = 2
  FR = 6
  RG = 8
- RGF = 12

Wheeled

- RD = 1
  CL = 3
  FR = 9
  RG = 11
- RGF = 17

"The Pyros formula"

A. Step = (Dn - 1) x Sp / UTc B. Dn = (UTc x Step / Sp) + 1 Variables WP(n) (Waypoint Location): This means Waypoint location No(n) (for example for the first waypoint location; n=1, WP(1)) **WP_n (Waypoint Mark):** The game allows for 125 waypoint marks; a waypoint mark is created when you click on the map using the waypoint tool. For example WP_5 is the fifth waypoint that you have clicked on the map. **Step:** This is the distance (interval in hexes) between WP(n) and WP(n+1); in other words this is the distance between two contiguous (adjacent) waypoint locations. **Dn (Density):** This is the number of waypoint marks located in a single waypoint location. **Sp (Speed):** This is the speed of the vehicle as it is in the unit's data menu. **Tc (Terrain Coefficient):** This is a special parameter defined by the basic movement cost for each type of terrain . **UTc (Unified Terrain Coefficient):** This is a special parameter defined by the unified terrain model (explained later). **LIMITATIONS** 1. Minimum Step value must be bigger or equal with 5 hexes. 2. Minimum Dn value must be bigger or equal with 3. 3. On extremely dense rough terrain the Dn = Step x 2. 4. The Armor_Car class and Light Tank class will ignore any waypoints for the first 3 turns, instead these two classes will move toward the nearest neutral or enemy held (active) VP flag. 5. Whenever the designer is planning a precise waypoint path (Step = 5) on a dense forest or rough terrain, he must make use of the advanced "extended leg" technique. 6. If Tc is bigger than the Sp, then the Tc = Sp 7. A big concentration of units may require an addition to the density by 1-2 marks. 8. A big variation in the map elevation levels may require an addition to the density by a number of marks (related with the slopes, included inside the Step path. **UTc (Unified Terrain Coefficient) definition** In order to use this formula you must know the basic cost (known as Terrain coefficient Tc) for the terrain movement of that unit. Then you must make an estimation about the proportion of the various types of terrain between the step (or in general, along the path of movement).

In the example map, the terrain cost (Tc) for tracked movement is :

- CLEAR TERRAIN = 2
  FOREST TERRAIN = 4
- ROUGH TERRAIN = 5

My estimation for the proportional percentage of these types of terrain in the example map is the following:

- CLEAR 25%
  FOREST 60%
- ROUGH 15%

Tc (Terrain Coefficient) chart (also known as Terrain Cost)

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ALL Terrain Wheeled

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EXAMPLE No1 (Tutorial). For this example, I will use a section of German Tanks PzKw IIIh with a speed of 13 (hexes per turn) I decided to apply a [Step] of 30 and I have estimated the proportional percentage of terrain as 25% Clear, 60% Forest and 15% Rough. First I will calculate the UTc [Unified Terrain Coefficient], by multiplying the terrain cost by their respective percentages. **UTc = {25% x 2} + (60% x 4) + (15% x 5) = 3,65** So, I ve just calculated the [UTc] = 3,65 The rest of variables are [Step] = 30 and [Sp] = 13 Now I need to calculate the [Dn] (Density) of the Waypoint Marks per Waypoint Location (in other words, how many click of waypoint marks I need to apply between two steps). Since I wish to calculate the Dn parameter I will use the Pyros Formula B : B. [Dn (Density of marks)] = {[Step] x [Unified Terrain Coefficient] / [SPEED]} + 1

Dn = (UTc x Step / Sp) + 1

- **[UTc] = 3,65
  [Step] = 30**
- **[Sp] = 13**

Dn = (30 x 3,65/ 13) + 1 => Dn = 8,42 => Dn = 9 So the formula calculates that we have to use 9 Waypoint marks on each Waypoint Location (one Waypoint Location each 30 hexes). In other words, you will have to count 30 hexes path, then click 9 time the waypoint tool and then count again the next 30 hexes path and repeat the process.

Here is the EXAMPLE No1 (Tutorial) PICTURE (the orange - red circles represent the actual movement of both tanks) :
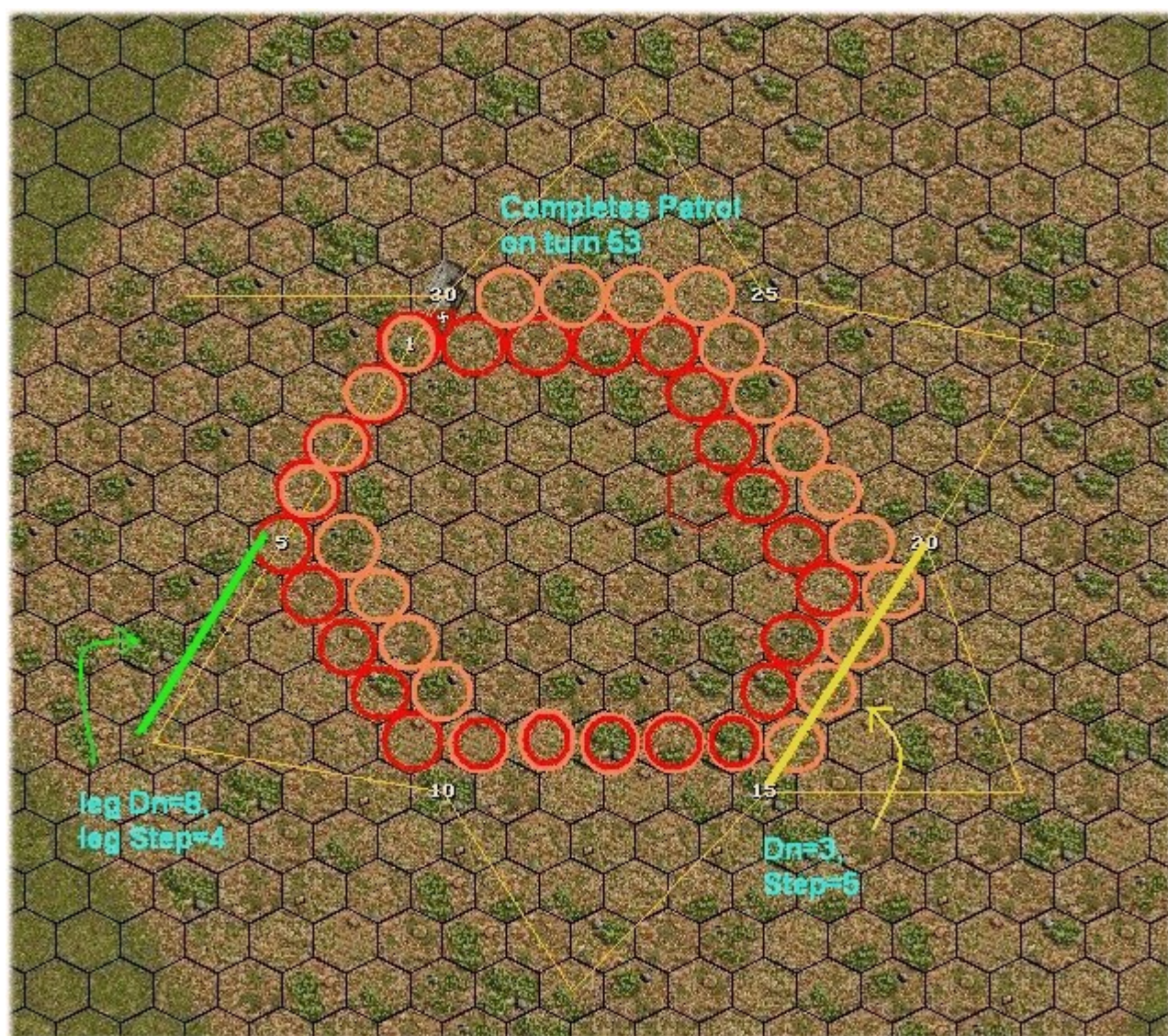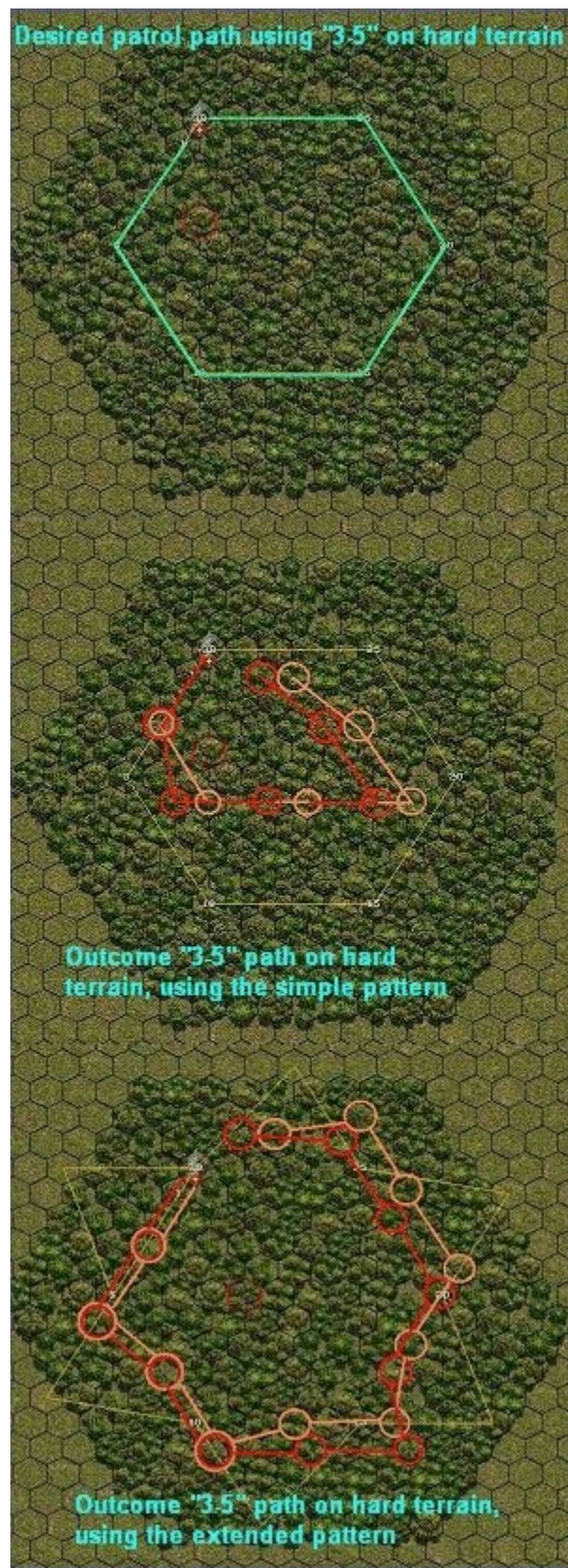
Advanced Technique: "Extended Leg"

The ATEL (Advanced Technique:"Extended Leg), is a method of assigning a waypoint path with very big precision (in case that the designer needs to have absolute control of the movement path of his units). The ATEL should also be used in extremely rough (90% rough terrain) battleground. The extended leg should be positioned at a longitude of (StL) of 4 hexes (as an extension of each normal step) with a density defined by the following formula: **DnL (Density of Leg) = Tc - 1 StL = 4**

Variables

- ATEL: Advanced Technique:"Extended Leg
  DnL: Density of Leg
  StL: Step of Leg
- Tc: (Terrain Coefficient): This is a special parameter defined by the basic movement cost for each type of terrain

LIMITATIONS 1. If Tc is bigger than the Sp, then the Tc = Sp 2. For APC Class, StL = 2

Completes Patrol
on turn 63

30
5
1

25

5

20

leg Dn=6,
leg Step=4

10

15

Dn=3,
Step=5

Desired patrol path using "3.5" on hard terrain

Outcome "3.5" path on hard terrain, using the simple pattern

Outcome "3.5" path on hard terrain, using the extended pattern

Advanced Waypoint Usage

Next, I will present you, two examples of the advanced usage of the waypoint mechanism:

1. Waypoints combined with Airdrop: There are two possibilities (either buy separate cargo

planes or by using a formation that includes cargo planes). I recommend you using formations that include the cargo airplane.

First, you must assign the waypoint marks before you load the troops into the cargo planes. Then, plot the airdrop location (mark) somewhere in the map and set it for turn #1. As a result of the above process you will get an (airdropped) infantry formation that will start normal WP movement toward the Waypoint mark No #4. If the Airdrop is not set for Turn #1 but for turn #N, then the units (once airdropped) will start moving toward the Waypoint mark No #(3+N) Limitation: You must make sure that all formation units enter (airdrop) the game at the same reinforcement turn.

2. Waypoints combined with Reinforcement Entry mechanism Before you set the unit as reinforcement, you may plot a waypoint path. Then if you set the unit as reinforcement for turn #N, the unit (formation) will start the Waypoint movement toward the Waypoint mark #(1+N). This method may be used for solving the problem with the irrational movement phase of scout vehicles (they ignore waypoints for the first three turns). Simply, set the reinforcement entry turn for the scout vehicles to be turn #3, and then the scout/light vehicles will move normally toward the Waypoint mark #4. Limitation: You must make sure that all formation units enter the the game at the same reinforcement turn.

Speed Regulation Mechanism

If the designer needs to have a direct control over the moving speed of a formation he may apply a special speed regulation technique. This technique is based on the use of multiple waypoint marks per hex. This means that the waypoint locations will be positioned one next to the other (step of 1). What is regulating the movement speed of the formation is the number (density) of waypoint marks at each waypoint location. In general, the more waypoint marks per waypoint location a formation has, the slowest the movement will be.

Here is an indicative table describing the regulation of the movement speed of a tank formation (speed 14) on clear terrain (movement cost of 2):

- [Dn] =[Density per hex]
  [SpR] =relative [Speed] defined by terrain cost, for our example 14/2=7
- [%] =percentage (%) of the regulated speed in comparison with the MAX [SpR]

[Dn]-[Spr]-[%]

- --0--7,00--100%
  --1--6,66---95%
  --2--5,33---75%
  --3--3,60---50%
  --4--3,00---40%
- --5--2,20---30%

From the above table, if a designer wishes to control the movement speed of a formation for a specific part (of the waypoint path) he should deploy 3 waypoint marks per hex in each hex (that defines that specific part of the waypoint path). Why would the designer do such a thing?

1. If the designer thinks that the player will try to ambush the AI at this specific location then he may wish to make the movement extra cautious.
2. Perhaps the designer wishes to slow down the advance pace of a specific group in order to give the chance to another group to catch up with the advancing group.