Radar Application
User Manual Supplement
Plugin FCS Support Description
Supplement Revision 1.0

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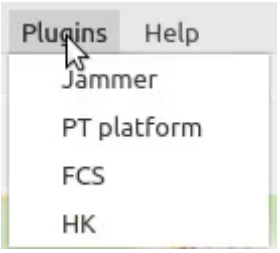
1. Introduction

The “Radar Application” is a graphical user interface (GUI) tool that allows its user not only to operate the radar devices, but also to extend application capabilities by additional plugins. This document describes FCS - TCP protocol plugin functionality. It is used to transmit data of a target, selected with a click-to-target utility, to other systems.

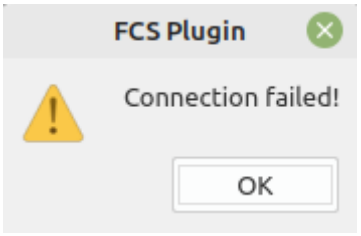
2. Connection

Plugin FCS is initialized as a TCP client in Radar Application. To integrate, the user must provide a TCP server to establish a connection. To open a TCP socket, choose Plugins in the menu bar:

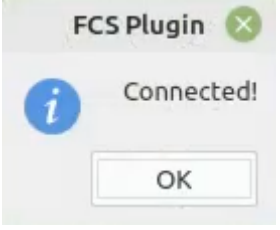


To add a plugin, select FCS in the list, a new window will pop up in the screen:

Users must provide an IP address and Port to a TCP server which determines TCP connection. **Heading offset is an additional value to offset track's azimuth by a constant value. It should be set to 0.0.** When connection is not established, a warning window will appear in the screen:



If connection is established, an information window will pop up in the screen:



Additionally, a label with connection status will appear in the radar panel:

FCS SOCKET ACTIVE

To send data to a TCP server, the user must select a target in the Track List or by Crosshair in the screen (described in User Manual Supplement Jammer + PT Platform Support Description Supplement Revision 1.0).

When connection is interrupted while radar operation, a warning message will pop up in the screen:

The connection label will also change status to:

FCS SOCKET INACTIVE

To remove the plugin, press the Remove button in the Plugin FCS window.

3. Protocol

3.1 Message protocol

All transmitted data shall be interpreted as ASCII characters. The general structure of messages to be transmitted by the RADAR system is summarized below. The protocol is loosely based on a NMEA format.

$aaccc,c—c*hh<CR><LF>

ASCII	HEX	DESCRIPTION
“$”	24	Start of Sentence
aa	-	Address Field: Alphanumeric characters. The first two characters identify the ‘talker’. In this case, these will be “RS” as the message will originate from the RADAR system.
“,”	2C	Field Delimiter: Starts each field except the address and checksum fields.
c—c	-	Data Sentence block: A series of data fields containing all the transmitted data. Data field sequence is fixed and defined by the Sentence Formatter. Data fields are preceded by “,” delimiters.
“*”	2A	Checksum Delimiter: Follows the last data field of the sentence and indicates that the following two alphanumeric characters show the hexadecimal value of the checksum.
hh	-	The hexadecimal value of the checksum.
<CR><LF>	0D 0A	Terminates Sentence

3.2 Checksum

A checksum field is transmitted in all messages. The checksum field is the last field in a message and follows the checksum delimiter character “*”.
The checksum is the 8-bit exclusive OR (no start or stop bits) of all characters in the message, including “,” and “^” delimiters, between but not including the “$” and the “*” delimiters. The hexadecimal value of the most-significant and least-significant 4 bits of the result is converted to two ASCII characters (0-9, A-F) for transmission. The most-significant character is transmitted first.

3.3 Message data

The message structure is detailed below.

$RS,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>,<13>,<14>,<15>,<16>,<17>,<18>,<19>,<20>*hh<CR><LF>

F.ID	F.Name	Format	Unit	Description
1	Target Range	x.xx	m (two decimal places)	Target Range
2	***Reserved field***	-	-	**Filled with NULL.**
3	Target Azimuth	xxx.xx	0.0 to 359.99 (degrees)	Target Azimuth Position Relative to predefined 0 position
4	Target Elevation	xxx.xx	0.0 to 359.99 (degrees)	Target Elevation Angle from Ground Level
5	Target Location, X	x.xx	m (two decimal places)	Location of Target in Cartesian coordinates, relative to the Radar.
6	Target Location, Y	x.xx	m (two decimal places)	
7	Target Location, Z	x.xx	m (two decimal places)	
8	Target Range Rate	x.xx	m/s (two decimal places)	Doppler Range Rate
9	***Reserved field***	-	-	**Filled with NULL.**
10	***Reserved field***	-	-	
11	***Reserved field***	-	-	
12	Target Classification	x	Integer value	Classification from UNDEFINED (0), DRONE (20), HIGH RCS (30).
13	Target RCS	x.xx	m^2 (two decimal places)	Radar Cross Section
14	Track ID	x	Integer	Unique Track ID for each Target
15	***Reserved field***	-	-	**Filled with NULL.**
16	***Reserved field***	-	-	
17	***Reserved field***	-	-	
18	Latitude	xx.xxxxxxx	degrees (7 decimal places)	Latitude Position
19	Longitude	xx.xxxxxxx	degrees (7 decimal places)	Longitude Position
20	Time of Data	hhmmss.sss	In ms precision (3 d.p seconds)	GPS UTC time

3.4 Example

Message sent to TCP server from TCP client (RS):

$RS,336.03,,122.96,41.92,113.67,-222.70,121.46,6.81,,,,20,0.13,2253,,,,54.5315497,18.4035351,113051.692*06\r\n

Message is translated to:

F.ID	F.Name	Value
1	Target Range	336.03
2	***Reserved field***	-
3	Target Azimuth	122.96
4	Target Elevation	41.92
5	Target Location, X	113.67
6	Target Location, Y	-222.70
7	Target Location, Z	121.46
8	Target Range Rate	6.81
9	***Reserved field***	-
10	***Reserved field***	-
11	***Reserved field***	-
12	Target Classification	20
13	Target RCS	13,2253
14	Track ID	2253
15	***Reserved field***	-
16	***Reserved field***	-
17	***Reserved field***	-
18	Latitude	54.5315497
19	Longitude	18.4035351
20	Time of Data	113051.692