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Rev D

SETUP and OPERATING MANUAL

ADVANCED MULTI-CHANNEL VEHICLE INTERCOM SYSTEM (AMCVIS)

with

DIGITAL CREW CONTROL

and

RADIO BRIDGING



This version permitted the two radios connected to the IMU to be linked (VOX keying of the radios through add-on circuitry in the IMU) so that land warriors with PRC-117 could be directly connected to a TACSAT without crew involvement.

The AMCVIS was designed, manufactured and is supported by:
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TABLE OF CONTENTS

DIGITAL AMCVIS SYSTEM WITH RADIO BRIDGING	2
FIGURE 1: DIGITAL AMCVIS SYSTEM CONFIGURATION	2
THEORY OF OPERATION	3
1. SYSTEM COMPONENTS	4
1.1. INTERCOM MASTER UNIT (IMU):.....	4
FIGURE 2: INTERCOM MASTER UNIT (IMU) FRONT PANEL	4
FIGURE 3: REAR and SIDE of INTERCOM MASTER UNIT (IMU)	4
1.2. INTERCOM CONTROL UNIT (ICU):.....	4
FIGURE 4: INTERCOM CONTROL UNIT (ICU)	5
2. AMCVIS ADJUSTMENTS PRIOR TO OPERATION.....	6
2.1. <i>CONNECTING IMU COMPONENTS:</i>	6
2.2. ADJUSTING AND BALANCING THE AUDIO LEVELS BETWEEN RADIOS AND INTERCOM HEADSETS	6
RADIO PRE-ADJUSTMENT:	6
AMCVIS IMU ADJUSTMENTS:.....	6
FIGURE 5: AUDIO ADJUSTMENT POTS	6
2.3. ADJUSTMENTS FOR RADIO BRIDGING	8
IMU CONTROLS AND INDICATORS	9
2.4. FRONT PANEL.....	9
FIGURE 6: IMU FRONT PANEL	9
2.5. SIDE and REAR PANEL	10
FIGURE 7: IMU SIDE/REAR PANELS	10
3. ICU CONTROLS AND INDICATORS.....	11
FIGURE 8: INTERCOM CONTROL UNIT (ICU)	11
4. CABLE AND CONNECTOR INSTRUCTIONS.....	12
4.1. POWER CABLE:	12
FIGURE 9: POWER CABLE/CONNECTOR	12
4.2. RADIO CABLES:.....	13
APPENDIX A: SYSTEM COMPONENTS	14
APPENDIX B: SYSTEM PREVENTATIVE MAINTENANCE.....	15
APPENDIX C: ALUMINUM MOUNTING BRACKETS TEMPLATE.....	16
FIGURE10: MOUNTING BRACKET TEMPLATE.....	16

DIGITAL AMCVIS SYSTEM WITH RADIO BRIDGING

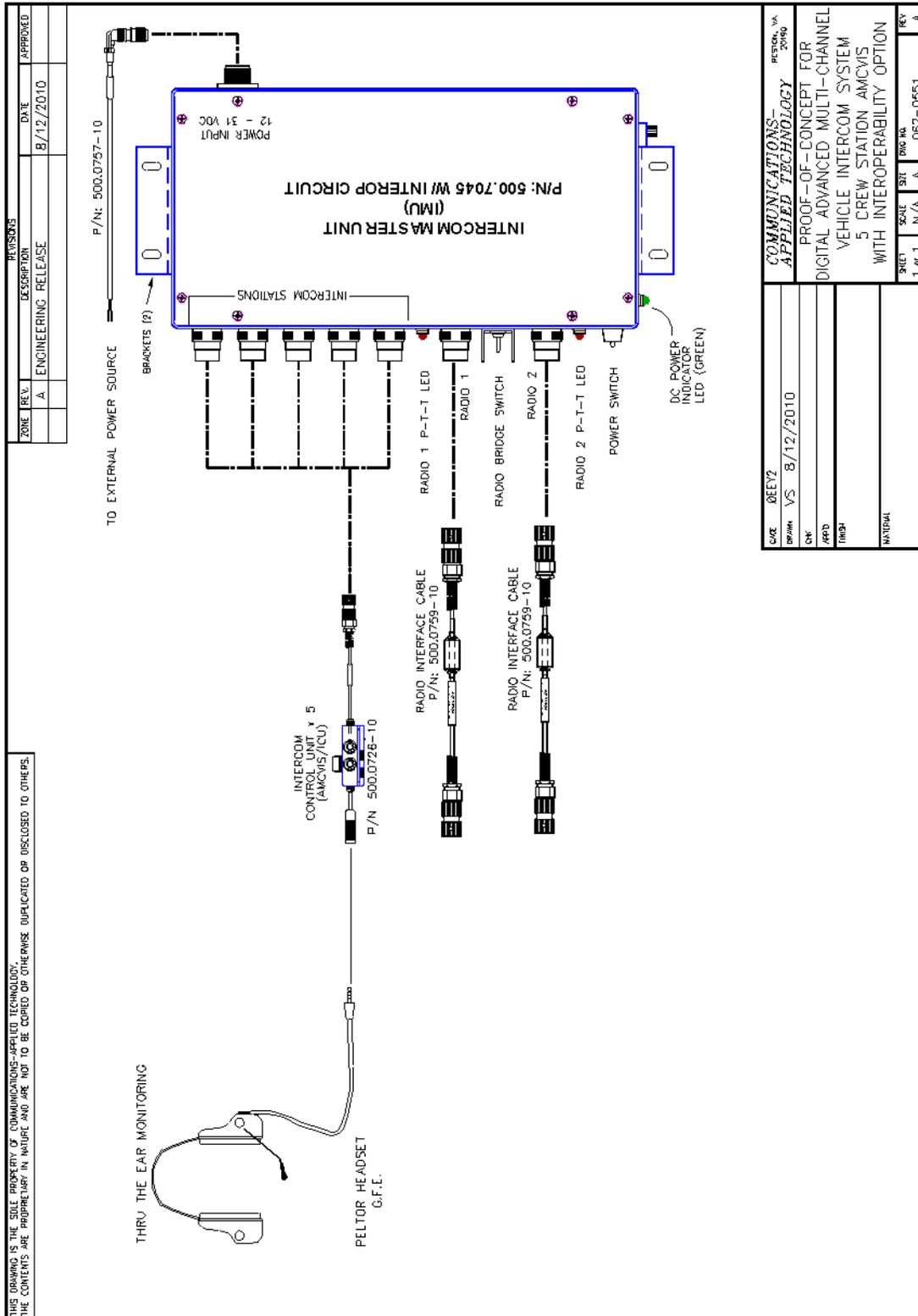


FIGURE 1: DIGITAL AMCVIS SYSTEM CONFIGURATION

THEORY OF OPERATION

- The AMCVIS-D (p/n 500.7044) provides up to five personnel with a two way intercom capability. All headset station ports have common capabilities.
- The AMCVIS-D provides the five users with the ability to simultaneously monitor two, 2-way radios---connected to the AMCVIS---and to transmit on one of them. Selection of the Radio to be transmitted on is made at a switch located on the individual users ICU. When a radio is selected for both monitoring and transmitting, the other radio is automatically monitor only.
- This capability is modified when the radios are bridged. When bridged, radio users are transmitting on both radio's simultaneously. Intercom users continue to transmit on only the radio selected at the individual's ICU.
- All users hear all voice transmissions by the other users whether the Intercom or a Radio is keyed at an ICU.
- A user hears his own voice in his headset when he is keying either the intercom or the radios from his ICU. This "sidetone" circuit provides the user with confirmation that all parts of his communications system is operating properly.
- Each ICU is configured with two volume controls. These rotary controls permit the user to adjust the listening level in his own headset from a preset minimum to maximum volume (approximately 0.5 watt into 50 ohm speaker). Adjusting the level on one's ICU does not affect the listening level of the other users. One volume setting independently controls the radio that the user currently has selected to transmit/receive. The other volume control is a master control to each users' overall system volume.
- Each user is configured with a radio selector switch to independently select which radio will be used in "monitor only" and which radio will be used to transmit and receive.
- Separate, momentary, push-to-talk switches are provided for the intercom and radio "keying" functions. These are located on the individual ICUs and protected by guards. Keying a radio also places the user's voice in the intercom for other users to monitor.
- Variety of headsets can be used with the intercom system. The system accommodates most types of dynamic and 2-wire electret type microphones and headset speaker impedances from 50 to 2000 ohms.
- The Intercom Master Unit (IMU) and Intercom Control Unit (ICU) are designed to comply with military environmental shock and vibration specifications.
- A limiter and speech frequency filter circuits in each channel control the level of the headset microphone and filter out extraneous noise.
- To reduce potential acoustic feedback between the headset speakers and the headset microphone, the side tone is attenuated by as much as 32dB (adjustable from inside of the master intercom unit).
- Power requirement for this demonstration intercom system is +12 to +31 volts DC from an external power source. The power input is protected by a self-resetting fuse, which can be quickly reset in the field without tools. Current requirements are 350mA at 12V during initial "start up" and normally at 300mA.

1. SYSTEM COMPONENTS

1.1. INTERCOM MASTER UNIT (IMU):

The IMU is the AMCVIS system controller. It contains the various audio circuits, power supply, two radio interfaces, five intercom station interfaces and radio bridging control circuits. The components are housed in a splash-proof, rugged metal housing that can be mounted in a wheeled vehicle or boat.



FIGURE 2: INTERCOM MASTER UNIT (IMU) FRONT PANEL

Controls, indicators and jacks include:

1. A power “ON/OFF” switch located on the front panel.
2. A Green LED on the right side panel is the power ON indicator
3. A power jack located on the rear side panel.
4. Five jacks on the IMU front panel allow connection to the intercom control units (ICU).
5. Two radio interface jacks also on the front panel allow connection to the military and commercial two-way radios.
6. A cover labeled “RADIO AUDIO LEVEL ADJUSTMENT” (held in place by two thumb screws to provide environmental protection) allows access to the Radio #1 and Radio #2 RECEIVE and TRANSMIT level adjustments, (one per radio).
7. Two Green LEDs on the front panel are the P-T-T indicators for Radio #1 and Radio #2.
8. There are also five side tone adjustments, (one per station), that are located inside the IMU. These are not accessible from the outside of the unit (*no field adjustments should be required*).

FIGURE 3: REAR and SIDE of INTERCOM MASTER UNIT (IMU)



1.2. INTERCOM CONTROL UNIT (ICU):

The Intercom Control Unit, or ICU, is the individual's link to the intercom system and the radios connected to the intercom system's IMU. The ICU provides the user with:

1. Jack for a headset with a "Switchcraft" #483 connector
2. Personal earphone volume control
3. Personal radio selector switch
4. INTERCOM push-to-talk button to talk with others in the vehicle
5. RADIO push-to-transmit/talk button

The user talks through the intercom by pushing the INTERCOM P-T-T button or transmits over a selected two way radio by using the RADIO P-T-T button (these transmissions are also heard by all intercom users). All AMCVIS users (intercom and radio) hear all voice communications.

All five users can be talking on the intercom or radio at the same time.

All switches and controls are protected by guards.

The volume control permits the user to adjust the listening level in his headset from a preset minimum volume to maximum. This is an individual control and will not affect the listening level of the other users.

The system accommodates most types of dynamic and 2-wire electret type microphones and headset speaker impedances from 50 to 2000 ohms.



FIGURE 4: INTERCOM CONTROL UNIT (ICU)

2. AMCVIS ADJUSTMENTS PRIOR TO OPERATION

2.1. CONNECTING IMU COMPONENTS:

Securely connect power cable into the IMU power jack. When the power switch is in the “ON” position, the GREEN LED on the right side of the IMU will be lit.

Securely connect the radio cables into the IMU Radio jacks.

Connect at least two ICUs into the jacks on the IMU, labeled “INTERCOM STATIONS”.

Connect at least two headsets to the ICUs.

2.2. ADJUSTING AND BALANCING THE AUDIO LEVELS BETWEEN RADIOS AND INTERCOM HEADSETS (NO TEST EQUIPMENT IS REQUIRED):

RADIO PRE-ADJUSTMENT:

Set the radio’s volume control to a mid-position between fully CCW and fully CW.

AMCVIS IMU ADJUSTMENTS:

NOTE: NO FURTHER ADJUSTMENTS SHOULD BE NECESSARY. WE SUGGEST THAT THE FOLLOWING ADJUSTMENTS SHOULD ONLY BE MADE IF THE AUDIO LEVELS BETWEEN RADIO USERS AND/OR INTERCOM USERS AND INTERCOM USER AND/OR RADIO USERS IS DEEMED UNACCEPTABLE.

After removing the “Radio Audio Level Adjustment” protective panel, use a 3/32 flat tip screwdriver to rotate the trim pot adjustments. Turning the adjustment clockwise increases the audio level and counter clockwise decreases it. Each trim pot has only 270° of rotation. DO NOT FORCE THE ADJUSTMENT PAST ITS MECHANICAL STOPS.



FIGURE 5: AUDIO ADJUSTMENT POTS

To Radio #1

Set for undistorted audio from a headset to radio #1. Set with headset microphone place close to speaker’s lips. Radio # 1 must be selected at the ICU and the Radio P-T-T must be depressed and held.

From Radio #1

Set for maximum undistorted audio at a headset from radio #1. Set with ICU volume control fully clockwise and Radio output volume set to a mid position.

To Radio #2

Set for undistorted audio from a headset to radio #2. Set with headset microphone place close to speaker's lips. Radio # 2 must be selected at the ICU and the Radio P-T-T must be depressed and held.

From Radio #2

Set for maximum undistorted audio at a headset from radio #2. Set with ICU volume control fully clockwise and Radio output volume set to a mid position.

NOTE: If the Radio-to-Headset volume levels for Radio #1 and Radio #2 are not equal, adjust the levels at the ICU Radio output volume control.

2.3. ADJUSTMENTS FOR RADIO BRIDGING

NOTES:

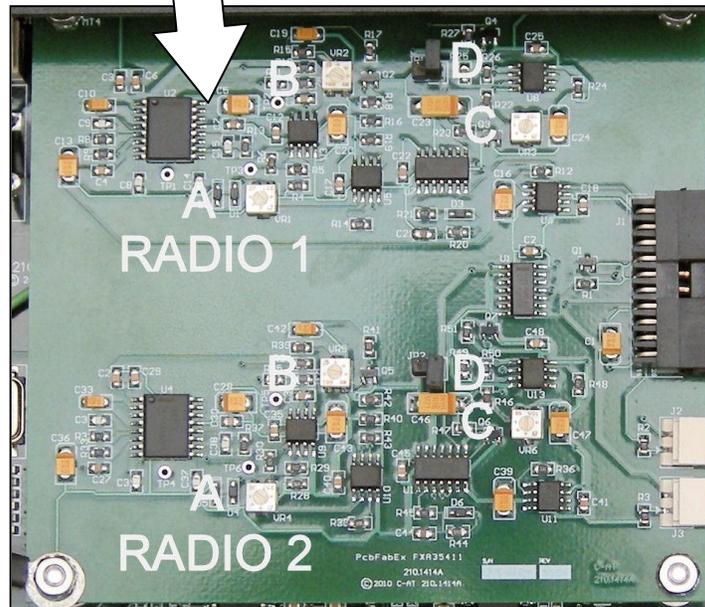
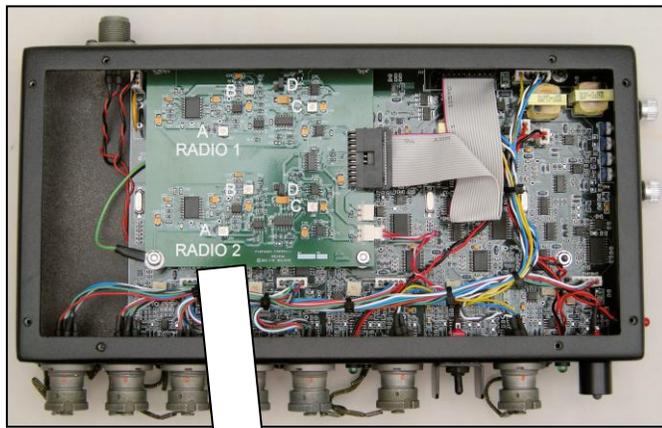
- THESE CONTROLS/SETTING ARE ONLY ACTIVE WHEN BRIDGING FUNCTION IS ENABLED
- THESE ADJUSTMENTS MUST BE MADE AFTER IMU SETTING IN PARAGRAPH 2.2 HAVE BEEN COMPLETED
- NO TEST EQUIPMENT REQUIRED

A: Radio VOX threshold Adjustment: Sets the sensitivity of VOX (voice-activated circuit) to incoming audio from radios to “key” bridged radio (*Technician note: factory set for 100mv @ 1khz*)

B: Tail Timer Adjustment: Sets the period of time that the VOX will continue to “key” radios after the end of a voice transmission received at the IMU (*Technician note: factory set for 1.5 seconds*)

C: Time Out Timer Adjustment; Set the period of time a message (or noise) will activate the VOX circuit and “key” the bridged radio (*Technician note: factory set for 60 Sec*).

D: Time Out Timer bypass jumper (TOT disabled when jumper installed)



IMU CONTROLS AND INDICATORS

2.4. FRONT PANEL

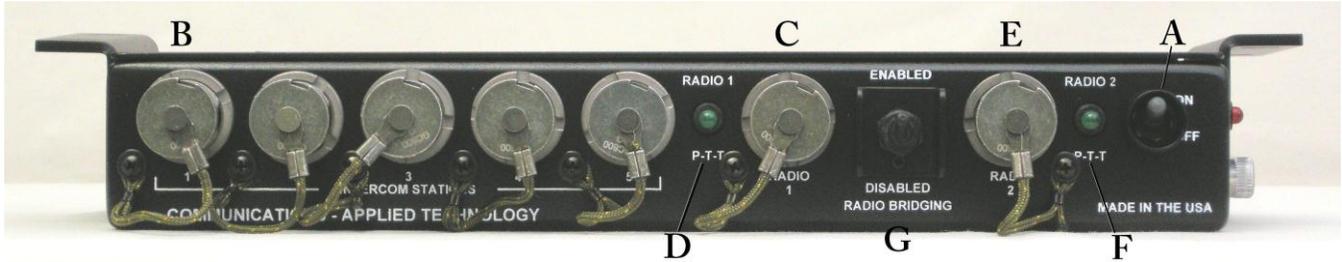


FIGURE 6: IMU FRONT PANEL

POWER “On/Off” Switch: A
This is a two position switch is used to turn the IMU power “ON” and “OFF”

INTERCOM STATION Jacks 1-5: B
Pin A: Mic High
Pin B: PCB Ground
Pin C: Audio out to headset
Pin D: Control signal
Pin E: 9V DC supply for ICU circuit
Pin F: Isolated microphone ground

RADIO INTERFACE #1 Jack: C
Pin A: Ground
Pin B: Audio from radio
Pin C: Audio to radio
Pin D: No Connection
Pin E: P-T-T

RADIO #1 P-T-T LED (Green): D
When this LED is lit, it indicates that Radio #1 is being keyed at an ICU.

RADIO INTERFACE #2 Jack: E
Pin A: Ground
Pin B: Audio from radio
Pin C: Audio to radio
Pin D: No Connection
Pin E: P-T-T

RADIO #2 P-T-T LED (Green): F
When this LED is lit, it indicates that Radio #2 is being keyed at an ICU.

BRIDGING ENABLE/DISABLE SWITCH G

- Normal condition is “disabled”
- When “enabled”; transmissions received at the IMU from Radio #1 are retransmitted over Radio #2
- When the bridged function is ENABLED, a crewmember connected to the IMU will transmit only over the radio that he has selected from the switch on his ICU.

2.5. SIDE and REAR PANEL



FIGURE 7: IMU SIDE/REAR PANELS

POWER LED (Red):

When this LED is lit, it indicates that the IMU is enabled

H

POWER INPUT Jack:

PIN OUT:

Pin A: +12 TO +31 VDC

Pin B: Ground

I

RADIO AUDIO LEVEL ADJUST (Controls under protective panel):

To Radio #1

Audio level adjustment from a crew station headset to radio #1.

From Radio #1

Audio level adjustment to crew station headset from radio #1.

To Radio #2

Audio level adjustment from a crew station headset to radio #2.

From Radio #2

Audio level adjustment to crew station headset from radio #2

J

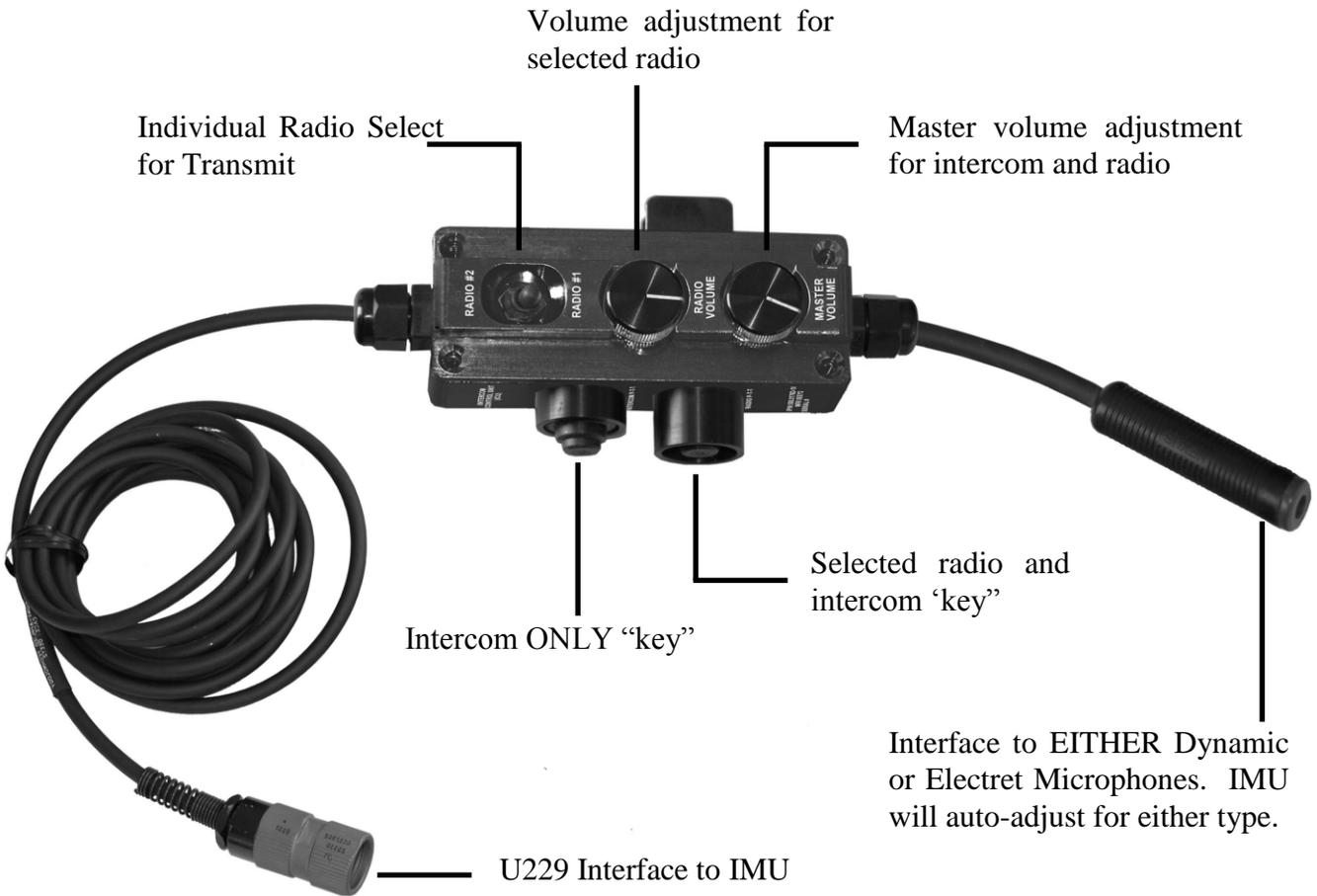
3. ICU CONTROLS AND INDICATORS

On the ICU is a jack that will mate with “Switchcraft” #483 headset plug.

A spring-loaded clothing clip is provided on the ICU.

To plug the cable’s connector into a jack on the front of the IMU, align the ICU plug and IMU jack Intercom and Radio P-T-T switches, and volume control are installed on the ICU.

FIGURE 8: INTERCOM CONTROL UNIT (ICU)



4. CABLE AND CONNECTOR INSTRUCTIONS

4.1. POWER CABLE:

The IMU power cable is supplied with an unterminated end. The cable should be secured away from any sharp objects. Power requirement for the demonstration IMU is +12 to +31 volts DC from vehicle or an external power source. The power input is protected by a circuit breaker, (mounted on the side of the IMU enclosure), that can be reset by the user in the field without any tools. Refer to drawing below.

Line up the keyway on the IMU's jack, labeled POWER, with the tab on the inside of the cable's connector, sliding the connector body down until the threads make contact. Rotate the threads clockwise until the power connector body is finger tight to the receptacle.

DO NOT OVERTIGHTEN OR DAMAGE TO THE THREADS MAY OCCUR.

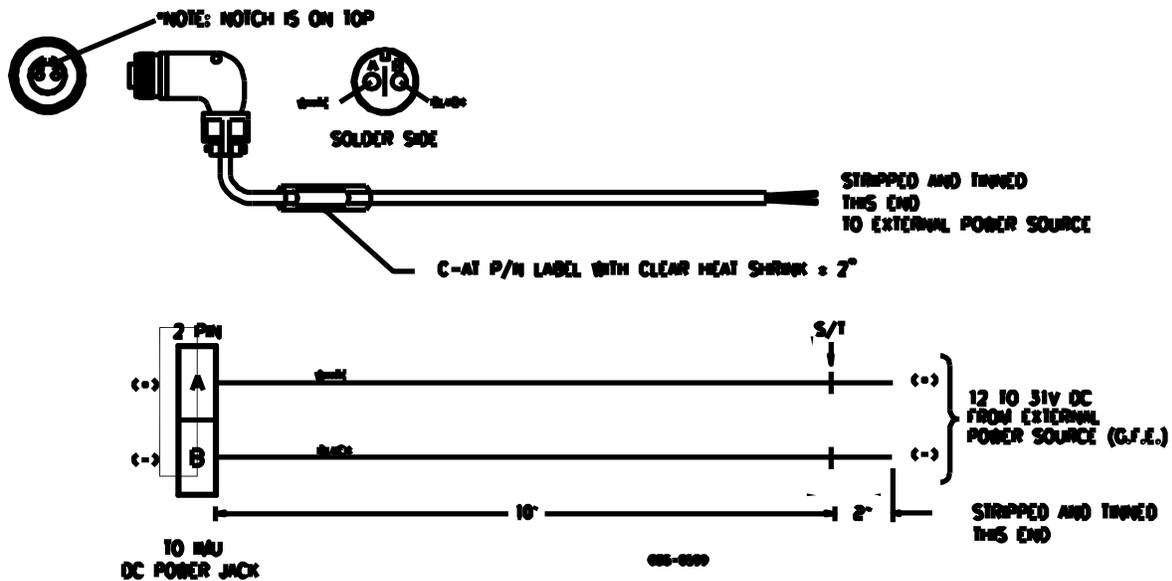


FIGURE 9: POWER CABLE/CONNECTOR

4.2. RADIO CABLES:

The IMU radio cables should be routed to their associated radios. The cables should be secured away from any sharp objects.

To plug the cable's connector into the IMU receptacle, take off the dust cover by turning counterclockwise. Align the connector keyway (red dot) and push the connector into the receptacle turning clockwise until it "locks" in place.

To disconnect the cable from the IMU, turn the connector counterclockwise, then pull on the connector's outer shell. Do not pull on the cable. Always replace dust cover if no cable connector will be attached.

Note: A silicon based lubricant on the plug's internal "O" ring may be helpful if excessive binding is encountered during this process. Do not remove the rubber "O" rings from the connectors; they are essential for proper operation of the connector.

APPENDIX A: SYSTEM COMPONENTS

Component	Part Number	Quantity required
<p align="center">Intercom Master Unit (IMU)</p> <p>Dimensions 33.65cm (29.21cm) x 19.05cm x 5.08cm</p> <p>Weight 3.25 lbs/1.47kg</p> <p>Current requirements @ 12.0VDC: 300mA</p>	<p>500.7045</p>	<p>1 each</p>
<p align="center">Power supply interconnect cable stripped and tinned</p>	<p>500.0757-10</p>	<p>1 each</p>
<p align="center">AMCVIS Primary Radio Interface Cable, 10' length</p>	<p>500.0759-10</p>	<p>2 each</p>
<p align="center">Intercom Control Unit (ICU) Specially configured for use with IMU P/N 500.7045</p>	<p>500.0726-10</p>	<p>1 each per user, maximum 5 per system</p>
<p align="center">Interoperability Circuitry for AMCVIS with two position on/off switch</p>	<p>500.7010</p>	<p>1 each installed on IMU</p>

APPENDIX B: SYSTEM PREVENTATIVE MAINTENANCE

Before each use please check the following:

1. Make sure all connectors are dry tight and clean.
A pencil eraser and a can of compressed air can be used to brighten contacts and remove dust and debris.
2. Aggressively shake each ICU to see if its mounting screws or internal hardware has worked loose.
Tighten any screws that show signs of movement.
3. Inspect all the cable runs for abrasion, stretching, and other kinds of damage. Replace any that show signs of damage or excessive wear and might fail.
4. Inspect the power connection to the vehicle's DC distribution system.
Insure that the terminals are clean and have a solid connection.
Good clean DC power is essential for proper operation.
5. Test each crew station interface.
Set the Radio Selector Switch to the Two-Way Radio #1.
With a known good crew headset do the following:
Test the Intercom P-T-T button; you should be able to hear your own side tone.
Vary the volume control from minimum to maximum, to insure that the volume control works.
6. Do your radio checks and adjust the levels slowly and carefully.
The trimmer pots have an adjustment range of about 270 degrees.
Use only small precision tools designed for this task.
Using too much force can break these parts, requiring a return to the factory for repair.
7. Test the Radio P-T-T Button
Ask for a radio check of the Two-Way Radio.
The goal is to transmit and receive well on the Two-Way Radio #1.
8. Set the Radio Selector Switch to the Two-Way Radio #2.
Ask for a radio check of the Two-Way Radio.
The goal is to transmit and receive well on the Two-Way Radio #2.
9. Should any of these field checks fail, follow your procedures for changing out the failed item and have it submitted for higher level repair by returning it to manufacturer.

FOR TECHNICAL ASSISTANCE

CALL 800-229-3925 / 703-481-0068 or support@c-at.com

APPENDIX C: ALUMINUM MOUNTING BRACKETS TEMPLATE

Note: SEE FULL SIZE TEMPLATE ATTACHED (DWG#087-1098-8)

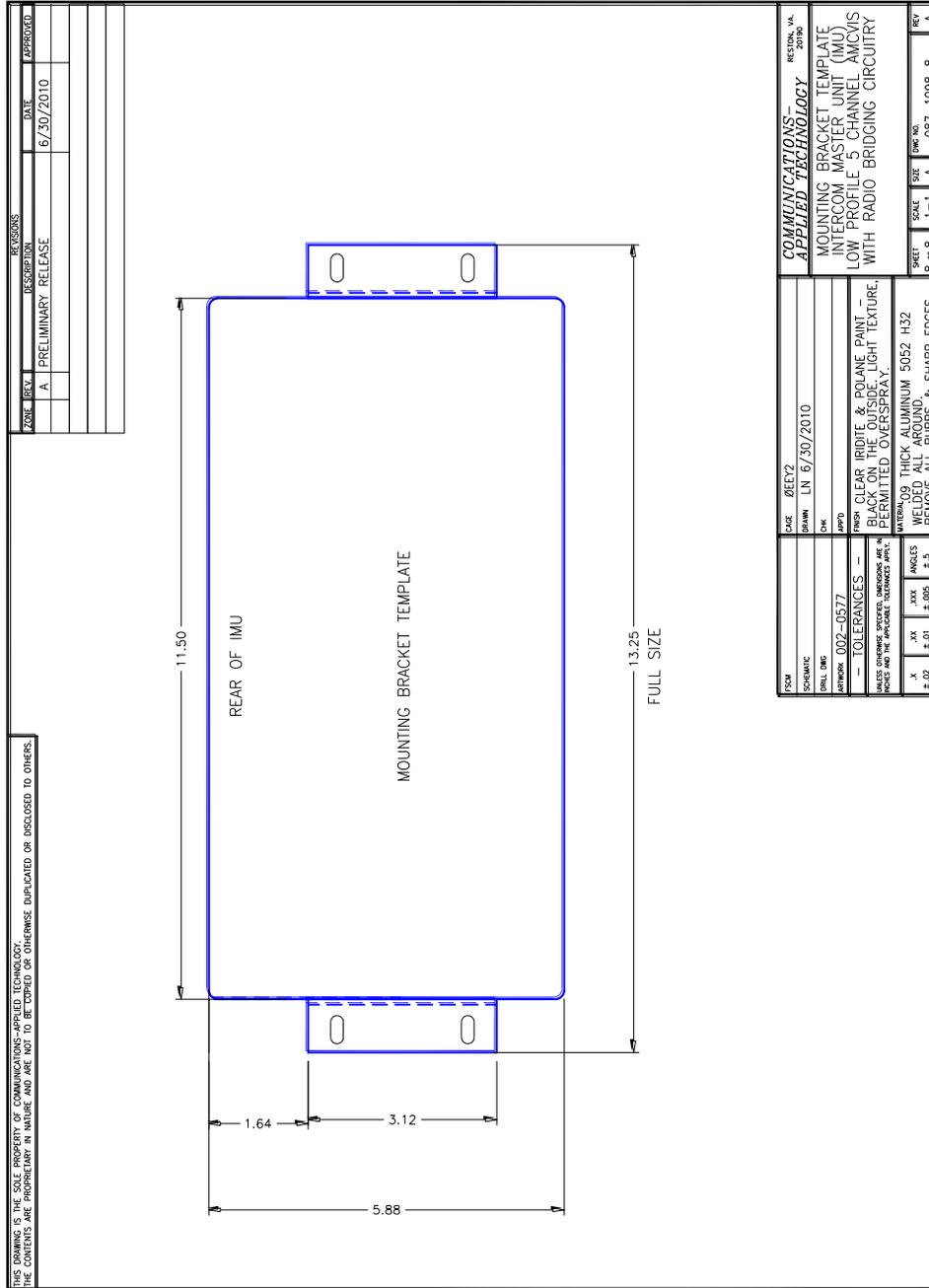


FIGURE10: MOUNTING BRACKET TEMPLATE