



Comanche® Software

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1 Overview

1.1 Welcome To Comanche RMCS

The *Comanche RMC System* represents the **State of the Art** in **Remote Monitoring and Control**, providing a combination **User Friendly Software** and **Military Grade Hardware** affording maximum flexibility to perform the simplest monitoring tasks to the largest scale monitoring and control operations. This is accomplished using the same **Comanche Software** for both routine applications, such as monitoring rectifier outputs and reference electrode potentials to those very complex installations at major international airports which require monitoring the outputs of hundreds of anodes and dozens of reference electrodes as well as controlling the rectifiers, sump pumps, et cetera.

The following is an overview of *Comanche Remote Monitoring & Control System*.

1.2 Software Features

Operating System

The *Comanche® RMC Software* is PC based, running on **Windows '98, 2000, NT** (or latest version) and does not require any specialized programming skills

Operating Protocol:

The *Comanche RMC System* has a "**International Standardized Data Protocol Specification**" as defined according to IEC 870-5 respectively EN 60870-5 with a Hamming distance of 6 (as a measure of data integrity).

Operating Method

The *Comanche RMC System* works automatically without requiring the attention or time of personnel. Once set up, the monitoring and alarm functions operate automatically without requiring personnel to be present. The remote monitoring and control system automatically notifies personnel via facsimile and/or text pagers in a sequence that can be determined by the user.

Help System

The *Comanche RMC System Software* has context sensitive help files at all levels of the program. Instructions for all of the basic and advanced functions of the software and hardware are included.

System Visualization

The *Comanche Software* communicates technical processes through visual images, maps, drawings and photographs. The *Comanche RMC System's* visual presentation utilizes OLE technology (Object Linked Embedding) allowing images created in CorelDraw!™, Lotus Freelance™, or similar graphics packages to produce the computers on-screen graphical interface. Access to the specific processes or values can be made directly from the image, such that it opens a command window.

Alarm Management System

The **Comanche alarm management system** will automatically initiate calls to and from the remote installations and the master computer station.

The **Comanche alarm management system** has eight priority levels. A higher level alarm will override communications to the master station of lower levels. Digital monitoring channels have full alarm capability and analog monitoring channels have both full alarms and full warning capabilities.

Alarms and/or warnings detected by the hardware module, at the site, generate automatic calls to the master computer station.

Alarms received from the hardware field module will initiate, at the master station, a set of on screen instructions. These instructions are the steps necessary to be taken to resolve the alarm condition. The **Comanche Alarm Management System** provides a pop-up note screen to document actions taken, and by whom, that automatically becomes part of the permanent record of that event.

Message Management System

The **Comanche RMC System** provides a "Graphical Link" for all of the incoming messages. Illustrations are able to be accessed from the message center and provide detailed data about the equipment which can include wiring schematics, installation notes, installation drawings, photographs, current values and diagnostic data relating to performance of the equipment.

Messages become permanent records and additional notes can be added to any incoming message at any time, which also becomes part of the permanent record for that message.

The **Comanche Message Management Software Module** has the ability to filter all incoming messages so only those messages that the user wishes to view can be visible on the incoming message screen. This filtering process still allows all other messages that are coming in to continue to be recorded for view at a later time. The Message Management Software Module also has the ability to sort all messages that have been recorded and archived for review in a format determined by the user.

Personnel Management System

The **Comanche RMC System** provides the ability to organize all interested personnel, at all levels of the company, in a manner that allows alarm and warning messages to be sent automatically and/or manually to the responsible person, or persons, at the right time in the correct geographical location.

The **Comanche Personnel Management Software Module** maintains a data bank of personnel, their work schedule, their on duty schedule, their time off, vacation time and work away from the office schedule. Using this data bank the **Comanche System** is able to send text pages and/or facsimiles to any combination of people or equipment that has been predetermined by the user. These messages sent include exact information regarding the cause of the alarm and it's specific location.

Hardware Management System

The management of field hardware through the software shall consist of the following four elements:

Monitoring - Control - Counting - Diagnostics.

Monitoring - The *Comanche RMC System* has the full capability of monitoring automatically and/or manually both digital and analog functions of any field equipment that provides an interface. This would include but not be limited to: temperature, pressure, smoke alarms, burglar alarms, lighting systems, status of valves on or off, control valves, flow rates, density, humidity, gates, doors, soil resistance, soil pH, structure to soil potentials, strain gauges, tank levels, voltage, amperage, boiler pressure, water & hydrocarbon leak detectors, et cetera.

Control - The *Comanche RMC System* has the full capability of controlling automatically and/or manually both digital and analog functions of any field equipment that provides an interface. This would include but not be limited to: the control of temperature, pressure, smoke alarms, burglar alarms, lighting systems, turning valves on or off, operating control valves, increasing or decreasing flow or humidity, opening and closing gates and doors, changing structure to soil potentials through auto-potential rectifiers, tank levels, voltage, amperage, boiler pressure, regulators, et cetera.

Counting - The *Comanche RMC System* has a full-featured counting system that automatically and/or manually record, not only an event, but also the duration of that event.

Diagnostics - The *Comanche RMC System* has the full capability of performing diagnostics on remote field equipment automatically and/or manually to determine their operational status.

Security

The "Comanche RMC System" has a security system, working continuously.

The first level is software driven and has a multiple level password structure, which enables personnel to have different levels of system access and control. The second level is hardware driven requiring a Dongle to be in place at the master station at all times for general system access. Absence of the Dongle denies access to the system.

Data Compatibility

The *Comanche RMC System* data is compatible with major database and spreadsheet programs such as Excel, Lotus 123, Quattro Pro, dBase, Access, Approach as well as custom programs.

1.3 Hardware Features

Primary Enclosure

The primary enclosure is high impact plastic impregnated with carbon black to provide the first level of ultraviolet protection. Additionally ultraviolet inhibitors are used in the manufacture of the primary enclosure. The primary enclosure is water, moisture and dust proof to an IP65 rating.

Operating Temperature

The **Comanche RMC System** hardware has a continuous functional operating temperature range from **-40°Celsius to +85°Celsius (-40 Fahrenheit to +185 Fahrenheit)**.

Channels

The **Comanche RMC System** hardware, in the field, is capable of remote monitoring and controlling of both analog and digital functions. The field hardware has a mother board capable of receiving a minimum of 32 channels and expansion to 480 channels, allowing multiple rectifiers and other devices to be monitored and controlled utilizing a single communication source. Configuration of all hardware functions is only done at the master station in the office location, not in the field. All the channels are capable of continuous two-way communication with any other channel in any combination.

All channel sets have their own microprocessor and are electrically isolated from each other – **there is no common ground** between channels or other electronics in the Comanche hardware.

Each channel has both **Electro Static Discharge (ESD) & Electro Magnetic Protection (EMP) Surge Protection** as well as a **Master Surge Suppressor (MSS)** protecting the entire module from massive surges.

All channels have **full memory retention** capability when power to the hardware is terminated. All of the established settings and protocols are maintained and there is never a requirement to re-enter any information. When power is lost the **Comanche RMC System** will not allow current discharges into any appurtenances being monitored or controlled.

System Power

Hardware is capable of using power sources that would include commercial power with ratings ranging from 110-120 volts AC 60hz to 220-240 volts AC 50/60hz single or three phase as well as solar and battery power. The operating voltage is 12-24 Vdc and the power consumption is less than 15 watts. The **Comanche RMC System** may utilize an uninterruptible power source (Battery Backup).

Installation Features

The **Comanche** field-installed modules have both colors coded analog & digital connectors and color-coded function connectors.

Communications and Communication Formats

The **Comanche RMC System** works with a broad range of communication formats including telephone, cellular, digital cellular, satellite, radio, or hardwiring, all of which can be mixed in any combination. The master computer station software is capable of operating ten (10) modems and/or facsimile units simultaneously to support the remote monitoring and control system's communication activities.

2 Main Station Hardware Setup

To be able to establish connections with remote monitoring and control devices, at least one modem must be connected to the **Comanche** main station. This chapter describes the actions required to install and set up modems under Windows 98, 2000 or NT operation systems.

2.1 Connecting the modem

Connect the modem to a free serial port (**RS-232C** or **COM port**) of the main station PC. If unsure, read the documentation supplied by the modem manufacturer. Standard PCs are equipped with two COM ports labeled 'COM1' and 'COM2'. COM1 should be reserved for the mouse; COM2 should be used for modem communications.

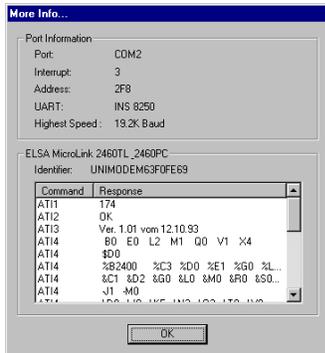
2.2 Auto-detecting the modem

Windows 98, 2000 or NT offers automated modem detection and diagnostic features. To use these, click **Start/Settings/Control Panel**:

To install a new modem, double-click on the „Modems“ icon and let Windows detect and install the modem. Make sure that the modem is switched on and properly connected. After the modem has been detected and installed, Windows tells you about the modem's COM port: "The following modem was found on COM2: ...".



Windows 9x Control Panel



Modem Diagnostics

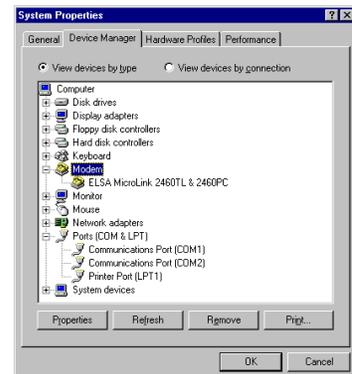
Make sure the modem is switched on. Click on **Modems/Diagnostics**, select COM2, and then click on **Details**. Windows will run the diagnostics and show the results of the query.

If auto-detection or diagnostics fail, consult the manual that was shipped with the modem. Modem manuals include a very detailed section on setting up and connecting the device to the PC as well as a checklist on error analysis. If you can not fix the problem yourself, ask a technician, the modem dealer or the manufacturer for assistance.

2.3 Printing The System Summary

Printing the system summary is a vital part of setting up an RMC System, as it will ease computer diagnostics and fixing problems with both hardware and software. Click on **Start/Settings/Control Panel**, then double-click the **System** icon.

From Device Manager, select **Print/All devices and system summary** and print it.



System Properties

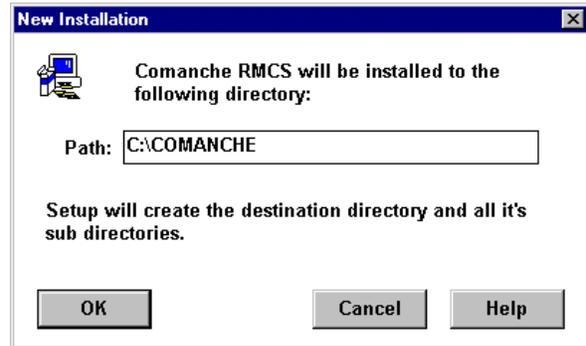
3 Installing the Comanche Software

3.1 Starting the Setup

Run the program **SETUP.EXE** from the *Comanche* installation disk #1.

3.2 Installation path

Any hard drive or network drive path may be entered here, but C:\COMANCHE is the recommended setting.



Path for new installation

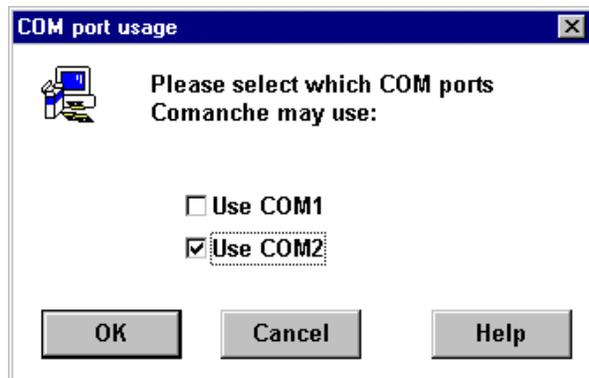
3.3 COM Port Selection

Check the COM port that the modem is connected to.

Recommended settings are:

- COM1 = mouse
- COM2 = modem

If you are using the recommended settings, *un-check* "Use COM1" and *check* "Use COM2".



COM port selection

3.4 DigiBoard™

A DigiBoard is a multi-port serial interface adapter that adds another four to ten serial communication ports to a main station computer. This is needed only for large numbers of *Comanche RMC* installations and requires special installation and configuration steps to be carried out. It is safe to check "DigiBoard is not installed" here.

3.5 Configuration disk

When asked for it, insert the configuration disk into the floppy drive and click the "OK" button. Though the configuration disk is needed for the setup process only, it is a vital part of the *Comanche Software* as it determines the RMC software's capabilities. Both setup and installation disks should be kept in a safe place after setup is finished.

3.6 Completing the Setup

When setup asks you to restart Windows, click "OK", shut down Windows and shut off the main station computer. Then, attach the Dongle to a printer port and switch on the computer. When Windows is up again, the *Comanche RMCS Software* installation and setup is complete.

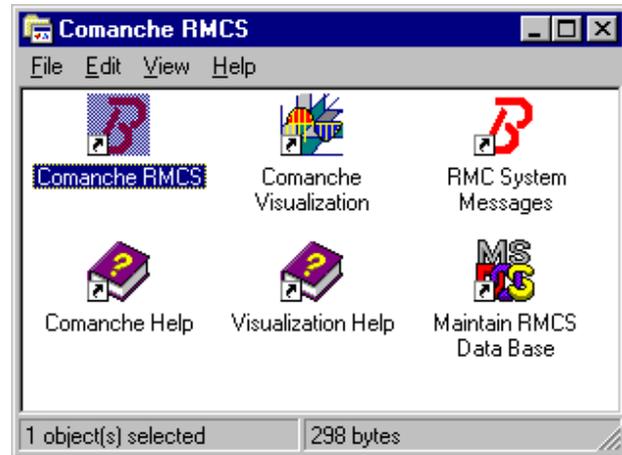
4 Configuring the Comanche Software

4.1 Starting Comanche

Comanche related software and tools are located in the *Comanche RMCS* program group. To start the program, double-click on the *Comanche RMCS* icon.

After *Comanche* is started, it will ask you to enter a user ID and a password to gain access to the system.

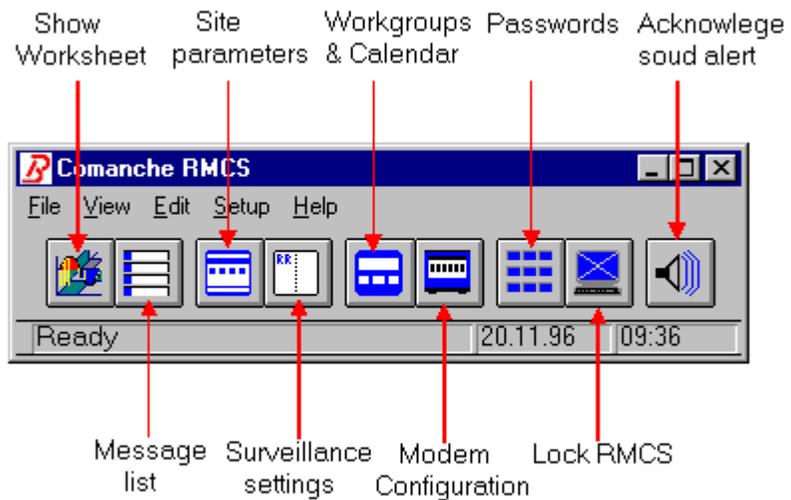
Default login:
 User ID : **SYSTEM**
 Password : **start**



Comanche Program Group

4.2 Comanche Main Panel

The *Comanche* Main panel offers all of the tools you need to fully administer a *Comanche RMC System*.

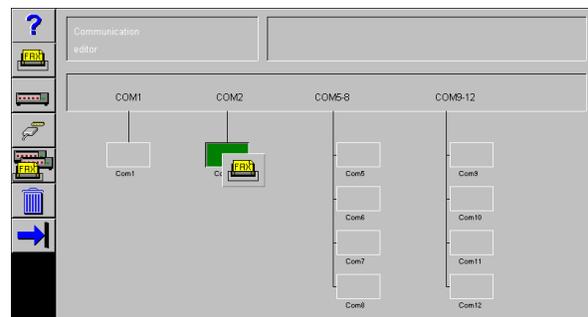


Comanche Main Panel

To start a *Comanche* program function, single-click on the function's icon.

4.3 Adding Modems

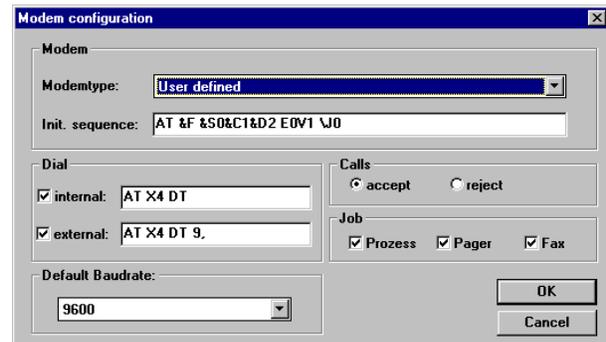
The first step in configuring the *Comanche* software should be editing the modem configuration. To add a new modem, use *Comanche's* drag & drop feature to pick up a Modem of suitable type (fax or process modem) and place it on a COM port symbol. Grayed COM port symbols can not be used for *Comanche* communications purposes.



Adding a new modem

4.4 Configuring Modems

After adding a new modem, the modem configuration box will open. You can select the modem type from a pre-configured type list or enter user-defined settings. You also have to verify the modem dialing parameters (tone / pulse dial method) and the intended usage of the modem (dial-in and out or dial-out only, enabling it for process communication, paging and fax). Click "OK" when you are finished.



Modem configuration

4.5 Modem Init Sequence and "AT" commands

The modem init sequence is a command the *Comanche software* uses to properly initialize a remote control and monitoring modem. Virtually all modems sold today claim to be "Hayes compatible", which is only true for a very limited subset of the original Hayes modems "AT" command" functionality. A good starting point for a proper initialization string therefore is to use "AT" commands that should be common to all modems:

AT &F &S0 &C1 &D2 E0 V1

These modem commands are intended to achieve the following modem settings:

- &F : Reset the modem to factory defaults
- &S0 : Set modem's DSR signal to be always active
- &C1 : Modem's DCD signal is active during an established connection
- &D2 : Modem's DTR signal going inactive will cause the modem to hang up
- E0 : Modem will not echo (repeat) modem commands
- V1 : Modem will return alphanumeric answers

Ensure that the "&F" command also activates the modem's "bi-directional RTS/CTS hardware handshake". This is required for proper modem communications!

4.6 Dial settings

To be able to dial up remote installations, facsimile devices or pager services, the *Comanche software* must know how dialing out has to be performed:

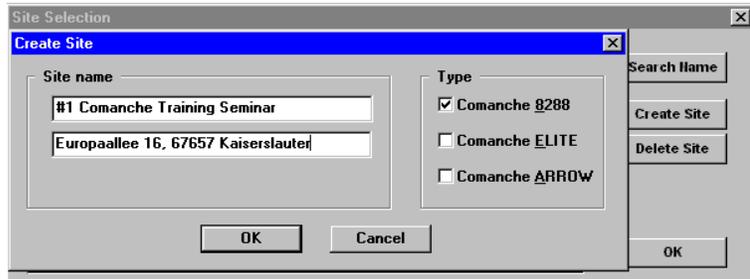
- If the modem is connected to a regular (dedicated) phone line and is to use the tone dial method, the appropriate dial-out command should be: **AT X4 DT**
- If the modem is connected to an internal phone system and needs to dial a „9" to get an outside line, the dial-out command has to be: **AT X4 DT 9**

5 Setting Up Sites

5.1 Creating a new Site

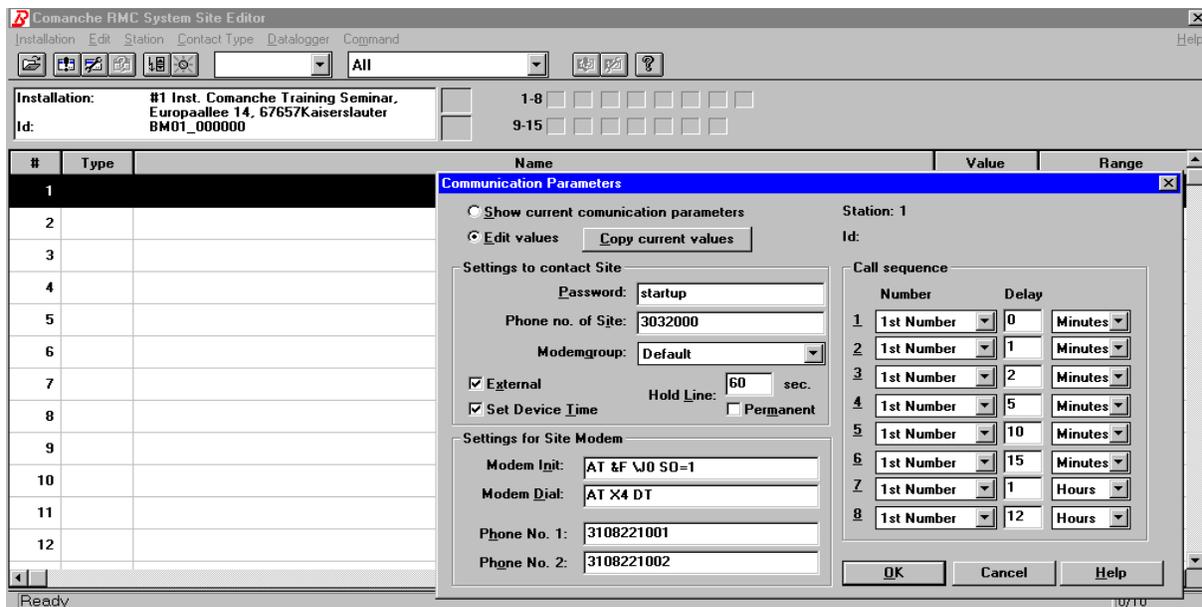
From the Comanche Main Panel, select **File/Create/Delete Site...**, then click the "Create Site" button of the "Site Selection" window. Then enter two lines of text describing the remote installation. You can choose between three Types of Sites: The **Comanche Chief**, **Comanche Elite** and **Comanche Arrow** (see 5.4).

Click the "OK" button when you are finished.



Creating a new Site

5.2 Editing Communication Parameters



On the Comanche Main Panel, click on the "Edit site data and parameter" icon. From the "Site Selection" dialog, double-click on the new site you have installed. From the "**Comanche RMC System Site Editor**", select **Edit Communication Parameters** and click "Edit values".

Entries in the "Communication Parameters" window concern different parts of the **Comanche system**:

- The "**Settings to contact Site**" group contains information for the Comanche *software*.
- The "**Settings for Site Modem**" and "**Call sequence**" groups contain information that will be sent to and used by the Comanche *hardware*. *To be valid, this information must be sent to a remote installation by a **Send System Parameters** call.* This will be explained later.

5.3 Communication Parameters Reference

Entry	Explanation
Password	The password that will be used for authenticating access.
Phone no. of Site	The phone number to dial to connect to the remote site.
Modem Group	The modem group to use to establish a connection.
External	If selected, indicates that the site is not connected to an internal phone system.
Set Device Time	Whenever calling the remote site, send it the current date and time.
Hold Line	The minimum duration the Comanche software will keep up a connection to the site. Selecting Permanent will hold the line forever! This should be selected for testing reasons only!
Modem Init	The initialization string the <i>remote site's modem</i> will use.
Modem Dial	Modem commands required to dial up the Comanche main station.
Phone No. 1 / No. 2	Primary and secondary telephone number to call the main station.
Call Sequence	If a module fails dialing up the main station, it uses the call sequence settings for further dial-up attempts. 1st Number and 2nd Number refer to Phone No. 1 / No. 2 . The Delay value sets the time to wait between two subsequent calls.

5.4 The three Comanche-Types

The three Comanche types, *Comanche Chief*, *Elite* and *Arrow*, differ only in the Site Editors. At the Site Editors of the *Elite* and the *Arrow* the contacts are strictly fixed. They are defined for special hardware, namely for *Comanche Elite* Series and *Comanche Arrow* Series.

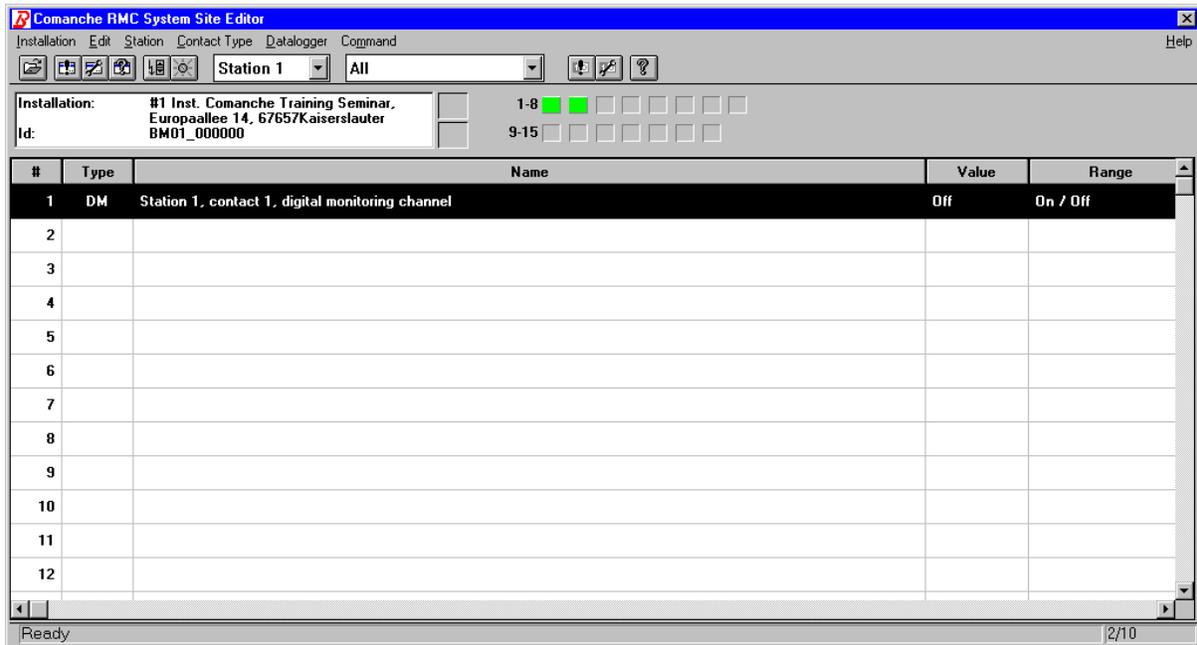
You can only change the ranges of the components.

#	Type	Name	Value	Range
1	AM	Rectifier output, voltage	0,00	0,00 ... 30,00 V
2	AM	Rectifier shunt, current	0,00	0,00 ... 102,00 mV
3	AM	Reference cell, potential	0,00	0,00 ... 4,096 V
4	AC	Analog control, voltage	0,00	0,00 ... 10,00 V
5	DM	Elite module, contact 5, digital monitoring channel	Off	On / Off
6	DM	Elite module, contact 6, digital monitoring channel	Off	On / Off
7	DC	Elite module, contact 7, digital control channel	Off	On / Off

Comanche Elite Site Editor

#	Type	Name	Value	Range
1	AM	Rectifier Output Amperage, current	0,00	0,00 ... 100,00 mV
2	AM	Pipe to Soil Potential, voltage	0,00	0,00 ... 4,00 V

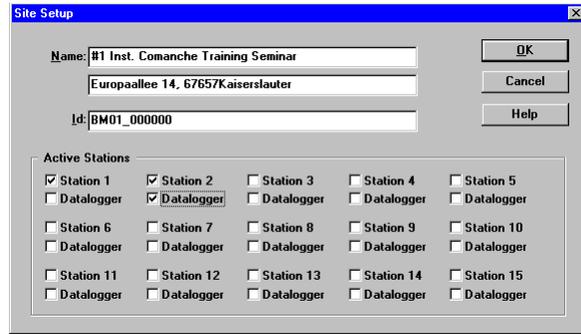
Comanche Arrow Site Editor



Comanche Chief Site Editor

5.5 Editing Site Setup

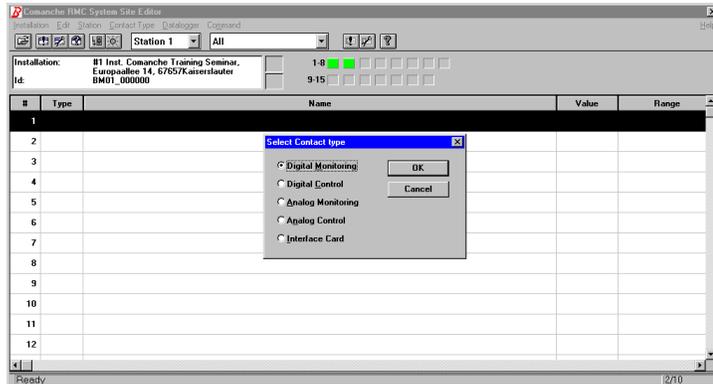
Here, you have to select the number of stations the site consists of, and which stations are equipped with a datalogger. The example shows a site that consists of two stations. Station #2 is equipped with a datalogger.



Site Setup

5.6 Editing Contacts

From the installation editor, select "Station 1" and "All (Contacts)". Then double-click on the contact number you want to edit, and select the correct type and contact information. The type you assign a contact *must* correspond to the remote site contact's type.



Select a Contact Type

The site editor's toolbar features a selection box for the **station number** you want to edit. It also features a **contact** menu, from which you can select the contacts to be displayed:

- **All** lists the maximum number of contacts the station could be equipped with, regardless whether they physically exist in the corresponding station. Selecting the "All" option is required for adding new contacts to a station.
- **All activated** lists the station's contact's that already have been activated. This is the site editor's default view.
- **Digital monitoring, digital control, analog monitoring and analog control** list all **activated** contacts of the corresponding type.

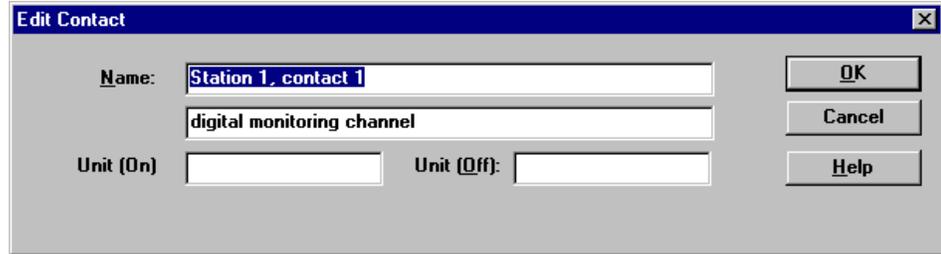
Editing contact types is in several ways very closely related to a *Comanche remote module's* internal hardware organization. If a *Comanche remote module* has digital and analog channels, they are always organized in physical groups (blocks):

Channel type	Number of contacts
Digital input	4
Digital output	4
Analog input	4
Analog output	2

Channel types & numbers of contacts

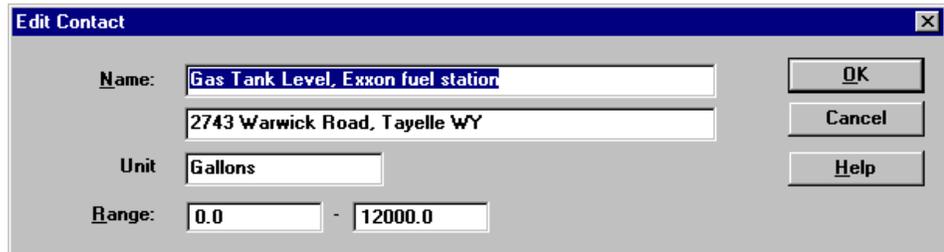
Therefore, if contact #1 is assigned to be a digital input, contacts #1 through #4 will **all** be digital inputs. The next selectable contact of a *different* type then would be contact #5.

Having selected the contact type, the "Edit Contact" dialog will ask you for the desired contact name and units. Here, you should enter a brief description of the device being monitored or controlled as well as entries for the device's units and/or status (Gallons, On, Off, OK, Alarm).



Edit Contact

An example for an analog name, units and values is:



Analog contact name, unit & range

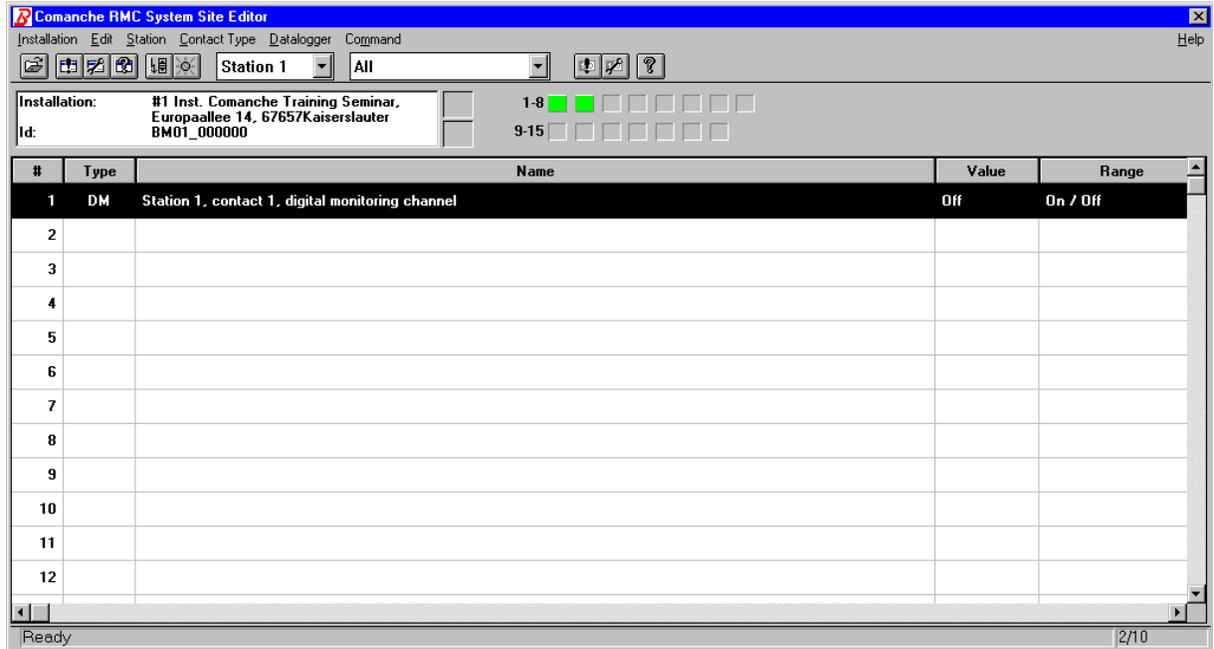
5.7 Dialing up Remote Sites

At this point, the *Comanche software* has received all the information needed for establishing a communication with the remote site. From the Site Editor, select **Command/ Site Commands**. In the window **Site Commands**, check the stations you want the commands being sent to, then click **Send Parameter**. The *Comanche software* will dial up the site and upload the settings to the remote modules.



Site Commands

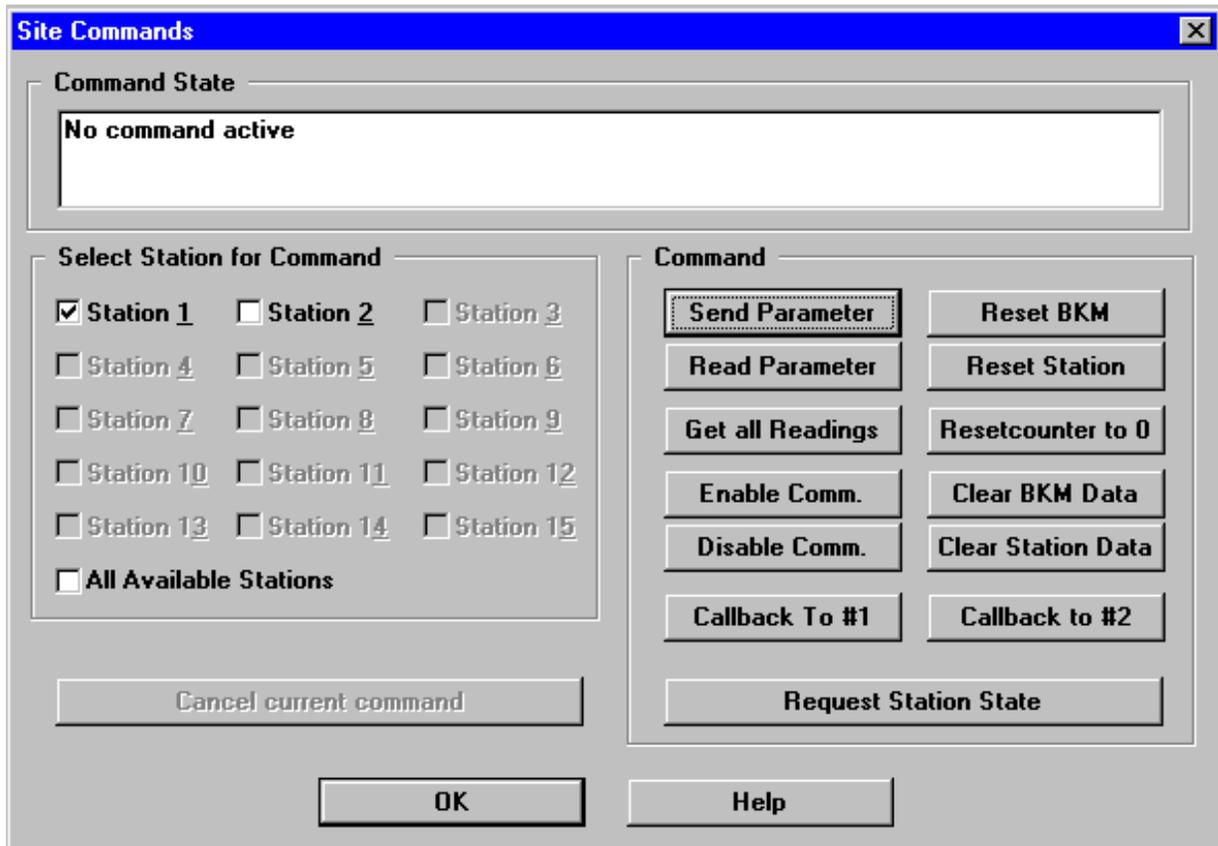
After this is finished, you have successfully tested dialing up a remote site, and the *Comanche remote module* has received the basic communication parameters. The final step in the first time configuration of the *Comanche software* will now be ensuring that the site is able to dial up the main station.



Click **Callback to #1** in the **Site Commands** window. This will tell the *Comanche software* to send a callback request to the remote site. The remote site will then initiate a call back to the main station after a short delay.

5.8 Site Commands Window

The **Site Commands** window offers a couple of options that will be sent to the selected stations.



Site Commands

Selecting **All Available Stations** will work for the **Send**, **Read** and **Callback** commands only.

5.9 Installation Commands Reference

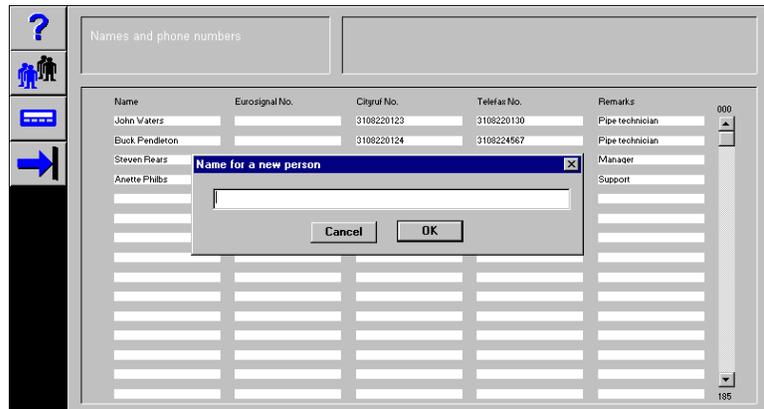
Command	Action
Send Parameters	Send the communication parameters to the site.
Read Parameters	Read the communication parameters from the remote site.
Get all Readings	Read the values of all activated contacts of a selected station.
Enable/Disable Comm.	Enables/disables communication with the selected station(s). This is for diagnostic purposes only.
Callback to #1/#2	Requests the remote site to call the main station on phone number 1 or 2.
Reset BKM	Restarts the communication module's software. Sending this command usually is not necessary.
Reset Station	Restarts the station module's software. Sending this command usually is not necessary
Clear BKM data	Clears any data the communication is currently holding. <u>Be extremely careful sending this command to a site!</u>
Clear Station Data	Clears any data the station is currently holding. <u>Be extremely careful sending this command to a site!</u>

6 Alarm Planning

6.1 Names and Phone numbers

The **Comanche Software** features an automated alarm system which alerts individuals in workgroups pre-defined by you. Click on the **Edit workgroups and calendar** icon on the **Comanche Main Panel**.

The **Names and Phone numbers** windows lets you enter a list of any staff members who will be capable of handling an alarm. Any staff entry in this window should be assigned his/her personal facsimile and pager number as well as a brief description of the staff member's duties.



Names and Phone numbers

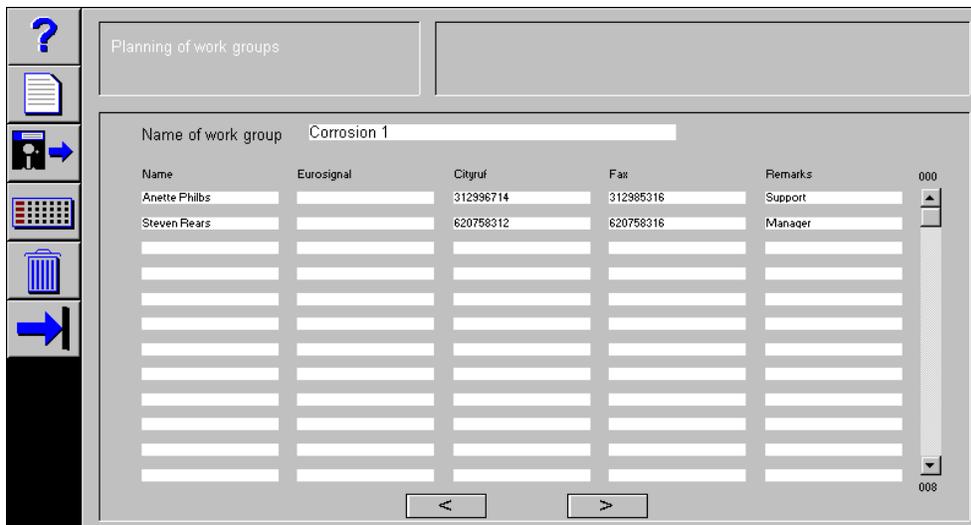
6.2 Workgroups

Staff members can be organized in workgroups related to the assignment of responsibilities of the staff members.

To create a new workgroup, click on the **Create New Workgroup** icon and enter the new workgroup's name. Then, choose the workgroup's staff members by clicking on the blank member lines. All people that were entered in the **"Names & Phones numbers"** window can be selected for the new workgroup.



Creating Workgroups EMBED



Workgroup „Corrosion 1“

6.3 Calendar Planning

Having assigned staff to a workgroup, it is possible to divide the workgroup staff into **Emergency Groups**, subgroups of the workgroup with shift changes according to daytime and calendar date.

To create an Emergency Group, click on the **Create Emergency Group** icon.



Time planning of emergency groups

Work group: Corrosion 1 Change of shifts: 09 . 00 Group 1 / 2

Name:	Selection	Time	Remarks	
Anette Philbs	City Fax	09 . 00 . 21 . 00	Support	A R 000
Steven Rears	City Fax	21 . 00 . 09 . 00	Manager	A R
		00 . 00 . 00 . 00		A R
		00 . 00 . 00 . 00		A R 006

Buttons: Check, <, >

Time scheduling 1996/1997

week :	November 47	November 48	November 49	December 1	December 2	December 3	December 4	December 5	December 6	December 7	December 8	December 9	December 10	December 11	December 12	December 13	December 14	December 15	December 16	December 17	December 18	December 19	December 20	December 21	000
Group 1	█	█	█	█																					
Group 2					█	█	█	█																	

Navigation: <<<, <<, <, >, >>, >>>

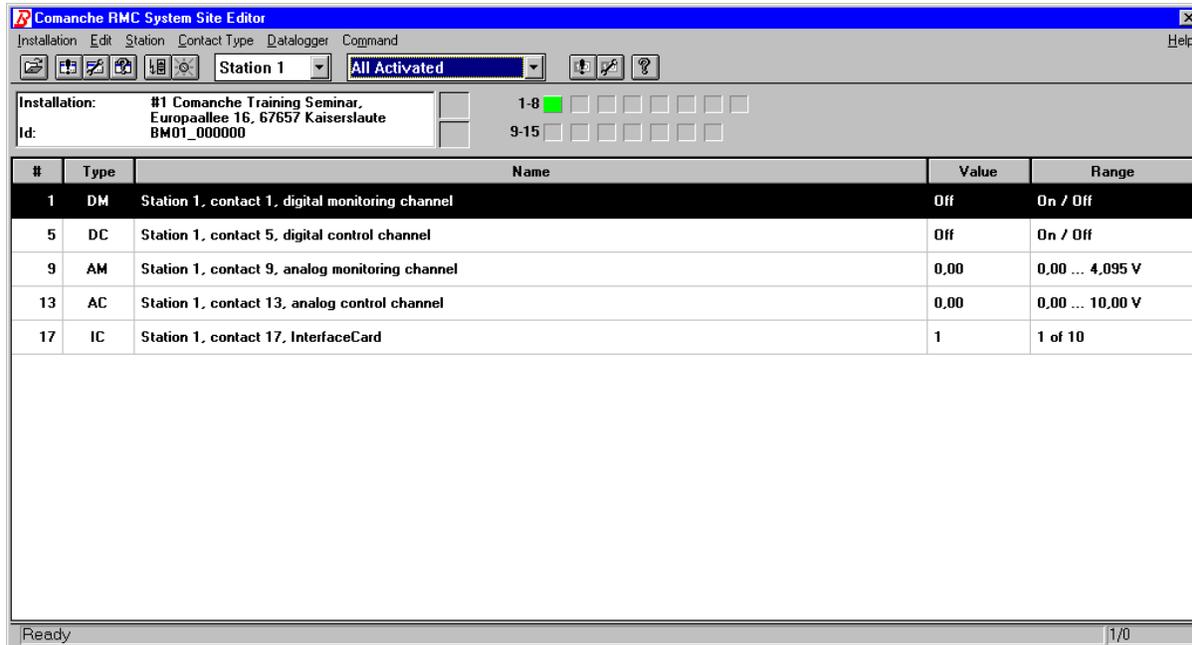
Emergency groups & Calendar

To assign a new emergency group member, click on a blank line and choose a new member from the workgroup's staff list. Emergency group members can be set active or inactive due to illness or leave, and reserve staff can be assigned to inactive persons.

By making use of the **Time Scheduling** feature, duty cycles for different emergency groups can be planned according to the **Emergency Groups Calendar**.

7 Process Communications

7.1 Contact Types



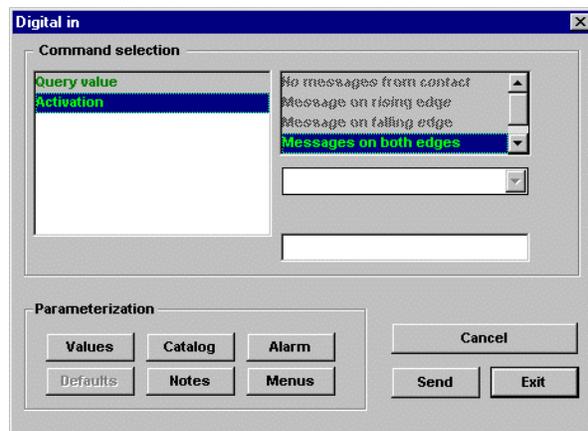
Available site contact types

Currently available contact types are **Digital Monitoring**, **Digital Control**, **Analog Monitoring**, **Analog Control** and **Interface Card**.

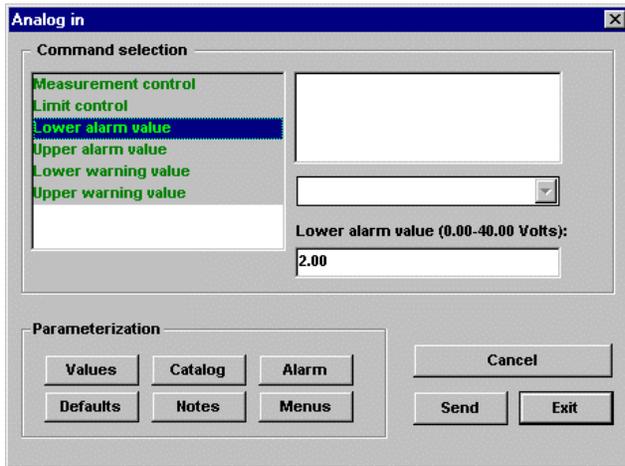
To send commands to a specific contact, double-click on the associated contact's line.

7.2 Sending Commands

The **Command Selection** window for digital inputs offers various selection possibilities. The left half lists the different command groups; the right half lists the commands possible within the currently select command group. To send a command to a contact, single-click on the desired command group, and then double-click on the command to be sent to the remote site. *To be able to send alarm messages, this digital input's feature **must be activated** by sending the command **Activation/Messages on both edges**.*



Digital input activation

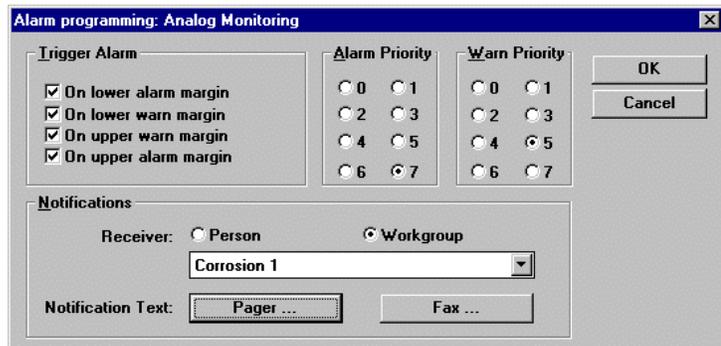


Analog input

Analog inputs offer a broader range of command groups and commands due to the fact that they feature automatic messaging in **warning** or **alarm** conditions. Analog inputs can be parameterized to send the **Comanche** main station a message if the values to be monitored drop below or raise above any user-defined warning or alarm values. *For you to enable this feature, select the contact's **Limit control** and enable the warning and alarm margins. Then, select **Lower/Upper Warning/Alarm** value and enter the desired margins.*

Click the **Alarm** button to set the alarm programming for the contact you are editing.

Now select the conditions that will trigger an alarm and enter the priority for both alarms and warnings. Priorities can be freely assigned and are not used by the **Comanche software**. They exist for you to easily determine the severity of an alarm or warning received from a specific site contact.



Alarm programming

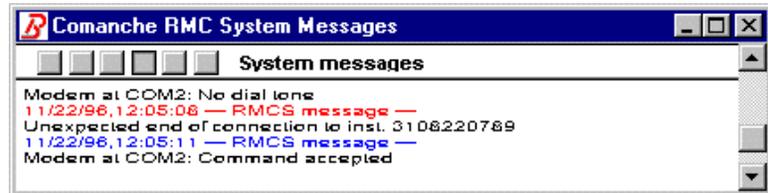
Notifications should list the receiver of an alarm or warning message. The receiver can be a single person or an entire workgroup including the workgroup's emergency groups. Certainly, before a workgroup can be given here, it first has to be created in **Comanche's Workgroups & Calendar** section. Click **OK** when you are finished.

Finally, click the **Send** button. The **Comanche Software** will dial up the remote site and send the values and settings to the remote module.

In addition, any contact can be assigned **Notes** and **Measures** concerning the handling of an alarm.

7.3 Comanche System Messages

The *Comanche RMC Messages* window is a tool for watching the progress *the Comanche's* activity and process communications.



Comanche System Messages

The part to be monitored can be selected by one of the six buttons from the Comanche RMC System Messages toolbar:

- **System messages** monitors system related items like "Modem detected on Port #2", "Dialing up remote installation <<phone number>>", et cetera.
- **Installation Messages** lists the replies from remote site installations.
- **Communication** lists the codes being sent to and received during process communications.
- **Job Management** lists pending jobs and their termination.
- **Process Messages** shows values received from or sent to the remote site installations.
- **Alarm** lists the alarms the *Comanche Software* has received from remote site installations.

All of these messages are permanently stored and archived in *Comanche's archive files*.

8 Datalogging

The *Comanche RMC System* supports datalogging for both off-potential and on-potential measurements as well as the automated measuring of the potential decay curve of an anode bed. It features user-defined cycle timing, sampling duration and sampling resolution.

8.1 Datalogging for Comanche Chief

8.1.1 Configuring Datalogging support

The screenshot shows the 'Site Setup' dialog box with the following configuration:

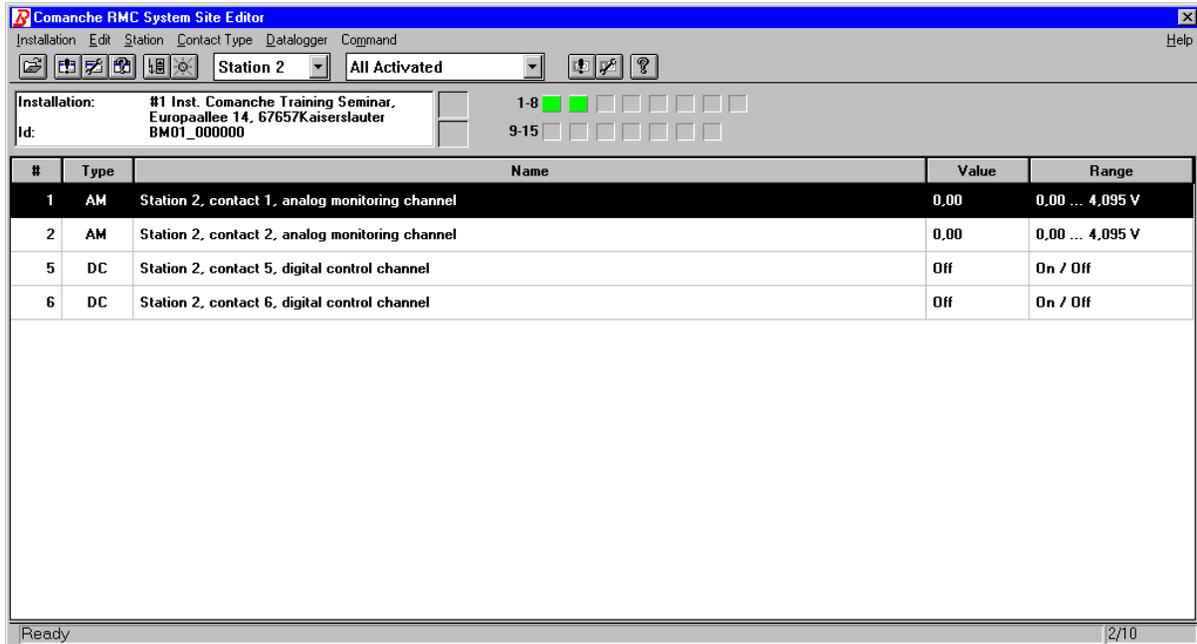
- Name: #1 Inst. Comanche Training Seminar
- Address: Europaallee 14, 67657Kaiserslauter
- Id: BM01_000000
- Buttons: OK, Cancel, Help
- Active Stations:

<input checked="" type="checkbox"/> Station 1	<input checked="" type="checkbox"/> Station 2	<input type="checkbox"/> Station 3	<input type="checkbox"/> Station 4	<input type="checkbox"/> Station 5
<input type="checkbox"/> Datalogger	<input checked="" type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger
<input type="checkbox"/> Station 6	<input type="checkbox"/> Station 7	<input type="checkbox"/> Station 8	<input type="checkbox"/> Station 9	<input type="checkbox"/> Station 10
<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger
<input type="checkbox"/> Station 11	<input type="checkbox"/> Station 12	<input type="checkbox"/> Station 13	<input type="checkbox"/> Station 14	<input type="checkbox"/> Station 15
<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger	<input type="checkbox"/> Datalogger

Site Setup

In the **Site Setup** window, select the site's stations that have been equipped with a datalogger. In the example, both Station #1 and Station #2 are activated, but only Station #2 features a datalogger device.

For off-potential readings, the station has to be equipped with a digital control output to be able to switch rectifier potential on and off.

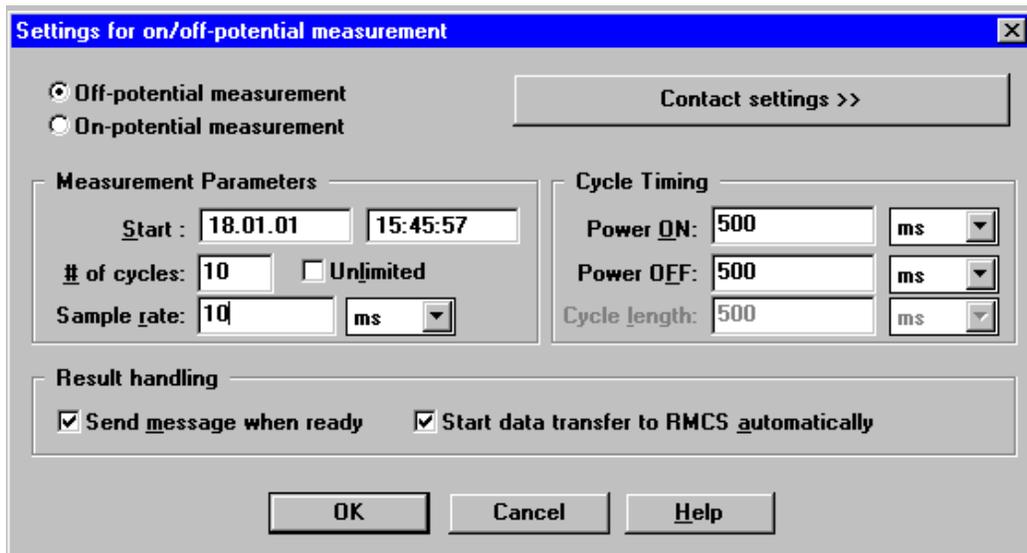


Off-potential configuration

For on-potential readings, there is no need for a separate switching output, as all readings will take place while the rectifier power is on.

8.1.2 Measurement Settings

Select **Datalogger/ Measurement Parameters** and enter the measurement type and values for the readings.

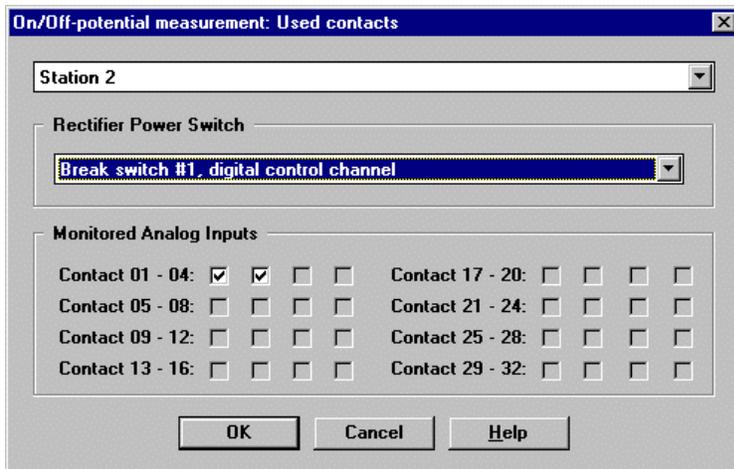


8.1.3 Measurement Settings Reference

Setting	Explanation
Off-/On-potential measurement	The type of potential measurement the site is capable of and configured for. Off-potential measurement requires a digital control “ break switch ” that shuts off and on the rectifier power.
Start	Date and time of the logging process to be started.
Power ON/OFF	Applies to off potential logging only. The ON & OFF fields must contain the duration for the rectifier to be powered on and off.
Cycle length	Applies to on-potential measurements only. The duration of a single measurement cycle must be given here.
# of cycles	The number of cycles the datalogging will take place. This can be a numeric value, or you can log infinitely by checking the Unlimited option.
Sample rate	The interval between readings during a cycle. This controls the resolution of the logging process.

8.1.4 An Off-Potential Example

As an example, with **Power On = 500 ms** and **Power Off = 500 m0s**, **number of cycles = 10** and the **Sample rate = 10 ms**, a single cycle’s duration is 500 ms + 500 ms = 1 second. As 10 cycles are to be logged, the entire logging process will take 10 x 1 second = 10 seconds. As the sample rate is set to 10 ms, the number of readings will be 10 seconds / 0.01 seconds = 1000 readings.



Contact settings

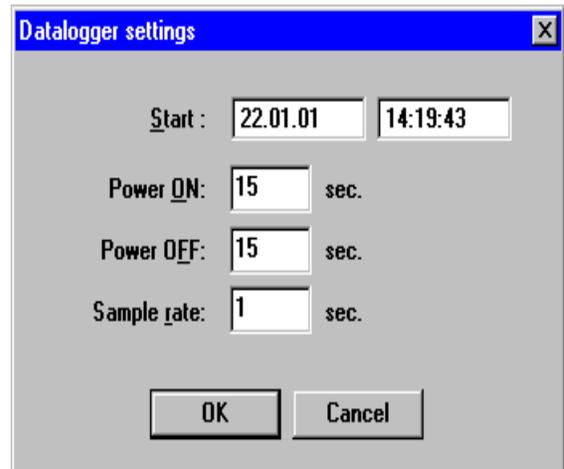
Click on **Contact Settings** and then select the analog inputs that are to be used for the datalogger readings. If the selected station will be doing off-potential readings, then you must also select the break switch output that is connected to the rectifier’s switching circuitry.

Click **OK** when you are finished.

8.2 Datalogging for the Comanche Elite & Comanche Arrow

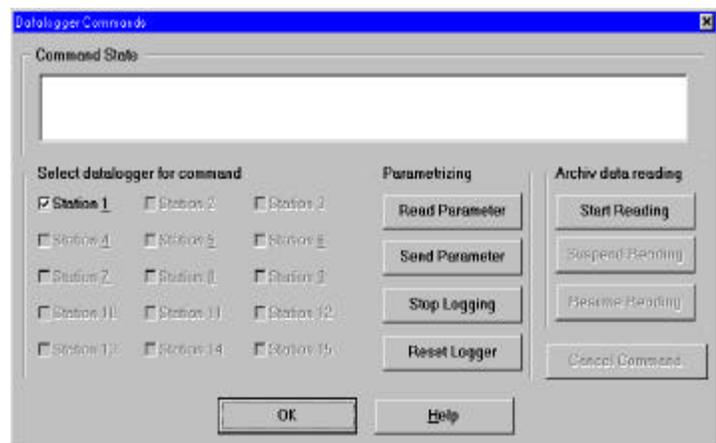
8.2.1 Taking Readings

At this point, it is assumed that the *Comanche Elite* or *Comanche Arrow* is installed properly, and that all parameters have been sent to the remote module, (example; all the variables such as the password and the two telephone numbers!). Now, in the menu *Datalogger – Measurement Parameter*, **all necessary parameters need to be specified**: The interval can range from 1 to 255 seconds. Generally, a one-second sampling rate is appropriate. Using the *Datalogger – Command – Reset Logger*, which is in the *Comanche software*, a connection to the remote module is established and the logger is reset to its default state. Now, the *Datalogger–Command–Send Parameter* sends the previously defined values to the *Comanche Elite* or *Comanche Arrow* remote station.



Measurement Parameters

After this is completed successfully, the connection to the remote module can be cancelled. When sufficient readings are taken, the data can be downloaded to the computer by *Datalogger-Command–Stop Logging - Start Reading*. Alternatively, the *Comanche Elite* or *Comanche Arrow* remote module will call the main station, once the datalogger's memory is full and the data can be retrieved by *Datalogger – Command – Start Reading*. From now on, the readings are available for processing through the *Command Center* only.



The datalogger command set

8.3 Datalogger Readings

This is the same to all three Types of Comanche.

To save the readings the Comanche Command Center (see 8.4) must be started.



To start a datalogger reading, click on **Send Parameters** in the *Datalogger Command* window. The **Comanche RMC software** will send the command to **all** activated dataloggers of the selected installation and list the datalogging process in the **Command State** window.

A reference of the **Datalogger Commands** window:

Read Parameters	Re-read the datalogger settings (parameters) from the addressed datalogger stations.
Send Parameters	Sends the configured settings to all datalogger stations of the site.
Stop Logging	Stops datalogging for the selected station(s).
Reset Logger	Erases any data that the datalogger is currently holding. <u>Be extremely careful sending this command to a site!</u>
Start Reading	Initiates the datalogger sending the station's readings to the Comanche main station.

The retrieved datalogger readings can be processed with the **Comanche Data Agency**.

8.4 Using the Datalogger and the Command Center

8.4.1 Initiating the Software

First, start the *Comanche System* basic software, and then initiate the *Comanche Command Center*.



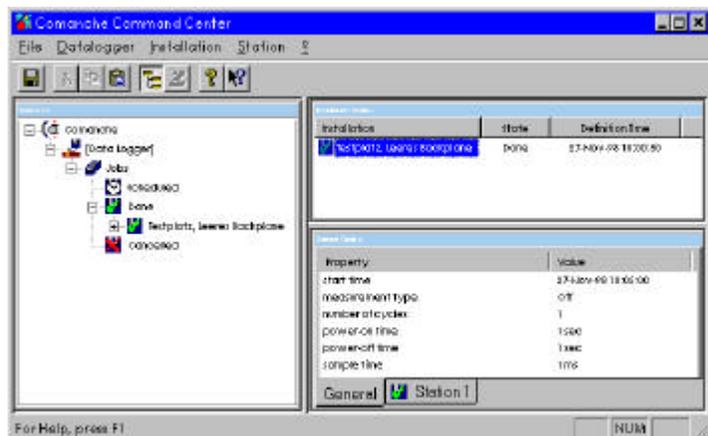
The Command Center main menu

The proper installation and connection of these two software modules can be verified in the *Comanche Command Center's* menu *Option-Connect RMCS*. In the *Comanche Command Center's* menu *Option-Connect RMCS* it also can be established manually.

8.4.2 Transferring Data

In the tree diagram on the left hand, all readings are available for user access. To retrieve the data, the tree needs to be expanded to the second level by clicking the box left of *Comanche*. Now, the menu option *Data logger* in the tree needs to be marked by a left mouse click and be activated by a right mouse click. The appropriate icon in the menu status bar at the top is activated (6th icon from the left). By pressing this icon, the data management tool will be invoked in the right window. Now, the full tree can be expanded and the complete schedule can be inspected.

The finished measurements you will find in the menu point *Done*. After choosing the installation in the tree diagram and the measurements in the right window, the readings can be exported as a *.CSV file* by using *Station-Export to File*. Alternatively, it can be viewed as an *EXCEL* file by *Export To Excel*.

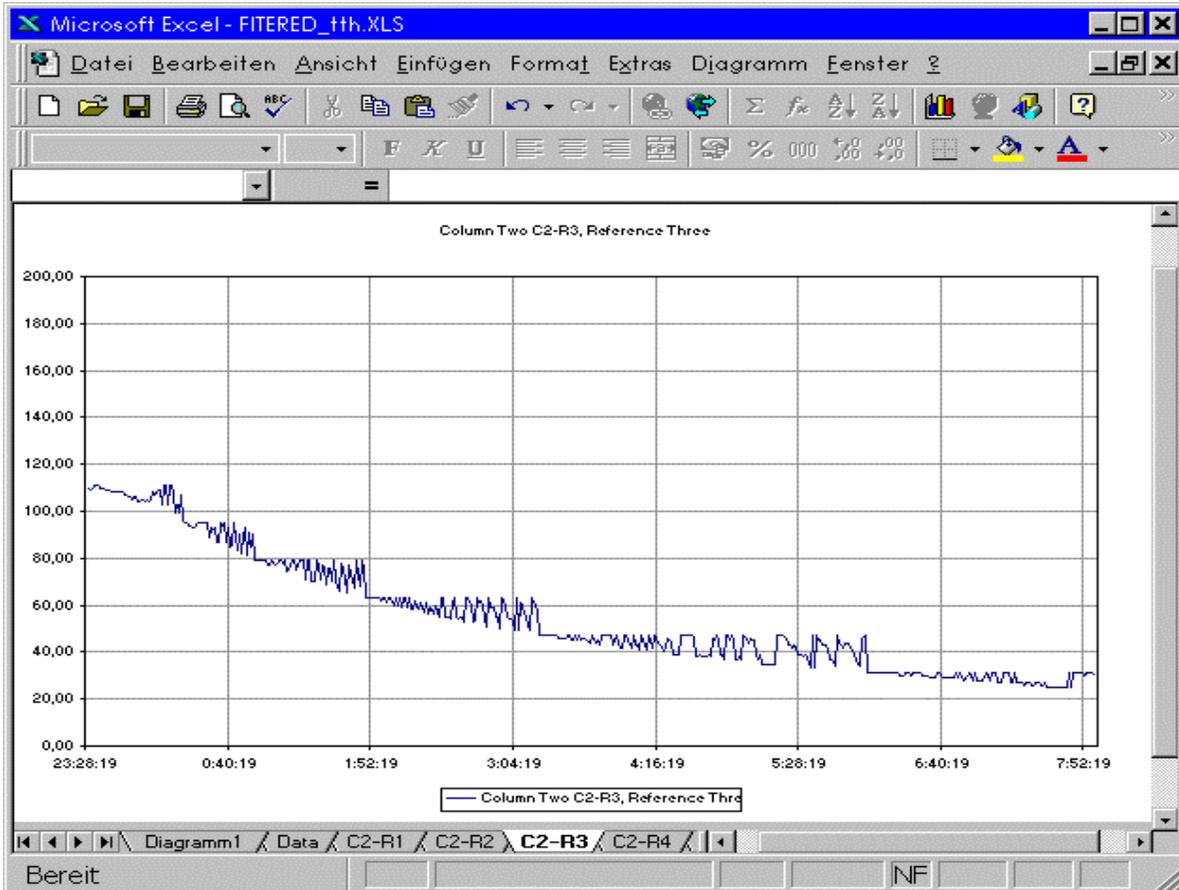


The expanded Command Center

8.4.3 Processing Data

After initiating *EXCEL*, the data will be available automatically, or it can be loaded from the directory *Comanche – Command Center* as a **.CSV* file. Visualization and data interpretation can be done according to the regular *EXCEL* features.

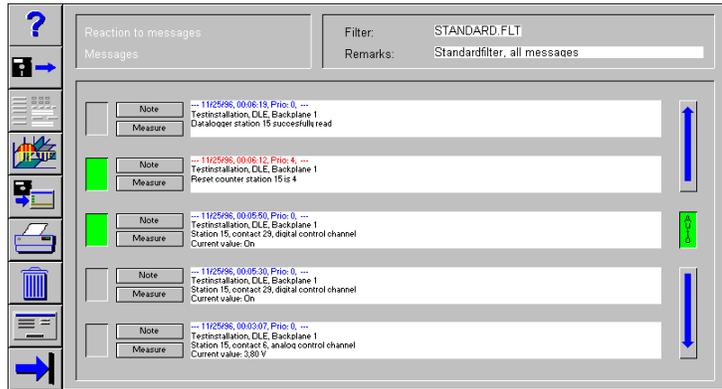
An Excel example



Message List

The *Comanche RMC Message list* enables you to keep track of all incoming process messages, both routine and alarm notifications. It also gives you the option of filtering messages to reflect a specific time frame, installation, contact type or message priority.

With the **AUTO** button locked, any incoming messages will scroll forward continuously. Single messages can be locked and selected by highlighting the **LOCK MESSAGE** button on the left of each message line. If you click on the **VISUALIZATION** icon with a single message selected (locked), the *Comanche System* will take you to the worksheet or series of worksheets that the contact is related too and which the locked message appears in.



Message list

If the contact sending the message or alarm was assigned notes or instructions (measures), the message's **Notes** and/or **Instructions (Measures)** buttons are highlighted and can be selected. Notes and Instructions (measures) could, for example, list special **“actions required”** for a certain alarm condition or **“actions taken”** in response to a an alarm or warning condition.

8.5 Filter Editor

To show the **Filter Editor** click on the **Filter Editor Icon**.



The **Filter Editor** is used for creating or editing message filters. Message filtering is especially useful while monitoring values and/or alarms for a specific remote contact. In this example, the filter's focus is set on all analog input values that were received from a single remote site between September 27th 1996 and January 1st 1997.



Filter Editor

8.6 Message Control

To show the **Message Control window** click on the **Message Control Icon**.



The Message Control window gives an overview of the amount of alarms and messages that the main station has received during a certain period of time. If, for example, the message control is reset at 5 p.m. and inspected again at 9 a.m. next day, it will show how many alarms and messages came in over night. It will also show date and time of the last messages that were received.



Message Control

9 Surveillance

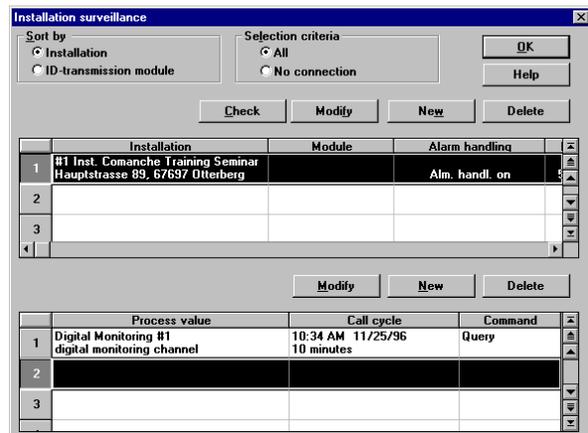
A basic problem of modem communications is that it cannot be guaranteed that a connection will be established any time it is required. For example, either the main station or one of the installations could become unavailable due to roadwork or phone system maintenance, or an entire telephone-cabling branch could have gone out of service due to a telephone system blackout.

The **Comanche Surveillance** therefore is a feature for constantly monitoring and testing the ability of establishing connections between the **Comanche main station** and the **Comanche remote modules**. Monitoring intervals and options in case of a failure can be set by the main station's administrator.

The **Comanche Surveillance** window is divided into two parts:

- The upper half lists the **remote installations** the surveillance is applied to
- The lower half lists the installations' **contacts** that are being monitored constantly

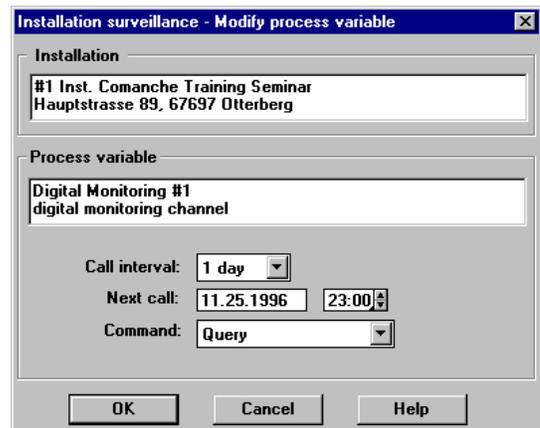
The **Check** button will force immediate checking for the **"reachability"** of the installation and all specified contacts.



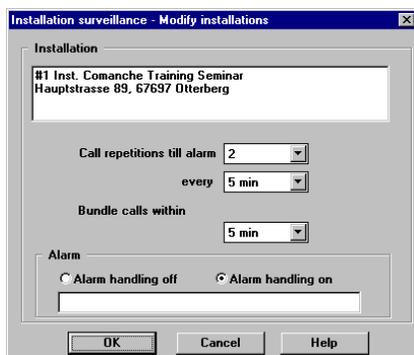
Comanche Surveillance

9.1 Surveillance parameters

In the **Surveillance Interval & Actions** dialog box the call interval, date and time are specified. The **Command** field contains the action that will be performed to test the installation's state. The **"Command" field's** contents can vary depending on the contact type being monitored. For example, the command for digital outputs could be **"Query"**, **Is the Switch ON or is it OFF**, while digital inputs are restricted to **"Query"** only.



Surveillance Interval & Actions



Call bundling & Alarm handling

Alarm handling should always be enabled for installations under surveillance. In case of a surveillance call failing, the **Comanche System** will send an **installation alarm** to the person or workgroup being on duty for installation alarms.

The **Call bundling** settings state how many surveillance jobs will be performed during a single call to a monitored installation. Changing its defaults usually is not needed.

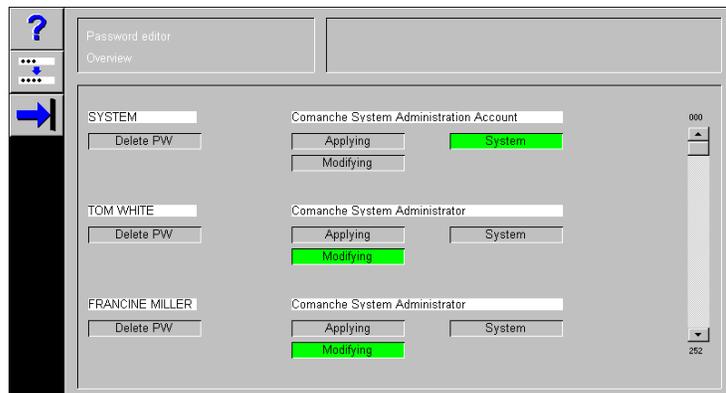
10 Multi-user Administration

The **Comanche system** offers multi-user and password protection support at user level. Access passwords can be changed and deleted, and all non-authorized personnel can be refused access to the **Comanche RMC system**. Additionally, the entire system can be locked until an authorized user logs in again.

10.1 Password Editor

The **Password Editor** is used for creating, changing or deleting Comanche user accounts. Access control can be set to **SYSTEM**, **MODIFYING** or **APPLYING**:

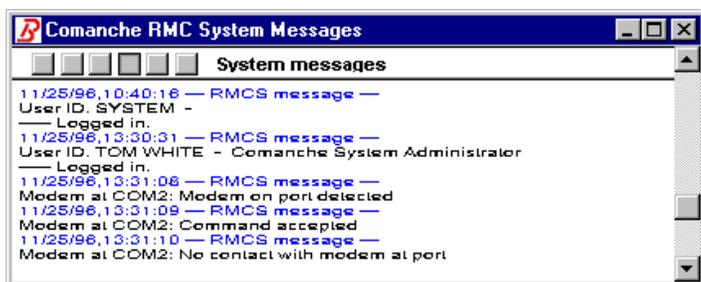
- **SYSTEM** accounts can fully administer the Comanche RMC System, including the multi-user administration.
- **MODIFYING** accounts can fully administer the system except from adding/ deleting/changing other users' rights and passwords.
- **APPLYING** accounts can apply most of Comanche's features, but cannot add, change or delete any system components or settings (e.g. modems, sites, passwords).



Password Editor

10.2 Login Logging

The Comanche main station logs any successful or unsuccessful attempt to login to the system. A user logging in successfully is logged with his/her login account and description and is responsible for any action and reaction performed during the time he/she is logged in.



Login logging

10.3 Passwords

- To enter a password for a new user, Comanche needs to be locked first. When Comanche asks for the password, the new password must be typed twice to check for the password's correct spelling. After that, the user's password is registered and saved.
- To change an existing password, the old password first has to be deleted in the password editor window. Then, follow the directions for „entering a password for a new user“.

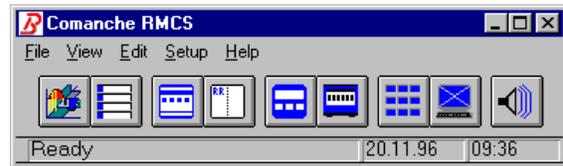
11 Comanche Visualization System

The *Comanche Visualization System* offers a graphical, easy-to-understand, user interface to the remote monitoring and control processes, which is the **Worksheet System**. Due to the Visualization's **OLE (Object Linking and Embedding)** support, any program with **OLE-capability** can output into a *Comanche worksheet*.

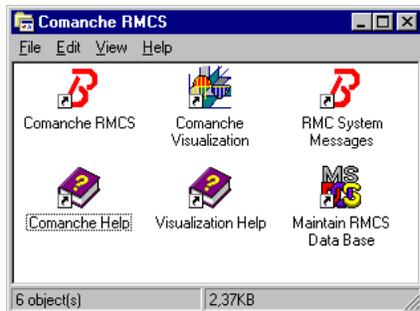
11.1 Viewer mode and Edit Mode

The *Comanche Visualization* can be launched in two different modes: **Viewer mode** and **Edit mode**. The viewer mode is used for displaying previously created worksheets, while the edit mode Visualization can be used for both creating and viewing/testing worksheets.

Starting the Visualization from the *Comanche RMC System* main panel will launch the Visualization in the Viewer mode.



Viewer mode Visualization



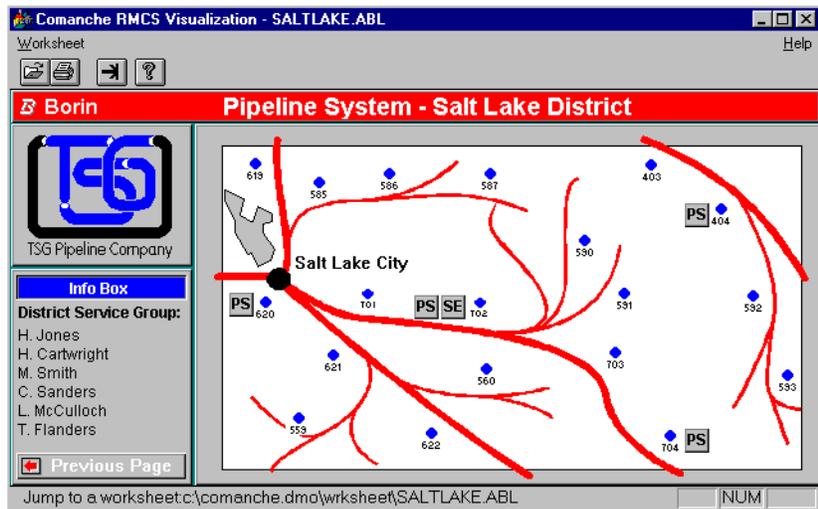
Edit mode Visualization

Starting the Visualization from the *Comanche RMCS* program group will launch the Visualization in Edit mode.

11.2 Using worksheets

First, start the Visualization in **viewer mode** and open an any existing worksheet by clicking on the Visualization's **Worksheet/Load** command, then select a worksheet from the file menu.

Worksheets can feature the issuing of commands, links to other worksheets that are part of a worksheet system as well as top-down views on specific installations. For you to utilize a command or link feature, double-click on the related symbol within the worksheet.

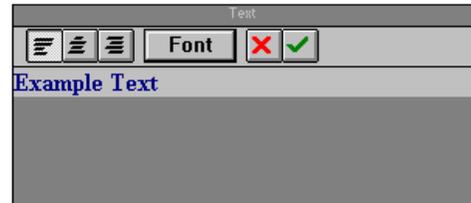


Using a worksheet

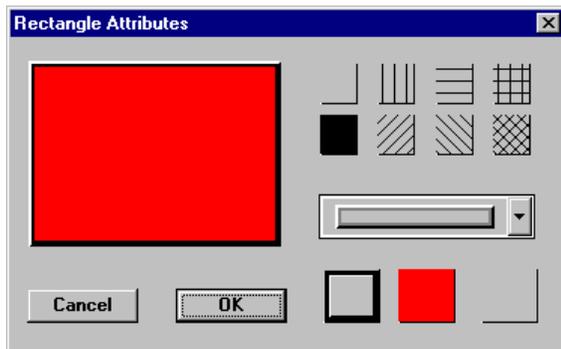
11.3 Worksheet editing basics

To create a new or edit an existing worksheet, open the Visualization in **edit mode**. To insert new text, a rectangle, OLE or parameter objects, select the desired object type from the Visualization toolbar or **Object menu**. Then move the mouse pointer to the point where you want the new object to be placed. Press and hold down the left mouse button and change the object's size to your needs. Then release the mouse button. Double-click on the new object to edit its properties:

Text objects can be assigned any font and color Windows 9x supports. Text can consist of one or more lines, depending on the size the text object was assigned. Text can be centered or justified left or right.



Text object



Rectangle object

Rectangle objects can be assigned various shape, frame and fill styles as well as colors.

OLE objects' looks depend on the program they were created with. Common examples of OLE-capable applications are **CorelDraw!**™, **Microsoft Draw**™ or **Micrografx Designer**™.

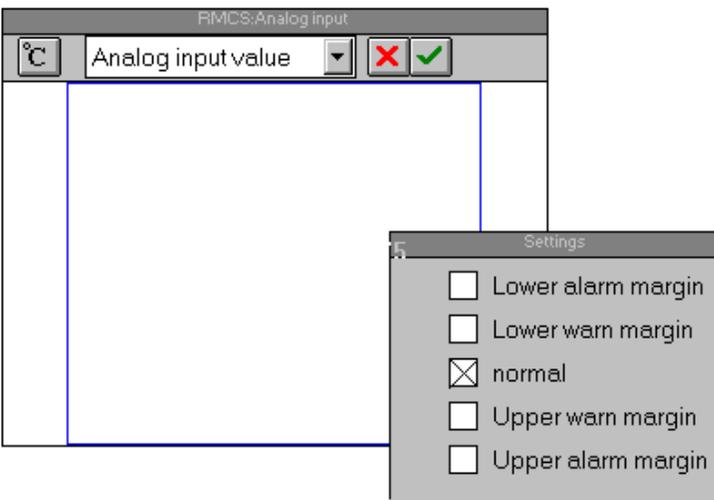
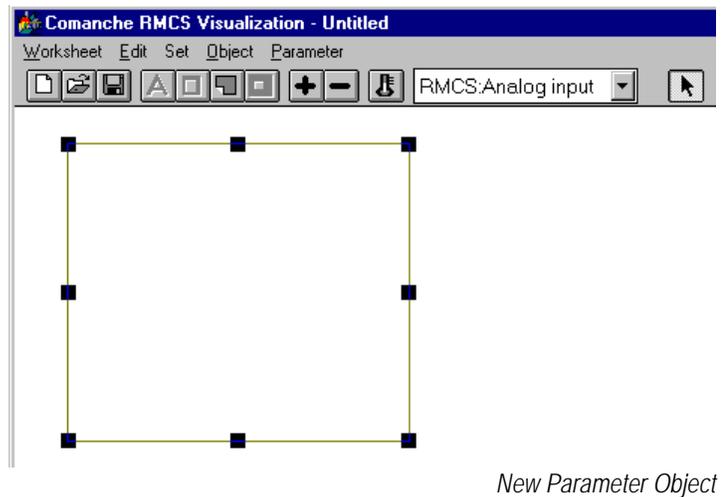
Link Objects are used to insert jumps to other worksheets within a worksheet system. Each link can be assigned both a link bitmap and the path to the worksheet to be jumped to.

11.4 Parameter Objects

A **Parameter object** is a graphical user interface to a remote installation's contact. It therefore can have one of the following types: digital input, digital output, analog input or analog output.

The following example shows the creation of a new parameter object of the **Analog input** type:

With the *Comanche RMCS* running, start the Visualization in edit mode. From the Visualization menu, select **Object/Parameter**, then choose the parameter type, **Analog Input**, from the Visualization toolbar. Move the mouse pointer to the position where the parameter object will be located. Press and hold the left mouse button and size the parameter object. When finished, release the left mouse button and you will be presented with a new parameter object.



Parameter Object Properties

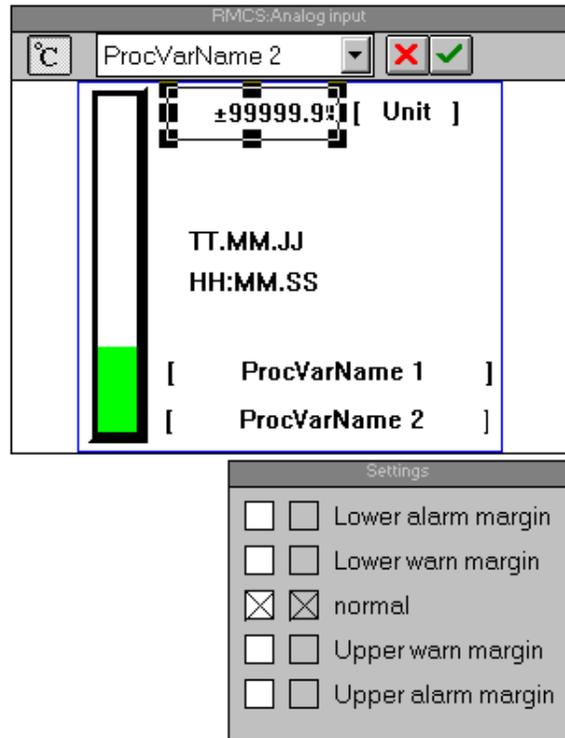
Double-click on the parameter object to edit its properties. The **Settings** window selects what the parameter object will display in the normal and lower/upper warning and alarm margin states. **Unselect** the displaying of lower and upper warn and alarm margins. Now, you will edit the design for the parameter's normal state.

Generally, any text and/or graphics can be displayed for a certain parameter state. For example, you could draw different symbols in CorelDraw! and assign each symbol to display a different parameter state. By inserting the CorelDraw! objects into the parameter object, each symbol would be displayed for the appropriate contact state.

The **Comanche Visualization** also offers a way to display contact-related information that has been entered in the Site Editor: The **Parameter Values** button . Having clicked this button while editing a parameter object lets you insert contact-related information like the current value and unit, contact name and description and the date and time the last messages from the installation were received. Analog inputs also feature *input value bars* that display values on a percentage base.

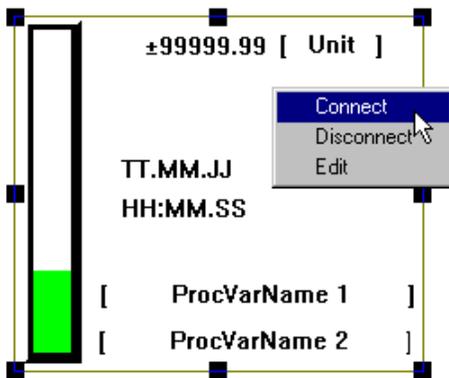
Having selected a single item of a parameter object, the related 'Settings' window is displayed with two columns of checkboxes. The right column selects the contact status currently being edited. The left column selects the states in which the selected object will also appear.

An example: Supposing you are editing an analog input parameter object, and you want the value bar displayed green for normal, yellow for warning and red for it's alarm state. Numeric value, unit, date, time display etc. should always be displayed black and white. Thus, for any items of the parameter object except for the value bar, all the left column's check boxes would be checked.



Inserting Parameter Values

11.5 Connecting Parameter Objects



Connecting a Parameter Object

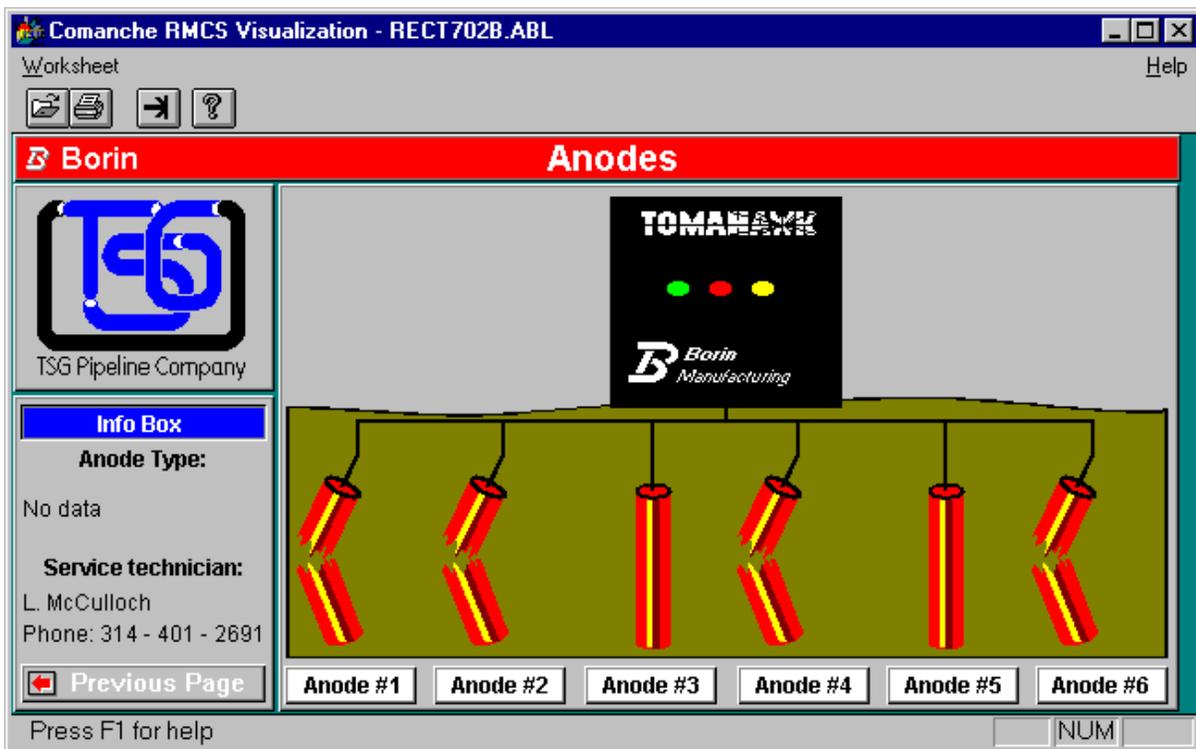
Before parameter objects are able to display process values and states, they must be connected to a site. To connect a parameter object, *select* it by a *left* mouse click. Then, *connect* it to a site by a *right* mouse click. Choose the target process variable from the **site** and **contact** menus.

When you are finished, save the parameter object using the Visualization's **Worksheet/Save as...** option. Once saved, parameter objects can be used as templates and be used again in further projects.

11.6 Viewing the Worksheet

Once the **worksheet** and the **parameter object** designs have been completed and all parameters are connected to the installations, the worksheet or worksheet system (multiple linked sheets) can be used for a process display and also for communications. This can be done by:

- Switching the edit mode Visualization to user mode selecting **Worksheet/Switch to User mode**. This should be applied for designing and testing only!
- Starting the viewer mode visualization from the Comanche main panel.



12 Modems - Information and Troubleshooting

12.1 Introduction

The following contains some basic information about modems and also some hints for troubleshooting modems in general. A modem is a device that allows your computer to communicate via telephone line, cellular phone, radio or satellite. The word 'modem' is an abbreviation of **modulator-demodulator** which means that the modem transforms computer data into telephone signals and vice versa. There are two kinds of modems: built-in modems on internal add-on cards inside the computer and external modems, which have to be connected to a serial port of the computer.

In the *Comanche Remote Monitoring and Control System*, modems provide communication between the remote modules (remote sites) which are located at the rectifier or remote field hardware, and the *Comanche RMCS main station*. Over and above that, the *Comanche RMCS* uses modems to send fax messages and to contact pager services.

12.2 Connecting an external modem to the *Comanche RMCS main station*

The parts required for connecting an external modem to the RMCS main station are:

- A personal computer with **Microsoft Windows 98, 2000 or NT operating system** (the main station)
- An external modem
- A power supply adapter for the modem (usually delivered with the modem)
- A serial cable to connect the modem to the computer (usually delivered with the modem)
- A cable for the connection between modem and telephone line or communication device (usually delivered with the modem)
- A telephone socket
- The manuals of the modem and the personal computer

The following instructions explain the necessary steps for connecting and installing an external modem to the *Comanche RMCS main station*. See your modem manual for details about establishing the cable connections.

1. Connect the modem to the AC power line. Make sure that you use a power supply adapter that is suitable for your modem.
2. Connect the modem to the telephone network.
3. Check, which RS-232C serial port is available on your computer. Generally, personal computers have two serial ports, named **COM1** and **COM2**. In most cases COM1 is used for your mouse, so if this is the case, use the COM2 port for your modem installation. Note: If your personal computer contains a **DigiBoardä card**, more serial ports for modem connections are available. For more information, regarding this serial port expansion card, see the manual enclosed with the DigiBoard.
4. Connect your modem to a free serial port on your computer. Note: There are two kinds of plugs/sockets for serial connections with personal computers: one with **9 pins (DB-9)** and one with **25 pins (DB-25)**. If the cable plugs on your serial cable do not fit together with the sockets on your modem and/or your computer, use a suitable adapter which, are available at any computer store.

12.2 (Continued)

5. Switch on your modem.
6. Next, start your computer.
7. Set up the modem as it is described in chapter "Main Station Hardware Setup" of this document.

If your computer has a built-in modem, see your computer and modem manual for information about installation.

12.3 AT commands

A modem can work in two different states: the **DATA STATE** or the **COMMAND STATE**. When the modem is in the **Data State**, it is considered to be **ON-LINE**. In this state all data that is generated by the computer is sent first to the modem and then transmitted through any of a variety of communication systems, such as a land telephone line to another modem. Data can only be exchanged between two modems when both are **On-Line**.

When the computer sends the string "+++" (the escape sequence) to the modem, it will switch to the **Command State**. In the **Command State** the computer can control the modem's behavior by sending it specific commands, called **AT Commands**. Every command line has the prefix **AT** which stands for "**Attention**" and is followed by one or more commands. You can find a list of all the possible **AT Commands** in your modem manual.

To switch back to the **Data State**, the **AT Command ATO** has to be sent. **Note: the length of an AT command line must not exceed 40 characters.**

AT commands were originally developed by Hayes for their Smart modems™. This is why today we reference the sub-set of AT commands as the "Hayes standard". Your modem may support some AT commands, which are not part of the "Hayes standard". See your modem manual for details.

AT commands are used to manipulate several parameters for initialization of the modem, examples would be, data speed or dialing.

12.4 Modem Initialization

The **Comanche software**, will automatically initialize any connected modem or modems with a specific **AT command line**. The **AT command line** used by the **Comanche Software** for initialization, for every connected modem, can be seen in the modem configuration box.

When you click the **Modem Configuration** icon in the **Comanche Main Panel**. An overview of all available serial ports (COM ports) and any modems connected to these ports are previewed. To open the modem configuration box for a certain modem, click the right mouse button over the icon of the modem concerned. The window **Modem Configuration** will open. In the section "**Modem**" you find an expandable list "**Modem-type**" with pre-defined modems (press button on the right of the list). Select the type of the modem you have connected to the computer. The entry at "**Init. sequence**" below the modem type shows the accompanying **AT command line**.

If you cannot find your modem in the modem list, you have to choose **User defined** as modem type. In this case it is necessary to insert an appropriate **AT command line** at "**Init. sequence**". The recommended **AT command line** for a user defined modem is:

AT &F &S0 &C1 &D2 E0 V1

The commands in that **AT command line** have the following meanings:

- &F** resets the modem's parameters to the factory defaults. The **&F** command must additionally activate the "**bi-directional RTS/CTS hardware handshake**" which, is necessary for proper modem communications. **RTS** stands for "**request to send**" which is a signal on a certain wire of the RS232-C serial interface that is used for a special kind of communication control (so-called **hardware handshake**). **CTS** stands for "**clear to send**" and is another handshake signal.
- &S0** sets the modem's DSR signal to be always active. **DSR** stands for "**data send ready**" which is a signal transmitted on a specific wire of the RS232-C serial interface.
- &C1** activates the modem's DCD signal during an established connection. **DCD** means "**data carrier detected**". The DCD signal uses a specific wire of the RS232-C interface. The data carrier is a special signal on the telephone line on which the transferred data is carried (i. e. modulated).
- &D2** causes the modem to hang up when the modem's DTR signal becomes inactive. **DTR** is the abbreviation for "**data terminal ready**". Here, **data terminal** is another term for **main station computer**. The DTR signal uses a specific wire of the RS232-C interface, too. The **&D2** command makes sure that the modem does not hold the line when communication between modem and computer has ended.
- E0** prevents the modem from "**echoing**" the AT commands. Normally, every AT command sent to the modem by the computer is repeated (echoed) by the modem and sent back to the computer. The **E0** command switches off echoing.
- V1** lets the modem return alphanumeric answers. In the command state, for example while establishing a telephone connection, the modem sends certain messages to the computer. **V1** causes the modem to send the messages in a readable text format. Commonly used messages are:

OK	modem has accepted the AT command
RING	modem is receiving a call
CONNECT <i>n</i>	modem has a connection at <i>n</i> baud (baud is the measure of the data transmitting rate)
BUSY	line is busy
NO CARRIER	modem cannot detect data carrier
NO DIALTONE	modem cannot access telephone line (for example, the line is being used by a telephone)
ERROR	improper or incorrect AT command

Since different modems support different sets of AT commands, your modem may not understand one or more of the commands shown above. In this case, see your modem manual to determine which command has the same effect on your modem as the one described above. Note: An improper or incorrect command line may cause the modem to not connect to the telephone line.

12.5 Dial sequence

In section "*Dial*", of the modem configuration box, you have to enter several specific **AT commands** that will control the dial actions of the modem. **Note**, the telephone number which, the modem must dial to contact a remote **Comanche** module **must not** be inserted here.

There are two dial methods in a telephone network: the **tone** dial method and the **pulse** dial method. The tone dial method uses different harmonic tones to represent the dialed numbers. The pulse dialing method transforms a dialed number into a pulse sequence. The tone dial method is the standard method used in the United States. In the AT commands vocabulary, **DT** stands for the **tone dial** method and **DP** stands for the **pulse dial** method.

Basically, there are two possibilities for connecting a modem to the telephone network. You can either connect the modem directly to a dedicated telephone line, or you can connect the modem to an internal telephone system. In the AT commands, **X4** is used for modems connected to a **dedicated line** and **X3** is used for modems connected to an **internal telephone system**.

If your modem is connected to a dedicated line, select "**external**" in the "*Dial*" section and insert the AT command **AT X4 DT** at "**external**" if your telephone network uses the tone dial method. If your telephone network uses the pulse dial method, you must to insert **AT X4 DP**.

If you are connecting your modem to an internal phone system, select **both** "**internal**" and "**external**". The AT command at "**internal**" is used for internal calls, such as installations that are inside the same building which are connected to the same internal telephone system. The AT command at "**external**" is used for external calls, such as remote **Comanche** module installations, pagers or facsimile machines. The corresponding AT commands are **AT X3 DT** and **AT X3 DP**, respectively. If you are required to dial a specific number to get an outside line in your internal telephone system, this number must be added to the AT command at "**external**". **Example**: If you are required to **dial "9"** for an **outside line**, then the corresponding AT command is **AT X3 DT 9** (tone dial method assumed).

Some internal telephone systems require a short break (approx. 2 seconds) before dialing an external number. In this case you can add a comma to the AT command for external calls. In our example, the complete AT command at "**external**" reads "**AT X3 DT 9,**".

12.6 Baud rate

The baud rate is a measure of the amount of data being transferred between two modems per second. The measure is called baud. In section "**Default Baud rate**" in the modem configuration box you can select the baud rate that the modem normally uses to transfer data to another modem. An appropriate value is 2400 or 4800 baud.

12.7 Accept Calls

In section "**Calls**" of the modem configuration box you can select whether the modem shall accept or reject incoming calls. If you select "**accept**", the modem answers every call coming in from the outside. If you select "**reject**", the modem ignores all incoming call.

12.8 Job Control

In section "**Job**" of the modem configuration box you can select what kind of job the modem has to do:

- If the modem is to contact a **Comanche** remote module (a remote installation), select "**Process**".
- If the modem is to send messages to a pager service, select "**Pager**".
- If the modem is to send fax messages, select "**Fax**". **Note**: this will work for "**class II fax modems**" only, see modem manual for details.

You can select one or more of these options. **Note**, that if you select none of the above options, the modem will not dial out. The modem will accept calls only if "**accept**" is selected in the "**Calls**" section.

12.9 Troubleshooting

If after installing your modem it does not work properly, the problem may be one or more of several causes. The following should give you some hints for troubleshooting.

If the modem does not work at all, make sure that

- the modem is connected to the mains and is switched on. Most modems have display indicators so you can see if the modem is switched on.
- the modem is connected correctly to the telephone line. Note, that many modems have two sockets for telephone cables. One to connect the modem to the telephone line (usually marked with a telephone socket symbol or the word "line") and another one to connect a telephone to the modem (usually marked with a telephone symbol or the word "phone"). Make sure, that you use the line socket, see your modem manual if necessary.
- the modem is connected correctly to the Comanche main station computer.

If the modem cannot make contact with a remote installation, it is possible that the telephone line or the remote installation is malfunctioning. To check this, disconnect the modem from the telephone socket and plug in a regular telephone. If you cannot hear the dial tone, your telephone line is dead. Assuming that the telephone line is operational then dial the number of the remote installation. If the remote installation is okay, you will here modem signals (static noise and whistling) in the receiver. Do not forget to reconnect the modem to the telephone line after ending that test.

If the above test, with the regular telephone was successful, then you must check if the **Comanche** main station computer can communicate with it's modem. To test this you can use a terminal program, for instance, the **Hyper Terminal program of Windows 98, 2000 or NT**. A terminal program allows you to enter both data and AT commands to your modem directly via computer keyboard and to see received data and modem messages on your computer screen. The use of the Hyper Terminal program is described as follows:

- End the **Comanche RMCS** Program.
- Reset the modem by switching it off and on.
- Select "**Start/Programs/Accessories/Hyper Terminal**" in the start menu of Windows. Next, the "**Accessories**" window will open.
- Double-click the folder icon named "**Hyper Terminal**" in the "**Accessories**" window, the "**Hyper Terminal**" window will open.
- Double-click the "**Hyper Terminal**" icon, the Hyper Terminal program will start.
- The Hyper Terminal program will ask you to enter a name for your terminal session. Enter any name, for example "**test**", and press "**OK**".
- Next the Hyper Terminal program will ask you to enter the telephone number that should be dialed by the modem. Since we only want to check the communication between modem and computer, it is irrelevant which number is entered.
- Now the Hyper Terminal is ready to accept any input.

Enter "**AT**" and press the return key. The modem will answer with "**OK**" if the communications are correctly established. If you do not receive this reply, communication between computer and modem is not functional. If this is the case then check, if

- the modem is connected correctly to the computer.
- the modem is correctly installed under Windows 98, 2000 or NT.

Restart the **Hyper Terminal program** and try the above procedure again. If the modem accepts the "**AT**" input, then try the complete **AT command line** that is entered at "**Initialization Sequence**" in the modem configuration box of the **Comanche RMCS** software, an example would be:

AT &F &S0 &C1 &D2 E0 V1

If the modem answers with "**ERROR**" it does not understand one or more of the AT commands. Try the single commands one by one (do not forget to put "**AT**" before every single command) and check which command or commands are answered with "**ERROR**". See your modem manual for alternative commands that have the same effect as the ones which were rejected, using them repeat the above.

When using a terminal program, you will note that some AT commands produce visual and sound effects that are channeled to the output on your computer screen and to the modem's speaker. Here are some examples:

- AT E0** switches echo off. Depending of the settings of your terminal program you may not see on screen what you enter on your keyboard.
- AT E1** switches echo on. Depending of the settings of your terminal program you may see your keyboard inputs twice on screen.
- AT V0** displays modem messages as number codes.
- AT V1** displays modem messages in readable text format.
- AT M0** turns off the modem's built-in speaker.
- AT M1** turns on speaker until carrier detected.
- AT M2** the modem's speaker is always on.
- AT L0-3** adjusts the speaker's volume control: **AT L0** low volume, **AT L3** high volume.

To dial out from the terminal program you have to enter the appropriate dial sequence (see chapter "Dial sequence") followed by the number you want to dial.

If dialing was successful, the modem will answer "**CONNECT n**" where **n** is the baud rate (for example, **CONNECT 1200**) and will automatically switch to the data state. To switch back to command state, you have to input the escape sequence "**+++**". To end a call, enter "**ATH**" in command state. See your modem manual for further AT commands.

When you have determined an appropriate **AT command line** for initialization, end the terminal program and start the **Comanche RMCS software**. Open the **modem configuration box** and enter the new **AT command line** at the "**Initialization Sequence**".

If the modem still does not work properly, check to see if you have the correct settings in the modem configuration box.

- Check if you have entered the correct AT command lines for dialing at the "**Dial**" section.
- Try to use another baud rate - section "**Default Baud-Rate**".
- If the modem does not answer incoming calls, check to see if you have selected "**accept**" at the "**Calls**" section.
- If the modem does not dial out, check if you have selected any services at the "**Job**" section and check if you have entered the correct telephone number of the remote site.

If you have any further questions, see your modem and computer manuals for hardware-specific information or give us a call and discuss with one of our communication engineers. We would like to hear from you anyway just to discuss how your **Comanche RMCS system** is being applied.

For **CUSTOMER SERVICE & TECHNICAL SUPPORT** please call the numbers listed below. There is always a real person that will answers the telephone. You will never get an automated computer voice or a recording that tells you to wait or punch this number if you want this, or punch that number if you want that. **A real live person will immediately be at your service!**



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