



MAGIC BREED **PLUS**

User Manual

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Receiver firmware revision 1.21

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1. Contents

1.	Contents	1
2.	Introduction	2
3.	Legal Information	3
4.	Principle of Operation.....	5
5.	Getting Started	6
6.	Setting Up.....	8
7.	Fitting to the Mare.....	12
8.	User Interface	15
9.	Transmitter Pairing	16
10.	Operation	18
11.	Transmitter Settings.....	24
12.	Range and Testing.....	28
13.	After Use.....	29
14.	Specifications	30
15.	Warranty.....	31
16.	Transmitter Reference.....	33

2. Introduction

Congratulations on your purchase of the Magic Breed Plus foaling alarm system. Magic Breed has been the leading name in foaling alarms for over 40 years and with the release of the Magic Breed Plus now incorporates many electronic advancements made during that time.

To ensure that you have the best possible experience with your Magic Breed Plus system, please ensure that you read through this manual and understand the operation before use.



This symbol is used to note instructions that must be followed to prevent damage to the Magic Breed Plus system.

NOTE: This manual has been updated to cover the expanded features offered in receiver firmware version 1.21. The receiver firmware version is displayed on the screen when the unit is first powered on. For older firmware versions please see previous manual versions.

3. Legal Information

3.1. Liability Statement

Magic Breed Plus is intended to aid in the foaling process but there are limitations to the technology which mean that it cannot be 100% accurate.

While we have every expectation that the Magic Breed Plus will work well and be very helpful in the majority of situations, Electronic & Electrical Solutions can unfortunately take no responsibility or liability of a negative outcome due to the failure of the Magic Breed Plus system to detect the foaling event. The only way to achieve 100% reliability is to have an awake, alert person physically watching the mare at all times.

3.2. Regulatory Compliance

The Magic Breed Plus system has been designed and tested to comply with Australian regulations regarding Electromagnetic Compatibility and radio transmissions. Both the transmitter and receiver comply with the following Australian/New Zealand standards:

AS/NZS 4268:2017
AS/NZS CISPR32:2015

The RCM mark found on the Magic Breed Plus components is a confirmation that the equipment meets Australian regulatory requirements. Always look for this mark when purchasing new electronic equipment:



By complying with AS/NZS 4268, the Magic Breed Plus system is classified as a “Low Interference Potential Device”, or LIPD. An LIPD device can be operated by any person without requiring a radiocommunications licence, which is important for equipment like the Magic Breed Plus which is intended for operation by unlicensed people.

If you require more information regarding EMC and radiocommunications legislation please consult the Australian Communications and Media Authority (ACMA) at www.acma.gov.au or New Zealand Radio Spectrum Management (RSM) at www.rsm.govt.nz

4. Principle of Operation

Typically, in the late term of pregnancy, a mare will avoid lying flat on its side until it enters labour. The Magic Breed Plus system uses this well documented behaviour.

A transmitter containing a special sensor called an accelerometer is attached to the mare's halter. The accelerometer allows the transmitter to determine the direction of the ground and therefore it can detect when the mare has laid on its side.

When the transmitter detects that the mare is in the foaling position it will begin timing and after a short delay it will alert the receiver, which will sound an alarm.

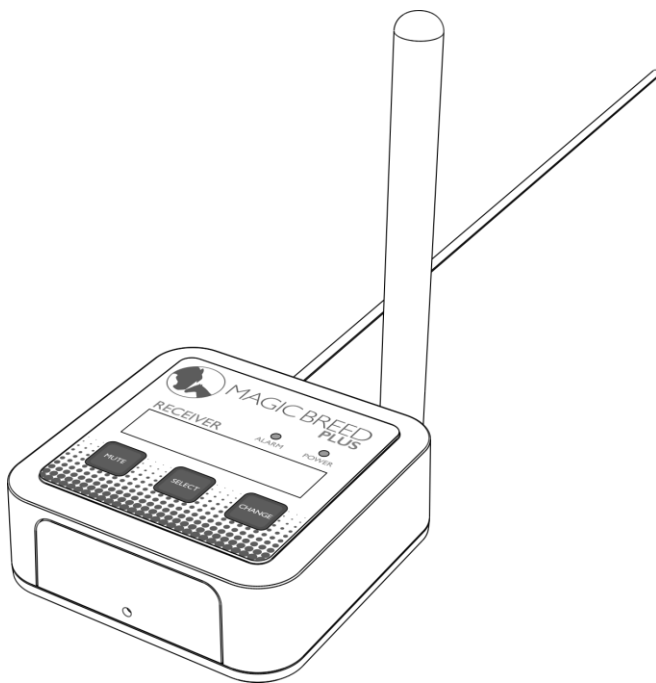
Note however that some mares are very active and will even temporarily lay in the foaling position prior to foaling. This results in false alarms, so it's important to be able to easily and temporarily silence any foaling alarms. The Magic Breed Plus makes this easy.

5. Getting Started

The Magic Breed Plus system is comprised of two main components: the receiver (base station) and transmitter. The transmitter is attached to the mare and sends wireless signals to the base station for reporting when it has detected that the mare is foaling.

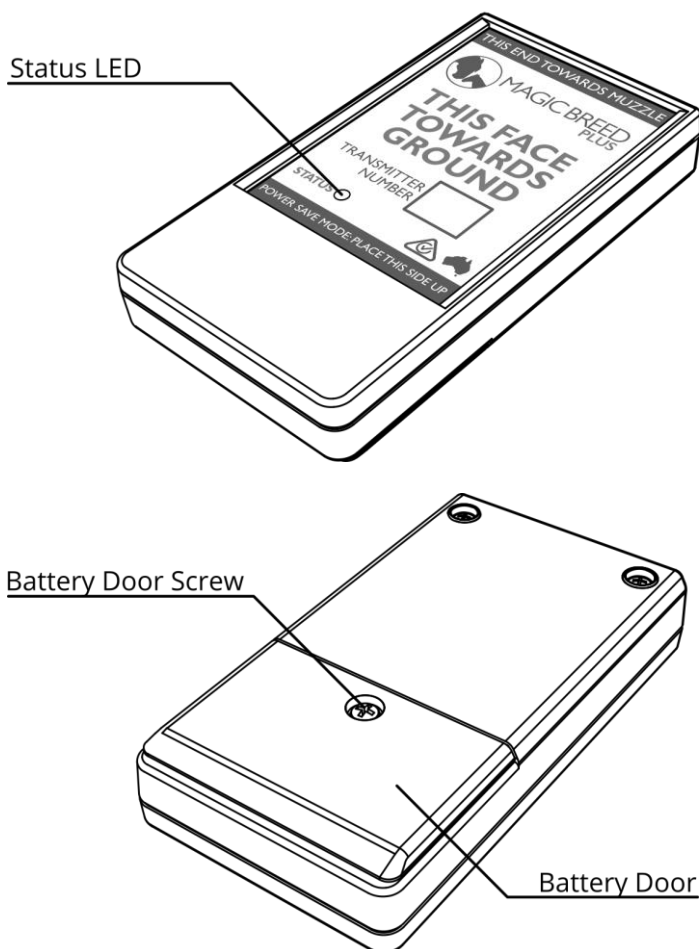
5.1. Receiver

The receiver is a dark grey unit which has a power supply and antenna connected at the rear. Up to 8 transmitters can be used with a single receiver.



5.2. Transmitter

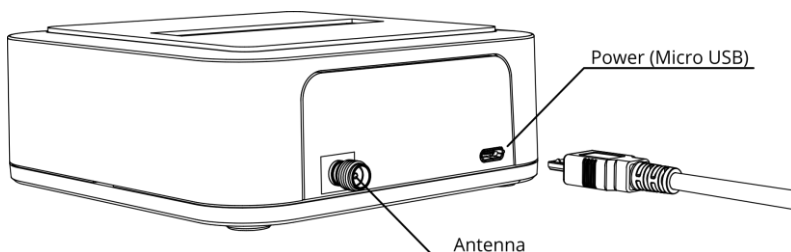
Magic Breed Plus transmitters are battery powered and contain an accelerometer which enables it to sense the orientation of the mare's head. Detecting when the mare is laying on its side with its head on the ground is how the transmitter determines if the mare is in a foaling position.



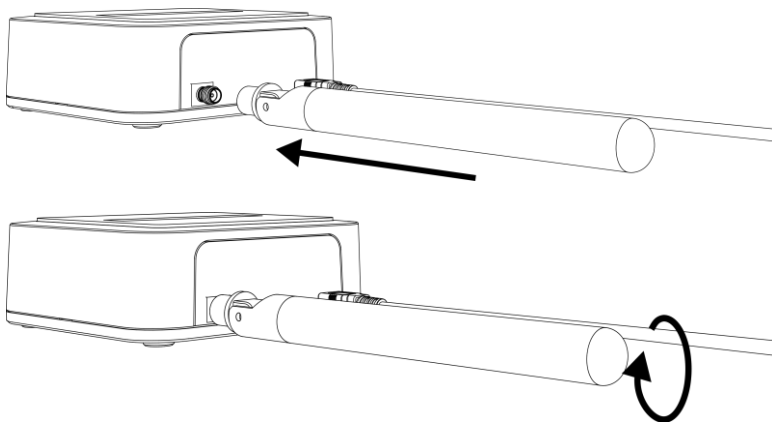
6. Setting Up

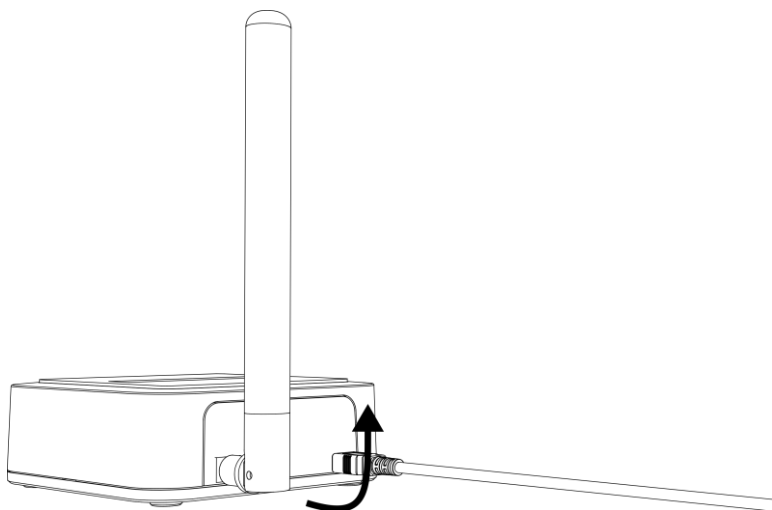
6.1. Receiver Connections

The receiver is powered by USB, either using the supplied USB plug pack or an alternative USB power source.



The receiver also needs to have the supplied antenna connected to the screw in connector on the rear.





The antenna screw connection should only be tightened to finger tight (do not use a tool to tighten it further).



The antenna and power connections can be damaged if treated roughly or dropped. Please take care with them and place the receiver in a safe location.

The antenna supplied may differ slightly from the one shown in the diagrams but operation will be the same.



Do not use any antenna other than that which was supplied with your unit or otherwise recommended by Electronic & Electrical Solutions.

6.2. Transmitter Batteries

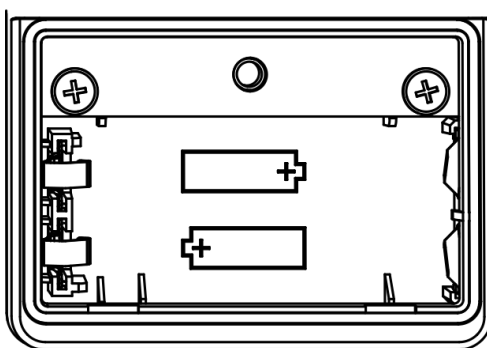
Transmitters are powered by a pair of AAA 1.5V alkaline batteries. Depending on the mare's level of activity the batteries in a transmitter can easily last an entire season.



Only use quality batteries from Energizer, Eveready, Duracell or Panasonic. Low quality batteries can leak and cause damage to the battery contacts.

To insert or remove the batteries, the transmitter battery door must be opened by first removing the battery door screw using a PH1 philips head screwdriver. When closing the door don't forget to reinstall the screw (including the sealing ring).

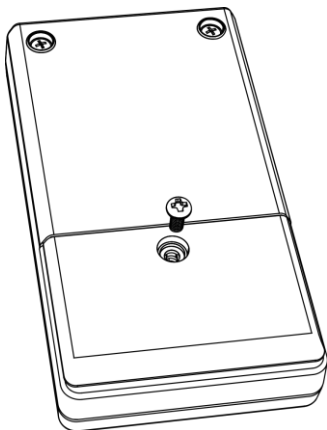
Note that the batteries must be installed in the correct orientation, as noted in the bottom of the battery holders:



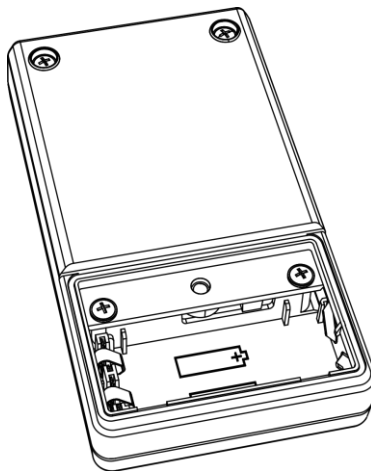
Do not overtighten the battery door screw as this may cause damage.

Under typical usage and depending on the movements the mare makes when not foaling, a single pair of AAA batteries can last an entire season.

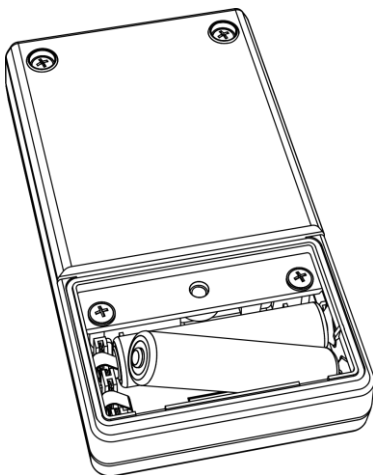
1. Remove battery door screw



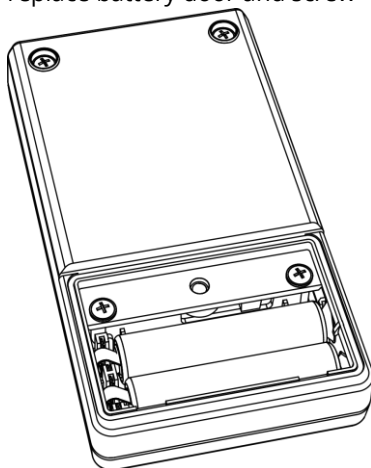
2. Remove battery door



3. Insert batteries

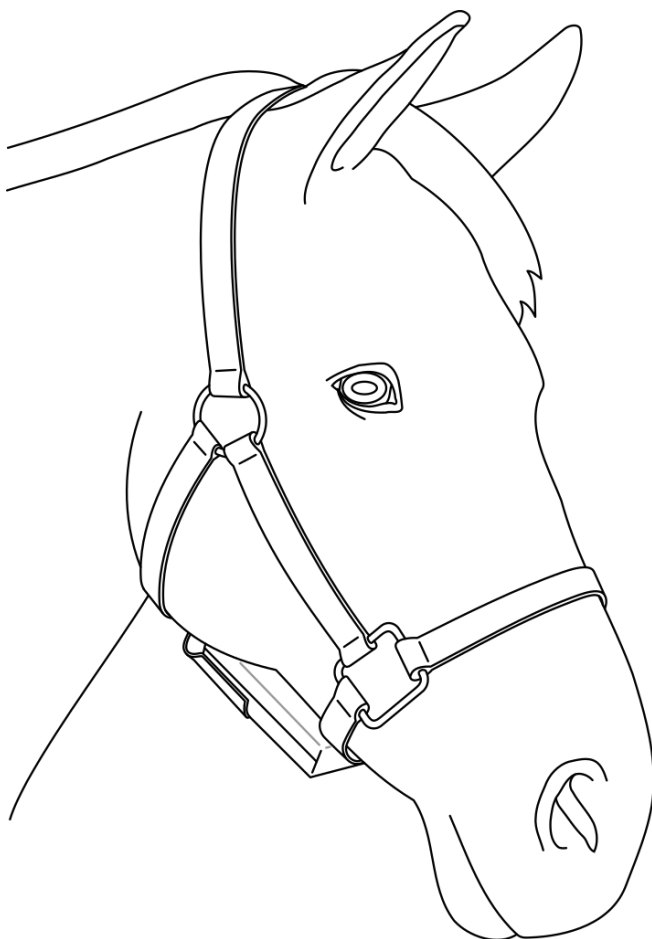


4. Once batteries are installed
replace battery door and screw

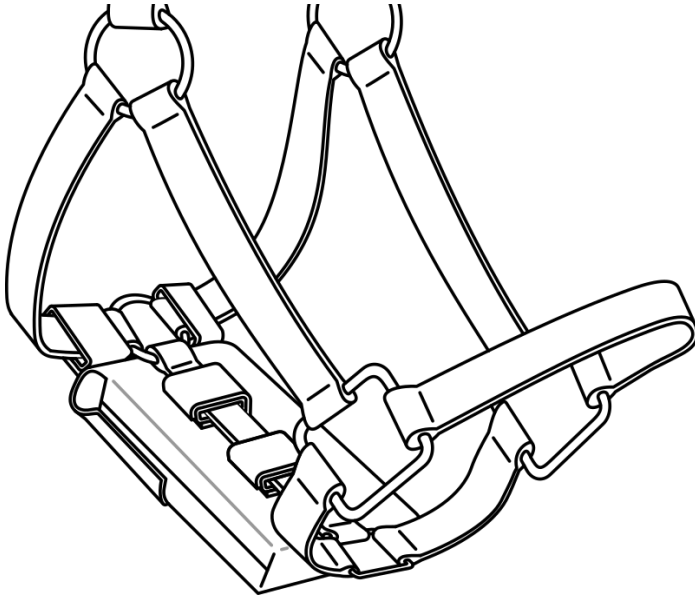


7. Fitting to the Mare

The transmitter is secured in place under the mare's chin using a halter fitted with a transmitter pouch.



The pouch is fitted to the halter using the four Velcro straps:

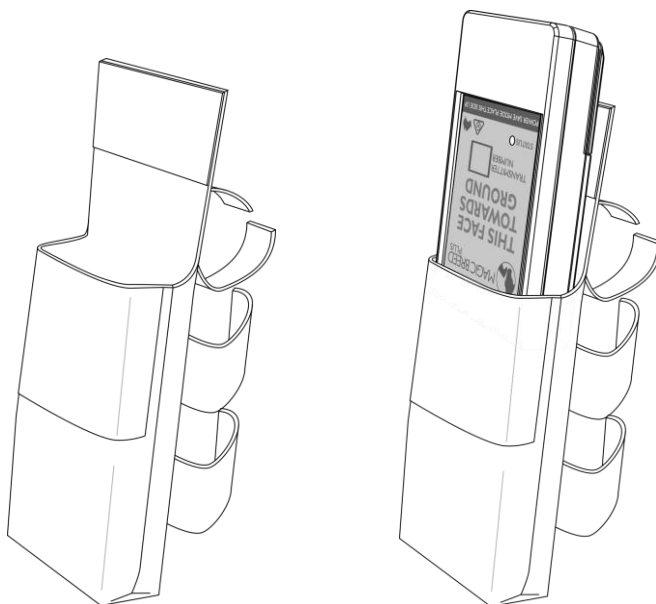


If concerned about the Velcro fasteners coming loose an optional alternative would be to use cable ties to fasten the pouch to the halter.

Pouches are manufactured from high quality Weathermax® canvas and should last many foaling seasons but if required replacements are available for purchase. The pouch is designed to work with both the original Magic Breed and the new Magic Breed Plus transmitters.

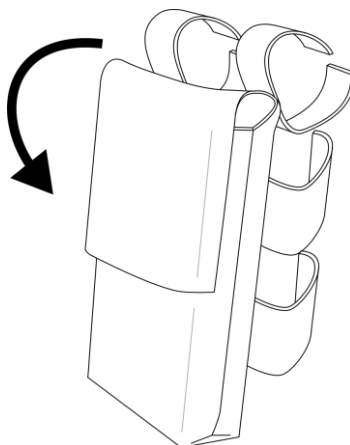
Once the pouch has been fitted to the halter, the transmitter can then be fitted.

Insert the transmitter into the pouch in the orientation indicated in the following diagram:



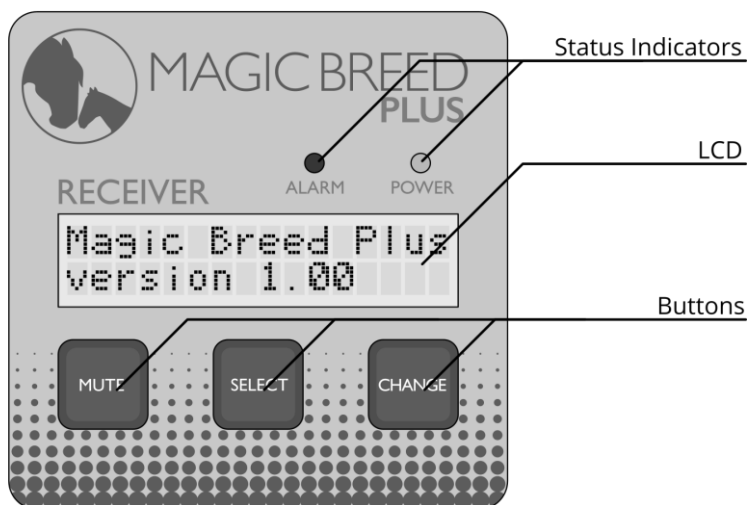
Note that the transmitter must be inserted into the pouch in the correct orientation or it WILL NOT WORK. Refer to the instructions on the transmitter front label for guidance in the field.

Then pull the flap over and down, sealing the Velcro so that the transmitter is held tightly. It's important that the transmitter is not able to move around inside the pouch.






8. User Interface

The Magic Breed Plus receiver features an LCD screen and three buttons to aid in configuration and user information.



Operation is simple:

-  Switch between the various menu and status screens.
-  Change a setting on the current screen.
-  Silence the alarm.

Some functions require that the button is pressed and held.

9. Transmitter Pairing

Before a transmitter can be used it first must be paired with the receiver. Each transmitter has a unique code that it uses to identify itself and the pairing process is used to teach the receiver this code without the user having to enter it.

Up to 8 transmitters can be paired to a single receiver - when a transmitter is paired the receiver assigns it an identifying number from 1 to 8.

9.1. Pairing

To perform pairing use the following procedure:

1. Turn the receiver on and place it in learning mode by pressing *SELECT* until the option "press *CHANGE* to pair a new Tx" is shown:



Press CHANGE to
pair a new Tx

2. Press *CHANGE* and the receiver will begin listening for a new transmitter to learn:



Looking for Tx..

3. Insert the batteries into the transmitter and place it on its side so that the status indicator is flashing. This indicates that it is sending an alarm signal.

4. The receiver should then beep to indicate that it has paired the new transmitter, and will display the number that has been assigned to that transmitter:

The image shows a monochrome LCD screen with two lines of text. The first line reads 'Found new Tx' and the second line reads 'Tx1 paired'. To the right of the text, there are several empty rectangular boxes, likely for status indicators or additional data.

It is recommended that this number is marked on the face of the transmitter in the location provided using a permanent marker:



Note that the pairing must take place while the transmitter and receiver are in close range of each other – within 10 metres is ideal.

Like all other receiver settings, pairings are retained when the power is off.

10. Operation

10.1. Transmitter Communication

While a transmitter has batteries inserted it sends periodic messages to the receiver every 10 minutes. These "status" messages inform the receiver that the transmitter is operational and provide information such as signal strength and battery power level.

10.2. Transmitter Status

The transmitter status LED provides visual feedback to the user:

Off	Transmitter is idle (or no/dead batteries fitted)
Flashing	Alarm condition
On Steady	Battery level is too low to operate

10.3. Receiver Power On

After power on, the receiver can make no assumptions about the status of the paired transmitters until it receives a status message from each one. To give the user a visual confirmation, after power on the screen will momentarily report the number of learned and active transmitters:



The image shows a digital display with two lines of text. The first line reads '2 Tx paired' and the second line reads '0 Tx online'. The text is in a pixelated, monospaced font. To the right of the text, there are several empty square boxes, likely representing a status bar or progress indicator.

Once the receiver receives a status message from a transmitter this will change to the normal idle screen:



2 Tx online

10.4. Foaling Alarm

The transmitter will detect when the mare enters a foaling position (laid on its side, head flat against the ground), and begin transmitting this information to the receiver. After the alarm delay (default 10 seconds), the siren in the receiver will begin to sound. The receiver display will indicate which transmitter number has caused the alarm:



FOALING ALARM
Tx1

If more than one transmitter is detecting an alarm then the additional transmitters will be listed:



FOALING ALARM
Tx1. Tx6

10.5. Alarm Reset

For alarm reset the Magic Breed Plus has two operating modes: *auto reset* (default) and *continuous*.

In *auto reset* mode an alarm will cancel (and the buzzer will silence) once the mare has returned to an upright position for 5 seconds.

In *continuous* mode, once an alarm has been triggered the alarm will remain until specifically cancelled. This mode is similar to the original Magic Breed system and allows for more certainty if the monitoring person cannot be constantly in earshot of the receiver.

10.6. Mute

Any time an alarm is sounding the *MUTE* button on the receiver can be pressed. This will silence the buzzer for a set period of time (the default is 5 minutes but this can be changed), after which it will resume sounding.

The mute applies individually to each transmitter: if another transmitter creates an alarm during the mute period then the mute will cancel and the buzzer will begin to sound again.

10.7. Offline Transmitter Alarm

If the receiver does not receive a status report from a paired transmitter for more than 20 minutes then an offline transmitter alarm will sound. This alarm differs from the foaling alarm in that when muted, the alarm will remain quiet until the receiver has heard from the transmitter in question again.



OFFLINE ALARM:
Tx1

The image shows a monochrome LCD screen with a grid of 16 columns and 2 rows. The text "OFFLINE ALARM:" is displayed in the first row, and "Tx1" is displayed in the second row. The remaining grid cells are empty.

As with the foaling alarm, this screen will provide a list of the transmitters that are currently offline.

10.8. Empty Battery Alarm

The transmitter is able to measure its battery level and sends this information to the receiver. If the battery level is being measured as critically low and the transmitter goes offline then a "Battery Empty" alarm will be triggered:



BATTERY EMPTY:
Tx1

The image shows a monochrome LCD screen with a grid of 16 columns and 2 rows. The text "BATTERY EMPTY:" is displayed in the first row, and "Tx1" is displayed in the second row. The remaining grid cells are empty.

As with the foaling alarm, this screen will provide a list of the transmitters that have an empty battery.

10.9. Multiple Concurrent Alarms

If multiple alarms are occurring at the same time then they are displayed based on priority: foaling alarms are displayed first, followed by empty battery alarms and offline transmitter alarms. The status of individual transmitters can be viewed by pressing the *SELECT* button until the desired transmitter information screen is displayed.

10.10. Transmitter Information

For each paired transmitter a screen is available showing its current status. Pressing the *SELECT* button will cycle through these. The content of the screen is shown as follows:



Pressing the *CHANGE* button will allow settings for the displayed transmitter to be displayed and adjusted (see section 11 for further information).

The two icons on the right hand side of the screen indicate the signal strength and the battery level of the transmitter:



Battery full

Battery half-full

Battery low



Full signal

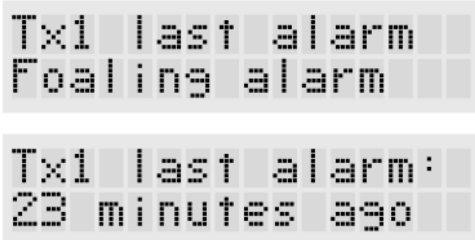
Moderate signal

Weak signal

If the battery level reaches “battery low” then the transmitter batteries should be changed as soon as possible to ensure reliable operation.

If a weak signal is shown the system will still operate correctly but there is a chance of “offline transmitter” alarms occurring.

If there have been any alarms since power was last reset then the transmitter information screen will also alternate to show the last alarm and how long ago it occurred.

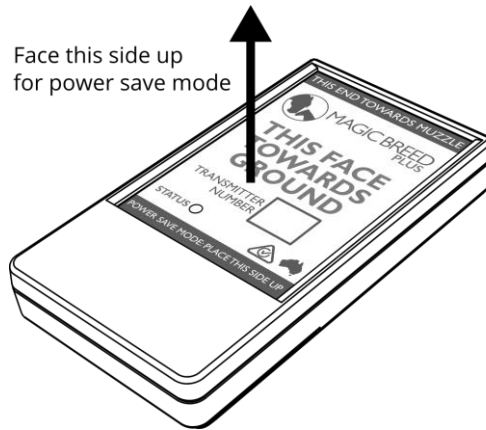


10.11. Backlight

The display is backlit so that it can be read in the dark. The backlight turns off after 7 minutes of inactivity so that it is not disruptive. Any time a button is pressed or an alarm occurs the backlight will automatically turn on again.

10.12. Power Saving Mode

During the foaling season the transmitter may not need to be used for periods from a few days up to a couple of weeks. Instead of requiring battery removal, it's possible to put the transmitter into power saving mode by placing it on its back so that the label is facing up. This must be on a flat and level surface:



In power save mode the transmitter will still transmit status updates but at a much longer interval of 2 hours.



To exit power save mode, place the transmitter on its side and wait for the red indicator to start flashing. This provides visual confirmation that the transmitter has returned to normal operating mode. Note that depending on your settings this may trigger a foaling alarm for that transmitter.

11. Transmitter Settings

The settings for each transmitter can be adjusted individually, which allows for setting precisely to suit the personalities of different mares being monitored. Pressing **SELECT** will step through each of the settings and then back to the transmitter information screen.

Note that although these settings are saved and remembered after power is lost, any time a transmitter is added the new transmitter settings will be set to defaults.

11.1. Setting: Mute Period

The mute period specifies how long the receiver will ignore an alarm for a specific receiver for after the mute button is

pressed. Pressing *SELECT* will cycle through each of the available settings

A screenshot of the Magic Breed Plus transmitter settings screen. The screen is divided into two rows of seven segments each. The top row displays 'Tx1' in the first segment, 'mute' in the second, 'period:' in the third, and the remaining four segments are empty. The bottom row displays '5' in the first segment, 'minutes' in the second, and the remaining five segments are empty.

- 1 minute
- 5 minutes (default)
- 10 minutes
- 15 minutes
- 20 minutes
- 30 minutes
- 1 hour
- 2 hours

11.2. Setting: Alarm Delay

The alarm delay specifies how long the mare must have its head in a horizontal position until the alarm is triggered. Pressing *SELECT* will cycle through each of the options:



Tx1 alarm delay:
10 seconds

- 5 seconds
- 10 seconds (default)
- 20 seconds

11.3. Setting: Alarm Mode

The alarm mode determines the behaviour once the alarm condition stops (i.e. the mare returns to an upright



Tx1 alarm mode:
Auto reset

position). In *auto reset* mode an alarm will cancel (and the buzzer will silence) once the mare has returned to an upright position for 5 seconds.

In *continuous* mode, once an alarm has been triggered the alarm will remain until specifically cancelled. This mode is similar to the original Magic Breed system and allows for more certainty if the monitoring person cannot be constantly in earshot of the receiver.

11.4. Setting: Silence Transmitter

While the mute setting will silence a particular transmitter for the configured period of time, sometimes it is



Tx1:
Silence for 12hr

necessary to keep a transmitter silent for an even longer period. This is what the *silence* function is for. Pressing *CHANGE* will put the transmitter into silent mode. When in silent mode a countdown timer will show how long until the transmitter is no longer silent. Silent

mode can be cancelled by pressing the *CHANGE* button again when this screen is displayed.

11.5. Setting: Remove Transmitter

If for some reason you wish to unpair a transmitter use the following steps.



1. Press and hold the *CHANGE* button for 5 seconds. The following will be displayed:

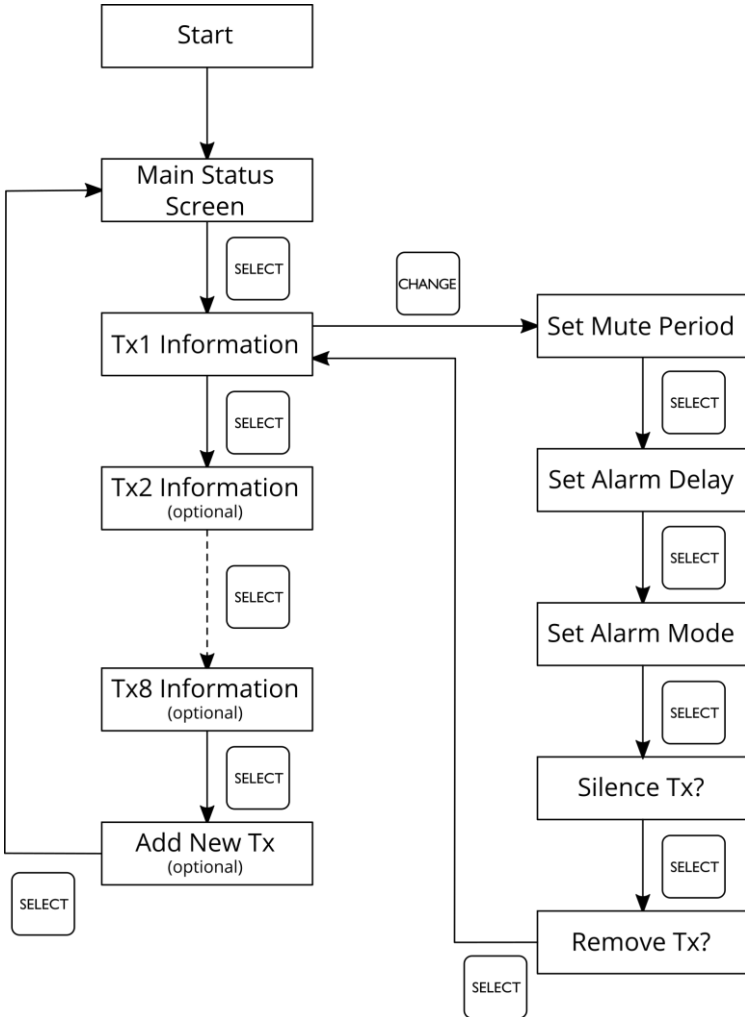


2. When the unpairing is complete, the buzzer will beep twice and a confirmation message will be displayed:



11.6. Menu Overview

The following diagram is a reference for the menu system and how to navigate it:



12. Range and Testing

The range of RF devices such as the Magic Breed Plus system is highly dependent on many factors but most specifically on the path between the transmitter and receiver. Magic Breed Plus uses the latest modulation technology at 917MHz, which provides a significant increase in performance over the 27MHz FM system used by the original Magic Breed design.

If there is a clear line of sight between the transmitter and receiver than a range of over 1km can be easily achieved. Unfortunately clear line of sight is somewhat uncommon. Trees, fences and buildings can have a minimal to moderate impact on the range. Hills can have a significant impact. Regardless, even with significant blocking objects a range of 500m should still be easily achievable.

To perform testing, first check the pairing by placing a transmitter on its side near the receiver. The alarm should sound and then silence once the transmitter is placed back in a flat orientation.



Note that if the transmitter is placed too close to the receiver (within 2 metres) the signal may actually be *too strong* and not operate as expected. Always test at a distance of more than 2 metres.

Take the transmitter to the foaling location and place it on its side on the ground. For the most accurate testing place your foot between the transmitter and the direction of the receiver (this simulates the blocking characteristic of the mare's body). Again, the receiver should sound the alarm (it might be necessary to have a helper relay this information).

13. After Use

New Magic Breed Plus systems should be stored in a clean, dry environment between seasons or when not in use.



IMPORTANT: make sure the batteries are removed from all transmitter units prior to storage. This will prevent the batteries being depleted and also prevent possible damage due to the chance of leaking batteries.

The Magic Breed Plus design features significant improvements over the old Magic Breed design and as such, regular servicing is unnecessary. For peace of mind however, many customers may still wish to send their Magic Breed system in for a factory check from time to time.

14. Specifications

Operating frequency:	917MHz
Signal modulation:	Chirp spread-spectrum
Transmitter	
Size:	110 x 58 x 19mm
Weight (excluding batteries):	58g
Power:	2x AAA 1.5V Alkaline batteries
IP rating:	IP54
EIRP output power:	50mW
Receiver	
Size:	110 x 110 x 37mm
Weight:	180g
Power:	5VDC 500mA max, micro-USB

15. Warranty

15.1. Standard Warranty Terms and Conditions: Manufacturer's Warranty

Australian Consumer Law guarantees that regardless of the manufacturer warranty, products are warranted for a period relative to the product's value and intended use. The following manufacturer's warranty does not modify or exclude the manufacturer's obligations under the Australian Competition and Consumer Act and other Australian laws.

1. Electronic & Electrical Solutions Pty Ltd warrants that, during the warranty period this product will be free from faulty parts, manufacture or workmanship when used within normal operating conditions.
2. The warranty period for Magic Breed Plus components is 24 months from the date of purchase.
3. The warranty does not apply where damage is caused by other factors, including:
 - (a) abuse, mishandling, accident or failure to follow operating instructions.
 - (b) exposure to liquid or infiltration of foreign particles exceeding the IP rating of the unit.
 - (c) servicing or modification of the equipment other than by Electronic & Electrical Solutions.
 - (d) use of the equipment with other accessories, attachments, parts or devices that do not conform to the specifications laid out in this manual.
 - (e) damage during shipment.
4. Any repair work carried out will receive a further 12 month warranty. A fresh warranty does not apply to any parts not repaired.

15.2. Warranty Claim Procedure

1. You must inform Electronic & Electrical Solutions as soon as the failure becomes apparent.
2. Once authorised, return the unit (at the customer's cost) to Electronic & Electrical Solutions to be assessed and repaired. Ensure that all contact information and a written fault description are included.
3. The unit will be assessed and, as appropriate, either repaired or replaced. It is then returned to the customer at the cost of Electronic & Electrical Solutions.

16. Transmitter Reference

For ease of reference, write down your transmitter numbers and corresponding mares in this table:

[illegible]