



LINK RESEARCH PRODUCT MANUAL

L2132 / L2134 Manual

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Link L2132 /L2134 Manual

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2 Products Covered.

Link Part No.	Product Description	Details
L2132	HD/SD IRD Receiver 2Channel	UHF input 70-880MHz
L2134	HD/SD IRD Receiver 4Channel	UHF input 70-880MHz
L2134 (CV)	HD/SD IRD Receiver 4Channel with CVBS output	UHF input 70-880MHz
L2140	HD/SD Decoder	ASI input only

2.1 Manual Issue

Issue	Date	Comments
A	June 2008	Initial Issue
B	Nov 2008	Minor mods & additions
C	Jan 2009	Additions to cover Firmware release V4.0
E	April 2009	Minor mods & corrections

2.2 Firmware Version

This manual is based upon Firmware version V4.0.

Some features covered in this manual will not be available until release V4.1; these items are **greyed** out in the manual.

Please see the website for details of latest firmware revision :-
<http://www.linkres.co.uk/link+research+firmware+updates>

3 Safety and Compliance

Any mains power equipment must be earthed. Operate the equipment within environmental limits and ensure as much ventilation as possible (Normally Temp 0°C - 50°C <99% humidity).

Only authorised personnel should open the product and any repair or warranty will be invalidated if the seals are broken.

The equipment has been designed to be CE compliant and Technical files are available on request.

Certificate of Conformance



EU Declaration of Conformity: **RADIO & TELCOMMUNICATIONS
TERMINAL EQUIPMENT DIRECTIVE 1999/5/EC**

Certificate No. **S 070230**
Date **21st Feb 2006**

Equipment under Test

Name of equipment:-
Link HD System consisting:-
L140x LinkHD Encoder/Transmitter
L2132/4 LinkHD Receiver/Decoder
L30x0 S Band Downconverters

Equipment has been designed to meet and has been tested to the following specifications:-

Safety

EN 60950 European Safety of Information Technology Equipment
IEC 60950 International Safety of Information Technology Equipment
UL 1950USA UL Safety of Information Technology

EMC/RFI

IEC 301 489 – 1 Emissions and Immunity
IEC 301 489 – 28 Emissions (Wireless Links)
FCC Part 74

RF

EN 302 064 ERM Wireless Video Links

Manufacturer/Agent

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Certified by

A handwritten signature in black ink, appearing to read "R. V. Davies".

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CL140040 Issue 01

4 System Description

The L2132/4 range is a compact DVB-T and LMS-T demodulator using Link Research Maximum Ratio Combining diversity algorithm, and a combined low delay HD/SD decoder.

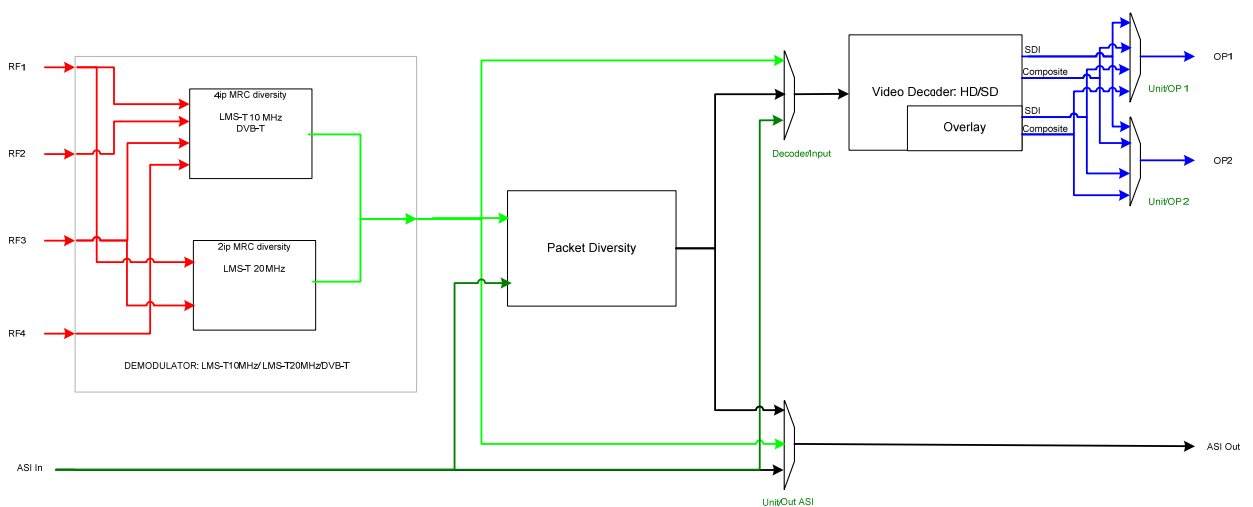
The L213x-CV also provides a composite (CVBS) output for SD operation.

The ultra low delay MPEG2 SD/HD Decoder has been speed optimised to operate with the Link Research Ltd family of MPEG2 Encoders, which utilise field encoding. This range of decoders will **not** support frame decoding.

The product range is based on four hardware variants; 0, 2 or 4 RF inputs and also the CVBS (SD) video output. All other variants are licensable and therefore allow for field upgrades by changing the license to enable extra features as required. Please contact Link Research Ltd. for details.

Product	RF Inputs	ASI Input	Frame Lock	ASI Out	Audio	SDI Out	CVBS Out
L2032 HD Diversity Demodulator	2			1			
L2034 HD Diversity Demodulator	4			1			
L2132 SD HD Diversity IRD	2	1	1	1	2 Stereo / AES	2	
L2134 SD HD Diversity IRD	4	1	1	1	2 Stereo / AES	2	
L2132-CV HD SD Diversity IRD	2	1	1	1	2 Stereo / AES	2	2
L2134-CV SD HD Diversity IRD	4	1	1	1	2 Stereo / AES	2	2
L2140 HD Decoder		1	1	1	2 Stereo / AES	2	

4.1 L2134 Internal Architecture

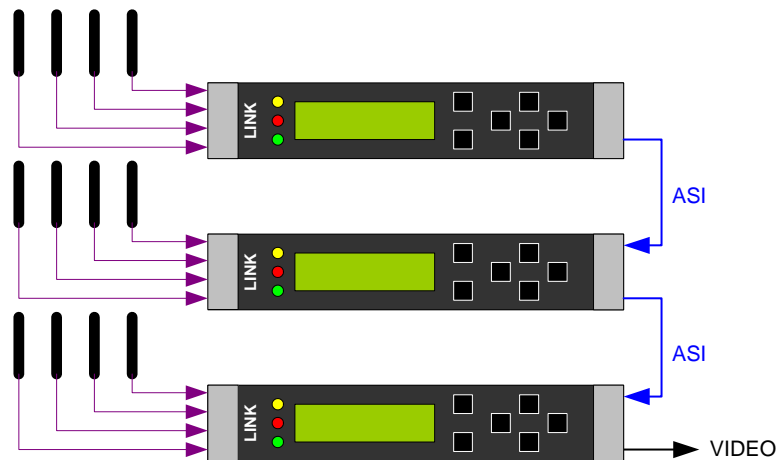


Link HD/SD Receiver, Functional Block Diagram

The above block diagram illustrates the flexible design of the L2134 receiver / decoder and how multiple units can be cascaded using ASI input and outputs. The

use of both MRC (Maximum Ratio Combining) of the received COFDM signals and the ASI packet diversity, the combining of two ASI streams to produce a stream with fewer errors than either input; provides a flexible and extendable receiver system.

The 'cascading' of the L2134 receivers also provides a method of configuring a system using up to 12 RF inputs to provide a single radio camera channel.



4.2 L2134 Front & Rear Panel Layout



5 Physical Details

Size

44mm, Width 210mm, Depth 375mm - including rear panel connectors
Small form 1U, 1/2 width 19" rack mount

Weight

~1.7kg weight

Operating temperature range

Ambient 0°C to +50°C

Power

AC input option 90 VAC to 264 VAC 50Hz to 60Hz
DC input option 10 VDC to 32 VDC (-ve chassis earth)

20Watts excluding the downconverters requirements.
50Watts max allowing for downconverters and cables.

6 Input / Output Connections

All connectors are on the rear of the unit.

6.1 RF1 RF2 RF3 RF4 inputs

75Ω BNC type chassis connector

Diversity inputs, antenna 1-4 to RF 1-4 respectively for L2134

Diversity inputs, antenna 1 & 2 to RF 1 & 3 for two input L2132

Note:- When operating in 20MHz LMS-T RF 1 & 3 are used for connection to the two down convertors. Demod settings (IPFreq, DConvLO & LoSide) for 1 & 3 should also be used to configure the appropriate RF inputs.

UHF input 70MHz to 800MHz.

Receiver sense limit -80dBm

Receiver overload limit -20dBm

For configuration please refer to [8.2 Demodulator Menu](#)

Note:-

These inputs can have +20VDC output (set in Unit/LNB Power) to power the external down converter; limited to 400mA per connector

Short circuit protected

6.2 Frame lock input

75Ω BNC chassis mounted socket

SD Mode :- Composite Black and Burst input for timing reference. Can also be used to lock SD & HD rates.

HD Mode:- Support HD tri-level sync reference input.

Delay increased by 0 – 40ms.

For configuration please refer to [8.4 Decoder Menu](#)

6.3 Outputs

75Ω BNC chassis mounted socket.

Output #1 and #2. Two independent outputs for HD either SD output of SDI or when operating in SD mode analogue CVBS output.

For configuration please see- Unit / OP1&2 menu. [8.6 Unit Menu](#)

6.4 ASI out

75Ω BNC chassis mounted socket.

ASI output from the demodulator, diversity or ASI input for decoding by an external decoder or chaining to another L2134.

For configuration please see - Unit / Out ASI [Unit Menu](#)

6.5 ASI Input

75Ω BNC chassis mounted socket.

ASI input to the MPEG2 HD/SD decoder, packet diversity block or ASI output connector.

For configuration please see – Decoder/Input [Decoder Menu](#)

6.6 Data/Remote/Alarm (L2132 Style units)

9way 'D' Type Chassis mounted socket

A 'D' Type sub connector that is used for RS232 data output, firmware download and alarm outputs.

'D' Type Conn	Function
Pin 1	Relay normally closed
Pin 2	Remote TX
Pin 3	Remote RX
Pin 4	Data in (diagnostic mode)
Pin 5	Data /Remote Gnd
Pin 6	Relay normally open
Pin 7	Remote TX enable
Pin 8	Data out
Pin 9	Relay common

6.7 Data/Remote (L2134 Style units)

Chassis Socket Connector :- LEMO EEF0B306CLV
Mating Cable Plug :- LEMO FGG0B306CLAD52Z

The six pin connector provides the RS232 input / output of both the User Data and also Remote Control of the transmitter unit.

LEMO Pin	Function
Pin 1	Tx Data (output)
Pin 2	Rx Data (input)
Pin 3	0v
Pin 4	Tx Control (output)
Pin 5	Rx Control (input)
Pin 6	0v

6.8 Audio

Two 5way XLR Male Chassis mounted plugs

Two stereo pairs or 4 mono channels. A1 and A2.

These connectors are switched to provide either analogue or AES-EBU (digital) audio outputs.

These can be switched independently. For configuration see – Decoder/A audio O/P [Decoder Menu](#)

Note:- Permanent damage can occur to the audio output amplifiers if a connection is made to an audio input that has Phantom power applied.

Internal protection is provided on the audio outputs but damage may still occur and this will not be covered by warrantee.

48kHz sampling

Clip level 18dB

THD < 0.1%

20Hz to 18kHz ± 0.25 dB

Crosstalk >60dB minimum

Signal to noise ratio >66dB RMS

XLR5 Conn	Function - Analogue	Function - AES
Pin 1	Audio Gnd	Audio Gnd
Pin 2	Left +	
Pin 3	Left -	
Pin 4	Right +	AES +
Pin 5	Right -	AES -

6.9 Camera Control

Connector - LEMO 6pin socket EEF.0B.306.CLL

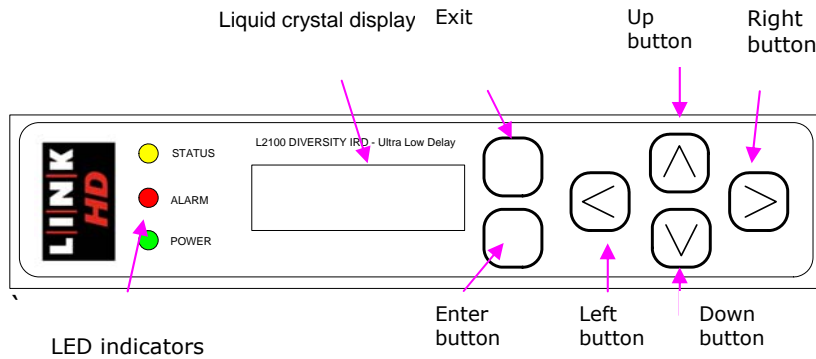
The serial data from the camera is returned via the L1500 transmitter as part of the MPEG transport stream in a similar way as the RS232 'User data' .
It is then extracted from the transport stream by the decoder and passed back to the L1255 Data transmitter via this Camera Control connector.

For configuration see - [CCU Menu - Camera Control](#)

'Lemo' Type	Function - RS232	Function - RS485
Pin 1	Rx Data (input)	RS485
Pin 2	Tx Data (output)	
Pin 3	0v	0v
Pin 4	Rx Remote (input)	RS485
Pin 5	Tx Remote (output)	
Pin 6	0v	0v

7 Controls

The diagram below shows the function of the front panel controls and displays necessary to operate the receiver.



The operation of the receiver is through the six membrane buttons on the front panel of the receiver. These allow the operator to navigate through the various menus.

Control/Display	Function
Enter button	Selects the currently selected parameter.
Exit button	Cancels any parameter changes and Escapes to higher menu.
Up button	Allows upward navigation in a sub menu.
Down button	Allows downward navigation in a sub menu.
Left button	Allows movement to the left when changing parameters within a menu setting.
Right button	Allows movement to the right when changing parameters within a menu setting.
LCD window	Displays menu settings and system status. Tick boxes indicate individual channel RF lock, and ASI lock.
Status LED (yellow)	When lit, the receiver is locked to a signal.
Alarm LED (red)	When lit, an alarm has been detected.
Power LED (green)	When lit, power is applied to the receiver.

8 Operator Menus

The following table indicates the top level menu structure and gives the cross reference for the detailed explanation of each sub menus.

The 'Up/Down' buttons are used to scroll through the menus, 'Enter' is then used to select and enter the sub-menu.

'Enter' selects the required parameter or 'Exit' can be used to return to the level above without selecting the new parameter.

Menu	Function
RF Status	Displays the RF quality on each input
RF Input Level	Displays the RF level on each input
Memory Menu	Used to select and store the configuration menus
Demodulator Menu	Used to select and monitor operating frequency and demodulation settings
Descrambling Menu	Used to select and configure required descrambling
Decoder Menu	Shows Service name and Decoder status, selects required audio configuration,
RS232 Menu	Configure RS232 port
Unit Menu	Configure Down Converter, Shows code versions, selects operating mode
CCU Menu - Camera Control	If the L1255 is connected, selects UHF frequency and OCP type

8.1 RF Status & Input Level

These provide a display of the currently received signal conditions for each input RF1 – 4. They are not automatically updated in 'real time' but can be refreshed by using the 'Enter' key without the need to exit out to the upper level.

8.2 Memory Menu

Sub menu	Options	Comments
Default Restore	No	Does not change the current active settings.
	Yes	Restores the current active settings to factory defaults. NB – If the receiver cannot be set up, it is worth using this option and then restarting the set-up again.
Store –Config?	Config 1...9	Stores the current settings into selected memory location 1 to 9
Load – Config?	Config 1...9	Loads stored settings from the selected memory location 1 to 9
Last Config #	None	Shows the last configuration (memory) that was used.

8.3 Demodulator Menu

Sub menu	Options	Comments
IPFreq #.###GHz	Enter required frequency	The transmit frequency of the camera transmitter is entered here. Note that although tuning steps of 10kHz can be entered on the screen, when the enter key is pressed the receiver locks to the nearest 1MHz step. If the down converter settings in the Unit menu are set to a L3xxx, the frequency is automatically copied to the Demod 2,3 &4 menu. If the down converter setting is set to 'Other', a frequency can be entered that does not have to be the same as in Demod 2,3 or 4.

DConvLO #.###GHz	Enter required frequency, if required.	The Downconverter local oscillator frequency is entered here. Where Link down converters are being used, the figure is automatically entered from a menu setting in the Unit menu. For down converters from other manufacturers, set the Downconverter type in the unit menu to 'OTHER' and enter the local oscillator frequency here.
LoSide Low	High	Selects the local oscillator output mix for the Downconverter. Automatically entered for Link downconverters entered in the unit menu; but can be set for 'Other' downconverters.
	Low	As above. Means that the downconverted frequency is higher
Polarity ???	Auto/ Norm / Invert	If not set to Auto this MUST be matched to transmitter.
Width #MHz	20/10/8/7 /6MHz Indicator	Channel width indicator as set by the transmitter. 20Mhz and 10Mhz only is LMS-T mode
Guard ???	Auto,1/8,1 /16,1/32	Normally set to Auto
RxMode	None	Displays the received COFDM mode – Guard & Polarity
Lock Indicator	None	Indicates whether the Demodulator has locked onto the incoming signal
Modulation ???	None	Displays the received modulation mode from the incoming signal.
FEC Rate ???	None	Displays the received FEC setting from the incoming signal.
ASNR #.###dBm	None	A measure of signal quality measurement. The reading shown is an instantaneous measurement taken at the time the return key is pressed. To update the reading, the press the 'Enter' key. Note value is not calibrated
BSNR #.###dBm		Display for RF2
CSNR #.###dBm		Display for RF3
DSNR #.###dBm		Display for RF4
InA Level ??? dB	None	Displays input level into RF1
InB Level ??dB	None	Displays input level into RF2
InC Level ??? dB	None	Displays input level into RF3
InD Level ??dB	None	Displays input level into RF4
PreBER #####	None	Pre viterbi error rate automatically detected from the incoming signal. The reading shown is an instantaneous measurement taken at the time the return key is pressed. To update the reading, the press the 'Enter' key.
PostBER #####	None	Post viterbi error rate automatically detected from the incoming signal. The reading shown is an instantaneous measurement taken at the time the return key is pressed. To update the reading, the press the 'Enter' key.
Pkt Errs #####	None	Packet errors automatically detected from the error corrected data stream. The reading shown is an instantaneous measurement taken at the time the return key is pressed. To update the reading, the press the 'Enter' key.
Squelch	No/Yes	Ensures that only valid packets of data are sent out in the ASI stream.

8.4 Descrambling Menu

Please see Section 10.6

Sub menu	Options	Comments
Descrambling ###	Off	An encrypted data stream will not be decrypted.
	EBS	Enables decryption of an EBS encrypted data stream.
	BISS-1	Only decodes an BISS-1 encrypted data stream.
	BISS-E	Only decodes an BISS-E encrypted data stream.
	AES128	Enables decryption of an AES128 encrypted data stream.
	AES128+	Only decodes AES128 encrypted data stream.
	AES256	Enables decryption of an AES256 encrypted data stream.
	AES256+	Only decodes AES256 encrypted data stream.
	N/A	Not applicable in this release
N/A	Not applicable in this release	
EBS Key ^^	Value	Enables entry of an 8 digit key. The left and right arrows allow scrolling to the left or right in the number. The up and down arrows enable scrolling through the values 1 – 9 ,A – F. Must match transmitter setting
Key BISS-1	Value	BISS-1 Key. Must match transmitter setting.
BISS-E InjectedID	Value	BISS-E Key Must match transmitter setting.
1AES Key 1-64	Value	AES key bytes 1-64
2AES Key 65-128	Value	AES key bytes 65-128
3AES Key 129-192	Value	AES key bytes 129-192
4AES Key 193-256	Value	AES key bytes 193-256

8.5 Decoder Menu

Sub menu	Options	Comments
Input	Demodulator	Decodes ASI stream coming from internal demodulator
	Diversity	Decodes the ASI from the packet diversity block
	ASI	Decodes ASI stream input from the rear panel ASI in connector
Mode	SD	Decoder set for MPEG2 SD video
	HD	Decoder set for MPEG2 HD video
	OFF	Not used
	N/A	Not used
Service #####	List of available services	Shows the service name of the service to which the decoder is currently locked. Pressing enter brings up a list of available services which can be scrolled through. Pressing enter selects the new service. If the receiver is not locked No Service is displayed and a DEC error warning flashes on the display.
Auto Service	On/Off	Enables the auto selection of the decoded service
Default '#####'	Enter Name	Name of the service the receiver will automatically lock onto.
Pwr Video xxxx	1080i25	Defines the video output standard before a stream is received & decoded. So that equipment down the production line knows what signal to expect.
	1080i29	
	1080i30	Addition formats added , check video HD format table.
	720p50	
	720p59	
	720p60	SD video formats
	625	
	525	
Aaudio O/P ###	Ana	Sets Audio A output to analogue.
	Dig	Sets Audio A output to digital – AES3

Baudio O/P	Ana	Sets Audio B output to analogue.
	Dig	Sets Audio B output to digital – AES3
Aud DID Group ##	Off	Allows the audio data identifier for embedded audio to be selected
	Group 0	
	Group 1	
	Group 2	
	Group 3	
PSF Mode	ON/OFF	Determines whether out video is displayed as progressive or interlaced
Locked ###	None	Shows when the receiver is locked to a valid input signal. Yes or No will be displayed according to the status.
Fail mode #####	Freeze	If the input to the receiver is lost, the last good frame of video is displayed.
	Blue	If the input to the receiver is lost, a blue screen is displayed.
Line Std ###	None	Displays current received video standard
Framelock ###	Off	The unit is free running and not locked to any external source.
	SD	The unit's video is frame locked to an external source and will be slightly delayed. If Framelock is set to on and no synchronising input is detected, an alarm, GEN, flashes on the display. NB – the colour sub carrier is not locked to the synchronising source. SD mode uses black and burst mode to lock the frame
	HD	HD uses the more accurate tri-level sync signal to lock the frame
Offset ##### pix	None	Allows delay or advance of the framelock in the range of 0 – 9999 pixels. 5000 is the centre of the range. 1 pixel = approx 74.63 nano seconds.
Video NTSC	Ped / No Ped	Selects required CVBS output format for NTSC video

8.6 RS232 Menu

Sub menu	Options	Comments
Data ###	Off	Inhibits any RS232 data being output.
	On	Allows RS232 data to be output. See remote control protocol for details of data types and encoding settings.
Baud rate ####	None	Automatically detects the baud rate of the data stream. If no data is detected, (null) is displayed.
Parity	None	Automatically detects the baud rate of the data stream.

8.7 Unit Menu

Sub menu	Options	Comments
Demod	10MHz LMS-T, 20MHz LMS-T, DVB-T, None	Select the required demodulator type
LNB Power ###	Yes	Power is supplied via the down leads to the down converter. On the display LNB ON is shown in the bottom left corner.
	No	There is no low voltage power supplied to the down leads.
	L3010	Use this setting for an older Link manufactured down converter. This setting automatically enters the correct local oscillator frequency in

Dconv Type #####		the Demod menus
	L3014	Link down converter - 1.435GHz to 1.525GHz
	L3030	Link down converter - 1.95GHz to 2.7GHz filter
	L3031	Link down converter - 2.00GHz to 2.11GHz filter
	L3032	Link down converter - 2.1GHz to 2.2GHz filter
	L3033	Link down converter - 2.2GHz to 2.3GHz filter
	L3034	Link down converter - 2.3GHz to 2.4GHz filter
	L3035	Link down converter - 2.4GHz to 2.5GHz filter
	L3037	Link down converter - 2.5GHz to 2.7GHz filter
	L3060	Link down converter - 3.4GHz to 3.58GHz filter
	L3080	Link down converter - 6.425GHz to 7.125GHz
	L3085	Link down converter - 6.80Ghz to 7.5GHz filter
	L3066	Link down converter – 3.2Ghz to 3.6GHz filter
	L3039	Link down converter – 2.7Ghz to 2.9GHz filter
	L3090	Link down converter – 5.20Ghz to 5.92GHz filter
	L9234	Link L9234 portable receiver
	L3025-1718	'One piece' down converter – 1.7Ghz to 1.8GHz
	L3025-2024	'One piece' down converter – 2.0Ghz to 2.4GHz
	L3025-4450	'One piece' down converter – 4.4Ghz to 5.0GHz
	L3025-6471	'One piece' down converter – 6.4Ghz to 7.1GHz
	L3025-6875	'One piece' down converter – 6.8Ghz to 7.5GHz
	Customised	Allows for saving of the freq, LO freq & LO high/low setting. Used with 'Other' See 10.2
	Other	Use this setting for other manufacturers down converters. The local oscillator setting must be manually entered in the Demod menus. By entering a value of 0 for the down converter local oscillator, the receiver can be tuned in the range of 860MHz to 470MHz. See 10.2
None	With this setting, the receiver automatically tunes to 70MHz.	
OP1	SDI,SDI Overlay, Comp,Comp Overlay	Select the required video output SDI or CVBS with / without overlay
OP2	SDI,SDI Overlay, Comp, Comp Overlay	Select the required video output SDI or CVBS with / without overlay
Out ASI #	Demod, Diversity, ASI In	Selects the required output to the ASI Out connector
Triax #	Single ,Dual, No	Configures the RF inputs for connection to a Triax L1273 unit
Address #	None	Allows the unit address to be set where multiple receivers are controlled from the same source. Used by the Link Control protocol. A value between 0001 and 9999 can be set.
Soft version: ###	None	Displays the version of the currently installed firmware.
AFPGA version: ##	None	Displays the version of the currently installed FPGA code.
BFPGA version: ##	None	
HW Version	None	Currently displays two variants HW4000 or HW6000
SerNum #####	None	Displays the electronic serial number of the unit.
Lcod `//////////	None	Allows a unique hexadecimal string (licence code) to be entered so that the unit's features can be upgraded or downgraded. The hex string is issued by Link providing the correct conditions (payment) are satisfied.
Baud Rate	9600 or 115200	Selects the User Data RS232 baud rate

Lock ###	Off	Allows full control of all settings on the receiver.
	On	Allows the User to scroll through the menus but will not allow any changes to be made to settings – other than Lock Off ! A padlock symbol is shown on the display when Lock is on.
LCD Contrast #	None	Allows the contrast of the display to be varied in 16 steps (0 to 16)
ASI Lock	None	Displays whether the decoder is locked to an incoming ASI stream
Unit PCB #####	None	Not supported in this version of code.
Features	None	List of include features (engineering use only)
Battery	None	Feeds back status of Camera battery if CCU fitted
Tuner Version	None	Indicates version of the tuner board
Command	None	Generic command entry (engineering use only)
Overlay	Spectrum, Status	Select the required overlay type
Background	Off, 10 -100	Sets the required overlay background level

8.8 CCU Menu - Camera Control

Only available if connected to the L1255 data transmitter.

Sub menu	Options	Comments
Camera Type	Select camera type	Philips, Sony, Ikegami (other options to be added)
Power	Set power output	Current L1255 CCU can be set between 0.1W to 2.0W
Frequency	Enter required frequency	Set UHF transmitter frequency 450-470MHz
Status	None	Confirms communication status of L1255 CCU unit
Modem (not Implemented yet)	Internal	Uses internal modem and local RF power output
	External	Disables local RF output and allows CC serial data to be transmitted down RS485 path to remotely situated L1255 Modem unit
Baudrate	None	Indicator of input baud rate. If set to 115200, it means that there is no return data being sent back from the camera. When correctly working should display 9600
Lock No		Indicates lock. Power Reset if necessary
CCU Opt		

9 Receiver Set-up

The main functions that require configuration at the receiver are :-

- Type of down converter and operating frequency
- Demodulation scheme in operation; DVB-T, LMS-T or ASI input
- Decoder

Other commonly used setup procedures are also defined are :-

- Frame Lock
- Audio Output
- Decryption
- Operation with HD Triax (L1273 / L1274) units
- Configuration Memories
- Independent Down Converter operation

9.1 Down Converter Type

The following sequence defines the changes and sequence required when selecting the required down converter and receiver RF frequency:-

Step	Menu	Option	Setting
1	Unit	DConv Type	Select Type
2	Unit	LNB Power	On

The demodulator will then automatically detect code rate.
These received demodulation settings can be confirmed by checking the Demodulator menu.

9.2 Demodulation Options

The demodulator in the L2132/4 receiver can operate in three main operating modes and can be disabled :-

- 1) DVB-T; demodulator
- 2) 10MHz COFDM; (LMS-T) demodulator
- 3) 20 MHz COFDM (LMS-T) demodulator
- 4) None, Assumes ASI input (this will disable the Display RF TICK boxes)

Step	Menu	Option	Setting
1	Demodulator	IPFreq	As Required
2	Demodulator	Polarity	Auto
3	Demodulator	Width	Auto
4	Demodulator	Guard Inv	Auto

9.2.1 DVB-T Operation

The following sequence defines the changes and sequence required when changing to DVB-T operation :-

Step	Menu	Option	Setting
1	Unit	Demod	DVB-T
2	Demod	Polarity	Auto
3	Demod	Width	Auto
4	Demod	Guard	Auto
5	Demod	Frequency	As Required

The Table below defines the corresponding gross bit rates for DVB-T operation. This includes video, audio, data and other transport stream data tables.

Bitrates (Mbit/s) for a DVB-T system in 8 MHz channels					
Modulation	Code Rate	Guard Interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	3/4	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.676	10.246	10.556
16-QAM	1/2	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.086
	3/4	14.929	16.588	17.564	18.096
	5/6	16.588	18.431	19.516	20.107
	7/8	17.418	19.353	20.491	21.112
64-QAM	1/2	14.929	16.588	17.564	18.096
	2/3	19.906	22.118	23.419	24.128
	3/4	22.394	24.882	26.346	27.144
	5/6	24.882	27.647	29.273	30.16
	7/8	26.126	29.029	30.737	31.668

9.2.2 LMS-T Operation

The following sequence defines the changes and sequence required when changing to LMS-T operation :-

Step	Menu	Option	Setting
1	Unit	Demod	LMS-T 10 or 20MHz
2	Demod	Polarity	Auto
3	Demod	Guard	Auto
4	Demod	Frequency	As Required

The Table below defines the corresponding gross bit rates for LMS-T operation.

Bitrates (Mbit/s) for a LMS-T system			
Channels		10MHz	20MHz
Modulation	Code Rate	Guard Interval	

		1/8	1/16	1/8	1/16
QPSK	2/3	9.2	9.7	18.4	19.5
16QAM	2/3	18.4	19.5	36.8	39

9.3 Decoder

The Decoder can be disabled, so that no error is displayed when only operating as a demodulator. It can be operated in HD or SD mode. It can also be switched to decode an ASI stream either from the demodulator output, the Packet Diversity output or an external source from the rear panel ASI In socket.

	Menu	Option	Setting
1	DECODER	INPUT	ASI in, Demodulator, Diversity
2	DECODER	MODE	OFF, SD, HD

Note the decoder and the demodulator can be operated independently. Typically this can be used in cellular diversity applications, where the demodulated ASI signal is taken via the ASI out connector, to a Link Research Diversity Packet Switch; the L2014. The Packet diversity corrected output of the L2014 can then be fed back into the ASI in for decoding. Contact Support for further information.

9.4 Frame Lock

The L2132 receiver can lock the decoder output to an external frame lock input. This can either be SD Black & Burst or HD Tri-Level input into the rear panel BNC connector.

Menu	Option	Setting
Decoder	Framelock	OFF, SD or HD
Decoder	Offset	+/- 5000 pixel offset

9.5 Audio Output Format

The L2132 receiver can output either analogue or AES3 digital audio from the rear panel XLR5 connectors.

Menu	Option	Setting
Decoder	A Audio O/P	Analogue or Digital
Decoder	B Audio O/P	Analogue or Digital

10 Decryption

The L2134 can provide various decryption options dependant upon the licence options for the unit.

First the required decryption algorithm is selected and the appropriate key must then be entered either from the front panel or via Link Control software running on a PC. For the AES keys these must be entered in two (AES128) or four (AES256) 8 byte segments.

The BISS-1, BISS-E and AES+ decryption will **only** decode an encrypted stream; EBS and AES will decode **non** (clear) streams and also the appropriately encrypted streams.

10.1 Config Memories

The Config memories allows for the saving of some of the receiver operating parameters to be saved and subsequently recalled. The L2134 can hold up to nine Configurations in memories 1-9.

The following table indicates the various parameters that are preserved and recalled when the unit is switched on (**Power**); or those that are saved when the Memory / Store / Config command is used (**Power & Config**).

Demodulator	
IPFreq	Power & Config
2IPFreq	Power & Config
3IPFreq	Power & Config
4IPFreq	Power & Config
DConLO	Power & Config
2DConLO	Power & Config
3DConLO	Power & Config
4DConLO	Power & Config
LoSide	Power & Config
2LoSide	Power & Config
3LoSide	Power & Config
4LoSide	Power & Config
Polarity	Power & Config
Width	Power & Config
Guard	Power & Config
RxMode	Not saved
Lock	Not saved
Modulation	Not saved
FEC Rate	Not saved
ASNR	Not saved
BSNR	Not saved
CSNR	Not saved
DSNR	Not saved
InA Lev	Not saved
InB Lev	Not saved
InC Lev	Not saved
InD Lev	Not saved
PreBER	Not saved
PostBER	Not saved
Pkt Errs	Not saved
Squelch	Power
Descrambling	
Descram	Power & Config
Key BISS-1	Power & Config
ESW BISS-E	Power & Config
BISS- E InjectedID	Power & Config
EBS Key	Power & Config
1AES Key 1-64	Power & Config
2AESKey 65-128	Power & Config
3AESKey129192	Power & Config
4AESKey193256	Power & Config
128AES lower	Power & Config

RS232 Data	
Data	Power & Config
Baudrate	Not saved
Parity	Not saved
Unit	
Demod	Power & Config
LNB Power	Power
DConv	Power & Config
OP1	Power
OP2	Power
Out ASI	Power
Triax	Power
Address	Power
Soft version:	Not saved
AFPGA version:	Not saved
BFPGA version:	Not saved
HWVersion:	Not saved
SerNum	
Lcod	
Baudrate	Power & Config
Lock	Power & Config
LCD Contrast	Power & Config
ASI Lock	Not saved
Unit PCB	Not saved
Features	Not saved
TunerVersion	Not saved
Command:	Power & Config
BackGround	Power
Battery	Not saved
CCU	
Cam Type	Power & Config
Power	Power & Config
Fre	Power & Config
Status	Power & Config
Modem	Power & Config
Baudrate	Not saved
Lock	Not saved
CCU Opt	Power & Config
Present	Power & Config
SRecord	Power & Config

