400 Series Full Duplex Handset Stations

1. Intent & Scope

This document describes the installation procedure for the 400 series full duplex handset stations. The 400 series full duplex handset stations include two intercom station types; FDH-420, which mounts into a standard two-gang electrical box, and FDH-440, which mounts into a standard four gang electrical box.

2. Description

The 400 series full duplex handset stations allow the user to talk and listen simultaneously with a master station or another full duplex handset station. These stations are connected to an SAB-400 or SAB-401 station audio board with two shielded twisted pairs that carry all the microphone, speaker, and switch signals.

The 400 series full duplex handset stations can be ordered in several configurations. These include:

FDH-420

i) 1 optional switch. This switch is mounted on the faceplate and is internally terminated. The termination allows the system to detect open or short line faults. This switch is normally used as a volume control switch, but it can be used for other functions.

FDH-440

i) 1 or 2 optional switches. These switches are mounted on the faceplate and are internally terminated. They can be used for volume control, call request, press-to-talk, or other functions.

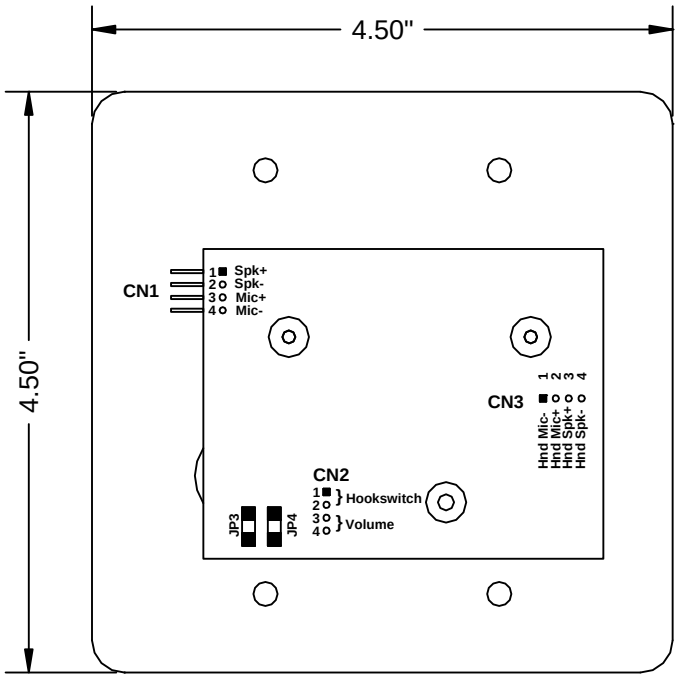
ii) internal speaker/microphone. The FDH-440 operates as a half duplex station when the handset is on hook.

3. Installation

3.1 FDH-420

A simplified diagram of the back view of the FDH-420 is shown below. The connectors CN1, CN2, and CN3 are always present. CN1 connects the audio and programmable switch information between the system and the handset station. A four pin female MTA-100-04 connector connects the audio input speaker lines to pins 1 and 2 of CN1 and the audio output microphone lines to pins 3 and 4 of CN1. The headset is connected to CN2. A hookswitch and an optional volume switch are connected to CN3.

The jumpers JP3 and JP4 are used to make the optional face mounted switch act as either Switch A or Switch B.



Backview of FDH-420 Showing Header and Jumper Location

3.1.1 Audio Connection from System to Intercom Station

Each FDH-420 full duplex handset station is connected to the exchange with two shielded twisted pairs. Each pair is connected to terminals on the field interface BIX block. These terminals are connected via twisted pairs in a CBL-190 cable to the SAB-400 or SAB-401.

All shields are terminated at the field interface BIX block. The shields are grounded through the CBL-190 cable that connects the BIX block to the DB-37 connector on the SAB-400 or SAB-401. The shields are left open at the full duplex station end of the cable. Where a cable is connected to another cable the shields must be continued from one cable to the other. Care should be taken to ensure that the shields on the different signal pairs are not connected together.

The connections to the full duplex handset station are made with an AMP MTA-100-04 series connector. To make these connections you should use an AMP tool Handle Assy 58074-1 with a 58246-1 head. The cable should be cut to length and the shield and outer jacket should be trimmed back about 1/2 inch. Ensure that the shield is not exposed or it may short out exposed contacts on the intercom PCB when it is installed.

The pin configuration of the station connector is:

MTA Pin	Signal
1	Audio In + (Spk +)
2	Audio In - (Spk -)
3	Audio Out + (Mic +)
4	Audio Out – (Mic -)

MTA Pin Signals for Connector CN1

To insert the signal wires into the connector you remove the white cover from the connector, insert the connector into the tool from the left side (it will travel through the tool in the direction indicated by the arrow), pull the trigger once to load the connector. Then insert the signal wire for pin 1 (do not strip the wire) into the hole on the top of the tool and pull the trigger to insert the wire into the connector. Then repeat to install the other signal wires. Finally, remove the connector from the tool, replace the cover, and then slide the connector onto the pins on the intercom station.

The two audio pairs from the FDH-420 are connected to a pair of adjacent ports on the SAB-400 (or SAB-401). If the Card Cage has an ACB-100 the port pair combinations are restricted to 2-3, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15, i.e. the first port must be an even number. The port pair 16-Mic cannot be used as a FDH connection.

For a Card Cage with an ACB-101 the SAB port pairs include the combinations of 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16 as well as port pairs 2-3, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15. Up to eight (8) FDH's can be connected to an SAB-400 (or SAB-401) using port pair combinations 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16. The FDH-420 cannot use the port labeled Mic.

The Audio In pair must be connected to the first numbered port, while the Audio Out pair must be connected to the second adjacent numbered port. Note that the audio lines have dc levels so polarity of connections must be maintained, i.e. Audio In + on the FDH must connect to a terminal labeled Audio X + on the SAB while Audio In – on the FDH must connect to a terminal labeled Audio X – on the SAB, where X is the first port in the pair.

3.1.2 Handset Connections

The handset is connected to the FDH-420 printed circuit board through the header labeled CN3. Connections are made with an MTA-100-04 female connector. The pin configuration is as follows:

MTA Pin	Wire Color	Signal
1	Black	Handset Mic -
2	Red	Handset Mic +
3	Green	Handset Speaker +
4	Yellow	Handset Speaker -

Handset Connections to CN3

The necessary wiring and MTA connector are installed at the factory.

3.1.3 Hookswitch and Volume Connections

When the handset is removed from the handset cradle the hookswitch contacts open. The switch information is multiplexed over the Audio Out pair. (The hook switch is wired to act as Switch A on this pair.) The switch opening is normally used to generate a call request to the DXI system.

The optional push button switch can be used to generate a signal to the DXI system to change the volume of the audio signal received at the station. Each switch closure will change the volume by one step in an set of eight predefined gain settings. (Without a volume switch the volume level is set to the Initial Volume setting for the station in the Software Configuration). This switch information is multiplexed over the Audio In pair. This switch can be hardwired to act as Switch A by inserting a jumper in JP3, or to act as Switch B by inserting a jumper in JP4.

MTA Pin	Signal
1	Hookswitch -
2	Hookswitch +
3	Volume -
4	Volume +

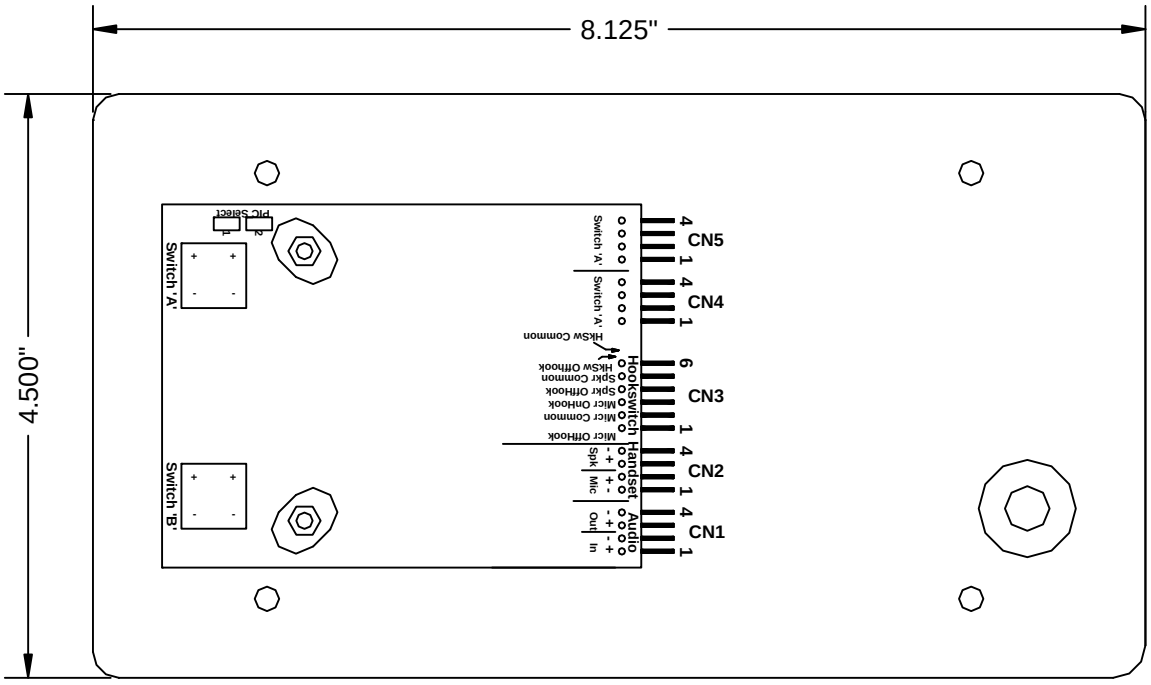
Hookswitch and Volume Connections to CN2

3.2 FDH-440

A simplified diagram of the back view of the FDH-440 is shown below. The connectors CN1, CN2, and CN3 are always present. CN1 connects the audio and programmable switch information between the system and the handset station. A four pin female MTA-100-04 connector connects the audio input lines to pins 1 and 2 of CN1 and the audio output lines to pins 3 and 4 of CN1. CN2 connects the handset to the printed circuit board of the handset station. CN3 is used to connect the cradle hookswitch to the printed circuit board of the full duplex handset station.

The connectors labeled CN4 and CN5 are used for optional switch configurations. These connectors can bring the on board switch contact out to external equipment, or bring switch contacts from external equipment onto the station (and ultimately to the DXI system). The internal switch contacts of the lower switch (normally Switch B) are connected to pins 1 and 2 of the connector CN4. Connector CN5 is used when the upper switch, normally Switch A, is to provide external switch contacts.

The PIC Select jumpers serve two purposed; inserting a jumper in position 1 disables the automatic call request signal to the DXI system when the handset goes offhook, inserting a jumper in position 2 will interchange the physical location of Switch A (becomes lower position) and Switch B (becomes upper position).



Back View of FDH-440 Showing Header and Jumper Locations

3.2.1 Audio Connection from System to Intercom Station

Each FDH-440 full duplex handset station is connected to the exchange with two shielded twisted pairs. Each pair is connected to terminals on the field interface BIX block. These terminals are connected via twisted pairs in a CBL-190 cable to the SAB-400 or SAB-401.

All shields are terminated at the field interface BIX block. The shields are grounded through the cable that connects the BIX block to the DB-37 connector on the SAB-400 or SAB-401 (a CBL-190 cable). The shields are left open at the full duplex station end of the cable. Where a cable is connected to another cable the shields must be continued from one cable to the other. Care should be taken to ensure that the shields on the different signal pairs are not connected together.

The connections to the full duplex handset station are made with an AMP MTA-100-04 series connector. To make these connections you should use an AMP tool Handle Assy 58074-1 with a 58246-1 head. The cable should be cut to length and the shield and outer jacket should be trimmed back about 1/2 inch. Ensure that the shield is not exposed or it may short out exposed contacts on the intercom PCB when it is installed.

The pin configuration of the station connector is:

MTA Pin	Signal
1	Audio In +
2	Audio In -
3	Audio Out +
4	Audio Out -

MTA Pin Signals for Connector CN1

To insert the signal wires into the connector you remove the white cover from the connector, insert the connector into the tool from the left side (it will travel through the tool in the direction indicated by the arrow), pull the trigger once to load the connector. Then insert the signal wire for pin 1 (do not strip the wire) into the hole on the top of the tool and pull the trigger to insert the wire into the connector. Then repeat to install the other signal wire. Finally, remove the connector from the tool, replace the cover, and then slide the connector onto the pins on the intercom station.

The two audio pairs from the FDH-440 are connected to a pair of adjacent ports on the SAB-400 (or SAB-401). If the Card Cage has an ACB-100 the port pair combinations are restricted to 2-3, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15, i.e. the first port must be an even number. The port pair 16-Mic cannot be used as a FDH connection.

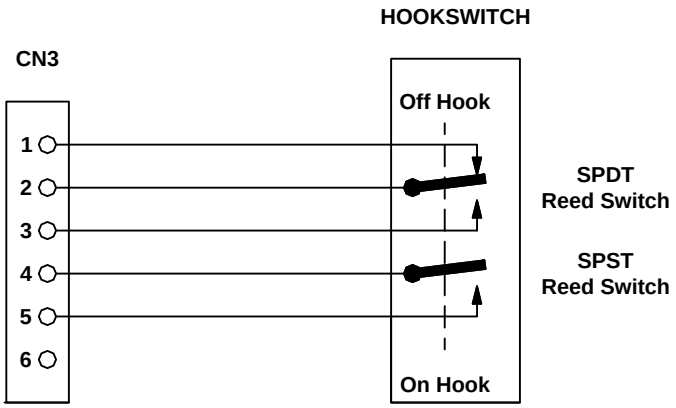
For a Card Cage with an ACB-101 the SAB port pairs include the combinations of 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16 as well as port pairs 2-3, 4-5, 6-7, 8-9, 10-11, 12-13, 14-15. Up to eight (8) FDH's can be connected to an SAB-400 (or SAB-401) using port pair combinations 1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16. The FDH-440 cannot use the port labeled Mic.

The Audio In pair must be connected to the first numbered port, while the Audio Out pair must be connected to the second adjacent numbered port. Note that the audio lines have dc levels so polarity of connections must be maintained, i.e. Audio In + on the FDH must connect to a terminal labeled Audio X + on the SAB while Audio In – on the FDH must connect to a terminal labeled Audio X – on the SAB, where X is the first port in the pair.

3.2.2 Hookswitch Connections

The handset hookswitch is connected to the printed circuit board by means of an six pin MTA-100-06 connector labeled CN3. A schematic showing the interface connection is given below. The necessary wiring and MTA connector are installed at the factory.

When a handset goes off-hook a call request will normally be generated. Inserting a jumper in PIC Select position 1 will disable the call request when the handset goes off-hook.



Hook switch connections to CN3

3.2.3 Handset Connections

The handset is connected to the FDH-440 printed circuit board through the header labeled CN2. Connections are made with an MTA-100-04 female connector. The pin configuration is as follows:

MTA Pin	Wire Color	Signal
1	Black	Handset Mic -
2	Red	Handset Mic +
3	Green	Handset Speaker +
4	Yellow	Handset Speaker -

Handset connections to CN2

The necessary wiring and MTA connector are installed at the factory.

3.2.4 Switch Headers

The standard faceplate mounted switch(es) can be brought out to headers for connection to external devices. The internal switch contacts are brought out to pins 1 and 2 of the header CN4 or CN5. An external switch can be connected to pins 3 and 4 of the header. If the external switch closes, the closure is transmitted to the system in the same manner as the internal switches on stations without the external switch header. One or two headers can be installed. CN4 is the header for the lower switch and CN5 is the header for the upper switch. Normally the lower switch acts as Switch B, and the upper switch acts as Switch A

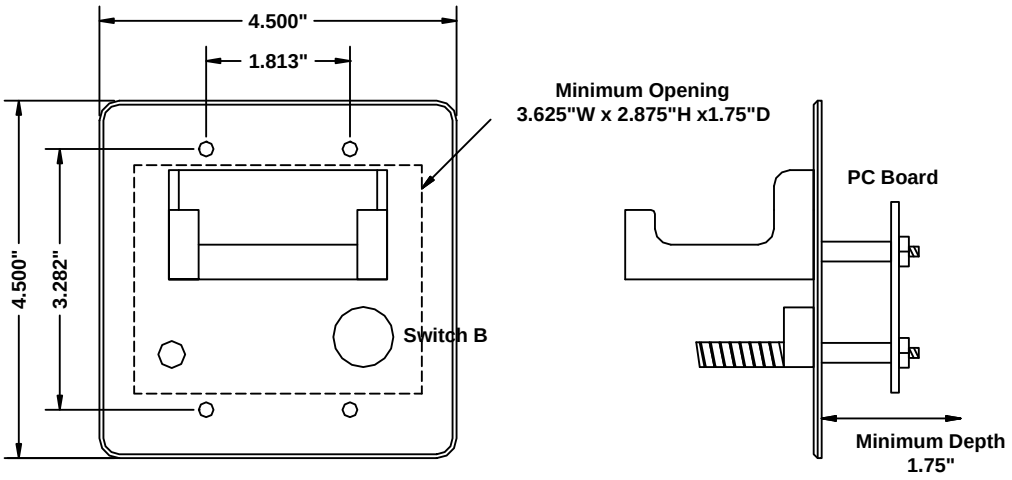
MTA Pin	Signal
1	Switch Out +
2	Switch Out -
3	Switch In +
4	Switch In –

The normal location of Switch A and Switch B is shown on the diagram in section 4, however it is possible to interchange the physical location of Switch A and Switch B by moving jumpers on the FDH-440 printed circuit board. To make the upper switch Switch B and the lower switch Switch A insert a jumper into PIC Select position 2. The header CN4 will still be associated with the lower switch, while header CN5 will still be associated with the upper switch. (The reason that the you may wish to interchange the physical location of Switch A and Switch B is that there is a hardware-defined priority for the Switches. If Switch A and Switch B are pressed simultaneous, the DXI system will only detect Switch A.)

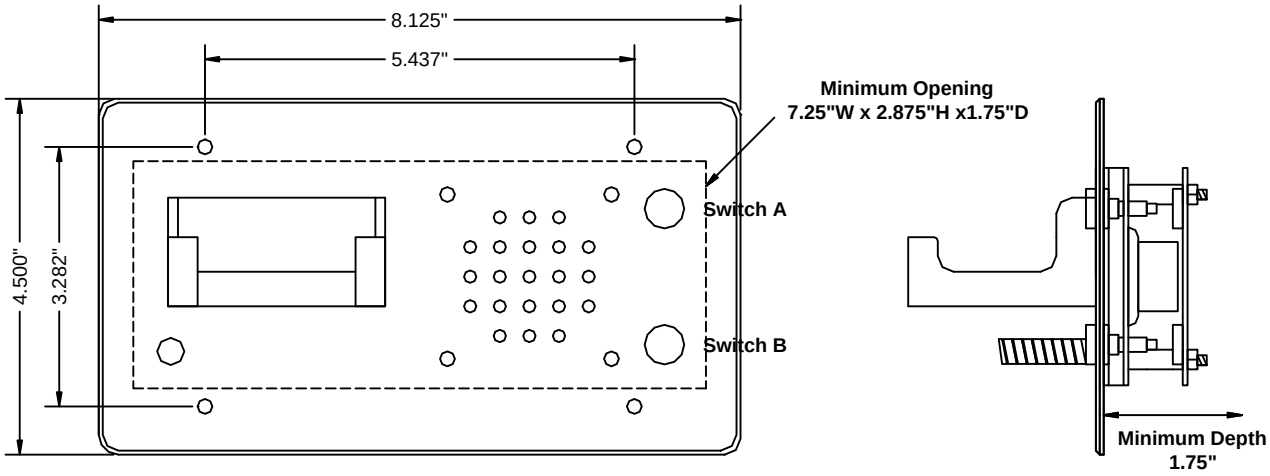
4. Mounting the FDH

The FDH-420 Full Duplex Handset station is designed to mount in a standard 2-gang electrical box. The box must have a minimum depth of 1.75 inches. The FDH-440 Full Duplex Handset station is designed to mount in a standard 4-gang electrical box and requires a minimum box depth of 1.75 inches. (Both stations are compatible with standard #6-32 mounting hardware).

Note: Make sure that when the station is inserted into the backbox.the field cable connected to the station does not interfere with the operation of the hookswitch contacts



Mounting Details for FDH-420



Mounting Details for FDH-440