

Trend Modem Node Controller



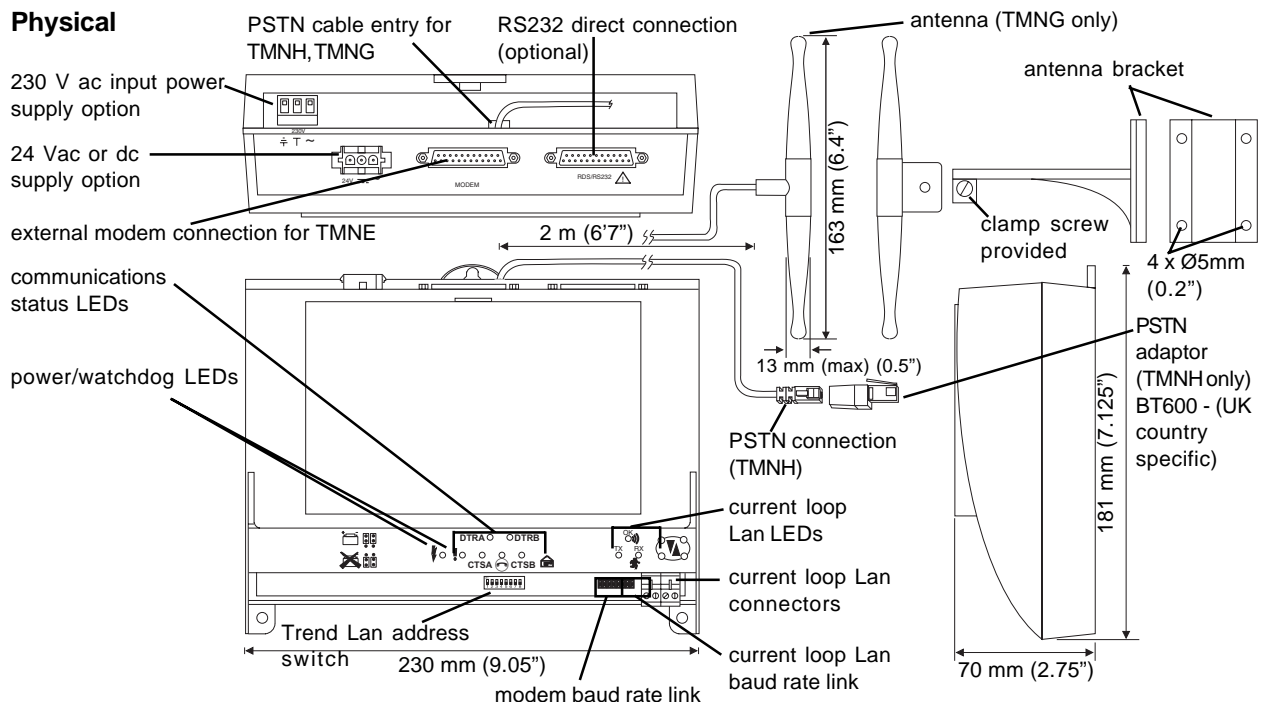
Description

The TMN allows either networked or stand-alone IQ System devices to access the Public Switched Telephone Network (PSTN) via an integral or external modem, or to access the Integrated Services Digital Network (ISDN) via a terminal adaptor. The TMNG uses wireless communication via a GSM service provider enabling connections to sites without landlines and direct SMS messaging (text messages) to mobile phones. The TMN can communicate either to single or multiple devices over the IQ system current loop Lan. It also supports text messaging and communications to radiopagers and GSM phones via the PSTN and is supplied either boxed, or as a board which can be fitted in other IQ system devices (e.g. IQ controllers). A boxed battery-backed version is available (230 Vac only). There are high speed integral modem, GSM modem, and external modem/terminal adaptor versions.

Features

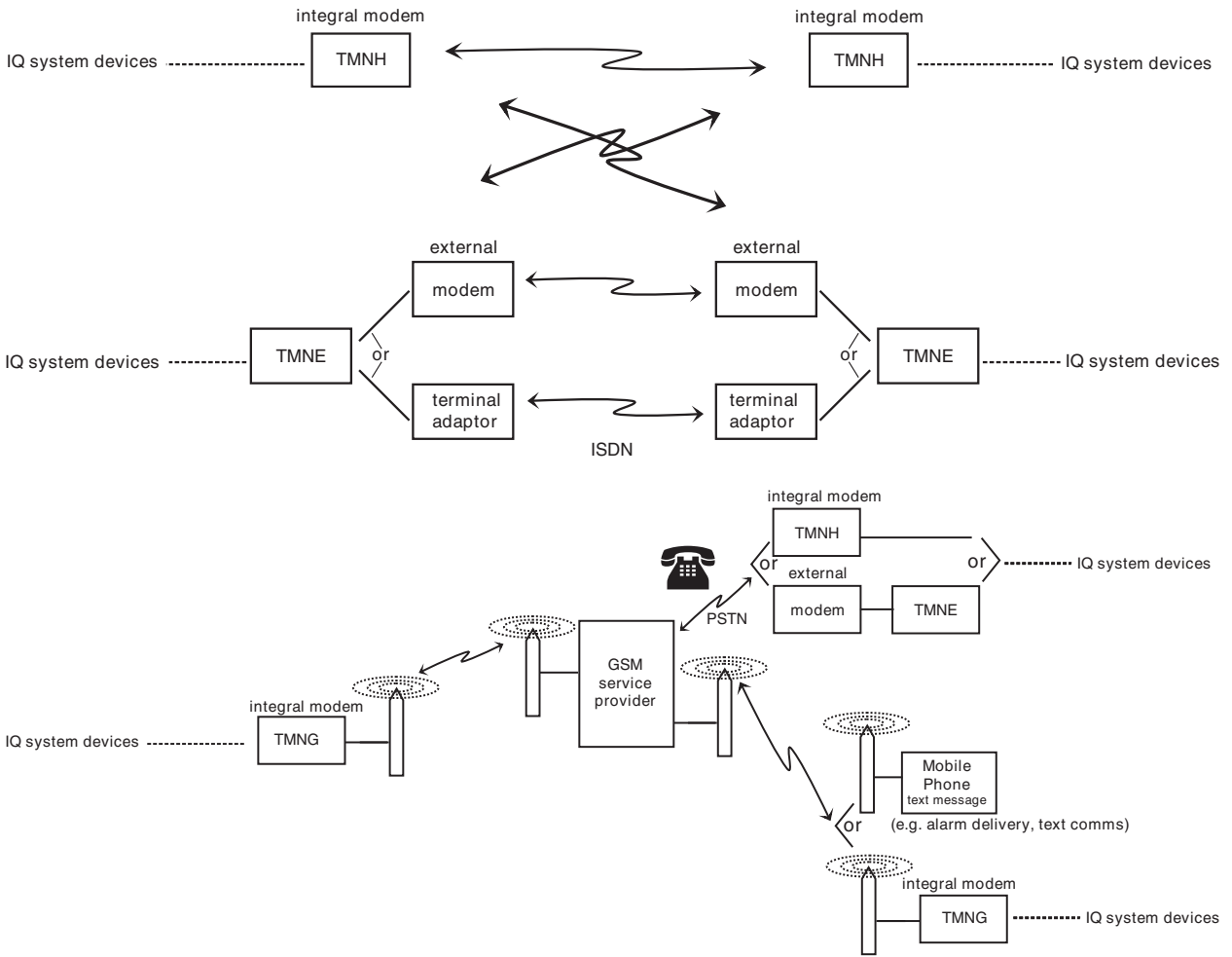
- Enables communication between IQ System devices over PSTN, ISDN, or GSM.
- TMNG enables wireless communication and direct SMS messaging to mobile phones
- Memory retains telephone numbers and settings on power fail without battery.
- Can be used on IQ system current loop Lans and internetwork or direct connected to software tool or controller.
- Battery-backed option (NBOXB/TMN..) allows continued operation on power fail.
- TMNH high speed integral modem has international approvals.
- Fast data rate reduces transmission times.

Physical

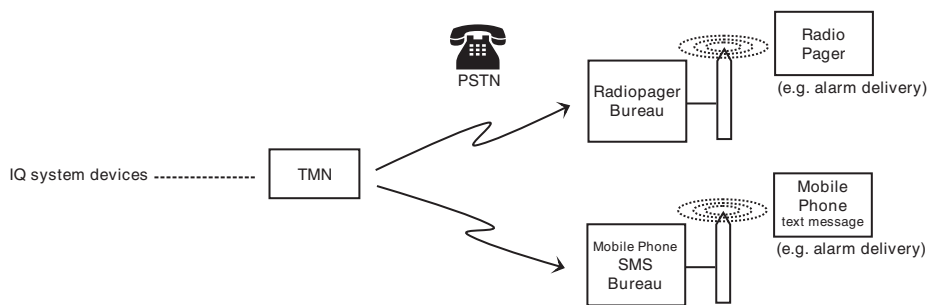


FUNCTIONALITY

The TMN enables communications between IQ system networked (or stand-alone) devices by PSTN via an integral or external modem, by ISDN via an external terminal adaptor, or by wireless communications via an integral GSM modem.

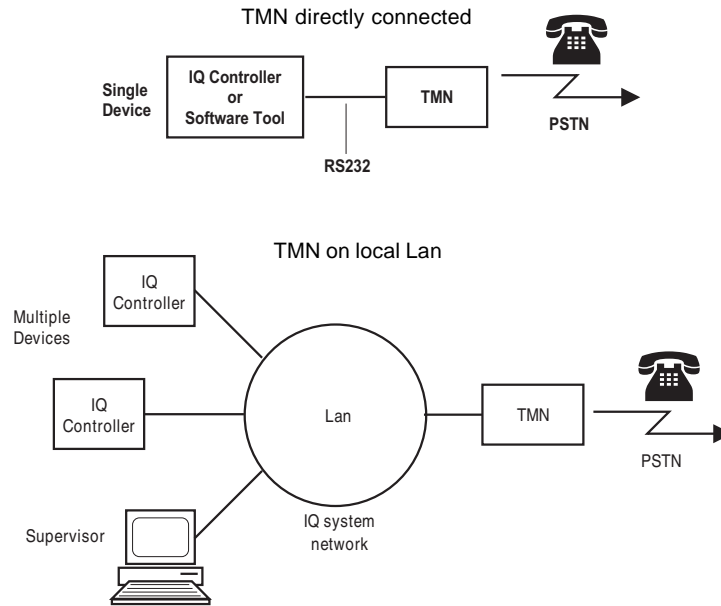


The TMNG is able to send text messages (SMS) directly to mobile phones as shown above (e.g. for alarm delivery). A mobile phone user is also able to dial into a TMNG and send text comms by text messaging enabling parameter monitoring and adjustment (e.g. monitor temperature, change setpoint). The TMNH or TMNE may also send text messages to mobile phones via an SMS bureau. All TMNs enable communications between IQ system devices and radiopagers.

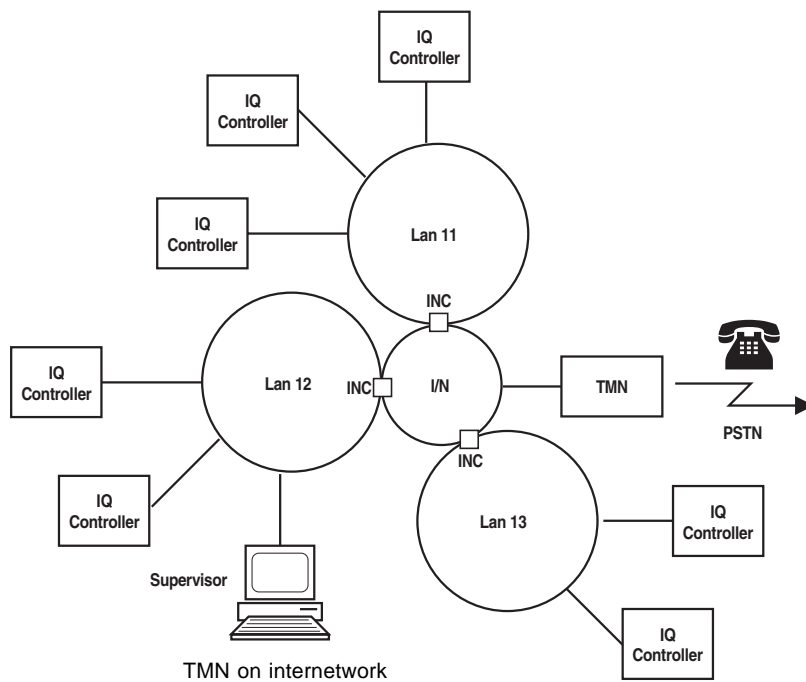


FUNCTIONALITY (continued)

The TMN may be connected either to a single local device via RS232, or to single or multiple devices connected together by the IQ system current loop network. (The RS232 connection is only used for old IQ's without integral CNC, or for configuration using 822+/Toolbox or 921).



The TMN can be positioned on a local network (Lan) as shown above or internetwork (I/N). On the local network it can communicate with all devices on the Lan, whereas on the internetwork it can talk to all devices on any connected Lan.



Thus it facilitates various system applications such as a central supervisor accessing a number of remote sites, a stand-alone controller which can report alarms and be supervised remotely, and a supervisor passing on selected alarms to a radiopager or mobile phone outside normal working hours.

HARDWARE

Packaging: The TMN can be provided boxed, or as a board version.

Boxed version: The TMN can be supplied in a plastic enclosure with a transparent plastic flip-up terminal cover (NBOX/TMN/...). It has 3 point mounting to facilitate installation. There is optional battery backup to keep the node functioning in the event of mains failure (NBOXB/TMN/230., 230 Vac version only). If used with external modem (TMNE version) it will not maintain the modem power.

An optional metal enclosure with cable glanding knockouts (ENCLS/MBOX/IQ22x) is available.

Board version: The board version will fit inside certain IQ controllers - see table below.

UNIT	TMNE	TMNH <v4.4	TMNH v4.4	TMNG
NETB/NETBB	✓	✓	✗	✗
IQ10x+	✓	✓	✓ ^②	✓ ^②
IQ111+	✓	✓	✓ ^②	✗
IQ131+	✓	✓	✓ ^②	✗
IQ23x	✓	✓	✓	✗
IQ241/242	✓	✓	✓	✗
IQ25x	✓ ^①	✓ ^①	✓ ^①	✗

Notes:

- ① *TMN board fits with 3 screws in normal node position or fits in NDP position (if no NDP). Must use NDP position if RDS fitted.*
- ② *The board will not fit into the controller if a display panel is fitted*

The controllers may be ordered pre-fitted with the node (e.g. IQ251/TMNE/..), or the node can be retrofitted by using the appropriate fitting kit, KIT/NODE/IQyyy, where yyy = 23x (231/232), 241 (241/242), 25x (250/251).

Power: The battery-backed boxed TMN (NBOXB/TMN/230) can only be supplied in 230 Vac version but the versions without the battery backup (NBOX/TMN/..) can be supplied in 230 Vac and 24 V(ac or dc) versions. The 230 Vac version is supplied with an optional supply terminal shroud.

The board version requires 24 Vdc, or 18 Vac (transformer isolated), or 18-0-18 Vac (transformer centre tapped).

Fusing: No fuses are fitted. Protection is proved by a self-resetting thermally protected transformer. The 24 V version is protected by a self-resetting PTC device.

Network: The 2 part network terminals are for 2 wire cables. The standard IQ system current loop node features are included (OK, TX and RX indicators, bypass relay, and network alarm generation).

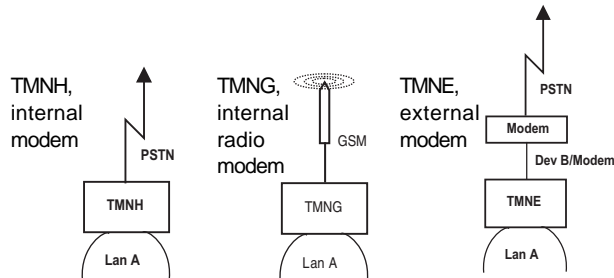
RS232/Lan Connections:

The Lan A network connector is duplicated as Dev A, J15 (J4 on TMNG), RS232 connector. The RS232 connection enables an RS232 device (e.g. a pc running a software tool) to connect to the TMN directly. If an RS232 device is connected to the RS232 connector, the Lan connection (Lan A) is effectively disconnected.

The NBOX(B) versions have an RS232 cable fitted to the RDS/RS232 position in the back of the unit, but the 10 way Molex must be fitted to the DevA plug internally for the RS232 to operate, and connecting to this (e.g. for direct configuration) disables the Lan A network connection.

Modem Connection:

The Dev B/Modem (J16) RS232 connector (designated Modem on the back of the NBOX(B) versions) is only fitted on the TMNE versions of the product to enable connection to an external modem. The TMNH product has an internal modem and connects directly to the PSTN, and the TMNG has an internal GSM modem with an external antenna.



Address Switch: The TMN device address on the local Lan (or the TMN Lan number on the internetwork if the TMN is positioned on the internetwork) is set by the address switch poles 1 to 7. Pole 8, the dumb/normal switch, should be set to dumb for pre-Network+ (pre 1985 networks) and to normal for all other networks.

The address must be unique on the local network (or the internetwork if the TMN is positioned on the internetwork).

The permitted address range is (1,4 to 9,11 to 114) but since the TMN uses the selected address and the next five addresses, the recommended address range on a Lan is 11 to 99, and on the internetwork is 100 to 114. Any other devices on the local Lan (or the internetwork if the TMN is positioned on the internetwork) must not use either the TMN address or the next 5 addresses. Note that if TMN is set to address 1, addresses 1 and 4 to 8 will be used by the TMN.

The 'Position' configuration parameter can be set to 'autosense', 'internet', or 'localnet'. If set to 'internet' then the TMN is configured as positioned on the internetwork, if set to 'localnet' it is configured as positioned on a Lan, but if set to autosense it is configured as positioned either on the internetwork or on the Lan dependent on the address switch setting; if the address switch is <100, then Lan A is a local Lan, but if the address switch is => 100, then Lan A is the internetwork.

Setting the address switch to zero for more than 3 seconds (or until the network OK LED flashes) with power applied will reset the configuration parameters (i.e. zero telephone number table, clear delay list, sets defaults - see below). It does not affect modem menu parameters, call log, nor any modem settings.

It sets the default module to the following defaults:

- Own Tele: cleared
- oWn Lan: 1 (if on Lan)
- Access number: cleared
- Default answer mode: visitor network
- Visitor network dial out: on
- Position: autosense
- Alarm reporting: address: 1 Lan: 1 (if on internetwork)
- Text: on
- Security: Autodial password: off Config password: off
- Dial in: off

(See Autodialling manual for full explanation of parameters).

Baud Rate: The current loop Lan baud rate (19k2, 9k6, 4k8, or 1k2) is set by a link (BAUD A). The baud rate must match the other nodes on the local Lan (or the internetwork if the TMN is positioned on the internetwork). The baud rate may also be set to 38k4 by selecting both 1k2 and 19k2 links; this can only be used on high speed internetwork segments (see INC2 data sheet).

Note that a firmware upgrade to v 4.4 on a previously used board will not permit the use of 38k4 baud rate

HARDWARE (continued)

Network bypass relays: In order that Lan A continues to operate if the TMN fails, the node bypass relay is fitted to maintain network integrity in the event of failure of the node's power supply or failure of the node itself. The bypassing of a node will be recognised by the downstream node and reported as a 'Lan Changed' alarm.

Indicators: The TMN has 11 indicators to monitor unit status.

- ⚡ (Power) (green) On when supply is on (normally ON); if OFF, power fail
- ! (Watchdog) (red) On if a processor or software fault (normally OFF); if ON, TMN fail.
- DTR A (yellow) When Dev A connected to RS232 device (e.g. personal computer, PC), if ON means TMN is busy, unable to receive data from the PC. Otherwise the LED is normally ON and briefly turns off for each data packet sent to the modem (i.e. normally flashes).
- CTS A (yellow) When Dev A connected to RS232 device (e.g. PC), if ON means PC is busy, unable to receive data from the TMN. Otherwise not used.
- DTRB (yellow) For TMNE only; if ON TMN is busy, unable to receive data from the modem. For TMNH not used.
- CTSB (yellow) For TMNE only; if ON modem is busy unable to receive data from the TMN. TMNH not used.
- Ⓜ (Modem) (yellow) Modem activity - changes state every time the TMN receives legal data from the modem (flashes).
- TX (yellow) Monitors current flow from TMN to Trend Network
- RX (yellow) Monitors current flow to TMN from Trend Network
- OK 🟢 (green) On if network OK. Flashes if prohibited address (0, 2, 3, >119).
- Modem mode (red) TMNG only, LED on modem module -only visible in NBOX(B) with cover removed. OFF: modem switched off, ON continuous: Modem switched on but not registered on the network (e.g. card password protected, or not activated), ON slow flash: Switched on and registered on the network. ON fast flash: Active call

Connectors: Two part connectors are used throughout to facilitate wiring. A busbar is provided to facilitate screen termination.

Modem/Terminal adaptor: There are integral modem versions and an external modem/terminal adaptor version.

TMNH/.../country: Integral PSTN modem runs up to 56k bps. Approved in UK, USA and many other countries and fitted with relevant country phone plug or adaptor.

TMNG/ : Integral dual band GSM modem complete with antenna, approved in UK, USA and many other countries.

TMNE/..: TMN will control external modem/terminal adaptor which complies with certain requirements (see compatibility section).

Generally the modems will operate at communication standards lower than and up to their maximum as shown in the table below:

Standard (bps)	V21 300	V22 1200	V22bis 2400	V32 9600	V32bis 14400	V34 36600	V90/V92 56000	ISDN
Modem								
TMNH	✓	✓	✓	✓	✓	✓	✓	
TMNE	✓	✓	✓	✓	✓	✓	✓	✓

Note that if differing TMN/Modems inter-communicate they will transfer data at the maximum bps rate of the slowest TMN/Modem of the pair.

Note that communication rate from device to device is limited by maximum current loop network baud rate of 19k2.

The baud rate (19k2, 9k6, 4k8, 1k2) for the external modem connection is set by an on-board link (BAUD B), and must be set to the maximum baud rate of the modem/terminal adaptor up to 19k2 baud. For TMNH, TMNG the baud rate must be left at the default setting of 19k2.

Data Backup: The TMN uses EEPROM to hold configuration data. This is non-volatile to power failure without need for a battery.

Battery Backup: NBOXB/TMN/230 (230 Vac version only). Rechargeable batteries maintain node operations for 20 minutes (typical) during mains failure. The battery circuit is enabled by two links (J12, J13), and by default the battery circuit is disabled (OFF). The battery links should be moved to the ON position after power up to enable the battery backup. The unit should be powered on for at least 16 hours after moving the links to the ON position to charge up the batteries.

Modem initialisation: For TMNE, the modem or terminal adaptor must be configured to operate correctly with TMN and these settings must be stored in the non-volatile memory of the modem or terminal adaptor prior to its use with the TMN. The TMNE will cause the modem or terminal adaptor to initialise to these non-volatile memory settings as it powers up and at regular intervals. Some recommendations are given in the AND setup section of the Autodialling Manual, but check the compatibility section of this data sheet, and check with Technical Support if unclear. An integral modem (TMNH or TMNG) is configured in the factory, and partially initialised by the TMN.

However, after the insertion of a SIM card into a TMNG (see below) the last 6 settings are cleared and in V4.5 can be re-entered automatically typing the hidden command 'init' at the top level configuration mode prompts. For V4.4 they have to be re-entered manually as follows:

- Enter configuration mode on the TMN in the normal way and type 'direct' while at the top menu prompts.
- Type "dAT+CNMI=2,1,1,0,0" to enable SMS received notification
- Type "dAT+CSMS=1" to set SMS commands to Phase 2+ version
- Type "dAT+ILRR=0" to disable data rate reports
- Type "dAT+CAOC=1" to disable charging information reports
- Type "dAT+CMGF=1" to set SMS message mode to text
- Type "dAT+CSMP=17,196,0,0" to set SMS validity period to 4 weeks
- Type "dAT+CSAS" to save the SMS settings
- Type "dAT&W" to save settings to modem stored profile

HARDWARE (continued)

SIM Card: (TMNG only) The TMNG communicates via a GSM service provider. On completion of the contract with the service provider, the user will receive a SIM card. In addition to the normal voice number, **the SIM card must be set up with a data number; the voice number cannot be used for data calls**, whereas the data number is another mobile number which is used exclusively for data calls.

The user should request a GSM data enabled SIM from the service provider (in the UK Trend recommend either O2 or Orange) and stress that a Mobile Terminated Data SIM is required. In addition the user should request the service provider to turn off automatic SIM updates

GSM calls are typically at 9600 bps, but calls from an ADL controller (e.g. IQ20x/ADL or IQ204/ADL) are only capable of 2400 bps; **calls from an ADL controller require the SIM card to have an additional 2400 bps data number**. When a TMN or ADL calls the TMNG, it must use the appropriate data number, not the voice number.

Before use, the user may have to contact the service provider to activate the SIM card.

The SIM card must be plugged into the GSM modem within the TMNG. This clears some of the modem settings; they then have to be reconfigured as above.

SIM cards normally have a password set up by default. If you wish to keep the PIN then enter AT+CPIN=4321 (where 4321 is the PIN) into the Additional init strings field in the Modem Menu, otherwise put the SIM card into your mobile and remove the PIN via the security settings.

SMS Text Comms: (TMNG only) A mobile phone user can dial into a TMNG and send a text comms message as a text message (SMS). He can use this to interrogate the system or change settings. If an outstation password or autodialling password is set up then it/they must be included in the message. (Text Comms commands are given in the IQ Configuration Manual, 90-1533)

e.g. 1

Send to TMNG: L1 O16 P1234 A1234 S1(\$,V)

Reply from TMNG: L1 O16 S1(\$"=Equipment Room", V=25.2)

where

L=Lan number of Outstation

O=Outstation address

P=Password (PIN) of outstation

A=Password (PIN) of autodialler

(Note that L, O, P, or A may be in upper or lower case)

S1(\$,V)=Text comms request for sensor 1 label and value

e.g. 2

Send to TMNG: L1 O16 P1234 A1234 K1(V=100)

Reply from TMNG: L1 O16 ok

The text message must obey the following rules:

- There must be at least one space between parameters
- If an outstation or autodialler password is not set up omit the entire parameter.
- Parameter order is not important but the text comms (e.g. K1(V=100)) must be last.
- Lan numbers 2, 3, >119 are ignored
- Outstation addresses 0, 2, 3, 10 and >126 are ignored
- If the controller rejects a message because it's invalid or the password is invalid, the TMNG will reply with an error message (e.g. L1 O16 Error)
- If the autodialler password is invalid the TMNG will not send a reply.

Dialling TMNG using PSTN: (TMNG only) It is strongly recommended that a national landline (e.g. BT line for UK) be used when dialling into a TMNG using a landline (e.g. from TMNH or TMNE).


Antenna: (TMNG only)

Mounting: The TMNG is provided with an antenna with a 2 m lead and a plastic mounting bracket, facilitating mounting on a wall or panel.


Interference: The antenna should be mounted with vertical polarization and away from sources of RF interference (e.g. domestic appliances without radio interference suppression, computer monitors or TV receivers, machinery with high HF leakage).

Signal Strength: The signal strength of the GSM service provider's transmitter should be checked. This can be done as explained below or by checking the signal strength indicated on a mobile phone using the same service provider.

RF Exposure: Ensure that the TMNG's antenna is separated from the body of a user or nearby persons by at least 20 cm. The TMNG modem and antenna complies with the relevant FCC rules and regulations regarding RF exposure (see international use section. p7). The user should take care not to use the modem with a damaged antenna.



Do not use the modem with a damaged antenna. If a damaged antenna comes into contact with the skin a minor burn may result. Replace a damaged antenna immediately



Only use the supplied antenna. An unauthorised antenna could damage the modem and may contravene local RF emission regulations or invalidate type approval

Interference with equipment: (TMNG only) The RF energy may affect some improperly shielded electronic equipment

Vehicles. Check the vehicle manufacturer to determine if any on board electronic equipment is adequately shielded from RF energy.

Medical: Consult manufacturer of personal medical devices (e.g. pacemakers, hearing aids etc.) to check if they are adequately shielded from RF energy. The modem may not be used in certain areas of hospitals or health care facilities where regulations posted in the area request mobile phones be turned off.

Aircraft: Do not use the modem in an aircraft

Blasting areas: Do not use the modem in an area designated as a blasting area or where posted 'turn off two way radio'.

Checking Signal Strength: (TMNG only) To check the signal strength using a TMNG:

- Switch on TMNG and enter configuration mode
- Type 'direct' at the top menu prompts
- Type 'dAT+CSQ' to request signal strength
- The value returned is of the form x,y where x is signal strength and y is error rate. Minimum signal strength is indicated by zero with maximum of 31. If the number given is 99 the signal strength is not detectable. If the number is less than 2 or equal to 99 then relocate the antenna and check again

FIRMWARE

Alarms

The TMN also helps to maintain a high level of network integrity by performing continuous checking of network messages. The following text alarms are generated when faults are found:

(if on local Lan) “**Local Lan Reported by xxx-**

(if on internetwork) “**Internetwork Reported by Lan xxx-**

Lan Broken NKBK” - a break in communications in the Lan
Lan OK NKOK” - Lan communications are restored

Lan Changed NKCH” - a node has gone from or been added to the Lan

Autodialler on line AONL” - TMN on line after a successful power up

No answer far site BTNR” - BT Not Responding, generated after 5th dial attempt by TMN.

Local modem fault MONR” - Modem Not Responding, generated if local modem fails to respond to dial request by TMN

No dial tone LINR” - Line Not Responding, generated if local modem does not respond to a dial request by TMN with a dial tone

Pager bureau fault PGNR” - Radio Pager Not Responding, generated when the telephone link to the radiopager (or SMS) bureau is established, but the response by the bureau to transmit the message, or to acknowledge the transmitted message is abnormal.

Dialling Messages

The following dialling messages are sent from the TMN to the dialling device as coded messages and are interpreted and displayed by some supervisors: Dialling (number), Unobtainable (number), Connected (number), Disconnected (number), Link fail (number) Remote disconnection, Local disconnection, Security fail. See autodialling manual for details.

Dialling Modes

The telephone number that the TMN is to dial may be either set up in advance in the number table using configuration mode, or may be sent to it in a separate message by the device initiating the call. Different devices (e.g. IQ controllers, supervisors) use one or a mix of these methods. It is recommended that supervisors use their own internal number tables.

Configuration

The TMN uses the standard configuration mode which is a built-in feature enabling configuration via the network, using any IQ System configuration utility, or by local direct connection, using Wupdn or PowerTool.

Configuration by direct connection uses the RS232 Lan A which can be connected by adaptor cable, 9 Way D Female to 25 Way D Male (CABLE/58/0750). The TMN board version requires an additional adaptor cable, 25 Way D Female to 10 Way Female Molex (CABLE/EJ100179A001). The TMN boxed versions require that the internal 10 way Molex must be fitted to the DevA plug internally for the RS232 to operate. Note that making the direct connection disables the Lan A network connection.

Modules: The firmware consists of a number of configuration modules that define how the TMN functions. They must be set up (configured) for each particular TMN. The configuration of the modules is described in the Autodialling Manual (90-1353) and in the TMN Installation Instructions. The table below lists the different types of modules, and their number.

Module Type	No of Modules	Module Type	No of Modules
Status	1	Delay list	1
Record	10	Default	1
List	1	Modem	1

Note that setting the address switch to zero with power applied for more than 3 seconds will reset the telephone number table and other internal settings.

List: This gives a view of the all the records. It contains ten records with their parameters as defined in the Record section below.

Record: This allows a record to be viewed or changed.

```
record x
addR      20
laN       13
Tele      01234123456
```

Ext addr
(Help, Quit, eXit)

Each record gives the telephone number, network address, and Lan number. It also has an extended address field which is used to hold the pager identification number when radio paging (or mobile number for SMS). Each telephone number may be up to 20 characters including special control characters (e.g. for delays, pulse dialling, tone dialling). Radiopaging is covered in the auto dialling manual; however, the bureau number is put into the tele field with the prefix **RR** which forces the modem into radiopaging mode and negotiates the baud rate with the bureau (previous prefix RP used V21 which may not be supported by the bureau). The security code is entered as a suffix (pager number-space-security code-space).

SMS (text messaging to mobiles) is performed simply in the TMNG by entering the mobile number in the telephone number field preceded by the prefix **SM**, and entering the number again (without the SM prefix) into the extended address field.

```
e.g. record x
addR      24
laN       8
tele      SM077712345
Ext addr  077712345
```

SMS can also be performed by TMNH, TMNE by using the same setup in the TMN as radiopaging with the 'tele' field containing the SMS bureau's telephone number (prefixed RR), and the 'ext.' field containing the mobile number but unlike radiopaging, the SMS extended address field does not normally require a security code.

Record: This allows a record to be viewed or changed.

Delay List: The delay list contains details of up to five telephone numbers where attempts to connect are currently unsuccessful. If all 5 are set up, no further dial outs will be attempted. The delay list can be cleared as explained in the autodialling manual (e.g. after 2 hours, or by entering 'z' when delay list module is selected). The list enables the TMN to conform to UK BAPT regulations by blocking attempts to re-dial numbers where insufficient time has elapsed since the previous attempt. The details include the telephone number, the number of failed attempts, and time elapsed since first and last attempts along with the reason for the last failure.

Status: This gives details of the current state of the TMN and the numbers of different types of unsuccessful attempts to connect.

HARDWARE (continued)

Default: This module contains a number of settings that modify the behaviour of the TMN (note that for a TMN positioned on a Lan, oWn Lan **must** be set up):

The **position** parameter defaults to autosense which enables the TMN to automatically decide its position to be on either a Lan or the internetwork.

If the address is less than 100 it is assumed to be on a Lan, whereas if equal to or greater than 100 it is assumed to be on the internetwork. This parameter also enables this address rule to be overridden. Autosense is recommended.

The TMN may be set up to **report alarms** to a particular device address on a particular Lan in either text or coded (old supervisors only) form.

Password protection may be set to enable this TMN to dial out to secure sites, to protect this TMN being dialled by unauthorised sites, and to protect against unauthorised changes being made in configuration mode.

The **visitor network dial out** parameter enables the TMN to be reserved for incoming calls only, when used by 94x or 921 (v2.5 or greater) supervisors.

The **access number (B)** is a preset number (up to 20 digits) which may be inserted into the telephone number to increase its range to 39 digits (e.g. for accessing Mercury numbers).

Modem: This module gives information about the modem and defines various modem settings:

modem type (*read only*) is the type of modem fitted (Psion 56K PCMCIA, Psion V34 PCMCIA, MultiTech MT5600SMI, MultiTech MTSMC-G-F1, or External).

fixed init string (*read only*) is the fixed initialisation string which is sent to the modem on power, after every call, and once an hour.

Additional init string (*read/write*) allows the user to enter additional modem initialisation strings (Note: Must begin with "AT"). This string is sent to the modem after the 'fixed init string'.

Eight bits no parity (*read/write*) sets the serial link between modem & TMN to 8 bits no parity instead of the default of 7 bits odd parity.

Note that Additional init string and Eight bits no parity should not be changed without instruction from technical support.

Sms text comms (*read/write*) allows the user to enable/disable text comms via SMS (TMNG only). If disabled, a mobile phone user will not be able to perform text communications; this increases security by stopping access for monitoring or changing parameters.

Max sms transmit per hour (*read/write*) allows the user to set the number of SMS messages transmitted per hour (TMNG only). This can be set in the range 0 to 255. If a controller is repeatedly sending alarms it may incur high charges from the service provider; this enables the calls to be limited to a certain number (e.g. 10) per hour.

Restart tmn every 24 hours (*read/write*) allows the user to force the TMN to restart every 24 hours without generating an autodialler on line alarm. If problems are experienced with system interference it may be advisable to restart the TMN every 24 hours to clear down the internal registers. *Note that if the restart is enabled, the TMN will restart every 24 hours from when it was last powered up and only if the modem is idle.*

Call log: The call log can be accessed by typing the hidden command, 'log', when at the top menu prompts. It contains details of the last 10 calls (incoming and outgoing).

CALL LOG

No.	Phone No.	In/Out	Duration(Secs)	Time Since Call (Days,Hrs,Mins)
1	SM07771234567	O	5	1, 10, 43
2	+447771234567	I	4	0, 1, 12
3	+447771234567	O	5	0, 1, 13
4	014031234567	I	3600	0, 0, 5
5	Log Empty			
6	Log Empty			
7	Log Empty			
8	Log Empty			
9	Log Empty			
10	Log Empty			
(Quit,eXit)				
=?				

Initialize: A TMNH or TMNG modem may be re-initialized by typing 'init' at the top level prompts (TMN V4.5 or greater only).

Identification: The node will respond to overview (w) comms with identifier 'A', Autodial Node controller.

COMPATIBILITY

Supervisors and Tools: NDP, 942, 943, 945, 962, 963, 921, 915 (see below), 822+/Toolbox, 841, 842, 843, 845, WupDn, PowerTool

Note that on systems with a combination of ANC+/AND/TMN/MNCs and XN28s special consideration is required if operating with a Supervisor as explained in the Autodialling Reference Manual (90-1353).

Autodialling devices:

TMNHs will intercommunicate. External modems will intercommunicate (i.e. TMNE, ANC) if they share a communication standard. TMN will not communicate with MNC, but will communicate with MNC(U) (MNC >=v2.54) at V21, 300 baud. For MNC system expansion, it is recommended to add a central TMN and expand using TMNs. The following compatibility table applies to the TMN both dialling and receiving unless explicitly mentioned.

TMN	MNC<v2.54	MNC>=v2.54	ANC	AND	TMN<v4	TMN>=v4 <v4.4	TMNH, TMNE v4.4 or greater	TMNG	915+modem	IQ2xx/ADL
TMN<v4	X	✓ ②③	X	✓	✓	✓	✓	X	X	X
TMN>=v4 <v4.4	X	✓ ②③	X	✓	✓	✓	✓	✓ ④⑤	X ✓ ①	✓
TMNH, TMNE v4.4	X	✓ ②③	X	✓	✓	✓	✓	✓ ⑤	X ✓ ①	✓
TMNG	X	X	X	X ✓ ⑦	X	✓ ④⑤	✓ ④⑤	✓ ⑤	X ✓ ① ⑤	✓ ⑥

① A 915 + modem can dial into a TMN, but a TMN cannot dial into a 915 + modem. Dialling in to TMN v4.1 needs manual addressing in the 915, but TMN >=v4.2 is recommended as it allows the 915 to map the site, and the device can then be selected from the map.

② When the MNC >=v2.4 dials into an TMN it must have the telephone number prefixed with **SW** to force it to use V21

③ TMNE may not communicate with MNC because its external modem may not be capable of V21

④ Adjust TMN v4.3 or greater Modem Link Configuration setting 'Originate Msg Delay' to 10 secs.

Setting 'Originate Msg Delay':

- Enter configuration mode on the TMN and type 'modem' when at the top menu prompts.
- Type G3X to set the 'oriGinate msg delay time' to 10 s.
- Type X to exit configuration mode

⑤ The TMN must dial the TMNG data number

⑥ The TMNG must have a 2k4 bps enabled SIM and the IQ2xx/ADL must dial the TMNG's 2k4 bps data number

⑦ The TMNG can dial into an AND v2.5, but an AND v2.5 cannot dial into a TMNG

Configuration: WupDn, PowerTool

Radiopager/SMS: Compatible with TAP (Telelocator Alphanumeric Protocol) and UCP protocols; it does not support proprietary pager protocols. Contact your service provider for bureaux availability or contact Technical Support.

Modem or terminal adaptor: The TMNE requires a Hayes compatible modem.

The TMNE modem or terminal adaptor must be compatible with Hayes 'AT' commands. It must also be able to have the following settings configured:

- Dropping DTR causes the modem to terminate a call and enter command mode.
- DCD indicates if a call has become connected (incoming or outgoing call)
- The data rate of the TMN and the modem must be locked to the TMN baud rate.
- The RTS/CTS flow control is enabled, and the XON/XOFF control disabled.
- The modem must not echo commands sent to it by TMN.
- Messages sent from the modem to the TMN to indicate the progress of the call should only be numeric.
- Data compression must be switched off.

Check with Technical Support for compatible modems or terminal adaptors if unclear.

COMPATIBILITY (continued)**International use**

The TMNH integral modem is approved in the UK, USA, - Australia, Austria, Belgium, Canada, China, Cyprus, Denmark, Eire, Finland, France, Germany, Greece, Holland, Hong Kong, Hungary, India, Italy, Japan, Luxembourg, New Zealand, Norway, Poland, Portugal, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, and many other countries. Check with Technical support for other countries. The country specific statutory information is contained in the installation instructions supplied with the TMN

If a country is not supported, the TMNE may be used with an external modem which is approved in that country.

The TMNG modem complies with all applicable RF safety standards. It meets the standards and recommendations for the protection of public exposure to RF electromagnetic energy established by governmental bodies and other qualified organisations such as the following:

Directives of the European Community

Directorate General V in Matters of Radio Frequency Electromagnetic Energy

The TMNG/EUR uses 900/1800 MHz suitable for Europe and several other countries (contact Technical Support for details).

The TMNG/USA uses 850/1900 MHz suitable for USA.

RF Exposures

Pursuant to 47 CFR § 24.52 of the FCC Rules and Regulations, personal communications services (PCS) equipment is subject to the radio frequency radiation exposure requirements specified in § 1.1307(b), § 2.1091 and § 2.1093 as appropriate.

The TMNG/USA Modem is a GSM (PCS 1900) terminal which operates in the US licensed PCS frequency spectrum. The device transmits over the 1850-1910 MHz band and receives over the 1930-1990 MHz Band. Mult-Tech Systems, Inc. certifies that it has determined that the Modem complies with the RF hazard requirements applicable to broadband PCS equipment operating under the authority of 47 CFR Part 24, Subpart E of the FCC Rules and Regulations. This determination is dependent upon installation, operation and use of the equipment in accordance with all instructions provided.

The modem is designed for and intended to be used in fixed and mobile applications. "Fixed" means that the device is physically secured at one location and is not able to be easily moved to another location. "Mobile" means that the device is designed to be used in other than fixed locations and generally in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's antenna and the body of the user or nearby persons. The Modem is not designed for or intended to be used in portable applications (within 20 cm of the body of the user) and such uses are strictly prohibited.

To ensure that the unit complies with current FCC regulations limiting both maximum RF output power and human exposure to radio frequency radiation, a separation distance of at least 20 cm must be maintained between the unit's antenna and the body of the user and any nearby persons at all times and in all applications and uses. Additionally, in mobile applications, maximum antenna gain must not exceed 3 dBi (to comply with Section 24.232(b) and is limited to 7 dBi for fixed applications. Finally, the tune-up procedure for the O9EM2113 ensures that the maximum RF output power of the device does not exceed 30.0 dBm within the variations that can be expected due to quantity production and testing on a statistical basis.

Firmware Upgrade: Note that upgrading the firmware from <v4.4 to v4.4 or greater will not enable the 38k4 current loop Lan baud rate to be selected. This is because as the firmware runs up in a previously used board, it detects that it has been used before, and retains the previous setup which does not allow the use of the 38k4 baud rate.

INSTALLATION

If the TMN is supplied as a board, it must first be mounted in a suitable enclosure (e.g. certain IQ controllers, NBOX). It is normally mounted on 4 pillars (see Hardware-board version).

The NBOX(B)/TMN must be mounted on a flat surface via 3 off, 6 mm (0.24") holes using screws/rawl plugs.

The TMNG has a 2 m cable to an antenna with a plastic mounting bracket suitable for mounting on a wall or panel.

Note the recommendations above (Hardware, Antenna section) with regard to interference, signal strength, RF exposure and interference with equipment.

The installation process involves:

mount unit in position

mount antenna (TMNG only)

route cables

connect to current loop network or local device

connect the input power supply

connect to modem/terminal adaptor/PSTN socket (TMNH, TMNE)

set up address and baud rate for current loop network

set up baud rate for modem (TMNE only)

commission current loop network

configure TMN

set up local device

configure modem or terminal adaptor (TMNE only)

insert SIM card and configure radio modem (TMNG only)

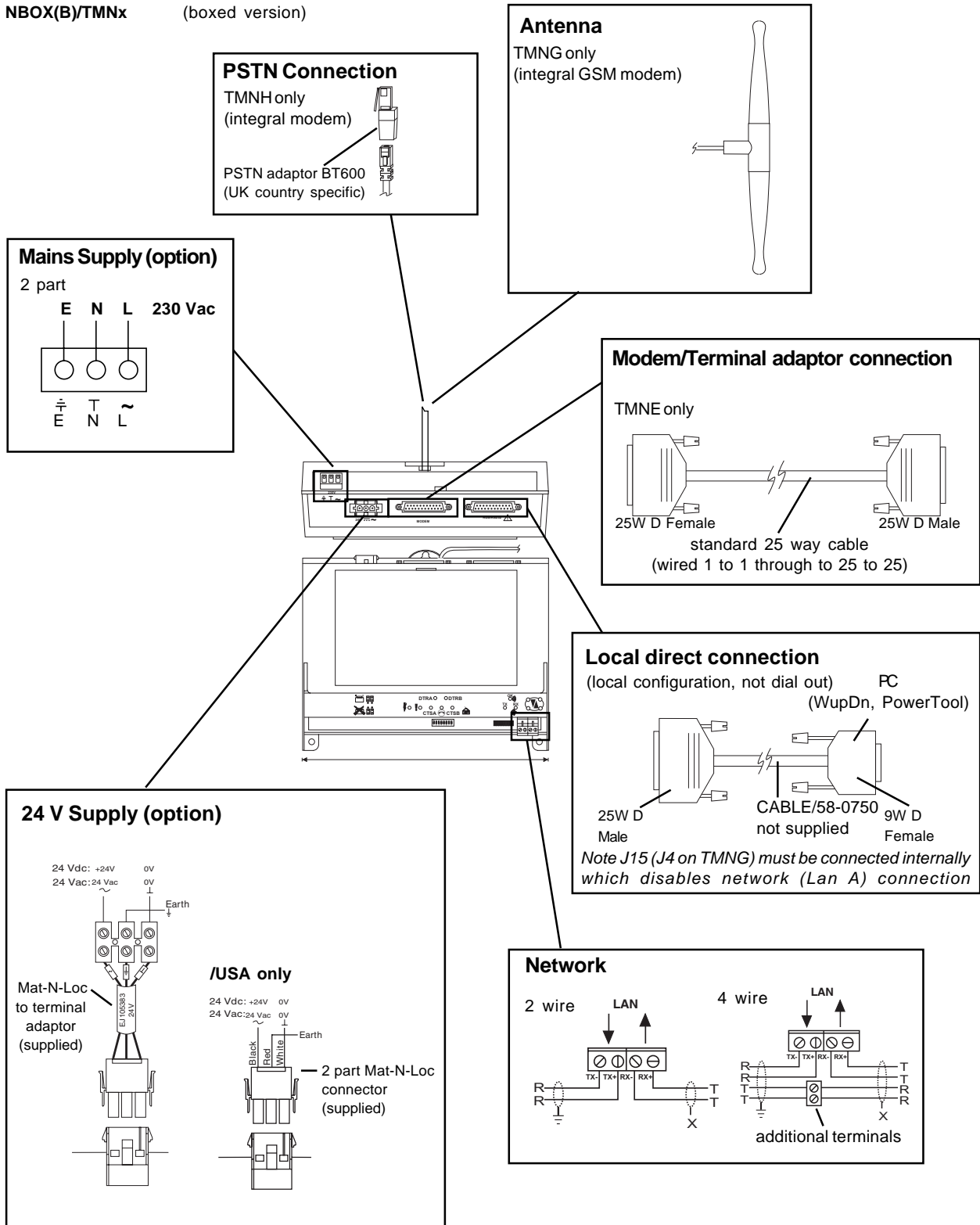
configure remote end

test system

The installation procedure is covered in NBOX(B)/TMNE, G, H Installation Instructions - TG200729 for the boxed versions, or TMNE, G, H Installation Instructions - TG200730 for board only versions. Both versions contain 4 sheets: Fixing, and Configuration 1, 2, and 3.

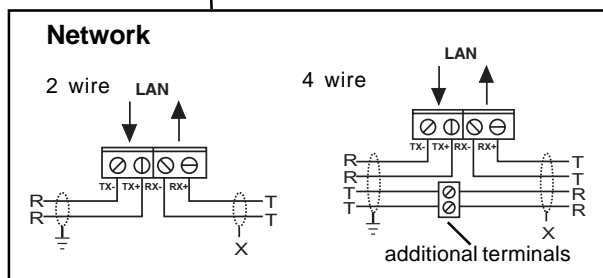
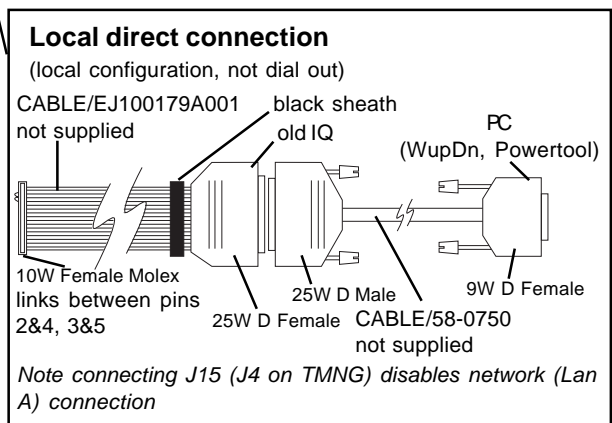
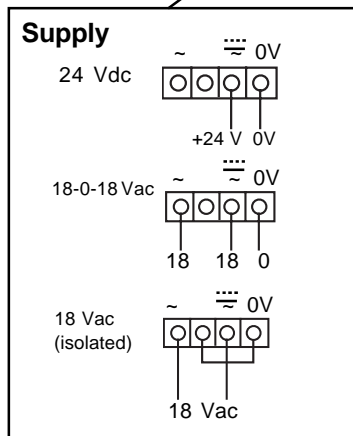
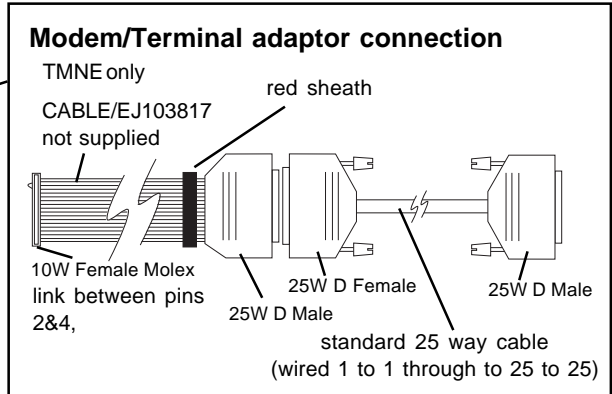
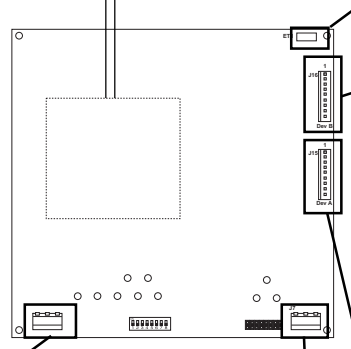
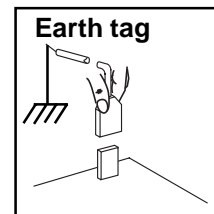
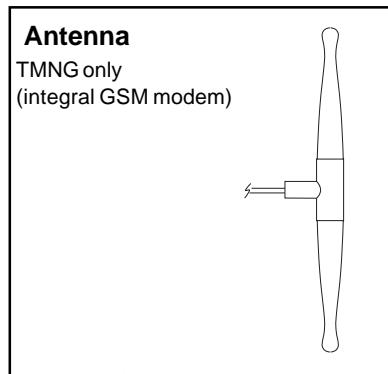
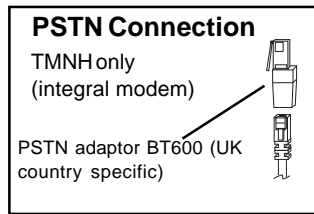
CONNECTIONS

NBOX(B)/TMNx (boxed version)



CONNECTIONS (continued)

TMNx (board version)





FIELD MAINTENANCE

The TMN requires no routine maintenance.

DISPOSAL

COSHH (Control of Substances Hazardous to Health - UK Regulations 2002) ASSESSMENT FOR DISPOSAL OF NODE CONTROLLER. No parts affected.

RECYCLING.  All plastic and metal parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover some of the components for any metals such as gold and silver.



WEEE Directive :

At the end of their useful life the packaging, product, and batteries should be disposed of via a suitable recycling centre.

Do not dispose of with normal household waste.
Do not burn.

ORDER CODES

[box]/TMNH/[country]/[supply] - IQ system modem node with integral modem capable of up to 56 kbps.

[box]/TMNE/[supply] - IQ system modem node with connector for external modem/terminal adaptor.

[box]/TMNG/EUR/[supply] - IQ system modem node with integral GSM modem (900/1800 MHz for Europe and several other countries) and external antenna

NBOX/TMNG/NOVAR/UL/24 - IQ system modem node with integral GSM modem (850/1900 MHz for USA) and external antenna. This unit is UL rated as 'UL916 listed open energy management equipment accessory'.

[box]	
NBOX	in plastic box
NBOXB	in plastic box with battery backup (230 V only)
blank	board version

[supply]	
230	230 Vac version
24	24 Vac or dc version
-	not applicable for board version

[country]	For TMNH only, modem configured for country, and unit supplied with country specific PSTN plug adaptor
UK	United Kingdom
NOVAR/UL	United States of America
ANZ	Australia and New Zealand
AUS	Austria
BEL	Belgium
DEN	Denmark
IRL	Eire
FIN	Finland
FRA	France
GER	Germany
HOL	Holland
ITL	Italy
LUX	Luxemburg
NOR	Norway
POR	Portugal
RSA	South Africa
SPN	Spain
SWE	Sweden
SWZ	Switzerland
[other country]	Contact Technical Support

e.g. NBOX/TMNH/UK/230
 NBOX/TMNH/UK/24
 NBOXB/TMNH/UK/230
 NBOX/TMNE/230
 NBOX/TMNE/24
 NBOXB/TMNE/230 - Note battery will not power modem on power failure
 NBOX/TMNG/EUR/230
 NBOX/TMNG/EUR/24
 NBOXB/TMNG/EUR/230
 NBOX/TMNG/NOVAR/UL/24
 /TMNH/UK/
 /TMNE/
 /TMNG/EUR/ - Note that this will only fit into IQ10x+ controllers which do not have an integral display panel

KIT/TMN/IQxx retrofit kit for fitting TMN inside IQ1xxs (includes cables EJ100179A001 and EJ103817 or equivalent)
 KIT/node/IQ23x retrofit kit for fitting TMN inside IQ231/233 (includes cables EJ100179A001 and EJ103817 or equivalent)
 KIT/node/IQ25x retrofit kit for fitting TMN inside IQ250/251 (includes cables EJ100179A001 and EJ103817 or equivalent)
 KIT/node/IQ24x retrofit kit for fitting TMN inside IQ241/242 (includes cables EJ100179A001 and EJ103817 or equivalent)

IQ2xx/TMNH/UK/.. TMNH fitted inside IQ231, 233, 241, 242, 250, 251 (e.g. IQ241/TMNH/UK/.. for UK TMNH inside IQ241)
 IQ2xx/TMNE/.. TMNE fitted inside IQ231, 233, 241, 242, 250, 251 (e.g. IQ241/TMNE/.. for TMNE inside IQ241)

CABLE/EJ100179A001 TMN to RS232 device adaptor cable, 10Way, Molex, Female to 25Way, D type, Female (e.g. for direct configuration, also requires CABLE/58-0750). For board versions only (boxed versions have a cable fitted).

CABLE/EJ103817 TMN to modem/terminal adaptor cable, 10 Way, Molex, Female to 25 Way, D type, Male (may also require standard 25 way D type Male to 25 way D type Female cable - wired 1 to 1 through to 25 to 25). For TMNE board version only (boxed versions have a cable fitted).

CABLE/58-0750 Personal Computer connection cable, 25 Way, D type, Male to 9 Way, D type, Female
 ENCLS/MBOX/IQ22x Wall mounting metal box with hinged front panel; provides cable gland knockouts, protection, earth bus, and cutouts to view indicators.

TP/1/1/22/HF/200 200 m of screened single twisted pair cable for use in IQ system Lan (or inputs /outputs). Belden equivalent 8761NH.

TP/2/2/22/HF/200 200 m of screened twin twisted pair cable for use in IQ system Lan. Belden equivalent 8723NH.

SPECIFICATION

Electrical

Supply	
TMN (board)	:24 Vdc ±15% at 250 mA, or 18-0-18 Vac ±15% (transformer centre-tapped) 50 or 60 Hz at 5 VA, or 18 Vac ±15% (transformer isolated) 50 or 60 Hz at 5 VA. (board must be earthed.)
NBOX(B)/TMN (boxed)	
/230	:230 Vac, +10%, -15% 50/60 Hz at 7.5 VA
/24	:24 Vac 50/60 Hz at 250 mA, or 24 Vdc ±15% at 5 VA.
Fuses	:No fuses - protected by self-resulting devices
Data backup	:No battery needed, configuration data stored in non-volatile memory.
Battery backup	:NBOXB/./230 Vac only. Maintains board and integral modem operations for 5 mins (typical) during mains failure (NBOXB/TMNE maintains board only for 20 mins - typical).
Discharge cycles	:15 minimum.
Charge time	:7 days max.
Supervisor transmission	:EIA RS232 EIA/TIA/232E, V28
Network transmission	:20 mA, 2 wire current loop, opto-isolated, polarity independent receiver, balanced transmitter.
Network distance	:Between units dependent on cable type and baud rate, see table.

Cable	1k2 baud	4k8 baud	9k6 baud	19k2 baud	38k4 baud	No. of Wires
Belden 9182	1000 m (1090 yds)	1000 m (1090 yds)	1000 m (1090 yds)	700 m (765 yds)	500 m (545 yds)	2
Belden 9207	1000 m (1090 yds)	1000 m (1090 yds)	1000 m (1090 yds)	500 m (545 yds)	350 m (380 yds)	2
Trend TP/1/1/22/HF/200 (Belden 8761)	1000 m (1090 yds)	1000 m (1090 yds)	700 m (765 yds)	350 m (380 yds)	250 m (270 yds)	2
Trend TP/2/2/22/HF/200 (Belden 8723)	1000 m (1090 yds)	1000 m (1090 yds)	500 m (545 yds)	250 m (270 yds)	125 m (135 yds)	4

Network baud rate	:Selectable by links (38k4, 19k2, 9k6, 4k8, 1k2 baud). Set to be same as other nodes on network to which it is connected (Lan A, local Lan or internetwork)
Network address	:Set by board switches - set to be unique on network to which it is connected (Lan A, local Lan or internetwork). As TMN uses the selected address and the next five addresses, recommended range addresses on Lan are 11 to 99, Lan number on internetwork 100 to 114. Address =>100 positions TMN on internetwork if set to auto-positioning.
TMN to modem	:TMNE only - RS232 15 m (16 yds) max.
RS232 baud rate	:selectable by link (19k2, 9k6, 4k8, 1k2 baud). Must be left at 19k2 for TMNH, TMNG
Direct connect	:RS232 for old IQ's and local configuration (connection to Dev A disables network).
RS232 baud rate	:set by network baud rate link
Integral modem	
TMNH	:V21 300, V22 1200, V22 bis 2400, V32 9600, V32 bis 14400, V34 36600, V90/92 56000
TMNG	:GSM Class 2/10 modem. Dual band (TMNG/EUR uses 900/1800 MHz; TMNG/NOVAR uses 850/1900 MHz). Supports SMS services.

Mechanical

Dimensions	
(board)	:151 mm (5.94") x 160 mm (6.3") x 38 mm (1.5") (max)
NBOX(B)	: 230 mm (9.05") x 181 mm (7.125") x 70 mm (2.75")
Antenna	:(TMNG only) 163 mm(6.4") x 13 mm (max) (0.5") diam. 2 m (6'7") cable
Material	
NBOX, NBOXB	:Box:ABS
	:Terminal cover - clear Styrolux
Protection	
NBOX, NBOXB	:IP30
Weight	
(board)	:0.3 kg (10.6 ozs)
NBOX	:1.0 kg (2lb 3.2 ozs)
NBOXB	:1.1 kg (2lb 6.7 ozs)
Connectors	
supply NBOX(B)/230	:2 part connector or 0.5 to 2.5 mm ² cross section area (14 to 20 AWG) cable.
supply NBOX/24/USA	:Mat-N-Loc 2 part connector
supply NBOX/24	:Mat-N-Loc to terminal adaptor (supplied). Terminals for 1 to 2.5 mm ² cross section area (14 to 17 AWG) cable.
supply (board)	:2 part connector or 0.5 to 2.5 mm ² cross section area (14 to 20 AWG) cable.
network	:2 part connector or 0.5 to 2.5 mm ² cross section area (14 to 20 AWG) cable.
modem NBOX(B)	:25 Way D type Male (TMNE).
modem (board)	:Flat 10 Way in line female Molex (TMNE).
PSTN	:2 Way PSTN via BT600 Plug (TMNH/UK, country specific).
direct connect (RS232)	
(board)	:Flat 10 Way in line Female Molex.
NBOX(B)	:25 way D type female. (if J15 connected internally)

Indicators

⚡ (power)	: (green) ON when input power supply is on.
! (watchdog)	: (red) ON if a processor or software fault.
DTRA	: (yellow) If RS232 device (e.g. PC) connected to Dev A connector, ON when TMN busy, else flashes off as TMN communicates with modem
CTS A	: (yellow) Only used if RS232 device (e.g. PC) connected to Dev A connector; indicates PC busy to TMN.
DTRB	: (yellow) Only used for TMNE. ON when TMN is busy unable to receive data from modem.
CTSB	: (yellow) Only used for TMNE. ON when modem is busy unable to receive data from TMN.
Ⓜ (Modem)	: (yellow) Flashes when modem is communicating.
TX	: (yellow) ON if current flows from TMN to network (Lan A, local Lan or internetwork).
RX	: (yellow) ON if current flows to TMN from network (Lan A, local Lan or internetwork).
OK 🗣️	: (green) ON if network (Lan A, local Lan or internetwork) OK. Flashes regularly if prohibited addresses (0, 2, 3, >119) set on address switch.
Modem mode	: (red) TMNG only, LED on modem module -only visible in NBOX(B) with cover removed. OFF: modem switched off, ON continuous: Modem switched on, not registered on the network, ON slow flash: Switched on and registered on the network, ON fast flash: Active call.

SPECIFICATION (continued)**Environmental**

EMC

emissions :EN50081-1

immunity :EN50082-2

Safety :EN61010

UL : (TMNH/NOVAR, TMNG/NOVAR only) The unit is rated as 'UL916 listed open energy management equipment accessory'.

Ambient limits : -10 °C (14 °F) to +50 °C (122 °F) (storage).
0 °C (32 °F) to 45 °C (113 °F) (operating).
0 to 90 %RH non-condensing (TMNE).
20 to 90 %RH non condensing (TMNH, TMNG)

Flammability

Casing material: Flame retardance, UL99V0

Glow wire test, UL746A(3)

Approvals

modem : (TMNH) Canada IC 125 11142A

USA AU7/USA-46014 MD-E

Ringer Equivalence REN=0.1 B

modem : (TMNG) Complies with all applicable RF safety standards. It meets the standards and recommendations for the protection of public exposure to RF electromagnetic energy established by governmental bodies. e.g. Directives of the European Community. Directorate General V in Matters of Radio Frequency Electromagnetic Energy. (/NOVAR) See FCC requirements p9.

Version : This document applies to the following version

firmware : V4.52

daughter board : AM105388

mother board : AM104178

modem : (TMNH) MT5600SMI-92

modem : (TMNG/EUR) MTSMC-G-F1

modem : (TMNG/NOVAR) MTSMC-G-F2

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Trend Control Systems Limited reserves the right to revise this publication from time to time and make changes to the content hereof without obligation to notify any person of such revisions or changes.

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