

TX CELLULAR



Technical write-up

Hardware:

The TXC board consists of the following subsystems:

- 3.3V regulated power supply
(Drives the AT45DB161 EEPROM).
- 3.8V regulated power supply
(Drives the iWOW GSM modem).
- 5V regulated power supply
(Drives the ATMEGA64L micro controller).
- Audio amplifier – TDA7052BT (not used).
- iWOW GSM modem – TR800.
- DTMF decoder – MT8870DS.
- Micro processor – ATMEGA64L.
- EEPROM memory – AT45DB161.
- Subscriber identity module – GHU780.



The TXC has the following hardware interfaces:

- 7 Dry contact inputs (7 to 14VDC)
- 1 Dedicated AC monitoring pin (7 to 17VAC)
- 2 Normally open relay outputs (max 24V 10A)
- DTMF (tip & ring) interface for contact ID.
- Serial data interface 1 – for programming and alarm panel data.
- Serial data interface 2 – for FSK 433MHz receiver board.
- 7 Jumpers for weak input pull-up(one for each dry contact input used in conjunction with trigger low programming option).
- Learn jumper (to learn 433MHz remote account code).
- Forget jumper (to erase all 433MHz remote account codes from memory).
- JTAG interface (for development purposes only).
- STK500 interface (for production and testing purposes only).

Typical values (measurements done with 13.8 volt power supply):

- Supply voltage: Min 6.5Vdc, Max 15Vdc.
- Power consumption in standby: 80mA
- Power consumption during network interaction:
 - GPRS 460mA
 - SMS/ voice 260mA
- Peak power consumption: 2000mA (not more than 1.5ms in every 4ms)
- Output power:
 - GSM 850 – Class 4 (2W)
 - GSM 900 – Class 4 (2W)
 - GSM 1800 – Class 1 (1W)
 - PCS 1900 – Class 1 (1W)
- GSM Frequency (Tri-band, optional quad-band):
 - GSM 850 – TX 824 to 849MHz, RX 869 to 894 MHz
 - GSM 900 – TX 880 to 915MHz, RX 925 to 960 MHz
 - GSM 1800 – TX 1710 to 1785MHz, RX 1805 to 1880 MHz
 - PCS 1900 – TX 1850 to 1910MHz, RX 1930 to 1990 MHz
- Input pin voltage (No jumper) 0.0V
- Input pin voltage (With jumper inserted) 10.9V

Software functions/ features:

LED Indicators:

The TXC has 4 LED indicators.

- LED 1 (Green) – Located to the left of the serial interface.
 - Off – The TXC has not yet initialised or registered on the GSM network.
 - Flashing slowly – The TXC is in standby.
 - Flashing fast – The TXC is busy sending a message or an alarm via SMS or GPRS.
- LED 2 (Red) – Located to the right of the DTMF (tip & ring) interface.
 - Off – The TXC has been initialised successfully.
 - Flashing fast – The TXC is busy with initialisation resetting, registering or re-registering on the GSM network.
- LED 3 (Yellow) – Located below the SIM card connector at the bottom right corner of the iWOW modem.
 - On – The iWOW GSM module is switched on but not currently registered on any GSM network.
 - Off – The iWOW GSM module is switched off.
 - Flashing slowly – the iWOW module is registered on the network.
- LED 4 (Yellow) – Located at the top of the board to the left of the ‘learn’ and ‘forget’ jumper. [See remote control functions.](#)

Communication options:

- The TXC can communicate alarm and device state information using the short message service (SMS) and or the general packet radio service (GPRS) supplied by the relevant cellular service provider.
- The user can provide up to 10 distinct phone numbers for SMS reporting.
- The user can supply 5 server address, port and APN connection settings for GPRS reporting. The TXC will try each of the 5 connection settings in turn when a GPRS connection is required.
- All input triggers can be reported via GPRS in standard contact ID form or via SMS using normal text.
- In the event of GPRS failure, GPRS alarms can automatically be reported via SMS to a control room using the FSK GSM base station. The message is in numeric format and must be decoded using an FSK GSM modem (Siemens version).

Inputs and alarm triggers:

- The 7 dry contact inputs can be programmed to send an SMS and or GPRS message when the input is triggered (high/12V) and restored (low/ 0v).
- The CAC is a dedicated AC monitoring input. This is the only input that can be connected to an AC power supply. The input will accept between 7 and 17VAC. This input can be programmed to report an AC fail or restore event using GPRS and or SMS.
Note: The CAC is a delayed input. The CAC must be either high(above 7V AC) or low (0V) for at least 10 minutes before an AC fail or restore signal will be sent.
- The TXC DTMF interface can be programmed to monitor DTMF tones in the ADEMCO contact ID format. The contact ID alarms can be reported via GPRS using the standard contact id alarm code or via SMS using the standard contact ID text as defined by SIA. For SMS reporting the user can supply up to 64 zone descriptions and up to 32 user names as an alternative to zone or user numbers. The TXC can report using the alarm panel account code instead of its own account code by programming either a '?' or a '%' as the first digit of its own account code. It will operate as follow:
 - Account code format %xxxxx. Example "%00001".
 - i. Login: report panel account code.
 - ii. DTMF alarm: report panel account code.
 - iii. Serial alarm: report panel account code.
 - iv. Dry contact: report panel account code.
 - Account code format ?xxxxx. Example "?00001".
 - i. Login: report own account code.
 - ii. DTMF alarm: report panel account code.
 - iii. Serial alarm: report panel account code.
 - iv. Dry contact: report own account code.
- The TXC can be set to send alarms received through its serial interface using GPRS or SMS. The standard or closest equivalent ademco contact id code will be sent via GPRS. The standard or closest equivalent ademco contact id alarm text

will be sent via SMS. The serial interface can be set up to monitor using Paradox, Pima or Texecom serial alarm protocol. For SMS reporting the user can supply up to 64 zone descriptions and up to 32 user names as an alternative to zone or user numbers.

- The TXC can monitor its own supply voltage (Battery voltage) and send an SMS or GPRS message if the supply voltage drops below or rises above the set threshold.

Note: The battery low alarm is a delayed event. The supply voltage must be either high (above threshold) or low (below threshold) for at least 10 minutes before a battery low or restore signal will be sent.

- The TXC can be set to send an SMS or GPRS message every time the unit is switched on.
- The TXC can be programmed to send an SMS and or GPRS message in response to any one of six FSK remote buttons being pressed. [See remote control functions.](#)
- The TXC can be programmed to send an SMS and or GPRS message in response to receiving a voice call from one of the 10 phone numbers programmed into the unit.
- The TXC can be programmed to send a test SMS message at specific intervals ranging from 1 to 65500 minutes (1 minute to +- 45 days).
- The TXC can be programmed to send a GPRS test message at specific intervals ranging from 1 to 65500 minutes (1 minute to +- 45 days).
- The TXC can send a GPRS and or SMS message when either one of the two outputs are turned on or off.

Outputs:

- The TXC has two relay outputs.
- The outputs can be commanded to turn on or off by sending an SMS to the unit, by pressing a remote control button or by means of a voice call.
- Each output can be configured to be a latching or a momentary output. As a momentary output the momentary on time can be set between 1 and 65500 seconds.
- Each output can be configured to return to the previous state that it was in, to turn on or to remain off when the unit is powered up.

Other SMS functions:

- Most of the TXC programming options and device setup can be done by sending SMS messages to the TXC. [See appendix A.](#)
- The device status or individual input status can be retrieved via SMS. [See appendix B.](#)
- The TXC can accept SMS commands to control the outputs, reset the unit etc. [See appendix C](#) for more information.

Programming and device setup:

The TXC is PC programmable using a dongle and serial cable. The TXC firmware can also be updated using the same serial interface.

Remote control functions

- The TXC can 'learn' up to 200 remote control account codes.
- To add remotes onto the TXC:
 - Insert the learn jumper.
 - Press any button on the remote control.
 - The yellow LED (LED 4) will rapidly flash to indicate that the TXC has stored the remote account code.
 - Alternatively the programming software can be used to manually enter remote account codes.
- To remove/ forget remotes:
 - Insert the forget jumper
 - The LED will turn on for two seconds before flashing rapidly to indicate that all 200 possible remote account codes have been erased from its memory.
 - Alternatively the programming software can be used read the existing remote account codes, remove one remote and then program the account code information back into the TXC.
- Each of the 6 remote buttons can be used to turn an output on, off or to toggle the output both ways. Additional to controlling the outputs the TXC can report each remote button press via GPRS and or SMS.

Alarm panel functions

The TXC can act as a simple self standing alarm system.

- With panel functions enabled the TXC will assume input 7 to be a key switch input, 6 to be a 24 hour panic zone and input 1 to 5 to be normal alarm zones. Optionally output 1 can act as a dedicated siren output and output 2 as a strobe output.
- The TXC can be armed or disarmed using the relevant keywords in an SMS.
- The TXC can be armed or disarmed using a high pulse on input 7.
- The TXC can be armed or disarmed using an FSK remote.
- The TXC can be armed or disarmed using a missed call.
- The TXC can be programmed to report via SMS or GPRS every time it is armed or disarmed.

If connected to an FSK 6 zone alarm panel the TXC will issue the relevant arm or disarm command to the 6 zone panel when receiving an arm/ disarm SMS command or missed call.

Appendix A (SMS programming)

To set an option or value, send an SMS to the TXC with the item code followed by a single space and the new value.

To retrieve the existing value or setting send an SMS to the TXC with the item code followed by a '?'.
Use the table below to locate the relevant item code.

Example:

- a. To change the TXC unit description to "Beach house alarm" an SMS can be sent to the TXC with the following text: "000 Beach house alarm".
- b. To change the SMS text that the TXC sends when remote button 1 is pressed to "Panic alarm, phone police!" an SMS can be sent to the TXC with the following text: "037 Panic alarm, phone police!".
- c. To retrieve the text message that will be sent when remote button 1 is pressed send an SMS to the TXC with the text "037?". Note: When requesting the phone number stored in 001 to 010 the TXC will reply with all 10 phone numbers.

| Item code | Item | Default value | Max val/ Max Len | Min val |
|-----------|------------------------|-----------------------------------|---------------------|---------|
| 000 | Unit description | My alarm system | 20 | n/a |
| 001 | Phone number 1 | | 15 | n/a |
| 002 | Phone number 2 | | 15 | n/a |
| 003 | Phone number 3 | | 15 | n/a |
| 004 | Phone number 4 | | 15 | n/a |
| 005 | Phone number 5 | | 15 | n/a |
| 006 | Phone number 6 | | 15 | n/a |
| 007 | Phone number 7 | | 15 | n/a |
| 008 | Phone number 8 | | 15 | n/a |
| 009 | Phone number 9 | | 15 | n/a |
| 010 | Phone number 10 | | 15 | n/a |
| 011 | GPRS fallback num | | 15 | n/a |
| 012 | SMS Center number | +27831000002 | 15 | n/a |
| 013 | CAC Ok SMS txt | AC/ mains restore | 140 | n/a |
| 014 | Input 1H SMS txt | open | 140 | n/a |
| 015 | Input 2H SMS txt | burglary zone 1 | 140 | n/a |
| 016 | Input 3H SMS txt | burglary zone 2 | 140 | n/a |
| 017 | Input 4H SMS txt | burglary zone 3 | 140 | n/a |
| 018 | Input 5H SMS txt | fire | 140 | n/a |
| 019 | Input 6H SMS txt | panic | 140 | n/a |
| 020 | Input 7H SMS txt | duress | 140 | n/a |
| 021 | Output 1H SMS txt | | 140 | n/a |
| 022 | Output 2H SMS txt | | 140 | n/a |
| 023 | Battery ok SMS txt | battery voltage ok | 140 | n/a |
| 024 | CAC Low SMS txt | AC/ mains fail | 140 | n/a |
| 025 | Input 1L SMS txt | close | 140 | n/a |
| 026 | Input 2L SMS txt | | 140 | n/a |
| 027 | Input 3L SMS txt | | 140 | n/a |
| 028 | Input 4L SMS txt | | 140 | n/a |
| 029 | Input 5L SMS txt | | 140 | n/a |
| 030 | Input 6L SMS txt | | 140 | n/a |
| 031 | Input 7L SMS txt | | 140 | n/a |
| 032 | Output 1L SMS txt | | 140 | n/a |
| 033 | Output 2L SMS txt | | 140 | n/a |
| 034 | Battery low SMS txt | battery voltage low | 140 | n/a |
| 035 | Power up SMS txt | power up | 140 | n/a |
| 036 | Self test SMS txt | self test | 140 | n/a |
| 037 | Remote button 1 SMS | panic | 140 | n/a |
| 038 | Remote button 2 SMS | fire | 140 | n/a |
| 039 | Remote button 3 SMS | medical | 140 | n/a |
| 040 | Remote button 4 SMS | | 140 | n/a |
| 041 | Remote button 5 SMS | | 140 | n/a |
| 042 | Remote button 6 SMS | | 140 | n/a |
| 043 | Missed call SMS txt | | 140 | n/a |
| 044 | Battery low threshold | 105 (65 = 6.5V, 105 = 10.5V etc.) | 65 | 145 |
| 045 | Send SMS for serial | Y | Y(es) | N(o) |
| 046 | Send GPRS for serial | Y | Y(es) | N(o) |
| 047 | Send SMS for DTMF | Y | Y(es) | N(o) |
| 048 | Send GPRS DTMF | Y | Y(es) | N(o) |
| 049 | SMS Self test interval | 2880(minutes) | 65535 | 0 |

| | | | | |
|------------|-----------------------|------------------------|----|-------|
| 050 | Balance enq kw | Balance? | 10 | n/a |
| 051 | User 1 name | | 25 | n/a |
| 052 | User 2 name | | 25 | n/a |
| 053 to 081 | | | | |
| 082 | User 32 name | | 25 | n/a |
| 083 | Zone 1 name | | 20 | n/a |
| 084 | Zone 2 name | | 20 | n/a |
| 085 to 145 | ... | | | |
| 146 | Zone 64 name | | 20 | n/a |
| 147 | Output 1 stat req kw | Out1? | 10 | n/a |
| 148 | Output 2 stat req kw | Out2? | 10 | n/a |
| 149 | Battery stat req kw | Battery? | 10 | n/a |
| 150 | CAC stat req kw | Cac? | 10 | n/a |
| 151 | Output 1 on cmd kw | 1on | 10 | n/a |
| 152 | Output 1 off cmd kw | 1off | 10 | n/a |
| 153 | Output 2 on cmd kw | 2on | 10 | n/a |
| 154 | Output 2 off cmd kw | 2off | 10 | n/a |
| 155 | Server address 1 | 10.10.10.3 | 32 | n/a |
| 156 | Server address 2 | 41.208.32.195 | 32 | n/a |
| 157 | Server address 3 | fskrouter3.merseine.nu | 32 | n/a |
| 158 | Server address 4 | fskrouter4.merseine.nu | 32 | n/a |
| 159 | Server address 5 | fskrouter4.merseine.nu | 32 | n/a |
| 160 | Port 1 | 8020 | 5 | n/a |
| 161 | Port 2 | 8020 | 5 | n/a |
| 162 | Port 3 | 8020 | 5 | n/a |
| 163 | Port 4 | 8020 | 5 | n/a |
| 164 | Port 5 | 8020 | 5 | n/a |
| 165 | APN 1 | sabregprs.com | 32 | n/a |
| 166 | APN 2 | internet | 32 | n/a |
| 167 | APN 3 | internet | 32 | n/a |
| 168 | APN 4 | internet | 32 | n/a |
| 169 | APN 5 | internet | 32 | n/a |
| 170 | Account code | 00001 | 6 | n/a |
| 171 | CAC Ok GPRS code | | 30 | n/a |
| 172 | Input 1H GPRS code | | 30 | n/a |
| 173 | Input 2H GPRS code | | 30 | n/a |
| 174 | Input 3H GPRS code | | 30 | n/a |
| 175 | Input 4H GPRS code | | 30 | n/a |
| 176 | Input 5H GPRS code | | 30 | n/a |
| 177 | Input 6H GPRS code | | 30 | n/a |
| 178 | Input 7H GPRS code | | 30 | n/a |
| 179 | Output 1H GPRS code | | 30 | n/a |
| 180 | Output 2H GPRS code | | 30 | n/a |
| 181 | Battery ok GPRS code | | 30 | n/a |
| 182 | CAC Low GPRS code | | 30 | n/a |
| 183 | Input 1L GPRS code | | 30 | n/a |
| 184 | Input 2L GPRS code | | 30 | n/a |
| 185 | Input 3L GPRS code | | 30 | n/a |
| 186 | Input 4L GPRS code | | 30 | n/a |
| 187 | Input 5L GPRS code | | 30 | n/a |
| 188 | Input 6L GPRS code | | 30 | n/a |
| 189 | Input 7L GPRS code | | 30 | n/a |
| 190 | Output 1L GPRS code | | 30 | n/a |
| 191 | Output 2L GPRS code | | 30 | n/a |
| 192 | Battery low GPRS code | | 30 | n/a |
| 193 | Power up GPRS code | | 30 | n/a |
| 194 | Self test GPRS code | | 30 | n/a |
| 195 | Rem butt 1 GPRS code | | 30 | n/a |
| 196 | Rem butt 2 GPRS code | | 30 | n/a |
| 197 | Rem butt 3 GPRS code | | 30 | n/a |
| 198 | Rem butt 4 GPRS code | | 30 | n/a |
| 199 | Rem butt 5 GPRS code | | 30 | n/a |
| 200 | Rem butt 6 GPRS code | | 30 | n/a |
| 201 | Missed call GPRS code | | 30 | n/a |
| 202 | Out 1 Mom on time | 1 | 0 | 65535 |
| 203 | Out 2 Mom on time | 1 | 0 | 65535 |

| | | | | |
|-----|---|-----------------------------------|------------|-----------|
| 204 | Out 1 is momentary | N | Y(es) | N(o) |
| 205 | Out 2 is momentary | Y | Y(es) | N(o) |
| 206 | Out 1 restore | L | H(igh) | L(ow) |
| | | | P(revious) | |
| 207 | Out 2 restore | L | H(igh) | L(ow) |
| | | | P(revious) | |
| 208 | Serial interface | P | T(execom) | (P)i(ma) |
| | | | P(aradox) | |
| 209 | Rem button 1 func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 209 | Rem button 1 func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 210 | Rem button 2 func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 210 | Rem button 2 func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 211 | Rem button 3 func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 211 | Rem button 3 func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 212 | Rem button 4 func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 212 | Rem button 4 func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 213 | Rem button 5 func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 213 | Rem button 5 func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 214 | Rem button 6 func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 214 | Rem button 6 func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 215 | Missed call func a | | 1On | 1Of(f) |
| | | | 1To(ggle) | |
| 215 | Missed call func b | | 2On | 2Of(f) |
| | | | 2To(ggle) | |
| 216 | Arm keyword | Arm | 10 | n/a |
| 217 | Stay arm keyword | Stay | 10 | n/a |
| 218 | Disarm keyword | Disarm | 10 | n/a |
| 219 | En/ disable panel functions? | D | (E)nable | (D)isable |
| 220 | Missed call toggles arm and disarm? | D | (E)nable | (D)isable |
| 221 | Output 1 is a siren? | D | (E)nable | (D)isable |
| 222 | Squawk on arm/disarm? | D | (E)nable | (D)isable |
| 223 | Output 2 is a strobe? | D | (E)nable | (D)isable |
| 224 | Report serial comms failure? | D | (E)nable | (D)isable |
| 225 | Contact ID phone number | | 15 | n/a |
| 226 | Input 7 overrides CID phone number? | D | (E)nable | (D)isable |
| 227 | GPRS comms fail report code | | 30 | n/a |
| 228 | GPRS comms restore report code | | 30 | n/a |
| 229 | GPRS comms fail report phone number | | 15 | n/a |
| 230 | Client ID | FSK TEST | 20 | n/a |
| 231 | En/ disable SMS alarms and command replies? | E | (E)nable | (D)isable |
| 232 | CAC pin delay in seconds | 600 | 1 | 65535 |
| 233 | Battery low/ restore delay in seconds | 600 | 1 | 65535 |
| pwd | Technician Password | pwd [old password] [new password] | | |

Appendix B (SMS status requests)

Usage:

To retrieve the TXC unit status an SMS can be sent to the TXC with the following text: "Status?". The TXC will reply with a comprehensive status message.

| Keyword | Item | Format | Comments |
|----------|----------------------|----------|-------------------------------|
| status? | Get full unit status | status? | Not case sensitive. No spaces |
| balance? | Get account balance | balance? | Not case sensitive. No spaces |
| cac? | Get AC status | cac? | Not case sensitive. No spaces |
| 1? | Get input 1 status | 1? | Not case sensitive. No spaces |
| 2? | Get input 2 status | 2? | Not case sensitive. No spaces |
| 3? | Get input 3 status | 3? | Not case sensitive. No spaces |
| 4? | Get input 4 status | 4? | Not case sensitive. No spaces |
| 5? | Get input 5 status | 5? | Not case sensitive. No spaces |
| 6? | Get input 6 status | 6? | Not case sensitive. No spaces |
| 7? | Get input 7 status | 7? | Not case sensitive. No spaces |
| out1? | Get output 1 status | out1? | Not case sensitive. No spaces |
| out2? | Get output 2 status | out2? | Not case sensitive. No spaces |
| battery? | Get supply voltage | battery? | Not case sensitive. No spaces |

Appendix C (SMS commands)

Usage:

Send an SMS containing the appropriate keyword to the TXC.

| Keyword | Item | Format | Comments |
|------------|--------------------------------|--|---|
| pwd | Technician Password | pwd [old password] [new password] | Not case sensitive. Single spaces between parameters. Hard coded password: "merseine" |
| 1on | Turn output 1 on | 1on | Not case sensitive. No spaces |
| 1off | Turn output 1 off | 1off | Not case sensitive. No spaces |
| 2on | Turn output 2 on | 2on | Not case sensitive. No spaces |
| 2off | Turn output 1 off | 2off | Not case sensitive. No spaces |
| connect | Connect to server | connect [srv addr] [port] [APN optional] | Not case sensitive. Single spaces between parameters. Server address in dotted decimal or url format. APN optional – default "internet" |
| reset TXC | Reset command | reset TXC | Not case sensitive. Single spaces between words. |
| STUN TXC | Disable the sending of alarms | STUN TXC | This command is case sensitive. Single spaces between words. |
| UNSTUN TXC | Enables the sending of alarms. | UNSTUN TXC | This command is case sensitive. Single spaces between words. |



FSK TECHNICAL STANDBY NUMBERS:

FRANK : 082 657 7852

RICKUS : 072 595 7700