Operations Manual, Remote Control Panel, RCP2-1000-CO

Drawing Number: 217091
Revision -
RA 7813

- **General Information** (216351-1)
- **Unit Description** (216351-2)
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System Controllers with Touchscreen, General Information

Teledyne Paradise Datacom
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Introduction

This section provides the general information for the Teledyne Paradise Datacom line of controllers. While previous models of the controllers were specifically built to handle a certain type of system, the new system controllers with the touchscreen display can be configured to handle a variety of system types without the need for special hardware modifications.

Legacy controllers include:

- RCP2-1100 for 1:1 redundant systems;
- RCP2-1200 for 1:2 redundant systems;
- FPRC-1100 for 1:1 phase combined systems;
- FPRC-1200 for 1:2 phase combined systems;
- RCP2-SWITCH for use as a maintenance switch controller;
- RCP2-1000-CO as a remote control panel for a remote Compact Outdoor SSPA.

All of the configurations listed above may now be controlled by the system controller with touchscreen. Any mention of RCP, FPRC or RCP2 throughout this manual refers to the new line of system controllers with touchscreen display.

This section describes the supplied equipment and safety precautions.

Description

The controller is used to monitor and control amplifiers configured in 1:1 and 1:2 redundant systems, 1:1 and 1:2 phase combined systems, as a maintenance switch controller, or as a remote control panel for a single remote amplifier. The controller can be configured provide control of one, two, or three amplifiers and any corresponding transfer switch.

> ⚠ **Note: The RCP2-1000-CO is programmed with a different firmware set than the other controllers. It can only act as a RCP2-1000-CO remote control panel.**

The controller can be used in LNA, LNB, and SSPA systems as well as frequency converter systems. A RF Signal Path Display on the front panel indicates the RF path and the fault status of the equipment. User interface and control is provided in several forms:

- Front panel, local control via touchscreen
- 37-pin parallel control port with contact closures and opto-isolated inputs
- Serial data control via RS232 or RS485 (2 or 4-wire)
- 10/100 Base-T Ethernet interface. Ethernet control options include embedded web page, SNMP interface and propriety IP interface to connect over Paradise Universal M&C software

Additional features include:

- User-friendly front panel touchscreen display for local monitor & control;
- Universal input, power factor corrected power supply;
- Dual AC mains entries with removable power supplies.

Equipment Supplied

The following equipment is supplied with each unit:

- System Controller
- (2) IEC Line Cord Sets

Optional equipment includes:

- Rack Slides
- 100 ft. (30 m) Control Cable
- Switch Plate Mating Connector
- DC Operation

Specifications

Refer to the specification sheet for complete specifications on the RCP2/FPRC Redundant System Controllers.

Outline Drawing

Figure 1 shows an outline drawing of an redundant controller.

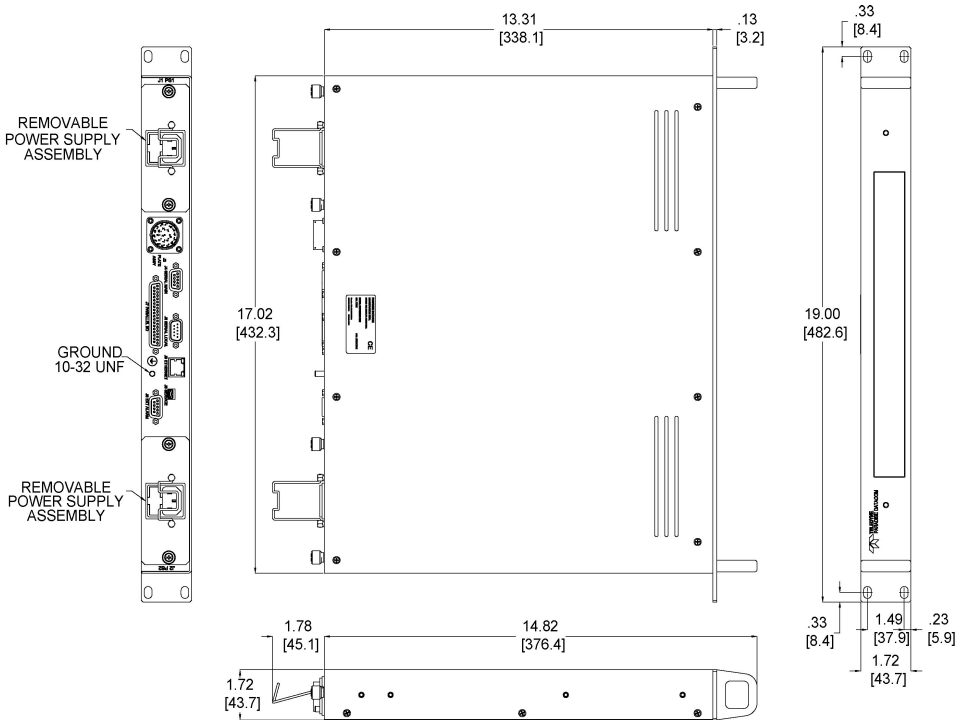

Figure 1: Outline Drawing, Typical Redundant System Controller Unit

The system controller is also available with 24/48VDC input, or with a high output power option (-HP), both of which have removable power supply assemblies of the respective type.

Safety Considerations

Potential safety hazards exist unless proper precautions are observed when working with this unit. To ensure safe operation, the user must follow the information, cautions and warnings provided in this manual as well as the warning labels placed on the unit.

High Voltage Hazards

High Voltage for the purpose of this section is any voltage in excess of 30 volts. Voltages above this value can be hazardous and even lethal under certain circumstances. Care should be taken when working with devices that operate at high voltage.

⚠ All probes and tools that contact the equipment should be properly insulated to prevent the operator from coming in contact with the voltage.

⚠ The work area should be secure and free from non-essential items.

⚠ Operators should never work alone on high voltage devices. There should always be another person present in the same work area to assist in the event of an emergency.

⚠ Operators should be familiar with procedures to employ in the event of an emergency, i.e., remove all power, CPR, etc.

⚠ An AC powered unit will have 115 VAC or 230 VAC entering through the AC power connector. Caution is required when working near this connector, the AC circuit breaker, or the internal power supply.

High Current Hazards

Many high power devices are capable of producing large surges of current. This is true at all voltages, but needs to be emphasized for low voltage devices. Low voltage devices provide security from high voltage hazards, but also require higher current to provide the same power. High current can cause injury from burns and explosion. The following precautions should be taken on devices capable of discharging high current:

⚠ Remove all conductive personal items (rings, watches, medals, etc.)

⚠ The work area should be secure and free of non-essential items.

⚠ Wear safety glasses and protective clothing.

⚠ Operators should never work alone on high risk devices. There should always be another person present in the work area to assist in the event of an emergency.

⚠ **Operators should be familiar with procedures to employ in the event of an emergency, i.e., remove all power, CPR, etc.**

Electrical Discharge Hazards

A spark can not only create ESD reliability problems, it can also cause serious safety hazards. The following precautions should be taken when there is risk of electrical discharge:

⚠ **Follow all ESD guidelines**

⚠ **Remove all flammable material and solvents from the area.**

⚠ **All probes and tools that contact the equipment should be properly insulated to prevent electrical discharge.**

⚠ **The work area should be secure and free from non-essential items.**

⚠ **Operators should never work alone on hazardous equipment. There should always be another person present in the same work area to assist in the event of an emergency.**

⚠ **Operators should be familiar with procedures to employ in the event of an emergency, i.e., remove all power, CPR, etc.**

Keep in mind that ground potential on both ends of long cable runs may be significantly different due to various factors. These ground potentials equalized by a cable ground signal line. Hence, it always a good practice to make connect/disconnect interface connectors when the equipment on both ends of a long cable run is powered down. This practice will minimize risk of damage of electrical interfaces due to unbalanced ground potentials.

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System Controllers with Touchscreen, Description

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Introduction

This section provides information for the initial inspection, installation, and external connections for the RCP controller.

Inspection

When the unit is received, an initial inspection should be completed. First ensure that the shipping container is not damaged. If it is, have a representative from the shipping company present when the container is opened. Perform a visual inspection of the equipment to make sure that all items on the packing list are enclosed. If any damage has occurred or if items are missing, contact:

Teledyne Paradise Datacom
11361 Sunrise Park Drive
Rancho Cordova, CA 95742 USA
Phone: +1 (814) 238-3450

Mounting

The Teledyne Paradise Datacom RCP controller is designed to be mounted in a standard EIA 19 inch equipment rack. The depth of the chassis, excluding rear panel connectors, is 13.19 inches (335 mm). The height of the chassis is 1.7 inches (44 mm) or 1 rack unit.

Optional 22 inch (559 mm) rack slides with extensions are available.

Storage and Shipment

To protect the controller during storage or shipping, use high quality commercial packing methods. Reliable commercial packing and shipping companies have the facilities and materials to adequately repack the equipment.

Cable Connections

The controller has a wide range of I/O interconnections available at the rear panel. The controller rear panel is shown in Figure 1.

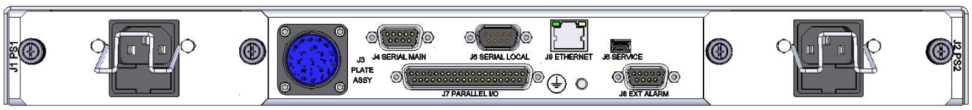

Figure 1: Rear Panel, System Controller

Control Cable Connector (J3) - MS3112E16-23S

The primary connection between the controller and the LNA/LNB (Low Noise Amplifier/Low Noise Block Converter) switch plate or SSPA (Solid State Power Amplifier) switch assembly is through J3. The connector is a 23-pin circular connector, type MS3112E16-23S (See Figure 2 and Table 1). For external waveguide switches, a standard 100 ft. (30m) cable, L201061 should be used.

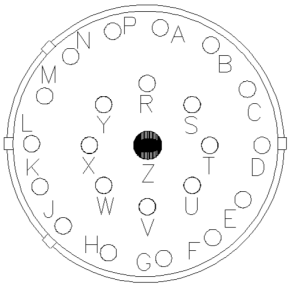

Figure 2: Control Cable Connector (J3)

Table 1: Switch Connector (J3) Pin-Outs

Pin	Description
L	Power Supply #1; +13-17 VDC, 900mA; or, +24V, 1.5A (-HP version only)
J	Power Supply #2 +13-17 VDC, 900mA; or, +24V, 1.5A (-HP version only)
G	Power Supply #3 +13-17 VDC, 900mA; or +24V, 1.5A (-HP version only)
E	Switch Common, +26 VDC, 5A max
B	AMP Support GND
D	Switch Common, +26 VDC, 5A max
W	Switch #1, Position 1 (Tx) (primary)
U	Switch #1, Position 1 (Tx)
P	Switch #1, Position 2 (Tx)
S	Switch #1, Position 2 (Tx) (primary)
F	Switch Common, +26 VDC, 5A max
H	Switch Common, +26 VDC, 5A max
T	Switch #2, Position 1 (Rx)
V	Switch #2, Position 1 (Rx) (primary)
N	Switch #2, Position 2 (Rx)
R	Switch #2, Position 2 (Rx) (primary)
A	AMP Support GND
C	AMP Support GND
K	Switch Common, +26 VDC, 5A max
M	Switch Common, +26 VDC, 5A max

⚠ **Note: The RCP2-1000-CO remote control panel does not require connection to this port.**

Serial Port, Main (J4) - DB9 (F)

The main serial port is for connection with any host computer. This port contains both RS-232 and RS-485 communication in half duplex. RS-485 interface is compatible with 2- or 4-wire interface connection. As an additional protection measure, this port features full galvanic isolation from the chassis ground. For convenience, a set of Form C relay contacts are available at this port as a Service Request. The Service Request is essentially a Summary Alarm for any system faults that occur. The baud rate and other communication parameters are selectable via the front panel menu.

The pin-out is shown in Table 2. Note that the pin-out is standard DTE; a null modem is not required when connecting to a standard PC serial port.

Table 2: Serial Port, Main (J4) Pin-Outs

Pin	Description	Notes
1	RS-485 TX+	
2	RS-232 Out or RS-485 TX-	
3	RS-232 In or RS-485 RX-	
4	RS-485 RX+	
5	Signal Ground	
6	Service Request 1	Closed on Fault
8	Service Request 2	Open on Fault
7	Service Request Common	Form C Common
9	Termination (120 Ohm)	Connect to pin 4 to terminate unit on end of bus

Serial Port, Local (J5) - DB9 (M)

The local serial port is used to support special transceiver systems and remote control panels. The baud rate of this port is fixed at 9600 Baud and cannot be changed. J5 is permanently configured for RS-485 half duplex communication. Table 3 details the local serial port pin-out. Port features full galvanic isolation from chassis ground.

Table 3: Serial Port, Local (J5) Pin-Outs

Pin	Description	Notes
1	RS-485 RX+	
2	RS-485 RX-	
3	RS-485 TX-	
4	RS-485 TX+	
5	Signal Ground	
9	Termination (120 Ohm)	Connect to pin 1 to terminate unit on end of bus

Service Port (J6) - Mini USB

A 5-contact Mini USB connector is used to provide flash re-programmability for the controller card. In order to reload controller board firmware, connect this port to a standard PC USB port. See the **Fault Analysis and Troubleshooting** section for a description of the firmware upgrade procedure.

Parallel I/O Connector (J7) - DB37 (F)

The controller has a full compliment of parallel monitor and control lines. A 37-pin D sub-style connector is used for the parallel I/O signals, which are detailed in Table 4.

Table 4: Parallel I/O Port (J7) Pin-Outs

Identification	Signal	Pin	Function	Notes
Amp 1 Alarm	Output	1	Closed on Fault	Relay contacts: 30VDC @ 0.5A
Amp 1 Alarm	Output	20	Common	
Amp 1 Alarm	Output	2	Open on Fault	
Amp 2 Alarm	Output	21	Closed on Fault	Relay contacts: 30VDC @ 0.5A
Amp 2 Alarm	Output	3	Common	
Amp 2 Alarm	Output	22	Open on Fault	
Amp 3 Alarm	Output	4	Closed on Fault	
Amp 3 Alarm	Output	23	Common	
Amp 3 Alarm	Output	5	Open on Fault	
Auto/Manual Mode	Output	24	Closed on Manual	
Auto/Manual Mode	Output	6	Common	
Auto/Manual Mode	Output	25	Closed on Auto	
Local/Remote Mode	Output	7	Closed on Local	
Local/Remote Mode	Output	26	Common	
Local/Remote Mode	Output	8	Closed on Remote	
Switch #1 Position	Output	27	Switch #1, Position 1	
Switch #1 Position	Output	9	Common	
Switch #1 Position	Output	28	Switch #1, Position 2	
Switch #2 Position	Output	10	Switch #2, Position 1	
Switch #2 Position	Output	29	Common	
Switch #2 Position	Output	11	Switch #2, Position 2	
Power Supply #1 Alarm	Output	30	Closed on Fault	
Power Supply #1 Alarm	Output	12	Common	
Power Supply #1 Alarm	Output	31	Open on Fault	
Power Supply #2 Alarm	Output	13	Closed on Fault	
Power Supply #2 Alarm	Output	32	Common	
Power Supply #2 Alarm	Output	14	Open on Fault	
Priority Setting	Output	33	Closed on Priority 2	
Priority Setting	Output	15	Common	
Priority Setting	Output	34	Closed on Priority 1	
Fault Clear	Input	37	Ground to Activate	5mA max current on all inputs
Priority Select	Input	17	Ground to Activate	Toggle Function
Auto/Manual	Input	16	Ground to Activate	Toggle Function; Alternate function: External Mute Input
Amp 3 Standby	Input	36	Ground to Activate	
Amp 2 Standby	Input	35	Ground to Activate	
Amp 1 Standby	Input	18	Ground to Activate	
Inputs Ground (isolated)	Common	19		

Ten Form-C relays are used for converter, switch position, and mode control. Each Form-C contact has a rating of 30 VDC @ 0.5 A, 110 VDC @ 0.3 A, and 125 VAC @ 0.5 A. The inputs and ground pins are isolated from the rest of the unit's circuitry. Inputs are activated by pulling it down to the isolated ground pin. In order to fully utilize the built-in inputs protection, it is recommended to keep the input's ground isolated from the chassis ground.

See the External mode description in the **Touchscreen Operation** section for instructions on how to use the Auto/Manual Input (Pin 16) as an External Mute Input.

⚠ **Note: The RCP2-1000-CO remote control panel does not require connection to this port.**

External Alarm Port (J8) - DB9 (F)

An external alarm port is provided to allow maximum flexibility of configurations. This allows the user to interface with the alarm output of other equipment into the controller. Inputs are protected against ESD of ±15 kV using the Human Body model; against ESD of ±8kV using the Contact Discharge method specified in IEC1000-4-2; and against ESD of ±15 kV using the Air Gap method described in IEC1000-4-2. Table 5 shows the external alarm pin-out.

Table 5: External Alarm Port (J8) Pin-Outs

Function	Pin	Notes
External Alarm 1	1	Closure to Ground, 5mA max short circuit current, 5 VDC open circuit voltage
External Alarm 2	2	Closure to Ground, 5mA max short circuit current, 5 VDC open circuit voltage
External Alarm 3	3	Closure to Ground, 5mA max short circuit current, 5 VDC open circuit voltage
Ground	4,8,9	
Auxiliary Alarm 1	5	Closure to Ground, 5mA max short circuit current, 5 VDC open circuit voltage
Auxiliary Alarm 2	6	Closure to Ground, 5mA max short circuit current, 5 VDC open circuit voltage
Auxiliary Alarm 3	7	Closure to Ground, 5mA max short circuit current, 5 VDC open circuit voltage

⚠ **Note: The RCP2-1000-CO remote control panel does not require connection to this port.**

Ethernet Port (J9) - RJ45 (F)

This is a RJ45 connector with integrated magnetics and LEDs. This port becomes the primary remote control interface when the Interface option is selected to "IPNet" or SNMP interface as described in the Communication > Interface description of the **Touchscreen Operation** section.

This feature allows the user to connect the controller to a 10/100 Base-T office Local Area Network and have full-featured Monitor & Control functions through a web interface. See Table 6.

Table 6: Ethernet Port (J9) Pin-Outs

Pin	Function
1	TX+
2	TX-
3	RX+
6	RX-
4,5,7,8	Ground

⚠ **Note: IP address, Gateway address, Subnet mask, IP port and IP Lock address need to be properly selected prior to first use.**

LED lamps on the connector indicate network status. A steady Green light indicates a valid Ethernet link; a flashing Yellow LED indicates data transfer activity (on either the Transmit and Receive paths). Starting with firmware version 6.00, the controller can support multiple remote control interfaces. See the **Remote Control Interface** section for details.

Prime Power Connection (J1, J2)

Two separate removable power supplies are provided for fully redundant operation. Either of the two supplies is capable of operating the system and its associated switches. Two AC power connectors are provided on the rear panel (J1,J2).

Removable Power Supply Modules

The unit has a redundant power supply array consisting of two modules. A failed power supply module may be removed from the chassis by loosening the two captured thumbscrews and sliding the module out of the chassis, then unplugging the quick-disconnect power pole connectors.

24V Power Supply Module

Figure 3 shows an outline drawing of a power supply module.

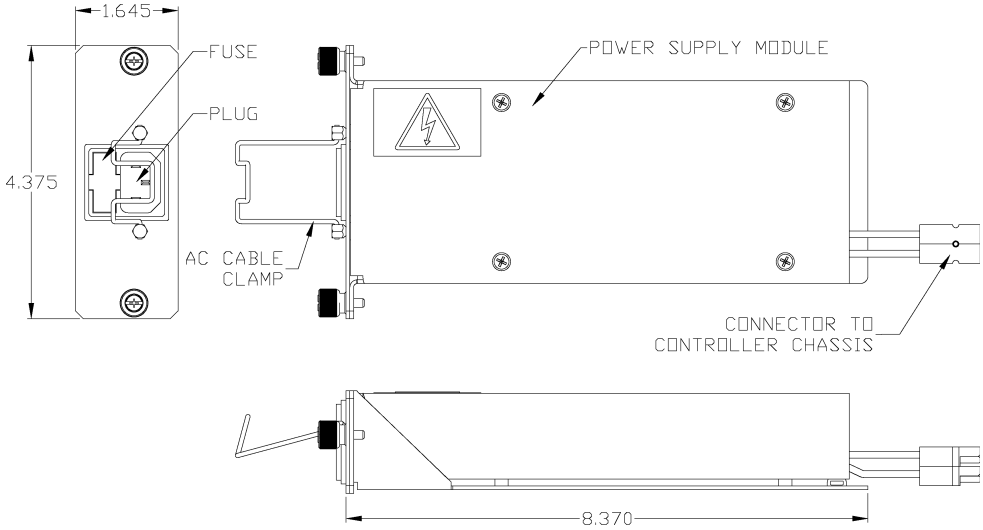

Figure 3: Outline Drawing, 24V Power Supply Module

The following list comprises the specifications for the standard power supply module:

Plug: IEC, 250V, 10A, Male plug with wire-form AC Cable Clamp
Fuse: 2 Amp 5x20mm
Power Supply: 85-264 V input, 28V output, 175W
Connector to chassis: Quick-connect Power pole

See the **Fault Analysis and Troubleshooting** section for directions on identifying and replacing a failed power supply module.

24V Power Supply Module, High Power option

Figure 4 shows an outline drawing of a power supply module for units utilizing the High Power (-HP) option.

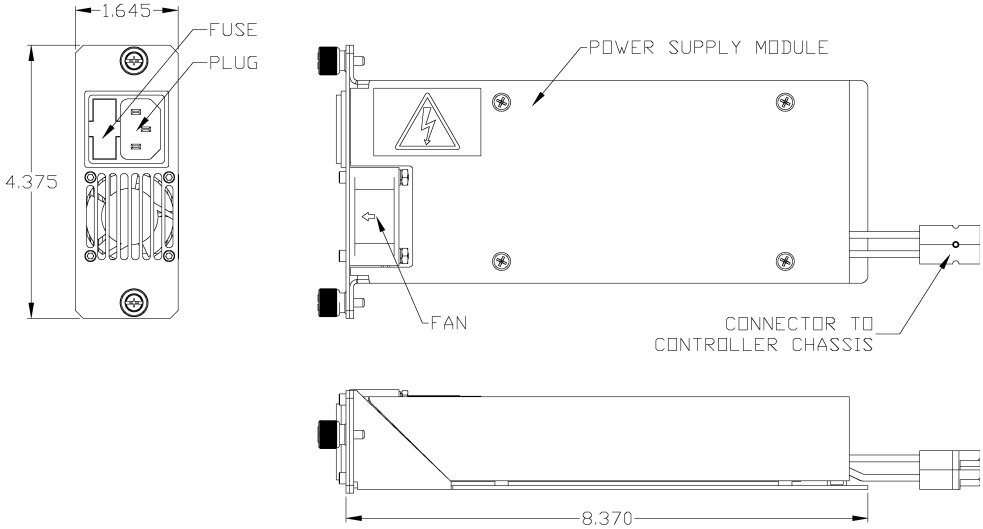

Figure 4: Outline Drawing, -HP Option Power Supply Module

The following list comprises the specifications for the -HP option power supply module:

Plug: IEC, 250V, 10A, Male plug
Fuse: 2 Amp 5x20mm
Power Supply: 85-264 V input, 28V output, 175W
Fan: 40mm, 24V, 4.9 CFM
Connector to chassis: Quick-connect Power pole

See the **Fault Analysis and Troubleshooting** section for directions on identifying and replacing a failed power supply module.

48V Power Supply Module

Figure 5 shows an outline drawing of a 48V power supply module.

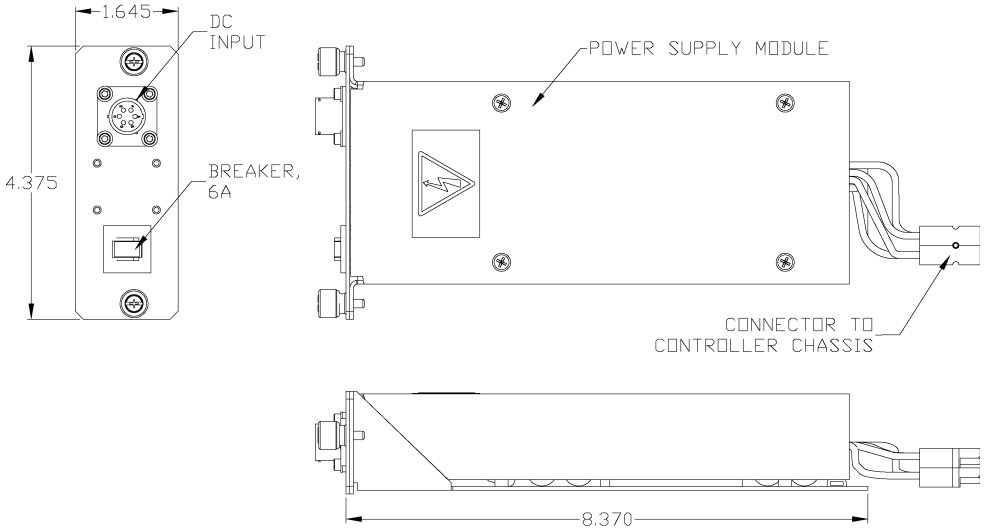

Figure 5: Outline Drawing, 48V Power Supply Module

The following list comprises the specifications for the 48V power supply module:

Plug: MS3112E10-6P Circular MIL connector, 6-pin (MS3116F10-6S mating)
Circuit Breaker: 6 Amp
Power Supply: 48V, 150W
Connector to chassis: Quick-connect Power pole

See the **Fault Analysis and Troubleshooting** section for directions on identifying and replacing a failed power supply module.

Design Philosophy

The redundant controller was designed to achieve a new level in high reliability, maintenance free operation. A tightly integrated modular assembly approach has been used to realize an extremely versatile controller while maintaining its user friendly operator interface. Four basic building blocks are combined in the redundant system controller:

1. Redundant Power Supplies
2. Digital Core Board Assembly
3. I/O Board Assembly
4. Touchscreen Display

Redundant Power Supplies

A block diagram of the controller is shown in Figure 6. Two power supplies are provided in the controller. These supplies can be connected to two independent AC sources for absolute system redundancy. Either supply is capable of operating the controller and its associated transfer switches. Both power supplies have universal input capability operating over an input voltage range of 85 to 265 VAC and line frequencies of 47 to 63 Hz. The power supplies have a power factor of 0.93 ensuring minimum line harmonic products. Each power supply produces +26 VDC.

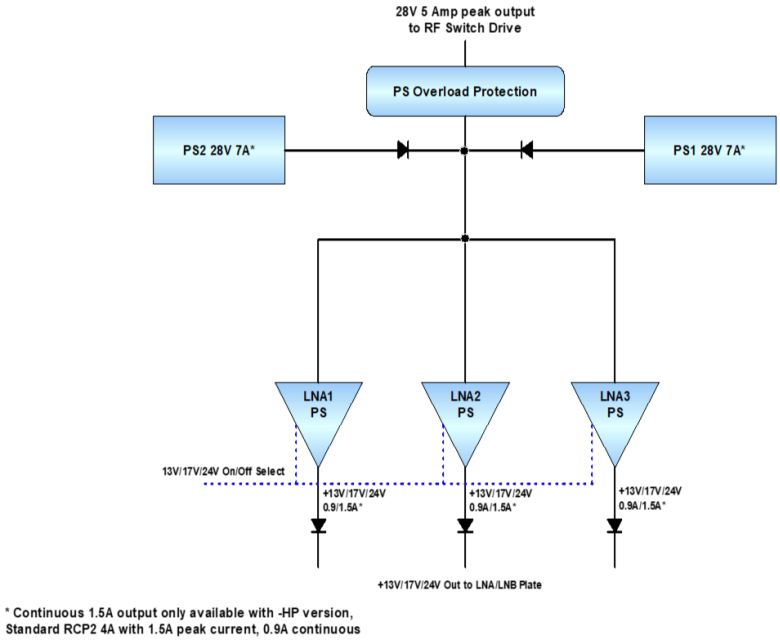

Figure 6: Block Diagram, Power Supply Configuration

The controller provides three channel power outputs for connecting external LNA/LNB units. In standard configuration, each LNA/LNB channel can be selected to supply 13V or 17V with up to 900 mA DC current output. Output voltage is user-selectable either from the front panel menu or over the remote control interface. The -HP model provides an additional 24V 1500 mA output option for use with higher power external equipment.

All channels are protected from overload and will reduce output if the maximum power output capacity is exceeded by an external load.

> ⚠ **Note for 24V 1500 mA channel output: In order to provide an equal load to both internal AC/DC supplies, channels derive their power asymmetrically: Channel 1 from PS2, Channel 3 from PS1; and Channel 2 from either PS2 or PS1. See Figure 6. This configuration allows default standby Channel 2 to power up in case one of the AC/DC power supplies fails. In order to conserve power from the remaining power supply, the LNA/LNB channel will reduce its power output to 13V, 900 mA.**

Digital Core Board

The Digital Core Board is operated by a microcontroller unit. All digital I/O lines feature transient absorbing devices and a ground isolated barrier for extra protection. The power supply lines are protected by current limiting devices. The digital core board also contains a USB port that allows the controller to be firmware upgradeable in the field.

I/O Board Assembly

The I/O Board Assembly contains the primary parallel (hardware) interface circuitry of the controller. It is physically attached to the Digital Core Board by a 40-pin header. The I/O Board provides user selectable output voltage: +13, 17 and 24 VDC supply output for the LNB units.

Each output on a standard unit can supply continuously up to 0.9A and up to 1.5A in peak current. The -HP version can supply 1.5A continuously. All channels are short circuit protected. The 10 Form C relays and opto isolated inputs for the parallel I/O interface are included on this board assembly. A series of rugged N-channel enhancement mode MOSFET devices provide the current sink circuitry to drive either one or two waveguide transfer switches.

Touchscreen Display

Rarely found in redundant controllers, the controller provides a large full-color touchscreen panel. This provides an extremely user friendly interface. The touchscreen is directly interfaced to the microcontroller via the address and data bus. Virtually all of the controller's setup and adjustments are accessible from the touchscreen. There is no need to access the interior of the controller to make any setup changes.

The touchscreen may be configured as a redundant system controller (1:1 or 1:2), as a phase combined controller (1:1 fixed phase combined or 1:2 phase combined), or as a maintenance switch. A great deal of human engineering has gone into the design of this membrane panel. A full complement of alarm indicators are provided along with the mimic display which shows the switch positions of the redundant system. An intuitive menu structure allows the user to easily set the operating parameters, and monitor and control the connected system. Separate Action Buttons have been provided for frequently used functions, further enhancing the controller's ease of use. See the **Touchscreen Operation** section.

Control Cable Considerations

The redundant controller is designed to drive negative 28 VDC latching style transfer switches. Latching means that the switch has a self cutoff and does not require continuous current consumption. Some commonly used waveguide transfer switches used in Teledyne Paradise Datacom Redundant Systems are given in Table 7.

Table 7: Commonly Used Waveguide Transfer Switches

Part Number	Description	Manufacturer	Voltage Range	Current
75SBOS	10.7-14.5 GHz (Waveguide/Coax)	Sector	-20 to -30 VDC	0.80 Amps
3NBGS	5.8-6.4 GHz (Waveguide/Coax)	Sector	-20 to -30 VDC	2 Amps
2SBGS	3.7-4.2 GHz (Waveguide/Coax)	Sector	-20 to -30 VDC	3 Amps
4BF	1.7-2.6 GHz (Waveguide)	Sector	-20 to -30 VDC	4 Amps

As Table 7 shows, the switch drive current is dependent on the frequency band which determines the physical size of the switch motor. Therefore the system designer must consider the resistive cable losses when choosing a control cable length.

Similarly, the system designer must ensure use of the proper cable insulation for the particular installation. Teledyne Paradise Datacom uses both standard service and burial grade for redundant system control cables. Standard service cable has a PVC jacket which is ultra violet ray (UV) stable in outdoor use. However, standard service cable should not be immersed in water or be buried underground for long periods of time. For such applications, burial grade cable should be installed.

The controller sources a maximum +26 VDC @ 5 Amps to the transfer switch. A typical -28 VDC waveguide switch will operate over a range of -20 to -30 volts. Therefore, the minimum voltage required at the waveguide switch is -20 VDC. Using this as a design guideline, the control cable should be sized so that it does not drop more than 6 VDC from the controller to the switch.

Teledyne Paradise Datacom control cables utilize 20 conductors of #18 AWG stranded wire. The control cable schematic is shown in Figure 7. The resistance of #18 AWG stranded wire is 6.5 ohms per 1000 feet. The controller switch connector (J3) allows contacts for two wires per switch connection. Therefore, two conductors can be paralleled for both the source and return lines for the transfer switch. With a maximum allowable voltage drop of 6 volts, this equates to a 3 volt drop in the source wires and 3 volt drop in the return wires. This is shown schematically in Figure 7. Using four (4) parallel #18 AWG conductors gives a resultant cable resistance of 1.6 ohms per 1000 feet, or 0.0016 ohms per foot.

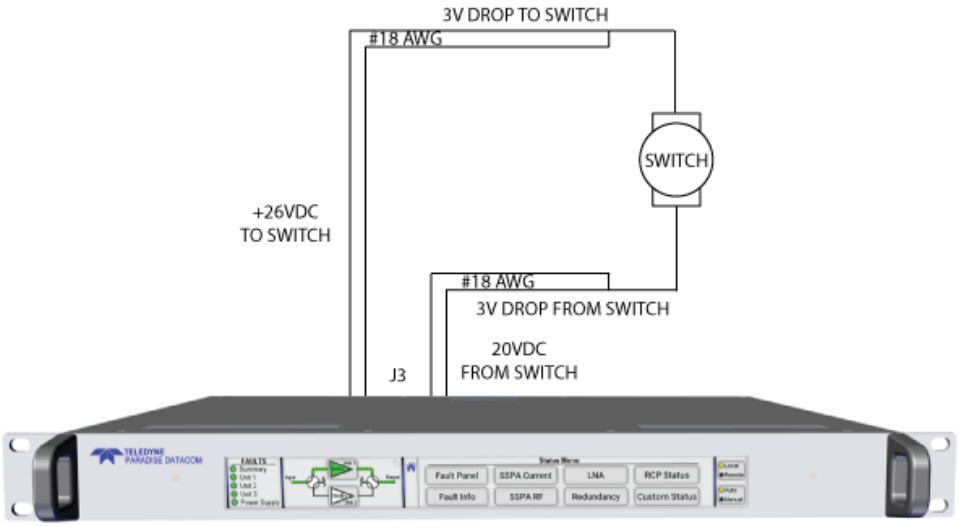

Figure 7: Cable Losses to Transfer Switch

To calculate the maximum cable length that can be accommodated to the transfer switch, first consider the current draw by the switch either from the manufacturer's data or from Table 7. Next divide this current into 6 volts. This gives the maximum cable resistance to and from the switch. Finally, divide this cable resistance by 0.0016 ohms/ft. to find the maximum cable length. This is shown in the following example:

```
Switch Current draw = 3 Amps
6 V / 3 Amps = 2 ohms (maximum cable resistance)
2 ohms/0.0016 ohms/ft. = 1250 ft.;
maximum cable length using (4) #18 AWG connectors
```

Table 8 gives the maximum cable length for some popular switches.

Table 8: Maximum Cable Length for Selected Switches (Single Switch Systems)

Part Number	Description	Manufacturer	Maximum Cable Length
75SBOS	10.7-14.5 GHz (Waveguide/Coax)	Sector	4,690 ft. (1,430 m)
3NBGS	5.8-6.4 GHz (Waveguide/Coax)	Sector	1,880 ft. (572 m)
2SBGS	3.7-4.2 GHz (Waveguide/Coax)	Sector	1,250 ft. (381 m)
4BF	1.7-2.6 GHz (Waveguide)	Sector	938 ft. (286 m)

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RCP2-1000-CO, Touchscreen Menu Structure

Teledyne Paradise Datacom
Drawing Number: 217091-1 Revision -
RA 7813
22 May 2020

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Introduction

All versions of the RCP controller are available with a front panel touchscreen, from which the user can control the connected amplifier or amplifier system, and obtain information about the operational status of the connected amplifiers.

There are four main areas on the touchscreen display, as shown in Figure 1:

- Menu [1]
- Fault Indicators [2]
- RF Signal Path Display [3]
- Action Buttons [4]

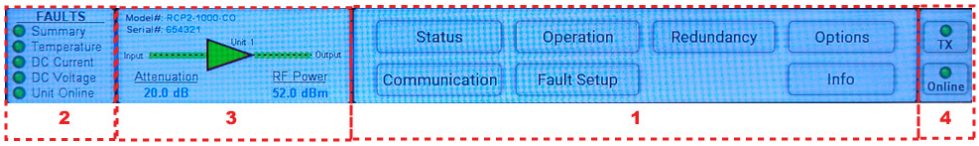

Figure 1: Main Areas of the RCP2-1000-CO Touchscreen Front Panel

Menu

This area is where all menu selections are made. See the **Local (Front Panel) Menu Structure** section below for a complete description of the menu selections.

Fault Indicators

Up to five fault indicators are shown in the left-most section of the touchscreen display. The Summary fault indicator is always displayed at the top. The user can select up to four other fault indicators to be displayed. See the **Config Faults** section.

By default, in addition to the Summary fault indicator, the following fault indicators are shown:

- Temperature
- DC Current
- DC Voltage
- Unit Online

If the fault indicator is green, it means there is no fault present for that fault parameter. If the fault indicator is flashing red, a fault exists for that fault parameter. If the fault indicator is yellow, a communication error with the module exists.

Depending on fault settings, the presence of certain types of faults will also trigger a Summary fault.

RF Signal Path Display

To the right of the fault indicators is the RF Signal Path Display of the connected unit. The display shows the operational state of the connected amplifier, input RF path and output RF path. It also displays the current attenuation setting and RF output power value.

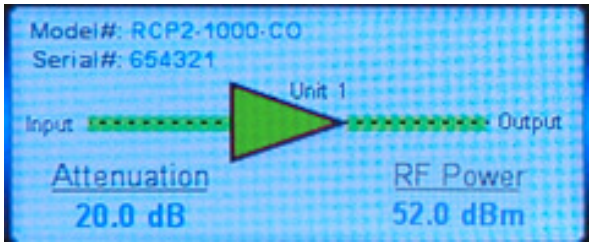

Figure 2: RF Signal Path Display

A green amplifier symbol (triangle symbol) indicates that the amplifier is functioning normally. A red amplifier symbol indicates that the amplifier has a fault condition.

Action Buttons

Up to two action buttons may appear to the far right of the touchscreen. These buttons are typically used to trigger common functions without having to navigate through the menu structure.

By default, the Mute (TX) button is on top, and the Attenuation button is on the bottom. See Figure 3. The button selection may be customized by the user. See the **Config Buttons** section.

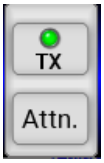

Figure 3: Action Buttons

Mute (TX) Button

The Mute (TX) Action button allows the user to quickly mute or unmute the connected amplifier.

Tapping the Mute (TX) button results in a confirmation window (unless prompts are disabled in the **Options > Front Panel > Confirm Prompt** menu) to change the mute state of the connected amplifier. Tap the OK button to change the mute state or the Cancel button to keep the current mute state. See Figure 4.

Figure 4: Action Button > Mute Setting

If confirmation prompts are disabled, tapping the Mute (TX) button will toggle the mute state of the amplifier between muted and unmuted.

Attenuation Button

The Attenuation Action button gives the user the ability to alter the gain setting of the connected amplifiers from the touchscreen. Any adjustments to attenuation using this button are immediately applied to the connected amplifiers.

Tapping the Attenuation button opens the attenuation setting screen. See Figure 5. The current attenuation setting is displayed in the green window. The user may adjust the ones place and the tenths place by touching the up and down arrows on the screen. Tap the OK button to accept the attenuation setting.

Figure 5: Action Button > Attenuation Setting

Standby State Button

The Standby State Action button allows the user to switch the standby state of the connected amplifier between the Standby state and the Online state.

Tapping the Standby State button results in a confirmation window (unless prompts are disabled in the **Options > Front Panel > Confirm Prompt** menu) to change the standby state of the connected amplifier. Tap the OK button to change the standby state or the Cancel button to keep the current state.

Control Mode Button

The Control Mode button allows the user to switch between Local control or Remote only control of the controller. Tapping the Control Mode button results in a confirmation window (unless prompts are disabled in the **Options > Front Panel > Confirm Prompt** menu) to change the control mode to either Local or Remote mode. A yellow indicator on the button shows which mode is currently active for the unit. Tap the OK button to change the control mode or the Cancel button. See Figure 6.

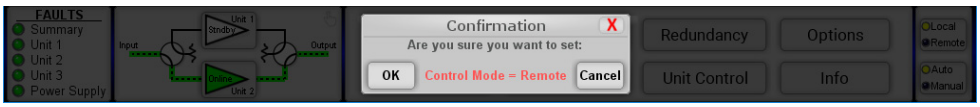

Figure 6: Action Button > Control Mode Setting Confirmation

If confirmation prompts are disabled, tapping the Switch Mode button will toggle the control mode between Local and Remote.

Note that when the unit is in Remote mode, the user will not be able to access any functions from the touchscreen except the Local/Remote Action button. A message on the display will indicate "Unit in Remote Mode". See Figure 7.

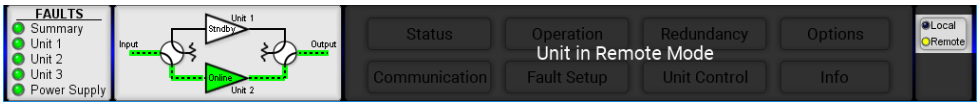

Figure 7: Display When in Remote Mode

Local (Front Panel) Menu Structure

Figure 8 shows the Main Menu hierarchy.

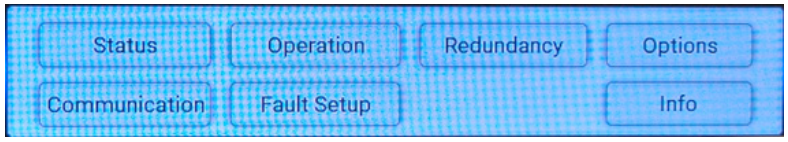

Figure 8: Main Menu Buttons

There are eight main levels of menu selections.

- Status - Unit information menu sublevel
- Communication - All communication-related settings
- Operation - Unit operation related settings
- Fault Setup - Fault handling settings
- Redundancy - All settings related to redundant system modes
- Options - Miscellaneous settings and functions
- Info - Display of connected unit/controller information and time settings

The user should tap the button of interest to proceed to the next menu level. When navigating the menu, the user can tap the Home icon to go back to the main menu at any time. There are also icons that may be used to go back to the previous screen.

Status Menu

Figure 9 shows the Status menu.

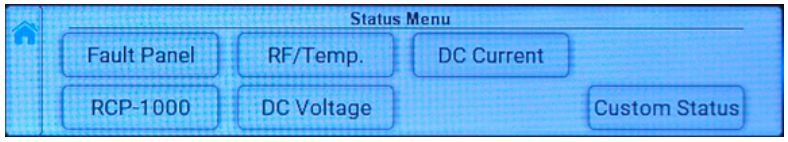

Figure 9: Status Menu

The Status menu includes the following buttons:

- Fault Panel
- RCP-1000
- RF/Temp
- DC Voltage
- DC Current
- Custom Status

Fault Panel Menu

Figure 10 shows the Fault Panel.

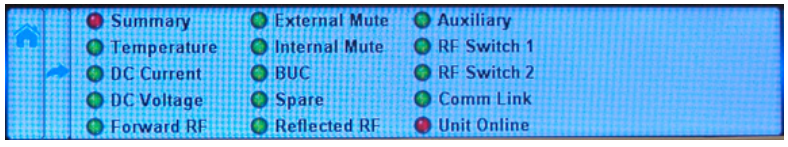

Figure 10: Status > Fault Panel

The Fault Panel displays the fault status for various parameters monitored by the unit's controller. A green icon next to the unit condition title indicates a non-faulted state. A red icon next to the unit condition title indicates a faulted state. A yellow icon indicates a communication error. A black icon designates a condition not applicable to the unit.

Fault states for the following conditions are displayed: Summary fault, Temperature fault, DC Current fault, DC Voltage fault, Forward RF fault, External Mute status (green = no external mute), Internal Mute status (green = no internal mute), BUC fault, Spare fault, Reflected RF fault, Auxiliary fault, RF Switch 1 fault, RF Switch 2 fault, Comm Link status and Unit Online status (green = unit online).

RCP-1000 Menu

Figure 11 shows the RCP-1000 menu.

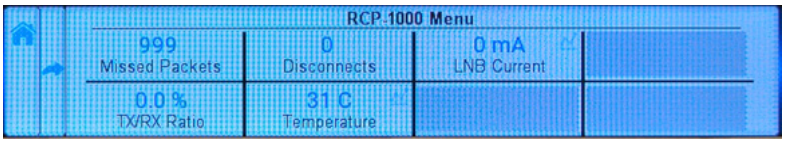

Figure 11: Status > RCP-1000

The RCP-1000 menu summarizes the quality of the serial control link to the remote amplifier, as well as the internal temperature of the RCP unit and the current provided to an external LNB.

Parameters displayed include:

- Missed Packets - Displays the number of unanswered request packets since the last RCP power-up or since the last "Clear Faults" command was initiated.
- TX/RX Ratio - Shows the percentage of successful request/response packets out of total number of sent packets. This value begins calculation upon RCP power-up and gets reset when a "Clear Faults" command is executed by the operator.
- Disconnects - This value indicateds the number of disconnect events (5 or more unanswered packets in a row) that have occurred since the last RCP power-up or since the last "Clear Faults" command.
- Temperature - Shows the internal temperature of the RCP unit.
- LNB Current - Displays the current consumption of an externally connected LNB (if equipped).

RF/Temp Menu

Figure 12 shows the RF/Temp menu.

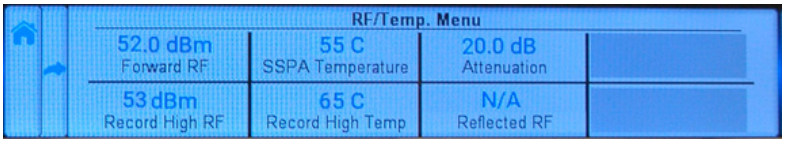

Figure 12: Status > RF/Temp Menu

The RF/Temp menu displays the following measured values from the connected amplifier:

- Forward RF - The forward RF output power of the amplifier, in dBm or Watts (depending on operator selection), with an accuracy of 0.1 dB.
- Record High RF - The record high RF output of the amplifier.
- SSPA Temperature - The current temperature of the amplifier's internal baseplate in degrees Centigrade.
- Record High Temp - The record high temperature of the amplifier is displayed here, displayed in degrees Centigrade.
- Attenuation - Displays the amplifier's gain attenuation setting (in dB), with an accuracy of 0.1 dB.
- Reflected RF - Shows the reflected RF to the amplifier (if the amplifier includes a reflected power monitor, and the RCP is configured to display this value).

DC Voltage Menu

Figure 13 shows the DC Voltage menu.

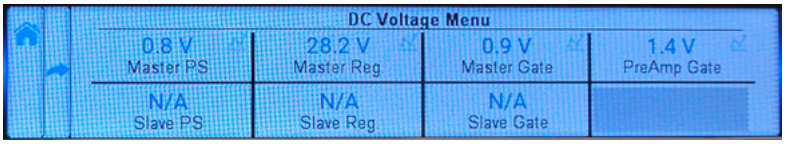

Figure 13: Status > DC Voltage Menu

The DC Voltage menu shows the following values:

- Master PS - Main power supply 1q output voltage with an accuracy of 0.1V. Normal output voltage should be in a range of 11 to 58 V.
- Slave PS - Displays "N/A" unless connected amplifier is configured with a master/slave power supply.
- Master Reg. - Voltage regulator output. In an unmuted state, depending on the model of the connected amplifier, thisvalue should read close to 10V for GaAs-based units and anywhere from 20 to 55V for GaN-based units. If the SSPA is muted, this value should be close to 0V for all units.
- Slave Reg. - Displays "N/A" unless the connected amplifier includes a master/slave power supply.
- Master Gate - Negative RF GASFET gates bias voltage. This value varies depending on the temperature and mute state of the connected amplifier. The approximate value window is 1.5 to 7 V.
- Slave Gate - Displays "N/A" unless the connected amplifier includes a master/slave power supply.
- PreAmp Gate - For units which include a preamplifier, displays the gate bias voltage of the pre-amp. Otherwise displays "N/A".

DC Current Menu

Figure 14 shows the DC Current menu.

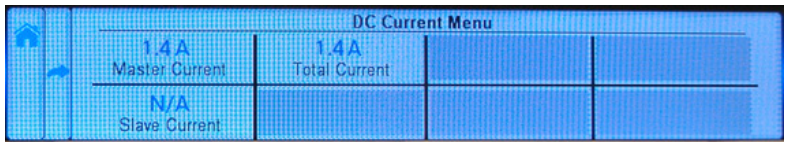

Figure 14: Status > DC Current Menu

The DC Voltage menu shows the following values:

- Master Current - DC current draw by the RF module of the remote amplifier from the main power supply. This value varies depending on the model of the connected unit. If the amplifier is muted, this value should drop to a range of 0 to 5A.
- Slave Current - Displays "N/A" unless connected amplifier is configured with a master/slave power supply.
- Total Current - Total of Master and Slave current draw.

Custom Status Menu

Figure 15 shows the Custom Status menu after the operator selected the parameters to be displayed. Up to eight (8) parameters may be displayed. See the

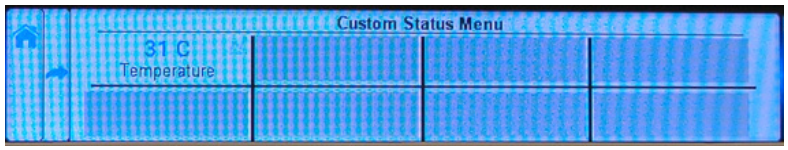

Figure 15: Status > Custom Status Menu

Figure 16 shows the default display until the user assigns a set of parameters to be shown on this screen. See the Config Status section.

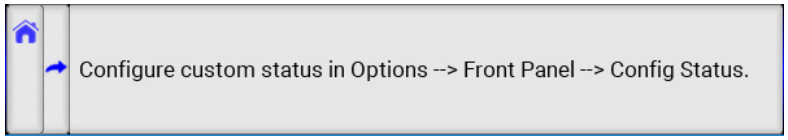

Figure 16: Status > Custom Status Menu

Communication Menu

Figure 17 shows the Communication menu.

Figure 17: Communication Menu

The Communication menu includes the following buttons:

- Serial
- IP Setup
- SNMP Setup
- Trap Setup
- RCP Address
- RCP Interface
- Panel Setup

Serial Button

Tapping the Serial button opens the Serial menu, from which the user can select the Baud Rate and Serial Protocol used by the controller. See Figure 18.

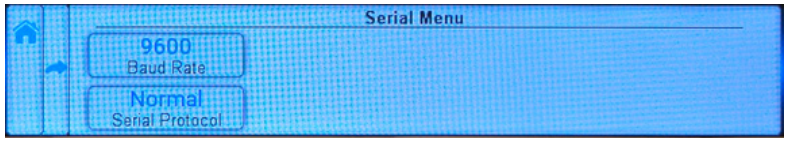

Figure 18: Communication > Serial Menu

Baud Rate Menu

Tapping the Baud Rate button opens the Baud Rate menu. The user may select from the available baud rates. Default baud rate is 9600. See Figure 19.

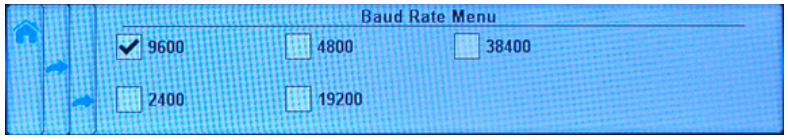

Figure 19: Communication > Serial > Baud Rate Menu

Serial Protocol Menu

Tapping the Serial Protocol button opens the Serial Protocol menu. The user may select either Normal or Terminal communication protocol. See Figure 20.

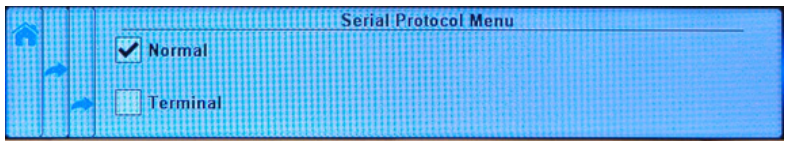

Figure 20: Communication > Serial > Serial Protocol Menu

IP Setup Button

Tapping the IP Setup button opens the IP Setup menu, from which the user can select the IP address and parameters used by the controller. See Figure 21.

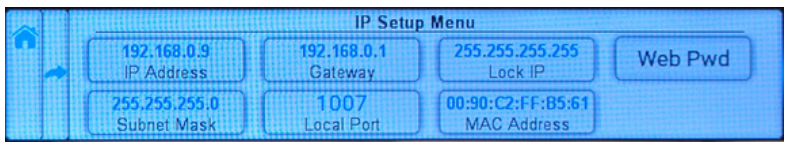

Figure 21: Communication > IP Setup Menu

IP Address

Tapping the IP Address button opens the IP Address menu, from which the user can enter the IP Address for the controller. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap each section to enter the values for that octet. Default IP Address is 192.168.0.9. See Figure 22.

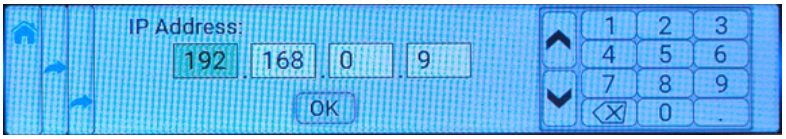

Figure 22: Communication > IP Setup > IP Address Selection

Tap the OK button to accept the entered values and return to the IP Setup Menu.

> ⚠ **Note: Teledyne Paradise Datacom products use IPv4, Class C addressing.**

Subnet Mask

Tapping the Subnet Mask button opens the Subnet Mask menu, from which the user can enter the Subnet Mask for the controller. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap each section to enter the values for that octet. Default Subnet Mask is 255.255.255.0. See Figure 23.

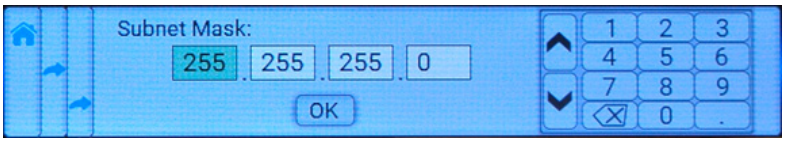

Figure 23: Communication > IP Setup > Subnet Mask Selection

Tap the OK button to accept the entered values and return to the IP Setup Menu.

Gateway

Tapping the Gateway button opens the Gateway menu, from which the user can enter the Gateway for the controller. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap each section to enter the values for that octet. Default Gateway is 192.168.0.1. See Figure 24.

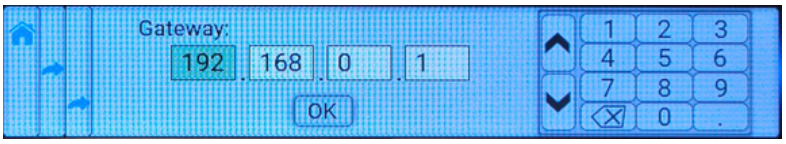

Figure 24: Communication > IP Setup > Gateway Selection

Tap the OK button to accept the entered values and return to the IP Setup Menu.

Local Port

Tapping the Local Port button opens the Local Port menu, from which the user can enter the Local Port for the controller. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Default Local Port is 1007. See Figure 25.

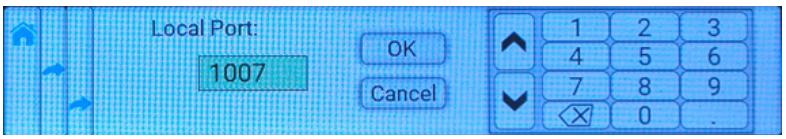

Figure 25: Communication > IP Setup > Local Port Selection

Tap the OK button to accept the entered values and return to the IP Setup Menu. Tap the Cancel button to revert to the last saved Local Port and return to the IP Setup Menu.

Lock IP

Tapping the Lock IP button opens the Lock IP menu, from which the user can enter the IP address from which requests will be accepted by the controller. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap each section to enter the values for that octet. See Figure 26. Default Lock IP Address is 255.255.255.255.

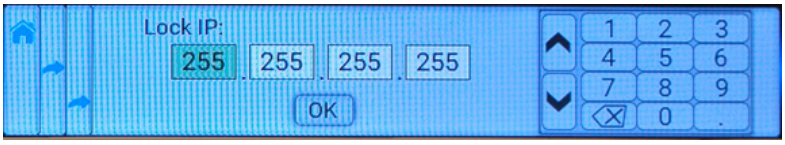

Figure 26: Communication > IP Setup > Lock IP Selection

Tap the OK button to accept the entered values and return to the IP Setup Menu.

The LockIP selection gives the user the ability to increase the security measure for the IPNet protocol. The controller will answer a request which comes only from the assigned IP address. For firmware prior to version 6.00, set this address value to 0.0.0.0 or 255.255.255.255 to disable this feature.

Starting with version 6.00, the Lock IP address function has been updated to allow "Binding" and "Masking" functions. "Binding" means that the first datagram retrieved for this socket will bind to the source IP address and port number. Once binding has been completed, the SSPA will answer to the bound IP source until the unit is restarted or reset. Without binding, the socket accepts datagrams from all source IP addresses.

Address 0.0.0.0 allows all peers, but provides binding to first detected IP source; Address 255.255.255.255 accepts all peers, without binding. If Lock IP is a multicast address, then the amplifier will accept queries sent from any IP address of multicast group.

MAC Address

Tapping the MAC Address button opens the read-only MAC Address display. See Figure 27.

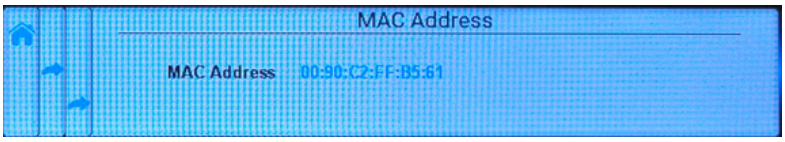

Figure 27: Communication > IP Setup > MAC Address Display

Web Password

Tapping the Web Password button opens the Web Password menu, from which the user can enter the web password which is requested when the user attempts to communicate with the controller over IPNet using a web browser. Use the alpha-numeric keypad on the screen to enter the value for the web password. When the alphabetic keypad is displayed, Tap the "#" symbol to switch to the numeric keypad. When the numeric keypad is displayed, tap the "A" to switch to the alphabetic keypad. Tap the "OK" button to confirm the entered password and return to the IP Setup Menu. Maximum password length is 20 characters. Erase all characters to disable password protection. Default Web Password is **paradise**. See Figure 28.

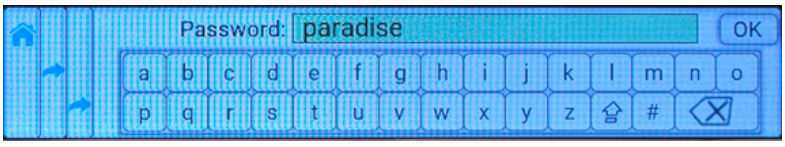

Figure 28: Communication > IP Setup > Web Password Selection

Tap the OK button to accept the entered values and return to the IP Setup Menu.

SNMP Setup Button

Tapping the SNMP Setup button opens the SNMP Setup menu, from which the user can select the Community Get and Community Set passwords, and review the User Info. See Figure 29.

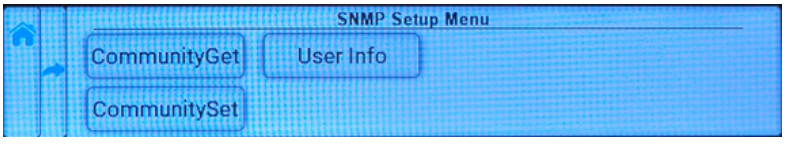

Figure 29: Communication > SNMP Setup Menu

Community Get

Tapping the Community Get button opens the Community Get menu, from which the user can enter the Community Get password which is requested when the user attempts to communicate with the controller over IPNET using SNMP. Use the alpha-numeric keypad on the screen to enter the value for the web password. When the alphabetic keypad is displayed, tap the "#" symbol to switch to the numeric keypad. When the numeric keypad is displayed, tap the "A" to switch to the alphabetic keypad. Tap the "OK" button to confirm the entered password and return to the IP Setup Menu. Maximum password length is 20 characters. Erase all characters to disable password protection. See Figure 30. Default Community Get password is **public**.

Figure 30: Communication > SNMP Setuip > Community Get Selection

Tap the OK button to accept the entered values and return to the SNMP Setup Menu.

Community Set

Tapping the Community Set button opens the Community Set menu, from which the user can enter the Community Set password which is requested when the user attempts to communicate with the controller over IPNET using SNMP. Use the alpha-numeric keypad on the screen to enter the value for the web password. When the alphabetic keypad is displayed, tap the "#" symbol to switch to the numeric keypad. When the numeric keypad is displayed, tap the "A" to switch to the alphabetic keypad. Tap the "OK" button to confirm the entered password and return to the IP Setup Menu. Maximum password length is 20 characters. Erase all characters to disable password protection. See Figure 31. Default Community Set password is **private**.

Figure 31: Communication > SNMP Setup > Community Set Selection

Tap the OK button to accept the entered values and return to the SNMP Setup Menu.

User Info

Tapping the User Info button opens the User Info display screen. See Figure 32.

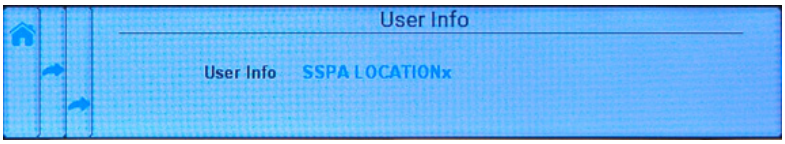

Figure 32: Communication > SNMP Setup > User Info Display

This screen is reserved for future development.

Trap Setup Button

Tapping the Trap Setup button opens the Trap Setup menu, from which the user can set the various SNMP trap parameters, and assign the Network Management System (NMS) IP address which will receive the trap notifications. See Figure 33.

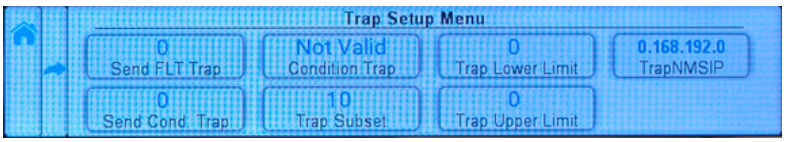

Figure 33: Communication > Trap Setup Menu

Send FLT Trap

Tapping the Send FLT Trap button opens the Send FLT Trap menu, from which the user can set the Send FLT Trap parameter. The value entered equals the number of attempts the unit will make to send all fault information to the assigned NMS IP address. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Entering "0" disables this feature. Tap the "OK" button to set the entered value. See Figure 34.

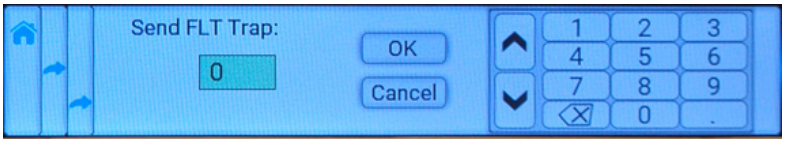

Figure 34: Communication > Trap Setup > Send FLT Trap Selection

Tap the OK button to accept the entered value and return to the Trap Setup Menu. Tap the Cancel button to revert to the last saved value and return to the Trap Setup Menu.

Send Cond. Trap

Tapping the Send Cond. Trap button opens the Send Cond. Trap menu, from which the user can set the Send Cond. Trap parameter. The value entered equals the number of attempts the unit will make to send the selected condition information to the assigned NMS IP address. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Entering "0" disables this feature. Tap the "OK" button to set the entered value. See Figure 35.

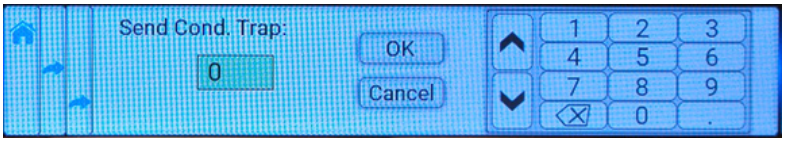

Figure 35: Communication > Trap Setup > Send Condition Trap Selection

Tap the OK button to accept the entered value and return to the Trap Setup Menu. Tap the Cancel button to revert to the last saved value and return to the Trap Setup Menu.

Condition Trap

Tapping the Condition Trap button opens the Condition Trap menu, from which the user can select the controller condition that will be monitored and trigger a trap notification if it falls outside the upper and lower limits defined by the user. See Figure 36.

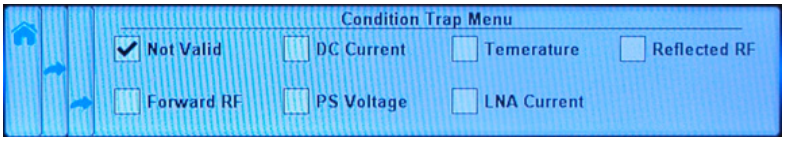

Figure 36: Communication > Trap Setup > Condition Trap Selection

Tick the checkbox beside the controller condition that will be monitored.

Trap Subset

Tapping the Trap Subset button opens the Trap Subset menu, from which the user can set the Trap Subset parameter. This parameter is required when the trap condition selected has multiple sources, such as multiple power supplies in a unit. The value entered corresponds to the condition source selected. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. See Figure 37.

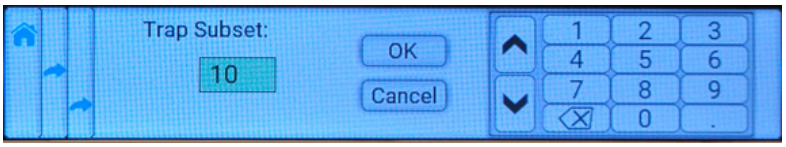

Figure 37: Communication > Trap Setup > Trap Subset Selection

Tap the OK button to accept the entered value and return to the Trap Setup Menu. Tap the Cancel button to revert to the last saved value and return to the Trap Setup Menu.

Trap Lower Limit

Tapping the Trap Lower Limit button opens the Trap Lower Limit menu, from which the user can set the lower limit of the selected condition being monitored. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. See Figure 38.

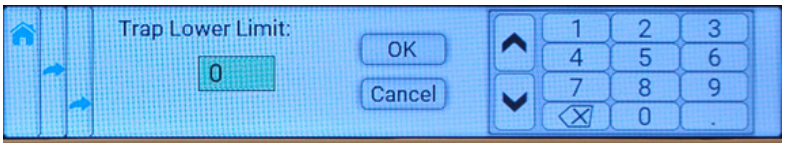

Figure 38: Communication > Trap Setup > Trap Lower Limit Selection

Tap the OK button to accept the entered value and return to the Trap Setup Menu. Tap the Cancel button to revert to the last saved value and return to the Trap Setup Menu.

Trap Upper Limit

Tapping the Trap Upper Limit button opens the Trap Upper Limit menu, from which the user can set the upper limit of the defined condition being monitored. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. See Figure 39.

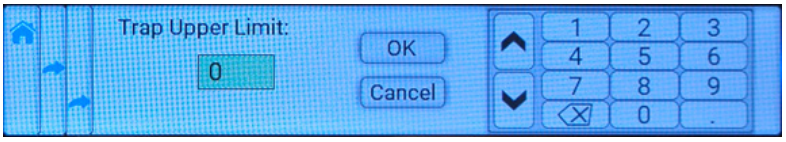

Figure 39: Communication > Trap Setup > Trap Upper Limit Selection

Tap the OK button to accept the entered value and return to the Trap Setup Menu. Tap the Cancel button to revert to the last saved value and return to the Trap Setup Menu.

TrapNMSIP

Tapping the Trap Setup button opens the Trap Setup menu, from which the user can assign the Network Management System IP address which will receive the trap notifications. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap each section to enter the values for that octet. Tap the "OK" button to set the selected address. The default address is 192.168.0.9. See Figure 40.

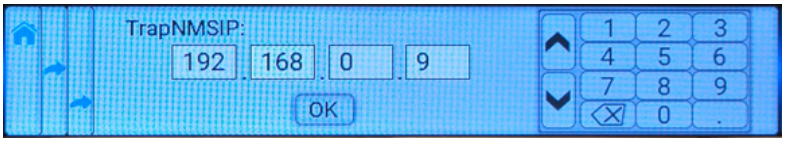

Figure 40: Communication > Trap Setup > Trap NMS IP Selection

Tap the OK button to accept the entered values and return to the Trap Setup Menu.

RCP Address

Tapping the RCP Address button opens the RCP Address menu, where the user can assign the network address of the RCP unit. See Figure 41.

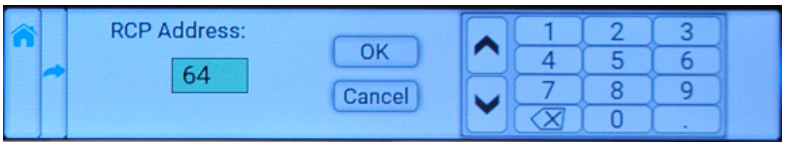

Figure 41: Communication > RCP Address Menu

Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the OK button to accept the entered value and return to the Communication Menu. Tap the Cancel button to revert to the last saved value and return to the Communication Menu.

RCP Interface

Tapping the RCP Interface button opens the RCP Interface menu, where the user can select the interface method used at the main serial port of the RCP unit. See Figure 42.

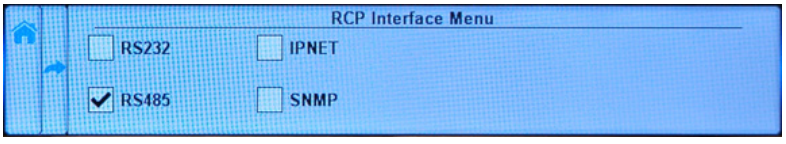

Figure 42: Communication > RCP Interface Menu

Tick the checkbox beside the desired communication interface. Select between "RS232", "RS485", "IPNET" and "SNMP".

Panel Setup

Tapping the Panel Setup button opens the Panel Setup menu. See Figure 43.

Figure 43: Communication > Panel Setup Menu

Poll Mode

Tapping the Poll mode menu opens the Poll Mode menu, where the user can select the polling method for communcating between the RCP and remote amplifier. See Figure 44.

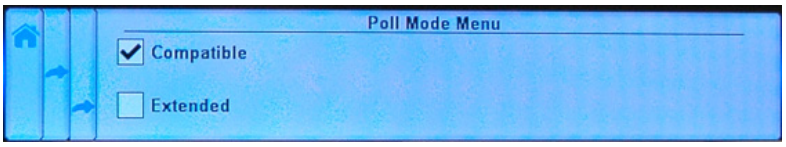

Figure 44: Communication > Panel Setup > Poll Mode

- Compatible - This option sets the RCP unit to work with legacy Compact Outdoor amplifiers. This mode must be selected for Teledyne Paradise Datacom amplifiers with serial numbers of 399999 and below. Extended serial protocol fields such as the Reflected RF detector reading are disabled in this mode.
- Extended - This mode can be used for newer Teledyne Paradise Datacom amplifiers with serial numbers of 400000 and above. This mode must be enabled to work with SSPA units equipped with a Reflected RF detector.

> ⚠ **Unless otherwise directed by the factory, this setting should be set to Extended mode.**

Remote Address

Tapping the Remote Address button opens the Remote Address menu, where the user can assign the network address of the RCP. See Figure 45.

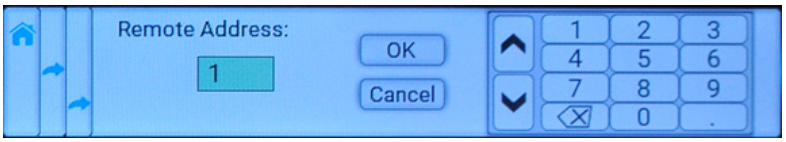

Figure 45: Communication > Panel Setup > Remote Address Menu

Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the OK button to accept the entered value and return to the Panel Setup Menu. Tap the Cancel button to revert to the last saved value and return to the Panel Setup Menu.

Fiber Link

Tapping the Fiber Link button opens the Fiber Link menu. Teledyne Paradise Datacom no longer supports communication with its amplifiers over fiber-optics. See Figure 46.

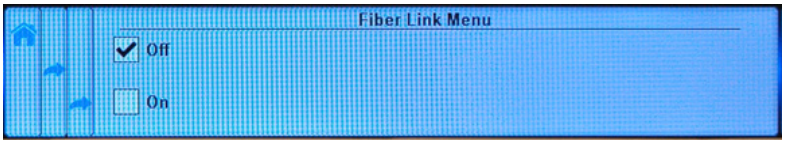

Figure 46: Communication > Panel Setup > Fiber Link Menu

⚠ **Note: This setting should be set to "Off".**

Operation Menu

Figure 47 shows the Operation menu.

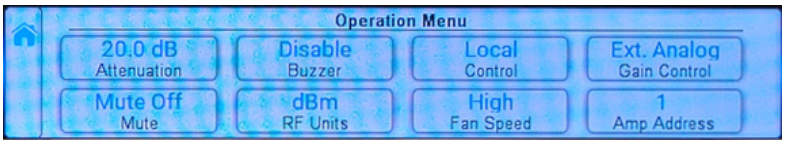

Figure 47: Operation Menu

The Operation menu includes the following buttons:

- Attenuation
- Mute
- Buzzer
- RF Units
- Control
- Fan Speed
- Gain Control
- Amp Address

Attenuation Menu

Tapping the Attenuation button opens the Attenuation menu, from which the user can select the amount of attenuation (in dB) that should be applied to the gain of the amplifier. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the "OK" button to set the selected value. See Figure 48.

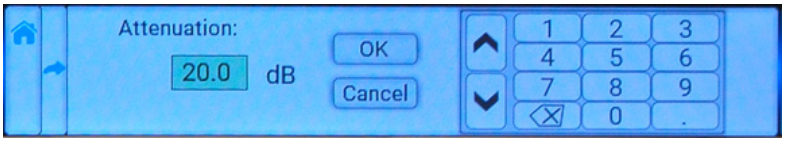

Figure 48: Operation > Attenuation Menu

Enter a value between 0 and 20.0 dB. If Auto Gain is enabled, the system will reserve 5 dB of attenuator range for gain compensation and attenuation is limited to a value between 0 and 15.0 dB.

Mute Menu

Tapping the Mute button opens the Mute Menu, from which the user can mute or unmute the connected unit. See Figure 49.

Figure 49: Operation > Mute Menu

The Mute On and Mute Off selections offer the same function as the **Mute (TX) Action Button**.

Buzzer Menu

Tapping the Buzzer button opens the Buzzer menu, from which the user can enable or disable the buzzer alarm that is triggered whenever a fault condition occurs. The current Buzzer state is checked. See Figure 50.

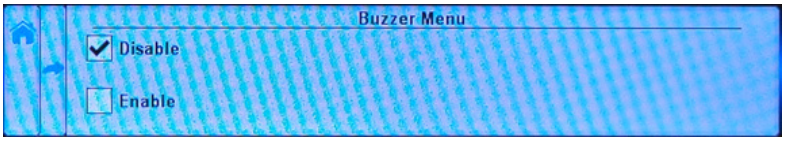

Figure 50: Operation > Buzzer Menu

Tick the checkbox beside the desired condition of the audible alarm buzzer.

RF Units Menu

Tapping the RF Units button opens the RF Units menu, from which the user can select the type of unit displayed on the touchscreen. Values are dBm and Watt. The current unit type selected is checked. See Figure 51.

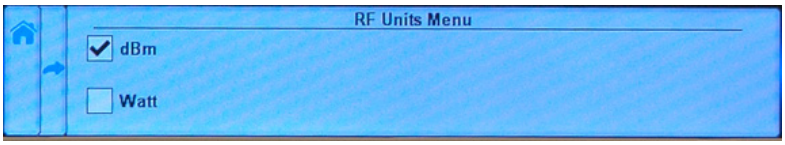

Figure 51: Operation > RF Units Menu

Tick the checkbox beside the RF unit type that will be displayed.

Control Menu

Tapping the Control button opens the Control Menu, from which the user can select either Local or Remote control of the unit. The current Control mode is checked. See Figure 52.

Figure 52: Operation > Control Menu

Note that this menu performs the same function as the **Control Mode Action** button.

Tick the checkbox beside the desired control mode. If Remote is selected, all local control will be disabled, except for the Control Action Button at the right of the touchscreen display. See Figure 53.

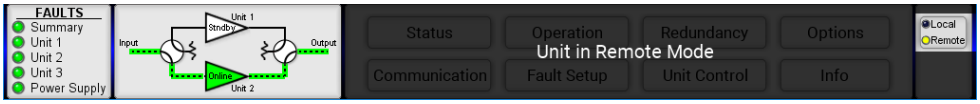

Figure 53: Remote Control Mode Active

Fan Speed

Tapping the Fan Speed button opens the Fan Speed Menu, from which the user can select how the fans of the connected amplifier operate. Note that no all amplifiers support this function. GaN Outdoor SSPAs with serial numbers greater than 399,999 are equipped with a Fan Speed Control option. See Figure 54.

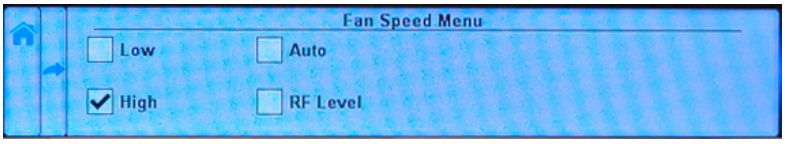

Figure 54: Operation > Fan Speed Menu

- High: This option sets the fan speed to maximum. Air velocity will remain at the same level regardless of other operation parameters.
- Auto: This setting allows the unit to control the cooling fan speed according to the internal RF module temperature. If the module plate temperature remains below 50 °C, the fan speed will be set to minimum. If the registered module plate temperature is above 50 °C, unit will gradually increase the fan speed. Fan speed will reach maximum at a plate temperature of 65 °C.
- RF Level: This setting should be set on units without the fan speed control option. It will allow proper functioning of the RF power monitor analog output. Applying this setting on units with the fan speed control option allows the fan speed to be proportional to the output RF level. Fan speed will be set at the minimum when output RF is below a detectable level. Fan speed will gradually increase when RF output increases within the detectable RF range. Fan speed will be at maximum level when unit reaches saturated power (Psat).

Tick the checkbox beside the desired fan speed mode.

Gain Control

Tapping the Gain Control button opens the Gain Control Menu. The operator may select how gain attenuation is applied to the connected amplifier. See Figure 55.

Figure 55: Operation > Gain Control Menu

Ext. Analog - In analog voltage control mode, the operator needs to apply positive voltage between (J4, Pin A) and Ground (J4, Pin V) from an external source. The applied voltage will be translated to the SSPA attenuation level and will determine the linear gain of SSPA unit as follows:

- 2.5 VDC = Maximum Gain: 75 dB (Attenuator set to 0 dB);
- 0.5 VDC = Minimum Gain: 55 dB (Attenuator set to 20 dB);

Voltage increments by 0.1V in a range between 0.5 to 2.5V will reduce the amount of attenuation by 0.1 dB steps. Voltages below and above this limit will be treated as lower and upper limits of adjustment range. Gain adjust input typically has 20 kOhm pull down to the signal ground. Hence, with no external voltage applied, the SSPA will default to minimum gain (55 dB).

Serial Port - This attenuation control is the default method of controlling SSPA linear gain. In this method of control, the specific attenuation is defined by the RCP controller, selected using the Embedded Web page or Universal M&C GUI, or sent as a remote control command. The SSPA will retain the selected attenuation level in non-volatile internal memory until a new command or selection is issued by the user.

Tick the checkbox beside the desired gain control mode.

Amp Address

Tapping the Amp Address button opens the Amp Address screen, where the operator can assign a network address to the remote amplifier. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the "OK" button to set the selected value. See Figure 56.

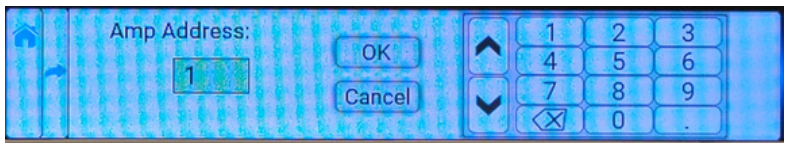

Figure 56: Operation > Amplifier Address

Enter a value between 0 and 255.

Fault Setup Menu

Figure 57 shows the Fault Setup menu.

Figure 57: Fault Setup Menu

The Fault Setup menu includes the following buttons:

- BUC Fault
- Aux Fault
- Forward Pwr
- Refl Pwr
- Fault Latch
- High Temp

BUC Fault

Tapping the BUC Fault button opens the BUC Fault menu, from which the user can select the action and logic type that any BUC faults would trigger. See Figure 58.

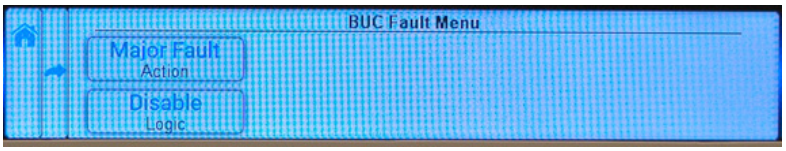

Figure 58: Fault Setup > BUC Fault menu

Tap the Action button to open the Action menu, or tap the Logic button to open the Logic menu.

Action Button

Tapping the Action button opens the Action menu, where the user can select how the amplifier responds to a BUC fault. See Figure 59.

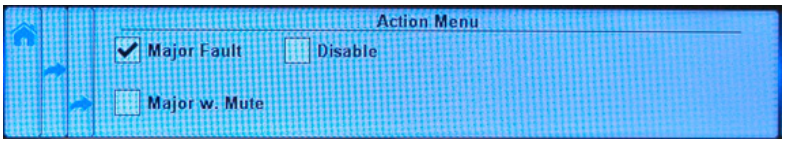

Figure 59: Fault Setup > BUC Fault > Action Menu

Tick the checkbox beside the desired Action mode for BUC faults.

- Major Fault - If Major Fault is selected, in the event of a BUC fault, the unit will exhibit a Summary fault, as well as a BUC fault indicator.
- Major w. Mute - If Major w. Mute is selected, a BUC fault will trigger a Summary fault, as well as illuminate the BUC fault indicator, and will mute the amplifier. This is the default setting for units which include an internal BUC.
- Disable - If Disable is selected, no action will be taken by the unit if a BUC fault occurs. This is the default setting for units without an internal BUC.

Logic Button

Tapping the Logic button opens the Logic menu, where the user can select the parameters that will trigger a BUC fault. See Figure 60.

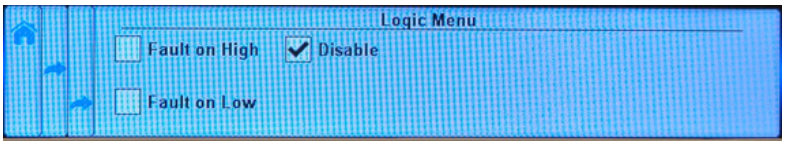

Figure 60: Fault Setup > BUC Fault > Logic Menu

Tick the checkbox beside the desired Logic mode for BUC faults.

- Fault on High - Fault on High is the default setting for units which include an internal BUC, where faults are triggered by a high impedance state.
- Fault on Low - If Fault on Low is selected, faults are triggered by a low impedance state.
- Disable - If Disable is selected, no action will be taken by the unit if a BUC fault occurs.

Aux Fault

Tapping the Aux Fault button opens the Aux Fault menu, from which the user can select the action and logic type that any Auxiliary faults would trigger. See Figure 61.

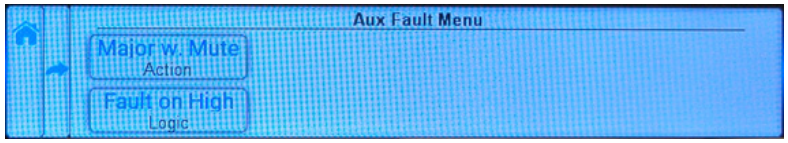

Figure 61: Fault Setup > Aux Fault menu

Action Button

Tapping the Action button opens the Action menu, where the user can select how the amplifier responds to an Auxiliary fault. See Figure 62.

Figure 62: Fault Setup > Aux Fault > Action Menu

Tick the checkbox beside the desired Action mode for Auxiliary faults.

- Major Fault - If Major Fault is selected, in the event of an Auxiliary fault, the unit will exhibit a Summary fault, and the Aux fault indicator will turn red.
- Major w. Mute - If Major w. Mute is selected, an Auxiliary fault will trigger a Summary fault, and the Aux fault indicator will turn red. The amplifier and will mute.
- Minor w. Mute - If Minor w. Mute is selected, an Auxiliary fault will cause the Aux fault indicator to turn red, and the amplifier will mute.
- Minor Fault - If Minor Fault is selected, in the event of an Auxiliary fault, the Aux fault indicator will turn red, but no Summary fault will be triggered.

Logic Button

Tapping the Logic button opens the Logic menu, where the user can select the parameters that will trigger an Auxiliary fault. See Figure 63.

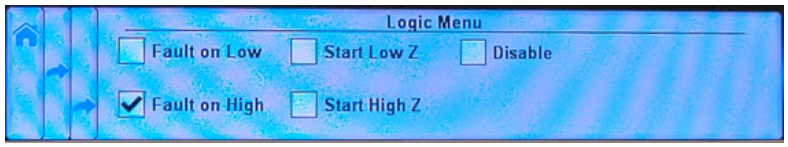

Figure 63: Fault Setup > Aux Fault > Logic Menu

Select from the items listed below:

- Fault on Low - If Fault on Low is selected, faults are triggered by a low impedance state.
- Fault on High - If Fault on High is selected, faults are triggered by a high impedance state.
- Start Low Z -
- Start High Z -
- Disable - If Disable is selected, the unit ignores the Auxiliary line condition.

Tick the checkbox beside the desired Logic mode for Aux faults.

Forward Pwr

Tapping the Forward Pwr button opens the Forward Pwr menu, from which the user can select the type of fault, the Forward Power level being monitored, and the action to be assigned while monitoring the amplifier's forward RF power level. See Figure 64.

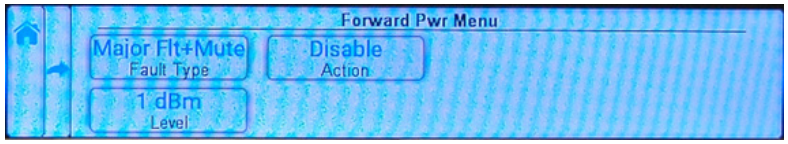

Figure 64: Fault Setup > Forward Power Fault menu

Tap the Fault Type button to open the Fault Type menu; tap the Level button to open the Level Entry menu; or tap the Action button to open the Action menu.

Fault Type

Tapping the Fault Type button opens the Fault Type menu, from which the user may select the type of fault that will be triggered when a forward power fault condition exists. See Figure 65.

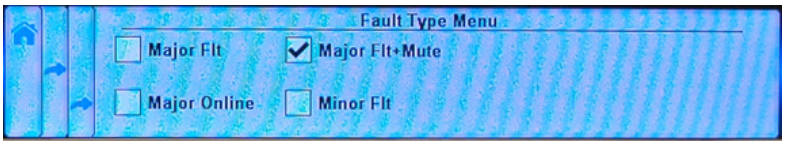

Figure 65: Fault Setup > Forward Power Fault > Fault Type menu

Tick the checkbox beside the desired Fault Type.

- Major Flt. - A detected Forward Power fault will also set a SSPA Summary alarm;
- Major Online - This option can be used when the remote SSPA is configured in 1:1 or Dual 1:1 redundancy mode. In these modes, a Forward Power fault will be triggered only if the SSPA unit is in the "Online" configuration and outputting RF to the antenna feed. A fault will be ignored for the "Standby" unit. If the SSPA is in "Standalone" mode, this option is the same as a "Major Flt";
- Major Flt+Mute - In this configuration, the Summary alarm will be triggered when a Forward Power fault is detected. The SSPA also will be forced to a mute state. The Forward Power fault will be latched by the SSPA to prevent mute function oscillation. If this condition is triggered by a Forward Power fault, the user will need to disable the Forward Power fault in order to clear the fault and unmute SSPA;
- Minor Flt. - Forward RF fault function is isolated from the SSPA Summary alarm. Summary alarm will not be affected by the current state of the Forward RF fault.

Level

Tapping the Level button opens the Level Entry screen. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the "OK" button to set the selected value. See Figure 66.

Figure 66: Fault Setup > Forward Power Fault > Level Entry

The level entered is used as the trigger threshold for a Forward Power fault.

Action

Tapping the Action button opens the Action menu, from which the operator may select the parameter to be used to determine whether the forward RF power should be considered in a fault condition. See Figure 67.

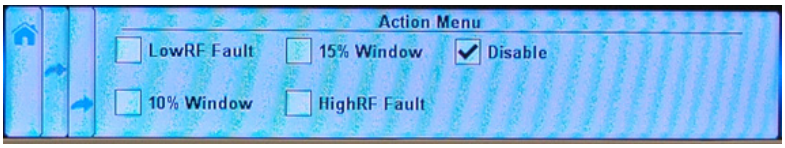

Figure 67: Fault Setup > Forward Power Fault > Action menu

Tick the checkbox beside the desired Action.

- Low RF Fault - A Forward Power fault will be triggered if the detected RF level falls below the Level assigned.
- 10% Window - A Forward Power fault will be triggered if the detected RF level falls outside a value of ± 10% of the Level assigned.
- 15% Window - A Forward Power fault will be triggered if the detected RF level falls outside a value of ± 15% of the Level assigned.
- High RF Fault - A Forward Power fault will be triggered if the detected RF level rises above the Level assigned.
- Disable - Disables the Forward Power fault.

Refl Power

Tapping the Refl Power button opens the Refl Power menu, from which the user can select the type of fault and the Reflected Power level being monitored. See Figure 68.

Figure 68: Fault Setup > Refl Pwr Fault menu

Tap the Fault Type button to open the Fault Type menu; or tap the Level button to open the Level Entry menu.

Fault Type

Tapping the Fault Type button opens the Fault Type menu, from which the user can select the type of fault a Reflected Power fault condition will trigger. See Figure 69.

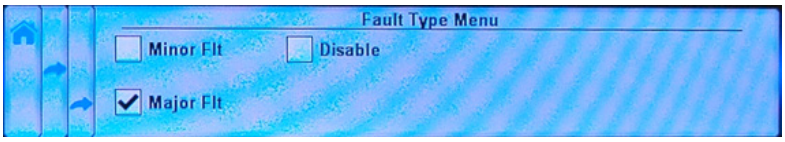

Figure 69: Fault Setup > Refl Pwr > Fault Type menu

Tick the checkbox beside the desired fault type.

- Minor Flt - The Reflected Power fault function is isolated from the Summary alarm. The Summary alarm will not be affected by the current state of the Reflected Power fault;
- Major Flt - A detected Reflected Power fault will also set a Summary alarm;
- Disable - isables the Reflected Power fault.

Level

Tapping the Level button opens the Level Entry screen. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the "OK" button to set the selected value. See Figure 70.

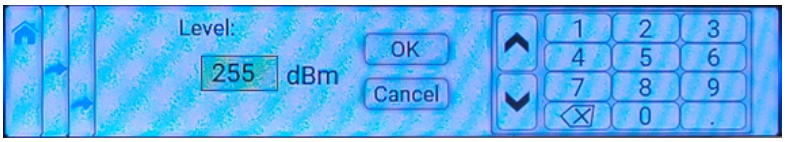

Figure 70: Fault Setup > Refl Pwr > Level Entry

The level entered is used as the trigger threshold for a Reflected Power fault.

Fault Latch

Tapping the Fault Latch button opens the Fault Latch menu. See Figure 71.

Figure 71: Fault Setup > Fault Latch menu

Tick the checkbox beside the desired function. If fault latching is enabled, the unit will retain a detected fault condition until the operator executes a "Clear Fault" command. See the Clear Fault description.

High Temp

Tapping the High Temp button opens the High Temp menu. See Figure 72.

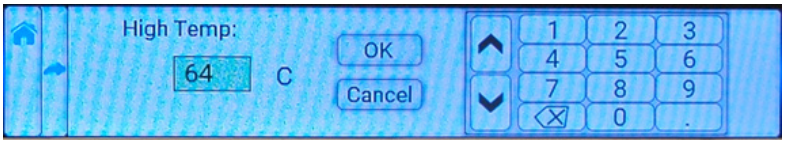

Figure 72: Fault Setup > High Temperature Fault menu

The operator may enter a value that corresponds with the baseplate temperature of the remote SSPA unit. If the baseplate temperature of the remote SSPA unit meets or exceeds the entered value, a Temperature fault will be triggered.

> ⚠ **Warning! Consult the factory before changing this value. Setting the value too low may cause unintentional fault conditions.**

Redundancy Menu

Figure 73 shows the Redundancy menu.

Figure 73: Redundancy Menu

The Redundancy menu includes the following buttons:

- System Mode
- Switch Mute
- Standby Mode
- HPA Status
- Standby Select

System Mode

Tapping the System Mode button opens the System Mode menu. See Figure 74.

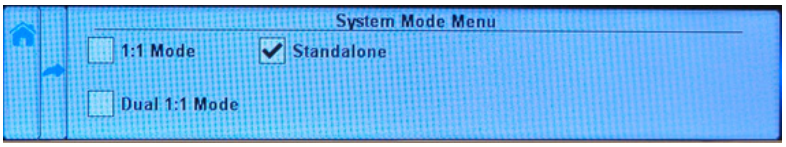

Figure 74: Redundancy > System Mode Menu

The operator may select from the following items:

- 1:1 Mode - Select this mode if the connected amplifier is part of a redundant system configured for 1:1 mode. Consult the factory for more information.
- Dual 1:1 Mode - Select this mode if the connected amplifier is part of a redundant system configured for dual 1:1 mode. Consult the factory for more information.
- Standalone - This is the default mode for the RCP2-1000-CO controller. This item should be selected if communicating with a single amplifier that is not part of redundant system.

Tick the checkbox beside the desired mode.

Switch Mute

Tapping the Switch Mute button opens the Switch Mute menu. See Figure 75.

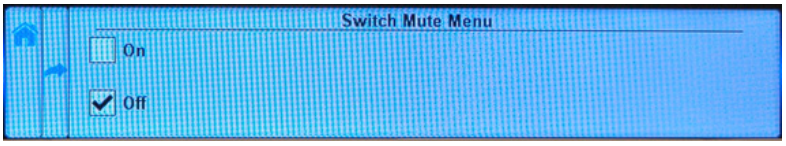

Figure 75: Redundancy > Switch Mute Menu

The operator may select from the following items:

- On - Select this option if the amplifier is part of a system that includes a transfer switch. The Switch Mute function helps to prevent arcing within the waveguide in high power amplifier systems by temporarily muting the amplifier any time the switch position changes.
- Off - Select this option if the amplifier is in Standalone mode.

> ⚠ **Note: If an amplifier is in Standalone mode and the Switch Mute function is turned on, the amplifier will always show an internal mute alarm and will be muted.**

Tick the checkbox beside the desired setting.

Standby Mode

Tapping the Standby Mode button opens the Standby Mode menu. See Figure 76.

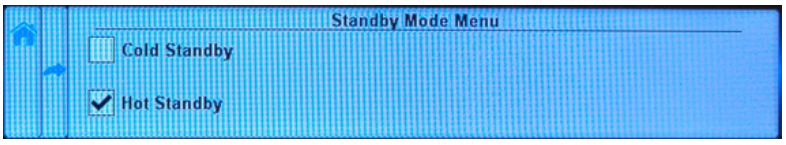

Figure 76: Redundancy > Standby Mode Menu

The operator may select from the following items:

- Cold Standby - In Cold Standby mode, the connected amplifier mutes when it enters Standby mode and unmutes when it it switched to Online mode.
- Hot Standby - In Hot Standby mode the connected amplifier retains an unmuted state during any standby period.

Tick the checkbox beside the desired setting.

HPA Status

Tapping the HPA Status button opens the HPA Status menu. HPA Status is used when there are two amplifiers configured in a 1:1 redundant system. If the connected amplifier is in Standalone mode, this setting selection has no bearing on the operation of the amplifier. See Figure 77.

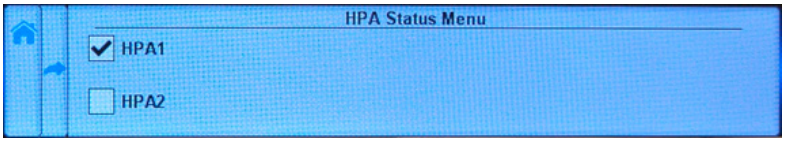

Figure 77: Redundancy > HPA Status Menu

The operator may select from the following items:

- HPA1 - Sets the amplifier status to "HPA1".
- HPA2 - Sets the amplifier status to "HPA2".

Tick the checkbox beside the desired setting.

Standby Select

Tapping the Standby Select button opens the Standby Select menu. Standby Select is used when there are two or more amplifiers configured in a redundant syste. If the connected amplifier is in Standalone mode, this setting selection has no bearing on the operation of the amplifier. See Figure 78.

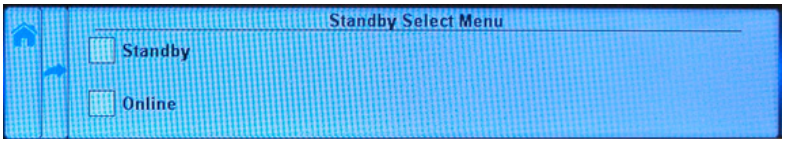

Figure 78: Redundancy > Standby Select Menu

The operator may select from the following items:

- Standby - In redundant systems, the Standby amplifier does not transmit to the antenna feed until one of the Online amplifiers in the system gives away its online status.
- Online - In redundant systems, the Online amplifier is transmitting to the antenna feed. Should a fault condition cause the Online amplifier to mute or otherwise go offline, a properly configured amplifier will automatically give away its online state to the standby amplifier.

Tick the checkbox beside the desired setting.

Options Menu

Figure 79 shows the Options menu.

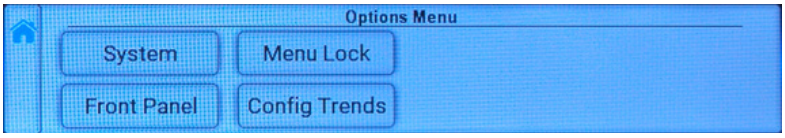

Figure 79: Options Menu

The Options menu allows the user to select the System backup and restore utilities, Front Panel configuration options, Menu Lock options, and Trends configurations.

- System
- Front Panel
- Menu Lock
- Config Trends

System Menu

Tapping the System button opens the System menu, from which the user can choose to backup settings, restore settings from a saved backup, reset the unit, or select the memory mode used by the unit's EEPROM. See Figure 80.

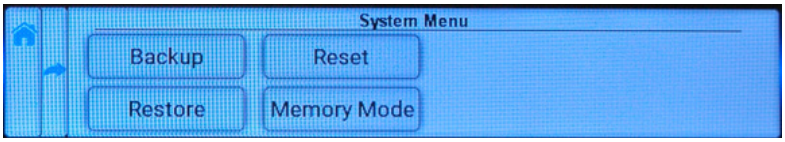

Figure 80: Options > System Menu

Backup Menu

Tapping the Backup button opens the Backup menu, which allows the user to backup all settings to nonvolatile memory. There are two repositories for saved settings, User 1 and User 2. See Figure 81.

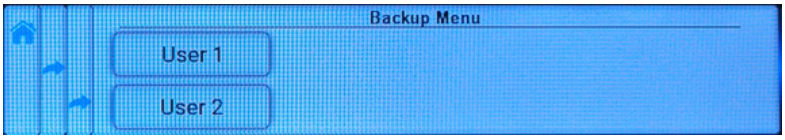

Figure 81: Options > System > Backup Menu

A confirmation window will appear after a button is selected and tapped. Tap the OK button to confirm, or the Cancel button to cancel the action. See Figure 82.

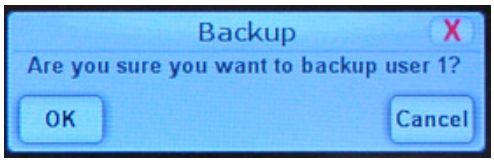

Figure 82: Options > System > Backup Confirmation

Restore Menu

Tapping the Restore button opens the Restore menu, which allows the user to restore settings from nonvolatile memory. There are three repositories for saved settings, User 1, User 2, and Factory. Selecting Factory restores all factory default settings. See Figure 83.

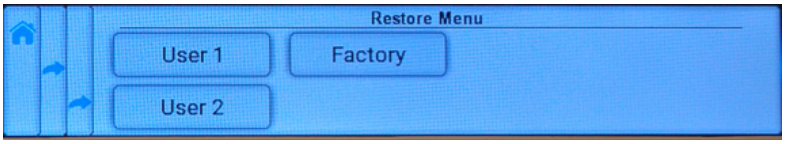

Figure 83: Options > System > Restore Menu

A confirmation window will appear after a button is selected and tapped. Tap the OK button to confirm, or the Cancel button to cancel the action. See Figure 84.

Figure 84: Options > System > Restore Confirmation

Reset Menu

Tapping the Reset button opens the Reset menu, which allows the user to reset the SSPA controller hardware to activate certain settings. For example, when the IP Address is modified the SSPA must be reset for it to use the new IP Address. See Figure 85.

Figure 85: Options > System > Reset Menu

IO Card -- Resets all hardware on the removable M&C card as well as the embedded cards on all RF modules. The amplifier will be muted during the reset process, therefore the reset will cause a momentary loss of RF output. All communication links to remote M&C will be dropped until reset process is complete. The amplifier will use the currently selected communication parameters (IP address, baud rate, etc);

Module -- Resets only the embedded chips in all RF modules. The I/O card remains operational and maintains a communication link to remote M&C. The RF module will be muted during the reset process. This function is useful for clearing latched fault conditions in SSPA units under N+1 system control;

Comms Only -- Resets only communication parameters. If unmuted, the SSPA maintains an unchanged RF output level during reset. Remote COM links will be dropped and re-enabled with selected parameters;

Clear Faults -- Clears all latched faults and remaining fault history information. SSPA remains fully operational during the process;

IP Comms -- Resets only IP communication parameters. If unmuted, the SSPA maintains an unchanged RF output level during reset. Remote COM links will be dropped and re-enabled with selected IP parameters.

When the user selects and taps one of the buttons described above, a confirmation window will appear. See Figure 86. Tap the OK button to continue the reset function, or the Cancel button to cancel the function.

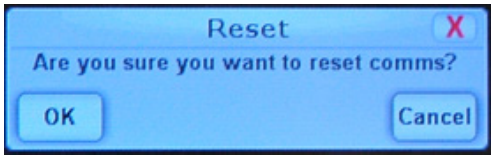

Figure 86: Options > System > Reset Confirmation

In the case of the Clear Faults button, a different confirmation window will appear. See Figure 87. Tap the OK button to continue the reset function, or the Cancel button to cancel the function.

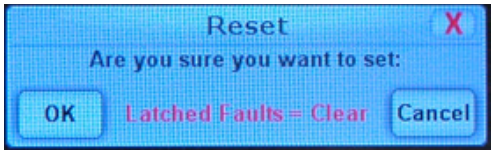

Figure 87: Options > System > Clear Faults Confirmation

Memory Mode Menu

Tapping the Memory Mode button opens the Memory Mode menu, from which the user can select options for how the unit retains settings in memory. See Figure 88.

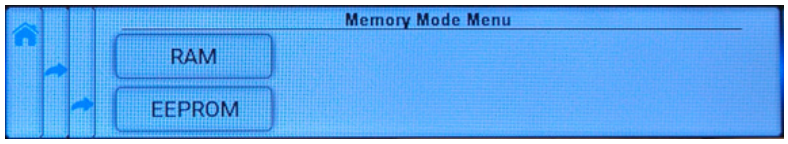

Figure 88: Options > System > Memory Mode Menu

RAM -- In this mode, the unit will not backup any settings changes to internal EEPROM. This mode is optional and needs to be set by the user every time the unit endures a power cycle or I/O card reset. This mode is beneficial when the SSPA application requires frequent changes to the SSPA state (such as mute/unmute or attenuation changes). Since any EEPROM device has limited write cycles, RAM mode allows the user to execute unlimited settings changes. If the SSPA experiences a power or reset cycle in RAM mode, it will use the last saved settings setup before RAM was engaged;

EEPROM -- Default mode. Without user intervention, the unit will retain this mode of operation. All changes to settings setup performed over local or remote interface will be backed up to EEPROM within a 3 second time interval. If the unit experiences a power cycle or reset, the last saved set of settings will be applied to the unit upon each power up or I/O card reset. Any EEPROM device has a limited ability to endure write cycles. Maximum write cycles ability for units with firmware version prior to 6.00 is 150,000. After exceeding this limit, the unit will operate in RAM mode, utilizing a default set of settings on each power up. Firmware versions above 6.00 allow a minimum of 3,000,000 write cycles before opting out to RAM mode.

After selecting one of the choices above, a confirmation window will appear. See Figure 89. Tap the OK button to continue the memory mode selection, or the Cancel button to cancel the selection.

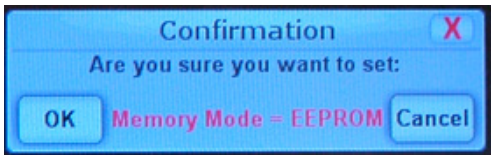

Figure 89: Options > System > Memory Mode Confirmation

Front Panel Menu

Tapping the Front Panel button opens the Front Panel menu, from which the user can select options for the touchscreen, and configure the customizable fault display, action buttons, and status display, or reset the screen. See Figure 90.

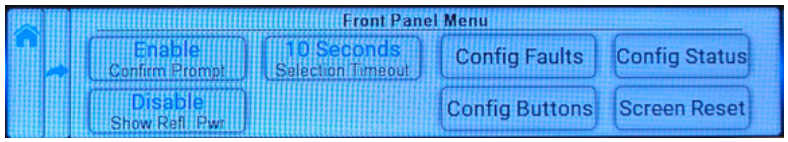

Figure 90: Options > Front Panel Menu

Confirm Prompt

Tapping the Confirm Prompt button opens the Confirm Prompt menu, from which the user can enable or disable the confirmation prompts that are generated when certain actions (such as changing Mute Status or initiating a Backup/Restore) are triggered. The current selection is checked. See Figure 91.

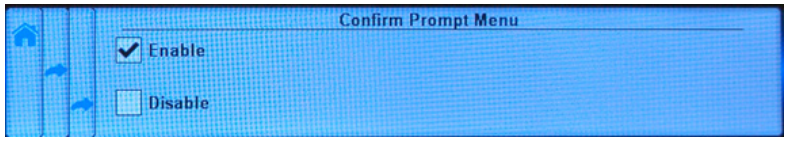

Figure 91: Options > Front Panel > Confirm Prompt Menu

Show Refl. Pwr

> ⚠ **Note: If the amplifier or system does not include a Reflected Power Monitor, the Show Refl Pwr button is disabled and the following menu is inaccessible.**

Tapping the Show Refl. Pwr button opens the Show Refl. Pwr menu, from which the user can enable or disable the display of the Reflected Power measurement in the RF Signal Path Display. See Figure 92.

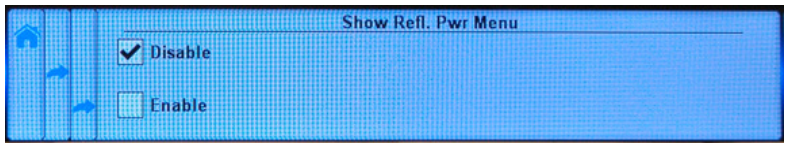

Figure 92: Options > Front Panel > Show Reflected Power Menu

Selection Timeout

Tapping the Selection Timeout button opens the Selection Timeout menu, from which the user can select the time interval that must pass (10 Seconds or 30 Seconds) before most menu screens revert to the previous menu screen if a selection is not made, or disable all confirmation screens. Default setting is 10 Seconds. See Figure 93.

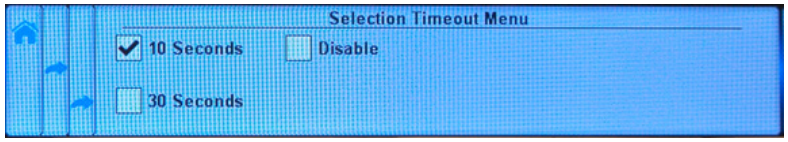

Figure 93: Options > Front Panel > Selection Timeout Menu

Config Faults

Tapping the Config Faults button opens the Config Faults menu, from which the user can select the fault indicators that are shown in the Fault Indicator section at the far left of the touchscreen display. The Summary selection is always selected by default. Other default settings include Power Supply, Temperature, DC Voltage and DC Current. See Figure 94.

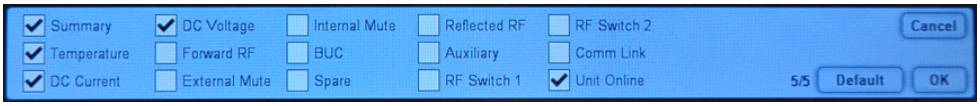

Figure 94: Options > Front Panel > Config Faults Menu

The user may select up to four other options besides the Summary selection to be displayed. Tap the OK button to display the selected settings. Tap the Cancel button to return to the previous menu. Tap the Default button to return to the default settings.

Config Buttons

Tapping the Config Buttons button opens the Config Buttons menu, from which the user can select the Action Buttons that appear on the far right of the touchscreen display. Up to two items may be selected. Control Mode and Switch Mode are selected by default. See Figure 95.

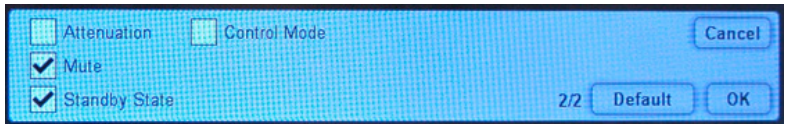

Figure 95: Options > Front Panel > Config Buttons Menu

The first item selected will appear as the top Action Button. The second item selected will appear as the bottom Action Button. Tap the Cancel button to return to the previous menu. Tap the Default button to return to the default settings.

> ⚠ **Note: When the unit is set to Remote Only mode, the Control Mode button will appear in the top position of the Action Buttons area, whether or not it was selected by the user. See Figure 96.**

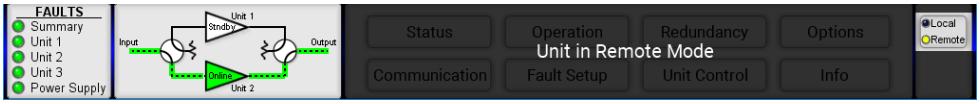

Figure 96: Remote Only Mode

Config Status

Tapping the Config Status button opens the Config Status menu, from which the user can select the items that appear in the Custom Status menu (Status > Custom Status). Up to eight items may be selected between two screens of parameters that may be monitored. See Figure 97 and Figure 98.

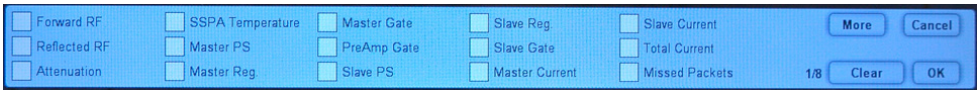

Figure 97: Options > Front Panel > Config Status Menu Page 1

Tap the More button to get to page 2.

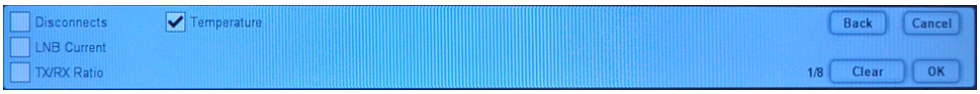

Figure 98: Options > Front Panel > Config Status Menu Page 2

Tap the Back button to return to page 1. Tap the Clear button to remove the checks from all items in both page 1 and page 2. Tap the Cancel button to return to the previous menu. Tap the OK button to accept the selected parameters.

Screen Reset

Tapping the Screen Reset button results in a confirmation window. See Figure 99. Tap the OK button to continue the reset function, or the Cancel button to cancel the function.

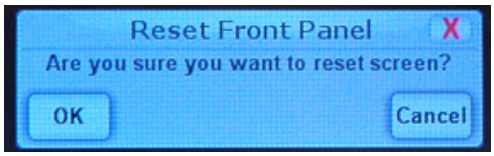

Figure 99: Options > Front Panel > Reset Screen Confirmation

The Screen Reset function reboots the touchscreen's microcontroller card and resets all trendlines.

Menu Lock Button

Tapping the Menu Lock button opens the Menu Lock menu, from which the user can set the parameters for locking the touchscreen menu. See Figure 100.

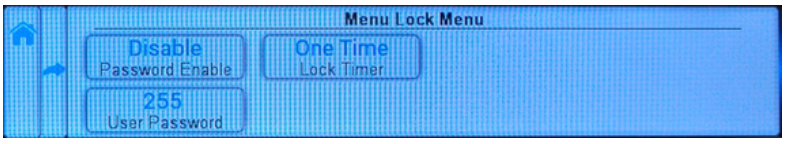

Figure 100: Options > Menu Lock Menu

Password Enable

Tapping the Password Enable button opens the Password Enable menu, from which the user enable or disable password protection for the touchscreen menu. The current selection is checked. See Figure 101.

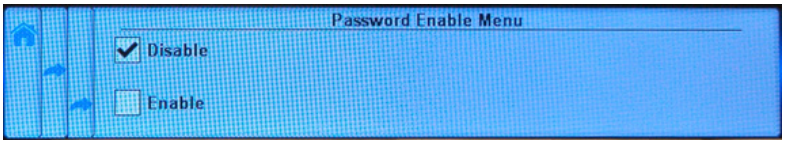

Figure 101: Options > Menu Lock > Password Enable Menu

When this function is enabled, the resulting screen returns to the Main Menu, which will show a red "locked" icon over all buttons that require a password to access. Only the Status and Info menus are not locked. See Figure 102.

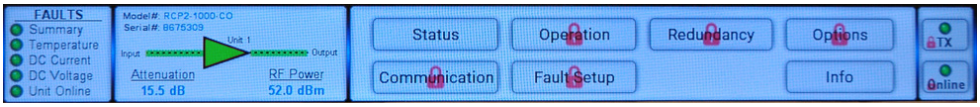

Figure 102: Main Menu With Menu Lock Enabled

If the user selects one of the locked buttons, a password entry screen will appear. See Figure 103. By default, the password is 170.

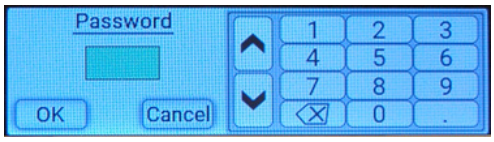

Figure 103: Enter Password to Unlock Menu

If the correct password is entered, the "locked" icons will disappear, and the user can access all buttons normally, until the Lock Timer refreshes (based on its setting).

User Password

Tapping the User Password button opens the User Password menu, from which the user set the password for the touchscreen menu. Use the numbered keypad on the screen to enter the numbers for the highlighted selection. Tap the "OK" button to set the selected value. The default value is 170. See Figure 104.

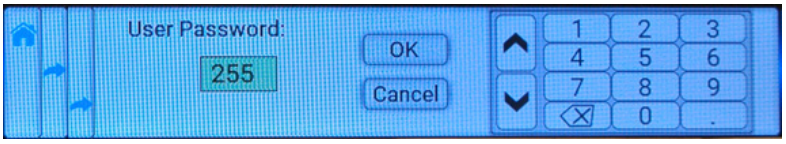

Figure 104: Options > Menu Lock > User Password Selection

Lock Timer

Tapping the Lock Timer button opens the Lock Timer menu, from which the user select how often the screen will be password protected. The current selection is checked. See Figure 105.

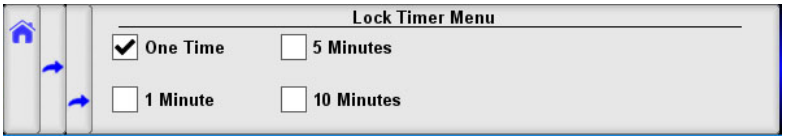

Figure 105: Options > Menu Lock > Lock Timer Menu

If One Time is selected, after the user unlocks the screen for the first time since the menu lock was enabled, the menu lock function will be disabled. Otherwise, the menu lock function will re-establish the touchscreen menu lockdown after the selected time interval passes.

Info Menu

Figure 106 shows the Info menu.

Figure 106: Info Menu

The Info menu includes the following buttons:

- System Info
- SSPA Info
- Time
- Runtime

- Front Panel

System Info

Tapping the System Info button opens the System Info menu. This screen shows the System ID (serial number) and System FW (firmware) values. These values are in reference to the RCP unit. See Figure 107.

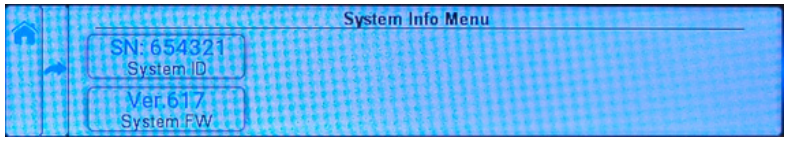

Figure 107: Info > System Info Menu

Tapping the System ID or System FW buttons will open windows that show the same information shown on the button.

SSPA Info

Tapping the SSPA Info button opens the SSPA Info menu. This screen shows the SSPA ID (model number) and SSPA FW (firmware) values. These values are in reference to the connected amplifier. See Figure 108.

Figure 108: Info > SSPA Info Menu

Tapping the SSPA ID or SSPA FW buttons will open windows that show the same information shown on the button.

Time

This item is currently not available in RCP2-1000-CO units.

Runtime

Pressing the Runtime button opens the Runtime display, which shows the length of time since the last power-up. This is a read-only screen. See Figure 109.

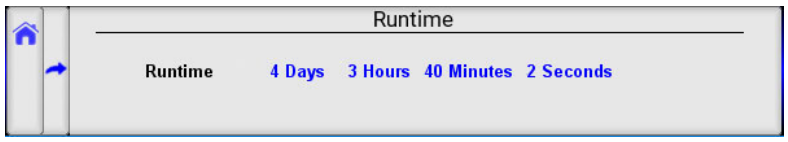

Figure 109: Info > Runtime Menu

Front Panel

Pressing the Front Panel button opens the Front Panel menu, from which the user can review the touchscreen unit's microcontroller (MCU) version, graphic user interface (GUI) type, and serial number. See Figure 110.

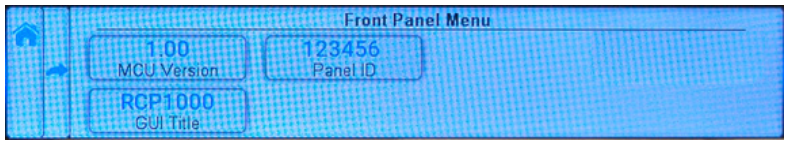

Figure 110: Info > Front Panel Menu

Pressing any of the buttons on this screen results in a more detailed read-only description. These information screens are not subject to the screen time-out, and will remain open until the user selects the back or home icons. The information contained within these menus are critical when calling technical support.

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RCP2-1000-CO, Unit Setup and Control with RCP

Teledyne Paradise Datacom
Drawing Number: 217091-2 Revision -
RA 7813
22 May 2020

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Introduction

The RCP2-1000-CO unit should be installed in an equipment rack in a sheltered environment as close as possible to the antenna feed.

This set-up procedure requires the following equipment:

- Teledyne Paradise Datacom RCP2-1000-CO unit;
- Teledyne Paradise Datacom Compact Outdoor SSPA;
- Quick-Start Cable (p/n L207755-2);
- RS-232 Communication Cable (p/n XXXXXX; max. length 50 ft.);
- Power cable for Compact Outdoor SSPA;
- Line cords for RCP2-1000-CO unit;
- A PC running Teledyne Paradise Datacom's Universal M&C software.

The Universal M&C software may be downloaded from the Teledyne Paradise Datacom web site.

Amplifier Set-up

Perform the following procedure to set up the Compact Outdoor SSPA.

> ⚠ **WARNING! Ensure the RF/L-Band input and RF output ports are properly terminated before powering up the amplifier. RF hazards apply.**

1. Connect the Quick-Start Cable between the PC and the amplifier;
2. Provide power to the amplifier;
3. On the PC, open the Universal M&C software;
4. Select the Action pull-down menu > Add Unit > Compact Outdoor SSPA;
5. Select Internet Connection;
6. In the IP Address field, enter "192.168.0.9" (see Figure 1);
7. In the Port field, enter "1007" (see Figure 1);
8. In the Amplifier Address field, enter "1" (see Figure 1);
9. Press the Search for Unit button;
10. M&C should find the amplifier; Click the "OK" button;
11. Press the Create button;
12. Verify the unit is communicating with the M&C software;
13. Go to the Settings tab;
14. Verify the following settings: Protocol Select = Binary Mode, Baud Rate Select = 9600, Amplifier Address = 1 (see Figure 2);
15. Remove the Quick-Start Cable from the amplifier;
16. Connect the serial cable between port J5 (Serial Local) of the RCP and port J4 (M&C) of the amplifier;
17. On the RCP, tap the Operation > Amp Address buttons;
18. Enter 1 for the Amp Address and tap the OK button (see Figure 3);
19. Cycle the power to the amplifier to enable the changes.

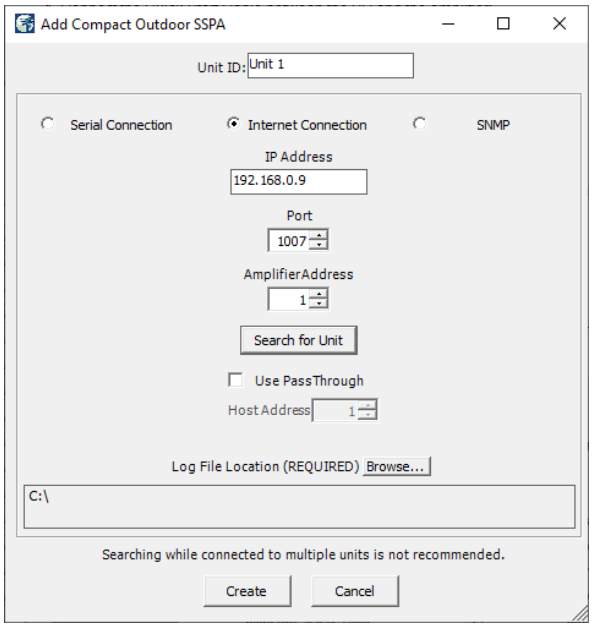

Figure 1: Universal M&C Settings Tab

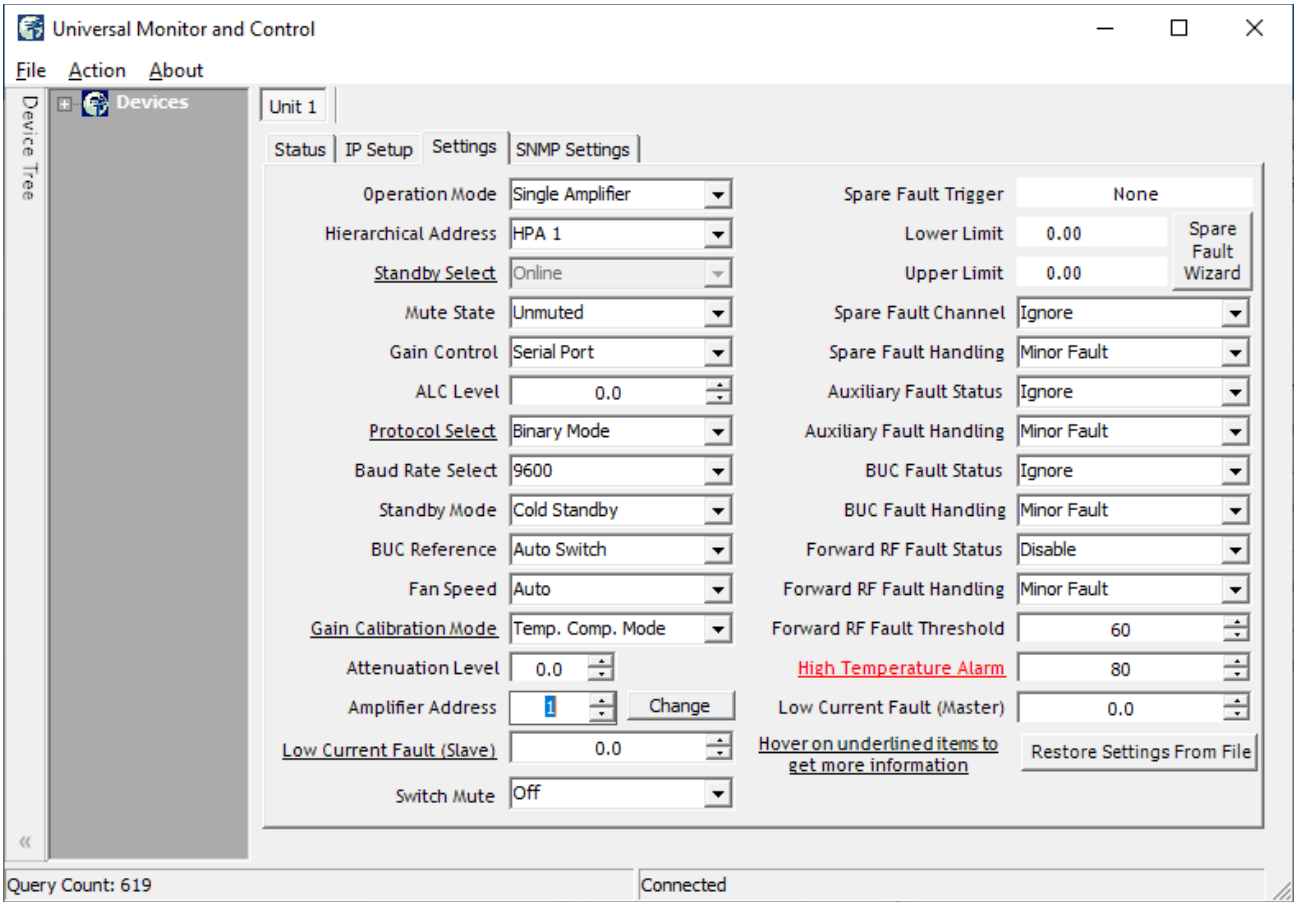

Figure 2: Universal M&C Settings Tab

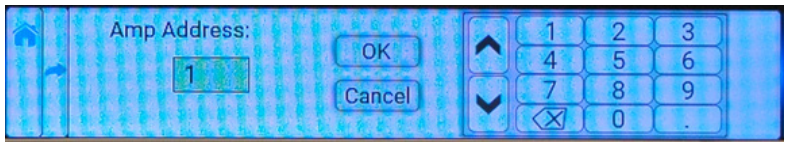

Figure 3: Touchscreen > Operation > Amp Address menu

Connecting to Port J4 of Amplifier

The Teledyne Paradise Datacom outdoor amplifier is available with a standard RS-232/RS-485 serial communications interface or an optional Ethernet & RS-232/RS-485 interface. Review the **Remote Communication Connection** section of the Outdoor SSPA manual.

It is important to note that RS-232 cable lengths are limited to approximately 50 feet (15 meters) or to a capacitance of 2500 pF. RS-485 cable runs are limited to approximately 4000 feet (1219 meters). Ethernet cable lengths are limited to 328 feet (100 meters) without including a router or other active component.

Controlling the SSPA via RCP2-1000-CO

The operator may now use the RCP2-1000-CO controller to control the mute state and gain level of the connected amplifier, and monitor the amplifier's operating status.

Mute/Unmute Amplifier

Perform the following sequence on the RCP touchscreen to change the mute state of the amplifier:

1. If not on the Main Menu, tap the Home icon;
2. Tap the Operation button;
3. Tap the Mute button;
4. Tick the desired mute state (Mute On or Mute Off). See Figure 4.

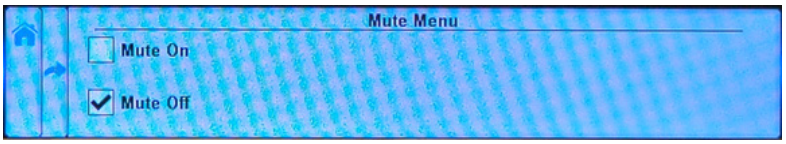

Figure 4: Change Amplifier Mute State

Alternately, tap the Mute (TX) Action Button at the far right of the touchscreen. If confirmation prompts are turned on, a dialog window will appear asking to verify the state change. Tap the "OK" button to proceed or the "Cancel" button to cancel. See Figure 5.

Figure 5: Confirm Mute State Change

Change Attenuation Setting

Perform the following sequence on the RCP touchscreen to change the attenuation setting:

1. If not on the Main Menu, tap the Home icon;
2. Tap the Operation button;
3. Tap the Attenuation button;
4. Use the numeric keypad to enter the desired attenuation value;
5. Tap the "OK" button to proceed or the "Cancel" button to cancel. See Figure 6.

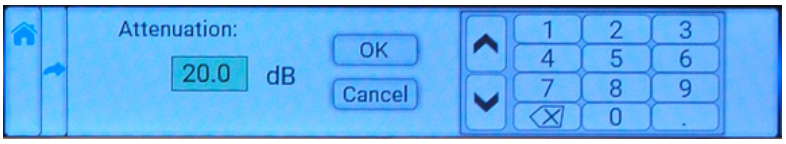

Figure 6: Adjust Attenuation Setting (Operation > Attenuation)

Alternately, tap the Atten. Action Button at the far right of the touchscreen. This will open the Attenuation setting screen. Tap the up or down arrow keys to adjust the attenuation setting to the desired level. Changes are applied immediately. Tap the "OK" button to save the setting and return to the previous screen. See Figure 7.

Figure 7: Adjust Attenuation Setting (Atten. Action Button)

Monitor Fault Status

The Fault Panel displays the fault status for various parameters monitored by the unit's controller. Perform the following sequence on the RCP touchscreen to view the fault panel:

1. If not on the Main Menu, tap the Home icon;
2. Tap the Status button;
3. Tap the Fault Panel button. See Figure 8.

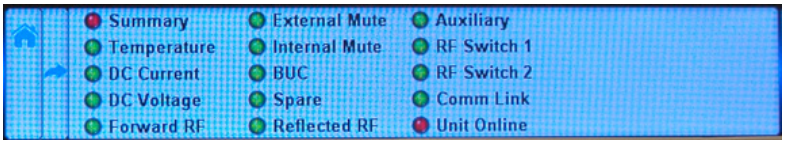

Figure 8: Monitor Fault Status

A green icon next to the unit condition title indicates a non-faulted state. A red icon next to the unit condition title indicates a faulted state. A yellow icon indicates a communication error. A black icon designates a condition not applicable to the unit.

Monitor RF Output

The RF Output power of the connected amplifier is shown on the RF Signal Path display. See Figure 9.

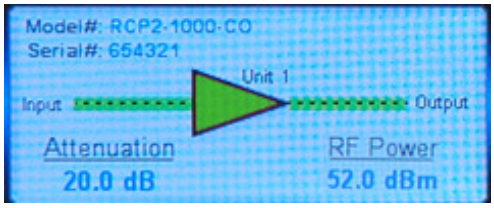

Figure 9: RF Signal Path Display

The operator may also monitor this value in the Menu area of the touchscreen display. Perform the following sequence on the RCP touchscreen to view the RF/Temp Menu:

1. If not on the Main Menu, tap the Home icon;
2. Tap the Status button;
3. Tap the RF/Temp button;
4. The Forward RF value is displayed at the top left of the screen. See Figure 10.
5. If the SSPA is configured with a reflected power monitor, and this feature is enabled on the RCP unit, the reflected RF value is displayed at the bottom left of the screen. Otherwise, this value is displayed as "N/A".

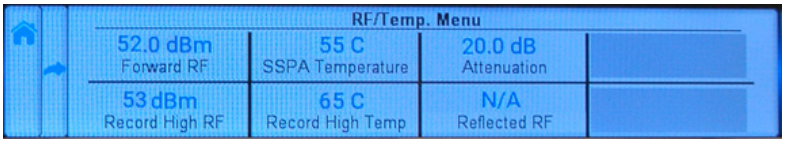

Figure 10: Status > RF/Temp Menu

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System Controllers with Touchscreen, Remote Control Interface

Teledyne Paradise Datacom
Drawing Number: 216351-6 Revision B
ECO A26086
May 2022

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Overview

A system which includes a system controller can be managed from a remote computer over a variety of remote control interfaces (see Figure 1).

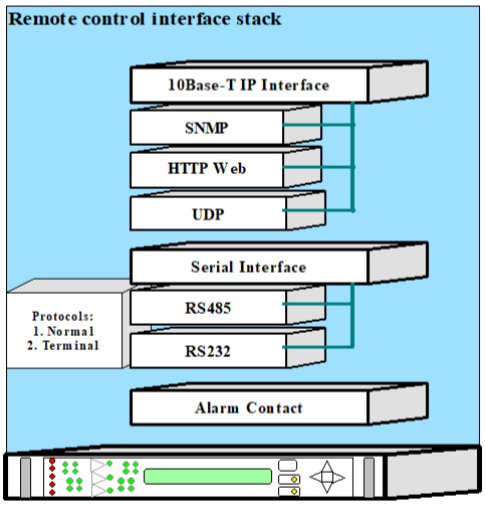

Figure 1: Remote Control Interface Stack

The parallel port on the unit provides a simple form of remote control. There are 10 Form C relay contacts for remote monitoring. There are six opto-isolated inputs for remote control commands. To enable the remote parallel interface, select Remote on the front panel Local/Remote key. When in Remote mode, all front panel commands are disabled with the exception of the Local/Remote key. See the **Remote Control - Parallel** section.

The serial interface supports both RS-232 and RS-485 standards. The control protocol supports two formats:

• Normal serial protocol, as detailed in the **Serial Communication** section;

• ASCII-based protocol, suitable for HyperTerminal applications (see the **Terminal Mode Serial Protocol** section).

Serial interface is equipped with overvoltage and overcurrent protection and benefits from full galvanic isolation from the chassis ground for extra protection.

The Ethernet interface supports multiple communication standards which can be used exclusively or simultaneously depending on the selected setting:

- IPNet - UDP encapsulated Normal serial protocol;
- SNMP V1 with support of SNMP traps;
- HTTP web interface

Serial protocol format is set at no parity, 8 bit with 1 stop bit. Baud rate is selectable through the front panel.

If using a Terminal mode protocol, the controller provides remote menu access through a HyperTerminal program or through an actual hardware terminal.

RS485 interface pin out is compatible with most 9-pin RS485 adapters. Interface always works in half-duplex mode and is suitable for either 4- or 2-wire RS485 configuration. Maximum achievable node length for this interface is 1500 feet. Proper termination and use of shielded twisted pair cable is required to achieve long cable runs

Ethernet interface is auto selectable between 10 and 100 MBits/s speeds. Maximum node length is 100 feet. Use of CAT5E or CAT6 cables are preferred. CAT5 cable can be used for 10Base-T standard or short runs of 100Base-T.

Digicor5 digital platform controller allows simulations support of multiple remote control interfaces.

Table 1 shows a list of enabled interfaces depending on chosen interfaces setting.

Table 1: Interfaces Enabled Based on Chosen Interface Setting Selection

Interface Selection	Supported Serial Interface	Supported IP Interfaces
RS232	RS232	IPNet, Web M&C (read/write), SNMP (read/write)
RS485	RS485	IPNet, Web M&C (read/write), SNMP (read/write)

IPNET	RS485	IPNet, Web M&C (read/write), SNMP (read only)
SNMP	RS485	Web M&C (read only), SNMP (read/write)

Serial protocol is an independent selection and allows support of Normal or Terminal mode protocols. Operation over IP interface remains unchanged regardless of serial protocol selection.

Digicor5 digital platform controller allows simulations support of multiple remote control interfaces.

Serial protocol is an independent selection and allows support of Normal or Terminal mode protocols. Operation over IP interface remains unchanged regardless of serial protocol selection.

Remote Control - Parallel

Control Outputs

The hardware behind the form C relay is a single pole, double throw relay. Under normal operation (no alarms) the relays are in an energized state. When a fault occurs or the controller is powered off, the relays are in a de-energized state. The relay contacts are capable of handling a maximum of 30 VDC @ 1A . The form C relay is shown schematically in Figure 2. The form C relay contact outputs are listed in Table 2.

Figure 2: Parallel I/O Form C Relay

Control Inputs

The parallel control inputs are opto-isolated inputs with pull up resistors. To trigger a remote input command, the input should be pulled to ground. The input does not need to be held to ground continuously but it is acceptable to do so. The input only need be pulled low for a minimum of 20 msec. For example, to make amplifier #2 the standby amplifier, pulse pin 36 to ground for 20 msec. If the operator then chooses to make amplifier #1 the standby amplifier, simply pulse pin 37 to ground for 20 msec. The schematic representation of the control input is shown in Figure 3.

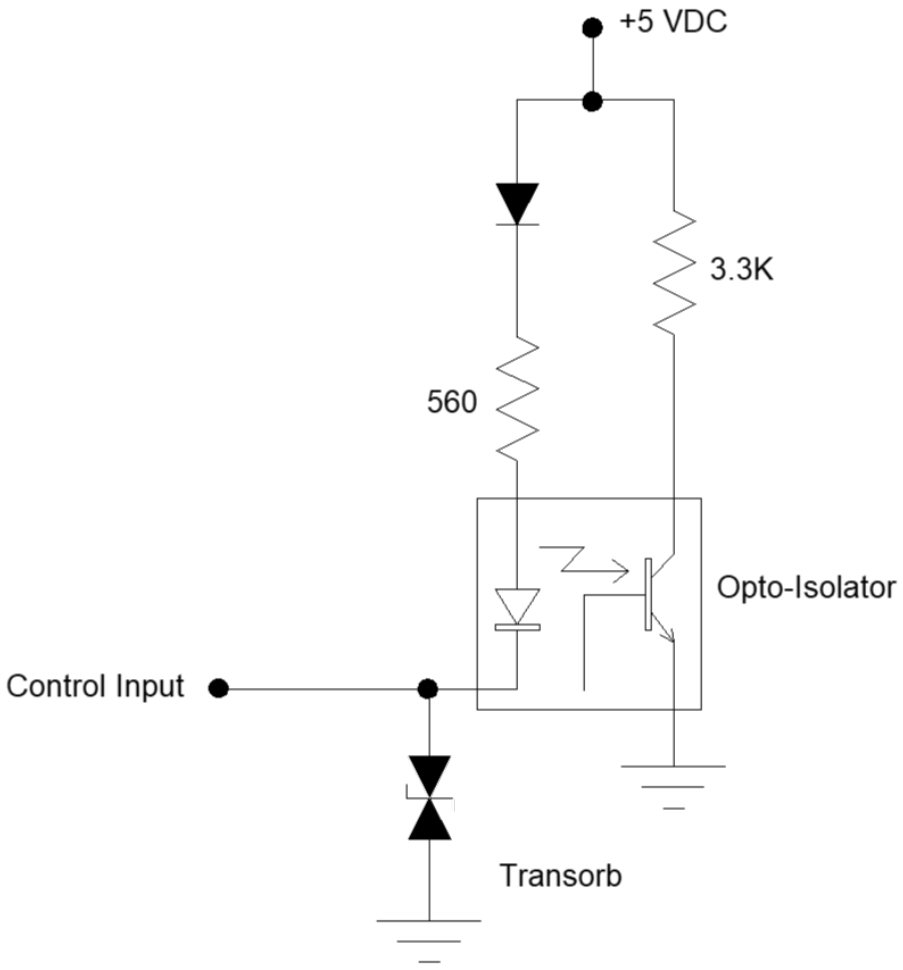

Figure 3: Opto-isolated Parallel I/O Input

The external alarm and auxiliary alarm inputs use the same opto-isolated input circuitry shown in Figure 3.

Serial Communication

This section describes the normal communication protocol between the controller and a host computer over RS232/RS485 serial interface. Serial port settings on host computer must be configured for 8-bit data at no parity, with 1 stop bit. Baud rate should match selected baud rate parameter on unit.

The unit will only respond to properly formatted protocol packets. Figure 4 shows the basic communication packet. It consists of a Header, Data, and Trailer sub-packet.

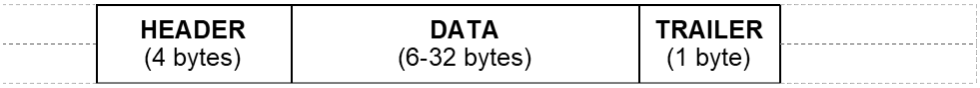

Figure 4: Basic Serial Communication Packet

Header Packet

The Header packet is divided into three sub-packets which are the Frame Sync, Destination Address, and Source Address packets, as shown in Figure 5.

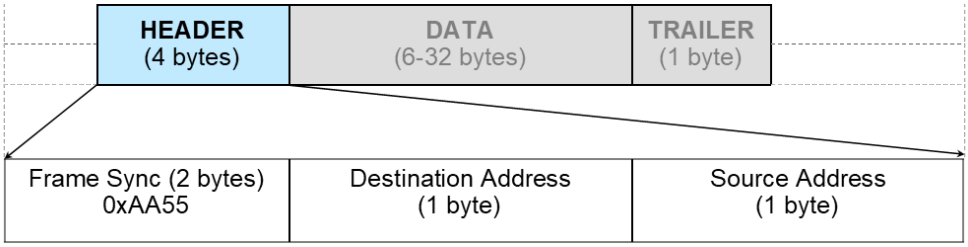

Figure 5: Header Sub-Packet

Frame Sync Word

The Frame Sync word is a two byte field that marks the beginning of a packet. This value is always 0xAA55. This field provides a means of designating a specific packet from others that may exist on the same network. It also provides a mechanism for a node to synchronize to a known point of transmission.

The destination address field specifies the node for which the packet is intended. It may be an individual or broadcast address. The broadcast address is 0xFF or 0xAA. This is used when a packet of information is intended for several nodes on the network. The broadcast address can be used in a single device connection when the host needs to determine the address of the amplifier. The unit will reply with its unique address.

Source Address

The source address specifies the address of the node that is sending the packet. All unique addresses, except the broadcast address, are equal and can be assigned to individual units. The host computer must also have a unique network address.

Data Packet

The data sub-packet is comprised of six to 32 bytes of information. It is further divided into seven fields as shown in Figure 6. The first six fields comprise the command preamble while the last field is the actual data.

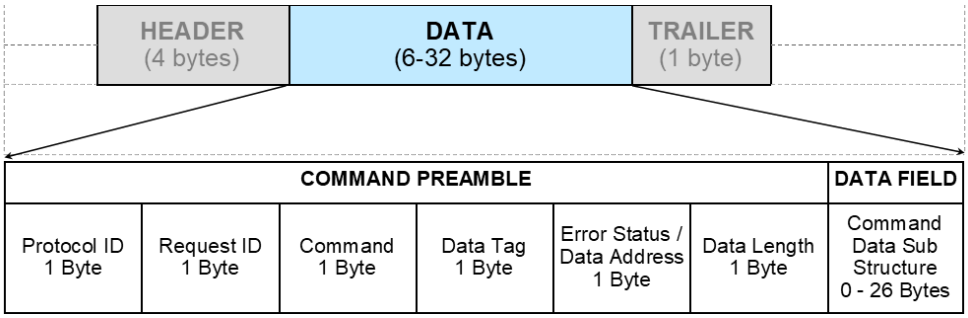

Figure 6: Data Sub-Packet

Protocol ID

This field provides backward compatibility with older generation equipment protocol. It should normally be set to zero. This field allows the unit to auto-detect other protocol versions, which may exist in the future.

Request ID

This is an application specific field. The amplifier will echo this byte back in the response frame without change. This byte serves as a request tracking feature.

Command

The RCP2 protocol is a table based protocol. It allows the user to view and modify data tables located on the controlled device. Throughout the remainder of this description, "sender" will refer to the host PC, and "receiver" will refer to the unit.

Sender and receiver are limited to two commands and two command responses. The Get Request command issued by a command sender allows monitoring of existing conditions and parameters on the receiver. The Get Request frame should not have any bytes in the Data Field and be no longer than 11 bytes.

The Response frame from the receiver will contain a Get Response designator in the Command field. If the receiver does not detect any errors in the Get Request frame, the requested data will be attached to the response frame. The length of the Get Response frame varies by the amount of attached data bytes. It may contain 11+N bytes where N is the amount of requested data bytes from a particular table, specified in the Data Length field.

The Set Request command allows the sender to actively change parameters for the receiver's internal configuration. The Set Request frame must contain a number of bytes in the Data Field as specified in the Data length field. The frame size must be 11+N bytes, where N is the length of the attached data structure. The receiver will respond with a frame where the command field will be set to a Set Response designator. The frame length is equal to the Request frame.

The byte value for each command is given in Table 2.

Table 2: Command Byte Values

Command Name	Command Byte Value
Set Request	0
Get Request	1
Set Response	2
Get Response	3

Data Tag

The controller internal structure is organized in several tables, all of which share similar functionality and internal resources. To access the various tables, the data tag must be specified in the request frame. The data associated with certain tags is read only. Therefore only the "Get" command request would be allowed to access these data tags. The controller will return an error on attempts to issue a "Set" request to a read-only table tag. Various tables may contain values formatted either in 1 or 2 bytes format. The data tag byte values are given in Table 3.

Table 3: Data Tag Byte Values

Tag Name	Data Tag Byte Value	Min. Valid Length of Data Field	Description
Systems Settings Tag	0	1 Byte	This tag allows accessing various system settings on remote unit. Host access status: Full Read/Write access. Settings can be modified at any time. Some of the settings may require hardware reset of the remote unit.
System Thresholds Tag	1	2 Bytes	This tag allows access to the critical unit thresholds. Host access status: Tag have read only status.
System Conditions Tag	3	1 Byte	This tag allows access to the unit's internal conditions flags, such as fault status or current system status. Host access status: Read only. This type of the data can not be set or modified remotely.
ADC Channels Access Tag	4	2 Bytes	ADC legacy access. Don't use for new development
Reserved	6	N/A	This tag is reserved.
Reserved	2	N/A	This tag is reserved.
Reserved	5	N/A	This tag is reserved for factory use only.

Special Command Tag (v.6.00)	10	N/A	This tag is reserved for factory use only.

Data Address / Error Status / Local Port Frame Length

This field is a tag extension byte and specifies the first table element of the tagged data. If the Data Length is more than 1 byte, then all subsequent data fields must be accessed starting from the specified address. For example, if the requestor wants to access the amplifier's unique network address, it should set data tag 0 (System settings tag) and data address 8 (see Table 7, System Settings Details table). If the following Data Length field is more than 1, then all subsequent Settings will be accessed after the Unique Network Address.

> ⚠ **Important! In any response frame, the Data Address field is replaced with the Error Status information. The various error codes are given in Table 4.**

Table 4: Error Status Byte Values

Error Code Name	Byte Value	Possible Cause
No Errors	0	Normal Condition, no errors detected
Data Frame Too Big	1	Specified Data length is to big for respondent buffer to accept
No Such Data	2	Specified Data Address is out off bounds for this tag data
Bad Value	3	Specified value not suitable for this particular data type
Read Only	4	Originator tried to set a value which has read only status
Bad Checksum	5	Trailer checksum not matched to calculated checksum
Unrecognizable Error	6	Error presented in originator frame, but respondent failed to recognize it. All data aborted.

Data Length

This byte value specifies the number of bytes attached in the Data Field. For the Get command, it specifies the number of data bytes that has to be returned by the unit to a host PC in the Response frame. For the Set command, the value of this byte specifies the number of data fields to be accessed starting from the address specified in the Data Address byte. In general, Data Length value plus Data Address must not exceed the maximum data size particular tag.

Data Field

The actual data contained in the packet must be placed in this field. The "Get Request" type of command must not contain any Data Field. "Get Request" will be rejected if any data is present in the Data Field. Generally, the Bad Checksum error code will be added to the response from the unit. In case the data length is 2 bytes, each data word is placed in the frame with its least significant byte first. All data with length of 2 bytes must be represented as integer type with maximum value range from 32767 to (-32767).

Trailer Packet

The trailer component contains only one byte called the Frame Check Sequence. This field provides a checksum during packet transmission. See Figure 7.

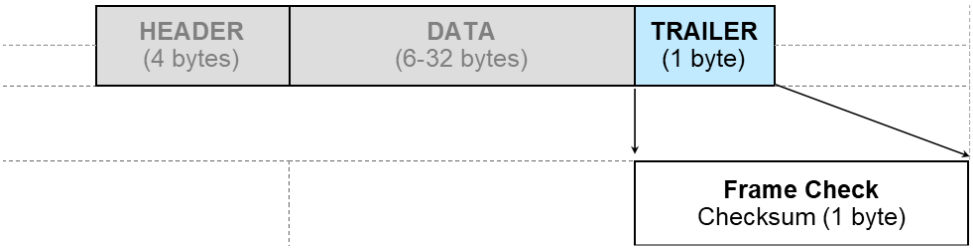

Figure 7: Trailer Sub-Packet

Frame Check Sequence

This value is computed as a function of the content of the destination address, source address and all Command Data Substructure bytes. In general, the sender formats a message frame, calculates the check sequence, appends it to the frame, then transmits the packet. Upon receipt, the destination node recalculates the check sequence and compares it to the check sequence embedded in the frame. If the check sequences are the same, the data was transmitted without error. Otherwise an error has occurred and some form of recovery should take place. In this case the amplifier will return a packet with the "Bad Checksum" error code set. Checksums are generated by summing the value of each byte in the packet while ignoring any carry bits. A simple algorithm is given as:

```
Chksum=0
        FOR byte_index=0 TO byte_index=packet_len-1
                Chksum=(chksum+BYTE[byte_index]) MOD 256
        NEXT byte_index
```

Timing Issues

There is no maximum specification on the inter-character spacing in messages. Bytes in messages to amplifier units may be spaced as far apart as you wish. The amplifier will respond as soon as it has collected enough bytes to determine the message. Generally, there will be no spacing between characters in replies generated by units. The maximum length of the packet sent to the amplifier node should not exceed 64 bytes, including checksum and frame sync bytes. Inter-message spacing, must be provided for good data transmission. The minimum spacing should be 100 ms. This time is required for the controller to detect a "Line Cleared" condition with half duplex communications. Maximum controller respond time is 200 ms.

Serial Communications Protocol

Table 5 through Table 9 detail the values of the serial communications protocol.

Table 5: Request Frame Structure

Byte	Tag	Description
1	0xAA	Frame Sync 1
2	0x55	Frame Sync 2
3	Destination Address	-// -
4	Source Address	-// -
5	Protocol Version	Protocol Compatibility Byte, must be set 0
6	Request ID	Service Byte
7	Command	0 = Set Request; 1 = Get Request
8	Data Tag	0 = System Settings; 1 = System Thresholds; 2 = Reserved; 3 = Conditions; 4 = ADC Data; 5 = Reserved
9	Data Address	Setting number, Sensor command, EEPROM address
10	Data Length	Total length of the data, valid values: 1 - 10
11+N	Data	Actual Data
11+N+1	Checksum	Destination Address + Source Address + Protocol Version + Request ID + Command + Data Tag + Data Address + Data Length + Data

Table 6: Response Frame Structure

Byte	Tag	Description
1	0xAA	Frame Sync 1
2	0x55	Frame Sync 2
3	Destination Address	-// -
4	Source Address	-// -
5	Protocol Version	Protocol Compatibility Byte, must be set 0
6	Request ID	Service Byte
7	Command	2 = Set Response; 3 = Get Response
8	Data Tag	0 = System Settings; 1 = System Thresholds; 2 = Reserved; 3 = Conditions; 4 = ADC Data; 5 = Reserved
9	Error Status	0 = No Errors, 1 = Too Big, 2 = No Such Data, 3 = Bad Value, 4 = Read Only, 5 = Bad Checksum; 6 = Unrecognized Error
10	Data Length	Total length of the data, valid values: 1 - 10
11+N	Data	Actual Data
11+N+1	Checksum	Destination Address + Source Address + Protocol Version + Request ID + Command + Data Tag + Data Address + Data Length + Data

Table 7: System Settings Data Values

Data Address	# Bytes	Description	Limits and Byte Values
1	1	System Configuration	0 = 1:2 Controller; 1 = 1:1 Controller; 2 = 1:1 Phase combine; 3 = Dual 1:1 Controller; 4 = Maintenance Mode; 5 = 1:2 Phase combine (v. 6.00)
2	1	Switching Mode	0 = Auto Mode; 1 = Manual Mode; 2 = Lock Mode (v. 6.00)
3	1	Control Mode	0 = Local; 1 = Remote
4	1	Reserved	N/A

5	1	Priority Select	0 = Pol1; 1 = Pol2
6	1	Communication Protocol *	0 = Normal; 1 = Terminal (v. 4.00)
7	1	Baud Rate *	0 = 9600; 1 = 2400; 2 = 4800; 3 = 19200; 4 = 38400
8	1	Unique network address	Valid values: 0 - 255
9	1	Type of Serial Interface *	0 = RS232; 1 = RS485; 2 = IPnet; 3 = SNMP (v. 4.00)
10	1	Type of Fault Monitoring	0 = SSPA only; 1 = LNA only; 2 = Both; 3 = SSPA Com Faults (v. 6.00)
11	1	Auxiliary Fault Monitoring	0 = Enable non-switching faults; 1 = Ignore; 2 = Enable non-switching faults, inverted logic; 3 = Enable switching faults (v. 6.00); 4 = Enable switching faults, inverted logic (v. 6.00)
12	1	RF Switch Monitoring	0 = Major Fault; 1 = Alert Only; 2 = Alternate (v. 3.30)
13	1	Fault Latching	0 = Latch Enable; 1 = Latch Disable
14	1	Fault Window	0 = 20%; 1 = 8%; 2 = 12%, 3 = 15%
15	1	Fault Logic	0 = Fault on Low; 1 = Fault on High
16	1	User Password	Valid Values=0 to 255
17	1	Amplifier Standby Configuration	0 = Amplifier 2 on Standby (default); 1 = Amplifier 1 on Standby; 2 = Amplifier 2 on Standby; 3 = Amplifier 3 on Standby
18	1	Buzzer	0 = Enable Buzzer; 1 = Disable Buzzer
19	1	Password Protection	0 = Protection Off; 1 = Protection On
20	1	System Type	0 = None; 1 = Compact Outdoor; 2 = Rack Mount; 4 = vBUC; 5 = SystemX; 6 = PowerMAX (v. 6.00)
21	1	RF Power Units	0 = Measure RF in dBm; 1 = Measure RF in Watts (v. 3.50)
22	1	Reserved	N/A
23	1	LNA/LNB PS Output Voltage	0 = Low range 13V, 900 mA; 1 = High range 17V, 900 mA; 2 = High Power Range 24V, 0.9A/1.5A (Standard/HP version only)
24	1	Standby Mode	0 = Hot Standby; 1 = Cold Standby (v. 6.00)
25	1	Mute State	0 = Mute On; 1 = Mute Pol1 (1:2 only) (v. 6.15); 2 = Mute Pol2 (1:2 only) (v 6.15); 255 = Mute Off
26	1	Remote SSPA Attenuation	Valid Values= 0 to 255 (v. 3.10 dBx10 value)
27	1	Switch Mute	0 = Off; 1 = Internal; 2 = External; 3 = All on (v. 3.30)
28	1	Fault Tolerance	0 = Disabled; 1 = One Fault; 2 = Two Faults (v. 3.70)
29-32	4	IP Address (MSB - LSB) *	Settings required for normal operation of IP interface. Consult network administrator for a proper setup. All settings physically located on the RCP unit. Changes to these settings effective only after controller restart. (v. 4.00)
33-35	4	IP Gateway (MSB - LSB) *	Settings required for normal operation of IP interface. Consult network administrator for a proper setup. All settings physically located on the RCP unit. Changes to these settings effective only after controller restart. (v. 4.00)
36-40	4	IP Subnet Mask (MSB - LSB) *	Settings required for normal operation of IP interface. Consult network administrator for a proper setup. All settings physically located on the RCP unit. Changes to these settings effective only after controller restart. (v. 4.00)
41-42	2	Receive IP Port (MSB - LSB) *	Settings required for normal operation of IP interface. Consult network administrator for a proper setup. All settings physically located on the RCP unit. Changes to these settings effective only after controller restart. (v. 4.00)
43-46	4	IP Lock Address (MSB - LSB) *	Settings required for normal operation of IP interface. Consult network administrator for a proper setup. All settings physically located on the RCP unit. Changes to these settings effective only after controller restart. (v. 4.00)

47-49	3	Individual SSPA Unit Attenuation Offset. Sum of Offset value and Remote SSPA Attenuation value (Data Address 26) must be ≤ 20	Valid Values= 0 to 255 (v. 4.20)
		* Requires hardware reset	

Table 8: System Condition Data Values

Data Address	# Bytes	Description	Limits and Byte Values
1	1	Unit 1 Fault State	0 = No Fault; 1 = Fault; 2 = Ignored
2	1	Unit 2 Fault State	0 = No Fault; 1 = Fault; 2 = Ignored
3	1	Unit 3 Fault State	0 = No Fault; 1 = Fault; 2 = Ignored
4	1	Summary Fault	0 = No Fault; 1 = Fault
5	1	Power Supply 1 Fault State	0 = No Fault; 1 = Fault
6	1	Power Supply 2 Fault State	0 = No Fault; 1 = Fault
7	1	Auxiliary Input Fault State	0 = No Fault; 1 = Fault; 2 = Ignored
8	1	External Port State	Bit 0-2 = SSPA Input lines; Bit 3-8 = Auxiliary Input lines
9	1	LNA Faults	Bit 0 = 1, Faults enabled; Bit 0 = 0, Faults disabled; Bit 1 = 1, Unit 1 Fault; Bit 2 = 1, Unit 2 Fault; Bit 3 = 1, Unit 3 Fault; Bits 1-3 = 0, No Fault
10	1	SSPA Faults	Bit 0 = 1, Faults enabled; Bit 0 = 0, Faults disabled; Bit 1 = 1, Unit 1 Fault; Bit 2 = 1, Unit 2 Fault; Bit 3 = 1, Unit 3 Fault; Bits 1-3 = 0, No Fault
11	1	RF Switch 1 Position	1= Switch Fault; 2 = Switch Ignore; 3 = Position 1; 4 = Position 2
12	1	RF Switch 1 Position	1= Switch Fault; 2 = Switch Ignore; 3 = Position 1; 4 = Position 2
13-14	2	Forward RF Power (available only with systems equipped with Forward RF power meter)	If Setting RF Power Units = 0, Value x 10dBm; If Setting RF Power Units = 1, Value x 10 W; (See Table 7, Data Address 21 for details) (-100 for N/A (0xFF9C)); Low Byte First (v. 3.10)
15-16	2	Ambient Temperature (in °C) (available only with systems equipped with Forward RF power meter)	Value x 1 °C; N/A=0xFF9C (if parameter is not available at present time); Low Byte First (v. 3.10)
17-18	2	Core Temperature of SSPA Unit 1 (available only with systems with remote SSPA control enabled)	Value x 1 °C; N/A=0xFF9C (if parameter is not available at present time); Low Byte First (v. 3.10)
19-20	2	Core Temperature of SSPA Unit 2 (available only with systems with remote SSPA control enabled)	Value x 1 °C; N/A=0xFF9C (if parameter is not available at present time); Low Byte First (v. 3.10)
21-22	2	Core Temperature of SSPA Unit 3 (available only with systems with remote SSPA control enabled)	Value x 1 °C; N/A=0xFF9C (if parameter is not available at present time); Low Byte First (v. 3.10)
23-24	2	Reflected RF Power (available only with systems equipped with Reflected RF power meter)	If Setting RF Power Units = 0, Value x 10dBm; If Setting RF Power Units = 1, Value x 10 W; (See Table 7, Data Address 21 for details) (-100 for N/A (0xFF9C)); Low Byte First (version 3.30)
25-26	2	DC Current (Unit 1 in Amps)	Value x 10 Amp; N/A=0XFF9C; Low Byte First (v. 3.60)
27-28	2	DC Current (Unit 2 in Amps)	Value x 10 Amp; N/A=0XFF9C; Low Byte First (v. 3.60)
29-30	2	DC Current (Unit 3 in Amps)	Value x 10 Amp; N/A=0XFF9C; Low Byte First (v. 3.60)
31-32	2	Forward RF Power (Unit 1 in dBm)	Value x 10 dBm; N/A=0XFF9C; Low Byte First (v. 3.60)
33-34	2	Forward RF Power (Unit 2 in dBm)	Value x 10 dBm; N/A=0XFF9C; Low Byte First (v. 3.60)
35-36	2	Forward RF Power (Unit 3 in dBm)	Value x 10 dBm; N/A=0XFF9C; Low Byte First (v. 3.60)

Table 9: System Threshold Data Values

Data Address	# Bytes	Description	Limits and Byte Values
1	2	LNA Unit 1 Calibration Data	Point conversion: 0.57 mA per 1 value increment, maximum value =4095 (2.3A) (read/write)
2	2	LNA Unit 2 Calibration Data	Point conversion: 0.57 mA per 1 value increment, maximum value =4095 (2.3A) (read/write)
3	2	LNA Unit 3 Calibration Data	Point conversion: 0.57 mA per 1 value increment, maximum value =4095 (2.3A) (read/write)
4	2	LNA Unit 1 DC Current	Point conversion: 0.57 mA per 1 value increment, maximum value =4095 (2.3A) (v6.00) (read only)
5	2	LNA Unit 2 DC Current	Point conversion: 0.57 mA per 1 value increment, maximum value =4095 (2.3A) (v6.00) (read only)
6	2	LNA Unit 3 DC Current	Point conversion: 0.57 mA per 1 value increment, maximum value =4095 (2.3A) (v6.00) (read only)
7	2	LNA Unit 1 DC Voltage	Point conversion: 0.1 V per 1 value increment, maximum value =1023 (v6.00) (read only)
8	2	LNA Unit 2 DC Voltage	Point conversion: 0.1 V per 1 value increment, maximum value =1023 (v6.00) (read only)
9	2	LNA Unit 3 DC Voltage	Point conversion: 0.1 V per 1 value increment, maximum value =1023 (v6.00) (read only)
10	2	PS1 DC Voltage	Point conversion: 0.1 V per 1 value increment, maximum value =1023 (v6.00) (read only)
11	2	PS2 DC Voltage	Point conversion: 0.1 V per 1 value increment, maximum value =1023 (v6.00) (read only)
12	2	RCP Chassis Temperature	Value x 1 °C (v6.00) (read only)

Examples

This section contains several examples of serial data exchange between a host computer and an RCP 1:2 Redundant Controller. All byte values are given in hexadecimal format. The following controller and system switch positions are used throughout all examples.

```
RCP2-1200 Network Address = 0
Host Computer Network Address = 0xA
Request ID = 0x6F


Amplifier Status
  Amplifier #1= OK
  Amplifier #2= Faulted
  Amplifier #3= OK


Power Supply Status
  Power Supply #1=OK
  Power Supply #2=OK


Auxiliary Fault Inputs = Faulted


RF Switch Status
  Switch #1 Position = Position 1
  Switch #2 Position = Undetermined or Faulted
```

Example 1

The host computer requests the RCP system conditions. The RCP detects no errors in the request frame and issues a response. The PC request string is listed below.

Table 10: Example 1: PC Requests RCP System Conditions

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	0	Destination Address of RCP unit
4	A	Source address of Request originating PC Host
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Request ID byte is set by originator, will be echoed back by respondent
7	1	Command field for "Get" type request
8	3	"System Conditions" tag indicates which data from respondent required in response frame
9	1	Data Address field indicates the beginning data address inside of the "System Conditions" data set to 1 (first element)
10	C	Data Length field indicates how many data bytes of the "System Conditions" requested from RCP2 (12 (C) is all available data of "System Conditions" type)
11	8A	Arithmetic checksum of bytes number 3 through 10

The RCP replies with the following response string.

Table 11: Example 1: RCP Response (System Conditions)

Byte Position	Byte Value (Hex)	Description

1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	A	Destination Address of PC request originator
4	0	Source address of RCP respondent
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Echo of the Originator's Request ID byte
7	3	Command field for "Get" type response
8	3	"System Conditions" tag indicates which data from respondent included in response frame.
9	0	Data Address field omitted and replaced with Error status code. 0 in this field indicates absence of errors.
10	C	Data Length field indicates how many data bytes of the "System conditions" requested from RCP (12 (C) is all available data of "System Conditions" type).
11	0	Data field 1 contains data element 1 of "System Conditions" data type, which is RCP System Unit1 Fault State. 0 Indicates that Unit 1 is not faulted.
12	1	Data field 2 contains data element 2 of "System Conditions" data type, which is RCP System Unit2 Fault State. 1 Indicates that Unit 2 is in fault condition.
13	0	Data field 3 contains data element 3 of "System Conditions" data type, which is RCP System Unit3 Fault State. 0 Indicates that Unit 3 is not faulted.
14	1	Data field 4 contains data element 4 of "System Conditions" data type, which is RCP System Summary Fault State. 1 Indicates presence of faults in the system.
15	0	Data field 5 contains data element 5 of "System Conditions" data type, which is RCP System Power Supply 1 Fault State. 0 Indicates that Power supply 1 is not faulted and functioning properly.
16	0	Data field 6 contains data element 6 of "System Conditions" data type, which is RCP System Power Supply 2 Fault State. 0 Indicates that Power supply 2 is not faulted and functioning properly.
17	1	Data field 7 contains data element 7 of "System Conditions" data type, which is RCP System Auxiliary Fault State. 1 Indicates presence of faults on one of the Auxiliary Inputs.
18	FF	Data field 8 contains data element 8 of the "System Conditions" data type. This data element is reserved for future applications.
19	FF	Data field 9 contains data element 9 of the "System Conditions" data type. This data element is reserved for future applications.
20	FF	Data field 10 contains data element 10 of the "System Conditions" data type. This data element is reserved for future applications.
21	3	Data field 11 contains data element 11 of the "System Conditions" data type, which is RF Switch 1 state. 3 Indicates that RF Switch 1 is in Position 1.
22	1	Data field 12 contains data element 12 of the "System Conditions" data type, which is RF Switch 2 state. 1 Indicates that RF Switch 2 is has a fault condition or its position can't be reliably determined.
23	8F	Arithmetic checksum of bytes number 3 through 22

Example 2

The host computer requests the RCP system thresholds. The request string is:

Table 12: Example 2: PC Requests RCP System Thresholds

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	0	Destination Address of RCP unit
4	A	Source address of Request originating PC Host
5	0	Protocol Version Compatibility Field must always be 0

6	6F	Request ID byte is set by originator, will be echoed back by respondent
7	1	Command field for "Get" type request
8	1	"System Thresholds" tag indicates which data from respondent required in response frame
9	1	Data Address field indicates the beginning data address inside of the "System Conditions" data set to 1 (first element)
10	6	Data Length field indicates how many data bytes of the "System Thresholds" requested from RCP2 (6 is all available data of "System Thresholds" type)
11	82	Arithmetic checksum of bytes number 3 through 10

The RCP replies with the following response string:

Table 13: Example 2: RCP Response (System Thresholds)

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	A	Destination Address of PC request originator
4	0	Source address of RCP respondent
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Echo of the Originator's Request ID byte
7	3	Command field for "Get" type response
8	1	"System Thresholds" indicates which data from respondent is included in response frame
9	0	Data Address field omitted and replaced with Error status code. 0 = no errors.
10	6	Data Length field indicates how many data bytes "System Thresholds" requested from RCP (6 is all available data of "System Thresholds" type)
11	D1	Data field 1 contains least significant byte of data element 1 of "System Thresholds" data type, which is LNA 1 cal. point
12	0	Data field 2 contains most significant byte of data element 1 of "System Thresholds" data type, which is LNA 1 cal. point. Data can be normalized to LNA current as follows: Lna1calpoint * 0.57mA/point = 209*0.57 = 119.13 mA
13	F	Data field 3 contains least significant byte of data element 2 of "System Thresholds" data type, which is LNA 2 cal. point
14	0	Data field 4 contains most significant byte of data element 2 of "System Thresholds" data type, which is LNA 2 cal. point. Data can be normalized to LNA current as follows: Lna1 cal point * 0.57mA/point = 216*0.57 = 123.12 mA
15	DC	Data field 5 contains least significant byte of data element 3 of "System Thresholds" data type, which is LNA3 cal. point.
16	0	Data field 6 contains most significant byte of data element 2 of "System Thresholds" data type, which is LNA 3 cal. Point. Data can be normalized to LNA current as follows: Lna1 cal point * 0.57mA/point = 220*0.57 = 125.4 mA
17	8	Arithmetic checksum of bytes number 3 through 16

Example 3

The host computer requests the RCP network address. The PC request string is listed below.

Table 14: Example 3: PC Requests RCP Network Address

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	FF	Destination Address is broadcast network address

4	A	Source address of Request originating PC Host
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Request ID byte is set by originator, will be echoed back by respondent
7	1	Command field for "Get" type request
8	0	"System Settings" tag indicates which data from respondent required in response frame
9	8	Data Address field indicates the address of the RCP2's network address inside "System Settings" data set to 8
10	1	Data Length field indicates how many data bytes "System Settings" requested from RCP (1 byte requested)
11	82	Arithmetic checksum of bytes number 3 through 10

The RCP replies with the following response string.

Table 15: Example 3: RCP Response (Network Address)

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	A	Destination Address of PC request originator
4	0	Source address of RCP respondent
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Request ID byte is set by originator, will be echoed back by respondent
7	3	Command field for "Get" type of the response
8	0	"System Settings" indicates which data from respondent is included in response frame
9	0	Data Address field omitted and replaced with Error status code. 0 in this field indicates absence of errors
10	1	Data Length field indicates how many data bytes "System Settings" requested from RCP
11	0	Data field 1 contains data element 8 of "System Settings" data type. "Unique Network Address"=0
12	7D	Arithmetic checksum of bytes number 3 through 11

Example 4

The host computer requests the Priority be set to Polarity #2. The PC request string is listed below.

Table 16: Example 4: PC Requests RCP Priority Set to Polarity #2

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	0	Destination Address of RCP unit
4	A	Source address of Request originating PC Host
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Request ID byte is set by originator, will be echoed back by respondent
7	0	Command field for "Set" type request
8	0	"System Settings" indicates which data from respondent is required in response frame
9	5	Data Address field indicates the address of the RCP's Priority Select data element inside "System Settings" (data element 5)
10	1	Data Length field indicates how many data bytes of the "System Conditions" requested from RCP2 (1 byte requested)

11	1	Data Field 1. 1 Indicates that priority must be set to Pol2
12	7F	Arithmetic checksum of bytes number 3 through 11

The RCP replies with the following response string.

Table 17: Example 4: RCP Response (Priority Set Failed)

Byte Position	Byte Value (Hex)	Description
1	AA	Frame Sync Byte 1
2	55	Frame Sync Byte 2
3	A	Destination Address of PC request originator
4	0	Source address of RCP respondent
5	0	Protocol Version Compatibility Field must always be 0
6	6F	Echo of the Originator's Request ID byte
7	2	Command field for "Set" type response
8	0	"System Settings" indicates which data from respondent is included in response frame
9	2	Data Address field omitted and replaced with Error status code. 2 indicates "No such data" error
10	1	Data Length field indicates how many data bytes "System Settings" requested from RCP
11	0	Data field 1 contains rejected data
12	7E	Arithmetic checksum of bytes number 3 through 11

Terminal Mode Serial Protocol

The Teledyne Paradise Datacom RCP Redundant System Controller utilizes Terminal Mode Serial Protocol (TMSP) as a secondary serial protocol for Management and Control through a Remote Serial Interface.

TMSP allows the user to access internal RCP functions via a remote ASCII Terminal or its equivalent (such as HyperTerminal for Windows). TMSP is accomplished through either the RS-232 or RS-485, half duplex, serial communication link.

U.S. ASCII encoded character strings are used to represent commands and data messages. A remote terminal or controller initiates a communication session and the RCP takes action and returns a report of requested status. The controller will not initiate communication and will transmit data only when commanded to do so. Prior to establishing the session with the unit, this mode must be enabled through the front panel menu.

The remote terminal must be configured with serial settings that match the unit's serial port settings. For example, if the unit is set at 9600 Baud, the remote terminal must be also configured as ASCII terminal at 9600 Baud, no parity, 8 bit data with 1 stop bit serial connection. The unit will not echo back any incoming characters, so local echo must be enabled on the remote terminal.

To establish a remote control session with the unit, the user must type "UNIT#XXX" in the terminal window (all letters must be in upper case), where XXX is the unit's unique network address or the global call address (255). Press the "Enter" key on Remote Terminal keyboard.

The unit should answer with words "Unit#XXX OnLine" with the first menu screen on the following lines. After a remote session is successfully established, the unit will stay connected as long as needed. The session interface mimics the unit's front panel menu. To help the user navigate through the menu, the help string with the list of active keys always follows the menu strings.

For example: "Active Keys:(U)p+Enter;(D)own+Enter;(C)lrearFlt; (M)enu+Enter; (E)nd+Enter" will be the last transmission string on all informative menu screens. NOTE: All letters must be in upper case!

To refresh current screen on the Remote Terminal simply press "Enter" key. To end a session, press "E" and then the "Enter" key.

> ⚠ **Important! If multiple units are networked on the same serial link, DO NOT ESTABLISH A SESSION WITH MORE THAN ONE UNIT A TIME. If you do so you will not get a valid response!**

The following procedure will guide the user through the remote terminal setup, using the Windows 95/98 HyperTerminal software. The unit must be connected to a PC com port and configured to use TMSP with 9600 Baud rate prior to setting up the PC configurations.

Start the Windows HyperTerminal Program (default Windows location at Programs - Accessories - HyperTerminal).

Enter the name of your serial connection ("Compact Outdoor SSPA" for example), and then click "Ok" button. See Figure 8.

Figure 8: HyperTerminal Connection Description

Select direct connection to the PC communication port (Com1 for example), which meant to be used for communication with unit, and then click "OK" Button. See Figure 9.

Figure 9: HyperTerminal Communication Port Selection

In the next window, select the following as shown in Figure 10:

1. Set Bits per Second to 9600;
2. Set Data bits to 8;
3. Set Parity to None;
4. Set Stop bits to 1;
5. Set Flow control to none.
6. Click the "OK" button.

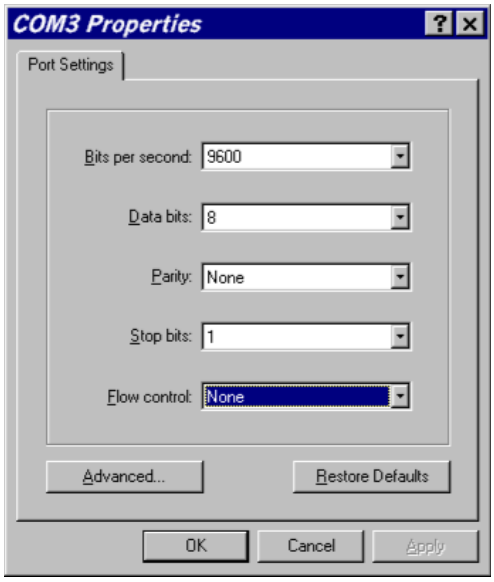

Figure 10: HyperTerminal Communication Properties

Normally, the unit will not echo back characters typed by the user in a Terminal window. For added security and convenience, turn on Local Echo in the HyperTerminal application. To do so, select the following from the HyperTerminal menu: File ? Properties ? Settings ? ASCII setup. This will bring up a window similar to that shown in Figure 11. In this window, check the box marked "Echo typed characters locally" and click "OK".

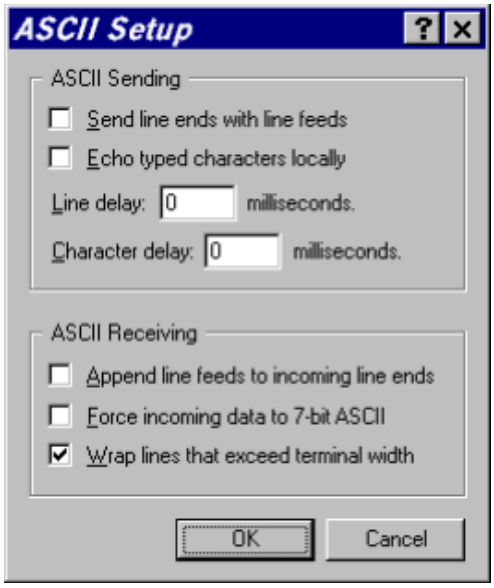

Figure 11: HyperTerminal ASCII Setup

> ⚠ **NOTE: Due to a software bug on some versions, this feature may not work. Do not use versions prior to 6.3. Download the latest version of HyperTerminal at http://www.hilgraeve.com.**

Your PC is now configured to work with the controller in Terminal mode. To establish a session with the controller, type "UNIT#170"

> ⚠ **Note: When using a RS-485 connection, avoid using the global address (170). Instead, use the unique RCP address.**

An example of a terminal mode session shown on Figure 12.

```
UNIT#101
Welcome! Unit#101 Online


PS1:Fault  System:Fault  SW1:Fault
PS2:Normal    Aux:Normal SW2:Fault
(B)ack; + EnterlrearFlt;(U)p;(D)own;(M)enu;(E)nd;D



Prtcl:Terminal Intrfc:RS232 Logic:Lo
 Baud:9600    SysAddr:101   Latch:Dis
Active Keys:(C)lrearFlt;(U)p;(D)own;(M)enu;(E)nd;(B)ack; + Enter

D

Track:Ext.   Ctrl:Local  Window(%):8%
Prior:Pol1   Mode:Manual    Buzzer:Dis
Active Keys:(C)lrearFlt;(U)p;(D)own;(M)enu;(E)nd;(B)ack; + Enter

D

LNA/LNB Faults:N/A   PS1Out(V):00.0
   SSPA Faults:None  PS2Out(V):28.4
Active Keys:(C)lrearFlt;(U)p;(D)own;(M)enu;(E)nd;(B)ack; + Enter
```

Figure 12: Terminal Mode Example

Ethernet Interface

Overview

The RCP2 Ethernet port (J9) supports several IP network protocols to provide a full featured remote M&C interface over an Ethernet LAN.

- IPNet protocol - redirection of standard Teledyne Paradise Datacom serial protocol over UDP transport layer protocol. This protocol is fully supported in Teledyne Paradise Datacom's Universal M&C software.
- SNMPv1 protocol - This protocol intended for integration into large corporate NMS architectures.
- HTTP Web interface - This interface is designed to allow platform independent remote control function for a single RCP2 unit.

In order to utilize either of the protocols listed above, the relevant interface option has to be turned on. Refer to the following sections:

- IPNET Interface
- SNMP Interface
- Web Interface

Of course, standard IP level functions such as ICMP Ping and ARP are supported as well. There is currently no support for dynamic IP parameters settings (DHCP).

IPNet Interface

General Concept

Satcom system integrators are recognizing the benefits of an Ethernet IP interface. These benefits include:

- Unsurpassed system integration capabilities;
- Widely available and inexpensive set of support equipment (network cable; network hubs);
- Ability to control equipment over Internet;
- Ease of use

Implementation of the raw Ethernet interface is not practical due to the limitations it places on M&C capabilities by the range of a particular LAN. It is more practical to use an Ethernet interface in conjunction with the standard OSI (Open System Interconnect) model to carry a stack of other protocols. In an OSI layered stack, an Ethernet interface can be represented as a Data Link layer. All upper layers are resolved through a set of IP protocols. In order to keep data bandwidth as low as possible (which is important when M&C functions are provided through a low-bandwidth service channel) the IP/UDP protocol set is used as the Network/Transport layer protocol on Teledyne Paradise Datacom SSPAs.

UDP (User Datagram Protocol) was chosen over TCP (Transmission Control Protocol) because it is connectionless; that is, no end-to-end connection is made between the unit and controlling workstation when datagrams (packets) are exchanged.

Teledyne Paradise Datacom provides a Windows ®-based control application to establish UDP-based Ethernet communication with the unit. The control application manages the exchange of datagrams to ensure error-free communication. An attractive benefit of UDP is that it requires low overhead resulting in minimal impact to network performance. The control application sends a UDP request to unit and waits for response. The length of time the control application waits depends on how it is configured. If the timeout is reached and the control application has not heard back from the agent, it assumes the packet was lost and retransmits the request. The number of the retransmissions is user configurable.

The Teledyne Paradise Datacom RCP2 Ethernet IP interface can use UDP ports from 0 to 65553 for sending and receiving. The receiving port needs to be specified through the front panel menu. For sending, it will use the port from which the UDP request originated. It is up to the user to select an appropriate pair of ports that are not conflicting with standard IP services. Teledyne Paradise Datacom recommends usage of ports 1007, 1038 and 1039. These ports are not assigned to any known application.

As an application layer protocol (which actually carries meaningful data), the standard RCP2 serial protocol was selected. This protocol proves to be extremely flexible and efficient. It is also media independent and can be easily wrapped into another protocol data frame. An example of the UDP frame with encapsulated Teledyne Paradise Datacom protocol frame is shown on Figure 13.

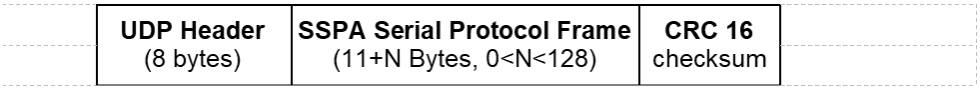

Figure 13: UDP Frame

This set of Ethernet IP protocols is currently supported by Teledyne Paradise Datacom Universal M&C package (RCP2/FPRC/RCPD selection). The software is available for download from the web site, http://www.paradisedata.com.

Setting IPNet Interface

All IP-related menu items are consolidated under the following menu: Tap the Home icon to return to the main menu screen; tap the Communication button; tap the IP Setup button.

Prior to enabling the Ethernet IP interface, the following IP parameters need to be set: IP Address, Gateway, Subnet Mask, Local Port and Lock IP Address. The Lock IP address is a security measure. Setting this parameter either to 0.0.0.0 or 255.255.255.255 will allow any host to control the unit. Setting the parameter to the specific address of the remote host will lock RCP2 access to this host. Packets received from other hosts will be ignored. For other parameters (IP Address, Gateway, Subnet Mask, Local Port) contact your network system administrator.

> ⚠ **Important! If you are planning to access the unit through the Internet, you must exercise the appropriate security measures. It is strongly recommended to put RCP2 units behind a protective Firewall or set up a VPN link for remote access.**

After selecting the IP parameters, you may turn on IP interfaces through front panel. Tap the Home icon to get to the main menu; tap the Communication button; tap the Interface button; tick the IPNET checkbox.

Once the Ethernet Interface is selected, the RS232/485 Main port is disabled. IP settings may be adjusted when the IPNet interface is turned on as needed without losing IP link. New settings will become effective only after a controller hardware reset or power cycle (Tap "Home" > "Options" > "System" > "Reset" > "Comms Only" > "OK" to confirm reset).

To disable the Ethernet port and enable the RS232/485 port, tap the Home icon to access the main menu; tap the Communication button; tap the Interface button; tick either the RS232 or RS485 checkbox.

> ⚠ **Important! At present, the controller supports one remote control protocol selection through its Ethernet interface port. This protocol is referred to as "Normal" on the front panel display. If the protocol selection is set to "Terminal", the controller will force its protocol selection to "Normal".**

The Ethernet port can be connected to a network hub through straight through network cable or directly to a work station NIC card through a null-modem or cross-over cable (Rx and Tx lines are crossed). As soon as an Ethernet interface has been selected as the primary interface, you should be able to verify the network connection to the unit by using the Ping command from your host workstation.

To do so on a Windows based PC, open a Command Prompt window and type PING and the dot delimited IP address of the controller, then press the Enter key. If the unit is successfully found on the network, the request statistic will be displayed.

```
PING XXX.XXX.XXX.XXX
```

If the unit does not answer on the ping command, check all hardware connections and verify that the IP settings on your host workstation and the controller match your network parameters. On a Windows-based PC you may also check ARP table entries. The new IP address of the unit may be set to another PC or network equipment with a different MAC address. Open a Command Prompt window and type "ARP -a", the press Enter. The current table will be displayed. If you see the unit IP address entry in the table, delete it by issuing the command "ARP -d XXX.XXX.XXX.XXX" and press Enter (XXX.XXX.XXX.XXX is the IP address of the unit). Now try the PING command again. More information about how to set up a network connection with the unit can be found in the **Ethernet Interface Set-Up and Cabling** section.

Using the RCP2 Web Interface

Starting with firmware version 6.00, the RCP web interface no longer needs to have a pre-installed Java application to operate. The web interface uses standard hypertext transfer protocol on port 80. The web interface is compatible with most modern web browsers, such as Firefox, Chrome or Internet Explorer, which support asynchronous JavaScript XML transactions (aka AJAX).

To connect to the controller internal web page, the user must make sure Web/IPNet interface is enabled on the device and that an IP address has been assigned to the unit. Connect the unit to an Ethernet network or directly to a PC 10/100 Base-T adapter and then open a web browser. Refer to the Setting IPNet Interface procedure of the **Remote Control Interface** section.

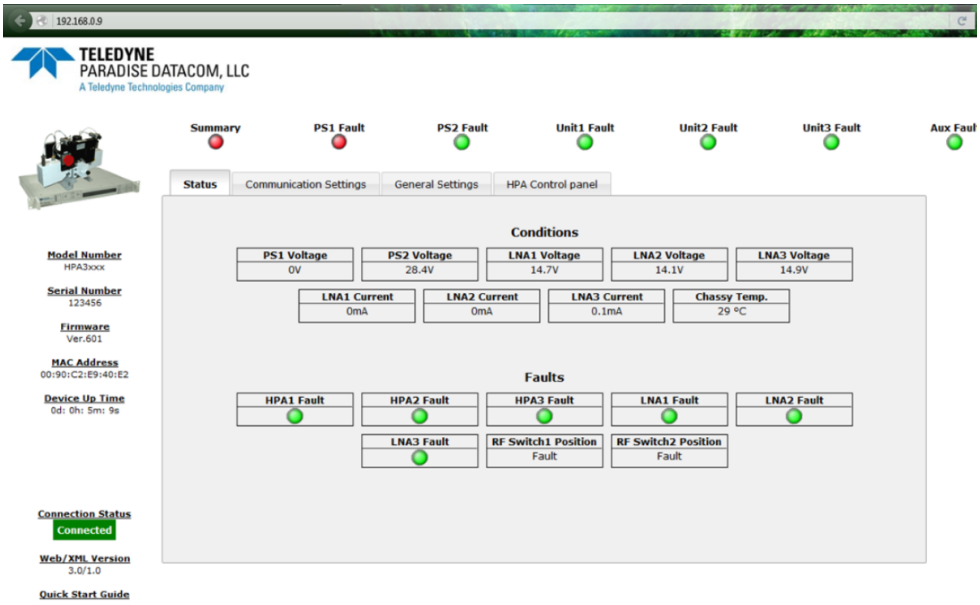

Figure 14: Web Interface Screen

Enter the IP address of the unit into the address bar of the browser. A security login window will appear. In the User Name field, enter admin, the default User Name. See Figure 15. The User Name is fixed and cannot be changed by the operator.

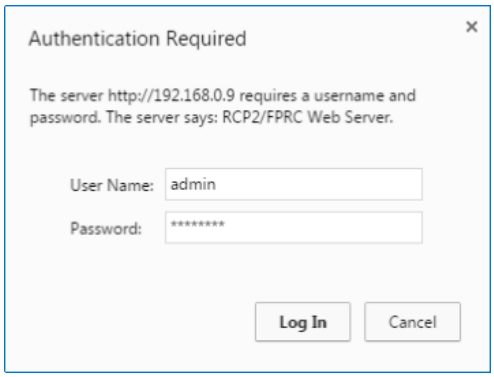

Figure 15: Web Interface Login Window

In the Password field, enter the web password assigned to the unit. The factory default password is **paradise**. The user name and password are case sensitive. The password may be changed at any time and may comprise up to 15 alpha-numeric characters.

Click on the [Log In] button to open the M&C control in the web browser (Figure 15).

To select another password, enter the following selection on the touchscreen: Tap the Home icon to return to the Main Menu; tap the Communication button; tap the Interface button; tick the IPNet checkbox; tap the IP Setup button; tap the Web Pwd button. Enter the new password using the keypad on the touchscreen. Tap the OK button to accept the entered password.

The top bar of RCP2 Monitor and Control application shows top level fault conditions: Power supply and unit faults as well as Auxiliary fault status.

The left side of the window displays unit model and serial number, firmware build, device MAC address and device up time since last I/O card power up or reboot. Additional information is displayed in multipage insert in the middle of the screen:

- Status: A view of all faults and operational parameters.
- Communication Settings: This tab provides access to all communication related settings. From here, the user can change the IP settings, Interface, Protocol, Baud Rate, Password and SNMP settings.
- General Settings: Read/Write listing of most adjustable RCP parameters. All options are selectable. To set a parameter, select the new value and click the "Confirm" button with the mouse pointer.
- HPA Control panel: All information and controls related to remotely control HPA system (if available)

⚠ **Note: The web server has limited hardware resources to support multiple simultaneously connected users. In the case that multiple users are connected to the same amplifier, service quality cannot be assured.**

SNMP Interface

Introduction

SNMP-based management was initially targeted for TCP/IP routers and hosts. However, the SNMP-based management approach is inherently generic so that it can be used to manage many types of systems. This approach has become increasingly popular for remote management and control solutions for various SSPA systems.

Teledyne Paradise Datacom devices with Ethernet interface support the most popular SNMPv1 format (SMIv1, RFC1155), SNMP Get, SNMP GetNext and SNMP Set commands. SNMP Traps are currently unsupported in units with serial numbers of 400000 and below.

In order to utilize SNMP protocol, the user has to enable this feature through the front panel or by remote serial protocol. SNMP uses the UDP fixed port 161 for sending and receiving requests.

The definition of managed objects described in MIB. The MIB file is available for download from the **Software Downloads** section of the Teledyne Paradise Datacom web site, http://www.paradisedata.com.

As with the serial protocol, the RCP2 MIB allows access to a remote SSPA (default state) as well as to the unit itself. To switch between those devices' MIBs, the proper Device Type has to be selected (OID -1.3.6.1.4.1.20712.1.4).

The Teledyne Paradise Datacom MIB is a table-based MIB, and is the same for all devices. The MIB table is designed to follow the same pattern as the tables for serial protocol. For additional information about OID values, refer to Table 11 through Table 13. The text values in the tables help automatic value parsing within NMS or make the values readable through an MIB browser. All text value OIDs follow the same pattern:

1. For settings or parameters with discreet values:
SettingName'ValueName1=xxx, ..,ValueNamex=xxx
Example: ControlMode'Local=0,Remote=1

2. For settings or parameters with continuous values:
SettingName'LowLimit..HighLimit
Example: NetworkAddress'0..255

SNMP V3 Issues in Teledyne Paradise Datacom RCP2 Controller

Simple Network Management Protocol (SNMP) is an interoperable standards-based protocol that allows for external monitoring of the Content Engine through an SNMP agent.

A SNMP-managed network consists of three primary components: managed devices, agents, and management systems. A managed device is a network node that contains a SNMP agent and resides on a managed network. Managed devices collect and store management information and use SNMP to make this information available to management systems that use SNMP. Managed devices include routers, servers, switches, bridges hubs, computer hosts, and printers.

An agent is a software module that has local knowledge of management information and translates that information into a form compatible with SNMP: the Management Information Base (MIB). The agent can send traps, or notification of certain events, to the manager. Essentially, a Teledyne Paradise Datacom SSPA is considered a "SNMP agent".

A manager is a software module that listens to the SNMP notifications sent by SNMP agents. The manager can also send requests to an agent to collect remote information from the Management Information Base (MIB).

The communication between the agent and the manager uses the SNMP protocol, which is an application of the ASN.1 BER (Abstract Syntax Notation 1 with Basic Encoding Rules), typically over UDP (for IP networks).

Version 1 (SNMPv1, described in RFC 1157) is the initial implementation of SNMP.
Version 2 (SNMPv2c, described in RFC 1902) is the second release of SNMP. It provides additions to data types, counter size, and protocol operations.
Version 3 (SNMPv3, described in RFC 2271 through RFC 2275) is the most recent version of SNMP.

SNMP V1

SNMP version 1 (SNMPv1) is the initial implementation of the SNMP protocol. SNMPv1 operates over protocols such as User Datagram Protocol (UDP), Internet Protocol (IP), OSI Connectionless Network Service (CLNS), AppleTalk Datagram-Delivery Protocol (DDP), and Novell Internet Packet Exchange (IPX). SNMPv1 is widely used and is the de-facto network-management protocol in the Internet community.

The Teledyne Paradise Datacom RCP2 family of products utilizes the most popular implementation, SNMP V1 over UDP transport layer.

SNMP V2

SNMPv2 (RFC 1441-RFC 1452) revises version 1 and includes some improvements in the areas of performance, security, confidentiality, and manager-to-manager communications. It introduced GetBulkRequest, an alternative to iterative GetNextRequests for retrieving large amounts of management data in a single request.

However, the new party-based security system in SNMPv2, viewed by many as overly complex, was not widely accepted.

The format of the trap message was also changed in SNMPv2. To avoid these compatibility issues, the trap mechanism was not implemented in the Teledyne Paradise Datacom SSPA MIB.

SNMP V3

Although SNMPv3 makes no changes to the protocol aside from the addition of cryptographic security, it looks much different due to new textual conventions, concepts, and terminology. SNMPv3 primarily added security and remote configuration enhancements to SNMP. Many embedded controllers and microprocessors that are used in electronic components such as amplifier modules do not have support for SNMP V2 or V3. This is due to the extensive memory resources required by the computation intensive cryptographic security of SNMP V3.

For this reason V3 has not gained widespread support amongst embedded MCU platform manufacturers. Existing port implementations are limited to very powerful ARM5 or above cores, running under full-scale OS systems (Linux, Android, etc.). At large, these configurations require external bulk RAM/FLASH to operate. This requirement ultimately affects the minimum device startup time (tens of seconds, due to the large boot BIOS) and working temperature range (mostly indoor).

As noted in Cisco's release notes about SNMP V3:

> ⚠ **SNMP notifications can be sent as traps or inform requests. Traps are unreliable because the receiver does not send acknowledgments when this device receives traps. The sender cannot determine if the traps were received. However, an SNMP entity that receives an inform request acknowledges the message with an SNMP response protocol data unit (PDU). If the sender never receives the response, the inform request can be sent again. Therefore, informs are more likely to reach their intended destination. However, informs consume more resources in the agent and in the network. Unlike a trap, which is discarded as soon as it is sent, an inform request must be held in memory until a response is received, or the request times out. Traps are sent only once, while an inform can be retried several times. The retries increase traffic and contribute to a higher overhead on the network.**

(http://www.cisco.com/c/en/us/support/docs/ip/simple-network-management-protocol-snmp/13506-snmp-traps.html, last visited on 19 March 2019.)

SNMP MIB Tree

```
--paradiseDatacom(1.3.6.1.4.1.20712)
  |
  +--deviceINFO(1)
  |  |
  |  +-- r-n OctetString deviceID(1)
  |  +-- rwn OctetString deviceLocation(2)
  |  +-- r-n OctetString deviceRevision(3)
  |  +-- r-n Enumeration deviceType(4)
  |
  +--devices(2)
     |
     +--paradiseDevice(1)
     |  |
     |  +--settings(1)
     |  |  |
     |  |  +--settingsEntry(1) [settingIndex]
     |  |     |
     |  |     +-- rwn Integer32   settingIndex(1)
     |  |     +-- rwn Integer32   settingValue(2)
     |  |     +-- r-n OctetString settingTextValue(3)
     |  |
     |  +--thresholds(2)
     |  |  |
     |  |  +--thresholdsEntry(1) [thresholdIndex]
     |  |     |
     |  |     +-- rwn Integer32   thresholdIndex(1)
     |  |     +-- r-n Integer32   thresholdValue(2)
     |  |     +-- r-n Enumeration thresholdStatus(3)
     |  |     +-- r-n OctetString thresholdText(4)
     |  |
     |  +--conditions(3)
     |     |
     |     +--conditionsEntry(1) [conditionsIndex]
     |        |
     |        +-- rwn Integer32   conditionsIndex(1)
     |        +-- r-n Integer32   conditionsValue(2)
     |        +-- r-n Counter     conditionsEventCount(3)
     |        +-- r-n OctetString conditionsText(4)
     |
     +--paradiseDeviceA(2)
     |
     +--paradiseDeviceB(3)
     |
     +--paradiseDeviceC(4)
     |
     +--modem(5)
```

Description of MIB Entities

deviceINFO - This field includes general device information.

deviceID - Octet string type; maximum length -60; field specifies device model and serial number; read only access; OID -1.3.6.1.4.1.20712.1.1

deviceLocation - Octet string type; maximum length 60; filed allow customer to store information about device physical location or any other textual information related to the device; read/write access; OID -1.3.6.1.4.1.20712.1.2

deviceRevision - Octet string type; maximum length 60; field specifies device firmware revision; read only access; OID -1.3.6.1.4.1.20712.1.3

deviceType - Enumeration, integer type; field allows simple detection of SNMP device type. Values: rmsspa(1), cosspa(2), rcp2fprc(3), rcp21000rm(4), rcp21000co(5), rcp21000rcp(6), buc(7), rbc(8), minicosspa(9); read/write access. Setting the ID to any other value will default type to cosspa. OID -1.3.6.1.4.1.20712.1.4

devices - This field is subdivided into 5 branches: paradiseDevice, paradiseDeviceA, paradiseDeviceB, paradiseDeviceC and modem. The paradiseDevice branch currently is used for all Paradise Datacom LLC SNMP enabled device except Modem. See the Evolution Modem manual for specific MIB information for modems. Branches for Device A, B and C are reserved for future use.

paradiseDevice - Field contents tables hold specific device information: Settings, Thresholds and Conditions. All table formats follow a common pattern: Index, Value, TextValue. The threshold table has an additional column for parameter validation. The conditions table has an extra column for event counters.

The Index column provides general table indexing; the Value column presents the current value of the relevant parameter; the TextValue column provides information about parameter name, measurement units and limits.

Value "1" in the validation column of the thresholds table indicates that relevant parameter is valid under the current system configuration; value "2" indicates that parameter is invalid or "Not available".

The event counter column of the conditions table indicates how many times a value of a relevant parameter changed its state since system power-up.

settings - Table contains current device configuration and provides device management. For detailed settings table info for SNMP device see Table 18 . Read/write access for settingsValue column.

thresholds - Table provides information about device internal limits and subsystems info. For detailed table information refer to Table 19. Read only access.

conditions - Table contents device fault status information. Read only access. For detailed conditions table info see Table 20.

Table 18: SNMP Detailed Settings

settingIndex/ settingValue	settingTextValue	Value OID	Description
1/INTEGER	SysMode'1:2=0,1:1=1, 1:1PhC1:1=2,Dual1:1=3, SnglSw=4,PhC1:2=5	1.3.6.1.4.1.20712.2.1.1.1.2.1	System Operation Mode
2/INTEGER	SwitchMode'Auto=0, Manual=1	1.3.6.1.4.1.20712.2.1.1.1.2.2	System Switching Mode
3/INTEGER	ControlMode'Local=0, Remote=1	1.3.6.1.4.1.20712.2.1.1.1.2.3	System Control Mode
4/INTEGER	Reserved'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.4	Field reserved for factory use
5/INTEGER	Priority'Pol1=0,Pol2=1	1.3.6.1.4.1.20712.2.1.1.1.2.5	Switching Priority
6/INTEGER	Protocol'Normal=0, Terminal=1	1.3.6.1.4.1.20712.2.1.1.1.2.6	Remote Serial Control Protocol
7/INTEGER	Baud'9600=0,2400=1, 4800=2,19200=3, 38400=4	1.3.6.1.4.1.20712.2.1.1.1.2.7	Baud Rate of Serial Interface
8/INTEGER	NetworkAddress'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.8	Unique Network Address
9/INTEGER	Interface'RS232=0, RS485=1,IPNet=2, SNMP=3	1.3.6.1.4.1.20712.2.1.1.1.2.9	Type of Remote Control Interface
10/INTEGER	FaultMonitor'SSPA=0, LNA/LNB=1,Both=2, SerCom=3	1.3.6.1.4.1.20712.2.1.1.1.2.10	Type of Fault Monitoring
11/INTEGER	AuxFaultMonitoring'Off=0, NonSw=1,NoSwInv=2, Sw=3,SwInv=4	1.3.6.1.4.1.20712.2.1.1.1.2.11	Auxiliary Fault Monitoring
12/INTEGER	RFSwitchFault'Major=0, Alert Only=1,Alternate=2	1.3.6.1.4.1.20712.2.1.1.1.2.12	RF Switch Fault Monitoring
13/INTEGER	FaultLatch'Enable=0, Disable=1	1.3.6.1.4.1.20712.2.1.1.1.2.13	Fault Latch
14/INTEGER	FaultWindow'20%=0, 8%=1,12%=2,15%=3	1.3.6.1.4.1.20712.2.1.1.1.2.14	LNB/LNA Current Fault Monitoring Window
15/INTEGER	FaultLogic'FaultOnLow=0, FaultOnHigh=1	1.3.6.1.4.1.20712.2.1.1.1.2.15	SSPA and Aux Fault Logic
16/INTEGER	UserPassword'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.16	User Password
17/INTEGER	StandbyUnit'Default=0, Unit1=1,Unit2=2, Unit3/combine=3	1.3.6.1.4.1.20712.2.1.1.1.2.17	Unit Standby Select
18/INTEGER	Buzzer'On=0,Off=1	1.3.6.1.4.1.20712.2.1.1.1.2.18	Audible Alarm
19/INTEGER	MenuPassword'On=0, Off=1	1.3.6.1.4.1.20712.2.1.1.1.2.19	Menu Password State
20/INTEGER	HPASysType'Off=0,CO=1, RM=2,Path=3,VBUC=4, SysX=5,PMAX=6	1.3.6.1.4.1.20712.2.1.1.1.2.20	Type of Optional SSPA Subsystem
21/INTEGER	RFPowerUnits'dBm=0, Watts=1	1.3.6.1.4.1.20712.2.1.1.1.2.21	Frwd/Reflected Power Measurement Units
22/INTEGER	Reserved'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.22	Field reserved for factory use
23/INTEGER	LNAPSRange'Low=0, High=1,Max=2	1.3.6.1.4.1.20712.2.1.1.1.2.23	LNA PS Output Voltage Range
24/INTEGER	StdbyMode'Hot=0,Cold=1	1.3.6.1.4.1.20712.2.1.1.1.2.24	HPA Subsystem Standby Mode Select

25/INTEGER	SubsystemMute'On=0, Pol1=1,Pol2=2,Off=255	1.3.6.1.4.1.20712.2.1.1.1.2.25	SSPA Subsystem Mute Control
26/INTEGER	SubsystemAttenuation (dBx10)'0..200	1.3.6.1.4.1.20712.2.1.1.1.2.26	SSPA Subsystem Attenuation Control
27/INTEGER	SwitchMute'Off=0, Internal=1,External=2, All On=3	1.3.6.1.4.1.20712.2.1.1.1.2.27	Switch Muting State
28/INTEGER	Reserved'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.28	Field reserved for factory use
29/INTEGER	IPAddressByte1'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.29	Device IP Address Byte1 (MSB)
30/INTEGER	IPAddressByte2'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.30	Device IP Address Byte2
31/INTEGER	IPAddressByte3'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.31	Device IP Address Byte3
32/INTEGER	IPAddressByte4'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.32	Device IP Address Byte4 (LSB)
33/INTEGER	IPGateWayByte1'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.33	Device Gateway Address Byte1 (MSB)
34/INTEGER	IPGateWayByte2'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.34	Device Gateway Address Byte2
35/INTEGER	IPGateWayByte3'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.35	Device Gateway Address Byte3
36/INTEGER	IPGateWayByte4'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.36	Device Gateway Address Byte4 (LSB)
37/INTEGER	IPSubnetByte1'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.37	Device Subnet Mask Byte1 (MSB)
38/INTEGER	IPSubnetByte2'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.38	Device Subnet Mask Byte2
39/INTEGER	IPSubnetByte3'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.39	Device Subnet Mask Byte3
40/INTEGER	IPSubnetByte4'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.40	Device Subnet Mask Byte4 (LSB)
41/INTEGER	IPPortByte1'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.41	Device Port Address Byte1 (MSB) (required only for IPNet Interface)
42/INTEGER	IPPortByte2'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.42	Device Port Address Byte2 (LSB) (required only for IPNet Interface)
43/INTEGER	IPLockByte1'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.43	Device IP Lock Address Byte1 (MSB) (required only for IPNet Interface)
44/INTEGER	IPLockByte2'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.44	Device IP Lock Address Byte2 (required only for IPNet Interface)
45/INTEGER	IPLockByte3'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.45	Device IP Lock Address Byte3 (required only for IPNet Interface)
46/INTEGER	IPLockByte4'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.46	Device IP Lock Address Byte4 (LSB) (required only for IPNet Interface)
47/INTEGER	Unit_Offset1'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.47	SSPA Unit 1 Attenuation Offset
48/INTEGER	Unit_Offset2'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.48	SSPA Unit 2 Attenuation Offset
49/INTEGER	Unit_Offset3'0..255	1.3.6.1.4.1.20712.2.1.1.1.2.49	SSPA Unit 3 Attenuation Offset

Table 19: SNMP Detailed Thresholds

thresholdIndex/ thresholdValue	thresholdTextValue	Value OID	Description
1/INTEGER	LNA1CalibrationPoint (x0.57mA)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.1	LNA1 Current Fault Threshold
2/INTEGER	LNA2CalibrationPoint (x0.57mA)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.2	LNA2 Current Fault Threshold

3/INTEGER	LNA3CalibrationPoint (x0.57mA)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.3	LNA3 Current Fault Threshold
4/INTEGER	LNA1DCCurrent (x0.57mA)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.4	LNA1 PS Output Current
5/INTEGER	LNA2DCCurrent (x0.57mA)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.5	LNA2 PS Output Current
6/INTEGER	LNA3DCCurrent (x0.57mA)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.6	LNA3 PS Output Current
7/INTEGER	LNA1PSVoltage (x0.1V)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.7	LNA1 PS Output Voltage
8/INTEGER	LNA2PSVoltage (x0.1V)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.8	LNA2 PS Output Voltage
9/INTEGER	LNA3PSVoltage (x0.1V)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.9	LNA3 PS Output Voltage
10/INTEGER	PS1Voltage (x0.1V)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.10	PS1 Output Voltage
11/INTEGER	PS2Voltage (x0.1V)'0..4095	1.3.6.1.4.1.20712.2.1.2.1.2.11	PS2 Output Voltage
12/INTEGER	ChassyTemperature (C)'-99..99	1.3.6.1.4.1.20712.2.1.2.1.2.12	Chassis Temperature

Table 20: SNMP Detailed Conditions

conditionIndex/ conditionValue	conditionTextValue	Value OID
1/INTEGER	Unit1FaultState'NoFault=0,Fault=1,N/A=2	1.3.6.1.4.1.20712.2.1.3.1.2.1
2/INTEGER	Unit2FaultState'NoFault=0,Fault=1,N/A=2	1.3.6.1.4.1.20712.2.1.3.1.2.2
3/INTEGER	Unit3FaultState'NoFault=0,Fault=1,N/A=2	1.3.6.1.4.1.20712.2.1.3.1.2.3
4/INTEGER	SummaryFaultState'NoFault=0,Fault=1	1.3.6.1.4.1.20712.2.1.3.1.2.4
5/INTEGER	PS1FaultState'NoFault=0,Fault=1	1.3.6.1.4.1.20712.2.1.3.1.2.5
6/INTEGER	PS2FaultState'NoFault=0,Fault=1	1.3.6.1.4.1.20712.2.1.3.1.2.6
7/INTEGER	AuxiliaryFaultState'NoFault=0, Fault=1,N/A=2	1.3.6.1.4.1.20712.2.1.3.1.2.7
8/INTEGER	ExternalPortState'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.8
9/INTEGER	LNAFaults'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.9
10/INTEGER	SSPAFaults'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.10
11/INTEGER	RFSwitch1State'NoFault=0, Fault=1,N/A=2,Pos1=3,Pos2=4	1.3.6.1.4.1.20712.2.1.3.1.2.11
12/INTEGER	RFSwitch2State'NoFault=0, Fault=1,N/A=2,Pos1=3,Pos2=4	1.3.6.1.4.1.20712.2.1.3.1.2.12
13/INTEGER	ForwardRFLowByte(0xHLx0. 1RFPowerUnits)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.13
14/INTEGER	ForwardRFHighByte(0xHLx0. 1RFPowerUnits)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.14
15/INTEGER	AmbientTemperatureLowByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.15
16/INTEGER	AmbientTemperatureHighByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.16
17/INTEGER	Unit1TemperatureLowByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.17
18/INTEGER	Unit1TemperatureHighByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.18
19/INTEGER	Unit2TemperatureLowByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.19
20/INTEGER	Unit2TemperatureHighByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.20
21/INTEGER	Unit3TemperatureLowByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.21
22/INTEGER	Unit3TemperatureHighByte(0xHL C)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.22
23/INTEGER	ReflectedRFLowByte(0xHLx 0.1EFPowerUnits)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.23
24/INTEGER	ReflectedRFHighByte(0xHLx 0.1EFPowerUnits)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.24
25/INTEGER	Unit1DCCurrentLowByte(0xHLx 0.1Amper)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.25
26/INTEGER	Unit1DCCurrentHighByte(0xHLx 0.1Amper)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.26
27/INTEGER	Unit2DCCurrentLowByte(0xHLx 0.1Amper)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.27
28/INTEGER	Unit2DCCurrentHighByte(0xHLx 0.1Amper)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.28

29/INTEGER	Unit3DCCurrentLowByte(0xHLx 0.1Amper)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.29
30/INTEGER	Unit3DCCurrentHighByte(0xHLx 0.1Amper)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.30
31/INTEGER	Unit1RFOutputLowByte(0xHLx 0.1dBm)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.31
32/INTEGER	Unit1RFOutputLowByte(0xHLx 0.1dBm)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.32
33/INTEGER	Unit2RFOutputLowByte(0xHLx 0.1dBm)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.33
34/INTEGER	Unit2RFOutputLowByte(0xHLx 0.1dBm)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.34
35/INTEGER	Unit3RFOutputLowByte(0xHLx 0.1dBm)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.35
36/INTEGER	Unit3RFOutputLowByte(0xHLx 0.1dBm)'0..255	1.3.6.1.4.1.20712.2.1.3.1.2.36

Configuring RCP2 Unit to Work With SNMP Protocol

Set up the unit IP address. Tap the Home icon to access the main menu; tap the Communication button; tap the IP Setup button; tap the IP Address button. Enter the desired IP address. The default address of a single controller in a system is **192.168.0.9**. Tap the OK button to accept the entered value.

Set up the unit gateway address. Tap the Gateway button; Enter the desitred IP address of the gateway. The default gateway address of a single controller in a system is 192.168.0.1. If no gateway is needed, set the address to **0.0.0.0**. Tap the OK button to accept the entered value.

Set up the unit subnet mask. Tap the Subnet Mask button; Enter the desired Subnet Mask address. The default subnet mask address of a single controller in a system is **255.255.255.0**. Tap the OK button to accept the entered value.

Set up the unit Community Get string. Tap the Home icon to return to the main menu; tap the Communication button; tap the SNMP Setup button. Tap the Community Get button; use the keypad to enter the desired Community Get string. The default string is **public**. Tap the OK button to accept the entered value.

Set up the unit Community Set string. Tap the Community Set button; use the keypad to entered the desired Community Set string. The default string is **private**. Tap the OK button to accept the entered value.

Set up the unit interface to communicate over SNMP. Tap the Home icon to return to the main menu; tap the Communication button; tap the Interface button; tick the SNMP checkbox.

SNMP protocol now is set and ready to be used.

Connecting to a MIB Browser

For a MIB browser application example, we will use the freeware browser GetIf, version 2.3.1. Other browsers are available for download from http://www.snmplink.org.

Copy the provided Paradise Datacom LLC MIB file into the Getif Mibs subfolder. The MIB is available for download at http://www.paradisedata.com.

Start the GetIf application.

Select the unit IP address and community strings in the relevant text boxes on the Parameters tab (see Figure 16) and then click the Start button.

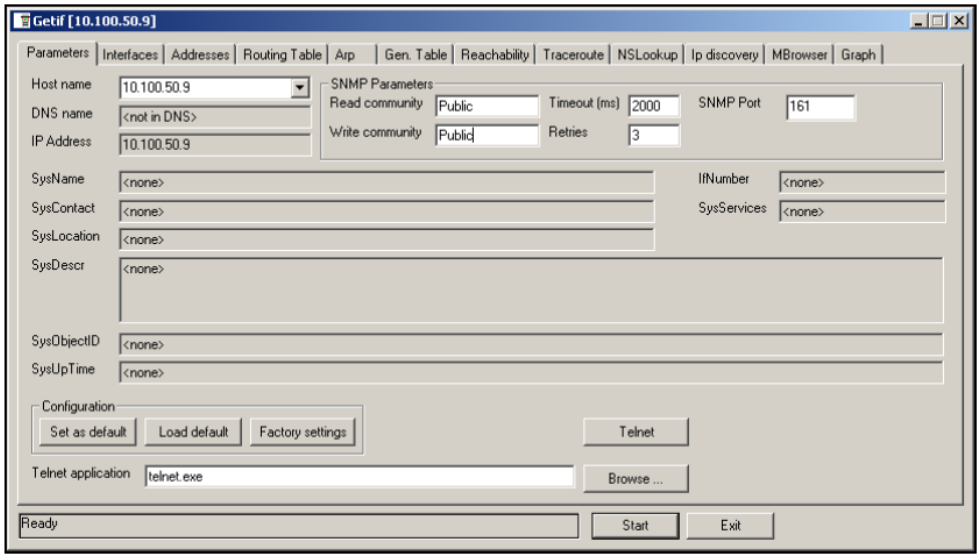

Figure 16: Enter Parameters into GetIF

Select the MIBBrowser tab.

Click on 'iso main entity' on the MIB tree, then click the Start button.

See update data in output data box (Figure 17).

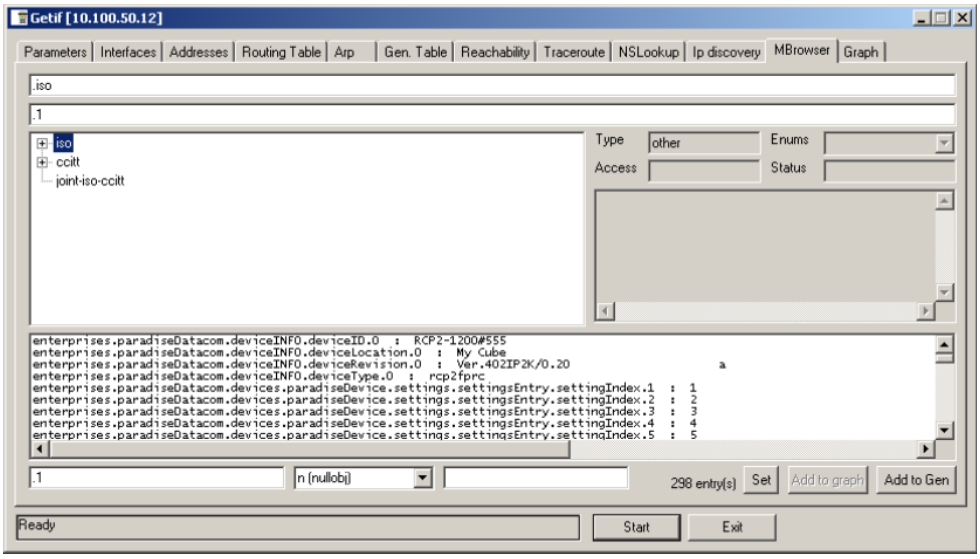

Figure 17: Update Data in MBrowser

The controller is equipped with a DigitalCore5 control board and utilizes firmware version 6.00 and above. These units feature an extended SNMP MIB and support SNMP traps. This extended MIB covers several OID objects related to SNMP trap functions.

These units allow independent functioning of two SNMP traps (asynchronous notifications): Fault trap and Conditions trap. Both traps can be enabled or disabled by the operator. The operator can also specify how many times the same trap notification will be sent back to the SNMP manager.

The SNMP manager IP address is also selectable by the operator. This IP address must be specified in the relevant OID branch.

Every trap message is marked by the fixed trap community string "trap". This community name is not user selectable.

Fault Trap

The Fault trap allows asynchronous notification of the RCP2 fault state change. When enabled, trap notification will be sent to a manager every time either the summary fault state or a fault type is changed.

The Last Fault Time ticks counter will be reset each time the summary fault changes its state to "Alarm" or when a new fault condition is detected. This counter also resets itself during device power-up. If no faults are present after device power-up, Fault Trap will issue a "Cold Start" notification to the manager.

Condition Trap

The Condition Trap allows the unit to generate asynchronous notifications independent from the unit fault state. Currently, the following conditions can be used for this trap triggering: Forward RF Level (each remotely controlled HPA or System RF level can be selected), Reflected RF Level (for systems equipped with a Reflected RF sensor), DC Current level (each remotely controlled HPA can be selected), PS Voltage level (both internal PS units can be selected), Temperature (each remotely control HPA can be selected or Ambient temperature sensor, if equipped), or LNA/LNB current.

To enable this trap, set the Condition Trap Resend option to a non-zero value and determine the upper and lower limits for the condition window. Window values must be selected according to the relevant selected condition measured by the unit.

For example: Temperature must be selected in degrees, RF power in tenth of dBms, etc. After successful configuration, the controller will generate a notification every time the selected condition is outside the selected measurement window. For units with multiple measured parameters, the relevant condition location must be selected (i.e., units with two power supplies use 1 for PS1, and 2 for PS2).

For other conditions, this value is "don't care". Both traps will send a "Device Up Time" time stamp with every trap notification.

Extended SNMP MIB Tree

```
--paradiseDatacom(1.3.6.1.4.1.20712)
|
+--deviceINFO((1.3.6.1.4.1.20712.1)
| |
| +-- r-n OctetString deviceID(1.3.6.1.4.1.20712.1.1)
| +-- rwn OctetString deviceLocation(1.3.6.1.4.1.20712.1.2)
| +-- r-n OctetString deviceRevision(1.3.6.1.4.1.20712.1.3)
| +-- r-n Enumeration deviceType(1.3.6.1.4.1.20712.1.4)
| +--deviceTimeTicks(1.3.6.1.4.1.20712.1.5)
| | |
| | +-- r-n TimeTicks deviceUpTime(1.3.6.1.4.1.20712.1.5.1)
| | +-- r-n TimeTicks deviceFaultTime(1.3.6.1.4.1.20712.1.5.2)
| |
| +--deviceCounters(1.3.6.1.4.1.20712.1.6)
| | |
| | +-- r-n Counter deviceSFaultCounter(1)
| |
| +--deviceFaultState(1.3.6.1.4.1.20712.1.7)
| | |
| | +-- r-n Enumeration deviceSummaryFault(1)
| | +-- r-n Enumeration deviceLastFault(2)
| |
| +--deviceTrapedCondition(1.3.6.1.4.1.20712.1.8)
| | |
| | +-- r-n Integer32 deviceTrappedConditionValue(1)
| |
| +--deviceTrapControl(1.3.6.1.4.1.20712.1.9)
| | |
| | +-- rwn IpAddress deviceManagerIP(1)
| | +-- rwn Integer32 deviceFaultsTrapResend(2)
| | +-- rwn Integer32 deviceConditionTrapResend(3)
| | +-- rwn Enumeration deviceConditionToMonitor(4)
| | +-- rwn Integer32 deviceConditionULimit(5)
| | +-- rwn Integer32 deviceConditionLLimit(6)
| | +-- rwn Integer32 deviceConditionLocation(7)
| |
| +--deviceTraps(1.3.6.1.4.1.20712.1.10)
| |
| +-- (1.3.6.1.4.1.20712.1.10.0)
| |
| +--deviceFaultsTrap(1.3.6.1.4.1.20712.1.10.0.11)
| [deviceUpTime,deviceSummaryFault,deviceLastFault]
| |
| +--deviceConditionTrap(1.3.6.1.4.1.20712.1.10.0.12)
| [deviceUpTime,deviceConditionToMonitor,deviceTrappedConditionValue]
+--devices(2)
|
+--paradiseDevice(1)
| |
| +--settings(1)
| | |
| | +--settingsEntry(1) [settingIndex]
| | |
| | +-- rwn Integer32 settingIndex(1)
| | +-- rwn Integer32 settingValue(2)
| | +-- r-n OctetString settingTextValue(3)
| |
| +--thresholds(2)
| | |
| | +--thresholdsEntry(1) [thresholdIndex]
| | |
| | +-- rwn Integer32 thresholdIndex(1)
| | +-- r-n Integer32 thresholdValue(2)
| | +-- r-n Enumeration thresholdStatus(3)
| | +-- r-n OctetString thresholdText(4)
| |
| +--conditions(3)
| |
| +--conditionsEntry(1) [conditionsIndex]
| |
| +-- rwn Integer32 conditionsIndex(1)
| +-- r-n Integer32 conditionsValue(2)
| +-- r-n Counter conditionsEventCount(3)
| +-- r-n OctetString conditionsText(4)
|
+--paradiseDeviceA(2)
|
+--paradiseDeviceB(3)
|
+--paradiseDeviceC(4)
```

```
|
+--modem(5)
```

Extended SNMP MIB Tree Elements in Detail

deviceRevision - Octet string type; maximum length 60; field specifies device firmware revision; read only access; OID -1.3.6.1.4.1.20712.1.3

deviceUpTime - Device total up time in hundredths of a second; OID - 1.3.6.1.4.1.20712.1.5.1

deviceFaultTime - Time elapsed since last state change of deviceLastFault parameter in hundredths of second; OID - 1.3.6.1.4.1.20712.1.5.2

deviceSFaultCounter - Counts number of Summary alarms since device power up; OID - 1.3.6.1.4.1.20712.1.6.1

deviceSummaryFault - Enumerated value of device last detected fault condition. The following enumerated values are possible: coldStart(1), overTemp(2), badRegltr(3), lowDCCur(4), aux(5), buc(6), lna(7), hpa(8), lowFwdRF(9), highRefRF(10), nPlusOne (11), badPS(12), timeOut(13), other(14), noFaults(15). OID - 1.3.6.1.4.1.20712.1.7.1

deviceTrappedConditionValue - Condition value trapped by deviceConditionTrap; OID - 1.3.6.1.4.1.20712.1.8.1

deviceManagerIP - Trap recipient IP address; OID - 1.3.6.1.4.1.20712.1.9.1

deviceFaultsTrapResend - Defines how many times deviceFaultsTrap will repeat the message. 0 - Disables trap triggering; OID - 1.3.6.1.4.1.20712.1.9.2

deviceConditionTrapResend - Defines how many times condition trap will repeat the message. 0 - Disables trap triggering; OID - 1.3.6.1.4.1.20712.1.9.3

deviceConditionToMonitor - Enumerated value. Object defines which condition to trap. The following enumerations are possible: fwdRF(1), dcCurrent(2), voltagePS(3), temperature(4), lnaCur(5), refRF(6); OID - 1.3.6.1.4.1.20712.1.9.4

deviceConditionULimit - Conditions upper trap limit. Trap will be sent when the condition exceeds this limit. OID - 1.3.6.1.4.1.20712.1.9.5

deviceConditionLLimit - Conditions lower trap limit. Trap will be sent when condition falls below this limit. OID - 1.3.6.1.4.1.20712.1.9.6

deviceConditionLocation - Parameter specifying condition measuring location in device containing multiple location of the same type (multiple PS, HPAs, LNAs etc.). Set to 0 for system-wide conditions, 1 .. n for relevant unit. For devices with single condition location parameter is "don't care", for system wide parameters (System RF power, Ambient temperature etc. select 4). OID - 1.3.6.1.4.1.20712.1.9.7

deviceFaultsTrap - Trap fires deviceFaultsTrapResend times when deviceLastFault or deviceSummaryFault state changes. OID - 1.3.6.1.4.1.20712.1.10.0.11

UNCONTROLLED WHEN PRINTED!
You can view the latest revision of this manual section on the Teledyne Paradise Datacom web site:
http://www.paradisedatacom.com/xml/216351/216351-6.xml

USE AND DISCLOSURE OF DATA
EAR99 Technology Subject to Restrictions Contained in http://www.paradisedatacom.com/xml/216594/216594-1.xml.

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Ethernet Interface Set-Up and Cabling

Teledyne Paradise Datacom
Drawing Number: 216512-12 Revision E
ECO A26266
October 2022

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http://www.paradisedatacom.com/xml/216512/216512-12.xml

USE AND DISCLOSURE OF DATA
EAR99 Technology Subject to Restrictions Contained in http://www.paradisedatacom.com/xml/216594/216594-1.xml.

Ethernet Interface Quick Set-Up

This section describes the procedure for setting up the RM SSPA Ethernet IP interface through the front panel interface. It also describes basic network setup of a Windows-based host PC for a peer-to-peer network connection with the RM SSPA.

> ⚠ **Important! Do not use a crossover cable to connect to the network hub, use crossover only for direct PC-to-RM SSPA connection!**

Using a crossover null-modem network cable, connect the Ethernet Port (J9) of the RM SSPA to a host PC. See the **10/100 Base-T Ethernet Cable Wiring** section for wiring details.

If the PC NIC card has not previously been set, do so now using the following procedure; otherwise skip to the **Configure Unit to Use IPNET Protocol** section.

> ⚠ **Note: For PCs running earlier versions of Windows, go to the Control panel and open the Network settings and open the TCP/IP properties of your LAN card. Pick up the procedure with Step 8.**

1. On a PC running Windows 10, click on the Start icon.
2. Type "Settings" and open the Settings window.
3. Click on the Network & Internet icon.
4. Click Ethernet.
5. Click Change Adapter Options.
6. Right-click on the connection that you want to configure and select Properties from the menu.
7. Select Internet Protocol Version 4 (TCP/IPv4) and click on the Properties button.
8. Select "Use the following IP Address" and enter the parameters shown in Figure 1 in the IP Address and Subnet Mask fields.

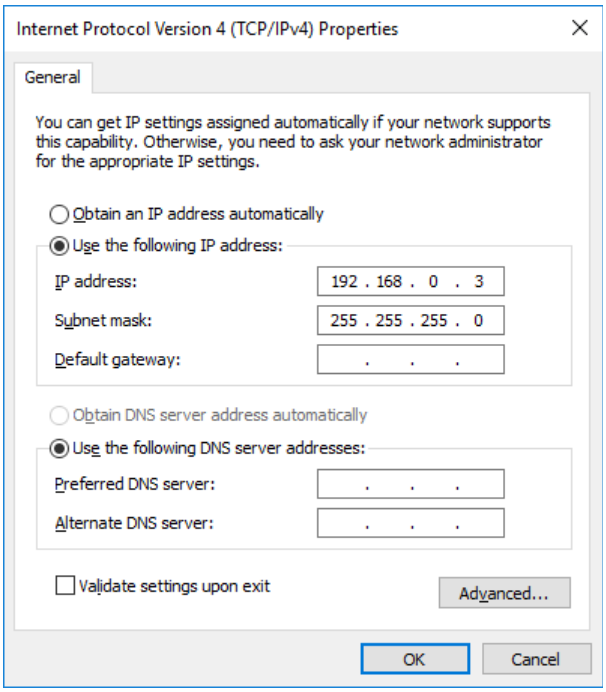

Figure 1: TCP/IPv4 Properties Window

```
IP Address.....:192.168.0.3
Subnet Mask.....:255.255.255.0
```

After you press "OK", depending on the operating system, you may need to reboot the workstation.

After optional reboot, open the Command Prompt console window and enter:

```
C:\>IPCONFIG
```

This will display the IP settings:

```
0 Ethernet Adapter:
IP Address:             192.168.0.3
Subnet Mask:    255.255.255.0
Default Gateway:
```

You can now try to Ping your PC. In Command Prompt window enter the following:

```
C:\>ping 192.168.0.3
```

This will display:

```
Pinging 192.168.0.3 with 32 bytes of data:
Reply from 192.168.0.3: bytes=32 time < 10ms TTL=128
Reply from 192.168.0.3: bytes=32 time < 10ms TTL=128
Reply from 192.168.0.3: bytes=32 time < 10ms TTL=128
Reply from 192.168.0.3: bytes=32 time < 10ms TTL=128
Ping statistics for 192.168.0.3:
                Packets: Sent=4, Received=4, Lost=0 (0%loss),
                Approximate round trip times I milli-seconds:
                Minimum=0ms, Maximum=0ms, Average=0ms
```

Your network LAN card is now set up.

Configure Unit to Use IPNET Protocol

Use the following procedure to configure your unit to operate using the IPNET protocol.

1. On the RM SSPA unit front panel, tap the Home icon to return to the Main Menu;
2. Tap the Communications button;
3. Tap the IP Setup button;
4. Tap the IP Address button;
5. Enter IP address 192.168.0.0;
6. Tap the OK button to accept the entered values.

Follow the same menu route to select the Subnet, Gateway, IP Port and IP Lock items, and set those parameters to:

```
Subnet:255.255.255.0;
Gateway:0.0.0.0;
IPLock:255.255.255.255;
IPPort:1038.
```

Verify that the values entered above are displayed in the Communications > IP Setup menu.

1. On the RM SSPA unit front panel, tap the Home icon to return to the Main Menu;
2. Tap the Communications button;
3. Tap the Interface button;
4. Tick the IPNET checkbox.

The RM SSPA is now set up to work with Ethernet Interface. You may now ping the SSPA unit from host PC:

```
C:\>ping 192.168.0.0
```

This will display:

```
Pinging 192.168.0.0 with 32 bytes of data:
Reply from 192.168.0.0: bytes=32 time < 10ms TTL=128
Reply from 192.168.0.0: bytes=32 time < 10ms TTL=128
Reply from 192.168.0.0: bytes=32 time < 10ms TTL=128
Reply from 192.168.0.0: bytes=32 time < 10ms TTL=128
Ping statistics for 192.168.0.3:
                Packets: Sent=4, Received=4, Lost=0 (0%loss),
                Approximate round trip times I milli-seconds:
                Minimum=0ms, Maximum=0ms, Average=0ms
```

Run the Paradise Datacom Universal M&C software on a host PC to check all M&C functions. When prompted, select an Internet connection to the unit using IP Address 192.168.0.0, local port address to 1039 and remote port address to 1038. The SSPA now connected to your host workstation for remote M&C.

10/100 Base-T Ethernet Cable Wiring

This section briefly describes the basic theory related to the physical layer of 10/100Bas-T networking, as well as proper wiring techniques.

There are several classifications of cable used for twisted-pair networks. Recommended cable for all new installations is Category 5 (or CAT 5). CAT 5 cable has four twisted pairs of wire for a total of eight individually insulated wires. Each pair is color coded with one wire having a solid color (blue, orange, green, or brown) twisted around a second wire with a white background and a stripe of the same color. The solid colors may have a white stripe in some cables. Cable colors are commonly described using the background color followed by the color of the stripe; e.g., white-orange is a cable with a white background and an orange stripe.

The straight through and crossover patch cables are terminated with CAT 5 RJ-45 modular plugs. RJ-45 plugs are similar to those you'll see on the end of your telephone cable except they have eight versus four or six contacts on the end of the plug and they are about twice as big. Make sure they are rated for CAT 5 wiring. (RJ means "Registered Jack"). A special Modular Plug Crimping Tool (such as that shown in Figure 2) is needed for proper wiring.

Figure 2: Modular Plug Crimping Tool

The 10BASE-T and 100BASE-TX Ethernets consist of two transmission lines. Each transmission line is a pair of twisted wires. One pair receives data signals and the other pair transmits data signals. A balanced line driver or transmitter is at one end of one of these lines and a line receiver is at the other end. A simplified schematic for one of these lines and its transmitter and receiver is shown in Figure 3.

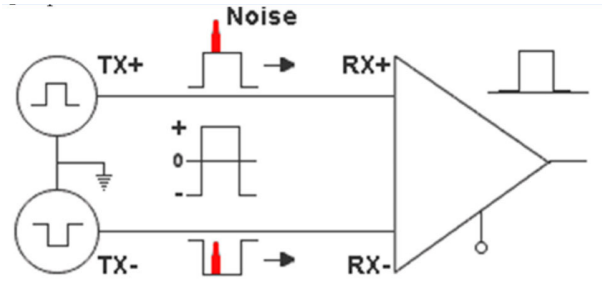

Figure 3: Transmission Line

The main concern is the transient magnetic fields which surrounds the wires and the magnetic fields generated externally by the other transmission lines in the cable, other network cables, electric motors, fluorescent lights, telephone and electric lines, lightning, etc. This is known as noise. Magnetic fields induce their own pulses in a transmission line, which may literally bury the Ethernet pulses.

The twisted-pair Ethernet employs two principle means for combating noise. The first is the use of balanced transmitters and receivers. A signal pulse actually consists of two simultaneous pulses relative to ground: a negative pulse on one line and a positive pulse on the other. The receiver detects the total difference between these two pulses. Since a pulse of noise (shown in red in the diagram) usually produces pulses of the same polarity on both lines one pulse is essentially canceled by out the other at the receiver. In addition, the magnetic field surrounding one wire from a signal pulse is a mirror of the one on the other wire. At a very short distance from the two wires, the magnetic fields are opposite and have a tendency to cancel the effect of each other. This reduces the line's impact on the other pair of wires and the rest of the world.

The second and the primary means of reducing cross-talk between the pairs in the cable, is the double helix configuration produced by twisting the wires together. This configuration produces symmetrical (identical) noise signals in each wire. Ideally, their difference, as detected at the receiver, is zero. In actuality, it is much reduced.

Pin-out diagrams of the two types of UTP Ethernet cables are shown in Figure 4.

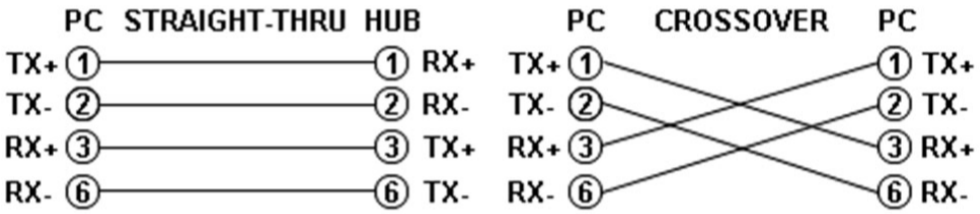

Figure 4: Ethernet Cable Pin-outs

Note that the TX (transmitter) pins are connected to corresponding RX (receiver) pins, plus to plus and minus to minus. Use a crossover cable to connect units with identical interfaces. If you use a straight-through cable, one of the two units must, in effect, perform the crossover function.

Two wire color-code standards apply: EIA/TIA 568A and EIA/TIA 568B. The codes are commonly depicted with RJ-45 jacks as shown in Figure 5.

If we apply the 568A color code and show all eight wires, our pin-out looks like Figure 6.

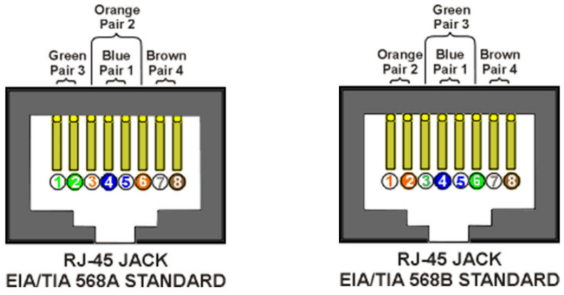

Figure 5: Ethernet Wire Color Code Standards

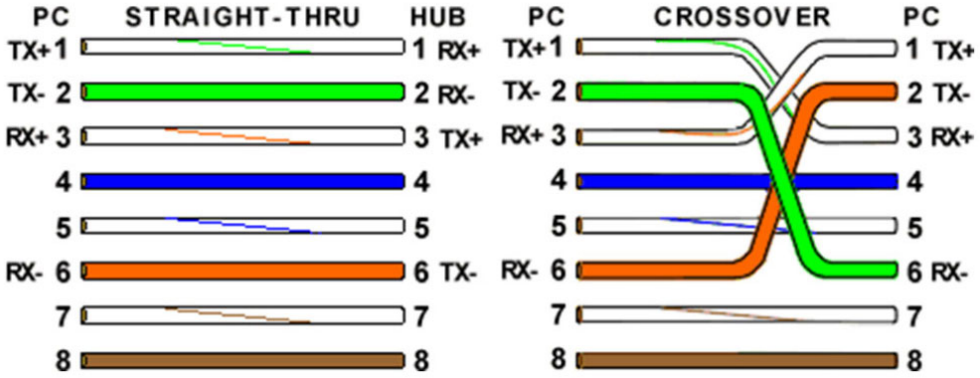

Figure 6: Wiring Using 568A Color Codes

Note that pins 4, 5, 7, and 8 and the blue and brown pairs are not used in either standard. Quite contrary to what you may read elsewhere, these pins and wires are not used or required to implement 100BASE-TX duplexing.

There are only two unique cable ends in the preceding diagrams, they correspond to the 568A and 568B RJ-45 jacks and are shown in Figure 7.

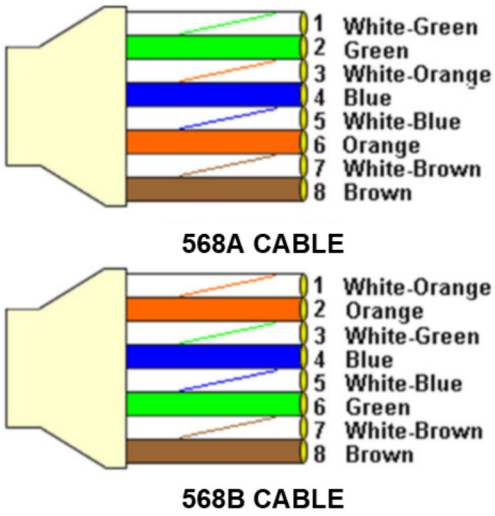

Figure 7: Wiring Using 568A and 568B Color Codes

Again, the wires with colored backgrounds may have white stripes and may be denoted that way in diagrams found elsewhere. For example, the green wire may be labeled Green-White. The background color is always specified first.

To properly configure the cables, all you need to remember are the diagrams for the two cable ends and the following rules:

- A straight-thru cable has identical ends.
- A crossover cable has different ends.

It makes no functional difference which standard you use for a straight-thru cable. You can start a crossover cable with either standard as long as the other end is the other standard. It makes no functional difference which end is which. A 568A patch cable will work in a network with 568B wiring and a 568B patch cable will work in a 568A network.

Here are some essential cabling rules:

- Try to avoid running cables parallel to power cables.
- Do not bend cables to less than four times the diameter of the cable.
- If you bundle a group of cables together with cable ties (zip ties), do not over-cinch them. It's okay to snug them together firmly; but don't tighten them so much that you deform the cables.
- Keep cables away from devices which can introduce noise into them, such as: copy machines, electric heaters, speakers, printers, TV sets, fluorescent lights, copiers, welding machines, microwave ovens, telephones, fans, elevators, motors, electric ovens, dryers, washing machines, and shop equipment.
- Avoid stretching UTP cables (tension when pulling cables should not exceed 25 lbs.).
- Do not run UTP cable outside of a building. It presents a very dangerous lightning hazard!
- Do not use a stapler to secure UTP cables. Use telephone wire/RG-6 coaxial wire hangers, which are available at most hardware stores.

Teledyne Paradise Datacom
Drawing Number 216512-12 Revision E
ECO A26266
Last Modified: October 2022

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USE AND DISCLOSURE OF DATA
EAR99 Technology Subject to Restrictions Contained in http://www.paradisedatacom.com/xml/216594/216594-1.xml.

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Unit Control with Universal M&C Software

Teledyne Paradise Datacom
Drawing Number: 216594-2 Revision D
ECO A26152
June 2022

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USE AND DISCLOSURE OF DATA
EAR99 Technology Subject to Restrictions Contained in http://www.paradisedatacom.com/xml/216594/216594-1.xml.

Introduction

This section describes the control of a remote unit using Teledyne Paradise Datacom's free Windows-based Universal Monitor and Control software.

Download/Install Software

Teledyne Paradise Datacom provides a free version of its Universal Monitor and Control (M&C) Software available for download from its web site. Install the software on a PC running Windows 7 or later.

Navigate to the Support > Downloads page and click on the latest version of the software to download the zip file.

Unzip the package and run the setup.exe file. This launches the Universal M&C Software installer. Follow the prompts and agree to the license agreement to install the application. When complete, close the installer.

> ⚠ **By default the installer saves the software to C:\Program Files (x86)\Paradise Datacom. When running the installer, you can change the destination of the installation.**

The software may be used to remotely monitor and control any of the following Teledyne Paradise Datacom products:

- Rack mountable (RM) Amplifiers (3RU, 5RU, 7RU)
- Compact Outdoor (CO) Amplifiers
- High Power Outdoor (HPO) Amplifiers
- Indoor PowerMAX Amplifier Systems
- Outdoor PowerMAX Amplifier Systems
- System Controllers

Add RM Unit to Universal M&C

Launch the Teledyne Paradise Datacom Universal M&C software from the Programs Menu of your PC. During installation, a shortcut to the software may have been added to your desktop.

To add a new rack mountable amplifier, click the 'Action' menu and select 'Add Unit' from the pull-down menu. Select 'Rackmount' from the menu choices. See Figure 1.

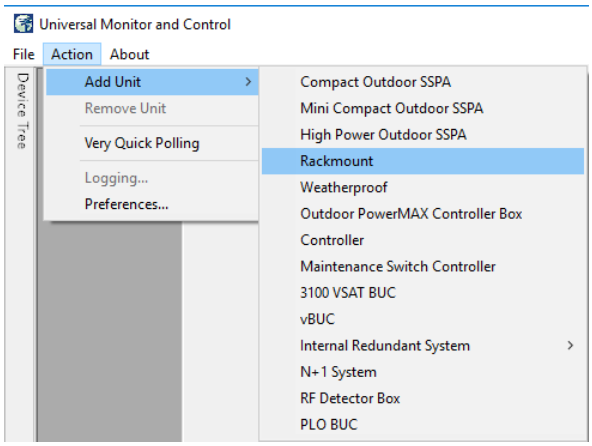

Figure 1: Universal M&C > Action > Add Unit > Rackmount

An 'Add Rackmount SSPA' dialog window will appear.

Enter a Unit ID (not required although it is recommended). If a Unit ID isn't entered the Unit ID will be assigned by the M&C.

To add a unit connected to a serial port you must supply a Port and a Baud Rate. See Figure 2.

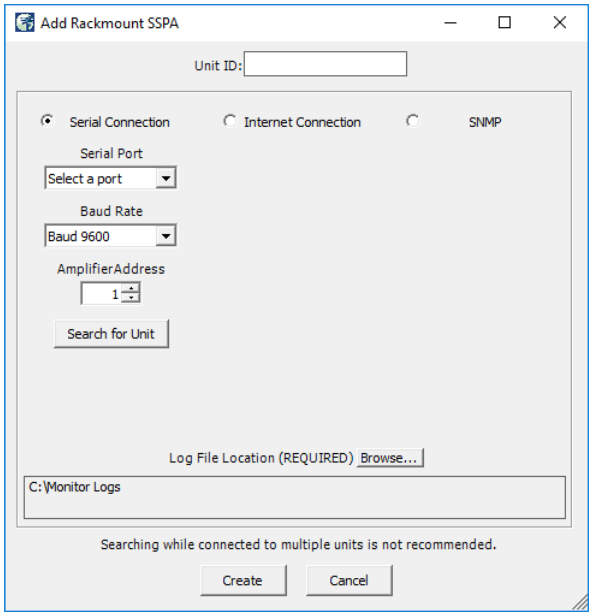

Figure 2: Select a COM Port and Baud Rate for Serial COMs

To add a unit connected via UDP (TCP/IP) you must supply either a Hostname or an IP Address. See Figure 3.

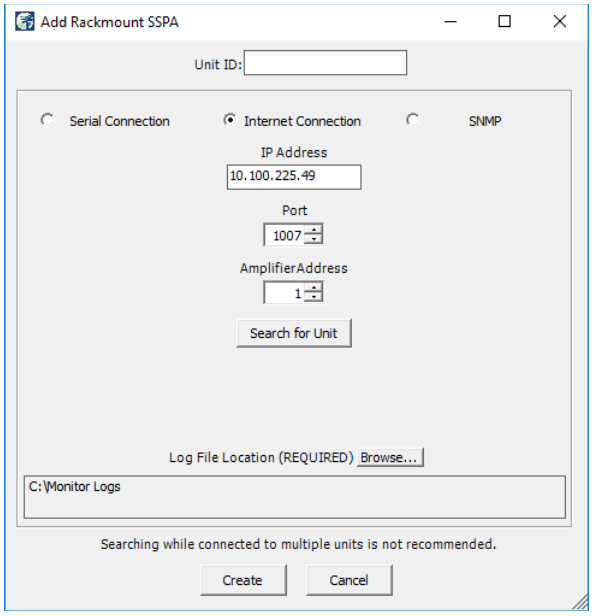

Figure 3: Enter IP Address and Port Address for UDP COMs

Specify the Unit's unique address in the Amplifier Address box. If you don't know the address of the unit you may search for it. Be aware that this search feature is only useful when you have only one unit connected to your PC at a time.

Choose a log file location by clicking the 'Browse...' button. The default is the "My Documents" folder. The log file name will be the UnitID and the extension ".log" appended to it. i.e. "Unit1.log".

Click on the 'Create' button to connect to the unit. The Universal M&C software will open a new window from which you can control and review the status of the connected unit.

Overview of RM SSPA M&C

Each SSPA in the Rackmount M&C has six screens:

- Status Tab
- Settings Tab
- Faults Tab
- IP Setup Tab
- N+1 Settings Tab
- SNMP Tab

Status Tab

The first screen is the "Status" tab, shown in Figure 4. The Status tab shows the current conditions (or state) of the connected SSPA. In addition, the Status tab allows the operator to change the Mute state of the carrier and allows adjustment of the on-board attenuator for gain control.

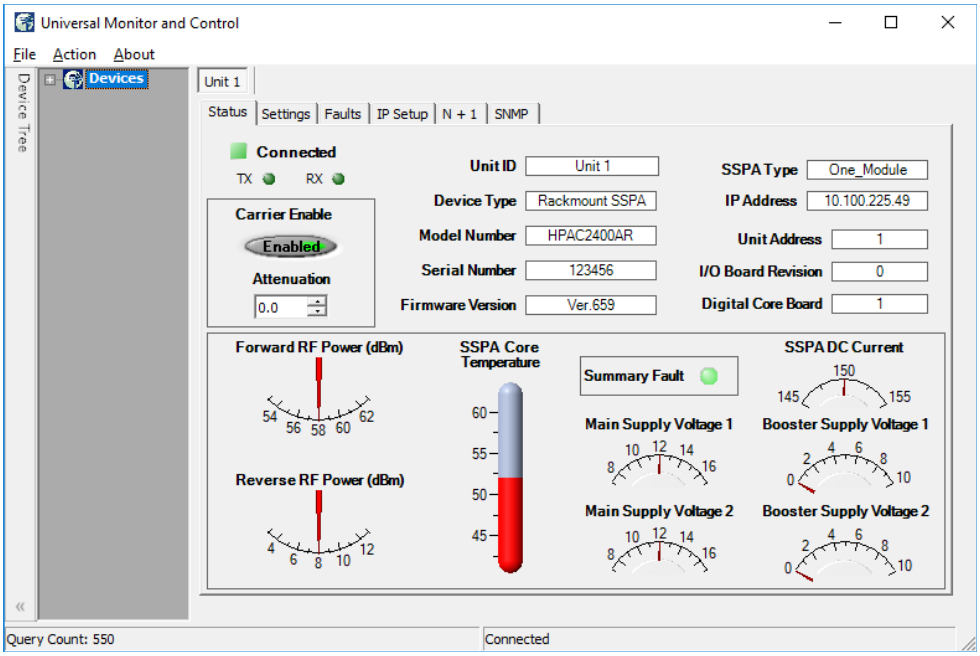

Figure 4: Universal M&C Software > Status Tab

Settings Tab

The second screen is the "Settings" tab, shown in Figure 5. It shows the user all available settings on the SSPA. All user-adjustable settings are allowed to be modified to suit the specific needs of the customer. However, it should be noted that the SSPA is configured for the customer at the factory.

If modification of any settings is necessary, details of each setting, condition and threshold are available in the Settings, Conditions and Thresholds description of the **Remote Control Protocol** section of any rack mountable amplifier manual.

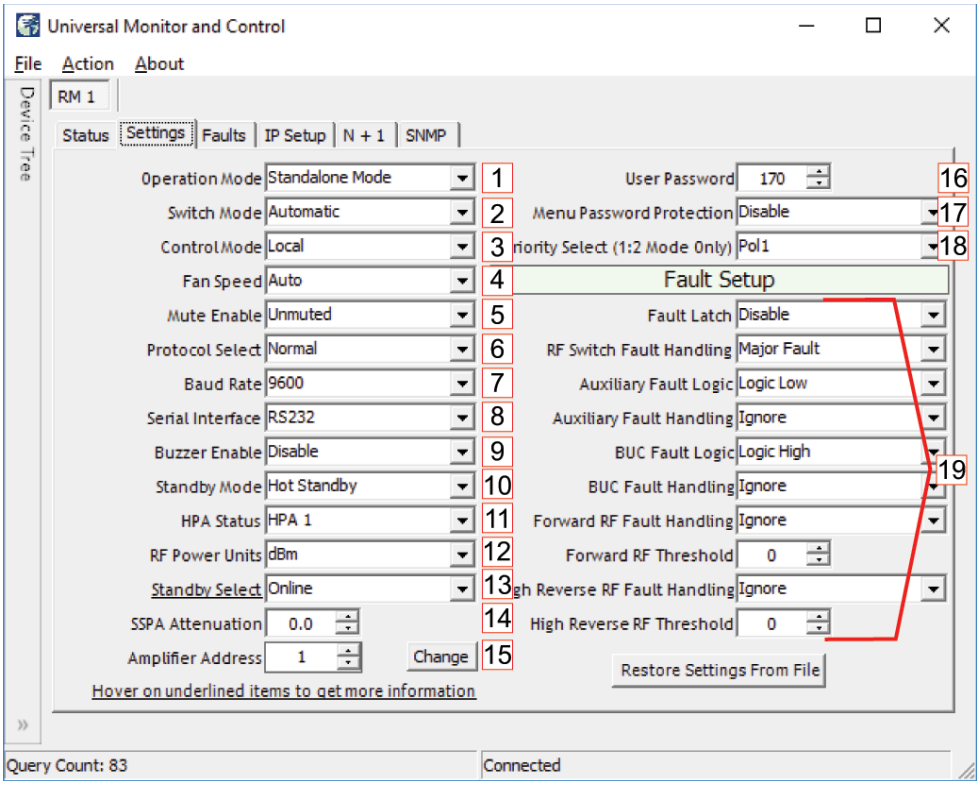

Figure 5: Universal M&C Software > Settings Tab

Operation Mode [1]

Select between Standalone Mode, (single unit), 1:1 Mode, 1:2 Mode, 1:1 Phase Combined or 1:2 Phase Combined.

If the amplifier will be configured in a redundant system and controlled with an external controller, each system amplifier should be set to Standalone Mode.

If the amplifier will be configured in a redundant system but will be controlled using internal control logic, each system amplifier should be set to the appropriate redundant mode. All amplifiers in the redundant system should be set to the same mode.

For more information on settings used for internal 1:1 redundancy mode, see the **Internal 1:1 Redundant System Operation** section.

For more information on settings used for internal 1:2 redundancy mode, see the **Internal 1:2 Redundant System Operation** section.

Switch Mode [2]

Select between Automatic switching, Manual switching or Switch Lock.

Control Mode [3]

Select between Local or Remote control.

Fan Speed [4]

Select between Low, High or Auto.

Mute Enable [5]

Select Muted or Unmuted.

Protocol Select [6]

Select Normal or Terminal. The operator will be asked to verify any to change to the Protocol Select setting. Communication with the amplifier may be affected.

Baud Rate [7]

Select a baud rate of 2400, 4800, 9600 (the default), 19200, or 38400. The operator will be asked to verify any to change to the Baud Rate setting. Communication with the amplifier may be affected.

Serial Interface [8]

Select the type of serial communications interface to use: RS232, RS485, IPNET or SNMP. The operator will be asked to verify any to change to the Serial Interface setting. Communication with the amplifier may be affected.

Buzzer Enable [9]

Enable or Disable the audible buzzer on the unit.

Standby Mode [10]

Select Hot Standby or Cold Standby. In Cold Standby mode, the RF module is muted when its Standby Select setting is set to Standby.

HPA Status [11]

Select HPA1, HPA2 or HPA3. For use in redundant systems.

RF Power Units [12]

Select the type of unit displayed on the front panel: dBm or Watts.

Standby Select [13]

Select the disposition of the amplifier in a redundant system: Standby or Online.

SSPA Attenuation [14]

The Gain Adjustment of the unit is adjustable here, from 0 to 20 in 0.1 dB steps.

Amplifier Address [15]

Sets a network address for the unit. Range is 0 to 255. Click the 'Change' button to change the address. The operator will be asked to verify any to change to the Amplifier Address setting. Communication with the amplifier may be affected.

User Password [16]

Sets a password for the unit. Range is 0 to 255.

Menu Password Protection [17]

Enable or Disable password protection for the unit.

Priority Select [18]

For use in 1:2 Mode only. Assign whether the standby unit will be switched to Pol1 or Pol2 if the amplifiers transmitting to both polarities exhibit failures and the standby unit must switch to one of the polarities. All units in a 1:2 configuration must use the same Priority Select setting.

Fault Setups [19]

The user may Enable or Disable fault latching, and set the fault logic and handling for RF Switch faults, Auxiliary faults, BUC faults, Forward RF faults and High Reverse RF faults. Logic settings are Logic Low or Logic High.

RF Switch Fault Handling settings include Ignore, Minor Fault, Major Fault, and Switchover Mute.

Auxiliary Fault Handling settings include Ignore, Minor Fault, Major Fault, Minor Fault with Mute, and Major Fault with Mute.

Forward RF Fault Handling settings include Ignore, Low RF Major Fault, Low RF Minor Fault, ALC On, High RF Major Fault, High RF Minor Fault, and High RF Major Fault with Mute.

High Reverse RF Fault Handling settings include Ignore, Major Fault, and Minor Fault.

The user can also set the threshold levels for Forward RF and High Reverse RF.

Faults Tab

The third screen is the "Faults" tab, shown in Figure 6. It shows the user the status of all faults on-board the SSPA. These include: Summary, Module # faults, Standby State (green = Online; red = Standby); Power Supply, Low DC Voltage and Current, Fans, BUC, High Temperature, Forward RF and High Reflected RF, Auxiliary, switch faults (for units configured in a redundant system), and optional faults.

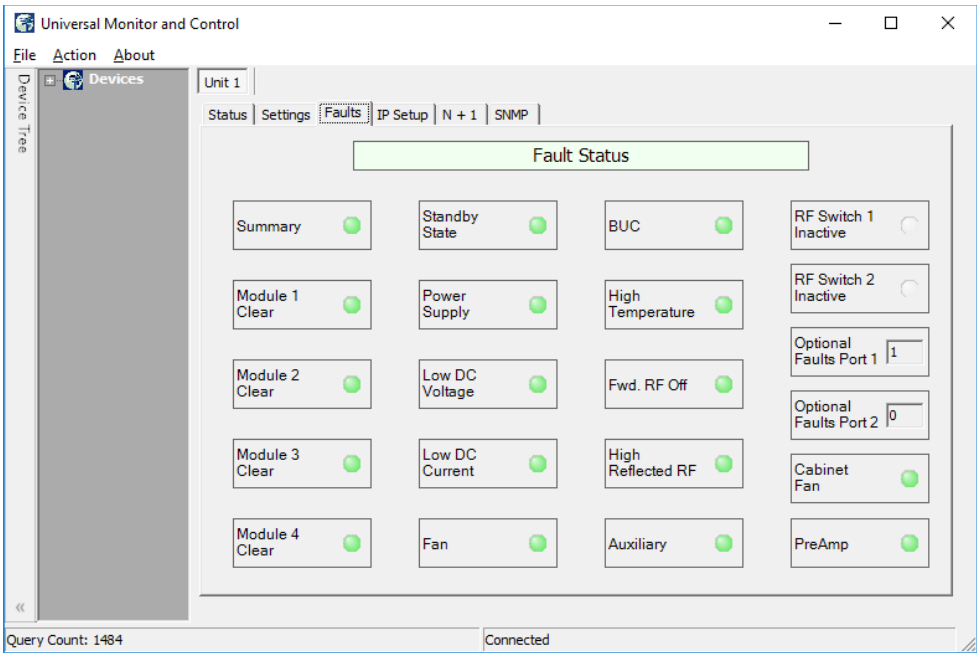

Figure 6: Universal M&C Software > Faults Tab

Each RF Module in the SSPA is monitored for faults in addition to the SSPA itself. If the SSPA does not include a module, non-existent modules will show up with a status of 'N/A' in the Module Status box, and the indicator will turn yellow.

IP Setup Tab

The fourth screen is the "IP Setup" screen, shown in Figure 7. It displays all of the TCP/IP settings on the SSPA.

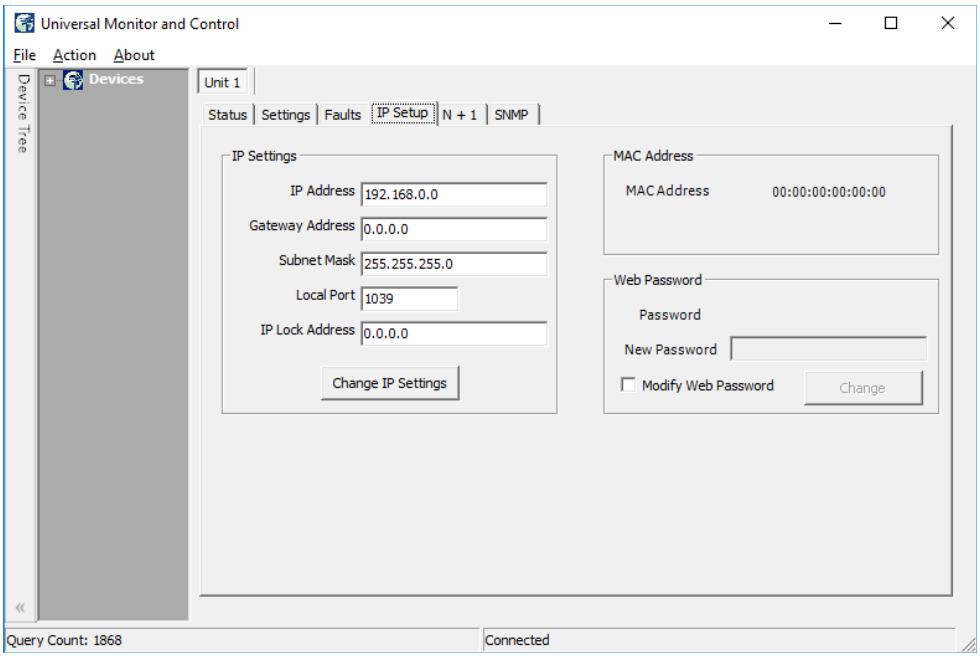

Figure 7: Universal M&C Software > IP Setup Tab

When the IP Address is modified, the SSPA must be reset for it to use the new IP Address. Until the SSPA is reset, it will use the old IP Address. The Local Port is the port that the SSPA uses for UDP requests. The SSPA also answers requests using the same port. If the Local Port is changed, the SSPA must be reset.

The Gateway Address and Subnet Mask are standard settings for TCP/IP communications. If either of these settings is changed, the SSPA must be reset for the new settings to take effect.

The IP Lock Address is used for security. If it is set to something besides 0.0.0.0 or 255.255.255.255 it will only answer the address it is set to. For example, if the IP Lock Address is 192.168.0.50, then a request from 192.168.0.100 will not be accepted. The IP Lock Address may be changed without resetting the SSPA.

N+1 Settings Tab

The fifth window is the "N+1 Settings and Conditions" tab, as shown in Figure 8. This screen is used for setting N + 1 system parameters, and monitoring N+1 system conditions. Note that only the master module in an N+1 system will show the N+1 Master settings.

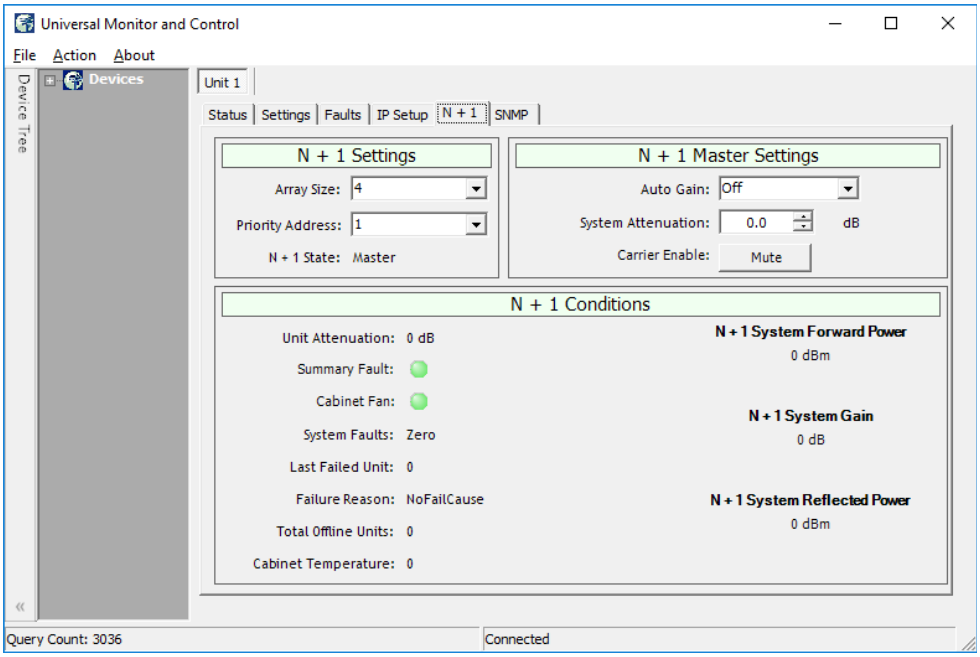

Figure 8: Universal M&C Software > N+1 tab

See the **Overview of the PowerMAX M&C** section for more information on Master/Slave functions using the N+1 Settings Tab.

SNMP Tab

The sixth window is the "SNMP Settings" tab, as shown in Figure 9. This screen is used for setting SNMP communication parameters, and for assigning trap conditions.

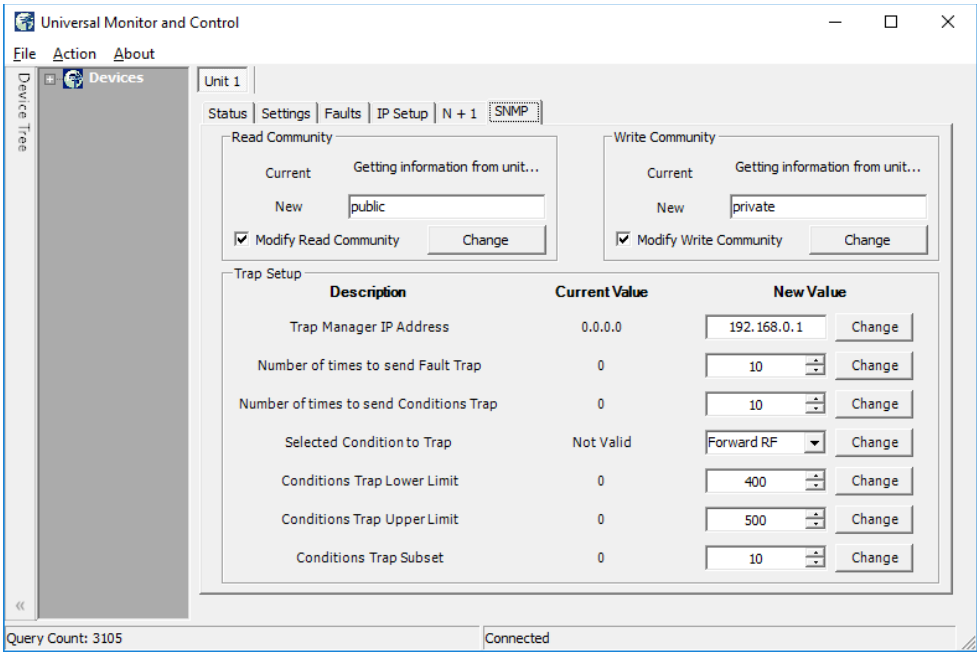

Figure 9: Universal M&C Software > SNMP tab

Add CO Unit to M&C

Launch the Teledyne Paradise Datacom Universal Monitor and Control software from the Programs Menu of your PC. Upon installation, a shortcut to the software may have been added to your desktop.

Click the 'Action' menu and select 'Add Unit' from the pull-down menu. Select 'Compact Outdoor SSPA' from the menu choices. See Figure 10.

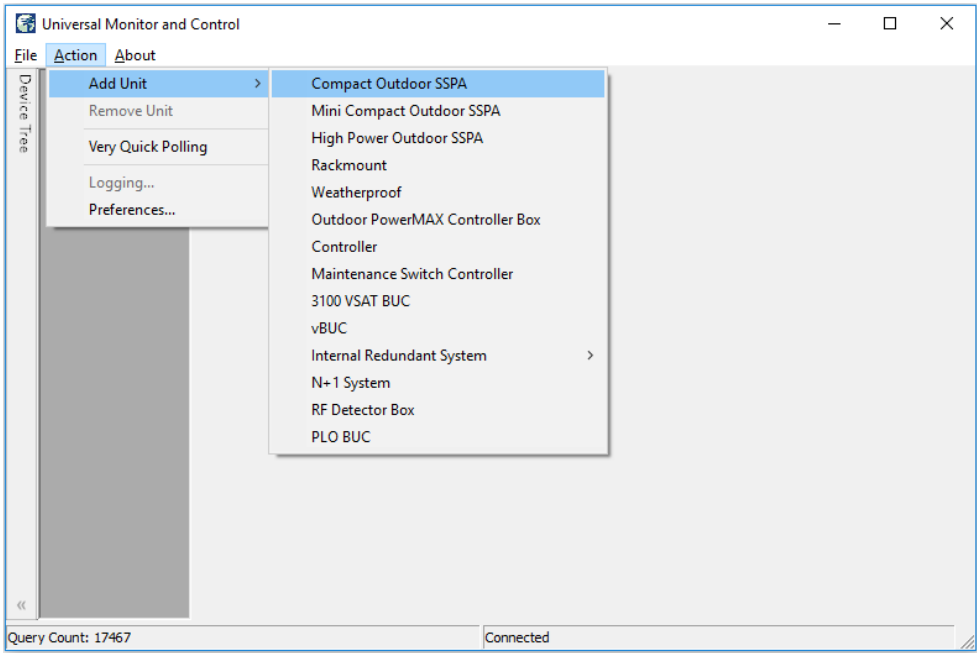

Figure 10: Universal M&C > Add Unit > Compact Outdoor SSPA

A new dialog window will open. Enter the following information where applicable: Unit ID; if using a RS-232 Connection, the Serial Port and Baud Rate. See Figure 11.

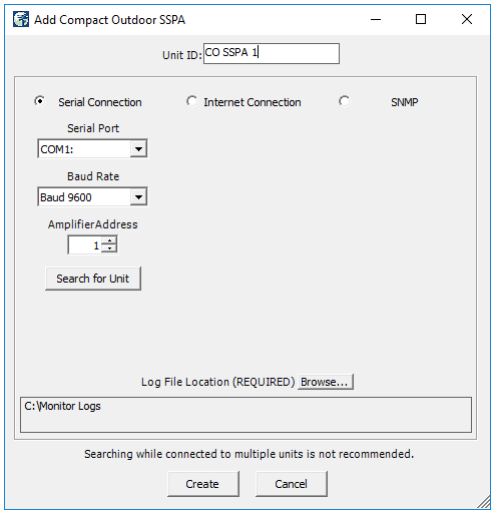

Figure 11: Add Compact Outdoor SSPA > Serial Connection

If using an Ethernet Connection, enter the unit's IP Address and Port number. See Figure 12.

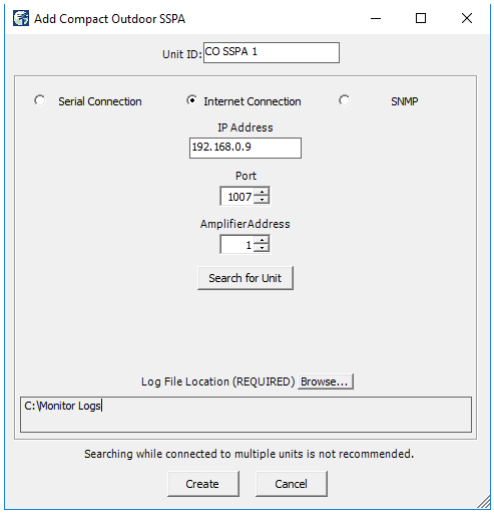

Figure 12: Add Compact Outdoor SSPA > Internet Connection

Specify the unit's Address in the Amplifier Address box. If you don't know the address of the unit you may search for it. Be aware that this search feature is only useful when you have only one unit connected to your PC at a time.

If you wish to change the log file location, click on the 'Browse' button and navigate to the desired location.

Click on the 'Create' button to generate the operation window for this unit.

Overview of the CO M&C

The operational status, settings and conditions of the connected Compact Outdoor amplifier are displayed in the Universal M&C application's four tabs:

- Status Tab
- Settings Tab
- IP Setup Tab
- SNMP Settings Tab

Status Tab

The Universal M&C Software will initialize and open to the Status tab, the main monitoring display. See Figure 13. The Status tab shows the current conditions (or state) of the Compact Outdoor SSPA. In addition, the status screen allow the user to alter the Mute condition of the carrier and adjust the on-board Attenuator for gain control.

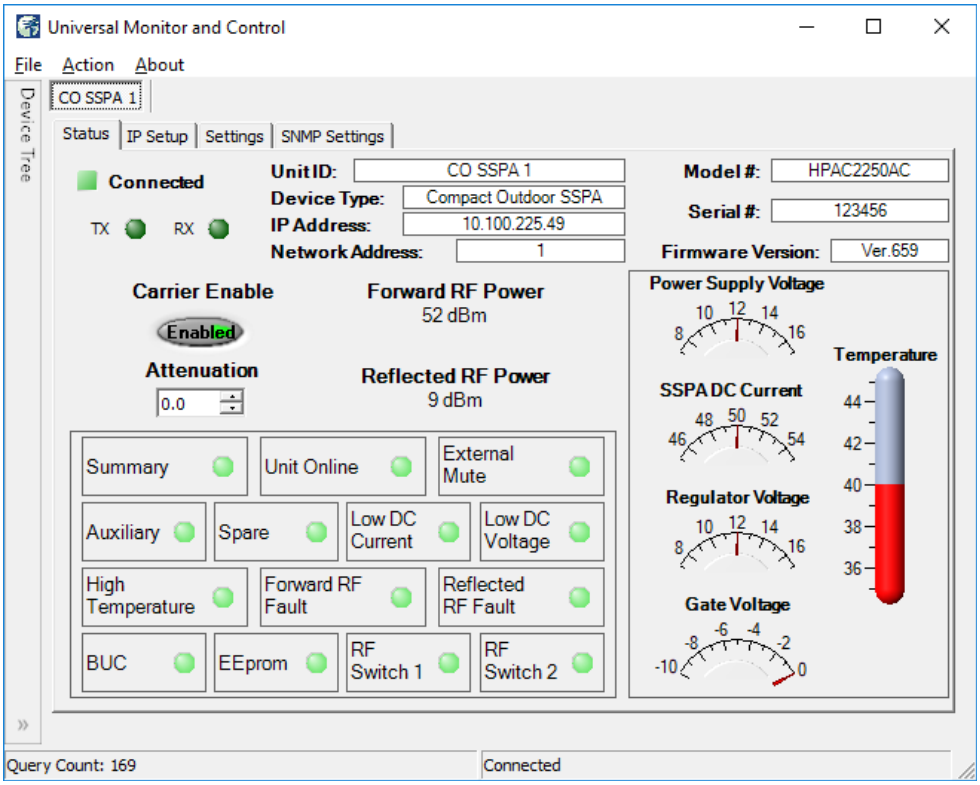

Figure 13: Compact Outdoor SSPA > Status Tab

Upon connection with a unit, the M&C application obtains and displays the unit ID, the amplifier's model number and serial number. The SSPA module's firmware version number is also displayed here for convenience.

The unit's network address and serial COM or IP address are also listed, which can be helpful in optimizing serial communications.

Signal Indicators

Three rows of indicators show the connection status of the connected amplifier. Top-most is an indicator that displays a green square when Connected, or a red square when Disconnected. Immediately below are two indicators for the TX and RX paths. The third row displays the mute state (Carrier Enable). The operator may click on the indicator to toggle between enabling or muting the amplifier. See Figure 14.

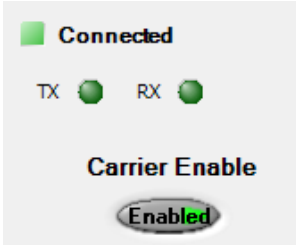

Figure 14: Status Tab > Signal Indicators

Fault Status Indicators

The Fault Status frame in the lower left side of the Status tab contains a 3x4 grid of SSPA fault lights. See Figure 15.

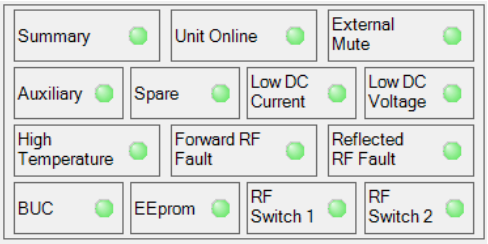

Figure 15: Status Tab > Fault Status Indicators

- Summary Alarm: The Summary Alarm is simply a logical 'OR' of any major alarm indicators.
- Unit Online: This is a status indicator that illuminates green when the unit is online.
- External Mute Alarm: The External Mute line gives an indication that the SSPA has been externally muted by J4-Pin B. This alarm can be configured to trigger a summary alarm if desired. Factory default is to signal a External Mute fault but no summary alarm.
- Auxiliary & Spare Alarms: The Auxiliary and Spare Alarms are configurable from the Settings Window.

These alarms can be configured to trigger a summary alarm. See the **Settings Tab** section.

- Low DC Current Alarm: The Current Fault is factory preset to alarm if the SSPA module current falls below 60% of its nominal value. This alarm will also trigger a summary alarm.
- Low DC Voltage Alarm: The Voltage Alarm is factory preset to alarm if the SSPA module current falls below 80% of its nominal value. This alarm will also trigger a summary alarm.
- High Temperature Alarm: The Temperature Fault indicator is factory preset to alarm at 80°C. The amplifier will continue to operate up to 90°C. Beyond 90°C the DC power will be interrupted to the SSPA module. This measure will protect the sensitive microwave transistors from catastrophic failure. The fans and monitor and control circuitry will continue to operate normally. This function has approximately a 5°C hysteresis window which will allow the amplifier to re-enable itself when the ambient temperature is reduced by 5°C. This alarm will also trigger a summary alarm.
- Forward RF Alarm: The Forward RF Fault Alarm indicates when the RF output of the amplifier falls below the threshold set in the Settings Window.
- BUC Alarm: The BUC fault is only active in units that are supplied with an optional L-Band Block Up Converter module. If the Up Converter's phase locked local oscillator loses lock, a BUC alarm is set and the amplifier is muted so that spurious RF cannot be transmitted. This alarm can be configured to trigger a summary alarm.
- EEPROM Alarm: The EEPROM Alarm is primarily used as a Fiber RX Link alarm for Compact Outdoor SSSPA units configured with a fiber-optic interface.
- RF Switch Alarms: The RF Switch 1 Alarm is only active if a 1:1 Redundant System has been configured in the M&C program. The RF Switch 2 Alarm is only active is a 1:2 Redundant System has been configured. These configurations are covered in Section 7.

Voltage, Current and Temperature Display

On the right side of the Status window is a thermometer display that reports the present baseplate temperature of the amplifier. The baseplate temperature typically experiences a 20-30 degree rise above ambient on the highest power Compact Outdoor amplifiers and 15-20 degree rise on lower power units. See Figure 16.

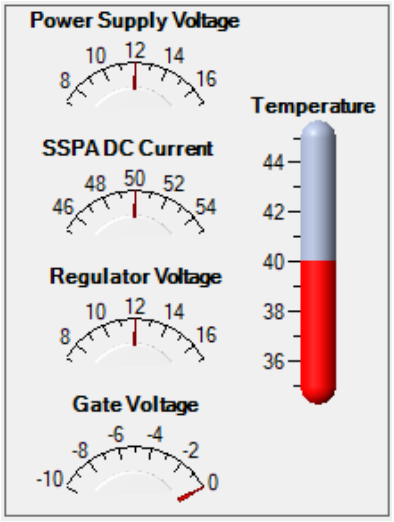

Figure 16: Status Tab > Signal Indicators

To the left of the thermometer display are several indicators that show various operating conditions of the Compact Outdoor Amplifier in real time. These indicators are helpful for any diagnostic procedures and consist of: Power Supply Voltage monitor SSPA DC Current monitor Regulator Voltage monitor Gate Voltage monitor.

The Power Supply voltage indicator displays the primary 12 volt power supply output. SSPA DC Current is the total current drawn by the microwave transistors. Regulator Voltage is the DC voltage of the drain circuitry that feeds the GaAs transistors. The Gate Voltage indicator monitors the DC voltage of the gate circuitry of the microwave GaAs transistors. These indicators provide direct access to the active device operating characteristics.

Gain Adjustment (Attenuation Control)

The Gain Attenuation Control is located above the Fault Condition Indicators and below the Carrier Enable status. See Figure 17.

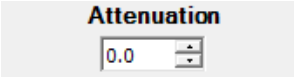

Figure 17: Status Tab > Attenuation Control

The gain can be adjusted by setting the Attenuation Control. An Attenuation Control of 0 dB is the maximum gain (typically 75 dB) setting on the amplifier. By setting the Attenuation Control to 20 dB; the gain is set to 55 dB. The Attenuation Control can be varied using the up/down arrows to the right of the displayed value or by typing a value between 0 and 20 in the field and hitting the Enter key.

Forward/Reflected RF Power Display

The Forward RF Power is displayed in the central part of the Operation window. This indicator reports the approximate forward output power of the amplifier. It uses the voltage from the RF Power Detector to determine a corresponding power level in dBm. The accuracy of the power indicator is ±1 dB at the mid-point of the specified band, with a single CW or QPSK carrier.

Units with the reflected power meter option also display the Reflected RF Power. See Figure 18.

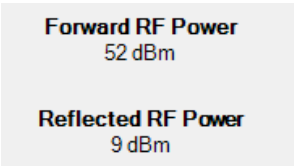

Figure 18: Status Tab > Forward/Reflected RF Power Display

Settings Tab

Figure 19 shows the Settings tab of the Universal M&C software. The Settings tab contains many of the global settings that are available in the SSPA.

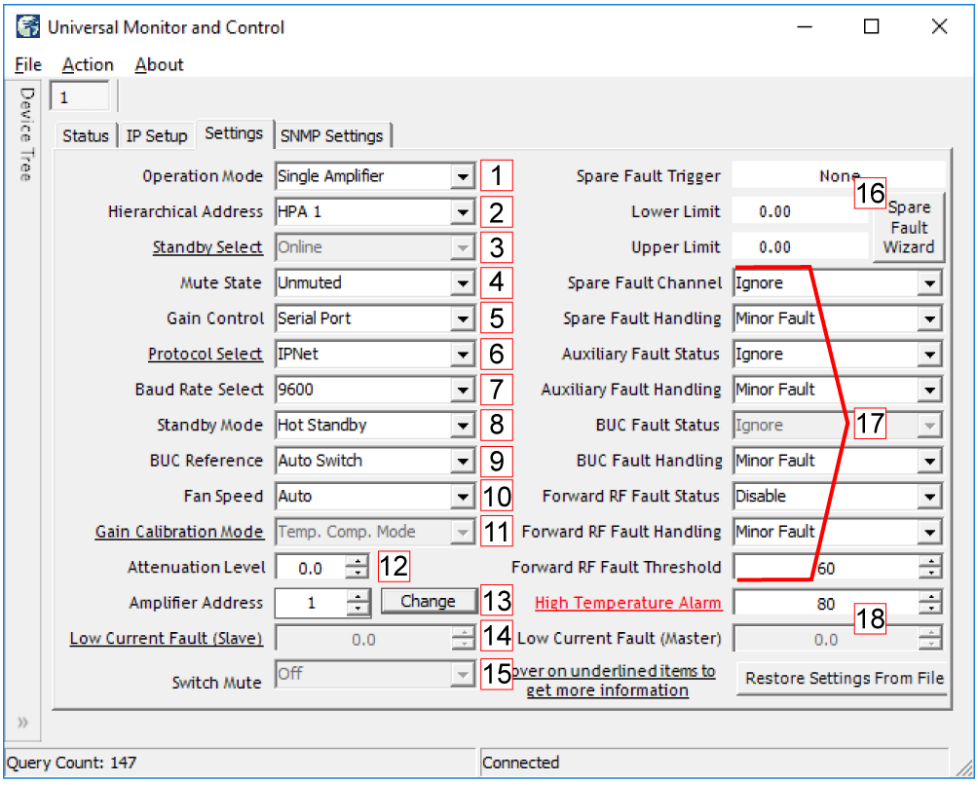

Figure 19: Compact Outdoor SSPA > Settings Tab

The Compact Outdoor amplifier will power up with the "last-state" settings before the unit was powered down. Whatever attenuation setting or mute state the amplifier was in when powered down will be the restored settings when the amplifier is powered back on.

Operation Mode [1]

Select between stand-alone (single unit), Dual 1:1 mode, 1:1 Redundant mode, or Maintenance Switch mode.

Hierarchical Address [2]

Identifies each amplifier in a redundant system as HPA 1, HPA2 or HPA 3.

Standby Select [3]

Selects whether the unit should start up as the online amplifier or the standby amplifier. When in a redundant system configuration, if the amplifier Standby Select state is changed from the Online state to the Standby state, the system will drive the switch so that another amplifier in the system is in the Online state. Only the Online amplifier can give away its Online state. This setting is saved upon unit shut-down, and the unit will start up in the last saved state.

Mute State [4]

Determines if the unit should start up muted (transmit disabled) or mute cleared (transmit enabled).

Gain Control [5]

Select between serial communication control of the unit's gain or analog voltage gain control via J4.

Protocol Select [6]

The operator may select either the standard string protocol, Terminal mode, IPNET or SNMP (as well as legacy Binary Mode and NDSatcom protocols). The operator will be asked to verify any change in protocol. Communication with the amplifier may be affected.

Baud Rate Select [7]

Sets the baud rate of the unit. The supported baud rates include: 2400, 4800, 9600, 19200, and 38400 baud. The factory default baud rate is 9600. The operator will be asked to verify any change to the baud rate. Communication with the amplifier may be affected.

Standby Mode [8]

Selects between Hot and Cold standby mode for units in redundant systems.

BUC Reference [9]

Selects between an Internal or External reference for an optional block up converter integrated with the unit, or allows the unit to Auto-switch between Internal and External reference.

Fan Speed [10]

Selected GaN units are equipped with a Fan Speed Control option. The fan speed control circuit is shared with the RF power detector analog output (pin R on M&C connector J4). This pin remains not connected on units with the fan speed control option installed. Available control options: Auto, High, Low, Default/Off

- Auto - This setting allows the unit to control the cooling fan speed according to the internal RF module temperature. If the module plate temperature remains below 50 °C, the fan speed will be set to minimum. If the registered module plate temperature is above 50 °C, unit will gradually increase the fan speed. Fan speed will reach maximum at a plate temperature of 65 °C.
- High - This option sets the fan speed to maximum. Air velocity will remain at the same level regardless of other operation parameters.
- Low - This option sets the fan speed to minimum. Air velocity will remain at the same level regardless of other operation parameters.
- Default/Off - This setting should be set on units without the fan speed control option. It will allow proper functioning of the RF power monitor analog output. Applying this setting on units with the fan speed control option allows the fan speed to be proportional to the output RF level. Fan speed will be set at the minimum when output RF is below a detectable level. Fan speed will gradually increase when RF output increases within the detectable RF range. Fan speed will be at maximum level when unit reaches saturated power (Psat).

Gain Calibration Mode [11]

This feature is disabled for most users. Should be set for Temp. Comp. (Temperature Compensation) Mode. Consult the factory if set for Calibration Mode.

Attenuation Level [12]

The Gain Adjustment of the unit is adjustable here, from 0 to 20 in 0.1 dB steps.

Amplifier Address [13]

Sets a network address for the unit. Range is 0 to 255. Click the 'Change' button to change the address. The operator will be asked to verify any to change to the Amplifier Network Address. Communication with the amplifier may be affected.

Low Current Fault (Slave) [14]

This feature is not available on all units. Consult the factory.

Switch Mute [15]

This is a read-only view of the Switch Mute setting. Higher power amplifiers which include a maintenance switch or are configured in a system which includes a transfer switch may be set to mute on switch (setting = On) at the factory.

Spare Fault Wizard [16]

This feature allows the user to set the Spare Fault Trigger using the Spare Fault Wizard.

Click on the Spare Fault Wizard button, which opens a new window. See Figure 20. Select between the following fault triggers: Analog Gain Adjust Voltage, Gate Voltage, Regulator Voltage, Power Supply Voltage, SSPA Current, External Mute, or None.

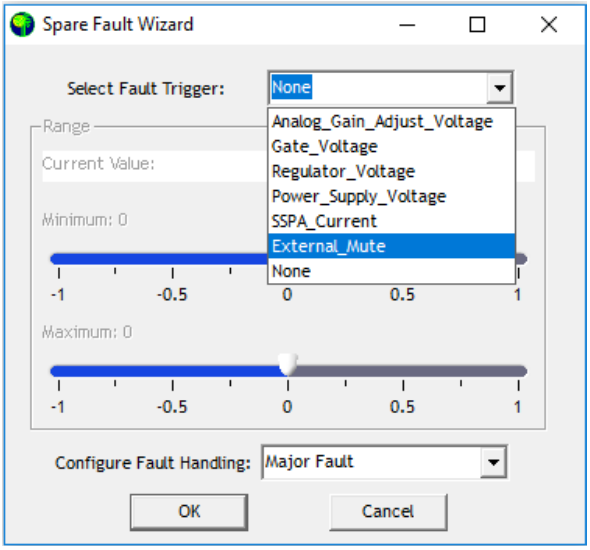

Figure 20: Spare Fault Wizard

Set the range of thresholds (maximum and minimum) that would trigger the selected fault, and configure the fault handling via a pull-down menu (Major Fault, Minor Fault, Major Fault plus Mute).

Click the OK button to set the fault trigger for the Spare Fault.

Fault Setups [17]

The user may also adjust the Spare, Auxiliary, BUC, and Forward RF Fault Status and Handling via the appropriate pull-down menus on the Settings Window.

- Spare/Auxiliary/BUC/Forward RF Fault Handling: Selects whether the associated fault should be a major or minor fault, and whether the fault should mute the unit. A minor fault will trigger a Spare/Auxiliary/BUC/Forward RF Fault alarm but not trigger a Summary Fault. A major fault will trigger both an Spare/Auxiliary/BUC/Forward RF Fault and a Summary Fault.
- Spare/Auxiliary/BUC Fault Status: Determines if the associated fault input should be ignored or enabled based on the available selections.
- Forward RF Threshold: Allows the user to assign the threshold at which a Forward RF Fault will be triggered.

Fault Thresholds [18]

Allows the user to set the limit for triggering the unit's Current Fault or High Temperature Fault.

- High Temperature Alarm Threshold: Range is 0 to 125 °C.
- Low Current Fault Threshold: This setting is factory pre-set.

> ⚠ **Take care not to adjust the High Temperature Alarm Threshold within the temperature range of the amplifier's normal operation. Doing so will trigger unneccessary high temperature alarm faults.**

IP Setup Tab

If the user wishes to set up the networked Compact Outdoor SSPA with custom IP settings, the internal IP settings need to be modified. Click on the IP Setup Tab. See Figure 21.

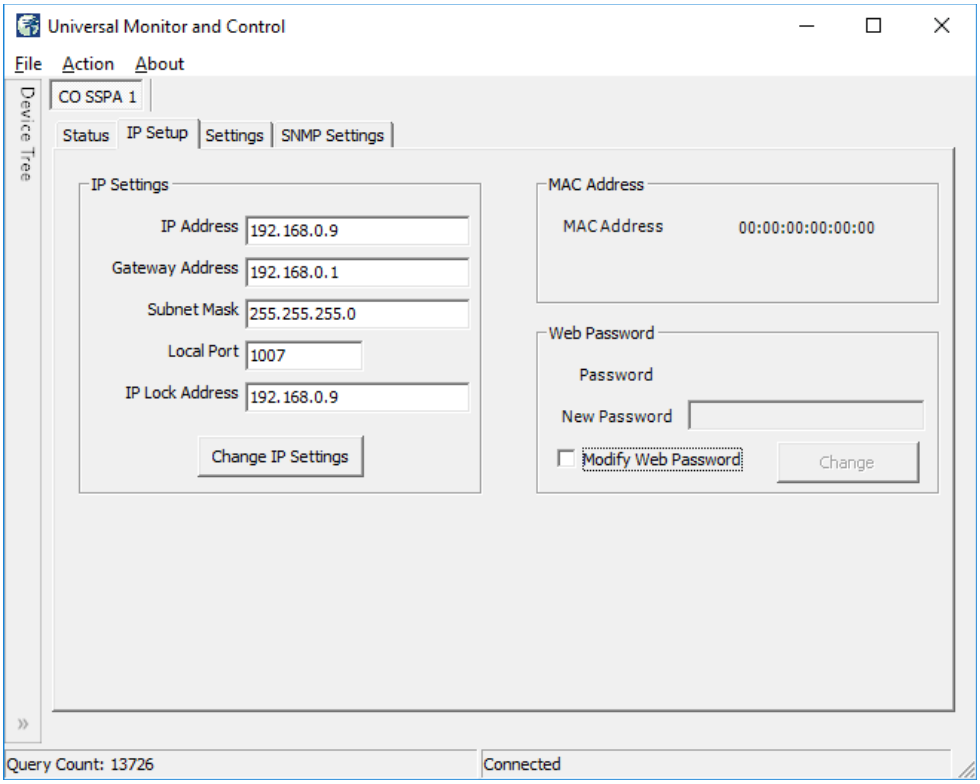

Figure 21: Compact Outdoor SSPA > IP Setup Tab

In this window, the user may enter custom IP settings, including the IP Address of the unit, the Gateway Address, the Subnet Mask and the Local Port.

The IP Lock Address allows the operator to set the IP address from which the amplifier will accept requests. This selection gives the operator the ability to increase the security measure for the IPNet protocol. The SSPA will only answer a request which comes from the assigned IP address.

To disable this feature in firmware versions prior to 6.00, set the Lock IP Address value to 0.0.0.0 or 255.255.255.255. The Lock IP address function was updated in firmware version 6.00 to allow "Binding" and "Masking" functions. "Binding" means that the first datagram re-trieved for this socket will bind to the source IP address and port number. Once binding has been set, the SSPA will answer to the bound IP source until the unit is restarted or reset. Without binding, the socket accepts datagrams from all source IP addresses. Address 0.0.0.0 allows all peers, but provides binding to the first detected IP source; Address 255.255.255.255 accepts all peers, without binding. If the Lock IP Address is a multicast address, then the amplifier will accept queries sent from any IP address of the multicast group.

Click on the 'Change IP Settings' button to save the entered settings into non-volatile memory.

The user may also modify the web password used when accessing the web-based remote M&C. Tick the 'Modify Web Password' checkbox to enable the New Password field. Enter a new password and click on the 'Change' button to save.

Using Custom IP Settings with Quick Start Cable

If the Quick Start Cable is connected to Port J4 when power is applied to the amplifier, it will use the default settings.

Default Settings with Quick Start Cable Connected:

```
Interface: IPNET
IP Address: 192.168.0.9
Local Port: 1007
Gateway: 192.18.0.1
Subnet Mask: 255.255.255.0
IP Lock: 255.255.255.255
Web password: paradise
Read Community: public
Write Community: private
Unit Starts Up: Unmuted
```

To use custom IP settings while using the Quick Start cable, remove power from the amplifier.

Unplug the Quick Start cable from the M&C connector, J4. (If the unit is restarted with the Quick Start cable connected, it will always come up with default IP settings).

Connect power to the SSPA.

Connect the Quick Start cable to J4, and check connectivity with the custom IP settings. Make sure that the Protocol setting in the Settings tab of the Universal M&C is set to IPNet.

If custom IP settings will be used in normal operation, the user will need to construct an IP cable or modify the Quick Start Cable by disconnecting the interface control pins (pins j and e, Baud Select 0 and Baud Select 1) from ground.

In this configuration, the SSPA will always use the saved communication control settings rather than the default configuration.

SNMP Settings Tab

The SNMP Settings Tab allows the operator to change the Read/Write Community strings and the Trap settings (if communicating over SNMP protocol). See Figure 22

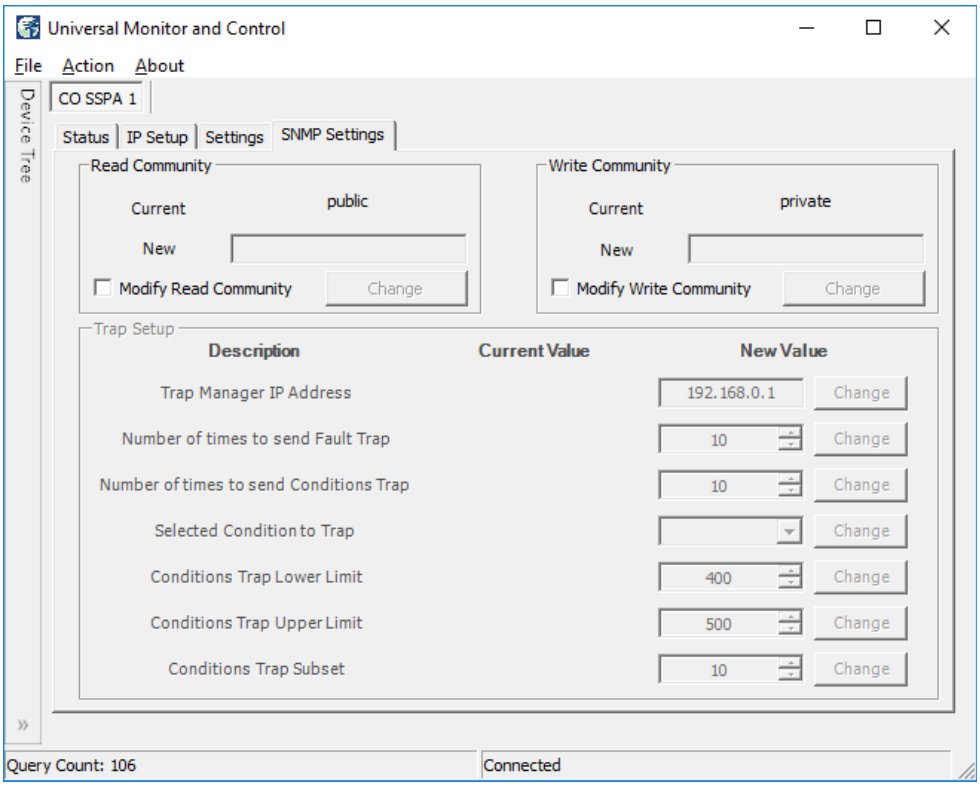

Figure 22: Compact Outdoor SSPA > SNMP Settings Tab

The current Read/Write Community strings are displayed as read from the connected unit. Tick the Modify Read/Write Community checkbox to enable the New Read/Write Community field. Enter a new password and click on the 'Change' button to save.

Add HPO Unit to M&C

Launch the Teledyne Paradise Datacom Universal Monitor and Control software from the Programs Menu of your PC. Upon installation, a shortcut to the software may have been added to your desktop.

Click the 'Action' menu and select 'Add Unit' from the pull-down menu. Select 'High Power Outdoor SSPA' from the menu choices. See Figure 23.

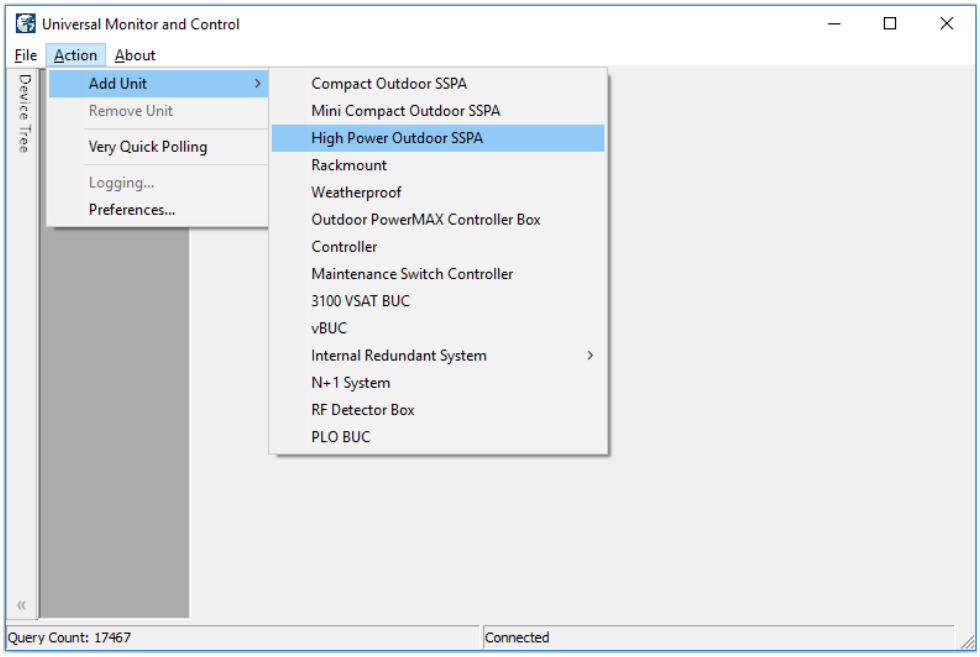

Figure 23: Universal M&C > Add Unit > High Power Outdoor SSPA

A new dialog window will open. Enter the following information where applicable: Unit ID; if using a RS-232 Connection, the Serial Port and Baud Rate. See Figure 24.

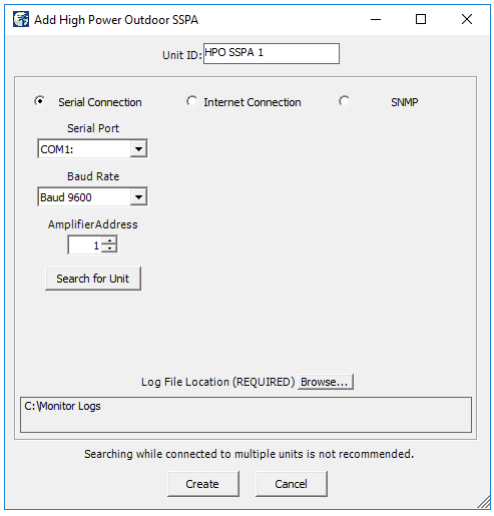

Figure 24: Add High Power Outdoor SSPA > Serial Connection

If using an Ethernet Connection, enter the unit's IP Address and Port number. See Figure 25.

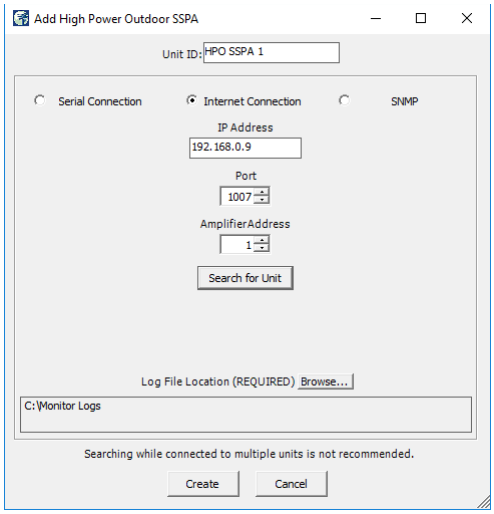

Figure 25: Add High Power Outdoor SSPA > Internet Connection

Specify the unit's Address in the Amplifier Address box. If you don't know the address of the unit you may search for it. Be aware that this search feature is only useful when you have only one unit connected to your PC at a time.

If you wish to change the log file location, click on the 'Browse' button and navigate to the desired location.

Click on the 'Create' button to generate the operation window for this unit.

Overview of the HPO M&C

The H-Series High Power Outdoor SSPA uses the same protocol as the Compact Outdoor SSPA, and also the same structure of Universal M&C.

See the **Overview of the CO M&C** section when using the software with a High Power Outdoor SSPA.

Add Indoor PowerMAX System to M&C

Launch the Teledyne Paradise Datacom Universal M&C software from the Programs Menu of your PC. Upon installation, a shortcut to the software may have been added to your desktop. An Indoor PowerMAX system requires Universal M&C version 4.4.8b or later.

Add Each RM SSPA to M&C

Each individual amplifier in the PowerMAX System should first be added to the Universal M&C. Follow the instructions detailed in the **Add RM Unit to Universal M&C** section.

PowerMAX systems are typically configured with four, eight or 16 amplifiers.

Set the N+1 Settings for each individual unit to include the Array Size (four, eight or 16) for the PowerMAX System and the unique Priority Address for each unit. The amplifier assigned with the lowest Priority Address (typically 1) is granted the Master status for the N+1 system, and controls the other (Slave) amplifiers in the system.

Add PowerMAX System to M&C

To add the PowerMAX System, click the 'Action' menu and select 'Add Unit' from the pull-down menu. Select 'N+1 System' from the menu choices. See Figure 26.

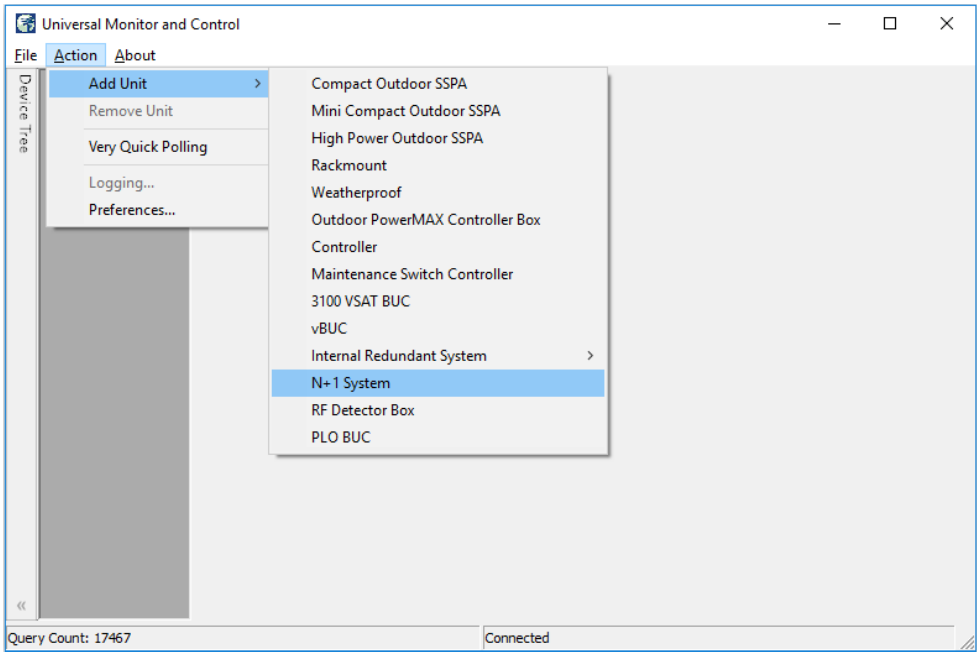

Figure 26: Universal M&C > Add Unit > N+1 System

A new 'Add N+1 System' dialog window will appear, as shown in Figure 27. If the individual amplifier N+1 settings were properly set, the Unit #s should automatically populate in ascending Priority Address order, using the Unit ID entered in the M&C. Otherwise, select the Unit # for each unit in the system and enter a System Name in the field at the bottom of the window. Click on the 'OK' button to initialize the system.

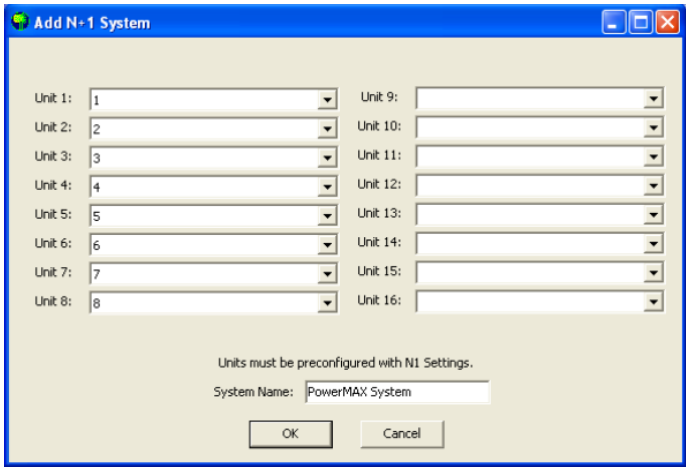

Figure 27: Add N+1 System Selection Window

⚠ **The System window may take several moments to load as the software collects and compiles the data from each unit in the system.**

Overview of the Indoor PowerMAX M&C

The N+1 System tab displays an overview of each unit in the system, and overall system performance. The Universal M&C screen shown in Figure 28 displays the N+1 system tab (labeled PowerMAX System), as well as tabs for each of the eight (8) SSPA units (labeled 1, 2, 3, 4, 5, 6, 7 and 8) being monitored.

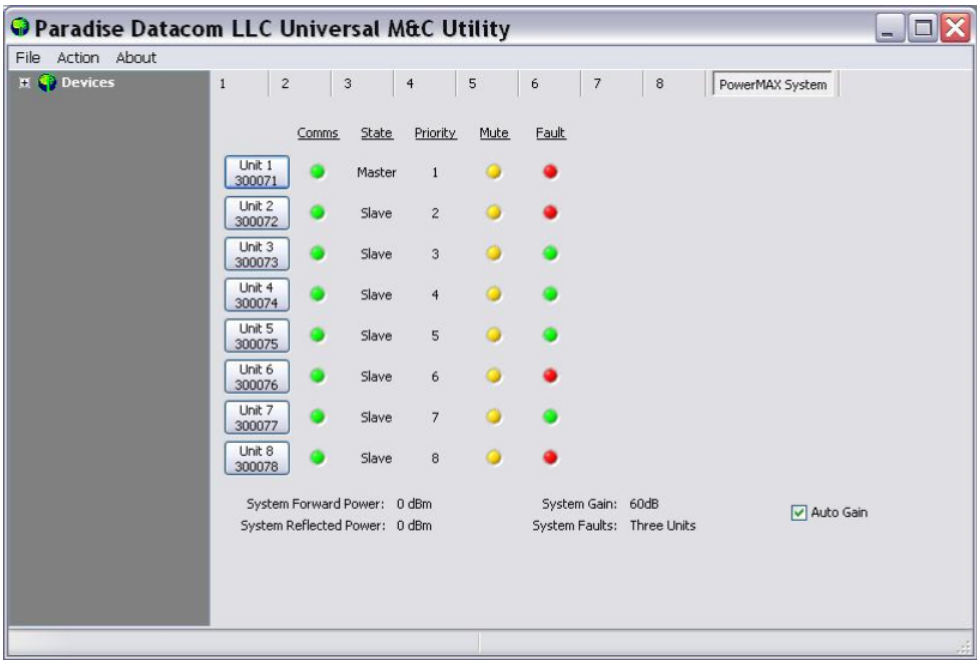

Figure 28: N+1 System Tab

For each unit in the system, the PowerMAX System tab displays the unit's serial number, comms status, master/slave state, N+1 priority in the system, mute state and fault state.

Also shown are the System Forward Power, Reflected Power, System Gain and number of System Faults. A checkbox at the lower right of the window allows the user to quickly enable or disable the Auto Gain function. See the Auto Gain description in the **Touchscreen Menu Structure** section.

By hovering the mouse over the individual unit buttons, as shown in Figure 29, the unit's conditions are detailed.

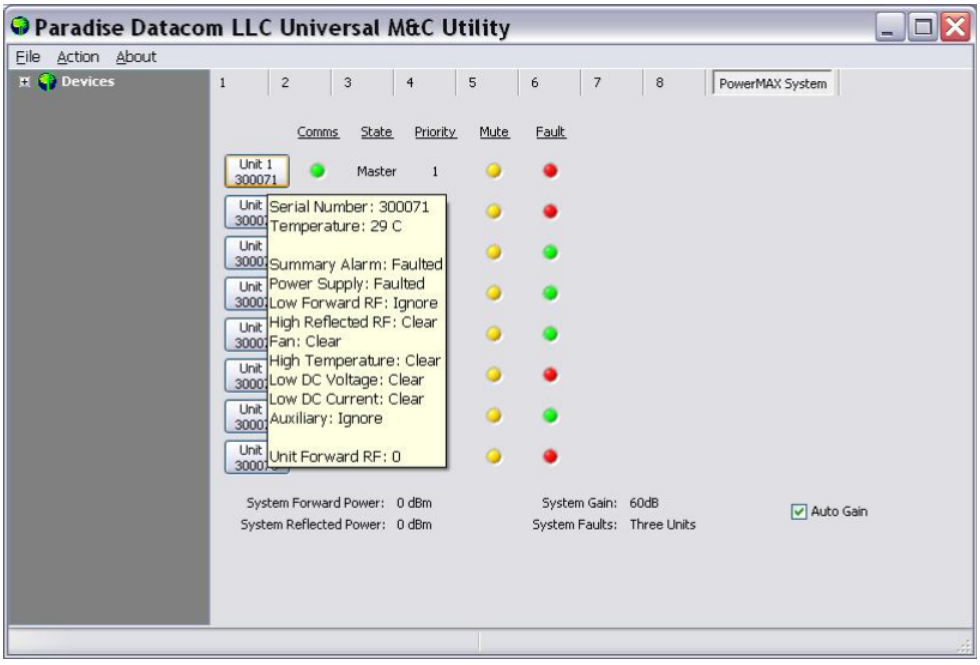

Figure 29: N+1 System Tab > Unit Info on Hover

Clicking on the Unit # button to switch to the Status tab for that unit. You may also click on the unit's tab to navigate to the M&C windows for that unit.

The N+1 tab for each unit shows the N+1 settings for that unit. Depending on whether the unit is assigned Master status or Slave status, the N+1 screen will show slightly different information. Figure 30 shows the display for the Master unit.

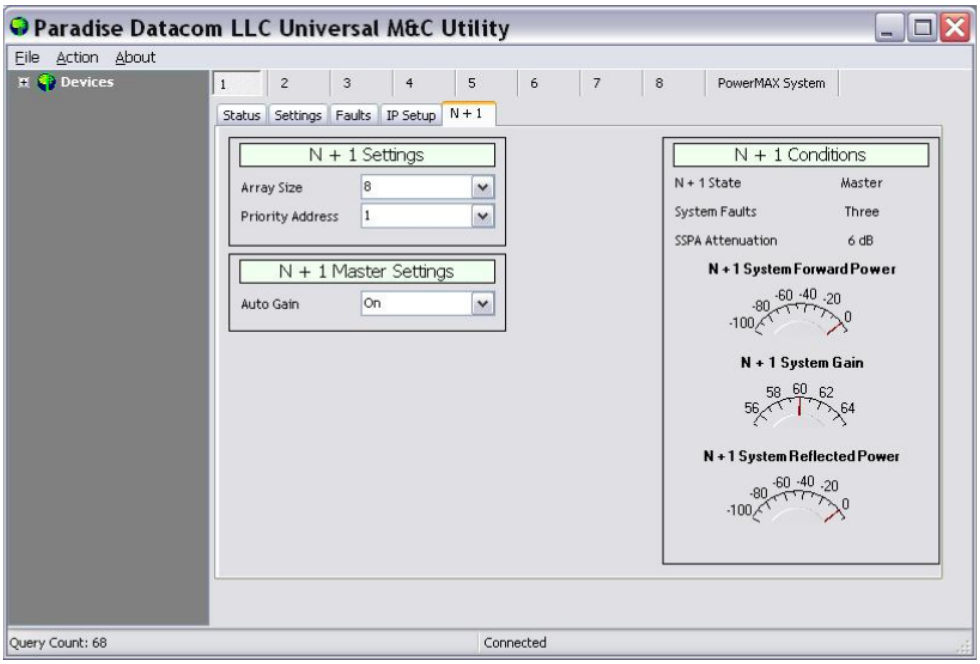

Figure 30: N+1 Tab > Master Unit

Figure 31 shows the display for the Slave units.

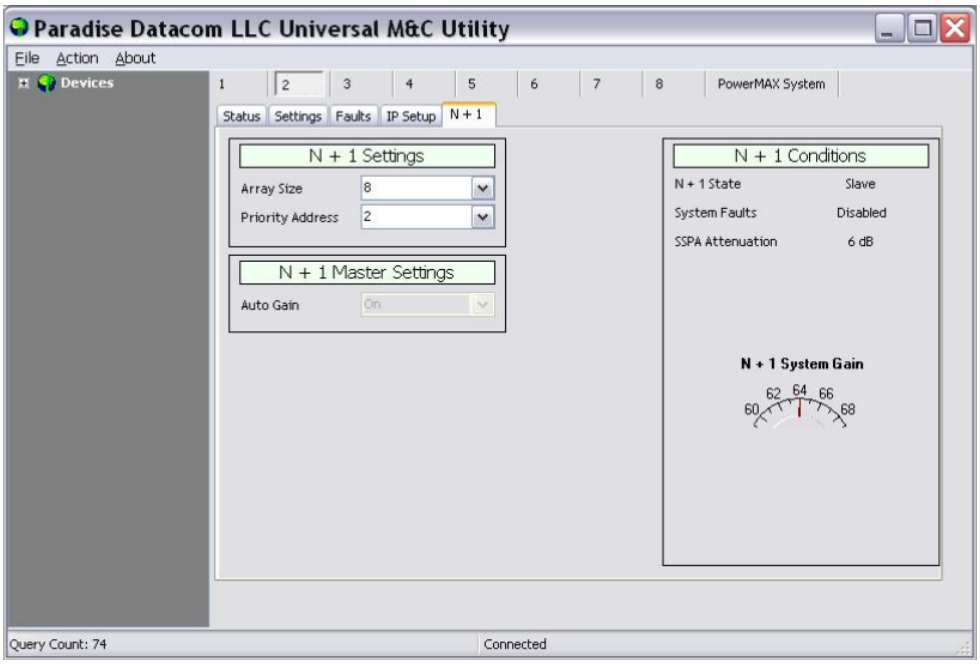

Figure 31: N+1 Tab > Slave Unit

Add Outdoor PowerMAX System to M&C

The Outdoor SSPA Controllers in an Outdoor PowerMAX system can be monitored by the Universal M&C Application. All information is read-only.

The operator must load each of the Outdoor SSPA Controllers individually. Refer to Table 1 for the default IP addresses to use.

Table 1: Outdoor SSPA Controllers, IP Addresses for Universal M&C

Controller ID	IP Address
Outdoor SSPA Controller 1 (Master)	192.168.0.11
Outdoor SSPA Controller 2 (Slave)	192.168.0.12

Launch the Teledyne Paradise Datacom Universal Monitor and Control software from the Programs Menu of your PC. Upon installation, a shortcut to the software may have been added to your desktop.

With the system operating, select the Action pull-down menu, select Add Unit, and select Outdoor PowerMAX Controller Box. See Figure 32.

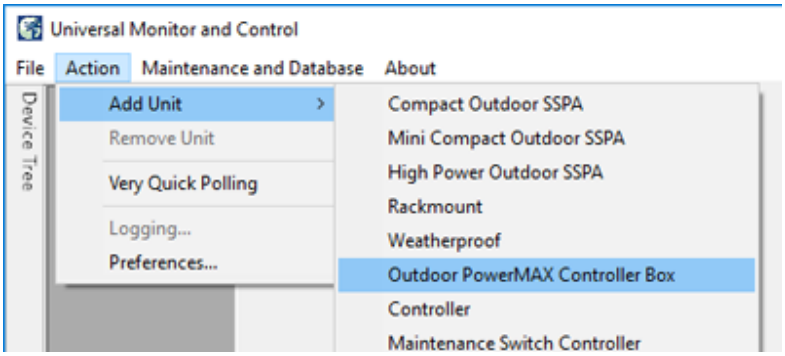

Figure 32: Universal M&C > Add Unit > Outdoor PowerMAX Controller Box

A new dialog window will open. Select the Internet connection. See Figure 33.

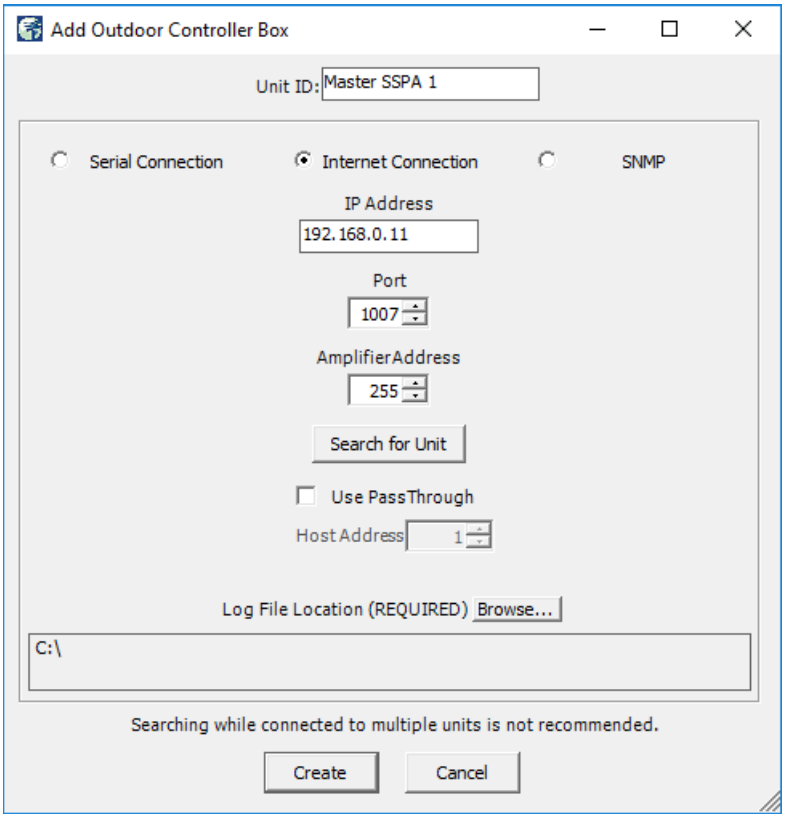

Figure 33: Add Outdoor PowerMAX Controller Box

Enter the Unit ID text that will be used to identify the unit in the M&C application. For example, "Master SSPA 1" for Controller 1.

Enter the IP address of the Master or Slave unit . Refer to Table 1.

Use the default port 1007, or change to reflect the local network.

Enter the global address (255) in the Amplifier Address field, and click on the [Search for Unit] button. The utility will locate the unit on the network. See Figure 34. Click on the [OK] button.

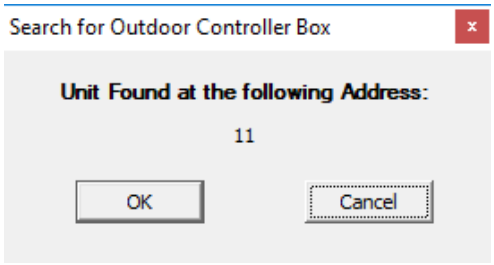

Figure 34: Dialog Window, Search for Outdoor Controller Box

Click on the [Create] button to open the M&C windows.

Repeat for each Outdoor SSPA Controller.

Overview of the Outdoor PowerMAX M&C

This section describes the information available in each of the Universal M&C screens for the Outdoor SSPA Controllers used in Outdoor PowerMAX systems.

Status Window for Outdoor SSPA Controllers

The Status Window for the Outdoor SSPA Controllers (Controller 1, typically the Master controller) shows the operational status of the array of four (4) SSPA modules for that system. See Figure 35.

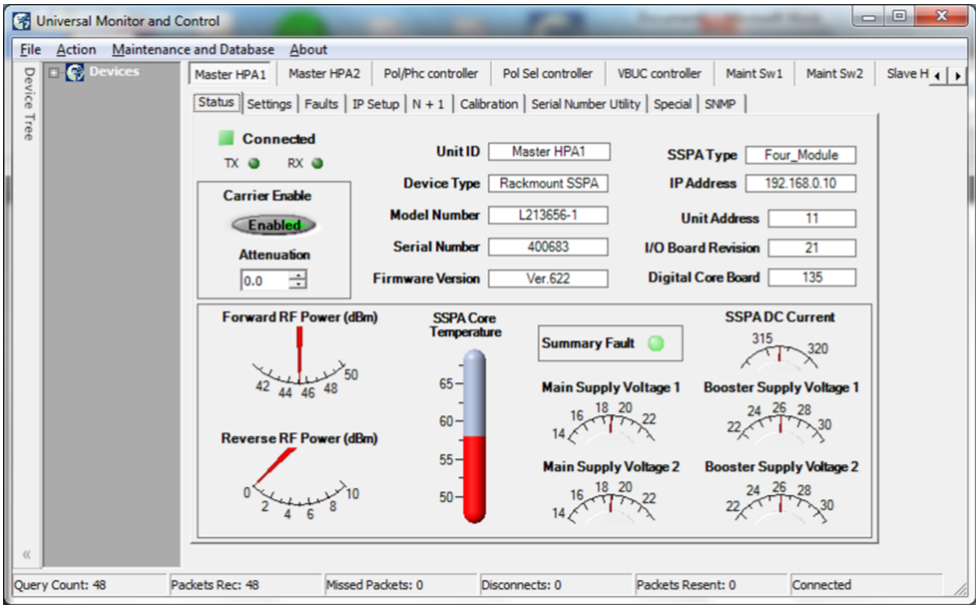

Figure 35: Status Window, Outdoor SSPA Controllers

This window displays the Mute status (Carrier Enable, indicated by "Enabled", if unmuted, or "Muted"), Attenuation and Summary Fault status LED. Also included is information about the System Forward RF Power, Reverse RF Power, SSPA Core Temperature, Main Supply Voltages, DC Current and Booster Supply Voltages.

> ⚠ **Note: Changes to Mute Status and Attenuation made in this window will be overwritten by the system.**

Settings Window for Outdoor SSPA Controllers

The Settings Window, shown in Figure 36, is common for all controllers, and is used to select the operation settings for the unit.

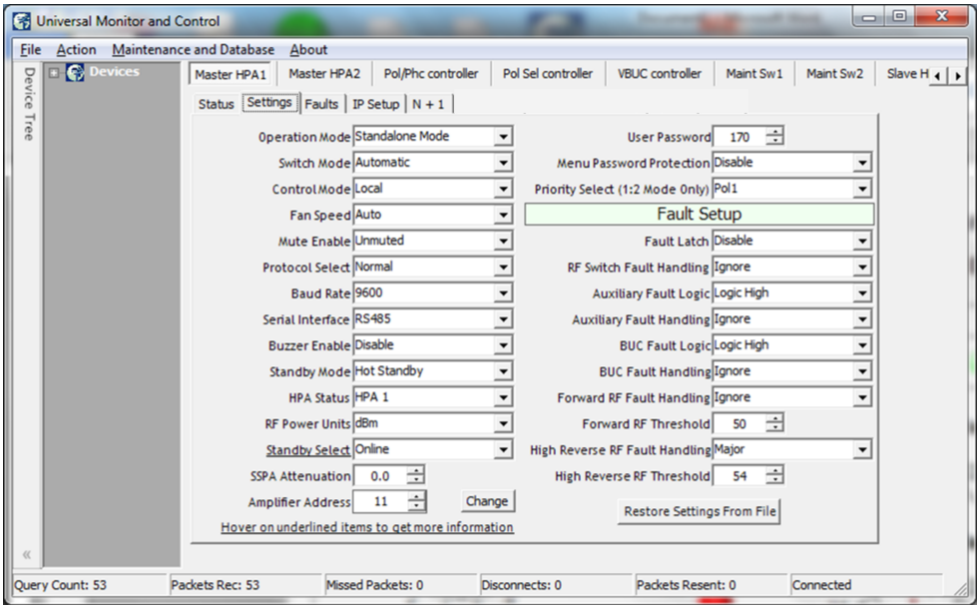

Figure 36: Settings Window, Outdoor SSPA Controllers

See your system manual for the required settings for each controller.

> ⚠ **Note: All settings are read-only. Changes made to settings in this window will be overwritten by the system.**

Faults Window for Outdoor SSPA Controllers

The Faults Window, shown in Figure 37, is common for all controllers, and is used to monitor the various fault conditions for the SSPA Modules connected to the unit.

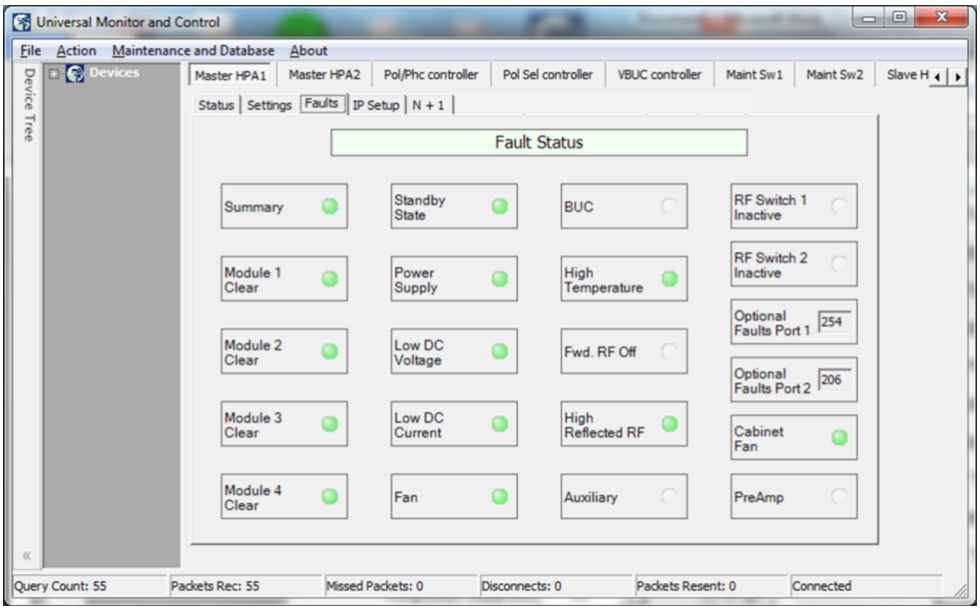

Figure 37: Faults Window, Outdoor SSPA Controllers

Table 2 shows how the fault LEDs in this window correspond with the SSPA Modules for the indicated Outdoor Controller.

Table 2: Identifying SSPA Module Faults in Universal M&C Faults Window

Module # Fault LED	SSPA Module

Module 1 for the Faults Window of Controller 1	SSPA 1.1
Module 2 for the Faults Window of Controller 1	SSPA 1.2
Module 3 for the Faults Window of Controller 1	SSPA 1.3
Module 4 for the Faults Window of Controller 1	SSPA 1.4
Module 1 for the Faults Window of Controller 2	SSPA 2.1
Module 2 for the Faults Window of Controller 2	SSPA 2.2
Module 3 for the Faults Window of Controller 2	SSPA 2.3
Module 4 for the Faults Window of Controller 2	SSPA 2.4

IP Setup Window for Outdoor SSPA Controllers

The IP Setup Window is common for all controllers, and is used to adjust the IP settings for the connected unit. The IP Address, Gateway Address, Subnet Mask, Local Port and IP Lock Address may all be modified. See Figure 38. Changes to these settings require a unit restart before they are applied.

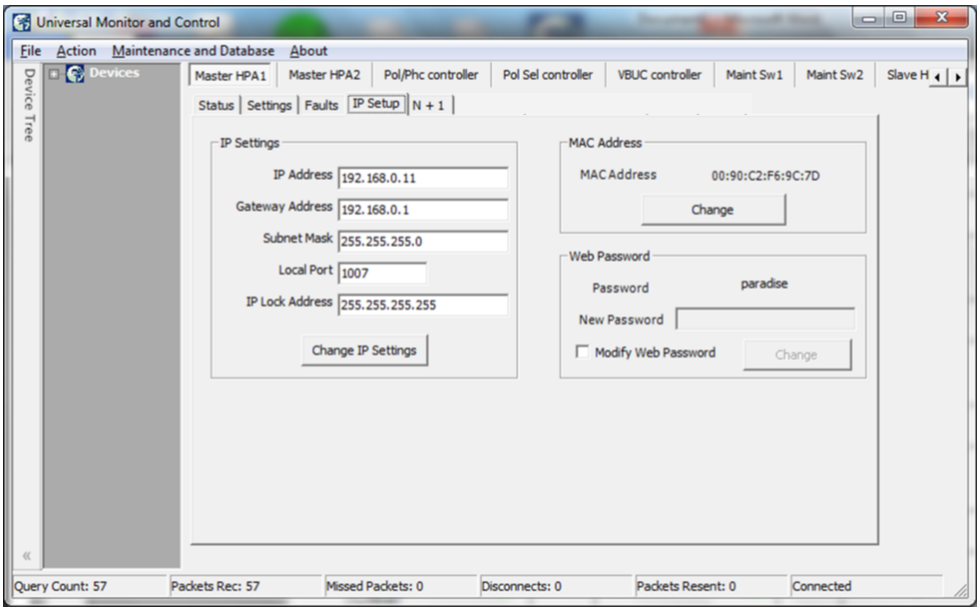

Figure 38: IP Setup Window, Outdoor SSPA Controllers

In addition, the operator may modify the read/write community and web passwords. The operator must check the box to unlock the field for the new password, then click on the [Change] button to implement the change.

Add RCP Unit to M&C

Launch the Universal M&C software. Click on the Action menu and select "Add Unit", then choose "Controller" from the pull-down menu. See Figure 39.

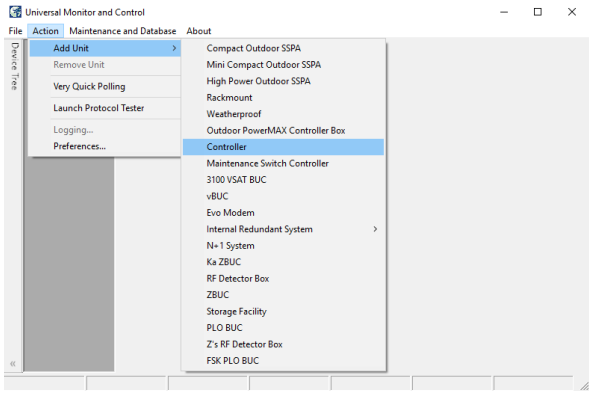

Figure 39: Universal M&C, Add New Controller Unit

A new dialog window will appear. See Figure 40. Select the method of communication (Serial Connection, Internet Connection, or SNMP).

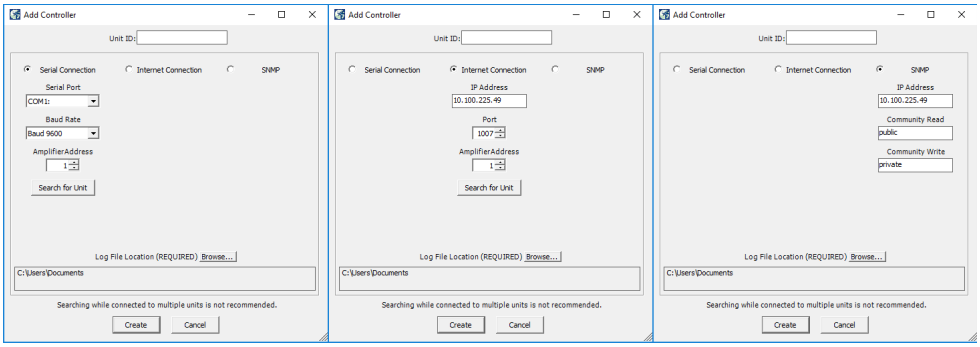

Figure 40: Add Controller (Serial, Internet or SNMP Connection)

For Serial Connections, select the Serial Port and Baud Rate, and select the amplifier address. If you don't know the address of the unit you may search for it. Click the Search for Unit button.

For Internet Connection, enter the IP address of the unit, and select the port and amplifier address. Click the Search for Unit button if you don't know the address of the unit.

> ⚠ **Note: The Search for Unit feature is only useful when you have only one unit connected to your PC at a time.**

For SNMP, enter the IP address of the unit and the community read/write passwords.

The default Community Read password is **public**.

The default Community Write password is **private**.

A Unit ID is not required although it is recommended. If a Unit ID isn't entered the Unit ID will be assigned by the M&C. Click the Create button to open the M&C windows.

Choose a log file location by clicking the Browse... button. The default is the "My Documents" folder. The log file name will be the UnitID and the extension ".log" appended to it. i.e. "Unit1.log".

Click on the Create button to open the M&C windows.

Overview of the RCP2 M&C

The Universal M&C user interface features five screens which are used to monitor and control the system.

- Status
- IP Setup
- Conditions
- Settings
- HPA Control Panel

Status Tab

The first screen is the "Status" window shown in Figure 41.

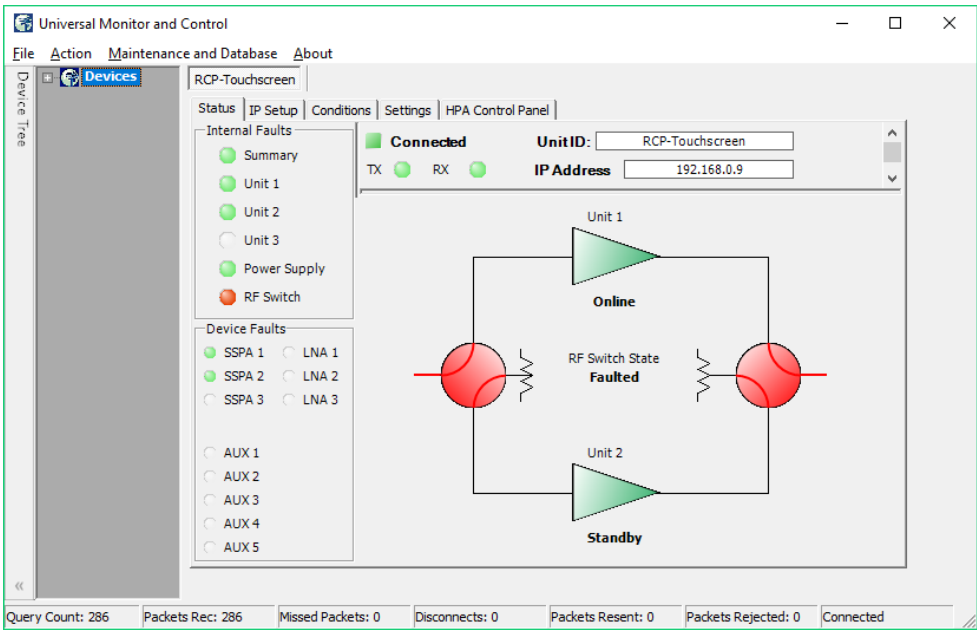

Figure 41: Universal M&C, Status Tab

The status screen reflects the Online/Standby status of each amplifier in the system, and the switch position of each waveguide switch in the system. In addition, Internal and Device fault indicators are displayed. When there is no fault condition on a given unit, the indicator illuminates green. When a fault condition exists, the indicator illuminates red.

> ⚠ **Note that in Figure 41 above, there is an RF Switch Fault. The RF Switch fault indicator is illuminated red in the Internal Faults panel, and the RF Switch State in the mimic panel shows "Faulted". In addition, the baseball switch icons are colored red to indicate a switch fault.**

The user may click on one of the triangular amplifier icons to set that amplifier as the Standby unit in the system.

IP Setup Window

The second screen is the "IP Setup" window, shown in Figure 42.

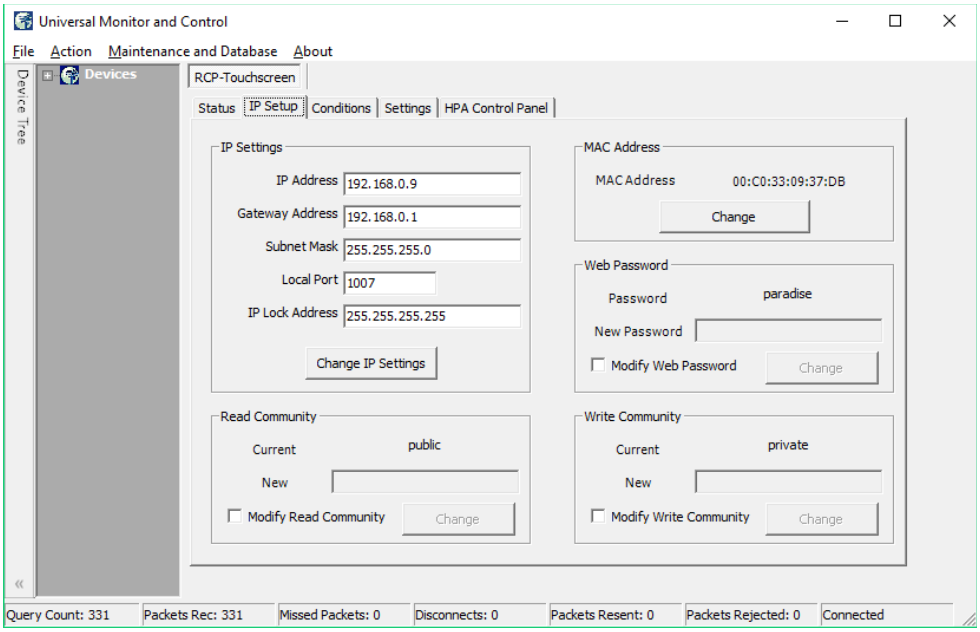

Figure 42: Universal M&C IP Setup Window

It shows the user all of the TCP/IP settings on the unit. When the IP Address is modified the unit must be reset for it to use the new IP Address. Until the unit is reset it will use the old IP Address. The Amplifier Local Port is the port that the unit monitors for UDP requests. The unit also answers requests using the same port.

If the Amplifier Local Port is changed the unit must be reset. The Gateway Address and Subnet Mask are standard settings for TCPI/IP communications. If either of these settings is changed the unit must be reset for the new settings to take effect. The IP Lock Address is used for security. If it is set to something besides 0.0.0.0 or 255.255.255.255 it will only answer the address it is set to. For example, if the IP Lock Address is 192.168.0.50 then a request from 192.168.0.100 will not be accepted. The IP Lock Address may be changed without resetting the unit.

Conditions Window

The third screen displays the Conditions of the units connected to the controller, as shown in Figure 43.

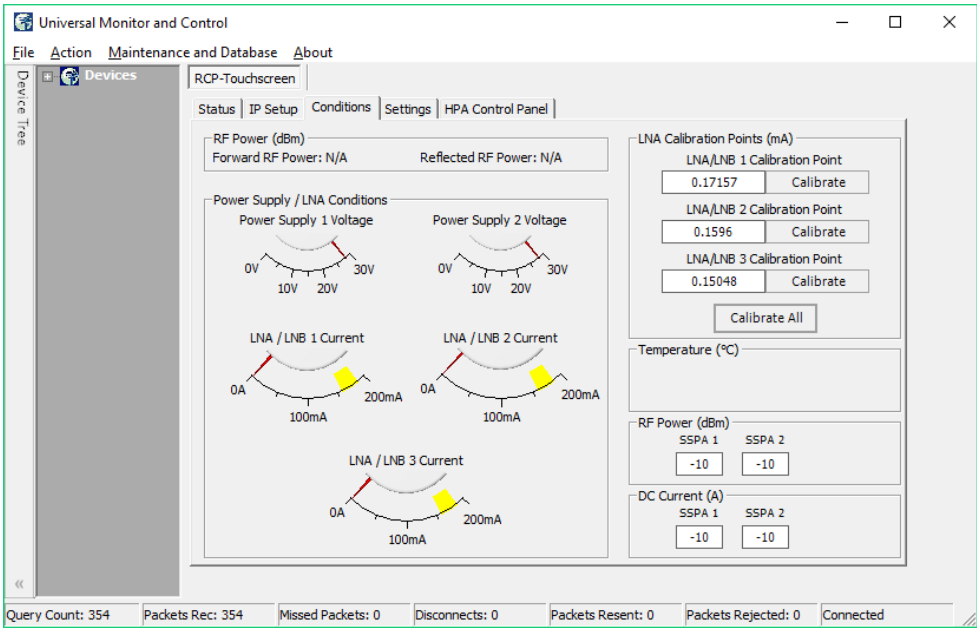

Figure 43: Universal M&C, Conditions Window

The system forward power, reflected power, power supply voltages and LNA/LNB currents and temperatures are all monitored. In addition, the calibration points of each LNA/LNB are displayed.

Settings Window

The fourth screen is the "Settings" screen, shown in Figure 44.

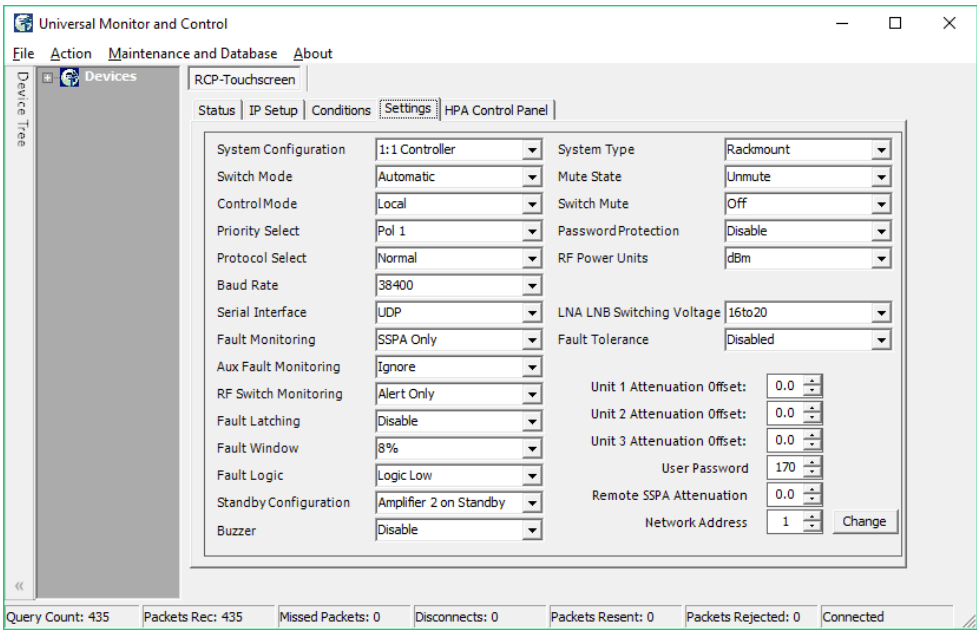

Figure 44: Universal M&C, Settings Window

It shows the user all available settings on the unit. All user-adjustable settings may be modified to suit the specific needs of the customer. However, it should be noted that the units are pre-configured for the customer at the factory. If modification of any settings is necessary, refer to the Table 7 of the **Remote Control Interface** section.

HPA Control Panel Window

The fifth screen is the "HPA Control Panel" screen, shown in Figure 45.

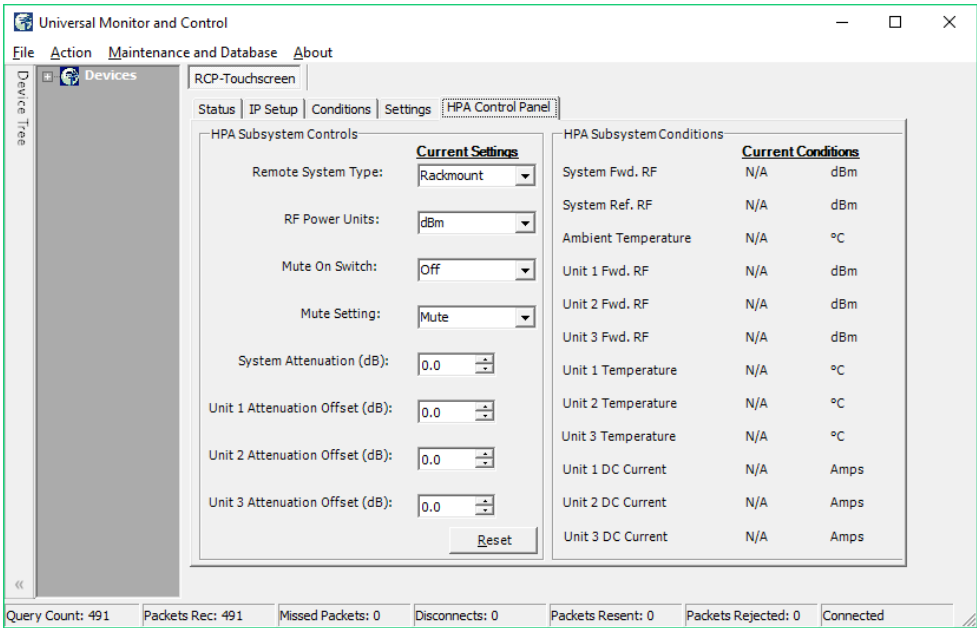

Figure 45: Universal M&C, HPA Control Panel Window

From this window, the user may select the type of amplifier used in the system, choose the RF power units displayed, mute or unmute the system, and set the attenuation levels of the system or individual amplifier offsets. The user may also monitor the forward RF, temperature and DC current conditions of the HPA subsystem.

Universal M&C Advanced Features

Universal M&C Preferences

The user can adjust certain preferences of the Universal Monitor and Control software. Click on the Action pull-down menu and select Preferences. See Figure 46.

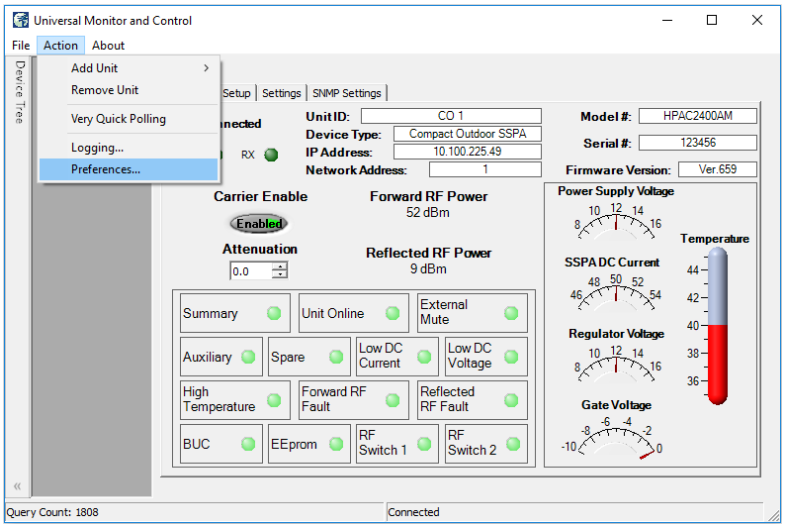

Figure 46: Universal M&C > Action > Preferences

Queries

Click on the Queries icon at left to open the Query Settings menu. Select the PC Source Address. Adjust the interval that the software queries the unit. Tick the Queries Enabled checkbox to begin sending queries to the connected unit. Note that if queries are disabled, there will be no communication with the unit at startup. Untick the bottom checkbox to disable commands on units set to Local Control Mode. See Figure 47.

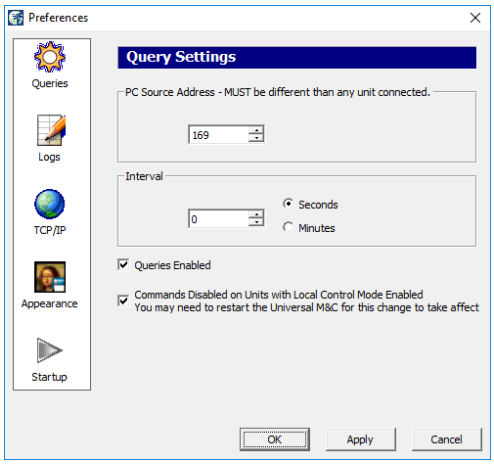

Figure 47: Universal M&C Preferences > Queries

Logs

Click on the Logs icon at left to open the Log Settings menu. Adjust the interval that selected parameters are recorded (in minutes or seconds). Tick the checkbox to enable logging. See Figure 48.

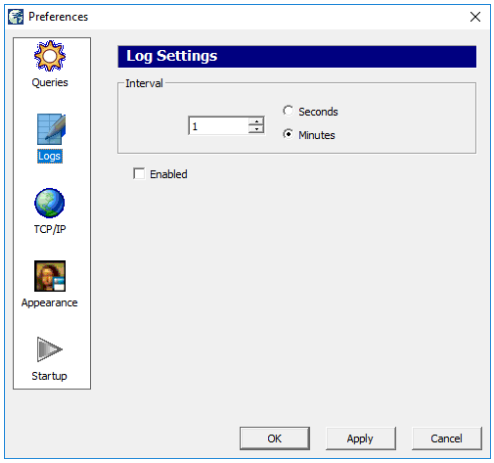

Figure 48: Universal M&C Preferences > Logs

TCP/IP

Click on the TCP/IP icon at left to open the TCP/IP Settings menu. Select the Local UDP Port (the software must be restarted to take effect). Note that each UDP address must be unique. Default Unit UDP Port is 1007. See Figure 49.

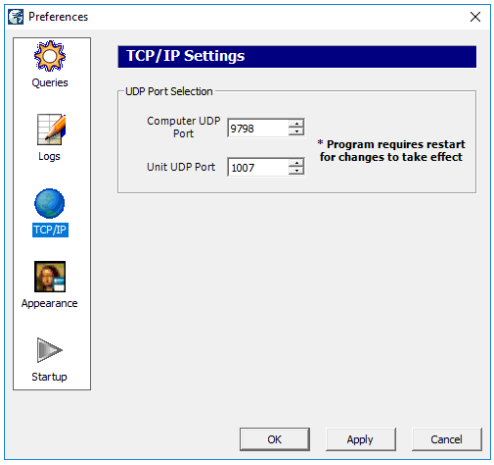

Figure 49: Universal M&C Preferences > TCP/IP

Appearance

Click on the Appearance icon at left to open the Appearance menu. Set the transparency of the M&C Windows. A setting of 0 indicates no transparency. Maximum value is 80. See Figure 50.

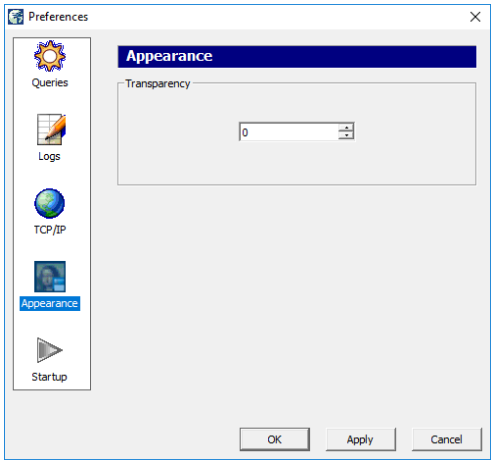

Figure 50: Universal M&C Preferences > Appearance

Startup

Click on the Startup icon at left to open the Startup menu. Tick the checkbox to enable auto-loading of the last-used device configuration. See Figure 51.

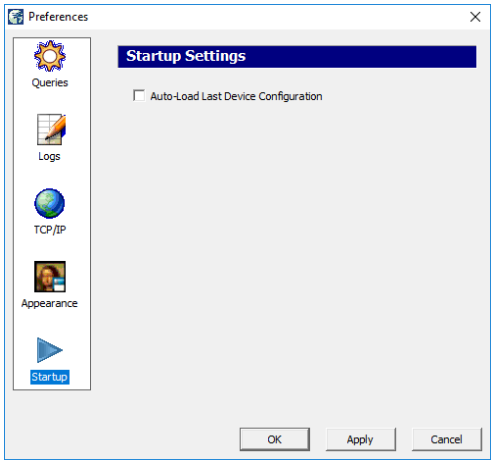

Figure 51: Universal M&C Preferences > Startup

Using the Device Logger

The Universal Logger may be used to show a real-time log of selected parameters. Before opening the logger, at least one unit must be connected and added to the Universal M&C. To open the Logger, click on the Action pull-down menu and select 'Logging...' as shown in Figure 52.

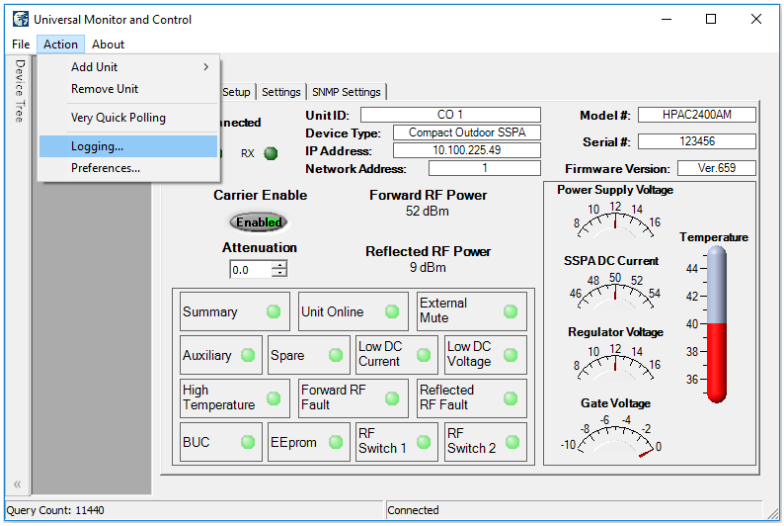

Figure 52: Universal M&C Action > Logging...

The Device Logger will open, as seen in Figure 53.

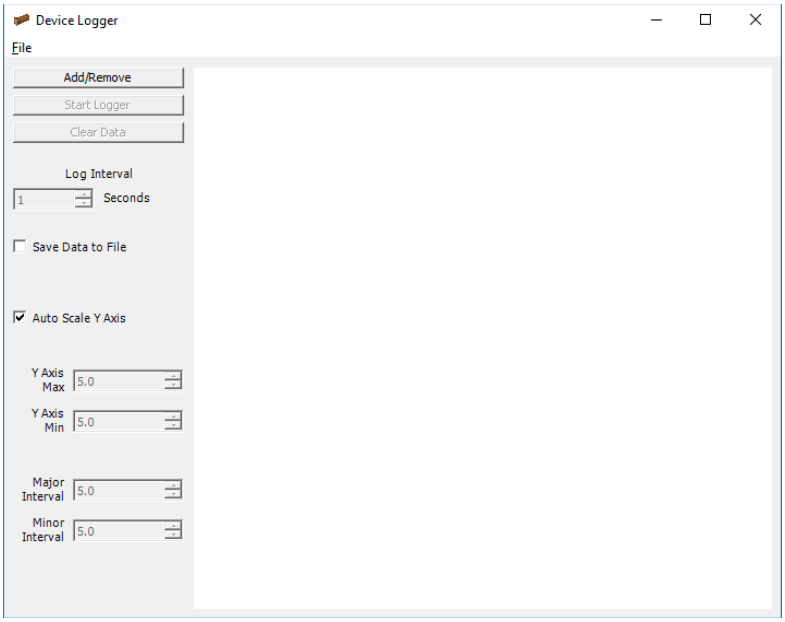

Figure 53: Universal M&C Device Logger Window

Click on the 'Add/Remove' button, which opens a new window as shown in Figure 54. Select the desired device in the Available Devices pull-down menu. Individually select which parameters to log (or remove unwanted parameters).

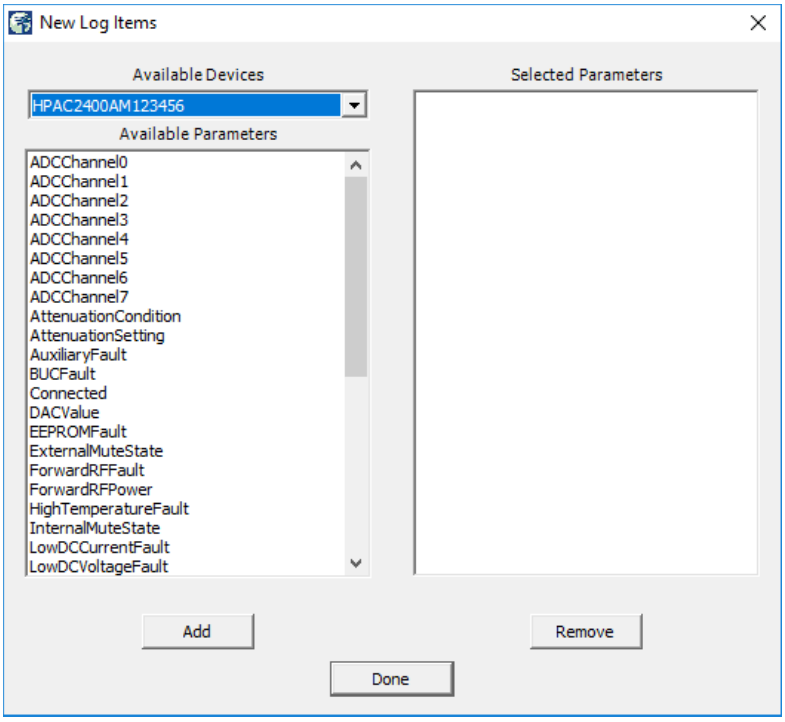

Figure 54: Universal M&C Device Logger > New Log Items Window

After choosing the parameters, the Logger window will be similar to Figure 55. Click on the Done button to accept the list of selected parameters.

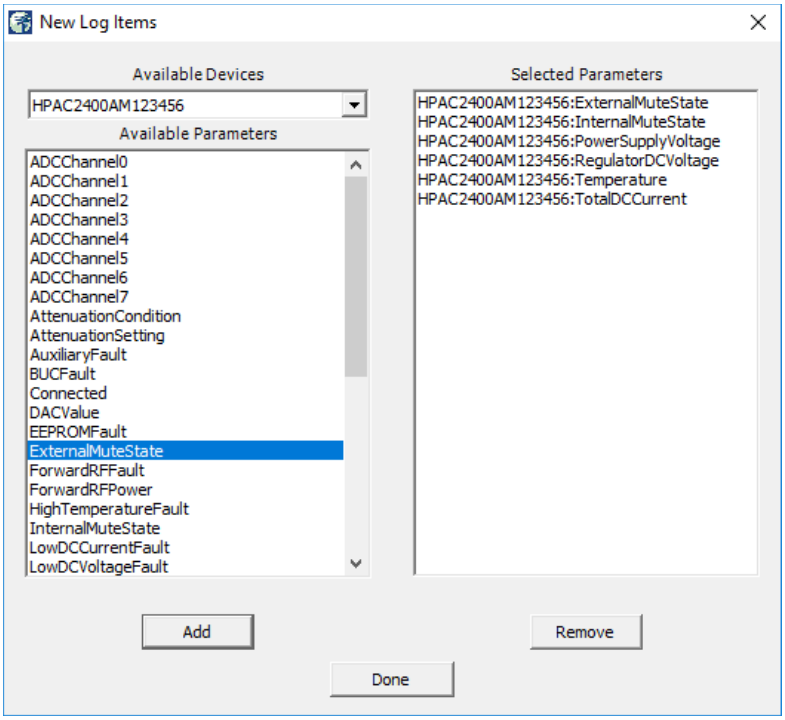

Figure 55: Universal M&C Device Logger > New Log Items > Items Selected

You may modify the log interval by entering the number of seconds between each record. Default interval is 1 second. Click on the Start Logging button to begin logging the selected parameters.

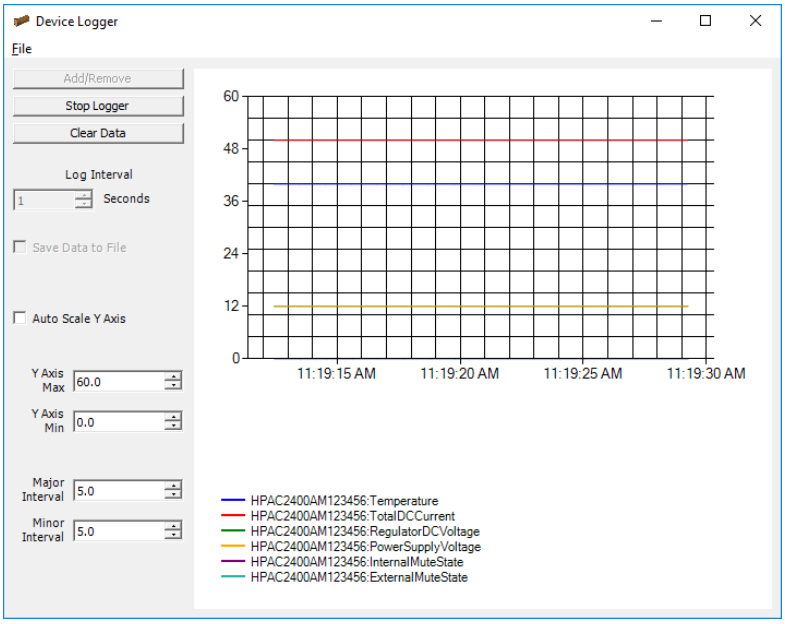

Figure 56: Universal M&C Device Logger > Start Logging

Click on the 'File' menu and select 'Print' to print the graph and legend as shown in Figure 56. You may stop, start, and clear the data at any time.

> ⚠ **While running the Logger, you may continue to use the Universal M&C to monitor the status of or make settings modifications to any connected unit.**

Saving M&C Configurations

The Universal M&C allows users to save multiple configurations to a variety of units. In addition, the software features a 'Load Last Configuration' option that will reload the last configuration used by the M&C.

Save a Single Configuration

To save a single configuration, add the desired units to the Universal M&C and select 'Save Configuration' from the 'File' menu. See Figure 57. After saving, a confirmation message will appear that states the success of the save. This saved configuration may be reloaded even after a computer restart. It is important to note that the Universal M&C will occasionally perform this save automatically.

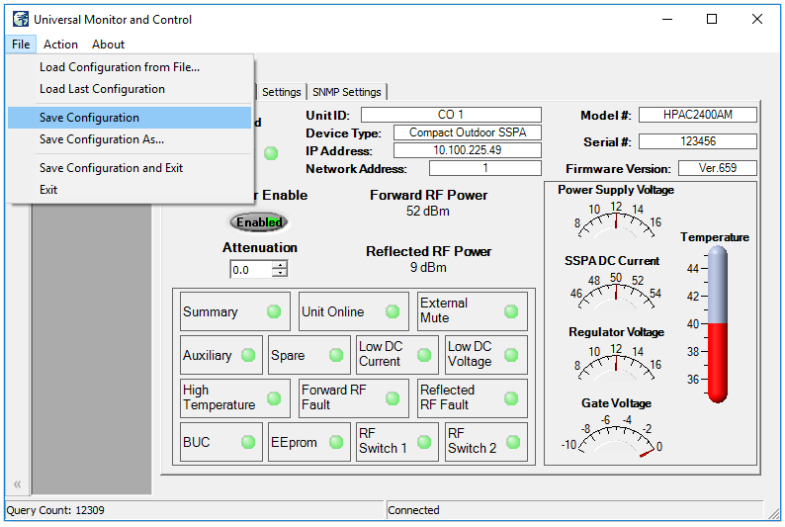

Figure 57: Universal M&C File > Save Configuration

To be certain the proper configuration is saved, select 'Save Configuration As...' from the 'File' menu, and navigate to a directory to which the file will be saved. You may wish to name the file with descriptive text about the connected unit.

Load the Last Configuration

To load the last configuration, select 'Load Last Configuration' from the 'File' menu. See Figure 58. The M&C will load whatever unit(s) were previously loaded. You may set the Universal M&C Preferences to automatically load the last configuration used by the Universal M&C software when the software is run. See the Startup Preferences section.

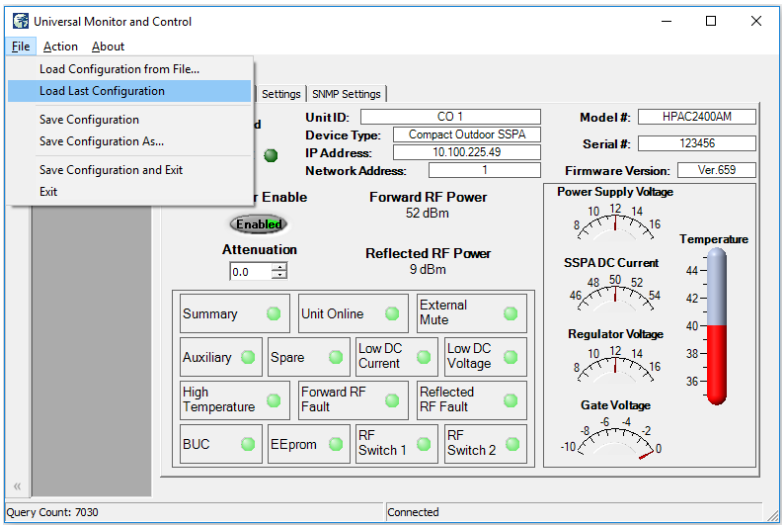

Figure 58: Universal M&C File > Load Last Configuration

Load a Configuration from a File

To load a specific configuration from a file, select 'Load Configuration from File...' from the 'File' menu. Select the location of the file as shown in Figure 59. Click the Open button to load the configuration to the Universal M&C.

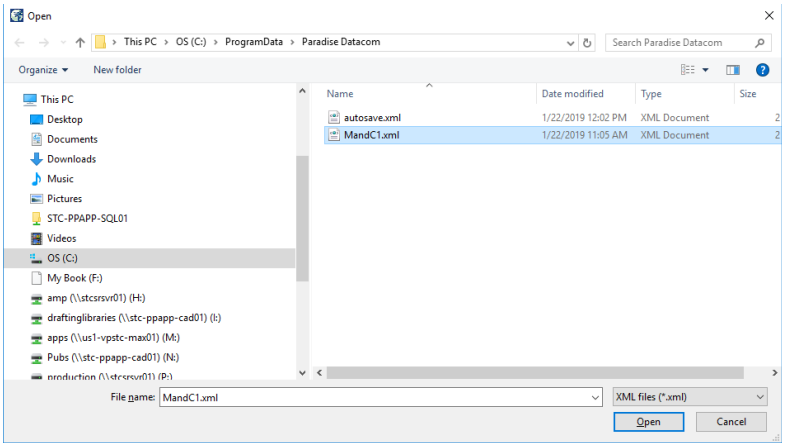

Figure 59: Universal M&C File > Load Configuration from File

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About Teledyne Paradise Datacom

Teledyne Paradise Datacom, a division of Teledyne Defense Electronics LLC, is a single source for high power solid state amplifiers (SSPAs), Low Noise Amplifiers (LNAs), Block Up Converters (BUCs), and Modem products. Operating out of two primary locations, Rancho Cordova, CA, USA, and Chelmsford, England, Teledyne Paradise Datacom has more than a 20 year history of providing innovative solutions to enable satellite uplinks, battlefield communications, and cellular backhaul.

Teledyne Paradise Datacom
11361 Sunrise Park Drive
Rancho Cordova, CA 95742 USA
(814) 238-3450

Teledyne Paradise Datacom Ltd
106 Waterhouse Lane
Chelmsford, Essex, England, CM1 2QU
+44(0)1245 847520

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