

# ***'Getting Started'***

## ***m - Comm*** **System**

**User Notes**  
**Version 1.2**  
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## **1. Introduction**

This documentation is not intended to take the place of the operator's instruction manual. All users should be familiar with the contents of the operator's manual which contains important safety information. The information given in this document supplements the operator's manual and is intended to provide users with the necessary information to ensure that the best possible performance is received from the *m-Comm* system.

Note. For the purposes of this document, the terms ground and earth are taken to be the same.

## **2. How It Works**

The *m-Comm* system uses non-contact coupled transmission guided by a simple wire or pair of wires to transmit speech over several kilometres. The *m-Comm* handheld and base units each incorporate an inductive pick-up arrangement or coupler. The coupler enables the units to link into the path that the wire provides and thereby send and receive speech. There is no limit to the number of units on a guide wire but only one unit can talk at any one time.

For effective long distance communications, the units must be clipped around the guide wire(s). In the case of the base unit, this is simply done by threading the guide wire through a hole in the case and depending on the deployment method used, either ground the end of the single wire or plug together the ends of the pair of wires. With the handheld unit, the coupler slides open for the guide wire or wires to be inserted, anywhere along its length. The *m-Comm* system must have a wire between the people who want to talk but no direct connection is needed. The linking wire can be a temporary single wire laid on the ground, in water, or a fixed wire along the wall of a tunnel. The path and pattern of the guide wire can be varied and invariably made to fit in with the operator's requirement.

The basic idea of the *m-Comm* system is very simple. However, in practice, and because of the *m-Comm*'s flexibility, this 'Getting Started' document provides users with the background and know-how needed to obtain the best out of their *m-Comm* system.

## **3. Intrinsic Safety**

Intrinsic Safety Approvals and classifications cover the types of atmosphere in which equipment may be safely used. A full description of the Intrinsic Safety Approvals appropriate to your country is given in your *m-Comm* operator's manual. You should be fully conversant with these before operating the system, to ensure that the equipment is only used in atmosphere, for which it has been certified.

### 3.1 Non-Intrinsically Safe Equipment

Handheld units with YELLOW cases are not intrinsically safe. Their use in a hazardous environment is prohibited.

### 4. Methods of Operation

There are many different guide wire arrangements that can be configured with the *m-Comm* system, a feature of its flexible design. Hence, this section can only outline the more conventional variants together with their pros and cons. Usually, each variant would be chosen on the importance of; lightweight, low cost, ease of deployment, signal enhancement and immunity from external electrical noise. The variants outlined in the following sections are for single entry tunnel operations. The same basic arrangements can be adapted for branching, double entry, etc., methods but each branch communicating distances will be generally less than for a single line. If in any doubt talk to someone at RMT to get the best option for your particular operational needs.

The primary emphasis is on securing good signal, be it with a grounded or with ground free arrangements. A grounded arrangement need only employ a single wire whereas the ground free arrangement has to have at least 100 metres of twin wire at the start of the guide wire.

The ground free arrangement, see Figure 3, is recommended for general use.

Let's look at some of the methods of configuring the guide wire:

#### 4.1 Single Guide Wire, Grounded One End

Figure 1 illustrates the simplest and cheapest method of connecting the *m-Comm* system. It can be seen that the single guide wire is drawn through the coupler on the base unit and connected to a grounding point. This may be an electrical installation grounding point or a grounding spike provided specifically for this purpose. Handheld units are clipped on to the single wire, when communication is needed or can be left clipped on to the wire and slid along it as deployment of the guide wire progresses.

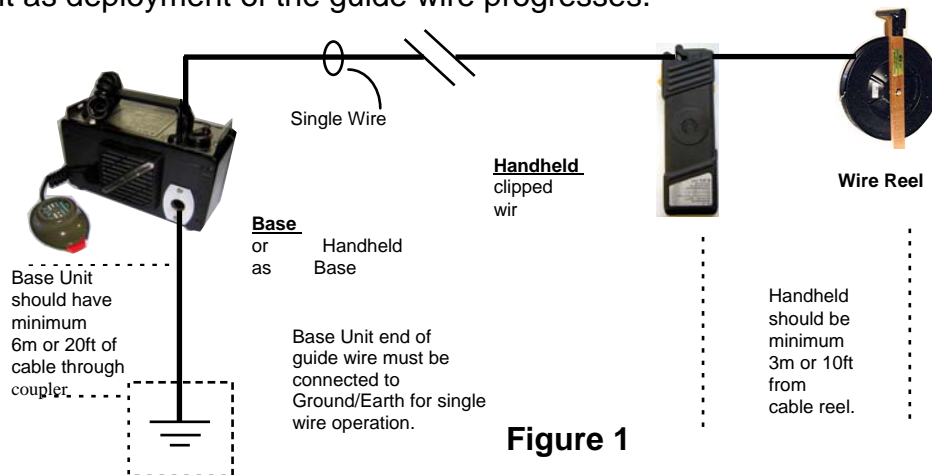
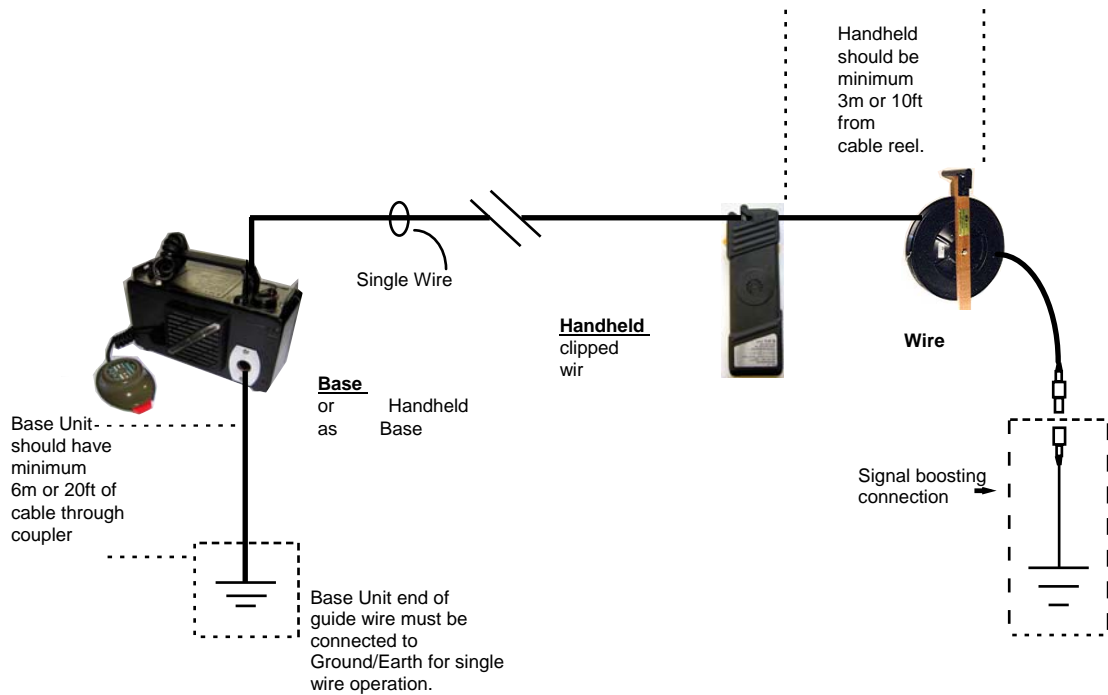


Figure 1

## 4.2 Single Guide Wire, Enhanced

Though basically the same as the first method, Figure 1, an additional booster cable is employed to improve the signal by grounding the transmission wire at the dispensing reel end, see Figure 2. A major advantage of grounding both ends of the guide wire is that should the integrity of one of the grounding points be less than perfect the other grounding point ensures that communication is still possible.



**Figure 2**

With both of these methods of deployment, there are two additional points to be remembered.

- At least six metres (20 feet) of wire should be pulled through the base unit before it is connected to the grounding point.
- Signal level diminishes as the end of the guide wire is reached. For optimum performance, the handheld units should not be operated within three metres (~10 feet) of the end of the guide wire or its dispensing reel.

## 4.3. Grounding Explained

Ground or earthing is the issue that seems to cause most of the confusion experienced by users of the *m-Comm* system. It is also vital that it is carried out correctly to ensure good operating performance. Because of this, the ground free arrangement, Figure 3, is recommended for most operational use.

However, it is important to address some of the confusion surrounding the use of grounding with the *m-Comm* system.

Let's start by clearing up some common causes of misunderstanding:

**With a single guide wire, at least one end of the guide wire must be grounded.**

Do not assume that all exposed metalwork offers a good grounding point.

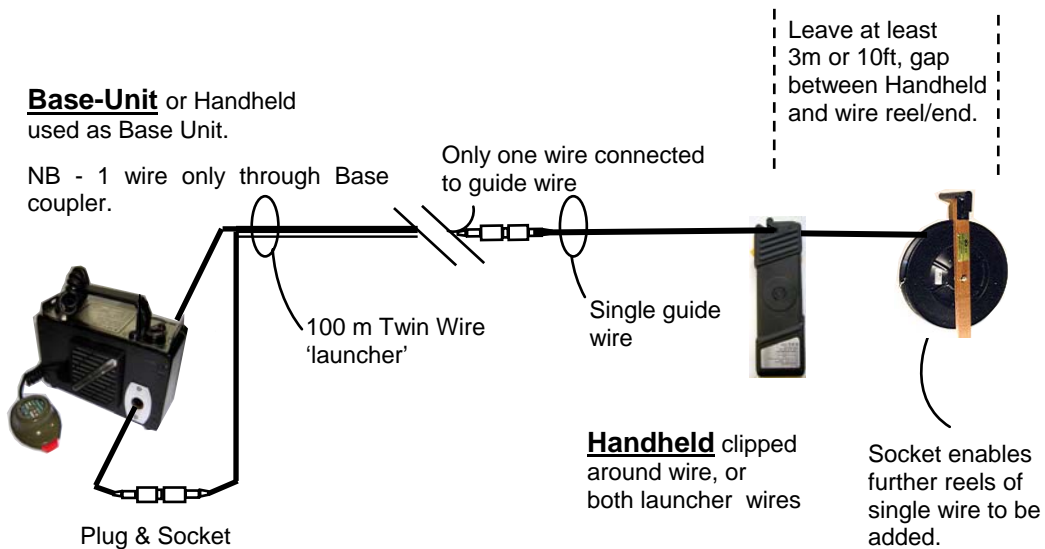
The exposed metal parts of all electrical installations should be grounded and usually provide a good grounding point for *m-Comm*. Equally, most other exposed metal for example radiators, heating pipes and cold water pipes etc. are also usually grounded and may provide a suitable connection for our *m-Comm* guide wire. However, this can never be guaranteed.

For example, over distances up to around 70 to 90 metres (80 to 100 yards), the system will often work adequately with a poor or non-existent ground. Therefore, it is difficult to assess whether or not a ground is good, without first extending the guide wire for some considerable distance. Where no exposed metal is available for clipping and grounding the guide wire there is a simple solution and that is to use a grounding spike. This is exactly what it sounds like. A spike of metal which is driven into the ground with a mallet, to which the *m-Comm* guide wire is connected. Invariably there will be an opportunity to do this, even if it is 30 or 40 metres (33 to 44 yards) away from the base unit. Remember we said that at least 6 metres (20 feet) of guide wire should be pulled through the base unit coupler in any case.

Where a good local grounding point is available, a strong, spring-loaded clip should be used to clip the 'flying end' of the guide wire to the grounding point. In most cases, the crocodile clip provided in the kit can be used, but where something larger is required, a welding clamp is a useful addition to your *m-Comm* kit, specifically for this type of situation. Remember that there must be metal-to-metal contact so the grounding point should be free of paint and rust. A wire brush or scraper is ideal for this purpose. One final point, if you use a grounding spike, don't forget to take it with you when you leave!

#### **4.4 Ground Free Method (Preferred Method for General Operations)**

The recommended method for an *m-Comm* system is the use of a single wire with a 100 m start, or launch, section of twin wire, as depicted in Figure 3. This method eliminates the need for a grounding point for the guide wire(s) and is normally employed where temporary communications over distances up to 5 kilometres or so (around three miles) are required.



**Figure 3**

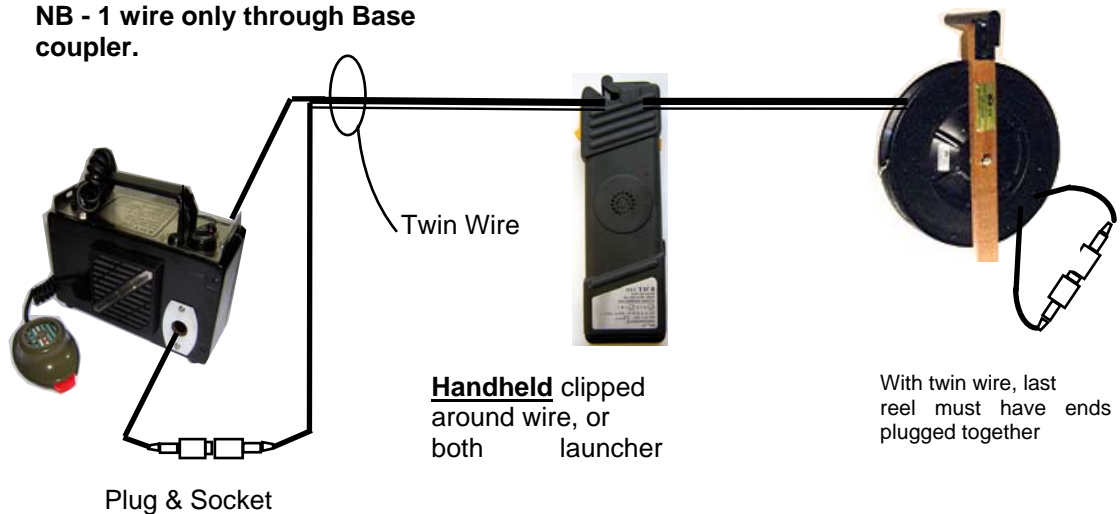
This method is ideal for *m-Comm* operators in stressful situations and where rapid and secure communications are the primary requirement. It can also prove useful in reducing electrical noise (see below, 4.5).

#### **4.5 Enhanced Ground Free Method**

There are occasions when the guide wire has to be deployed next to, or along side, noisy electrical equipment and cables. The simplest solution is to employ twin twisted wire, as show in Figure 4. This method greatly reduces electromagnetic noise, particularly useful in tunnels where there are other live (and noisy) cables present. It can also be employed as a means of increasing communications distances to over 10 kilometres (over 6 miles), primarily by eliminating any possibility of the loss of transmission through poor strata /grounding.

**Base-Unit** or Handheld  
used as Base Unit.

**NB - 1 wire only through Base  
coupler.**



**Figure 4**

Deployment is the same as for the twin wire launcher arrangement, Figure 3, either pass the plug or socket through the base unit coupler and connect it to its counterpart. There is no need to pull any more cable through the base than is necessary. The loose or 'flying' ends of the twin wire used in this type of deployment will have to be plugged together. The end of each reel also has a plug and socket which enables additional reels to be connected. It is very important to remember that the end of the line, i.e. the last cable reel should have its plug and socket connected together to form a complete loop.

### **Clip around Both Wires**

Handheld units are normally coupled around both wires except where a handheld unit is used in place of the base unit. In this case, the handheld unit is connected as if it were a base unit.

Although not as pronounced in this method of operation, signal level does diminish towards the end of the wires so the handheld units should not be used within 1.5 metres (5 feet) of the cable reel.

### **Clip onto One of the Twin Wires**

In an emergency, when for example the handheld unit's battery is very nearly exhausted or the wire has been damaged it is possible to boost the return signal by clipping around one wire only and make contact with base.

## **4.6 Wire Deployment and Retrieval**

A golden rule with the reel and dispenser is to ensure that the wire is pulled from and rewound to the rotating reel, rather than pulled from over the side of the reel. This will help to prevent tangling of the wire and enable the wire to be paid out and retrieved at a speed to match the progress of the work/rescue party.

The standard RMT reel is constructed of a special anti-static material and is approved for used in hazardous atmospheres.

The retrieval method is illustrated in Figure 5., gloves should be worn in actual operations. The retrieval method may seem a little clumsy at first, but it is an effective method of retrieving the wire, without kinking and with the added benefit of removing any significant debris from the wire at the same time. Practise first.



**Figure 5**

#### **4.7 Joining the Guide Wire(s)**

##### **Standard Reel Connections**

All *m-Comm* wire reels incorporate a socket (and a plug in the case of the twin wire) which allows extra reels to be added by being simply plugged to the next and so on.

With the twin wire arrangement, the plug and socket at the end of the spent reel must be disconnected and the plug and socket of the new reel connected, as shown in Figure 6.

Remember that the plug and socket of the last reel or the reel from which wire is being dispensed, must be connected together to complete the transmission loop.

#### 4.8 Damaged Wire Repair

With thin, copper, insulated wire, the simplest way to make a repair is to bare the insulation from the ends of the wire and twist them together then tie a knot in the wires to prevent them from pulling apart. It would be a good idea to insulate the joint with electrical tape, once it has been made. There are commercial snap connectors available (e.g., Scotchlocks) that can also be used to good effect with many types of wire. Never twist corroded wires together; it will reduce signal level and consequently operational range.

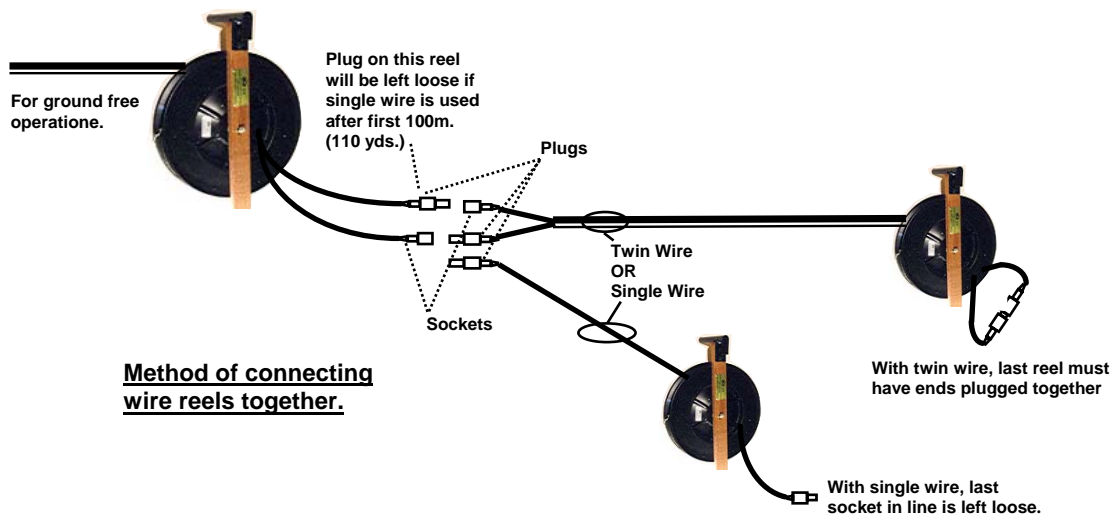


Figure 6



**Rechargeable Battery Handheld** units with rechargeable batteries should always be charged with the recommended automatic charger, namely, ANSMANN ENERGY GMBH or a MASCOT charger. Charging operation must be carried out in a safe area. When charging batteries, ensure that battery charging terminals are clean. If the charging indicator LED fails to illuminate when the unit is placed in the charging adapter first check the connections for dirt. If the charger still refuses to indicate charging then the handheld unit should be withdrawn from service and returned to RMT for checks/repair.

**Replacement Batteries Handheld** units use a replaceable 9 volt battery which must be replaced each time before the system is used. Only alkaline batteries from Duracell must be used and must only be changed in a safe atmosphere. New batteries will give a life of at least 8 hours.

Access to the battery compartment requires a special Torx type screwdriver. When changing batteries, ensure that battery terminals are clean. If a good connection cannot be achieved due to damage to the battery connector, the handheld unit should be withdrawn from use and returned to RMT for repair.

### **5.3 The Coupler**

The coupler condition and correct use is vital to the handheld unit's operation. It is opened and closed by the yellow slider on the right of the handheld unit. It can be clipped on as required, or left clipped on and simply slid along the guide wire(s) as progress continues. In conditions of reduced visibility, it is possible to feel the top edge of the slider is flush with the case. Do not use excessive force to open or close the coupler, it can be broken in this way. Always check the wire is not trapped between the jaws.

It is vital that the coupler is not damaged or broken. **Damaged coupler is the most frequent cause of transmission problems experienced during operation.**

The coupler faces have a self-cleaning action that will remove most loose debris. It is possible however for build up of dirt to occur, particularly if not regularly cleaned. Therefore, before the equipment is stowed away ensure that any accumulated dirt is removed. Debris and dirt can best be removed by rinsing under clean, running water and dried in a warm room. The use of abrasive materials is prohibited as this could lead to damage to the plastic case and coupler.

Additionally, an *m-Comm* **ring-tester** can be used (in a safe area only) to check the unit's transmitter output level. Clip the **ring-tester** into the handheld as shown in Figure 8 below.

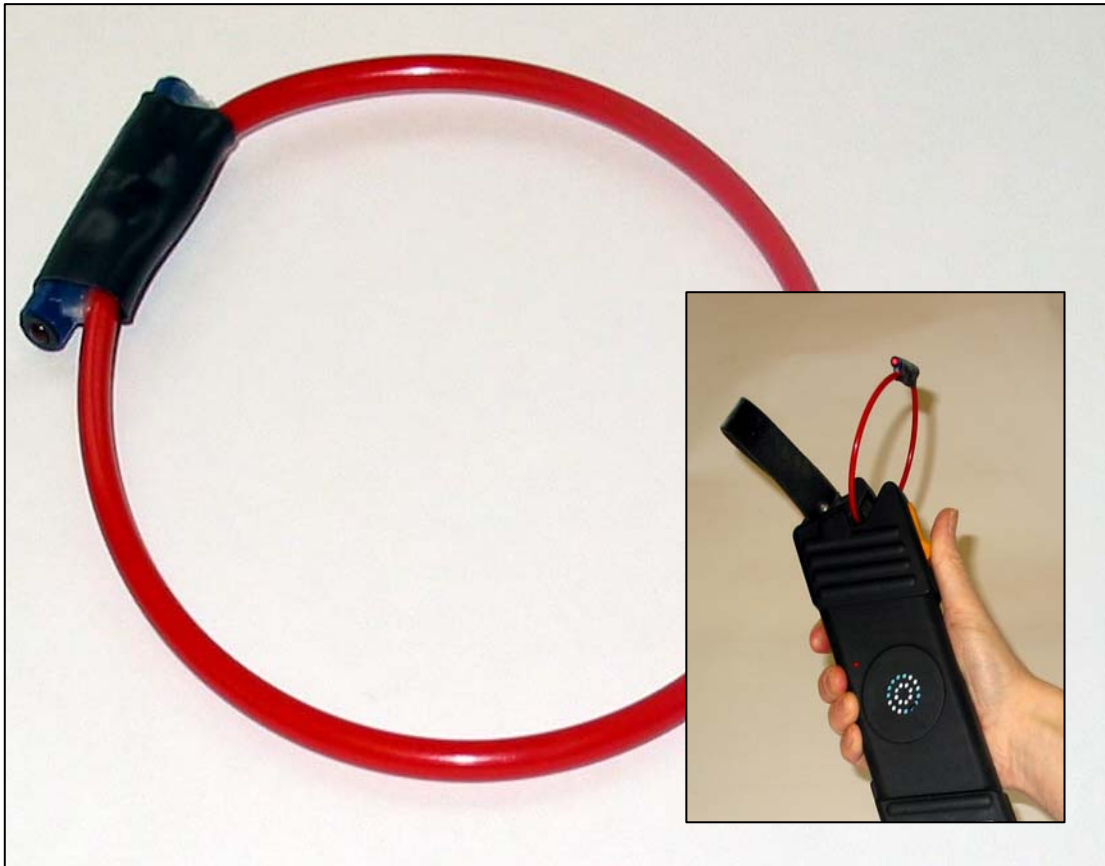
The **ring-tester** LEDs will only light up when:

- the handheld unit is switched on,
- press-to-talk button is operated,
- battery voltage is within its normal working range, and

- the ferrite coupler is in working order.

As the battery voltage decreases the brightness of the LEDs will also dim. You should not however use the **ring-tester** as a battery condition indicator.

Essentially, the **ring-tester** is designed to check the condition of the retractable ferrite coupler. Should you fail to obtain any light from the LEDs with a fully charged or new replaceable battery then the unit should be taken out of service with a suspected broken coupler and returned to the manufacturer for further checks/repairs.



**Figure 8**

#### **5.4 Speaker/Microphone**

Unlike a mobile phone, *m-Comm* handheld units uses the same aperture for both the speaker and the microphone. Speech is transmitted by speaking or shouting into the circular array of holes on the front of the handheld unit. This is also where speech/sound will come from. When using a breathing apparatus (BA set), the microphone should be held in front of the face mask speech diaphragm.

In noisy conditions, use of the approved earpiece is recommended. Alternatively, the speaker/microphone aperture can be held against the operator's ear.

#### **5.5 On/Off Switch**

The handheld unit is switched on when the switch is 'up' i.e. it is towards the top or coupler end of the handheld unit. A red LED, next to the speaker/microphone, should

glow when switched on. This dual function LED is extinguished when the PTT button is pressed, indicating that the handheld unit is in transmitting mode.

## 6. Base unit

The locations of the base unit's controls and other parts are given in Figure 9. see below.

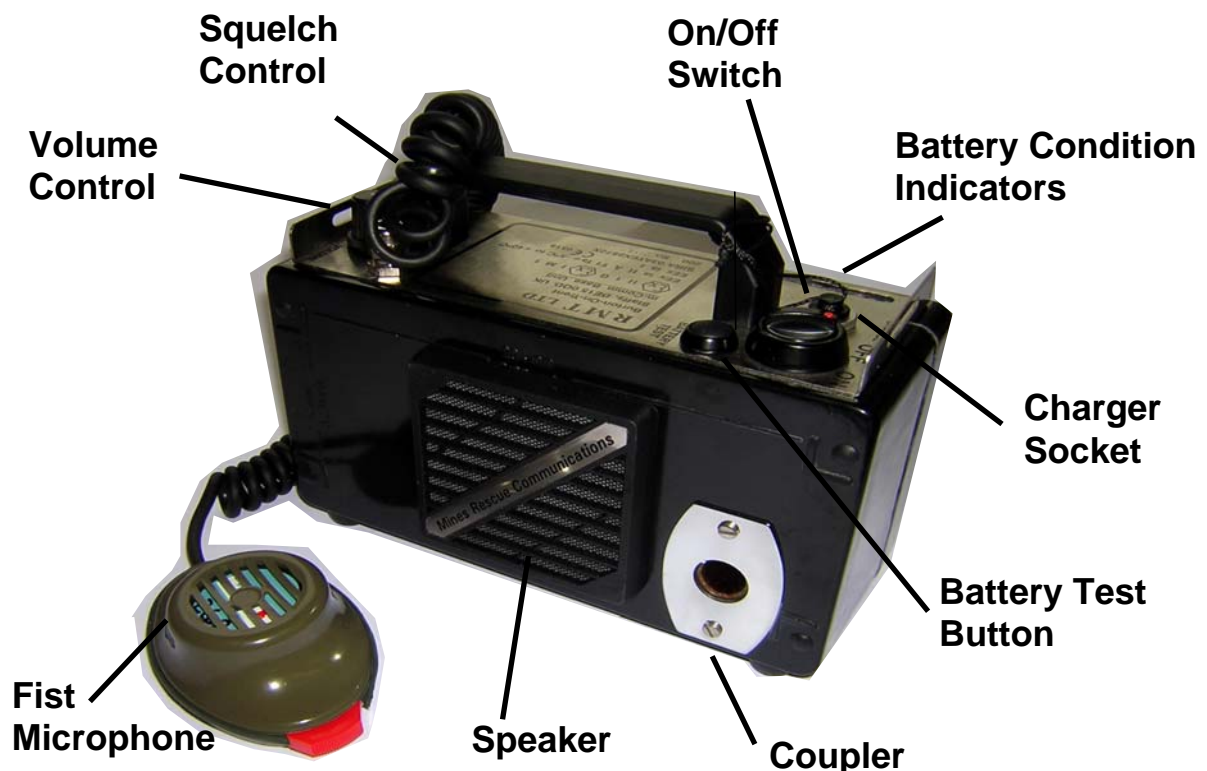


Figure 9

### 6.1 Charging the Battery

The base unit has a battery test button on its top surface, if you press this, the LED array will show the state of charge of the internal battery.

Green LED	the unit is fully charged
Orange LED	<b>normal</b> - operations
Red LED	the battery power is getting low

To ensure a full 8 hours of operation one of the green LEDs should initially be illuminated.

Recommended *m-Comm* chargers are either; ANSMANN ENERGY GMBH (note the discharge function does not work for IS units) or MASCOT, they'll ensure that the battery receives exactly the right amount of charge.

Once plugged in and switched on, the operation of the charger unit is automatic.
----------------------------------------------------------------------------------

Charging operation must be carried out in a safe area.

If the charging LED (on the front of the charger) fails to come on when the unit is plugged to the charger first check the connections for dirt. If the charger still refuses to indicate charging then the Base unit should be withdrawn from service and returned for checks/repair.

## **6.2 Squelch [or Mute] Control**

Squelch control is used to cut down background noise when the units are in standby mode, as with conventional two-way radios. *m-Comm* uses a manually controlled semi-squelch system in the base unit to enable it to operate effectively in a wide variety of different environments. Semi-squelch provides a safeguard for a wrongly set squelch control and allows the unit to hear, be it at very low level, an incoming call. This semi-squelch feature is also present in the handheld unit.

Setting of the base squelch control is vital for good communications. First, switch on the base unit, it doesn't matter whether the handheld units are connected or switched on. Next, turn the squelch knob anti-clockwise until a loud hissing noise comes from the speaker on the base unit. You will not mistake this noise. Now, turn the squelch knob clockwise slowly, to a point where the noise drops. Do not continue beyond this point. This is the correct setting for the squelch control and it will vary at every location that the equipment is used, so you must perform this operation each time you set up the equipment. Not unnaturally, local conditions do change and you should check this setting periodically during use. Turn the knob anti-clockwise until loud hissing is heard - rotate clockwise to the point where it just stops. If loud hissing is heard, without any changes having been made, you can assume that local conditions have changed and therefore reset the squelch level as described above. In the event of extreme electromagnetic interference, beyond the control of the squelch, move the base location.

## **6.3 Volume Control**

This only controls the volume of the base unit output. It does not affect the rest of the system. Volume can be set to suit local conditions and we would suggest that when first setting up the system, the control is set to the mid-way position.

## **6.4 Integrity Bleep**

Every 15 seconds the base unit transmits an integrity bleep. This is a short burst of sound which is sent down the guide wire to the handheld units. It is heard as a click at the base unit and as a bleep at the handheld units. If this is not received at the handheld unit then it should be first assumed that the guide wire is broken at some point between base unit and handheld unit. The break(s) should be located and repaired as described above, to restore communications.

## **7. Maintenance Procedures**

*m-Comm* equipment is designed to withstand rough handling and extreme operating conditions. However, like all equipment, it does require some regular checks and maintenance to ensure that it always performs at its best. For safety related equipment it is recommended that your *m-Comm* system should be returned to RMT every twelve months for routine checks/service. Remember, your life may depend on how well you have maintained your equipment.

The maintenance and cleaning procedures listed below should be carried out after each occasion that the equipment is used, or at least once per shift (8 hours) if the equipment is in continual use.

### **7.1 Handheld units**

After use in dirty conditions, rinse the coupler in clean water (a mild detergent may be used to remove heavy soiling). A soft brush and/or a low-pressure airline may be used to remove stubborn deposits. Shake out excess water and allow to drain by standing handheld unit in an upright position with battery compartment uppermost. Clean outside of case with a soft damp cloth and wipe dry.

Check the coupler for damage and ensure it slides freely. Additionally, check the output (and coupler condition) with the ring-tester.

### **7.2 Base unit**

Do not rinse under running water or immerse. Clean outside of base unit with a soft damp cloth and wipe dry. Inspect microphone and cable for signs of damage.

### **7.3 Cable Reel & Holder**

Remove cable reel from dispenser and wipe clean central spindle.

Ensure that any damage to the guide wire is repaired. Or that the guide wire is replaced. Do not rub the wire reel with a dry cloth.

## **8. Problem Solving**

### **8.1 High Ambient Noise**

Where the handheld unit is used in an area of high background noise, the earpiece supplied with the kit should be used. No other earpiece may be used with IS certified equipment.

### **8.2 Damage to the Guide Wire(s)**

The operation of the *m-Comm* system, relies upon the guide wire being insulated. It is possible that with use, the guide wire will rub against abrasive surfaces and the insulation will be worn away. Where this occurs, the result could be degraded performance. If the wire becomes badly damaged, the whole cable or the damaged section should be replaced. As a temporary measure, these damaged sections can be insulated with electricians tape. When using a pair of guide wires, care should be taken to ensure that the two wires are not shorted together except at the very ends of the transmission line i.e. the base unit and at the last reel in the line.

### **8.3 Feedback**

This is something that sometimes occurs with public address or PA systems and is characterised by a loud whistling noise. It's a vicious circle which can easily be broken by turning the volume down or by moving the speakers further away from the microphone. Feedback can be experienced when two handheld units are used close together or when a handheld unit is used too close to the base unit. If this happens, the handheld units should be moved further apart or the base unit volume should be turned down until the feedback ceases.

### **9. Summary**

*m-Comm* is a very effective and easy to use communications system. Providing the simple operating and maintenance procedures outlined above are followed, there is no reason at all why it should not continue to give reliable and dependable performance.

If however difficulties are experienced or there are questions about the operation or maintenance of the equipment, please call us -

Rock Mechanics Technology Limited,  
**Bretby Business Park, Stanhope Bretby, Ashby Road,  
Burton-on-Trent, Staffs, DE15 0QD, United Kingdom.**  
Tel.: +44 (0) 1283 522 201, Fax.: +44 (0) 1283 522 279  
e-Mail: [rmt@rmtltd.com](mailto:rmt@rmtltd.com), Website: [www.rmtltd.com](http://www.rmtltd.com)

You can be assured that we will do our very best to help.