

770-PRO

Cellular Signal Analyzer



Art no. 090-07700-0

Manual ver. A

Manual



Table of Contents

1.	Introduction.....	3
1.1	Technical data	3
1.2	Button configuration	4
1.3	Device Menu Flowchart.....	5
1.4	Accessories.....	5
2.	Device Info, Settings & Testing	6
2.1	SMS remote configuration.....	6
2.2	System	7
2.2.1	Device Data.....	8
2.2.2	Server Address.....	8
2.2.3	Check for Firmware (FW) Updates.....	8
	Device will connect to the internet to check if the firmware is up to date.	8
2.2.4	Restart Device.....	8
2.3	Settings & test	9
2.3.1	Select APN & Select User/Password.....	9
2.3.2	Logging.....	9
3.	Scanning	10
3.1	Scanning a signal.....	10
3.2	Understanding Signal Parameters	12
4.	View, Test and Upload/Download Scans	13
4.1	Communication Test	13
4.2	Upload Signal (Remote).....	13
4.3	Download Signal (Local)	14
4.4	Current Network Data	14
5.	Configuration Tool	15
6.	Appendix.....	17
7.	Contact Information.....	19



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1. Introduction

The 770-Pro is a tool used for analyzing cellular signals, originally developed by ETM Mätteknik, which is now a part of Sigicom Group. 770-Pro was developed to support both Cat M1, NB as well as 4G, 3G, 2G technology while also providing GPS positioning together with cellular data. The tool is battery powered and handheld for easy carrying around.

1.1 Technical data

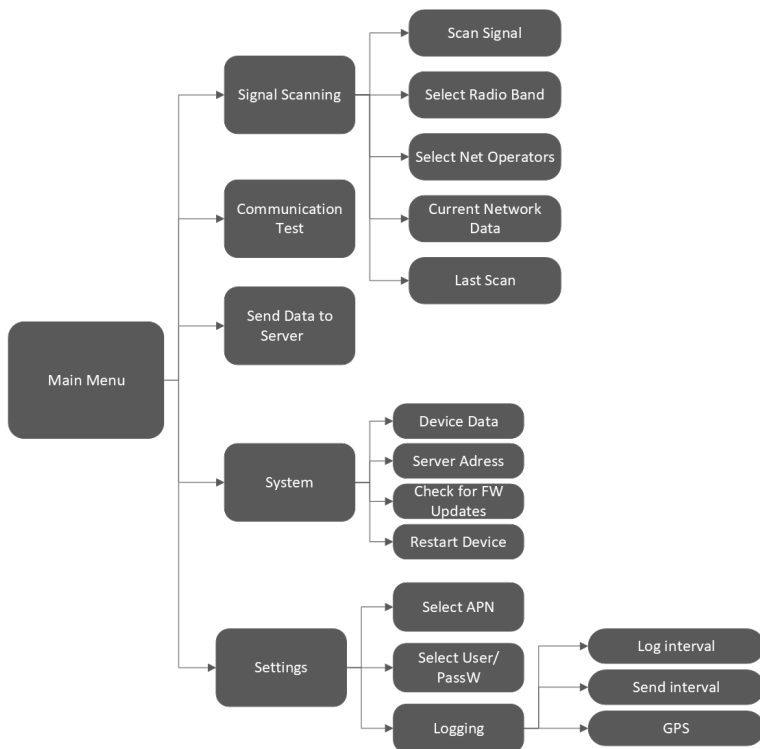
Model	770-Pro
Part.no	090-07700-0
Cellular	2G, 3G, 4G, Cat-M1, Cat NB1,2
GNSS (GPS)	GPS/BeiDou/GLONASS/Galileo
Frequencies/Bands	GSM/GPRS (2G) Frequencies: 850/900/1800/1900 MHz UMTS (3G) Bands: 1, 2, 3, 4, 5, 6, 8, 9, 19 FDD-LTE (4G) Bands: 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 19, 20, 26, 28, 66 TD-LTE (4G) Bands: 38, 40, 41 FDD-LTE (M1, NB1, NB2) Bands: 1, 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 25, 26, 27, 28, 66, 71, 85
Dimension	115x69x28mm
Weight	130g
Battery	Lithium Polymer (LiPo) 3Ah rechargeable
Battery lifetime	Scanning mode: More than 48 hours Standby mode: More than 6 months
Screen	2,4 inch OLED 128x64px display
Operating temp.	-20°C to +55°C
Antenna	External SMA + Internal GNSS (GPS)
Interface	USB (Mini USB connector)

1.2 Button configuration

Action/Button	Explanation
Restart device	Hold Arrow down + up 5s or System → Restart device in the device menu
Power OFF	Hold Power button 3s
Sleep mode	Hold Power button >5s
OK Button	Navigation
Arrow Up	Navigation, doubles as backwards button at top of menu
Arrow Down	Navigation

1.3 Device Menu Flowchart

Flowchart showing the entire menu navigation of the tool.



1.4 Accessories

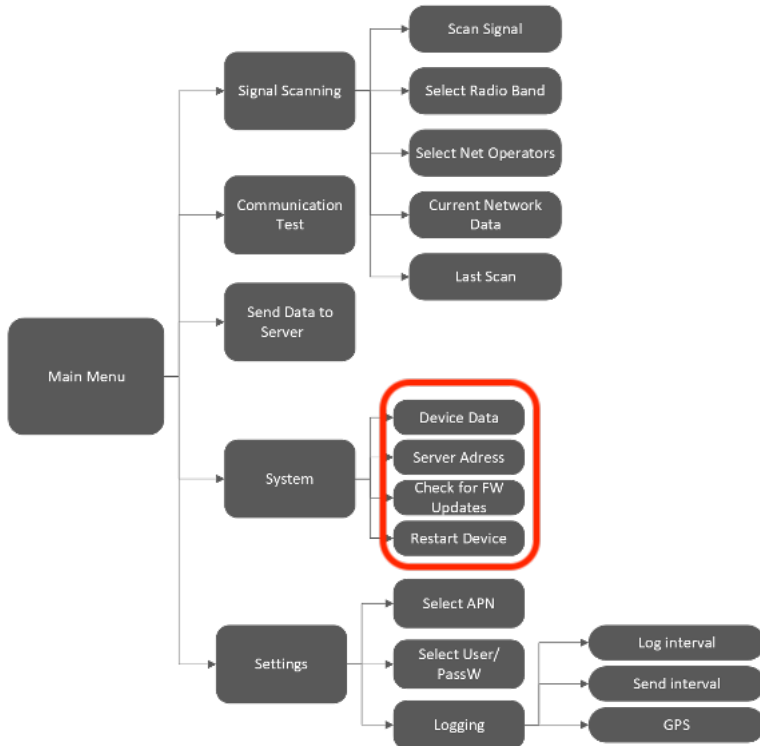
The 770-Pro comes with a carrying case containing USB cable for programming/charging, charging brick, power adapters, car charger and quick start guide.

2. Device Info, Settings & Testing

2.1 SMS remote configuration

SMS COMMANDS	EXPLANATION AND EXAMPLE
ET-IP1="IP Address": "Port"	Change the server address Example: ET-IP1=54.77.219.177:7162 (EWO server)
ET-IP3="IP Address": "Port"	Change the PING address Example: ET-IP3=8.8.8.8:80 (Google)
ETSAPN="List position", "APN name"	Change APN list Example: ETSAPN=1,m2m.tele2.com
ETSUP="List position", "Username", "Password"	Change User/Password Example: ETSUP=1,username1,password23

2.2 System



2.2.1 Device Data

Firmware version (TOP) Hardware number (HW#) IMEI Number	<pre>ETM770 Default Profil 71666 770SW3.2.1.019 HW#:16777215#N/A IMEI:350588280020256 PLMN:24007 B7</pre>
Date and Time Module Temperature Supply Voltage Battery Voltage Rolling network Information	<pre>00/02/07,18:01:59 MTemp:0de9C SUPPL VOLT:1.76V BAT VOLT:3.77V PLMN:24007 B7</pre>

2.2.2 Server Address

Add a server to receive data being sent from the device. This can be configured in the configuration tool shown below or via SMS command shown above.

Note! The values sent by the devices will be in raw format.

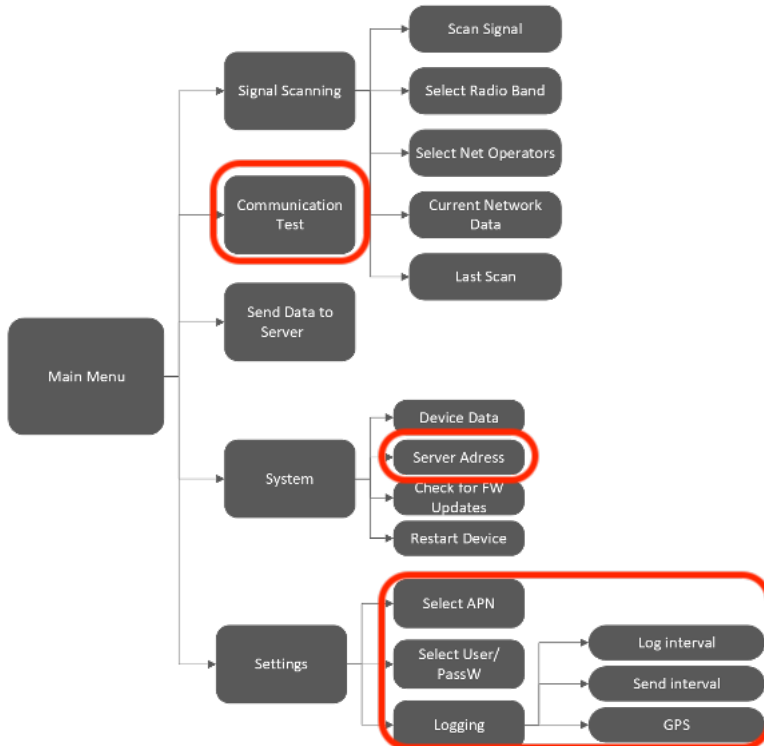
2.2.3 Check for Firmware (FW) Updates

Device will connect to the internet to check if the firmware is up to date.

2.2.4 Restart Device

Restart the device without using buttons.

2.3 Settings & test



2.3.1 Select APN & Select User/Password

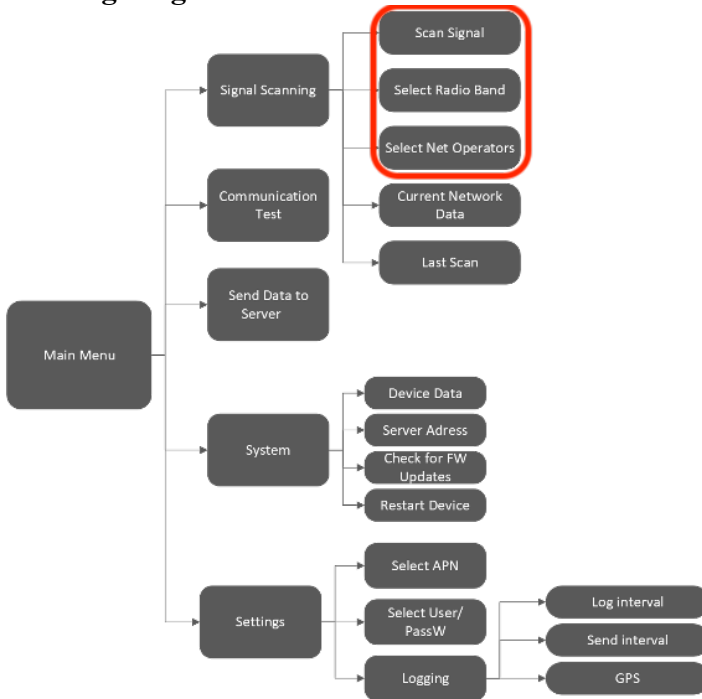
Select which APN to use. APN can be added using the configuration tool shown below, or via SMS command shown above. The same principle goes for User and password.

2.3.2 Logging

Log interval is where you activate automatic continuous logging of the signal measurements. This is also where you specify the interval between logs. Send interval determines how often the logged data gets transmitted to a server. The server address can be setup via configuration tool or SMS command.

3. Scanning

3.1 Scanning a signal



Step 1: Select Radio Bands

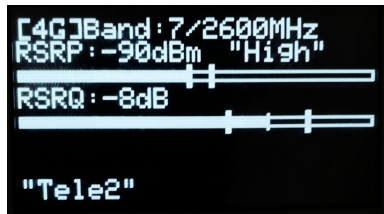
Broaden or narrow down your network scanning to only the bands you wish to scan.

Note! Before selecting radio bands, please check what bands are available in your country/used by your SIM-card provider. Searching for inactive bands lead to negative results.

Step 2: Scan for available operators

This might take a few minutes. The device displays all operators it can find in your area together with a network technology (e.g. 4G or M1)

Step 3: Scanning a signal



Explanation

The device is connected to a 4G band. The band is 7 and the frequency is 2600 MHz.

RSRP - Reference Signal Received Power (the signal strength without noise and interference)

measured in decibel meter (dBm). The signal is visualized in the signal bar below the data.

RSRQ Reference Signal Received Quality (how well the signal is coded)

measured in decibel (dB). The signal is visualized in the signal bar below the data.

In the bottom shows rolling information about PLMN & Band, Operator, RSSI, Status (abbreviations explained under appendix).

3.2 Understanding Signal Parameters

PARAMETER	RSSI	SINR	RSRQ	RSRP	EC/IO
Technology	LTE & 3G	LTE	LTE	LTE	HSPA+ & EVDO
Excellent	> -65	> 12,5	> -5	> -84	> -2
Good	-65 to -75	10 to 12.5	-9 to -5	-85 to -102	-2 to -5
Fair	-75 to -85	7 to 10	-12 to -9	-103 to -111	-5 to -10
Poor	< -85	< 7	< -12	< -111	< -10
Short	Full	Explanation			
RSSI	Reference signal strength indicator	An average of the signal strength recieved.			
SINR	Signal-to-interference-plus-noise ratio	Indicates the amount of interference and noise in the signal.			
RSRP	Reference Signal Received Power	Similar to RSSI, but using a reference signal to compare cells.			
RSRQ	Reference Signal Received Quality	Measuring signal quality based on RSSI			

4. View, Test and Upload/Download Scans

```
B7/2600MHz
RSRP:-82dBm
Min:-83 Max:-82
RSRQ:-7dB
Min:-11 Max:-7

PLMN:24007 CH:2850
"Tele2"
```

Explanation

Band 7 / 2600 MHz

Referenced Signal Received Power (RSRP) is -82 dBm with Min & Max values below.

Referenced Signal Received Quality (RSRQ) is -7dB with Min & Max values below.

Public Land Mobile Network (PLMN) is 240007: The channel is 2850.

Scanned Network (Operator)

4.1 Communication Test

Ping to test network communication. Standard is set to Google's server. This can be change using the configuration tool shown below.

```
Reply Success!
IP:"8.8.8.8"
Sent:3 Received:3
min RTrip Time:31ms
max RTrip Time:181ms
avg RTrip Time:83ms

PLMN:24007 B7
```

4.2 Upload Signal (Remote)

Uploading a signal is made through pushing "Send Data to Server" (See 2.2 *Menu flowchart*). Make sure you have IP + Port setup. You can easily add this by sending a SMS command seen above in 2.1 *SMS Commands*.

Uploading signals continuously without pushing can be done through activating logging and sending under settings.

4.3 Download Signal (Local)

If logging is turned on while sending is turned off, the logged scans will be stored on the device. They can be downloaded using the configuration tool explained further down the manual.

4.4 Current Network Data

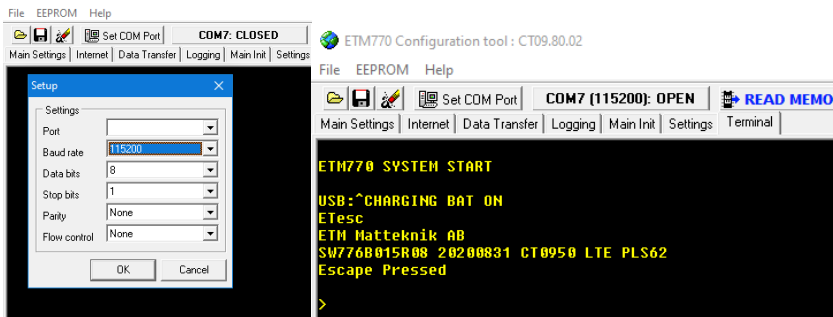
Abbreviations described under appendix at the bottom of this manual.

**Press Arrow Down to access next page*

<p>Basic network data information.</p>	<pre>MCC:240 MNC:7 B7/2600MHz CH:2850 RSRP:-83dBm RSRQ:-10dB DL:20MHz UL:20MHz Mode:FDD PCI:142 TAC:85A3 GCID:4CAFB05 PLMN:24007 B7</pre>
<p>Neighboring cells</p>	<pre>6 Neighbour Cell(s) 2850,-6.6,-82,45,142, 2850,-20.0,-108,19,33 6,0,-192,-,-,0,0,0,0 31,0,-192,-,-,0,0,0,0 60,0,-192,-,-,0,0,0,0 PLMN:24007 B7</pre>
<p>SIM Status, Network Status, Net Provider and</p>	<pre>SIM READY Registered, roaming Net Provider(EONS): "Tele2"</pre>
<p>APN and LIP (Local IP Adress)</p>	<pre>APN: "" LIP:10.5.76.224</pre>

5. Configuration Tool

Another way of configuring your ETM770 is by using the configuration tool. Begin by downloading the latest configuration tool located under **Resources** on <https://etmiot.com/>. Proceed by connecting the unit to a computer with the provided USB charging cable.



1. Start the configuration tool and connect the device to a PC running Windows.
2. Go to the terminal tab, press “Set COM Port” to choose the right COM port (see device manager, COM Ports. If no COM port shows up, make sure the drivers got properly installed to your computer when the 770-Pro was plugged in. When correct port is selected, set baud rate to 115200.
3. Open the port by pressing “COM(X): CLOSED”.
4. Click anywhere in the black terminal window until you see a flashing square. Proceed by restarting the unit by either holding down arrow UP and DOWN for 5 seconds, or write “ETESC” in the command window.
5. Make sure that the firmware matches the configuration tool version unlike the picture above. Above, the config tool says CT09.80 in the name, but the terminal window shows the device having FW to match CT09.50.



1. When done configuring the unit, press the red button “**WRITE MEMORY**” to upload the configuration to the unit.
2. To see what configuration is already on the unit, press “**READ MEMORY**” when having the unit connected to the computer to read it onto the configuration tool.
3. To save your configuration to use for future devices, press “File” in the top left corner, then “save” in the dropdown menu and save the file to an optional location. Make sure it’s saved as a .ctx file.

6. Appendix

Table below shows a brief explanation of the 3G network abbreviations.

ABBREVIATION	FULL	EXPLANATION
CHANN	CHANNEL	Shows the ARFCN (Absolute Frequency Channel Number) of the Radio Band Frequency.
PSC	Primary Synchronization Code	Describes start and stop time for the time slot that the device has been allocated.
MCC	Mobile Country Code	The first part of the PLMN code.
MNC	Mobile Network Code	The second part of the PLMN code.
EC/n0	Carrier to Noise Ratio	
LAC	Local Area Code	
CELL	CELL ID	Cell identification number
APN	Access Point Name	This will only be useful information if you have set up an ISP connection.
LIP	Local IP	This will only be useful information if you have set up an ISP connection.
RSCP	Received Signal Code Power	Measured in dBm
SQ	Signal Quality	Quality value for base station selection in dBm
SRxL		RX level value for base station selection indBm

Table below shows a brief explanation of the 4G network abbreviations.

ABBREVIATION	FULL	EXPLANATION
EARFCN	CHANNEL	E-UTRA Absolute Radio Frequency Channel Number
B (Band)	Frequency Band	E-UTRA frequency band
DL	DL bandwidth	DL bandwidth
UL	UL bandwidth	UL bandwidth
Mode	Duplex Mode	TimeDivisionDuplex (TDD) or FrequencyDivisionDuplex (FDD)
MCC	Mobile Country Code	The first part of the PLMN code.
MNC	Mobile Network Code	The second part of the PLMN code.
TAC	Tracking Area Code	
GCID	Global Cell ID	Global Cell ID
PhyC ID	Physical Cell ID	Physical Cell ID
SQ	Signal Quality	Quality value for base station selection in dBm
RSRP		Reference Signal Received Power
RSRQ		Reference Signal Received Quality
RSSI		Reference Signal Strength Indication

Note: A **PLMN** is identified by the Mobile Country Code (MCC) and the Mobile Network Code (MNC)

7. Contact Information

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