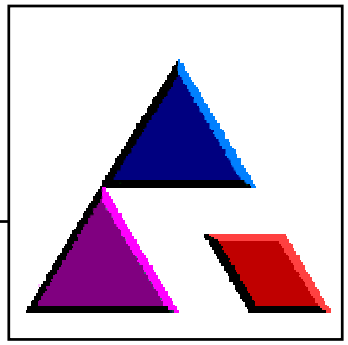
ALPHR TELEMETRY



LANDMARK RECEIVER

Technical Manual

Issue 2 : September 2001

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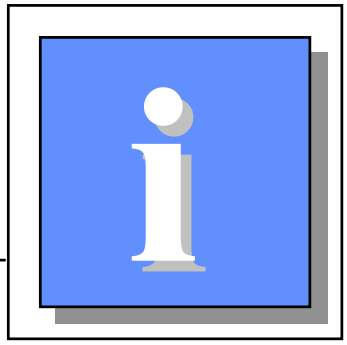
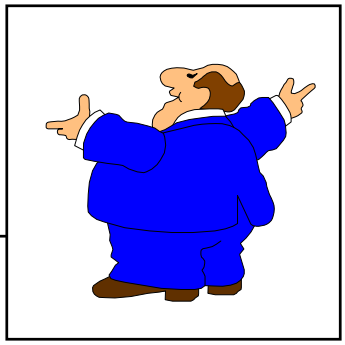


Introduction

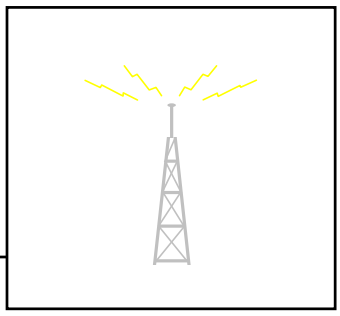


The receiver continually monitors the particular frequency at which the Landmark system is operating. When it receives signals from a transmitter it decodes them, testing the data security, the addressing and the condition of then transmitter and then outputs the data in the same form as input to the transmitter. The data can be a combination of analogue, digital and pulse information. Only true information is output. The receiver can also indicate battery low alarms and communications or other failures from respective transmitters.

The receiver undergoes extensive diagnostic routines when it is initially powered up and at regular time intervals during operation. Details of these features are included in the Fault Finding & Diagnostics section of this manual.

The basic receiver is capable of providing:
Mimic outputs of two channels of information (e.g.... two basic transmitters) and
Serial output providing information on up to 256 channels.
Should more than two channels of mimic outputs be required the basic receiver can be expanded. Details of the receiver expansion system are contained within a separate manual..
Should more than 256 channels of serial output be required, additional radio frequencies may be utilised.

Operation



The Receiver is always active. It continually looks for a message from a transmitter. When a message arrives, the receiver synchronises itself to lock onto the incoming data. The data supplies the following information:

Which transmitter it came from,
Which receiver it is meant for,
What type of measurement it is,
The value of the data itself,
What condition the transmitter's power supply is in,
Any diagnostic reports,
An error detection code.

All this information is passed directly onto the receiver's serial port.

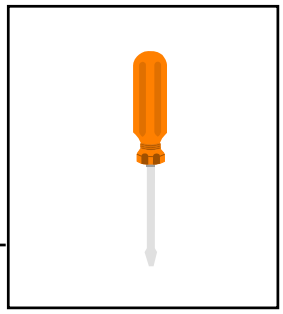
If the message is received correctly, then it is decoded and converted back into the same form in which it was input. The mimic outputs are then updated.
In the unlikely event of the data failing the error detection tests, the mimic outputs are not updated thus ensuring only true data is presented at the mimic outputs.

Should the transmitter power supply voltage fall below 9V, but remain high enough for the transmitter to continue to function, this will be transmitted as part of the data packet.
The battery low signal from the transmitter is presented on a separate terminal when brought out at the receiver.

If any transmitter fails to present a true message within 30 minutes, then another independent ‘transmit fail’ output is activated.

The receiver will only produce mimic outputs from transmitters that have the same secondary address as itself. This affords an extra level of security on the system by only accepting data from a transmitter that has specifically targeted that receiver. This also allows multiple systems to work in close proximity without the danger of crosstalk from transmitters of the same address.

Installation and Setup

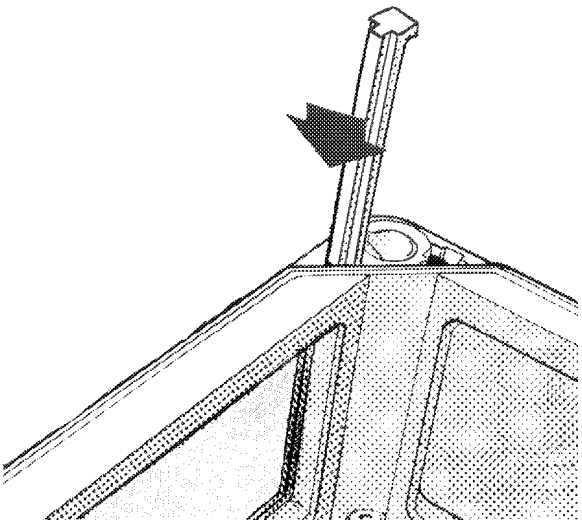


The standard Landmark enclosure is sealed to IP65 making it suitable for mounting directly onto a wall without further protection.

Mounting is achieved via a hole in each corner of the base.
To access these the user must remove the lid by giving a quarter-turn anticlockwise to each of the four lid retaining screws. This will cause them to pop up and release the lid.

To retain the IP65 rating of the box, all cables must be glanded through the removable gland plates.
Removal of the gland plate is achieved by withdrawing the retaining lugs from either end of the plate using a flat bladed screwdriver as shown in Fig.1 below.
Re assembly is the reverse of removal but may require slight pressure on the gland plates whilst the retaining lugs are being re-inserted.

Fig 1



The units have been designed to minimise installation. Access to the terminal connections can be gained by removing the gland plates. The connection block can then be detached by removing the 16 -way IDC leads and unclipping the terminal board. Necessary interconnections may then be made outside of the enclosure. Only when the wiring is complete need the gland plate and terminal board be refitted.

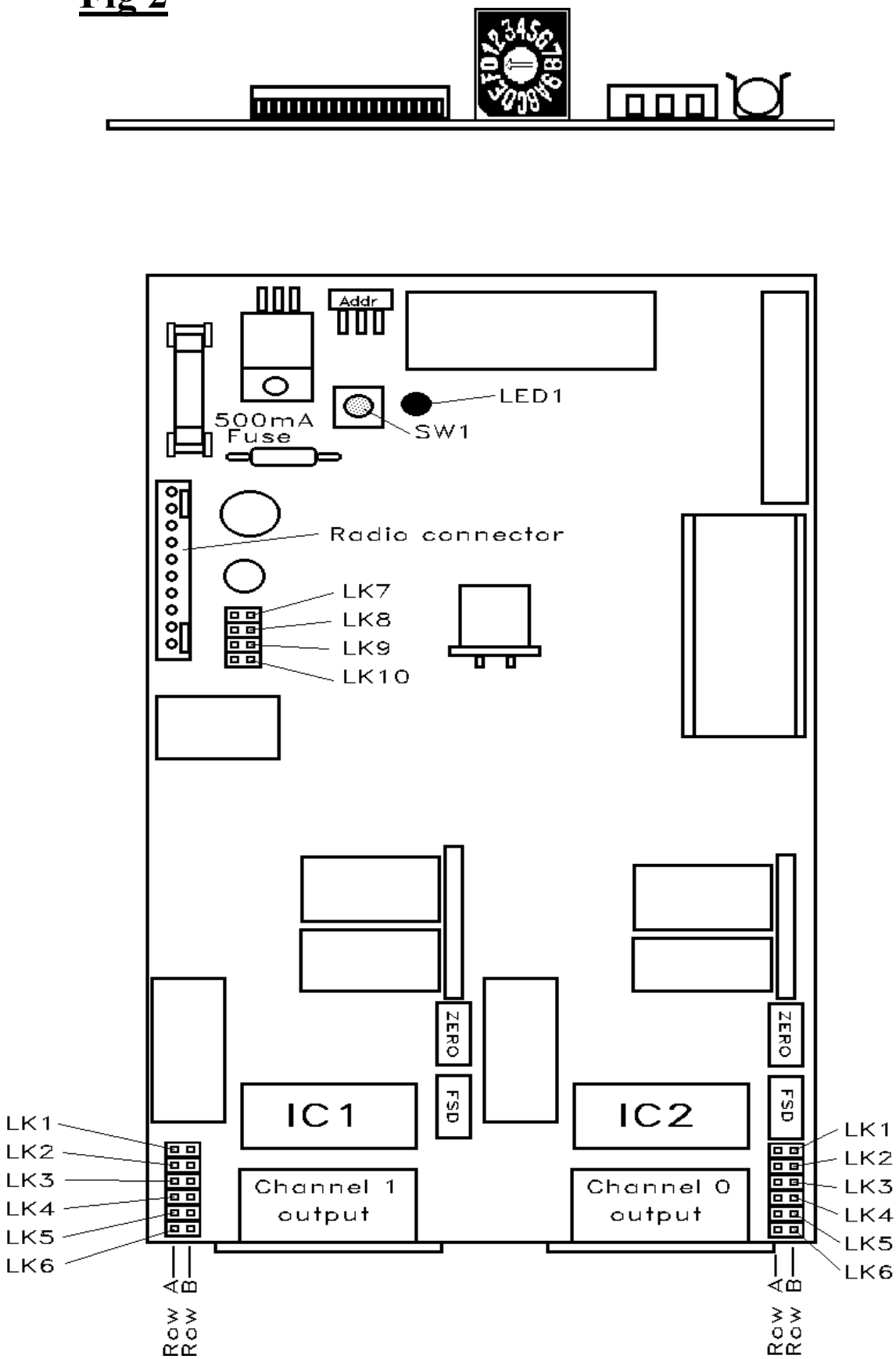
The process of setting up requires little or no effort in most cases and is dealt with individually in the respective output option sections.

The only general setup parameter to define is the receiver's address. The receiver address must be set to match the secondary address on the transmitters.
This will normally be factory set to match corresponding transmitters on the same order.

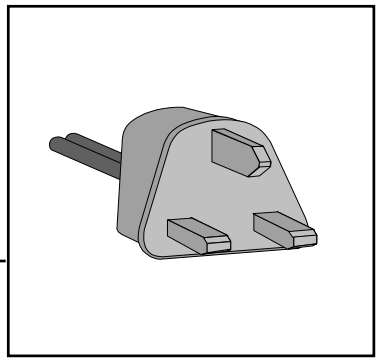
The address switch is a rotary dip switch mounted at the end of the circuit board. It can be set from 0 to F Hex using a small flat-bladed screwdriver or trimmer tool. An illustration of this is shown overleaf.

Also shown overleaf in Fig.2 is a plan view if the controller board detailing the links and switches thereon. This diagram is referred to throughout this manual.

Fig 2


Addr
LED1
500mA
Fuse
SW1
Radio connector
LK7
LK8
LK9
LK10
ZERO
FSD
IC1
IC2
Channel 1
output
Channel 0
output
LK1
LK2
LK3
LK4
LK5
LK6
Row A
Row B

Power Supplies



The receiver unit will, unless otherwise specified, be fitted with a power supply module.
Connection to this is via the 3-pin IEC socket on the psu itself. 3 core cable may then be run outside the enclosure through a cable gland in the side plate.

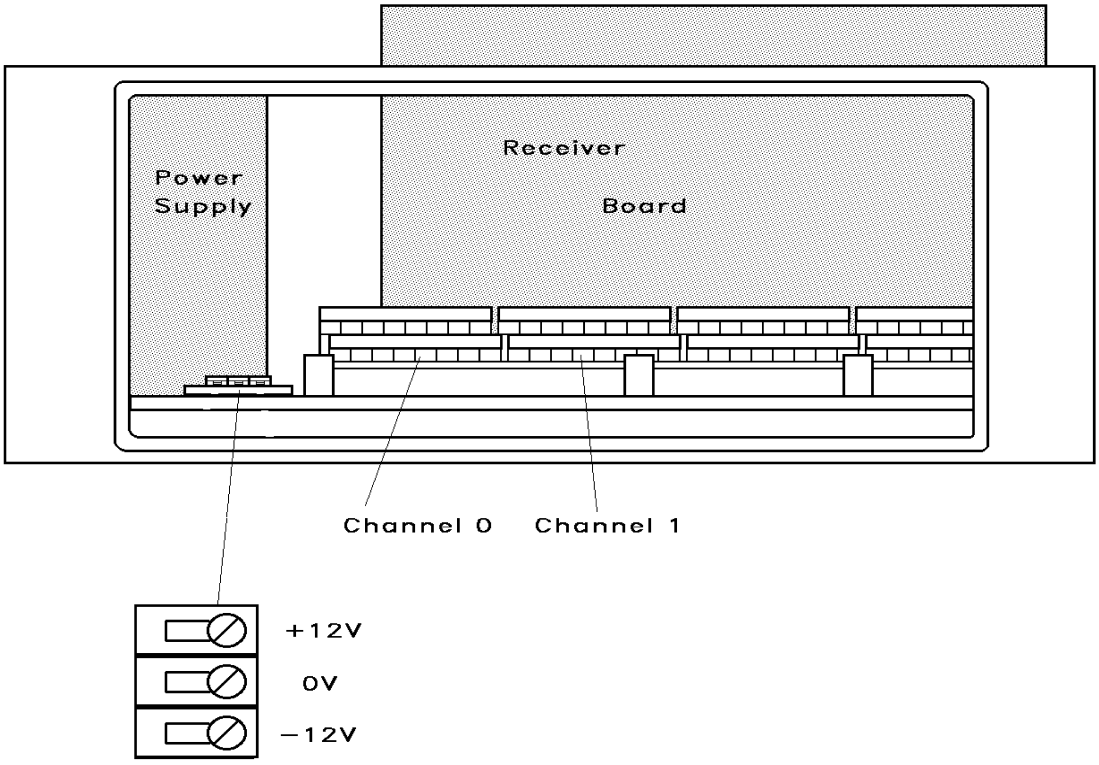
The power supply is factory set to accept 240V at 50Hz unless otherwise specified. 110V input may be selected by a switch on the circuit board of the psu itself, so alteration may require slight disassembly of the unit.

Supplying power to the unit will cause operation - there is no on/off switch. The psu is working correctly if the two green and amber leds on top of the unit are both lit.

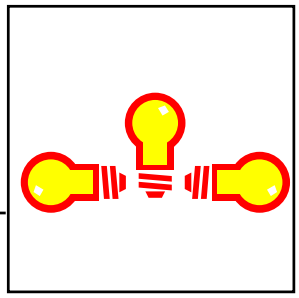
Once the power is supplied to the unit, a loop power supply will be available to supply loop current to outstations/monitoring equipment.
This is available on the screw terminals shown overleaf in Fig3, supplying +12V, 0V and -12V DC. The maximum output current from this supply is 700mA.

A battery charge output is also available from the Receiver power supply unit. This is presented at the B+ and B- terminals and consists of a regulated +13.6V d.c. voltage suitable for trickle charging a standby battery.

Fig 3



Digital Output Option



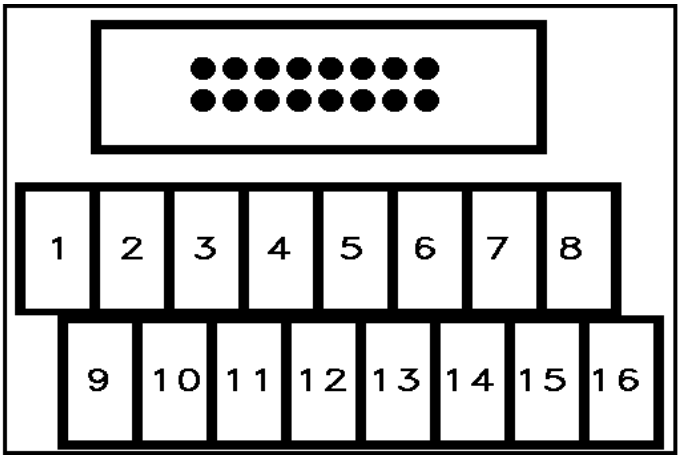
The basic receiver can provide one of three types of digital output:
- Open collector outputs
- Volt-free outputs (2A relays)
- Volt-free outputs (7A relays).

With each type, 8 discrete outputs are available per channel giving 16 digital outputs on the basic receiver.
Note that if the pulse option is also being used, this effectively takes up two digital outputs per channel leaving 6 available.

The option fitted will be as specified on ordering the equipment.
The three types of digital outputs are described on the following pages:

Digital Outputs : Open Collector

Fig 4



Pin	1	Digital output 0	Pin	9	Digital output 1
	2	Digital output 2		10	Digital output 3
	3	Digital output 4		11	Digital output 5
	4	Digital output 6		12	Digital output 7
	5	Freewheel diode		13	Battery low output
	6	Transmit fail output		14	Power
	7	Ground		15	Analogue -
	8	Analogue +			

These outputs are active low. They are open-collector and are capable of sinking 250mA. This is sufficient to drive lamps, led's, relays etc. or to be fed directly into most commercial outstations and recorders.

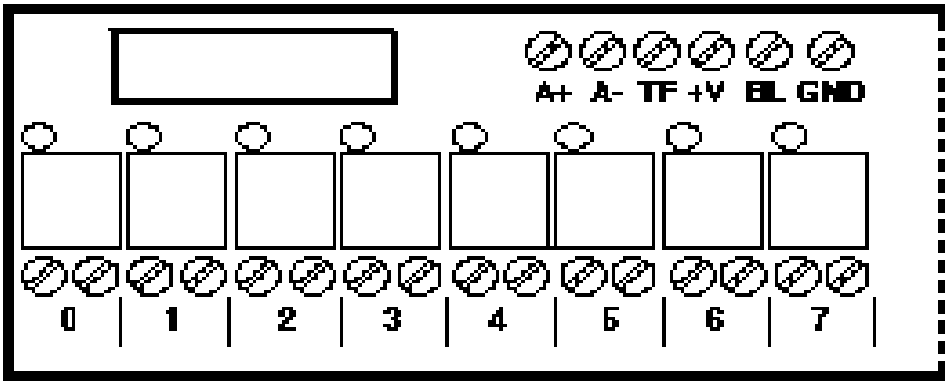
High Voltage Output:
External power up to 40V can be switched with no additional hardware but care must be taken to connect the high voltage supply to the freewheel diode inputs.

TTL/5V Output:
To drive TTL input equipment an external pull-up resistor may be required. However many commercial outstations already have this resistance on their input circuitry. The user is advised to check with the outstation supplier.

Low Current/Low Voltage Output:
Low current, low voltage devices may be driven directly from the output connector. Current must not exceed 250mA per output.

Digital Outputs : 2A Relay

Fig 5



(One channel shown for clarity)

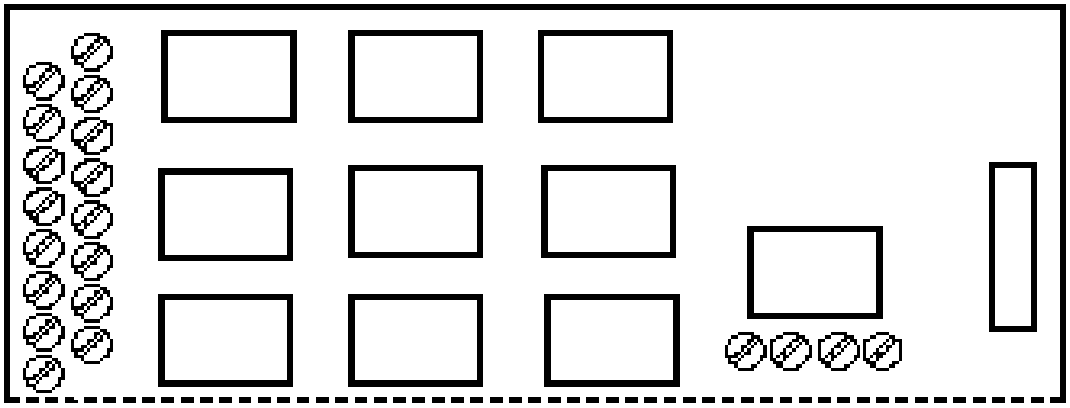
For each output channel on the receiver, a bank of 8 relays are fitted, each giving a volt-free normally-open output.
These relays are capable of switching 230V AC or 24V DC at 2A.
An led is fitted in series with each relay coil, giving a visual indication of whether each relay is energised.

'Battery low' and 'transmit fail' relays are also fitted if specified. These are of the same rating as above.
If not fitted, open collector outputs are available from the relay board at the terminals marked 'BL' and 'TF' respectively.

Analogue outputs are also brought out from the relay board on the A+ and A- terminals.
Connection details for these are given later in this manual in the 'Analogue Output' section.

Digital Outputs : 7A Relay

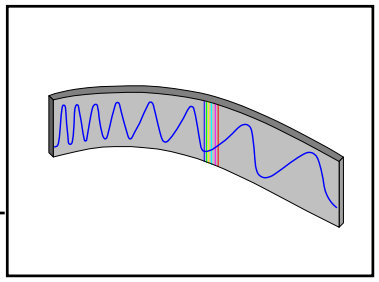
Fig 6



For each output channel on the receiver, a bank of 10 relays are fitted..
These relays are capable of switching 250V AC or 30V DC at 7A.
These are changeover relays and can be configured for normally-open or normally-closed operation.
An led is fitted in series with each relay coil, giving a visual indication of whether each relay is energised.

'Battery low' and 'transmit fail' relays are fitted as standard. These are of the same rating as above.

Analogue Outputs



The receiver analogue output allows a single current or voltage level to be output on each channel.
Each time the receiver receives a true message, it will refresh the level of the analogue output. Whilst a message is not received, or if a corrupted message is received the last true value will be held at the output.

The analogue output can operate in either a current or voltage mode over a variety of ranges and in an passive (isolated) or active (non-isolated) configuration.
In the passive configuration, power needs to be provided to supply the output.
In the active configuration, external power is not required.
Receivers are factory set to 4-20mA passive current output unless otherwise specified.

Depending on the digital output option specified, the connections for the analogue connections are different insofar as the output connector board used, however the output operation is identical in each case.

If the open collector digital output option is fitted, analogue pins A+ and A- appear on pins 8 & 15 respectively as shown previously.
If the 2A relay option is fitted, the analogue outputs A+ and A- appear on the connector block at the top of the board as shown previously.
If the 7A relay option is used, the same analogue output board is used as for

Voltage output:

Voltage output between 0 and 2.49 volts can be output at the 'Analogue +' pin. This is referenced to 'Analogue -'. Non-isolated and isolated circuits may be selected according to the on-board links:

Referring to Figure 9 previously:

For passive voltage : Remove IC1 & IC2
Fit shorting links to LK3 & LK5
5V must be supplied to the 'power' input for isolated operation.

For active voltage: Remove IC1 & IC2
Fit shorting links to LK3, LK4 & LK5
Short LK5A to LK6A

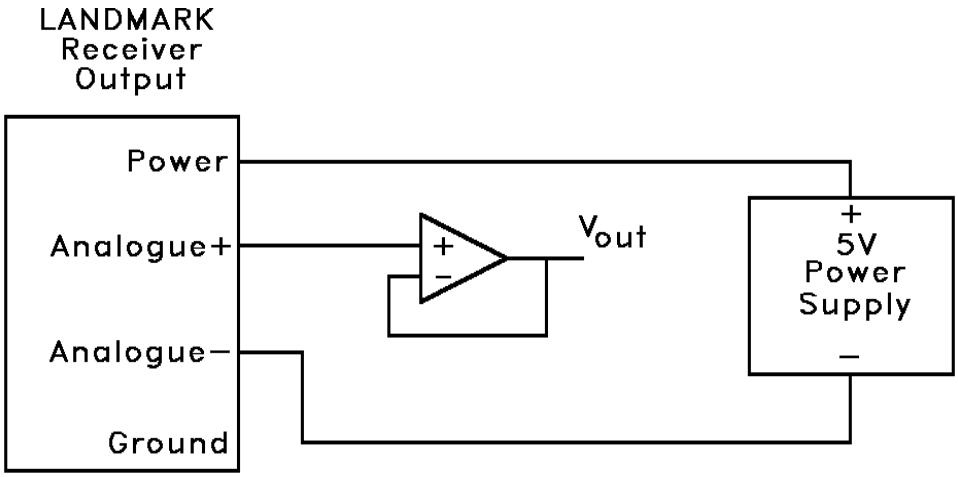
Illustrated overleaf are

Fig 7. : Passive (isolated) circuit

Fig 8 : Active (non-isolated) circuit

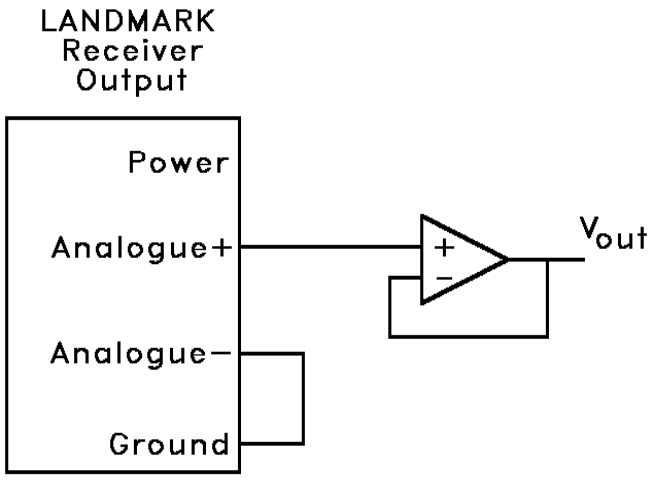
The output impedance is 10K ohms and should therefore be buffered prior to further conditioning.

Fig 7



Isolated Voltage output

Fig 8



Non−isolated Voltage output

Current output:

A 4-20mA passive output is available at the 'Analogue +' and 'Analogue -' terminals. No provision is made for active operation so loop power must always be available. This option is configured as standard and supplied calibrated.

The minimum voltage required across the output stage is 16V, maximum is 36V.

The +12V / -12V supply within the receiver may be used to drive the loop as this will give a voltage of 24V across the output stage.

Note: If the on-board -12V is used at the 'Analogue -' terminal to drive the current loop, the user must ensure that this terminal is not also grounded back to the receiver psu via equipment on the loop, antenna grounding etc... If this is the case, the analogue outputs will become unreliable and eventual psu damage will occur .

Recommended analogue output connection is shown below:
(RL is not necessary, but if already present will not affect operation)

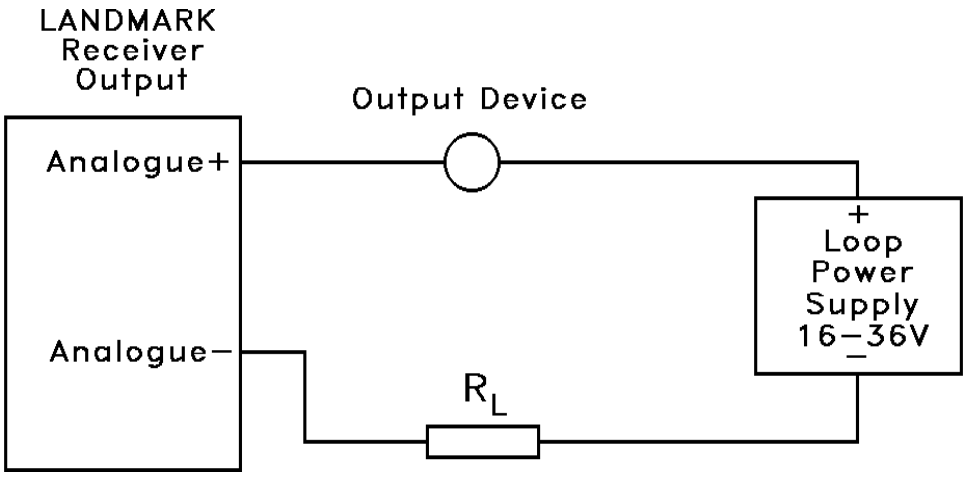


Fig 9

Analogue setup

There are two methods available to calibrate the analogue outputs from a receiver - one requiring a serial terminal (or PC running emulation software such as Procomm), and one where no terminal is required.

Manual method
Referring to the Controller board layout Fig. 2 previously, pressing SW1 repeatedly will cycle the analogue outputs through low, mid and high states - i.e. 4.0, 11.94 and 19.94mA respectively for a 4-20mA configuration.
The pots. marked zero and span may then be used to calibrate each channel.
Channel 0 shown will appear at the top of the board when mounted vertically in the box, with channel 1 being at the bottom.
Note that, at high, all the digital outputs will activate - at mid, alternate outputs will activate - and at low no outputs will activate.

Terminal method
Here, an RS232 terminal should be connected to the serial output port of the receiver, the pin-out of which is shown in later in this manual.

If the power to the receiver is then turned off and on again, the wake up message should be observed.
This consists of the code version, checksum and date, together with the message ‘Rx Running’.
The user should then type ‘Q’ and then type ‘SETUP’ and press <Return>.

Data will then appear on the screen and , as the user hits a key, the outputs will cycle through high, mid and low with the screen showing the values which are expected.;
This screen is illustrated overleaf in Fig. 10.

Note that, at high, all the digital outputs will activate - at mid, alternate outputs will activate - and at low no outputs will activate.

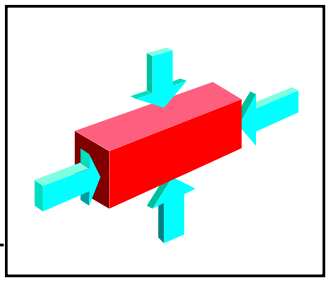
WSX4.0 9279 12th Jun 1991
Rx Running

Type ‘DOGOFF’ to user FORTH
SETUP
STYX Technology Ltd WSX09 - Landmark Rx
Analogue Setup V4.0
For 8 bit, values are : Low = 4.00mA High = 19.94mA Med = 11.94mA
For 12 bit, values are = 4.00mA = 20.00mA = 12.00mA
(voltage) = 0.00V = 1.25V = 2.50V

O/p’s HIGH - Adj. FSD Pot for high - hit a key to set centre.

Fig 10

Expansion Options



The standard Landmark receiver will output 16 digitals, 2 analogues and 4 pulse outputs i.e. data from two standard transmitters..
If more outputs are required, the receiver may be expanded accordingly.
The expansion system can increase the output capacity of the Landmark receiver as follows :

Analogue outputs	:	up to 16
Digital outputs	:	up to 128.
Pulse outputs	:	up to 32

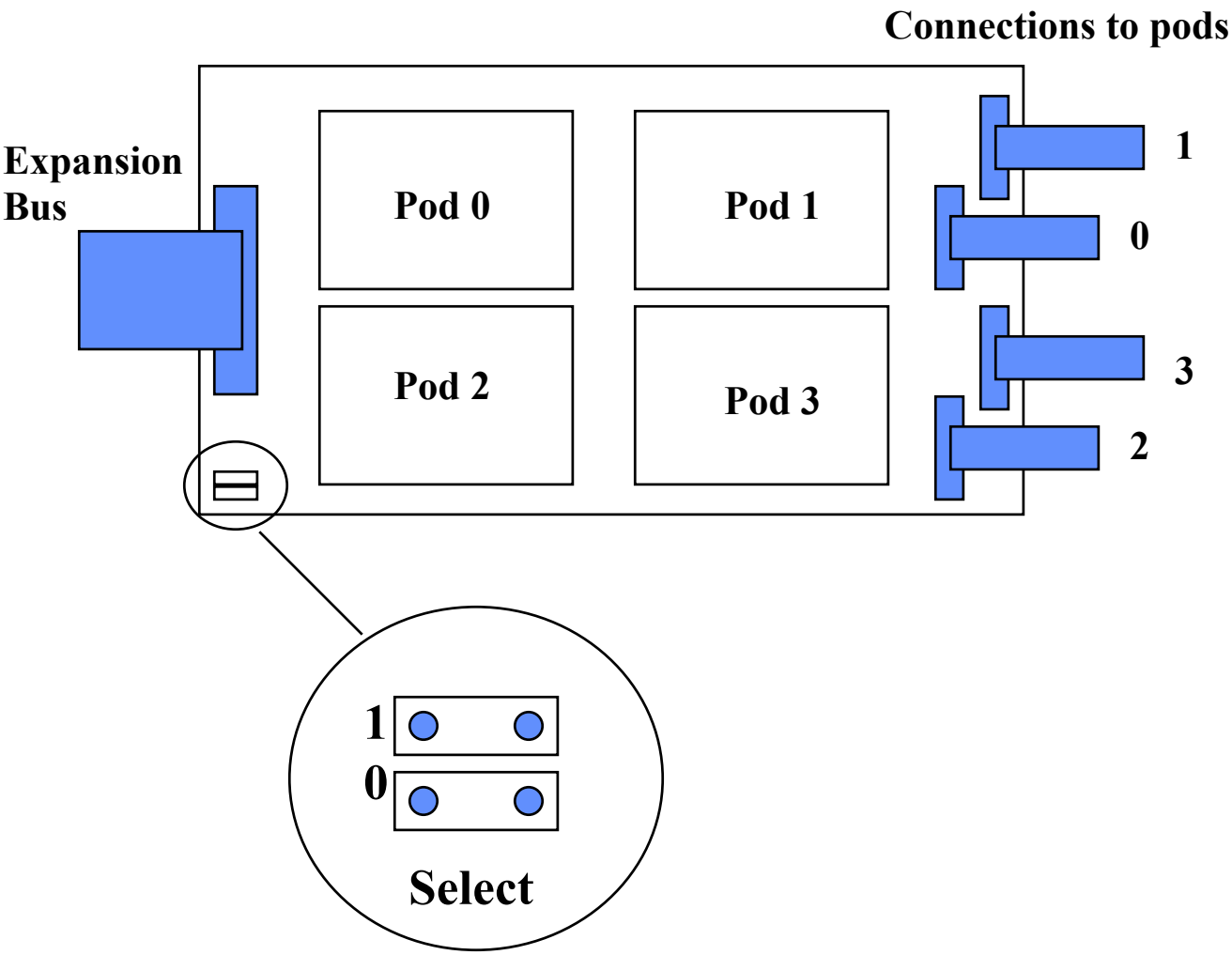
Further expansion is available. For output capacity in excess of the above, contact Alphr Telemetry for details.

The expansion system consists of connecting up the required number of expansion boards to the main receiver board.
These are connected via a 26-way ribbon connector which can be daisy chained from board to board forming the expansion bus.

Each expansion board has sites for up to 4 ‘output pods’.
These pods are each a duplicate of a single output channel on the base board and can thus provide 8 digital outputs and - if specified - one analogue output.

The expansion board has two jumper links fitted, which are set to ensure that the output pods respond to the desired channel of data being transmitted.
A diagram of an expansion board is shown overleaf in Fig 11, together with the jumper settings, and how they affect the address of each pod site.
Note that, with the expansion system fitted, channels 0 and 1 are still available from the main receiver card, thus the first level of expansion covers channels 2 and 3 only.

Fig 11



Jumper 0	Jumper 1	Pod 0	Pod1	Pod2	Pod3
Set	Set	Not used	Not used	2	3
Clear	Set	4	5	6	7
Set	Clear	8	9	A	B
Clear	Clear	C	D	E	F

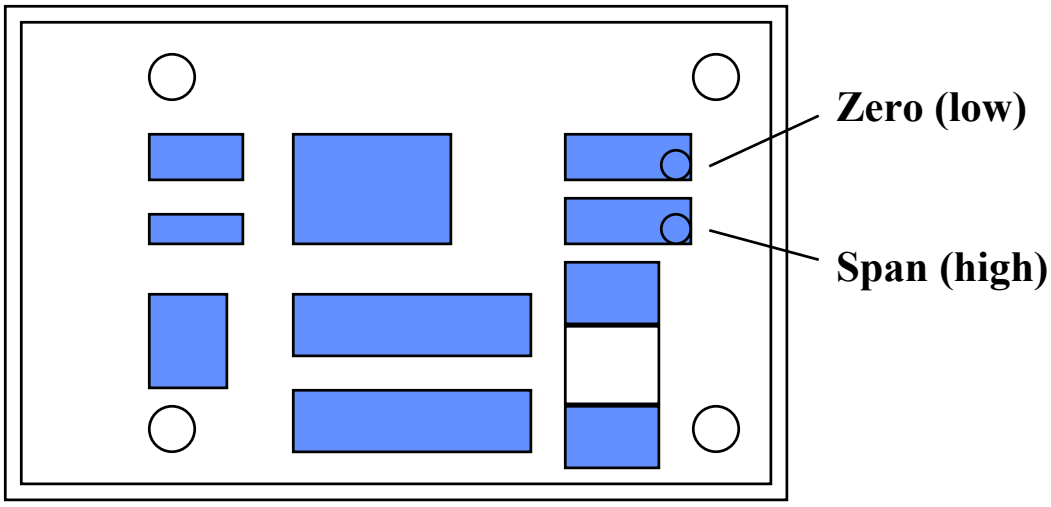
As each pod is a duplicate of a single output channel on the main receiver board, all options and settings are identical.

The user may thus refer to the Analogue Output section of this manual to set voltage or current output, passive or active configuration etc.

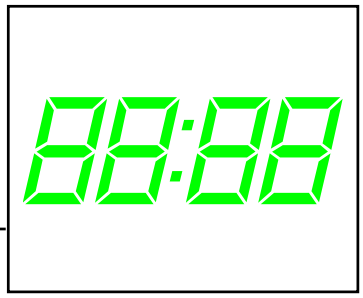
Analogue calibration is also identical and may be achieved following the instructions in the Analogue Output section.

The location of the calibration potentiometers are shown in Fig 12 below :

Fig 12



Pulse Count Output Option



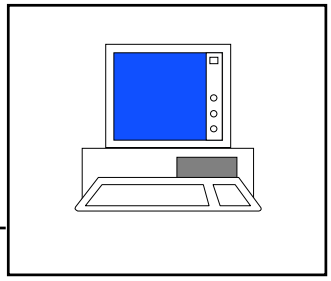
This output provides a series of pulses at a predefined rate, equal in number to the number of pulses input to a corresponding transmitter.

The count is transmitted as an absolute value so that, even in the unlikely event of a transmission being missed by the receiver, any deficit will be recovered on the next transmission.

Two pulse outputs of up to 50 pulses per second can accommodated simultaneously on both channels.

The pulse outputs are identical in specification to the digital outputs detailed earlier in this manual and as such can be specified as open collector, volt-free 2A relays or volt-free 7A relays.
There are two pulse outputs per channel and these are configured to take up digital outputs 6 and 7. Thus if the pulse option is fitted, these outputs are not available for digital outputs reducing the digital output capacity to 6 per channel.

Serial Output



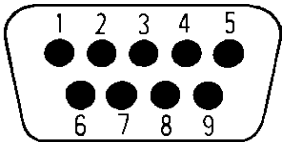
The serial output is a standard feature of all receivers. It supplies information it receives regardless of address, content or integrity. It is also the major information channel for diagnostic reporting.

The serial output allows direct connection with a number of devices such as intelligent data loggers, computers, outstations and terminals.

The serial port is also to set up the analogue channels on the receiver.

The serial port is located within the receiver and is a 9-pin d-type male connector mounted on the receiver baseplate.
The serial port cannot be mounted on the box top or sides as this would compromise the IP65 rating of the unit. Signal cable should therefore be passed through a cable gland before being made off at the connector.

The pin out of the connector is as shown below:



Pin 2 Transmit
Pin 3 Receive
Pin 5 Ground

Fig 13

The format of the data at the serial port is fixed as follows:

- 9600 baud
- 8 data bits
- 1 stop bit
- no parity.

No handshaking is used.
The signal is at RS232 data levels.

Data is output at the serial port on an ‘as received’ basis. All received data is output regardless of whether it is true or corrupted. Incorrect information is flagged as such and can be monitored to assess the performance of the system and the type of errors being encountered.

The protocol definition is specific to Landmark so specific software would have to be written to decode the messages when used with a SCADA type package.
Various other formats are continuously being developed, one of which gives a Modbus format output with the data being output on a request and reply basis.

The following pages give a definition of the Landmark serial output protocol.
In addition to allowing the user to write monitoring software, this also allows the user to plug a terminal into the port, or a computer running a serial data capture program, e.g.. Procomm, and analyse the signals coming in from the transmitters on the system.

Protocol Definition:

For every transmission, the receiver builds an output data packet which contains all the information gathered.
This packet is 15 characters of ASCII information, the general format of which is described below:

Address	Status	Data	Flag	CR	LF
Chars. 2	2	8	1	1	1

The address, status and flag information definition id the same for all packet s but the data field definition is dependent on packet type.
CR is the standard carriage return character, LF being the standard line feed.

Four types of packet are employed in order to deal with the transmission of all required data whilst maintaining good channel efficiency.
All information is output as Hex characters in ASCII enabling simple understanding and allowing a wider range of RS232 formats.

Each part of the above packet is explained in turn as follows:

Address Byte
The first two characters of the packet represent the Hex address of the transmitter from which the message was received.
The first character is the secondary address (0-F) as set on the '2nd' address switch on the transmitter. This is effectively the receiver address, as the receiver will only mimic the transmitted inputs when its own address switch matches this setting.
The second character is the primary address (0-F) as set on the 'address' switch of the transmitter. This identifies which transmitter has sent the message and tells the receiver on which output channel to mimic the data inputs.

Status Byte:
The third and fourth characters together form the status byte of the message. This contains information about the transmitter configuration and status as defined below:

3rd character:

Bit 7 set :	System Error
6	Packet type MSB
5	Packet type LSB
4	Battery Low
3	Undefined
2	Analogue Range
1	Multiplexer Installed
0	Mode

All flags are active high (1).

The 4th character will usually be a zero unless bit 7 above is set denoting System error. This means a recoverable error has been encountered at the transmitter and the following byte is used to define the error as follows:

Bit 7 set:	Reset occurred due to trap
6	Unknown reset occurred
5	Multiplexer selection failure
4	Pulse counter reset failure
3	ADC read failure
2	Watchdog reset failure
1	ROM checksum failure
0	RAM read/write failure

Packet Type :
Bits 6 and 5 of the status byte denote the type of packet transmitted. This is decoded as shown below:

Bit 6	Bit 5	Type of packet received
0	0	Pulse counters
0	1	Digital & 1 or 2 Analogues
1	0	4 Analogues
1	1	8 Analogues

Battery Low:
This bit is set if, during full load conditions, the transmitter power supply drops below the pre-defined voltage of 10.0 Volts. This is most likely to happen when using solar or battery power and signifies that the remote power supply needs attention.

Analogue Range:
When the receiver is required to mimic the transmitter analogue input, it uses the information in this bit to set the span.
It may be set to either full scale span, i.e.. 0-20mA or 0-1V or
offset span, i.e.. 4-20mA.
This bit is set when link LK4 is set on the transmitter board.

Multiplexer Installed:
This bit is set when the transmitter has an analogue multiplexer installed. This increases the analogue input capacity of the transmitter to 2, 4 or 8 channels.
The type of data packets received will define this input capacity.

Mode:
This bit defines the operating mode of the transmitter and is dependent on what type of packet is being received.

Data Bytes:
The data field occupies the next 4 bytes - the 5th to 12th characters of the packet.
Their meaning is dependent on the packet type being transmitted. Each of the four packet types is described below:

Pulse counter packet:
This packet has packet type bits 00 as previously explained. Its format is:

Address	Status	Count 0	Count 1	Flag	CR	LF

Count 0 and Count 1 are the two pulse count totals from the transmitter.
The values represent a 16 bit count in Hex, with the most significant bit being transmitted first.

Digital & Analogue packet:
This packet has packet type bits 01 and has the following format:

Address	Status	Digital	Serial	An0	An1	Flag	CR	LF

Digital : This represents the 8 digital inputs of the transmitter with each input
active low - e.g. all inputs off : FF , all inputs on : 00.
Bits are presented MSB first e.g. input D0 on only : FE.

Serial : This contains the last character read at the transmitters serial port.

An0 : This contains the value obtained from the analogue input on the transmitter (channel 0).
It is a Hex 8 bit value ranging from 0 to FF.

An1 : If an analogue multiplexer is not installed at the transmitter, this field will contain the same value to , within 1 count, as the An0 field
but the An0 field should be used for measurement purposes in this case.
If an analogue multiplexer is installed at the transmitter, this field will contain the value read from channel 1 (the second channel).

4 Analogues Packet:
This packet is transmitted with packet type bits 10. Its format is:

Address	Status			An2	An3	Flag	CR	LF

This packet will be transmitted if the analogue multiplexer on the transmitter is configured for 4 or 8 channels.
The fields An2 and An3 contain the analogue values of channels 2 & 3 respectively.
Channels 0 & 1 will already have been transmitted in the previous packet.

8 Analogues Packet:
This packet is transmitted with packet type bits 11. Its format is:

Address	Status	An4	An5	An6	An7	Flag	CR	LF

This packet will be transmitted if the analogue multiplexer on the transmitter is configured for 8 channels.
The fields An4 to An7 contain the analogue values of channels 4 to 7 respectively.
Channels 0 to 3 will already have been transmitted in the previous packets.

Flag:
The 13th character of the message is a flag which indicates the validity of the data received.
This flag will be set to 0 for a correctly received message.
Should this flag be set to 1, this indicates that the message has been corrupted.
This can happen for various reasons:
- Corrupt data or CRC : This occurs when two or more transmitters transmit data together. The fact that 5 messages are transmitted randomly spaced ensures that this error does not jepardise the data getting through.
- Mis-sync : This occurs due to random noise causing a sync. word to be mistakenly identified. This rarely happens due to 3 x oversampling technique.

Both corrupt and correct data are output at the serial port to enable the user to gather data on the performance of the system and determine the suitability of report rate combinations etc...

CR/LF:
All output packets end with a Carriage Return (0D) and Line Feed (OA) terminator.

Sample data packets

00**20**FFFF7F000 Standard 8 digital, 1analogue
All digitals off, analogue at Hex 7F.

0020**FE**FF7F000 Standard 8 digital, 1analogue
Digital 0 on - all others off.

00**22**FFFF7F7F0 Expanded tx. - 2 analogues
Analogues 0,1 at Hex 7F

00**42**00007F7F0 Expanded tx. - 4 analogues
Analogues 2,3 at Hex 7F

00**62**7F7F7F7F0 Expanded tx. - 8 analogues
Analogues 4,5,6,7 at Hex 7F

00**2A**FEFE7F7F0 Expanded tx. - 2 analogues,16 digitals
Digitals 0 & 8 on only.

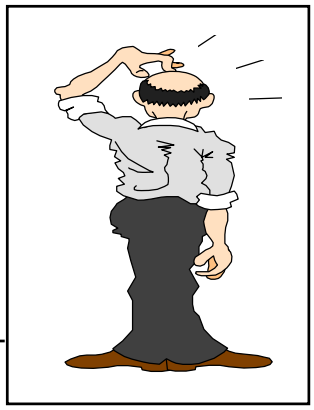
00**4A**FEFE7F7F0 Expanded tx. - 4 analogues,32 digitals
Digitals 16 & 24 on only.

00**00**123412340 Pulse count packet - both counts showing
Hex 1234.

00**3**0FFFF7F000 Standard tx. but Battery low showing.
Data will still be output.

0020FFFF7F7F**1** Corrupt packet - data will not be output.

Fault Finding & Diagnostics



The major source of diagnostic information is the serial port of the receiver. All messages received are output from this port whether corrupt or true and regardless of address or data content.

The user may therefore monitor this output with a terminal, PC, PSION organiser etc.. and, using the information in this manual, evaluate the data being transmitted - if any.

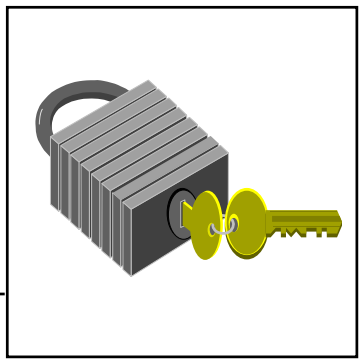
Note that the green led on the controller board flashes every time the radio receives a message. If the led flashes but no message appears on the serial port then the terminal wiring is incorrect.
If the power is cycled to the receiver, the wake-up message should appear.

As detailed in the 'Analogue output' section of this manual, pressing the push-button on the receiver board will cycle the outputs through high, mid and low - also energising patterns of digital outputs.
This can be used to determine whether the data being received is incorrect or missing, or whether the problem lies with the output and/or instrument wiring.

The leds. on the mains power supply give an indication of supply integrity to the controller card.
The green led will be lit if the +12V supply is present, and the orange led will show the presence of the -12V supply.

A step by step guide to troubleshooting for the Landmark Receiver can be found in Appendix II at the back of this manual.

Data Security



The information transmitted by Landmark is supplemented by check bits in order to protect messages against interference and also synchronised by means of a preamble.

The Cyclic Redundancy Check code used is the widely accepted X16 which gives a residual error probability of 1 in 10E-14.

It can then be calculated that the Landmark data transmission system , when used in its fastest transmission mode of 5 packets every 15 seconds, will produce an average time between undetected errors of 936 years.

These calculations show that the equipment conform with the IEC guidelines on telealarming, telemonitoring and telecontrol as detailed in the following section.

A copy of the full calculation procedure is available on request.

Recommended Spares

Whilst at no point during the first 10 years of operation do we expect the Landmark equipment to fail for any reason , due to the often process critical nature of its applications, it can be prudent to carry spares of major boards and components.

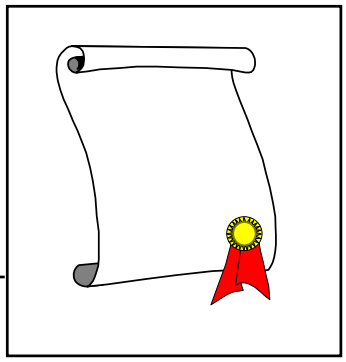
This list also acts as a guide if boards are required to upgrade or expand an existing system.

Receiver Controller card
Receiver Power supply unit
Expansion board (if fitted)
Output pods (if fitted)
Receiver radio
Output connector board (open collector or relays)

All parts except radios are available ex-stock from Alphr Telemetry - radios are approximately 2-3 weeks delivery.

As the Landmark system can be built to numerous levels of inputs/outputs, radio frequencies etc., the original Alphr reference should be noted to ensure the suitability of any spares supplied.

Conformance



In the United Kingdom, Landmark units are, as standard, type approved to MPT1329 and, as such, do not require an operating licence.
Also available among others are units type approved to MPT1328 and the rigorous German FTZ regulations.

The structure of the protocol used to transmit the data across the airwaves conforms with the following standards :

IEC 870 Part 5

Class I	: Telemetering
Class II	: Teleindication
Class III	: Critical information transmission and Telecommand.

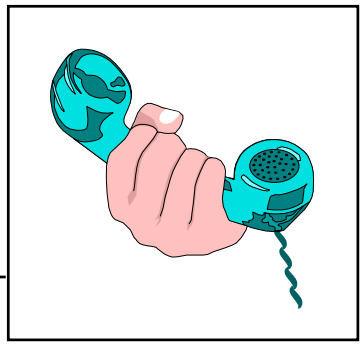
In addition to this, the Landmark system also performs various data checks as detailed in IEC870 Part 4 , which improve data integrity still further.

This specification has now been ratified to British Standards as follows :

IEC 870 Part 4	=	BS7404 Part 4
IEC 870 Part 5	=	BS EN 80670 Part 5

The Landmark product is CE marked.

Technical Support



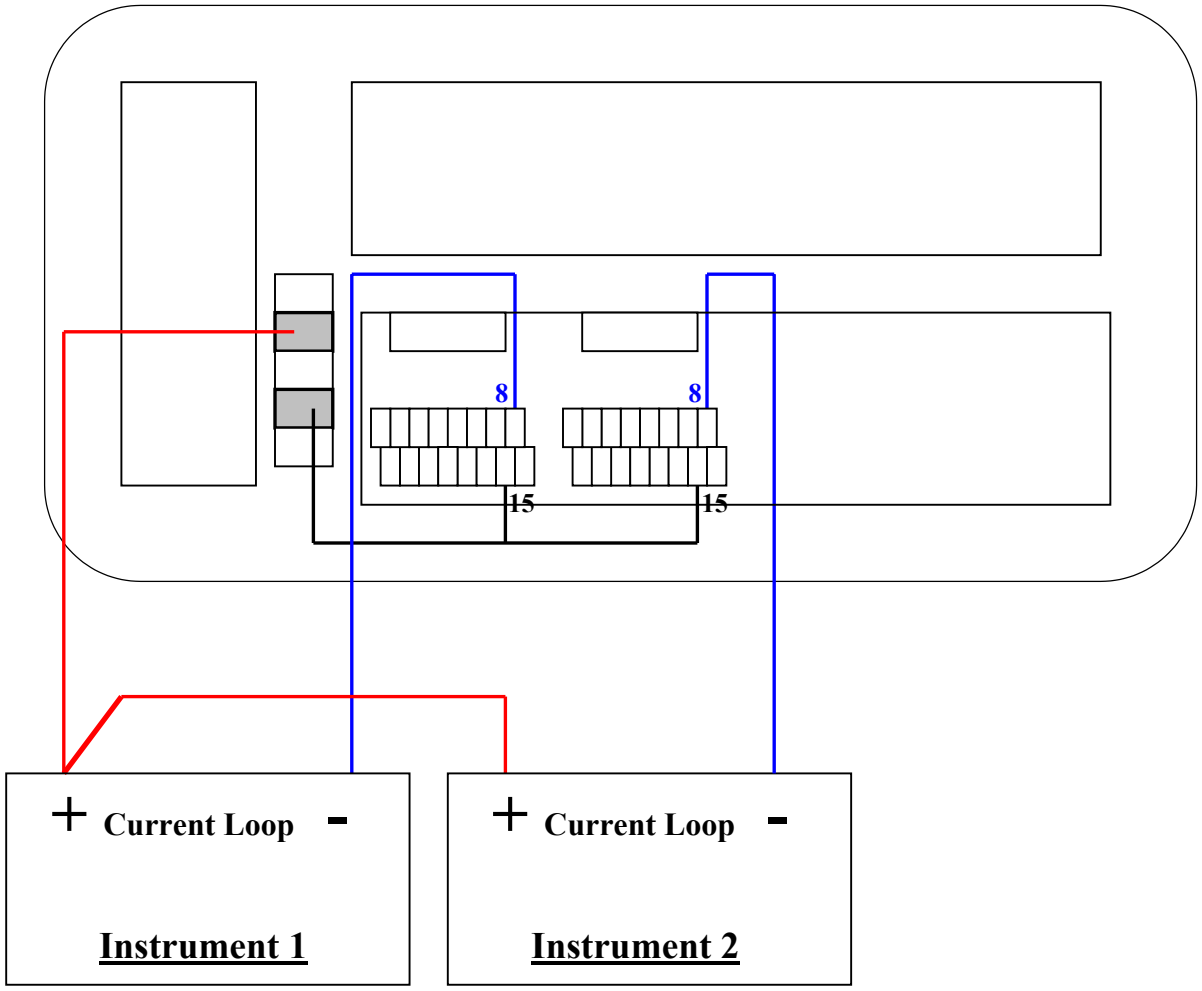
ALPHR Telemetry back the Landmark products with a full range of compatible products and services.
These include test equipment, radio site surveys to establish radio requirements for a given application and full installation if required.

For more details or assistance in installation or operation of the Landmark system, contact ALPHR Telemetry at the following addresses:

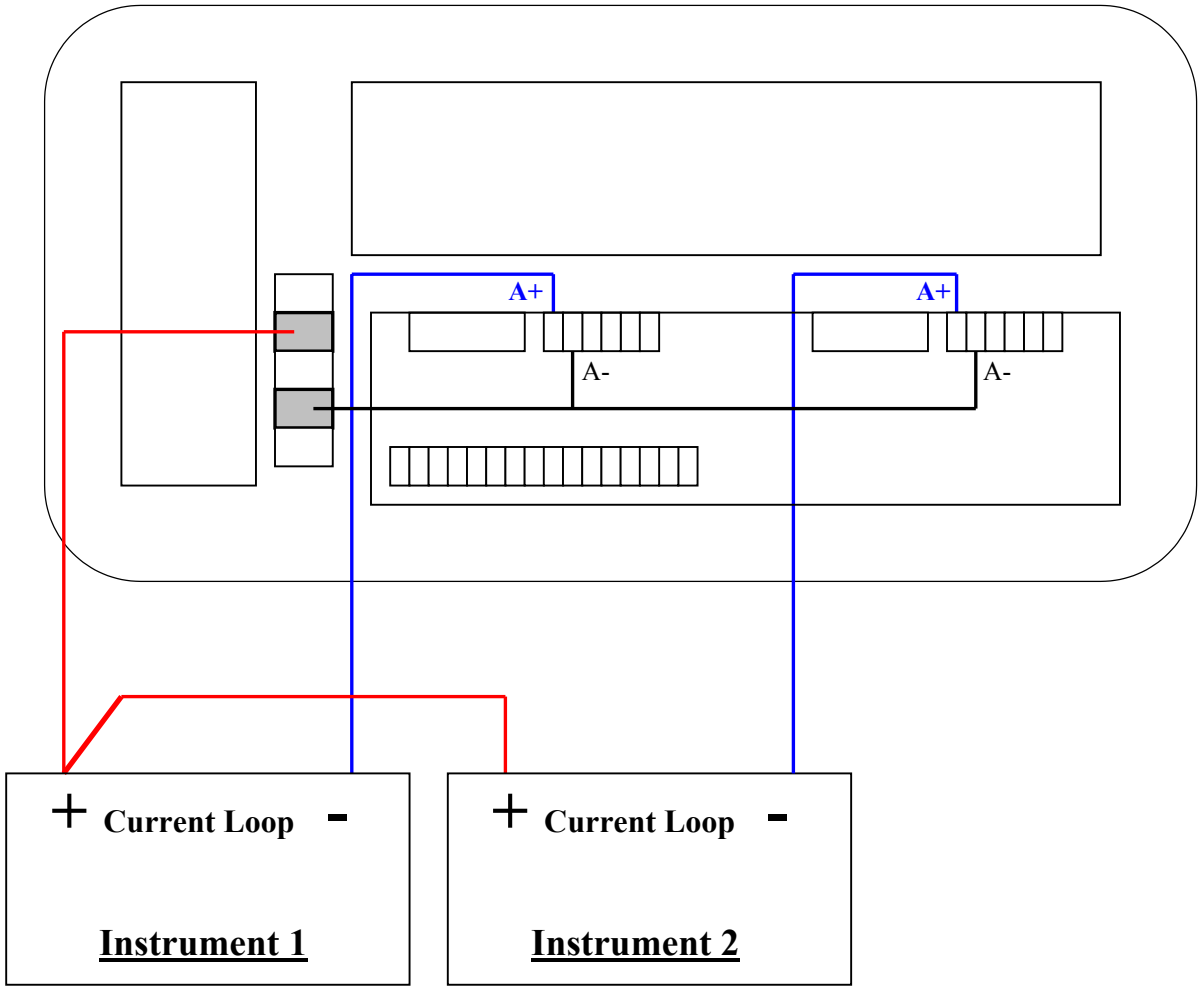
Head Office : Customer Support Manager
25 Tower Quays,
Tower Road,
Birkenhead,
Merseyside CH41 1BP

Telephone : 0151 647 6003
Fax : 0151 650 2008

Appendix 1 - Sample Wiring Diagrams



CONNECTION OF ANALOGUE OUTPUTS
(Open Collector Output Board)



CONNECTION OF ANALOGUE OUTPUTS
(Relay Output Board)

BASIC FUNCTIONAL TROUBLESHOOTING PROCEDURE ON STANDARD RECEIVER IN FIELD.

As the receiver is a passive device, it will wait for a signal before showing any outward sign of operation (except for LED's on PSU).

If the receiver does not perform as expected then signals must be simulated using a serviceable transmitter and the results monitored. To remove the external radio signal path from the procedure it is best to carry out tests with the test transmitter as close as possible to the receiver (<1 metre is ideal).

The initial test can be carried out as follows:-

		REMEDY
No LED's lit on relay board and no sign of flashing LED on main receiver board.		
↓		
Is power on? (check with DVM on mains lead moulded socket)		
↓		
Check PSU setting matches power available. A yellow sticker on PSU indicated factory voltage setting.	→	If the setting needs to be changed, remove 3 crosshead screws on base plate and remove radio module (4 screws) The baseplate can now slide forward to reveal switch on PSU PCB
↓		
Are green (+12V) & amber (-12V) LED's lit on PSU case?		
↓		
Check mains fuse on PSU case.		
↓		
Monitor +12V DC on black terminal strip on base plate (see manual) and if not present, check on PSU terminal strip +V & -V to 0V.	→	PSU U/S. Return receiver to Alphr or seek service.
↓		
Check 12V on relay board (twisted red & black wires)	→	Wiring fault / bad connection. Seek advice from Alphr.
↓		

RECEIVER SHEET 2.

REMEDY.

Check fuse on receiver board.

Ensure D plugs on right of receiver board in place and correct order. → See manual

↓

Ensure white plug fully home (next to fuse) → Press home.

↓

Ensure external BNC connector is clean and dry.

↓

Ensure gold connector on radio is fully tight & D plug on radio is fully home.

↓

Monitor green LED on receiver board for at least twice the transmitter report rate. → Either radio signal path, antenna or receiver is suspect.

↓

Remember that even if it flashes, it may not be receiving signals from your transmitter, but the board is alive. → To test receiver, go to Sheet 3

↓

Make sure receiver address switch is set to same transmitter 2nd address switch.

RECEIVER SHEET 3.

REMEDY.

USE KNOWN GOOD TRANSMITTER

Remove antenna from transmitter.
Set transmitter 1st address switch to 0 and 2nd address switch to match receiver address. Set report rate switch to 0.

↓

Simulate digital signal by connecting pin 1 to pin 16 on digital input board and/or inject analogue input.

↓

Transmitter relay should click 5 times and LED flick on 5 times. Receiver LED should flick on 5 times in response. (3 or 4 will do). Digital 0 LED should light and/or analogue output. (Assuming relay output board fitted in receiver.

→ If receiver LED active but no output, try different 2nd Address on transmitter & matching address on receiver. Also try different digital input.

↓

If transmitter fails above, then connect a terminal to RS232 output on receiver and monitor data packets as per manual.

→ If terminal not available, return receiver to Alphr or call for assistance.

↓

Monitor data packets as per manual.