



Networking your vision

Cohu 9900 Series

**IP Video Network Appliances
for Surveillance Management**

--- USER MANUAL ---



REVISION HISTORY

Item	Date	Description	Page	New Revision
1	28/10/ 04	First Release		
2	17/04/ 06	Second release		



COHU 9900 SERIES OVERVIEW

INTEGRATED SURVEILLANCE SYSTEMS

The Cohu 9900 Series is a remote intelligent monitoring and surveillance building block used for implementing broad surveillance solutions, including transportation, industrial process control and security applications. The Cohu 9900 Series utilizes advanced computer networking technology to integrate information from multimedia devices (audio, visual and digital data) in order to provide the user with a reliable, flexible and interactive monitoring system.

The Cohu 9900 Series introduces enhanced capabilities embedded in the product design, which consider the needs of today and the future markets.

Cohu 9900 Series enables digital transmission, switching, and control of remote multimedia surveillance devices spread over large geographical areas. Compressed audio and video information and other digital data are captured by remote sensors and transmitted to the Cohu 9900 Series unit where they are processed. The data is then packaged by the TCP/IP protocol and transmitted over a standard high-speed computer communication network to the control center.

The challenge facing any monitoring and surveillance system design today is to build a concept for tomorrow. Systems installed today are often outdated by the time their implementation has been completed. The key objective is to build an open system that is never closed to future options, and which facilitates expansion of capacity and function in an efficient and flexible manner. Cohu 9900 Series provides the solution.

Cohu 9900 Series is designed and manufactured by Cohu. Based on open system architecture, the Cohu Solution brings together the considerable progress made to date with information networking technology and the sophisticated requirements of current monitoring systems. The Cohu 9900 System integrates, manages, and controls all components of the monitoring system, including cameras, audio devices, monitors, alarms, sensors, and controllers.

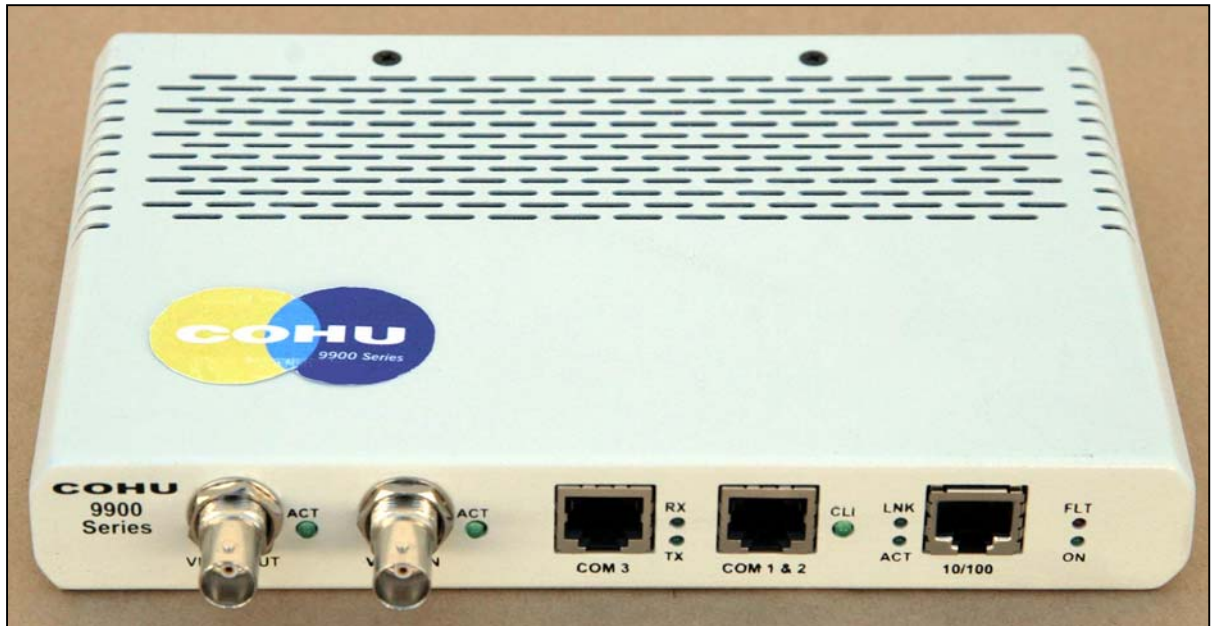


Figure 1: 9900 Series Codec (Front Panel View)

CHAPTER 1

9900 SERIES SYSTEM DESCRIPTION

The Cohu 9900 series is a new family of video codecs, designed to provide high quality delivery of video, audio and other electronic data using TCP/IP networks.

The flagship member of the family, The Cohu 9905 series encoder/decoder, features full motion video at different resolutions (PAL/NTSC), supports state-of-the-art compression standards, and uses a low-cost, compact design, while maintaining the high-end system qualities that are found in all Cohu products. The Cohu 9900 Series also features unique capabilities for low-end applications, such as non-managed point-to-point automatic link recognition and setup, eliminating the need for costly management applications. This allows end users to tailor the solution to their exact needs and budget.

Cohu 9900 Series offers up to 1, and optionally 2, video camera inputs, a bi-directional audio port, RS232, RS485/422 and Discrete I/O connections, all using a box the size of a VHS cassette. It facilitates connecting access control devices, intercoms, Audio Public Address Systems, and PTZ (Pan, Tilt, and Zoom) for video cameras. This highly integrated solution performs as a zone concentrator for numerous video, audio and data devices, thus eliminating the need for multiple hardware platforms for different protocols, and significantly reducing the overall cost of the installation.

The Cohu platform is generic, meaning that in addition to the MPEG-4 & MPEG-2 compression standard supported today, it will be capable of supporting in the future new compression standards, just by downloading a new s/w version. The product can also perform as a compressing or a decompressing unit, saving cost in logistics of customers and end users.

Small point-to-point applications are easily monitored and controlled by the Cohu Configurator application. For medium to large applications, Cohu 9900 Series is fully managed by the 9990 Series Software Management Suite, enabling unified monitoring and control of large installations from a single or multiple management locations.



Cohu 9900 Series is a wide-range solution that can be used by low, medium and large-sized applications. It supports different video stream bandwidths according to the various compression types. This capability is achieved by the use of new, state-of-the-art MPEG-4 and MPEG-2 compression standards.

Cohu 9900 Series allows significant bandwidth savings by optimizing the UDP and IP packets. It also supports IP Multicast. End users can determine the video quality and bandwidth budget simply by defining a configuration parameter during the set up of the unit. As bandwidth becomes more available, the end user can improve the video parameters by means of a simple update of the unit's configuration parameters. In this way the Cohu 9900 Series solution "grows" with the customer budget, greatly reducing the total life cost of installation.

With unique Cohu transmit protocol (MPEG-4 only) over the low bandwidth networks, Cohu 9900 Series units are connecting easily to IP Public Network via the ADSL or Cellular interfaces. Remote sites, stores, homes, office buildings, factories can all be connected over the IP Public Network to one or more control centers for on line surveillance features the most advanced requirements. The basic idea is to give the control center access to any site connected to an ADSL/Cellular NAT/GRE Routers (only one 9900 can be connected to the NAT router at a remote site) and the IP Public Network. The 9900 units at the site are connected to the ADSL/Cellular NAT/GRE Routers and through the Router to the Public Network.

The information at the remote sites is transmitted over the IP Public Network, to the control center is available for bandwidth that runs from 96kbps up to 256kbps for ADSL network (depending on the request from the ISP) or 20kb/s up to 40kbs (depending on the cellular networks CDMA, GPRS or MIRS) for cellular networks.

Integrated Cohu 9900 Series build in VMD (Video Motion Detector) feature allowed the user to protect the interior zone from external intrusions and immediately to alert the Control Center if the system is detected the intrusion conditions. User can define the region of the protected zone, VMD direction, VMD sensitivity, number of active frames before VMD event, number of silent frames after VMD event and the event string contents on the user desktop monitor.

CONFIGURATION – DESCRIPTION OF SYSTEM COMPONENTS



The Cohu 9900 Series solution to remote intelligent surveillance, is based on open system architecture. The basic configuration, as seen in Figure 1, contains the following components:

- End units – two total: One Cohu 9900 Series working as a Camera Side unit (compression unit), located on the remote side and the other, a Cohu 9900 Series working as a Monitor Side (decompression unit), located on the monitor side, usually in the control room.
- Software components
 - Cohu Configurator Application
 - 9991-0900 GUI Console Application
 - 9991-0400 Viewer Application
 - Cohu API (SDK)
 - 9950 NVR Networked Recording System.

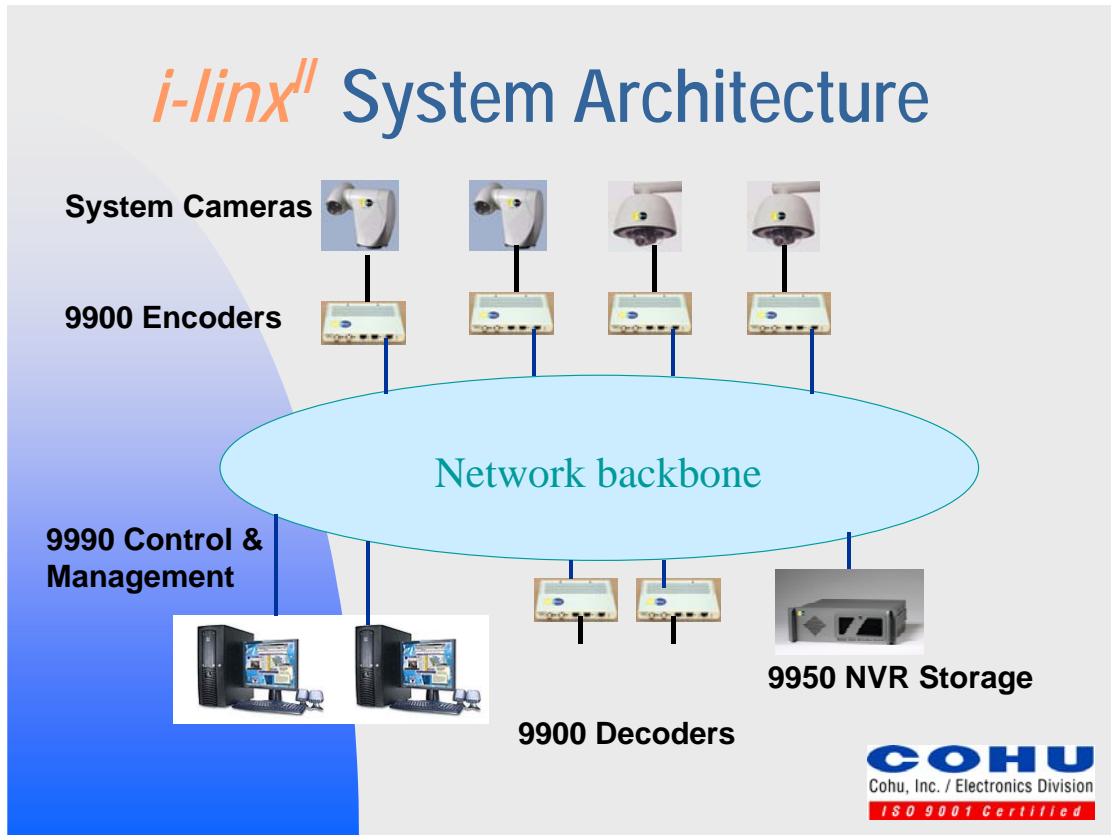


Figure 1-1: Cohu I-Linx^{II} System Architecture



FEATURES

- The 9900 System supports an M x N Virtual Matrix architecture, which enables logical switching of M distributed sources and N destinations of video, audio and data over IP.
- Remote bandwidth control.
- Multicast Video capability – the same camera can be viewed on several monitors, over the network.
- Advanced compression of video (MPEG 2/4) and audio (G711/G729A) executed by dedicated hardware providing real time, full motion – high video quality (PAL/NTSC).
- Audio and Video synchronization for video conference applications.
- On-line adjustment of video compression parameters enables the fitting of specific resolution and motion requirements of the application.
- Video monitoring on desktop, using the 9991-0900 GUI Console or the 9991-0400 Viewer Application.
- Direct attachment integrating multiple video, audio and data monitoring devices.
- Bi-directional audio connections for intercom or other audio monitoring features.
- Audio broadcast for public address systems.
- Support for up to two RS-232, and one RS-485/422 interfaces.
- Support for up to two Dry-contact Discrete Inputs and two Opto-isolated Discrete Outputs.
- Automatic link setup without the need for a management system (Point-to-Point).
- Dual NAT connectivity for point-to-point configurations.
- Unique Transmit algorithm for low bandwidth networks (ADSL, Cellular).
- Build-in VMD feature for indoor applications.



- Extensive OSD (On Screen Display) support up to 31 ASCII characters, bit-map files, dynamic time and date display and event string display in any location on the screen.
- Transparent Serial Channel between Camera and Monitor sides, enabling easy integration with 3rd party devices.
- Low-cost latency support of a critical mission application, requiring precise PTZ control (less than 200ms).
- Continuous or per events video recording over the TCP/IP networks.

CHAPTER 2

COHU 9900 SERIES: END UNITS

GENERAL DESCRIPTION

Cohu 9900 Series enables conversion of analog data from its original form, to a digital packet on one side of a network, back to its original analog form on the other side. Cohu 9900 Series handles input composite video signals, output video signal, audio signals for intercom, serial output data for the camera pan, tilt, zoom, washer, wiper and heater control, and other discrete input/output data.

Cohu 9900 Series provides the physical connection to the network and remote site surveillance devices. The information is packaged using the UDP/IP protocol and routed to the Control Center via the standard data communications network.

Cohu 9900 Series can be attached directly to high-speed standard data communications networks, using the Ethernet or Fast Ethernet connections (10/100Base-TX). It can also be attached to low-speed data networks, such as the telephone network, ISDN, ADSL and Cellular modems, via the appropriate external LAN router.

Cohu 9900 Series Camera side unit is usually located at a remote site. It serves as a zone concentrator for the various devices required for the monitoring and control. The unit enables communication sessions between remote surveillance devices, the control room, and remote surveillance devices attached to different units. Each medium (video, audio, sensors) maintains a separate independent session. In this way the video from unit A may be delivered to unit B, and concurrently the audio of unit A may be delivered to unit C. The Cohu 9900 Series monitor side unit is usually located in the control room and enables the viewing of the video pictures taken by the remote cameras on analog monitors.

COHU 9900 SERIES – FRONT PANEL



Figure 2-1: Front Panel

DESCRIPTION

The front panel of the Cohu 9900 Series contains:

- Video Channel (Video In or Video Out)
- Com 1 & 2 Serial Data Channels
- Com 3 Serial Trunk Channel
- 10/100 Network Port
- System LED Indicators

VIDEO CHANNEL

VIDEO IN - Cohu 9900 Series Camera Side unit



The **VIDEO IN** channel consists of one composite video input that facilitate the attachment from a video source - camera or analog video matrix - to the Cohu 9900 Series Camera Side unit.

The video input connector has its own LED. The LED, which is lit, indicates the video source selected by the user.

VIDEO OUT - Cohu 9900 Series Monitor Side unit



Figure 2-3: Video Out Connector

The **VIDEO OUT** channel has a single composite video output connector. An analog monitor can be connected to this connector, enabling viewing of video pictures taken by the remote cameras.

The video output connector has its own LED. The LED, when lit, indicates the video destination selected by the user.

SERIAL DATA CHANNEL



Figure 2-4: RS485/232 Connector

Devices that transfer data, such as PTZ control for video camera, computers, VMS (Variable Message Sign) boards and other industrial control systems, can be connected to **RS232** (COM 1) and **RS485/422** (COM 2).

The unit supports RS422 Half and Full Duplex communication. Any of the serial ports can be configured as a Console Port (CLI) for unit configuration and status purposes. The Console Port (CLI) is defaulted to RS232 (COM 3) port.

CONSOLE LED

Console LED located next to the COM 1 & 2 (RJ-45) indicates that any of the serial ports are chosen to be a Console Port.



Figure 2-5: CLI LED

COM 3 SERIAL CHANNEL - NETWORK CONNECTOR (RJ-45)



Figure 2-6: SER LNK Connector

The **COM 3 Serial Channel** can be used for standard RS232 communication with all external modem control signals.

Devices that transfer data, such as PTZ control for video camera, computers, VMS (Variable Message Sign) boards and other industrial control systems, can be connected to COM 3 (RS232 Full Support)

COM3 as well as COM 1 and 2 can be configured as a Console Port for unit configuration and status purposes.

TX LED

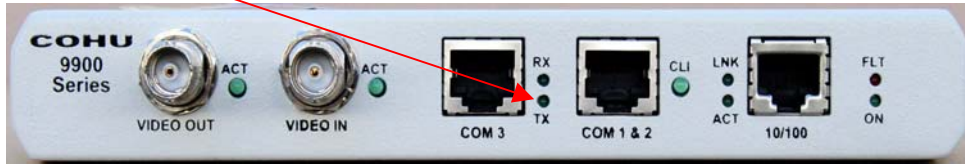


Figure 2-7: SER LNK TX LED

The **TX LED** indicates “Transmit” activities over the serial trunk network.

RX LED

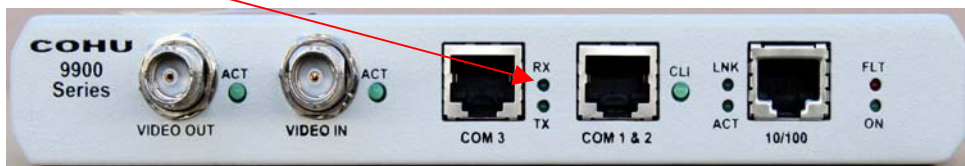


Figure 2-8: SER LNK RX LED

The **RX LED** indicates “Receive” activities over the serial trunk network.

NETWORK PORT

LAN - Network Connector



Figure 2-9: 10/100 Connector

This enables a Cohu 9900 Series unit to be connected to an Ethernet/Fast Ethernet standard (10/100Base-TX) data communication network, complying with the IEEE 802.3U standard.

LNK LED



Figure 2-10: 10/100 LNK LED

The **LNK** LED is lit when a communication link signal is received in the Cohu 9900 Series unit. The lit LED indicates that a connection to the network has been established.

ACT LED

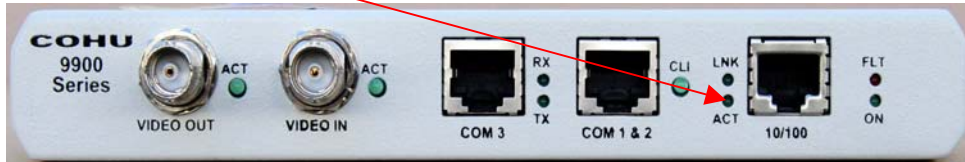


Figure 2-11: 10/100 ACT LED

The **ACT** LED indicates data activity over the network.

SYSTEM INDICATORS

ON – Power LED



Figure 2-12: ON (Power) LED

The **ON** LED is lit when the system is connected to a power supply and is switched on.

The **ON** LED will blink every 5 seconds, which indicates proper system operation.

FLT LED



Figure 2-13: FLT (System) LED

When the **FLT LED** is lit or blinking, it indicates one of the following problems:

- The system failed to initialize the operation software in Application mode.
- The Cohu 9900 Series unit began the reset cycle.

COHU 9900 SERIES – REAR PANEL



Figure 2-14: Rear Panel

DESCRIPTION

The rear panel of the Cohu 9900 Series contains:

- Audio Channel
- Power Connector
- DIO (Discrete Input/Output) Channel

AUDIO CHANNEL



Figure 2-15: Audio Connectors

The audio channel is designed for stereo capabilities and is used to connect an intercom (bi-directional channel) or a microphone and speaker connection (two uni-directional channels) or a public address system (uni-directional channel from one point to multiple points). The **AUDIO OUT** connectors are used to connect a speaker to the unit and the **AUDIO IN** connector is used to connect a microphone to the unit.

Installation of a public address system in the audio channel requires the attachment of a microphone on the Cohu 9900 Series Monitor Side unit (control side) and speakers on the Cohu 9900 Series Camera Side unit on the remote side.

POWER - DC CONNECTOR



Figure 2-16: Power Connector

The **POWER DC** connector is used to connect the desktop power supply cable of 5V to the Cohu 9900 Series unit.

DIO (DISCRETE INPUT/OUTPUT) CHANNELS



Figure 2-17: DIO Connectors

DIO devices, such as sensors (temperature, light etc.), automatic gate opening controls and alarms can be connected to a Discrete Input/Output (DIO) block terminal.

The DIO block terminal has two dry-contact input and two opto-isolated output ports. The negative terminal of the DO should be connected to one end of the relay coil (coil input end), while the second end of the relay is connected directly to the external power supply GND output.

The positive terminal of the DO should be connected to the external positive power supply output. The ON/OFF switch can be directly connected between (+) and (–) terminals of the Discrete Inputs. For more details about DIO connection, please reference to Appendix C.

CHAPTER 3

COHU 9900 SERIES: SPECIFICATION AND FEATURES

Video Interface	
Coding Algorithm	MPEG-4 or MPEG-2
Bit Rate: 9905-2xxx	10Kb/s – 2Mb/s *
9905-4xxx, 9905-8xxx	10Kb/s – 4Mb/s *
Formats	PAL or NTSC *
Resolution: 9905-2xxx	2CIF, CIF, QCIF *
9905-4xxx, 9905-8xxx	4CIF, 2CIF, CIF, QCIF *
Frame Rate	Up to full frame rate *
Input: Form	Composite
Impedance	75Ω
Level	TV Standard
Output Form	Composite
Impedance	75Ω
Level	TV Standard
Connector	BNC
Cable Length	Max. 100 m (RG59), 600m (RG11)

* Dynamic selection using the supplied Cohu Configurator application



Network Interface	
IEEE 802.3/802.3U	
10/100Base-TX (with Auto-Negotiation)	RJ-45
Cable Type	CAT5 UTP
Cable Length	Max. 100 m.
Audio Interface	
Coding Algorithm	G.711, G.729A
Bit Rate	64kbps / 8kbps
Inputs	RCA headphone jack
Voltage:	160mV RMS MAX
Input Gain:	Software adjustable in: 1dB steps from -30dB to +30dB
Impedance:	10kOhm, AC coupled
S/N ratio:	> 90dB @ full scale
Output	RCA headphone jack
Full scale voltage output:	1V RMS
Output Gain:	Software adjustable in: 1dB steps from -30dB to +30dB
Minimum Load:	16Ω
S/N Ratio:	>90Db @ for full scale output



Serial Interface	
RS-232 & RS-485 (COM1 & COM2)	RJ-45
Serial Trunk Interface (optional)	
RS-232 (COM 3 Full Control),	RJ-45
Discrete Interface Inputs	
2 Dry Contact Ports	
Discrete Interface Outputs	Opto-Isolated
Outputs:	Voltaç Max 24VDC
Max Output Current	Max 90 mA
Max Absolute Current	Max 100 mA
Physical Dimensions	
Size (WxHxD)	19.5x2.8x14 cm (7.67"x1.1"x5.51")
Weight	0.5 kgs
Power Supply Mains Connection	
Voltage Full Auto Range (+/- 10%)	100-220 VAC +/- 10%
Frequency	47 - 63Hz
Power Consumption: 9905-2xxx	7W Typical
9905-4xxx	9W Typical
Environmental Conditions	
Operating Temperature (Indoor)	+0° to 50°C (41° to 122°F)
Extended Range Temperature (Indoor)	-34° to 74°C (30° to 165°F)
Storage Temperature	-34° to 74°C (-34° to 165°F)



Operating Humidity	5% to 95% (Non-Condensing)
Certifications	
Safety	UL Listed
	CE MARK
Electromagnetic Interference (EMC)	FCC 47 CFR part 15 subpart B, Class A
	CE, Class A

CONNECTORS MAPPING TABLE

10/100 NETWORK RJ-45 CONNECTOR

Pin Number	Signal Name
1	TD+
2	TD-
3	RD+
4	Not Used
5	Not Used
6	RD-
7	Not Used
8	Not Used

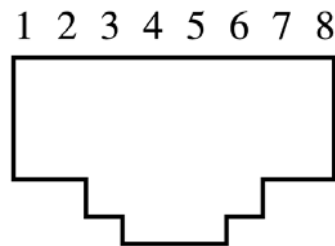


Figure 3-1: RJ-45 Connectors – Pins Order

SERIAL RS232 (COM 1) & RS422 (COM 2) RJ-45 CONNECTOR

Pin Number	RS232 (COM1)	Description	RS485 (COM2)	Description
1		Not Used	RX+	Differential Data (Half Duplex optional, TRX+)
2		Not Used	RX-	Differential Data (Half Duplex optional, TRX-)
3	GND	Signal Ground	GND	Signal Ground
4	TxD	Transmit Data		Not Used
5	RxD	Receive Data		Not Used
6		Not Used	GND	Signal Ground
7		Not Used	TX+	Differential Data
8		Not Used	TX-	Differential Data

RS485 JUMPER SETTING

The following table describes the jumper setting for RS485/RS422 full and half duplex configuration as well as RS485/RS422 termination setup (see table 3-1).

In order to change the jumpers, follow the steps below:

1. Remove power from the unit.
2. Remove all attached cables to the unit.
3. Remove cover.
4. The jumpers are located between the RS232/485 port and 10/100 port.
5. Change jumpers according to the Table 3-1.

DUPLEX	RS232/485 RJ45 PINS ORDER	JUMPER	NOTES
RS485 HALF DUPLEX	1 – RS485 TRX+	J9, J11, J12, J13 ARE CLOSED. J10 IS OPEN	J9 IS OPEN IF TERMINATION ISN'T REQUIRED
	2 – RS485 TRX-		
	3 – GND		
	4 – RS232 TX		
	5 – RS232 RX		
	6 – GND		
	7 – RS485 TX+		NOT USED
	8 – RS485 TX-		NOT USED
RS485 FULL DUPLEX	1 – RS485 RX+	J11, J12, J13 ARE OPEN. J9 & J10 ARE CLOSED	J9 & J10 ARE OPEN IF TERMINATION ISN'T REQUIRED
	2 – RS485 RX-		
	3 – GND		
	4 – RS232 TX		
	5 – RS232 RX		
	6 – GND		
	7 – RS485 TX+		
	8 – RS485 TX-		

Table 3-1: RS485 Jumper Setting

SERIAL TRUNK RJ-45 CONNECTOR (COM 3)

Pin Number	Signal Name (for RS232 only)	Description
1	RTS	Request to Send
2	DTR	Data Terminal Ready
3	GND	Signal Ground
4	TxD	Transmit Data
5	RxD	Receive Data
6	DCD	Data Carrier Detect
7	DSR	Data Set Ready
8	CTS	Clear to Send

ALARM INPUT BLOCK TERMINAL

Pin Number	Signal Name
1	IN 1+
2	IN 1-
3	IN 2+
4	IN 2-

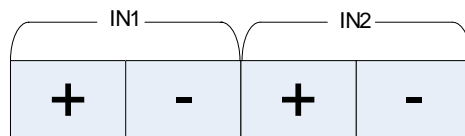


Figure 3-2: DIO Input Connector – Pins Order

RELEAY OUTPUT BLOCK TERMINAL

Pin Number	Signal Name
1	OUT 1+
2	OUT 1-
3	OUT 2+
4	OUT 2-

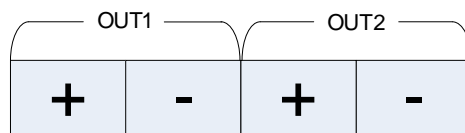


Figure 3-2: DIO Output Connector – Pins Order

POWER MINI DIN CONNECTOR

Pin Number	Signal Name
1	GND (+5V Return Pass)
2	+5V IN
3	GND (+5V Return Pass)
4	+5V IN
5	GND (+5V Return Pass)
6	+5V IN

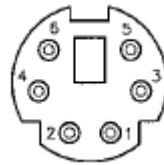


Figure 3-3: Power Connector – Pins Order

CHAPTER 4

9900 SERIES: INSTALLATION AND CONFIGURATION

INSTALLATION REQUIREMENTS

Cohu 9900 Series units should be installed indoors, in a dry and clean environment. The location should allow easy access to the cable channels or ducts. Do not install the Cohu 9900 Series where it may be subjected to extreme vibrations, dust, or fumes, which may damage the unit.

NOTE: Pay attention to operating environment requirements as defined in the Specifications section.

Check that the unit supplied includes the following:

- Cohu 9900 Series unit
- Desktop Power Supply with AC power cord
- RS232 D9 to RJ45 Configuration Cable. (One cable per 5 9900 units is supplied)
- CD containing Cohu 9900 Series Documentations, Configurator Application and update unit firmware.
- Mating terminal block for DIO attachment.

When installing the Cohu 9900 Series unit, leave enough space at the front and back of the unit to allow free air circulation. Clearance of at least 1 ft. (approx. 33 cm) should be provided behind the unit to allow for easy access of cables.

CONSOLE (CLI) SETTING

Various configuration and system parameter setting can be done via Console (CLI) commands using Microsoft Hyper Terminal Application or Telnet.

HYPER TERMINAL SETTING

Connecting a computer with a built-in Hyper Terminal Application to the Cohu 9900 Series unit performs the definition of the various setup values.

Turn-on the computer and define the Hyper Terminal application COM port setting values as follows (see Fig 4-1):

- Bits per second – 38400
- Data bit – None
- Stop bits – 1
- Flow control – None

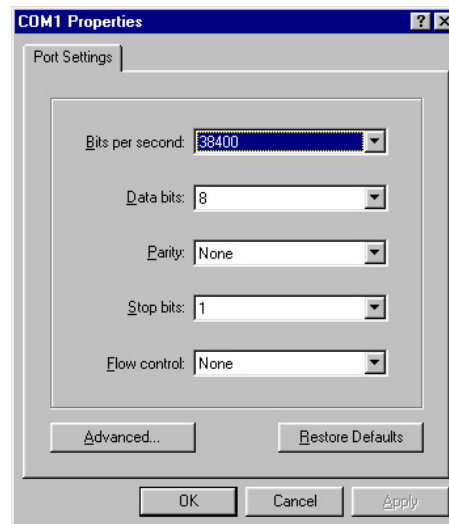


Figure 4-1: Hyper Terminal Application COM Port setting Values

CONSOLE (CLI) SETTING

Connect the computer to the Cohu 9900 Series unit via the units COM 3 (RS232 port), using the RS232 D9 to RJ45 cable supplied with the unit.

When the computer has been connected to the Cohu 9900 Series unit and the Hyper Terminal application is active, reboot the Cohu 9900 Series unit (disconnect the power cable from the power source and then reconnect it or press the reset button).

During the reboot process, press the space bar (see figure 4-2) in order to get “[VxWorks Boot]:” prompt (see figure 4-3).

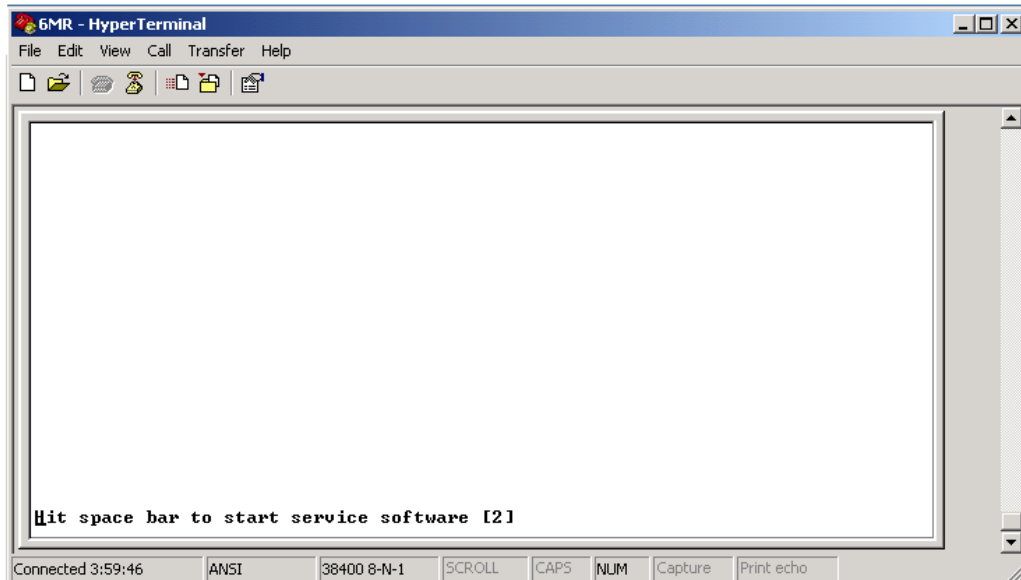
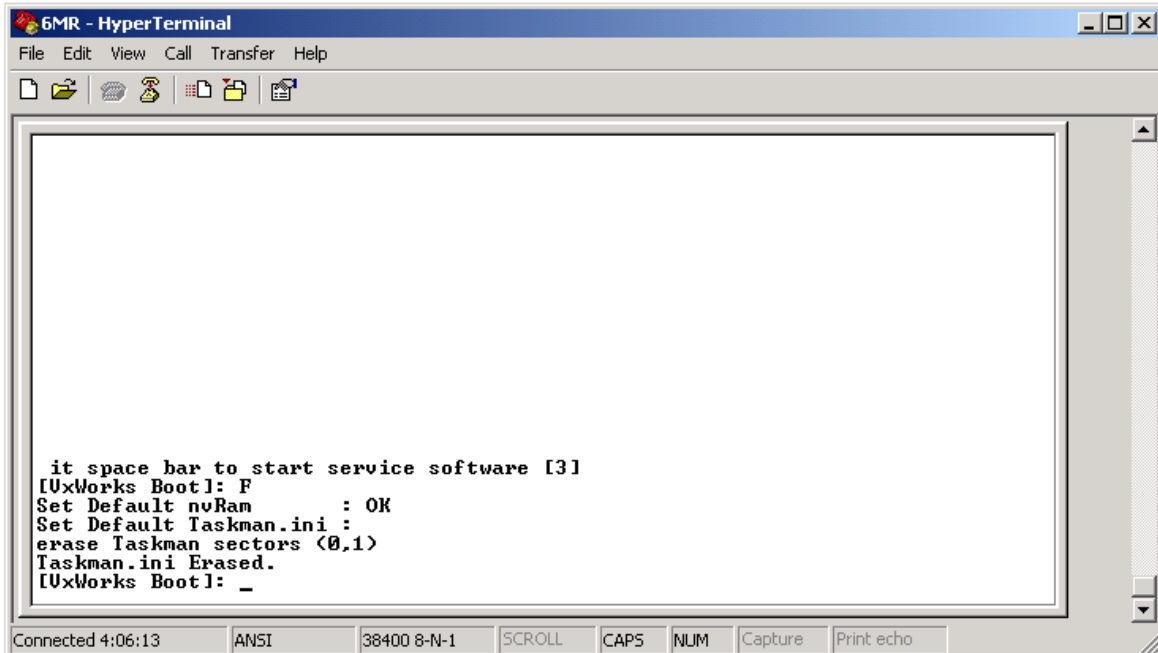


Figure 4-2

Load Factory Default Configuration to NVRAM

Type an upper case 'F' and press Enter. The system will update NVRAM with default parameters (see figure 4-3).

NOTE: The IP address will set to default: 192.200.10.20



```
it space bar to start service software [3]
[UxWorks Boot]: F
Set Default nvRam : OK
Set Default Taskman.ini :
erase Taskman sectors (0,1)
Taskman.ini Erased.
[UxWorks Boot]: _
```

Figure 4-3

Communication Parameters Setting

1. Type a lower case 'c' and press Enter. Each time you press Enter button, you will get another parameter line.
2. Press Enter until you get the "inet on ethernet <e>' : " line. The factory default IP address is **192.200.10.20**. Type your IP address and press Enter. This will change the factory default IP address to the address you entered.
3. Press Enter until you get the "gateway inet <g>' : " line. The factory default will be blank. If a unit should receive/transmit data via the router, type in "gateway inet" line the router IP address. If not, leave this field empty.

4. Type Enter until you will get "other <O> :." line.
5. Wait until "[VxWorks Boot]:" prompt will appear after a few seconds (see Figure 4-4).

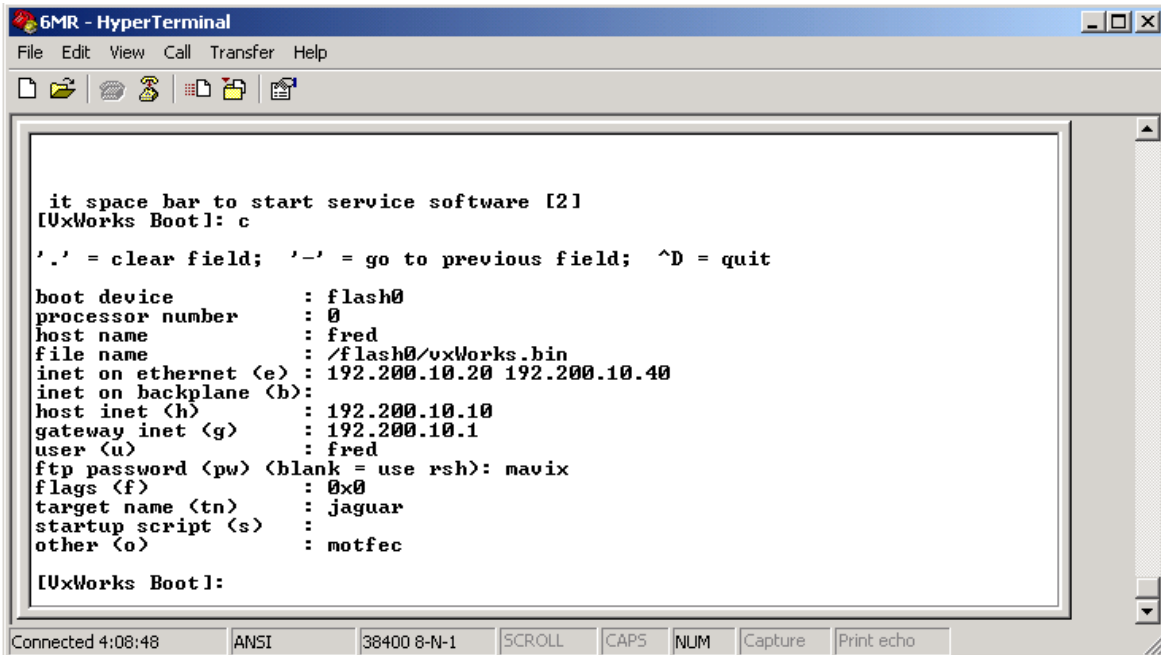


Figure 4-4

Flags Parameters

Boot flags (f) parameters defined as following (See Figure 4-4):

Flags	Descriptions
0x0	Default
0x01	Don't start SMMG
0x02	Load local system symbols
0x04	Don't autoboot
0x08	Quick autoboot (no countdown)
0x20	Disable login security
0x40	Use bootp to get boot parameters
0x80	Use ftp to get boot image
0x100	Use proxy arp
0x1000	Flash erase
0x2000	Reduce Max Idle characters on COM1 (from 12 bytes to 2 bytes)
0x4000	Reduce Max Idle characters on COM2 (from 12 bytes to 2 bytes)
0x8000	Reduce Max Idle characters on COM3 (from 12 bytes to 2 bytes)

Real Time Clock (RTC) Setting

1. In order to setup the date and time, type upper case 'T' key.
2. Update date and time parameters until you get the "[VxWorks Boot]:" prompt (see figure 4-5).

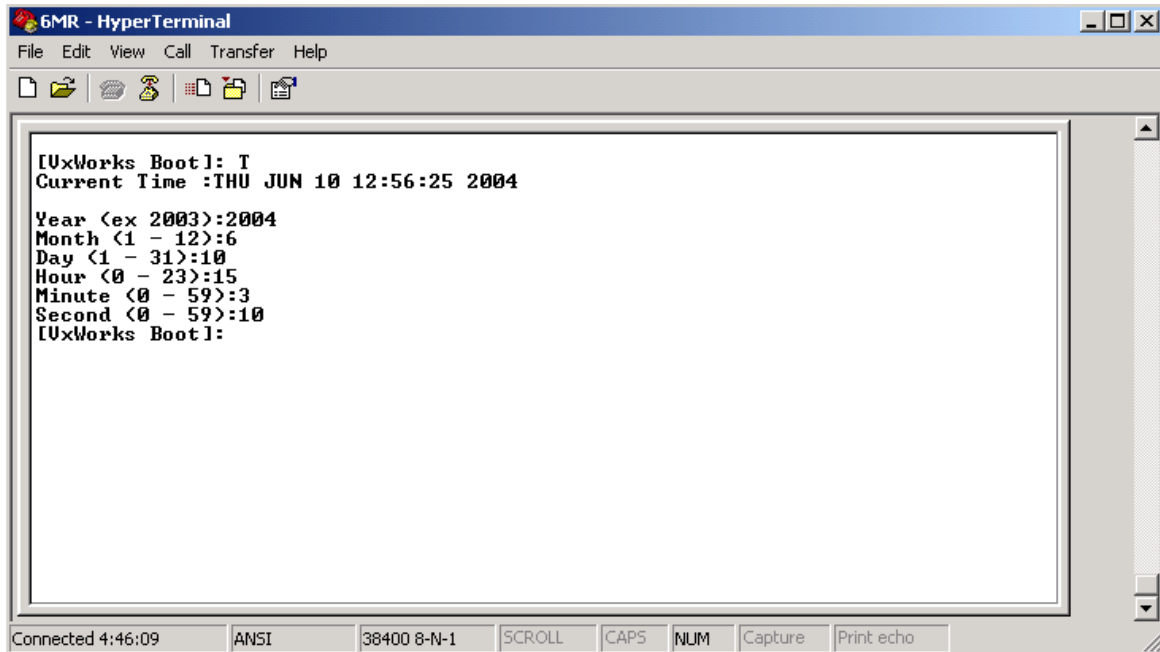
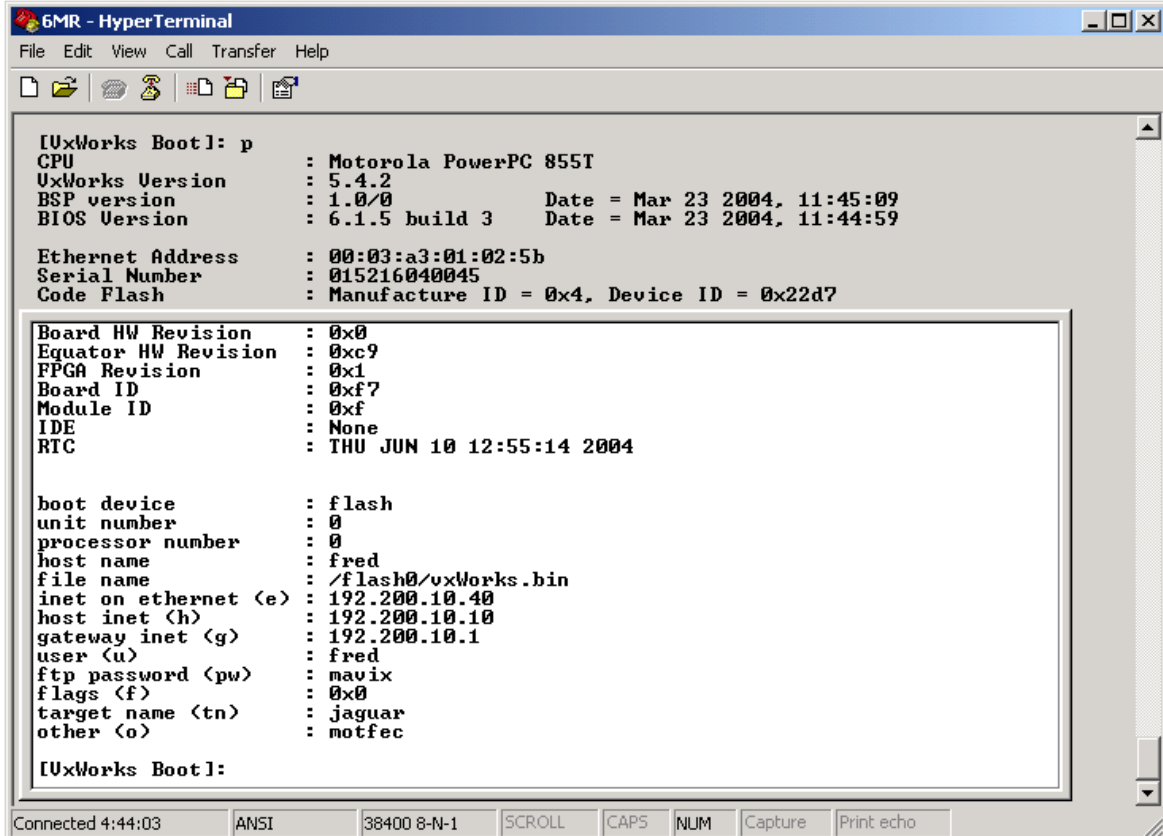


Figure 4-5

Boot Parameters Setup Display

In order to display the Boot parameters setup, type a lower case 'p'. The following parameters will display (see Figure 4-6):



```
[UxWorks Boot]: p
CPU : Motorola PowerPC 855T
UxWorks Version : 5.4.2
BSP version : 1.0/0 Date = Mar 23 2004. 11:45:09
BIOS Version : 6.1.5 build 3 Date = Mar 23 2004. 11:44:59

Ethernet Address : 00:03:a3:01:02:5b
Serial Number : 015216040045
Code Flash : Manufacture ID = 0x4, Device ID = 0x22d7

Board HW Revision : 0x0
Equator HW Revision : 0xc9
FPGA Revision : 0x1
Board ID : 0xf7
Module ID : 0xf
IDE : None
RTC : THU JUN 10 12:55:14 2004

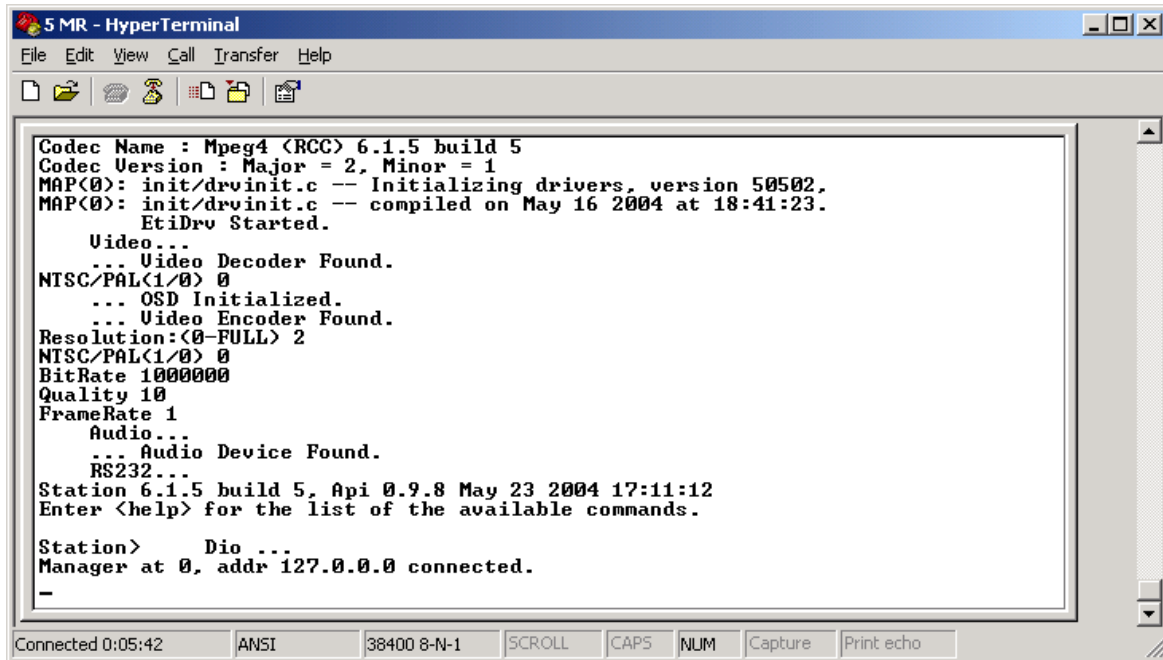
boot device : flash
unit number : 0
processor number : 0
host name : fred
file name : /flash0/vxWorks.bin
inet on ethernet (e) : 192.200.10.40
host inet (h) : 192.200.10.10
gateway inet (g) : 192.200.10.1
user (u) : fred
ftp password (pw) : mavix
flags (f) : 0x0
target name (tn) : jaguar
other (o) : notfec

[UxWorks Boot]:
```

Figure 4-6

Reset from CLI

Press 'CTRL " "x" keys simultaneously. The unit will reset and boot up to application mode. Wait until you will get the "Manager at 0, addr 127.0.0.0 connected" message (see Figure 4-7).



```
5 MR - HyperTerminal
File Edit View Call Transfer Help

Codec Name : Mpeg4 <RCC> 6.1.5 build 5
Codec Version : Major = 2, Minor = 1
MAP<0>: init/drvinit.c -- Initializing drivers, version 50502,
MAP<0>: init/drvinit.c -- compiled on May 16 2004 at 18:41:23.
Etdrv Started.
Video...
... Video Decoder Found.
NTSC/PAL<1/0> 0
... OSD Initialized.
... Video Encoder Found.
Resolution:<0-FULL> 2
NTSC/PAL<1/0> 0
BitRate 1000000
Quality 10
FrameRate 1
Audio...
... Audio Device Found.
RS232...
Station 6.1.5 build 5, Api 0.9.8 May 23 2004 17:11:12
Enter <help> for the list of the available commands.

Station> Dio ...
Manager at 0, addr 127.0.0.0 connected.
-
```

Connected 0:05:42 ANSI 38400 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 4-7

POWER CONNECTION

Connect the desktop power supply (supplied with the unit) to the Cohu 9900 Series unit, using the POWER connector. Connect the other cable to an AC power source.

Verify that the **ON** LED (located on the front panel) is lit and that after several seconds the **FLT** LED goes out.

CONNECTION TO NETWORK

Connect one end of the communication cable (CAT5 direct cable) to the **10/100** connector on the front panel of the Cohu 9900 Series unit. Connect the other end of the communication cable to your local Ethernet network (SWITCH). Verify that the **LNK** LED is lit.

NOTE: Make sure that the communication cables are wiring according to Ethernet Cable Color Coding Standard T-568A & T-568B.

CONFIGURATION SETTINGS

Before the various devices have been attached to the Cohu 9900 Series unit, it is necessary to define all the initialization and setup values required for the basic operation of the Cohu 9900 Series unit. The parameters to be defined include details of the Cohu 9900 Series unit and some network parameters. The default manufacturer settings can be changed in order to configure the Cohu 9900 Series unit according to the site requirements.

For network and configuration settings please use Cohu Configurator Application software. For more details on how to use and install Configurator software, please reference to Chapter 5 (Configurator).

NETWORK SETTING

The Configurator Application software is used to define the network parameters of the Cohu 9900 Series unit.

The following steps are required for setting the basic network parameters, such as an IP address, Network Mask and Default Gateway:

1. Connect PC with Configurator software and the 9900 unit to the network (Switch)
2. From the main window select 'Unit'/'Update Firmware' menu.



Figure 4-8

3. In 'Update Firmware' window the user must first make sure the unit is properly connected to the network and then enter its IP Address.

The factory IP address is 192.200.10.20.

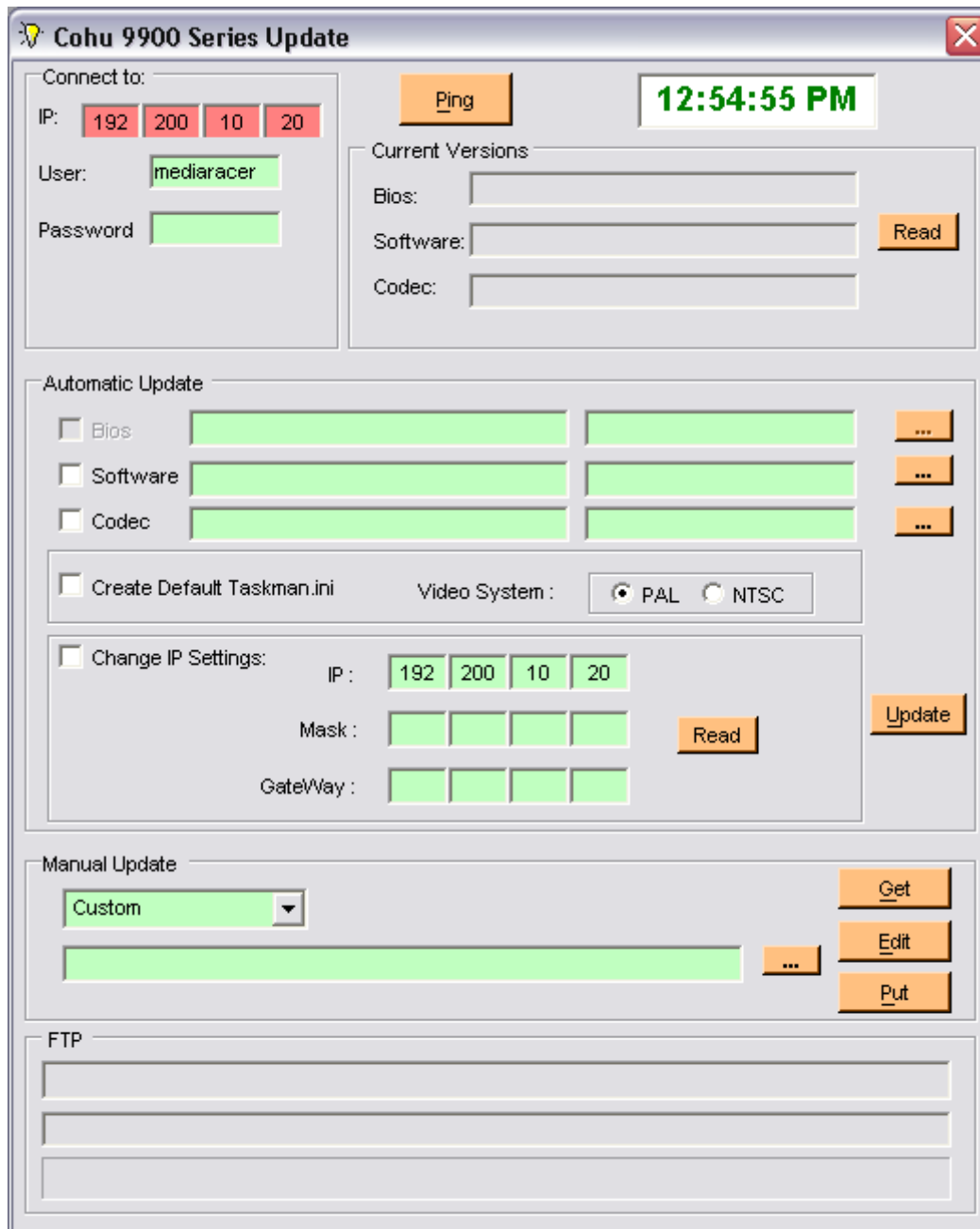


Figure 4-9

4. In order to retrieve Setup.txt file, select status.txt in the Parameters files section.
5. Press the GET button and wait for the data to download via the FTP protocol to the local disk, and then press the EDIT button to display the data in a text editor where you can modify communication parameters.

6. Edit network parameters IP address, Subnet Mask and Default Gateway (if required), and finally Save and Exit the file. For more details about 'status.txt' file, please reference Appendix B.
7. Press PUT to download your changes (status.txt file) back to the unit.
8. Wait for operation confirmation (see Figure 4-9).

SYSTEM CONFIGURATION SETTING & TESTING

The Configure & Test process of the system includes the setup of all required parameters for the system components, such as video parameters (resolution, brightness, contrast, etc), audio parameters (volume), recording parameters, serial port connection parameters and video stream parameters (frame rate, bit rate).

It also includes the parameters for adding connections between the different units (Camera to Monitor,

Microphone to Speaker, Transparent Serial and I/O connection)

The Configure & Test Process should be performed after completion of the System Building Process as described in Chapter 5 Configurator section, and after physically connecting the units to the network as well as connecting all relevant devices (for procedure details please reference to the 'Connecting Devices' section below).

For Configuration and test procedure please reference to the Chapter 5 Configurator section, 'Configure and Test' paragraph.



CONNECTING DEVICES

CONNECTING VIDEO SOURCES

One video source may be attached to the Cohu 9900 Series. In order to attach a video source, connect one end of a video coax RG59 or RG11 cable to the video output of the Camera.

Connect the other end of the cable to one of the **VIDEO IN** connector, located on the unit front panel. The lit LED indicates that the camera has been selected from the attached cameras using the management Application software (Configurator, 9991-0400 or 9991-0900).

NOTE: Pay attention to the maximum coax cable length as defined in the Specifications section.

CONNECTING THE MONITOR

The monitor connection is usually made in the control room. It enables the viewing of video pictures taken by the remote camera. In order to attach an analog monitor to the Cohu 9900 Series model, connect one end of a video coax RG59 or RG11 cable to the video inputs of the monitor and the other end to the VIDEO OUT connector located on the front panel of the 9900 unit. The lit LED indicates the monitor has been selected to the camera side unit using the management Application software (Configurator, 9991-0400 or 9991-0900).

CONNECTING AUDIO DEVICES

Connect a microphone to the AUDIO IN connector (located on the rear panel of the unit).

Connect a speaker to the AUDIO OUT connector (located on the rear panel of the unit).

NOTE: An intercom system may be used in place of a microphone and speaker.

CONNECTING DEVICES TO RS232 AND RS485/422 PORTS

Devices that transfer data, such as computers, VMS boards, camera control and other industrial control systems can be connected to the **COM 1** or **COM 2** ports. Connect the data device to the Cohu 9900 Series unit via the COM ports, according to the connectors mapping table.

CONNECTING DISCRETE INPUT/OUTPUT (DIO) DEVICES

Alarm devices, such as sensors (temperature, light etc.), automatic gate opening controls and alarms can be connected to a Discrete Input/Output (DIO) connector. The DIO connector has two dry-contact input and two opto-isolated output ports.

1. Connect the alarm device to the Cohu 9900 Series unit via the alarm or relay connector, as specified in the Specification section and according to the connector mapping table.
2. For more details how to connect alarm devices, please reference to APPENDIX C, ALARM (Discrete I/O) Application Note.

ADVANCED CONFIGURATION

Definition of advanced configuration settings can be carried out using the Configurator Update Firmware window. The Update Firmware window enables loading and editing of the unit's configuration files (status.txt & taskman.ini files).

The advanced configuration file, taskman.ini, is part of the Cohu 9900 Series application software. The file contains all the initialization and setup values required for the Cohu 9900 Series unit operation. The manufacturer default settings in the file can be changed in order to configure the Cohu 9900 Series unit according to the site requirements. The file is in ASCII format and can be modified using any text editor (NOTE PAD).

The parameters defined in this file include the Cohu 9900 Series unit details (OSD - On Screen Display, address, etc.), devices connected to the unit inputs (camera or monitor, etc.), description of the devices, video format and some network parameters.



For more detailed information about operating taskman.ini file, please refer to Appendix A.

CHAPTER 5

9900 SERIES: OPERATION

Operation of the unit entails connecting and controlling the devices on the Camera side of the Cohu 9900 Series unit, located on the remote side, with the device(s) connected to the unit's Cohu 9900 Series monitor side (more than one unit) located in the Control Center(s).

The association process (definition of relationships) between the devices can be done using one of the following applications:

- Configurator (partial management)
- 9991-0900 GUI Console Management software (full management)
- 9991-0400 Viewer (partial management)
- Customer application build on Cohu's API (full management)

CONFIGURATOR

The Configurator is the main tool for configuring, building and maintaining the system, as well as testing and adjusting the devices (cameras, monitors, audio, DIO) it contains. Therefore it serves as the basis for the operation of all entities. Without a proper installed System Configurator, all other applications: 9991-0400 Viewer, 9950 NVR and 9991-0900 Console will not run.

It is therefore recommended that prior to installing any application, you first install and run the Configurator to setup the system. Once the system has been configured properly and tested, you may continue to install other applications. A typical installation consists of one or more geographical sites, each of which may contain various surveillance components (cameras, intercoms, monitors, PAS, VMS, sensors, relays, etc) and recording units (9950-xxxx). Every operator, either using or configuring the system, is assigned a User Login ID and Password, which he should use to access all 4 applications.



Every User/Operator, defined by the System Configurator may be granted access rights to one or more sites defined in the installed system. Once a user has an access right to a specific site, he may access ALL devices and recorders defined for that site.

A user may access more than one site, and more than one user may access a single site.

General guideline for setting up and configuring a system:

- Define the devices in your system (Cameras, Monitors, Recorders, etc).
- Specify their IP addresses, types, names, etc.
- Test the units to make sure they are properly configured and installed. Adjust their parameters if needed.
- Define the sites by giving them unique names (and an optional description).
- Define the Recorders by giving them unique names, and specifying their location on the network (path to video files, and database)
- Add devices and recorders (defined in step one) to your sites.
- Define the users in your system by assigning each a unique Login ID and Password in addition to other optional details.
- Specify the sites each user may access.

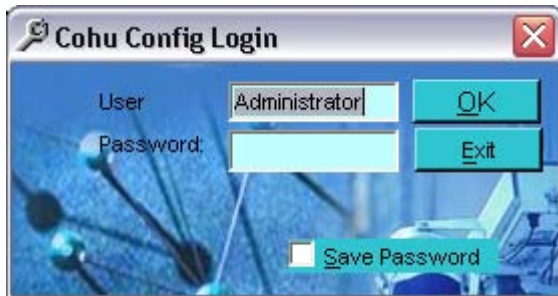
The system configuration data created in the previous steps is stored in a Database file called Config.mdb. All other applications must have access to that file (Network or Local), when they are launched for the first time, in order to be able to copy that file to their local path. From that point on the three applications: 9950-xxxx, 9991-0400 Viewer and 9991-0900 GUI Console are free to use the local imported copy of the configuration file. In case of changes in the configuration of the installed system, the applications can recopy the Configuration Database file (using the Configuration Refresh option). All applications store in the system registry the original location of the Config.mdb file (which is also where the Configurator application is located) as well as other details necessary for them to function properly.

NOTE: Users should not directly modify the Config.mdb file and the system Registry entries.

USING THE SYSTEM CONFIGURATOR

In order to start the Configurator application, the application requires a user name and a password. The package is supplied with a default, ready-to-use user name '**Administrator**', and password '**Admin**' for the Administrators user level.

The log-in dialog window appears when first launching the Configurator application.



Enter the default user and password names to gain access

User = Administrator

Password = Admin

NOTE: All four applications in the Cohu 9990 Management Suite have the same Login Dialog Window in which the user should enter his User ID and Password.

Upon successful log-in, the Configurators Main Menu Dialog Window will appear as shown below.

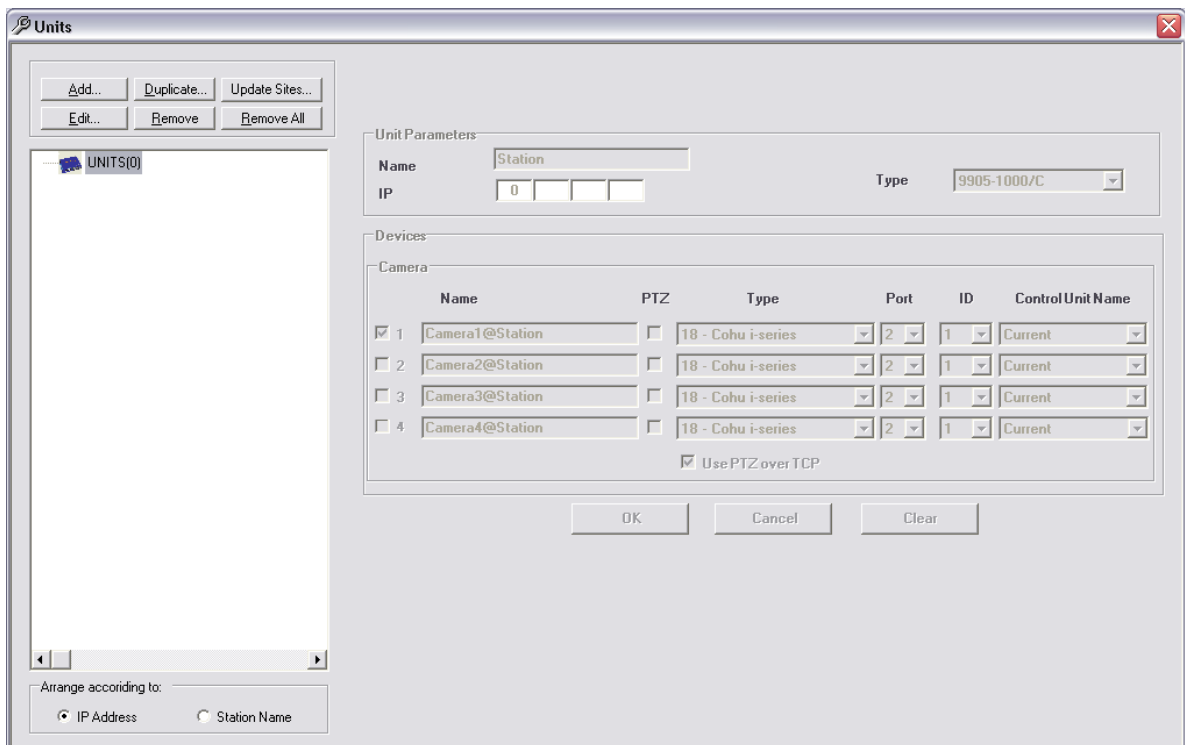
The Configurator main dialog window includes the following menu and sub-menus:



Main Menu Dialog Window

UNITS SUBMENU:

Selecting the Units menu item opens the below dialog window.



-Add

Allows the user to define the system units and devices, first select the unit type. A unit may be defined as one of the following types:

- 9905-2000C (May be listed as 9905-1000C)
- 9905-4000C (May be listed as 9905-2000C)
- 9905-8000 (May be listed as 9905-5000)
- 9905-2000M (May be listed as 9905-1000M)
- 9905-4000M (May be listed as 9905-2000M)

Unit Parameters

Name: Station
IP: 192 168 0 30
Type: 9905-2000/C

Devices

Camera

	Name	PTZ	Type	Port	ID	Control Unit Name
<input checked="" type="checkbox"/>	1 Camera1@Station	<input checked="" type="checkbox"/>	18 - Cohu i-series	2	1	Current
<input type="checkbox"/>	2 Camera2@Station	<input type="checkbox"/>	18 - Cohu i-series	2	1	Current
<input type="checkbox"/>	3 Camera3@Station	<input type="checkbox"/>	18 - Cohu i-series	2	1	Current
<input type="checkbox"/>	4 Camera4@Station	<input type="checkbox"/>	18 - Cohu i-series	2	1	Current

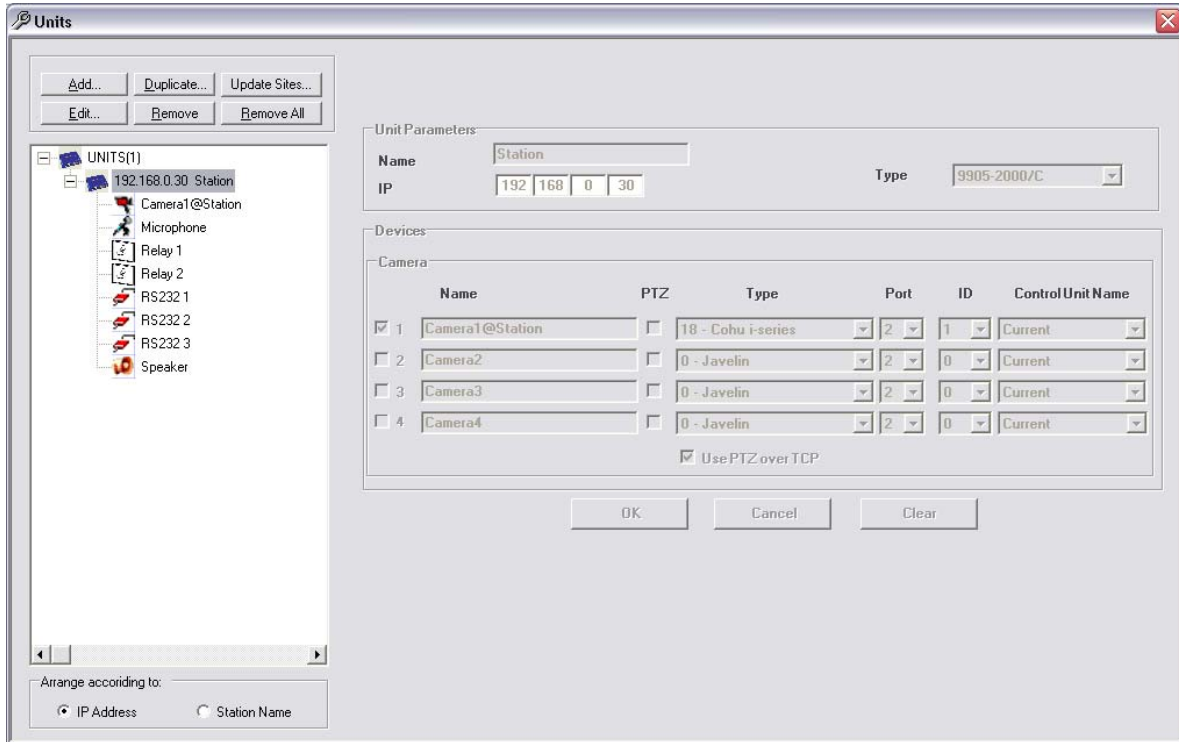
Use PTZ over TCP

OK Cancel Clear

For PTZ cameras the User selects the corresponding PTZ Checkbox, PTZ Protocol and related serial port of the station.

The user should allocate a significant and unique name to the unit, allocate the required IP address and select the type of unit. (listed above).

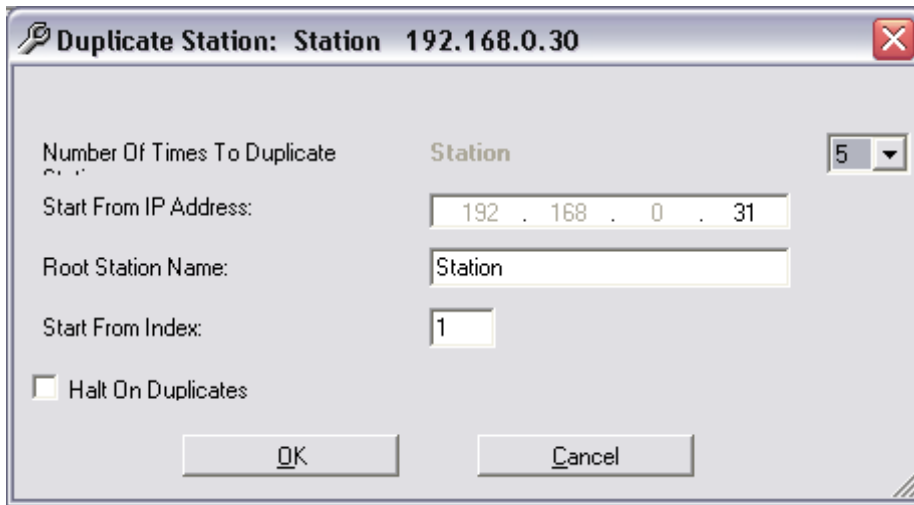
The interface in a graphical, tree like presentation, displays the list of defined entities. The User may add new units, remove or edit defined units by pressing the ADD or REMOVE buttons or by double-clicking an existing unit for editing.



Duplicate

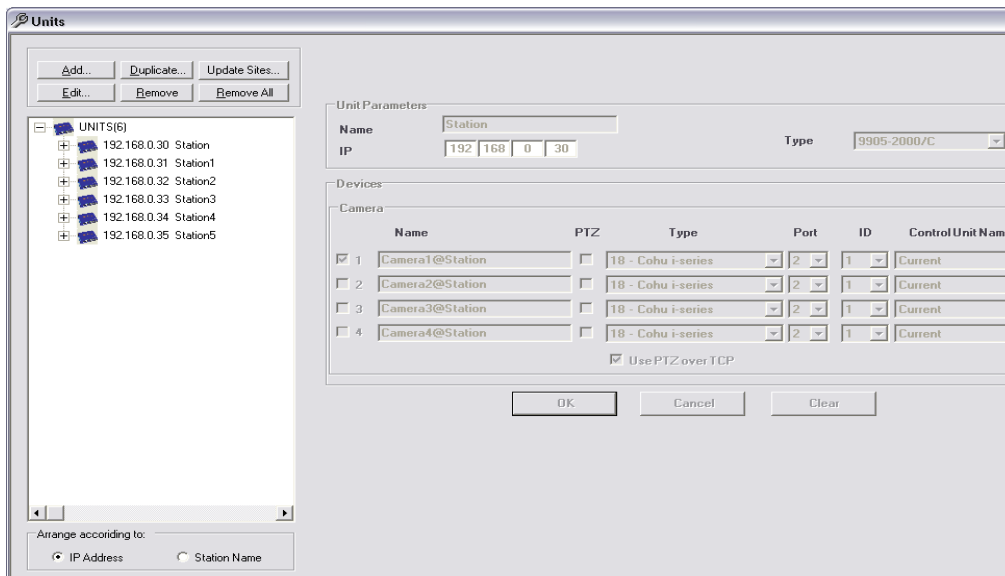
Instead of adding units manually in single steps, any defined station may be automatically duplicated (cloned) along with its devices. The user may mark any station from the unit's tree (on the left side of the form), and press the duplicate button.

A dialog will appear asking the user to select the number of times he would like to duplicate the station. (1 – 50).



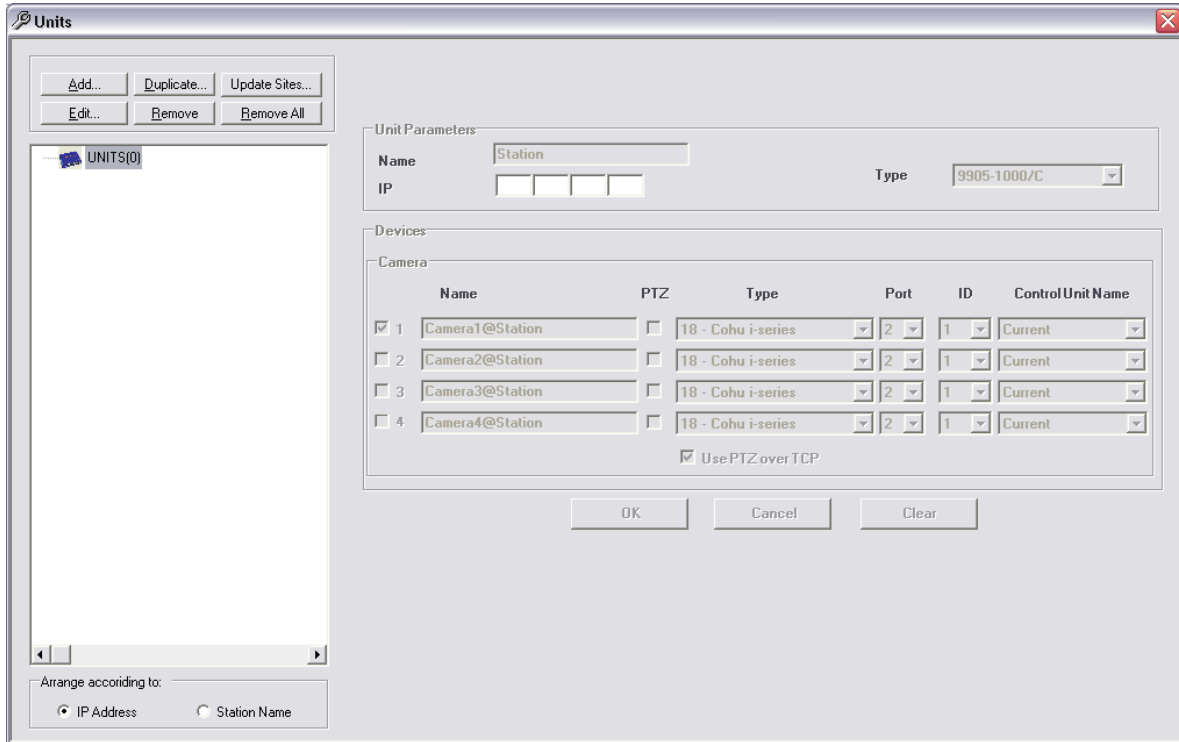
Duplicating Station Dialog Window

IP addresses and station names will generated automatically in an incremental order, starting from the values of the original station. After pressing the apply button, all new stations will be added and displayed on the station list. This option should save the user time when adding units to an empty database.



Remove All

Pressing the Remove-All button, will delete all defined units from the system. After deletion, an empty system tree will be displayed. (All defined sites containing units, will be deleted too).



UPDATE SITES

Upon entering all your system device(s) via the ADD functions, you MUST add these device(s) to a site(s). Do this by pressing the UPDATE SITES Button. This will bring up the following dialog window;

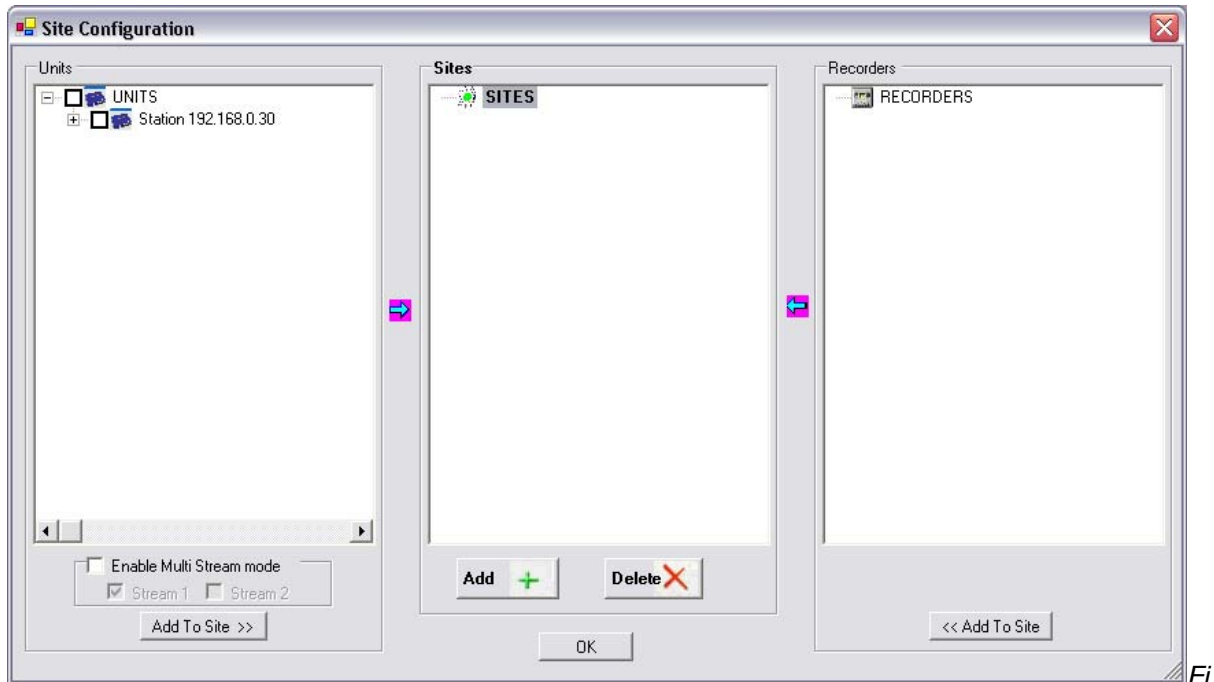
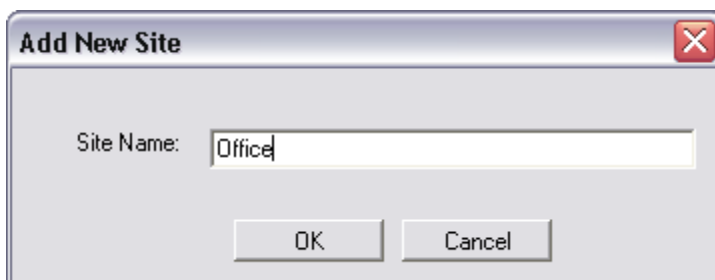
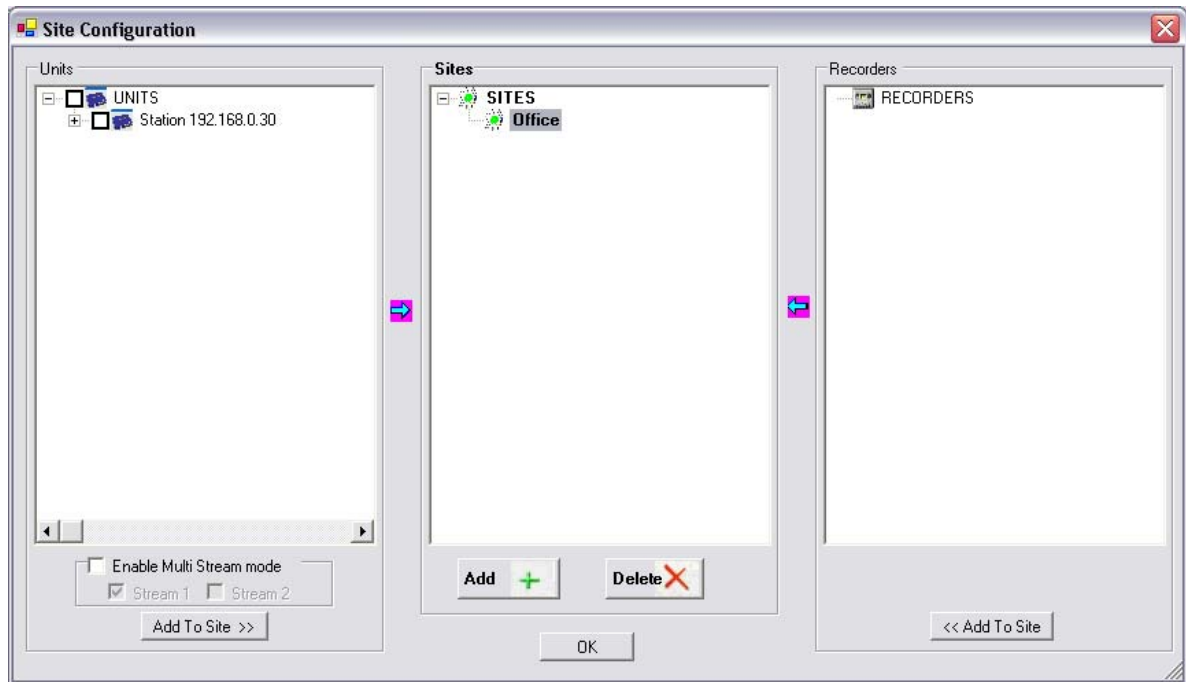


Figure 5-4: Configurator: Update sites

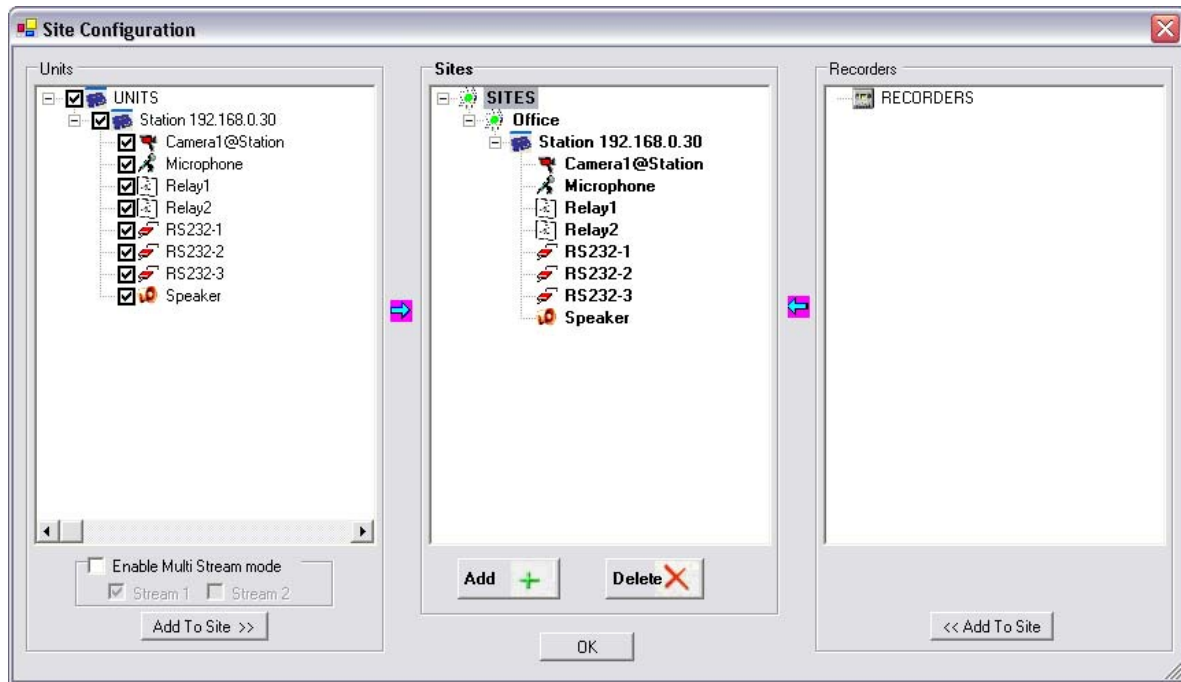
If no sites exist, then you need to add a site. Press the ADD+ under the sites box, which will present the following input box entry;



Type in your site name (Office used as example) and press OK. This will now add a site to the sites tree labeled as (your site name).



This site now exists, but does not have any devices attached. To add devices to the site, use the Check boxes next to the devices properties, which allows any or all functions of a device to be available to the site. In the example, all device properties have been selected. To add the device to the site, first select the site by clicking on the site name, then press the Add to Site>> button in the units box. This adds the device to the site as shown in the window below.



CONFIGURE SUBMENU



The Configure & Test tools of the system includes the setup of all required parameters for the system components, such as video parameters (resolution, brightness, contrast, etc), audio parameters (volume), recording parameters, serial port connection parameters and network parameters (frame rate, bit rate). As well as the connections between the different units (Camera to Monitor, Microphone to Speaker, Transparent RS232 and I/O connection)

The Configure & Test Process should be performed after completion of the System Building Process as described above, and after physically connecting the units to

the network. The tabbed window contains seven different forms: Video, Audio, RS232, and Digital I/O. (See figure 5-5)

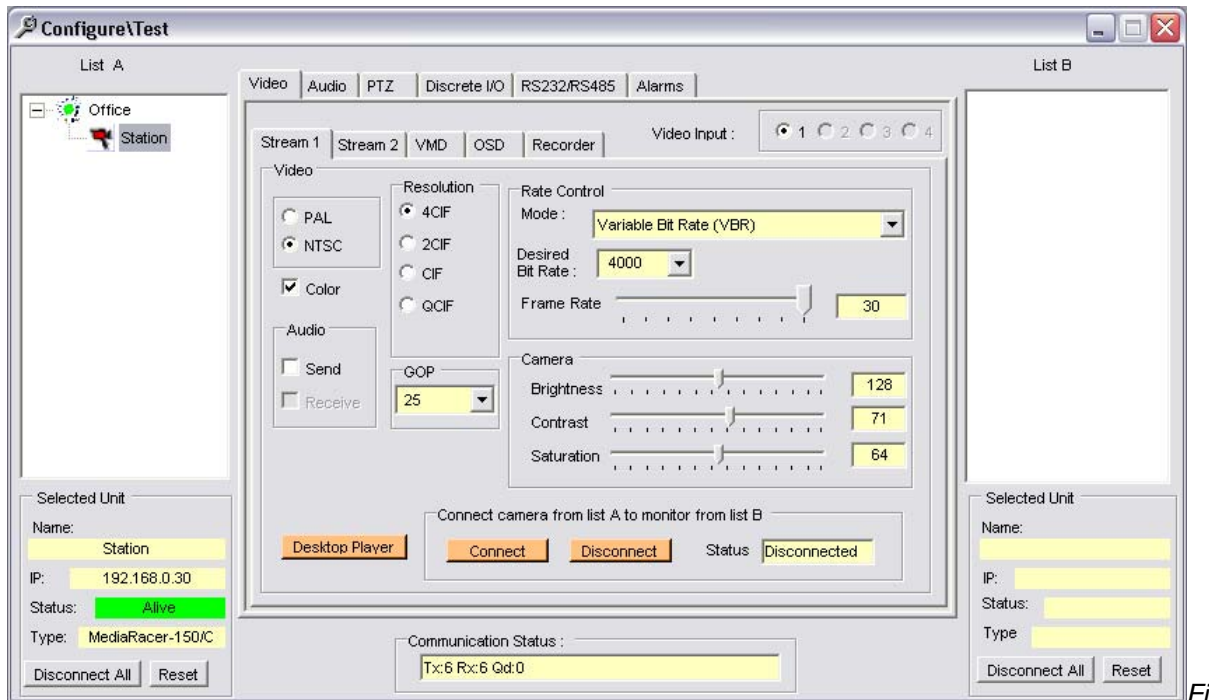


Figure 5-5 : Units configuration

VIDEO

The video Configure & Test window allows the user to control the video parameters as follows:

Video Standard (PAL\NTSC)

- Color/BW
- Resolution (9905-2000 type): 2CIF, CIF, QCIF .
- Resolution (9905-4000, and 9905-8000 type): 4CIF, 2CIF, CIF, QCIF.
- GOP (Group Of Frames) (0 – 500)
- Frames per second: NTCS: (Full, 30, 15, 10, 7.5, 6, 5, 3, 2, 1, 1/2, 1/5, 1/10)

- Frames per second: PAL: (Full, 25, 12.5, 8.3, 6.25, 5, 3.12, 2, 1.5, 1, 1/2, 1/4, 1/10.
- Brightness.
-
- Contrast.
- Saturation.
- Bit Rate (9905-2000 type): 1000 to 4000 bps.
- Bit Rate (9905-4000 and 9905-8000 type): 10 to 6000 bps.

Note: These parameters are defined for the selected camera unit ONLY.

The user may check the validity of the parameters by either viewing the resulting video picture at the video window (Desktop Player) or by performing a Connect” command to connect a Camera from list A to a Unit with a monitor on list B. The connection status Connected/Disconnected is displayed at the bottom of the form. Upon selecting a 9900 unit of type, the user is represented (in the video tab) with a list of 3 different methods for controlling the Bit Rate of the transferred video stream. Bit Rate refers to the average amount of video/audio data per second transferred over the network. The higher the Bit Rate is, the better the quality of the video/audio, but larger the amount of data transmitted over the network causing a heavy network load, (and potentially blocking other participants). Therefore the user may wish to control the Bit Rate, and quality of the video, depending on the available network bandwidth and the desired video quality.

CBR (Constant Bit Rate) - using this method, the user ensures the desired Bit Rate is kept unchanged during video transmission, enforcing some smoothness of the video bit rate over extended periods of times.



VBR (Variable Bit Rate) - the user specifies a desired Bit Rate value, but this value may fluctuate during video transmission depending on the nature of the video, a sudden motion in frame will result in a higher bit rate.

Fixed Quality - the user selects the desired video quality represented by a number (0 -31), without specifying any desired Bit Rate. The Bit Rate is automatically adjusted to preserve the video quality chosen by the user.

In **Constrained** mode the user can define the Maximum Bit Rate allowed by the network environment. The unit will automatically reduce the frame rate if the video data flow exceeds the MaxBitrate specified.

In 9900 units, transmission of Audio may be optionally included along with the video data by checking the Include Audio option on the video tab. In current version this option will take effect only after manually resetting the unit.

AUDIO

The Audio Configure & Test window allows the user to control and adjust the microphone and speakerphone volumes for each unit. It is possible to connect a Microphone from a unit on list A(B) to a Speaker from a unit on List B(A). The connection status Connected/Disconnected is displayed at the bottom of the form.

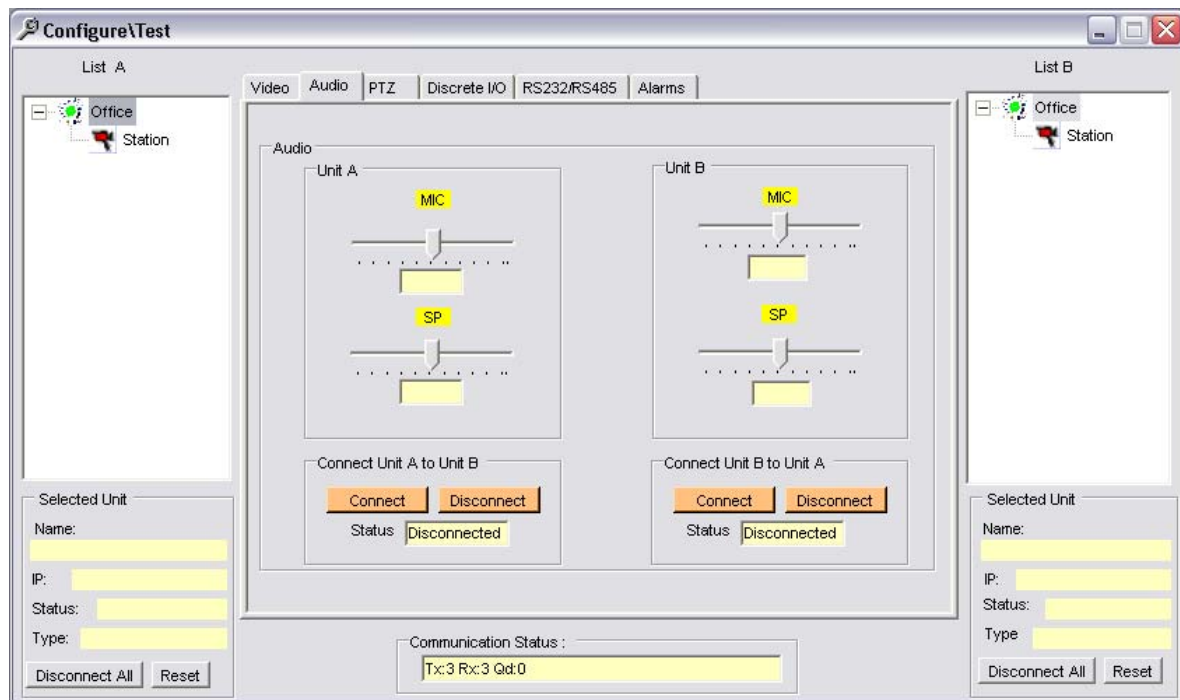


Figure 5-6 : Audio Tab

In the Serial Port window, the user may define the connection parameters for both COM1 (RS-232) and COM2 (RS232/RS485 Jumper selectable) ports. The parameters defined include the BAUD rate, number of data bits, stop bits, parity and flow control. The connection status Connected/Disconnected is displayed at the bottom of the form.

The serial port parameters may be adjusted by selecting any one of the available ports (depending on the unit type) and by selecting the desired value(s) from the settings frame. For 9900 units, the active console port is displayed too, and one or more of the three COM ports may be selected for transparent connection, by pressing the desired button(s) and then the CONNECT button.

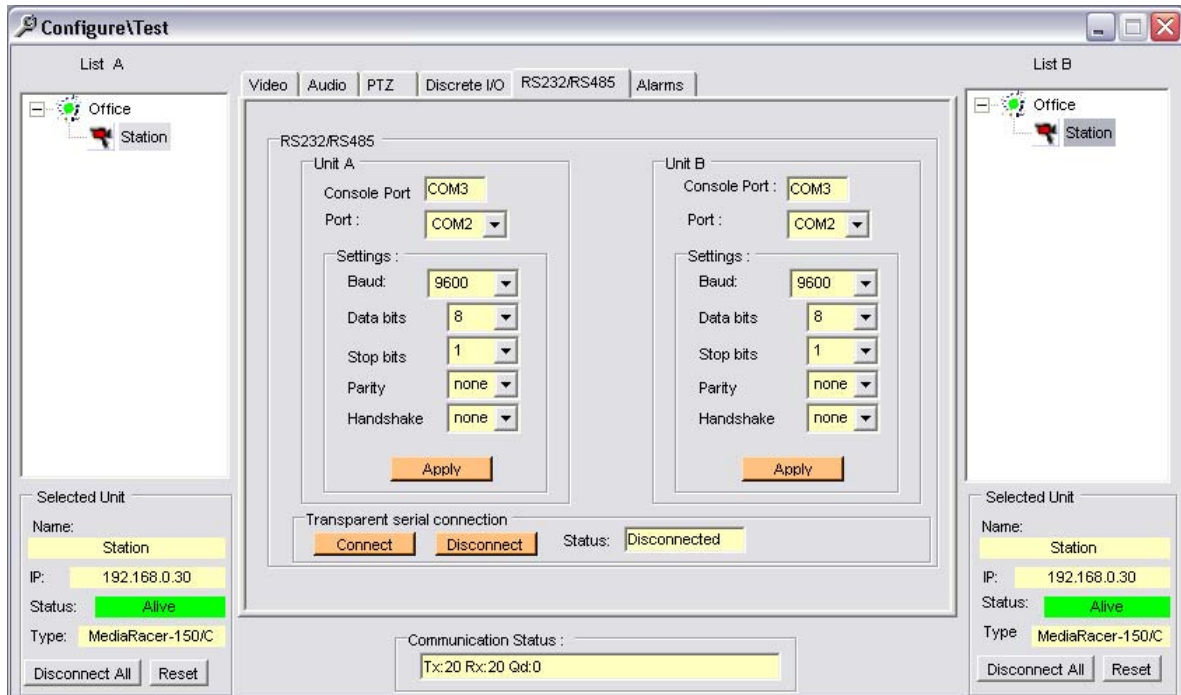


Figure 5-6 : RS23S – parameter settings and transparent connection

OSD - On Screen Display.

A text string and/or a time stamp may be optionally displayed on the video screen at a specified location (X,Y). The displayed text will be stored in the unit's memory and constantly displayed until it is replaced by a new text string.

A BitMap logo may be uploaded into the unit's memory and displayed on the video screen too. After pressing the ADD button on the right side of the BitMap list, the user may select a BitMap file on his local disk, and send it to the unit.

The REFRESH button displays the names of all currently loaded BitMap file, and the REMOVE button will delete from the unit's memory the selected logo file. The user may select any one of the logo files on the list and press APPLY, the selected logo will become the current one (its name will appear in the current text box), and will be displayed on the video screen at the specified (X ,Y) coordinates. This logo will appear on screen until it is replaced by a different logo, or no-logo is selected from the list.

The maximum dimension allowed for a logo file is:

PAL: 720 X 288

NTSC: 720 X 240

And a legal file name must follow the old DOS file naming convention..

(8 chars or less with or without a 3 char extension)

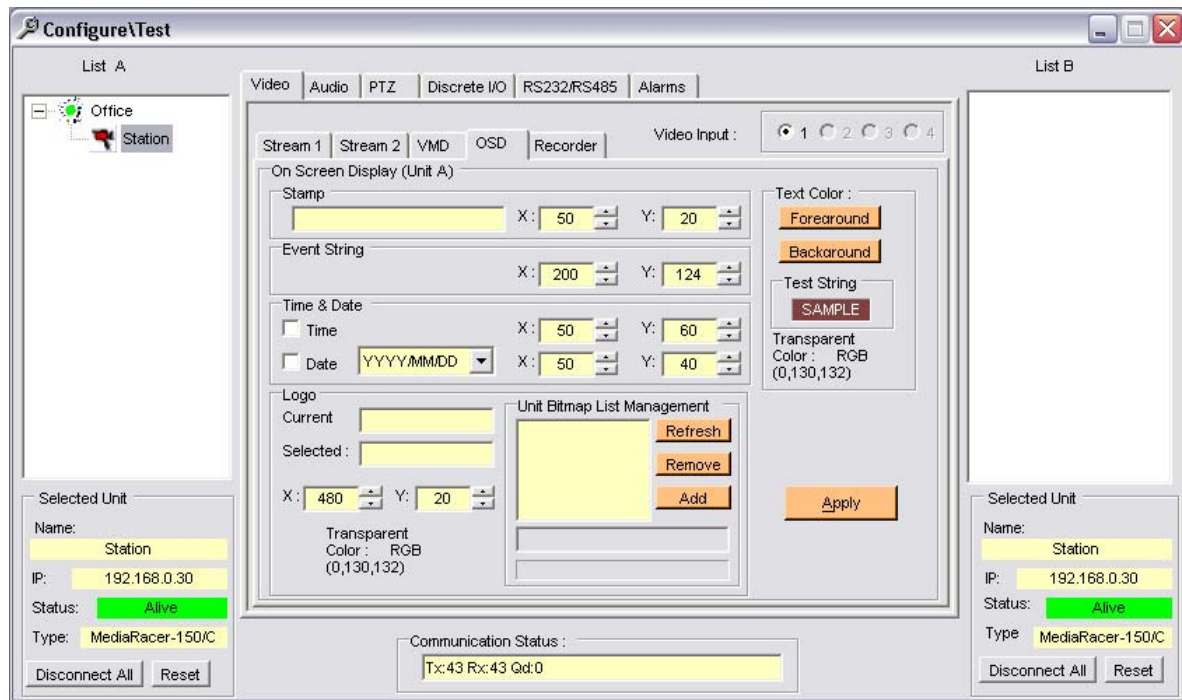


Figure 5-7 : Logo on screen display

VMD - Video Motion Detection

Enabling the VMD option for a selected 9900 unit, will activate the Video Motion Detection mechanism. A sudden motion in the specified region of the video frame will trigger an event, and a text string will appear on screen. In this tab the user can adjust some additional parameters tuning the behavior of the VMD:

The number of frames to wait since motion has been detected before VMD event is fired.

The number of frames to wait since motion has ended before VMD event ends.

Direction of motion to be detected Right-Left, Left-Right or all.

Region of interest specified by an (X, Y) point, Width and Height creating a square. Any motion occurring outside that region will be ignored. The region of interest may be displayed (as a colored square) by explicitly enabling this option in the VMD tab.

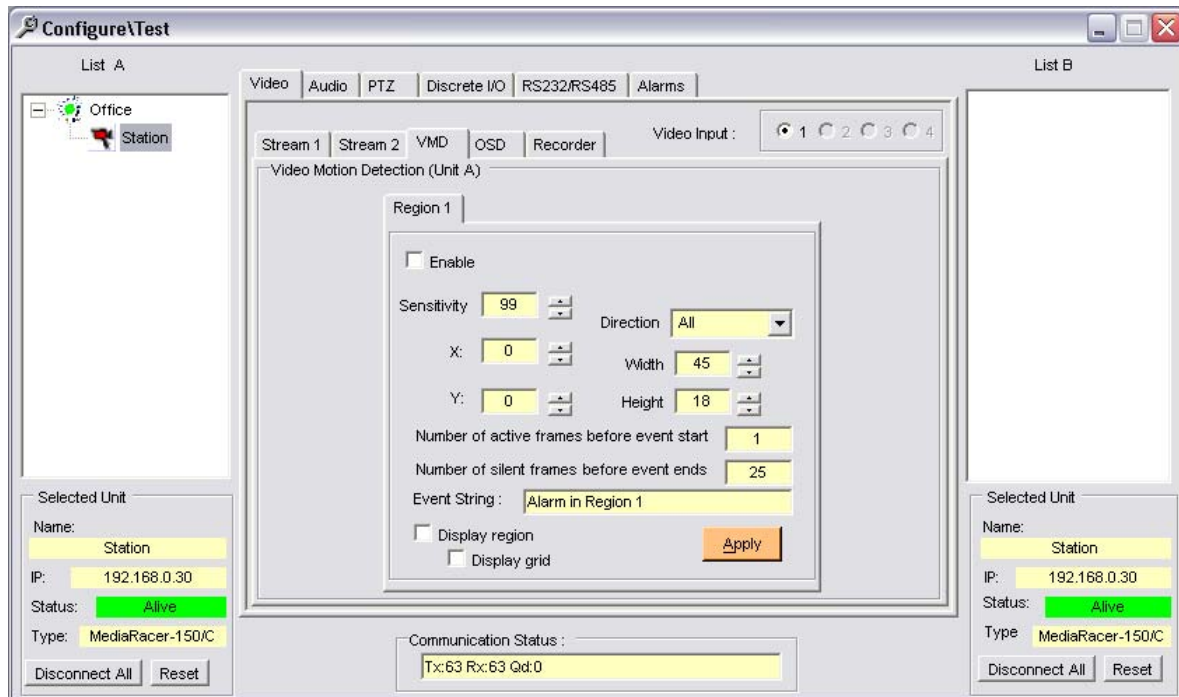


Figure 5-9 : VMD parameters

PTZ

All PTZ settings for the currently selected camera (from list A) are displayed along with button controls for controlling directional movement (Up Down Right Left) as well as Zoom and Focus of the PTZ camera. Preset positions are available (first 9 of which are represented directly by clickable buttons), and may be set by moving the camera to the desired position, selecting a preset number from the list, and finally pressing the SET button.

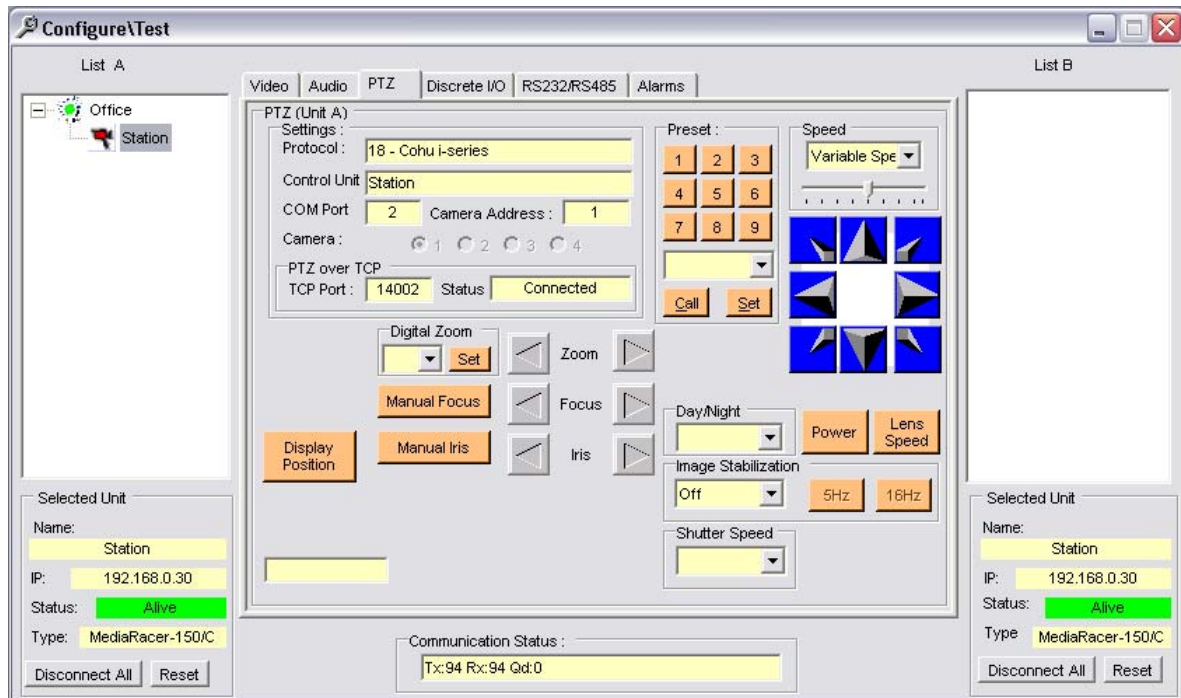


Figure 5-10 : PTZ Preset

In the settings frame, the following PTZ parameters are displayed:

- PTZ protocol (example: 18 = Cohu I-series Positioners).
- COM port 2.
- Camera address 1.

Discrete I/O

The Discrete I/O Configure & Test window is intended to allow the user to check the reception of alarms and the activation of external devices through the Digital Input\Output ports of the units. Also a transparent connection between a left side and a right side unit may be set and checked pressing the connect button at the bottom of the form. The connection status Connected/Disconnected is displayed at the bottom of the form.

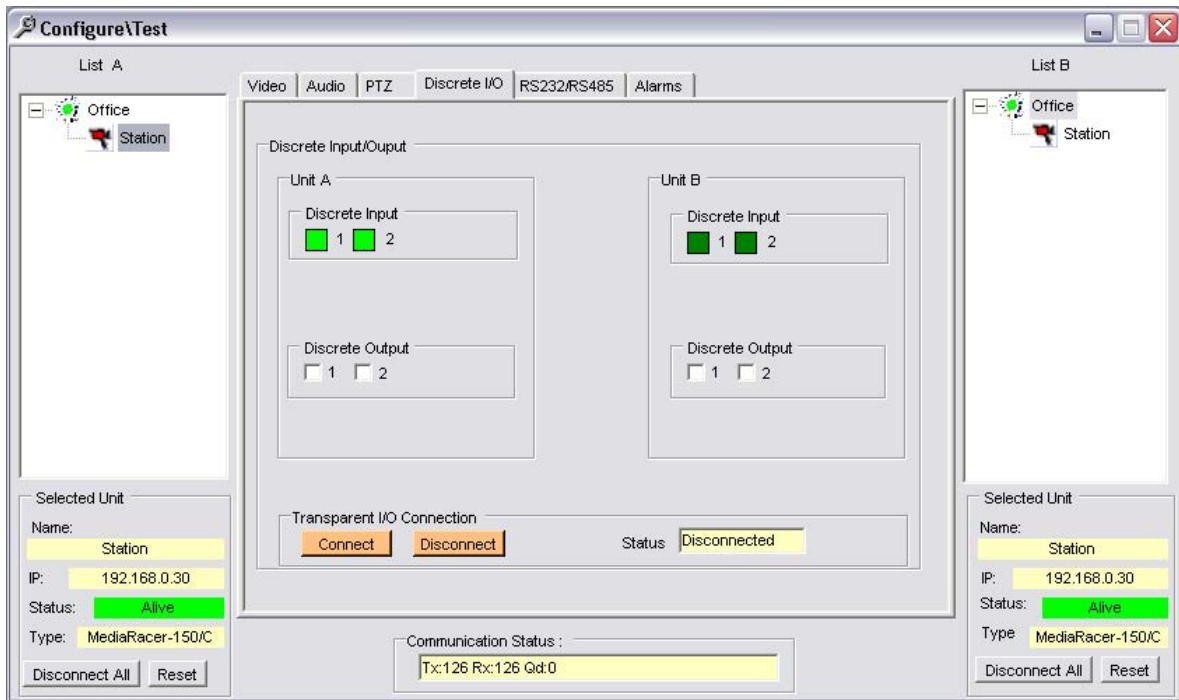
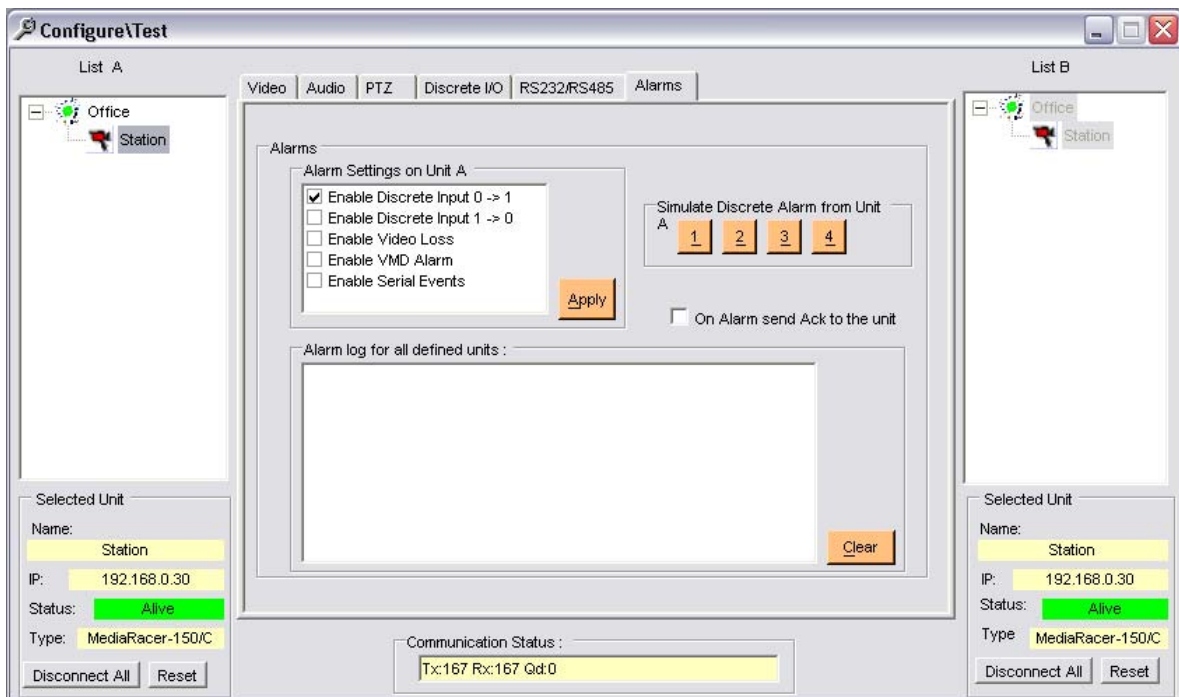


Figure 5-12 : Discrete I/O and transparent connection

Alarms

A selected subgroup of alarms may be enabled\disabled by checking\unchecking the checkbox control next to the alarm name and clicking APPLY.



Upon disabling an alarm the application will no longer receive event strings from the unit until the alarm is enabled again. Following a fired event (Example: motion detection) the unit will send up to 10 event strings in a sequence, or until an ACK signal is sent to the unit. If the ACK checkbox is checked only one event string will be sent. The event strings are displayed in a scrollable list, and may be cleared at any time. The string contains the Unit's name, date and time of the triggered alarm.

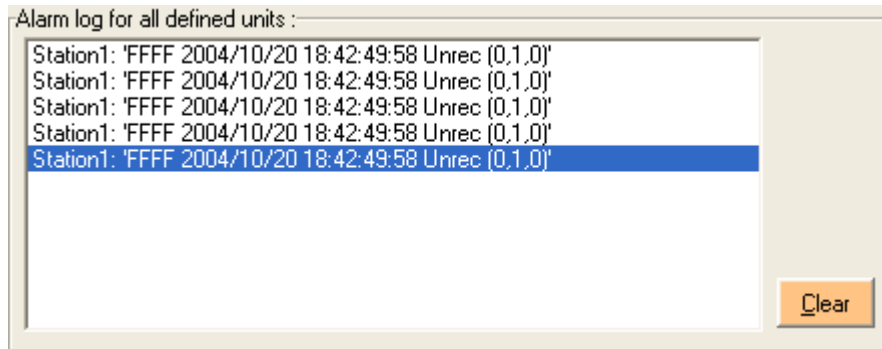


Figure 5-14 : Alarm Log

On this tab, the user may simulate discrete input alarms by pressing one of the 4 buttons next to the alarms settings list. Pressing a button will initiate an input alarm, and a trigger will be fired from the unit accompanied by an event string. The string will be displayed on the alarm log list.



Figure 5-15 : Alarm Simulator Window

UPDATE FIRMWARE

In this form the user may retrieve update or reset the firmware of the selected unit. The user must first make sure the unit is properly connected to the network and then enter its IP Address. In order to retrieve data from the unit, press the GET button and wait for the data to download via the FTP protocol to the local disk, then press the EDIT button to display the data in a text editor Where you can modify data and parameters, and finally press PUT to write your changes back to the unit. Make sure to specify the correct 9900 series unit type before retrieving or writing data to the unit.

BIOS may be updated 9900 units, after entering User Name and Password. Codec software may also be updated. (See figure 5-16).

File names for 9900 units:

- **Software: VxWorks.bin.**
- **BIOS: Codec.out.**

Unit reset (which lasts 20-30 sec') will take place following any software update, or modification of Application or Network parameters, via the Taskman.ini and Status.txt files. The user should wait for the reset process to complete.

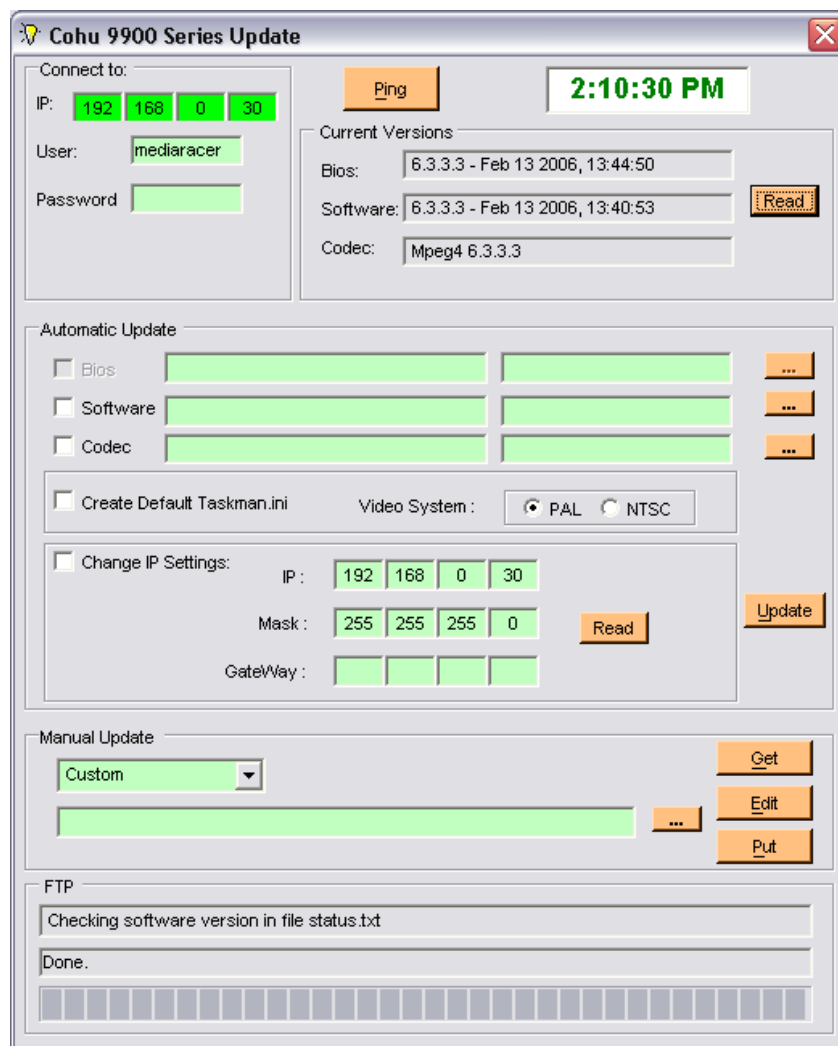


Figure 5-16 : Configurator: Firmware update.

RECORDERS:


Add/Edit/Remove

Allows the user to define new recorders (9950 NVR applications) for the system. Each recorder has a single database file (Video.mdb) into which it writes the details of every AVI file it records (Name, Date\Time, Location, and Camera). The Network path to this file should be specified by the user. In the second field the user must add the Network path to the recorded AVI files themselves. The Recording application is responsible for sharing this path across the network. Finally the user should assign a unique name to the new recorder. An existing recorder may be edited or deleted pressing the EDIT or REMOVE button respectively

USERS:

Add/Edit/Remove

This form should be used to add new users to the system, or edit/delete defined users.



The screenshot shows a web browser window titled "User Accounts". At the top left, there are three buttons: "Add" with a green plus sign, "Delete" with a red X, and "Edit" with a person icon. Below these buttons is a tree view showing a folder named "Users" containing a sub-entry for "Administrator".

The main area is divided into two sections. The left section, titled "User Details", contains several input fields with red asterisks indicating they are required: "User ID:" (containing "Administrator"), "Password:" (masked with asterisks), "Repeat Password:" (masked with asterisks), "Full Name:", "Address:", "Phone Number:", and "E-mail Address:". Below these fields is a note: "Fields indicated with red asterisk (*) are required".

The right section, titled "Sites User May Access", contains a table with two columns: "Site" and "Access Level". There is a checkbox next to "Office" and the "Access Level" is set to "0".

At the bottom right, there is a "Level:" dropdown menu with the value "(0 - 7)" selected.

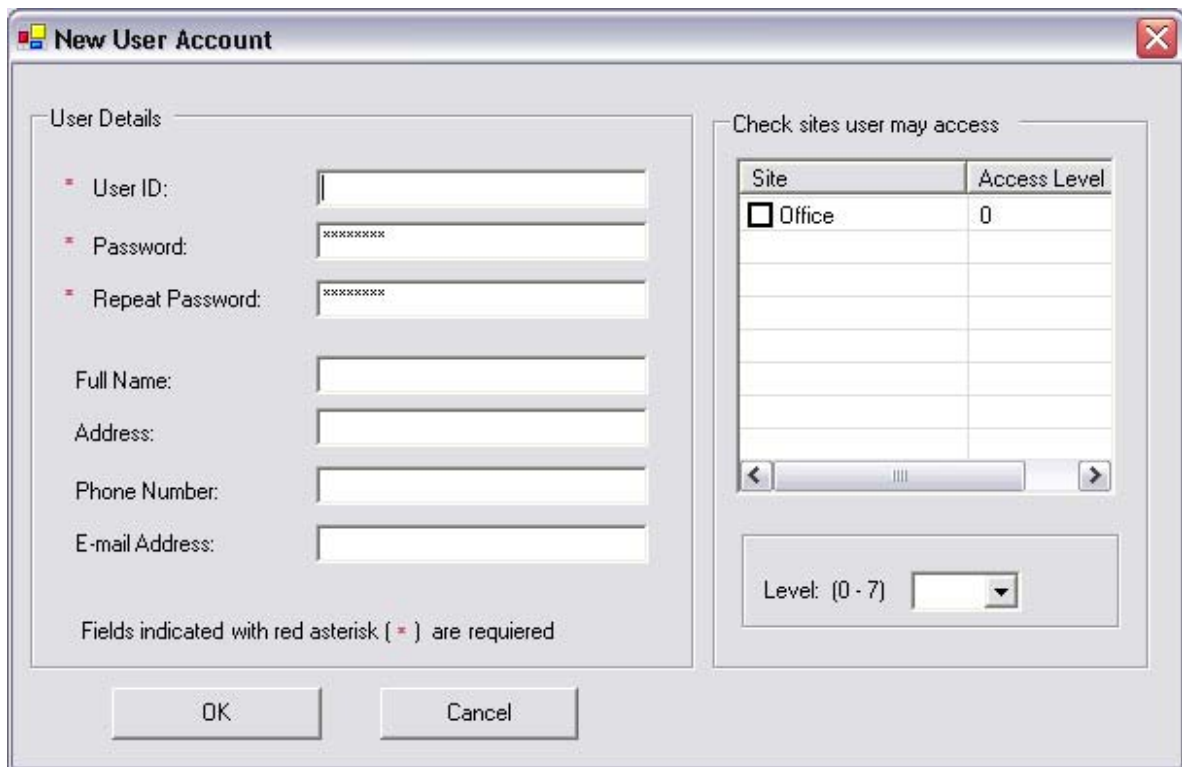
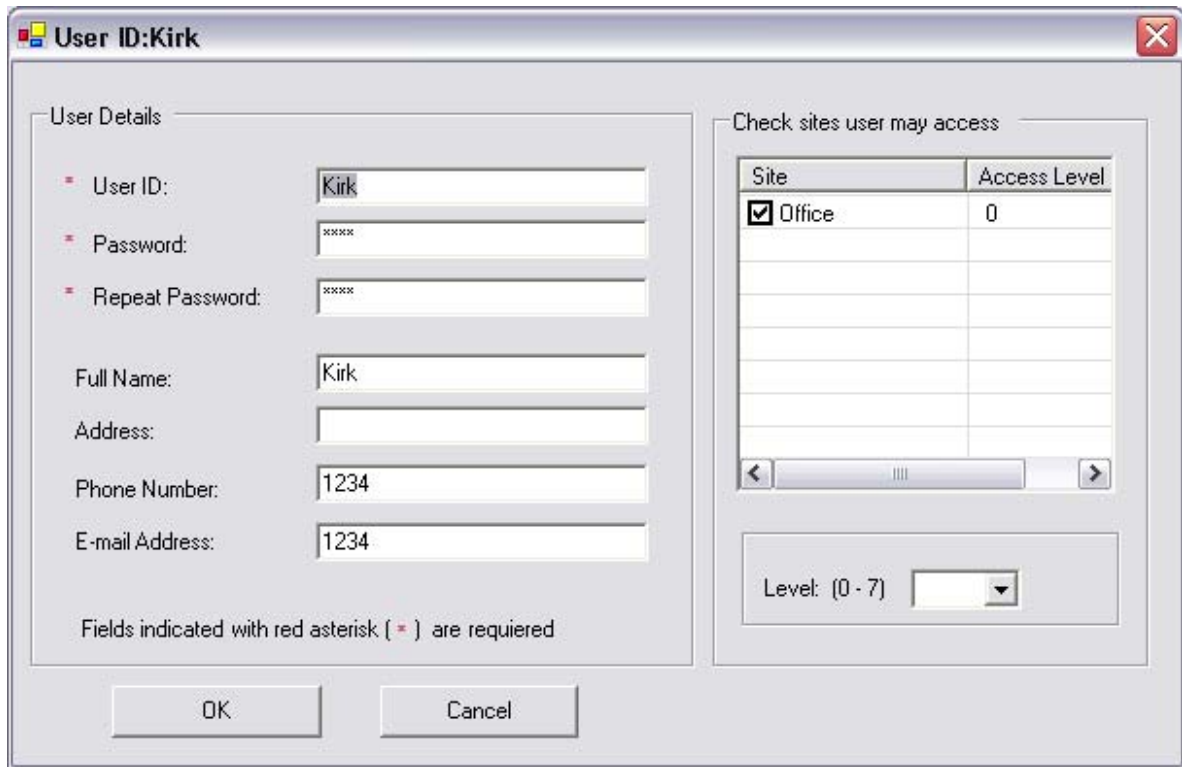


Figure 5-20 : User Configuration

A new user is assigned a unique Login ID, Password and some optional details (phone number, name and Email). After entering the required fields and properly confirming the password, the OK button should be pressed to add the new user to the Database, At this stage, the new user may be granted access to sites by selecting a site from the list of sites. Select the check box next to the site to add this user to that site. To remove a user, select the user from the list and click the REMOVE button. The new defined user may use any application by entering his Login ID and password and have access only to the sites which appear on his user's list of sites. If no sites are defined in the system, or the user has no access rights to any site, he will still be able to login into applications but will have no devices to access, and thus will not be able to perform any functions such as recording and viewing live or recorded video. To modify user details or add/remove subscribed sites, select 'EDIT' from the Users Configuration dialog, and the same 'Add New User' dialog will appear displaying the current details of the selected user, along with his subscribed sites.



The dialog box titled "User ID:Kirk" contains two main sections. The "User Details" section on the left includes input fields for "User ID" (containing "Kirk"), "Password" (masked with "*****"), "Repeat Password" (masked with "*****"), "Full Name" (containing "Kirk"), "Address", "Phone Number" (containing "1234"), and "E-mail Address" (containing "1234"). A note at the bottom of this section states "Fields indicated with red asterisk (*) are required". The "Check sites user may access" section on the right features a table with columns "Site" and "Access Level". The table contains one row with a checked checkbox, "Office", and "0". Below the table is a "Level: (0 - 7)" dropdown menu. At the bottom of the dialog are "OK" and "Cancel" buttons.

Site	Access Level
<input checked="" type="checkbox"/> Office	0

Figure 5-21 : User details.

Note: Devices recorders, sites and users may be added edited, or deleted later at any stage, using the System Configurator. The changes will be reflected in other applications by applying the Configuration Refresh function described earlier.



9991-0900 CONSOLE MANAGEMENT SOFTWARE

The 9905-0100 Console, COHU state-of-the-art management package, monitors and controls surveillance applications with Cohu 9900 Series multimedia gateways. The 9905-0100 Console Management Software is installed on a workstation in the control center, which provides the operator with a graphical user interface. The 9905-0100 Console Management Software is running according to the Configurator's predefined database. The operator can view the site map and control, the station in real-time as well as the remote surveillance hardware devices located at the site.

The main functions of the 9905-0100 Console Management software are:

- Site mapping and visual display on the control workstation monitor.
- Control of remote sensors, cameras, audio and data devices
- Predefined events and incident alarms
- Information reports and activity log
- Video transmission control

For more detailed information about the 9905-0100 Console Management software, refer to the '*COHU Management Suite User Manual*'.

9905-0100 VIEWER

The 9905-0100 viewer is a desktop application that allows users to connect to video cameras and view live video pictures (currently up to 4 cameras simultaneously), search and display video files from local disk or files recorded by StreamR applications. As well as capture live video into local AVI files or single frame snapshot BMP files.

The 9905-0100 viewer is intended for those users of the system, who are usually outside the Control Room, and do not require the extended capabilities of hardware-based decompression and display on Analog monitors, as present in the Control Room.

For more detailed information about the 9905-0100 viewer, refer to the *Cohu Management Suite User Manual*.

THE 9905-0100 API COM

9905-0100 API COM is a software package, which contains a set of functions and routines that enable the user application program to access, control and manage the MediaRacer® devices as well as receive alarms using the COHU solution. This software package implements all the 9905-0100 functions except for the GUI (Graphic User Interface). The 9905-0100 API COM enables the user to write any human-machine interface (HMI) on top of it, or to combine it with other software elements, in order to implement an integrated monitoring and control application for all the required surveillance functions.

The 9905-0100 API COM uses a set of routines and macros, called by the user application to the 9905-0100 API COM, as well as callback routines, which must have been previously defined within the user application. They are transmitted as permanent or local parameters to the API. Some of the parameters will be filled according to the status of the Cohu 9900 Series (following receipt of results/status from the Cohu 9900 Series).

The main management functions of the 9905-0100 API COM are:

- General management: initializing API, configuring the system, terminating API.
- Station control and management: station and device status receipt, disconnecting station, defining the station name.

- Device management: connection/disconnection of devices, device control (changing video parameters and camera pan, tilt and zoom, changing audio parameters, closing/opening gate, digital input/output data management, messages display).
- Serial and digital port control.
- Scenario management: activation, stop and pause scenario, resumption scenario.
- Dual 9905-0100 management: request control of group, unrestricted control of group, obtaining control of group.
- Issue of communication commands: establishment of a connection with stations, data transmission and receipt, directing to LAN or ISDN.
- Fault management (Ack, Nack).
- Alarm management.
- For more detailed information about the 9905-0100 API, refer to the *'COHU COM Reference Manual'*.

CHAPTER 6

COHU 9900 SERIES: TROUBLESHOOTING

NETWORK TROUBLESHOOTING

Fault description:

The management software does not recognize the Cohu 9900 Series unit

1. Run the following hardware tests:
 1. Verify that the network equipment – cables, switch, HUB etc. are operating correctly.
 2. Verify that the ON LED – (green) located on the front panel is lit constantly.
 3. Verify that the communications cable is connected to the Cohu 9900 Series unit at the other end of the network. Verify that the green LNK LED, located on the front panel is lit constantly.
2. Verify the system configuration:
 1. Verify the IP Addresses of each of the Cohu 9900 Series units are the same as the addresses that have been defined in the network settings.
 2. Verify that network subnet mask definition matches the local network requirements.
 3. Verify that Gateway IP node address is defined (if required):
 - If there is a gateway, set the address accordingly.
 - Verify that the PC address is defined in the same network environment.
 - Verify that the gateway is properly set.

3. Run a PING test from the PC where the management software of the Cohu 9900 Series units is installed.
4. Run a PING test from the PC to the gateway (if one is configured).

RS232 & RS485 TROUBLESHOOTING

Fault description:

Difficulty in Controlling of RS232/RS485 Devices.

1. Verify that the RS cable is correctly inserted according to the pin out in the RJ45 RS232 & RS485 Connector table (see Chapter 3 Specifications & Features).
2. Verify that the number of bits, stop bit, handshake parity and baud rate are set correctly for the equipment connected.
3. Transparent RS: There is no data transfer between devices connected to various Cohu 9900 Series units in RS Transparent Mode
 1. Open the Configurator Application Test menu, in the RS232 page; the status field displays “Connected”.
 2. Verify that the RS232 device cable is connected to the COM2 port.

VIDEO TROUBLESHOOTING

Fault description:

The monitor does not display video picture (while camera is transmitting).

1. Open the Configurator Application Test menu, in the Video page; the status field displays “Connected”.
2. Verify that the cables of the equipment (camera and monitor) that are connected to the Cohu 9900 Series Camera Side unit and the Cohu 9900 Series Monitor Side unit are firmly in place.

3. Verify that the camera is working properly by connecting it directly to the monitor.
4. Verify that the Cohu 9900 Series Camera Side unit is working properly with Configurator's Desktop Player.
5. The video is not displayed continuously or pixelization effects around the move object.
 - Verify that the bit-rate is appropriate to the bandwidth allocated by the network. If the bit-rate is too high, reduce bit-rate value or frame rate value or resolution value so that it will match the broadband requirements.

AUDIO TROUBLESHOOTING

Fault description:

No transfer of audio signal between the Cohu 9900 Series Units.

1. Open the Configurator Application Test menu, in the Audio page; the status field displays "Connected".
2. Verify that the audio equipment cables are properly connected to the Cohu 9900 Series units, and in accordance with the specifications.
3. Verify that the speakers and microphones are connected and the volume not set to OFF.

APPENDIX A

MEDIARACER®100/150: TASKMAN.INI CONFIGURATION

FILE

The following table will describe only parameters that can be useful for skill technicians. All other parameters are for internal (Cohu) use only and should be not modified. It's imported to notice that all below parameters are controlled through the COHU standard applications (Configurator, 9905-0100 Console, 9905-0100 Player) and 9905-0100 API.

NOTE: In the TASKMAN.ini file, lines commencing with a semicolon (;) are remarks.

[Flash]	<i>The Flash section control initialization of the configuration copy on the flash</i>
ApplStamp="Racer"	<i>Product signature</i>
DateStr="SEP 8 2004 16:00:18"	<i>Firmware build date</i>
CreateDefault=0	<i>In order to force the factory (IP address will not change) defaults, please change the value to '1'</i> <i>Default value=0</i>
AutoSave=1	<i>Unit's configuration parameters are saved in FLASH memory in AutoSave=1</i>



[Station]	<i>The Station section contains general definitions</i>
Statistics=1	<i>'0' enable more debug prints. Use for debug purposes only.</i>
Manager1="192.200.10.9	<i>The IP address of the manager authorized to operate the station. The list must include all Managers and 9905-0100 API applications. The number of managers may be no greater than 15.</i>
DisconnRetry=10	
ConnRetry=10	
Timeout=350	
PrCtPk=0	<i>Print Control Packets. Use for debug purposes only.</i>
Name="MediaRacer"	<i>OSD string. String position is defined by NamePosition parameters in Stamp section. Controlled by Configurator application.</i>
CallingRetries=10	<i>Number of alarm retries that unit will send to the network before hang up (if none managers are acknowledge)</i>
CallingInterval=1000	<i>Interval (milliseconds) between each CallingRetries.</i>
Managers=7	<i>Maximum allowed managers (up to 15 managers) that can communicate with the unit. Default Value = 7</i>
KeepAliveTimer=3000	<i>Keep alive message timer in millisecond between the connected camera and monitor side units</i>

[Station]	Continue
TransmitTimeOut=15000	<i>Each time when unit receive keep alive (camera side) message this timers is reset. If the network is down for more then 15 (150000ms default time) second units will disconnect from each other.</i>
RecieveTimeOut	<i>Each time when unit respond (monitor side) to keep alive message this timers is reset. If the network is down for more then 15 second (150000ms default time) units will disconnect from each other.</i>
StationToStationTimer=10000	<i>In case when TransmitTineOut and ReciveTimeOut timers are resets, monitor side unit will try to connect to the camera side unit according to the StationToStation timer. Default Value = 10000ms (10 seconds).</i>
EquatorSpeed="405,135"	<i>Equator internal speed (405Mhz) and external memory speed bus (135Mhz). This parameters is use for MR150 product, for MR100 product the Equator Speed will be "311,104"</i>
CodecName="codec.out"	<i>Codec name</i>
EquatorUpdateRTCInterval=60	<i>Equator watchdog timer in second. Value=0, watchdog disable.</i>

[TaskManager]	<i>Unit's tasks configuration and management</i>
MulticastOnly=0	<i>Video data will multicast always (even if only one destination is required) if the value=1. Default Value = 0 (Normal operation)</i>
MulticastMask=255.0.0.0	<i>Multicast IP address will be defined by the following parameters: MulticastMask, MulticastPrefix and unit's IP address. The MulticastMask default is 255.0.0.0, meaning that the first IP is unmasked.</i>
MulticastPrefix="232.0.0.0	<i>Multicast IP address will be defined by the following parameters: MulticastMask, MulticastPrefix and unit's IP address. The MulticastPrefix default is 232.0.0.0, meaning that the multicast IP address will be 232.[unit's low IP bytes]</i>
WatchDog=1	<i>System Watchdog is disabled if the value=0. Default value = 1</i>
SntpUsed=1	<i>'1' enables to get the date & time from SNTP server.</i>
[Stamp]	<i>On Screen Display (OSD) position</i>
NamePosition="x,y"	<i>Up to 32 characters OSD position. Controlled by Configurator application.</i>
TimePosition="x,y"	<i>Time and Date OSD position. Controlled by Configurator application.</i>
EventPosition="x,y"	<i>VMD event string OSD position. Controlled by Configurator application.</i>
RealTime=0	<i>'1' enables time and date OSD display.</i>



[Video]	<i>Video Codec function parameters</i>
Statistics=1	<i>'0' enable more debug prints. Use for debug purposes only.</i>
TransmitTo=""	<i>To connect automatically on start-up fills in</i>
ReceiveFrom=""	<i>the TransmitTo at the camera or the</i>
	<i>ReceiveFrom at the monitor, with the</i>
	<i>desired dotted IP address of the other node.</i>
	<i>TransmitTo="192.200.10.90"(Monitor side)</i>
	<i>ReceiveFrom ="192.200.10.20"(Camera</i>
	<i>side)</i>
AutoResetRetries=3	
SetVideoEncoder=0	
AutoHwReset=3000	
RateControlMode=0	<i>Bit rate control mode. Controlled by</i>
	<i>Configurator application.</i>
ScanTime=10000	
MaxLineRate=0	<i>Maximum video bandwidth (Kbits/s) limit on</i>
	<i>the network. Controlled by Configurator</i>
	<i>application.</i>
	<i>Default value = 0 (none)</i>
LineRate=4000	<i>Desired video bandwidth on network</i>
	<i>(Kbits/s). Controlled by Configurator</i>
	<i>application.</i>
BufSize=8000	<i>Maximum video size (in bytes) that will send</i>
	<i>to the network (UDP Datagram).</i>
	<i>Default value=8000</i>
IntraTimer=165	
VideoEventMask=0x00	<i>Events enable mask. The most significant</i>
	<i>byte is masking (masking=0) "Video Loss</i>
	<i>Alarms" from</i>

[Video]	Continue
Brightness="128,128,128,128"	<i>Brightness, CCIR nom level: 128 (1.000) for 4 video inputs. Controlled by Configurator application.</i>
Contrast="199,199,199,199"	<i>Contrast, CCIR nom level: 199 (1.109) for 4 video inputs. Controlled by Configurator application.</i>
Saturation="192,192,192,192"	<i>Saturation, CCIR nom level: 192 (1.000) for 4 video inputs. Controlled by Configurator application.</i>
Colour="128,128,128,128"	<i>Color: 0-BW, 128-Color for 4 video inputs. Controlled by Configurator application.</i>
InputOne=0	
Camera=0	<i>Video input select. Controlled by Configurator application.</i>
MaxQuant=25	<i>GOP (Group Of Pictures) select. Controlled by Configurator application.</i>
Resolution=2	<i>Resolutions select (QCIF, CIF, 2CIF and 4CIF). Controlled by Configurator application.</i>
Coding=5	<i>Codec select. 5=MPEG4 Codec, 6=MPEG4 Codec. This field is updated automatically according to the downloaded codec on the unit.</i>
FrameRate=2	<i>Frame rate select. Controlled by Configurator application.</i>



System=0 *Video system, 0 = PAL, 1 = NTSC.
Default value = 0.
Controlled by Configurator application.*

VMDRegion="0,0,Alarm in
Region 1,0,0,45,18,99,0,1,25" *VMD Region setting. Controlled by
Configurator application.*

[Video]

Continue

Logo="" *Logo name for OSD. Controlled by
Configurator application.*

LogoPosition="480,20" *Logo OSD position. Controlled by
Configurator application.*

BruteExit=32

[Audio]	<i>Audio Codec function parameters</i>
Statistics=1	<i>'0' enable more debug prints. Use for debug purposes only.</i>
TransmitTo=""	<i>To connect automatically on start-up fills in</i>
ReceiveFrom=""	<i>the TransmitTo at the Microphone or the ReceiveFrom at the loudspeaker, with the desired dotted IP address of the other node. TransmitTo="192.200.10.90"(Loudspeaker side) ReceiveFrom ="192.200.10.20"(Microphone side)</i>
AutoHwReset=0	
VideoSync=0	<i>Value of '1' defines Video/Audio synchronization mode. Controlled by Configurator application.</i>
Bufsize=320	<i>Audio buffer size in bytes.</i>
ScanTime=10000	
Coding=2	<i>Audio codec options: 1=G729A, 2=G711A low, 3=G711 μ low, 4=PCM 16 bit (not supported yet). Default value = 2</i>
LineLevel=0	<i>Speaker volume: -31 to 31 db. Default value = 0.</i>
[Audio]	Continue
LineSens=0	<i>Mic gain: -31 to 31 db. Default value = 0.</i>
Mute=0	<i>Audio mute ('1')</i>

[RS232]

Serial ports function parameters

Statistics=1

'0' enable more debug prints. Use for debug purposes only.

TransmitTo=""

To connect automatically on start-up fills in

ReceiveFrom=""

the TransmitTo at the RS232 Transmitter side or the ReceiveFrom at the RS232

Receiver side, with the desired dotted IP address of the other node.

TransmitTo="192.200.10.90"(Receiver side)

ReceiveFrom ="192.200.10.20"(Transmitter side)

IPPort1=14001

TCP port number for COM1. Controlled by Configurator application.

IPPort1=14001

TCP port number for COM1. Controlled by Configurator application.

IPPort1=14001

TCP port number for COM1. Controlled by Configurator application.

MinGap(n)=64

Minimum Gap in number of characters that signal the end of RS232/485 message for COM port n (close the buffer and send).

Default value=64

Delay(n)=0

Number of idle characters inserted at end of transmit buffer (COM port n).

Default value=0

RBufsize=24

RS232/485 low level buffer size.

Default value=24 bytes

[RS232]

Continue

CnxMask=0x4

Transparent port masking while COM1 is corresponding to the list significant bit.

CnxMask default value = 0x4 (COM3 port is enabled for transparent communication).

Controlled by Configurator application.

InitCOM="COMn,38400,n,8,1,n"

Defines RS port parameters as following (default value): COM1 port with 38400b/s baud rate, even parity, 8 bits data, 1 stop bit, no-handshake.

*parity options: n-none, e-even, o-odd
handshake options: x-xon/xoff, p-hardware,
n-no*

Controlled by Configurator application.

[DIGITAL]

DIO (Discrete Input Output) function parameters

Statistics=1

'0' enable more debug prints. Use for debug purposes only.

InBitsRef=3

InfoPort=0

DIODevice="NONE"

ParallelPortPowerOn=0xF

Default DO power-on outputs state

Default value=0xF

DIEventMask=0x0F

Event mask enabled DI events and event transition polarity. The most significant byte enables DI events on low to high transition (switch release). The list significant byte enables DI events on high to low transition (switch push).

[SNTP]

RTC (Real Time Clock) function parameters

`TZ="GMT+02:00"`

Time Zone

`SNTPServer=""`

SNTP Server's (FTP Server) IP address.

*Overwrite the FTP server IP address in
status.txt file.*



APPENDIX B STATUS.TXT FILE

The following table describes all "status .txt" file parameters:

Function Description:	Status.txt Line	Note
Product Name:	Product ID:	Read only
System CPU (PowerPC) Information:		
CPU (PPC) Type	Type: Motorola PowerPC 855T	Read only
CPU (PPC) External Bus Speed	Clock Speed : 33 Mhz	Read only
CPU (PPC) Internal Core Speed	Core Speed : 66 Mhz	Read only
CPU (PPC) SDRAM Memory Size	Memory size : 16M Bytes	Read only
Multimedia CPU (EQUATOR DSP):		
DSP Type	Type : Equator	Read only
EQUATOR DSP Internal Speed	Speed : 400 Mhz	Read only
EQUATOR DSP SDRAM Memory Size	Memory size : 32M Bytes	Read only
System Options:		
PCI Bus Speed	PCI Speed : 33 Mhz	Read only
Code Flash Memory ID	Flash Id: Manf ID=0x4 Dev ID=0x22d7	Read only
System Flash size	Flash Size : 8 Mbytes	Read only
Video Option	Video Option : 1 camera input + 1 monitor output	Read only
Audio Option	Audio Option : Audio present	Read only
DIO Option	Dio Option : 2 input + 2 output	Read only
COM2 Setting. The duplex type is jumper depended (see RS485 Jumper Setting Table 3-1)	COM2 Setting : RS-485 FULL duplex	Read only



System Options continue:		
Trunk Port ID (Other Modules except the RS232 are not supported)	Module Id : 0xF (RS232)	Read only
HARD Disk (Not Supported)	HARD Disk : Not Install	Read only
For internal use only	Debug Switch : 0x3	Read only
Software Versions:		
FPGA (Altera) Version	FPGA Revision : 0x1	Read only
Real Time Operating System Version	vxWorks Version : 5.4.2	Read only
BSP (Board Support Package) Version	BSP Version : 1.0/0	Read only
BIOS Version	BIOS SW Version : 6.1.5 build 3 - Mar 23 2004, 11:44:59	Read only
Application (main code) Version	APP SW Version : 6.1.5 build 4 - May 13 2004, 10:10:27	Read only
Video Codec name & Version	Codec Name : Mpeg4 (RCC) 6.1.5 build 4	Read only
Codec Interface version	Codec Version : Major = 2, Minor = 1	Read only



System Settings:		Read only
MediaRacer MAC Address	MAC Address : 00:03:A3:01:02:5B	Read only
MediaRacer Production Serial Number	Serial Number : 015216040045	Read only
Real-Time Clock –	Real-Time Clock : SUN JUN 13 15:44:10 2004	Read only
Console port location. COM1=1, COM2=2, COM3=3. Changeable by user.	Console Port : 1	Read/Write
The Baud Rate definition for Console Port. Changeable by user.	Console Baud : 38400	Read/Write
Startup Delay in seconds. Define window time in order to enter to Maintenance mode. Changeable by user.	Startup Delay : 3	Read/Write
System Setting continue:		
System Boot source (options are Flash or network).	Boot Device : flash	Read only
Boot File Name inside the Flash memory	Boot FileName : /flash0/vxWorks.bin	Read only
The name of the Project (for internal use only)	Target Name : jaguar	Read only
Network driver from Flash	Other : motfec	Read only



Boot mode flags	Flags: 0x0 - Default 0x01 - don't start SMMG 0x02 - load local system symbols 0x04 - don't autoboot 0x08 - quick autoboot (no countdown) 0x20 - disable login security 0x40 - use bootp to get boot parameters 0x80 - use tftp to get boot image 0x100 - use proxy arp 0x1000 - Flash erase 0x2000 - Reduce Max Idle characters on COM1 (from 12 bytes to 2 bytes) 0x4000 - Reduce Max Idle characters on COM2 (from 12 bytes to 2 bytes) 0x8000 - Reduce Max Idle characters on COM3 (from 12 bytes to 2 bytes)	Read/Write
Network Settings:		
Unit LAN IP address (Changeable by user)	LAN IP : 192.200.10.40	Read/Write
Unit LAN Subnet Mask (Changeable by user)	LAN Subnet Mask : 255.255.255.0	Read/Write
Unit Gateway IP address (Changeable by user)	GateWay IP : 192.200.10.1	Read/Write
Software Update Settings:		
FTP Svrer IP address (for software upgrade purposes). Changeable by user	FTP server IP : 192.200.10.10	Read/Write



Software Update Settings continue:		
FTP host name (FTP Server). Changeable by user.	FTP Host Name : fred	Read/Write
FTP Server and MediaRacer unit username. Changeable by user.	FTP username : fred	Read/Write
FTP Server and MediaRacer unit password. Changeable by user.	FTP password : Cohu	Read/Write
LM 80		
Temperature inside the box	Temperature = 51.5 Celsius (124.7 Fahrenheit)	Read only
2.5 volt status	IN0: 2.50 V (2.5)	Read only
3.3 volt status	IN1: 3.32 V (3.3)	Read only
5 volt status	IN2: 4.98 V (5.0)	Read only
Not Used	IN3: 0.00 V (0.0)	Read only
Not Used	IN4: 0.00 V (0.0)	Read only
FAN Status (Not Used)	Fan 1: 0 RPM, Fan 2: 0 RPM	Read only
Flash Dir display	<pre> size date time name ----- 2132272 MAY 13 2004 17:22:54 VXWORKS.BIN 1810250 MAY 13 2004 17:27:52 CODEC.OUT 0 APR 20 2004 14:38:20 VER </pre>	Read only

APPENDIX C

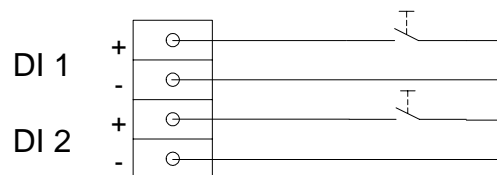
ALARM (DISCRETE I/O) APPLICATION NOTE

Product: Cohu 9900 Series
Application Note: Using the 9900 units Dry Contact Inputs and Opto-isolated Discrete Outputs ports.

DISCRETE INPUTS:

The 9900 units discrete inputs ports are dry contact type inputs, and therefore they are intended to use with general-purpose SPDT switches.

Each input port contents two terminal, which are connected directly to SPDT, switch two ends.



Discrete Input Circuit

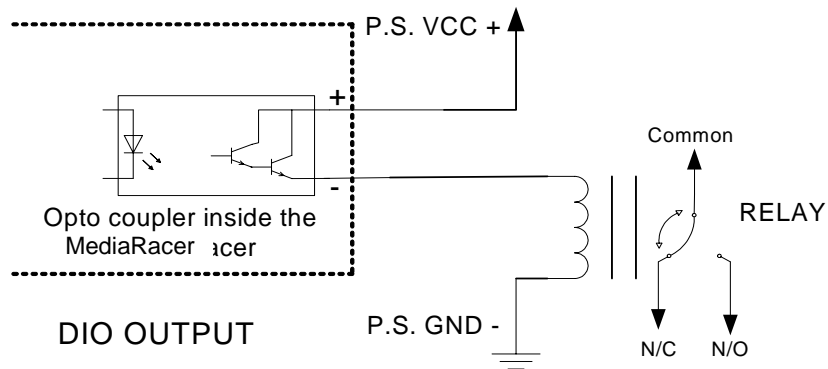
OPTO-ISOLATED DISCRETE OUTPUTS:

The outputs on the 9900 units are optically isolated from the system ground and voltage.

In order to drive the relay coil, external voltage and ground should be supplied (see DO Output figure below). One end of the external relay coil is connected to ground while the second end is connected to the negative pin of the 9900 DO terminal and limits the port's output collector current. The positive 9900 DO terminal is connected directly to the (+) terminal of a power source.

The maximum output current, common voltages and resistor values are as follows:

1. The absolute maximum supplied voltage shall not exceed 24VDC.
2. The absolute maximum rating output collector current shall not exceed 100ma.
3. The MediaRacer[®] output operating current is 90ma maximum.



Discrete Output Circuit

Warning: Drawing operating current out of a DO port above the absolute maximum (100ma) may cause permanent damage to the unit.

Following is a table of common voltages and the examples of minimum relay coil resistances value required in order to drive the relay circuitry.

Input Voltage (DC)	5V	12V	24V
9900	60 Ohm	150 Ohm	300 Ohm

Minimum Coil Resistance Value for DIO Outputs

Note: Pay attention DIO outputs are polarity sensitive. For polarity pin descriptions please see Chapter 3 Specification and Features.