

Instruction manual



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Introduction

Since 1983 BCF Technology Ltd has been developing, manufacturing and distributing worldwide animal husbandry equipment becoming market leader in the development and production for real time ultrasound pregnancy scanners for most animal species.

Using the latest state of the art technology we have combined cutting edge digital imaging with low power consumption and miniaturisation to produce Easi-Scan Micro-Convex: a small, light, robust, portable and truly versatile ultrasound scanner.

The **Easi-Scan** Micro-Convex is designed and manufactured in Scotland at:

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As specialists in providing ultrasound imaging equipment for veterinary and animal husbandry applications, we realise the importance of equipment reliability and speed of response should service assistance be required. Our engineers and their appointed agents are available to provide rapid service assistance to ensure optimum performance of BCF systems.

The Easi-Scan Micro-Convex meets all essential and safety requirements of all current relevant European Directives. The CE mark on the front label is a symbol of this conformance. If you require any further information regarding these directives please contact us directly. This product is classed as electronic equipment. At the end of its useful life it should not be disposed of with general waste, it should be taken to a recycling point for electrical\electronic equipment. The crossed-out wheellie bin symbol is placed on the front label as a reminder and in conformance with the European WEEE Directive.

Note: All BCF Technology products are to be used for animal applications only.

System features

Easi-Scan Micro-Convex is optimised for mobile real time ultrasound scanning, giving crisp imaging in target applications with minimum need for operator adjustments.

- The fixed high resolution broadband probe supports a wide application range from OPU applications to external abdominal scanning
- Scanner settings are optimised for imaging depth
- The image may be viewed on a choice of displays
- Images may be stored, for later review. Stored images may be uploaded to computer via USB or printed with optional accessories
- Lightweight unit for less strain
- Four hours continuous use from external rechargeable battery and even longer using the auto Standby function
- The unit is water resistant to IP65 (see comments later in manual)
- Easily cleaned; all component parts can be wiped down to clean

Operator safety

Easi-Scan Micro-Convex is designed to run from its external battery latched to the scanner.

The batteries must be charged using only the BCF battery charger or integrated carry case powered from the car power outlet (12 V DC) or the BCF mains power supply. The carry case must not be closed during charging. If the unit must be charged using the mains adapter, use only in dry conditions.

Although the Easi-Scan Micro-Convex runs from a low voltage source, high voltages are generated inside the unit. For this reason no attempt should be made to disassemble the scanner.


1 Operating instructions

1.1 Preliminary switch on

Ensure that the external battery is securely latched to the top of the scanner.

If a remote display is used, switch on the scanner ensuring the correct receive channel is selected. If a cable connection is required, attach the plug to the user connector port on top of the scanner (Fig 1). Check the plug and socket are free from debris. Align the dots on the plug and socket and push to click in place.

1.2 Power

To power the scanner on, press and hold the Power button  (Fig 2) until the scanner beeps. The control panel LED (Fig 3) will illuminate green.

The external battery charge level is indicated on the Battery LED while the scanner is switched on. On power-up, the scanner will perform a system initialisation, displaying the Main Menu, current operating mode and battery level indicator. In addition, a grey bar will be visible down the left side of the display (Fig 3).

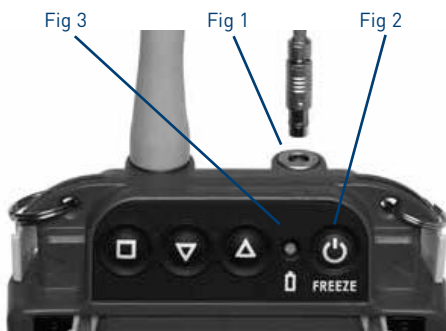
The on-screen battery indicator gives a more accurate indication of the battery charge remaining in the external battery (Fig 4). If viewing on a display headset, the headset may need to be switched on separately. The scanner will beep a second time, indicating system initialisation is complete and the system is ready to function.




Note: The scanner will power on with the same settings it had when last switched off.

To switch the scanner off, press and hold the Power button  until the scanner beeps twice.

Fig 4










1.3 Scanning



Easi-Scan Micro-Convex has several selectable preset scanning depth modes. System gain may be varied to suit current study. A short press on the Power button  will freeze and unfreeze the image.

1.3.1 Standard operation

The scanner loads the preferred settings at power on and is ready for use.

To change a setting, press the Select button  to switch the Main Menu on. In the absence of any button presses, the menu disappears after a short (user selectable) period. Use the Up  and Down  buttons to navigate the menu and the Select button  to switch the relevant Sub-Menu on or off. In normal operation (Sizing not selected, see 1.3.6) with no menu displayed, the Up  and Down  buttons control the gain setting. To clear the menu or navigate to the previous menu press and hold the Select button .

1.3.2 Mode selection

The scanner loads the preferred start-up mode when switched on. Press the Select button  to bring up the menu, use the arrow buttons to highlight 'Mode' and press the Select button  to display the Mode Menu.

Use the Up  and Down  buttons to select preferred mode:







1. Near
2. Mid
3. Far



The preferred start-up mode will be stored automatically when the unit is powered off.

1.3.3 Mode description

The Easi-Scan Micro-Convex is designed for OPU applications and abdominal scanning and offers 3 ranges of examination. Near mode is limited to 6 cm and is optimised for detailed scanning with a high resolution. Mid mode is set to 8cm with settings balanced between resolution and penetration for general imaging. All modes provide a wide view from a small contact patch.

1.3.4 Gain control

The gain may be adjusted via the menu, press the Select button  to bring up the menu, use the arrow Up  and Down  buttons to highlight 'Gain' and press the Select button  to display the Gain Menu, then use the Up  and Down  buttons to adjust the gain.

Pressing the Up  and Down  buttons will adjust the gain (while the menu is not on screen). The current gain setting (1-to-10) will be briefly displayed at the top of the screen.

1.3.5 On-farm timer control

The Easi-Scan Micro-Convex provides a timer which can be used to monitor On-farm time. Its operation is as follows: Select 'Timer' from the main menu. The Timer Sub-Menu will appear with the following options:

Exit	Select this option to exit the menu without making any changes
Start/Stop	Select this option to start and stop the timer; a running timer is displayed in a light grey colour, a stopped timer in a dark grey
Reset	Select this option to reset the timer
Display	Select this option to switch the timer display on and off

Note: The timer will continue to run even if not displayed.

The timer value is stored on power down and on power on will resume with the same value and settings.

1.3.6 Auto standby mode

The Easi-Scan Micro-Convex has a low power standby mode, which can be enabled by selecting a duration from the Standby Sub-Menu.

If the scanner does not detect an ultrasound image for the period selected in the Standby Sub-Menu, then it switches to low power mode. In this mode, the power consumption is halved by using a non-imaging scan, but ultrasound echoes are continually monitored. On detecting ultrasound echoes or in response to any button press, the scanner immediately reverts to normal imaging.

1.3.8 Image storage and review

The Easi-Scan Micro-Convex allows the operator to store up to 100 images on the scanner.

To store a frozen image, select 'Image' from the Main Menu and Select 'Store' from the Image Sub-Menu, the scanner will then store the image. If a Cattle ID has been entered, the ID will be overlaid across the top left of the image, and the first five characters of the Cattle ID will form the image filename. If a Practice ID has been entered, this will also be overlaid on the stored image. Once the image storage memory is full (100 images) newly stored images will overwrite the earliest stored images.

To review the stored images on the scanner, Select 'Review' from the Image Sub-Menu and use the Up ▲ and Down ▼ buttons to page through the stored images. The scanner defaults to reviewing the most recently stored image every time it is switched off or if a new image is stored. Otherwise it will return to the last reviewed image during any scan session. Stored images may be uploaded to a PC using the USB cable accessory – See WARNING and instructions in USB image retrieval below. All images stored on the scanner may be removed by selecting the 'Delete all' menu option available in Review mode. Select 'Exit' from the Image Sub-Menu to leave image review mode.

USB image retrieval

Warning: Select USB from the Output Sub-Menu on your scanner BEFORE connecting the USB cable. Once images have been copied, disconnect the USB cable before switching your scanner off.

Note: The scanner identifies itself as a removable flash drive and will function with Windows, Apple and Linux computers.

To retrieve stored images from the scanner, select USB from the Output Sub-Menu. Connect the USB adapter cable (accessory) to the front panel and connect the USB plug to a computer. The scanner will identify itself as a USB Flash drive with the name Easi-Scan, if necessary, perform any mounting operations required by your operating system.

Once the drive has mounted, all of the stored images will be visible as bmp (bitmap) images which can be copied to the computer and opened in most image viewers.

The scanner is read only and images cannot be deleted via the connected computer. To clear the images stored on the scanner disconnect the USB lead, and Select 'Delete all' from the scanner menu, available when 'Review' is selected from the Image Sub-Menu. See Image storage and Review section.

1.3.9 Image ID entry

The Easi-Scan Micro-Convex allows the operator to enter an identification number (ID), which will be associated with the image once it is stored.


If a ID has been entered, on storing an image the ID will be overlaid across the top left of the image, and the first five characters of the ID will form the image filename. The ID will only be displayed when the image is frozen. Selecting 'ID' from the Main Menu, brings up the ID Entry Menu. The operator can use the Up ▲ and Down ▼ buttons to select the digit to be changed, pressing Select highlights the digit and its value can be changed by using the Up ▲ and Down ▼ buttons, pressing Select □ again returns to the digit selection mode. To exit this sub-menu, it is necessary to either wait for the menu to blank or press and hold the Select button □ until the scanner beeps twice and the menu exits.

1.3.10 Output selection

On Easi-Scan Micro-Convex , current BCF Display and accessory products are automatically detected when connected: all BUGs variants will be detected upon connection, switching the output to Goggles Mode; connecting the wrist display will cause the Easi-Scan Micro-Convex to switch to Wrist Display Mode; and connecting the USB cable between the Easi-Scan Curve and a computer will switch the scanner into USB mode. If using older accessories or cables it may be necessary to manually set the output.

The operator can select from 3 different uses on the front panel user connector:

Caution: If you rely on a viewing device plugged into the scanner display connector, altering this setting will interrupt viewing, making it difficult to revert to correct setting. It is recommended you do not alter this setting unless you have a Wireless monitor which will continue to display regardless of changes to the Output selection setting.

The Output Sub-Menu can be accessed by Selecting 'Output' from the Main Menu. Use the Select button  to choose from the following output options;

- | | |
|---------------|---|
| Wrist display | Selecting this option feeds a digital video signal out of the front panel, this option is used with the BCF wrist display accessory |
| Goggles | Selecting this option feeds a standard greyscale NTSC video signal out of the front panel, this option is used for BCF BUGs or other goggles, or if using a video lead accessory (e.g. for video printer) |
| USB | Selecting this option allows the user to connect the scanner to a computer via the USB adapter accessory. This mode is used to copy stored images from the scanner. See WARNING and instructions in Appendix B) |






Note: If there is no image on your connected viewing device, and you do not have a Wireless monitor to facilitate menu navigation to select the correct video output signal, the scanner output can be switched by pressing and holding the button combinations (below) while switching the scanner on.


- | | |
|-------------------|--|
| For goggles | Press and hold  and  simultaneously while switching on |
| For wrist display | Press and hold  and  simultaneously while switching on |

1.3.10 Selection of languages for the menu

The menu on Easi-Scan is available in English, German, French, Italian, Spanish, Polish, Portuguese and Russian.

To choose the language:

Press the button  to switch the Main Menu on. Use the Up  and Down  buttons to select 'Setup'. Then use Up  and Down  buttons to select Language. Then choose your language from the menu.

If you have chosen the wrong language accidentally, disconnecting the battery will switch the scanner back to the previous language. The language setting will only be saved if you switch off your scanner using the Power button .

1.4 Scanner setup

Preferences such as image orientation and graticule grid display may be altered and stored as default at start-up. The Setup Sub-Menu can be accessed by Selecting 'Setup' from the Main Menu.

1.4.1 BUGs control

The first 2 options in the Setup Sub-Menu allow the user to adjust the brightness and contrast of BCF BUGs headmounted display.

To adjust the settings, select either 'Contrast' or 'Brightness', the word 'Adjust' will appear alongside the selected option. Use the Up ▲ and Down ▼ buttons to adjust the settings, press the Select button □ to exit adjustment mode.

1.4.2 Low battery warning

When the external battery is nearing the end of its useful capacity, the on-screen indicator will start to blink. In addition, by switching the 'Low Batt Buzzer' option to on, the scanner will give an audible indication.

1.4.3 Grid & graticule display

The Easi-Scan Micro-Convex allows the operator to display grid and/or graticule lines on the image. The following options are available:

Off	No grid or scale markings displayed
Grid 1/2 cm	A 1/2 cm grid is displayed
Grid 1 cm	A 1 cm grid is displayed
Scale	Scale markings (1/5 cm on Detail mode, 1/2 cm on other modes) are displayed down each side of the image
Grid & scale	A 1 cm grid, and scale markings are displayed

1.4.4 Video link channel (remote monitor option)

The Easi-Scan Micro-Convex can transmit to an optional wireless monitor. To reduce interference and allow the use of multiple Easi-Scans, the scanner can be set to transmit on one of four channels.

Press the Select button □ to bring up the RF Channel Sub-Menu and use the Up ▲ and Down ▼ buttons to select the required channel.

1.4.5 Bluetooth enable

The Easi-Scan Micro-Convex can be controlled via Bluetooth (See Appendix A). This sub-menu allows the Bluetooth module to be switched On or Off.

The Bluetooth control functions are also available through an Android app called "Easi-Scan Bluetooth" available from the Android app store.

Bluetooth control

The Easi-Scan Micro-Convex allows control of certain scanner functions via Bluetooth, all functions are controlled in the same manner. A Bluetooth device (phone, PDA, PC etc) sends an address entry (vcard) where the Name takes one of the following forms:

M	Sending this name will switch to the next mode
M D	Sending this name will switch to Detail mode
M F	Sending this name will switch to Foetal Sexing mode
M O	Sending this name will switch to Ovary/Early mode
M L	Sending this name will switch to Late mode
C	(followed by Cattle Identification) – Sending this name followed by a space and the Cattle ID number will change the cattle ID on the scanner
P	(Practice Name) – Sending this name followed by a space and the Practice name will change the practice name on the scanner
F	Sending this name will Freeze/Unfreeze the scanner

Initial 'pairing' between your Bluetooth device and your Easi-Scan Micro-Convex will require you to enter a 'Passkey'. Refer to the manual for your Bluetooth device for details on pairing with another device.

The passkey for Easi-Scan Micro-Convex is '0000' (four zeros).

1.4.6 Practice data entry

The Easi-Scan Micro-Convex allows the operator to enter a practice name which will be overlaid on any image that is stored. Selecting 'Practice Data' from the Setup Sub-Menu brings up the Practice Data Entry Menu. The operator can use the Up ▲ and Down ▼ buttons to select the digit to be changed, pressing 'Select' highlights the digit and its value can be changed by using the Up ▲ and Down ▼ buttons, pressing 'Select' again returns to the digit selection mode. To exit this sub-menu, it is necessary to either wait for the menu to blank or press and hold the Select button □ until the scanner beeps twice and the menu exits.

1.4.7 Factory reset

Selecting 'Reset' from this sub-menu will reset all settings to factory defaults, stored images are not affected.

1.4.8 Menu timer

Selecting 'Short' from this sub-menu will set the time the menu is displayed to about one second. Selecting 'Long' from this sub-menu will set the time the menu is displayed to about four seconds.

1.5 Smart Display

The Easi-Scan Micro-Convex may be used with the Smart Display accessory .

To use the Smart Display, make sure the Easi-Scan Micro-Convex is switched off, feed the probe cable through the lower handle of the Smart Display, engage the rear of the Easi-Scan Micro-Convex with the lip on the Smart Display and press the Easi-Scan Micro-Convex into place, ensuring that the yellow clips on the Easi-Scan Micro-Convex are fully engaged with the Smart Display and switch on by pressing the power button on the front of the Smart Display.

When Easi-Scan Micro-Convex is used with Smart Display it can be used for OPU procedures with OPU handle and needle guide.

2 Care & maintenance

2.1 Easi-Scan Micro-Convex & power packs

The Easi-Scan Micro-Convex is designed for reliability in the veterinary and animal husbandry marketplace. Our engineers and their appointed agents are available to provide rapid service assistance to ensure optimum performance of BCF systems. However there is no substitute for careful usage.

We state that the Easi-Scan Micro-Convex is **splashproof**, indeed it is sealed to IP65, but you should note the following **important points**:

1. The unit is not sealed against jets of water. Water will penetrate your scanner if it is hosed down or rinsed under a fast flowing tap
2. The unit is NOT corrosion proof and thus it should not be left wet
3. Some types of goggles are not waterproof and care should be taken to avoid submersion
4. The standalone charger, battery charger and charging carry case are not waterproof – avoid getting them wet

Cleaning

- Antibacterial wet wipes are particularly effective for scanner, battery and probe wipedown, and reduce the need for drying. This prevents problems related to corrosion following washdown
- The plastic scanner, power pack and carry pack can also be cleaned using a cloth, soap and warm water
- Sponging down or even brief, shallow submersion is less aggressive than rinsing or hosing down
- Thoroughly dry the scanner before storage or charging. Take care to detach the external power pack and ensure interconnect areas are dry also
- Neoprene Scanner waist pouch may be machine washed
- **Warning:** The scanner and power pack must not be stored damp – severe corrosion will result. See separate section for probe care
- Your equipment should be returned periodically to a BCF qualified service engineer. The service agent will use special test equipment to thoroughly check the instrument and advise of any work that appears to be necessary. Any other service problems should be referred to our qualified service engineers

2.2 Battery charging

The external battery can be charged in the carry case either while connected to the scanner with the scanner docked or in the battery charging dock. The battery can also be charged in the standalone charger.

The battery LED will flash slowly while charging with the colour indicating the current state of charge (Red = less than 25%, Amber = 25% – 75%, Green = more than 75%. Once fully charged the LED will either show continuous green or a rapid flashing green.

All batteries will be charged within five hours, but will not be damaged by continued charging.

The NiMH batteries in the battery pack are paired with charge management circuits to give several hundred recharge cycles. While the battery is in a good condition and is fully charged, the scanner will run for the duration below. This time will vary depending on the display option used.

- Easi-Scan Micro-Convex with power pack latched 4 hours

Scanner run time may approach double this duration using the Auto Standby feature.

Electrical connection to the power pack is through the gold pads on battery and scanner. Power pack output is protected with a resetting fuse but care should be taken to prevent short circuiting the gold connector pins and pads. Battery metering relies on internal calculation. Repeated cycling without complete discharge or charge completion will result in increasingly inaccurate battery level indication. For peak performance, and for most accurate battery meter indication, batteries should occasionally be run flat followed by a complete charge cycle.

Occasionally (every ten cycles, or once a fortnight) discharge until the scanner automatically switches off, followed by a complete charge in one go (preferably from the mains supply).

Notes: The biggest difference you can make towards battery longevity is the occasional full discharge-recharge cycle. When charging in short bursts e.g. top-up charging between jobs, or in-car with Cigar power cycling on engine start etc the charger uses a less accurate method to terminate charging. Occasional full charge-discharge cycle not only helps maintain maximum capacity, but ensures updated calibration of the integrated charge control circuit for optimum charge control which in turn ensures maximum battery lifetime. Corrections are also made to battery level metering for continued accuracy of on-screen battery level display.

'Memory effect' - if NiMH batteries are not used regularly (weekly) or fully (repeatedly using only a fraction of full capacity) there will be a temporary reduction in available capacity, with resulting reduced run times. After the battery has been "exercised" the full capacity returns. A return to almost full capacity is achieved with a complete charge / discharge cycle. Further marginal improvement in capacity may be seen progressively over two to three complete charge/discharge cycles.

Do not store the scanner for extended periods without occasional exercise. Store the scanner fully charged – particularly in hot climates.

Notes: This is only relevant if your scanner will remain unused for 6 months or more. Some permanent reduction in capacity can be incurred through prolonged storage without occasional recharging. Battery charge will not be maintained very long in storage – particularly at higher ambient temperatures. Batteries can lose as much as 30% of their charge in 1 month's storage.



Warning:

To reduce the risk of burns, fire, electric shock, or injury to persons an appliance should never be left unattended when plugged into mains or 12 V cigarette lighter.

2.3 Easi-Scan Micro-Convex probe

While every attempt has been made to make the probe as rugged as possible the crystal array remains vulnerable and should be protected from knocks. Even a small knock against a hard object can cause damage to the probe elements situated behind the thin rubber coating on the probe face. The probe has a protective sheath covering the length of cable subject to greatest wear and flexing. Any damage to this sheath or the rest of the cable should be repaired before further use to prevent moisture ingress that will rapidly damage the probe. The probe should be checked regularly for such damage.

Gels

Use only gels recommended by BCF TechnologyLtd. Do not store the probe in gel.

Cleaning

The probe may be cleaned by removing all organic/protein residue and disinfecting using an IPA or 10% bleach wipe. Do not soak transducer in IPA or bleach.

Storage

Clean and dry the probe head prior to storage in dry location. Do not store the transducer in gels or cleaning/disinfecting solutions. This will lead to premature deterioration of transducer materials.

Warning: Never sterilize the transducer with autoclave, ultraviolet, gamma radiation, gas, steam or heat sterilization techniques. Severe damage will result.

Do not expose the transducer to materials containing the following agents:

- Acetone
- Methanol
- Mineral oil
- Iodine
- Freon
- Industrial cleaners
- Materials containing perfumes (lotions, gels, etc.)

Transducers must not be soaked in alcohol, bleach, or hydrogen peroxide.

Technical specification

Digital ultrasound scanner with fixed probe

Size 22 x 15 x 7 cm / 6 x 8.5 x 2.5 in

Weight 2 kg / 4 lb (with battery)

Mechanical Splashproof, rugged plastic casing. Sealed to IP65

User operation

Sealed 4 button key pad with LED

User functions

- Selection of operating modes optimised to application, automatically setting suitable range, frequency & post processing e.g. dynamic range, edge enhancement
- Preset modes: Near (6 cm), Mid (8 cm), Far (12 cm)
- Overall gain adjustable
- Image freeze
- Foetal ageing reference
- Image store and review with filename entry by keypad or over Bluetooth

User output

Waterproof User connector provides power and selectable signal output

- Composite NTSC video format for display headset Video review or Video printer accessories using adapter lead (accessory)
- Digital Video out (proprietary format) for wrist display (accessory)
- USB PC connection using adapter lead (accessory)

Power output

5 V @ 250 mA max.

Storage

100 images with user entered image file identity Stored on non-volatile internal flash memory
image format 640 x 480 bitmap, 8 bpp

Probe

- Fixed broadband micro-convex probe
- 15 mm radius
- Frequency range 5 MHz to 8 MHz
- 80 element crystal array
- 10 digital channels
- 90° curved

Power

- External battery gives four hours continuous use
- Charge time 5 hours
- Runtime extended with auto standby enabled
- Indicator on screen. Low battery audible buzzer.

Temperature range

- -10 °C to 40 °C / 14 °F to 104 °F

Please note that frequent usage above 35 °C / 95 °F will shorten battery lifetime. Video link stability maybe affected below -10 °C / 14 °F until scanner has warmed up.

Accessories



BUG
(BCF Universal Goggles)



Smart Display



Remote Display



Wrist monitor



Battery pack



Battery charger



Charging carry case



Carry bag



Video splitter



Introducer



OPU handle

Service centres

If your Easi-Scan requires servicing please contact official authorised service centres below or distributor in your country. Distributors contact details can be found at www.bcftechonology.com

In the UK:

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For further information on care and maintenance of the Easi-Scan Curve please visit the "Customer support" section of the BCF website www.bcftechnology.com