JANUS

OPERATORS MANUAL

Specialist Demolitions and Explosive Method of Entry Device

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Product Manager	**Reviewer**
Tony Humphries Product Manager - RI	**Roger Ballantine GENERAL MANAGER**
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MAS Zengrange (NZ) Ltd
30 - 32 Downer Street, Lower Hutt
Wellington
NEW ZEALAND

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Please direct any queries/comments reference this document to:

Product Manager (RI)
MAS Zengrange (NZ) Ltd
30 – 32 Downer Street
Lower Hutt 5010
Wellington
NEW ZEALAND

Tel: +64 4 570 2688
Fax: +64 4 570 2677
Email: **product.manager.ri@maszengrange.co.nz**

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Amendment	Date	Description
1	5/11/2012	Initial Release. *Derived from M15-00104 iss 5.*
2	6/11/2012	Updated Annex A and B Error code tables.
3	7/11/2012	Added FCC Warnings under Warnings and Cautions section. Added FCC certification in section 2.

JANUS
OPERATORS MANUAL
CONTENTS

SCOPE OF THE MANUAL

1. This Operators Manual is for JANUS - Specialist Demolitions and Explosive Method of Entry Device. The purpose of this operators manual is designed to meet two requirements:

    a. To provide operators with a structured programmed learning text, this includes sufficient detail and examples, to allow them to operate JANUS - Specialist Demolitions and Explosive Method of Entry Device.

    b. To provide an instructor with a manual containing sufficient information to conduct a lesson. It is assumed the instructor will:

        (i). supplement the content to cover operational procedures, not included in this manual, and

        (ii). create additional examples.

2. The objective of this manual is to provide information as a training aid only. It is not to be used as a stand-alone training package.

3. Throughout this manual JANUS - Specialist Demolitions and Explosive Method of Entry Device will generally be referred to as “JANUS” or “device”.

4. This operator manual is designed to explain the functionality of JANUS. **It should not be used as a reference for demolitions, the handling of explosives or blinds and misfires.** Direction provided in this manual is not intended to replace Unit Standard Operating Procedures.

5. Experience has shown that most perceived “errors” are the result of incorrect procedures or data being entered into JANUS (transmitter or receiver) by operators or operators not fully understanding the correct procedures or how data is processed by JANUS. It is strongly recommended that local policies and procedures be developed to implement training and independent checks to negate error situations.

LAYOUT OF THE MANUAL

6. The layout of the manual is structured to:

   a. Provide a general description and specifications of JANUS,

   b. Provide detailed operation of JANUS,

   c. Detail how to enter, amend and delete data, and

   d. Provide guidance on operator maintenance.

7. Throughout the manual whenever a specific key/button on the transmitter or receiver is referred to, it is described using the greater and less signs either side of the name that is displayed on the key, e.g. the “ON” key would be described as <ON>.

WARNING AND CAUTION INSTRUCTIONS

8. Instructions which are particularly important in terms of functional reliability and safety are highlighted under the headings WARNING or CAUTION. Warnings and Cautions in this manual are indicated by a yellow triangle with a black border and the word **WARNING** or **CAUTION** followed by a short description. Particular attention should always be paid to Warning or Cautions when given. The Warning/Caution definition is described below:

 **WARNING**: Indicates a potentially hazardous situation or an unintended use which, not avoided, could result in death or serious injury and/or serious appreciable material, financial and environmental damage.

 **CAUTION**: Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.

OPERATOR EXAMPLES

9. The operator examples are primarily included for those operators who are using the manual as a programmed learning text.

10. Operator examples use standard formats for training. The operator examples are designed to practice operators in specific JANUS processes/procedures and should not be taken as a guide for tactical or operational purposes.

11. Some examples may rely on data entered in previous chapters, therefore the manual should be followed in the order chapters are listed.

ALTERATIONS

12. MAS Zengrange (NZ) Ltd reserves the right to make such alterations as they may consider necessary in the light of experience. For this reason (although current when first released) the particulars and details specified in this manual/publication may not conform in every detail with future production of the equipment detailed herein. Illustrations, descriptions and technical data are not binding and may be changed without notice.

MAINTENANCE

13. The JANUS hardware is manufactured to Defence Standards. Operator maintenance requirements are minimal and no special tools are required. Maintenance, beyond the operator level, is only to be carried out by MAS Zengrange (NZ) Ltd or suitably trained and authorised technical personnel.

WARNINGS AND CAUTIONS

WARNING

Personal Safety:

- To prevent personal injury or death, read and fully understand the operating instructions and all warning and cautions before using the JANUS equipment.
- Do not operate JANUS equipment unless fully trained on all aspects of setting up, operating and maintaining the equipment.
- The understanding of this manual and local instruction is the basis for the safe use of this equipment.
- Not following correct operating procedures or practices could result in personal injury or loss of life.
- Do not operate any JANUS equipment or accessories unless you are a competent and qualified user or a student under supervised instruction.

WARNING

Objective:

The objective of this manual is to provide information as a training aid only. It is not to be used as a stand-alone training package.

WARNING

Intended purpose:

JANUS (Specialist Demolitions and Explosive Method of Entry Device) is a short range UHF radio controlled initiation system designed to initiate shock tube for Specialist Demolitions and Explosive Method of Entry.

WARNING

All technical repairs and maintenance is to be carried out by MAS Zengrange (NZ) Ltd or suitably qualified and authorised technical staff only.

WARNING

Hazard: **(Multiple Channel Selection)**

A JANUS set potentially has the capability to have receivers within the same JANUS set operated on different channels. This capability is provided so that different operating groups can operate with separate channels and avoid

mutual interference with other nearby groups. Using this capability within a single JANUS deployed set is operationally hazardous and is advised against.

WARNING

Inappropriate use brings the risk of:

- Death or injury.
- Damage to equipment or ancillaries.
- Malfunction.

WARNING

Inappropriate use:

- Deployment or use of JANUS without prior knowledge of the operating instructions and/or safety notices.
- Unauthorized changes and modifications to JANUS or accessories by the operator or user.
- Use of third-party accessories not expressly approved by MAS Zengrange (NZ) Ltd.
- Using JANUS or accessories in applications other than that for which they were intended.
- Use and storage outside of the intended limits.
- Unauthorized opening of JANUS or associated devices.
- Use of JANUS or accessories with obviously recognizable damages or defects.

WARNING

Build-in-Test: (BIT). 

On switching <ON> the Transmitter or Receiver, a BIT will automatically be performed. During the BIT all segments on the LCD should be displayed as shown above. A BIT should take no longer than 5 seconds. If any segments are not visible, switch <OFF> the device and do not use. The device is to be returned to a workshop facility for repairs. This WARNING is to be observed every time a transmitter or receiver is turned <ON>.

WARNING

Environmental Hazard:

JANUS uses off the shelf AA lithium commercial batteries that should be treated as hazardous waste.

- Deposit used batteries at a proper collection point and IAW local policies and directives.

WARNING

Hazard:

The batteries must:

- Not be short-circuited.
- Not be mechanically modified.
- Not placed in fire, incinerated or heated above their specified maximum storage or operating temperature.
- Not be disassembled, open or work on a battery in any way.

- Not be recharged, (primary cells or non rechargeable batteries only).
- Not inserted backwards, correct polarity must be observed.
- In the event of an incident, isolate the battery and remove it from inflammable materials.
- In the event of a battery leaking, protect the skin and eyes (in the event of contact, wash the parts affected with clean water and consult a doctor immediately).
- Do not use a battery of suspect appearance (impact, abnormal overheating, deformation, unusual odor, etc).

 **WARNING**

Physical Injury Hazard:

- Do not transport JANUS without storing in transport container or pouch and securing it - risk of injury when vehicle braking.
- Ensure JANUS is securely fitted in the vehicle hard stowage pouch during transit.

 **WARNING**

Obligation of the Operator:

The person responsible for the equipment must ensure that:

- The operators are qualified according to the local directives.
- All users understand these directives and adhere to them.

CAUTION

Avoiding storage and transport damage:

- When not in use, always keep JANUS in its pouch and container.
- Observe the permissible storage temperatures.
- Do not expose JANUS to strong mechanical shocks or abrupt temperature transitions during transport or storage.
- Use transit container or equivalent packaging for shipment.
- To prevent damage to JANUS caused by leaking battery electrolyte, remove battery from battery compartment if not being used. DO NOT leave battery in JANUS for long periods or when in storage for longer than seven days.

CAUTION

Equipment Damage:

- DO NOT operate JANUS before reading and fully understanding the operating instructions and all warnings and cautions.
- DO NOT operate JANUS equipment unless fully trained on all aspects of setting up, operating and maintaining the equipment.
- JANUS equipment is designed to resist 'day to day' impacts and knocks. To prevent damage to JANUS equipment DO NOT subject to high impact forces, for example, dropping from heights.
- To prevent damage to JANUS equipment, DO NOT operate if a malfunction is evident or suspected or the equipment is damaged in any way.
- To prevent damage to equipment, when cleaning, avoid use of solvents and abrasive materials, cleaning agents or scrapers.
- When inserting new battery check that they are connected correctly, DO NOT insert reversed, all batteries must face in the direction indicated with correct polarity.

WARNING

FCC Warning:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

WARNING

FCC Warning:

The user manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms may be used throughout this manual or seen on various LCD screen displays:

ABBREVIATION	MEANING
A	Fire All
ArM	Armed
Adr	Address
bAtt	Battery
BIT	Built-in-Test
CRC	Cyclic Redundancy Check
E	Enable
E123	Error Code (E followed by 3 Digit Number)
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMOE	Explosive Method of Entry
F	Fire
Fn	Function
IEDD	Improvised Explosive Device Disposal
km	Kilometres
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOS	Line of Site
LP	Local Procurement
MAn	Manual
MOE	Method of Entry

ABBREVIATION	MEANING
NLOS	Non-Line of Sight
NI	Not illustrated
NVG	Night Vision Goggle
NZ	New Zealand
RF	Radio Frequency
RI	Remote Initiation
Rx	Receiver
SOP	Standard Operating Procedure
ST	Shock Tube
STI	Shock Tube Interface
Tx	Transmitter
UHF	Ultra High Frequency

CHAPTER 1 - INTRODUCTION

SECTION 1

GENERAL DETAILS

1-1. JANUS is a short range UHF radio controlled initiation system designed to initiate shock tube. JANUS is ideal for:

a. Short range demolitions,
b. Specialist demolitions, and
c. Explosive method of entry/breaching.

1-2. The system has 16 selectable channels with 10 individual addresses available per channel. The transmitter has the ability to initiate a single receiver, a group of receivers collectively or all bonded receivers (on the same channel) simultaneously.

1-3. JANUS utilizes radio signals to transmit firing commands from a transmitter to a receiver(s). If signals are being intentionally or unintentionally jammed, JANUS has the ability to manually initiate shock tube by docking an armed receiver directly onto a transmitter.

1-4. Each system comprises of one transmitter and any number of receivers. Receivers are “dumb” until bonded to a transmitter; receivers can be bonded to other transmitters or zeroised if required.

1-5. Receivers are designed to be expendable and should be placed on or near charges in order so that they are destroyed. JANUS receivers are not designed to be used more than once on a live explosive task. Once a receiver has been used to initiate an explosive, and has not been destroyed, it must not under any circumstance be used again for another live explosive charge.

1-6. JANUS is designed to operate with shock tube with inner diameters between 0.8mm to 1.3mm. It should also be noted that shock tube should be cut perpendicular or at 90 degrees cleanly otherwise reliability can be affected.

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SECTION 2

GENERAL SPECIFICATIONS AND TECHNICAL DATA

1-7. JANUS is manufactured to Defence Standards. The following are general specifications and technical data for the JANUS system:

Operating Range:	All ranges from zero.
Non-Line of Sight (NLOS)	50m
Line of Sight (LOS)	100 - 200m
Weight:	
Transmitter	162 grams (excluding batteries)
Receiver	203 grams (excluding batteries)
Dimensions:	
Transmitter	95mm x 84mm x 43mm
Receiver	95mm x 73mm x 43mm
Housing:	
Transmitter and Receiver	PC/ABS (Polycarbonate / Acrylonitrile butadiene styrene)
Power Source: (Battery)	
Transmitter and Receiver	1 x Lithium: L91 AA (FR6) Cell 1.5V
Battery Life:	
Transmitter	24 hours with multiple firings
Receiver	24 hours
Transmitter Power Output:	Available on request
Frequency Range:	Available on request
Firing Delay: @ 25℃	0.50 Seconds

Operating Temperature:	-21°C to +58°C
Storage Temperature:	-40°C to +70°C
Processors:	Dual (Main and Safety)
Safe to Arm Time:	10 Seconds
Shock Tube Size:	Inner diameters between 0.8mm to 1.3mm
Environmental Specifications:	DEF STAN 00-35
Immersion	Test CL29-Immersion (1m)
Thermal	Test CL6-High Temperature, Humidity & Solar Heating Diurnal Cycle Test (Category B1/B3) (71℃), Test CL5-Low Temperature Test (Category C2) (-40℃)
Vibration	Test M1 Air Transport Vibration Test, Helicopter Vibration Test, Tracked Vehicle Vibration Test
Drop	Test-M5 Impact (Vertical and Horizontal) Test (1m unpackaged)
Dust and Sand	Test CL25-Dust & Sand-Turbulent Dust
EMC/EMI Certifications:	DEF STAN 59-411
Radiated E-Field Emissions	DRE01.A
Radiated Emissions Magnetic	DRE02.A
Radiated Susceptibility Magnetic	DRS01.A
Radiated Susceptibility Electric	DRS02.A
Electro Static Discharge (ESD)	DCS10.A
FCC	Code of Federal Regulations 47
Transmitter	Part 15 subpart C
	Section 15.249
Receiver	Part 15 subpart A and B

SECTION 3

DESIGN SAFETY FEATURES

1-8. JANUS is designed for maximum reliability and safety in all operating environments. When switched <ON> the transmitter and receiver perform a Built in Test, if a fault/error is detected the faulty device will automatically switch to a safe non-operational state (suspend mode), displaying the error code.

1-9. The press of two separate buttons is required to transmit a firing command.

1-10. Each transmitter contains a unique embedded registration code; only bonded receivers will react to a command from a bonded transmitter.

1-11. Dual processors are incorporated in the transmitter in order to ensure dual verification of transmitted code.

1-12. A comprehensive error checking system is employed on the radio transmission, involving a data comparison and validation process. This ensures the integrity of all detonation commands and hence a high safety standard.

1-13. A safe to arm period of ten (10) seconds is incorporated within the receiver prior to arming and is indicated by a flashing green LED.

1-14. When the receiver is armed the arming capacitor is fully charged and responsive to firing commands from the transmitter. During this period the receiver continuously monitors itself, if there is a safety discrepancy the capacitor is automatically discharged through a separate discharge path from the firing circuit.

1-15. Dual processors are incorporated in the receiver in order to ensure dual verification of received code and manage independent safety breaks.

1-16. The receiver arming capacitor automatically discharges on power down.

1-17. If at any time a fault within the transmitter or receiver is detected, the faulty device will display an error code and place itself into a safe state.

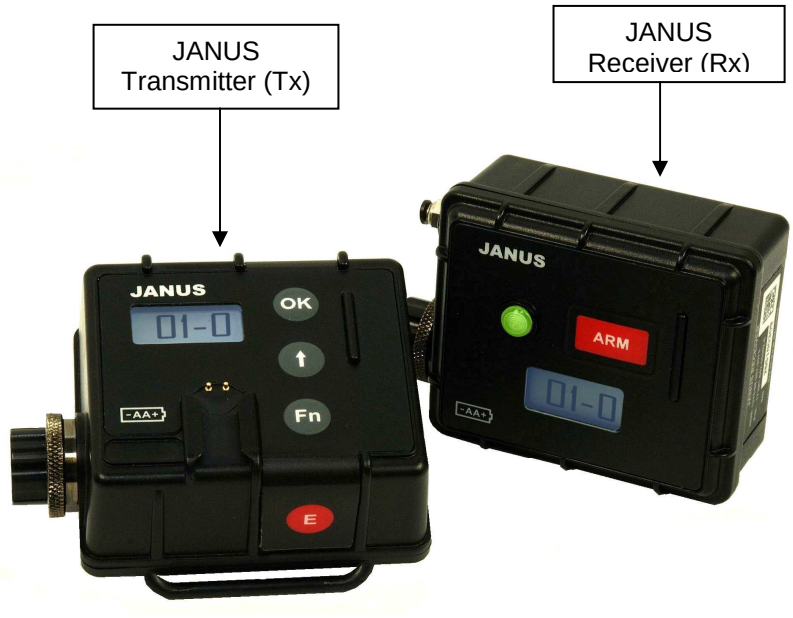
CHAPTER 2 – DESCRIPTION

SECTION 4

JANUS SYSTEM DESCRIPTION

2-1 The JANUS remote firing system is specifically designed for Explosive Method of Entry (EMOE) operations. The system permits multiple breaching teams to explosively enter a target, using their own independent firing system without interference. Speed of set up, single and collective initiation and a unique shock tube connector give the user an enhanced operational capability over traditional EMOE firing systems.

2-2 In harsh RF environments, JANUS has the ability to fire shock tubing directly from the receiver unit with no RF interface. Receivers are selected from stock and individually bonded via manual connection with the transmitter unit prior to deployment.



SECTION 5

PACKING

2-3 The packing concept of JANUS is for resupply in bulk, the standard resupply configurations are:

- System Carton
- System Bulk Carton
- Receiver Carton
- Receiver Bulk Carton
- Accessories

System Carton

2-4 A System Carton consists of 1 x transmitter and 5 x receivers, packed in a cardboard carton. 20 x System Cartons makes a System Bulk Carton.

System Bulk Carton

2-5 A System Bulk Carton consists of 20 x System Cartons, packed in a cardboard carton. 10 x System Bulk Cartons will fit a standard pallet.

Receiver Carton

2-6 A Receiver Carton consists of 5 x receivers, in a cardboard carton. 20 x Receiver Cartons makes a Receiver Bulk Carton.

Receiver Bulk Carton

2-7 A Receiver Bulk Carton consists of 20 x Receiver Cartons, in a cardboard carton. 10 x Receiver Bulk Cartons will fit on a standard pallet.

Accessories

2-8 The optional accessories are:

- Transit case with foam inserts.
- Transmitter wrist strap.
- Transmitter pouch.
- 2mm shock tube terminal pack (5 per pack with spanner)
- 3mm shock tube terminal pack (5 per pack with spanner)

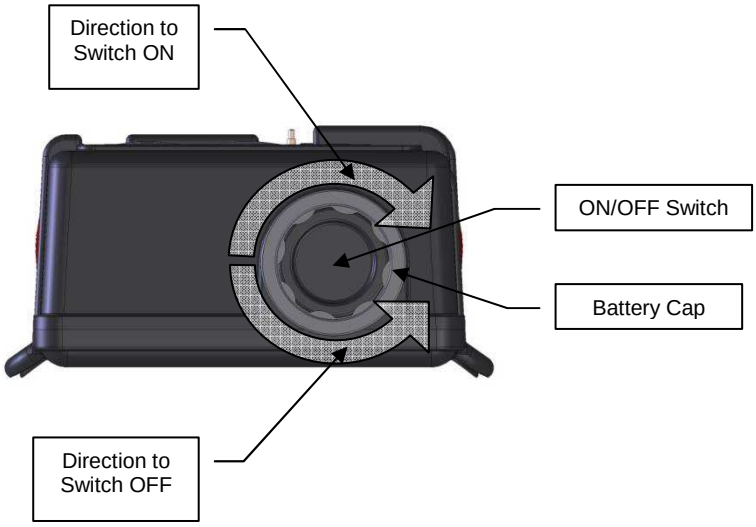
SECTION 6

TRANSMITTER DESCRIPTION AND GENERAL DETAILS

2-9 The transmitter is a waterproof plastic housing containing the UHF radio and associated electronics. Externally the unit has five buttons with various functions, an <ON/OFF> switch which is part of the battery cap assembly, a LCD and a docking bay.

TRANSMITTER ON/OFF SWITCH

2-10 The transmitter <ON/OFF> switch provides mechanical separation from its power source and is part of the battery cap assembly.



TRANSMITTER BUTTONS

2-11 The transmitter has five buttons, the names and function of these buttons are:

- **OK** **OK button:** used to lock in the selected channel or address values.
- ↟ **Scroll button:** used to increment the channel or address values.
- **Fn** **Function button:** has three functions, these being:
  - o A quick double press of the **Fn** button is used to turn the transmitter backlight <ON> or <OFF> depending on operational requirements.

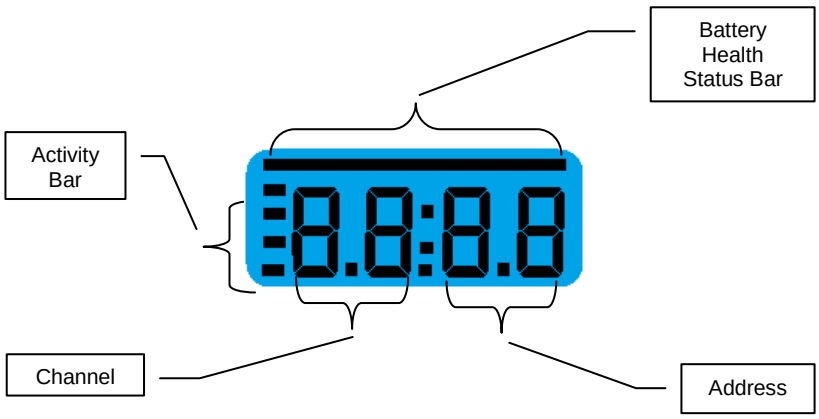
- o **Fn** button used with ↟ button to initiate channel configuration (1st press and hold **Fn** button) or
- o **Fn** button used with **OK** button to do a communications check with the receiver(s), (1st press and hold **Fn** Button).

- **E** **Enable button:** used with the **Fire** (**F**) button (1st press and hold **E** button) to send a fire command to the receiver.
- **F** **Fire button:** used with the Enable (**E**) button (2nd press) to send a fire command to a receiver.

TRANSMITTER LCD

2-12 The transmitter LCD incorporates a 4 digit, 7-segment display with battery health status bar, activity bar and 4 digits with selectable high intensity and low intensity back lighting.

2-13 Below are the names and function of display events.



- **Battery Health Status Bar**
  - o **No Battery Health Status Bar**, if no battery health status bar is displayed the battery is in a good state.
  - o **Solid**, displayed only on start up.

- o **Flashing Battery Health Status Bar**, the battery is low and should be replaced as **soon as possible**. The bar will continue to flash until replaced.
- o **Flashing bAtt**, if the letters **bAtt** flash on the LCD screen; the battery is at a critical level and the transmitter has been placed in suspend mode, all user operations have been suspended. Replace battery immediately.

- **Activity Bar**
  - o **Transmitting Firing Command**, activity bar rises from bottom to top twice indicating transmission.
  - o **Communications Check**, activity bar rises from bottom to top twice indicating transmission.
- **Channel Digits**
  - o Displayed as the left two digits and represent channels 01-16
- **Address Digits**
  - o Displayed as the right two digits and represent:
    - **- :** Underscore is used when the receiver is zeroised
    - 0-9: Address
    - A: Fire All
    - Man: Manual fire (using 4 digits)

TRANSMITTER FUNCTIONAL MODES

2-14 The transmitter has the following functional modes:

- **Configuration Mode**: This allows the Channel and Address values to be modified or changed. Configuration values will flash in this mode. The firing command cannot be initiated in this mode.
- **Firing Mode**: This allows initiation of the firing command using locked-in Channel and Address values. After 5 seconds of activity, the unit will revert back to Configuration Mode except when in manual firing mode.

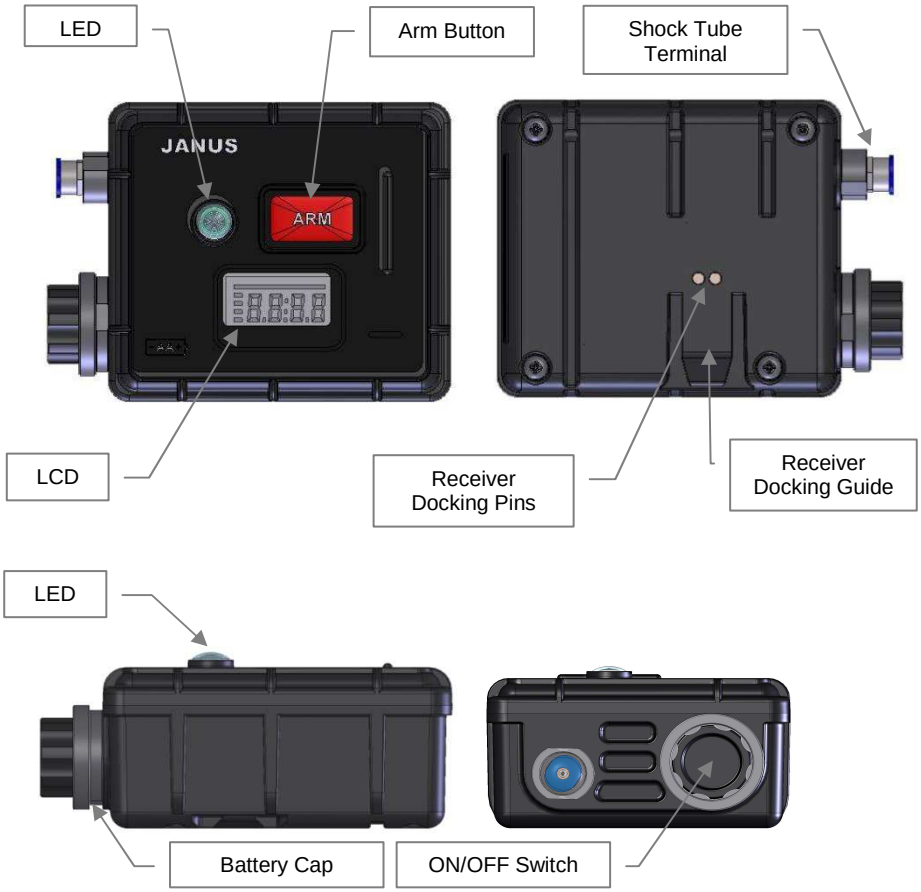
- **Suspend Mode**: This makes the transmitter non-operational due a system fault. An error code will be displayed when in this mode.

2-15 When not in use the transmitter should always be switched <OFF>.

SECTION 7

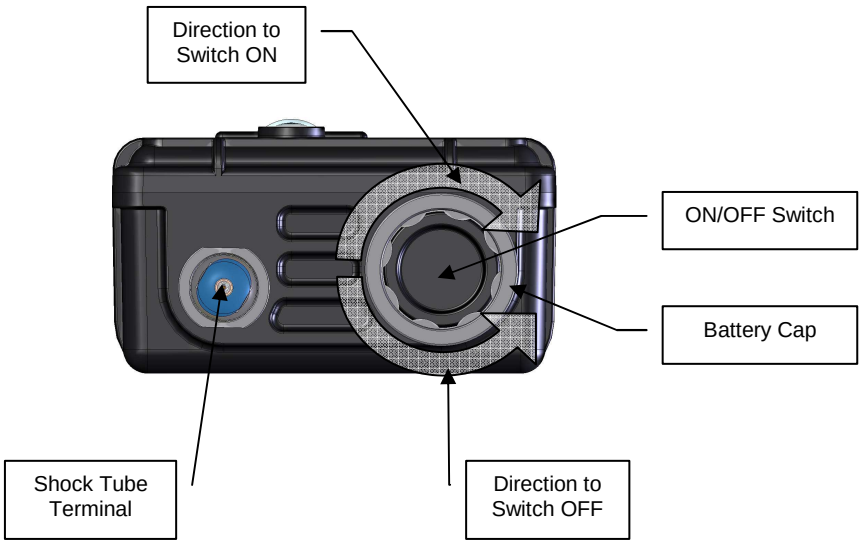
RECEIVER DESCRIPTION AND GENERAL DETAILS

2-16 The receiver is a waterproof plastic housing containing the electronics necessary to accept and interrogate RF commands then disseminate correct information to the firing circuit. Externally the unit has an arm button, <ON/OFF> switch which is part of the battery cap assembly, LCD, LED, docking guide and shock tube terminal.



RECEIVER ON/OFF SWITCH

2-17 The receiver <ON/OFF> switch provides mechanical separation from its power source and is part of the battery cap assembly. When not in use, the receiver should always be switched <OFF>.



RECEIVER ARM BUTTON

2-18 The receiver has only one button, the ARM button, it has two functions which are:

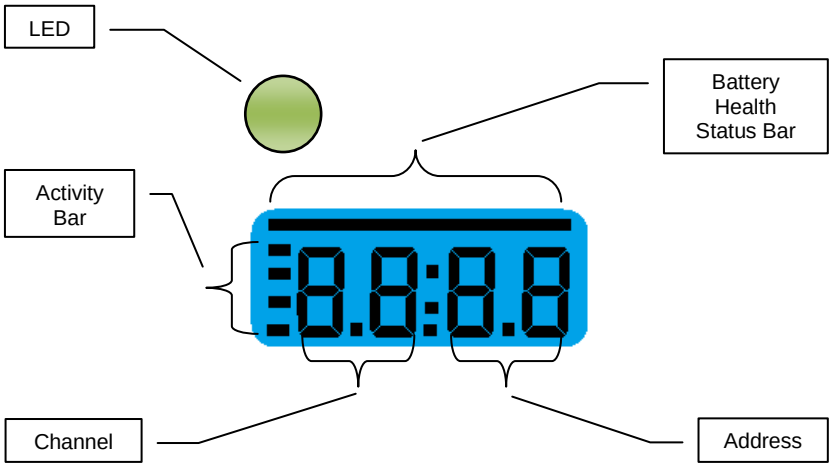
- **Arm the Receiver**
  The ARM button is used to start the arming sequence of the receiver, (Refer to Chapter 4) and
- **Night Operations/NVG Use**
  To allow the operator to power up the receiver with no backlight/LEDs for night operations/NVG use as required for operational use. Press and hold Arm button then switch receiver <ON> and release the Arm button.

NOTE: The LED is syncronised to some ARM button events.

RECEIVER LCD AND LED

2-19 The receiver LCD incorporates a 4 digit, 7-segment display with battery health status bar and activity bar and 4 digits with selectable high intensity and low intensity back lighting. An LED is located above the LCD and is synchronised to some LCD events.

2-20 Below are the names and function of display events.



RECEIVER LCD

- **Battery Health Status Bar**
  - o **No Battery Health Status Bar**, if no battery health status bar is displayed the battery is in a good state.
  - o **Solid**, displayed only on start up.
  - o **Flashing Battery Health Status Bar**, the battery is low and should be replaced as **soon as possible**. The bar will continue to flash until replaced.
  - o **Flashing bAtt**, if the letters **bAtt** flash on the LCD screen; the battery is at a critical level and the receiver has been placed in suspend mode, all user operations have been suspended. Replace battery immediately.

- **Activity Bar**
  - o **Arming**, activity bar rises from bottom to top indicating the device is arming.
  - o **Firing Command**, activity bar descends from top to bottom twice indicating the device is receiving a firing command.
  - o **Communications Check**, activity bar descends from top to bottom indicating the device is receiving a transmission.
  - o Sustained contact with the transmitter is confirmed by top and bottom segment flashing alternatively.
- **Channel Digits**
  - o Displayed as the left two digits and represent Channels 01-16
- **Address Digits**
  - o Displayed as the right digit and represent Addresses 0-9

RECEIVER LED

2-21 The receiver LED is bicolour (red/green), its functions are:

- **Built in Test**
  - o Steady red followed by steady green then LED OFF.
- **Arm**
  - o Fast flashing green, receiver is arming.
  - o Slow flashing green, receiver is armed then LED OFF.
- **Communications**
  - o If armed, high intensity slow flashing green then LED OFF.
  - o If not armed, high intensity double flashing red then LED OFF.
- **Fault**
  - o Low intensity double flashing red LED.

RECEIVER FUNCTIONAL MODES

2-22 The receiver has the following functional modes:

- **Configuration Mode**: Channel and Address values flashing, this mode allows the Channel and Address values to be changed when docked to a transmitter. **Configuration mode is only available for 30 seconds after switch** <**ON**>**.**

- **Locked Mode**: Channel and Address values steady, this is an intermediate mode which prevents changes to Channel and Address values. To change back to Configuration mode switch the receiver <OFF> then <ON> again.
- **Armed Mode**: Configuration values and ARM alternately flashing, this is the only mode where initiation can take place.
- **Suspend Mode**: Error code displayed, the receiver is non-operational due a system fault.

SHOCK TUBE TERMINAL

2-23 The receiver features a unique shock tube terminal which locks in the shock tube and creates a waterproof seal.

To Insert
Firmly insert shock tube.

To ensure shock tube is inserted correctly, attempt to pull it out, it should remain locked in.

To Remove
1. Press down on plastic locking cap.
2. Remove shock tube.

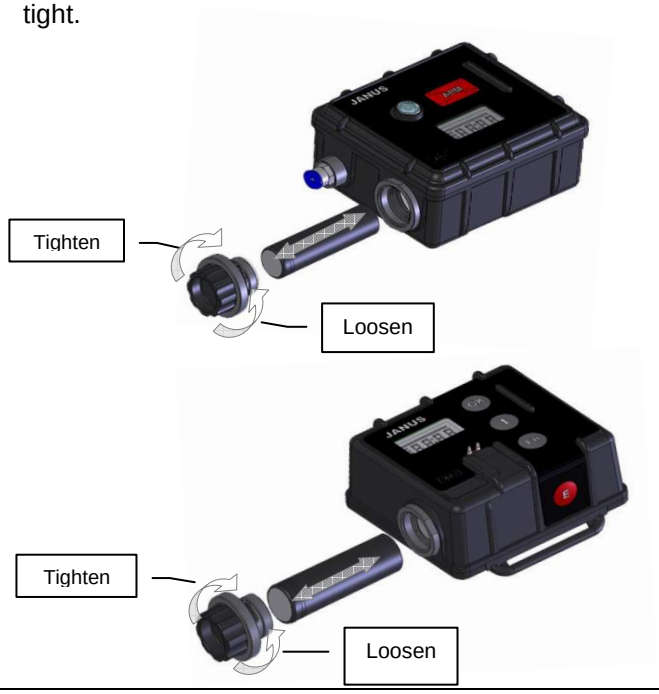
CHAPTER 3 – PRE-FIRING DRILLS

SECTION 8

REPLACE BATTERIES

3-1 The specified battery type for the transmitter and receiver is the (Lithium) L91 AA Cell 1.5 Volts (FR6). This type of battery is not a specialist battery and is commercial available. (Of note: full performance specifications will not be achieved if other batteries are used).

3-2 To remove or replace a battery, hold the transmitter or receiver in the right hand, grip the knurled battery cap with the left hand and turn anti-clockwise. Unscew the battery cap until it can be removed, extract the old battery. Ensure the new battery is facing the correct direction before inserting it, once the new battery is inserted screw the battery cap clockwise, the battery cap should be tightened finger tight.



SECTION 9

TRANSMITTER POWER-ON AND INITIALISATION

3-3 When switching the transmitter <ON> it will conduct a Built-in-Test (BIT). This sequence basically consists of the following internal tests/checks.

TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	<ON> Power-On: The transmitter will conduct a Built in Test (BIT), the basic sequence is: 1. Battery health test. 2. All segments On. 3. Inter processor communication test. 4. Memory Cyclic Redundancy Check (CRC) test. 5. All segments Off. 6. Buttons pressed/stuck check. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.

SECTION 10

TRANSMITTER CONFIGURATION

3-4 When switching the transmitter <ON> and on completion of the BIT the transmitter will display channel and address values at last switch-Off, these are configuration values. The following sequence configures/reconfigures the channel and address.

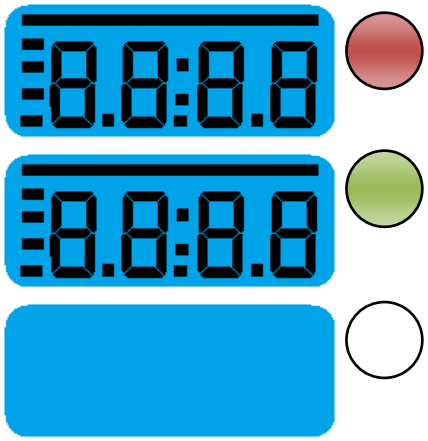
TRANSMITTER	
Channel Configuration	**Example only** <ON> Power-On: The transmitter displays the following channel and address: **Channel: 01** **Address: 3** The operator requires the following channel and address: **Channel: 02** **Address: 1**
	On completion of the BIT the transmitter will automatically switch to configuration mode. The values at last switch <OFF> will be displayed; the address value will be flashing.
	Press and hold the <**Fn**> button, then press <▲> button combination, then release both keys. The address value will disappear and

	the channel value will flash.
	Press the <▲> button incrementally and scroll until the required channel value is displayed. Total channel values available are 01-16.
	Press the <**OK**> button to lock in the selected channel value. **The channel value is selected.** The address value will reappear and start to flash.
Address Configuration	
 	While the address value is flashing press the <▲> button incrementally and scroll until the required address value is displayed. Press <**OK**> button to lock in the selected address value. **The address value is selected.** **Note:** Total address values available for configuration are: **-** Underscore is used when the receiver is to be zeroised **0-9** Address **A** Fire all **MAn** Manual fire

SECTION 11

RECEIVER POWER-ON AND INITIALISATION

3-5 When switching the receiver <ON> it will conduct a Built-in-Test (BIT). This sequence basically consists of the following internal tests/checks.

RECEIVER	Ensure the receiver has a new battery inserted and polarity is observed.
	<ON> Power-On: The receiver will conduct a BIT, the basic sequence is: 1. Battery health test, observe red then green LED. 2. Intensity setting button check. 3. All segments On. 4. Inter processor communication test. 5. Memory CRC test. 6. LED Off- all LCD segments Off. 7. Buttons pressed/stuck check. **Note**: If stealth is required and it is more suitable the backlight and LED are <OFF> at power-on, hold down the <**ARM**> button during power-on. **WARNING**. During the BIT all segments should be displayed, if they are not switch the receiver <OFF>, it is not to be used. A BIT should take no longer than 5

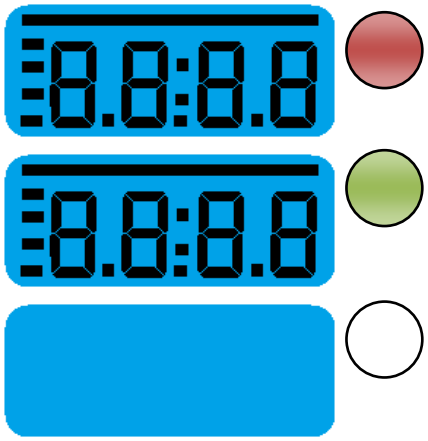
	seconds. If an error is detected the receiver will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the receiver will switch to configuration mode.
	**Note**: The receiver default factory configuration value is “zeroised” (displayed as three flashing dashes). If previously configured, values at last switch <OFF> will be displayed.

SECTION 12

BONDING

3-6 Prior to deployment, receivers should to be configured to the required channel and address, this process is called bonding. The process establishes a unique relationship between the transmitter and bonded receivers. The process is detailed below:

TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	Configure transmitter to required channel and address values. Leave transmitter in configuration mode **(address flashing)**.
RECEIVER	

	Switch receiver <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the receiver <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the receiver will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
 Default configuration **OR**  Values at last switch OFF	On completion of BIT the receiver will automatically switch to configuration mode. If the receiver has not been previously configured it will display the default configuration value. **OR** It will display the values at last switch <OFF>. The receiver will stay in configuration mode for first **30 seconds only after switch** <**ON**>. Then switch to locked mode.

	**Dock transmitter to receiver.** **Note:** As detailed above, this must be completed after the BIT, but in the first 30 seconds after switch On of the receiver.
	The message 'bond' will flash three times and at the same time the top and bottom segments of the activity bar will flash alternately.
	Once bonded the new channel and address will be displayed and the top and bottom segments of the activity bar will continue to flash while in docked position. **The receiver is now bonded to that particular transmitter.** The receiver is in locked mode and will remain in that state until switched <OFF>. **Note:** The receiver can be switched <OFF> and <ON> without loss of channel or address data.

3-7 The above bonding procedure can also be used to:

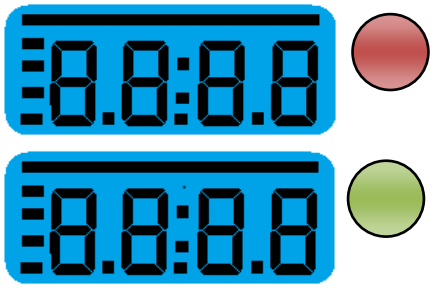
- Zeroise a receiver. To do this select address value **–** on the transmitter and conduct the bonding procedure.
- Set a transmitter and receiver for manual fire. To do this configure the transmitter to Manual (MAn) and conduct the bonding procedure.

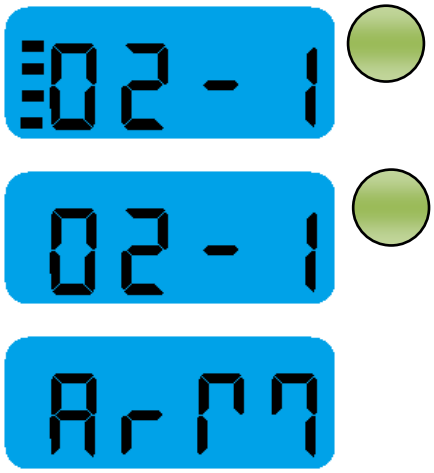
SECTION 13

RECEIVER SETUP

3-8 The following receiver setup drills should not compromise Unit Standard Operating Procedures.

3-9 Once a receiver has been used to initiate an explosive, and has not been destroyed, it must **NOT** be used again for another live explosive charge.

RECEIVER	Ensure the receiver has a new battery inserted and polarity is observed. Select required pre-configured and bonded receiver.
	At target location, place charge on target. **Assumption**: Detonator is already connected to Shock Tube. Place receiver securely on target, do not attach shock tube from charge to receiver.
	Switch receiver <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, and red and green LED should be observed, if they are not switch the receiver <OFF>, it is not to be used. A BIT should take no longer than 5 seconds.

	If an error is detected the receiver will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	Channel and address values will flash. Visually confirm configuration values are correct. If not, re-bond receiver. **If configuration values are correct, attach shock tube to receiver.**
	Double press the <**ARM**> button, arming sequence events are: • Rapid flashing low intensity green LED. • Activity bar increases incrementally from bottom to top. • Slow flashing low intensity green LED. • Configuration values and ARM message flash alternately. • **Receiver is now ARMED.** (Receiver is armed when flashing slows and stops). **Note**: Armed receiver will continue to alternately display configuration value and ARM message, backlight will extinguish after 15 seconds. To illuminate backlight at any time press <ARM> button.

SECTION 14

TRANSMITTER SETUP

3-10 Setting up a transmitter is exactly the same as configuring a transmitter, therefor the drill is exactly the same.

TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	On completion of the BIT the transmitter will automatically switch to configuration mode. The values at last switch <OFF> will be displayed; the address value will be flashing.

	Press and hold the <**Fn**>, then press <▲> button combination, then release. The address value will disappear and the channel value will flash. (Usually, only required if the set channel is to be changed.)
	Press the <▲> button and scroll until the required channel value is displayed. Total channel values available are 01-16.
	Press the <**OK**> button to lock in the selected channel value. **The channel value is selected.** The address value will reappear and start to flash.
 	While the address value is flashing press the <▲> button incrementally and scroll until the required address value is displayed. Press <**OK**> button to lock in the selected address value. **The address value is selected.** **The transmitter is setup.** **Note:** Total address values available for configuration are: **-** Underscore is used when the receiver is to be zeroised

	0-9	Address
	A	Fire All
	MAn	Manual fire

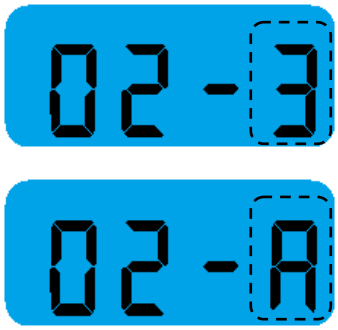
TRANSMITTER SETUP – FIRE ALL

3-11 A transmitter has the ability to fire all receivers on the same channel simultaneously, the following conditions apply:

- Receiver(s) must be bonded to transmitter.
- Receiver(s) must be on the same channel as the transmitter.
- Receiver(s) must be armed.

TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to

	configuration mode.
	On completion of the BIT the transmitter will automatically switch to configuration mode. The values at last switch <OFF> will be displayed; the address value will be flashing.
	Press and hold the <**Fn**> button, then press <▲> button combination, and then release both keys. The address value will disappear and the channel value will flash. (Usually, only required if the set channel is to be changed).
	Press the <▲> button and scroll until the required channel value is displayed. Total channel values available are 01-16.
	Press the <**OK**> button to lock in the selected channel value. **The channel value is selected.** The address value will reappear and start to flash.



While the address value is flashing press the <▲> button incrementally and scroll until to address value **A**.

Press <**OK**> button to lock in the selected address value.

The address value is selected.

The transmitter is setup to fire all receivers on channel 2.

TRANSMITTER SETUP – FIRE MANUAL

3-12 A transmitter has the ability to fire an individual receiver manually, the following conditions apply:

- Receiver must be docked to transmitter.
- Receiver must be armed.

TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	On completion of the BIT the transmitter will automatically switch to configuration mode. The values at last switch <OFF> will be displayed; the address value will

	be flashing.
 	While the address value is flashing press the <▲> button incrementally and scroll to address value **MAn**. Press the <**OK**> button to lock in the selected address value. **The address value is selected.** **The transmitter is now setup to fire manually.**

SECTION 15

COMMUNICATIONS CHECK

3-13 In order to check the propagation path or signal between the transmitter (firing point) and receiver(s) a communications check should be transmitted.

3-14 The following drills are to be conducted to send a communications check:

TRANSMITTER and RECEIVER(s) ⚠ **WARNING:** To prevent inadvertent detonation of charges when conducting a communications check ensure shock tube, detonators and charges are not connected to JANUS receivers.	Ensure both Transmitter and Receiver have a new battery inserted and polarity is observed. Switch both Transmitter and Receiver(s) <ON> and check that they are in the Configuration or Fire Mode. Ensure both the Transmitter and Receiver(s) have the same channel and address value.
TRANSMITTER	Press and hold down the <**Fn**> button and then press the <**OK**> button. Release both keys. (The Activity Bar rises from bottom to top twice indicating transmission).
RECEIVER(s)	The Receiver(s) will confirm a signal/communications have been received by double blinking of the LED for 5 seconds and the Activity Bar descending from top to bottom on the LCD, indicating the device has received a communications check. **LED Colour Code:** Red – Not Armed mode Green – Armed mode

CHAPTER 4 – FIRING DRILLS

WARNING must be observed for SAFE and correct operations.

SECTION 16

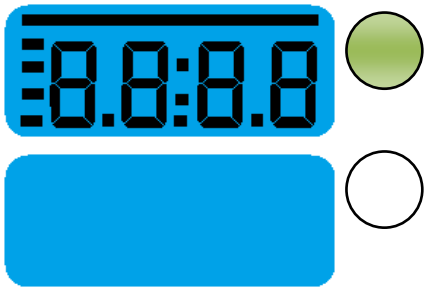
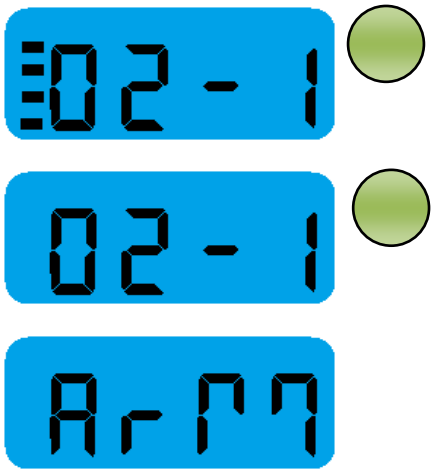
FIRE A SINGLE RECEIVER

4-1 The following firing procedures should not compromise Unit Standard Operating Procedures.

4-2 Receivers are considered expendable. Once a receiver has been used to initiate a live explosive it is **NOT** to be used again.

4-3 JANUS is designed to operate with Shock Tube with inner diameters between 0.8mm to 1.3mm. It should also be noted that Shock Tube should be cut perpendicular or at 90 degrees cleanly otherwise reliability can be affected.

RECEIVER	Select required pre-configured and bonded receiver.
	At target location, place charge on target, do not attach shock tube to receiver. **Assumption**: Detonator is already connected to Shock Tube. Place receiver securely on target, do not attach shock tube to receiver.
	Switch receiver <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, and red and green LED should be observed, if they are not switch the receiver

	<OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the receiver will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	Channel and address values will flash. Visually confirm configuration values are correct. If not, re-bond receiver. **If configuration values are correct, attach shock tube to receiver.**
	Double press the <**ARM**> button, arming sequence events are: • Rapid flashing low intensity green LED. • Activity bar increases incrementally from bottom to top. • Slow flashing low intensity green LED. • Configuration values and ARM message flash alternately. • **Receiver is now ARMED.** • Slow flashing low intensity green LED stops flashing. **Note**: Armed receiver will continue to alternately display configuration value and ARM message, backlight will extinguish after 15 seconds.

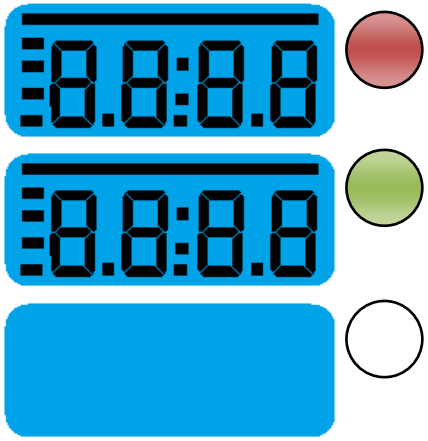
	To illuminate backlight at any time press <ARM> button.
TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	Configure transmitter to required channel and address values. Leave transmitter in configuration mode (address flashing).
Conduct Communications Check	Press and hold down the <**Fn**> button and then press the <**OK**> button.

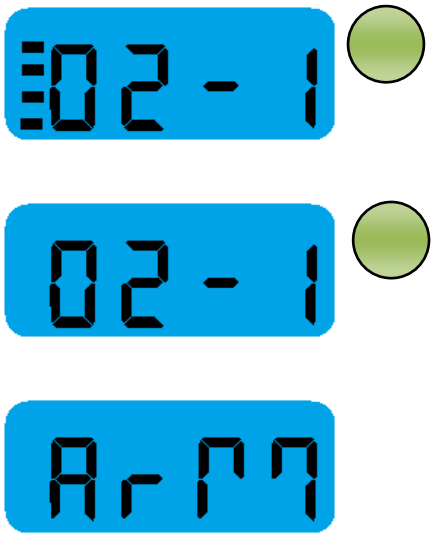
	**To Fire:** **Ensure firer is in safe location.** Press and release <**OK**> button. Press and hold <**E**> button. Press <**F**> button. Release both <**E**> and <**F**> buttons The activity bar segments will increment from bottom to top, twice, indicating the firing command is being transmitted.
RECEIVER	
	On receipt of a firing command the activity bar segments will increment from top to bottom, twice, indicating the firing command is being received and processed. **Receiver will initiate shock tube.**
  	If the receiver is not destroyed it will immediately ARM itself again. **Receiver is now ARMED.** **Note**: Armed receiver will continue to alternately display configuration value and ARM message, backlight will extinguish after 15 seconds.

SECTION 17

FIRE A GROUP OF RECEIVERS

4-4 When firing a group of receivers all receivers must have the same channel and address values.

RECEIVERS	Select required pre-configured and bonded receivers.
	At target location, place charges on each target, do not attach shock tube to receiver. **Assumption**: Detonator is already connected to Shock Tube. Place receivers securely on each target; do not attach shock tube to receiver.
	Switch each receiver <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, and red and green LED should be observed, if they are not switch the receiver <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the receiver will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the receiver

	will switch to configuration mode.
	Channel and address values will flash. Visually confirm configuration values on each receiver are identical. If not, re-bond receiver. If configuration values are correct, attach shock tube to receiver.
	Double press the <ARM> button on each receiver, arming sequence events are: • Rapid flashing low intensity green LED. • Activity bar increases incrementally from bottom to top. • Slow flashing green low intensity LED. • Configuration values and ARM message flash alternately. • Receiver is now ARMED. • Slow flashing green low intensity LED stops flashing. Note: Armed receivers will continue to alternately display configuration value and ARM message, backlight will extinguish after 15 seconds. To illuminate backlight at any time press <ARM> button.
TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is

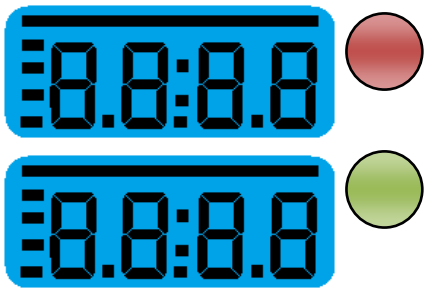
	observed.
 	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. A BIT should take no longer than 5 seconds. If an error is detected the transmitter will switch to suspend mode and a corresponding error code will be displayed. If no errors are detected the transmitter will switch to configuration mode.
	Configure transmitter to required channel and address values. Leave transmitter in configuration mode (address flashing).
	**To Fire:** **Ensure firer is in safe location.** Press and release <**OK**> button. Press and hold <**E**> button. Press <**F**> button. Release both <**E**> and <**F**> buttons. The activity bar segments will

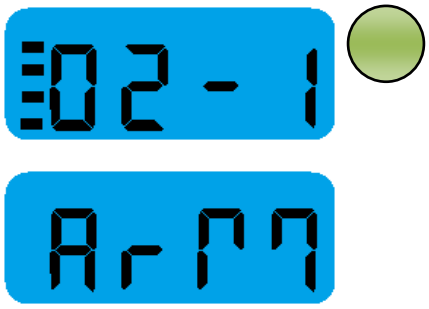
	increment from bottom to top, twice, indicating the firing command is being transmitted.
Receiver	
	On receipt of a firing command the activity bar segments will increment from top to bottom, twice, indicating the firing command is being received and processed. Receivers will initiate charges.
  	If a receiver is not destroyed it will immediately Arm itself again. **Receiver is now ARMED.** Note: Armed receiver will continue to alternately display configuration value and ARM message, backlight will extinguish after 15 seconds.

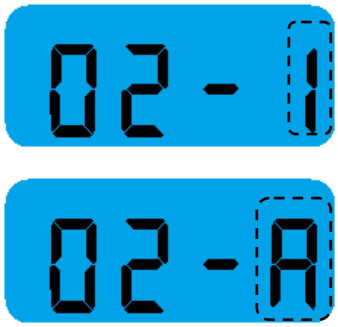
SECTION 18

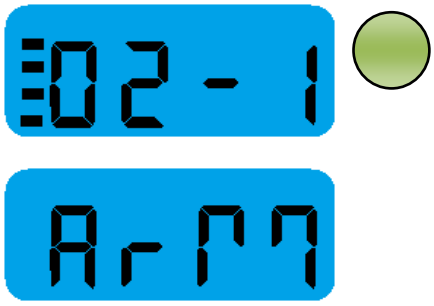
FIRE ALL RECEIVERS

4-5 When firing 'all receivers', all receivers must have the same channel value.

RECEIVERS	Select required pre-configured and bonded receivers.
	At target location, place charges on each target, do not attach shock tube to receiver. **Assumption**: Detonator is already connected to Shock Tube. All charges are prepared.
	Place receivers securely on each target; do not attach shock tube to receiver.
	At each target:
	Switch receiver <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, and red and green LED should be observed, if they are not switch the receiver <OFF>, it is not to be used. If no errors are detected the receiver will switch to configuration mode.

	
	Visually confirm configuration values are correct. Receivers must have the same channel value but can have different address values. **If configuration values are correct, attach shock tube to receiver shock tube terminal.**
	Double press <**ARM**> button on each receiver. **Receivers are ARMED when fast flashing LED stops.**
TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.

	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. If no errors are detected the transmitter will switch to configuration mode.
	While the address value is flashing press the <▲> button incrementally and scroll to the address value **A**. Press the <**OK**> button to lock in the selected address value. **The address value is now selected.** **The transmitter is setup to fire all receivers.**
	**To Fire:** **Ensure firer is in safe location.** Press and release <**OK**> button. Press and hold <**E**> button. Press <**F**> button. Release both <**E**> and <**F**> buttons. The activity bar segments will increment from bottom to top, twice, indicating the firing command is being transmitted.

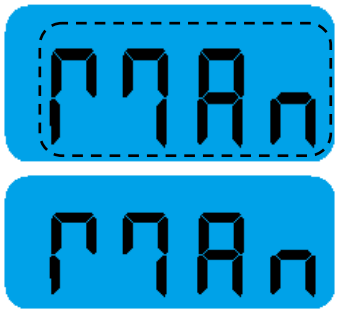
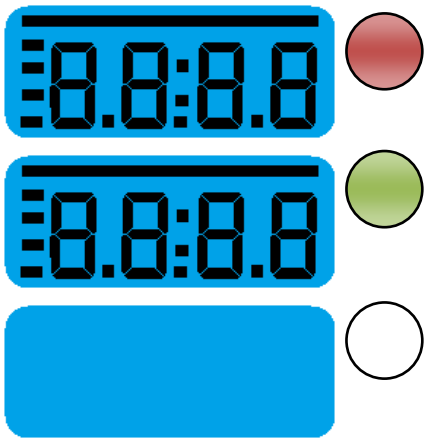
RECEIVER	
	On receipt of a firing command the activity bar segments on each receiver will increment from top to bottom, twice, indicating the firing command is being received and processed. **Once the receivers have received and processed the firing command they will initiate the attached shock tube.**
	If a receiver is not destroyed it will immediately arm itself again. Arming sequence begins, sequence is: • Safety timer starts (minimum 10 seconds). • Capacitor starts charging, indicated by fast flashing green LED. • Activity bar segments increase incrementally from bottom to top. • Receiver is armed when green LED flashes slowly and ArM is displayed. **Receiver is now ARMED.** **Note**: An armed receiver will alternately display configuration value and ARM message. • Backlight will extinguish after 15 seconds. Press <ARM> to illuminate backlight.

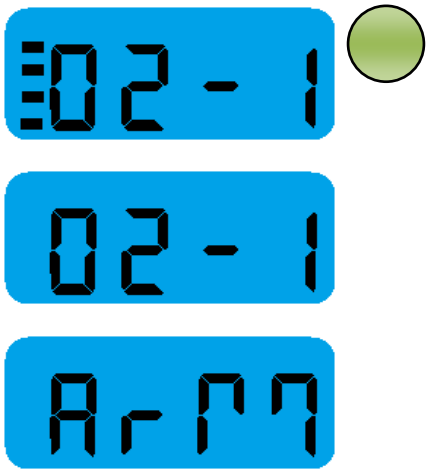
SECTION 19

MANUAL FIRE A SINGLE RECEIVER

4-6 There may be the requirment to fire a single receiver manually, to do this the receiver must be docked to the transmitter. The receiver must be bonded to the transmitter but any channel value or address value can be displayed.

At Target	Place charge on target. **Assumption**: Detonator is already connected to Shock Tube. Lay and uncoil shock tube from target to firing point.
At Firing Point	
TRANSMITTER	Ensure the transmitter has a new battery inserted and polarity is observed.
	Switch transmitter <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, if they are not switch the transmitter <OFF>, it is not to be used. If no errors are detected the transmitter will switch to configuration mode.
	While the address value is flashing press the <▲> button incrementally and scroll to the address value **MAn**.

	Press the <**OK**> button to lock in the selected address value. The transmitter is setup to fire manually.
RECEIVER	
	Switch receiver <ON>, observe the BIT. **WARNING**. During the BIT all segments should be displayed, and red and green LED should be observed, if they are not switch the receiver <OFF>, it is not to be used. If no errors are detected the receiver will switch to configuration mode.
	When receiver switches to configuration mode it will display the last values at switch <OFF>. Receiver will stay in configuration mode (all values flashing) for 30 seconds after which time it will switch to locked mode. **Attach shock tube to receiver shock**

	tube terminal.
	Double press <**ARM**> button on receiver. **Green LED will flash rapidly.** Activity bar segments increase incrementally from bottom to top. The Configuration values and the message **ArM** will be displayed alternately and the green LED will start to flash slowly and then stop.

  	**Dock Receiver to the Transmitter.** **Green LED will flash.** The Configuration values and the message **ArM** will be displayed alternately, additionally the top and bottom segment of the activity bar will flash alternately and the green LED will then stop. **Receiver is ARMED when flashing green LED stops.** Note: A red flashing LED indicates an error or incorrect setup.
TRANSMITTER	**To Fire:** **Ensure firer is in safe location.** Press and hold <**E**> button. Press <**F**> button. Release both <**E**> and <**F**> buttons.
RECEIVER	

	On receipt of a firing command the activity bar segments on the receiver will increment from top to bottom, twice, indicating the firing command is being received and processed. **Once the receiver has received and processed the firing command it will initiate the attached shock tube.**
    	The receiver will automatically arm itself again. Arming sequence is: • Safety timer starts (minimum 10 seconds). • Capacitor starts charging, indicated by **fast** flashing green LED. • Activity bar segments increase incrementally from bottom to top. • Receiver is armed when green LED flashes slowly and then stops and ARM is displayed. **Receiver is now ARMED.** **Note**: An armed receiver will alternately display configuration value and ARM message additionally the top and bottom segment of the activity bar will flash alternately. • Backlight will extinguish after 15 seconds. Press <ARM> to illuminate backlight.

SECTION 20

ERROR CODE PROCEDURE (TRANSMITTER AND RECEIVER)

4-7 Whenever an error code is displayed, a 3 digit number preceded by E (e.g. E213), will be displayed on the LCD screen of either the transmitter or receiver. JANUS will be automatically placed in suspended mode. In suspended mode the unit is in a safe state and no unintended actions will take place; no functionality other than <ON/OFF> switching is supported.

4-8 When an error code occurs during use or as described in this manual, proceed as follows:

a. Note the operation that you have carried out and the menu you were in when the error occurred,

b. Note the error code number,

c. Switch <OFF> the device,

d. Wait 10 seconds,

e. Switch <ON> the device, and

f. If the error is cleared, further deployment can proceed.

4-9 If there is again an error, repeat the whole procedure one more time ensuring you have good battery power health status. If the error is not cleared, the device should be turned <OFF> packed up and sent back to base workshop for repairs with appropriate documentation which includes displayed error code number.

CHAPTER 5 – POST FIRING DRILLS

SECTION 21

TRANSMITTER POST FIRING DRILLS

5-1 On completion of a task the JANUS transmitter should always be switched <OFF> to ensure the safety of others.

5-2 The transmitter should be accounted for and handed to one person for safe keeping and securing.

5-3 Only once the transmitter is switched <OFF>, secured and accounted for should the target area be approached for clearance.

SECTION 22

RECEIVER POST FIRING DRILLS

5-4 The JANUS receiver is considered expendable therefore it should be placed on or close to the charge and destroyed. Post firing drills are conducted in order to safely conduct post firing inspection of target area and when required recover equipment.

5-5 **Prior** to approaching the target areas ensure the transmitter is switched <OFF>, accounted for and secure.

5-6 Approach and inspect target area in accordance with Unit Standard Operating Procedures. Common sense must apply and **safety must always take priority**.

5-7 The following situations may be found at the target area:

- **Charge initiated and receiver destroyed**:
- **Charge initiated and receiver not destroyed**: Switch receiver **<OFF>** and disconnect shock tube from receiver. The receiver is not to be used on any further live explosives and is best destroyed in accordance with and as directed in Unit Standard Operating Procedures.
- **Charge not initiated and receiver not destroyed**: If a Blind is suspected, wait mandatory/appropriate times, in accordance with Standard Operating Procedures. Once time is up approach the receiver from a safe direction and inspect. Switch receiver **<OFF>**, treat complete system (receiver and charge) as a blind. Destroy blind in accordance with Unit Standard Operating Procedures.

NOTE: This manual should not be used as a prime reference when it comes to the recovery or handling of blinds or misfires. Extreme care must be exercised and Standard Operating Procedures followed for dealing with receivers and explosives in this situation.

JANUS receivers are not designed to be used more than once on a live explosive task. Once a receiver has been used to initiate a live explosive, and has not been destroyed, it must not under any circumstance be used again for another live explosive charge.

CHAPTER 6 – MAINTENANCE

SECTION 23

OPERATOR MAINTENANCE

6-1 JANUS is manufactured to Defence Standards. The common sense field handling, care and maintenance rules that apply to any electronic equipment also apply to JANUS. For operator maintenance complete the following drills:

PRIOR TO USE

6-2 Prior to use inspect the following:

- Battery is inserted with correct orientation/polarity.
- Battery cap is screwed on tight.
- Device functions (switch device <ON>, check BIT, switch device <OFF>).
- Shock tube assembly is screwed in tight.
- Key pad is not damaged.
- LCD for cracks and signs of condensation.
- Body for cracks.

DURING USE

6-3 Even though units were inspected prior to use continue to monitor the following:

- Battery status.
- Suspend mode for errors.

AFTER USE

6-4 In order to care for JANUS after use, check the following:

- Ensure all devices are switched <OFF> and accounted for.
- Wipe transmitter down with clean damp cloth.
- If receivers have not been used for live explosives practice and are being returned after use wipe down with damp clean cloth.
- Do not use solvents to clean units.

- Inspect LCD for cracks and signs of condensation.
- Inspect bodies for cracks.
- Inspect docking bay pins.

STORAGE

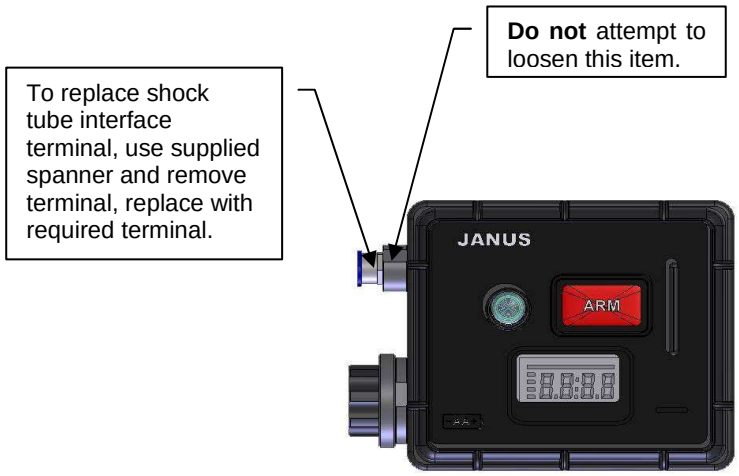
6-5 When units are to be stored for longer than 7 days conduct the following:

- Ensure **After Use** maintenance is carried out.
- Remove batteries.
- Ensure units are free from foreign material.
- Ensure battery compartment and cap are clean and free from debris. Periodically clean the thread of the battery cap to ease fitting the cap, do not lubricate.

REPLACEMENT OF SHOCK TUBE INTERFACE TERMINAL

6-6 The shock tube interface terminal is manufactured in two sizes, 2mm and 3 mm. The terminals can be identified by:

- 2mm terminal has a black top.
- 3mm terminal has a blue top.



ANNEX A – TRANSMITTER FAILURE DIAGNOSIS & ERROR CODES

TRANSMITTER FAIL URE DIAGNOSIS

4-10 The following paragraph and table provide failure diagnosis information for the JANUS transmitter. The JANUS system components are non-repairable by the user units and if unable to rectify a problem, return the equipment to base workshop/stores for repair and replacement using the normal channels. The table provides failure diagnostic information for the JANUS Transmitter.

Ser	Malfunction/Display	Possible Cause	Remedy
1	Flashing Battery Health Status Bar or **bAtt** error message.	Battery low.	Replace battery.
2	Device will not switch <ON>.	No battery inserted, battery incorrectly inserted or low battery power.	Replace/insert new battery ensuring you observe correct orientation/polarity.
		Contacts in battery compartment corroded or loose.	Clean dirty or corroded terminals. Have the device serviced – replace device.
		<ON/OFF> switch faulty.	Have the device serviced – replace device.
3	Incorrect initial LCD display after switch <ON>, (BIT Test).	Battery low.	Replace battery.
		Transmitter unit software, switch <ON> problem.	Switch transmitter <OFF> and remove battery. Re-insert new battery (ensuring that battery is installed in correct

			orientation/polarity) and switch <ON> again. If transmitter fails to switch <ON> correctly have the device serviced – replace device.
4	When configuring transmitter with receiver, configuration is not received by receiver.	Transmitter and receiver have not been bonded correctly in the docking bay.	Re-bond transmitter and receiver.
		Transmitter or receiver docking bay pins faulty or docking bay pins corroded or loose.	Clean docking bay pins. Have the device serviced – replace device.
		No battery inserted, battery incorrectly inserted or low battery power.	Replace/insert new battery ensuring you observe correct orientation/polarity.
		Transmitter faulty.	Have the device serviced – replace device.
5	Transmitter does not respond to keypad button presses.	Keypad faulty.	Have the device serviced – replace device.
6	Error code displayed.	System fault.	Conduct error code procedure. If error code continues to display have the device serviced – replace device.

TRANSMITTER ERROR CODES

If at any time a fault within the reusable receiver is detected an error code will be displayed in the format "E NNN" where NNN is a 3-digit error code. The receiver is placed into a safe state in which it cannot operate. In most cases switching the receiver <OFF> (Waiting 10 seconds) then switching <ON> again will clear the fault. Below is the description of displayed errors.

Code	Description
bAtt	Battery Voltage Critical
E053	EEPROM Data Test Fail
E054	Primary Processor ROM Test Fail
E055	Primary Processor RAM Test Fail
E056	EEPROM Data Loading Error
E057	Primary Processor Stack Overflow Detected
E058	Power-up Built-In Test Sequence Timeout
E121	RF Transceiver Register Loading Error
E122	RF Transceiver RFC-MUX Line Timeout error
E131	ADC Timeout Error
E132	ADC Outside Range Error
E141	Button Stuck Error
E151	IIC Bus Error
E152	LCD Module Error
E153	LED Driver Error
E154	DAC Driver Error
E162	EEPROM Write Fail
E163	Memory CRC Check Fail
E171	IPC-HSHK-SP State Error
E172	SPI Message Start Timeout Error
E173	SPI Message End Timeout Error
E175	SPI Byte Start Timeout Error
E176	SPI Byte Transmit Timeout Error
E177	SPI Byte Receive Timeout Error
E201	Secondary Processor ROM Checksum Error
E202	Secondary Processor RAM Read/Write Failure
E203	Secondary Processor Firing Code Reception Error
E204	Secondary Processor Registration Code Reception Error
E205	Secondary Processor Message Type Undefined Error

E206	Secondary Processor SPI Bus Timeout Error
E207	Secondary Processor UART Transmit Error
E208	Secondary Processor RF Transceiver Clock Failure
E209	Secondary Processor Unexpected State Error
E210	Secondary Processor Safety Break Error
E211	Secondary Processor Stack Overflow Error
E212	Secondary Processor Activity Mode Error
E213	Secondary Processor Button Stuck Error
E218	Secondary Processor Undefined Value Error
E219	Secondary Processor Incorrect Software Type Error
E221	Primary-Secondary State Synchronisation Error
E222	Primary-Secondary Dock State Mismatch Error
E231	Safety Variable Test Error
E232	Safety Port Test Error
E233	Fire Lock Status Error
E241	Event Timeout Error
E251	Transmission Error

ANNEX B – RECEIVER FAILURE DIAGNOSIS & ERROR CODES

RECEIVER FAILURE DIAGNOSIS

4-11 The following paragraph and table provide failure diagnosis information for the JANUS receiver. The JANUS system components are non-repairable by the user units and if unable to rectify a problem, return the equipment to base workshop/stores for repair and replacement using the normal channels. The table provides failure diagnostic information for the JANUS Receiver.

Ser	Malfunction/Display	Possible Cause	Remedy
1	Flashing Battery Health Status Bar or **bAtt** error message.	Battery low.	Replace battery.
2	Device will not switch <ON>.	No battery inserted, battery incorrectly inserted or low battery power.	Replace/insert new battery ensuring you observe correct orientation/polarity.
		Contacts in battery compartment corroded or loose.	Clean dirty or corroded terminals. Have the device serviced – replace device.
		<ON/OFF> switch faulty.	Have the device serviced – replace device.
3	Incorrect initial LCD display after switch <ON>, (BIT Test).	Battery low.	Replace battery.
		Receiver unit software, switch <ON> problem.	Switch receiver <OFF> and remove battery. Re-insert new battery (ensuring that battery is installed in correct orientation/polarity)

			and switch <ON> again. If receiver fails to switch <ON> correctly have the device serviced – replace device.
4	When configuring receiver to transmitter, configuration is not received by receiver.	Receiver and transmitter have not been bonded correctly in the docking bay.	Re-bond receiver and transmitter.
		Receiver or transmitter docking bay pins faulty or docking bay pins corroded or loose.	Clean docking bay pins. Have the device serviced – replace device.
		No battery inserted, battery incorrectly inserted or low battery power.	Replace/insert new battery ensuring you observe correct orientation/polarity.
		Receiver or transmitter faulty.	Have the device serviced – replace device.
5	Receiver does not respond to keypad button presses, (ARM button).	Keypad faulty.	Have the device serviced – replace device.
6	Error code displayed.	System fault.	Conduct error code procedure. If error code continues to display have the device serviced – replace device.

7	Shock Tube does not fire/ignite.	Incorrect size Shock Tube.	Shock Tube inner diameters are to be between 0.8mm to 1.3mm.
		Shock Tube not cut correctly or cleanly.	Shock Tube should be cut perpendicular or at 90 degrees cleanly otherwise reliability can be affected.
		No battery inserted, battery incorrectly inserted or low battery power.	Replace/insert new battery ensuring you observe correct orientation/polarity.

RECEIVER ERROR CODES

If at any time a fault within the reusable receiver is detected an error code will be displayed in the format "E NNN" where NNN is a 3-digit error code. The receiver is placed into a safe state in which it cannot operate. In most cases switching the receiver <OFF> (Waiting 10 seconds) then switching <ON> again will clear the fault. Below is the description of displayed errors.

Code	Description
E001	Primary Program Flash Memory Checksum Error
E002	Primary RAM Memory Write/Read Verification Error
E003	Configuration CRC Error
E004	Frequency Band CRC Error
E005	Pilot Frequency CRC Error
E006	RF Transceiver Register Setting CRC Error
E007	Display CRC Error
E008	Frequency Channel Spacing CRC Error
E009	PCA Serial Number CRC Error
E010	RF Board Voltage Error
E011	RF Board Voltage Error Zero
E012	RF Transceiver Ready Timeout Error
E015	RFC-MUX Line Stuck Error
E016	RFC-EN Line Stuck Error
E017	RF Transceiver Register Load Failure
E018	RF Transceiver Register Read Failure
E021	Null Pointer to SPI Data
E022	IPC-HSHK-SP Line Initial State Error
E023	IPC-HSHK-SP Line End Of Transmission State Low Error
E024	IPC-HSHK-SP Line End Of Transmission State High Error
E025	IPC-HSHK-SP Line Byte Transfer State Error
E026	SPI Bus Transfer Timeout
E027	Secondary Taking Too Long To Process Last SPI Byte
E031	Secondary Processor Safety Variable Corruption
E032	Secondary Processor CHG-SFB-SEC Line Stuck
E033	Secondary Processor Invalid Firing Key Received
E035	Secondary Processor SPI Bus Error
E036	Secondary Processor Unexpected Interrupt
E037	Secondary Processor ROM Test Checksum Fail

E038	Secondary Processor RAM Test Fail
E039	Secondary Processor Not Armed
E040	Secondary Processor Undefined State
E041	Secondary Processor Stack Overflow
E042	Secondary Processor UART Buffer Overrun
E043	Secondary Processor CHG-DISCHG Line Stuck
E044	Secondary Processor Invalid Message Decoded
E045	Secondary Processor Key Stuck Error
E050	Primary Detected Secondary In Unexpected State Error
E055	Primary Detected Secondary Software Type Error
E056	Primary Detected Secondary Software Build Error
E060	Input Sensor Data Bound for ADC Channel AN0
E062	Input Sensor Data Bound for ADC Channel AN2
E063	Input Sensor Data Bound for ADC Channel AN3 – Unloaded Battery Circuit
E065	CRC Configuration (Firing Code) Check
E066	Incorrect Address Key
E067	Incorrect Frequency Band
E068	Bonding/Configuration Retry
E069	Invalid Channel Code
E070	Arming Capacitor Voltage Under Threshold Receiver Unit Armed
E071	Arming Capacitor Voltage Over Threshold Receiver Unit Not Armed
E072	Reservoir Capacitor Voltage Over Threshold No Firing Message Received
E073	CHG-ARMING-PRI Line Incorrect State Receiver Unit Not Armed
E074	CHG-ARMING-PRI Line Incorrect State Receiver Unit Armed
E075	CHG-SFB-PRI Line Incorrect State
E077	ARM Button stuck error
E080	Overvoltage on Arming Capacitor
E081	Invalid Functional Mode State
E082	Stack Overflow
E083	Message Buffer Overflow
E084	Unused Interrupt Triggered
E090	EEPROM Read Software Undefined Error
E091	SPI Command Software Undefined Error

E092	EEPROM Data Verification Error
E093	Built-In Test Sequence Timeout
E094	Arming Capacitor Charging Timeout
E097	TCXO DAC Access Error
E098	IIC Bus Timeout Error
E099	IIC Bus Error