Sentence Rebuilding

The MiniPlex-3 possesses a very unique feature called Sentence Rebuilding. This feature allows you to build a completely new NMEA 0183 sentence using the contents of another sentence.

Since this requires a complex command with a variable number of fields, there are no user interface controls defined for this in MPXConfig3. The Sentence Rebuilding definition must be entered as a proprietary sentence in **Send NMEA**. The starting '$' character may be omitted.

The format and meaning of the fields of this proprietary sentence is shown below:

`$PSMDSR,a,b,ccccc,ddddd,eeeee,text,…,text`

a: Sentence Status flag:

    C = sentence is a command to change settings
    R = sentence is a status report of current settings

b: Definition number (1..3)

`ccccc`:   Address field of originating sentence. Wildcard characters ('-') are accepted, matching on every character.

`ddddd`:   Optional contents of first data field of originating NMEA sentence. May be left empty if not required.

`eeeee`:   Address field of new sentence

`text`:   Arbitrary number of text fields defining the fields of the new sentence. A percent sign followed by a number (e.g. "%3" or "%11") within these text fields is replaced with the contents of that field from the originating sentence. All other valid NMEA characters are copied verbatim to the new sentence. If a minus sign is added between the '%' and the field number (e.g. "%−3" or "%−11"), the value of that field is negated: 45 becomes -45 and -45 becomes 45.

The use of the placeholder "%x" might be best explained using human language. Imagine we have a sentence A like below:

    A: My house is blue

and we want to build a new sentence B about the colour of our car, using the colour of the house mentioned in the sentence A. The Sentence Rebuild definition would then look like this:

    B: My car is %4

Now if the MiniPlex-3 receives the sentence A, it will generate sentence B and at the position of "%4" it will put the fourth word of the sentence A, resulting in:

    B: My car is blue

Translated to NMEA sentences, A is the address field of the originating sentence like GPRMC, and B is the address field of the new sentence like GPVTG, while the individual words of a sentence are the parameters of an NMEA sentence, separated by commas.

Example 1

Suppose we want to convert an RMC sentence into a VTG sentence. The symbolic format of a VTG sentence is shown below:

    `$GPVTG,<COG_T>,T,<COG_M>,M,<SOG_N>,N,<SOG_K>,K,A`

<COG_T> is the true course over ground, <COG_M> is the magnetic course over ground and so on. The last 'A' is the mode field of the VTG sentence. We're going to take that field from the RMC sentence as well.

The RMC sentences has a SOG in field 7, a true COG in field 8 and a GPS mode in field 12:

```
$GPRMC,124026.83,A,5221.62284,N,00505.00865,E,0000.7,088.0,100822,2.5,W,A,S
    0       1     2      3     4       5     6   7     8      9    10 . 12
```

A field from the RMC sentence is copied into the new VTG sentence by referring to this field with "%x" where 'x' is the field number into the RMC sentence. So, when we place '%7' in a `text` field of the PSMDSR sentence, it is replaced by the contents of field 7 of the RMC sentence.

To convert GPRMC into GPVTG, the following PSMDSR command is required:

```
PSMDSR,C,1,GPRMC,,GPVTG,%8,T,%8,M,%7,N,,K,%12
```

When this command is entered in **Send NMEA**, the MiniPlex-3 will respond with

```
PSMDSR,R,1,GPRMC,,GPVTG,%8,T,%8,M,%7,N,,K,%12
```

as a confirmation the command is accepted. The '1' in the second parameter field of the PSMDSR command tells the MiniPlex-3 to store this as Rebuild Definition number 1. Up to three Rebuild Definitions can be stored.

All the fields from GPVTG onwards are copied as a new sentence, copying all characters verbatim and replacing the "%8", "%7" and "%12" with fields 8, 7 and 12 of the originating GPRMC sentence. The '$' character preceding the address field of the VTG sentence is added automatically.

The resulting VTG sentence will appear as:

```
$GPVTG,088.0,T,088.0,M,0000.7,N,,K,D
```

The SOG field preceding the 'K' is left empty, simply because there is no SOG in km/h present in the RMC sentence, so we left this empty in the Sentence Rebuilding definition.

Command PSMDSR requests all stored Sentence Rebuilding definitions. To erase a single definition, execute PSMDSR,C,x where x is the definition number 1, 2 or 3.

The ddddd parameter is useful when proprietary sentences need to be converted. These sentences often start with the same address field, like $PSAT, while the first parameter field specifies what the sentence contains. Examples of such sentences are $PSAT,HPR,… containing heading, pitch and roll and $PSAT,INTLT,… containing tilt measurements, both originating from a Hemisphere satellite compass.

Example 2

A Hemisphere satellite compass needs to supply data to an older chart plotter which requires heading, pitch and roll in a Furuno proprietary $PFEC,GPatt,… sentence.

The command to achieve this conversion is:

```
PSMDSR,C,2,PSAT,HPR,PFEC,GPatt,%3,%4,%5
```

That same compass also outputs heave in a GPHEV sentence whereas the same chart plotter in the example above requires a $PFEC,GPhve,… sentence in which the heave has opposite sign. This can be converted with:

```
PSMDSR,C,1,GPHEV,,PFEC,GPhve,%-1,A
```

Note that the first conversion in this example uses the ddddd-field whereas the second conversion does not and leaves the ddddd-field empty.