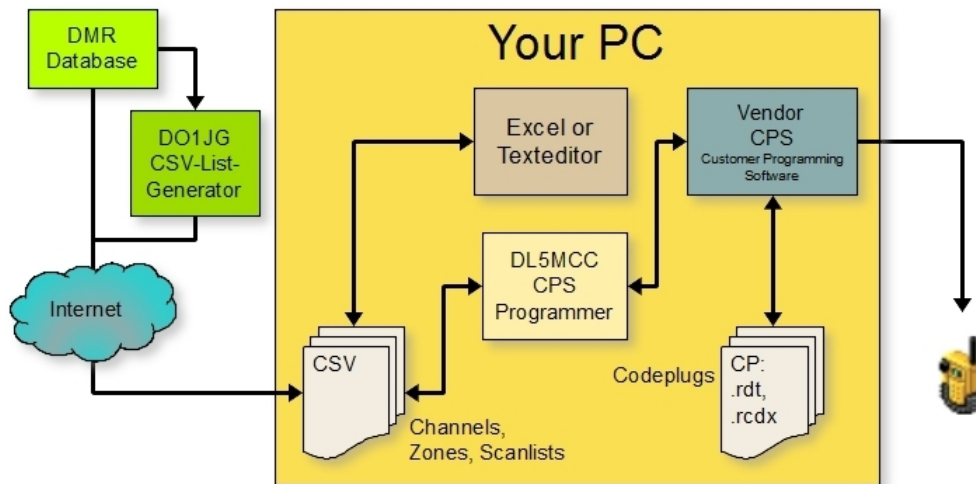


# DMR CPSProgrammer by DL5MCC

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DMR (Digital Mobile Radio) is a digital voice (DV) modulation scheme, which becomes more and more popular in amateur radio (ham radio). To be able to use the radio transceivers, all frequencies (channels) used must be entered as a „memory channel“ into the so called codeplug (CP). There is a huge number of local radio repeaters, as well as analogue FM repeaters and simplex frequencies, which all have to be entered into the CP by typing it manually into a programming software (CPS). Only in Germany we currently have about 300 DMR repeater, which expand to about 700 channels (2 timeslots + many mixed mode FM) only for DMR.



Principle of the CPSProgrammer: CPSProgrammer is designed to interact with the existing vendor-provided CPS software. The vendor's CPS software must be running for CPSProgrammer to update the codeplug that is open in vendor's CPS software

Programming this huge numbers of channels (callsigns, frequencies, timeslot & colour code, scanlist, RXGroup, TXContact, etc.) is a huge, boring and annoying pile of work, which can sum up to days

CPSProgrammer will make that work much more simple. All DV channels can be downloaded from the DMR database and than can easily be managed and extended by analogue channels, using Excel. A CSV file, to be generated from the Excel table, then will be used by the CPSProgrammer to program the channel information into the CPS. CPSProgrammer directly accesses the CPS windows controls to transfer the programming information from the CSV-file into the codeplug. The automatic transfer of a few hundred channels into the Radio Programming Software takes a few minutes only.

CPSProgrammer requires a well prepared codeplug and a well prepared database (CSV), to be able to minimize your typing work on the codeplug.

Additional information can be found at this Yahoo group (founded in April 2016):

<https://groups.yahoo.com/neo/groups/DMR-CPS-programming/info>

## Features and Limitations



CPSProgrammer is an automatic programming (programming robot) of the channel information of a CPS. CPSProgrammer reads all input-information from a CSV file.

CPSProgrammer is designed to interact with the existing vendor-provided CPS software. CPSProgrammer does not read or write codeplug-files (.rdt, .rcd, .rcdx). The vendor's CPS software must be running for CPSProgrammer to update the codeplug that is open in vendor's CPS software ([see picture above](#): "Principle of the CPSProgrammer").

Currently supported CPS software.

- Anytone AT-D868UV (CSV converting), CPS V 1.23+
- Ailunce HD1 (CSV converting), CPS V1.65+
- CSI CS700 Radio Programming Software V1.25 (2015-06-04): CS700, CS701, Kirisun DR7100
- CSI CS750 CPS HAM2000 R4.00.27: CS750, CS751, CS800, CS801

- Tytera MD380 Radio Programming Software V1.29.0, V1.30.0: MD380, MD390
- Tytera MD390 → [edit \[MD380\] section in .ini file: WindowTitle=CPS MD-390](#). Then select MD380 as CPS
- Tytera MD2017
- Tytera MD9600 (select MD2017 as CPS)
- Retevis RT3 Radio Programming SW, V1.30.0
- Retevis RT82, RT90 (select MD2017 as CPS)
- Hytera PD365 Hytera Customer Programming Software, V1.04.03.003.EM5: PD365, PD375
- Hytera PD785 Customer Programming Software (CPS), V7.00.07.020.EM5 / v7.06.02.006.EM5, V8.00.09.007.EM5: MD 655 (G), MD785 (G), PD785 (G), X1p  
**Please note:** The new feature of 255 channels/zone is **not yet** supported (however planned).
- Hytera AR685 → [edit \[PD785\] section in .ini file: WindowTitle](#). Then select PD785 as CP

## CPS Compatibility

Table: Compatibility and functionality, currently implemented

| Supported CPS   | Write to CPS / Import from .CSV |                    |                  |                     |                        |                  | Bulk Edit      |               | Export to .CSV |                               |          |
|-----------------|---------------------------------|--------------------|------------------|---------------------|------------------------|------------------|----------------|---------------|----------------|-------------------------------|----------|
|                 | RX-Group <sup>3)</sup>          | Channels DMR       | Channels FM      | Scanlists gen./fill | Zones                  | Roaming Lists    | Delete Channel | Edit Channels | Channels       | Scanlists Zones <sup>4)</sup> | RXGroups |
| CS700           | ok (32)                         | ok                 | ok               | ok                  | ok                     | n. a.            | ok             | planned       | ok             | ok (16)                       | ok       |
| CS750           | -                               | ok                 | ok               | -                   | -                      | n. a.            | -              | -             | -              | -                             | -        |
| HD1             |                                 | Beta               | Beta             |                     |                        | n. a.            |                |               |                |                               |          |
| MD380 RT3       | ok (32)                         | ok                 | ok               | ok                  | ok                     | n. a.            | ok             | planned       | ok             | ok (16)                       | ok       |
| MD2017 RT82     | planned                         | ok                 | ok               | ok                  | ok (64)                | n. a.            | ok             | -             | planned        | planned                       | planned  |
| PD365           | planned                         | ok <sup>1)</sup>   | ok <sup>1)</sup> | to do <sup>2)</sup> | ok <sup>2)</sup>       | n. a.            | planned        | planned       | ok             | ok (16)                       | planned  |
| PD785x (AR685x) | ok (64)                         | slow <sup>1)</sup> | ok <sup>1)</sup> | ok <sup>2)</sup>    | ok <sup>2)</sup> (256) | ok <sup>2)</sup> | planned        | planned       | ok             | ok (256)                      | ok       |

<sup>1)</sup> switch off "help view", to speed up programming

<sup>2)</sup> due to problems accessing the CPS, the CPS window is forced to stay in foreground and keep focus

<sup>3)</sup> The number in parentheses shows the maximum number of TGs in a single RX-group, supported by this CPS

<sup>4)</sup> The number in parentheses shows the maximum number of channels in a single zone, supported by this CPS

## Converting CSV-Files

Table: Types of CPS, supported by CPS converting

|              | User Contacts | RXGroups | Channels        | Scanlists | Zones |
|--------------|---------------|----------|-----------------|-----------|-------|
| AT-D868UV    | ok            | ok       | ok              | ok        | ok    |
| HD1          | ok            |          | Beta            |           |       |
| MD2017, RT82 | Beta          |          | see table above |           |       |

## Installing

Unzip all files of the download in a single directory. Thats it ...

The zip-file contains the following files:

- **CPSProgrammer\_[version-number].exe**: Executable
- **CPSProgrammer.ini**: Your individual settings for cpsprogrammer. See [table](#) below for details.
- Some sample CSV, just for demonstration. Not for a real codeplug.
- Prepared codeplug samples for CS700 / PD785G with scanlists, zones, RXgroups and TXcontacts, but without channels. This codeplug will intentionally cause warnings while programming, just to show how the software works.
- This page as pdf
- A tutorial with a prepared, empty codeplug, some CSVs and description

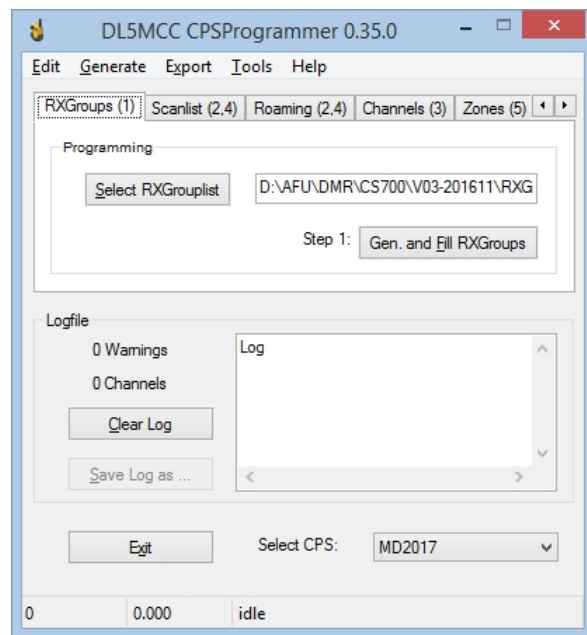
## Sample and first steps

Just follow the description ("start the programmer") below with the CSV provided with the download ZIP-file, to get a first impression. You may analyse the attached CSV-files and follow the provided tutorial, to get a better understanding of how this files controle programming.

## Start the Programmer

To start programming, you have to perform some steps in the following order:

1. Open your Customer Programming Software (CS700/MD380/RT3 or Hytera radio programmer) and load a prepared codeplug, containing at least the required RXGroups and TXContacts (see coding reference below for additional information).
2. The programmer allows you to create scanlists, write channels and fill scanlists.
3. Switch to the directory where you have installed the programmer.
4. Start the CPSPProgrammer and switch to the function, you want to perform. Then select a CSV file, if you want to use another than the default one.
5. Normally you first create empty scanlists (step 1, required to program the channels). Next you write the channel information (step 2). Once the channels are defined, you can fill the scanlists with the required channels (step 4).
6. Start Programming by clicking the related button, e.g. "Write Channels" or "Fill Scanlists".
7. Now, the Radio Programming Software gets focused, while all the information is automatically written into the codeplug.
8. **Note:** Should anything go wrong, **click onto the tray-icon** on your task-line, to pause CPSPProgrammer immediately. Then select to continue or to exit the programmer.



Main Menu of CPS Programmer V0.35.x



Click the Tray-Icon to pause immediately, then you may continue or exit

## Tutorial

The download below provides a tutorial with some sample CSVs. Please follow the tutorial to learn how CPSPProgrammer interacts with your customer programming software (CPS). The tutorial can be done within 15 minutes only. The tutorial video, embedded below, uses the CSV files used for the tutorial as well:



CPS-Programmer [tutorial video](#)  
More tutorials on [YouTube](#)

## Concepts Of Programming Codeplugs

Programming a codeplug requires a careful preparation of all the data needed. There are many fields to be filled with data

[illegible]

- First define all GroupCall, which are the Talk-Groups used in your area (e.g. TG1 world wide, TG2 Europe, TG262 Germany). This step must be done manually.
- Second define at least one RX-Group which contains all Talk-Groups expected to be received on a single channel (check for a talk group matrix for the repeaters in your area. This step also must be done manually)
- Next we have to define scanlists. As we have not yet programmed the channels, the scanlists will be empty in the first step. The CPSProgrammer supports generating empty scanlists from a given csv. This is marked as step 1 in the CPSProgrammer.
- Having prepared TX-Contacts (a single talk group), RX-Groups (a list of talk groups) and empty scanlists, we are able to write our channels into the CPS. This is step 2 in the CPSProgrammer.
- Next we are able to fill our empty scanlists with the channels, we just have written into the code plug. This is step 3 in the CPSProgrammer.
- As a last step (step 4) we can create zones and fill the zones with the channels we have written into the code plug.

[illegible]

28.01.2018, 15:57

```
num;dmrid;callsign;qrg;shift;cc;mix;ctcss;net;city;cnty;country;ctry;lat;lon;longcall
489;262866;DB0RTA;438,36250;-7,600;1;0;DMR-plus;Gilching;Bayern;Germany;DEU;48,11044;11,32423;DB0RTA
```

CPSProgrammer requires some of this labels, as well as additional labels to define RXGroupLists, ScanLists, names, TalkGroups and many other things required from the CP. Please have a look at the CSV file which comes with the software download:

Labels used by CPSProgrammer  
([1]=x: data comes with the CSV downloaded from the dmr-database)

| Label      | Values | [1] | Required_for         | Description  |
|------------|--------|-----|----------------------|--|
| callsign   | text   | x   | DMR, FM              | This is the callsign of the repeater which gets displayed in your transceiver, e.g. DB0RTA   |
| qrg        | number | x   | DMR, FM              | This is the frequency where your DMR transceiver will receive, e.g. 438.3525 or 438,3525   |
| shift      | number | x   | DMR, FM              | This is the shift of the repeater, e.g. -7,6 or 0 for simplex frequencies  |
| cc         | number | x   | DMR                  | This is the number of the colour code, e.g. 1  |
|            | c      |     | FM                   | If field is left empty, CTCSS is applied to TX only. If set to "c", CTCSS is set to TX and RX.   |
| mix        | m,     | x   | DMR                  | Defines, whether the repeater is a pure DMR or a mixed mode repeater. <ul style="list-style-type: none"> <li>• Must be "m" for mixed mode (TS1, TS2 and a FM channel will be generated)</li> </ul>   |
|            | s1, s2 |     | DMR                  | <ul style="list-style-type: none"> <li>• Leave field empty for normal operation (TS1 and TS2 will be generated)</li> <li>• If set to "s1" (single TS1), only TS1 will be generated, independent of a possible frequency shift other than 0.</li> <li>• If set to "s2" (single TS2), only TS2 will be generated, independent of a possible frequency shift other than 0.</li> </ul>   |
| ctcss      | number | x   | DMR (mixed mode), FM | Frequency of the CTCSS signal if required. Any notation may be used (e.g. 88, 88.5 or 88.5. Also Digital Coded Squelch codes can be defined (e.g. D445N). Please note, that digital codes may not be compatible between different devices (TYT, Hytera, ...). <ul style="list-style-type: none"> <li>• For callsigns marked with mix=m (mixed more), both CTCSS encoder (TX) and decoder (RX) will be programmed with the CTCSS frequency</li> <li>• For pure analogue channels: <ul style="list-style-type: none"> <li>◦ by default, CTCSS encoder (TX) only will be programmed</li> <li>◦ if field CC is set to "c", CTCSS encoder (TX) and decoder (RX) will be programmed with the CTCSS frequency.</li> </ul> </li> </ul> |
| net        | text   | x   | DMR                  | DMR-net. Used to insert characters after the callsign: dmr-plus: #, hytera: H, marc: M   |
| dmrid      | number | x   | FM (optional)        | This field is not mandatory for CPSProgrammer, however if a FM channel contains a valid DMR-ID (Number > 100,000) in this field, it will be treated like a mixed-mode channel: A net-delimiter for MixedFM will be appended (e.g. %FM).  |
| 0          | any    |     | -                    | Not required and not recognised by the programmer, but very useful to keep the header line on top, when sorting the CSV lines in different order in your table calculation.  |
| type       | a, d   |     | DMR, FM              | <b>Defines the type of the channel</b> , Enter <b>a</b> for analogue (FM) or <b>d</b> for digital (DMR) channels   |
| callex1    | text   |     | DMR                  | Additional description of timeslot 1, added to the callsign and displayed at the transceiver   |
| callex2    | text   |     | DMR                  | Additional description of timeslot 2, added to the callsign and displayed at the transceiver   |
| txcontact1 | text   |     | DMR                  | Name of the default TX Talkgroup for TG1 in the pull down menu, e.g. TG262   |
| txcontact2 | text   |     | DMR                  | Name of the default TX Talkgroup for TG1 in the pull down menu, e.g. TG9   |
| rxgroup1   | text   |     | DMR                  | Name of the RXGroup for TG1 in the pull down menu, e.g. WW   |
| rxgroup2   | text   |     | DMR                  | Name of the RXGroup for TG2 in the pull down menu, e.g. WW   |
| pwr        | h, l   |     | DMR, FM              | Power for this channel, set to h for high or l for low   |
| scanlist1  | name   |     | DMR                  | Name of the Scanlist for TG1 in the pull down menu, e.g. Munich-DMR (Also used to specify the Roaminglist for PD785x)  |

|                 |      |   |     |   |
|-----------------|------|---|-----|---|
| scanlist2       | name |   | DMR | Name of the Scanlist for TG2 in the pull down menu, e.g. Munich-DMR-FM (Also used to specify the Roaminglist for PD785x)                                |
| scanlistfm      | name |   | FM  | Name of the Scanlist for FM in the pull down menu, e.g. Munich-FM. Also required for the FM channel of a mixed mode repeater (mix = 'm')                |
| any other value | -    | - | -   | Not recognised by the programmer. Can be used to insert comments into the CSV. Additional columns, provided by the DMR-database can be left in the CSV. |

An example for a channel.CSV accepted from CPSPProgrammer, containing two repeater frequencies, is shown below. When executed, CSPPProgrammer generates two channels for each line (TS1 and TS2) resulting in a total of 4 channels.

```
0;num;type;callsign;dmrid;qrg;shift;cc;mix;ctcss;net;city;cnty;country;ctry;lat;lon;longcall;callex1;
callex2;txcontact1;rxgroup1;txcontact2;rxgroup2;pwr;scanlist1;scanlist2;scanlistfm{line-break=@CRLF}
1;1;d;DB0DMR;262815;439.47500;-7.600;1;;DMR-plus;Feuchtwangen;;Germany;DEU;49.15835;10.32665;DB0DMR;
1TG262;2TG9;TG262 DL;WW;TG9 Lokal/Ref1.;WW;h;BY-Nord;BY-Nord;{line-break=@CRLF}
1;2;d;DB0LEO;262750;439.53750;-7.600;1;;DMR-DL;Leonberg;;Germany;DEU;48.80621;9.01525;DB0LEO;1TG262;
2TG9;TG262 DL;WW;TG9 Lokal/Ref1.;WW;h;Stuttgart;Stuttgart;{line-break=@CRLF}
```

## Channel.csv - what goes where?

```
0;num;type;callsign;dmrid;qrg;shift;cc;mix;ctcss;net;city;cnty;country;ctry;lat;lon;longcall;callex1;callex2;txcontact1;rxgroup1;txcontact2;rxgroup2;pwr;scanlist1;scanlist2;scanlistfm{line-break=@CRLF}
1;1;d;DB0DMR;262815;439.47500;-7.600;1;;DMR-plus;Feuchtwangen;;Germany;DEU;49.15835;10.32665;DB0DMR;1TG262;2TG9;TG262 DL;WW;TG9 Lokal/Ref1.;WW;h;BY-Nord;BY-Nord;{line-break=@CRLF}
1;2;d;DB0LEO;262750;439.53750;-7.600;1;;DMR-DL;Leonberg;;Germany;DEU;48.80621;9.01525;DB0LEO;1TG262;2TG9;TG262 DL;WW;TG9 Lokal/Ref1.;WW;h;Stuttgart;Stuttgart;{line-break=@CRLF}
```

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# Channel.csv - what is created

```
0;num;type;callsign;dmrid;qrg;shift;cc;mix;ctcss;net;...

1;1;d;DB0DMR;262815;439.47500;-7.600;1;;;DMR-plus;...
    → add 2 DMR channels: TS1 + TS2

1;2;d;OE3XTR;232391;438.40000;-7.600;1;m;;DMR-plus;...
    → add 2 DMR channels: TS1 + TS2 / plus 1 FM (Mixed-Mode)

1;3;d;DMR simplex TS1;0;433,5;0;1;s1;0;;;... → 1 DMR ch: TS1

1;4;d;DMR simplex TS2;0;433,5;0;1;s2;0;;;... → 1 DMR ch: TS2

1;5;a;FM-call;0;433,5;0;0;;123;;;... → one FM channel
```

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## Generation of display names (channel name)

Display names are made by concatenation of the *callsign* and *callex1* or *callex2* (depending on the TS). For special networks, an additional delimiter will be inserted before *callexN*: This allows you to distinguish between different networks, which use different talkgroups and operating techniques. Different delimiters can be configured by editing the ini-file. The following settings are provided with the default ini-file:

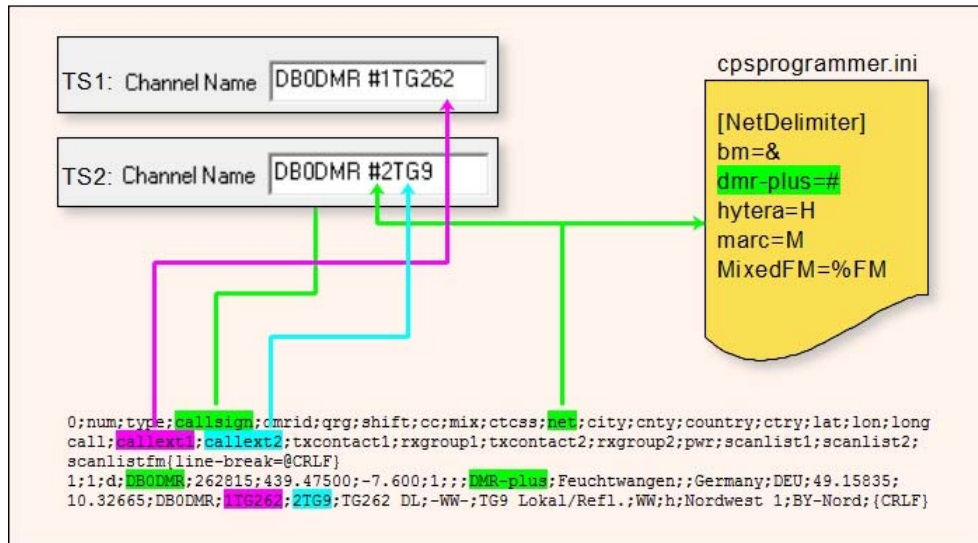
| Network name ( <i>net</i> ) | Delimiter |
|-----------------------------|-----------|
| BM (Brandmeister)           | &         |
| DMR-DL                      | (none)    |
| DMR-plus                    | #         |
| Hytera                      | H         |
| IPSC2                       | *         |
| Marc                        | M         |
| <i>Mixed-Mode FM</i> *)     | %FM       |

Sample: **DB0RTA #1TG262**, where *callsign*: DB0RTA, *net*: DMR-plus, *callex1*: 1TG262

**Important:** Please take care, that no channel name (e.g. DB0RTA #1TG262) occurs twice. CS700 programming software is not able to handle twice the same name and will respond with an error message, desynchronising the on-going program run.

\*) *Mixed-Mode FM*: This indicates a DMR-repeater providing FM mode on the same frequency as DMR. It usually transmits an CTCSS-signal on FM to allow an RX to suppress DMR signals.

# Channel Name - how its created



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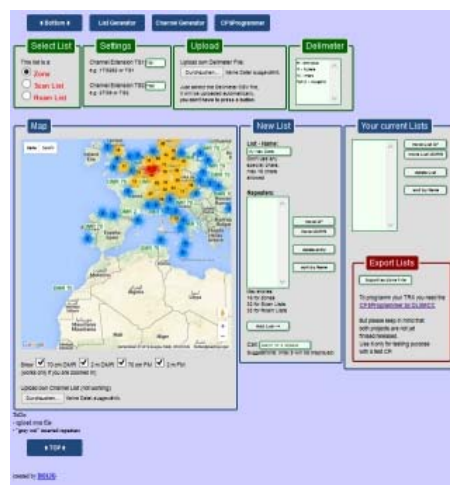
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## Coding Reference for Scan- and Roaminglists

To automatically generate and fill scanlists, a CSV with a specific format is required. The file contains one line for each scanlist, starting with the name of the scanlist and followed by the channel names.

```
ScanList;Ch1;Ch2;Ch3;Ch4;Ch5;Ch6;Ch7;Ch8;Ch9;Ch10;Ch11;Ch12;Ch13;Ch14;Ch15;Ch16;Ch17;Ch18;Ch19;
Ch20;Ch21;Ch22;Ch23;Ch24;Ch25;Ch26;Ch27;Ch28;Ch29;Ch30;Ch31{line-break=@CRLF}
MUC-DRM-FM;DB0NJ TS1;DB0NJ TS2;DB0TVM #TS1;DB0TVM #TS2;DB0PUC HTS1;DB0PUC HTS2;DB0RTA #TS1;
DB0RTA #TS2;DB0RTA %FM;DB0FSG HTS1;DB0FSG HTS2;DB0HKN TS1;DB0HKN TS2;DB0PME TS1;DB0PME TS2
;DB0AAT #TS1;DB0AAT #TS2;DB0AAT %FM;DB0ESS #TS1;DB0ESS #TS2;DB0ESS %FM;DM0ESS #TS1
;DM0ESS #TS2;DM0ESS %FM;DF0ANN TS1;DF0ANN TS2;DB0FUE #TS1; DB0FUE #TS2;DO0ET #TS1
;DO0ET #TS2;DO0ET %FM;{line-break=@CRLF}
Bodensee;DM0ESS #TS1;;;;;;;;;;;;;;;{line-break=@CRLF}
```

The only recognised labels are "scanlist" which contains the name of the scanlist, and "ch1" through "ch31" which contain the channel names to be added to this scanlist (**Note:** channel 32 is the selected channel itself). If less than 32 channels are added, the channelname is a zero-string "", which means that it's just followed by the next semicolon ";". As an example, the scanlist "Bodensee" contains only one channel.



To generate scanlists, you may comfortably use [DO1JG's scanlist & zonelist CSV-generator](#)

For a Roaminglist the same structure is valid, as for a Scanlist. The keyword in the CSV, line 1 is "RoamList". Please note, that roaming is not supported by all devices.

## Coding Reference for Zones



To automatically generate and fill Zones, a CSV with a specific format is required. The file contains one line for each zone, starting with the name of the Zone and followed by the channel names.

```
ZoneList;Ch1;Ch2;Ch3;Ch4;Ch5;Ch6;Ch7;Ch8;Ch9;Ch10;Ch11;Ch12;Ch13;Ch14;Ch15;Ch16{line-break=@CRLF}
Munich;DB0NJ 1TG262;DB0NJ 2TG9;DB0TVM #1TG262;DB0TVM #2TG9;DB0PUC #1TG262;
DB0PUC #2TG9;DB0RTA %FM;DB0FSG #1TG262;DB0FSG #2TG9;DB0HKN 1TG262;DB0HKN 2TG9;
DB0TTB #1TG262;DB0TTB #2TG9;DB0PME 1TG262;DB0PME 2TG9;DB0AAT #1TG262{line-break=@CRLF}
```

The only recognised labels are "zonelist" which contains the name of the scanlist, and "ch1" through "ch16" which contain the channel names to be added to this Zone. If less than 16 channels are added, the channelname is a zero-string "", which means that it's just followed by the next semicolon ";".

Hytera V8 codeplugs do allow up to 256 channel per zone. CPSProgrammer does support this feature by accepting additional columns Ch17;Ch18 ...Ch256. It is not mandatory to use consecutive numbers. Any amount of columns between 16 and 256 is accepted.

To generate zones, you may also use [DOIJG's scanlist & zonelist CSV-generator](#)

## Coding Reference for RX Groups

To automatically generate and fill RXGroups, a CSV with a specific format is required. The file contains one line for each RXGroup, starting with the name of the Group and followed by the TalkGroup names.

```
RxGroups;tg1;tg2;tg3;tg4;tg5;tg6;tg7;tg8;tg9;tg10;tg11;tg12;tg13;tg14;tg15;tg16;tg17;tg18;tg19;
tg20;tg21;tg22;tg23;tg24;tg25;tg26;tg27;tg28;tg29;tg30;tg31;tg32;tg33;tg34;tg35;tg36;tg37;tg38;
tg39;tg40;tg41;tg42;tg43;tg44;tg45;tg46;tg47;tg48;tg49;tg50;tg51;tg52;tg53;tg54;tg55;tg56;tg57;
tg58;tg59;tg60;tg61;tg62;tg63;tg64{line-break=@CRLF}
WW;TG1 WW;TG10 DE-WW;TG110 UA-DE;TG113 UA-EN;TG119 UA-any;TG120 UA-DE;TG123 UA-EN;TG129 UA-any;
TG13 EN-WW;TG2 EU;TG20 DACH;TG204 NL;TG206 ON;TG228 HB9;TG230 Czech;TG232 OE;TG235 GB;TG238 OZ;
TG262 DE;TG2628 DE-BY;TG8 regional;TG9 local;TG99 Simplex;;;;;;;;;;;;;
;;;;;;;;;;{line-break=@CRLF}
```

The only recognised labels are "RxGroups" which contains the name of the RXGroup, and "tg1" through "tg64" which contain the TG names to be added to this RXGroup. If less than 64 TGs are added, the TG-name is a zero-string "", which means that it's just followed by the next semicolon ";".

Please note, that different transceiver support a different number of maximum TGs per RXGroup. Please refer to "[features and limitations](#)" for manufacturer related information.

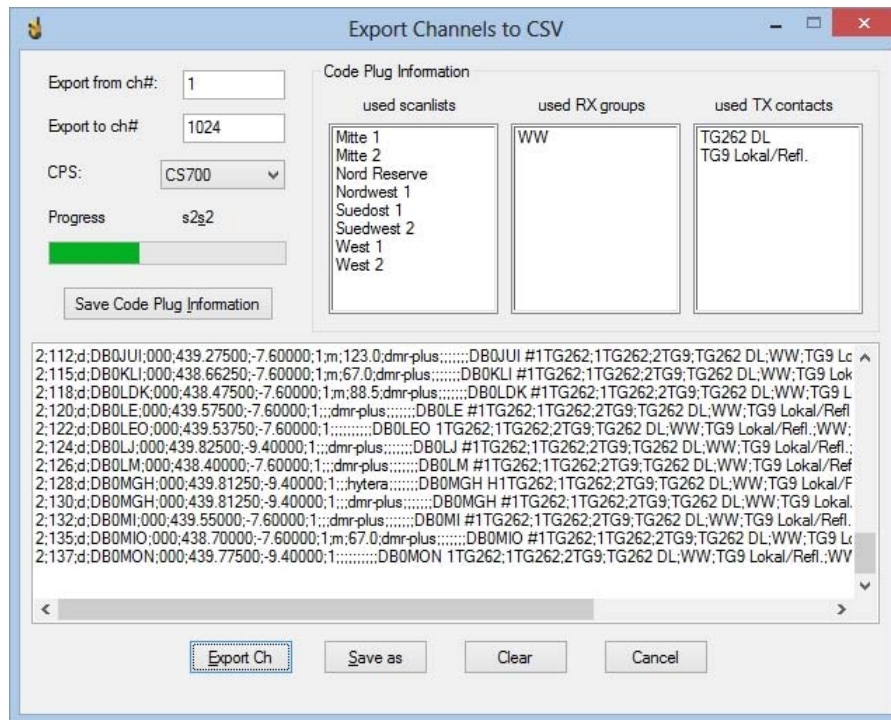
## Ini-File

The CPSProgrammer may be individually configured with an ini-file, **located in the same directory**. The [General] section applies to the whole program, while all the other sections only apply to a specific device, selected. The ini-file can be opened and edited with any text editor (e.g. notepad). The values provided below are default values, in case the related entry is missing, misspelled or the ini-file is missing.

[Download ini-file documentation](#) - last update 20180115

## Export Codeplug to CSV

CPSProgrammer can read the controls of the CPS and therefore export the channels of an opened codeplug into a CSV file. This can be used as backup, or as a base for codeplug development, to start from. This may also be used to copy channels between different DMR transceivers, which codeplugs are not interchangeable. Before you start "export channels", you have to open any channel with your CPS!

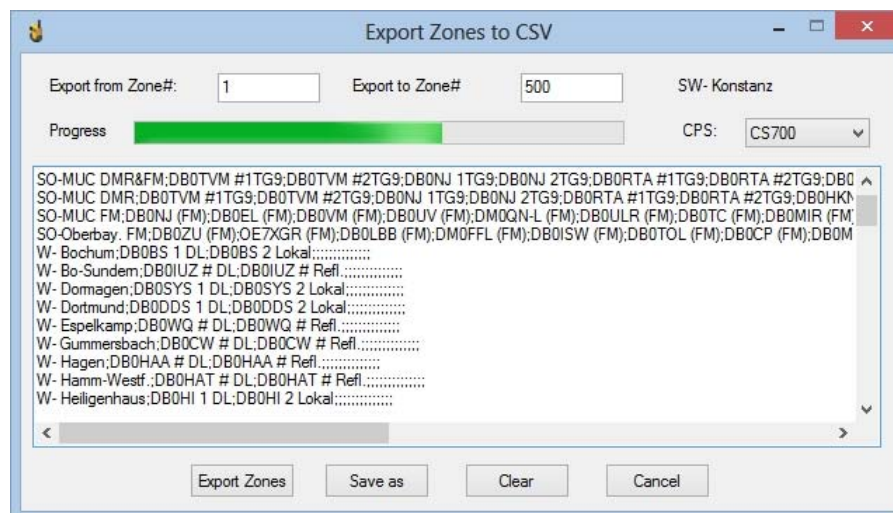


The picture above shows the export of channels from a CPS. The exported channels are written into a edit field in CSV notation first, where you can edit the data before storage. You may enter text, delete text or copy (ctrl+c) and paste (ctrl+v) text in the edit field. The red out channels are re-compiled into the CPSProgrammer format, where up to 3 channels (TS1, TS2, mixed-mode-FM) can be packed into one line, if applicable.

While exporting the channels, CPSProgrammer collects information about the used ScanLists, RXGroups and TXContacts in the codeplug being exported. This information is shown in the boxes under "Code Plug information" and can be saved in a text file by clicking the "Save Code Plug Information" button.

You may also define a range in your codeplug within the selected channels will be exported (a channel number can be found next to the navigation buttons in your CPS). With the default setting 1 ... 1024 ALL channels of a codeplug will be exported.

Exporting zones is shown in the picture below. The operation of exporting zones, scanlists and RXGroups as well, is quite similar to exporting channels, described above. Once the zones, scanlists or RXGroups are written into the edit-field, you can edit the CSV or save the data in a file by clicking "Save as".



## List Generators

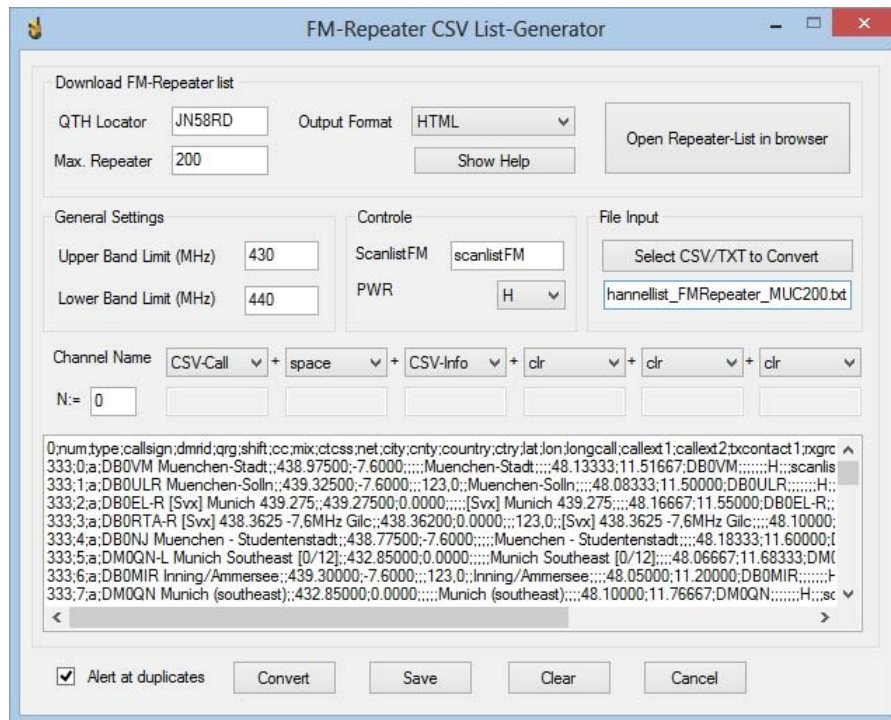
CPSProgrammer provides list generators for DMR and FM channels, to automatically generate channel-CSVs with consecutive frequencies, such as consecutive simplex- or repeater-channels. The generated channels are written into a edit field in CSV notation first, where you can edit the data before storage. You may enter text, delete text or copy (ctrl+c) and paste (ctrl+v) text in the edit field.

Below is an example, how to generate the European FM repeater channels with its former naming pattern R70, R70x ... R101x (x equals 12,5 kHz offset). The naming pattern for repeater channels now is different, but this example shows how powerful the channel list generator can be used.

The callsign ("channel name") to be displayed is generated automatically and made by a concatenation of up to 6 input fields. The following functions are available for each of the 6 fields:

- N: Insert counter value, incremented by one, each line. Usually starts by 0
- Text: Insert text, entered in the input field just below the combo-field
- space: Insert a single space " "
- N, N/2 ... N/16: Insert an integer N, or N/x (to generate x times the same number, e.g. N/2: generates 0, 0, 1, 1, 2, 2, ...)
- Nmod2 ... Nmod16: Insert the remainder of N/x. (e.g. N Mod 4 generates 0, 1, 2, 3, 0, 1, 2, 3, 0, ...)
- C1-3-5: Insert "Cx", cycling all odd numbers from 1 to 15: C1, C3, C5 ... C13, C15, C1, C3, C5, ...
- 0-0x: Inserts letter x, when N is an odd value (Used to generate R70, R70x, R71, R71x, ... in the sample above)
- 0-0text: Inserts the text, entered in the input field just below, when N is an odd value
- clr: Insert nothing (clear)
- f-RX.5: Insert RX frequency with 5 digits, e.g. 433.58750
- f-RX.4: Insert RX frequency with 4 digits, e.g. 433.5875
- f-RX.3: Insert RX frequency with 3 digits, e.g. 433.587

The picture above shows the DMR CSV List-Generator, which allows to generate a channel list with consecutive frequencies. The sample shown here, will generate consecutive channels according to the [DMR-Find](#) scheme.



The picture above shows the window of "Convert FM-Repeater List" with a converted repeater list. This allows you to convert a CSV file, downloaded from <http://relaislisten.darc.de/> into a format required from CPSPProgrammer. Via this Interface you have access to one of the biggest databases on amateur radio voice repeaters. Currently they have more than 8000 entries from more than 60 countries in their database. To build the channel-name for the newly generated CSV, two additional functions are provided:

- CSV-call: Adds the text provided with the "call" field of the input file
- CSV-info: Adds the text provided with the "info" field of the input file

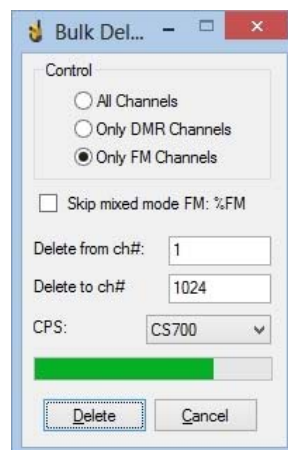
Please carefully check the input file for inconsistency and doubled entries. Sometimes information (e.g. repeater input frequency) is missing.

## Bulk Edit

To edit a bulk of channels in one time, CPSPProgrammer does provide bulk edit functions. Bulk Delete Channels (picture below) allows you to delete channels in your codeplug.

You can select if you want to delete all channels or only FM or DMR channels. You may also skip mixed mode channels (delimiter, e.g. %FM, is defined in the ini-file). You may also define a range in your codeplug within the selected channels will be deleted (a channel number can be found next to the navigation buttons on the left side). With the default setting 1 ... 1024 ALL channels in a codeplug will be deleted.

CPSPProgrammer first jumps to last channel in the codeplug and starts searching reverse. If the number of the current channel is lower or equal then "delete to ch" the current channel will be deleted, provided it fits to the selection (all, DMR, FM). If the channel number, given in "delete from ch" is reached, bulk delete stops.



Bulk Delete: The green progress bar shows the current progress.

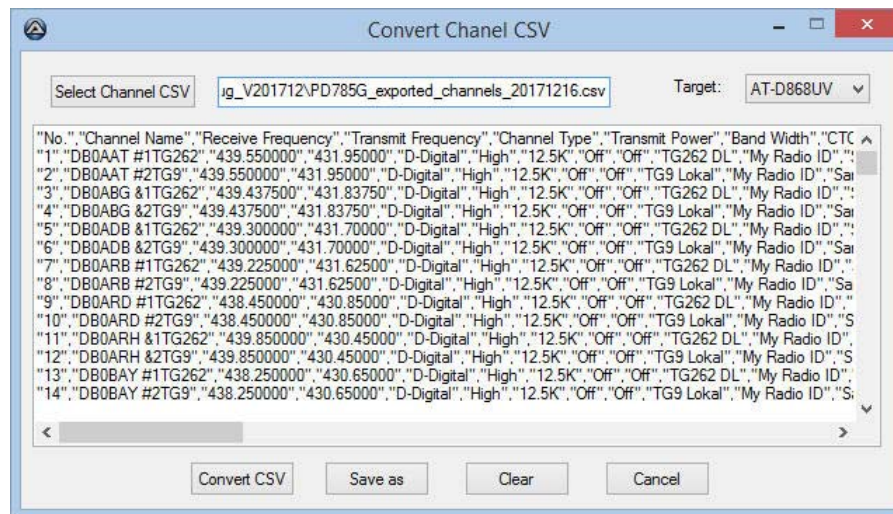
## Convert CSV

This new function allows you to convert CPSPProgrammer CSVs into CSV-formats accepted from third party Customer



Programming Software, for importing data.  
Following sources may be used as input for conversion:

- CPSProgrammer CSV, generated by exporting any existing codeplug from any supported CPS (Hytera, Tytera, Retevis)
- CSV generated from the current DMR-Repeater-Database. See [here](#) for detailed information.
- CSV containing consecutive frequencies (lists), generated by the integrated list generator. See [here](#) for detailed information.



Convert CSV: Allows to convert CPSProgrammer CSVs into other CPS (=target) CSV formats

## Downloads

|          |                  |  |  |
|----------|------------------|--|--|
| 0.39.0   | 28.01.2018       | <b>Ailunce HD1 - Converting CSVs:</b> Now converting channels.CSVs into Ailunce HD format is supported. Direct writing into CPS is supported as well, but may become obsolete in the future.<br><b>Anytone AT-D868UV:</b> Output-format of channel.CSV has been changed and required CPS V1.23+ now. | <a href="#">CPSProgrammer V0-39-0.zip</a><br><b>(Including Tutorial V0.02)</b> |
| Add ons: |                  |  |  |
| CSV      | 13.03.2016       | Channel CSV to program channels according to the <a href="#">DMRFind</a> scheme. e.g. display name "5C3" = Zone 5, Channel 3.<br>ZIP-file contains channellist.csv and zones.csv.  | <a href="#">channellistDMR_DMR-Find</a>  |
| INI      | frequent updates | Documentation for cpsprogrammer.ini  | Download from <a href="#">here</a>   |

## Codeplugs

Did you use the CPSProgrammer to create a codeplug and share it with other HAMs? Please let me know the link, to be provided here.

| Country | Area        | Description   | Link  |
|---------|-------------|---|---|
| DE      | Munich      | Codeplug, optimized for the Munich area. Also containing a VFO-like part. Available for CS700, MD380 (RT3, MD390), AT-585   | <a href="http://cp-cs700.ddns.net/index.php/cp-muenchen">http://cp-cs700.ddns.net/index.php/cp-muenchen</a> |
| DE      | Worldwide   | VFO-like Codeplug for most handheld and some mobile Hytera brand radios. Compatible with DL5DI schema, but covering a wider range of frequencies.<br>Corresponding online database under <a href="https://dmr.dm7ds.de">https://dmr.dm7ds.de</a> contains over 900 repeaters worldwide. | <a href="https://dm7ds.de">https://dm7ds.de</a>   |
| PA      | countrywide | MD380: All Dutch DMR repeaters, all Belgian DMR repeaters, all Dutch 70cm analogue repeaters, a Simplex zone with 8 DMR channels, 7 analogue channels and 3 PMR446 zones.   | <a href="http://www.pc5e.nl/md380">http://www.pc5e.nl/md380</a>   |



## History

|            |        |   |
|------------|--------|---|
| 2018-01-28 | 0.39.0 | <b>Ailunce HD1 - Converting CSVs:</b> Now converting channels.CSVs into Ailunce HD format is supported. Direct writing into CPS is supported as well, but may become obsolete in the future.<br><b>Anytone AT-D868UV:</b> Output-format of channel.CSV has been changed and required CPS V1.23+ now.  |
| 2018-01-23 | 0.38.1 | <b>Anytone AT-D868UV:</b> Supporting new format of DigitalUserList.CSV for CPS Version 1.22+<br>Select target := AT-D868UV-1.22+  |
| 2018-01-15 | 0.38.0 | <b>MD2017:</b> Support for GPS-Programming in ini-file: InCallCriteria=always / GPSSystem=1 / SendGPSInfo=check / ReceiveGPSInfo=check<br><b>Ailunce HD1:</b> Support for channel-writing (CPS-Version 1.61 and above)  |
| 2018-01-06 | 0.37.0 | <b>Anytone AT-D868UV - Converting CSVs:</b> Added Channels, Zones, Scanlists and RX-Groups<br><b>Improved:</b> New configuration parameter for converting DigitalUserContacts (AT-D868UV) in ini-file: UserListHighlight (see ini-file documentation).  |
| 2017-12-21 | 0.36.1 | <b>Improvements:</b> Changed file-handling on errors. Increased timeout time when writing large channel CSVs.<br><b>Converting CSVs:</b> First version to generate Digital Contact CSV for AT-D868UV  |
| 2017-11-27 | 0.36.0 | <b>MD2017/RT83:</b> Added support to export channels, scanlists, zones and RX-groups into CSV format.   |
| 2017-11-20 | 0.35.0 | <b>MD2017/RT83:</b> Added support to write analog/digital channel, writing and filling of scanlists. Bulk-delete now also works with MD2017/RT83<br><b>Ailunce HD1:</b> Added rudimentary support to write analog/digital channel.<br><b>INI-File:</b> New parameter TXfmax(min)VFO2 to allow out-of band warnings for dual-band transceiver as well!   |
| 2017-11-14 | 0.34.0 | <b>MD2017:</b> Added generating and filling of zones for VFO-A and filling for VFO-B. Use Step 5-B to fill VFO-B.   |
| 2017-09-04 | 0.33.0 | <b>PD785:</b> Added new function to allow export of roaming lists.  |
| 2017-04-17 | 0.32.0 | <b>General:</b> CPSProgrammer no longer distinguishes between analogue/digital in the device setting. Where it is necessary (channel access only), the programmer asks whether analogue or digital channels shall be accessed:<br><b>AR685/PD785:</b> Now import/export of scanlists supports up to 32 channels   |
| 2017-02-27 | 0.31.0 | <b>General:</b> Rearranged order of tabs in the main-window, in the order of a normal programming flow<br>- 1. RX-Groups, 2. ScanList/Roaming (generate empty lists), 3. Write channels, 4. Scanlist/Roaming (fill lists with channels), 5. Zones (generate and fill zones)<br><b>AR685/PD785:</b><br>- Added exporting RXGroups; AR685/PD785 allows up to 64 TGs per group<br>- Added export of zones with more than 16 channels; Now up to 256 channels per zone are supported<br>- Bugfix: Writing of zones with more than 16 channels, sometimes stopped at 16 channels, depending on CPS speed. This is fixed now.   |
| 2017-02-20 | 0.30.0 | <b>AR685/PD785:</b><br>- Added generating RXGroups; PD785 allows up to 64 TGs per group<br>- New ini-parameter Signalling-Type. Applies to FM-channels and may be used to activate 1750 Hz tone-call.<br>- Ini-parameter PhoneSystem, now applies to both FM- and DMR-channels. May be used to switch on DTMF-keyboard<br>- Improved filling of scanlists and roaminglists.   |
| 2017-02-10 | 0.29.0 | <b>AR685/PD785:</b><br>- Bugfix: CPS hanging when writing zones is fixed now.<br>- CPSProgrammer now supports zones with up to 256 channels now, using Hytera CPS V8  |
| 2017-01-05 | 0.28.0 | Ini-parameter <i>MaxLenCallsign</i> no longer applies in general. Now, this parameter only applies, if any of NET-delimiter or CallExt1/2 is really used. If both are empty, no length checking is applied any more.<br>And several <b>AR685/PD785 improvements:</b><br>- Export-Functions are back for Hytera's PD785 CPS.<br>- Also several improvements to stabilize filling of Zones, Scan- and Roaminglists on PD785<br>--- Check if the required mouse click is applied inside the CPS window, otherwise notify user<br>--- New ini-parameter <i>ZSListMouseDelay</i> , to better adapt programmer writing speed to CPS-speed.<br>See " <a href="#">ini-file</a> " for more information. Removed with version 0.29.0's bugfix |

|            |        |  |
|------------|--------|--|
| 2017-01-01 | 0.27.0 | <b>This and later versions no longer provide a separate admin version</b> for Hytera CPS, as the latest CPS versions do no longer require admin rights. Executable contains all types of CPS now. Implemented also a few improvements for PD785 (and compatible):<br>- Fixed an issue, where the channel name of digital channels was shortened to 15 characters.<br>- Fixed an issue with writing digital channels, where adding channels sometimes inserted additional empty channels, on slow CPSs.   |
| 2016-11-20 | 0.26.0 | New Export function, to export RXGroups: Currently implemented for CS700, MD380, RT3   |
| 2016-08-02 | 0.25.0 | Added a new function: Generate and fill RXGroups. Currently CS700, MD380 and RT3 will be supported. See <a href="#">description</a> above, for detailed information.   |
| 2016-07-27 | 0.24.5 | Minor Update: Check "dmrid"-field in CSV and treat channel as mixed-mode FM, in case a valid DMR-ID was found. See <a href="#">labels</a> for info.  |
| 2016-06-16 | 0.24.0 | Added new device CS750. This version supports writing of channels.   |
| 2016-06-01 | 0.23.0 | New option "MaxLenCallsign=" in cpsprogrammer.ini to control the length of callsigns in display names. See <a href="#">ini-file</a> for more information.<br>PD365 / PD785 CPs: Now Export of scanlists and zones is supported.  |
| 2016-05-25 | 0.22.1 | Minor Update: New option "ExportChCompileTS1TS2=". See <a href="#">ini-file</a> for more information.  |
| 2016-05-18 | 0.22.0 | Added additional status bar information (time, interaction with CPS). See <a href="#">ini-file</a> for more information.   |
| 2016-04-26 | 0.21.0 | Added new functions for PD365 / PD785 CPs:<br>- Export of channels into CSV-file<br>- New option "TOT_PreAlert=" in cpsprogrammer.ini to set PreAlert to a defined value. See <a href="#">ini-file</a> for more information.<br>For all devices: Optimized checking, if maximum number of channels is reached.   |
| 2016-04-14 | 0.20.0 | Added new functions for PD365:<br>- PD365: Add and fill scanlists. PD365 separates scanlists for FM and DMR.<br>First channel added, defines type of the scanlist. CPSPProgrammer takes care to only add the correct channel type<br>- PD365/PD785: new control TXAdmitFM in cpsprogrammer.ini allows to configure TX Admit Criterias for FM, independent from DMR<br>All devices:<br>- added a new function to control whether CTCSS is applied to TX only or to RX/TX. See <a href="#">labels</a> for info.<br>- checking the length of names for channels, scanlists and zones, before writing into CPS |
| 2016-04-02 | 0.19.0 | New Device Hytera PD365 is supported now!<br>- PD365: Write channels, generate and fill zones. Check if limits are reached.<br>- PD785: Now, the default channel added by the CPS to any zone created, will be deleted automatically.<br>- PD365/PD785: Force CPS to stay in foreground and to be focused.<br>- All: Check if the zone to start with, is really empty  |
| 2016-03-30 | 0.18.2 | Minor Updates:<br>- If "net"-name (or delimiter) and "callex1/2" is not used, the additional "space" after callsign is suppressed now<br>- Mixed mode-FM ("mix"=m) sets RX and TX-CTCSS (requires a valid MixedFM-delimiter), while<br>- pure FM channels (type "a") set TX-CTCSS only.  |
| 2016-03-15 | 0.18.1 | Bug Fix: failure when writing back exported scanlists, was fixed.<br>CS700/MD380/RT3: Check if maximum number of channels, scanlists or zones is reached.  |
| 2016-03-14 | 0.18.0 | New main menu export functions: Export scanlists / zones, allows to read scanlists or zones from a CPS and to store the scanlists and zones as CSV.  |
| 2016-03-06 | 0.17.0 | New main menu function: Export channels, allows to read channels from a CPS and to store the channels as CSV.<br>Bug Fix for RT3: Skipping fm when writing channels, was fixed.<br>Bug Fix GUI: Info labels (warnings/labels) did not update after running bulk delete.<br>CS700/MD380/RT3: Improved reliability for Bulk Delete and Writing Channels  |
| 2016-02-27 | 0.16.1 | Minor update: New .ini-file parameter "TOT_FM="; Defines Time-Out-Timer for FM-channels, independent from DMR-channels. "TOT=" now is only valid for DMR. See <a href="#">ini-file</a> for more information.   |
| 2016-02-22 | 0.16.0 | New functions and enhanced GUI-access for PD785x:<br>- Writing digital channels, now is <b>2-3 times faster!</b><br>- New controls accessible: IP-Multi Site Connect, Private Call Confirmed, Phone System, TX Admit   |

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|            |        | <p>Bug Fix for CS700/MD380/RT3: Increased timeout for Generating Zones (solves problems with very large numbers of channels)</p> <p>Some enhancements for GUI and lists:</p> <ul style="list-style-type: none"> <li>- Added "0-0text" option to the name generation of all list generators.</li> <li>- DMR list generator: enhanced activating/deactivating controls, related to selected modes</li> <li>- Added menu shortcuts (CTRL-D, CTRL-F, etc.) and controls via keyboard</li> <li>- Replaced CTRL-X with a Tray-Icon</li> </ul>  |
| 2016-02-16 | 0.15.0 | <p>Some improvements and new functions:</p> <ul style="list-style-type: none"> <li>- Bug Fix: Timing problem with "fill scanlist" when CPS-GUI is too slow (programmer faster than cps) is fixed by implementing a timeout.</li> <li>- Bug Fix: "Bulk Delete" with "delete from" &gt; 1 showing error message "nothing to do ..." even when finished correctly, is fixed</li> <li>- For all "Generate List CSVs": activate/deactivate controls and text-input where this is useful</li> <li>- Added a short "Help/Work Around"-text for FM-repeater list</li> <li>- Main Menu: "Bulk Edit" renamed to "Edit" to prepare future functions</li> <li>- New Icon: Portable radio</li> <li>- CS700/MD380/RT3: Added new channel control: "AdmitCriteria".</li> <li>- CS700/MD380/RT3: Added new global channel control: "PrivateCallConfirmed". See "<a href="#">ini-file</a>" for more information.</li> </ul> |
| 2016-02-12 | 0.14.0 | <p>Added some new tools</p> <ul style="list-style-type: none"> <li>- "Convert FM-Repeater List". Converts an online FM-repeater database into CPSPProgrammer format.</li> <li>- "Bulk Delete Channels" to delete a selection of channels</li> </ul> <p>Bug fix: Editing in drop-down boxes, causing malfunction, is disabled now.</p> <p>Improved all error and other messages.</p>  |
| 2016-02-05 | 0.13.0 | <p>Added some new functions:</p> <ul style="list-style-type: none"> <li>- Last used CPS will be stored in the ini file.</li> <li>- RT3-CPS now can be directly selected from "Select CPS"</li> <li>- Write channels: Check if current codeplug already contains channels. If more than one channel is found: Inform user, ask for permission to append CSV, if "yes" jump to the end and append channels to be written (CS700/MD380/RT3 only).</li> </ul>  |
| 2016-01-31 | 0.12.1 | Minor update: Added an error message, when CPS window is not open, or not accessible   |
| 2016-01-17 | 0.12.0 | Added a DMR channel-list generator, to generate CSVs with consecutive channel frequencies  |
| 2016-01-14 | 0.11.0 | Added a FM channel-list generator, to generate CSVs with consecutive channel frequencies   |
| 2016-01-10 | 0.10.0 | Added generating and filling of Roaminglists for PD785.  |
| 2016-01-07 | 0.09.6 | Preparing roaming lists for Hyteras, Generating of empty roaming lists works   |
| 2015-11-20 | 0.09.5 | Added writing / filling of zones, for PD785 (Hytera)   |
| 2015-11-15 | 0.09.0 | <p>Added new functions for PD785 (Hytera):</p> <ul style="list-style-type: none"> <li>- Writing analogue channels</li> <li>- Generating empty scanlists</li> <li>- Filling scanlists</li> </ul>  |
| 2015-11-05 | 0.08.2 | Added: Save last csv used. Tooltips for better description.  |
| 2015-10-29 | 0.08.1 | Improved error handling; Check CSV-files on consistency before start (all columns required are available?)   |
| 2015-10-23 | 0.08.0 | Added a function to generate and fill zones in the codeplug  |
| 2015-10-22 | 0.07.5 | <p>Added features and prepared writing of zones:</p> <ul style="list-style-type: none"> <li>- The value for the TOT, now is read from the ini-file instead of the CSV.</li> <li>- Use CTRL+x to pause the programmer. You may continue or exit the software</li> <li>- Mouse position 0,0 is no longer used to stop the programmer</li> <li>- Network delimiters are now defined in the ini-file</li> <li>- The network delimiters defined in the ini-file can be exported into a CSV. To be used for the scanlist/zones generator</li> </ul>  |
| 2015-10-17 | 0.07.0 | <p>Added features:</p> <ul style="list-style-type: none"> <li>- Supports the generation of scanlists from CSV, for CS700/MD380)</li> <li>- Supports filling scanlists with channels from CSV, for CS700/MD380</li> </ul>   |
| 2015-10-12 | 0.06.3 | Added a new feature, to allow the generation of a single DMR Channel using TS1 or TS2. Please check the <a href="#">table above</a> to see the new labels and features. Download will be provided with a new and updated CSV: channels-06.csv  |
| 2015-10-11 | 0.06.2 | Added GPSRevertChannel and RSSRevertChannel for PD785 programming. Both to be configured in the ini-file.  |

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|------------|--------|--|
| 2015-10-10 | 0.06.1 | Improved channel programming of PD785 in way, that no delay value has to be defined any more in the ini-file. The Programmer automatically detects, when the selection in the <i>Tx Group List</i> is finished.  |
| 2015-10-09 | 0.06.0 | First version, supporting Hytera PD785 => V0.06.0H. (Due to the characteristic of the PD785 CPS, the H version requires admin rights. Performance (programming speed) is much lower, compared to CS700/MD380.  |
| 2015-10-02 | 0.05.5 | Added features:<br>- Output a warning when requested Scanlist, RXGroup, TXContact, CC, ... can not be selected as it is missing in the codeplug (e.g. you try to assign scanlist "Munich" to a channel, but you have not yet created a scanlist "Munich" in this code plug.)<br>- Output a warning when transmit frequency is out of band. Band limits are defined in the ini-file.<br>- Minor improvements for saving the log |
| 2015-09-30 | 0.05.2 | Bug fixed: Error-message when there is no internet connection (Auto check for updates); Clean-up the code  |
| 2015-09-28 | 0.05.1 | Added features:<br>- rudimentary ini file to switch on/of the update check (avoid problems behind proxies)<br>- MD380 should work now (not yet tested on all of the TYT software versions, currently available)  |
| 2015-09-19 | 0.05.0 | Enhanced GUI with new functions:<br>- Added a log window. Content can be edited and stored as txt file.<br>- Software checks for updates after start up. Download page can be opened with default browser<br>- MD380 can be selected, but currently has no affect. / Warnings not implemented  |
| 2015-09-12 | 0.04.0 | Software now comes with Windows GUI.<br>- Significantly improved speed (300 channels in abt. 90 seconds, which took 10 Min. before).<br>- CSV File can be selected before<br>- Radio Programmer Software no longer has to be in foreground while programming. No more accidently influencing of other programs.<br>- RXGroups, Scanlists and TXContact are now defined by their name. Currently<br>- NO Logfile, NO Warnings.  |
| 2015-09-02 | 0.03.0 | Added a function to support DMR simplex frequencies, indicated by mix = s.   |
| 2015-08-29 | 0.02.1 | Minor changes in the display functions   |
| 2015-08-28 | 0.02.0 | Changed the starting position to "channel name". Added consistency checks for all integer values in the CSV. Added CTCSS programming. Added a log file.  |
| 2015-08-20 | 0.01.0 | This is the initial version of the programmer, which only supports the CS700 CPS so far. Runs in a terminal window and has no configuration features.  |

## Disclaimer and legal note

This software is a non commercial and experimental software for amateur radio (ham radio). It comes without warranty and with no support. The software is provided "as is," and you use the software at your own risk. I make no warranties as to performance, merchantability, fitness for a particular purpose, or any other warranties whether expressed or implied. No oral or written communication from or information provided by me shall create a warranty. Under no circumstances shall I be liable for direct, indirect, special, incidental, or consequential damages resulting from the use, misuse, or inability to use this software

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