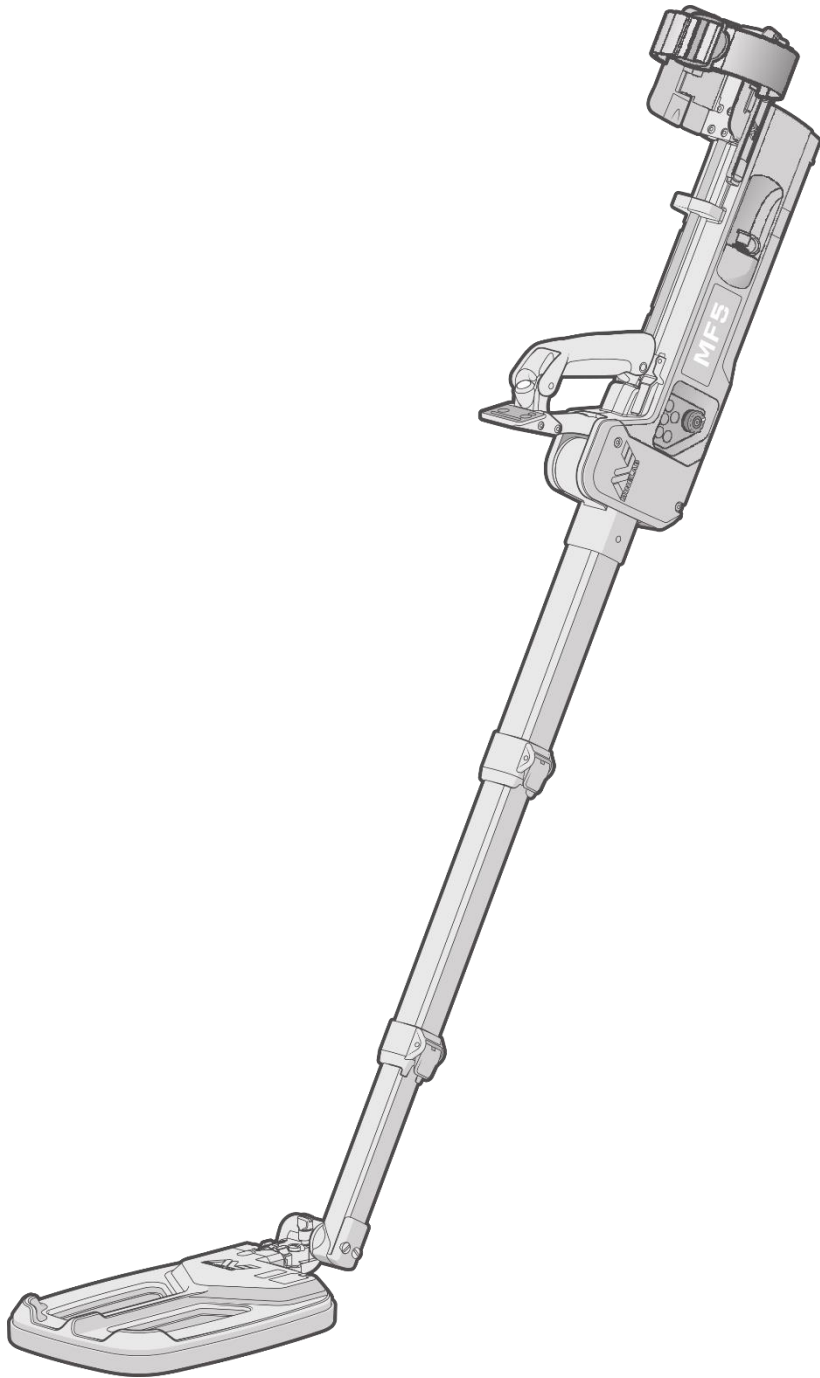


MF5 Metal Mine Detector



SERVICE MANUAL



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1. Introduction

a. Servicing the MF5 includes fault finding, repair and maintenance and is designed to be simple and fast thereby reducing the amount of time a detector is unserviceable. Repair and maintenance is based on Spare Part Kits which can be fitted to a detector without the need for adjustment or calibration. Additionally, individual parts and Spare Part Kits can be exchanged between detectors as required.

b. Spare Part Kits are sub-assemblies of the MF5 that can be obtained from Minelab for the purpose of repairing the MF5. Spare Part Kits include the following:

3004-0290	Coil Kit MF5
3004-0291	Coil Pivot Kit
3004-0292	Shaft Kit MF5
3004-0047	Camlock kit
3004-0048	Armrest Kit with Slide
3004-0049	Armrest Kit
3004-0308	Armrest Slide Assembly
3004-0293	Handle Kit MF5
3004-0051	Battery Compartment Kit
3004-0052	Battery Lid Kit
3004-0294	Main PCB Kit
3004-0296	Switch Kit Sensitivity MF5
3004-0295	Wiring Loom Handle Kit
3004-0057	Speaker Kit
3004-0297	Wiring Loom Earset Kit MF5
3004-0298	Vibration Motor Kit MF5
3004-0299	User Interface Chassis MF5
3004-0300	Coil Connector Loom MF5

c. Servicing the MF5 can be conducted in the field (under clean and dry conditions) or at local service centres. No special tools are required but it is recommended that the MF5 Service Tool Kit be used.

d. Servicing the MF5 is restricted to the exchange of Spare Parts Kits following the identification of a faulty sub-assembly.

e. This manual should be read in conjunction with 4901-0373 Operations Manual MF5. Additionally, from time to time, Minelab may issue Technical Service Notes that will supplement the information contained in this manual.

f. Any questions regarding this manual or any repair procedure can be directed to Minelab at Email: countermine@minelab.com.au

2 Mechanical & Functional Testing

a. The detector set should be regularly checked to ensure all parts and accessories are present and in good working order. The MF5 is supplied as a mine detecting set comprising the following items.

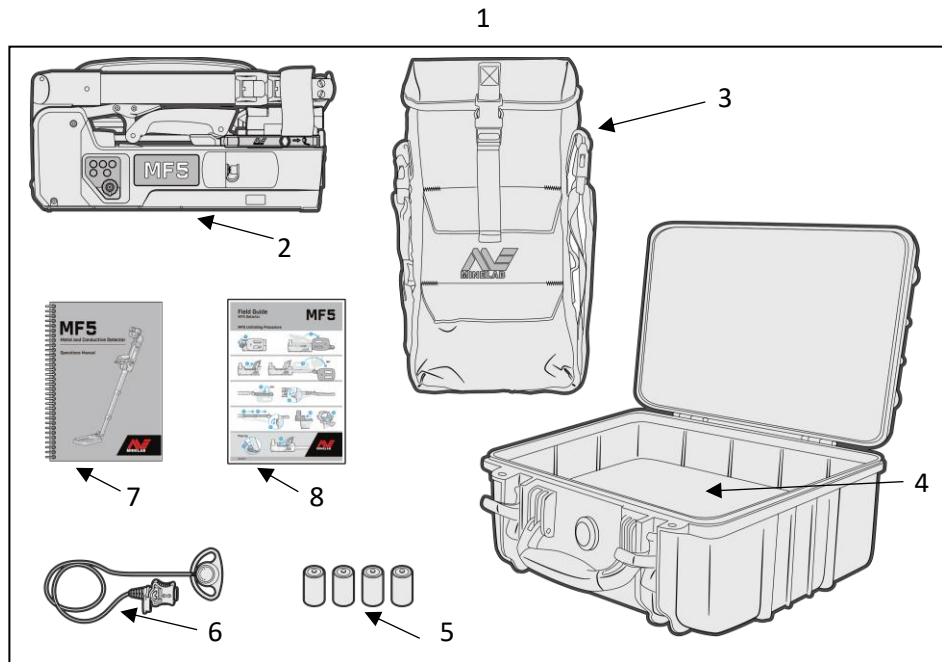


Figure 1: MF5 Detecting Set

Item	MRN	Description	Qty
1	3115-0001	MF5 Detecting Set	
2	3015-0029	MF5 Metal Detector only	1
3	3001-0112	Bag Carry Detector	1
4	5305-0111	Hard Case	1
5	65-71003	Battery, C cell 1v2 5Ah NiMH	4
6	4523-0025	Earset MF5	1
7	4901-0373	Operations Manual MF5	1
8	4903-0065	Field Guide MF5	1

Table 1: MF5 Detecting Set

- b. Whenever a detector is returned for servicing or repair, mechanical and functional tests must be completed to confirm and/or identify any faults.
- c. At the completion of any maintenance or repair procedure, ALL mechanical and functional tests must be completed to confirm the detector is working correctly and no faults remain.
- d. If a detector fails ANY of the mechanical or functional tests, it must not be used in operations.

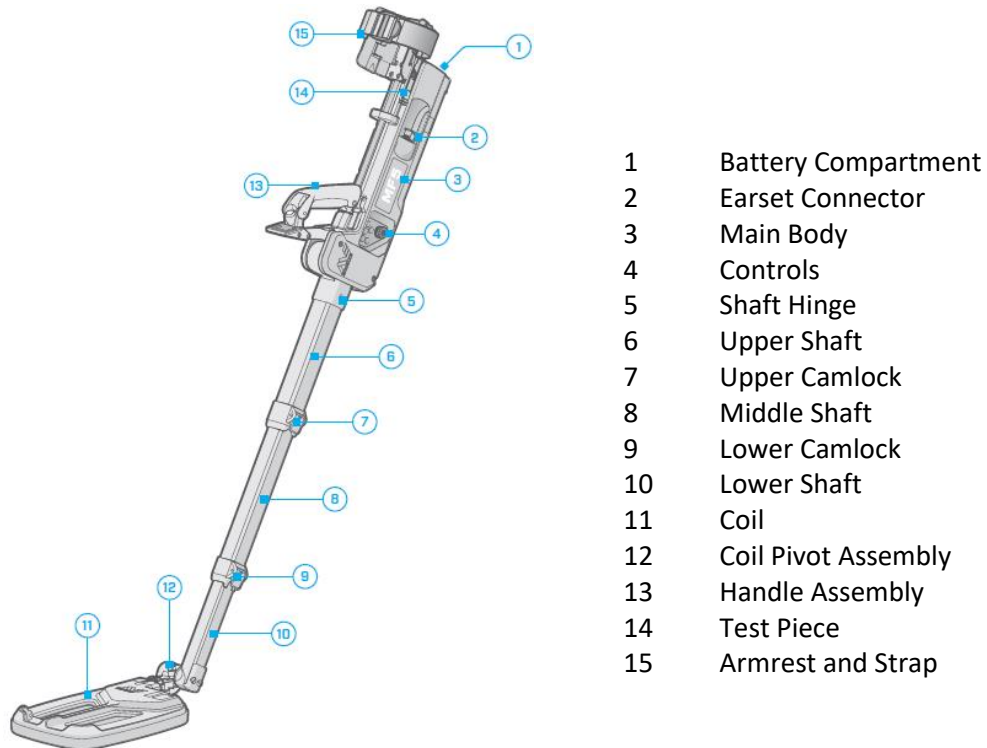


Figure 2: Major component parts of the MF5

2.1 Mechanical Testing

a. Confirm the MF5 and accessories are present and in good working order. Unpack the detector and prepare for use. Mechanical testing and inspection include checking the following:

- Visual inspection of the detector for any obvious signs of damage.
- Coil movement is smooth in both axes and holds its position without drooping.
- Shafts extend and retract smoothly and the camlocks hold the shafts firmly in location.
- The shaft hinge moves freely when the handle is down and locks into extended position when the handle is up.
- The battery lid opens and locks, the battery lid tether is in good condition, and the battery lid O-ring is clean and in good condition.
- The handle slides up and down freely locking into position.
- The armrest extends and retracts smoothly.
- The armrest strap is in good condition.
- The earset dust caps are in good condition.
- Sensitivity knob does not turn unless lifted and rotated and then springs back into the locked position when released.

b. The detector must pass all mechanical tests and checks to be considered acceptable for operational use.

2.2 Function Testing

Function testing is used to confirm the serviceability of an MF5 before and after repair. The MF5 must pass all functional tests to be considered serviceable and ready for operations.

Functional testing requires a ground balance test piece. The ground balance test piece simulates mineralised ground which results in an alarm from the detector. A mineralised “hot” rock or adequate amount of local mineralised soil is suitable. Alternatively, a ceramic floor tile or clay roof tile may be suitable for use as a ground balance test piece.

After preparing the MF5 for operations, complete the following tests:

a. **Factory Reset.** Factory reset will check that power is correctly supplied to the MF5 and internal diagnostics discover no system fault. The detector settings are returned to the Factory default values. The test is conducted as follows:

- Hold the coil at least 60cm (24in) away from the ground, and away from any metal objects.
- Ensure Sensitivity is set to Level 3 (default).
- Press and Hold the Power Button for longer than 5 seconds (Factory Reset).

- The detector will start up in its Factory Default settings. Default Factory Settings are: Detection Mode, Audio ON, Vibration OFF, LED Display OFF, Volume Level 6.

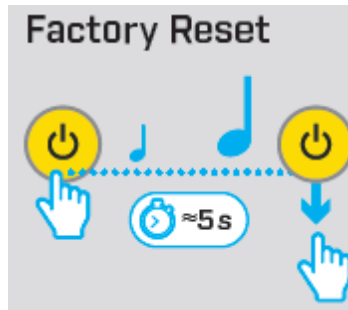


Figure 3: Switch On

b. **Noise Cancel Test.** The noise cancel test ensures the MF5 successfully completes the noise cancel procedure required whenever local electrical interference is present. During noise cancel the MF5 scans the environment searching for the source of any electrical interference (noise). At the completion of Noise Cancel the detector will automatically select operating frequencies that have reduced interference. The test is conducted as follows:

- Hold the coil stationary and away from the ground and objects.
- Short-press the Noise Cancel Button to initiate the Noise cancel. The MF5 will indicate that noise cancel is in progress via selected Audio/LEDs/Vibration indications. After 25 seconds, noise cancel will finish with a success indication via selected Audio/LEDs/Vibration indications.



Figure 4: Noise Cancel

c. **Ground Balance Test.** The ground balance test confirms the MF5 is capable of ground balancing against mineralised ground. In doing so, it confirms the correct operation of the ground balance button, coil and associated circuitry.

The ground balance test can be conducted using a ground balance test piece which must be metal free and can be a rock or soil sample that is mineralised enough to cause an alarm from the detector. The test is conducted as follows:

- Ensure hands and arms are free of metal objects (watches, rings etc) and that no other metal objects are near the coil.
- Conduct a factory reset or a Ground Balance with the coil in the air away from any metal targets. This clears any previous ground balance memory from the MF5.
- Sweep the coil left to right and up and down over metal free ground. If the ground is sufficiently mineralised or magnetic the detector will alarm (ground noise).
- Conduct the Ground Balance procedure and confirm ground noise is reduced.
- Provided ground noise is reduced or eliminated then the ground balance test is successful.

d. **Earset Test.** The earset test confirms the earset is operating correctly and is conducted as follows:

- Plug the earset into the detector.
- Switch on the detector and confirm the detection tone or heartbeat is audible using the earset.
- The MF5 will always provide audio to a connected Earset regardless of the user selected options/controls.

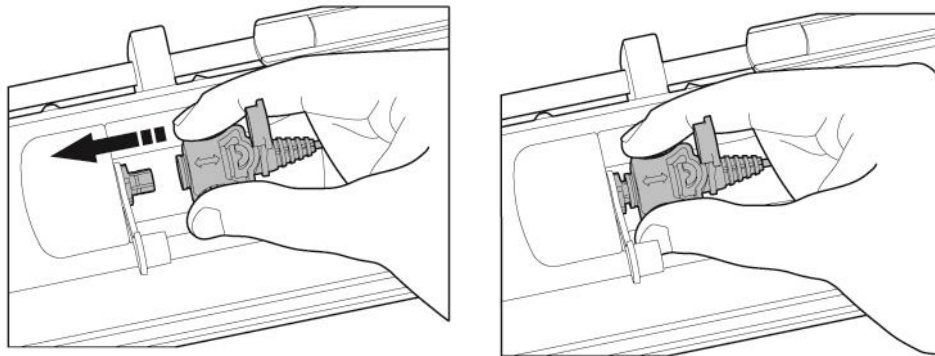


Figure 5: Connect the Earset

e. **LED Test.** The LED test confirms the visual display (LEDs) can be enabled and disabled. To conduct the test:

- Turn on the detector.
- The MF5 will disable the LEDs by default. Short press the LED Display button to enable the LEDs. Short press again to disable the LEDs.
- If LEDs are not visible, long press the LED Display button to toggle LEDs between IR (infrared, for use with night vision imaging systems) and visible light.
- Whilst in Detection mode, with the LEDs enabled, pass the coil over a metal object and check that an increasing number of LEDs illuminate as the detection tone increases in volume.

f. **Battery Level Test.** The battery level test confirms the MF5 provides an indication of battery status and is conducted as follows:

- Turn on the detector and enable the LEDs.
- Long press the Noise Cancel button confirming battery status is indicated on the LED display for three seconds.
- After three (3) seconds the battery level indicator will extinguish and normal operation will resume.
- If the LED display is not visible, ensure LEDs are enabled and operating with visible light.

g. **Sensitivity Control Test.** The sensitivity control test confirms the sensitivity of the MF5 can be adjusted and is conducted as follows:

- Set the sensitivity to the default position 3 in either IED or Conventional operations.
- Turn on the detector.
- Conduct the test piece test. Check that a faint but clear audio tone is heard and that more than one LED illuminates.
- Decrease the sensitivity of the MF5 by rotating the sensitivity knob to position 2. A single low pitched beep will be heard to prompt the operator that the sensitivity is being decreased.
- Conduct the test piece test again and ensure no audio or LED response occurs.
- Move the sensitivity knob to position 3 and confirm a double beep occurs. This prompts the operator that default sensitivity (position 3) has been selected.
- Rotate the sensitivity knob to position 4 and confirm that a high pitched beep is heard.
- Conduct the test piece test and confirm that a louder audio response and an increased number of LEDs are illuminated compared to the previous position 3.

h. **Volume Control Test.** The volume control test adjusts the audio volume of all tones emitted by the detector and is conducted as follows:

- Switch on the detector.
- Short press the volume decrease button several times and confirm that the audio tones decrease in volume.
- Short press the volume increase button several times and confirm that the audio tones increase in volume.
- The MF5 will beep with every adjustment of audio volume and will give a double beep when the default audio volume setting is selected.

i. **Mode Button Test.** The mode button test confirms the MF5 operates in all three sensor modes; detection mode, interrogate mode and pinpoint mode. Check the mode button as follows:

- Turn on the detector.
- Confirm the MF5 is in the default detection mode by checking that all targets have the same tone and have volume proportional to the size and proximity of the target, an iron nail will sound like a copper coin in detection mode.
- Press and release the mode button, the MF5 will enter interrogate mode.
- Confirm the MF5 gives a low-pitched beep for a ferrous (Fe, iron) target and a high-pitched beep for a non-ferrous target (like copper, aluminium and carbon)
- Press the mode button and confirm the MF5 switches to detection mode.

j. **Tactical Mode Test.** The tactical mode test confirms the MF5 too; speaker audio off, LEDs on IR, Vibration on. To conduct the test:

- Factory Reset the detector.
- Press and hold mode button then press the Power Button. Confirm the MF5 changes to tactical mode, main speaker muted, IR LEDs activated, vibration activated and audio available via Earset.
- The MF5 will stay in tactical mode even if it is turned off and on or batteries are removed. It is possible to turn LED display, main speaker and vibration on and off whilst in tactical mode.
- To exit tactical mode press and hold mode button then press the power button or factory reset the detector.

k. **Test Piece Test.** The test piece test is a **critical test** and shall be conducted last to confirm the correct detection performance of the MF5. This test shall be conducted in an environment that is free from electrical interference and an earset must be connected. The test is conducted as follows:

- Ensure hands and arms are free of metal objects (watches, rings etc) and that no other metal objects are near the coil.
- Set the sensitivity control to the default position 3 indicated by the yellow triangle then switch on the MF5.
- Hold the test piece above the middle of the coil with the metal end of the test piece away from the coil.
- Hold the test piece perpendicular to the bottom of the coil and smoothly move the test piece across the coil from one side to the other.

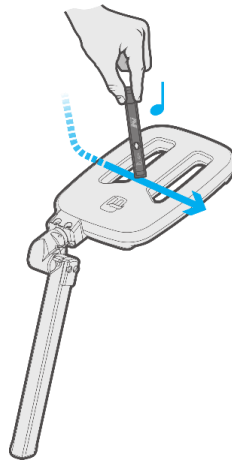


Figure 6: Test Piece Procedure

- Confirm a faint but clear response (detection tone) is heard. With the LED display enabled the test piece procedure should result in the illumination of at least one LED.
 - If the test piece is not heard, Factory Reset the detector and repeat the test.
 - If the test piece is still not heard, refer to section [Fault Finding Procedures](#).
- l. Provided the MF5 passes all function tests it is serviceable and ready for operations. If the detector does not pass all functional tests refer to section [Fault Finding Procedures](#)

3 Disassembly & Reassembly Procedures

a. This section describes the procedures required to exchange parts and conduct repairs. Whenever a part or sub assembly is replaced, mechanical and functional testing as described in Section [Mechanical & Functional Testing](#) must be completed.

b. The MF5 can be repaired and maintained with standard tools. No special tools are required. The following tools may be required to service and support the MF5:

- Hex key driver (Allen key) 3mm
- Hex key driver (Allen key) 2.5mm
- Hex key driver (Allen key) 2mm
- Hex key driver (Allen key) 1.5mm
- Torx driver T20
- Torx driver T10
- Spanner 18mm
- Spanner 13mm
- Spanner 10mm
- Pin punch 3mm
- Silicon Grease, Molykote 111 Compound
- Silicon Rubber Flowable Non-Corrosive, Dowsil 3140 RTV Coating.
- Threadlocker, Low strength (all metal) Loctite 222

3.1 Open the Detector Chassis

a. In order to conduct repairs and replace many of the parts of this detector, the first step will often be to open the detector chassis. Many sections of this manual will refer to this section.

b. Required Tools

The following tools are required to open the detector chassis:

- Hex key driver (Allen key) 3mm
 - Torx driver T20
- c. The following procedure outlines the steps involved in opening the detector chassis:
- Prepare a clean well-lit workspace.
 - Turn the detector off and remove the batteries.
 - Remove the four (4) Screws from the top of the armrest and remove the armrest.

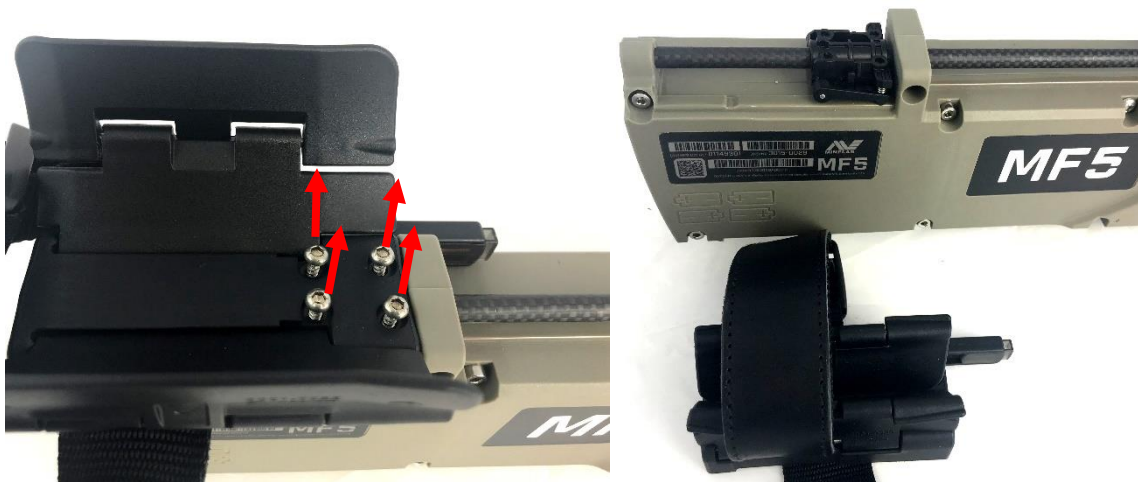


Figure 7: Remove Armrest.

- Place the detector on its right side with the ON/OFF switch uppermost and remove the two (2) Screws (M4x45mm) that secure the Cover Cable.
- Remove the Cover Cable.

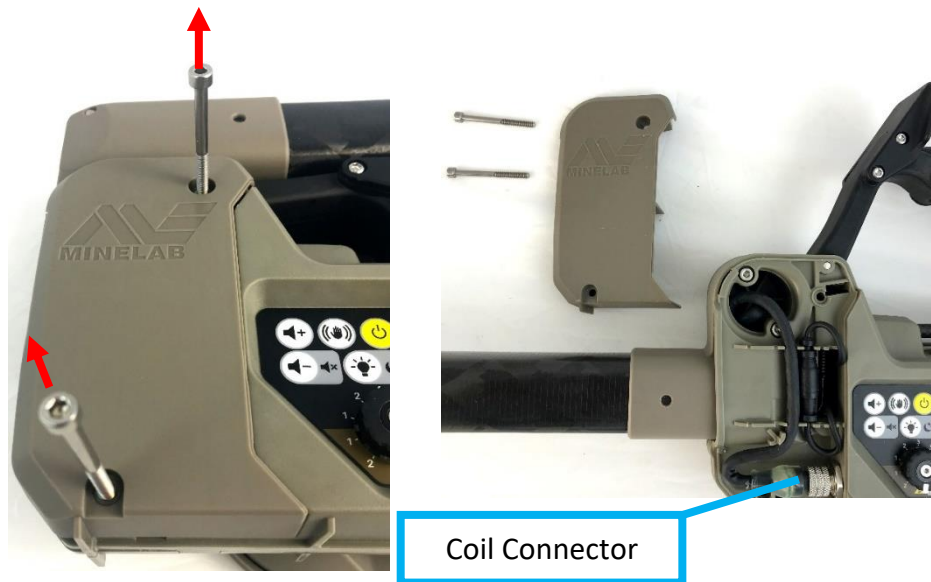


Figure 8: Remove Cover Cable.

- Unscrew and disconnect the coil connector.
- Remove the two (2) screws (M4x35mm) from the shaft hinge.

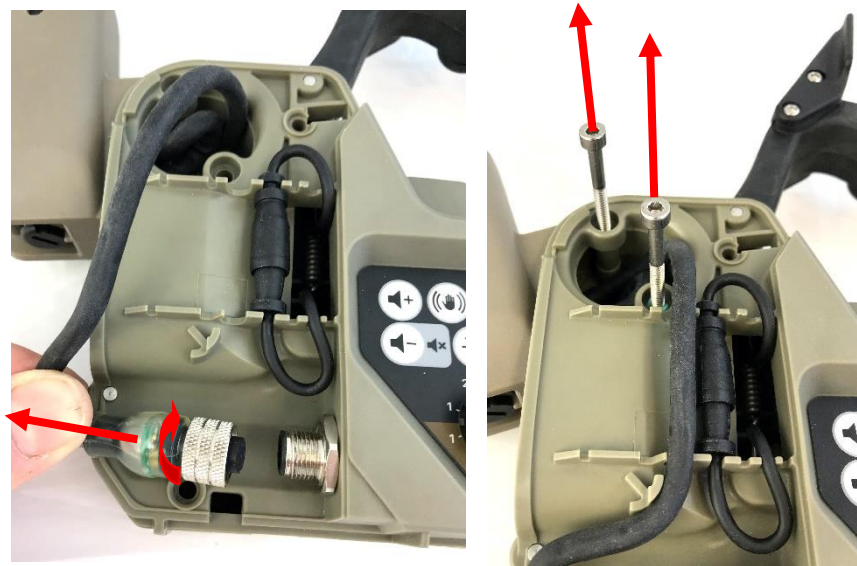


Figure 9: Disconnect Coil Connector and Remove Screws from Hinge

- Turn the detector over onto its left side with speaker grill uppermost.
- Using the 3mm hex key driver (3mm Allen Key) remove all 8 screws from the detector chassis.

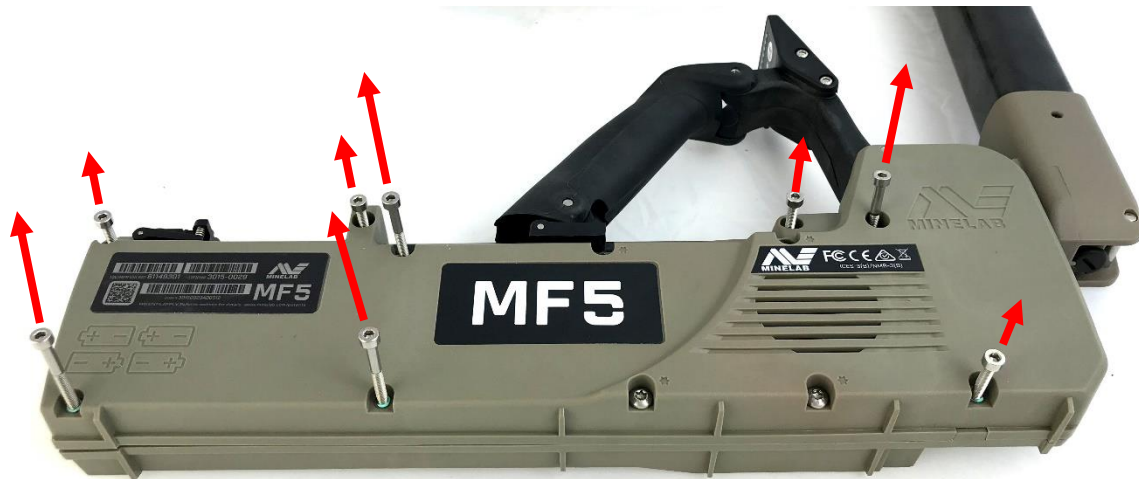


Figure 10: Remove Screw, 3mm Allen key. Four (4) M4x20mm and four (4) M4x35mm

- Using a T20 Torx (star) driver unscrew all four (4) Screws Torx T20 (Three(3) M4x35mm and One(1) M4x20mm) from the right side of the detector.



Figure 11: Torx T20 Bolts with O ring seal

Note

Four (4) Screws in the Chassis of the MF5 must have an O-ring on the Screw to seal (make watertight) the detector. All Screws with an O-ring are Torx T20 and not Allen key (Hex socket). The boltholes that require a Screw Torx T20 (with O-ring) are marked with a star (Torx)



Figure 12: Remove four (4) Screws Torx T20

- Using fingers gently separate the left and right chassis halves. The battery end of the detector will come away easily. The shaft end is held by two (2) locating pins and will require more force to separate.
- Gently lift the right side off the left body half taking care not to pull or stretch the speaker cable and connector.
- Locate the speaker connector on the PCB and disconnect the speaker from the PCB.
- Remove the right half of the detector body.

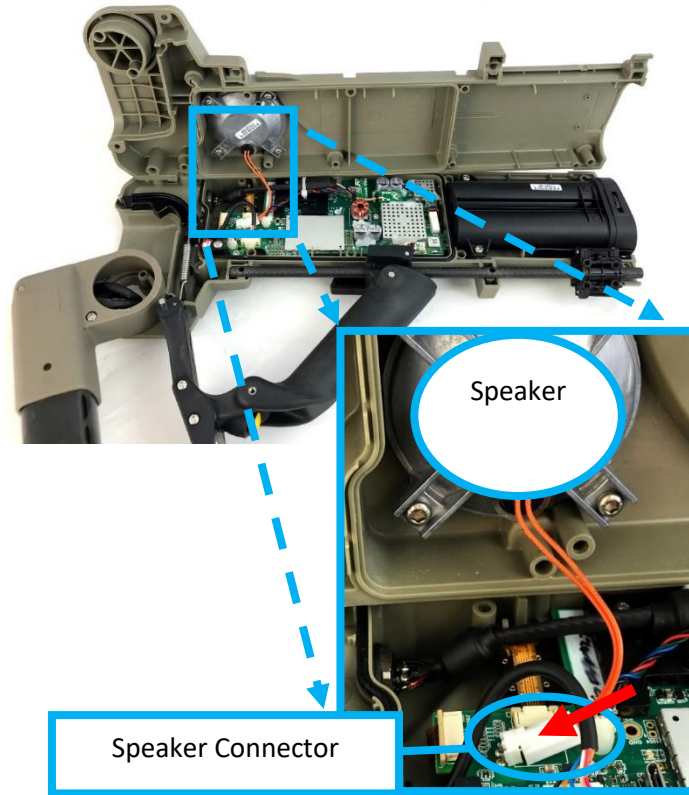


Figure 13: Disconnect the Speaker.

- Remove the upper shaft from the detector body.

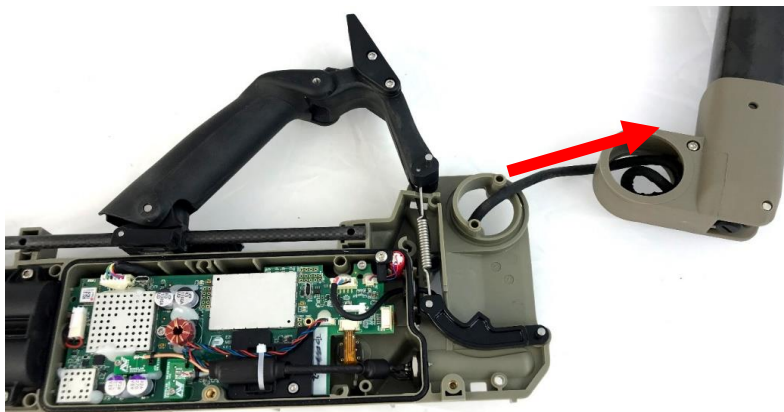


Figure 14: Remove Shafts

- c. The detector chassis is now opened revealing the internal components, which can now be replaced as required.

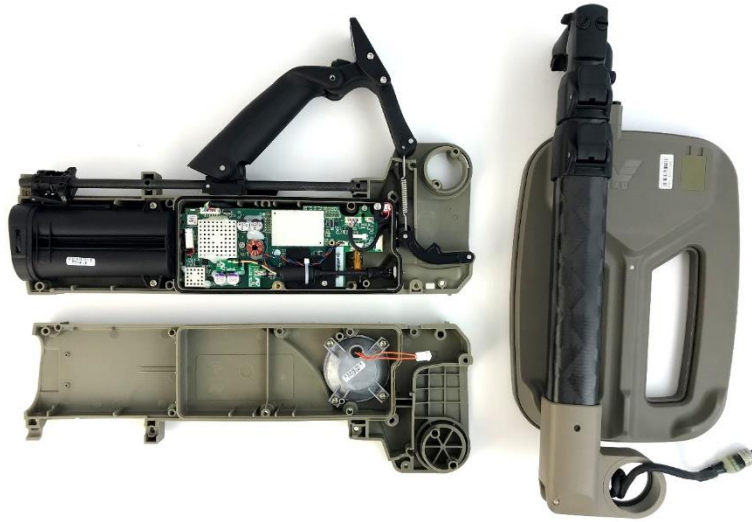


Figure 15: Open Detector Chassis

3.2 Close the Detector Chassis

a. **Required Tools.**

- Hex key driver (Allen key) 3mm
- Torx driver T20
- Silicon Grease

b. The following procedure outlines the steps involved in closing and resealing the detector chassis:

- Ensure all parts are present, in good working order and lay the detector chassis on its left side.
- Thread the coil cable through the detector hinge and position the upper shaft into the detector body.

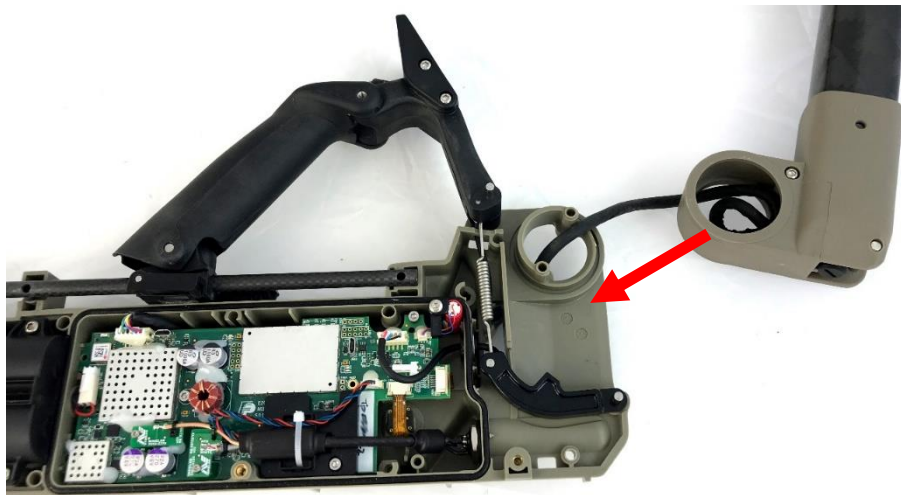


Figure 16: Attach Shafts

- Carefully turn the detector over so that it is on its right side. Check the coil connector nut is tight.
- Attach the coil connector to the socket and tighten the coil connector as tight as possible with fingers.
- Fit the coil cable into the cable router and check that the loop of coil cable within the shaft hinge is positioned so that it will not be trapped when the detector chassis is closed.

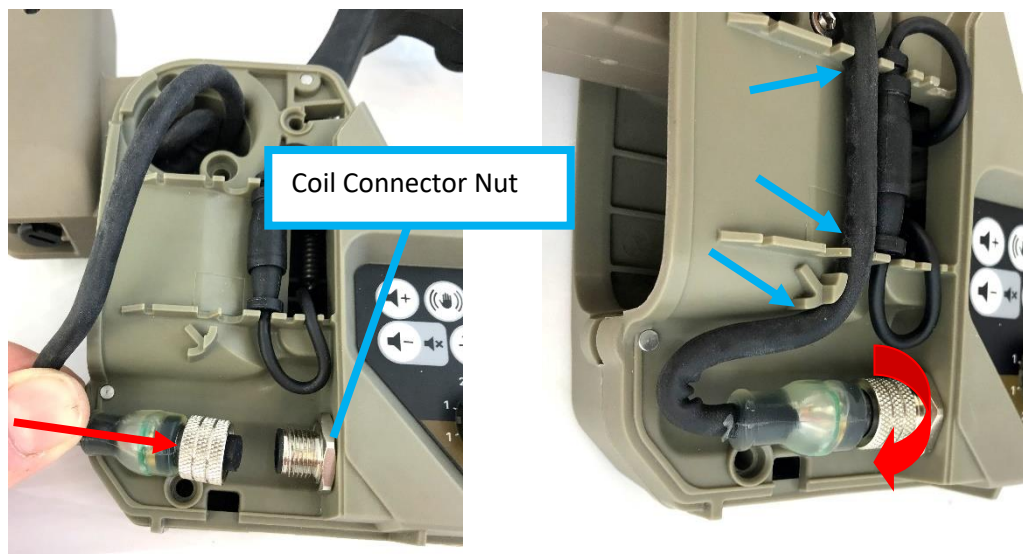


Figure 17: Connect Coil Cable.

- Turn the detector over so it is on its left side.
- Check the detector handle and armrest slide are correctly positioned on the detector, they must slide freely along the rod. The holes in the rod must align with the holes in the detector chassis.
- Check that the Latch Assembly and Spring Latch Hinge are correctly positioned into the left side of the detector body with the latch connected to the spring.

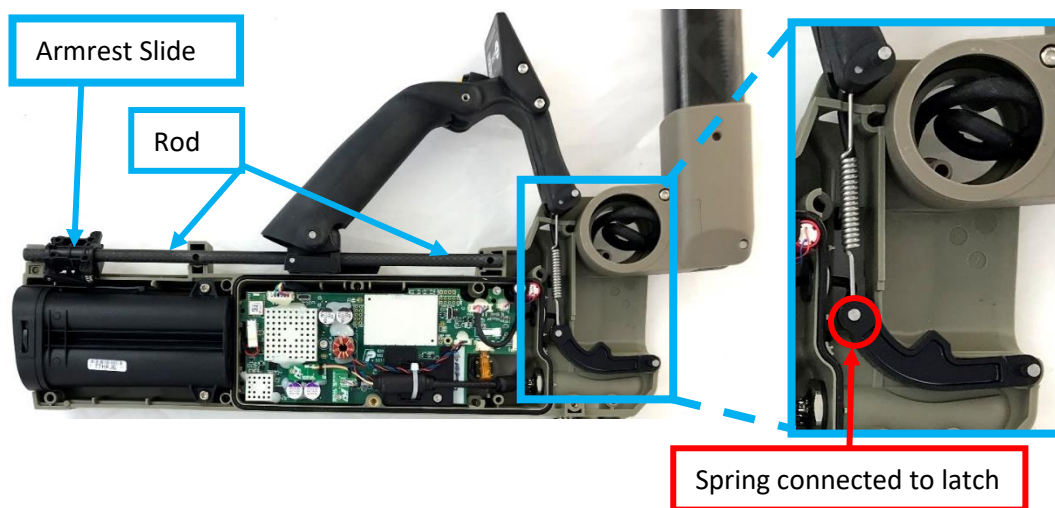


Figure 18: Open Detector Chassis

- Ensure the battery lid is closed.
- Check the Seal Chassis (O-ring) in the detector body is clean, lightly greased and correctly positioned.
- Connect the speaker to the PCB. Check all other connectors and cables are connected.

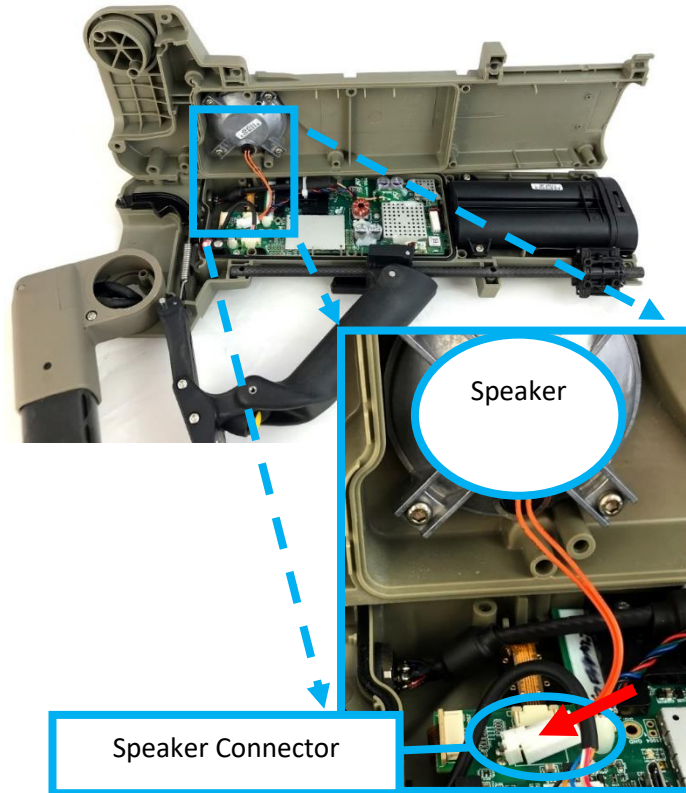


Figure 19: Connect the Speaker.

- Check all internal cables and wires are correctly positioned and will not be trapped.
- The coil cable must be located within the shaft hinge so that it is not trapped or damaged when the halves of the detector body are fitted together. In particular, the coil cable must not be positioned above the screw bosses of the hinge.

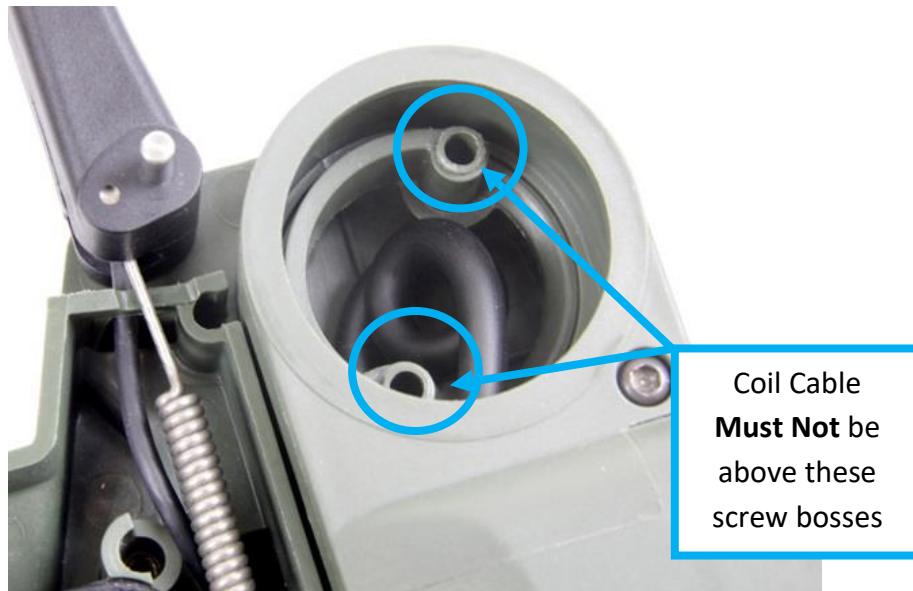


Figure 20: Coil Cable Position in Hinge

- Ease the two halves of the detector together. Align the detector chassis right side with the locating pins either side of the shaft hinge.
- Check the Latch Assembly and Spring Latch Hinge are in place and connected.
- Once the two sides of the detector are together check the handle, shafts and armrest slide are correctly fitted. Carefully hold the detector together whilst turning the detector over onto its right side.
- Check the coil cable is not trapped within the shaft hinge.
- Attach the Cover Cable.
- Insert the four (4) screws (two M4x20mm and two x M4x35mm) but do not fully tighten at this point.



Figure 21: Insert Four Screws

- With the detector loosely held together check the handle slides up and down correctly. Check the armrest slide also moves freely along the Rod Handle Slide.
- Check the Battery Lid moves in and out and ensure the Battery Lid is closed.

- Starting with the two (2) long (M4x35mm) screws fit the four (4) remaining screws into the right side of the detector.
- Tighten all eight (8) screws.



Figure 22: Insert four screws

- Identify the four (4) Torx (star) screws and check they all have O-rings fitted. Insert the four (4) Torx screws into the right side of the detector. The Torx screw positions have a Torx symbol next to their screw holes. Insert the three long screws first.

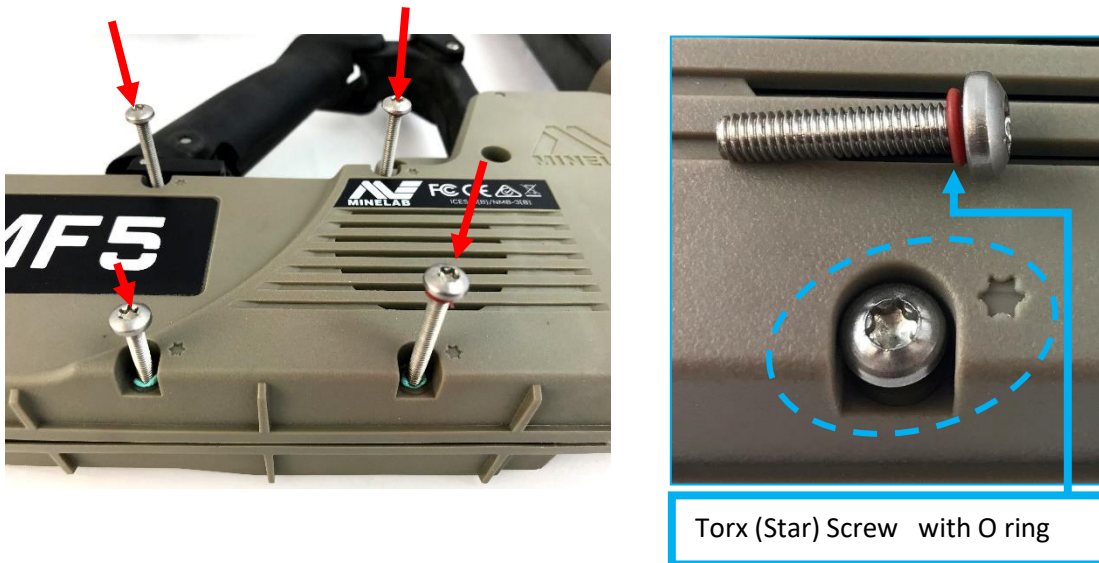


Figure 23: Insert four (4) Torx screws in location with star

- Check the detector assembly and test all moving parts.

- Place the detector on its right side. Remove the Cover Cable then insert and tighten the two (2) screws (M4x35mm) into the shaft hinge.

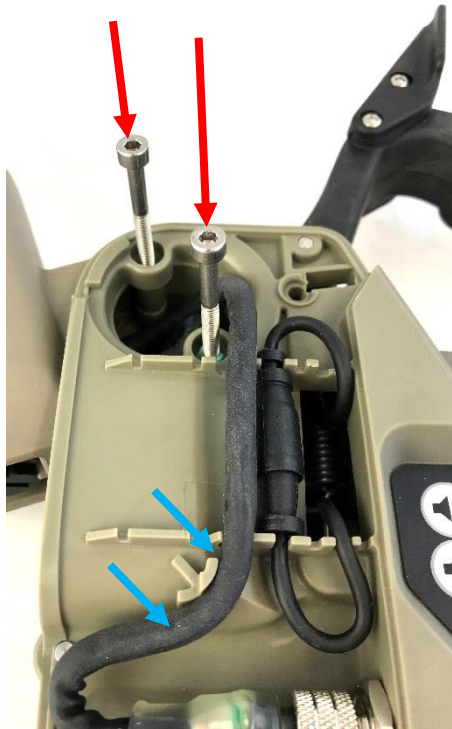


Figure 24: Insert two (2) screws (35mm length)

- Confirm coil connector is tight by turning the knurled connector collar as tight as possible by hand (clockwise no tools). Check the connector 18mm lock nut is tight then locate cables into the cable router.
- Attach the Cover Cable and make sure the protrusion on the underside of the hinge cover engages into the slot on the detector body near the hinge. Fit the two (2) screws (M4x45mm) into the Cover Cable and tighten.

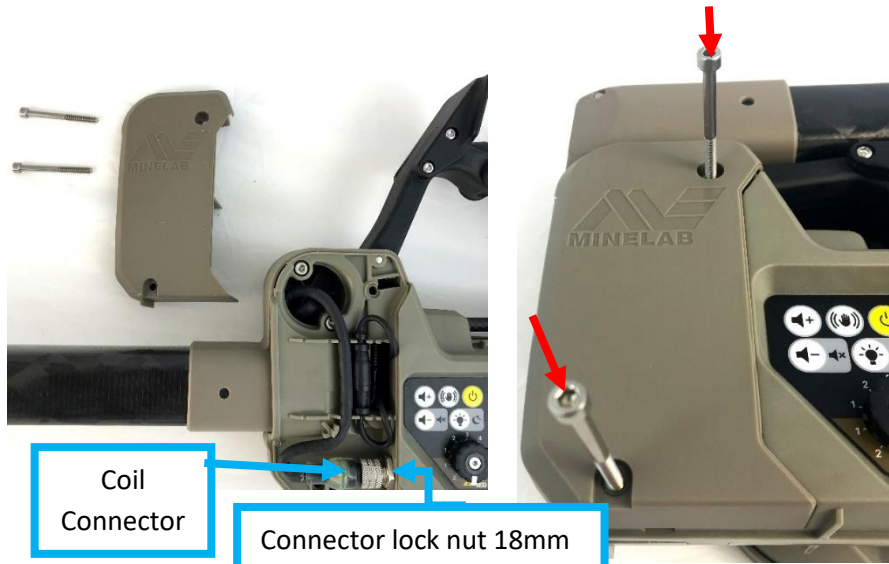


Figure 25: Check coil connector, Attach Cover Cable.

- Reattach the armrest with four (4) screws (12mm).



Figure 26: Attach Armrest

- Check all moving parts for correct operation.
- Insert batteries, turn on the detector then conduct mechanical & functional testing as described in Section 2 [Mechanical & Functional Testing](#).

3.3 Main Printed Circuit Board (PCB)

a. The Main PCB kit 3004-0294 is available as a spare part, this section of the manual describes the procedure for replacing the Main PCB.

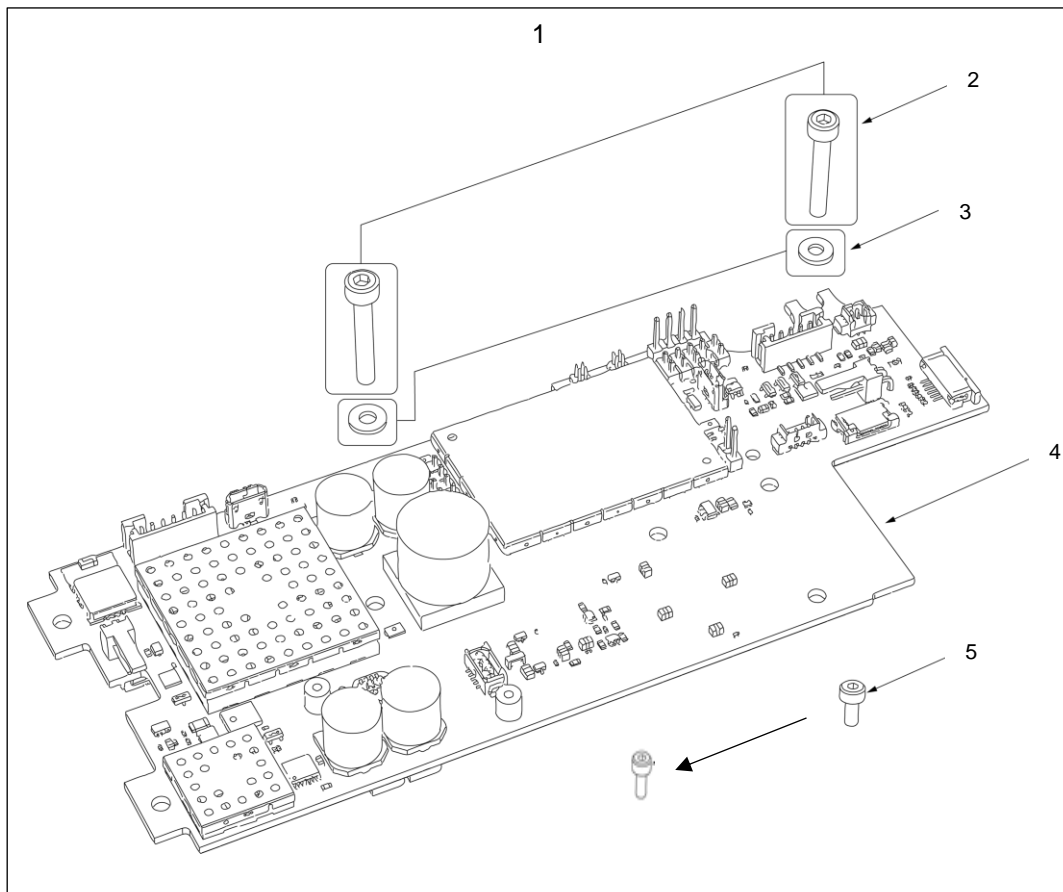


Figure 27: Main PCB kit

Item	MRN	Description	Qty
1	3004-0294	Main PCB Kit	1
2	31-23020-980	Screw, M3x20 304 SS Skt Cap	2
3	31-23001-991	Washer, M3 Nylon 2,92x6,35x0,81	2
4	5909-0324SK	PCB, Assy	1
5	31-22005-980	Screw, M2x5 316 SS Skt Cap	2

Table 2: Main PCB kit

b. The connections to the Main PCB are show in the following figure.

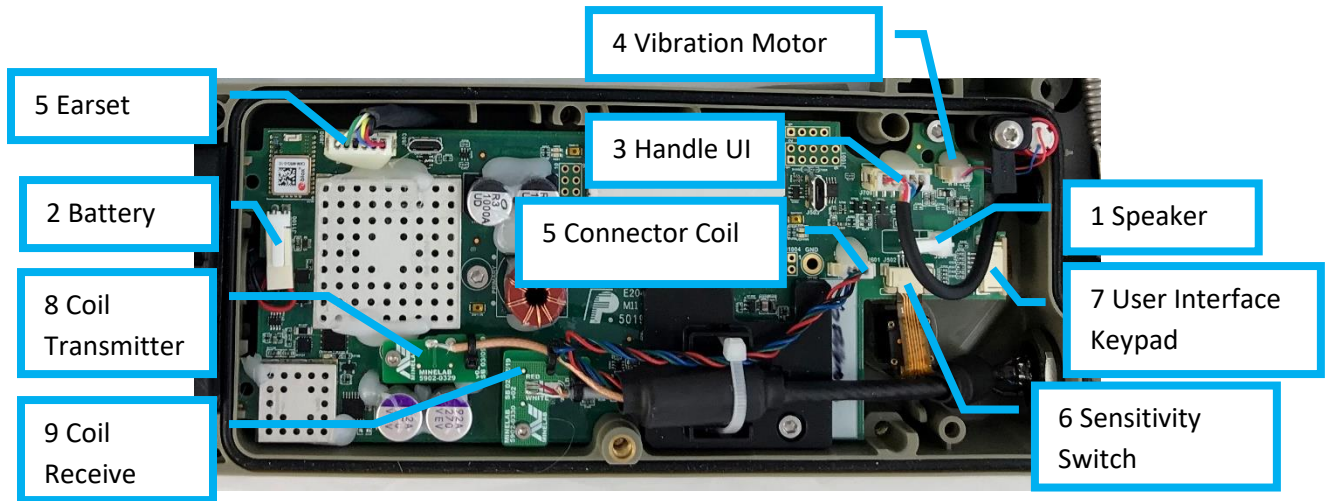


Figure 28: Main PCB Connections

3.3.1 Remove the Main PCB

a. **Required tools.**

- Hex key driver (Allen key) 2.5mm
- Hex key driver (Allen key) 1.5mm

b. To remove the Main PCB, first open the detector body as described in section [Opening the Detector Chassis](#).

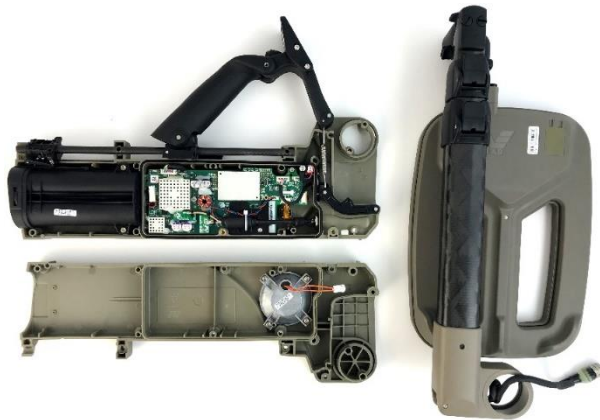


Figure 29: Open Detector Chassis.

- Disconnect the battery connector from the Main PCB.

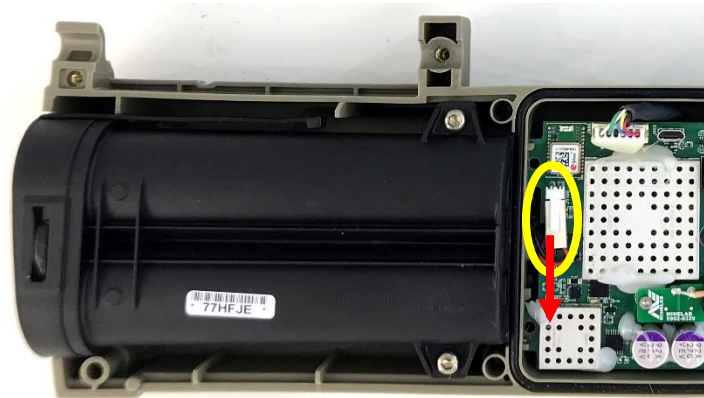


Figure 30: Unplug Battery Connector

- Unplug the Wiring Loom Handle from the Main PCB.
- Unplug the Vibration Motor from the Main PCB.
- Unplug the Coil Connector Loom from the main PCB.

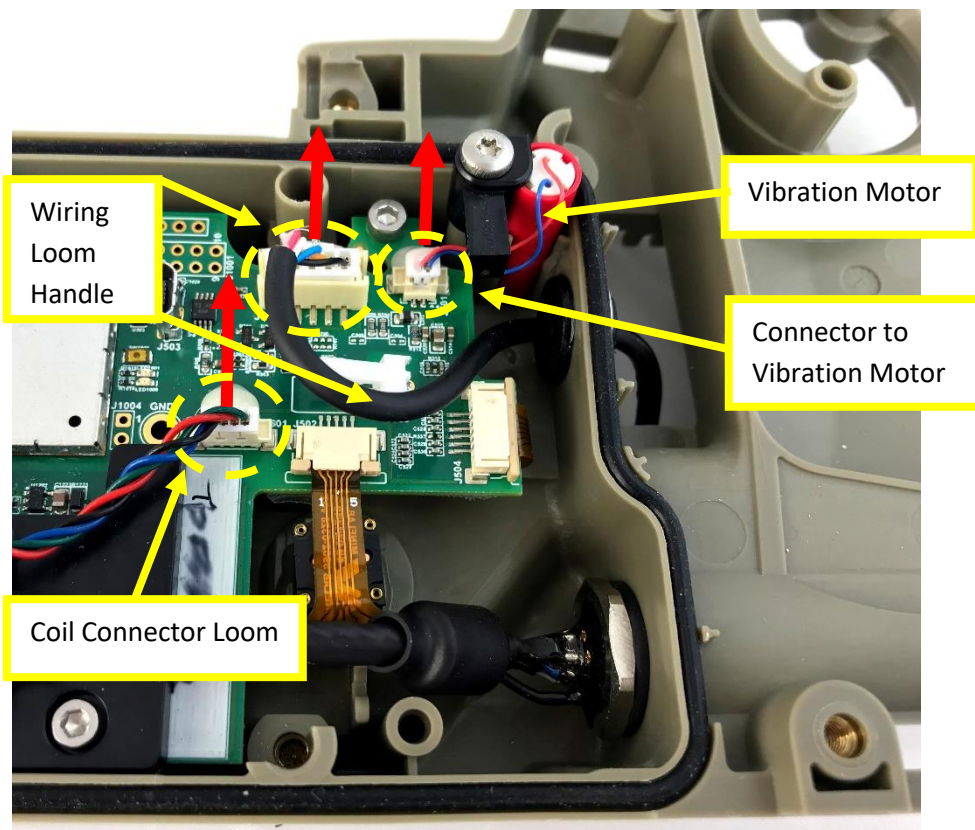


Figure 31: Unplug Vibration motor, Wiring Loom Handle and Connector Coil Loom

- Unplug the Wiring Loom Earset (connects earset connector to the Main PCB).

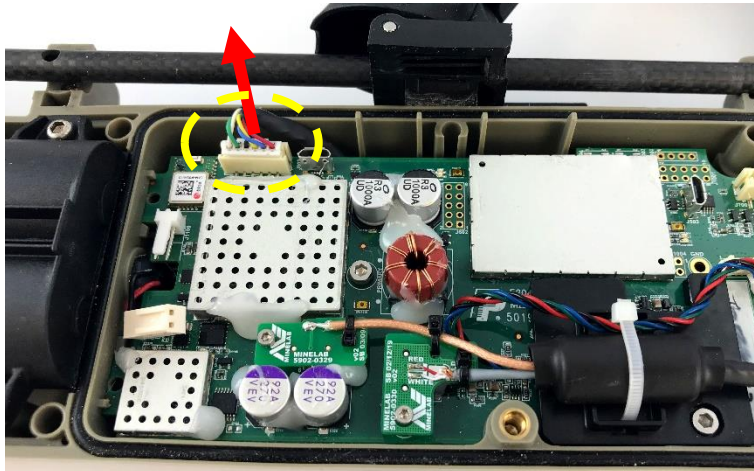


Figure 32: Disconnect Wiring Loom earset

- Unplug the Switch Sensitivity by first opening the locking bail on the connector on the main PCB

Caution:

The Sensitivity Switch Flexible Printed Cable (sensitivity switch to main PCB) and the Keypad Flexible Printed Cable can be easily damaged if it is stressed or pulled, handle carefully.

- Unplug the User Interface Secondary (keypad) from the Main PCB.

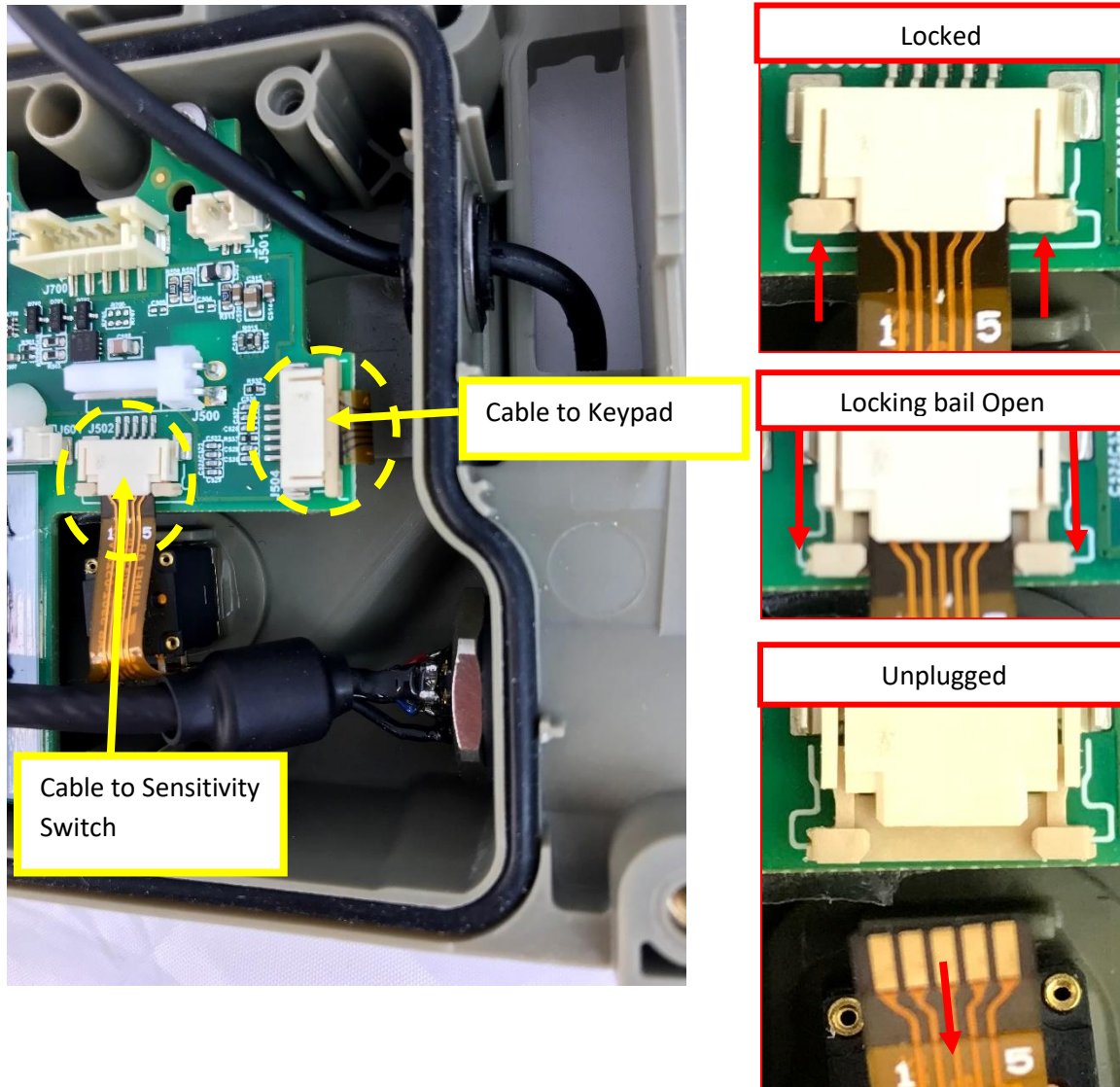


Figure 33: Unplug Switch Sensitivity and User Interface Secondary (keypad)

- Remove the screw from the Coil Transmitter Connector. Unplug the Coil Transmitter connector by lifting it off the Main PCB. The Coil Transmitter Connector is part of the Coil Connector Loom (3004-0300)
- Remove the screw from the Coil Receiver Connector. Unplug the Coil Receiver connector from by lifting it off the Main PCB. The Coil Receiver Connector is part of the Coil Connector Loom (3004-0300).

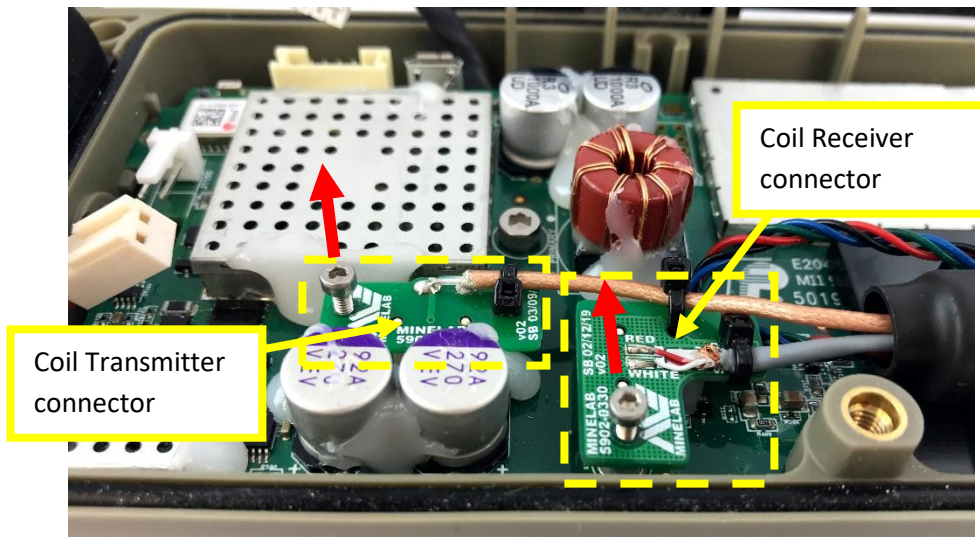


Figure 34: Unplug Coil Transmitter and Receiver Connectors from the Main PCB

- Remove the three screws that hold the main PCB in place.

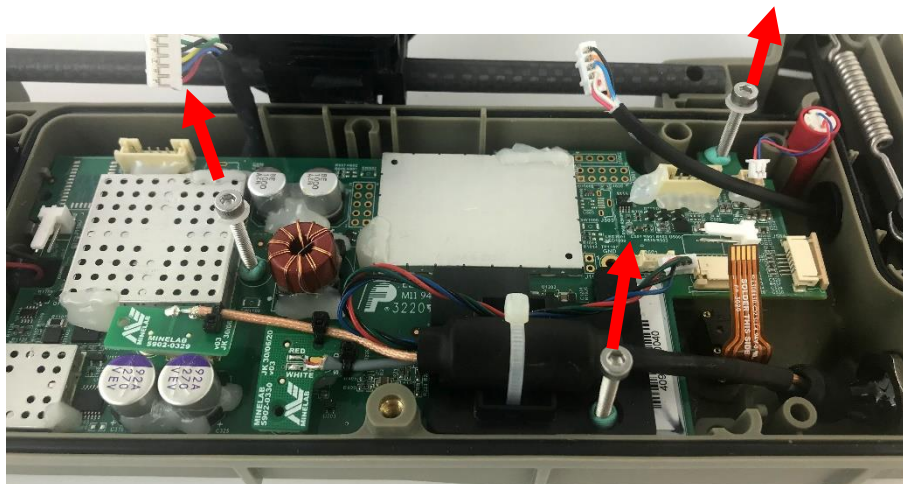


Figure 35: Remove main PCB mounting screws (3).

- Slide the main PCB away from the battery assembly until the ends of the main PCB disengage from the slots in the detector body near the battery compartment.
 - Gently tilt the top side (near the detector handle) of the main PCB up and away from the housing and lift the main PCB from the detector body.
- c. The Main PCB has now been removed from the metal detector and can be replaced if required.

3.3.2 Main PCB Assembly

a. **Required tools.**

- Hex key driver (Allen key) 2.5mm
- Hex key driver (Allen key) 1.5mm

b. The Main PCB can be replaced by first opening the detector chassis as described in section [Open the Detector Chassis](#), install a serviceable main PCB as follows:

- Place the detector on its left side in a clean well lit area.
- Lower the Main PCB into the detector, pushing the bottom side (away from the handle) down and into place first. Gently position the main PCB flat inside the detector.



Figure 36: Insert Main PCB

- Gently slide the Main PCB rearward towards the battery compartment so that the ends of the Main PCB insert into the locating slots in the detector chassis.

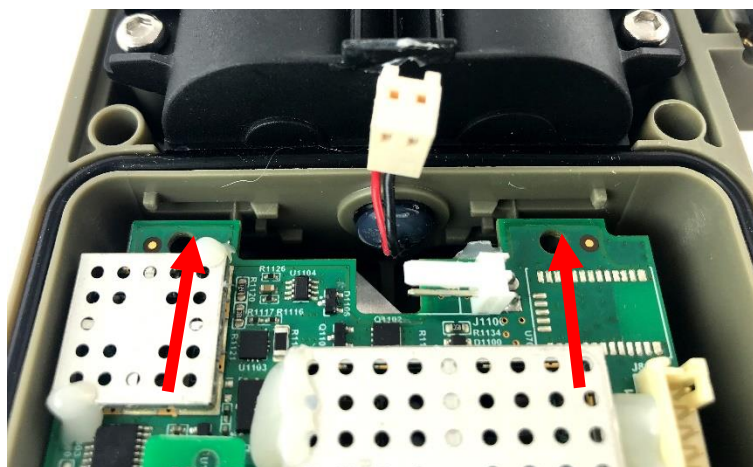


Figure 37: Insert Main PCB.

- Insert the three (3) mounting screws (M3x20mm) into the Main PCB. The two uppermost (of three) screws require a nylon washer, the lower screw closest to the coil connector doesn't require a washer.

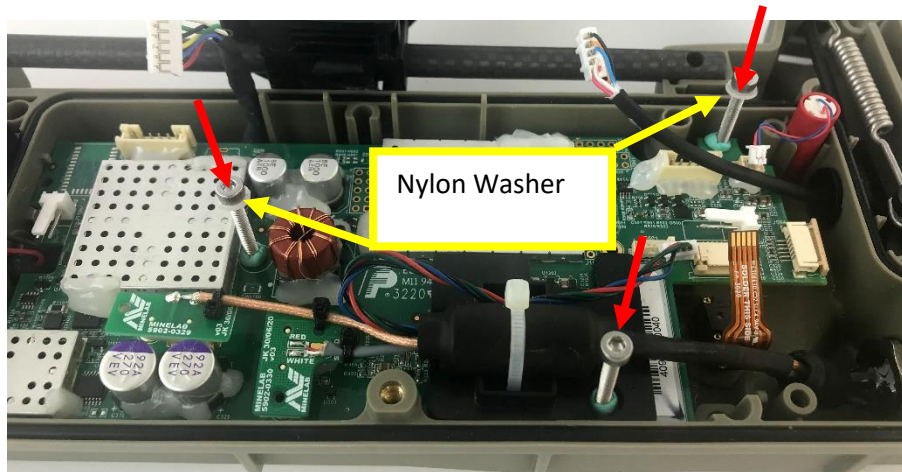


Figure 38: Insert mounting screws to PCB.

- Connect the flat ribbon cables from the Switch Sensitivity and the User Interface to the connectors on the Main PCB. First open the connector locking bail (slide out) then firmly insert the ribbon cable then close the connector locking bail.

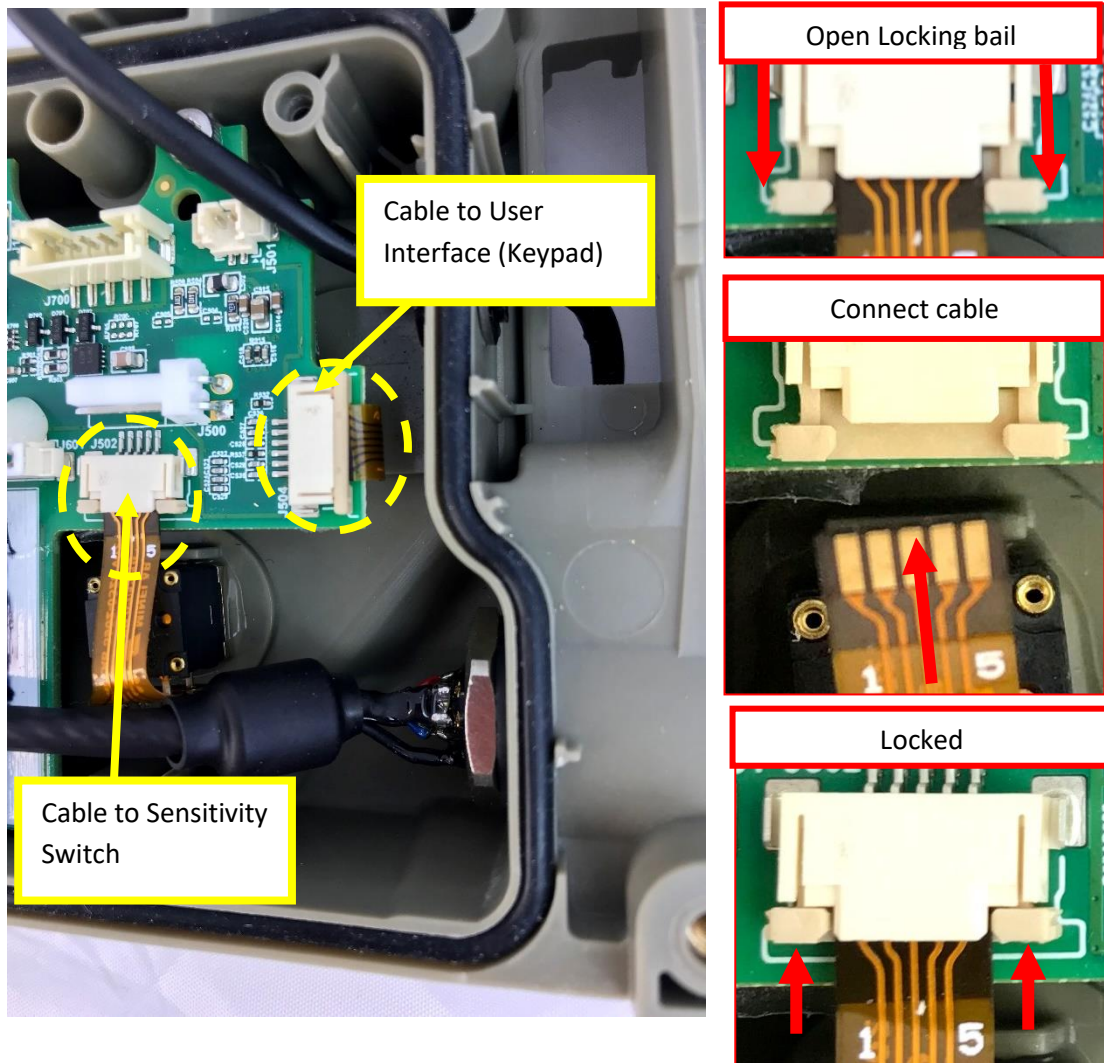


Figure 39: Connect User Interface and Switch Sensitivity ribbon cables.

- Connect the Coil Transmitter Connector to the Main PCB. Screw the Coil Transmitter Connector to the Main PCB using M2x5mm screw (31-22005-980). Apply a small amount of threadlocker (Loctite 222) to the thread of the M2x5mm screw.

- Connect the Coil Receiver Connector to the Main PCB. Screw the Coil Receiver Connector to the Main PCB using the M2x5mm screw (31-22005-980). Apply a small amount of threadlocker (Loctite 222) to the thread of the M2x5mm screw

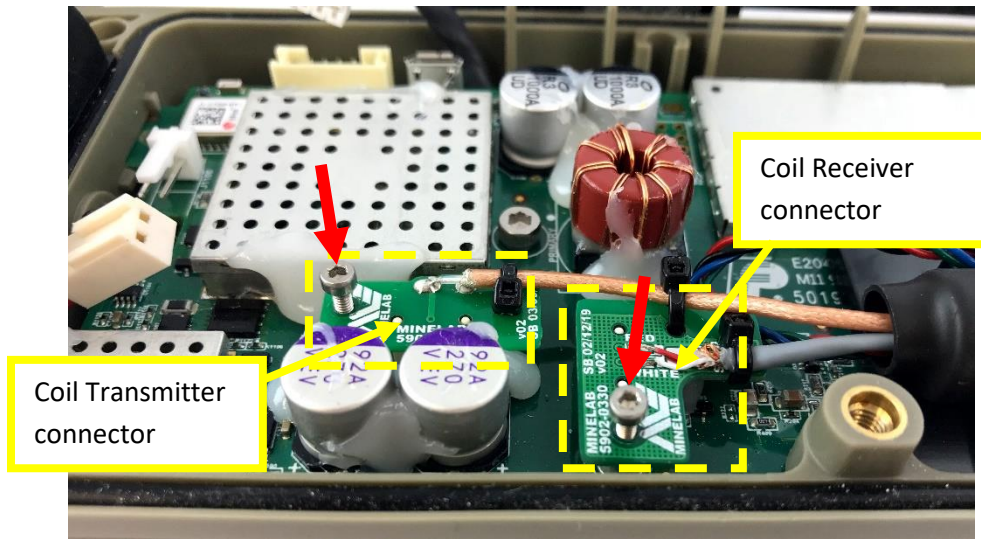


Figure 40: Connect Coil Transmitter and Coil Receiver.

- Connect the Wiring Loom Earset to the Main PCB.

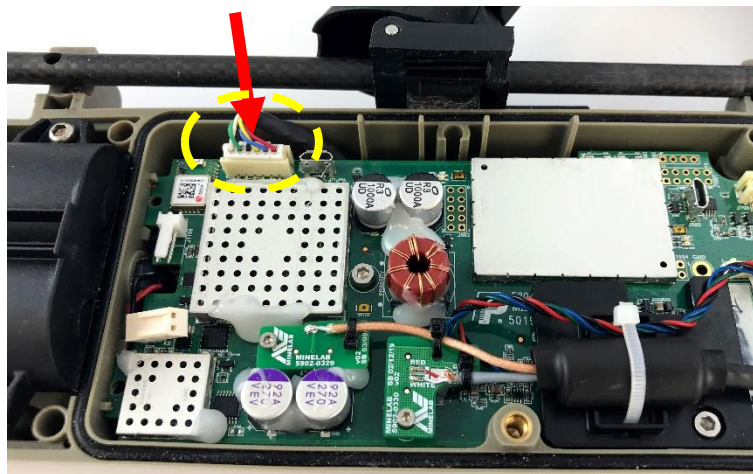


Figure 41: Connect Earset Loom.

- Connect the Wiring Loom Handle to the Main PCB.
- Connect the Vibration Motor to the Main PCB.
- Connect the Connector Coil Loom to the Main PCB.

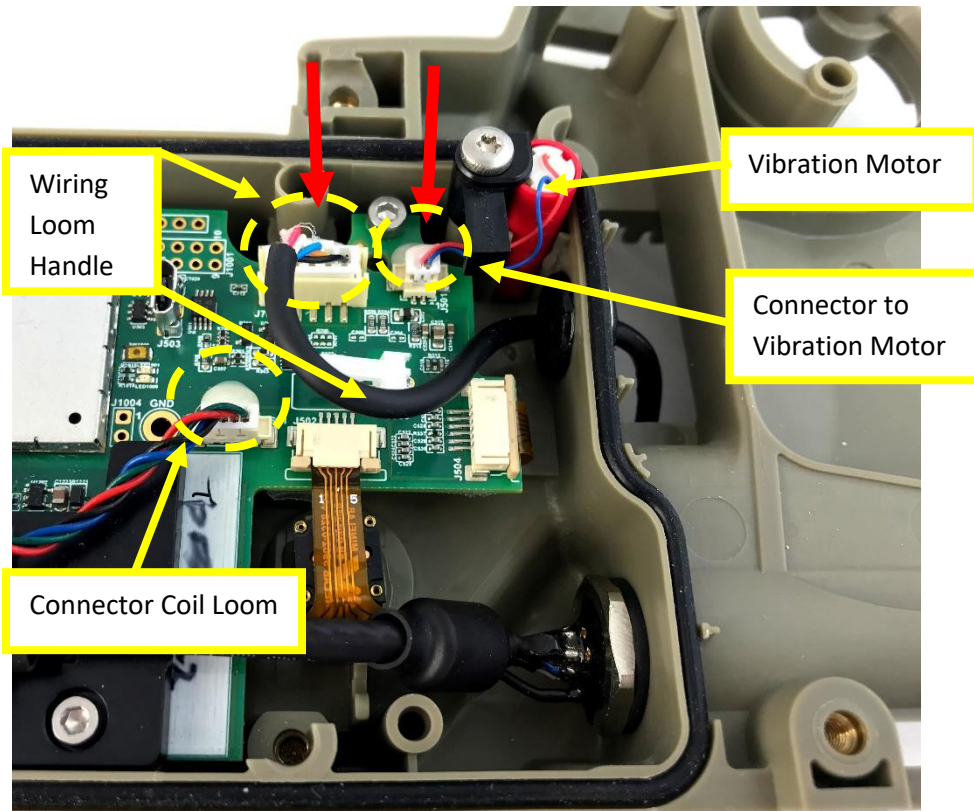


Figure 42: Connect Handle, Vibration Motor and Connector Coil Loom.

- Connect the Battery Connector to the Main PCB.

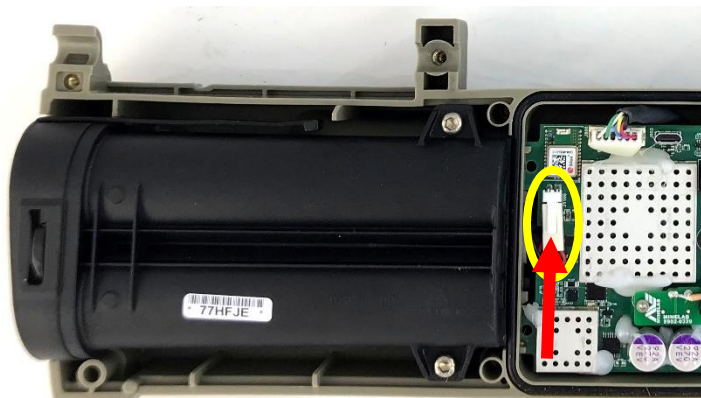


Figure 43: Connect the Battery Connector.

- Make sure all connectors are firmly in place and all wires and cables are positioned so that they will not cause obstruction or get damaged when the two halves of the main body are fitted together.
- Having completed the previous steps the Main PCB is now installed and connected into the MF5. To complete the assembly of the detector refer to section [Closing the Detector Body](#).

3.4 Coil

a. 3004-0290 Coil Kit MF5 is a spare parts kit that contains the coil and associated parts. The parts of the Coil Kit are shown in the following figure.

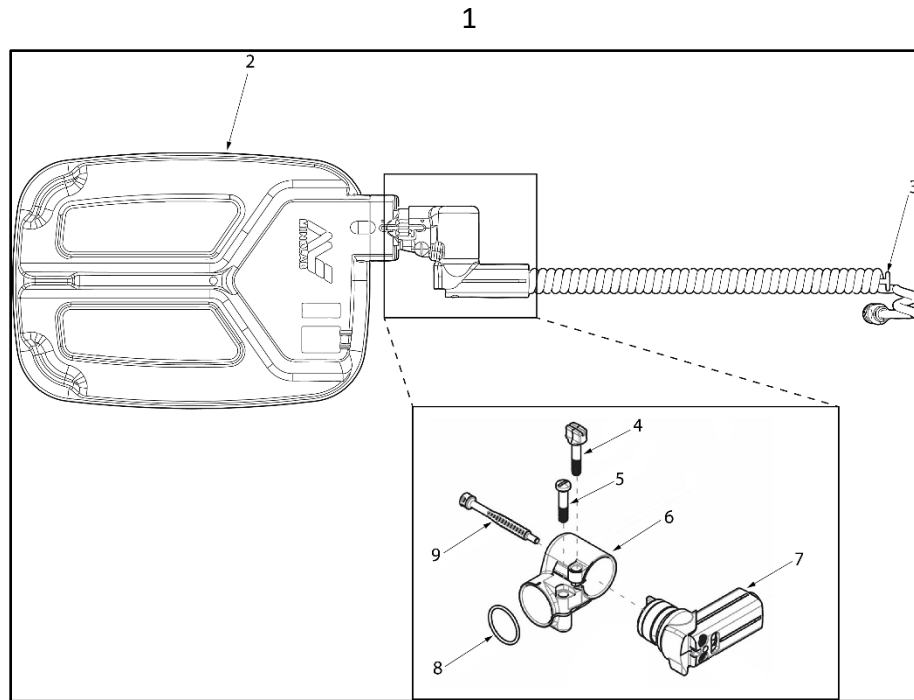


Figure 44: Coil Parts

Item	Part Number	Description	Qty
1	3004-0290	Coil Kit MF5	1
2	2021-0163	Coil Assembly	1
3	4308-0031	Pin Coil Cable	1
4	4003-0121	Screw Thumb Nylon 1/4BSW	1
5	4003-0126	Screw Nylon M6x27	1
6	4311-0114	Pivot Coil Yoke	1
7	4311-0117-001	Pivot Lower Shaft	1
8	30-29011-514	O Ring 25mm ID	1
9	4308-0030	Pin Coil Pivot	1

Table 3: Coil Parts

3.4.1 Remove the Coil

a. Required Tools:

- Hex key driver (Allen key) 3mm
- Flat tip screw driver

b. To remove the Coil from the MF5:

- Prepare a clean well lit area in which to work.
- Switch off the detector and remove the batteries.
- Place the detector on its right side and remove the two (2) screws (M4x45mm) that secure the Cover Cable.
- Remove the Cover Cable.

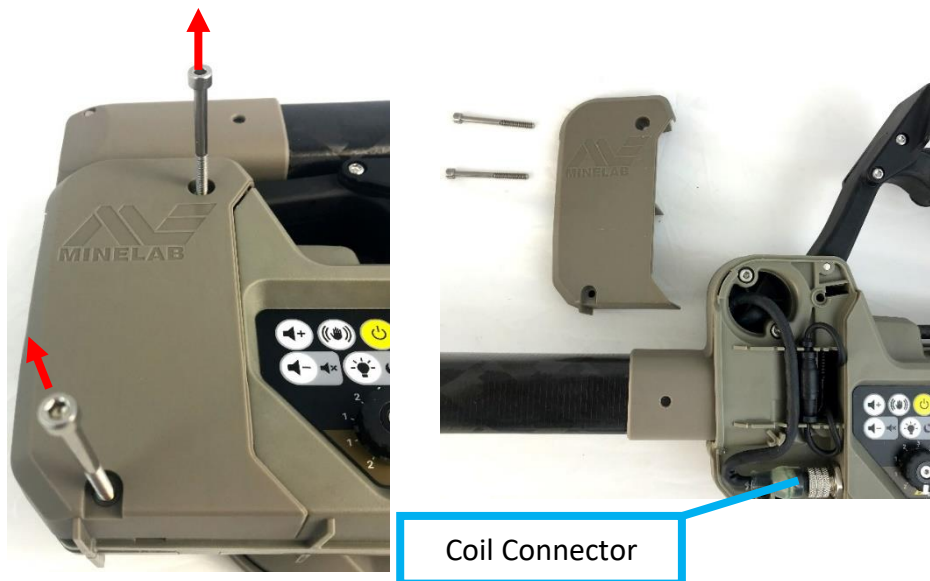


Figure 45: Remove Cover Cable.

- Unscrew and disconnect the coil connector.

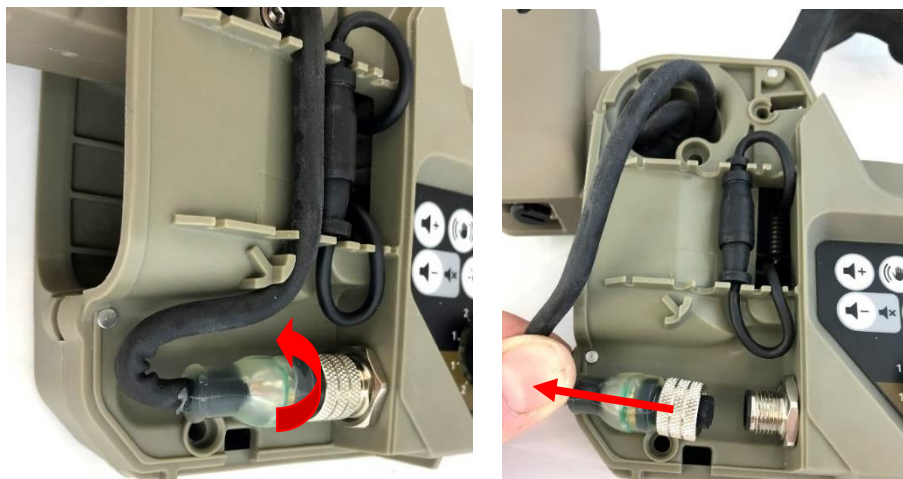


Figure 46: Disconnect the coil.

- Remove the Pin Coil Cable from the upper end of the upper shaft. Turn the pin clockwise (90deg) then pull to remove.



Figure 47: Remove Pin Coil Cable from the upper shaft

- Remove the two (2) screws (Nylon M6x14mm) from the Cap Shaft on the lower shaft.



Figure 48: Remove Screws from Lower Shaft

- Insert a flat tip screwdriver into the slot underneath the Cap Shaft and lift and remove the Cap Shaft.

- Slide the coil out and off the lower shaft, exposing the coil cable.

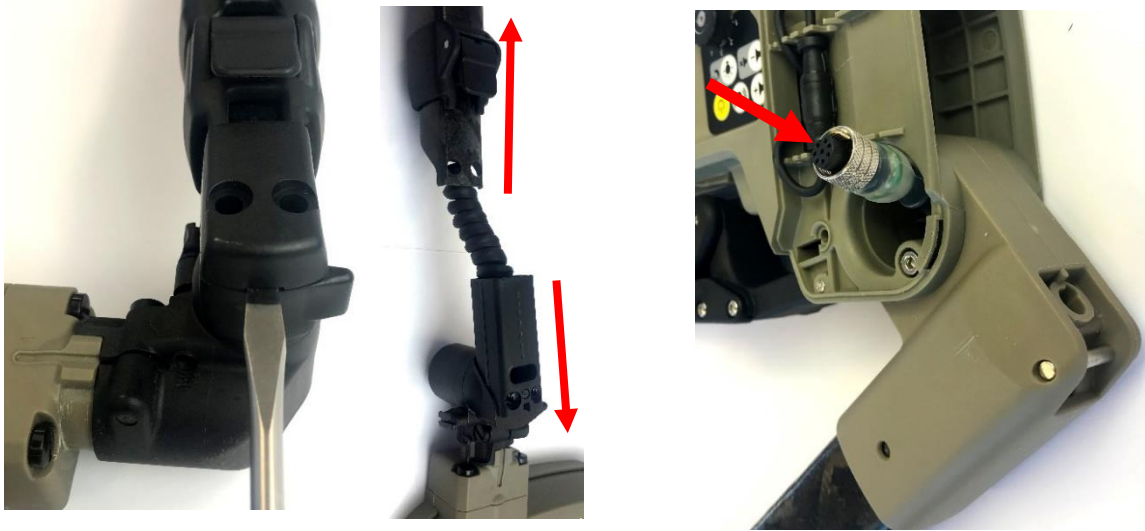


Figure 49: Slide the Coil off the Shaft

- Push the coil cable connector into the shaft hinge whilst gently pulling the coil cable out of the end of the lower shaft. Once the coil connector has passed through the shaft hinge it should slide out easily from the shafts. **Do not force the coil cable or coil connector.**
- c. The coil can now be removed or replaced as required. To fit the Coil to the detector, refer to section [Connect the Coil](#).



Figure 50: Coil removed from detector.

3.4.2 Coil Pivot.

The Coil Pivot is a spare part, the parts of the Coil Pivot are shown below. Each part of the coil pivot can be ordered individually or as a 3004-0291 Coil Pivot Kit.

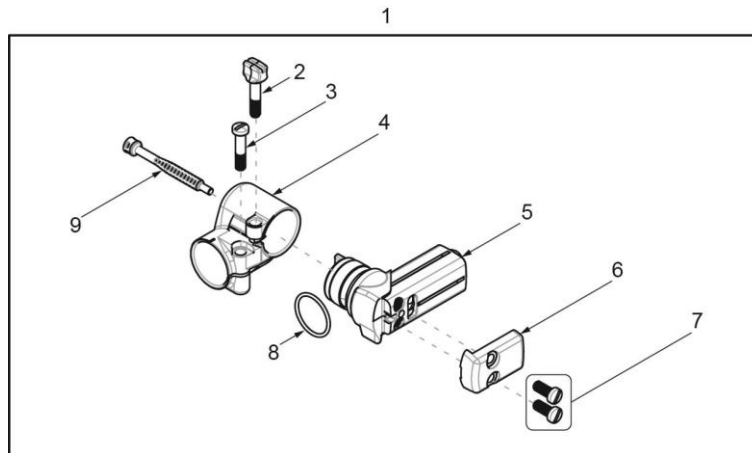


Figure 51: Coil Pivot Kit Parts

Item	Part Number	Description	Qty
1	3004-0291	Coil Pivot Kit	1
2	4003-0121	Screw Thumb Nylon 1/4BSW	1
3	4003-0126	Screw Nylon M6x27	1
4	4311-0114	Pivot Coil Yoke MF5	1
5	4311-0117-001	Pivot Lower Shaft	1
6	0703-0204	Cap Shaft	1
7	4003-0124	Screw Nylon M6x14	2
8	30-29011-514	O-Ring 25mm IDx2	1
9	4308-0030	Pin Coil Pivot	1

Table 4: Coil Pivot Kit Parts

3.4.3 Remove Coil Pivot

a. Required Tools:

- Flat tip screw driver
- Pin punch 3mm or hex key driver (allen key) 3mm

b. To remove the Coil Pivot, first remove the Coil as described in section [Remove the Coil](#).

Once completed:

- Remove the Thumb Screw (Screw Thumb Nylon 1/4BSW) and screw (Nylon M6x27) from the Coil Pivot.

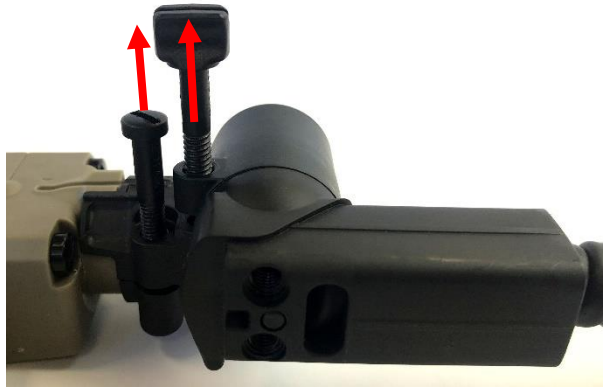


Figure 52: Remove two (2) Screws

NOTE

The two (2) screws each adjust the friction of the coil pivot movement.

- Push the Pin Coil Pivot out with a pin punch or hex key driver and remove the Pin Coil Pivot.

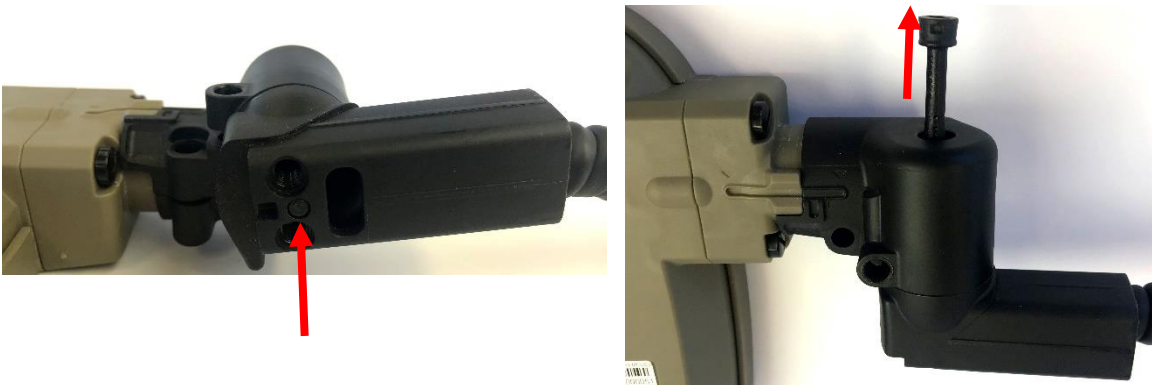


Figure 53: Remove Pin Coil Pivot.

- Separate the pivot lower shaft from the pivot coil yoke. Gently feed the coil cable through the pivot lower shaft removing the pivot shaft from the coil cable. Do not over stretch the coil cable.



Fig 54: Remove Pivot Lower

- Pull the Pivot Coil Yoke off the coil and carefully thread the coil cable through the Pivot Coil Yoke. If required remove the O-ring from the coil. Removing the Pivot Coil Yoke from the coil may cause damage to the O ring. A flat tip screw driver can be used to prise apart (expand the diameter) the Pivot Coil Yoke enough to fit over the O ring as it is removed .



Fig 55: Remove Pivot Coil Yoke

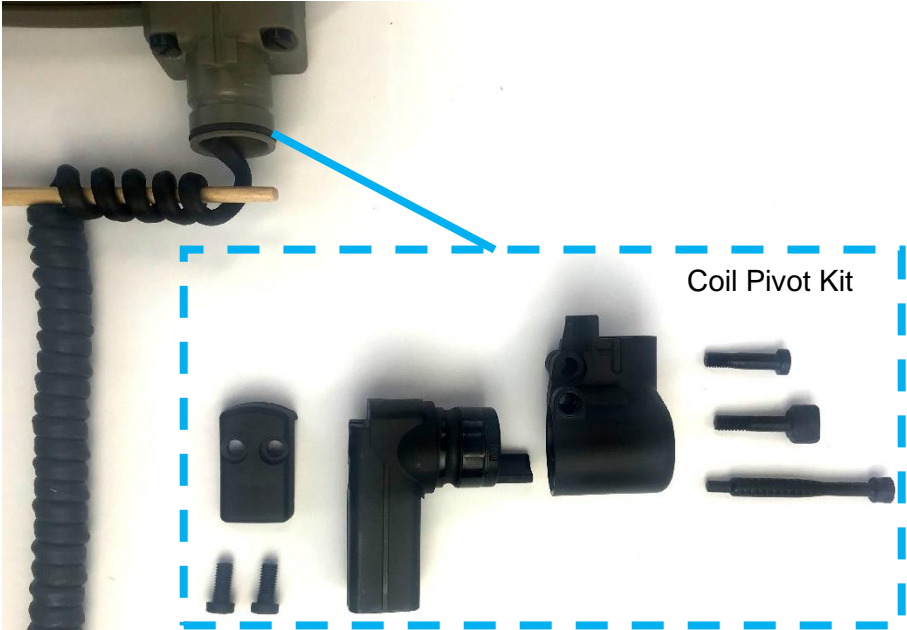


Figure 56: Coil Pivot Assembly

3.4.4 Attach the Coil Pivot

a. Required Tools:

- Flat tip screw driver

b. To attach the coil pivot:

- Attach the O-ring to the coil. The O ring needs to be clean and positioned in the groove around the cable entry point of the coil. Do not grease the O ring.

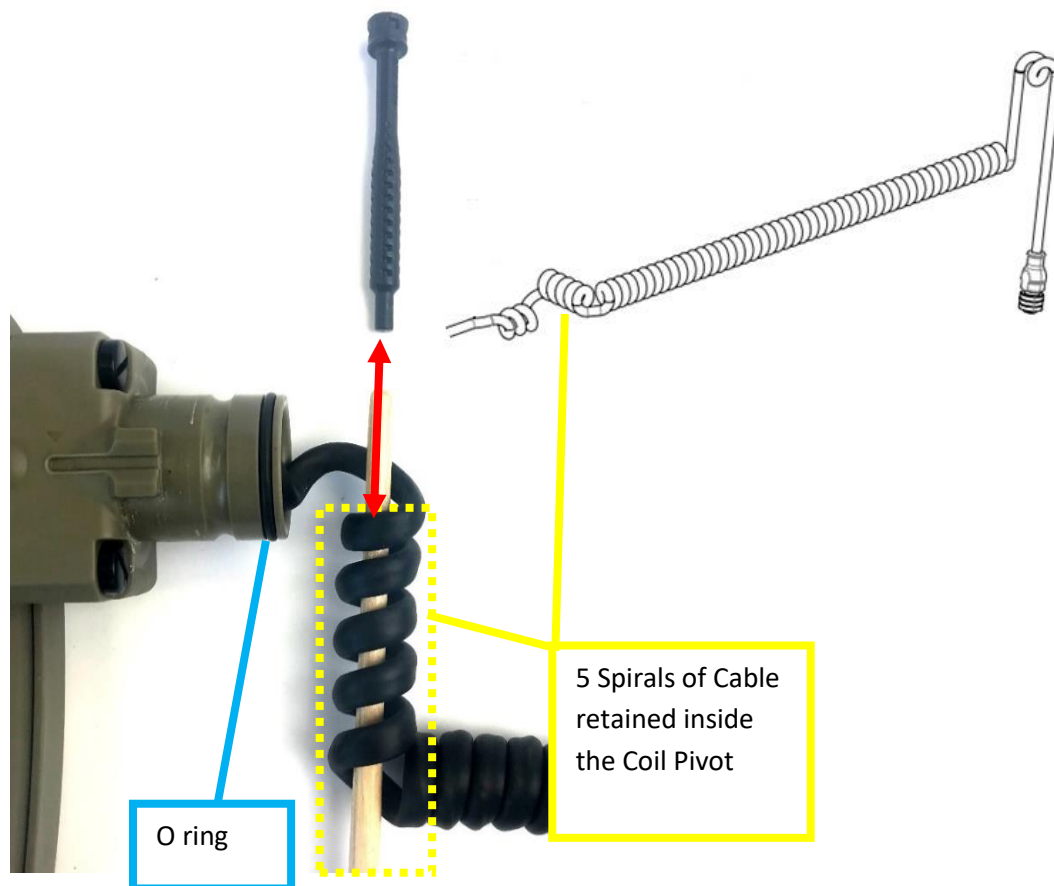


Figure 57: O-Ring and Coil Cable

- The coil cable is attached to the coil and sealed (waterproof) it is only possible to replace the coil cable by replacing the entire coil (with cable). The coil cable has two windings (spirals) closest to the coil, turns 90 degrees then five windings of cable (inside the coil pivot).
- It is important to correctly align the coil cable into the coil pivot when assembling with five (5) windings located within the pivot with the Pin Coil Pivot passing through the centre.
- Carefully check the inside of the Pivot Coil Yoke for any corners or edges that could damage the O ring when the parts are pressed together, remove the Thumb Screw (Screw Thumb Nylon 1/4BSW) and Screw (Nylon M6x27) from the Pivot Coil Yoke.

- Feed the Pivot Coil Yoke onto the coil cable and carefully move the Pivot Coil Yoke along the coil cable to the coil. Do not attach the Pivot Coil Yoke to the coil yet.
- Insert the Pin Coil Pivot into the Pivot Coil Yoke.



Figure 58: Attach Pivot Coil Yoke

- Wind the coil cable around the pin so that five (5) windings of cable are on the pin in the Coil Pivot assembly.

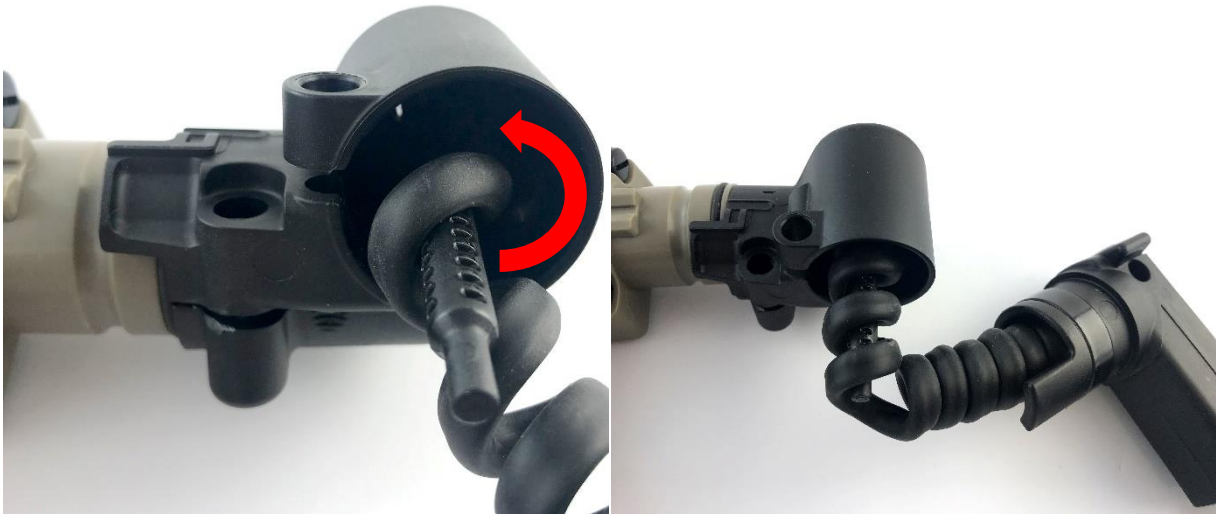


Figure 59: Wind coil cable around pin 5 times

- Feed the Pivot Lower Shaft onto the coil cable.
- Align the Pivot Lower Shaft so that it is 90 degrees to the Coil and Pivot Lower Shaft.
- Push the Pivot Lower Shaft into the Pivot Coil Yoke.

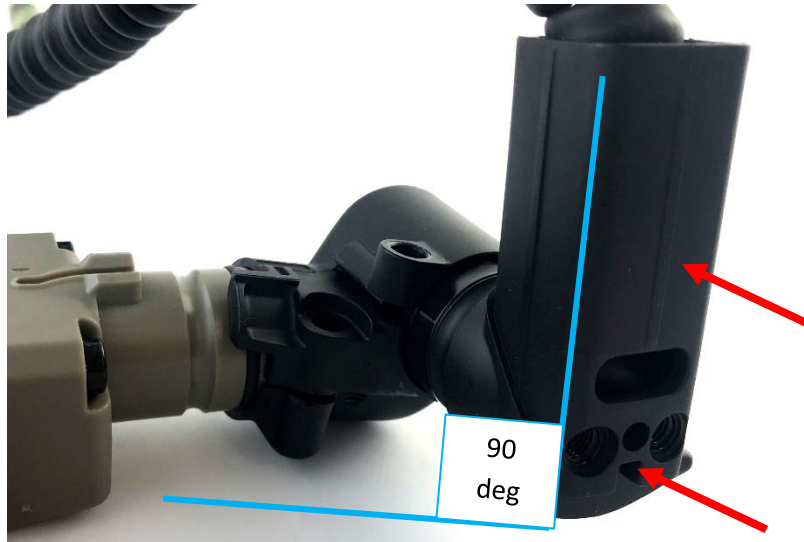


Figure 60: Align Pivot before assembly

- Push the Pivot assembly onto the coil. A flat tip screw driver can be used to prise apart the Pivot Coil Yoke so that it fits over the O ring without causing damage to the O ring.

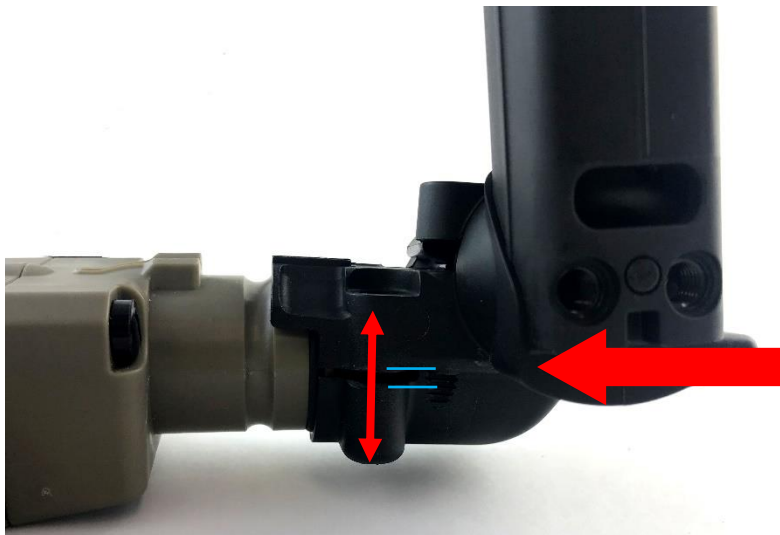


Figure 61: Push Pivot Assembly onto Coil.

- Check that the Pin Coil Pivot is fully inserted into the Coil Pivot assembly
- Check the Pivot Coil Yoke rotates through 270 degrees with end stops.
- Check the movement of the Coil Pivot in both directions.

- Insert the Screw (Nylon M6x27) into the Pivot Coil Yoke and then insert the Thumb Screw (Screw Thumb Nylon 1/4BSW). Tighten both screws until the movement of the coil starts to become firm.

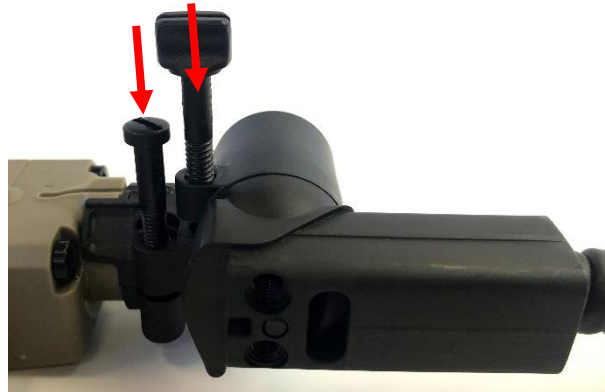


Figure 62: Insert Screws.

NOTE

The Screw Thumb Nylon 1/4BSW will adjust the friction of the coil tilt. The Screw Thumb Nylon 1/4BSW must be tight enough to stop the coil from moving position whilst being used. The Screw (Nylon M6x27) will adjust the friction of the coil rotation (270 deg).

- c. Attach the coil to the shaft then fit onto the detector as described in Section [Connect the Coil](#).
- d. Complete the mechanical and function testing of the metal detector (described in this manual) before returning the MF5 to operations.

3.4.5 Connect the Coil

a. Required Tools:

- Hex key driver (allen key) 3mm
- Flat tip screw driver

- b. Open the detector chassis as described in section [Open the Detector Chassis](#). Once completed. Remove the Shaft and Coil from the detector as described in section [Remove the Shafts](#)

- Remove the screw from the Cover Shaft Hinge then remove the Cover from the shafts.

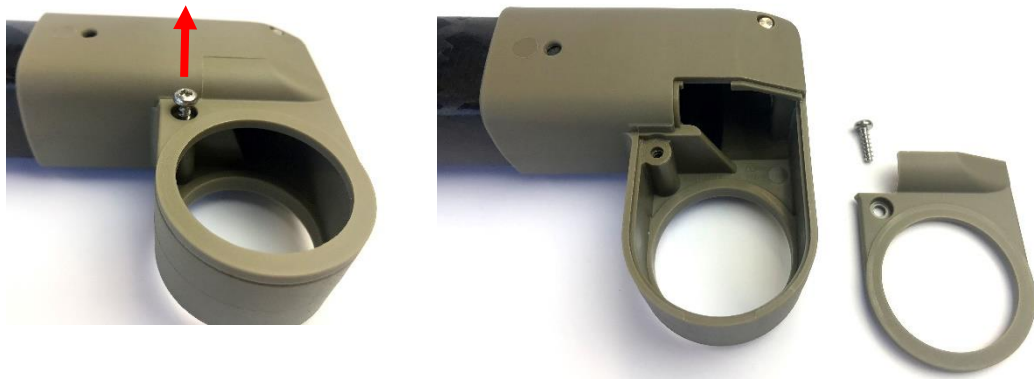


Figure 63: Remove the Cover Shaft Hinge from the shaft.

- Push the coil connector into the bottom of the lower shaft, thread the coil cable through the shafts and out of the hinge at the top of the upper shaft. If required an piece of string can be used to pull the coil cable through the shafts of the detector.
- Slide the lower shaft onto the Coil Pivot Assembly.

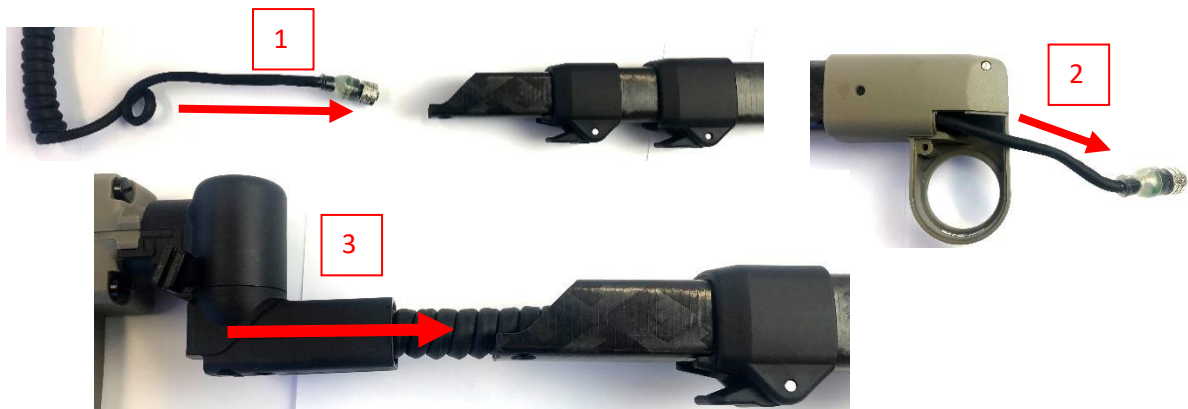


Figure 64: Thread coil cable through the shafts.

- Insert the Pin Coil Cable into the end of the upper shaft so that the Pin Coil Cable engages into the turns of the coil cable within the shaft. Push the pin in then turn it counter clockwise to lock.
- The Pin Coil Cable holds the coil cable in place so that when the shafts are extended and collapsed there is no movement of the coil cable through the hinge of the detector. If the spirals of the coil cable are not held firmly on the Pin Coil Cable and they tend to come off the Pin Coil Cable when the shafts are extended then the coil cable needs to be rearranged inside the shaft. Remove the Pin Coil Cable and add two more turns to the coil cable (turn clockwise) then reattach the pin. If the spirals of the cable are too tight to insert the pin then unwind the coil cable two turns (Counter clockwise) and try again.

- Push the Pin Coil Cable into the shaft and inside the spirals of the coil cable. Turn the pin counter clockwise to lock it into place.

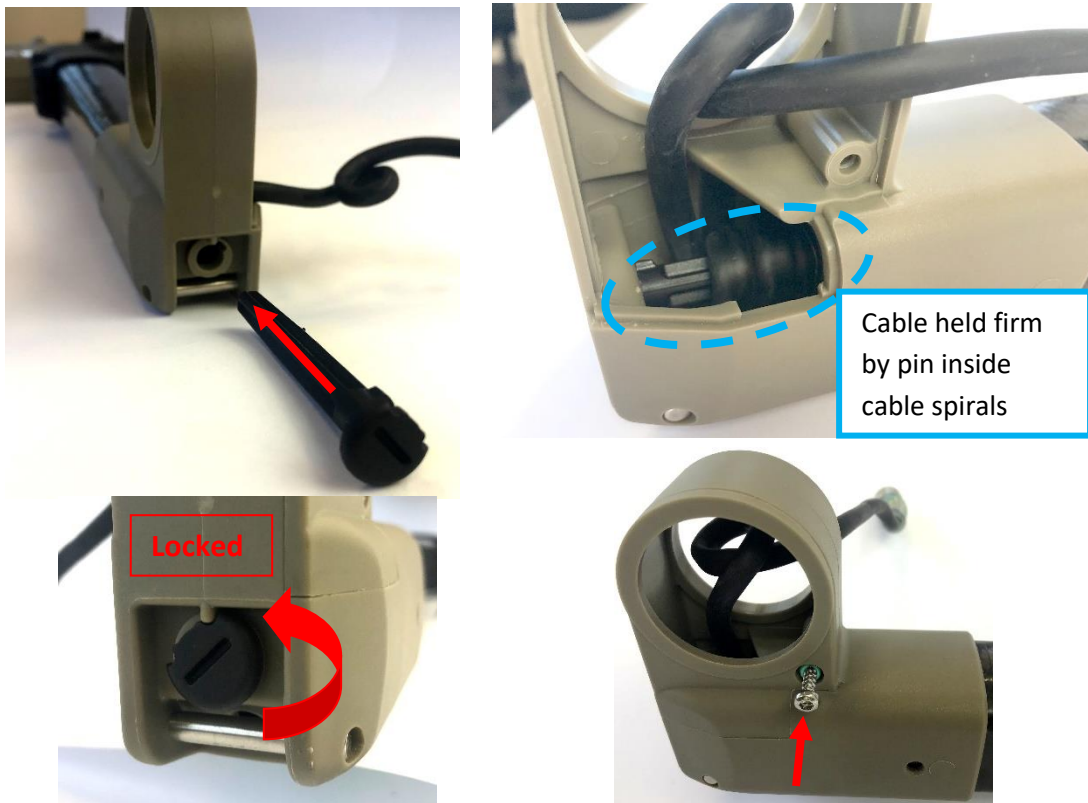


Figure 65: Insert Pin Coil Cable.

- Attach the Cover Shaft Hinge to the shaft and screw into place.
- Attach the Cap Shaft to the lower shaft then insert the two (2) Screws (M6x14mm Nylon).



Figure 66: Attach Cap Shaft

- Thread the coil cable through the detector hinge then place the shaft onto the detector hinge.

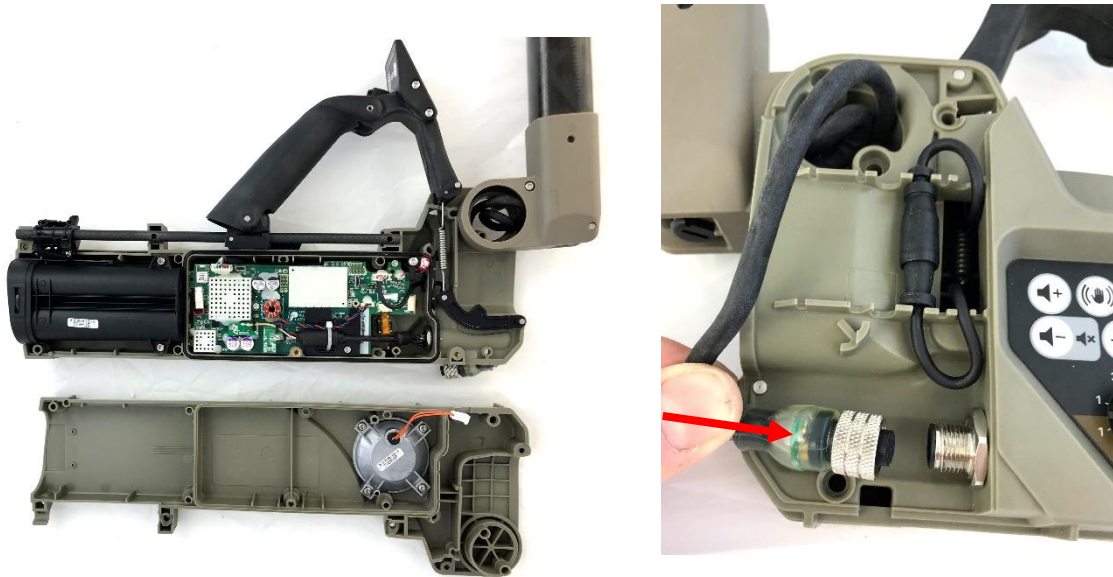


Figure 67: Attach shafts.

- Align then connect the coil cable to the MF5 detector, turn the connector locking collar clockwise until finger tight. Close the detector body and complete the detector assembly as described in Section [Closing the Detector Body](#).
- The Coil has now been connected to the detector. Check the assembly and all moving parts. Insert batteries and then carry out mechanical & functional testing as described in Section [Mechanical & Functional Testing](#).

3.5 Shafts

a. The 3004-0292 Shaft Kit MF5 is available as a spare part kit, the parts of the Shaft Kit are shown in the following table.

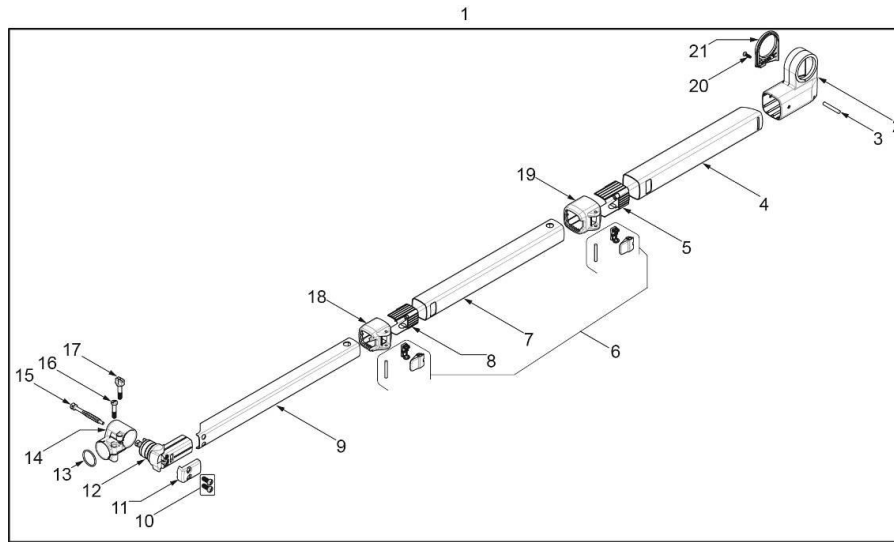


Figure 68: Shaft.

Item	Part Number	Description	Qty
1	3004-0292	Shaft Kit MF5	1
2	4311-0073-002	Hinge Upper Shaft	1
3	4308-0018	Pin Lock Latch	1
4	8007-0065	Shaft Upper	1
5	8009-0011	Shaft Guide Middle	1
6	3004-0047	Camlock Kit	2
7	8007-0064	Shaft Middle	1
8	8009-0012	Shaft Guide Lower	1
9	8007-0063	Shaft Lower	1
10	4003-0124	Screw Nylon M6x14	2
11	0403-0204	Cap Shaft	1
12	4311-0117-001	Pivot Lower Shaft	1
13	30-29011-514	O ring 25mm IDx2	1
14	4311-0114	Pivot Coil Yoke	1
15	4308-0030	Pin Coil Pivot	1
16	4003-0126	Screw Nylon M6x27	1
17	4003-0121	Screw Thumb Nylon 1/4BSW	1
18	8008-0060	Camlock Body Middle	1
19	8008-0059	Camlock Body Upper	1
20	31-03512-980	Screw 3.5x12 skt head	1
21	0703-0202-002	Cover Shaft Hinge MF5	1
	3004-0291	Coil Pivot Kit MF5 includes items 10 to 17	

Table 5: Shaft.

3.5.1 Replacing a Camlock

3004-0047 Camlock kit is available as a spare part and includes the following items.

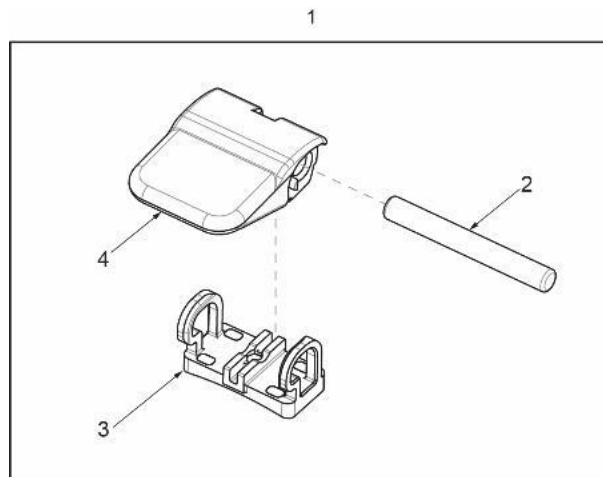


Figure 69: Camlock Kit

Item	MRN	Description	Qty
1	3004-0047	Camlock Kit	2
2	4308-0014	Pin Camlock Lever	1
3	8008-0062	Pressure Block Camlock	1
4	8008-0061	Camlock Lever	1

Table 6: Camlock Kit.

a. Required Tools:

- Pin Punch 3mm or Hex key driver (allen key) 3mm

b. Camlock replacement can be completed as follows:

- Fully open the Camlock Lever then using a pin punch and hammer drive the Pin Camlock Lever out.

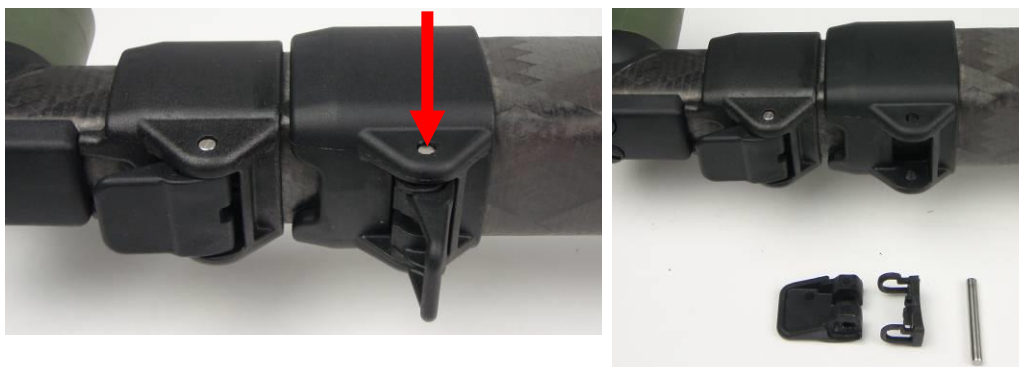


Figure 70: Remove Pin Camlock Lever

- Once the Pin Camlock Lever has been removed the Pressure Block Camlock can be removed and replaced if needed.

NOTE

When the camlocks are closed they must hold the shafts firmly with no slippage. If the camlock does not hold the shafts firmly in place, then pressure blocks should be replaced.

- c. To reassemble the camlock, attach the Pressure Block Camlock to the Camlock Lever.
- Place the Camlock Lever with Pressure Block Camlock into position within the camlock body (Camlock Lever open) then insert the camlock pin into place.



Figure 71: Insert Pin Camlock Lever.

3.5.2 Remove the Shafts

a. Required Tools:

- Flat tip screw driver.
- b. To remove the shafts from the detector firstly open the detector chassis as described in Section [Open the Detector Chassis](#). Once completed:
 - Lift the shafts clear of the detector.

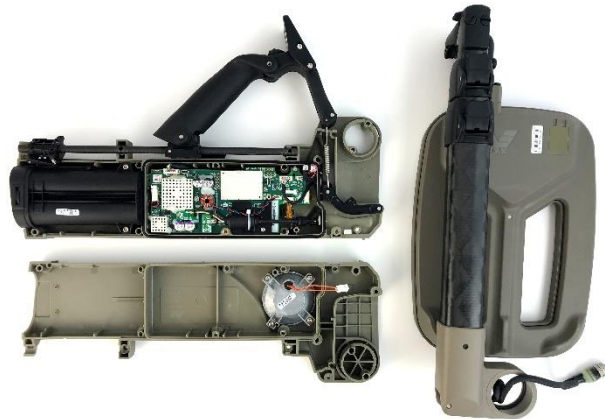


Figure 72: Shaft and Coil Removed from Detector

- Remove the Pin Coil Cable from the upper end of the upper shaft. Turn the Pin Coil Cable clockwise (to unlock) and then lift out.

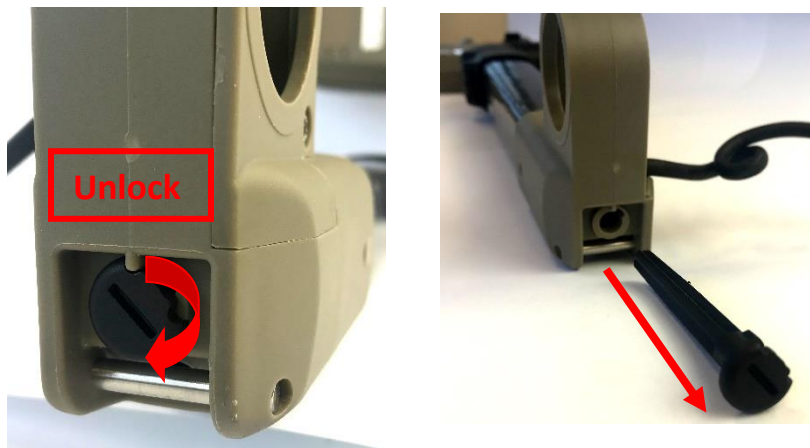


Figure 73: Remove Pin Coil Cable.

- Remove the two (2) Screws (Nylon M6x14) from the Cap Shaft on the lower shaft.
- Insert a flat tip screwdriver into the slot underneath the Cap Shaft and lift and remove the Cap Shaft.

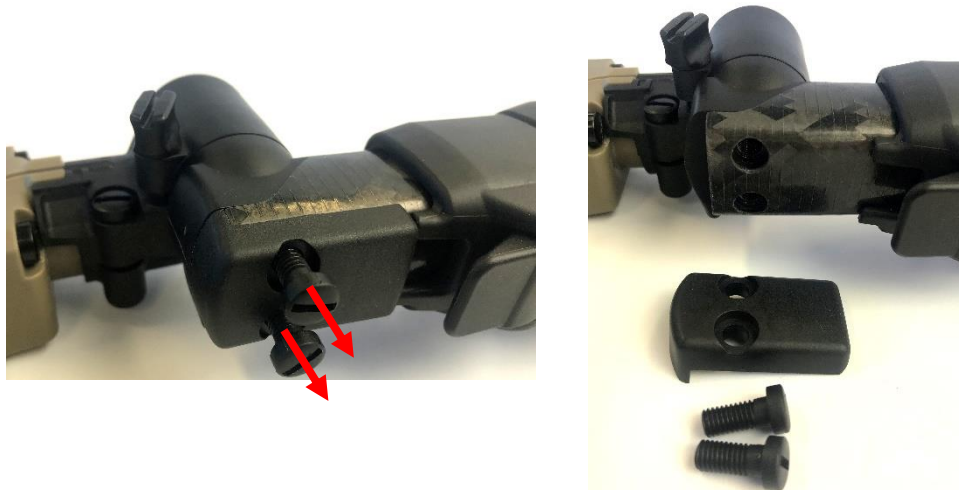


Figure74: Remove Cap Shaft.

- Slide the coil out and off the lower shaft, exposing the coil cable. Feed the coil cable connector into the upper shaft and pull the coil cable out of the end of the lower shaft.



Figure 75 Remove Coil Cable from Shafts

- c. The Shafts have now been removed from the MF5.

3.5.3 Attach the Shafts

- a. The detector chassis needs to be opened in order to fit the shafts to the detector, refer to Section [Open the Detector Chassis](#).
- b. The coil must be connected to the shaft then the shaft connected to the detector this process is described in Section [Connect the Coil](#).
- c. Assemble the detector as described in Section [Close the Detector Chassis](#).
- d. Once the detector is fully assembled check the operation of all moving parts and test the detector as described in Section [Mechanical & Functional Testing](#).

3.6 Handle

a. The Handle kit 3004-0293 is a spare part, the following figure illustrates the major parts of the handle.

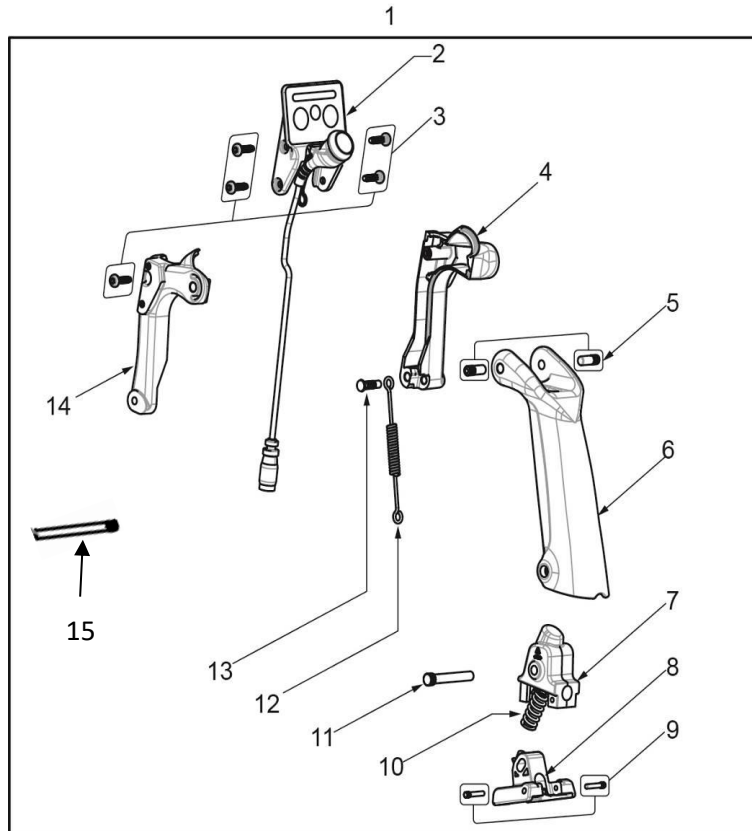


Figure 76: Handle Parts

Item	Part Number	Description	Qty
1	3004-0293	Handle Kit	1
2	9511-0278	Wiring Loom UI Handle	1
3	31-03512-980	Screw 3.5x12 skt head	5
4	8005-0068	Handle Forward Right	1
5	4308-0024	Pin Handle Main Upper	2
6	8005-0067	Handle Main	1
7	4311-0076	Hinge Handle Slide	1
8	4311-0079	Lock Handle Slide	1
9	4308-0022	Pin Lock Handle Detent	2
10	4006-0041	Spring Handle Detent	1
11	4308-0023	Pin Handle Main Lower	1
12	4006-0038	Spring Latch Hinge	1
13	4308-0026	Pin Spring Latch hinge	1
14	8005-0069	Handle Forward Left	1
15	4308-0027	Pin Handle Front	1

Table 7: Handle Parts

3.6.1 Removing the Handle

- a. No tools required to remove the handle once the detector chassis is opened.
- d. The detector body must first be opened to remove the handle as described in Section [Open the Detector Chassis](#)



Figure 77: Disconnect Wiring Loom Handle

- Disconnect the Wiring Loom Handle. Hold one side of the connector firm against the detector body whilst gently pulling the other side.
- Disconnect the spring latch hinge from the Latch Assembly.
- Lift the handle off the Pin Handle Pivot.
- Remove the Rod Handle Slide from the handle.

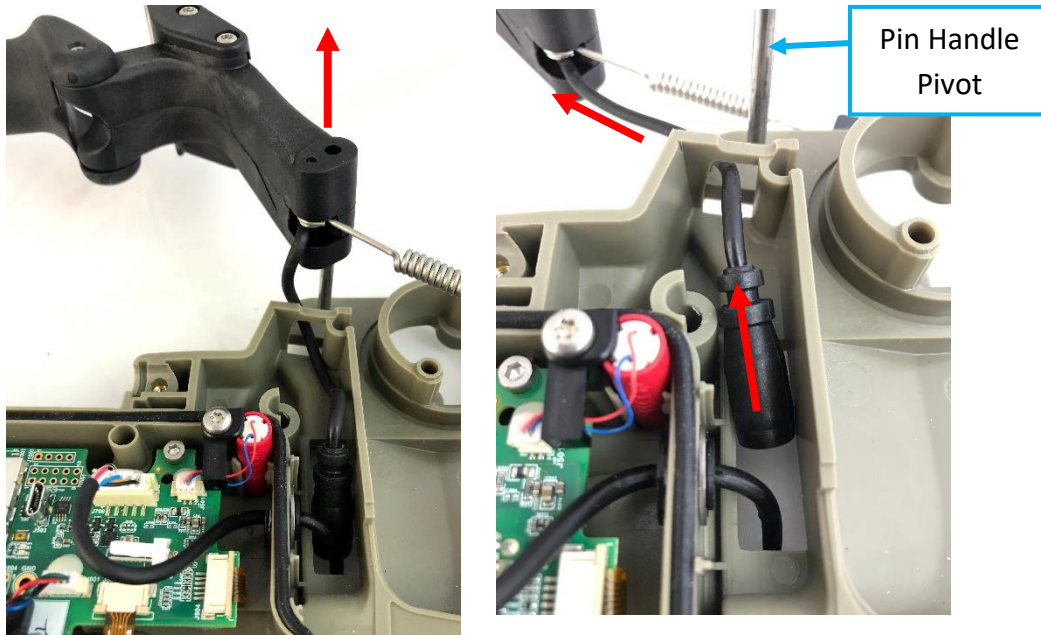


Figure 78: Lift handle off the Pin,

Thread handle cable out of the chassis.

- Pass the wiring loom through the top of the detector chassis and lift the handle out of the detector.
- e. The handle has now been removed from the MF5 and can be replaced if required.

3.6.2 Connecting the Handle

- a. To connect the handle the detector chassis must be opened as described in Section [Open the Detector Chassis](#)

- Thread the Wiring Loom Handle into the detector body.

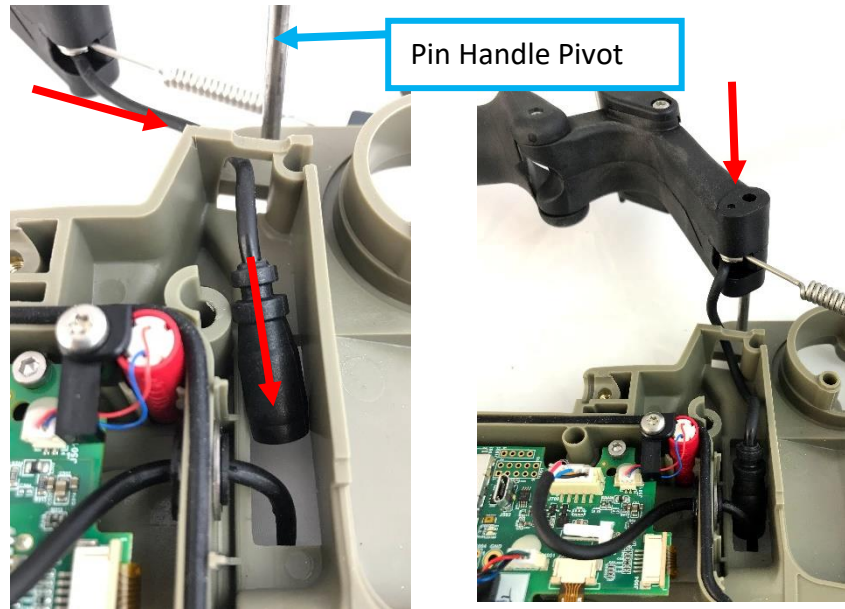


Figure 79: Thread the Wiring Loom Handle

- Push the handle onto the Pin Handle Pivot.
- Connect the Spring Latch Hinge to the Latch Assembly.
- Feed the rod handle slide through the handle (and Armrest Slide Assembly) and into position.

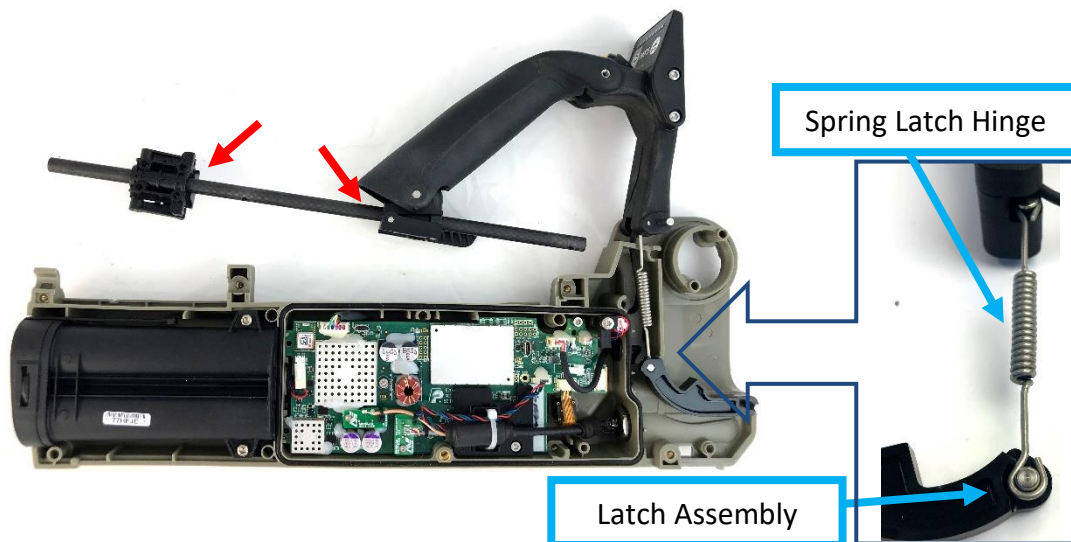


Figure 80: Latch Hinge and Spring Latch Hinge

- Connect the Handle to the Wiring Loom Handle, use a small amount of Silicon Grease on this round connector to the handle. Locate the cables into the cable router.

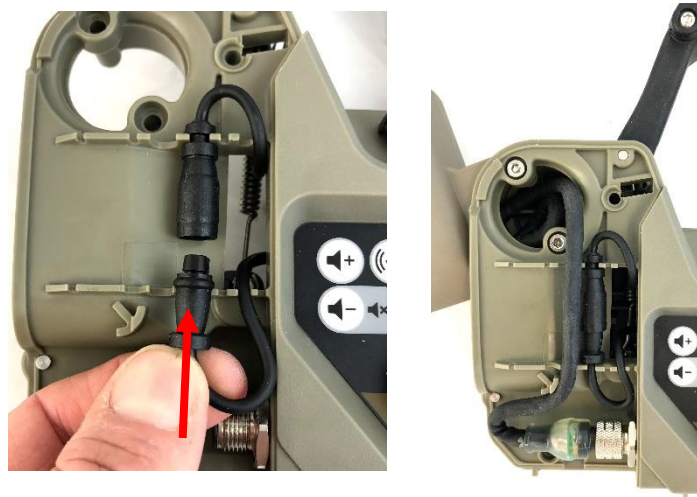


Figure 81: Connect Wiring Loom Handle

- b. Assemble the detector and close the detector body as described in Section [Close the Detector Chassis](#).

3.7 Armrest

a. The Armrest is available as a spare part, the following table shows all the parts of the Armrest.

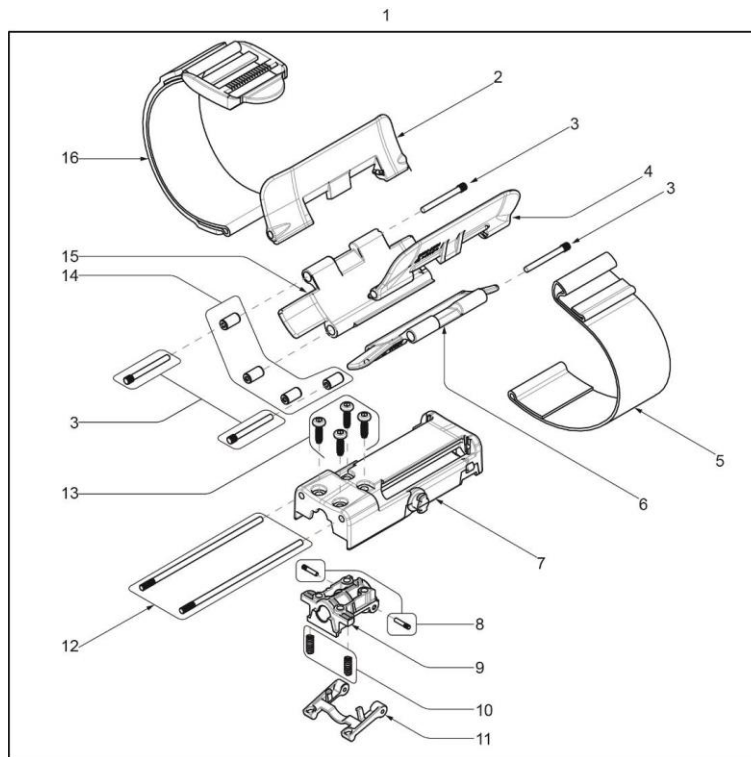


Figure 82: Armrest

Item	Part Number	Description	Qty
1	3004-0048	Armrest Kit with Slide	1
2	8001-0022	Armrest Flap Upper Right	1
3	4308-0020	Pin Short Armrest	1
4	8001-0021	Armrest Flap Upper Left	1
5	8005-0072	Arm Strap	1
6	8001-0019	Armrest Flap Lower Left	1
7	8004-0014	Bracket Armrest	1
8	4308-0021	Pin Armrest Slide	2
9	4311-0077	Mount Slide Armrest	1
10	4006-0040	Spring Detent Armrest	2
11	8008-0065	Lever Armrest	1
12	4308-0019	Pin Long Armrest	2
13	31-03512-980	Screw M3.5x12 skt head	4
14	4005-0095	Bush Friction Armrest	4
15	8001-0020	Armrest Flap Lower Right	1
16	8005-0071	Armstrap with Buckle	1
	3004-0049	Armrest Kit, no slide Includes only items 1 to 7 and 12 to 16 Doesn't include Slide, Items 8 to 11	1

Table 8: Armrest Parts

b. The Armrest Slide Assembly 3004-0308 is available as a spare part, the following figure shows that parts of the Armrest Slide Assembly

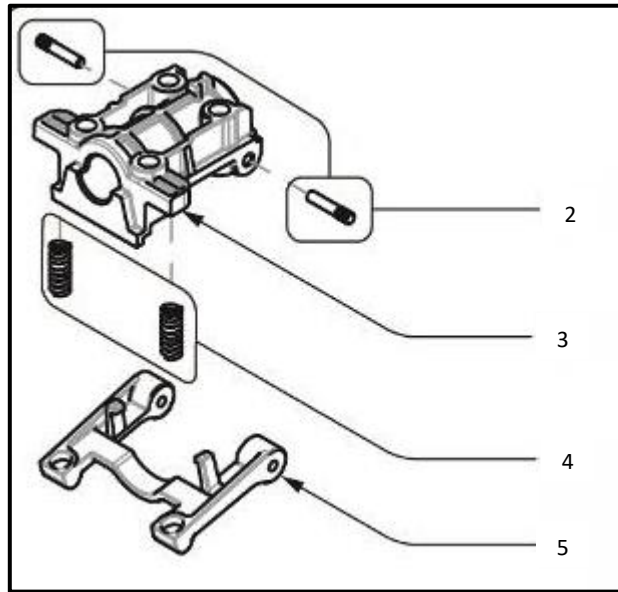


Figure 83: Armrest Slide Assembly

Item	MRN	Description	Qty
1	3004-0308	Armrest Slide Assembly	1
2	4308-0021	Pin Armrest Slide	2
3	4311-0077	Mount Slide Armrest	1
4	4006-0040	Spring Detent Armrest	2
5	8008-0065	Lever Armrest	1

Table 9: Armrest Slide Assembly Parts

3.7.1 Replace the Armrest

a. The Armrest can be replaced without the need to open the detector chassis. If the Armrest Slide Assembly needs replacing, then the detector chassis must be opened as described in section [Open the Detector Chassis](#)

- Prepare a clean well lit workspace.
- Turn the detector off and remove the batteries.

- Remove the four (4) screws from the top of the armrest and remove the armrest.

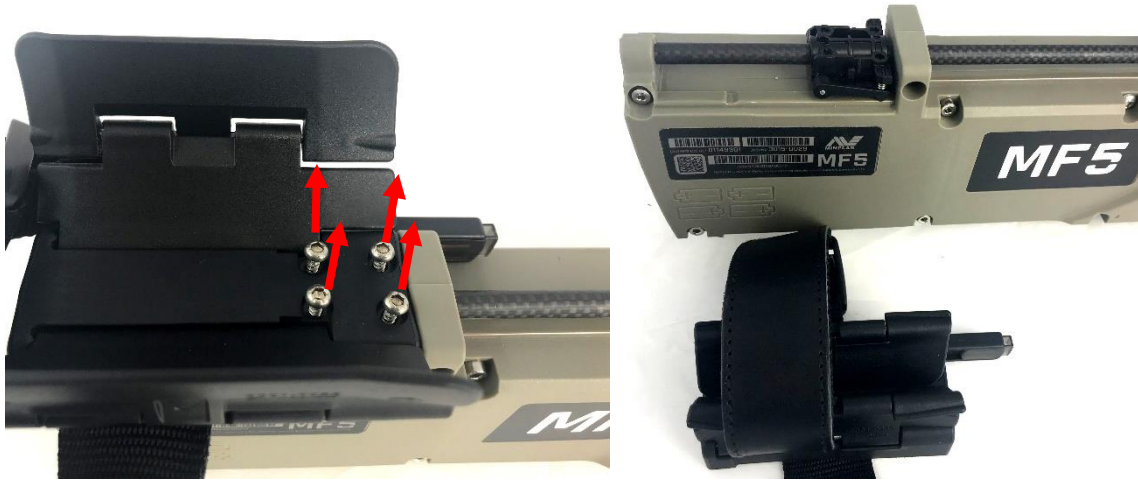


Figure 84: Armrest replacement.

- b. The armrest can now be replaced as an assembly. If the armrest slide assembly must also be replaced, then the detector body must be opened.
- Reattach the armrest and fit the four (4) screws (12mm)
 - Check the armrest folds in and out correctly and also check that the armrest slides backward and forward.

3.8 Battery Compartment

a. The Battery Compartment kit and the Battery Lid are available as a spare parts kit. The following table shows the parts of the Battery Compartment.

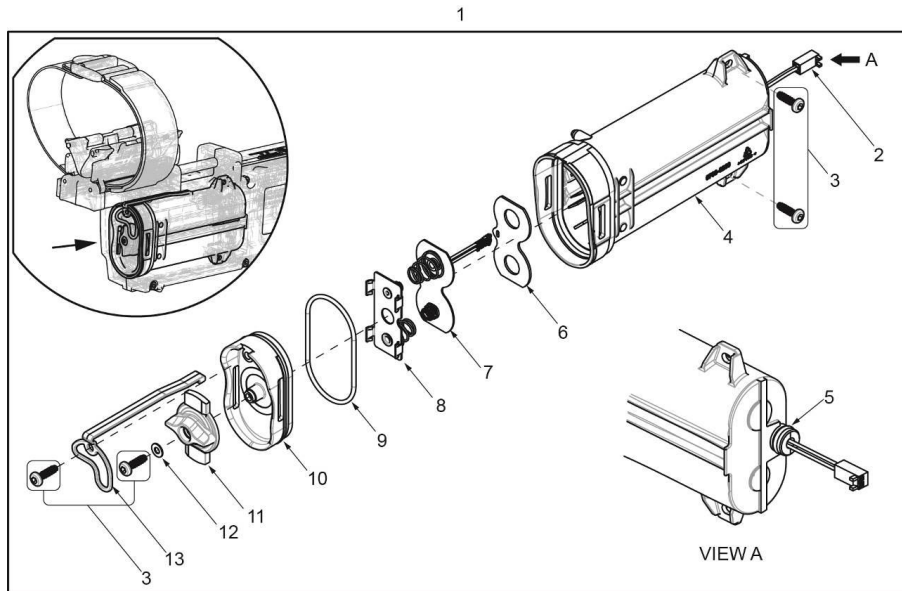


Figure 85: Battery Compartment

Item	Part Number	Description	Qty
1	3004-0051	Battery Compartment Kit	1
2	CMINE0568	Connector Housing Battery	1
3	31-03512-980	Screw 3.5x12 skt head	4
4	0703-0209	Holder Battery C Cell	1
5	30-29011-011A	O Ring BS011	1
6	2005-0026	Pad Adhesive Battery Holder	1
7	5904-0178	PCB Battery Contacts	1
8	2303-0042	Contacts Battery Lid	1
9	4309-0075	O Ring Battery Lid	1
10	0304-0028	Lid Battery Compartment	1
11	4313-0003	Lock Battery Lid	1
12	31-23001-927	Washer M3 Nylon	1
13	8005-0070	Tether Battery Lid	1

Table 10: Battery Compartment

3.8.1 Battery Compartment Replacement

- a. Open the detector body as described in Opening the Detector Body.
 - Disconnect the battery connector.
 - Remove the two (2) screws (12mm) from the Battery Compartment.

- Slide the battery compartment rearward (away from the main PCB), threading the battery connector out of the detector body.

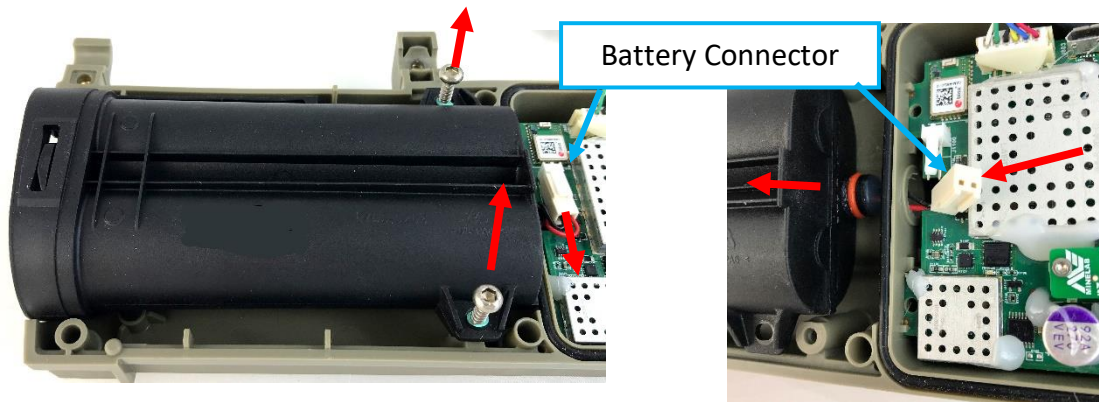


Figure 86: Replace Battery Compartment

- Check that the Battery Compartment has an O ring positioned where the battery cables leave the battery compartment and enter the detectors sealed enclosure.
 - Close the Battery Lid.
 - Install the Battery Compartment by first feeding the battery connector through the hole in the detector body.
 - Slide the Battery Compartment into position.
 - Connect the battery connector.
 - Insert the two (2) mounting screws (12mm).
- b. Reassemble the detector by closing the detector chassis as described in Section [Close the Detector Chassis](#).

3.8.2 Battery Lid

a. The Battery Lid kit 3004-0052 is available as a spare part, the parts of the battery lid are show in the following table.

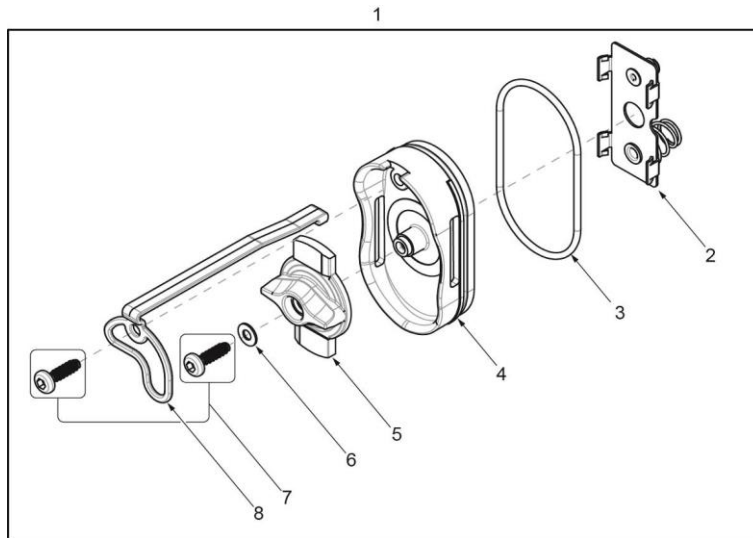


Figure 87: Battery Lid

Item	Part Number	Description	Qty
1	3004-0052	Battery Lid kit	1
2	2303-0042	Contacts Battery Lid	1
3	4309-0075	O Ring Battery Lid	1
4	0304-0028	Lid Battery Compartment	1
5	4313-0003	Lock Battery Lid	1
6	31-23001-927	Washer M3 Nylon	1
7	31-03512-980	Screw 3.5x12 skt head	2
8	8005-0070	Tether Battery Lid	1

Table 11: Battery Lid

3.8.3 Battery Lid Replacement

- a. Required tools:
- b. Open the detector body as described in Section [Open the Detector Chassis](#). This is only required if the battery tether must be replaced. If the battery tether is in good condition and the battery lid needs replacing this can be accomplished without opening the detector chassis.

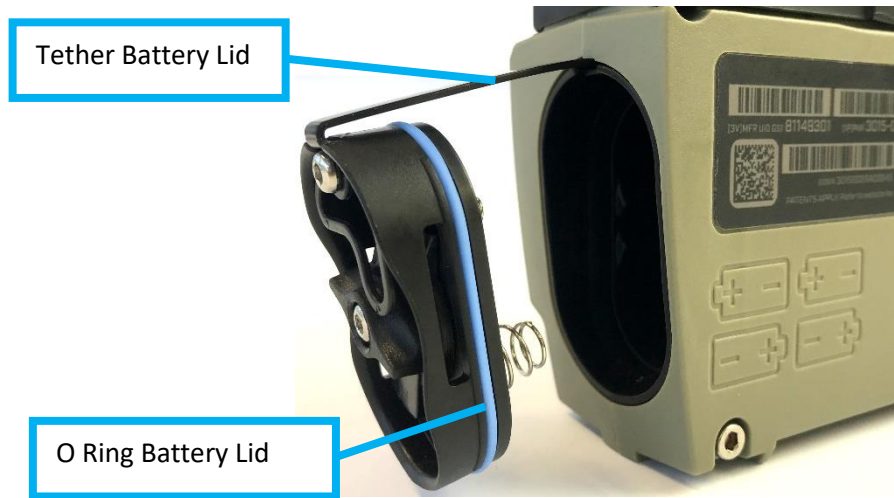


Figure 88: Battery Lid.

NOTE

The Battery Lid can be replaced without opening the detector body if the tether is unscrewed from the Battery Lid.

- Check the Battery Lid has an O-ring correctly in place. The O-ring must be clean and can be lightly greased.
- Check the battery lid closes onto the battery compartment. Close the battery lid.
- c. Close the detector body as described in Section [Close the Detector Chassis](#).

3.9 Detector Chassis

- a. The following assemblies within the detector chassis are available as spare parts:

3004-0295	Wiring Loom Handle Kit.
3004-0057	Speaker Kit
3004-0296	Switch kit Sensitivity MF5
3004-0297	Wiring Loom Earset kit MF5
3004-0298	Vibration Motor kit MF5
3004-0300	Coil Connector Loom MF5
3004-0299	User Interface Chassis MF5

3.9.1 Switch Sensitivity Replacement

a. Required tools:

- Hex key driver (Allen key) 2mm
- Spanner 10mm

b. The sensitivity control switch is available as a spare part. 3004-0296 Switch Kit Sensitivity includes all parts shown in the following table.

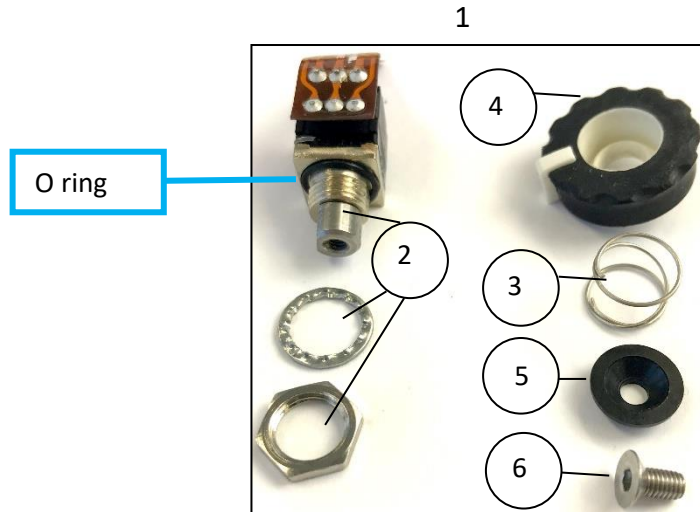


Figure 89: Sensitivity Switch parts

Item	Part Number	Description	Qty
1	3004-0296	Switch Kit Sensitivity MF5	1
2	5909-0328	Switch with Cable includes washer and nut	1
3	4006-0047	Spring Knob Lift to Turn	1
4	4305-0032	Knob Lift to Turn	1
5	4005-0096	Bush Knob Lift to Turn	1
6	31-23006-990	Screw M3x6 skt csk	1

Table 12: Sensitivity Switch parts

c. To remove the Switch Sensitivity first open the detector body and remove the Main PCB as described in Section [Open the Detector Chassis](#).

- Identify the ribbon cable from the Switch Sensitivity to the Main PCB.
- Open the locking bail of the connector on the Main PCB, disconnect the ribbon cable.

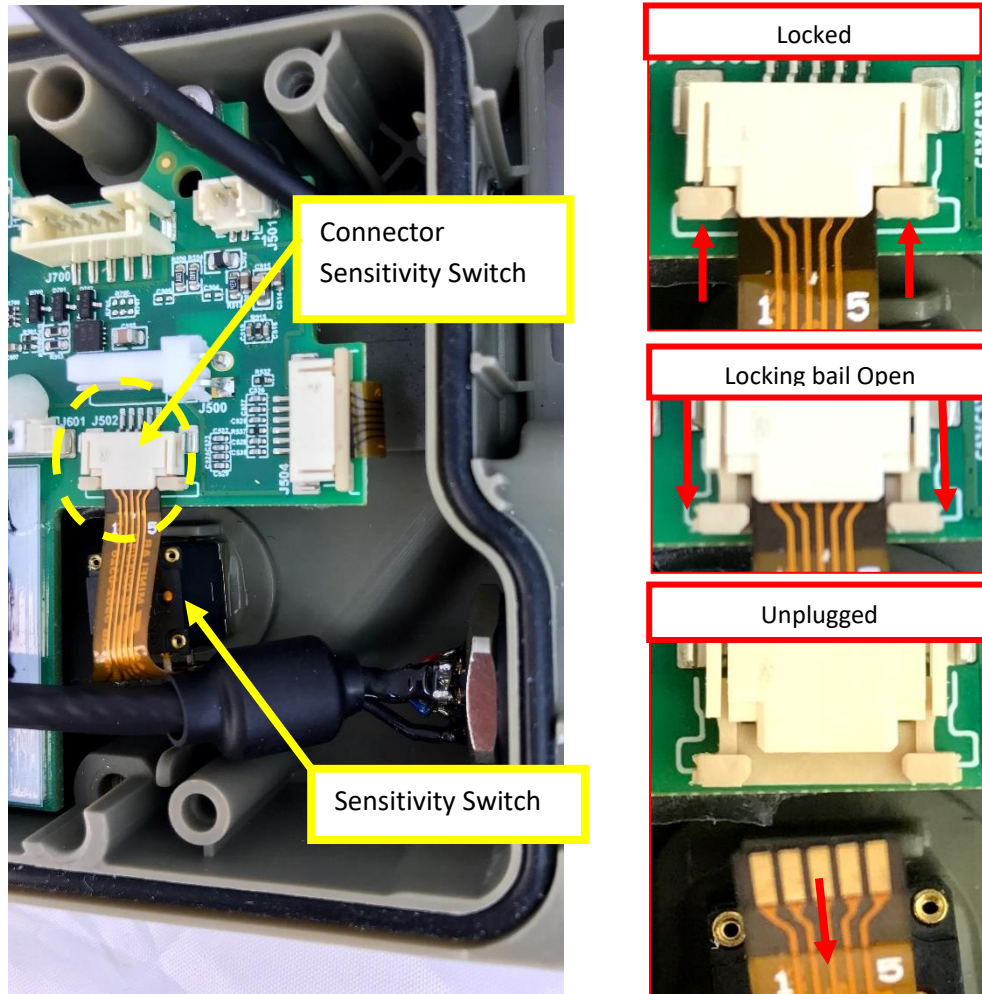


Figure 90: Sensitivity switch connector

- Lay the detector body on its right side with the Switch Sensitivity facing upwards. Set the Switch Sensitivity control to 3 IED.
- Using a 2mm hex key driver (allen key), undo the screw in the centre of the Switch Sensitivity and remove the screw, bush, spring and knob from the switch.
- Use a 10mm spanner to remove the nut and locking washer from the Switch Sensitivity.

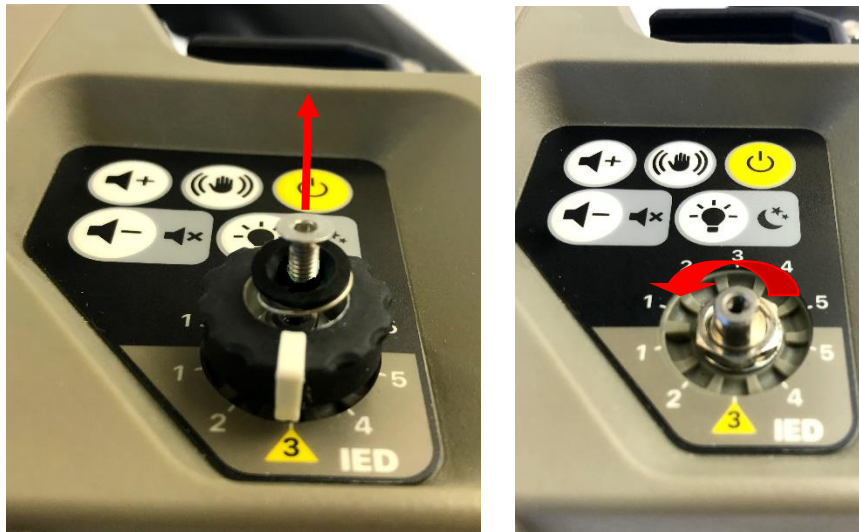


Figure 91: Remove Sensitivity Knob

- d. The Switch Sensitivity can now be removed from the chassis of the detector and replaced if required.

NOTE

Use care handling the flexible ribbon cable. These are internal components and will be easily damaged if they are forced or misaligned.

NOTE

Do not use a soldering iron on the switch or the flexible ribbon cable.

- e. Install the Switch Sensitivity as follows:
- check each control switch has a clean and lightly greased O-ring correctly positioned on the mounting face.
 - Carefully align the control switches and the flexible ribbon cable within the detector body.

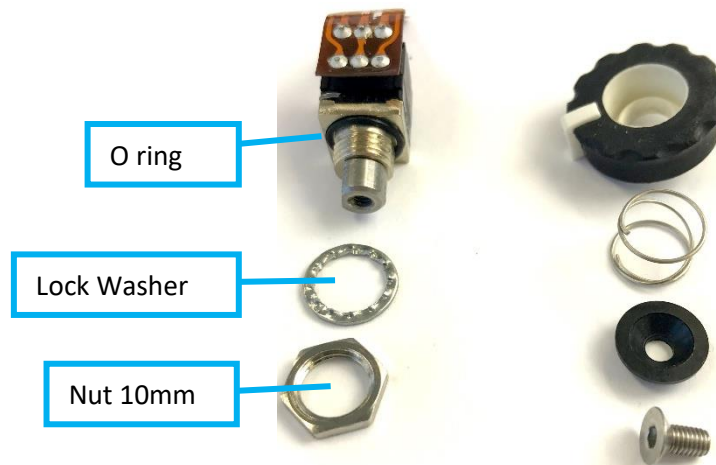


Figure 92: Switch Sensitivity

- Insert the Switch Sensitivity into the detector body; attach the lock washer and 10mm nut.
 - Attach the Switch knob then the spring followed by the bush and screw to the control switch. The Screw M3x6 should have a small amount of threadlocker (loctite 222) applied to the thread of the screw before insertion.
 - Check the Switch Sensitivity moves through the arc of movement with end stops.
 - Identify the connector on the Main PCB for the Switch Sensitivity. Open the connector locking bail (slide out).
 - Insert the ribbon cable into the connector on the Main PCB then close the locking bail on the connector.
- f. Reassemble the detector by closing the detector body as described in Section [Close the Detector Chassis](#)

3.9.2 Speaker Replacement

a. The speaker is a spare part kit, 3004-0057 Speaker Kit. The following table illustrates the major parts of the speaker kit.

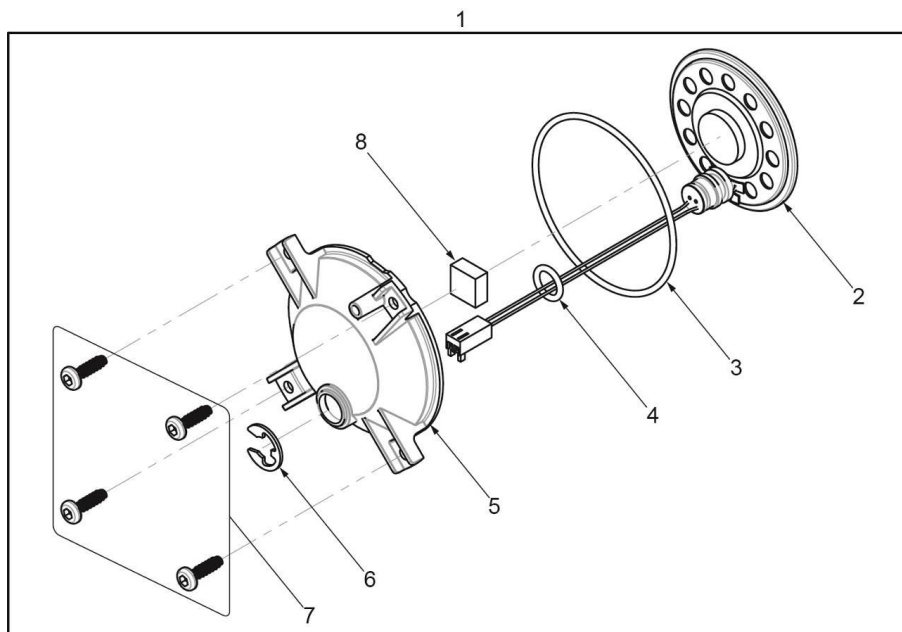


Figure 93: Speaker kit

Item	Part Number	Description	Qty
1	3004-0057	Speaker Kit	1
2	9511-0183	Wiring Loom Assy Inc Speaker	1
3	30-29011-034	O-Ring Speaker BS034	1
4	30-29011-011A	O-Ring BS011 Silicone	1
5	0708-0011	Enclosure Speaker	1
6	30-05214-003	Circlip External 7mm	1
7	31-03512-980	Screw 3.5x12 skt head	4
8	30-39300-015	Tape D/S PVC 10x10x4.8mm	1

Table 13: Speaker kit parts

b. Required Tools:

- Hex key driver (Allen key) 3mm.
- c. To remove the Speaker assembly first open the detector body as described in Section [Opening the Detector Body](#).
- Remove the four (4) screws from the Speaker assembly in the right side of the detector chassis.
 - Lift the Speaker assembly clear of the detector.
- d. The Speaker can now be removed, replaced or repaired as required.

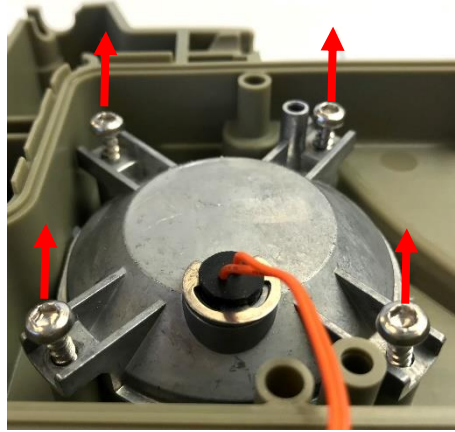


Figure 94: Replace Speaker Assembly

- e. To replace the Speaker assembly.
 - Check Speaker assembly is in good working order and the speaker cable is correctly sealed into the Enclosure Speaker and the Circlip External is installed.
 - Check the O-ring Speaker BS034 is clean, lightly greased and correctly positioned in its channel in the detector chassis.
 - Position the Speaker assembly and insert the four (4) Screws.
- f. Assemble the detector as described in Section [Closing the Detector Body](#).

3.9.3 Wiring Loom Earset Replacement

- a. The Wiring Loom Earset kit is available as a spare part, 3004-0297 Wiring Loom Earset Kit MF5 includes all parts shown in the following table.

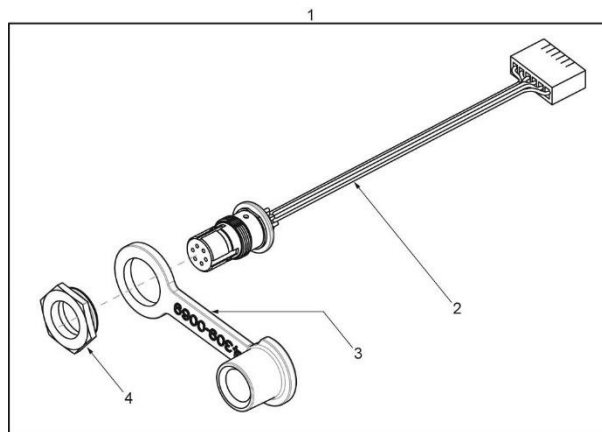


Figure 95: Wiring Loom Earset kit

Item	Part Number	Description	Qty
1	3004-0297	Wiring Loom Earset Kit MF5	1
2	9511-0263	Wiring Loom Earset	1
3	4309-0069	Dust Cap Earset Connector	1
4	4002-0053	Nut Earset Connector	1

Table 14: Wiring Loom Earset

b. **Required Tools:**

- Spanner 13mm
- c. Open the detector body and remove the Main PCB as described in Section [Open the Detector Chassis](#) and [Remove the Main PCB](#). Once completed:
- Disconnect the Wiring Loom Earset from the PCB.
 - Unscrew the Nut Earset Connector and remove the Nut and the Dust Cap.

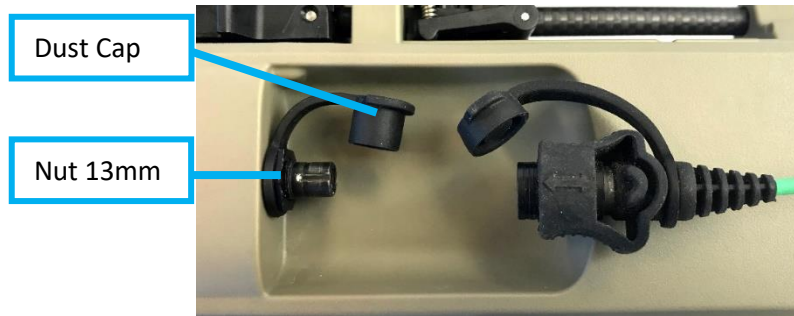


Figure 96: Earset connector

d. The Wiring Loom Earset can now be removed and replaced as required. The Wiring Loom Earset is connected to the detector following the reverse order of the removal.

3.9.4 Wiring Loom Handle Kit Replacement

a. The Wiring Loom Handle Kit is available as a spare part kit, the following table shows the major parts of Wiring Loom Handle kit.

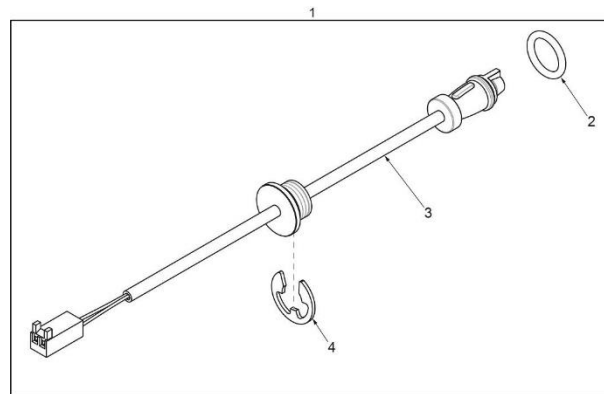


Figure 97: Wiring Loom Handle parts

Item	Part Number	Description	Qty
1	3004-0295	Wiring Loom Handle Kit	1
2	30-29011-519	O-Ring BS012	1
3	9511-0281	Wiring Loom Handle Socket	1
4	30-05214-003	Circlip External 7mm	1

Table 15: Wiring Loom Handle Kit

b. Required tools:

- Screw driver flat tip.
- Silicon Grease

c. Open the detector body as described in Section [Open the Detector Chassis](#). Then remove the Wiring Loom Handle as follows:

- Disconnect the Wiring Loom Handle socket from the plug (handle wiring loom).
- Disconnect the Wiring Loom Handle from the main PCB.
- Remove the Clip External 7mm from the Wiring Loom Handle at the entry point to the detector chassis.

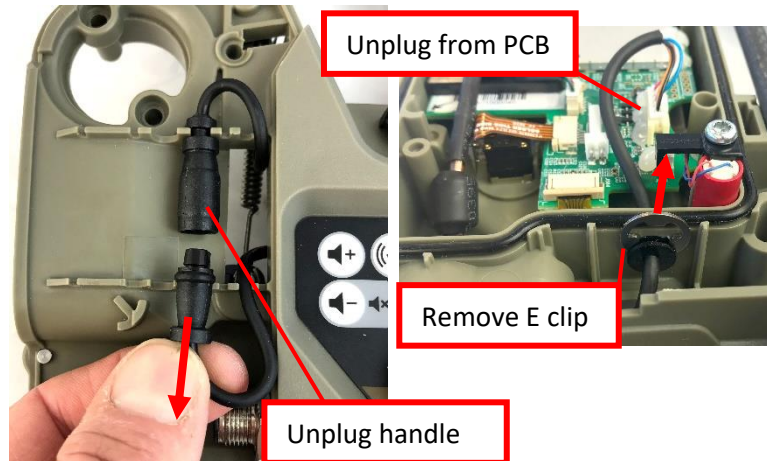


Figure 98: Wiring Loom Handle

- Thread the wiring loom handle out of the detector chassis

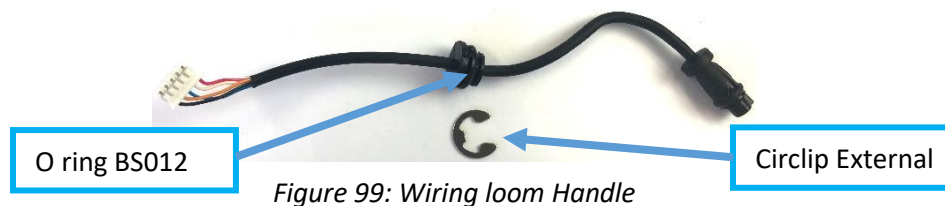


Figure 99: Wiring loom Handle

d. The Wiring Loom Handle can now be removed and replaced. To fit the Wiring Loom Handle follow the removal instruction above in reverse order.

e. Apply a small amount of silicon grease to the round handle plug before connecting also make sure the O ring is clean and lightly greased. Then assemble the detector as described in Section [Close the Detector Chassis](#)

3.9.5 Replace Vibration Motor

The Vibration Motor is a spare part, 3004-0298 Vibration Motor Kit MF5.

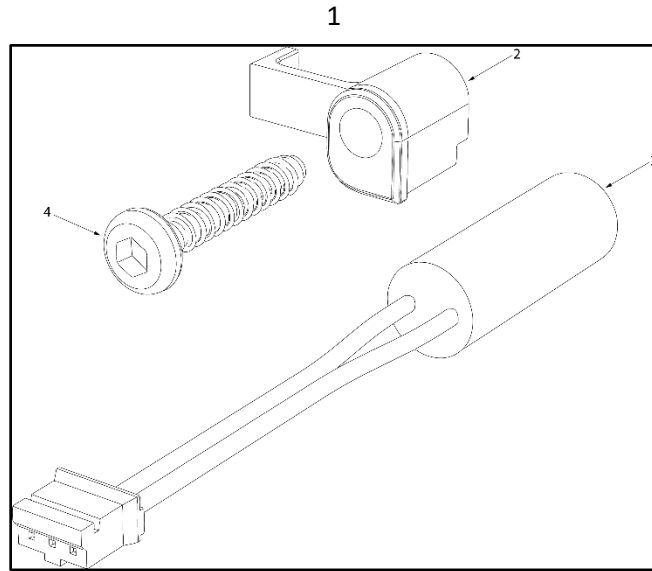


Figure 100: Vibration Motor

Item	Part Number	Description	Qty
1	3004-0298	Vibration Motor kit MF5	1
2	0703-0434	Clamp, vibration motor MF5	1
3	9511-0265	Vibration Motor Assembly	1
4	31-03520-901	Screw, 3.5x20 Pt PAN MS ZN SKT HD(Torx 10)	1

Table 16: Vibration Motor

a. Required Tools:

- Screw Driver Torx T10

- b. To access the Vibration Motor first open the detector body as described in Section [Opening the Detector Body](#).

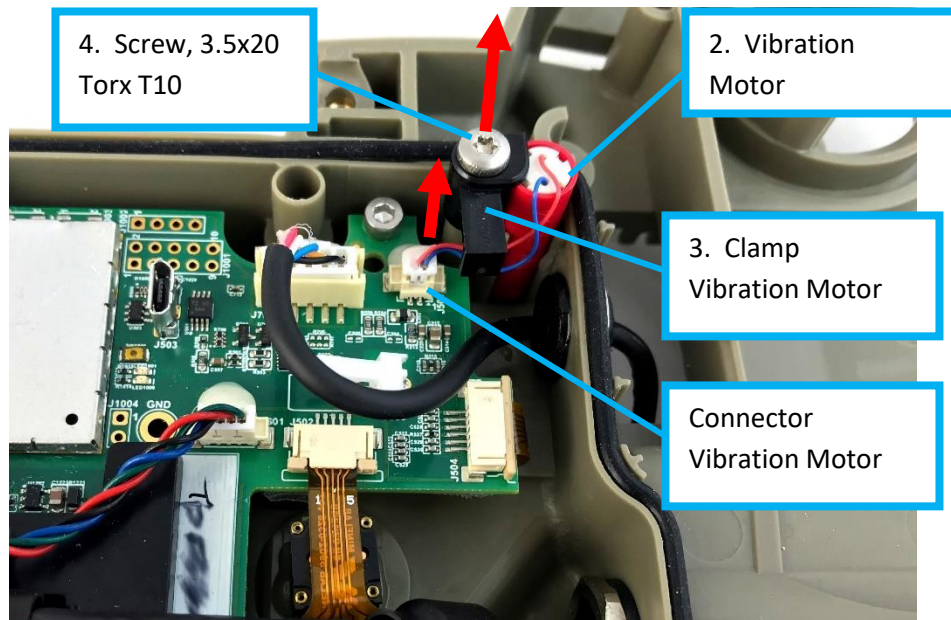


Figure 101: Vibration Motor Parts

- Unplug the Vibration Motor from the connector on the Main PCB.
- Remove the Screw 3.5x20 (Torx T10) from the clamp then remove the clamp.
- The Vibration Motor can now be lifted out of the detector chassis.

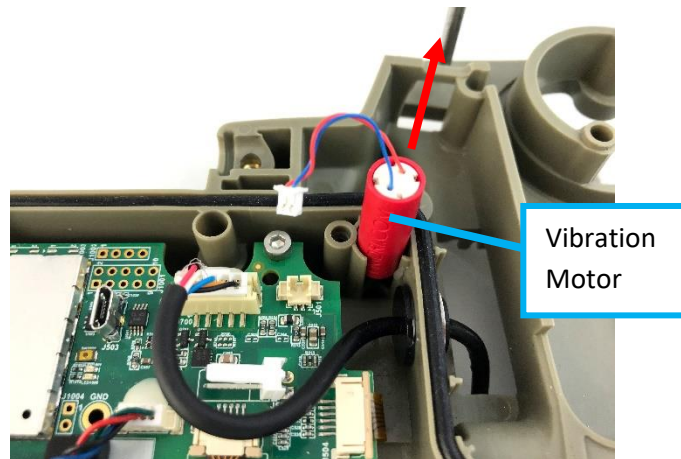


Figure 102: Remove Vibration Motor

- c. Having removed the Vibration Motor, it can now be replaced, if required.
- d. Replace the Vibration Motor by reversing the steps to remove the Vibration Motor.

3.9.6 Coil Connector Loom

3004-0300 Coil Connector Loom MF5 is a Spare Part, the following table shows the parts of the Coil Connector Loom.

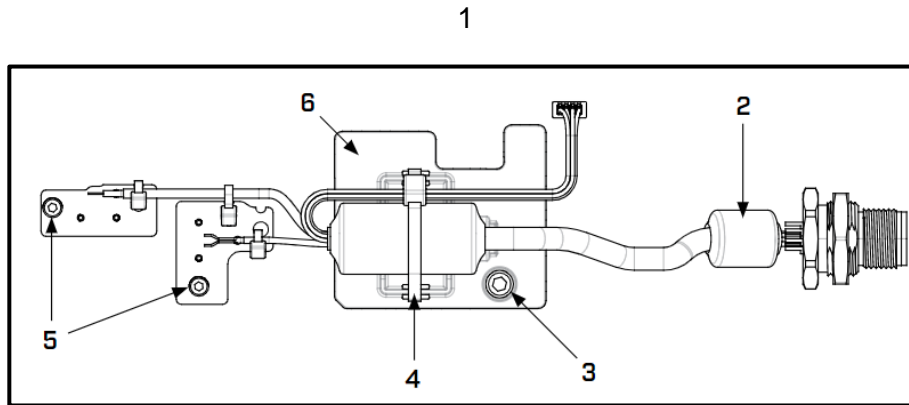


Figure 103: Coil Connector Loom

Item	MRN	Description	Qty
1	3004-0300	Coil Connector Loom MF5	1
2	9511-0286	Coil Cable and PCBs	1
3	31-23020-980	Screw M3x20 304 SS Skt Cap	1
4	30-39101-010	Tie, cable 2.5x100mm	1
5	31-22005-980	Screw, M2x5 316 SS Skt Cap	2
6	4311-0118	Bracket, Ferrite PCB	1

Table 17: Coil Connector Loom

a. To access the Coil Connector Loom first open the Chassis of the detector as described in Section [Open the Detector Chassis](#).

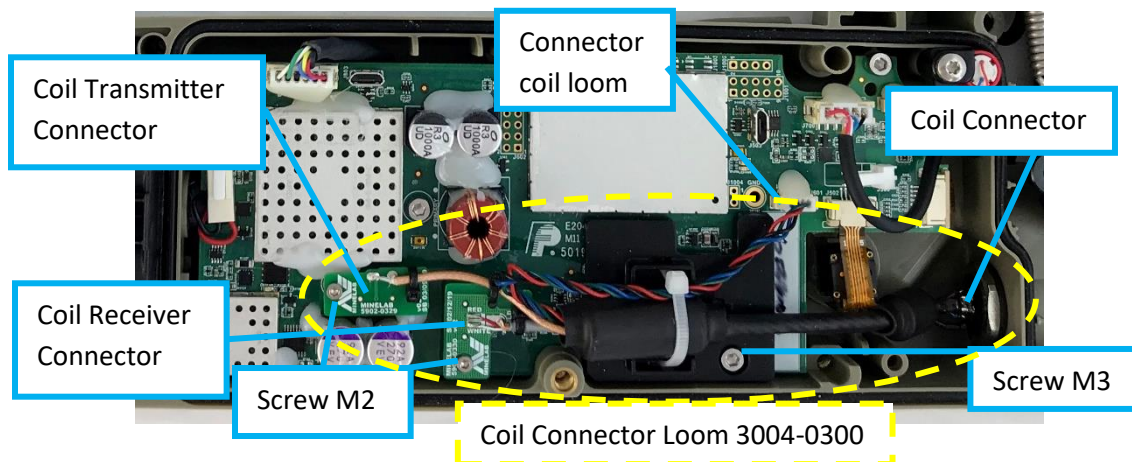


Figure 104: Coil Connector Loom

- b. To remove the Coil Connector Loom MF5:
- Remove the 18mm nut from the exterior of the Coil Connector.
 - Unplug the connector coil loom from the main PCB.
 - Remove the two (2) Screws M2x5 from the coil transmitter connector and the coil receiver connector. Then disconnect the transmitter and receiver connectors.
 - Remove the Screw M3x20.
 - The complete Coil Connector Loom can now be lifted out of the detector.
- c. Replace the Coil Connector Loom in the reverse order to the removal of the Coil Connector Loom.

3.9.7 User Interface Chassis Kit

3004-0299 User Interface Chassis Kit MF5 is a spare part. The following table shows the parts of the User Interface Chassis.

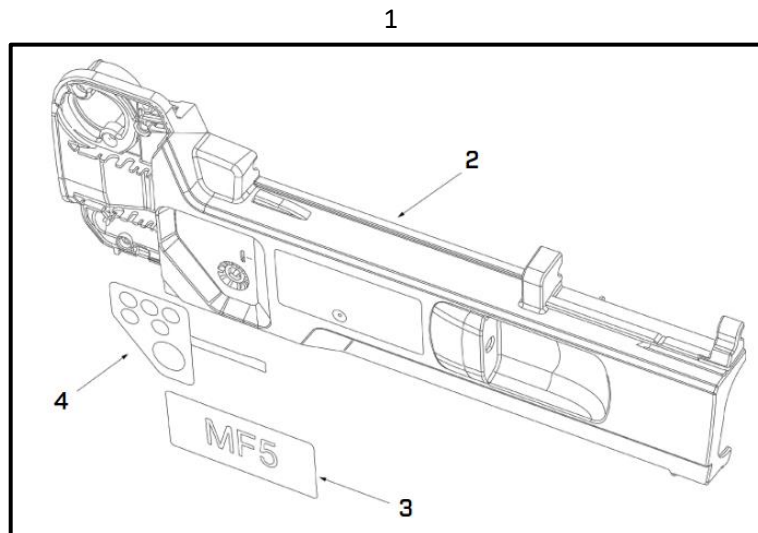


Figure 105: User Interface Chassis

Item	Part Number	Description	Qty
1	3004-0299	User Interface Chassis MF5	1
2	0703-0432	Chassis Left MF5	1
3	2701-0272	Decal Detector MF5	1
4	3014-0061	User Interface Secondary (keypad)	1

Table 18: User interface chassis

The User Interface keypad on the side of the detector is attached to the Chassis with an adhesive backing, the flexible cable from the user interface passes through an entry hole in the chassis of the detector which is then sealed with a flowable Silicon Rubber.

Minelab recommend that customer wishing to replace the User Interface (keypad) should purchase the complete User Interface Chassis as this is assembled sealed and tested.

3.9.8 Detector Chassis Parts

- a. The parts of the detector inside the chassis are show in the following figures.

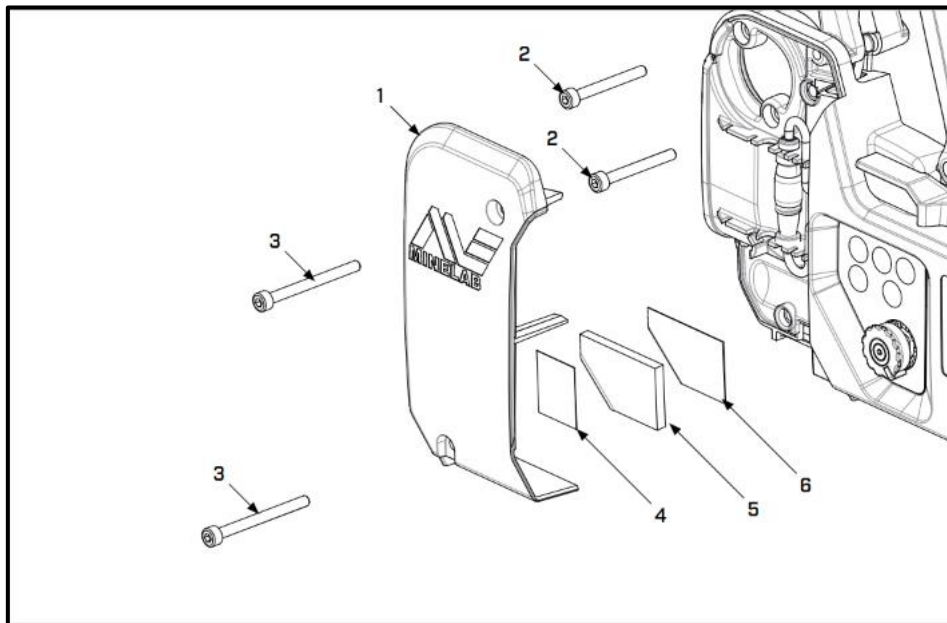


Figure 106: Cover, Cable

Item	Part Number	Description	Qty
1	0703-0437	Cover, Cable MF5	1
2	31-24035-980	Screw M4x35 Skt Cap	2
3	31-24045-980	Screw M4x45 Skt Cap	2
4	30-39300-017	Tape, Double Sided, 25,40mm	1
5	30-39301-020	Tape, Foam LD PVC 25x16mm x 15m	1
6	30-9501-0064	Braid, Monel Shield	1

Table 19: Cover Cable.

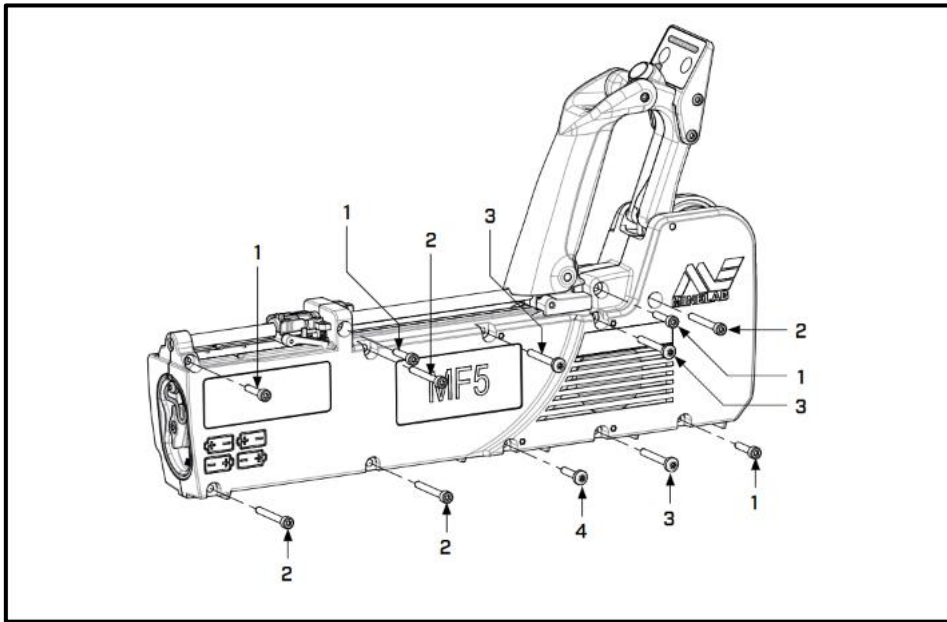


Figure 107: Screws.

Item	Part Number	Description	Qty
1	31-24020-980	Screw M4x20 Skt Cap	4
2	31-24035-980	Screw M4x35 Skt Cap	4
2	31-24035-987	Screw M4x35 Torx with Seal	3
3	31-24020-987	Screw M4x20 Torx with Seal	1

Table 20: Screws.

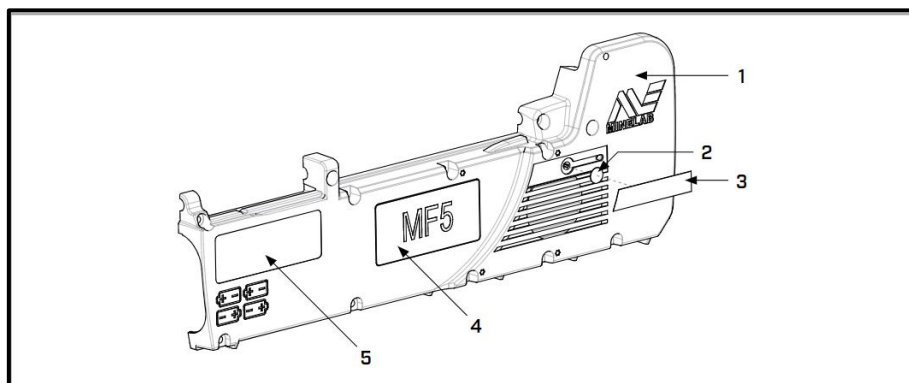


Figure 108: Chassis Right MF5

Item	Part Number	Description	Qty
1	0703-0433-001	Chassis Right MF5	1
2	30-43000-004	Vent, Temish Fabric	1
3	2705-0093	Decal, Compliance	1
4	2705-0097	Decal, serial FMV	1
5	2705-0092	Decal Serial QR Code MF5	1

Table 21: Chassis Right.

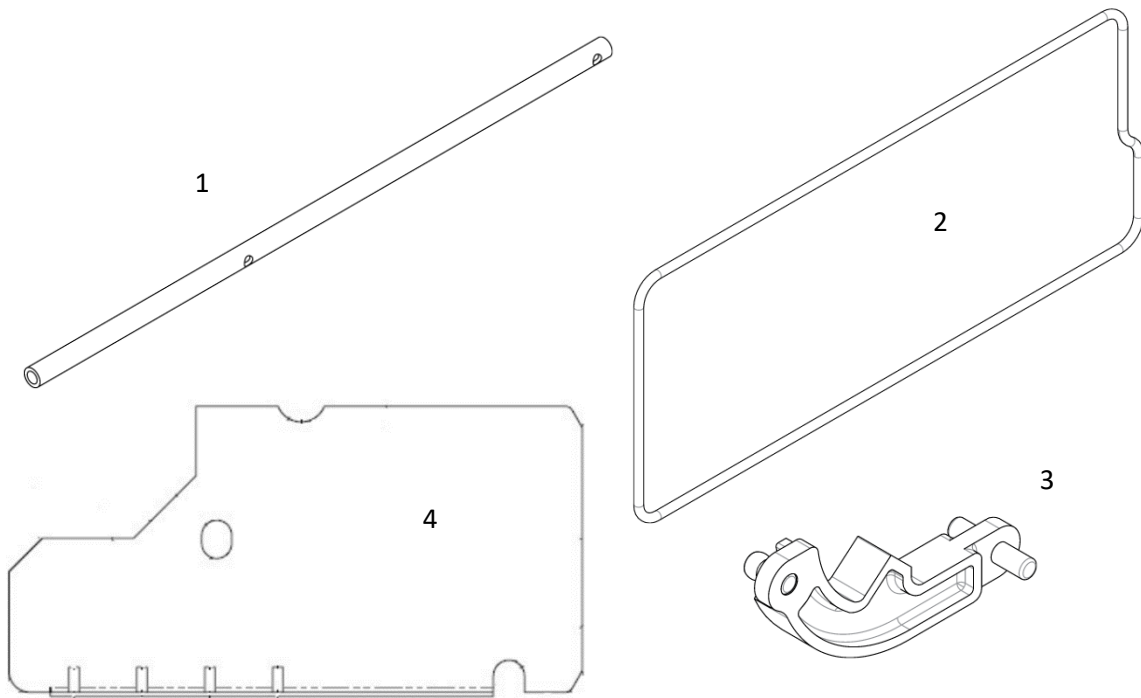


Figure 109: Parts MF5

Item	Part Number	Description	Qty
1	0304-0027	Rod, Handle Slide	1
2	4309-0068	Seal, Chassis	1
3	4007-0009	Latch Assembly	1
4	0701-0147	Shield Plate MF5	1

Table 22: Parts MF5.

4 Fault Finding Procedures Introduction

- a. A functional test failure can generally be repaired by replacing one of the sub-assemblies (Spare Parts Kits) of the detector.
- b. The MF5 is designed so that Spare Parts Kits can be exchanged between detectors without the need to calibrate. This means that where spare parts are not available and more than one detector is faulty, then parts from one detector can be used to make another serviceable. For example, if detector # 1 has an unserviceable coil and detector # 2 has an unserviceable battery compartment, then the coil from detector # 2 can replace the coil on detector # 1 thereby producing a serviceable detector.

4.2 Trouble Shooting Table

- a. The following table identifies faults and provides recommended solutions. The suggested solutions should be investigated in the order they are listed.

Problem	Recommended Solutions
Detector will not switch on	<ul style="list-style-type: none"> • Check batteries are installed correctly • Replace batteries with fresh batteries • Replace battery compartment • Replace main PCB
Detector will not switch off	<ul style="list-style-type: none"> • Remove batteries • Replace Main PCB
After switching on the detector makes no sound from speaker	<ul style="list-style-type: none"> • Check for tone using the earset, turn LEDs on • If there is tone through earset – replace the speaker • If there is no tone through earset – replace main PCB
Constant steady tone from detector	<ul style="list-style-type: none"> • Ensure area is free from local electromagnetic interference • Conduct Noise Cancel • Check coil plug is tight • Replace coil • Replace main PCB
On switch on, the “Coil Fault” tone occurs - “low pitched double tone every five seconds”	<ul style="list-style-type: none"> • Check the coil connector is firmly secured • Inspect coil cable for damage – if no damage replace main PCB • If damaged replace with new coil
On switch on, the “Equipment Fault” tone occurs – “low pitched slow oscillating tone (ee-aww, ee-aww)”	<ul style="list-style-type: none"> • Turn off then conduct factory reset • Replace the switch • Replace main PCB

After working in hot conditions, detector makes a loud noise	<ul style="list-style-type: none"> • Factory Reset • Check coil plug is tight • Replace coil • Replace main PCB
Ground Balance does not work	<ul style="list-style-type: none"> • Check area is metal free • <u>If no</u> button push conformation replace handle. • Replace main PCB
Noise Cancel does not work (no Noise Cancel tones emitted)	<p>Note: Noise Cancel may not completely remove the effects of interference if the source is powerful or close.</p> <ul style="list-style-type: none"> • Repeat Noise Cancel • Factory Reset. • <u>If no</u> conformation when button pushed replace the handle. • Replace main PCB
LEDs do not illuminate	<ul style="list-style-type: none"> • Factory Reset then turn on display, short press LED button • Replace handle • Replace main PCB
Cannot hear the Test Piece	<ul style="list-style-type: none"> • Connect and use an earset • Set sensitivity switch to default 3 • Conduct Noise Cancel • Factory Reset. • Ensure coil plug is firmly connected • Replace main PCB • Replace coil
Start Up tones keep repeating	<ul style="list-style-type: none"> • Insert new batteries • Factory Reset. • Replace battery compartment • Replace main PCB
Earset does not work	<ul style="list-style-type: none"> • Factory Reset. • Replace earset • Replace wiring loom earset
Hinge will not lock shaft extended	<ul style="list-style-type: none"> • Push the handle up • Reconnect the spring latch hinge to the latch hinge
Armrest will not move	<ul style="list-style-type: none"> • Replace armrest with slide
Coil does not remain in place (floppy)	<ul style="list-style-type: none"> • Tighten friction screw (thumb screw). • Replace coil pivot kit

Water found inside battery pack	<ul style="list-style-type: none">• Clean battery lid and apply silicone grease to battery lid O-ring• Replace the O ring on the battery lid
Camlocks will not stop shafts from collapsing	<ul style="list-style-type: none">• Replace camlock kit
Battery Lid will not close	<ul style="list-style-type: none">• Remove and clean O-ring on battery lid• Replace batteries.

Table 23: Trouble Shooting Table

5 Pressure Test

- a. The MF5 metal detector is designed and tested to be waterproof to a depth of 3m. Every MF5 has passed a pressure test before leaving the factory. Service and repair work can be performed on the MF5 detector without the need to pressure test the detector.
- b. There is no routine requirement to pressure test the MF5. Seals, gaskets and waterproof integrity of the MF5 will not degrade over time.
- c. Pressure testing the MF5 is a base repair level and not a field level repair.
- d. **Required items** to conduct a Pressure Test:
 - MF5 detector
 - Screw Driver Torx T20
 - Kit Service Seal Check MF5 Minelab part number 3004-0309. This is a special tool made from stainless steel that is 62mm long, at one end it has a M4 screw thread with 32mm long (by 4mm) shaft, this screws into the MF5 in place of a screw M4x35 Torx T20 with O ring. The other end of the Seal Checker has a 1/8BSPT female thread into which a 1/8BSPT hose tail can be attached for connection to a hose and vacuum pump.

1

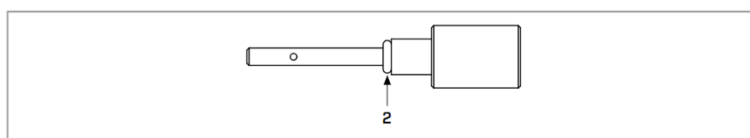


Figure 110: Kit Service Seal Check MF5

Item	Part Number	Description	Qty
1	3004-0309	Kit Service Seal Check MF5	1
2	4309-0119	O-ring 1.78 x ID 3.68mm	5

Table 24: Kit Service Seal Check MF5

- Vacuum pump capable of 50kPa (0.49 atm, 0.5Bar) with a pressure gauge, should be regulated to not exceed this pressure level. The following figure shows an example of a cheap and simple setup to pressure test the MF5. This example uses an automotive pressure pump normally used to bleed automotive hydraulic brakes.



Figure 111: Example of suitable vacuum pump

- e. Conduct a pressure test on the MF5 as follows:
- On the right side of the MF5 remove the Torx T20 screw just below the speaker.
 - Insert the Service seal checker 'plug' into the Torx T20 screw hole just below the speaker.
 - Set the vacuum pump so that it can provide a vacuum of 50kPa (0.49 atm) without the potential to create a vacuum in the detector of greater than 50kPa.



Figure 112: Apply a vacuum of 50kPa

- Connect the vacuum pump to the service seal checker plug so that a vacuum of 0.49 atmospheres is created inside the MF5 chassis. A vacuum of 0.49 atmospheres (50kPa) inside the detector is equivalent to submersing the detector to a depth of 5m in water.
- Turn off the vacuum pump and close a valve on the vacuum pump output, confirm that the pressure (in the MF5) doesn't drop below 50kPa (0.49 atm) after one (1) minute.
- When the detector chassis can maintain a vacuum of 50kpa for one minute without leaking (decrease in vacuum) it will be waterproof to a depth of 3m.
- If the vacuum decreases rapidly there is a large leak, like a seal not fitted, if the vacuum decreases slowly there is a small air leak. Check seals and O rings for possible leaks and retest.
- Remove the Service Seal Check Plug from the MF5, insert the Torx T20 screw into the detector making sure it has an O ring (on the screw).

6 Software Upgrade.

- a. The MF5 metal detector can have its internal software upgraded. When a software update is available Minelab will create and distribute an application to automate the software update process, referred to as the MUU (Minelab Update Utility).
- b. Requirements, for conducting a software upgrade on the MF5:
 - Windows PC with; Windows 10 operating system, USB 2.0 port, minimum 50 MB of hard drive space, minimum 20 MB of RAM.
 - Cable, Earset Data 3004-0300.
 - Software, MUU (Minelab Update Utility)
- c. MF5 software update procedure:
 - Load the MUU onto the windows PC. When an update is available Minelab will host it on our webpage for download or it will be supplied directly to the customer requiring it.
 - Connect the Data cable to the MF5 earset connector and a USB 2.0 connector on the windows PC.
 - Run the MUU.



Figure 113: Screen shot, MUU, Minelab Update Utility software

- Turn on the MF5
- The MUU will communicate with a connected detector and determine its software version. If there is a valid update available, the MUU will display “Updates are available for your detector” and the MUU will provide the operator with the following options: Install or Quit
- Click install to begin the upgrade.
- If the metal detector is up to date the MUU will display “Your detector is up to date” and prompt the operator to quit the MUU.
- The MUU will take approximately one minute to complete the update, there will be a screen showing progress.
- When the upgrade is complete the MF5 will turn off and back on. The MUU will prompt the operator to disconnect the detector and quit the application.

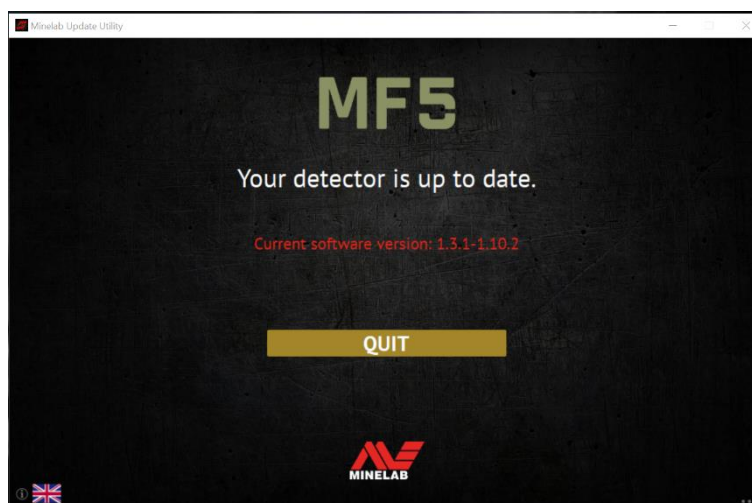


Figure 114: Screen shot, MUU, Detector is up to date.

- d. Minelab will provide detailed instruction when a software update is made available, including details of the changes in software.

7 Circuit Schematics MF5

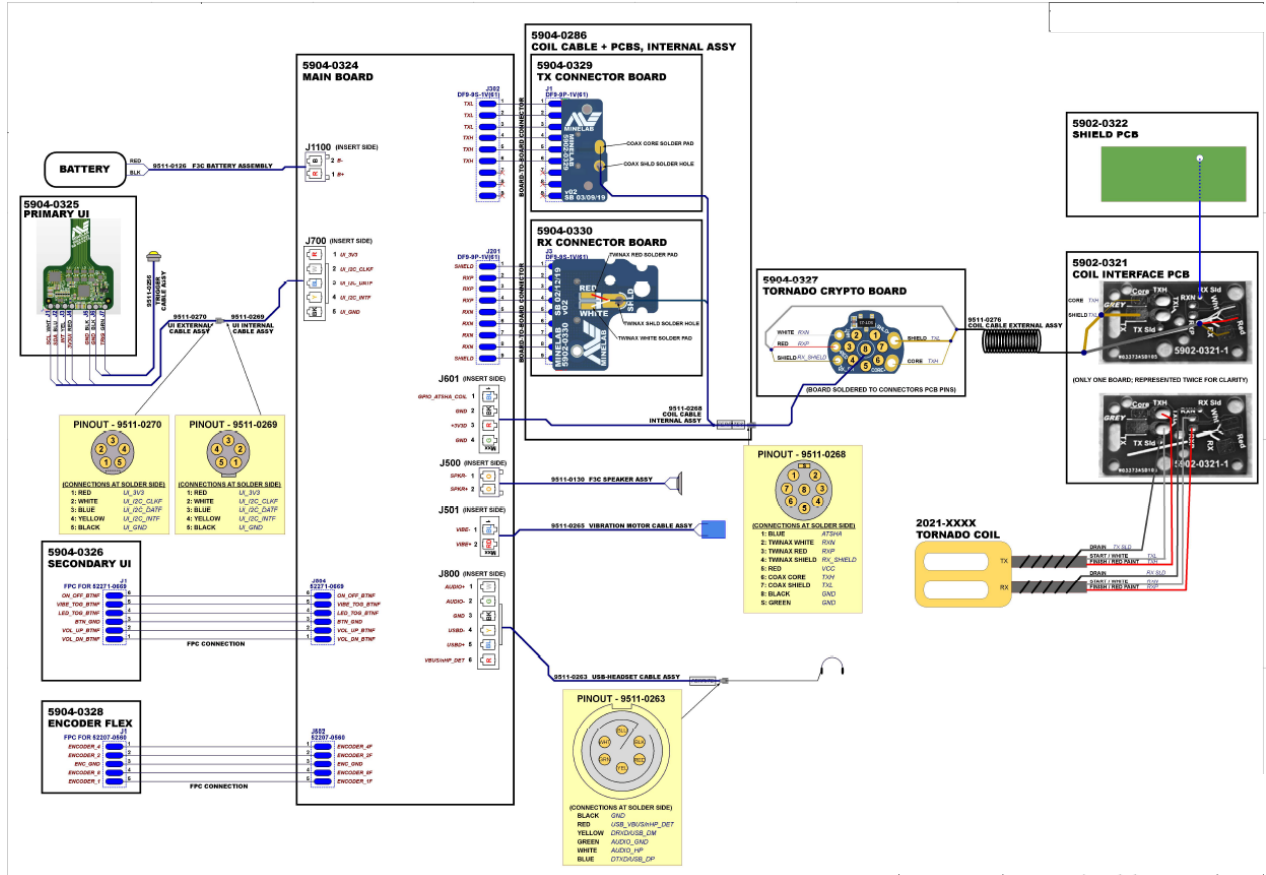


Figure 115: Schematic circuit of the MF5

8 Contact Minelab

Support and help with Minelab metal detectors is available through the following Minelab contacts:

Minelab Electronics Pty. Ltd.

Email countermine@minelab.com.au

Phone +61 8238 0888

Webpage www.minelab.com/countermine

Part Number: 4904-0015-2