**INSTALLATION / OPERATION
MANUAL**

**SERIES 9100
DIGITAL INTERCOM SYSTEM**

Table of Contents

Cautions and Warnings

READ AND SAVE THESE INSTRUCTIONS. Follow the instructions in this installation manual. These instructions must be followed to avoid damage to this product and associated equipment. Product operation and reliability depends on proper installation.

DO NOT INSTALL ANY DAVID CLARK COMPANY PRODUCT THAT APPEARS DAMAGED. Upon unpacking your David Clark product, inspect the contents for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify your David Clark product supplier.

ELECTRICAL HAZARD - Disconnect electrical power when making any internal adjustments or repairs. All repairs should be performed by a representative or authorized agent of the David Clark Company.

STATIC HAZARD - Static electricity can damage components. Therefore, be sure to ground yourself before opening or installing components.

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1. System Overview

The Series 9100 Digital Intercom System is a configurable, weather-resistant, IP-based communication system suitable for use in all environments. It allows for wired and wireless users to communicate with each other and external audio equipment such as two-way radios, smart phones, other intercoms, and any other analog audio device with virtually unlimited configurability. Each user has a PTT button and 4 modes to select from called selections. Via web-based programming, each user can have unique settings configured in "talk groups".

Component	Part and Model Numbers
Master Station	**Master Station** - Model U9100 (p/n 44000G-01); Includes 1 each U9101 Switch Card (pre-installed)
Add-In Cards	**Switch Card** – Model U9101 (p/n 44003G-01); Connection for up to 4 network cable assemblies **Radio/Aux Card** – Model U9102 (p/n 44003G-02); Connection for up to 2 radios, 1 auxiliary input and 1 auxiliary output **Quad Radio Card** – Model U9104 (p/n 44003G-03); Connection for up to 4 radios
Endpoint – Wired	**Headset Station** – Model U9110 (p/n 44001G-01); Connection for 1 headset
Endpoint - Wireless	**Wireless Gateway** – Model U9120-W4 (p/n 44002G-01); Wireless connection for up to 4 users (DECT 6.0 frequencies, US/CAN) **Wireless Gateway** – Model U9120-W4(EU) (p/n 44002G-02); Wireless connection for up to 4 users (DECT frequencies, EU)
Wireless Belt Station	**Wireless Belt Station** – Model U9110-BSW (p/n 40992G-19); Connection for 1 headset (DECT 6.0 frequencies) **Wireless Belt Station** – Model U9110-BSW(EU) (p/n 40992G-20); Connection for 1 headset (DECT frequencies, EU)

Headsets	**Over-the-Head Style**
	    Model H9130 (p/n 40864G-04); Dual-ear
	    Model H9190 (p/n 40864G-05); Single-ear
	Behind-the-Head Style
	    Model H9140 (p/n 40897G-09); Dual-ear
	    Model H9141 (p/n 40897G-11); Single-ear, slotted dome
	Helmet-Compatible Models
	    Model H9185 (p/n 41096G-03); Gecko open or full-face helmet models
	    Model H9180 (p/n 41032G-07); Under helmet, ballistic (e.g., ACH-type)

Cable Assemblies	**Radio Interface Cable** – Model C91-20RD (p/n 40892G-19); Universal analog interface (loose leads) **Power Cable** – Model C91-20PW (p/n 40892G-20); Connection to 11-30VDC **Auxiliary In/Out Cable** – Model C91-20AX (p/n 40892G-21); Terminates in 3.5mm TRRS connector (3.5mm to dual-RCA adapter also included)

Network/Endpoint Connectivity	**Cat 5e Cable**
	    (p/n 09271P-57); Standard-grade Cat5e cable, raw (sold per foot), .200" O.D.
	    (p/n 09271P-58); Industrial-grade Cat5e cable, raw (sold per foot), .265" O.D.
	RJ-45 Connectors
	    (p/n 13108P-09);RJ-45 standard, 10/pk (for use with 09271P-57 cable)
	    (p/n 13199P-66);RJ-45 Field Termination Kit (IP-68 rated), 1 each (for use with 09271P-58 cable)

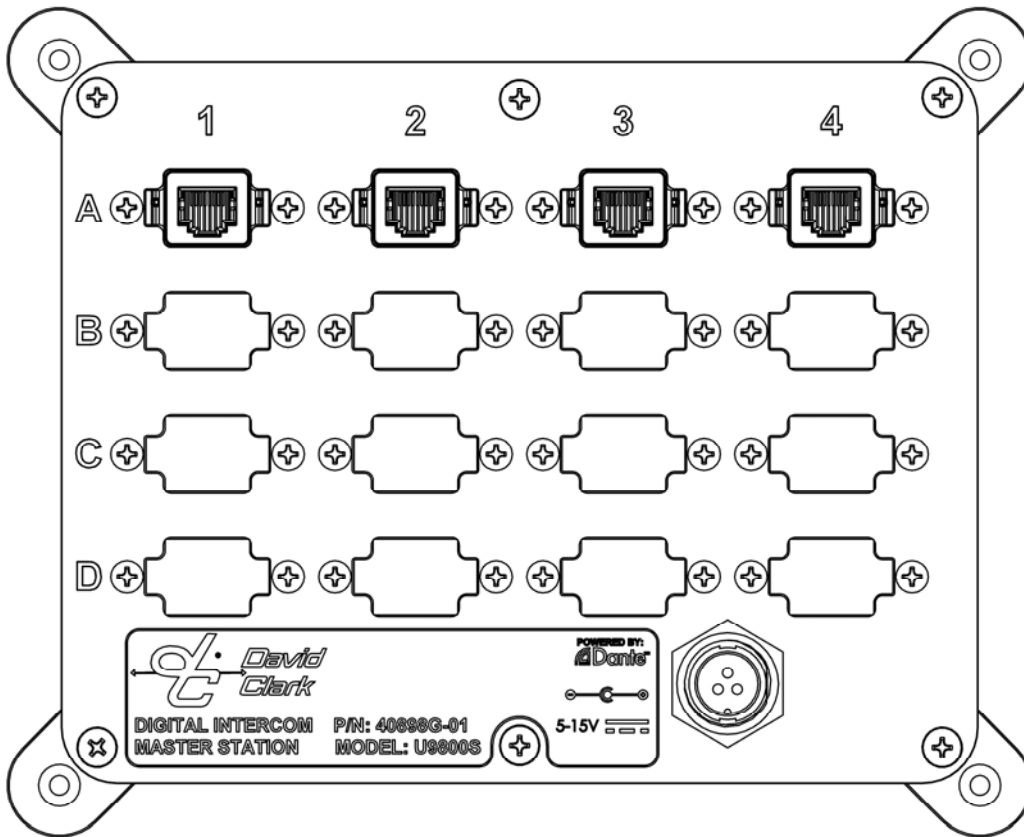Comment [DB1]: Did this cell split?

Table 1.1: System Components

Figure 1.0.1 U9100 Digital Intercom Master Station – Populated with U9101 Switch Card in slot "A".
Slots "B", "C", and "D" have blank panels installed.

2. Mounting the Master Station

Parts/Tools Required

- ❑ U9100 Series Digital Intercom System Master Station (44000G-01)
- ❑ M9100RM Rack-Mount Kit (44004G-01, optional)
- ❑ Pencil/Pen
- ❑ Drill
- ❑ 13/32-inch Drill Bit
- ❑ #8 Mounting Screws (customer supplied)
- ❑ Nuts (customer supplied)
- ❑ Lock-washers (customer supplied)

Procedure

Location Considerations

Select a location on a flat surface that is out-of-the-way, and provides adequate room to attach all cables. The Master Station is immersion-proof (IP67). However the mounting location should be chosen to minimize direct exposure to the elements.

Alternately, the Master Station may be rack-mounted as a 4U in a EIA-310 standard 19-in. rack with the optional rack-mount kit (M9100RM, 44004G-01).

Mounting

- ❑ Position the Master Station on the surface to be mounted and mark the (4) hole locations.
- ❑ Drill the (4) holes with 13/32-inch drill bit.
- ❑ Mount the endpoint with #8 mounting screws and nuts/lock-washers (customer supplied).

3. Mounting Endpoints

Parts/Tools Required

- ❑ U9100-series endpoint(s) (Headset Stations/Wireless Gateways)
- ❑ M9110FM Flush-Mount Kit (44004G-02, optional)
- ❑ Pencil/Pen
- ❑ Drill
- ❑ 13/32-inch Drill Bit
- ❑ #8 Mounting Screws (customer supplied)
- ❑ Nuts (customer supplied)
- ❑ Lock-washers (customer supplied)

Procedure

Location Considerations

Select a location on a flat surface that is out-of-the-way, and provides adequate room to attach all cables. The U9100-series endpoints are immersion-proof (IP67). However where possible the mounting location should be chosen to minimize direct exposure to the elements.

Alternately, the endpoints may be flush-mounted with the optional flush-mount kit (M9110FM, 44004G-02).

Mounting

- ❑ Position the endpoint on the surface to be mounted and mark the (4) hole locations.
- ❑ Drill the (4) holes with 13/32-inch drill bit.
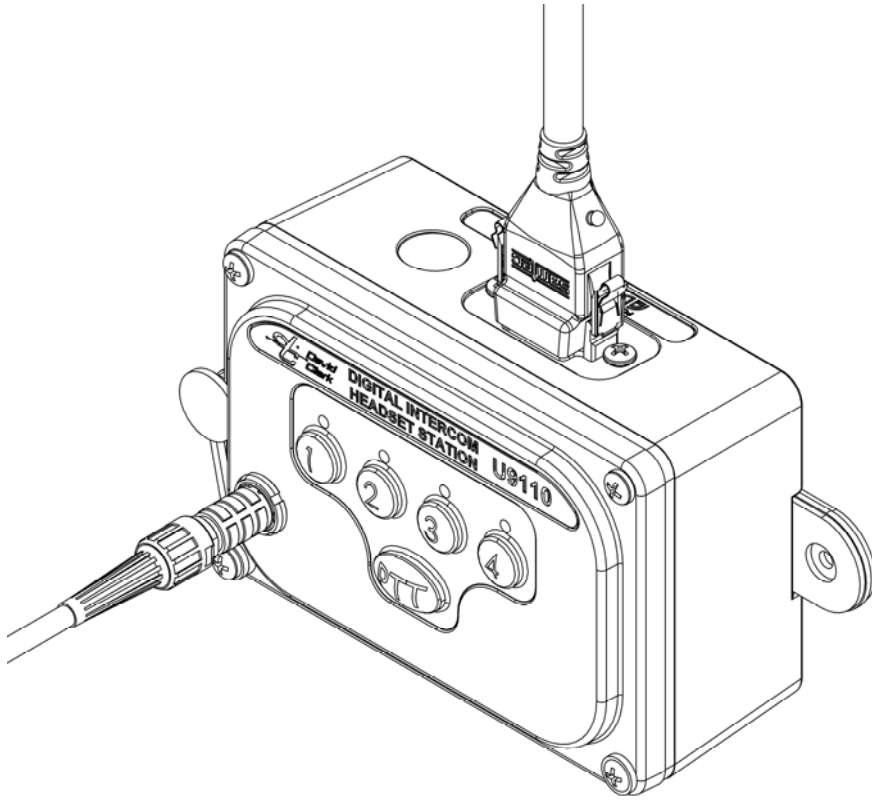- ❑ Mount the endpoint with #8 mounting screws and nuts/lock-washers (customer supplied).

Figure 3.1 U9110 Headset Station, shown with waterproof RJ-45 and headset connected
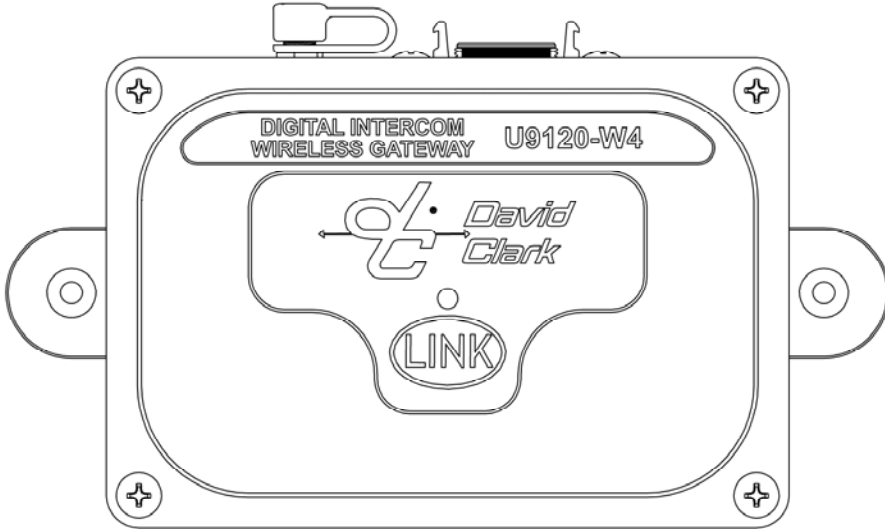

Figure 3.2 U9120-W4 Wireless Gateway
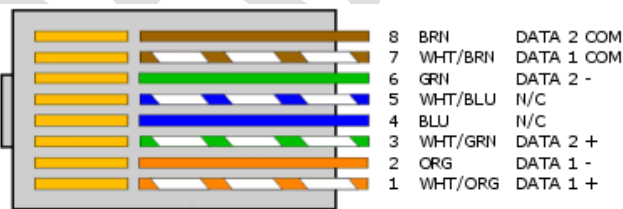
4. System Cabling

System Cabling is used to interface David Clark Series 9100 Endpoints to the 9100 Digital Master Station. This cabling must be Ethernet Category 5e or higher. David Clark offers two types of cabling as well as two RJ-45 connector options depending on the application and location.

Parts/Tools Required

- ❑ Ethernet Cabling (sold by the foot)
    - ❑ 09271P-57HA000 for indoor use
        - ▪ Use standard RJ-45 connectors (13104P-09/10pk)
    - ❑ 09271P-58HA000 for outdoor/wet locations
        - ▪ Use waterproof RJ-45 connectors (13199P-66)
- ❑ RJ-45 crimper
- ❑ Wire ties
- ❑ Silicone spray (for waterproof connectors only)
- ❑ Ethernet pinout (below)

Procedure

- ❑ Determine the lengths of cable required for each run and route the unterminated cables.

- ❑ The cables should be routed using conduits and be as far as possible from radio antenna coax cables and anywhere water may collect.

- ❑ Once run and properly secured, terminate the cables with the appropriate RJ-45 connector assembly. See **Figure 4.1** for RJ-45 pinout.

8	BRN	DATA 2 COM
7	WHT/BRN	DATA 1 COM
6	GRN	DATA 2 -
5	WHT/BLU	N/C
4	BLU	N/C
3	WHT/GRN	DATA 2 +
2	ORG	DATA 1 -
1	WHT/ORG	DATA 1 +

Figure 4.1 RJ45 pinout

Note: When using shielded cable, shield termination is unnecessary for this application.

Waterproof Connector Assembly

- ❑ See **Figures 4.2 and 4.3** for assembly.
- ❑ SCN-17-02, NCC-17-01, SG-17-XX, and RCEF-B-01 must be slid onto cable prior to terminating the RJ45 connector
- ❑ Use silicone spray on cable jacket to allow SG-17-XX to more easily slide on cable. Failure to use silicone spray may result in improper assembly.
- ❑ Crimp the RJ45.
- ❑ Slide RCEF-B-02 over the RJ45 as shown.

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❑ Slide all pieces together and hand-tighten SCN-17-02.
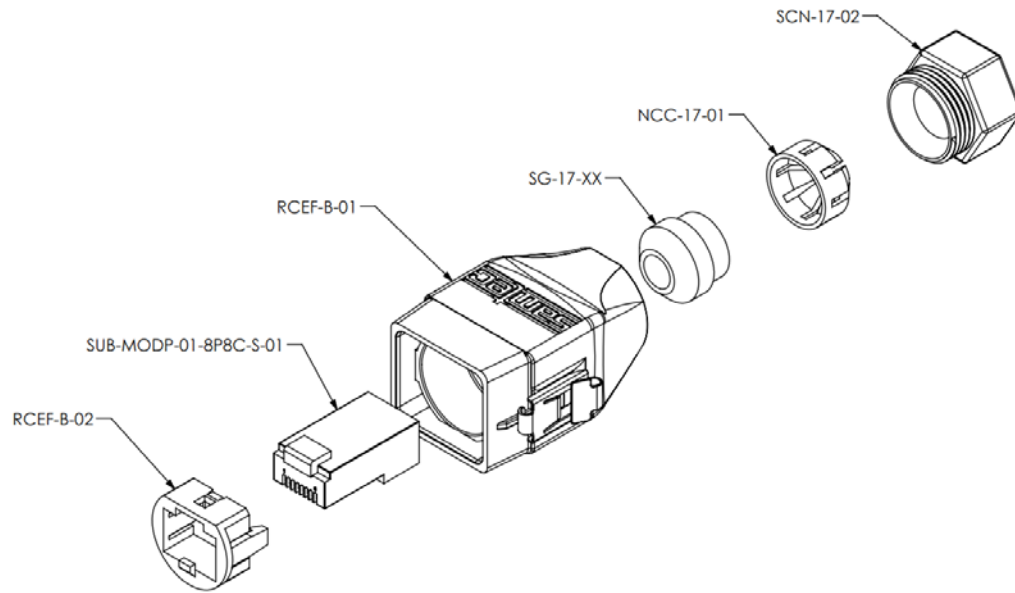
Figure 4.2 Waterproof connector assembly
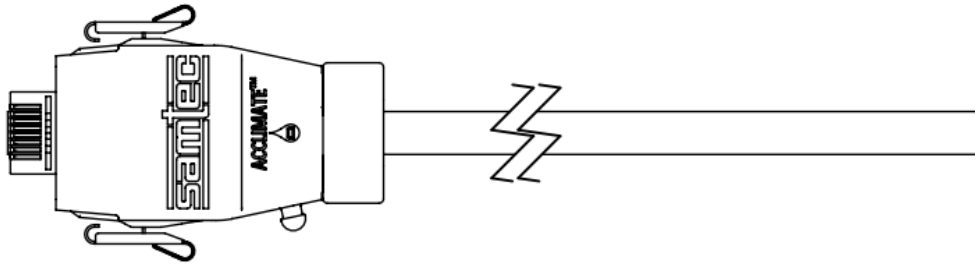
Figure 4.3 Waterproof connector fully assembled

5. Radio Cables

The C91-20RD Radio Cables are used to interface a marine or mobile radio to the 9100 Digital Intercom System. One end of the cable connects to a U9104 or U9102 installed in the Master Station and the other end connects to the radio. Since the interface is different for each type of radio, the C91-20RD is left un-prepared at the radio end so that the installer may choose the correct interface connector.

Parts/Tools Required

- ❑ C91-20RD Radio Cable (One for each radio to be interfaced)
- ❑ A U9104 or U9102 radio card installed in the Master Station
- ❑ Mating connector and pin information for radio interface (installer provided)
    - o Wire Crimping/Cutting/Soldering/etc. tools (depends on radio interface)
- ❑ Wire ties

Procedure

- ❑ Determine the path of the cable between each radio and the Master Station. The radios should already be installed and tested.

- ❑ Route the cable. The cable should be routed using conduits and be as far as possible from radio antenna coax cables and anywhere water may collect. The connector end connects to the appropriate radio card as installed in the Master Station. Leave enough excess cable at the radio end for preparation of radio interface connector.

- ❑ Connect the cable to one of the radio card inputs on the Master Station; Align red keyways and push. Pull back gently on the connector (behind the quick-release collar) to ensure it is properly locked.

- ❑ Prepare the radio interface in accordance with manufacturer's instructions. See **Table 5.1** for C91-20RD Radio Cable wire color functions. The end of this cable is stripped and tinned at the factory. Due to the difficulty in soldering to these conductors, it is recommended that any extra cable be coiled up rather than cut.

- ❑ Repeat this procedure for additional radios.

Pin	Color	Function
1	Red	Mic Hi (+)
2	White	Mic Lo (-)
3	Green	Ear Hi (+)
4	Black	Ear Lo (-)
5	Yellow	PTT Hi (+)
6	Blue	PTT Lo (-)
	Shield	Shield (To PTT Lo or Mic Lo)

Figure 5.1 Radio Cable Wire Color Functions

6. Power Cable

The C91-20PW is a 20-foot cable used to provide power to the 9100 Digital Intercom System. It has a connector on one end and the other end requires the installer to prepare. It is important to choose a power "pick-off" point which can provide 10 amperes of current at a voltage between 11-30VDC. Direct connection to a 10-Amp fuse/circuit-breaker is preferred.

Parts/Tools Required

- ❑ C91-20PW Power Cable (40892G-02)
    - o Includes David Clark 10-Amp Fuse kit (41090G-22)
- ❑ Power pick-off point (circuit breaker/Fuse box, 11-30VDC)
- ❑ Soldering iron/Solder
- ❑ Wire terminals
- ❑ Wire cutters/ Wire strippers
- ❑ Tape Measure
- ❑ Wire ties

Procedure

- ❑ Determine the location of a 10-Amp circuit breaker to be used and how to connect to it (solder, screw terminals, lugs, etc.).

- ❑ If only a higher-amperage circuit breaker is available, it may be used, but the David Clark 10-Amp Fuse Kit must also be used.

- ❑ Determine the location of the 11-30VDC and Ground pick-off points.

- ❑ Determine the path of the cable between the power source and the Master Station. The cable should be routed using under-deck conduits and be as far as possible from radio antenna coax cables and anywhere water may collect.

- ❑ Measure the length of cable necessary, adding 3 ft as a service loop.

- ❑ If necessary trim the length of the cable to the length determined in the previous step, making sure to trim the UN-PREPARED end of the cable.

- ❑ Route the cable. Use wire ties where necessary.

- ❑ Connect the cable to the power jack on the Master Station. To connect the cable to the Master Station, align keyways and push. Then firmly turn collar clockwise until it locks into place. Pull back gently on the cable to ensure connector is properly locked.

Before continuing, ensure that power is shut off to the point where you are going to connect the power cable!

- ❑ Using the wire cutters and wire strippers, prepare the end of the cable as necessary for your installation.

- ❑ If using the David Clark 10-Amp Fuse Kit, please see **10. Fuse Kit** for assembly instructions.

- ❑ Connect the cable to the power source

o   Connect the RED to the positive (+) terminal.
o   Connect the BLACK **and** SHIELD to the negative (-) terminal.

7.   Auxiliary Audio

The Auxiliary Audio connection is intended for use with line-level devices only. Typical connections include a portable CD/MP3 player's headphone jack or the "Preamp Output" RCA jacks on a car/marine stereo. This cable can also be used to route audio from the Digital Intercom System to another device (such as a camera or recorder) . Additionally, this cable can be used to interface to a smart phone.

> ⚠️ **IMPORTANT: To connect to the External Speaker terminals of a communications or weather radio that has balanced audio DO NOT use an aux connection. Instead use a radio connection.**
>
> **Failure to observe this warning may result in damage to the radio and/or the 9100 Digital Intercom.**

Parts/Tools Required

- ❑   A U9102 Radio/Aux card installed in the Master Station
- ❑   C91-20AX Auxiliary Audio Cable (40892G-21)
  - o   Includes 3.5mm Female to Left/Right RCA Plugs Adapter
- ❑   Wire cutters/Wire strippers
- ❑   Soldering iron/Solder
- ❑   Heat-shrink tubing
- ❑   Wire ties

Procedure

- ❑   Route the C91-20AX Cable between the source and the Master Station. The cable should be routed using under-deck conduits and be as far as possible from radio antenna coax cables and anywhere water may collect. Use wire ties where necessary.

- ❑   Connect the cable to Port 3 (Aux Out) or Port 4 (Aux In or smartphone) on the U9102 card in the Master Station. Align red keyways and push. Pull back gently on the connector (behind the quick-release collar) to ensure it is properly locked.

- • **For Portable CD/MP3/Smartphone installation:**

  - ❑   Plug 3.5mm male into the device's 3.5mm jack labeled "Line Out" or "Headphones".

  - ❑   Adjust device's volume to 75% to start. Make further adjustments if necessary.

- • **For Car/Marine Stereo installation:**

  - ❑   Locate the "Preamp Output" RCA jacks on the stereo. Some models require an additional adapter from the manufacturer to access these jacks.

  - ❑   Connect the supplied 3.5mm to RCA adapter cable to the stereo's output RCA jacks.

  - ❑   Connect the C91-20AX cable to the adapter cable's 3.5mm jack.

  - ❑   Use a waterproof, outdoor cable/coax sealant to ensure that no moisture can enter the contacts of the RCA plugs and the 3.5mm connections.

8. Operation and Programming

The Series 9100 Digital Intercom System has a variety of programming options and can satisfy virtually every configuration application. See the information and examples below for details.

Headset Stations

The U9110-series headset stations provide a fixed-position, wired interface into the U9100 Digital Intercom System. The headset station has the following interfaces:

- Headset Connector
    - Accepts a H9100-series headset
- Selection Buttons (1-4)
    - Used to change selection
    - Correspond to "S1-S4" settings in the user interface
- Selection LED Indicators
    - Visual indication of current selection status
- PTT Button
    - Traditionally used to transmit over a radio but is configurable in the user interface
- Ethernet Jack (RJ45)
    - Provides communications and power to the headset station
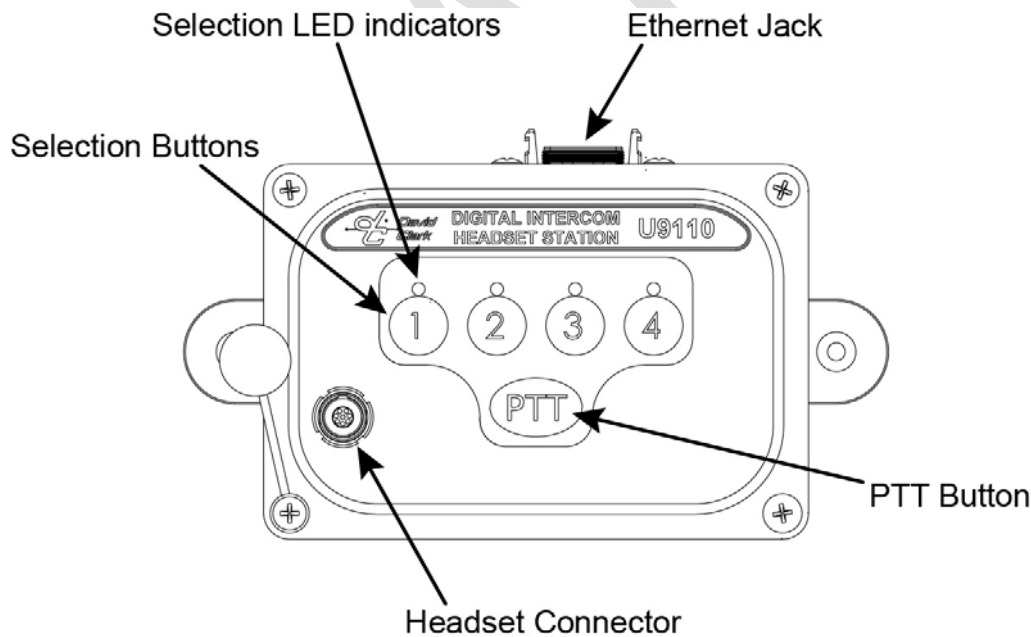

Figure 8.1 Headset Station

<u>Wireless</u>

Wireless Gateway

The U9120-series Wireless Gateways provide an un-tethered interface into the U9100 Digital Intercom System. Each Wireless Gateway can be linked with up to four U91xxBSW belt stations. The Wireless Gateway has the following interfaces:

- Link button
    - o   Used to link Wireless Belt Stations
- Antenna connector (RP-SMA)
    - o   For optional externally mounted antenna
- Ethernet Jack (RJ45)
    - o   Provides communications and power to the Wireless Gateway

Antenna Connector

Ethernet Jack

DIGITAL INTERCOM
WIRELESS GATEWAY U9120-W4

David Clark

LINK

Link Button
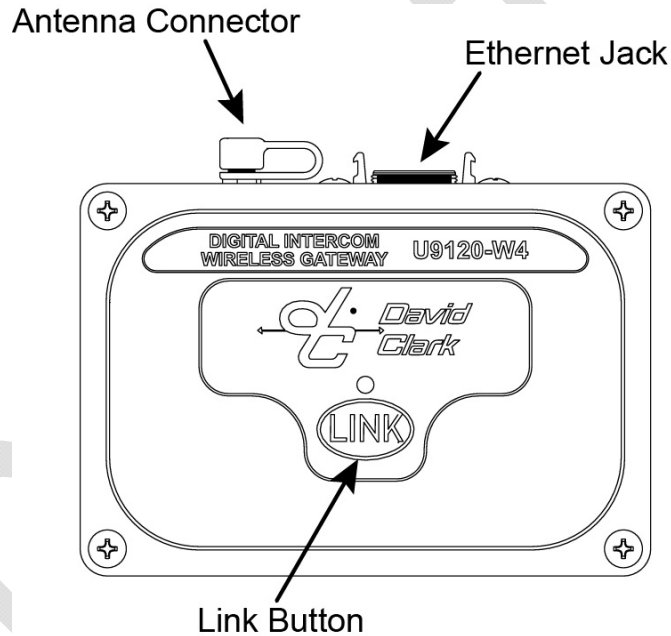
Figure 8.2 Wireless Gateway

Wireless Belt Stations

Pressing and holding the Power button for approximately 5 seconds will power on/off the Wireless Belt Station.

Linking

Linking is accomplished by momentarily pressing the LINK button on the Wireless Gateway and the PTT button on the Wireless Belt Station. The Wireless Gateway and the Wireless Belt Station must be within approximately 1 to 3ft (0.5 to 1m) of each other in order for linking to be successful. This "close-link" mechanism prevents other devices from being linked.

Operation

Once linked, the Wireless Belt Station's Power button LED will flash green. Additionally, the Wireless Gateway's LED will flash green a number of times indicating how many Wireless Belt Stations are linked.

- PTT
    - Traditionally used to transmit over a radio but is configurable in the user interface
- Power Button/Status LED
    - Pressing and holding the Power button for approximately 5 seconds will power on/off the Wireless Belt Station
    - Momentarily pressing and releasing the Power button will cycle the Wireless Belt Station through the four selections. A voice prompt will indicate the current selection.
- Battery Pack
    - The Li-Polymer battery pack is removable and is charged using the A9914-CRG charger.
- VOX
    - VOX is automatic and will adapt to background noise levels in real time.

More details on Wireless Gateways and Wireless Belt Stations are available in their respective manuals, available at www.davidclark.com.
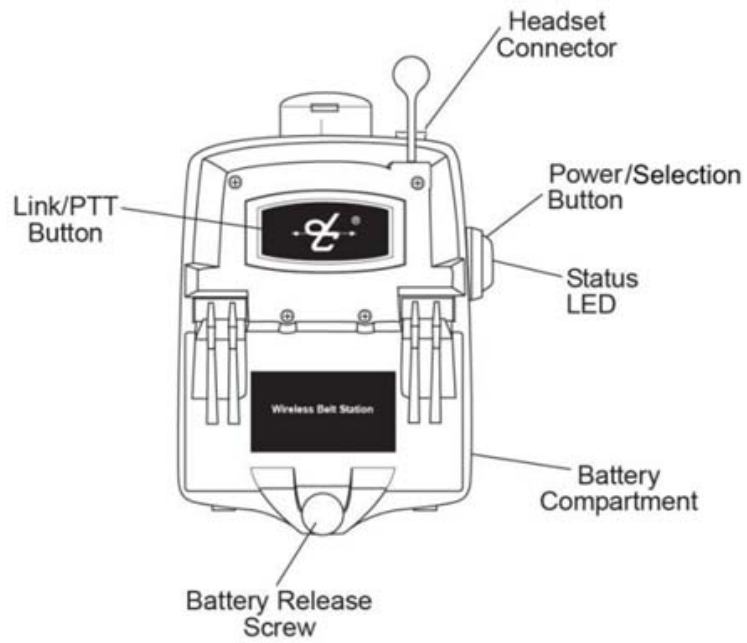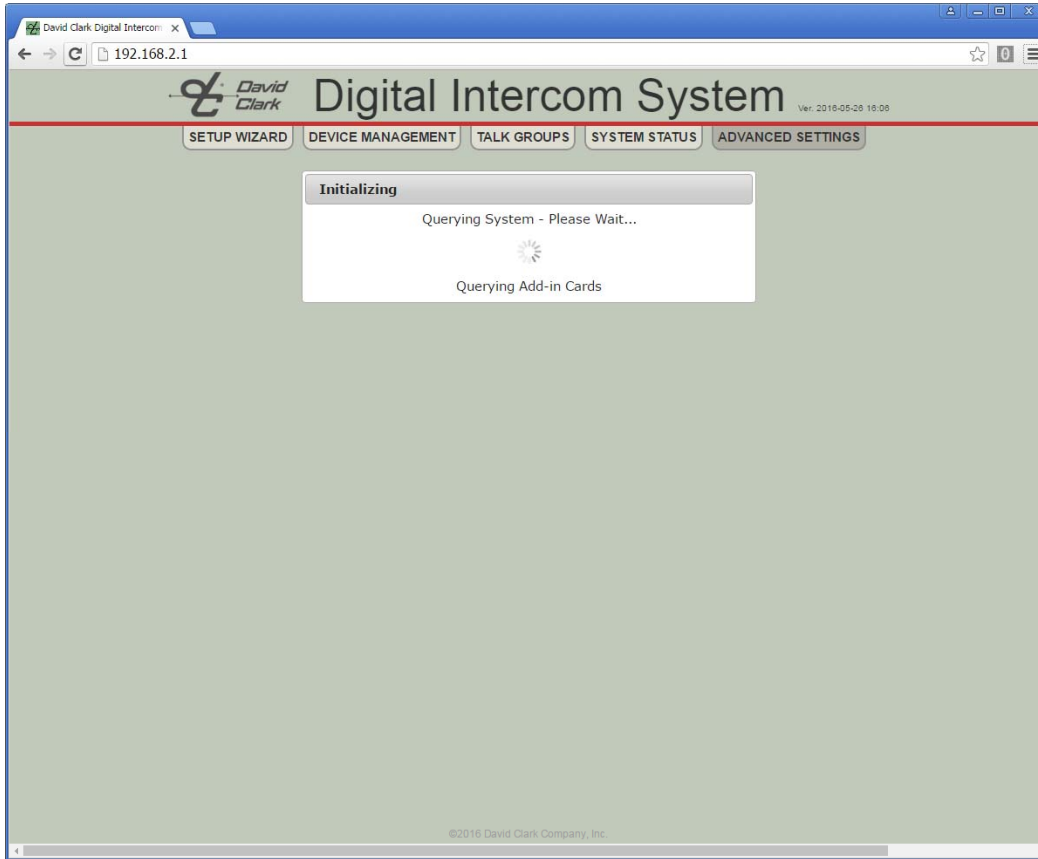
Figure 8.3 Wireless Belt Station

User Interface

1. Once power is turned on to the system in about 30 seconds the web interface will be available.
2. The factory default IP address is **192.168.2.1** and authentication is disabled.
3. Connect a computer via Ethernet cable to an open switch card port. If all switch card ports are used, a PoE splitter such as CyberData #011187 or a PoE capable Ethernet switch may be used.
4. Open a web browser and go to http://192.168.2.1
5. If prompted for a username and password, enter **user** for the username and **pass** for the password.
6. The user interface will begin loading. See **Figure 8.4.**

Figure 8.4

7. Once loaded, click SETUP WIZARD. See **Figure 8.5**

Comment [DB3]: This assumes Figure 8.3 will be the belt station from previous page.

Chronological Figure changes continue on subsequent pages. Please review for accuracy.

Setup Wizard
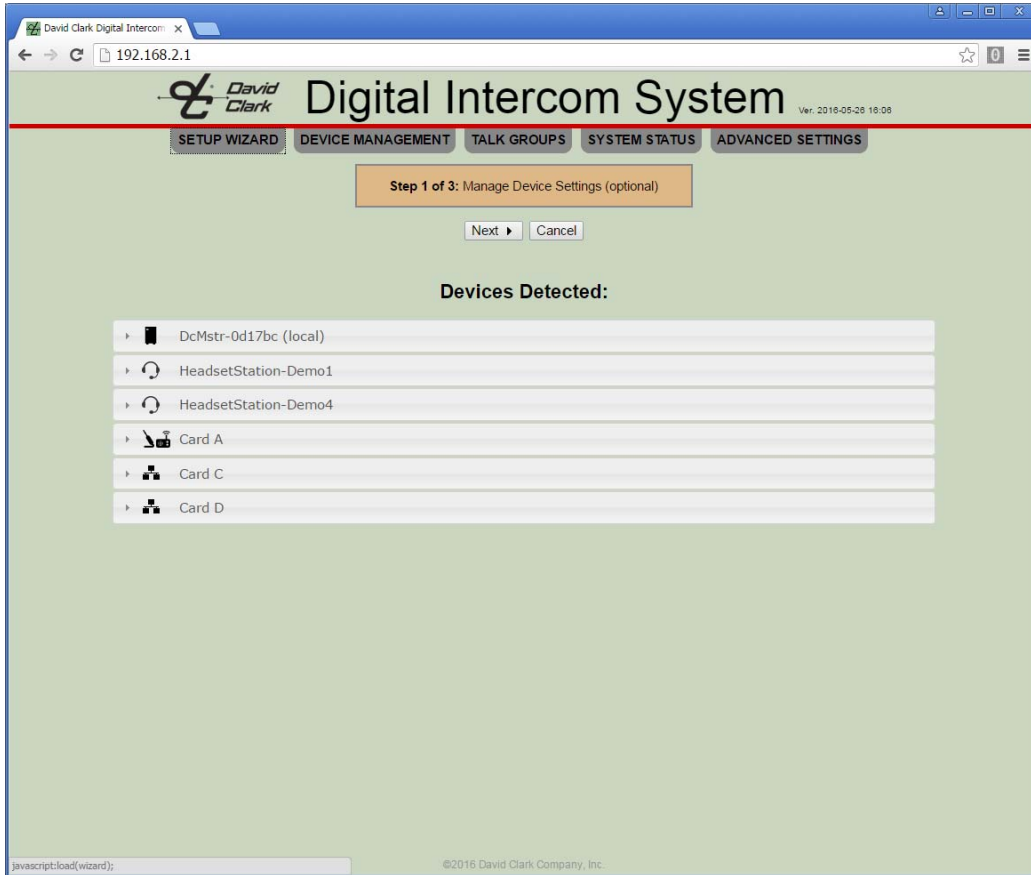
Figure 8.5

1. Each device detected on the system is shown, as well as any add-in cards present in the Master Station.
2. Clicking on a device expands a pane with its properties and settings.
3. A Headset Station or Wireless Gateway Station has the following options:
   a. Rename by clicking the ✎ icon
   b. Identify by clicking the 🔱 icon (all LEDs on the device will turn solid red for 10s)
   c. LED mode. Can be set to Normal or Dark. See **Figure 8.6**.
   d. VOX mode. Can be set to PTT, Auto, or Hot Mic. See **Figure 8.6**.
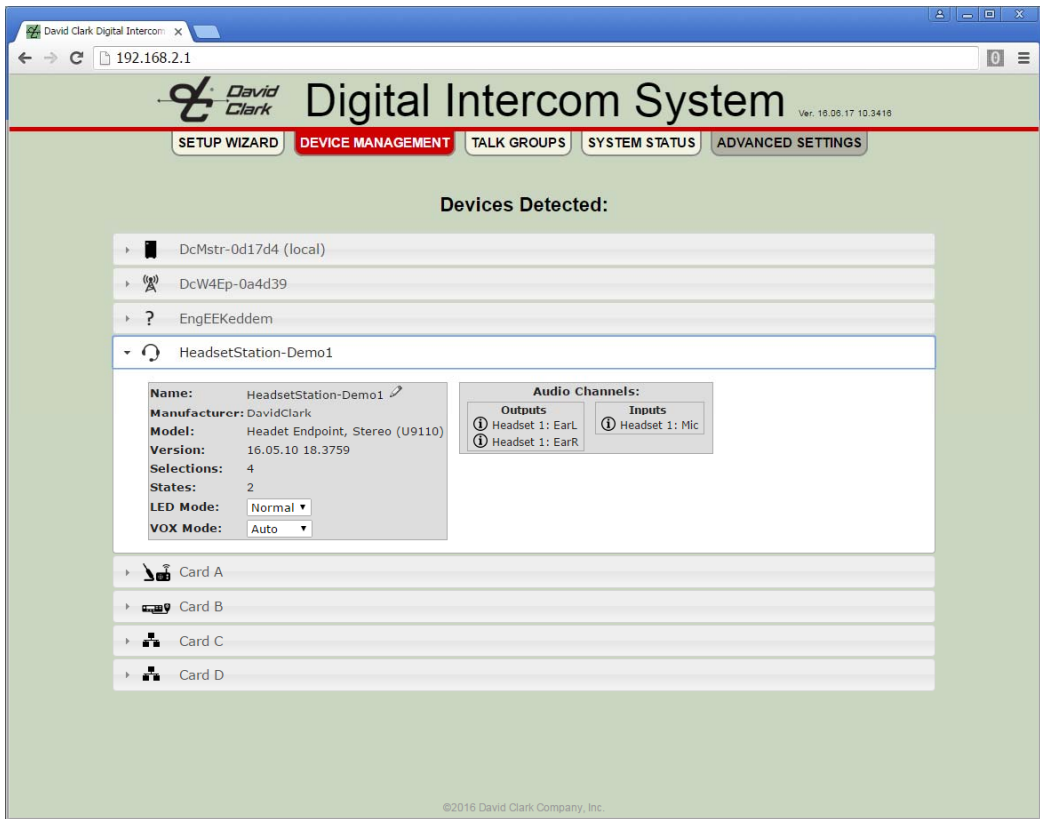
Figure 8.6.

4. A Radio Card or Radio/Aux Card can have its channels renamed and levels adjusted. Audio level adjustments should not be made now. Instead, make these adjustments after talk group setup is complete. See **Figure 8.7**
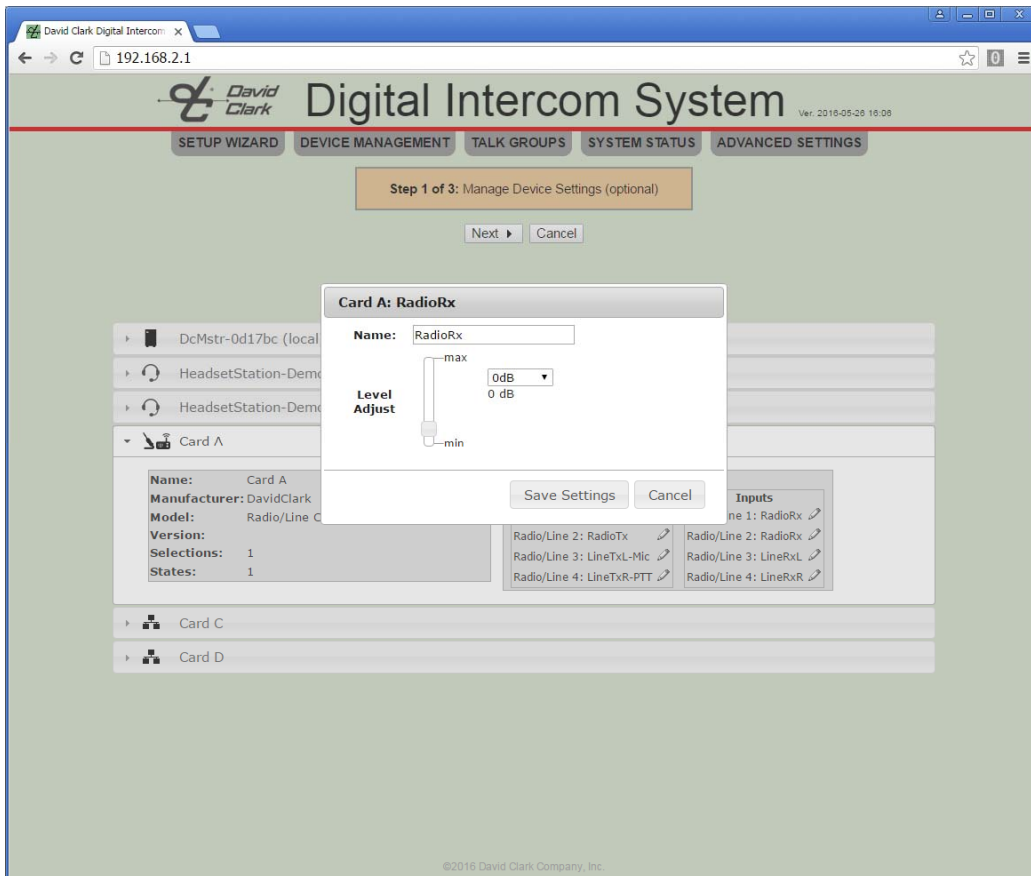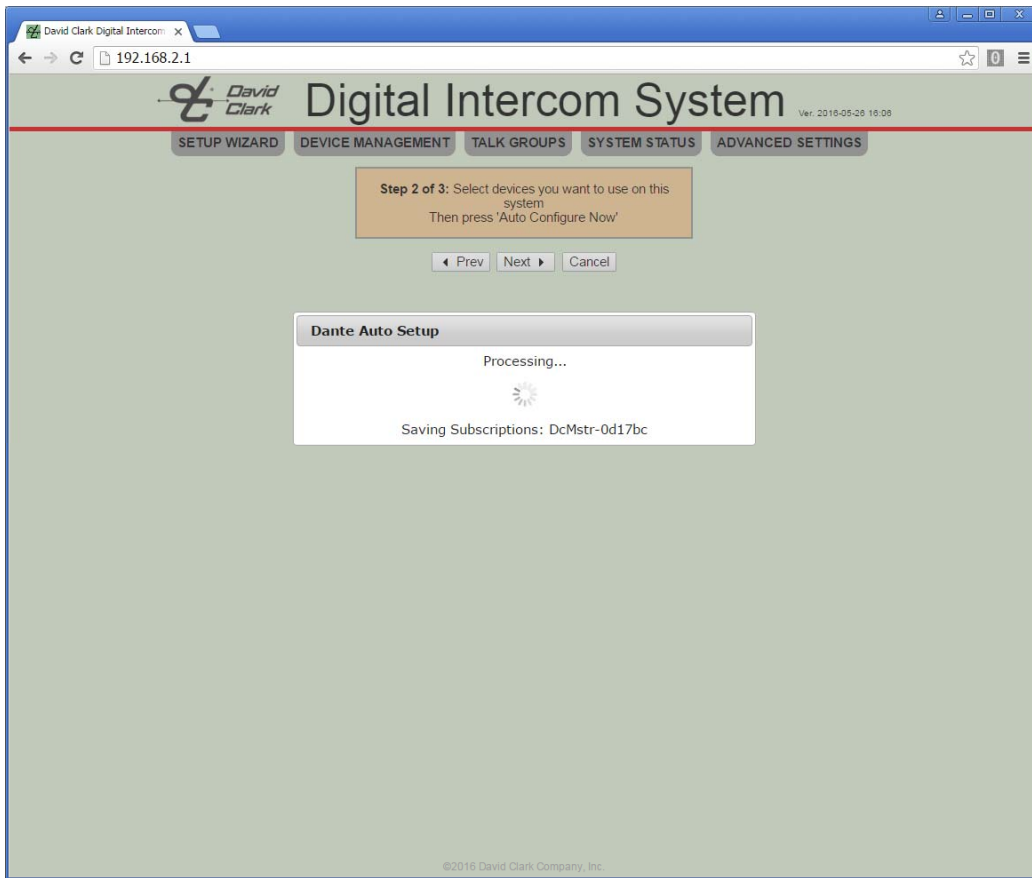
Figure 8.7

5. The Master Station and Switch Cards do not have any configurable options but their properties can be viewed.
6. Once all renaming and settings have been made, click NEXT. The Auto-Configure page will be displayed. See **Figure 8.8.**
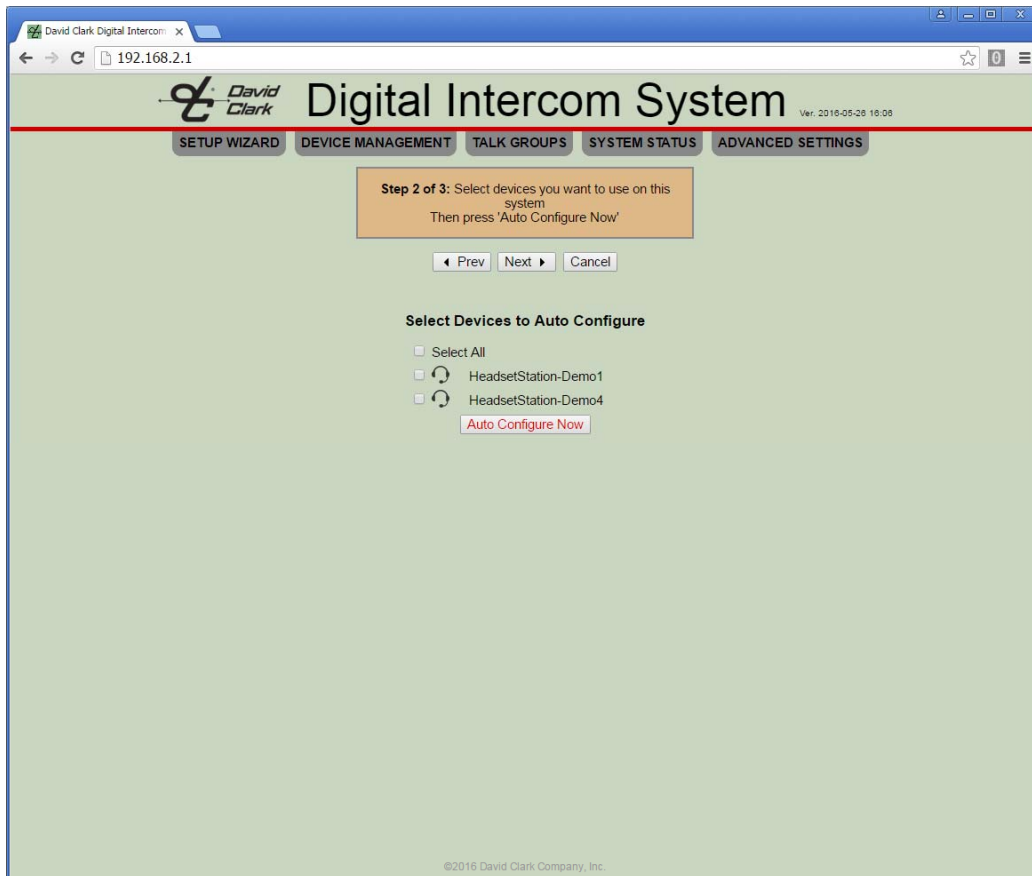
Figure 8.8

7. On the Auto-Configure page, select all the devices that you want to use on this system. Note that if you are connected to a LAN, there may be devices on the network that you do not wish to configure. In most cases however, you should check "Select All".
8. Once you have selected the devices, click "Auto Configure Now". A warning will appear notifying you that settings will be cleared from the Master Station, the devices you have selected and any devices previously configured by this Master Station. Click OK and the Auto-Configure operation begins. Depending on how many devices there are to configure, this could take several minutes.
9. See **Figure 8.9.**

Figure 8.9

10. Once Auto-Configure is complete, click NEXT. The system will reinitialize with the new settings. Once complete, the Configure Talk Groups page will be displayed.

11. Click "Add New Talk Group" and click the talk group name to expand it. See **Figure 8.10.**

Figure 8.10

12. In the pane you will see all of the devices you selected to Auto Configure, plus any Radio Cards or Radio/Line cards installed in the Master Station.
13. The talk group may be renamed by clicking the ✐ icon.
14. For detailed talk group programming and examples, see Talk Group Programming.

<u>Device Management</u>

Clicking DEVICE MANAGEMENT will display a list of all devices detected on the network and all add-in cards installed in the Master Station. Expanding each device's pane will reveal different information and options depending on the type of device:

- Device name (rename by clicking the ✎ icon)
- Identify device by clicking the ⊕ icon (all LEDs on the device will turn solid red for 10s)
- Manufacturer
- Model
- Version
- Selections (1-4 buttons, if applicable)
- States (PTT, if applicable)
- Audio Channels (if applicable)
- LED Mode -- See **Figure 8.6**.
    - o Normal Mode
    - o Dark Mode – all LEDs off (for covert operations)
- VOX Mode – See **Figure 8.6**.
    - o PTT – Mic active only when PTT button is pressed
    - o Auto – VOX is automatic
    - o Hot Mic – Mic always active
- Audio Channel editing – for Radio and Radio/Line cards only
    - o Channel name
    - o Audio levels - see **Figure 8.7.**
        - ▪ Presets for certain radios
        - ▪ Custom levels
        - ▪ Mute
        - ▪ Changes take effect immediately

<u>System Status</u>

   Clicking SYSTEM STATUS will display the system status page. Code versions are displayed along with currently installed add-in cards in the Master Station. On the right-hand side the IP configuration and web credentials settings can be changed. See **Figure 8.11.**
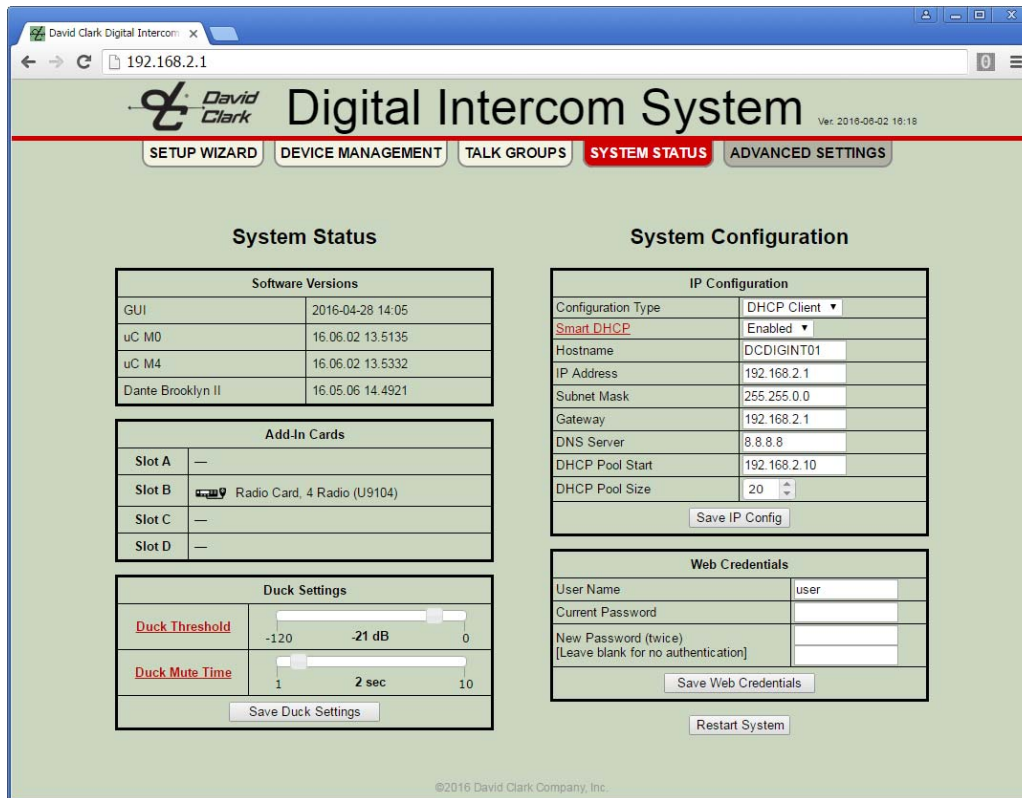
Figure 8.11: System Status

Configuration Type

There are three IP Configuration types available:
- DHCP Server
    - The Master Station will auto-assign IP addresses to other network devices connected.
    - Use this option if the system will be operated in a stand-alone environment and not connected to an existing network.
- DHCP Client (default)
    - The Master Station will look for a DHCP server on the network and use an IP address provided by the DHCP server.
    - Use this option if this system will be connected to an existing network.
    - Smart DHCP (default enabled)
        - When enabled, the system will attempt to obtain an IP address from your network. If unsuccessful, DHCP Server mode will be enabled using the parameters indicated.
- Static IP
    - Use this option for advanced configurations only.

Additional Networking Options

- Hostname: A host name to identify this device on the network.
- DHCP Server, Smart DHCP, or Static IP the following options apply:
    - IP Address
    - Subnet Mask
    - Gateway
    - DNS Server
    - DHCP Pool Start (not applicable for Static IP)
    - DHCP Pool Size (not applicable for Static IP; Number of addresses to assign)
- Click Save IP Config to save changes. The system must be restarted for most settings to take effect.

Web Credentials

By default, no credentials are required to log into the user interface. If you would like to require authentication, enter a user name and password here. The current password must be specified to make this change. If authentication is currently disabled, leave the current password field blank. Once "Save Web Credentials" is clicked the settings take effect immediately.

Duck Settings

Ducking is the ability for audio to mute when other audio is detected. The following settings can be used to tweak the duck settings:

- Duck Threshold
    - This setting defines the detection level the system will use to initiate ducking, if configured in a talk group.
    - A lower level would result in ducking occurring with quieter sounds where a higher level would require louder sounds to trigger the ducking.
    - Default is -21dB
- Duck Mute Time
    - This setting defines how long the ducked audio should mute before returning to normal level.
    - Default is 2 seconds

See Talk Group Example 5 for details on configuring ducking.

Backup and Restore

Currently not implemented. Backup will allow for a configuration file to be downloaded. Restore will allow for a previously saved configuration file to be applied to the system.

Advanced Settings

Most users should not have to make changes in the Advanced Settings menu. Changes made here may disrupt settings made in the Basic Settings menu.
The Advanced Settings menu provides for manual manipulation of Dante subscriptions and DSP settings.
Additionally, the system may be restarted from Advance Settings.

Contact David Clark Customer Service at (**800) 900-3434** for guidance if you feel your application requires settings not available in the Basic Settings menu.

Talk Group Programming

Talk groups are where most of the settings for the system will be made. Talk groups are a method of presenting the powerful options of the system to the user in a straight-forward and intuitive way. Each Headset Station or Wireless Belt Station is capable of (4) Selections as well as a PTT button. Talk groups are configured such that different combinations of selection and PTT pressed/not pressed can have different settings.

Headset Stations have four buttons labeled 1-4 to choose the selection and a PTT button to assert PTT. Wireless Belt Stations cycle through selections in numerical order by momentarily pressing the power button. A voice prompt will indicate "one", "two", "three", or "four". PTT is asserted by the large button on the front of the Wireless Belt Station or by the PTT button on the mic boom.

Tip: A device shown with red text and a green outline is a device that has one or more channels configured as part of the current talk group.

Following are some examples of common scenarios and how to program the system for each of them.

Talk Group Example 1: Multiple users on intercom, hot mic

- Multiple users talking and listening to each other
- Users can be on any selection (1-4) and do not have to press PTT to be heard

Steps

1. Click **Add New Talk Group**.
2. Rename talk group if desired by clicking ✎.
3. Click to expand each Headset Station or Wireless Gateway you wish to add to this group.
4. To identify a device, click the ⓘ and all LEDs on the device will turn red for 10 seconds.
5. Under **Outputs**, select **All Rx** which enables this user to hear in both L+R ears. Since wireless is mono, select **Ear** for wireless users.
6. Under Inputs, select **Mic** which enables this user's mic to be heard by other users of the group.
7. When finished, click **SAVE REQUIRED** on the top menu.
8. Once the operation completes, the users are now able to talk freely to each other.
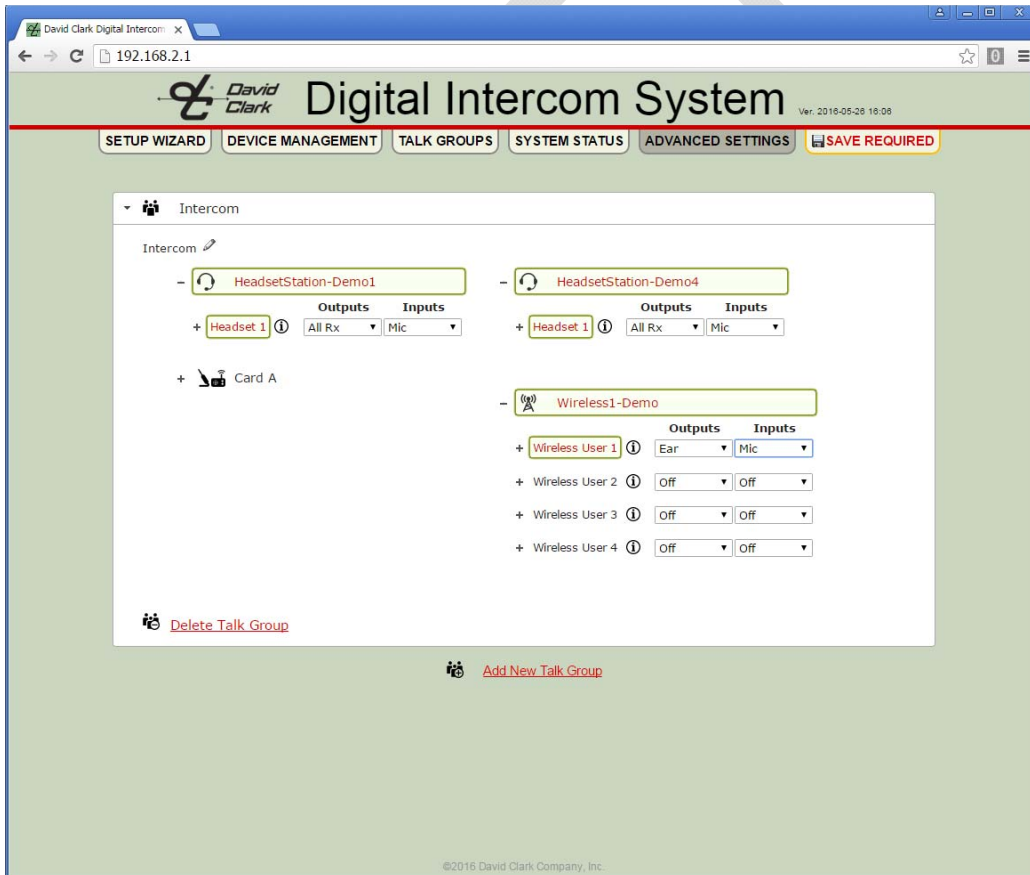9. See **Figure 8.12.**

Figure 8.12: Talk Group Example 1

For the next examples it will be assumed that the user knows how to add a new talk group, rename it, and identify devices.

Talk Group Example 2: Multiple users on intercom, press PTT to talk

- Multiple users talking and listening to each other.
- Users can be on any selection (1-4) but must press PTT in order to be heard by others.

Steps

1. Create a new talk group.
2. Click to expand each Headset or Wireless user you wish to add to this group.
3. Under **Outputs** select **All Rx.** For wireless, select **Ear.**
4. Under **Inputs** select **Mic-PTT** which specifies that the PTT button must be pressed in order for the mic to be heard by the other users of this group.
5. Click **SAVE REQUIRED.**
6. When the operation is complete, users of this group are now able to talk to each other by pressing the PTT button on the Headset Station, Wireless Belt Station, or the Headset mic boom.
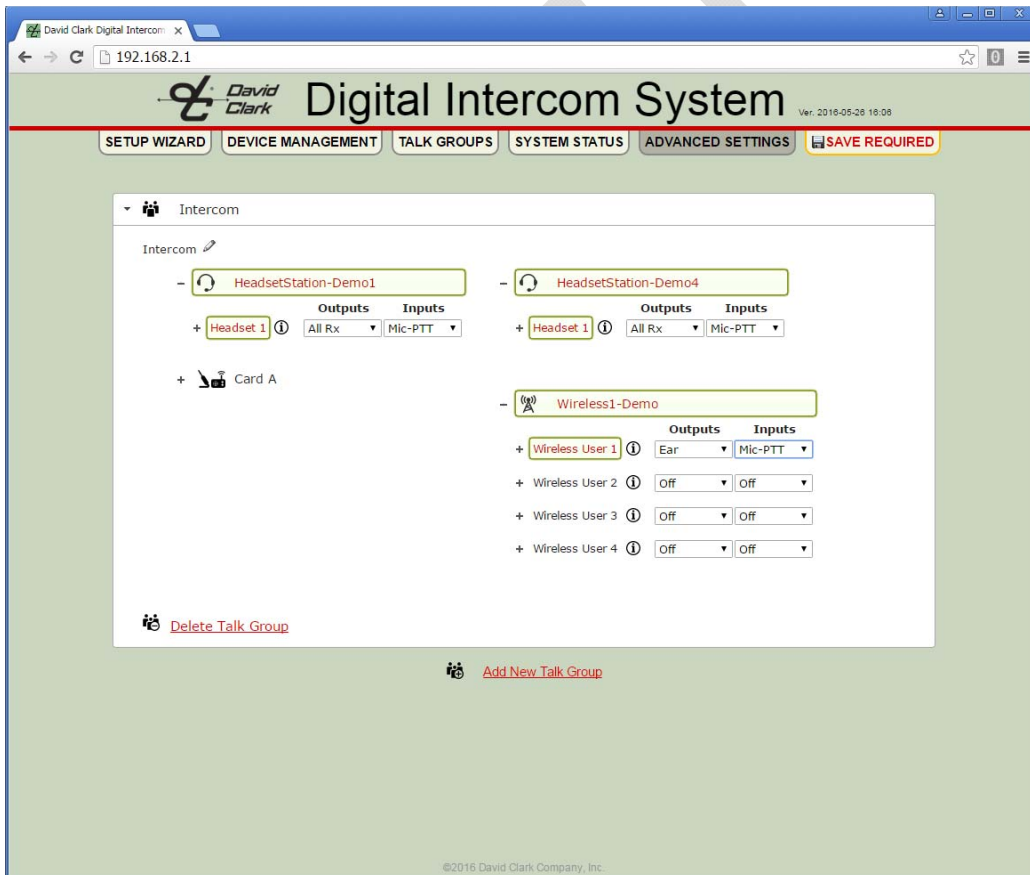7. See **Figure 8.13.**

Figure 8.13 Talk Group Example 2

Talk Group Example 3: Multiple users on hot-mic intercom, press PTT to talk over radio

- Multiple users talking to each other freely (no PTT)
- Press PTT to talk over radio
- Selection may be anything (1-4)

<u>Steps</u>

1. Create a new talk group and rename it "Intercom"
2. Click to expand each Headset or Wireless user you wish to add to this group.
3. Under **Outputs** select **All Rx.** For wireless, select **Ear.**
4. Under **Inputs** select **Mic**.
5. Create another new talk group and rename it "Radio"
6. Click to expand each Headset or Wireless user to configured in the "Intercom" talk group.
7. Under **Outputs** select **All Rx.** For wireless, select **Ear.**
8. Under **Inputs** select **Mic-PTT**.
9. Click to expand the Radio card or Radio/Aux card
10. Under Radio 1 **Outputs** select **Radio Tx**.
11. Under Radio 1 Inputs select **Radio Rx**.
12. Click **SAVE REQUIRED.**
13. When the operation is complete, users of this group are now able to talk to each other freely, and pressing the PTT button on the Headset Station, Wireless Belt Station, or the headset mic boom will cause that user to transmit over the radio.
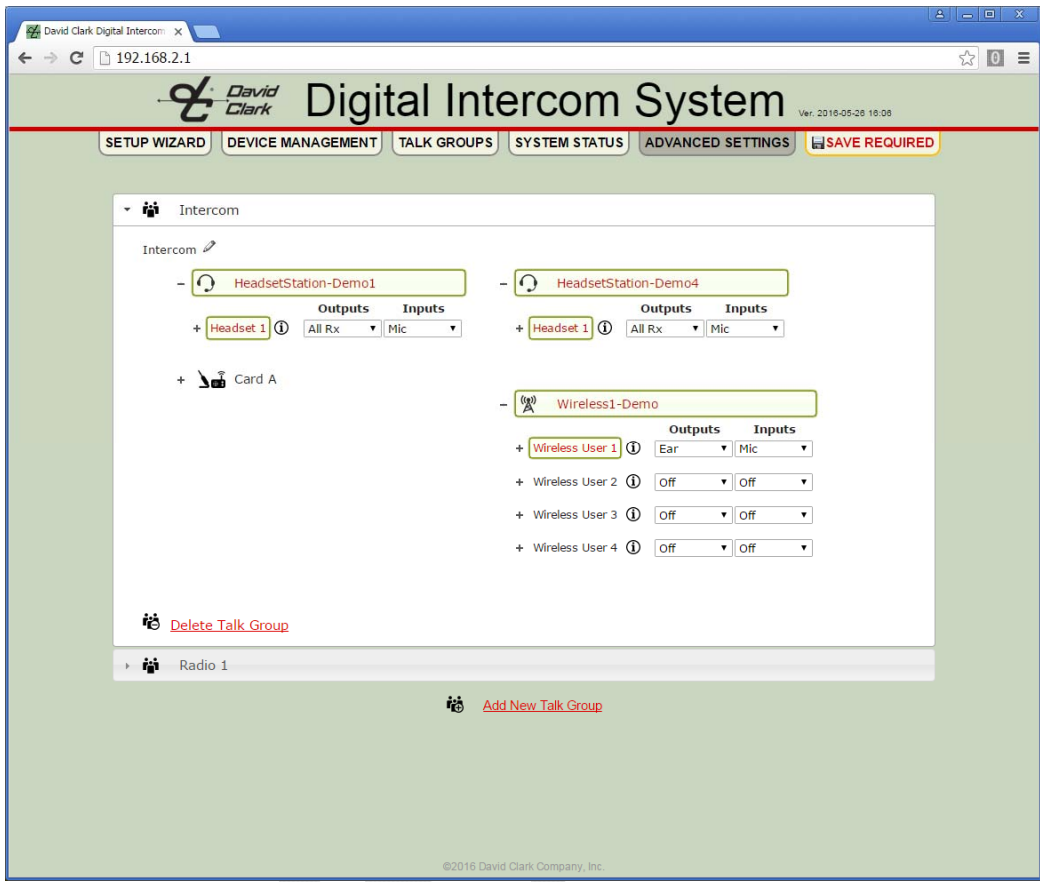14. See **Figures 8.14 and 8.15.**

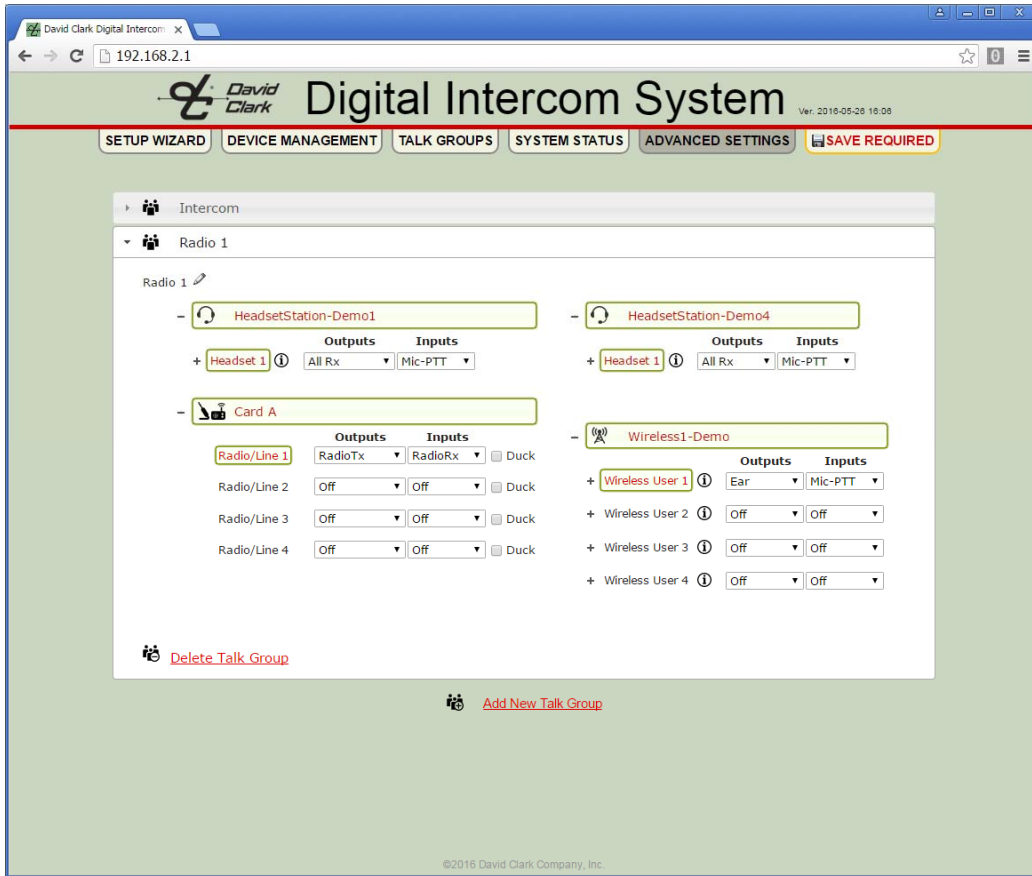**Figure 8.14 Talk Group Example 3 - Intercom**

Figure 8.15 Talk Group Example 3 - Radio

Talk Group Example 4: Intercom, multiple radios

- Users can talk freely on intercom when on selection 1 or 2
- Users hear and talk over Radio 1 when on selection 1
- Users hear and talk over Radio 2 when on selection 2

<u>Steps</u>

1. Create a new talk group and name it "Intercom".
2. Expand the Headset or Wireless users to be part of this group.
3. For each Headset/Wireless user, expand Headset/Wireless User to reveal the selections.
4. For each user, set S1 and S2 **Outputs** to **All Rx** (**Ear** for wireless) and **Inputs** to **Mic.**
5. Create a new talk group and name it "Radio 1"
6. Expand the Headsets and Wireless users which were configured in the "Intercom" group.
7. For each Headset/Wireless user, expand Headset/Wireless User to reveal the selections.
8. For each user, set S1 **Outputs** to **All Rx** and **Inputs** to **Mic-PTT.**
9. Expand the Radio card or Radio/Aux card.
10. Under Radio 1 **Outputs** select **Radio Tx**.
11. Under Radio 1 Inputs select **Radio Rx**.
12. Create a new talk group and name it "Radio 2"
13. Expand the Headsets and Wireless users which were configured in the "Intercom" group.
14. For each Headset/Wireless user, expand Headset/Wireless User to reveal the selections.
15. For each user, set S2 **Outputs** to **All Rx** and **Inputs** to **Mic-PTT.**
16. Expand the Radio card or Radio/Aux card.
17. Under Radio 2 **Outputs** select **Radio Tx**.
18. Under Radio 2 Inputs select **Radio Rx**.
19. Click **SAVE REQUIRED.**
20. When the operation is complete, users of this group are now able to talk to each other freely when on S1 or S2. Pressing the PTT button on the Headset Station, Wireless Belt Station, or the headset mic boom will cause that user to transmit over Radio 1 when on S1 and Radio 2 when on S2.
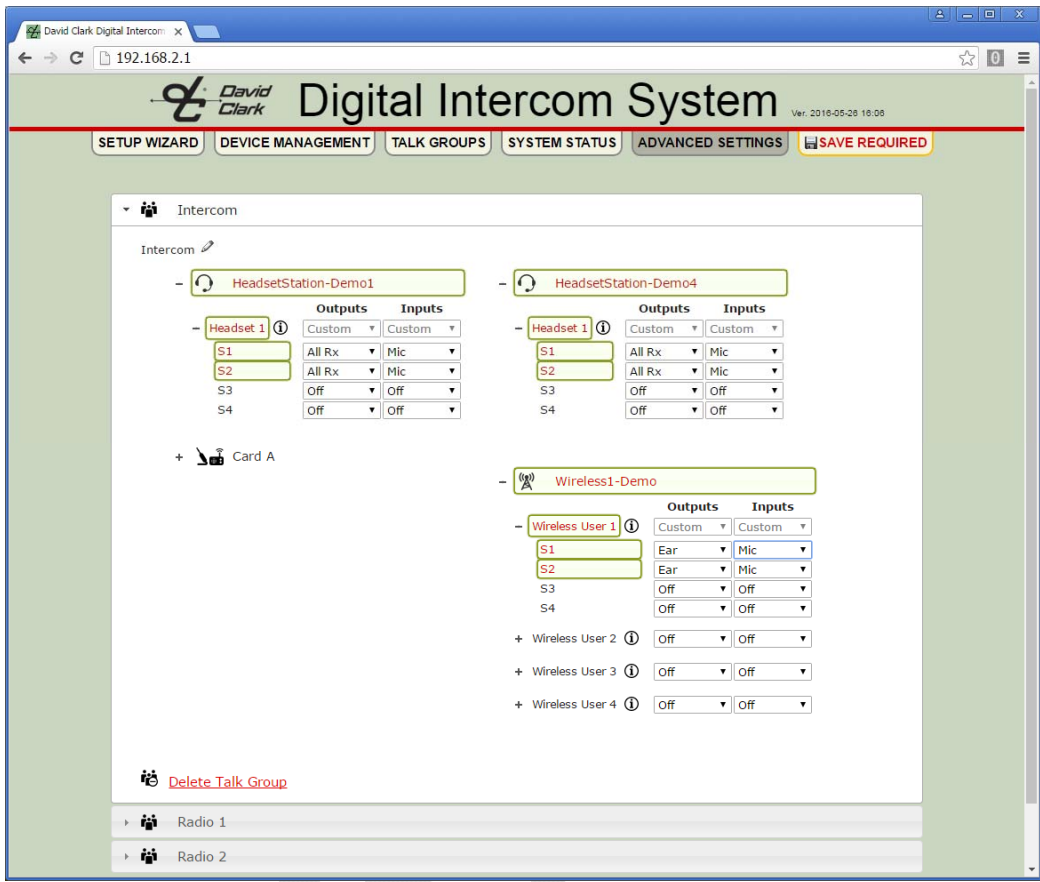21. See **Figures 8.16, 8.17, and 8.18.**
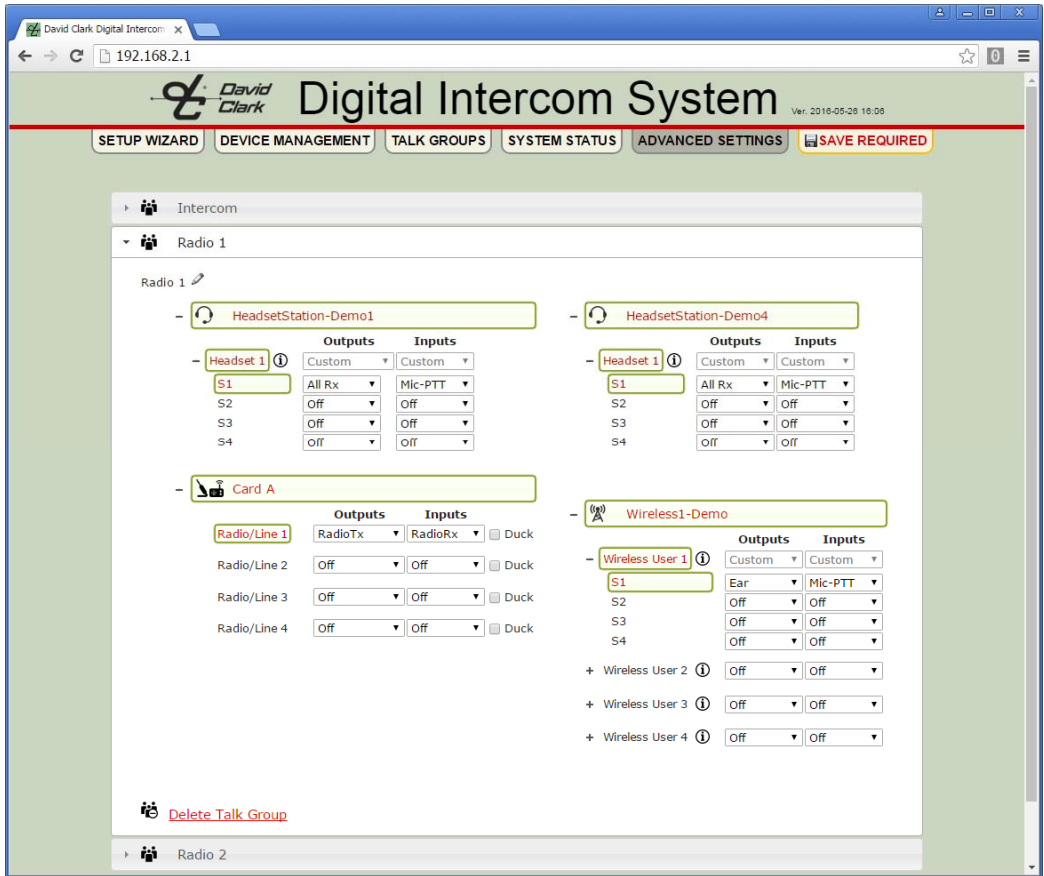
Figure 8.16 Talk Group Example 4 - Intercom

Figure 8.17 Talk Group Example 4 – Radio 1

Figure 8.18 Talk Group Example 4 – Radio 2

Talk Group Example 5: Aux-in + Smart phone with ducking

- Users can hear auxiliary audio from a music device or optionally, a smart phone.
- Users can press PTT to play/pause/answer/hang-up phone (if supported by phone).
- Users can talk over the phone.
- If a user speaks, the phone audio mutes in favor of the speaking user's audio.

Steps

1. Follow Talk Group Example 1 to create a talk group named "Intercom".
2. Create a new talk group named "Left".
3. Expand the Headset or Wireless users to be part of this group.
4. Optionally expand further to reveal selections (see previous examples).
5. Under **Outputs** for each device, select **EarL** (or just **Ear** for Wireless).
6. Expand the Radio/Aux card.
7. Under Radio/Line 3 **Inputs**, select **LineRxL** and check the box next to **Duck.**
8. Create a new talk group named "Right"
9. Under **Outputs** for each device, select **EarR** (or just **Ear** for Wireless).
10. Under Radio/Line 4 **Inputs**, select **LineRxR** and check the box next to **Duck.**
11. Create a new talk group named "Mic"
12. Under Inputs for each device, select **Mic.**
13. Under Radio/Line 3 Outputs, select **LineTxL-Mic.**
14. Create a new talk group named "PTT"
15. Under Inputs for each device, select **Mic-PTT.**
16. Under Radio/Line 4 Outputs, select **LineTxR-PTT.**
17. Click **SAVE REQUIRED.**
18. When the operation is complete, users of this group are now able to hear audio/music from the phone, press PTT to pause/play/answer/hang-up the phone, and talk over the phone. If a user speaks, the phone audio will be muted in favor of the speaking user's audio. When the user stops talking, the phone audio will resume.
19. This procedure could be combined with other examples to enable selections, two-way radios, etc.
20. See **Figures 8.19, 8.20, 8.21, and 8.22.**

Comment [DB4]: Thought this necessitated the 3.5mm connector to be a TRSS (TRRS), instead of a TRS as indicated on page 10. Which connector do we use…TRS or TRSS?

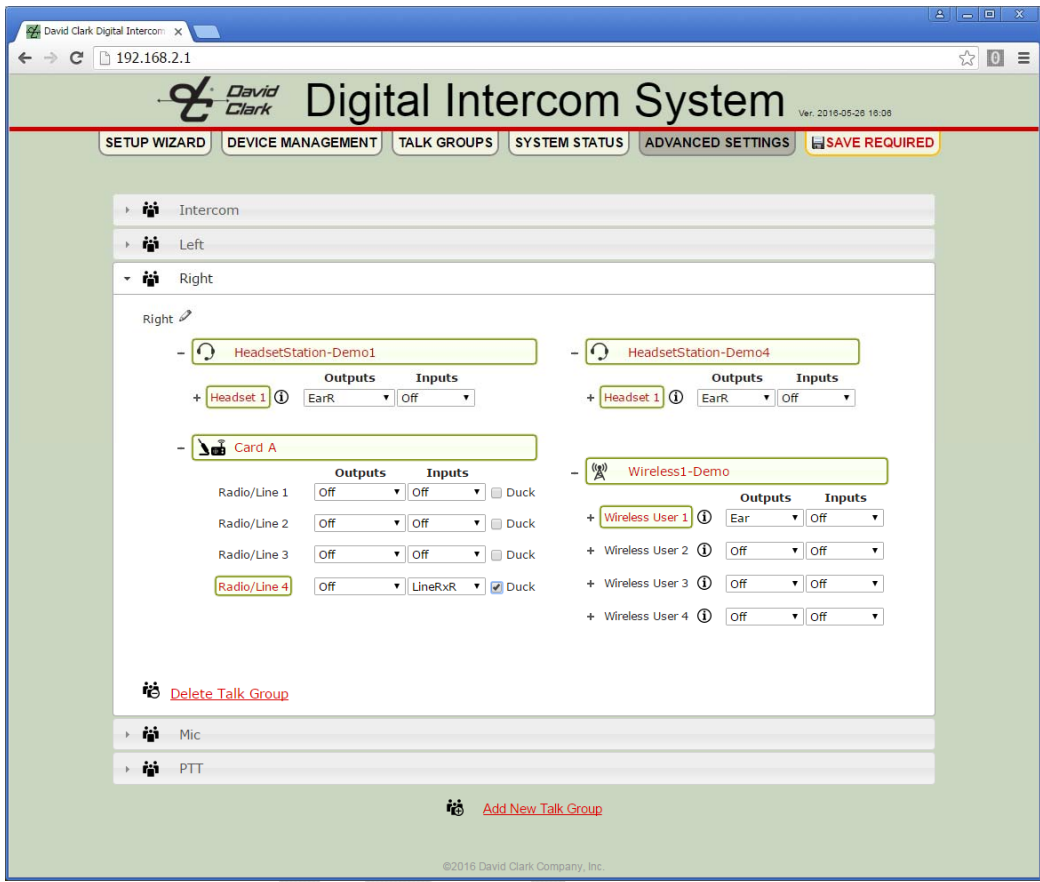**Figure 8.19 Talk Group Example 5 – Left**

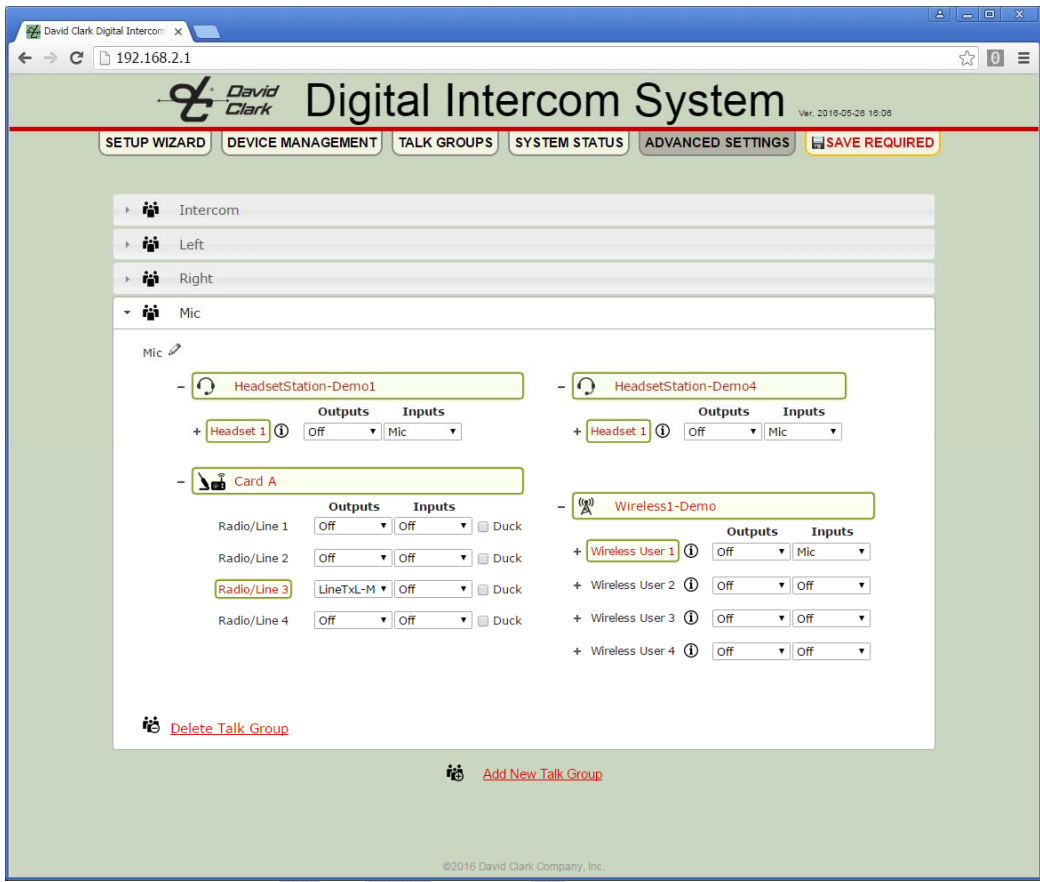**Figure 8.20 Talk Group Example 5 - Right**

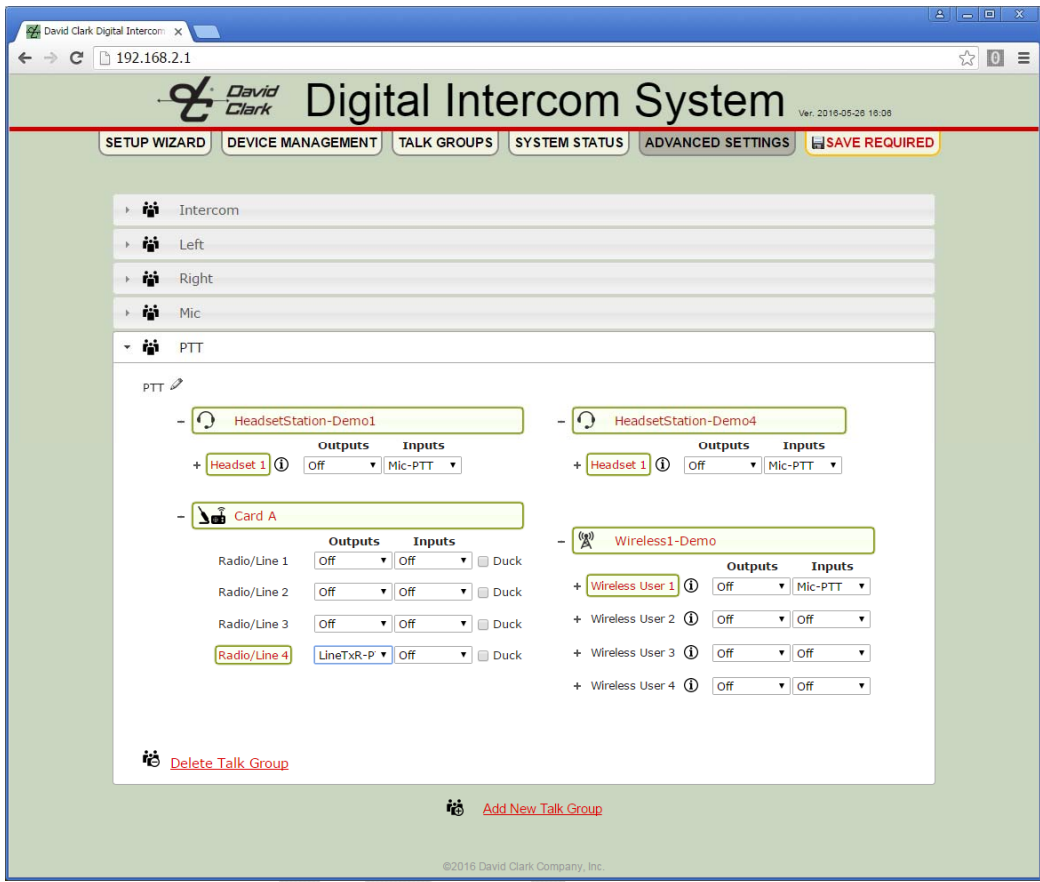**Figure 8.21 Talk Group Example 5 – Mic**

Figure 8.22 Talk Group Example 5 – PTT

Headsets

Donning/Positioning

Each Headset should be worn so that the ear seals fit snugly against the head, and the ears are fully enclosed within the inside of the ear seals. Adjust the microphone boom so that the microphone is positioned no more than ¼" from the lips. Using the Headset in this manner ensures optimal performance, especially in high-noise environments. For more detail on proper fit, maintenance and cleaning instructions, please refer to individual Headset documentation packaged with Headset or download at www.davidclark.com.

To connect Headset to Headset Station or Wireless Belt Station, align red keyways and push. Pull back gently on the connector (behind the quick-release collar) to ensure it is properly locked. To disconnect, pull back on the quick-release collar.

Volume Controls

The Series H9100-series Headsets have individual volume controls for the right and left ears (dual-ear models). This provides the wearer maximum flexibility to adjust volume and balance.

PTT Switches

The H9100-series Headsets have PTT switches conveniently located on the mic boom, just behind the microphone. These can be used to transmit over a talk group or a two-way radio, redundant to the PTT switches found on the Headset Station or Wireless Belt Station..

See **8. Operation and Programming** for more information.

> **Comment [DB5]:** Note: it has been requested regularly to be able to program a selection so that the PTT on the headset keys one function, and the PTT on the endpoint/belt pack keys a different function (especially military customers).
>
> If/when this functionality becomes available, this section would need mofidictaion.

9. Testing & Troubleshooting

Parts/Tools Required

- ❑ Completion of the previous installation sections in their entirety
- ❑ An assistant (recommended)

Test Procedure

- ❑ Double-check all connections and wiring from the previous sections.

- ❑ Complete connections of power cables to power source.

- ❑ Turn on power at the pick-off point/source.

- ❑ Connect a computer/laptop via Ethernet cable to one of the switch card ports on the Master Station.

    - o If all switch card ports are used, a PoE splitter such as CyberData #011187 or a PoE capable Ethernet switch may be used.

- ❑ After approximately 30 seconds, open a web browser and go to **http://192.168.2.1**

- ❑ Once the system initializes, click DEVICE MANAGEMENT

- ❑ Verify that all installed devices are present on this list, including add-in cards.

- ❑ To test audio and radio/aux connections, see **8. Operation and Programming**.

Troubleshooting

If the system does not function properly, it can be reset by either powering off the Series 9100 Digital Intercom System and then powering it back on.

Most problems are a result of improper setup. The first step in troubleshooting should always be to perform the SETUP WIZARD again.

Symptom	Possible Cause(s)
Cannot access web user interface	1. Is power applied to Master Station? Allow 30s for complete boot up. 2. Is computer connected to a Switch Card via Ethernet? 3. Did you previously change the IP settings in the user interface? 4. If all else fails, perform a <u>Factory Reset</u>
Device(s) missing on DEVICE MANAGEMENT	1. Check/replace Ethernet cabling to missing device(s). 2. Try a different port on the Switch Card. 3. Replace device.
Not able to communicate to other users/radios as expected	1. Verify configuration (see the Talk Group examples). 2. Repeat SETUP WIZARD.
Radio audio problem (low/high/distorted/etc.)	1. Verify configuration (see the Talk Group examples). 2. Radio turned on? 3. Adjust radio audio levels in DEVICE MANAGEMENT 4. Check radio settings/wiring. 5. Repeat SETUP WIZARD.
Muffled audio/high background noise	1. Keep mic as close to the mouth as possible when speaking.

Table 9.1 Troubleshooting

Factory Reset

A factory reset will clear all user settings and audio routes. The system will have to be completely reconfigured.

❑ Disconnect the power cable.

❑ Remove the six main screws on the Master Station enclosure See Appendix B Disassembly steps 1-3 for details.

❑ Lift the top assembly out of the bottom enclosure.

❑ Reconnect the power cable.

❑ Find the button labeled FACTORY RESET on the bottom of the main PC board.

❑ Press and hold FACTORY RESET for at least 30 seconds.

❑ The Master Station will restart with factory settings and the web user interface will be available.

10. Fuse Kit

<u>P/N 41090G-22 Waterproof Fuse Kit</u>
<u>Installation Instructions</u>

Parts/Tools Required

- ❑ 1/8-inch diameter heat shrink tubing
- ❑ Wire strippers
- ❑ Crimp tool (Thomas & Betts WT-11-M or equivalent)
- ❑ Crimp terminals
- ❑ 10-Amp fuse kit

Procedure

- ❑ Using a heat gun, install 1/8" diameter heat shrink tubing* over one end of the 4" red wire (supplied). Install the second piece of 1/8" diameter heat shrink tubing over the red wire on the C91-20PW Power Cable.

- ❑ Thread red wire of power cord with heat shrink tubing* into one end of fuse holder.

- ❑ Thread the heat shrink end of the 4-inch red wire into other end of fuse holder.

- ❑ Strip insulation on both wires 1/4 inch.

- ❑ Crimp fuse clips to both wires.

- ❑ Insert 10 amp fuse.

- ❑ Snap two halves of housing together.

* Note: The heat shrink tubing is necessary in order to provide weather tightness.
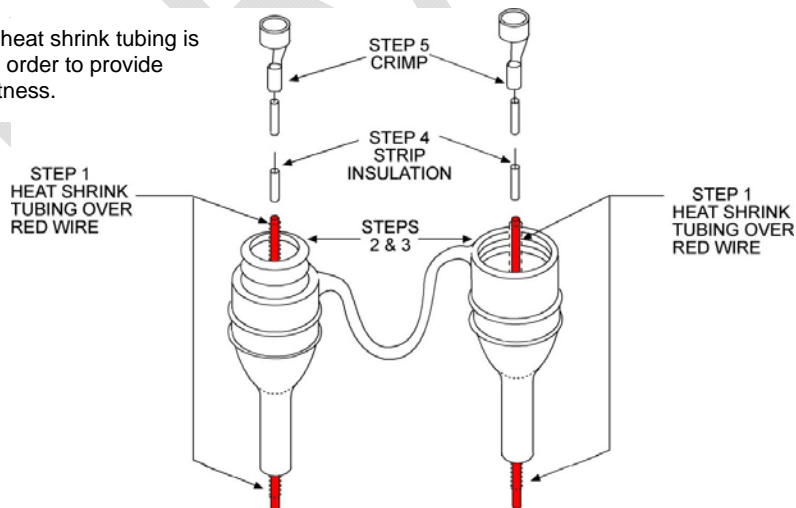

Figure 10.1 Proper assembly of Fuse Holder Kit (41090G-22)

11. Add-In Cards

Adding/Removing Master Station Add-in Cards

To add or remove an add-in card the Master Station must be opened. The procedure below must be followed correctly to maintain IP67 integrity and to prevent damage to the Master Station and Add-in Cards.

Parts/Tools Required

- ❑ #1 and #2 Philips bits
- ❑ Torque wrench capable of measuring 2 - 6 lbf-in (20 - 70 N-cm) of torque

Procedure

⚠️ **IMPORTANT: Failure to observe torque specifications will result in a compromise of IP67 integrity.**

Disassembly

1. Disconnect all radio and Ethernet cables from the Master Station. Mark them if necessary for reconnection later.
2. Remove the six main cover screws (**Figure 11.1**).
3. Remove the enclosure bottom.
4. Disconnect the power cable assy from the main PCB assy (**Figure 11.2**).
5. Remove the four screws which attach the main PCB assy to the standoffs (**Figure 11.3**).
6. Gently remove the main PCB assy from the cover assy and set aside.

Comment [DB6]: Move Figures 11.1, 11.2 and 11.3 here?

Adding card(s)

1. Remove the eight screws from the blank plate and remove the plate (**Figure 11.4**).
2. Ensure there are gaskets on each of the four ports of the card and that no leftover gaskets are stuck to the backside of the front panel.
3. Insert the new card into the plastic cover and tighten the eight screws to **3 lb-in (34 N-cm)**.

Removing card(s)

1. Remove the eight screws from the card and remove the card (**Figure 11.4**).
2. Ensure there are gaskets on each of the four ports of the blank plate and that no leftover gaskets are stuck to the backside of the front panel.
3. Insert a blank plate into the plastic cover and tighten the eight screws to **3 lb-in (34 N-cm)**.

Reassembly

1. Gently attach the main PCB assy to the cover assy, ensuring the "fingers" on the add-in cards line up with and insert fully into the connectors on the main PCB assy (**Figure 11.3**).
2. Tighten the four screws which attach the main PCB assy to the standoffs to **2 lb-in (23 N-cm)**.
3. Reconnect the power cable assy to the main PCB assy (**Figure 11.2**).
4. Place entire assembly back into enclosure bottom (**Figure 11.1**).
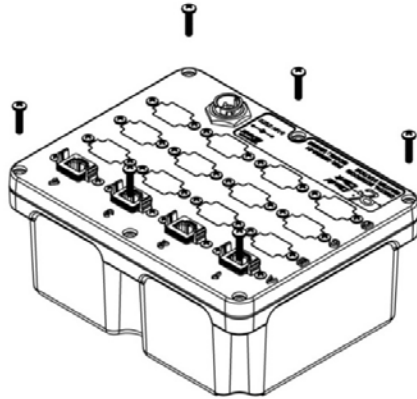5. Replace the six main cover screws and tighten to **6 lb-in (68 N-cm)**.
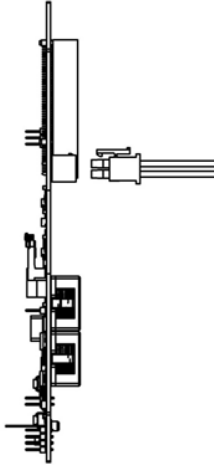
Figure 11.1 Main Cover Assembly
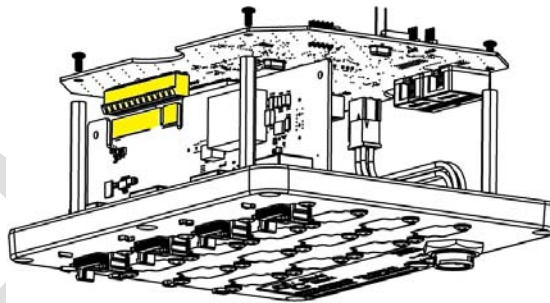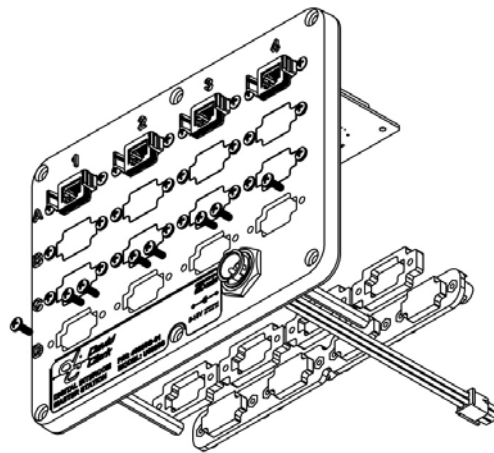

Figure 11.2 Power Connection   **Figure 11.3 Main PCB and Add-In Card**

Assemblies
Figure 11.2 Adding/Removing Add-In Cards

12. Technical Specifications

ELECTRICAL	
Power Requirements	11-30VDC (10A max., depending on system configuration)
Power Distribution	Power-over-Ethernet (802.3af)
Radio Connectivity	See U9102 or U9104
Auxilliary Connectivity	See U9102
System Cable Type	CAT5e (stock) or CAT6
Intercom Connection Scheme	RJ-45 type

MECHANICAL	
Mounting Method (where applicable)	Surface (included) or Flush/Rack Mount Kits (optional)
Enclosure Material (where applicable)	Polyethylene

COMPLIANCE	
	MECHANICAL
Ingress Protection	IP67, per IEC 60529, with proper installation
Operating Temperature*	-40° to +185°F (-40° to +85°C), per MIL-STD-810G
Storage Temperature*	-40° to +158°F (-40° to +70°C), per MIL-STD-810G
Aggravated Humidity	Per MIL-STD-810G
Functional Shock	Per MIL-STD-810G
Operational Vibration	Per MIL-STD-810G
Salt Fog	Per MIL-STD-810G
	ELECTRICAL (WIRED)
Immunity to DC Power Line Transients	Per EN 301 489-1 (ISO 7637-2)
Radiated and Conducted Emissions	Per EN 301 489-1, FCC Part 15
Electrostatic Discharge	Per EN 301 489-1
Radiated Immunity	Per EN 301 489-1
Electrical Fast Transient Burst	Per EN 301 489-1
Conducted Immunity	Per EN 301 489-1
	ELECTRICAL (WIRELESS)
Specific Absorption Rate (SAR) Compliance	Per IEEE 1528-2003, OET Bulletin 65, RSS-102 & Safety Code 6
DECT Harmonized EN	Per EN 301 406
EMC & ERM, Short Range Devices	Per EN 300 330-1, EN 300 330-2
Electrostatic Discharge	Per EN 61000-4-2
Radiated Immunity	Per EN 61000-4-3
EMC & ERM for Radio Equipment and Services, Part 1	Per EN 301 489-1
EMC & ERM for Radio Equipment and Services, Part 6	Per EN 301 489-6
CB Scheme	Per IEC 60950

* Not applicable to Wireless Belt Stations or Battery Charger
See individual product Data Sheets for more information

Table 12.1 Technical Specifications

FCC NOTICE (for U.S. Customers):
This device complies with Part 15 of the FCC Rules:
Operation is subject to the following conditions:

1. This device many not cause harmful interference, and

2. This device must accept any interference received, Including interference that may cause undesired operation

*Changes and Modifications not expressly approved by **DAVID CLARK COMPANY INC.** can void your authority to operate this equipment under Federal Communications Commissions rules.*

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

This device complies with Industry Canada licence-exempt RSS standard(s). *Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.*

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Comment [DB8]: Rob Vincent always had a thing about adding a comma here, as it subtly denotes something about the organization (don't ask me what)…