

**APPROVED**

**KSFT. 00193-01 34 01-LU**

**PORTABLE RADIO STATION R-187-P1  
SOFTWARE COMPLEX**

**Dedicated file transfer software with**

**using a radio station**

**Operator's manual**

**KSFT. 00193-01 34 01**

**Sheets 43**


2 **KSFT. 00193-01 34 01**

## **ANNOTATION**

**This document "Portable radio station R-187-P1. Software package. Special transfer software files using the radio station. Operator's Guide" KSFT.00193-01 34 01 contains instructions for the operator on use special file transfer software.**

**The operator's manual (hereinafter referred to as the manual) consists of six sections, which reveals a description of the sequence of actions, necessary for the operation of this software and performance its targets.**

**This program is designed to transfer files and messages between two PCs, each of which is connected to a radio station portable R-187-P1 (hereinafter referred to as radio station).**

**CONTENT**

<b>1. Purpose of the program</b> .....	5
1.1. <b>Purpose</b> .....	5
1.2. <b>Composition</b> of the program.....	5
1.3. <b>Required configuration</b> .....	5
1.4. <b>Installation and uninstallation</b> .....	6
<b>2. Conditions for program execution</b> .....	7
2.1. <b>Preparing and launching the program</b> .....	7
2.2. <b>Connection setup</b> .....	8
<b>3. Execution of the program</b> .....	eleven
3.1. <b>General view of the main window interface</b> .....	. eleven
3.2. <b>Adding a contact</b> .....	12
3.3. <b>Contact management</b> .....	13
3.4. <b>Transferring files</b> .....	14
3.4.1. <b>File transfer conditions</b> .....	14
3.4.2. <b>Algorithm for initializing file transfer</b> .....	14
3.4.3. <b>File transfer process</b> .....	15
3.5. <b>Sending messages</b> .....	17
3.5.1. <b>Conditions for sending messages</b> .....	17
3.5.2. <b>Message transmission algorithm</b> .....	17
3.6 <b>Receiving files</b> .....	18
3.6.1. <b>File acceptance conditions</b> .....	18
3.6.2. <b>Admission process</b> .....	18
3.7. <b>Receiving messages</b> .....	20
3.7.1. <b>Conditions for receiving messages</b> .....	20
3.8. <b>Channel testing</b> .....	21
3.9. <b>Settings</b> .....	25
<b>4. Messages to the operator</b> .....	27
<b>5. Open mode communication protocol</b> .....	29
5.1. <b>Connecting to a radio station</b> .....	29
5.2. <b>Packaging</b> .....	29

5.3. Package format .....	29	
5.3.1. Header package .....	29	
5.3.2. Data package .....	32	
5.3.3. End-of-transmission packet .....	33	
5.3.4. Transfer Status Package .....	33	
5.3.5. Message package .....	34	
5.3.6. Message Receipt Acknowledgment Packet .....	35	
6. Private communication protocol .....	36	
6.1. Connecting to a radio station .....	36	
6.2. Packet format in closed mode PPF software for transmission files .....	36	
6.3. Description of packages for transferring files in private mode .....	36	
6.4. Data transmission cycle .....	39	
6.5. Description of packages for transmitting messages in a closed mode .....		40
6.6. Message transmission cycle .....	41	
List of abbreviations .....	42	

## **1. PURPOSE OF THE PROGRAM**

### **1.1. Purpose**

**Dedicated file transfer software with using a radio station (SPO PPF) is intended for transmission and receiving files and messages on a PC using radio stations portable R-187-P1.**

### **1.2. Program composition**

**SPO PPF consists of:**

- **software, including an executable file:**
  - **«PPF.exe»;**
- **plug-in library CP210xManufacturing.dll for the driver**
  - **CP210x;**
- **CP210x driver for connecting the radio station to a PC;**
- **operator's manuals.**

### **1.3. Required Configuration**

#### **1.3.1. Hardware**

**Required hardware configuration includes:**

- **PC:**
- **keyboard;**
- **mouse- type manipulator (MD);**
- **output device (monitor);**
- **CD drive ;**
- **IA32 processor architecture (x86, 32-bit version);**
- **CD with the KSFT.467371.001 program.**

### 1.3.2. **Software**

#### **Required software configuration, preinstalled**

##### **on PC OS:**

- ÿ Windows XP;
- ÿ Windows Vista;
- ÿ Windows 7.

### 1.4. **Installation and uninstallation**

**Open source software PPF does not require installation and, as a result, uninstallation, the program must be launched immediately after copying it from CD with the KSFT.467371.001 program. When copying a directory program along with all its files, launching the program possible from the directory into which the copy was made.**

## 2. CONDITIONS FOR IMPLEMENTATION OF THE PROGRAM

### 2.1. Preparing and launching the program

To launch the PPF open source software, the operator needs to do the following actions:

- make sure that all necessary hardware and software are available funds (according to clause 1.3. of the manual), as well as their performance;
- turn on the PC and monitor, if it requires a separate turn-on, wait for the operating system to load;
- if necessary, enter the credentials of the relevant user;
- if necessary, install the driver from the program CD KSFT.467371.001.

**Note.** Sequence of actions to turn on the PC and other hardware during OS boot and when entering credentials data are described in the documentation for operation and use relevant products;

- connect the radio station to the PC using a USB cable PAKD.685662.001 (from the radio set);
- insert the CD with the KSFT.467371.001 program into the drive PC for CDs. Wait until the operating room is ready systems for working with media;
- open the root directory of the CD with the program KSFT.467371.001, then copy the directory with the executables files to a convenient location on your hard drive;
- go to the copied directory;
- move the cursor over the file "PPF.exe" and double-click the left key UP.

Appearance of the connection settings window, immediately after launching the program is shown in Fig. 1.

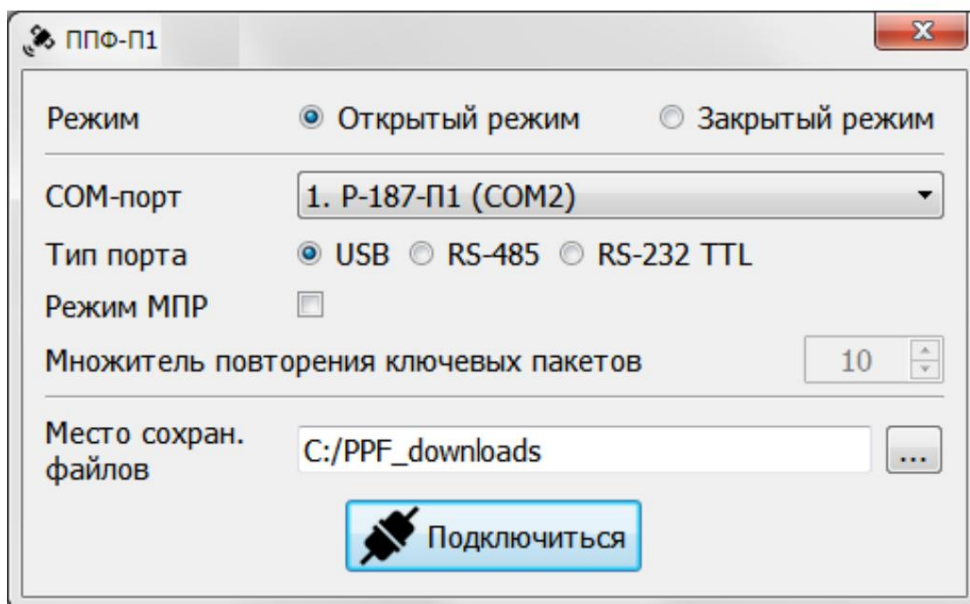


Figure 1 – Appearance of the connection settings window

## 2.2. Connection setup

To start working with open source software PPF, the operator must set parameters for connecting to the radio station in the connection settings window. Elements of the program interface at this stage are presented in Fig. 2.

### 2.2.1. The interface of this stage contains the following elements:

- mode switch: open / closed (1);
- drop-down list with available COM ports (2);
- port type switch: USB / RS-485 / RS-232 TTL (3);
- MPR mode switch (4);
- field for entering the key packet repetition multiplier value for MPR mode (5);
- button for selecting a location for saving received files (6);
- button to connect to a radio station with specified parameters (7).

**Note.** Operation in MPR mode is only possible for the radio station with installed software version no lower than 2.0.A.



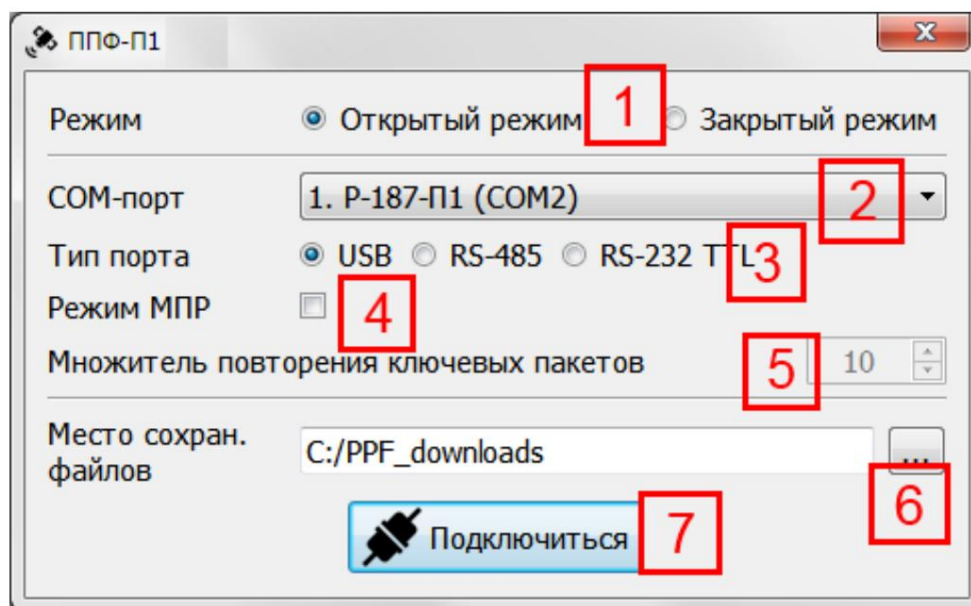


Figure 2 – Interface elements of the connection settings window

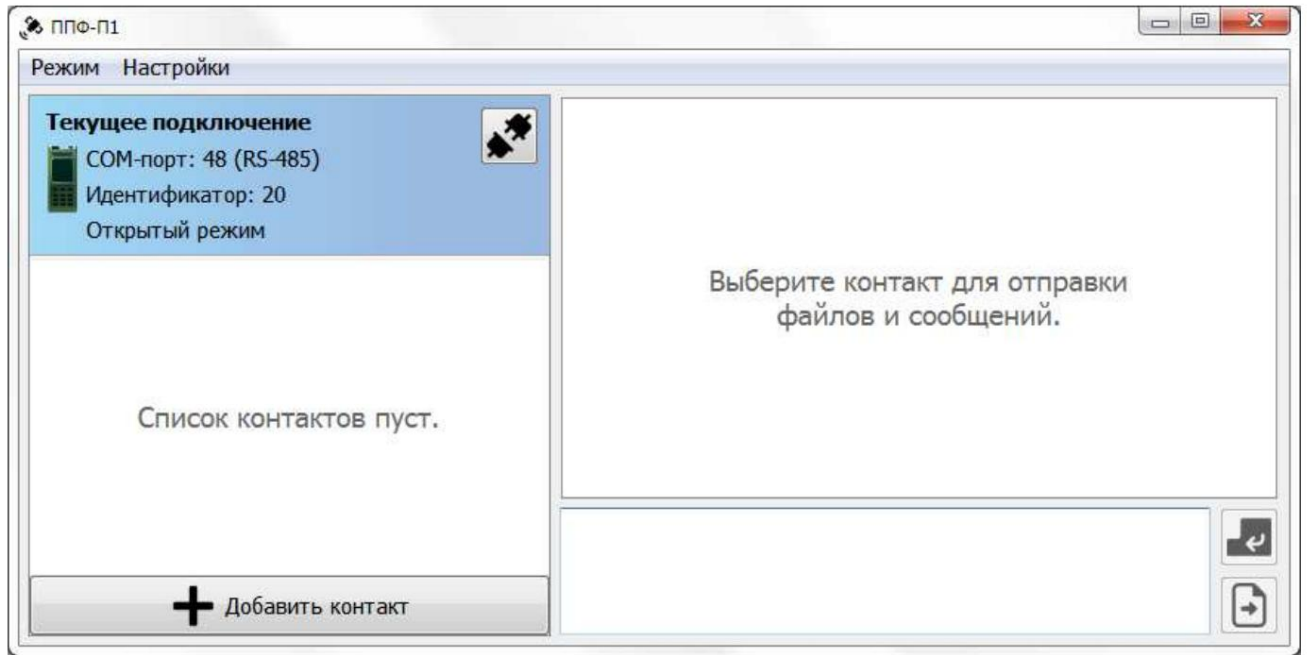
### 2.2.2 Connection setup algorithm:

- select the radio station operating mode (1);
- from the drop-down list select the radio station you want to access connect (2), after making sure that the switch port type (3) is set according to the connection method;
- when working in MPR mode, check the box (4);
- when working in MPR mode, enter the repetition factor key packages (5) or leave it at default;
- select the location to save the files by pressing the button (6), or leave it at its default value;
- Click the “Connect” button (7).

**Note.** When you select the closed operating mode, the additional setting parameter – “Identifier”. Necessary

Enter the radio station identifier in the input fields that appear.

If the connection is successful, the main window will appear, appearance which is shown in Fig. 3.



**Figure 3 – Appearance of the main window**

### 3. PROGRAM EXECUTION

#### 3.1. General view of the main window interface

The interface of the main program window is shown in Fig. 4.

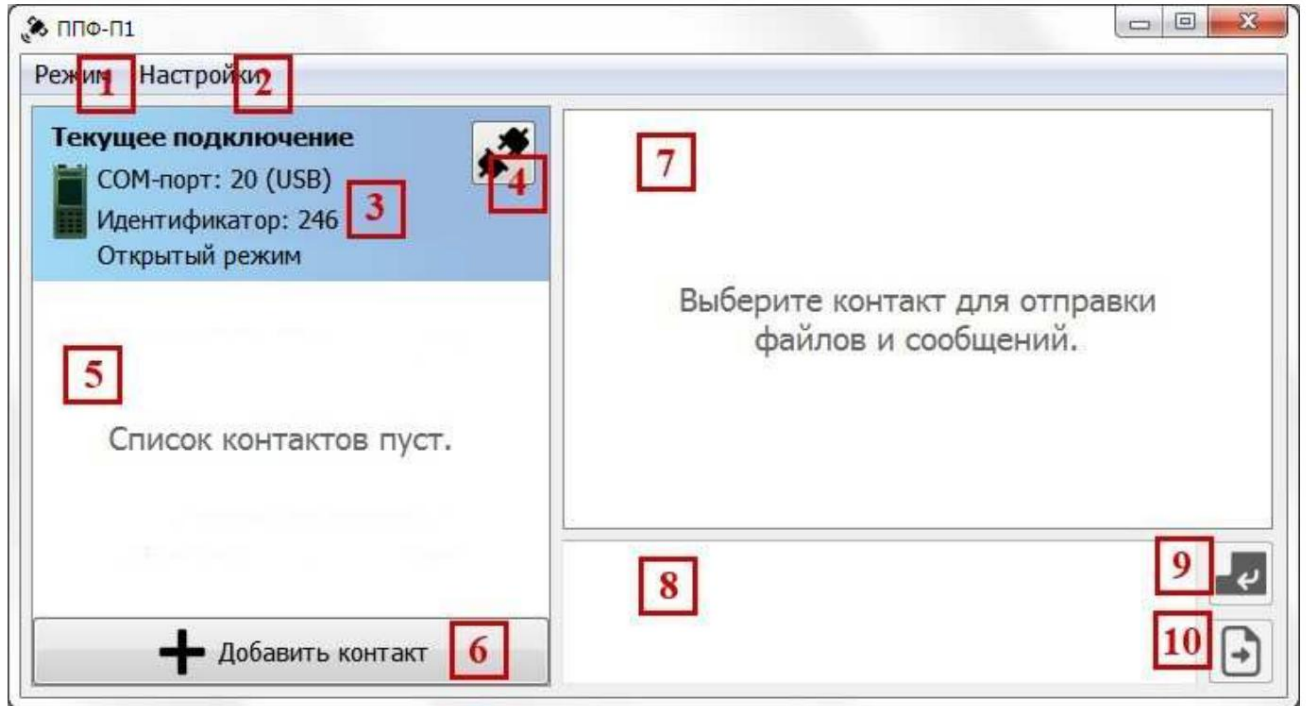


Figure 4 – Main window interface elements

The main window interface consists of the following elements:

- "Mode" menu (1);

• "Settings" menu (2);

• an area containing information about the current connection (3);

• radio disconnect buttons (4);

• contact list display areas (5);

• buttons for adding a new contact (6);

• chat display area of the selected contact (7);

• message input areas (8);

• message sending buttons (9);

• buttons for selecting files to send (10).

### 3.2. Adding a contact

To exchange files and messages with another subscriber, those using the PPF open source software must add it to their contact list. The uniqueness of the contact is determined by the radio station identifier subscriber

#### 3.2.1. Algorithm for adding a contact:

- in the main window (Fig. 4) click the “Add contact” button (6);
- in the window that appears (Fig. 5), enter the contact name;
- enter the contact ID (radio station number added contact);
- Click the “OK” button.

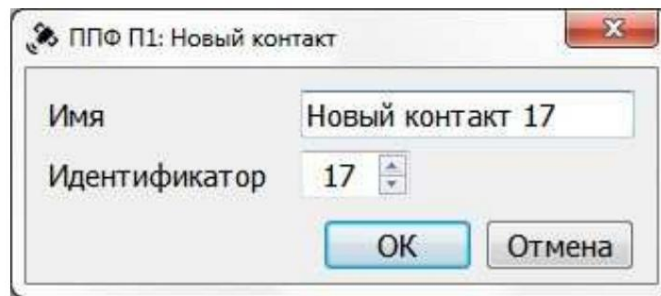
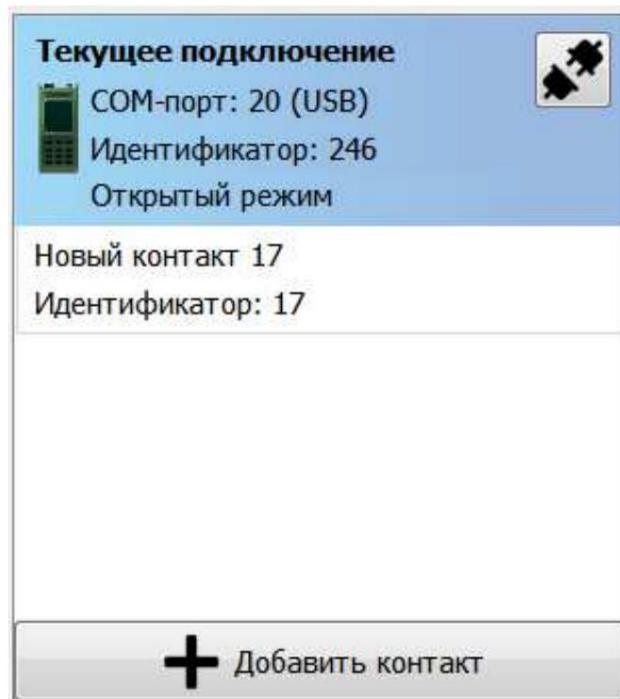


Figure 5 – Appearance of the window for adding a new contact

**Note.** Cannot create contact with ID equal to current. The name and ID must not be the same as those in contact list.

The added contact will appear in the contact list (5), which looks like presented in Figure 6.



**Figure 6 – Appearance of the contact list display area with added contact**

### 3.3. Contact management

Selecting a contact from the list is done by pressing the left button mouse along the line with the selected contact, which, when selected, is highlighted in green and appears on the right side of the contact card

contact control buttons – “Edit”



and "Delete"

(Fig. 7).

When you click the “Edit” button , a window similar to the one that appears when creating a new contact. In it you can change the contact name and ID.

The “Delete” button is designed to delete a contact.

Selecting a contact for exchanging files and messages is done with by double-clicking on the line with the selected contact in contact list. When selecting a contact in area (7), (see Fig. 4),

the chat window of the selected contact is displayed, and the message entry area (8) and the send buttons (9) and (10) are available.

You can also select contacts by switching between tabs in the area (7);



Figure 7 – Appearance of the area with contact controls

### 3.4. Transferring files

#### 3.4.1. File transfer conditions

To transfer files, the receiving side must be turned on, the PPF software is launched. Must be open the main window of the program, and the program must be in mode inaction. The contact ID must match the number receiving radio station.

#### 3.4.2. File transfer initialization algorithm

To initiate file transfer you must:

- select a contact from the contact list (double-click);

- click the “Send files” button (10) (see Fig. 4);
- in the dialog box that appears (Fig. 8), select speed sending;
- Click the “OK” button.

**Notes:**

1. For speeds of 144 kbps, 240 kbps and 256 kbps, mode is required VPD. Setting other speeds in the VPD mode does not guarantee file delivery.
2. In the dialog box (Fig. 8) the maximum channel transmission speed.
3. In closed mode, the set of available speeds is limited.

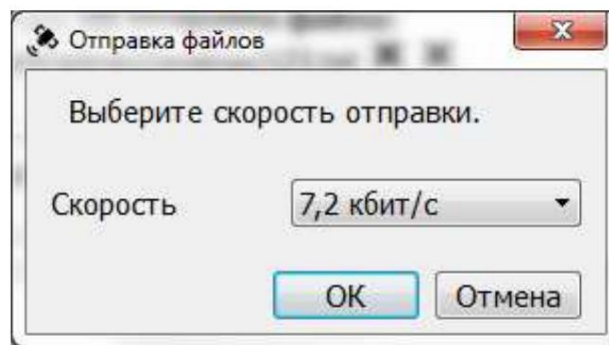
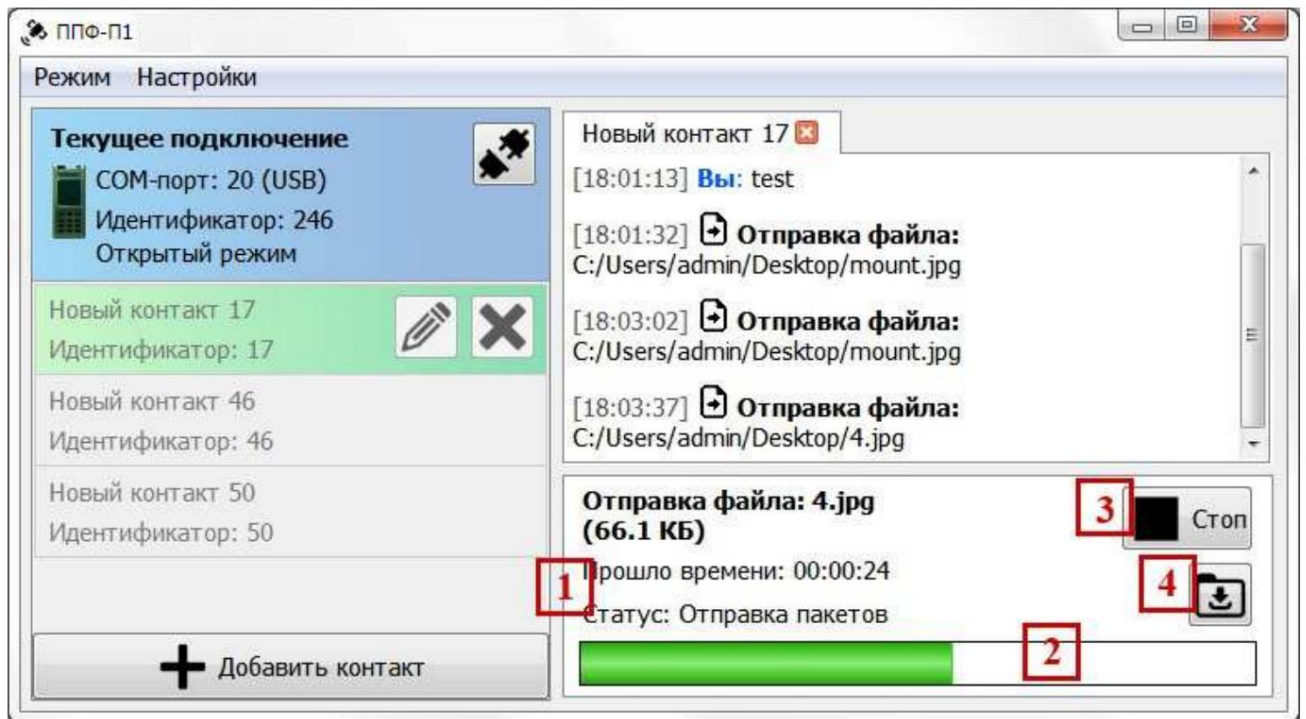


Figure 8 – Appearance of the file sending dialog box

### 3.4.3. File transfer process

During the file transfer process, the contact list is blocked, and the area text message input is replaced by an area that displays current file transfer status. The main window looks like this: shown in Fig. 9.



**Figure 9 – Appearance of the main program window during the transfer process  
file**

**Interface of the area where the current status is displayed  
file transfer is represented by the following elements:**

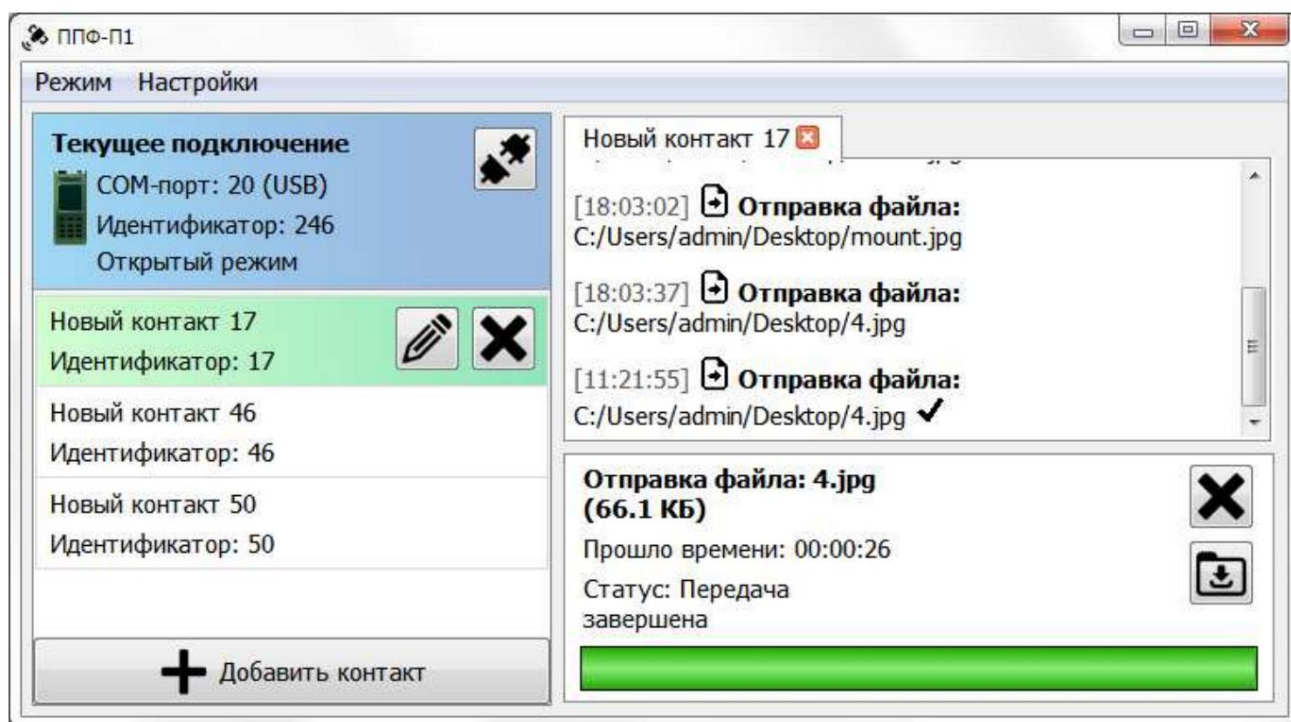
- **field displaying information about the file name, size  
file, sending time and current status (1);**
- **sending progress bar (2);**
- **stop sending button (3);**
- **button to open the downloads folder (4).**

**Note.** After the sending progress bar (2) is completely  
becomes full, the radio will need some time to clear the buffer.

**The transfer process can be interrupted by pressing the Stop button (3).**

**The transfer process includes periodic shipments of parts  
sent file that were not transferred successfully. Upon completion  
transfer process status will be changed to “Transfer complete”, timer  
will be stopped, and instead of the “Stop” button (3) the “Close” button will appear ,  
which hides the file transfer area and returns the input area  
messages. The main window will take the form shown in Figure 10.**





**Figure 10 – Appearance of the main program window after completion file transfer process**

**Note.** If the file transfer is successful, opposite the text in the message about sending the file, a check mark will appear in the chat.

### 3.5. Messaging

#### 3.5.1. Message transmission conditions

**To transmit messages on the receiving side**

The radio station must be turned on, the PPF software must be launched. Must be the main program window is open, and the program must be in idle mode. The contact ID must match the number receiving radio station.

**Note.** Messages cannot be sent while transmission is in progress or receiving files.

#### 3.5.2. Message transmission algorithm

**To send a message you must:**

**select a contact from the contact list (double-click);**

**enter the message text in the message input area (8)  
(see Fig. 4);**

**press the “Send message” button (9) (see Fig. 4) or  
Enter key ;**

**Note. If the message was successfully delivered, opposite the text  
sent message, a check mark appears in the chat.**

### **3.6 Receiving files**

#### **3.6.1. Terms accept file**

**To receive files, the receiving side must  
the radio station is turned on, the PPF software is launched, the main window is open  
program, while the program must be in idle mode.**

**The file receiving process is initialized automatically after  
as the sending party begins to transfer the file. Closed reception  
can be restored after a session break.**

#### **3.6.2. Admission process**

**During the process of receiving a file, the contact list is blocked, and the area  
text message input is replaced by an area that displays  
current file reception status. The main window will look like this :**

**in Fig. eleven.**

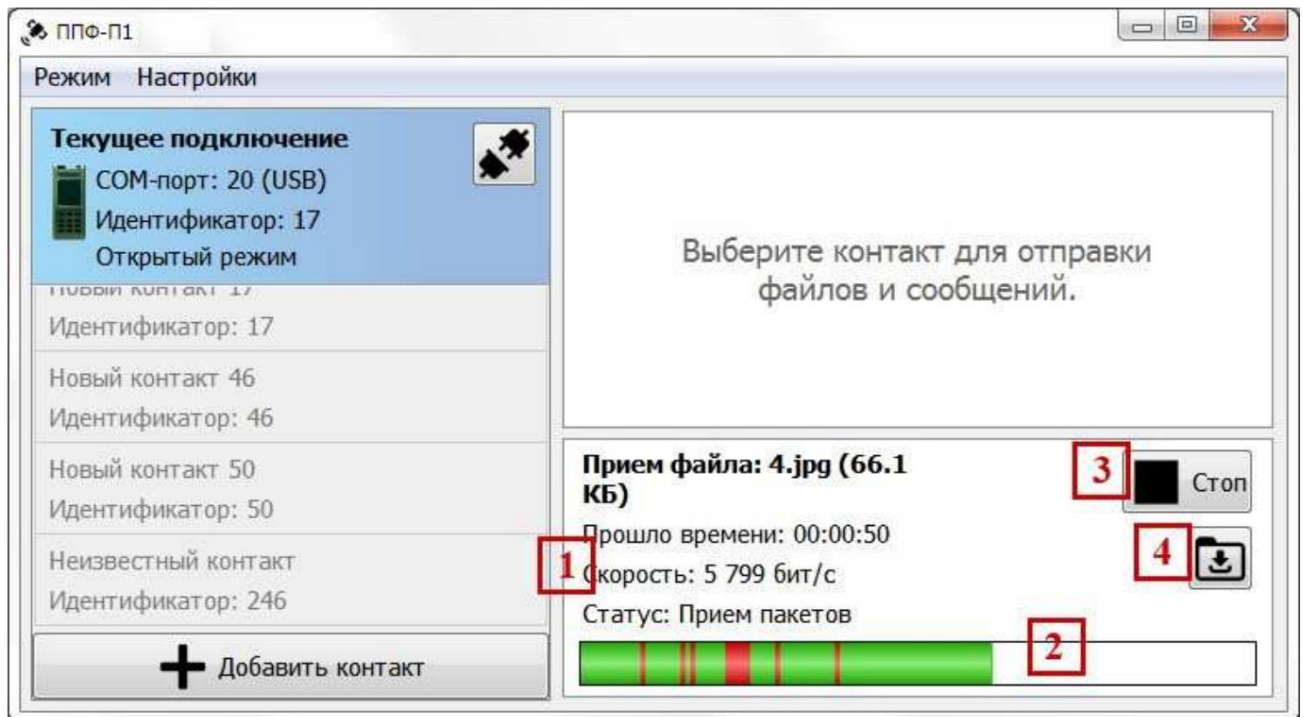


Figure 11 – Appearance of the main window during file reception

Interface of the area where the current status is displayed receiving a file, is represented by the following elements:

- field displaying information about the file name, size file, reception time, speed and current status (1);
- reception progress bar (2);
- reception stop button (3);
- button to open the download folder (4).

**Note.** Reception speed information displays information speed of receiving source blocks of the file.

Red areas on the reception progress bar indicate lost parts of the file that will subsequently be sent by the transmitting party.

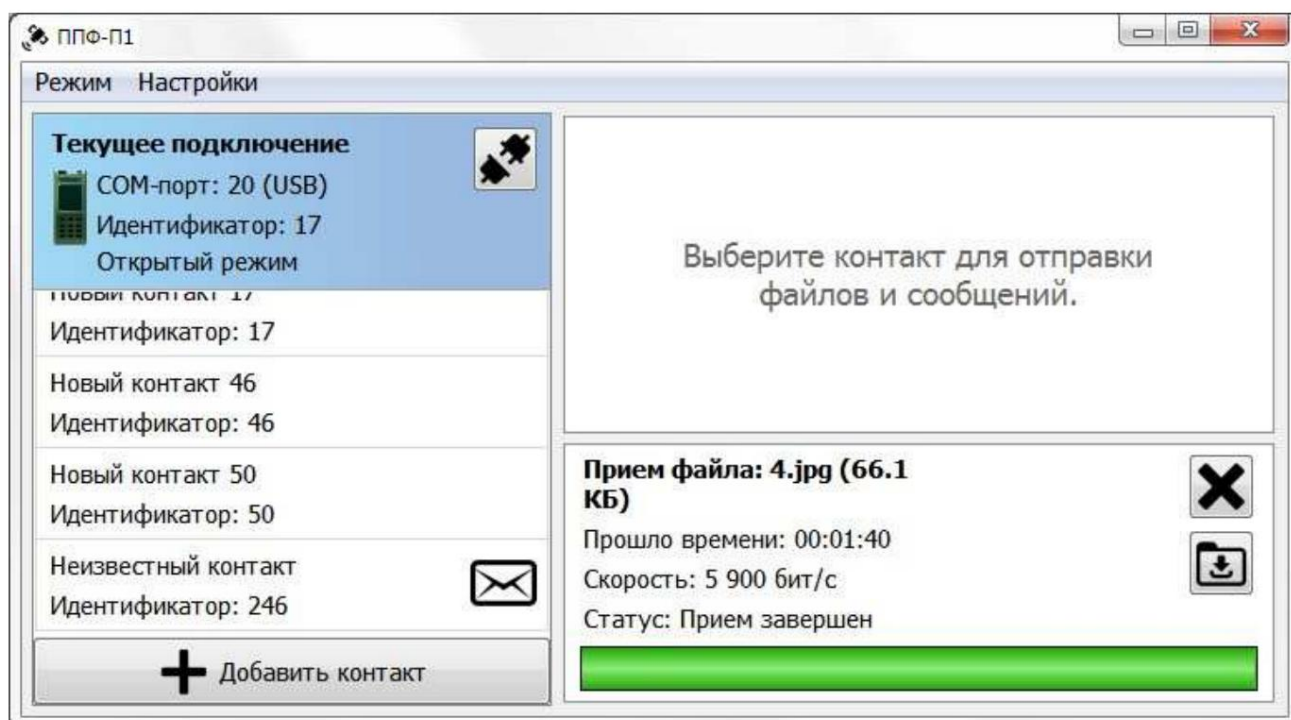
Successfully restored parts of the file are colored green.

The process continues until all

lost parts.

The reception process can be interrupted by pressing the “Stop” button (3).

The acceptance process includes periodic shipments of parts sent file that were not transferred successfully. Upon completion reception status of the process will be changed to "Reception completed", the timer will be stopped, the Stop button (3) will disappear and the button will appear instead "Close" which hides the file receiving area and returns the area for entering a message. The main window will take the form shown in Fig. 12.



**Figure 12 – Appearance of the main program window after completion file receiving process**

If the contact from whom the file is being received is not selected, then on the contrary contact, a flashing envelope icon will appear.

### 3.7. Receiving messages

#### 3.7.1. Conditions for receiving messages

To receive messages on the receiving side

the radio station must be turned on, the PPF software must be launched, the main one must be open program window, and the program must be in mode inaction.

If the contact from whom you are receiving a message is not selected, then  
A flashing envelope icon will appear next to the contact. In such  
In this case, you need to open the chat of this contact by selecting him in the contact list.

### 3.8. Channel testing

SPO PPF has functions that allow you to assess the quality  
communication channel. In this mode there is a receiving and transmitting side.  
The transmitting side sends a pseudo-random data stream, which  
the receiving side analyzes for bit errors and losses  
transmitted data.

3.8.1. To switch from file reception and transmission mode to  
channel testing, you need to select the item in the "Mode" menu (1) (see Fig. 4)  
"Testing the channel." The main window will take the form shown in Fig. 13.

The channel test mode interface contains the following  
elements:

- "Mode" menu (1);
- drop-down list for mode selection: reception or transmission (2);
- start / stop button for working in the selected mode (3);
- radio disconnect button (4);
- data transfer parameters area (5);
- transmission and reception statistics area (6);
- program window snapshot button (7).

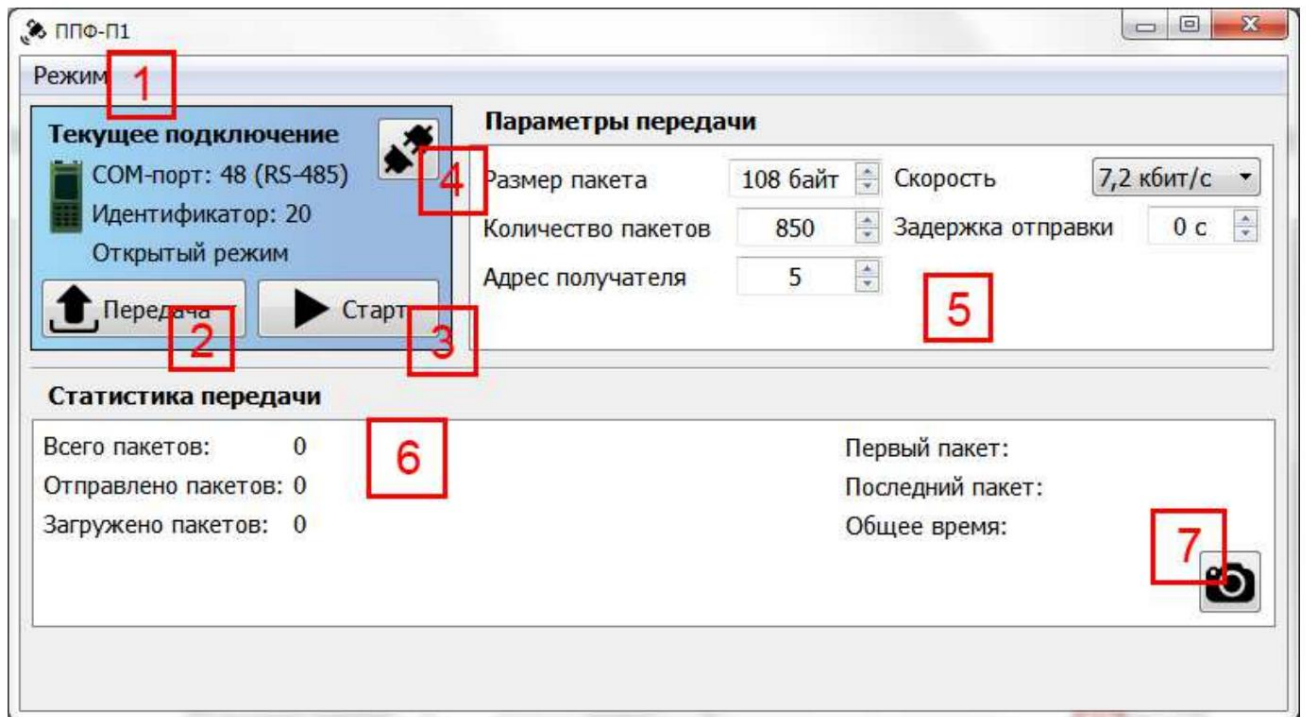


Figure 13 – Appearance of the main program window in testing mode

channel

### 3.8.2. Initialization algorithm for the transmitting side:

- in the drop-down list (2) select “Transfer”;
- select the transmission speed in the transmission parameters area (5);
- enter the number of packages;
- enter the recipient's address;
- press the “Start” button (3).

#### Notes :

1. It is recommended to use a package size that is set automatically when selecting speed.
  2. A delay in dispatch is required if the transmission data is not produced immediately.
- The “Start” button (3) will change to “Stop”, the main window will look like

shown in Fig. 14.

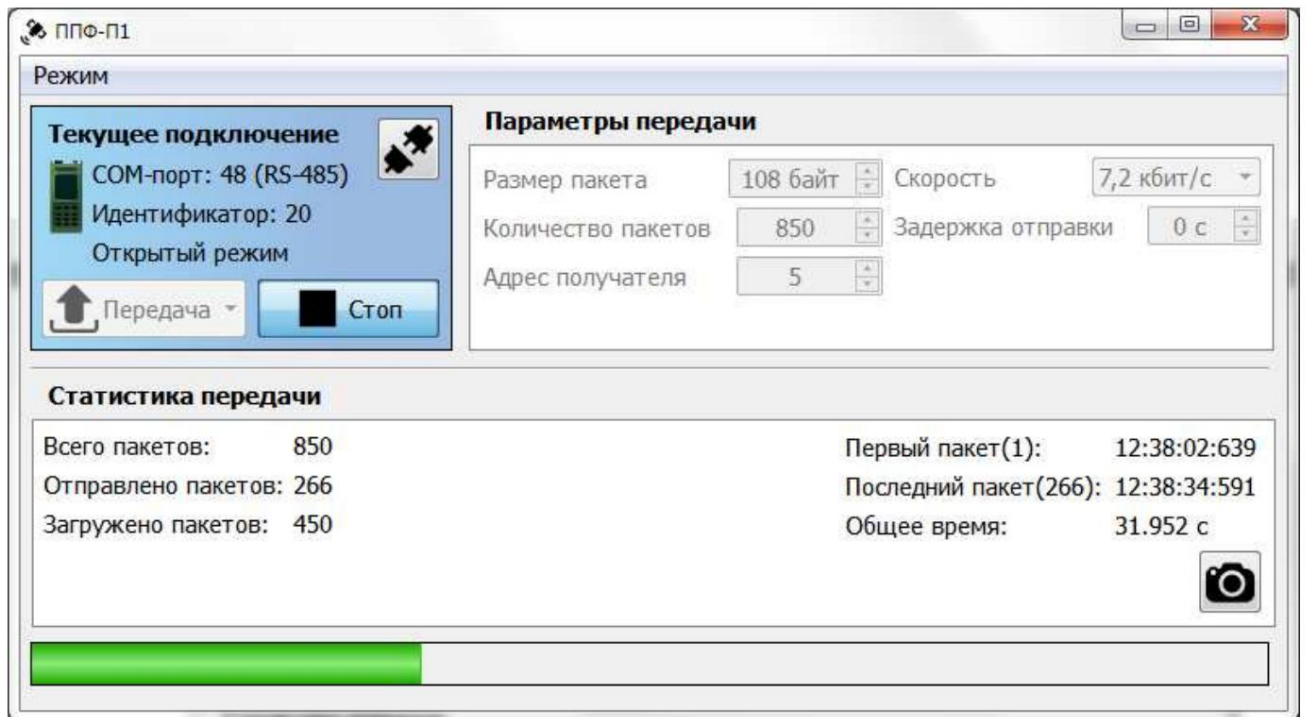


Figure 14 – Appearance of the main program window when transferring in channel testing

The process of data transmission in channel test mode can be interrupted by pressing the “Stop” button (3) (see Fig. 13). Bottom of the window The data transfer progress bar is displayed. Upon completion of the process the "Stop" button (3) will again change to the "Start" button, and on the strip progress, the message “Transfer complete” will appear.

### 3.8.3. Receiving side initialization algorithm:

in the drop-down list (2) (see Fig. 13) select “Reception”.

The Transfer Options area (5) changes to the Transfer Options area reception”, the appearance of which is shown in Fig. 15.

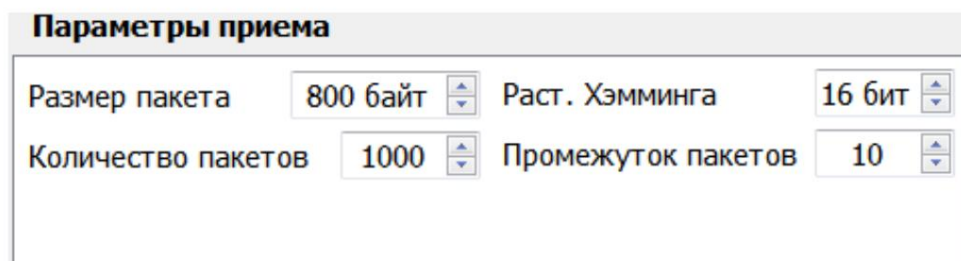


Figure 15 – Appearance of the “Reception parameters” area during testing channel

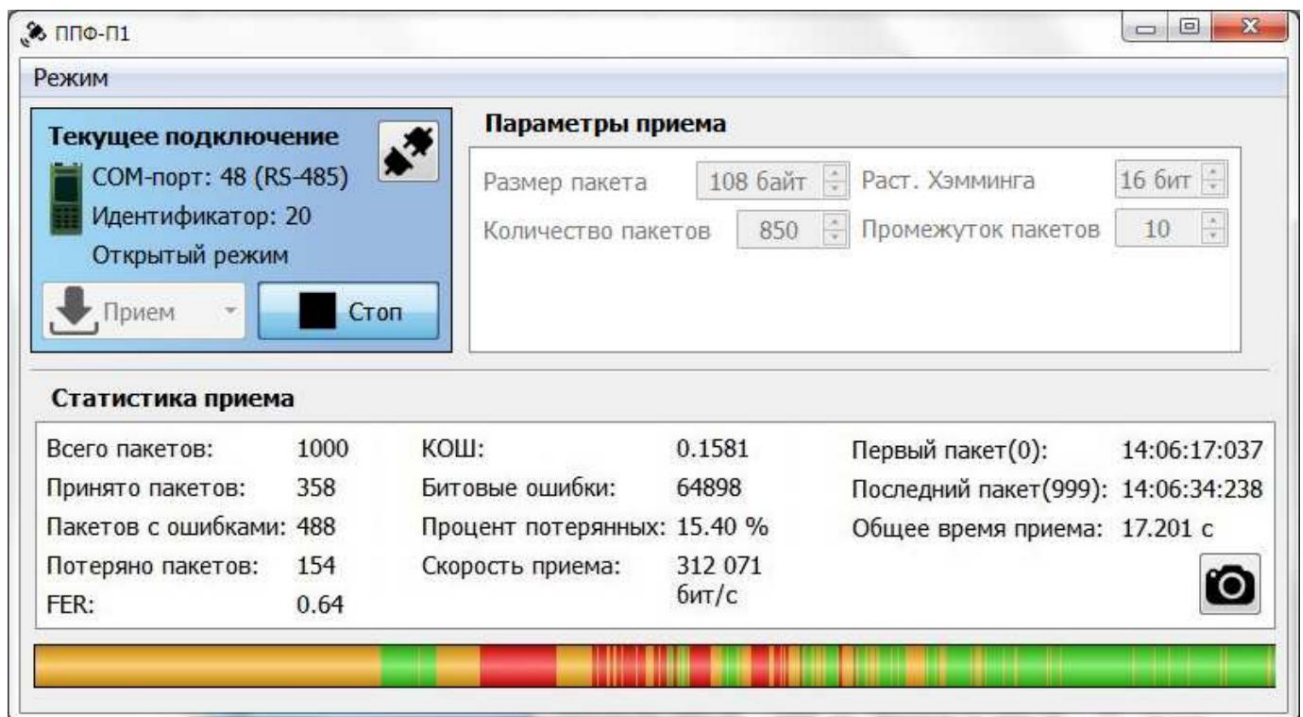
enter the number of packages (must be previously agreed with the transferring party);

enter the package size (must be previously agreed with transmitting party);

press the "Start" button (3) (see Fig. 13).

**Note.** The Hamming Distance and Gap options packets" affect the accuracy of recognition of incoming packets;

- wait until data reception starts. Appearance of the main window programs during reception is shown in Fig. 16.



**Figure 16 – Appearance of the main program window when receiving in channel testing**

The "Acceptance Statistics" area is updated as new information is received. data. The reception progress is displayed as a bar at the bottom of the window.

The following color designations are used:

- 1) green – the packet was received without bit errors;
- 2) orange – the packet was received with bit errors;
- 3) red – the packet is lost.



The process of receiving data in channel testing mode can be interrupted by pressing the “Stop” button (3) (see Fig. 13). Finishing process, the “Stop” button (3) will change to the “Start” button.

The result of data reception can be saved as an image, for To do this, you need to press the “Take photo” button (7) (see Fig. 13). will appear dialog box prompting you to select a save location Images.

### 3.9. Settings

Program settings are available in file transfer mode. For To obtain a list of settings, you need to open the main window of the program “Settings” menu (2) (see Fig. 4).

The appearance of the “Settings” menu list is shown in Fig. 17.

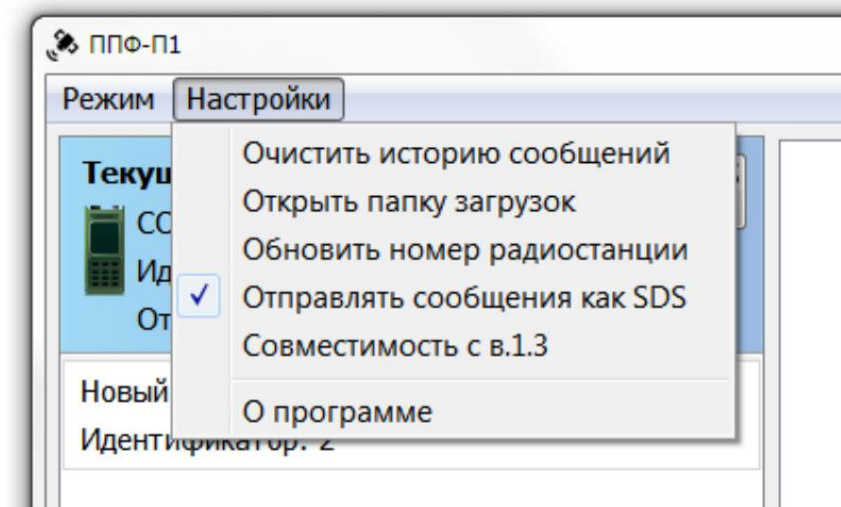


Figure 17 – Appearance of the list of “Settings” menu items

The “Clear message history” item completely clears the history messages from all contacts.

The “Open downloads folder” item opens in the file explorer the folder in which the PPF software saves files.

26 **KSFT**. 00193-01 34 01

**The item “Update radio station number” reads the number again radio station (if it was changed during the program).**

Recommended for use outside of transmit / receive **only** .

**The “Send messages as SDS” item changes the sending principle messages. SDS messages are sent directly by the radio station (its internal messaging system).**

**The item “Compatibility with v.1.3” changes the principle of sending files for support for compatibility with the old version 1.3 of SPO PPF.**

**The “About” item opens a window that displays**

**information about the version of the open source software PPF.**

#### 4. MESSAGES TO THE OPERATOR

Messages to the operator are shown in Table 1.

Table 1

Message text	Description	Operator actions
No connected radio stations	Message when trying connect to radio stations with an empty list of COM ports	To plug radio station
Failed to install connection with radio station	Message when trying incorrectly connections	Make sure correct connection radio stations
A contact with this ID already exists	Message when trying to create a contact with an existing ID Message when trying	Select a different ID for contact
Data Contact address already exists	to create a contact with an existing address Message when trying to create a	Choose another address for contact
Contact with this name already exists	contact with an already existing name Message when trying	Choose another name for contact
Impossible create contact with identifier equal to the current Name	creating contact with identifier equal to the current Message	Select a different ID for contact
field cannot be empty	when trying creating contact with empty name	Enter a name for contact
Invalid address entered	Message when trying create contact with incorrect address in closed mode	Enter the correct address for the contact
Transmission error	Message appears when installation is not possible call	Make sure correctness of the chosen direction

## End of table 1

<b>Message text</b>	<b>Description</b>	<b>Operator actions</b>
<b>Are you sure that want to disconnect? Are</b>	<b>Message when trying disconnect from radio stations</b>	<b>Confirm or cancel action</b>
<b>you sure you want to delete your entire message history? Are</b>	<b>Message when trying to clear the message history of contacts</b>	
<b>you sure you want to delete this contact?</b>	<b>Message when trying to delete a contact</b>	
<b>Lost connection with radio station</b>	<b>Lost message connections with radio station</b>	<b>Make sure the radio station is working correctly and the selected direction</b>
<b>Available unfinished session. Continue it?</b>	<b>Message when connecting to radio stations after the transmission session was interrupted</b>	<b>Confirm or cancel continuation of the session</b>
<b>Creation Error download folders. Select other the place for conservation</b>	<b>Message when impossibility of creating folders for saving files</b>	<b>Choose a different location to save files</b>
<b>Switch the radio station to digital mode</b>	<b>Message to the operator about the absence of an established digital mode on the radio station</b>	<b>Install on radio stations digital mode</b>

## **5. DATA EXCHANGE PROTOCOL IN OPEN MODE**

### **5.1. Connecting to a radio station**

To transfer data at the physical level, the mode is used

UART. UART mode parameters :

- **one** start bit;
- **8 data bits**;
- **no oddities bit**;
- **one** stop bit.

**Note.** Default baud rate is 9600 baud for interface

RS-485 and 921600 baud for USB interface.

### **5.2. Packaging**

Before shipping, all packages are packaged in frames according to exchange protocol described in PAKD.464113.005 RE (Description information and logical interfaces of the radio station with the OOD. Appendix M).

### **5.3. Package format**

In open mode, packets generated by the PPF are divided into the following types:

- **header packets**;
- **data packages**;
- **end-of-transmission packets**;
- **transmission status packets**;
- **message packages**;
- **message confirmation packets.**

#### **5.3.1. Header package**

The header packet is sent before the file is sent and contains information about the upcoming transmission session.

The header packet has the format presented in Table 2.

Table 2

<b>Field</b>	<b>Field length in bytes</b>
<b>Packet type (value 0xC0FFEE49)</b>	4
<b>Package size</b>	2
<b>Number of the radio station sending the packet</b>	4
<b>Reserve</b>	4
<b>Data Encoding</b>	1
<b>Reserve</b>	6
<b>File name size</b>	4
<b>File name</b>	<b>Varies</b>
<b>File size</b>	4
<b>Number of packages that make up the file</b>	4
<b>ID of this package</b>	1
<b>PPF version marker (value 0xA1B1C1D1)</b>	4
<b>Version PPF</b>	2
<b>Hesh-summa</b>	4

**Notes:**

1. The “**Package Type**” field contains information about the type of packages, listed in clause 5.3.

2. The **Packet Size** field contains the packet size in bytes.

3. The “**Number of the radio station sending the packet**” field contains number (address) of the radio station from which the transmission is made.

4. Field “**Data encoding**” – application of encoding **Hamming (value 0x55), Golay (value 0xAA) or none encoding (value 0x00).**

5. “**Reserve**” fields – unused in this protocol implementation parts of the packet that are reserved for protocol modification.

6. Field “File name size” – the number of bytes occupied the name of the transferred file.

7. Field “File name” – the value of the file name, the size of which is in bytes depends on the value of the “File name size” field.

8. Field “File size” – the number of bytes in the file.

9. Field “Number of packages that make up the file” – determined when the file is split into data packets.

10. The “Identifier of this package” field contains the number transmitted header packet, since header packets duplicated for more reliable delivery.

11. The “PPF version marker” field is intended to indicate header package version PPF 2017+.

12. The “PPF version” field can take the value 0x653C (for compatibility with the old version of PPF 2015) or 0x3E39 (version of PPF 2017+).

13. The value of the “Hash Sum” field is calculated using the following Features:

```
uint32_t oneAtATime(void* data, uint32_t size) {
```

```
    register uint32_t hash = 0xC0FFEE;
```

```
    for (uint32_t i = 0; i < size; i++) {
```

```
        hash+=((uint8_t*)data)[i];
```

```
        hash+=(hash<<10);
```

```
        hash^=(hash>>6);
```

```
    } hash+=(hash<<3);
```

```
    hash^=(hash>>11);
```

```
    hash+=(hash<<15);
```

```
    return hash; },
```

where “data” is a pointer to the package, “size” is the size of the package from the beginning to the bo

“Hash sum” fields .

### 5.3.2. Data package

Data packets contain parts of a file. In one package one part of the file is transferred.

The data package has the format presented in Table 3.

Table 3

Field	Field length in bytes
Packet type (value 0xC0FFEE08)	4
Package size	2
Reserve	6
Number of the transferred part of the file	4
File data part	100
Hesh-summa	4

**Notes:**

1. The field "Number of the transferred part of the file" contains the number of the part on which the file was split before sending.
2. The "Part of file data" field contains directly the part transferred file.



### 5.3.3. End of transmission packet

End of transmission packets are intended to indicate completion transmission of data packets or status packets from one party to another.

The end-of-transmission packet has the format presented in Table 4.

Table 4

Field	Field length in bytes
Packet type (value 0xC0FFEE8D)	4
Package size	2
Reserve	4
ID of this package	1
File reception status (values 0x0A0B or 0x1A1B)	2
Hesh-summa	4

**Note.** The “File Reception Status” field contains information about whether the file was fully accepted (value 0x0A0B) or not (value 0x1A1B).

It is intended to prevent premature termination file transfer session.

### 5.3.4. Transfer status package

Transmission status packets are used to notify the transmitting parties about which packets were lost during the file transfer process.

The transmission status package has the format presented in Table 5.

**Table 5**

<b>Field</b>	<b>Field length in bytes</b>
<b>Packet type (value 0xC0FFEEA8)</b>	4
<b>Package size</b>	2
<b>Reserve</b>	6
<b>Number of numbers of lost parts of the file</b>	2
<b>Numbers of lost file parts</b>	<b>from 4 or more</b>
<b>Hesh-summa</b>	4

**Note.** The length of the package depends on how many numbers lost parts of the file it contains. For example, if the field "Quantity numbers of lost parts of the file" has a value of 5, then the field "Numbers lost parts of the file" will have a length of 20 (5\*4).

#### 5.3.5. Message package

**Message packages are used to exchange text messages messages between the sending and receiving parties.**

**The message package has the format presented in Table 6.**

**Table 6**

<b>Field</b>	<b>Field length in bytes</b>
<b>Packet type (value 0xC0FFEE7D)</b>	4
<b>Package size</b>	2
<b>Number of the radio station sending the packet</b>	4
<b>Message ID</b>	4
<b>Message text</b>	<b>Varies</b>
<b>Hesh-summa</b>	4

**Notes:**

1. The “**Message ID**” field contains the number transmitted message. Messages are numbered for receipt dispatch confirmation.

2. The “**Message text**” field contains the text itself messages.

**5.3.6. Message Acknowledgment Packet**

Message acknowledgment packets are used to notifications to the transmitting party that a message previously transmitted it was successfully received.

The message confirmation packet has the format presented in Table 7.

**Table 7**

<b>Field</b>	<b>Field length in bytes</b>
<b>Packet type (value 0xC0FFEEC2)</b>	4
<b>Package size</b>	2
<b>Number of the radio station sending the packet</b>	4
<b>ID of the message being received confirmed</b>	4
<b>Hesh-summa</b>	4

## **6. PRIVATE MODE DATA EXCHANGE PROTOCOL**

### **6.1. Connecting to a radio station**

**To transfer data at the physical level, the mode is used**

**UART. UART mode parameters :**

- **one start bit;**
- **8 data bits;**
- **no oddities bit;**
- **one stop bit.**

**Note. Default baud rate is 115200 baud for interface**

**RS-485.**

### **6.2. Packet format in closed mode PPF software for transmission**

**files**

#### **6.2.1. In closed mode, packages generated by SPO PPF**

**are divided into the following types:**

- **header packets;**
- **data packages;**
- **end-of-transmission packets;**
- **transmission status packets.**

#### **6.2.2. In closed mode PPF software, the length of the packet (hereinafter referred to as length) depends**

**from the established transmission speed between radio stations and is**

**the following values:**

- **transmission speed 2400 bps – length 41 bytes;**
- **transmission speed 4800 bps – length 53 bytes;**
- **transmission speed 7200 bps – length 57 bytes.**

### **6.3. Description of packages for transferring files in private mode**

#### **6.3.1. Header package for private file transfer**

**has the format shown in Table 8.**

**Table 8**

<b>Field</b>	<b>Field length in bytes</b>	<b>Note</b>
<b>Marker</b>	1	<b>Value 0xA1</b>
<b>Index package</b>	1	<b>Value from 0 to 9. Designed for time tracking during shifts call directions</b>
<b>Address transmitting radio stations</b>	4	<b>The receiving radio station will respond to this address</b>
<b>File size</b>	4	<b>File size in bytes</b>
<b>Name size file</b>	2	<b>File name size in bytes</b>
<b>File name length - 12</b>		<b>File name with extension</b>

6.3.2. The data package for private file transfer has format presented in table 9.

**Table 9**

<b>Field</b>	<b>Field length in bytes</b>	<b>Note</b>
<b>Marker</b>	1	<b>Value 0xA2</b>
<b>Index package</b>	2	<b>File part number. At the host side "payload" is written according to <math>\text{offset} = (\text{length} - 3) * \text{package index}</math></b>
<b>Useful load</b>	<b>length - 3</b>	<b>Part of the file content</b>

6.3.3. Transfer status package for private file transfers has the format presented in table 10.

Table 10

<b>Field</b>	<b>Field length in bytes</b>	<b>Note</b>
<b>Marker</b>	1	<b>value 0xA4</b>
<b>Index package</b>	1	<b>Value from 0 to 9. Designed for time tracking during shifts call directions</b>
<b>Useful load</b>	<b>length - 2</b>	<b>Indexes of missed data packets</b>

#### 6.3.4. End-of-transfer packet for private file transfers

has the format presented in table 11.

Table 11

<b>Field</b>	<b>Field length in bytes</b>	<b>Note</b>
<b>Marker</b>	1	<b>value 0xA3</b>
<b>Index package</b>	1	<b>Value from 0 to 9. Designed for time tracking during shifts call directions</b>
<b>Marker end exchange</b>	2	<b>value 0x0A0B - all packets are received, end the exchange cycle value 0x1A1B - not all packets are received, continue the exchange cycle</b>

## 6.4. Data cycle

6.4.1. Data transmission cycle without resending lost packets presented in Fig. 18.



Figure 18 – Data transmission cycle without resending lost packets

6.4.2. Data transmission cycle with redelivery of lost packets presented in Fig. 19.



Figure 19 – Data transmission cycle with forwarding of lost packets

### 6.5. Description of packets for transmitting messages in private mode

Messages in private mode are transmitted at transmission speed data between radio stations - 2400 bps, packet length is 41 bytes.

#### 6.5.1. Header packet for private message transmission

has the format presented in table 12.

Table 12

Field	Field length in bytes	Note
Marker	1	value 0xB1
Address transmitting radio stations	4	The receiving radio station will respond to this address
Descriptor messages	1	Cyclic message counter. For of the best transmission, three copies are sent messages with the same descriptor. On the receiving side of the message with the same descriptor are ignored
Quantity parts	1	Long messages exceeding the length are broken into pieces

6.5.2. The data packet for transmitting messages in private mode has format presented in table 13.

Table 13

Field	Field length in bytes	Note
Marker	1	value 0xB2
Index package	1	Message part number
Useful load	length - 2	Message text



6.5.3. **Message Status Pack for Transferring Messages in Closed mode has the format presented in Table 14.**

**Table 14**

<b>Field</b>	<b>Field length in bytes</b>	<b>Note</b>
<b>Marker</b>	1	<b>value 0xB3</b>
<b>Descriptor messages</b>	1	<b>Message part number</b>

## 6.6. Message cycle

6.6.1. **The message transmission cycle is shown in Fig. 20.**



**Figure 20 - Message transmission cycle**

## **LIST OF ABBREVIATIONS**

**The following abbreviations are used in this document:**

**HPD - high-speed data transfer;**

**MPR — multi-spring retransmission;**

**OS - operating system;**

**DTE - data terminal equipment;**

**software - software;**

**PC - personal electronic computer;**

**SPO - special software;**

**UP - positioning device;**

**RS-485 is the recommended data transmission standard;**

**SDS - short message service;**

**UART - universal asynchronous transceiver;**

**USB is a universal serial bus.**

