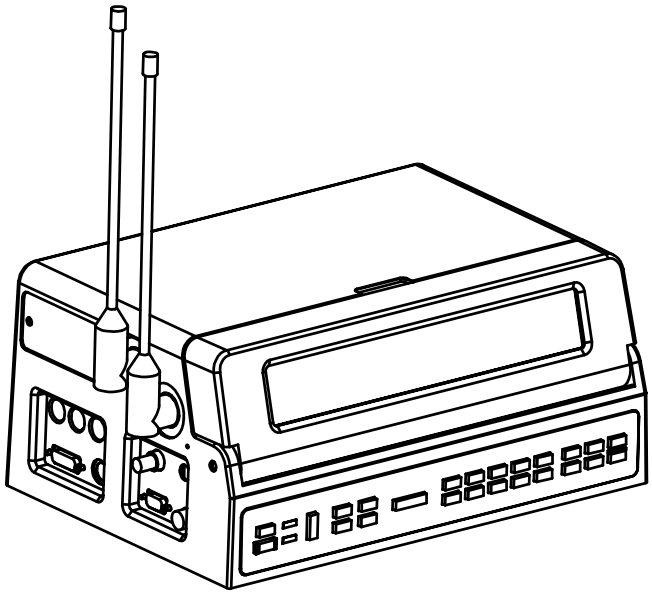
MicroCorr 6
Operators Guide



Ty Coch House
Llantarnam Park Way
Cwmbran
NP44 3AW
United Kingdom

Tel: +44 (0) 1633 489479
Fax: +44 (0) 1633 877857
Email: info@palmer.co.uk
Internet: www.palmer.co.uk

Part No. MC6OGE 12/98

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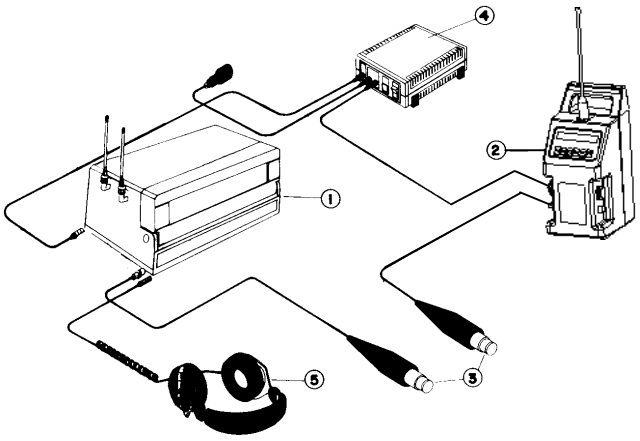
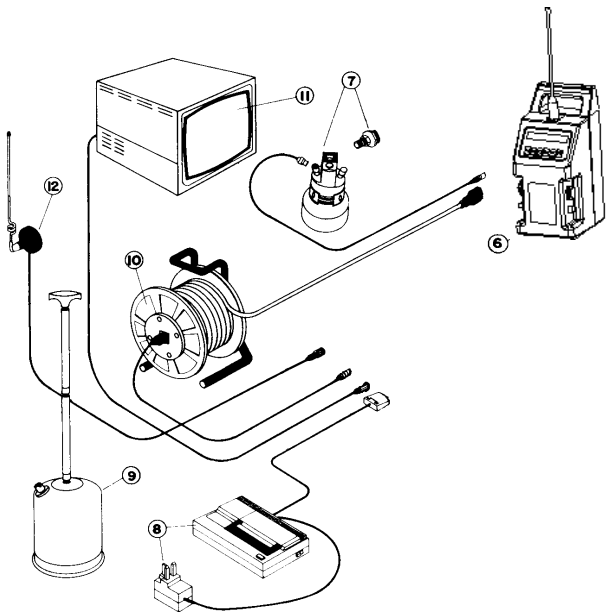
System Overview

The basic system



1. MicroCorr 6 Central Unit
2. 1 Radio Transmitter (Red)
3. 2 Active Sensors (accelerometers) with shrouds
4. 1 Power Supply Unit / Battery Charger
5. 1 Set of Headphones

Optional accessories

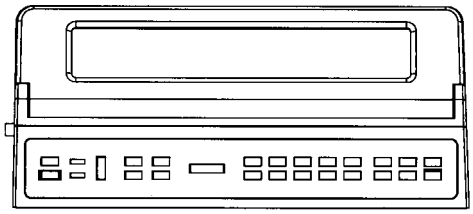


6. Second Radio Transmitter (Blue)
7. 2 Hydrophone Sensors and Adaptors
8. Printer (complete with its own charger)
9. Ground Microphone and cable
10. 1 Cable drum and 200m cable
11. TV Monitor
12. Vehicle mount Aerials
13. Wooden instrument box (not illustrated)
14. Measuring Wheel (not illustrated)
15. Transport Cases (not illustrated)
16. Tape Recorder (not illustrated)

Introduction

The MicroCorr 6 is a high speed leak location system which uses electronic correlation techniques to accurately locate the position of leaks in pipes.

1. The MicroCorr 6 Central Unit



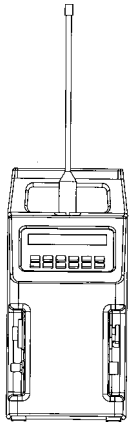
The unit performs accurate leak noise correlations for leak positioning and velocity measurement. It has listening and surveying facilities and its stored information can be downloaded to a computer or printer.

The operator can call up various screens and enter data using a keypad. The LCD screen shows all data which can be also viewed simultaneously on an optional TV monitor. It uses rechargeable batteries which have a maximum duration of 8 hours.

Do not open up any part of the MicroCorr system as this invalidates any repair warranty. If MicroCorr equipment, which is connected to the mains electricity, fails to operate, a qualified electrician should check the power circuits and cables to the equipment.

An annual calibration of the MicroCorr should be carried out by Palmer Environmental or the appointed distributor.

2. Radio Transmitter



The transmitters are connected to remote sensors with a short cable. The transmitters amplify the leak noise and transmit to the receiver in the correlator unit at UHF (Ultra High Frequencies). They use sealed interchangeable lead acid batteries.

Where UHF transmissions are not possible, cables can be connected to the line input sockets (Cable drums are optional equipment).

3. Active Sensors (Accelerometers)

Two Active sensors are supplied. These attach magnetically to external contact points (for example, valves) on pipe systems to detect noise signals travelling along a pipe from a leak point. These signals are transmitted to the MicroCorr 6 for measurement and analysis.

All sensors can be damaged by sudden shock impact and must be handled with care. Do not drop them or bang them into pipes, fittings etc. when fitting or removing.

To preserve the strength of the magnets, they should always be stored with the “keeper” plates fitted.

4. Power Supply and Battery Charger Unit

This provides 12 volt dc supply to the equipment from a 120 volt or 240 volt A.C. mains power supply. It also charges the MicroCorr rechargeable battery and the transmitter batteries, from a mains A.C. supply or from a 12 volt D.C vehicle supply. e.g. cigarette lighter connection.

5. Headphones

These high sound quality headphones connect to the "Phones" socket of the transmitters to confirm leak noise and interference levels.

Only use Palmer MicroCorr headphones. Other types may cause centre correlations or badly distorted signals.

6. Second Radio Transmitter (Blue)

This unit is identical to the red transmitter except for the colour, for easy identification, and the transmission frequency. It enables the operator to speed up many aspects of on-site work and to improve safety by enabling the sensors to be deployed in busy traffic areas. The MicroCorr unit can then be located in a vehicle or anywhere within signal range.

7. **Hydrophone sensors**

These can be used instead of accelerometers to give better results in difficult operating conditions. Using hydrophones enables operators to locate leaks over greater distances. They provide better leak noise signals under difficult background noise conditions. They are fitted in direct contact with the water at hydrants, air valves and other "wet" fittings and are supplied with a range of adaptors.

Before use, the rubber sealing washer should be checked for damage and should be lubricated with silicone grease. Regular greasing will ensure good watertight seals are maintained. Always chlorinate the hydrophones before contact with the water supply.

8. Printer (complete with its own charger)

The lightweight portable printer provides on-site prints of all correlation and processed information, including graphics, pipe diagrams and site reference data.

9. Ground Microphone (MK5 "foot")

This is a valuable leak detection confirmation tool that can be connected to the MicroCorr unit to filter and amplify leakage noise. It can also connect to the transmitters.

10. Cable drum and cable

The cable drum holds 200m of low noise cable to connect between the transmitters and the MicroCorr 6 where UHF transmissions are prohibited or when radio signals may be degraded by interference or screening effects.

11. TV Monitor

Specially adapted television monitors are ideal for viewing by customers and vehicle-based survey operators. They can be powered by 220/240 volt A.C. or via a 12 or 24 volt D.C. inverter connected to a vehicle's 12 volt D.C. supply. The monochrome television can use a vehicle 12 volt supply directly.

12. Vehicle mount Aerials

Two extension aerials are required for effective receiver operation when MicroCorr 6 is mounted in a vehicle and operated over extensive ranges. The leads from the extension aerials are simply screwed in, in place of the standard aerials on the MicroCorr 6.

13. Instrument box (not illustrated)

For storage and transport of the central unit with 2 radios and standard accessories.

14. Measuring Wheel (not illustrated)

Knowledge of the distance (via the pipework) between the two sensor points is essential to accurately position the leak.

15. Transport Cases (not illustrated)

For either the central unit or the transmitter unit.

Safety procedures

All relevant health and safety procedures must be followed at all times over and above those described in this manual.

When using MicroCorr equipment, use hygiene procedures applicable to any objects coming into contact with drinking water supplies..

Hydrophone sensors and adaptors should be appropriately sterilised prior to use and applicable procedures should be followed during their installation.

The use of Palmer products with other liquids or gases should follow relevant national and company safety procedures.

Do not use your hands for installing the sensors in valve / hydrant chambers or meter boxes without checking for foreign objects first.

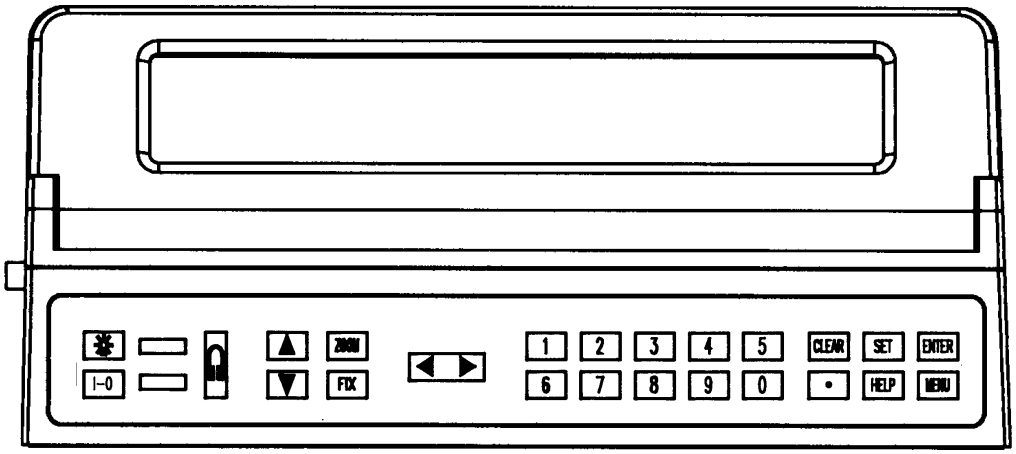
Electrical Safety

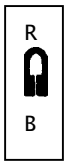
Water pipes are frequently used as the connection for electrical earth. Danger of electric shock exists when disconnecting meters etc. An earthing strap should be fitted between the two ends of the pipe before disconnection.

The MicroCorr unit and transmitters are powered by 12 volt sealed lead acid batteries. They are all interchangeable.

Operating MicroCorr 6

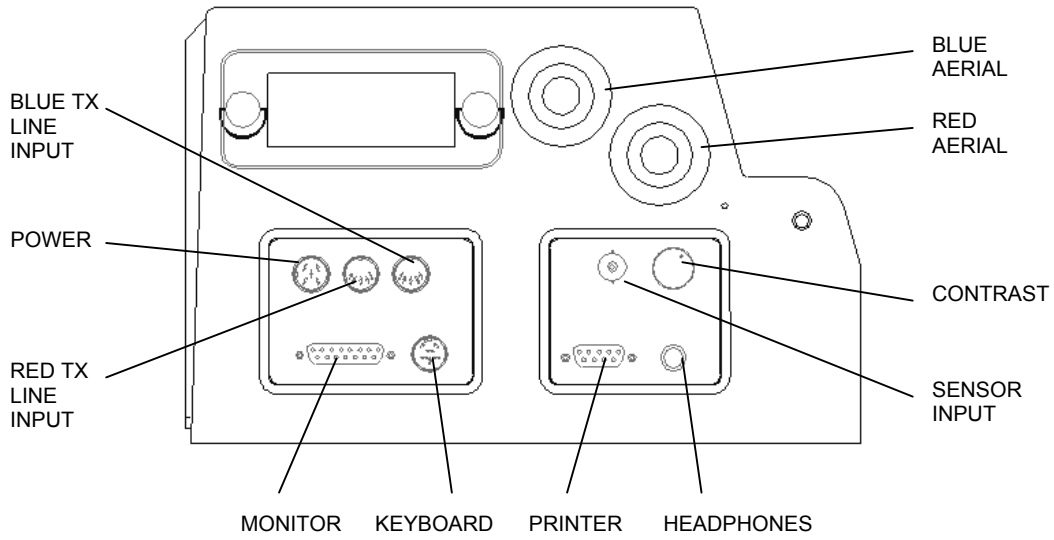
Warning: There are no user serviceable parts inside the MicroCorr 6 and no attempt should be made to open the case as the internal circuits may be damaged by static discharge.



✻	Switches on the back light on the display and all function keys.
1 – 0	Switches on the MicroCorr 6. Press again to switch off.
	Switches headphones from stereo "Red channel to the Right earpiece, AND Blue channel to the left earpiece" to MONO for each individual channel.
▲	Step back to previous screen
	Cursor Controls.
ZOOM	Used to improve leak position resolution and to display input signal frequency spectrum
FIX	Locks the right hand edge of a correlation data screen for use with the zoom function.
CLEAR	Erases the last data entry
SET	Press SET to change filter settings
ENTER	Press ENTER to continue
.	Decimal point
HELP	Displays the relevant HELP screen

MENU Displays the MENU screen

Side view of MicroCorr 6



System Power up

MicroCorr 6 and the transmitters are each supplied with a 12 volt 2.3Ah sealed lead calcium battery. All batteries are shipped separately and must be installed and charged before portable operation.

Batteries and battery charging

The MicroCorr 6 and transmitter batteries must all be fully charged before mobile operations can be started. The transmitters must be switched off during charging. The three charge LED's should be lit when connected indicating charge is required. A fully charged battery will be indicated by an almost unlit LED. Each battery should be fully charged for 14 hours and its normal voltage is 12.8 volts.

The lead acid batteries fitted to the MicroCorr 6 and transmitters are interchangeable. They must be recharged using the MicroCorr 6 charger. (Chargers supplied with MicroCorr 4 and 5 are also suitable, but previously supplied versions to these must not be used).

If charging a battery containing over 50% charge, the battery access covers should be opened to avoid the build up of any dangerous concentrations of gas.

Getting started

Switch on the MicroCorr 6. The set up screen is displayed. If you are using the system for the first time, examine the powerful help screen facilities by pressing the HELP button.
At switch-on, the following screen is displayed.

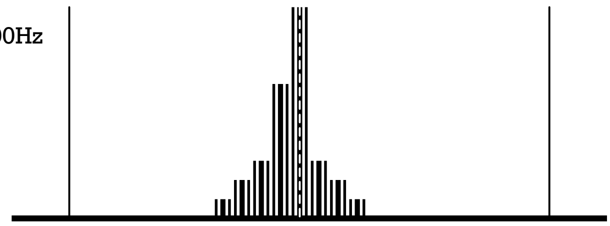
```
BATTERY CHARGE REMAINING

                                        ILLUMINATION TIME 15 SECS
                                        USE ▲▼ TO CHANGE
0 PRINT FILES STORED
SPACE FOR 61 MORE                       AUTO SHUTDOWN ON    USE SET TO CHANGE
DATE    01:01:98      TIME    09:30:00
                                        PRESS ENTER TO CONTINUE
```

Press ENTER to display the following screen, to key in signal source and sensor types and begin leak position mode.

```
LEAK POSITION MODE
    RED                BLUE                SELECT SIGNAL SOURCE AND SENSOR TYPE

1 RADIO                6 RADIO             PRESS ZOOM FOR SIGNAL STRENGTH
2 CABLE                7 CABLE             PRESS MENU FOR MENU OR HELP FOR HELP
3 DIRECT               8 DIRECT            DIRECT INPUT SET TO PASSIVE
4 ACCELEROMETER        9 ACCELEROMETER
5 HYDROPHONE           0 HYDROPHONE        PRESS ENTER TO CONTINUE
```

Follow the on-screen instructions entering the required data through to a correlation result.
The following screen shows a typical correlation result, with a clear peak of leak noise, and the distance from each sensor displayed on the left.

```
PIPE: D. IRON            V = 1.320m/Ms         CORRELATION RATE:   MODERATE 1:30 MINS
DISTANCE, D = 100.00
0                        600 1K2 2K5 5K  5000Hz
TIME DELAY,  TD =            11.6Ms (Blue)
| - - - - -                  | - - - - -
   RED ■ - - - - - - - - - - - - - - - - - - - - ■ BLUE

  57.6 m                     ↑          42.4 m
R    0.5 m        SCALE 1:  1.0     RANGE 2
```



Press MENU to display the main MENU screen shown below. Select the corresponding number to access any function, then follow the on-screen instructions.

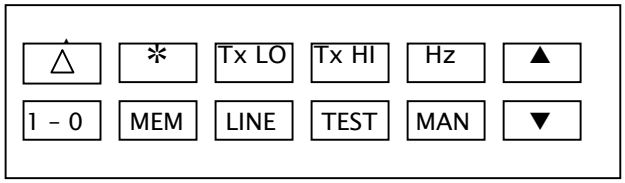
```
                              MENU

01  LEAK POSITION             07  HELP                    13  CONFIGURATION
02  PRINT                     08 COMPUTE EDIT             14  DISTANCE MEASUREMENT
03  VELOCITY MEASUREMENT      09  SELF TEST               15  AUTOCORRELATION
04  SURVEY                    10  CUSTOM PIPE CHOICE      16  SET UP SCREEN
05 LISTENING                  11  VELOCITY CALCULATION    SELECT OPTION THEN
06  VELOCITY TABLES           12  MEMORY ERASE             PRESS ENTER TO CONTINUE
```

<u>HELP screens</u>

There is screen-related help to aid selection and operation at any particular screen. These screens are accessed by pressing HELP. There are also over 80 general help screens that can assist you in

operational deployment and fault finding. These are selected from the main menu by keying 07 ENTER.

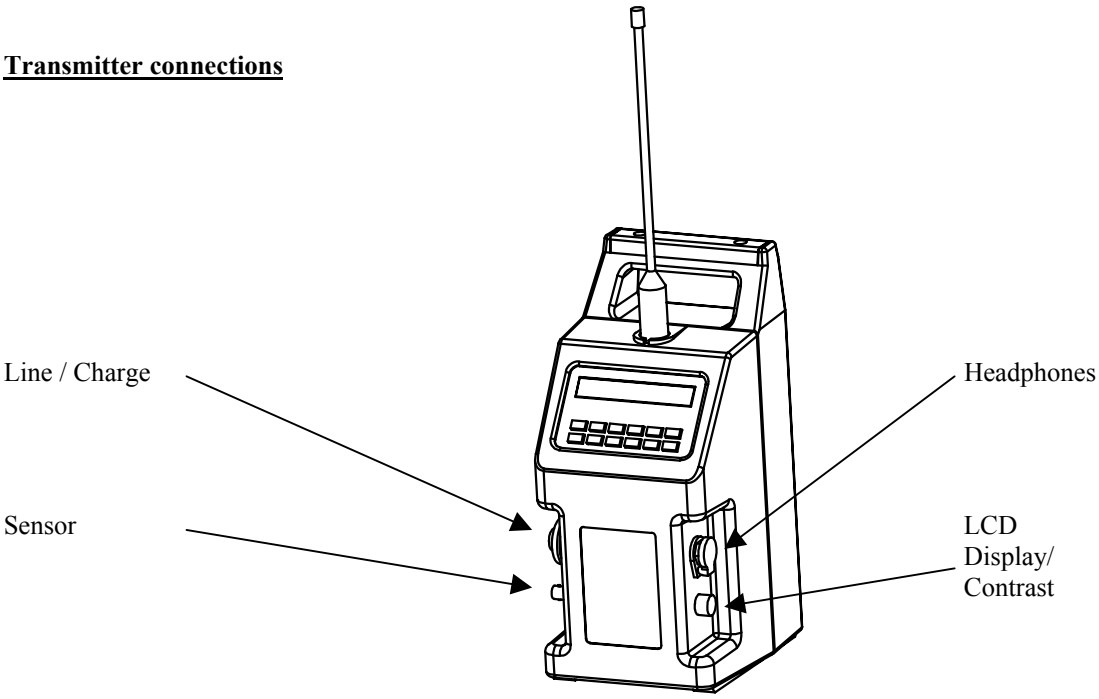
Transmitter operation



△	Press to switch on the flashing safety warning light.
✻	Press to illuminate display. This automatically switches off after 20 seconds.
Tx LO	Transmits a low power signal level to be used when the MicroCorr and transmitter are up to 30 metres apart.
Tx HI	To be used when the MicroCorr and the transmitter are more than 30 metres apart.
Hz	Displays the current band-pass filter settings which do not normally need adjustment. Press Hz again to progress through the 5 settings.
1 – 0	Switches on the transmitter. Press again to switch off. A bar graph displays the signal level being measured. The Transmitter automatically detects if passive or active sensors are used.
TEST	Displays the remaining charge in the battery, usually up to a maximum 7.5 hours.
MAN	Selects manual gain control for experienced operators using “listening mode”.
▲ ▼	Controls the signal level.
LINE	Press this to cables instead of radio transmitters.
MEM	Used to store up to 8 separate signal level readings. Exit this mode by pressing “TX LO”, “TX HI” or “LINE” as appropriate.

Do not use the transmitters in “Tx Hi” or “Tx Lo” positions with the aerials disconnected, as this can damage the transmitters.

Transmitter connections



Adjust the LCD display using the contrast control knob.

Radio mode

Connect the aerials to the MicroCorr 6 and the transmitters.
Connect an accelerometer or hydrophone sensor to the transmitter.
Switch on the transmitters and press TEST to check the battery level.
Select TX HIGH for normal operating ranges or TX LO for less than 30 metres.
Plug headphones into the transmitter phones socket to listen to the leak noise.
Plug headphones into the MicroCorr 6 side panel to monitor noise signals received from the transmitters.

Line operation mode

Where radio transmission cannot be used, connect the transmitter to the MicroCorr 6 using the special low noise cable.
Switch on the transmitter and check the battery level with the TEST key.
Press the LINE key.
Continue as with the radio transmission mode.

Detailed Operating Procedures

To operate the equipment, follow the instructions and help screens displayed on the MicroCorr 6.

Full operating procedures on leak detection, theory and practice, and the best methods for rapid, cost effective leak detection techniques, can be obtained from Palmer Environmental or the appointed distributor. Training courses designed after many years' experience, are available, either at Palmer Environmental, or at the customers site.

Please contact Palmer Environmental or your authorised distributor for further information.