

**McGRATH<sup>®</sup>**  
**MAC EMS**

## Instructor's Guide

Video Laryngoscope



Designed & manufactured  
by Aircraft Medical



Distributed by **Physio-Control**



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# How To Use This Guide



# How to use this guide

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The McGRATH® MAC EMS Video Laryngoscope (VL) is easy to use and enables clinicians to achieve direct and indirect laryngoscopy where required. It is based on the familiar design of the Macintosh blade and therefore enables clinicians to effectively secure patent airways, even in difficult to intubate patients.

With this comprehensive guide, you'll be able to train your staff to effectively use the device. This instructor guide is an introduction to the basic operation of the McGRATH® MAC EMS Video Laryngoscope. It does not suggest protocols or policies regarding the use of the Video Laryngoscope. Refer to the Operating Instructions for complete directions for use, indications, contraindications, warnings, precautions and potential adverse events.

Moving, removing, highlighting and adding content to this outline to meet individual user needs is encouraged. Hands-on practice and application with scenarios promote learning retention.



## Training Tips

This guide is divided into seven sections:

- Device design
- Power
- How to use
- Difficult airways
- Out of hospital confirmation of correct ET tube placement
- Decontamination
- Troubleshooting

All sections are optimally taught in a hands-on format. Instructors should first demonstrate how to use the McGRATH® MAC EMS Video Laryngoscope and then have students practice. Ideally, students will receive enough practice and coaching from the instructor to ensure they can use the device with confidence in an emergency.

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## Learning Objectives

The overall objective of this in-service is to provide an overview of the basic steps of operation of the McGRATH® MAC EMS Video Laryngoscope. Upon completion of this course, participants will be able to:

- Verbalize the importance of endotracheal intubation
- Understand basic anatomy of the airway
- Explain the rationale behind video laryngoscopy
- Demonstrate proficient VL
- Demonstrate how to change the battery
- Verbalize how to confirm and document correct ET tube placement
- Demonstrate device cleaning

## Equipment and Materials

The following is a list of accessories and support material recommended for training on the McGRATH® MAC EMS Video Laryngoscope. It is essential that all equipment be inspected and tested to ensure proper function prior to training according to the Basic Orientation section of the Operating Instructions.

### Equipment

- McGRATH® MAC EMS Video Laryngoscope
- A suitable head/neck manikin

### Accessories

- A selection of blade sizes (2, 3, 4 and X)
- Bougie
- Stylet
- A selection of ET tubes
- Catheter mount
- Thomas tube holder
- Magill forceps
- 50 ml syringe

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- Suction device
  - Stethoscope
  - OP airway
  - Capnography filterlines
  - Bag Valve Mask

## Support Materials

- Quick Start Guide
- Operator Checklist
- CGI Training Video
- Suggestions for User Performance Evaluation

Endotracheal Intubation (ETI) is the gold standard for securing a patient's airway. It is one of the most important skills Paramedics perform. However, it is an infrequently used skill; approximately 2% of EMS calls require advanced airway intervention<sup>1</sup>.

ETI is relatively straightforward; however some patients are difficult to intubate:

### **ETI success rate:**

Prehospital	77.0–86.3% <sup>1,2,3</sup>
Hospital:	97.0–99.3% <sup>1</sup>

Some patients have anatomically difficult airways to intubate. Additional patient-specific factors can obscure visualization in prehospital environment (e.g., anterior larynx, airway swelling due to anaphylaxis, blood, vomit, secretions, trauma, limited cervical mobility)

Scene-specific factors can also complicate intubation (e.g., poor lighting, inaccessible patient position etc.)

Many paramedics don't intubate frequently enough to maintain proficiency. There is an element of muscle memory involved, particularly with Macintosh blades. Finesse comes with practice.

It takes 20–25 intubations in order to achieve a success rate above 90%, but U.S. national standards only require 5 at graduation.<sup>4</sup>

Many paramedics perform fewer than 8 intubations per year—some will not intubate for several years.

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## Which patients are candidates for Video Laryngoscope?

Video Laryngoscope is ideal for patients in cardiac arrest, respiratory arrest and for those that require rapid sequence intubation. In the latter, it is important to intubate swiftly and successfully once a patient has been paralyzed.

Diggs, et al – 2012 NEMIS data: Overall ETI success of 85.3%; RSI success rate of 93.1%<sup>1</sup>

Wang, et al – 2008 NEMIS data: Overall ETI success of 77.0%; RSI success rate of 84.1%<sup>2</sup>

Specific focus on successful intubation in prehospital RSI

Video Laryngoscope improves visualization of key anatomic structures compared to direct laryngoscopy<sup>5,6,7,8</sup>

Furthermore, it enable providers to see parts of the anatomy that are hidden to the naked, effectively “seeing further around the corner”

# Part I: Device Design



# Device design

## Built-in video and vertical display

2.5" LCD monitor displays a clear view of the vocal cords and laryngeal inlet for an improved anatomical view. Vertically aligned optics display an earlier visualization of the tube to address tube-induced trauma.

## Long-lasting battery (250 minutes)

The long-lasting power source provides peace of mind as well as an accurate minute-by-minute on-screen battery indicator.

## Guaranteed sterility

Infection control is achieved with sterile packaged blades and immersible handle for High Level Disinfection.

## Direct or indirect use

The McGRATH® MAC EMS can be used as a direct or indirect laryngoscope with or without the aid of a stylet to facilitate quicker adoption of technique and quicker tube placement.

## Portable and easy to use

Easy to use “switch and go” technology. Its compact size and cable-free design means it is ready for the field.

## Robust

Drop and strength-tested to twice industry standards, the McGRATH® MAC EMS is designed to withstand tough clinical environments. Made from robust optical polymer supported by a reinforced CameraStick™, the blade delivers steel-like rigidity.

## McGRATH® MAC blade range

The McGRATH® MAC 119 mm slimline single-use blade minimises obstruction of the tube path and is especially beneficial in cases of small pediatric patients. Blade sizes 2, 3, 4 are available, ensuring you have the range you need.



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## McGRATH® MAC EMS

video laryngoscope  
(the device)



### Handle overview

- The CameraStick™ has a steel-reinforced chassis. It contains the CMOS camera and high-intensity LED. The blade covers and attaches to it during use.
- The heel is where the curvature of the CameraStick™ begins
- The screen connects to the handle by way of a hinge. The screen tilts by up to 45 degrees.

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## Blade overview



Each disposable blade is for single patient use. They are made from a robust optical polymer and the lenses are coated with an anti-fog optical surface treatment.

Sizes available are pediatric to large adult patients, with size 1 coming soon (neonate <8 weeks).

Standard bades are packaged in cartons of 50, X blades are provided in packs of 10, all are packaged individually.

- Mac 2: Pediatric Infant, for pediatric patients older than eight weeks or at least 4.5 kg**
- Mac 3: Adult**
- Mac 4: Large Adult**



## Part II: Power



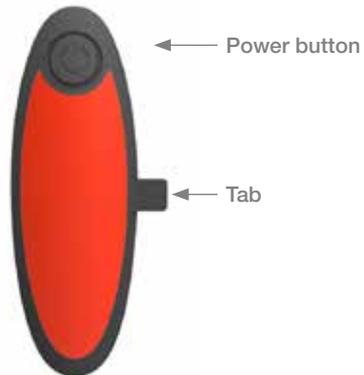
# Power

- The handle is supplied with one proprietary 3.6V Lithium Battery (non-rechargeable) in situ. It is embedded in the side of the handle
- A new non-rechargeable battery provides up to 250 minutes of operating time under normal operating conditions
- Battery minutes remaining are displayed on-screen. The battery icon begins flashing when reaches five minutes – change battery:



- Remove the small plastic tab from a new battery before use:

**McGRATH® 3.6V EMS  
Battery**



- If the device won't be used for more than one month, remove battery before storing



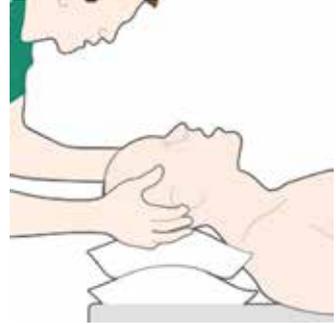
## Part III: How to Use



# How to use

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- 1 If possible, position the patient in the optimal position for direct laryngoscopy



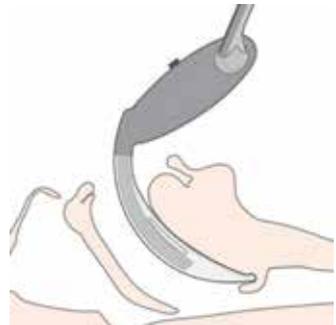
- 2 Look into the mouth; insert the blade into the right side of the mouth



- 3 Move device to a central position while sweeping tongue to left



- 4 Advance the tip of the McGRATH® MAC blade into the vallecula



- 
- 5 Visualize the epiglottis on the screen. Lift the anatomy forward and upwards to expose a direct and indirect view of the glottis. When the device is in the optimal position the glottis should be viewed in the central upper section of the screen.



- 
- 6 Advance the tube gently and atraumatically through the vocal cords. Tube placement can be performed either by looking directly in the mouth, indirectly on the screen or a combination of both.\*



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- 7 Indirectly visualize tube placement through the vocal cords. In optimal tube placement technique, E.T. tube will enter from right hand side of display.



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- 8 Screen view can be used to confirm correct insertion depth of endotracheal tube



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\* If a direct pathway for the tube was not created by sweeping the tongue or aligning the airway axis a stylet or a bougie may need to be used.

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## Improved view

- Students should be made aware that typically, 1 to 2 grades of improvement in view are possible

In most cases expect a 1 grade of view improvement with McGRATH® MAC, although 2 grade and 3 grade conversions have been achieved.



### Slim-line blade

The 11.9 mm slim-line blade reduces blade width at the patient's mouth, providing greater ability to maneuver the device without pressing on teeth.

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## Portrait view

The portrait orientation of the screen ensures that the ET tube comes into view sooner. This reduces blind spots (time between tube disappearing in direct view and appearing on screen) and the risk of inadvertently inflicting soft palate injuries. Confirm students can successfully demonstrate.



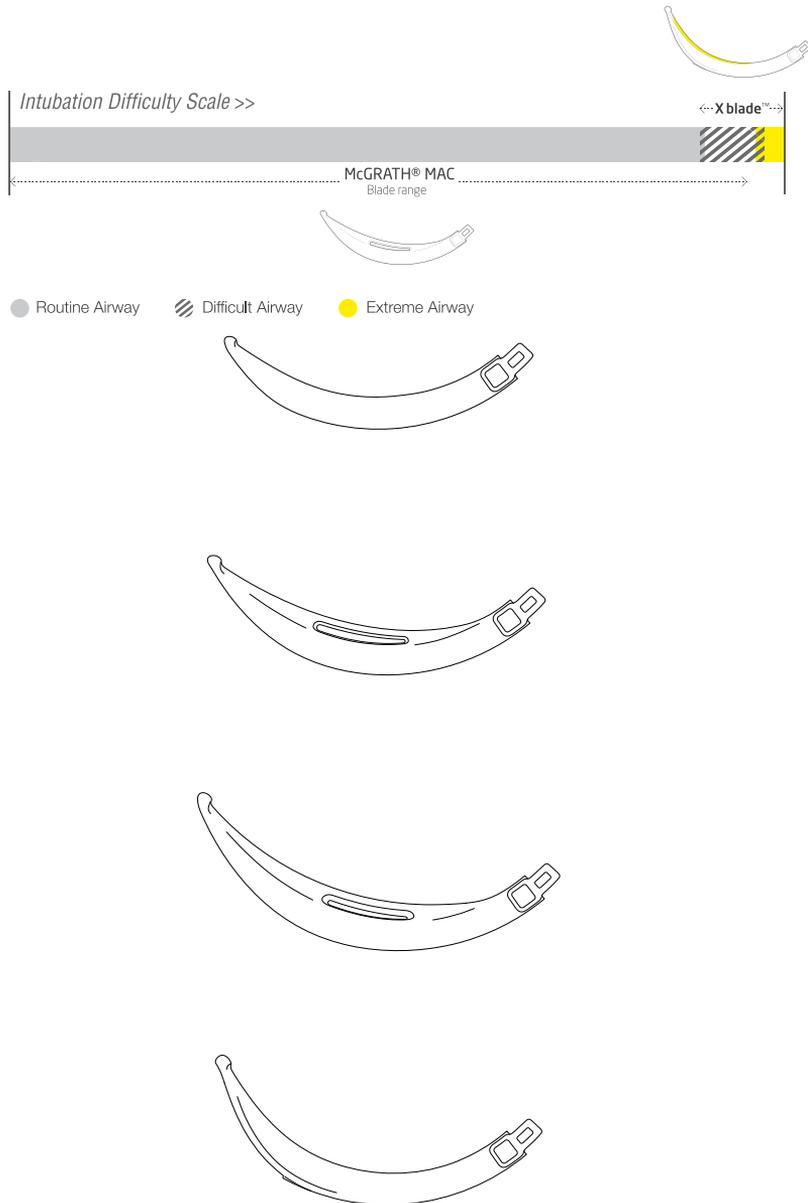
## Part IV: Difficult Airways



# Difficult airways

Very few patients have anatomically extreme airways. However, they represent a difficult category of patient in whom airway management is particularly challenging.

The MAC X blade™ has a more acute curvature that enables clinicians to see even further around corner. Students may struggle with the required modified technique. You should therefore pay particular attention to it in order to ensure that is successfully achieved.



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Due to its extreme angulation, the X blade™ does not facilitate a direct view and a stylet is required.



The insertion technique differs to that of the MAC blade:

- 1 Load the E.T. tube onto a stylet\* and form to the curvature of the X blade™

\* Clinical experience has shown that intubation without any introducer, or with a bougie, will not facilitate optimal tube placement.



- 2 Where possible, elevate the patient's head into the "sniffing" position for optimal access



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- 3 Using a mid-line approach, roll the blade into the mouth. Ensuring the anterior side of the blade maintains contact with the tongue, advance the blade until the epiglottis is seen on the top of the screen.



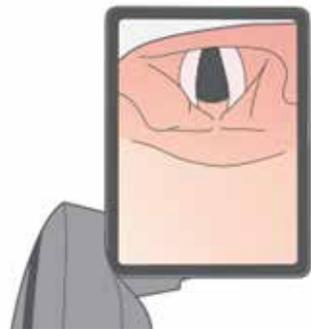
- 
- 4 Place the tip of the X blade™ into the vallecula



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- 5 Using minimal force, rock the device back towards the user to lift the epiglottis and obtain an indirect view of the glottis



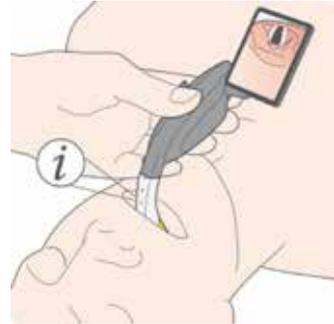
- 
- 6 When the device is in the optimal position the glottis will be views in the central upper section of the screen. It is important not to advance the blade too deep in order to maintain maximum space to facilitate the E.T. tube placement.



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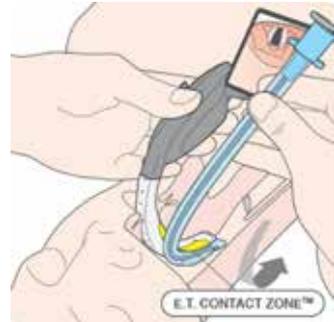
The DepthGuide™ numeric markings on the posterior side of the blade may be used as an indication of the depth of the blade insertion. Reference to these numbers can be useful during training to avoid inserting the blade too far.



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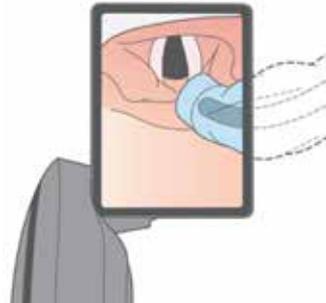
Insert the E.T. tube at the right side corner of the mouth. Advance in a rolling movement following the curvature of the blade, ensuring it maintains contact with the section of the blade labeled E.T. CONTACT ZONE™.



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When using optimal technique, the E.T. tube should enter the screen on the right-hand side; advance the tube until the tip is in front of the vocal cords

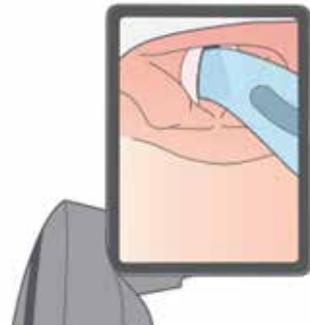


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Holding the stylet secure, slide the tube off the stylet and through the cords, ensuring the stylet does not pass through the cords. Once the tube has passed through the cords, remove the stylet completely.

The screen view can be used to confirm the correct insertion depth of the endotracheal tube.



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The X blade™ has additional markings to guide training in the modified technique for ETI:

- DepthGuide™ enables provider to know how far blade is inserted into mouth
- Highly distinctive yellow ET Contact Zone™ reminds provider to roll styletted ET tube along underside of blade

Remind students that X blade™ packaging contains a brief aide memoire for insertion technique:





## Part V: Out of Hospital Confirmation of Correct ET Tube Placement



# Out of hospital confirmation of correct ET tube placement

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Fatalities occur when misplaced tubes are not recognized (e.g., esophageal intubation). Consequently, it is imperative to teach the students how to confirm correct placement of an ET tube. It is also important to ensure that they can identify when a tube has become displaced (e.g., during transport). A few ways of achieving this are listed below:

- Visualization of tube passing through cords
- EtCO<sub>2</sub> waveform
- Bilateral breath sounds (auscultation via a stethoscope)
- Rise of the chest with each ventilation
- Fogging of the ET tube
- Absence of gastric distention



## Part VI: Decontamination



# Decontamination

It is important to decontaminate the handle and battery after each patient use. Refer to the Operators Manual for a detailed explanation of cleaning.

PRODUCT		CLEANING	RAPID DISINFECTION*	HIGH LEVEL DISINFECTION	STERILIZATION
	McGRATH® MAC Disposable Laryngoscope Blade	Supplied Sterile Do Not Reprocess	Supplied Sterile Do Not Reprocess	Supplied Sterile Do Not Reprocess	Supplied Sterile Do Not Reprocess
	McGRATH® MAC EMS with McGrath MAC 3.6V EMS Battery fitted	Cleaning (manual). Non-immersive	Disinfectant Wipe		STERRAD® 50/100S/200/NX /100NX
	McGRATH® MAC EMS with McGrath MAC 3.6V EMS Battery removed	Cleaning (manual). Non-immersive	Disinfectant Wipe	High Level Disinfectant Immersion/Chemical Disinfectant	STERRAD® 50/100S/200/NX /100NX
	McGRATH® MAC 3.6V EMS Battery	Cleaning (manual). Non-immersive	Disinfectant Wipe		Ethylene Oxide Sterilization

\*Wherever practical, a High Level Disinfection or Sterilization is preferred to a wipe-based process.



## Part VII: Troubleshooting



# Troubleshooting

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PROBLEM	RESOLUTION
No image shown on screen when switched on	Replace battery unit
Poor picture quality (image displayed on screen is blurred or fuzzy)	Remove blade and check that image is clear. If necessary, wipe camera at end of CameraStick™ with clean, soft wipe. If that does not solve the issue then replace the blade with a new one.



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# References

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**Physio-Control Headquarters**  
11811 Willows Road NE  
Redmond, WA 98052  
[www.physio-control.com](http://www.physio-control.com)

*Customer Support*  
P. O. Box 97006  
Redmond, WA 98073  
Toll free 800 442 1142  
Fax 800 426 8049

**Physio-Control  
UK Sales Ltd**  
Concorde House  
Trinity Park, Solihull  
Birmingham  
B37 7UQ  
United Kingdom  
Tel +44 (0)808 258 0094  
Fax +44 (0)808 189 0337

**Physio-Control Canada**  
Physio-Control Canada Sales, Ltd.  
7111 Syntex Drive, 3rd Floor  
Mississauga, ON  
L5N 8C3  
Canada  
Toll free 800 895 5896  
Fax 866 430 6115

**Physio-Control  
Australia Pty Ltd**  
Suite 4.01  
15 Orion Road  
Lane Cove  
NSW 2066  
Australia  
Toll Free Tel 1800 987 982  
Toll Free Fax 1800 890 892

**Physio-Control Operations  
Netherlands B.V.**  
HQ Europe, Middle East & Africa  
UP Office Building  
Piet Heinkade 55,  
1019 GM Amsterdam NL  
Tel +31 (0)20 7070560  
Fax +31 (0)20 3391194  
[www.physio-control.com](http://www.physio-control.com)

 **Aircraft Medical Limited**, 7E Cross Way, Dalgety Bay, United Kingdom KY11 9JE

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