

Operating and Maintenance Manual

DIVEX Portable Diver Radio, 3 Channel

Part No.
Document No.
Revision

CO373AA
CO-OM-807
1

This document is available digitally at:



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APPROVAL SHEET

Document Information				
Manual No	Title	Classification	Current Revision	Date
CO-OM-807	Operating and Maintenance Manual Diver Radio, 3 Channel, Portable	© JFD	1	09/05/16

Revision History					
Rev	Date	BY	CHK	APP	Comments
0	02/04/14	D. Allan	M. Summers	S. Coull	Original Issue
1	09/05/16	JR Cusson	L. Wedekind	M. Hossack	Gain controls added

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ABBREVIATIONS

2 Wire	Two wires used for communications. Microphone and earphone share two wires of the umbilical. Also referred to as “Simplex”.
4 Wire	Four wires used for communications. Two wires are used for the microphone and two wires are used for the earphone. Both functions are present simultaneously. Also referred to as “Duplex”.
A	Ampere, SI unit of electrical current
AC	Alternating Current
DC	Direct Current
Hz	Hertz, SI derived unit of frequency
PDR	Portable Diver Radio
PTT	Push To Talk
R-R	Round Robin, all comms channels open
V	Volt, SI derived unit of electrical potential difference

The following notices are used throughout this document:

WARNING **INFORMS THE READER OF AN OPERATION WHICH MAY BE HAZARDOUS TO HEALTH.**

CAUTION **Inform the reader of an operation which may cause damage to equipment.**

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INTRODUCTION

Figure 1 Portable Diver Radio in the Vertical Orientation



The CO373AA portable diver radio is a battery operated communications system for up to three divers and supervisor.

The portable diver radio supports 3 channels which are Diver 1, Diver 2 & Diver 3. Each diver channel has industry standard banana sockets for connection of the diver's umbilical and either 2 wire or 4 wire comms may be used. When using two wire comms the umbilical is plugged into the red (microphone) socket only, and when using 4 wire comms the umbilical is plugged into both the red (microphone) socket and the black (headphones) socket.

Diver round robin is available which allows diver to diver communications, this is selected by switching the Diver R-R switch to the on position.

The supervisor may choose to talk via a panel mounted microphone, hand held microphone or a headset mounted boom microphone, each microphone is fitted with a PTT switch. He may listen to diver transmissions via a panel mounted speaker or plug in headset. The speaker switch controls both the panel mounted speaker and panel mounted microphone, thus if the speaker switch is on, the panel microphone is available on pressing the panel PPT switch. The volume to the panel speaker or supervisor headset is controlled by the supervisor volume control.

The supervisor can choose to communicate with each diver individually or to all at the same time. The diver select switch is used to select which diver the supervisor is communicating with, either diver 1, diver 2, diver 3 or all can be chosen.

A record out socket is provided for output to a recording device.

The ruggedised case houses two sealed lead-acid batteries and a three stage smart battery charger. The in built batteries will provide in excess of 10 hours communication between the supervisor and up to three divers. The three stage smart charger will charge the batteries from a fully discharged state in approximately four hours. A battery monitor provides a visual indication of the battery status at all times when the power switch is in the on position.

Features include;

- Housed in a Storm Peli™ Case,
- 10 hours usage per charge,
- Quick charge time,
- Battery monitor providing constant battery status,
- Selector switch for choosing individual or all diver communications,
- Individual volume controls per diver,
- Single or double earpiece headsets,
- Panel mic/speaker and hand held mic options,
- Diver to diver communications,
- 2 or 4 wire operation,
- Powered microphone compliant (4 wire operation only),
- Safe for Air Carriage (contains no Lithium Ion batteries),

FUNCTIONAL DESCRIPTION

POWER SUPPLY

The CO373AA portable diver radio is a battery-operated unit and does not require an alternative power source unless the batteries are being charged. The battery life is approximately 10 hours, this is dependant on how frequent audio is being transmitted and received.

The built-in battery charger can be powered from a mains supply of 90 VAC to 264 VAC at 50 / 60 Hz. The power inlet is twin-fused and has 2 A anti-surge fuses installed into the fuse holders. The charger used will auto detect the battery charge level and is able to detect when the charging process is complete. The battery charge indicator (Figure 2) will show fully charged during battery charging, on disconnecting the mains supply the battery charge level indicator may take up to 3 minutes to stabilise and display an accurate charge state.

WARNING ONLY CHARGE THE DIVER RADIO IN A DRY ENVIRONMENT.

CAUTION Do not exceed the supply voltage stated above during charging.

It is recommended that battery charging takes place at the end of diving operations and the user should monitor the battery indicator on a regular basis. Battery charging should not be performed during diving operations as this may affect audio quality.

An external battery can be connected to the power socket using a specific cable to increase the battery life if long duration work is being carried out or if charging is not possible. Only batteries with a nominal voltage of 12 V can be used for this feature.

When not charging the batteries or using an external battery the dust cap should always be connected to the power inlet connector (Figure 2).

Figure 2 Power Section



DIVER TO SUPERVISOR COMMUNICATIONS

The supervisor receives communications from all three diver channels. The volume of the diver(s) audio signal is controlled by the supervisor volume control.

A power amplifier provides an audio output for the panel speaker and the supervisor headphones. It is possible to switch the panel speaker on or off via the speaker switch, this also switches the panel microphone on or off at the same time.

The diver(s) umbilical's can be wired for either 2 wire or 4 wire communications. There is a switch to select if 2 wire or 4 wire is being used.

Each divers microphone circuit is equipped with a gain control which independently adjusts the volume of each divers speech. This allows all three divers communications to be set at a similar volume even if using different models of microphone. The gain controls have no effect during 2 wire operation. The gain controls are labelled Diver 1 Gain, Diver 2 Gain and Diver 3 Gain.

SUPERVISOR TO DIVER(S) COMMUNICATIONS

The diver(s) receive communications from the supervisor only when the PTT button is pressed and held. Each diver circuit has a volume control to set the audio signal level received from the supervisor and from other divers during round robin comms at a comfortable level. The controls can be used to optimise the volume to each diver's

earphone(s) individually. The volume controls are labelled Diver 1 Volume, Diver 2 Volume and Diver 3 Volume.

The supervisor can select which diver receives the audio signal from the supervisor's microphone. The diver select switch (Figure 3) on the panel gives the supervisor the option to communicate to diver 1, diver 2, diver 3 or all divers.

Figure 3 Supervisor headset socket and controls



The panel contains a built-in microphone, this is used in the same manner as the hand-held microphone or headset microphone, the PTT button needs to be pressed and held whilst communicating to the diver(s). It is possible to switch the panel microphone on or off via the speaker switch on the fascia panel.

DIVER TO DIVER COMMUNICATIONS

When diver round robin is switched on, each diver has the ability to talk and listen to all other divers. This function is only available in 4 wire mode. The round robin switch is labelled DIVER R-R.

RECORD OUTPUT

All audio signals are available for recording purposes at the record signal connector (Figure 3). An Industry standard phono socket is used for the record output.

POWERED MICROPHONES

The portable diver radio is designed to operate with the latest diver headsets with powered microphones. The powered mic headsets produce the highest quality communications in the Divex headset range. The microphones used on the headsets are powered from a low voltage supply provided from the diver radio and provide superior quality of communications when compared with standard diver headsets.

The new headsets utilize the same four pin connectors as Divex standard headsets and there is no change required to umbilical wiring.

When using powered microphones the powered mic switch (located at the top-centre of the right-hand panel) must be in the on position. This switch provides low voltage supply to the microphone. Powered microphones can only be used in 4 wire operation and the orientation of the microphone connector is important when plugging into the diver radio. If communications are not available from the diver when using a powered microphone and the powered microphone switch is in the on position the diver microphone connector (usually red) should be disconnected and plugged back in the opposite orientation.

OPERATION

OVERVIEW

Figure 4 Portable Diver Radio as supplied



The portable diver radio is supplied with the lid closed and ancillary items such as the hand held microphone and power cable stowed inside the case.

The system can be used while placed in either a horizontal or vertical orientation. To use the system in the horizontal orientation, press the release button on the lid latches and lift the latches up. The system will look like the below image and is now ready to connect the hand held microphone (or headset) and the divers umbilical.

Figure 5 Horizontal orientation



To use the system in the vertical orientation, remove the hinge pin from the case (Figure 6). Press the release button on the lid latches and lift the latches up. The case lid can now be completely removed (Figure 7). Refit the case lid to the rear of the case where there are hinge assemblies located (Figure 8).

The hinge pin should be re-installed ensuring that the tip on the formed end passes through the hole in the lid (Figure 8). Press the latches down and ensure they click into the retaining blocks located at the front of the case.

The system is now ready to connect the hand held microphone or headset and the divers umbilicals (Figure 9).

Figure 6 Removing hinge pin



Figure 7 Hinge pin and lid removed



Figure 8 Hinge pin replaced to the bottom rear side of the PDR



Figure 9 Lid latches closed securing the lid and base together



To convert the diver radio back to its normal operating configuration simply remove the hinge pin (Figure 7), fit the lid back to the top section of the case and refit the hinge pin. If diving is completed, turn off the unit (The battery indicator will turn off for a visual indication that the unit has shut down) close the lid and secure the lid latches.

SYSTEM DEPLOYMENT

Switch the unit on and observe the battery level, if the battery level is low then the batteries should be charged. To charge the batteries, plug the mains cable into the power inlet connector (Figure 2) and connect the mains plug to a power source.

The power on/off switch (Figure 2) can be switched to the on position at any point during charging to check that the batteries are being charged. When charging the battery indicator will illuminate the right most bar as if the battery is fully charged. To check the battery charge status, turn off the mains supply and observe the battery indicator. When the battery indicator reaches fully charged, turn the power switch to the off position, remove the mains power, disconnect the power connector and fit the dust cap over the power inlet connector.

When connecting the supervisor headphones ensure the electrical connector is correctly orientated with the keyways aligned, see Figure 10.

Figure 10 Electrical Connector



CAUTION Ensure the dust cap for the power connector is always connected during operational use.

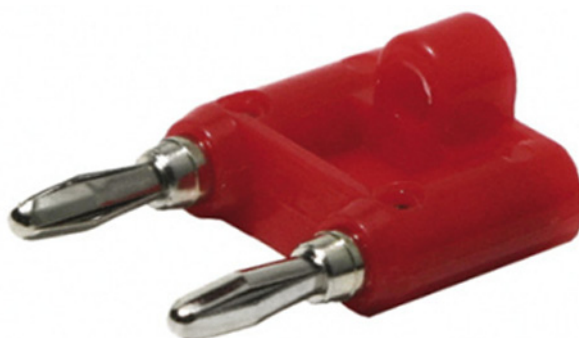
Connect the hand help microphone (or headset) to the supervisor headset connector on the fascia panel (Figure 3).

Connect the diver umbilical's to the terminal posts in the following way;

Note **Umbilicals must be all of the same type, either all 2 wire or all 4 wire.**

For a 2 wire setup (2 wire umbilical), stack the earphone and microphone banana plugs, and connect to the microphone terminal post of the relevant diver, or if a single banana plug is used connect this directly to the microphone terminal post of the relevant diver. Ensure the 2 wire / 4 wire switch is in the 2 wire position.

Figure 11 Twin Banana Plug



For a 4 wire setup, connect the microphone banana plug to the microphone terminal post and the earphone banana plug to the earphone terminal post of the relevant diver. Ensure the 2 wire / 4 wire switch is in the 4 wire position. If powered microphones are being used the powered microphone switch must be in the on position.

Determine if the communication audio for the operation requires to be recorded. Remove the cap on the record out connector and plug a phono cable into the record out jack of the portable diver radio. Plug the other end of the cable into a suitable recording device. Retain record connector protective cap.

CAUTION **If recording is not required the record connector blanking plug must always be fitted.**

Before carrying out pre-dive functionality checks, ensure all volume and gain controls are turned to the lowest level (Anti-clockwise as per Figure 12). The volume and divers speech volume may not be turned completely off using the volume and gain controls. The controls are designed so that there will be a minimum volume level to ensure the diver can be heard at all times.

Figure 12 Diver volume and gain controls at minimum



WARNING THE PORTABLE DIVER RADIO IS CAPABLE OF PRODUCING HIGH VOLUMES. ALWAYS CHECK VOLUME LEVELS IN ALL FUNCTIONS BEFORE USING THIS PRODUCT.

PRE-DIVE FUNCTIONALITY CHECK

Switch the power switch to the on position. The battery level indicator will illuminate to verify the system is on.

If the system has the record out phono jack connected, press the record button on the recording device being used.

WARNING THE PORTABLE DIVER RADIO IS CAPABLE OF PRODUCING HIGH VOLUMES. ALWAYS CHECK VOLUME LEVELS IN ALL FUNCTIONS BEFORE USING THIS PRODUCT.

Adjust the supervisor volume control located on the fascia panel to approximately 25%.

Adjust each diver(s) mic gain controls until all divers can be clearly heard by the supervisor, ensuring there is no distortion or “clipping”.

Adjust the diver(s) volume controls until all diver(s) can hear the supervisor at a comfortable level.

If R-R is required, verify that each diver can hear the other divers at a comfortable level.

Check the record out level.

Note Signal levels should primarily be adjusted by altering the volume controls. Once mic gains have been set to a reasonable level for the microphones in use, they should only be adjusted if distortion of communications is encountered, or if suitably loud signals cannot be achieved by turning up volume controls all the way.

To enable Diver Round Robin (4 wire mode only) turn the Diver Round Robin switch to the on position, this will allow diver to diver communications between all divers and supervisor. This can be switched on or off as required.

Only switch the powered microphone switch to the on position if powered microphones are being used.

CAUTION Turning the powered microphone switch to the on position when not using powered microphones may reduce the life of the microphones.

SYSTEM OPERATION WHILST DIVING

If the system has the record out phono jack connected, press the record button on the recording device to begin recording.

During diving operations, at any time the supervisor can adjust the supervisor volume control located on the fascia panel to control the volume of the diver(s) to supervisor speech.

To communicate to the diver(s), the supervisor should select which diver(s) should receive his audio signal. The diver select switch allows the supervisor to communicate to each diver individually or to all divers. For the diver(s) to receive audio from the supervisor, the PTT button should be pressed and held either on the panel, on the headset or on the hand held microphone.

The panel contains an in-built microphone, this is used in the same manner as the hand held microphone or headset microphone, the PTT button needs to be pressed and held whilst communicating to the diver(s). It is possible to switch the panel microphone on or off via the speaker switch on the fascia panel.

If the panel microphone is turned off the speaker is also turned off. When communications are required in noisy environments it is recommended that the supervisor uses a headset.

The supervisor can adjust the diver(s) volume control for the relevant supervisor to diver communications channel to an acceptable listening level, each diver has an individual volume control.

To enable diver round robin turn the diver round robin switch to the on position, this will allow diver to diver communications between all divers. This can be switched on or off as required.

If battery power level becomes low during diving operations (the third LED battery level indicator illuminated) connect an external 12 V battery to the power socket using the specific cable as specified in the spares list. Connect the battery cable to the battery, then turn all the panel volumes to minimum and connect the battery cable to the panel. Return the panel volumes to an acceptable level.

SYSTEM SHUTDOWN

Once diving operations have concluded and the divers are demobilized, press the stop button on the recording device if a recording device was used.

Unplug the recording cable and fit the blanking plug over the record out phono connector. If any of the protective covers or caps are missing/damaged refer to spares list at the rear of the document for replacements.

Unplug the supervisor's headset and replace the connector dust cap.

Unplug the diver(s) umbilical from the unit

Check the battery indicator, if the battery needs to be charged plug the mains cable into the power inlet connector and connect the mains plug to a power source. When the battery is fully charged, turn the power switch to the off position, remove the mains power, disconnect the power connector and fit the dust cap over the power inlet connector.

If the system has been used in the horizontal orientation, close the lid and secure the latches on the lid to the clips on the case.

If the system has been used in the vertical orientation, remove the lid from the rear of the case and refit to the original condition. Figure 7 shows the pin removed and lid detached.

MAINTENANCE

Clean and remove any dirt or debris from the portable diver radio panel. Plug the mains cable into the power inlet and leave to charge until the battery is fully charged.

Note The unit does not need to be switched on while charging, however the battery charge indicator may only be read when the unit is on.

The battery charge time is approximately 5 hours from a fully discharged state to a fully charged state. A faster charge time will be achieved if the battery is not in a fully discharged state.

Wipe down the panel and ensure all connector dustcaps have been installed. The unit should be stored in dry environment and temperature of -10°C to +70°C when not in use.

BATTERY REPLACEMENT AND DISPOSAL

Remove the 12 M4 screws and washers from the front fascia. Lift fascia and flip over so that the fascia sits up vertically. Remove the M4 screws from the battery brackets and remove battery brackets. Disconnect shrouded crimps from batteries taking note of connections.

It is recommended that the EM3606 batteries listed in the spares section are used when replacing the batteries. Reconnect the batteries to the PDR using the shrouded crimps following previous connections. Check that the batteries are correctly connected by turning the PDR on (The battery LED indicator will give a visual reference for the units power state). Replace the battery bracket and securing using M4 screws as before. Place the fascia back to its original position making sure O-rings and other seals are in place. Secure fascia using M4 screws and washers as before.

Used batteries must be disposed of responsibly. The batteries used in the PDR are Lead-Acid batteries and the relevant regulations should be followed for the disposal of the batteries.

FUSE REPLACEMENT

WARNING DISCONNECT MAINS SUPPLY TO THE PDR BEFORE REMOVING FUSES.

To replace the fuses of the PDR check that power is off and the mains supply has been disconnected. Unscrew the two fuse holders that sit under the power inlet (Figure 2). Remove the insert that holds the fuse from the body of the fuse holder and replace the fuse. It is recommended that fuse EM13357 is used as a replacement. Place the insert complete with new fuse into the main body of the fuse holder and secure (Fuse holders only require to be finger tight).

TECHNICAL SPECIFICATION

MECHANICAL

CASE DIMENSIONS	
Length	361 mm
Width	289 mm
Depth	165 mm
Weight	6.5 Kg

ELECTRICAL

POWER SUPPLY	
Input	90 VAC - 264 VAC 50 / 60 Hz
Fuses	2 Amp (Anti-surge) x 2

BATTERY POWER	
Battery power	12 VDC 5.8 Ah
Battery run time	Approx. 10 hours
Battery charge time	Approx. 5 hours

POWER AMPLIFIERS - ONE PER CHANNEL	
Output	10 Watts into 8 ohms
Frequency response	300 Hz to 12 kHz

INPUT IMPEDANCE	
Input impedance	600 ohms, transformer isolated
Frequency response	300 Hz to 12 kHz

SPARES LIST

CABLES	
CO373133	UK Power Cable
CO373134	External Battery Cable

SUPERVISOR EQUIPMENT	
CO640	Supervisor Headset
CO373132	Hand Held Microphone

DIVER HEADSETS / MICROPHONES	
CO641	Powered Microphone Headset (AGA Mask)
DE086	Diver Comms Set - Kirby Morgan
DE097	Microphone - Kirby Morgan
DE042	Earphone, Left - Kirby Morgan
DE077	Earphone, Right - Kirby Morgan

ANCILLARY	
EM13357	2 A Fuse
EM3435	Connector Dust Cap
EM3604	Record Out Cap
DD500012	Switch Covers
EM3606	Battery



NOTES

[illegible]

