ORION TELECOM NETWORKS INC.

Orion-T1-GSM-72
72 - SIM, T1 GSM Gateway

User & Installation Manual

Orion Telecom Networks Inc.

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Warranty

This Orion product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Orion will, at its option, either repair or replace products which prove to be defective. For warranty service or repair, this product must be returned to a service facility designated by Orion. Buyer shall prepay shipping charges to Orion and Orion shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties and taxes for products returned to Orion from another country.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied firmware or interfacing, unauthorised modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

Exclusive Remedies

The remedies provided herein are the Buyer's sole and exclusive remedies. Orion shall not be liable for any direct, indirect special, incidental, or consequential damages, whether based on contract, or any legal theory.

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Safety Warnings

The exclamation point within a triangle is intended to warn the operator or service personnel of operation and maintenance factors relating to the product and its operating environment which could pose a safety hazard.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only a qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this instrument. No adjustment, maintenance or repairs should be performed by either the operator or the user.

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PRODUCT OVERVIEW

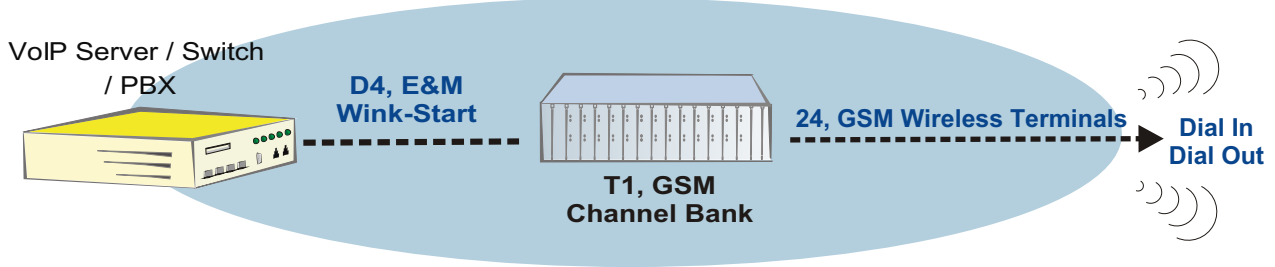
Orion presents a breakthrough in technology by integrating the WAN T1 interface to the GSM mobile communications network. Orion's GSM Channel bank is a compact wireless solution, which integrates the T1 interface to the GSM (wireless) network to provide the USER with 24, GSM (mobile) wireless links for mobile communications with an integrated T1 Interface.

- The interface of the Network Side is T1 Digital Interface with D4, E&M wink-start Signaling.
- The interface on the Wireless Side is 24 *x* GSM Wireless links.
- Ideal choice for terminating long distance traffic / VoIP / VoFR or DCME traffic to the PSTN / GSM (mobile cellular) networks. No LAND LINES REQUIRED!
- Remote monitoring and configuration through TCP/IP access.
- Unique out-bound calling, user programmable, access feature.

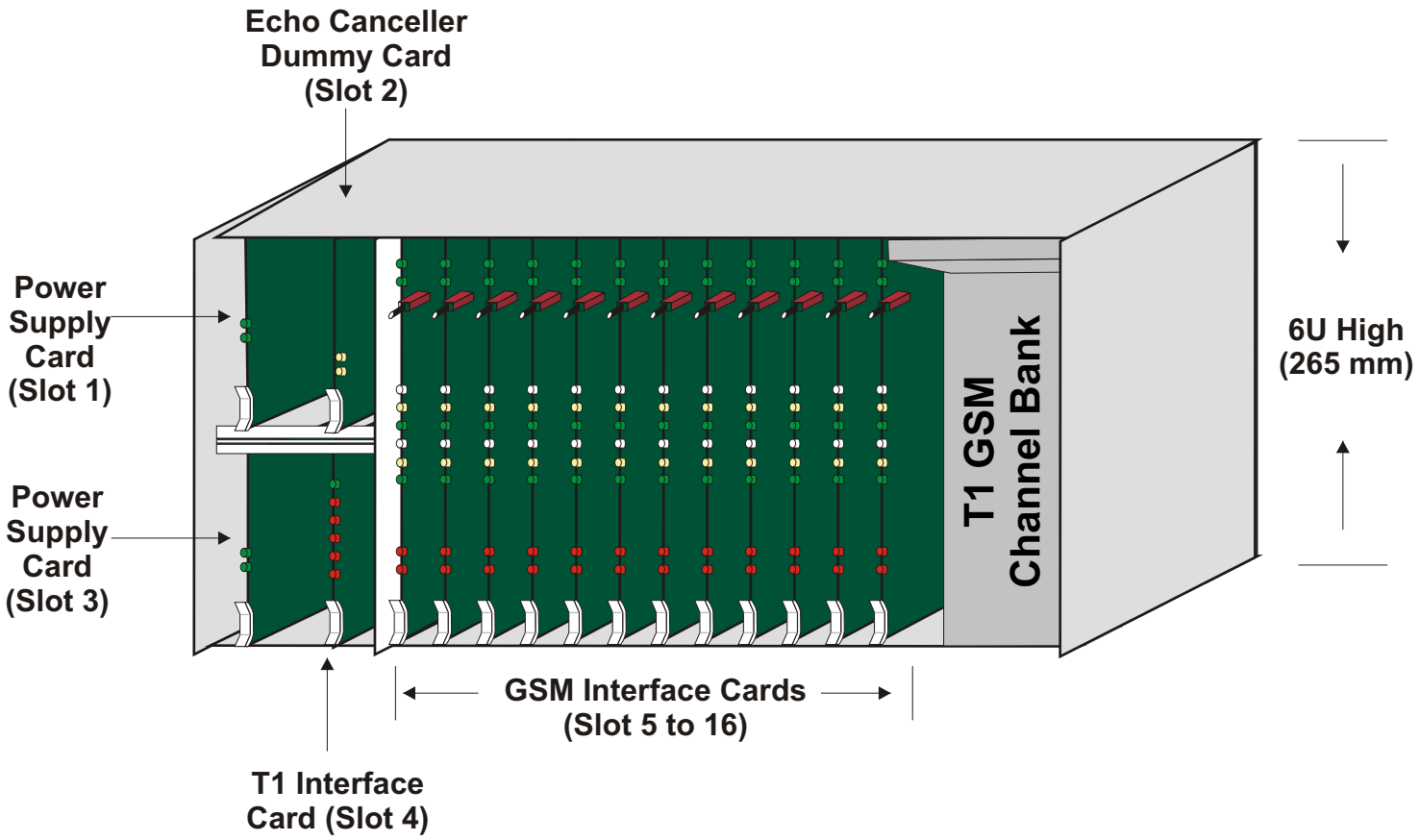
FEATURES & HIGHLIGHTS

- Compact, 24 GSM wireless terminals in a 19-inch chassis.
- GSM is integrated to the T1 Interface. No gray areas of what will work with what. Tested to work with Cisco 3600 and Cisco 5300 VoIP Servers (and many others). Please contact the factory for the exhaustive compatibility list.
- Improved voice quality. The two wire trans-hybrid analog path (present in the Fixed Wireless terminals) is eliminated in the Orion GSM design resulting in improved voice quality, clearer voice and superior channel separation by reducing the susceptibility to echoes that result from the analog two wire trans-hybrid VF paths.
- Disable caller ID. Orion's GSM terminal can be programmed (operator) to block caller ID presentation, if allowed by the local GSM Network.
- Provides accurate billing information ("answer supervision" and "line disconnect supervision") - not provided by Nokia Fixed Wireless Terminals and optional in Telular Fixed Wireless Terminals.
- Integrated, optional, T1 Echo-Canceller to cancel echo-tails resulting from the inherent delays of VoIP, VoATM, VoFR Networks. 64ms - unidirectional, 128ms - unidirectional and 64ms - bidirectional options available.
- Lower cost - resulting from complete, GSM wireless to T1 integration.
- Ideal choice for terminating long distance traffic / VoIP traffic to the PSTN / GSM (mobile cellular) networks. No LAND LINES REQUIRED!
- Plug-And-Play. Easy to install. Takes only minutes to install and start service.

Orion-GSM™ T1, Channel Bank with 24 X GSM Wireless Interfaces for VoIP / Switch / PBX Application



Front View of Orion-GSM-T1

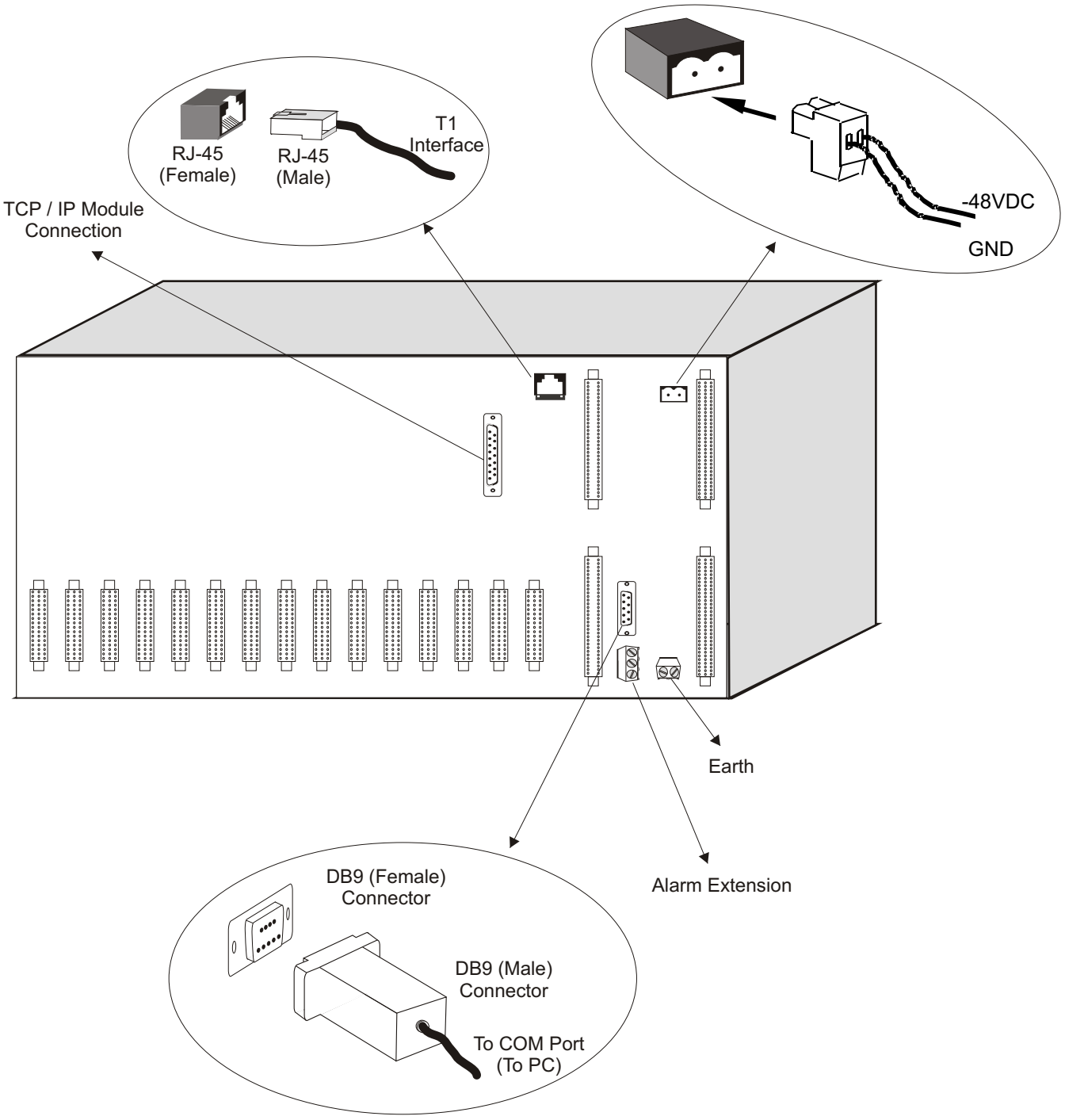


Slot Assignment of ORION-GSM

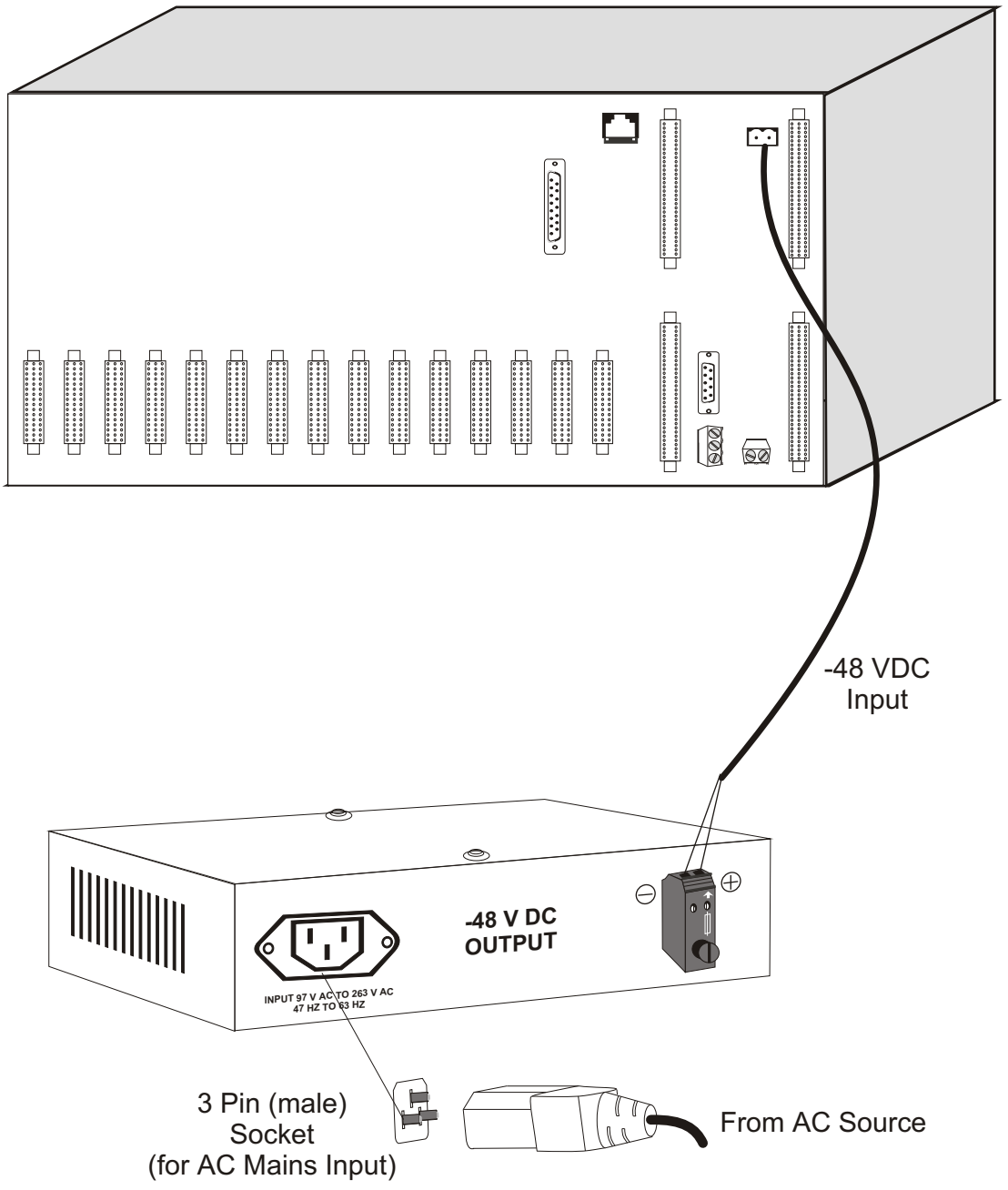
Front View (Left to Right)	Card Details	Part No.
Slot 1:	Power Supply Card	T1-010
Slot 2 :	Echo Canceller Dummy Card	T1-Dummy
Slot 3:	Power Supply Card	T1-010
Slot 4:	T1 Control Card	T1-015
Slot 5 to 16 :	GSM Access Interface Card	T1-072

Please Make sure that you have inserted the Echo Canceller Dummy Card in order to complete the T1 Signal.

Rear View of Orion-GSM-T1



Orion-GSM Connection with AC to DC Converter (for AC Mains Operation)



AC - DC Converter

Specifications: AC - DC Converter (for AC main operation)

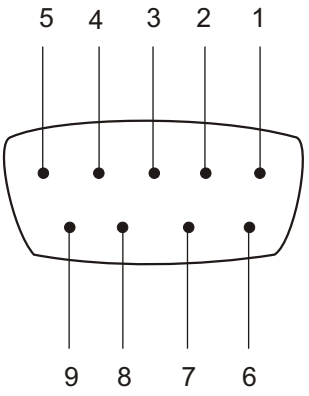
Voltage - Input (VAC)		(85~132VAC, 170~264VAC, 47Hz - 63Hz)
Frequency		47~63Hz
Efficiency		82%typ
Inrush Current		30A typ (ACIN 100/200, Io=100%) (at cold start)
Leakage Current		0.75mA max (60Hz, according to UL,CSA, VDE And DENTORI)
Voltage - Output	[VDC]	48VDC
Current	[A]	3A (Cumulative)
Line Regulation	[mV]	192 max
Load Regulation	[mV]	240 max
Ripple	0~+50 C	150 Max
[mVp-p]	-10-0 C	200 max
Ripple Noise	0~+50 C	400 Max
[mVp-p]	-10-0 C	600 max
Temperature	[mV]	560 max
Coefficient Drift	[mV]	192 max
Start-Up time	[mS]	200 max (ACIN 100V, Io=100%)
Hold- Up time	[mS]	10 typ (ACIN 85V, Io=100%), 20 typ (ACIN 100V, Io=100%)
Output Voltage	[V]	Fixed -48VDC
Overcurrent Protection		Works over 105% of rating (-H:peak) and recovers automatically .Additional protection is provided by a 4Amps slow-blow fuse.
Overvoltage Protection		Works at 105% ~ 140% of rating
Input- Output		AC3,000V, 1minute cutoff current= 10mA, DC500V, 50MΩ min. (At room temperature)
Input-FG		AC2,000V, 1minute cutoff current= 10mA, DC500V, 50MΩ min. (At room temperature)
Output-FG		AC500V, 1minute cutoff current= 10mA, DC500V, 50MΩ min. (At room temperature)
Operating Temp. And Humid.		-10~+60 C, 20~90%RH (Non-condensing)
Strage Temp. And Humid.		-20~+75 C, 20~90%RH (Non-condensing)
Vibration		10~55Hz, 2G, 3min. Period, 60 min. each along X, Y and Z axis.
Impact		20G, 11mS, once each X, Y and Z axis.
Safety		Recognized UL 1950, approved En60950, certified CSA C22.2 No.234, compiles with DENTORI and IEC950
Conducted Noise		Compiles with FCC-B, Vfg2443/91 and VCCI 2

Orion-GSM-T1 TO PC Com Port

DB-9F (Female) (To PC COM Port)		DB-9M (Male) (To ORION-GSM-T1)
RXD 2	----------	2 TXD
TXD 3	----------	3 RXD
GND 5	----------	5 GND

9 pin D-type (female) - pin assignment

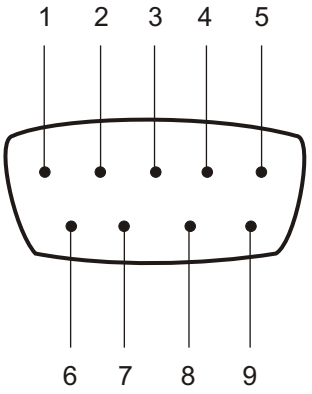
(View from front side)



DB - 9 (female)

9 pin D-type (male) - pin assignment

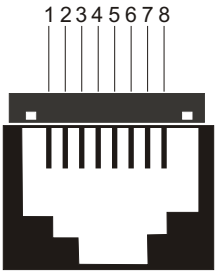
(View from front side)



DB - 9 (male)

RJ-45 for T1 Input

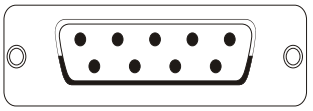
RJ-45 (male) Pin #	Signal in RJ-45 (male)
1	Tx Tip (Data Out)
2	Tx Ring (Data Out)
4	Rx Tip (Data In)
5	Rx Ring (Data In)



RJ-45
(Female)

RS232 DB-9 - NMS Port

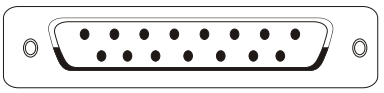
DB-9 (female) Pin #	Signal in DB-9 (female)
2	Transmit (Data Out)
3	Receive (Data In)
5	Ground



DB-9
(Female)

DB-15 - Connection to TCP-IP Access Module

DB-15 (female) Pin #	Signal in DB-15 (female)
1	+5V
2	+5V
9	+5V
12	TXD
13	RXD
7	GND
8	PWR GND
15	PWR GND



DB-15
(Female)

Installing the GSM Equipment

Precautions:

1 a) **ALWAYS** SWITCH OFF the GSM Access Card before removing it from the Chassis.

b) The GSM Access Card may be SWITCHED OFF by pressing the push- button switch SW1 till the LED's turn OFF.

c) Ejecting / Removing the GSM Access Card or disconnecting power from 19-Inch shelf without SWITCHING OFF the GSM Access Card may result in permanent damage to the GSM Transceiver / GSM Access Card.

2. **ALWAYS** ensure that the ANTENNAS are connected to the GSM Transceiver / GSM Access Card before they are powered-up.

Any GSM Transceiver POWERED-UP without an ANTENNA may be damaged permanently.

3. **ALWAYS** ensure that the ANTENNA connector is properly connected (snapped-in) to the GSM Transceiver Module (GSM Access Card).

4. **ALWAYS** insert the SIM Cards FACE UP in the SIM Card Tray and ensure that the SIM Card Tray is firmly locked into its place after the SIM Card has been inserted / Replaced.

5. **NEVER** INSERT / REPLACE the SIM Card with the GSM Access Card is POWER-ON position.

SIM Cards should be inserted / replaced only after removing the GSM Access Card From the 19-inch shelf.

The GSM Access Card / GSM Transceivers should be SWITCHED-OFF (using the push-button SW1).

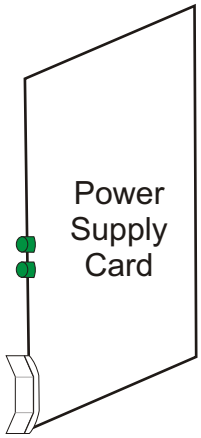
Before removing the GSM Access Card from the shelf.

IMPORTANT !!

It is NOT ESSENTIAL for the USER to shut-down the complete system to replace / insert NEW SIM CARDS. Each GSM Access Card may be SWITCHED OFF INDEPENDENTLY to REPLACE / INSERT a NEW SIM CARD, without shutting-down the entire system.

The GSM Access Card may be switched INDEPENDENTLY using the push-button switch SW1. The Card should be removed from the chassis after ALL LEDs are OFF.

Shelf Description



PSU Front Indications

The PSU provides the following indications in the front of the sub-rack:

3 LEDs which indicate the following:

L1 - Positive 5V present

L2 - Negative 48V present

Description:

PS, Power Supply Card Part # T1-010

Each ORION-GSM 19-inch shelf has two PSU, Power Supply Cards Part # ORION-GSM-010.
The ORION-GSM Power Supply Card plugs into slot # 1 and slot # 3 of the ORION-GSM, 19-inch shelf. (Please see figure on page 5).

It converts -48VDC Input (-40VDC to -60VDC Input) and provides +5VDC output that is required for the functioning of the equipment.

The PS, Power Supply Card has two LEDs.

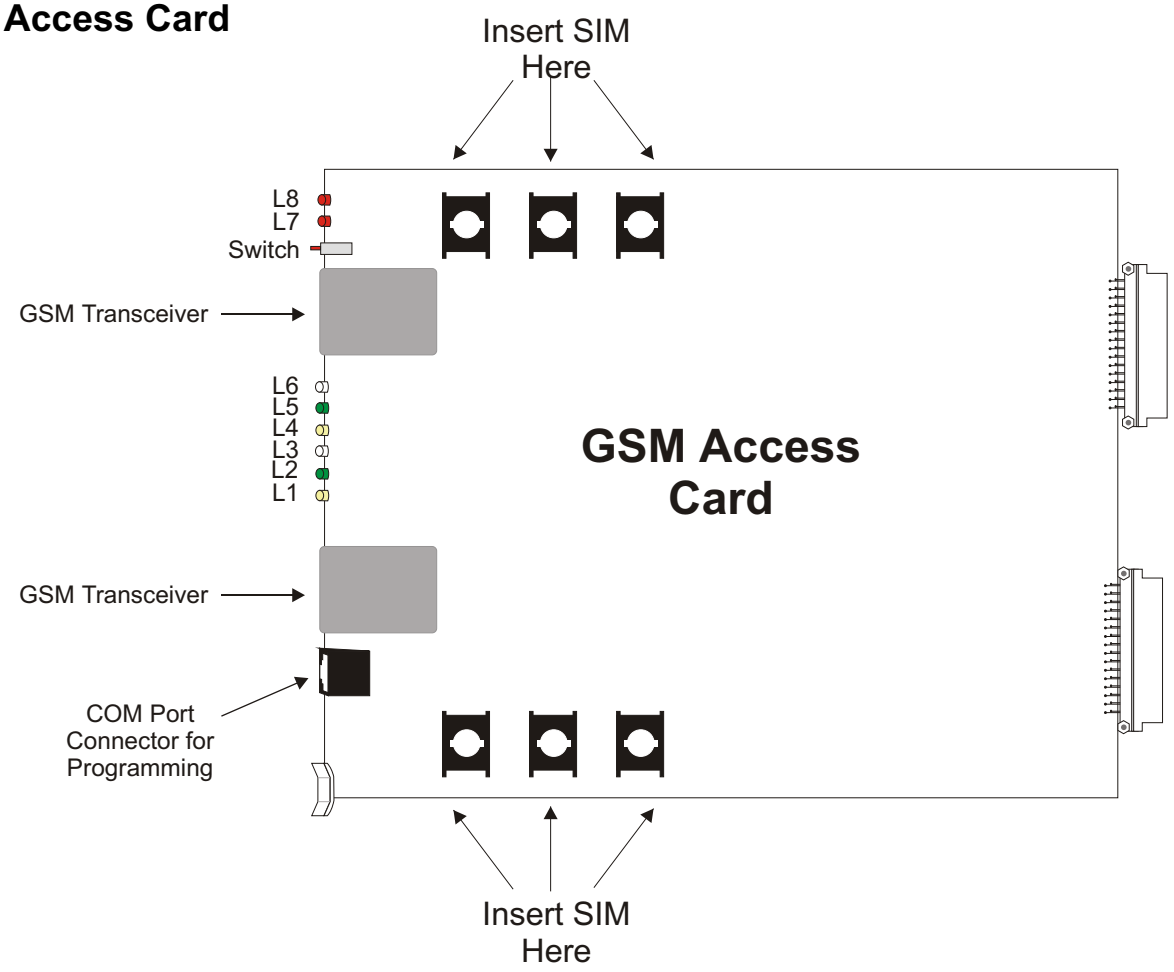
LED L1 indicates the presence of -48VDC input.
LED L2 indicates the presence of +5VDC output.

The card is protected against accidental reverse polarity of the -48VDC input, and shall only function if the -48VDC input is connected with the correct polarity.

Specifications

Input DC voltage	-48V DC (nominal)
Range of input	-40V to -60V DC
Output voltages	+5V
Full Load Output Current	18A@5VDC
Input Voltage Reversal Protection	Provided in the Card
Over Current Protection	20A for +5V
Short Circuit Protection	Current limit - 20A. Recovers on removal of short
Under Voltage	< 4.5V
Over Voltage	5.4V to 5.6V
Efficiency at full load	>80%
Ripple at full load	<5mVrms
Spike at full load	<50mV
Power Consumption	120 Watts (Worst Case)

GSM Access Card



GSM Interface Card Front Indications

The T1 Interface Card provides the following indications in the front of the sub-rack:

LEDs which indicate the following:

L1	Yellow	Channel 1 of GSM interface card Ringing
L2	Green	Channel 1 of GSM interface card Busy
L3	Bi-Color	GSM Signal strength of channel 1
		Green: Signal Good
		Yellow: Signal Average
		Red: Signal Poor
		OFF: No Signal
L4	Yellow	Channel 2 of GSM interface card Ringing
L5	Green	Channel 2 of GSM interface card Busy
L6	Bi-Color	GSM Signal strength of channel 2
		Green: Signal Good
		Yellow: Signal Average
		Red: Signal Poor
		OFF: No Signal
SW	Switch	ON / OFF for both channel of GSM
L7	Red	Alarm on Channel 1 of GSM interface card
L8	Red	Alarm on Channel 2 of GSM interface card

How to install / replace the SIM Card ?

1. Switch OFF the GSM Access Card using the Switch SW-1 mounted on the Card. All LED's (except an ALARM LED, if an alarm is present), shall TURN-OFF when the GSM Access Card is SWITCHED-OFF.

Important!!

If the GSM Access Card is not switched OFF before removing / installing the GSM Access Card shall be damaged.

ALWAYS switch OFF the GSM Access Card before removing the GSM Access Card from the 19 inch shelf, or before installing / replacing the SIM Card.
DO NOT REMOVE the GSM Access Card from the Chassis till ALL LEDs are OFF

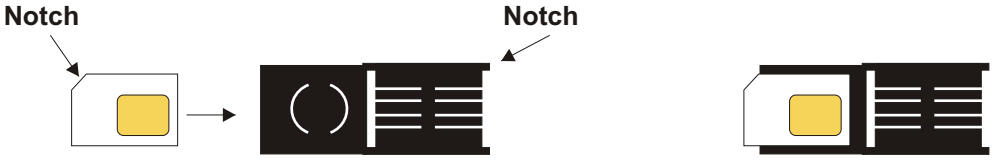
2. Rotate the Metal clip on the SIM Card Holder ANTI CLOCK WISEto open the SIM Card Holder

Close Position **Open Position**

Now the SIM CARD HOLDER is in OPEN position. Gently open the SIM CARD HOLDER to insert the SIM CARD

Close Position **Open Position**

3. Slide the SIM Card in the slot of the tray of SIM Card Holder, with the metal contacts Face up.

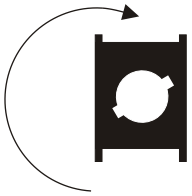


SIM Card **SIM Card Holder** **SIM Card Holder**

4. Now close the SIM Card Holder and make sure it is closed completely.

Open Position **Close Position**

5. Gently press down and rotate the Metal clip on the SIM Card Holder CLOCK WISE till the metal clip is locked under the plastic in the closed position.



Open Position

Close Position

6. Insert ALL SIM Cards in their respective SIM Holders in this manner.

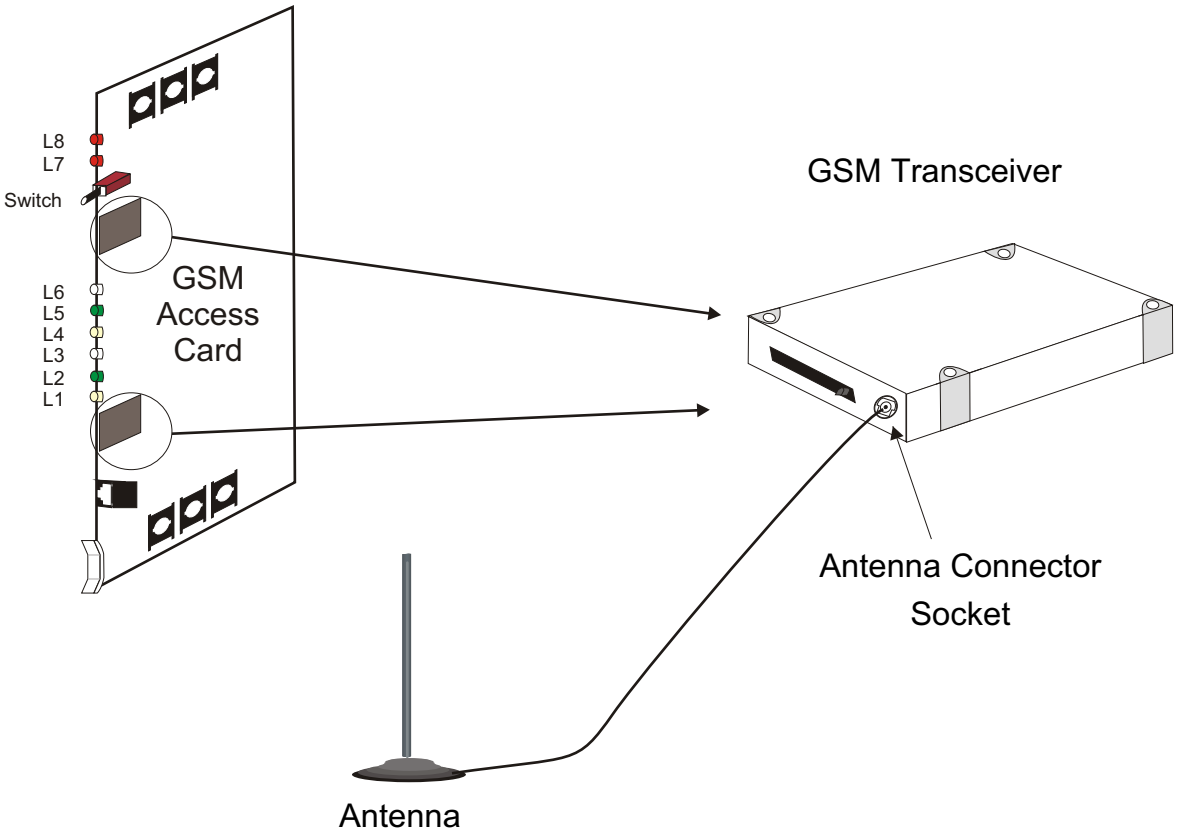
7. Insert the GSM Access Card into the Chassis, gently but firmly till the card is fully seated.

An alarm shall be displayed in LED L1 / L2 for the following reasons

1. **Invalid SIM Card**
2. **Unregistered SIM Card**
3. **Faulty SIM Card**
4. **Faulty GSM Module**
5. **GSM Access Card Out of Range**

Specifications: GSM Access Card

Number of GSM Interfaces	1 ~ 24 (Stackable, 1 thru 24).
Type	Dual Band EGSM 900 MHz and EGSM 1800 MHz.
Compliance	Compliant with ETSI GSM Phase 2+ standard (Normal MS) Class 4 (2W @ 900MHz) Class 1 (1W @ 1800 Mhz)
Approvals	Fully Type Approved to GSM Standards
SIM Interface Internal Tray	Toolkit Class 2. 3V Reader
Voice Features	Full Rate, Enhanced Full Rate And Half-Rate (FR/EFR/HR)
DTMF	Dual Tone Multi FrequencyFunction (DTMF) Dialing Support



How to install Antenna ?

Important !

1. NEVER POWER-ON the GSM Access Card without installing / connecting the Antenna.

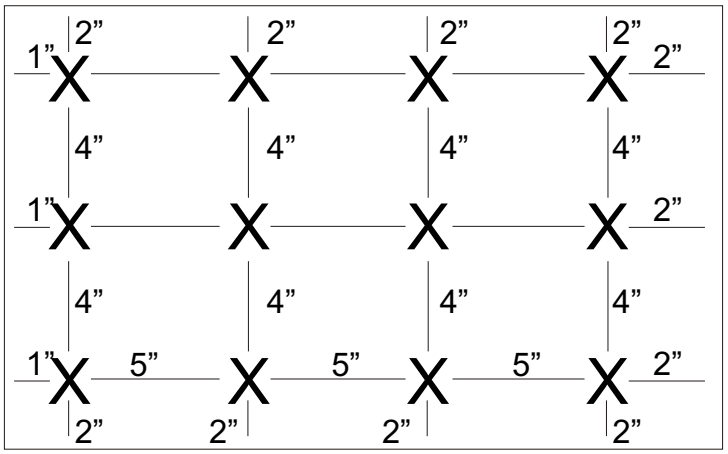
   Switching ON a GSM Access Card without connecting it to an Antenna may result in permanent damage to the GSM Access Card / GSM Transceiver module.

2. Snap-on the connector of the antenna to the GSM Transceiver module antenna Connector. Please ensure that the antenna connector is connected properly to the GSM Transceiver Module. The antenna connector snaps in to connect to the GSM Transceiver module.

3. (a) L1 RED LED indicates Alarm on GSM Card Channel 2 (Alarm)
   (b) L2 RED LED indicates Alarm on GSM Card Channel 1 (Alarm)

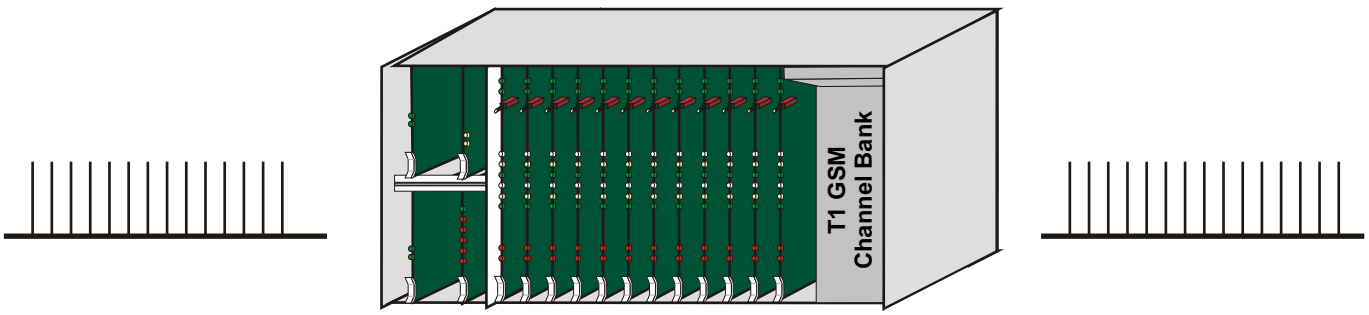
Two Antenna Tray each sized 18” X 12” are provided with the equipment.
It is advisable to place only 12 antennas on each tray in order to minimize interference.
Please use the recommended layout given in the figure below, to place the antennas on the Antenna Tray.

Antenna Tray



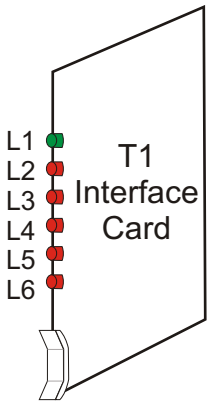
Typical placement of external antennas on the Antenna Tray

One antenna tray should be placed either side of the equipment as shown in the figure:



Antenna Tray # 1 **ORION-GSM** **Antenna Tray # 2**

Please Make sure that the SIM Card is in use is of 3 Volts (New SIM Card) and not of 5 Volts(Old SIM Card). The equipment does not accept and work with 5 Volt Sim Cards.



T1 Control Card (CC1) Front Indications

The T1 Interface Card provides the following indications in the front of the sub-rack:

LEDs which indicate the following:

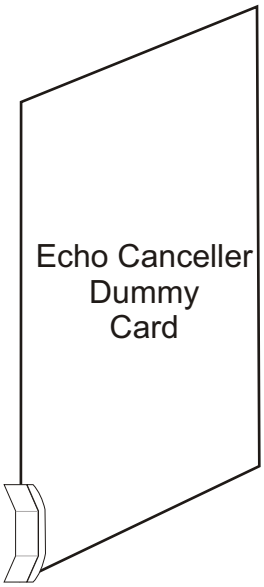
L1	Green	SYNC
L2	Red	(LOS) Loss of Signal
L3	Red	(LOF) Loss of Frame
L4	Red	(LOMF) Loss of Multiframe
L5	Red	(RA) Remote Alarm
L6	Red	(AIS) Alarm Indication Signal

Specifications

Number of T1 Interfaces	One
Conformity	G.703
Framing	D4
Signaling	D4, Robbed-Bit , E&M Wink-Start Signaling with answer supervision
PCM Sampling Rate	8000 samples / second.
Encoding Law	Mu Law
Bit Rate	1544Kbps 50ppm.
Code	AMI, B8ZS - Selectable
Nominal Impedance	100 Ohms Standard (75 Ohms Optional)
Connector	RJ45 (100 Ohms Impedance)
Peak Voltage of a mark For 100 Ohms Balanced Interface	3.0 Volt 0.3 Volt.
Pulse Mask	As per ITU-T (CCITT) Rec. G.703
Output Jitter	<0.05UI (in the frequency range of 20Hz to 100KHz).
Permissible Attenuation	6dB at 1MHz
Return Loss at: 51.2 KHz to 102.4 KHz. 102.4 KHz to 2048 KHz 2048 KHz to 3072 KHz	 > 12dB > 18dB > 14dB
Jitter Tolerance	As per ITU-T (CCITT) G.823
Loss and Recovery of Frame Alignment	As per Clause 3 of ITU-T (CCITT) G.732
Loss and Recovery of Multi-Frame Alignment	As per Clause 5.2 of ITU-T (CCITT) G.732

Setting of T1 Interface of your Router

Framing	**D4**
Signaling	**D4, Robbed-Bit , E&M Wink-Start Signaling with answer supervision**
Encoding Law	**Mu Law**
Code	**AMI, B8ZS - Selectable (prefer B8ZS)**



T1-GSM Dummy Card

The T1-Dummy Card has no LEDs.
The T1-Dummy Card is used in order to complete the T1 Signal. It is to be inserted if the Echo Canceller card is not being used.
Please see page # 5 for the slot where the Echo Canceller Dummy Card is to be inserted.

Please Make sure that you have inserted the Echo Canceller Dummy Card in order to complete the T1 Signal.

Ordering Information

Sr. No.	Part No.	Product Description	Qty
1.	T1-015	T1 Control Card	**01**
2.	T1-000 / 005	19" Shelf 3U High (Sub-rack) to accommodate 24 Channels with Connectorized Backplane 6U High	**01**
3.	T1-010	(-) 48VDC Power Supply Card	**02**
4.	T1-072	Dual Port Access Card to connect to connect to an T1interface, 12 Cards (max) per system 3 SIM per GSM Channel	12 (max.)
5.	T1-024-ANT	External Antennas Connectorized Cable (2 meters)	24
6.	T1-01048-150W	Power Supply (External) AC to DC Converter Portable External Converter Universal AC Input [93VAC-276VAC, 47Hz-63Hz] to DC Output [(-) 48VDC]	01

Common Equipment

Optional

7.	TCP-IP-MSS100	TCP-IP-MSS100 ethernet remote access module for configuration option allows the user to access, configure and control the T1 Channel Bank equipment over a TCP-IP network. 1 Required for every T1 Shelf	01

Installing T1-GSM, System Management GUI.

(Use with Windows 98, Windows 2000 and WindowsXP).

Insert CD- ROM into the CD drive.

CD- ROM is autorun CD.

Click on “Orion-GSM-T1 GUI Software”

Follow the instructions on the Installation Software screen.

Now your installation is completed and you can run GUI for managing and configuring the Orion-GSM-T1, Terminal.

If the CD- ROM does not run automatically please do the following:

Click on Start Menu of your computer
Go to Programs ----> Windows Explorer
Click on your CD Drive.
Go to GUI folder click on setup.exe

Follow the instructions on the Installation Software screen.

Now your installation is completed and you can run GUI for managing and configuring the Orion-GSM-T1, Terminal.

You can also print or copy the User Manuals from the CD- ROM

Using the GUI

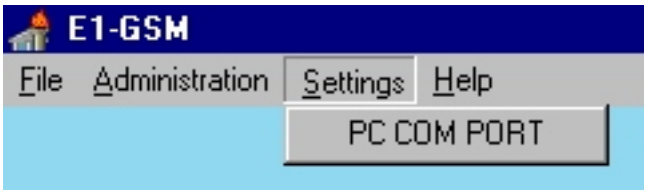
Please give the USER NAME and PASSWORD in the respective fields

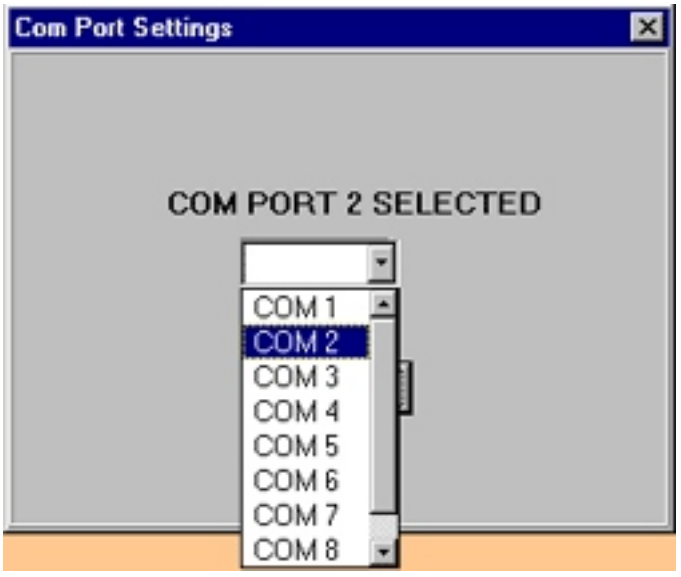
USER NAME : orion (case sensitive)
PASSWORD : orion (case sensitive)

The user name and the password are case sensitive, make sure the CAPS lock is off when you type the USER NAME & PASSWORD.

Selecting the COM Port

Select the COM Port (in the GUI) on which your PC is connected to the GSM Access Card. For this **GO** to **SETTINGS** then **PC COM PORT**

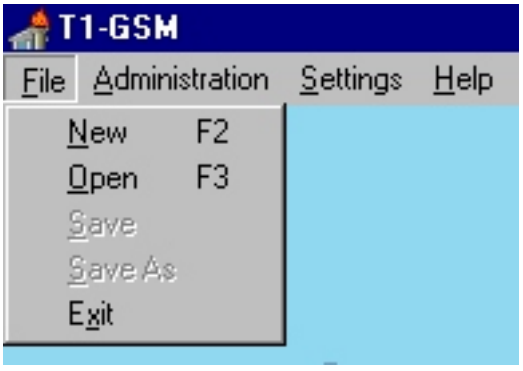




Downloading after selecting correct COM Port

Downloading if COM Port selection is incorrect.

Configuring the System



File Menu
File menu consists of the following menu items:-

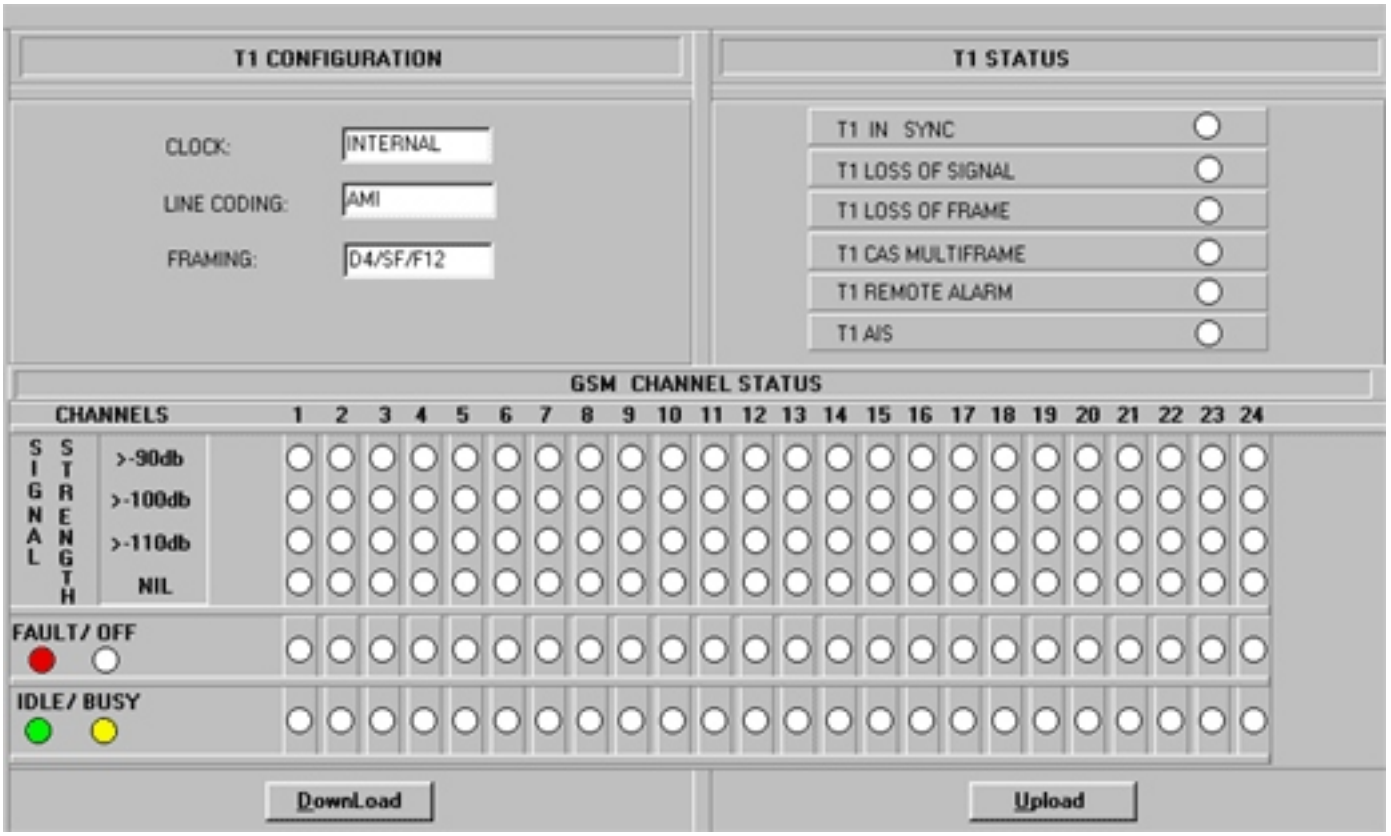
NEW - This menu is used for making a new configuration and status . On clicking NEW , a form is displayed through which a user can define a new configuration and status.

OPEN - This menu option is used to retrieve configuration and status which was saved previously.

SAVE - This menu option is used to save the currently displayed system configuration and status. This is effective only once the file name of the system has already been specified using the SAVE AS option described next.

SAVE AS - This menu option is used to save the currently displayed configuration and status with a user assigned file name.

Exit -This menu is used for exiting the configuration and status .



T1-GSM

The T1-GSM GUI helps in configuring the T1-GSM system through a serial port connection between the T1-GSM eqipment and a PC. It also lets the user view the status of the individual channels in T1-GSM system.

The control parameters that can be configured are -

Line Coding:- AMI/B8ZS Framing:-D4/SF/F12 Clock:-INTERNAL/LOOP-TIMED

The status parameters that can be viewed are -

SIGNAL STRENGTH (GSM signal strength for individual channel)

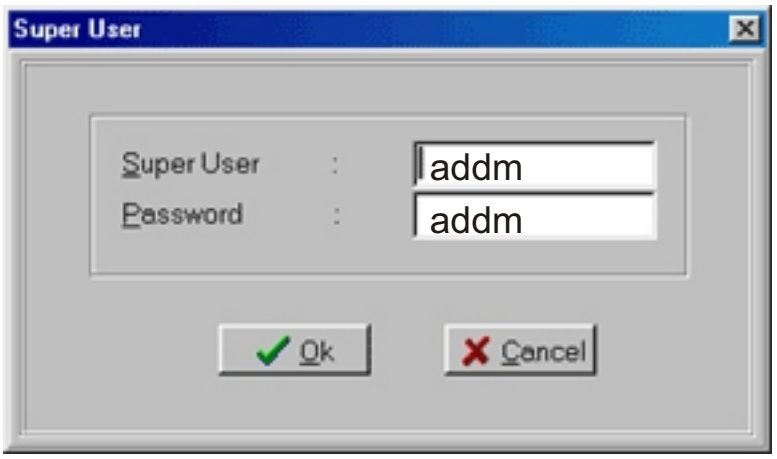
FAULT/OFF (Channel module faulty or powered off)

STATUS (Channel Idle or Busy)

In case the particular channels are unequipped, the system will display unequipped status instead of the above mentioned status parameters.

Administration
This menu consists of the following sub menu options.

1. **NEW USER** - This menu option is used for adding a new user for the application. This option remains disabled until the super user logs by using the Super User option described next.
2. **SUPER USER**- This menu option is used to log in the super user. Only the super user has the privilege to create new user. The super user must enter the login id & password as shown below



Please give the USER NAME and PASSWORD in the respective fields

USER NAME : addm (case sensitive)
PASSWORD : addm (case sensitive)

The user name and the password are case sensitive, make sure the CAPS lock is off when you type the USER NAME & PASSWORD.

Notes :

Technical specification are subject to change without notice.
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