T400FX/T400LR

Wireless Terminal

User Guide

© 2019 Burnside Telecom Ltd.

BURNSIDE

Contents

1 Introduction
4 Getting started
4 LEDs
5 Making and receiving calls
5 Emergency calls via the mobile network
5 Security features
6 Special mobile call features
7 Call forwarding of incoming mobile calls
8 Configuration of the terminal
9 List of commands
10 Detailed information on commands for all versions
17 Ring back commands
17 Caller ID from PSTN
17 T400LR automatic selection of PSTN
17 Disabling PSTN on T400LR
18 Operating tips
19 Troubleshooting
20 Important safety information
22 Specifications
24 Information on disposal/recycling of product
24 Approved batteries
25 Revision history

© 2019 Burnside Telecom Ltd.

Introduction

The Burnside T400 series fixed cellular terminals provide professional telephony features within a compact and easy-to-use package.
All models can be used with a standard desk phone (or cordless phone) in locations where wired sockets are not available. The T400LR is fitted with both a PSTN (Public Switched Telephone Network) landline socket as well as a mobile connection.
Both versions are feature rich and can be configured for a variety of applications.

The T400FX can:

- Be configured to report an exceptional event such as power failure.
- Operate from an internal battery in the event of power failure.
- Support many user programmable features.
- Provide outgoing call progress announcements.

The T400LR can also:

- Automatically provide backup for landlines in the event of a land line failure.
- Automatically route outgoing calls destined for mobile numbers via the mobile network.
- Pass a landline connection directly through to the telephone when the terminal is off or the battery is exhausted.

UK & EU versions of FX and LR models with supplied stub antenna fitted.

© 2019 Burnside Telecom Ltd.

Getting started

Remove the battery insulating tab then open the battery compartment to expose the SIM holder. Insert a standard size SIM card and replace the cover. If the unit is going to be wall mounted, we recommend using the supplied screw to secure the battery compartment lid.

Connect the telephone and landline where appropriate. See the supplied quick start guide for illustrations.
Connect the supplied charger. The charge LED will flash to indicate the terminal is charging the battery. See the section on LEDs.
The terminal will now be in “charge only mode” and will not be connected to the mobile network. If the terminal is a T400LR model, the landline will be connected through to the phone connection.
Turn on the terminal by pressing and holding the red button on the rear of the terminal, when the orange and green LEDS light, release the button and the terminal will operate. After a taking a few seconds to register with the mobile network, the terminal will be ready to make or receive calls.
To test the connection of the connected phone, try a ringback test by dialling *9# and hang up. The phone should ring and if your phone includes a caller display it will show the signal strength and name of the mobile network. The ringing will stop after 30 seconds or after lifting the handset.
To test the landline on the T400LR, with the handset off-hook, press the recall button on the phone and the landline will be connected and you should hear a dial tone from the landline.

LEDs

There are three LEDs on the terminal. The right hand red LED indicates the state of charging which applies whether the terminal is in “charge only” mode or when it is operating.
The middle green LED indicates the mode of operation. The left orange LED indicates if the terminal requires attention.

The table below shows the state and timings of the 3 LEDs. The solid graphic block character ■ represents the LED on, the □ represents the LED off. The ratios illustrated are approximate.

Left	Middle	Right	← Position & colour
[← 2 seconds →]	[← 2 seconds →]	[←2 s→]	**Function/Mode**
□□□□□□□□□□□□□□□□□□□□	□□□□□□□□□□□□□□□□□□□□	□□□□□□	Inactive
□□□□□□□□□□□□□□□□□□□□	□□□□□□□□□□□□□□□□□□□□	■■■■■□	Charge only mode. Charging
□□□□□□□□□□□□□□□□□□□□	□□□□□□□□□□□□□□□□□□□□	■■■■■■	Charge only mode. Charged
□□□□□□□□□□□□□□□□□□□□	□□□□□□□□□□□□□□□□□□□□	■■■□□□	Battery fault
□□□□□□□□□□□□□□□□□□□□	□□□□□□□□□□□□□□□□□□□□	■□□□□□	Temperature too high or low to charge
■■■■■■■■■■■■■■■■■■■■	■■■■■■■■■■■■■■■■■■■■	xxxxxxx[1]	On/Off Button pressed
□□□□□□□□□□□□□□□□□□□□	■□□□□■□□□□■□□□□■□□□□	xxxxxxx	Starting/searching
■■■■■□□□□□■■■■■□□□□□	□□□□□□□□□□□□□□□□□□□□	xxxxxxx	Waiting for PIN
■■■■■□□□□□■■■■■□□□□□	■■■■■□□□□□■■■■■□□□□□	xxxxxxx	Waiting for PUK
■□□□□□□□□□□□□□□□□□□□	■□□□□□□□□□□□□□□□□□□□	xxxxxxx	Weak signal (calls possible)
□□□□□□□□□□□□□□□□□□□□	■□□□□□□□□□□□□□□□□□□□	xxxxxxx	Ready for call
□□□□□□□□□□□□□□□□□□□□	■■■■■□□□□□■■■■■□□□□□	xxxxxxx	Incoming call
□□□□□□□□□□□□□□□□□□□□	■■■■■■■■■■■■■■■■■■■□	xxxxxxx	Mobile call in progress
□□□□□□□□□□□□□□□□□□□□	■■■■■■■■■■■■■■■■■■■■	xxxxxxx	PSTN Call in progress
■■■■■■■■■■■■■■■■■■■■	□□□□□□□□□□□□□□□□□□□□	xxxxxxx	Fault, such as no SIM
■□□□□□□□□□□□□□□□□□□□	□□□□□□□□□□□□□□□□□□□□	xxxxxxx	Fault, when on battery

[1] The xxxxxxx states of the charging LED during normal terminal operation can be any of the normal charging states.

© 2019 Burnside Telecom Ltd.

Making and receiving calls

T400FX
To make a call, lift the handset of the connected telephone and dial the desired number. The call will be made automatically. When dialling, the terminal will wait for 3 seconds after the last digit dialled before trying to connect the number. This delay can be changed using CFG3. However, pressing the # key at the end of the number will instruct the terminal to connect immediately.

T400LR
With the T400LR model in the default setting, the call will be routed to the landline (PSTN).
To override the automatic selection of PSTN on an individual call, dial the prefix *9 before within 3 seconds after taking the phone off hook. See CFG25 on page 13 for other options of PSTN selection.
TIP: To avoid the confusion of programming codes intended for the T400LR accidentally being sent to the PSTN, connect the PSTN after you have configured the terminal.

Emergency calls via the mobile network

If the SIM is locked or even if no is SIM installed, it may still be possible to make emergency calls provided there is signal coverage, external power or battery charge remaining. The standard mobile emergency code is 112. The following numbers may also be supported depending on your network: 000, 08, 110,118,119, 911, 999, 789.

Security features

These commands relate to the security access features of the SIM card and network services. Commands may be entered by dialling the following codes on the connected phone.

- **Unlock PIN1** *8*[PIN1]#
- **Disable PIN1** lock *870*[PIN1]#
- **Enable PIN1** lock *871*[PIN1]#
- **Change PIN1** *872*[[old PIN]*[new PIN]*[new PIN]#
- **Change PIN2** **042*[old PIN2]*[new PIN2]*[new PIN2]#
- **Unblock PIN1** **05*[PUK]*[new PIN1]*[new PIN1]#

Notes:
1 Some SIM cards will not allow you to disable PIN1 protection.
2 The PUK (Personal UnblocKing code) is provided by the service provider.
3 If PIN2 is entered wrongly 3 times, it is not possible to unblock PIN2 with PUK with the T400.

Note: If the T400 is waiting for a PIN to be entered, it will prevent normal power saving when operating on battery, so the standby time will be significantly reduced.

© 2019 Burnside Telecom Ltd.

BURNSIDE

Special mobile call features.

The terminal supports special network call features such as multiparty calling.
Special call features require the use of the button on the attached phone which is commonly labelled **RECALL** or **R followed by a dial digit**.

Call waiting
Providing call waiting is enabled and supported by your network, an incoming call whilst the phone is in use will sound a tone in the handset. You have the following options:

Call waiting options
• To ignore the call, wait until the caller either hangs up or is diverted.
• To reject the waiting call and continue with the active call, press **R0**.
• To end the active call and accept the waiting call, press **R1**.
• To put the active call on hold and accept the waiting call, press **R2**.
• To swap between the held call and the active call, press **R2** again.

In-call dialling
To make another call while one call is already active.
• Press the **R** key and dial the number. The active call will be put on hold.
• To swap between the held call and the active call press **R2**.

Multiparty calls
To have a conversation with two or more parties (host + up to 5 participants).
• Dial the first person in the normal way.
• Press **R** and then dial the next person.
• Press **R3** to create a conference call.
• To add another person, press **R** and dial the next number. When the person answers, press **R3** to join them to the conference.
If the call is answered by voice mail or the wrong person, press **R1** to reject and return to the conference.

To end the conference call, hang up the telephone.
• To remove one person from the conference, press **R1x** *(where **x** is the number of the person in the order the call was set up)*.
• To have a private conversation with one member of the conference, press **R2x** *(where **x** is the number of the person in the order the call was set up)*. The other parties will be placed on hold. To return to the conference, press **R3**.
• To transfer the call to the other parties and end your call, press **R4** (explicit call transfer).

Notes:
• The availability of these facilities is dependent on the SIM card and service provider.
• If you try to add a party to a conference call and the call is answered by voice mail, you should disconnect that party otherwise the conference may be recorded to voice mail until it becomes full.
• Replacing the handset phone will terminate all calls (held, calling, active or waiting).
• If there is an incoming call while the phone is in use but no call is active, a ringing tone will be heard through the handset. When the handset is replaced, the phone will ring and the call may be answered in the normal way.

© 2019 Burnside Telecom Ltd.

Call forwarding of incoming mobile calls

Call forwarding is a mobile network service which allows incoming calls to be routed in the network to an alternative number (such as a voicemail box) when certain criteria are met.
The terminal allows you to configure the operation of the call forwarding service by dialling codes from the connected telephone. The various forwarding criteria are not mutually exclusive and can be used in combination to divert different types of call to separate numbers.

Call forwarding dial codes:

Forward service	Activate and register	Cancel & deregister	Cancel & retain	Reactivate
All calls	**21*[phone number]#	##21#	#21#	*21#
If busy	**67*[phone number]#	##67#	#67#	*67#
If not answered	**61*[phone number]#	##61#	#61#	*61#
If out of reach	**62*[phone number]#	##62#	#62#	*62#
All forwards	**002*[phone number]#	##002#	#002#	*002#
All conditional forwards	**004*[phone number]#	##004#	#004#	*004#

Examples:

• To register a new number and activate call forwarding when busy, to the phone number 01234 567890: ****67*01234567890#**

• To deactivate call forwarding when busy: **#67#**

• To reactivate call forwarding when busy to the same number 01234567890 again: ***67#**

Notes:

1. The numbers and call forwarding status are registered (stored) in the mobile network.
2. If in doubt about forwarding services provided, check with your network provider.
3. To specify a country code in a number, use the IDD prefix before the number. For example, 0044 specifies the UK. “00” is the default IDD prefix and is configured with IPREFIX, see page 16.

© 2019 Burnside Telecom Ltd.

Configuration of the terminal

The terminal may be configured using dial codes or commands entered via SMS. Some commands are only available via SMS and some SMS commands have both a configuration code version and an easier to remember text version.

Commands by DTMF codes (dialled on phone)

The command is prefixed with *8 then the command number then * followed by the parameter or value then terminated by #
Example 1: ***83*4#** - sets the configuration register 3 with the value 4.
Example 2: ***83*4#*84*1#** - sets the configuration register 3 with the value 4 and register 4 with 1.

If a command is successful, two beeps are sounded on the handset. If there is an error, one long beep is sounded. If there is an error, re-enter the correct code.

Command syntax for SMS

The first 4 characters must be the terminal PIN (default is 1234). This is then followed by the command(s). For example **1234 cfg3=4**
If one or more space characters are used after the PIN, they will be ignored.
Commands are not case sensitive for example **1234 cfg3=4** or **1234 Cfg3=4** or **1234 CFG3=4** are all valid.

All commands that do not implicitly require a response are automatically replied to with a summary of the terminal status. This automatic reply may be suppressed by placing a stop character after the pin number. For example, **1234. Cfg1=3** will change the configuration without replying. An error in the command will always result in a reply. The reply is either sent to the number that sent the command or if a colon is used after the PIN, the reply will be sent to the number specified by **PNUM11**. For example, **1234: cfg3=2**.
If the colon is used and PNUM11 is not programmed, no reply will be sent.

Examples of command types:

Execute: **1234 STAT** *Will execute the status command*.
Write: **1234 CFG3=4** *Writes the value 4 to the configuration register 3*.
Read: **1234 CFG3?** *Reads the currently set value in configuration register 3*.

Commands may be concatenated by entering a semicolon delimiter for example **CFG3=4;CLOCK**
To read multiple parameters, a suffix wild card may be used, for example: **CFG*?**.

When writing new values with the **CFGn** and **PNUMn** commands, multiple parameters may be entered by concatenation using a comma separator.
Example 1: **1234 CFG3=4,2=1,5=1**
Example 2: **1234 PNUM0=+448700762666,11=+44712345678**
Example 3: **1234 CFG3=4,2=1,5=1;PNUM0=+448700762666**

© 2019 Burnside Telecom Ltd.

List of commands

Commands for all models:

AUTO	Sets automatic off-hook dial.
BATTERY	Returns the state of the battery.
CFG	Read and write configuration settings.
CLOCK	Sets the clock to the time recorded in the SMS delivery.
CLRCALL	Ends any active call.
CLRFAULT	Clears any fault condition.
CLRTEMP	Clears the maximum and minimum temperature memory.
INIT	Restarts the terminal.
PNUM	Read and write phone number memories.
REPORT	Report error event to specified destination number.
RESTORE	Restores the default settings.
STAT	Returns the status of the terminal.
STIME	Time to send daily or periodic SMS status.
TPIN	Read and write terminal PIN.
VER	Returns the firmware version number.

Additional commands for T400LR:

IPREFIX	Selects a prefix to be used to convert “+” in phone numbers for IDD PSTN dialling.
MPREFIX	Specifies the prefix that determines if the number is destined for the mobile network.
PPREFIX	Selects an optional prefix to use when dialling via the FXO.

© 2019 Burnside Telecom Ltd.

Detailed information on commands:

AUTO(=/?) *841*[phone number]#
Shorthand way of combining PNUM10=n and CFG8=1, where n is the phone number. For example, AUTO=0123456789. Also *841*# cancels auto dial.

BATTERY Returns the state of charge of the batteries.

CFGn Read and write configuration setting.

Value of n:	Code	Configuration/Function

0 *80*n# **Phone region:**
The line characteristics, frequency and cadence of progress tones.
UK=0, IRELAND = 1, SPAIN = 2, NETHERLANDS = 3, GERMANY = 4,FRANCE = 5, NORWAY = 6, SWEDEN = 7, GREECE = 8, AUSTRALIA = 9, USA = 10
UK is the default for T400 fitted with a BT431A FXS connector. Spain is the default for T400 fitted with a RJ11 FXS connector.

1 *81*n# **CLI type:**
The Caller ID may be sent to the phone from incoming mobile.
0 = None (default)
1 = UK
2 = ETSI
3 = FCC

2 *82*n# **My number sending:**
This determines whether the terminal number is declared to the destination being called.
0 = Use the setting defined by the network (default).
1 = Number is always sent if supported by the network.
2 = Number is always withheld.

3 *83*n# **Dial delay:**
This determines the delay after receiving the last DTMF digit until the call is made.
1 to 9 seconds (default 3).

4 *84*n# **Ring cadence for incoming mobile calls:**
Four different cadences useful to differentiate between phones in close proximity.
0 to 3 (default 0).

5 *85*n# **Call restrictions (apart from outgoing emergency calls):**
Restrict use of the terminal.
0 = No restriction (default).
1 = Inhibit incoming calls.
2 = Inhibit outgoing calls.
3 = Inhibit all calls.
4 = Restrict dialled numbers to match Memories 0-9
5 = Restrict dialled and received (mobile) numbers to match Memories 0-9

© 2019 Burnside Telecom Ltd.

6 *86*n# Call time restriction of outbound mobile call & auto answered:
Limit the duration of an outbound mobile call. When only 30 seconds remain, a beep or announcement is heard in the handset to warn the caller. No beep for auto-answered. 0-120 minutes (default 0, no restriction).

7 *87*nn# **Maximum dialled number length:**
The maximum number of digits accepted may be changed (default 20).
3-20 = Restriction on number of digits in a dialled number

8 *88*n# **Auto dial/Auto answer:**
This feature may be used to automatically dial when the phone is taken off-hook.
0 = Normal dialling that requires digits to be dialled (default).
1 = Dials number stored in memory location 10.
2 = Automatically answers mobile call and outputs audio on-hook to FXS.

9 *89*n# **Reserved for future use.**

10 *810*n# **Recall/flash hook:**
The recall/flash hook is used to control in-call functions such as call waiting and multiparty calling.
0 = Recall/flash hook ignored.
1 = Recall/flash hook accepted (default).

11 *811*n# **End of call signal method:**
0 = None.
1 = K-Break (default).
2 = Line reversal.
3 = Kewlstart (Asterisk compatible “K-break” 800ms).

12 *812*n# **Line reversal on outgoing call connection:**
0 = Disabled.
1 = Enabled (default).

13 *813*0# **Terminal configuration from DTMF codes:**
0 = Disabled.
1 = Enabled (default). Can be re-enabled by SMS command or by turning off the terminal, removing DC plug, pressing and holding the on/off button while reconnecting the DC plug.

14 *814*n# **Audio codec used:**
Selecting a specific codec like FR can sometimes be appropriate for in-band DTMF communication with equipment such a “telecare” terminals.
0 = Automatic as determined by network.
1 = Restrict to FR only.
2 = Restrict to FR and EFR (default).

15 *815*n# **Radio Access Technology (Reserved for future models).**

© 2019 Burnside Telecom Ltd.

16 *816*n# **Select DC feed current of FXS port:**
To increase the current for compatibility with older telephone equipment.
0 = 20 milliamps (mA)
1 = 25 mA (default)
2 = 30 mA

17 *817*n# **Call progress announcement mode:**
Instead of tones, voice announcements may be played to suit the condition of the terminal. For example, “We are unable to connect your call, please try again later”
0 = No announcements, only progress tones (default).
1 = Normal dial tone, then progress announcements.
*855# Listen to “being connected” announcement.

18 *818*n# **Call progress announcement and PA output level:**
The output level of announcements may be adjusted.
0 = -9dB
1 = -6dB
2 = -3dB
3 = Normal level (default).
4 = +3dB
5 = +6dB
6 = +6dB

19 *819*n# **Automatic sending of SMS status:**
The status of the terminal may be sent automatically either when an error event occurs or regularly at specified intervals. The time is set with the “STIME” command and the destination number for the SMS is set with “PNUM11”.
0 = No report (default).
1 = Report status type 1 when an event occurs.
2 = Report status type 1 daily at time specified and when event occurs.
3 = Report status type 2 when an event occurs.
4 = Report status type 2 daily at time specified and when event occurs.
5 = Report status type 3 (M2M) when an event occurs.
6 = Report status type 3 (M2M) daily at time specified and when event occurs.

20 *820*n# **Event conditions to report:**
When reporting on error condition is enabled with CFG20=1-4, events that trigger a report may be controlled by setting bits with this command.

Bit number	Function	Default setting	Decimal
0	**Battery condition**	1	1
1	**Temperature**	1	2
2	**Hook howl state**	1	4
3	**Power break**	1	8
4	**On/off state change**	1	16
5	**Low PSTN voltage**	1	32
6	**Extended PSTN tests**	0	64

The default value with 6 conditions enabled is 63.

© 2019 Burnside Telecom Ltd.

Notes:
Battery condition: Battery failure is determined by an abnormal rate of change of the battery voltage when subjected to charge current or load test. Low battery is when there is less than 20% charge remaining.
Temperature level is reported when outside operating limits.
Hook howl is reached after a period of 150 seconds off-hook no call activity.
Power break is when power is lost for more than the specified period (CFG21)
On/off state change condition when enabled will send the status of turn on or restart.
When turning off, one of the following may be displayed:
Turned off by user
Battery exhausted

When turned on or automatically restarted, one of the following may be displayed.
Turned on by user
Reset restart
WDT restart
Followed by full status information.

Low PSTN voltage is defined as being less than 5 volts.
Extended PSTN tests include:
a) Low current
b) In use (parallel phone)
c) No dial-tone

21 *821*n# **Power break period report threshold:**
Minimum power break period before reporting power break.
0-1000 minutes (default 5 minutes).

22 *822*n# **Number of days between sending automatic status:**
1 to 28 days (default 1/daily). See “STIME” for time of day to send.

23 *823*n# **Control operation of terminal with DC plug:**
0 = Disabled (default). Button is used to activate/deactivate terminal.
1 = Deactivate on plug removal.
2 = Deactivate on plug removal, activate when plug connected.

24 *824*n# **Ring mode for incoming PSTN calls:**
0 = Silent
1 = Follow cadence from FXO (default).

25 *825*n# **Rules for selecting the PSTN for outgoing calls:**
0 = Normally use PSTN unless match mobile prefix (MPREFIX).
1 = Route all calls via mobile unless PSTN selected with flash-hook.
2 = Route all calls via PSTN unless prefix *9 used.
3 = Route calls via PSTN when phone is off-hook, *9 can select mobile (default).
If either the PSTN or Mobile fails, the remaining functional connection will be used regardless of this setting. Note: The prefix option (CFG27 & IPREFIX) is not available with this setting.

26 *826*n# **Rules for determining PSTN failure:**
Calls will be routed via the mobile network if the PSTN appears to have failed due to:
0 = No voltage when on hook (PSTN less than 5V).

© 2019 Burnside Telecom Ltd.

1 = And insufficient off hook line current (less than 13.2mA).
2 = And parallel phone active (PSTN less than 20V) when FXO is on hook (default).
3 = And no dial tone detected when off hook.

27 *827*n# **Insert prefix on PSTN calls (see PPREFIX):**
0 = Do not insert prefix (default).
1 = Insert prefix.

28 *828*n# **Mute audio during PSTN dial:**
The audio may be muted to prevent DTMF tones being heard on the telephone which may affect automatic dial equipment such a “telecare” terminals.
0 = Allow the DTMF dial codes to be heard (default).
1 = Mute the audio.

29 *829*n# **Select length of line from PSTN Central Office to the terminal:**
This allows for fine tuning of echo cancellation on the PSTN. The terminal needs to be restarted after changing this setting.
0 = 300 metres
1 = 1km (default)
2 = 3km
3 = 6km

30 *830*n# **PSTN power saving on battery:**
0 = PSTN fully operational on battery (default).
1 = Do not detect incoming calls on PSTN to extend battery standby duration.
2 = Disable FXO circuit to save power under all conditions (restart terminal after setting this).

31 *831*n# **LED dimming control:**
0 = LEDs are at maximum brightness (default).
1 = LEDs are automatically dimmed after 30 seconds of inactivity.

CLOCK(=) *844*[YYMMDDHHMMSS]#
When command sent by SMS, the clock is set to the time recorded in the SMS delivery from the mobile network. Note, some networks can automatically provide time and date, the T400 supports this when available.

CLRCALL Ends any active call.

CLRFAULT *851#
Clears any fault state indication.

CLRTEMP *850#
Resets the maximum and minimum temperature memories to current temperature.

INIT *889*8# Restarts the terminal (cold boot).

PNUM(=/?) *840*n*[phone number]#
Read and write phone numbers.
There are 12 memory locations used to store phone numbers. 10 locations (0 to 9) are reserved for speed dial where only one digit need be dialled.
Location 10 is reserved for the off-hook autodial.

© 2019 Burnside Telecom Ltd.

SMS example: PNUM0=+447123456789”Ace Taxis” The name field may be omitted.
Dialled example: *840*0*00447123456789#.

Note when the IPREFIX IDD digits are matched at the start of a number the IDD digits are replaced and stored as a “+” in the PNUMn memory.

An existing number may be cleared, by entering an empty value for example: PNUM0=,11= (will clear numbers & names from memories 0 and 11).

Value of n:

0-9	Speed dial memory locations 0 – 9.
10	Number for off-hook dialling (CFG8=1 “Autodial”).
11	Number for sending SMS automatically (CFG19=1-6).
12	User specifiable number and/or name for SMS report.

REPORT(=/?) *842*[phone number]#
Restore settings of the terminal

Shorthand way of combining PNUM11=n and CFG19=1, where n is the phone number. For example REPORT=+447123456789”Bobs mobile”. The name field may be omitted. The STAT1 will be sent if an error condition occurs.
842

Entering REPORT without a number turns off the automatic error reporting and is equivalent to CFG19=0. For example, REPORT=

RESTOREn *888*n#
Restore settings of the terminal
n = 0 Restore all settings to factory defaults but retain phone numbers.
n = 1 Also clear phone number memories

STATn Returns the status of the terminal in one of three different formats specified by n. If n is omitted it is interpreted as zero.

n = 0 For general status, useful during installation:
Net: my network
Sig: -79dBm
Supply: 12.0V
Bat: 4.12V
PSTN: 48V (only T400LR)
Temperature – (in degrees Celsius)
Now: 20
Min: 18
Max: 26
Battery: OK/Fault
Ver: 1.0 (firmware version)
IMEI: 357749031743900

n = 1 For information about faults for a technician, each item is sent on a separate line which is convenient for a smart phone display.
<Imei number> or identity number/name from PNUM 12
Power: Fail/Recovered after d:h:m:s

© 2019 Burnside Telecom Ltd.

Battery: 4.2V,OK/Low/Exhausted/Fault
Temperature: 20 (degrees Celsius) OK/Fault
Hook state: On/Off/Howl
PSTN: 48V,OK (only T400LR)
Signal: -dBm

n = 2 The information is the same as type 1, but each item is sent on one line with each field separated by a comma. This is intended for a monitoring centre:

n = 3 All information in a format intended for a computer:
index:val,index:val... to index 13
The index values are as follows:
0 = Signal in –dBm (eg -79)
1 = Power supply state (0 for none, 1 for active)
2 = Battery voltage (eg 4.1)
3 = PSTN voltage in volts (eg 48)
4 = Temperature now (in Celsius) (eg 22)
5 = Minimum temperature recorded (eg -6)
6= Maximum temperature recorded (eg 37)
7 = Model/HW ver./Firmware ver. (eg 1/2/1.03)
8 = Hook howl state (0 is OK, 1 is off-hook & howling)
9 = Power break (0 for none, otherwise 1. Cleared on read)
10 = Call state (0 for idle, 1 for call in progress,)
11 = Battery state (0 for normal, 1 for fault)
12 = IMEI (eg 357749031743900)
13= PSTN state (0 for normal, 1 for fault)
14= Reserved (always 0)
15= Reserved (always 1)
16 = <network operator name>

n = 4 Information about the network in human readable format:

index:val,index:val... to index 13

STIME(=/?) *843*[hhmm]#
Time to send SMS status daily or at intervals. 24h format HHMM (default 0000).
For example: STIME=2315 will send status once per day at 23:15.
STIME=2415 will send status every 15 minutes.
Maximum time accepted 3600 which is once per 12 hours (3600 - 2400 = 1200).

TPIN(=) *860*[old tpin]*[new tpin]*[new tpin]#
Read and write teminal PIN, fixed length of 4 digits
For example: TPIN=4321 (from SMS command) *860*1234*4321*4321# (from DTMF dial).
The TPIN can be restored to the default using a master code provided by Burnside.

VER Returns the firmware version number.

Additional commands for T400LR:

IPREFIX *848*2*[prefix]#
Sets the IDD prefix that is used to convert “+” in phone numbers for PSTN dialling

© 2019 Burnside Telecom Ltd.

For example, IPREFIX=00 (default 00). Maximum 4 digits.

MPREFIX *846*0*[prefix]#
Sets the prefix which determines if the number is destined for the mobile network.
For example, MPREFIX=07 (default 07). Maximum 4 digits.

PPREFIX *847*1*[prefix]#
Sets a prefix to insert when dialling via the FXO (see CFG27).
For example, PPREFIX=9 (default 9) to access line via PBX. Maximum 4 digits.

Ring back commands using caller ID (CLI)

For phones that support CLI display, the status of the terminal may be determined by dialing various ring back codes. If the phone does not support CLI, use SMS status commands.

If the caller CLI is not enabled in CFG1 (*81*n#), the ETSI CLI protocol will be used for the ring back status. If a specific CLI has been selected, that will be used.

***9#** - Provides general status and mobile network. The IMEI is used as the calling number.
***#03#** - Provides state of battery charge.
***#04#** - Provides model number and firmware revision.
***#05#** - Provides signal strength.
***#06#** - Provides IMEI (serial number in the text field).

Note: For *#03#, *#04# & *#05# the calling number is 1234.

Caller ID (CLI) incoming from PSTN

For phones that support CLI display and PSTN connections that provide CLI, CLI information is passed through the T400 from the PSTN connection regardless of CFG1.

T400LR automatic selection of PSTN

The default settings of the T400LR is to automatically select the PSTN connection when the connected telephone is taken “off hook”. To call using the mobile network, dial *9 before the number. If the PSTN is not connected or faulty, the mobile network will automatically be used.
Options for PTSN line selection are controlled by CFG25, see page 13.

Disabling PSTN on T400LR

If the PSTN connection (FXO) is not going to be used, disabling the port is advised. This slightly increases the standby time on battery and removes any confusion about line selection. See CFG30 on page 13. After changing this setting, it is necessary to restart the T400LR by turning it off and on again. If this setting is changed by SMS command, the INIT command will perform the restart.

Caller ID (CLI) sent from T400 mobile call

Own number sending is controlled by CFG2 (*82*n#) but may be overridden for individual calls by dialling a prefix. To send CLI dial *31# before the number, to suppress CLI dial #31# before the number.

© 2019 Burnside Telecom Ltd.

Operating tips

Use with Telecare terminals or other automatic dial equipment.
When using equipment that dials into call monitoring centres with signalling equipment, mute the DTMF tones while the call is being established (CFG28=1 / *828*1#). This will prevent the dialling terminal from being confused by the dialling tones made by the T400LR.

Phone used in an unattended location or for public use
When providing a courtesy phone or similar, we recommend restricting the call duration to avoid an excessive call cost or blocked destination if the caller does not hang up the phone.
See CFG6=n / *86*[limit]#.

Using a phone located in a location with a weak mobile signal
Locate the terminal in a location where there is an acceptable level of mobile signal then connect a longer extension cable to the telephone. For example, the T400 could be in an upper floor near a window and the phone could be in a ground floor lobby. Using an external antenna connected by a long cable is less desirable as some of the signal is lost in the cable, whereas a long phone extension cable will not impair the performance. Where an external antenna is appropriate, we recommend the 2J2024GP wall mount antenna which is available from Burnside suppliers.

Working with SIMs and the pros & cons of 3G
There is a misconception that a SIM requires a terminal that supports a 3G or 4G network. In fact, most SIMs will work in 2G for voice. The primary advantage of 3G and 4G is high speed data, but the signal strength is weaker (1/8th) so the coverage can be sparse apart from urban areas. For a voice application, 2G works well and in many cases is much more suitable.

© 2019 Burnside Telecom Ltd.

Troubleshooting

If the amber LED is indicating a fault, it is typically because there is no SIM installed.
Remedy: Turn off the unit and install a SIM. Then turn the unit back on.

If the RED charge LED is flashing abnormally (see page 4):
• The unit is too hot or cold.
Remedy: Locate the terminal in a different location. In particular keep out of direct sunlight.
• The battery has failed.
Remedy: replace the batteries with Burnside approved batteries.

© 2019 Burnside Telecom Ltd.

BURNSIDE

Important safety information

Human exposure to electromagnetic fields

Calculations as per Annex A of EN62311:2008, show that the exposure levels with the supplied micro stub antenna are within the recommended levels at distances exceeding 10.8cm (900MHz) and 5.58cm (1800MHz). The T400 user should not be nearer to the antenna than these distances for longer than 6 minutes at any one time. If a higher gain antenna is used, this safe operating distance must be increased by an appropriate amount.

Battery

Use the supplied Panasonic NiMH batteries. It is possible to use non-rechargeable AA alkaline cells in special circumstances but replace with the correct batteries as soon as possible. Never leave alkaline cells in the terminal for an extended period.

Power supply

Do not use any other power supply other than the one supplied with your terminal.
Failure to use either the supplied batteries or charger can damage the terminal and will invalidate the warranty.

Operating environment

Make sure that no special regulations are in force that impose restrictions on the use of mobiles. Such restrictions to mobiles would also apply to the T400 terminal.

Electronic devices

Most modern electronic equipment is shielded from radio frequency (RF) signals. However, certain electronic equipment may not be shielded against the RF signals from your terminal.

Pacemakers

Pacemaker manufacturers recommend that a minimum separation of 20 cm (8 inches) be maintained between a hand-held wireless phone and a pacemaker. The same restriction should apply to the antenna of the terminal. If you have any reason to suspect that interference is taking place, switch off the terminal immediately.

Hearing aids

Some digital wireless phones may interfere with some hearing aids. In the event of such interference, you may want to consult your service provider.

Other medical devices

Operation of any radio transmitting equipment, including cellular phones, may interfere with the functionality of inadequately protected medical devices. Consult a physician or the manufacturer of the medical device to determine if they are adequately shielded from external RF energy or if you have any questions.
Switch off your terminal in health care facilities when any regulations posted in these areas instruct you to do so. Hospitals or health care facilities may be using equipment that could be sensitive to external RF energy.

Vehicles

RF signals may affect improperly installed or inadequately shielded electronic systems in motor vehicles (e.g. electronic fuel injection systems, electronic anti-skid (anti-lock) braking systems, electronic speed control systems, air bag systems).
Check with the manufacturer or its representative regarding your vehicle. You should also consult the manufacturer of any equipment that has been added to your vehicle.

© 2019 Burnside Telecom Ltd.

Potentially explosive atmospheres

Do not install the terminal or site the antenna in any area with a potentially explosive atmosphere and obey all signs and instructions.
Areas with a potentially explosive atmosphere are often but not always clearly marked. They include below deck on boats; chemical transfer or storage facilities; vehicles using liquefied petroleum gas (such as propane or butane); areas where the air contains chemicals or particles, such as grain, dust or metal powders.

Emergency calls

Important! This terminal, like any wireless phone, operates using radio signals, wireless and landline networks, which cannot guarantee a connection.
Therefore, you should never rely solely upon any wireless device for essential communications (e.g. medical emergencies).
Remember, to make or receive any calls, your terminal must be switched on and in a service area with adequate cellular signal strength. Emergency calls may not be possible on all wireless phone networks or when certain network services and/or phone features are in use. Check with local cellular service providers.

© 2019 Burnside Telecom Ltd.

Technical Specifications

Operational Requirements	
GSM Systems.	2G GSM Quad-band GSM phase 2/2+ 850/900 @ 33dBm max., 1800/1900 MHz @ 30dBm max.
Signal sensitivity	-90dBm or better recommended for reliable operation
Not suitable for connection to:	3G Networks GSM-R Networks
Power supply	12VDC Standby 0.15W, On call 1.9W average. AC adapter supplied 100 – 240Vac 50/60Hz.
Battery backup	User exchangeable 1900mAH AA size NiMH batteries Over 50 hours standby or 5 hours talk time (TS.09-v7.6).
Indicators	Red, green and amber LEDs.
Speech codecs	HR, FR, EFR & AMR
GSM In-call features	Call waiting, multiparty calls and explicit call transfer.
FXS specification	BT431A connector for UK model, RJ11 connector for EU model DC loop current 20/25/30mA (user selectable, default 25). Ringing signal 25Hz sinusoidal 60V RMS Ringing load 3 REN Dialling by DTMF CLI passed through from FXO. CLI generated from incoming Mobile call.
FXO specification	RJ11 connector On-hook and off-hook line voltage monitor 3μA on-hook line current monitor Loop current monitor Parallel handset detection Line polarity reversal detection Greater than 3000V isolation
Antenna connection	50 Ohm SMA male connector
Monitored faults and sensors	• Power break • PSTN failure • Battery condition • Supply voltage • Ambient temperature
Monitoring method	• Remote interrogation by SMS. • SMS sent on event.

© 2019 Burnside Telecom Ltd.

Environmental limits	
Temperature:	Operating: -20°C to +40°C Charging: 0°C to +40°C Storing: -40°C to +55°C
Relative Humidity	5 - 95% (non-condensing)
Physical characteristics	
Weight	192g (325g with supplied batteries installed).
Dimensions	141 x 91 x 40mm
Compliance to standards	
European Directive	2014/53/EU Radio Equipment Directive. 2014/35/EU Electrical equipment designed for use within certain voltage limits (Low Voltage Directive) 2011/65/EC - Restriction of the use of certain hazardous substances in electrical and electronic equipment (recast) (RoHS 2) Directive
EMC	EN 301 511 covering frequency bands 900/1800 MHz for test clauses 4.2.16 (allocated mode) & 4.2.17 (Idle mode) and including voltage extremes. EN 301489-1 - ElectroMagnetic Compatibility (EMC) standard for radio equipment and services. Part 1: Common technical requirements EN 301489-52 Electromagnetic Compatibility (EMC) standard for radio equipment and services.
RF Spectrum Efficiency	ETSI TS151.010-1 Mobile Station (MS) conformance specification. ETSI TS151.010-2 Mobile Station (MS) protocol implementation.
Safety	EN 62368-1: 2014 Audio/video, information and communication technology equipment: Part 1: Safety requirements EN 62311:2008 Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0Hz - 300GHz)

© 2019 Burnside Telecom Ltd.

Recycling information

All components except for the batteries	The symbol shown here and, on the product, means that the product is classed as Electrical or Electronic Equipment and should not be disposed with other household or commercial waste at the end of its working life. The Waste of Electrical and Electronic Equipment (WEEE) Directive has been put in place to recycle products using best available recovery and recycling techniques to minimise the impact on the environment, treat any hazardous substances and avoid the increasing landfill. Business users should contact their suppliers and check the terms and conditions of the purchase contract and ensure that this product is not mixed with other commercial waste for disposal.
Battery	Dispose of unwanted batteries in a suitable recycling collection location such as your local supermarket.

Approved batteries

Panasonic BK200AAB.
Panasonic Eneloop BK-3MCCE.

The Eneloop BK-3MCCE is the retail equivalent of the industrial Panasonic BK200AAB originally supplied with the T400.
Eneloop BK-3MCCE are typically available in a blister pack of 4 from online retailers, part number BK-3MCCE/4BE.

Burnside resellers may also be able to supply packs of 4 original BK200AAB Burnside part number 228002.

Whilst it is likely that other brands of NiMH battery would provide good service, Burnside have so far only tested and approve the above mentioned high quality Panasonic batteries.

© 2019 Burnside Telecom Ltd.

Revision History

Date	Revision	
18/12/18	1.0	First release
25/02/19	1.1	Added note on page 17 about #31# and *31# codes to control CLI
27/02/19	1.2	Added section on human exposure to electromagnetic fields on page 20
26/03/19	1.3	Revised product images
18/04/19	1.4	Added auto-answer function (CFG8=2) Added new call restriction option (CFG5=5) Increased range of CFG18 audio level
05/05/19	2.0	New issue to coincide with V2.00 version of firmware
21/06/19	2.1	Added “Battery” command that was omitted from previous document.

© 2019 Burnside Telecom Ltd.