



Link L1500 Series Manual

1. System Description	3
2. L1500 Transmitter	4
a. L1500 Display	5
b. L1500 Menus	6
c. Transmitter Setup	11
d. L1500 Connector Interface	14
e. L1520 Camera Control Module	14
f. L1500 HD Transmitter Description and Specification	15
g. Input / Output Connections	16
h. Mechanical	18
3. L1520 Camera Controller / Data Receiver – Optional	18
4. Maintenance & Firmware Upgrades	19
a. L1500 RF / Up Converter and Camera Control Module Removal	19
b. L1500 Firmware Upgrades	20
5. L1500 Product Part Numbers	21
6. Part Numbers for L1500 Accessories	21



Document Link L1500 HD Series Systems Manual

Issue	Date	Comments
A	July 07	Working draft – based on LinkHD (L1400) Manual
B	Oct 07	Initial release
C	Oct 07	Minor edits
D	Dec 07	New menu features added for Tx, separate L213x manual created.
E	Dec 09	Added Deinterleaving
F	Nov 10	Updated Link logo, Website and customer support information. Removed L3020 downconverters and associated information. Added L3025 downconverters. Updated Supported camera manufacturers information.

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 0C-50C <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 an EC Declaration of Conformity and Technical files are available on request. Please contact Link SUPPORT any issues.

Please ensure that normal anti-static precautions are taken when removing the L1500 modules from the main unit.





The power switch on the side of the L1500 is provided to switch the L1500 / L1520. This switch **cannot** be used to control the supply to the forward camera interface plate which is always fed power from the battery or external Lemo connector.

The L1500 can be supplied with various interface plates providing mounting of different batteries and to different camera mounts - either IDX / Sony 'V', PAG Loc or Anton Bauer Gold Mount are available.

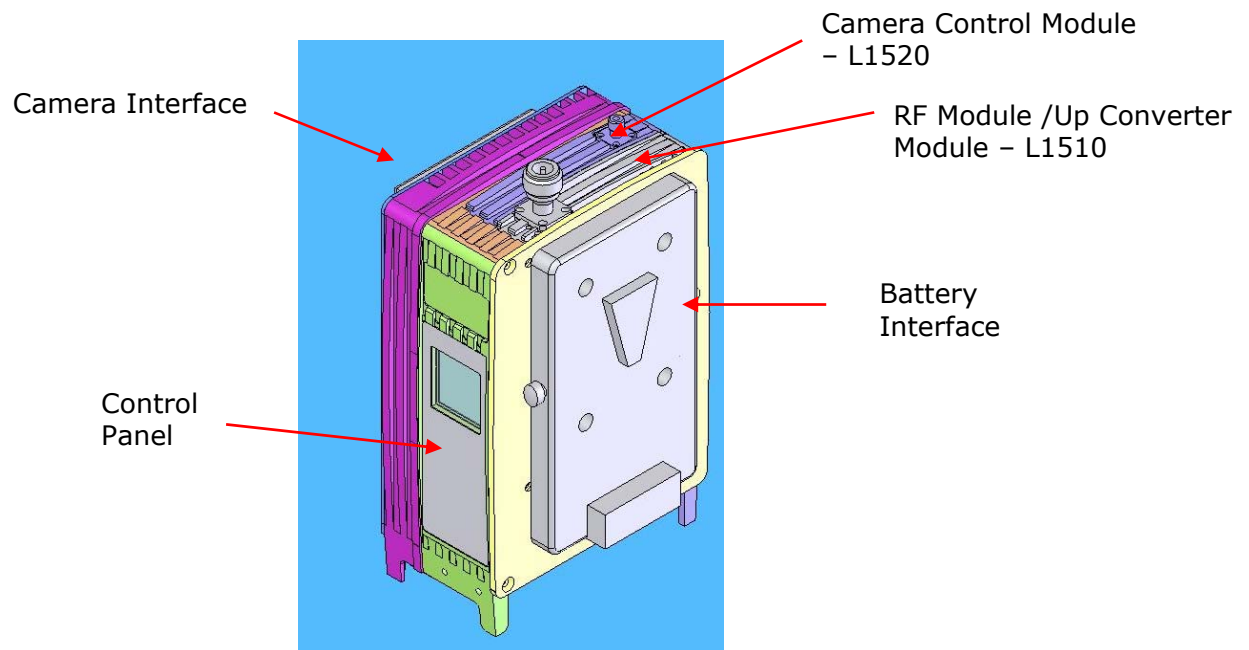
Adaptor brackets are also available to allow mounting of the L1500 to the rear of Thompson LDK6000 series of cameras and the Sony 1500 series. These interface plates provide a 'quick release' to remove the transmitter from the camera

A full list of accessories and cables is given at the end of this document

2.

L1500 Transmitter

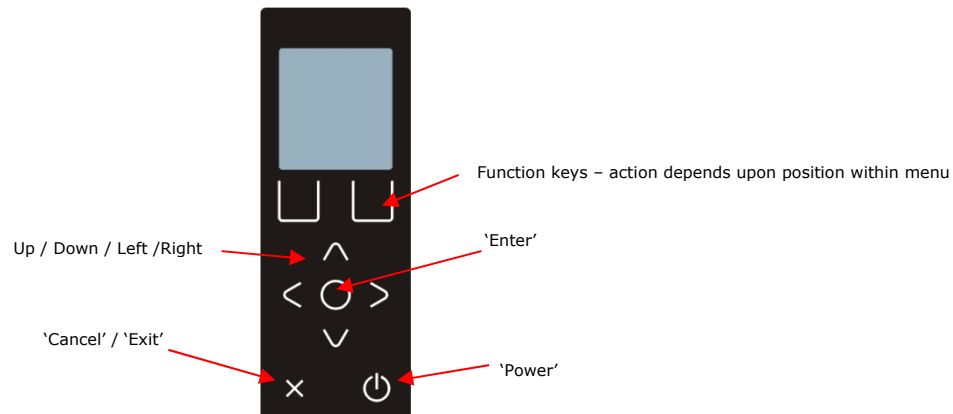
The L1500 Series Encoder/Transmitter is a compact HD/SD MPEG2 Encoder, DVB-T and LMS-T modulator and 100mW output power amplifier (250mW FCC only). LMS-T is a unique robust modulation scheme developed specifically for wireless camera use.



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The L1500 is configured by the operator using the menu structure displayed on the colour LCD display, 9 membrane push buttons are used to navigate through these menus and select the required data. Please see below for details of the L1500 menu structure.



The **left / right** and **up / down** buttons are used to select the required menu, or sub-menu the **Enter** selects highlighted option which can then be modified with the **up / down** buttons. **Enter** will then select the option or **Cancel** ('X') will exit back to the level above without selecting or changing the settings..

Two **Function** keys are also available and can provide 'short cuts' into various functions without navigating through the menu structure.

The **'Status'** display can be used to display the battery voltage and current consumption of the L1500 unit.

The **'RF'** function key is used to toggle the RF output on / off without the need to enter the sub menus.

A single 'soft' **Power** switch is also provided to control the L1500 unit. This switch must be pressed for ~3secs to switch the L1500 on or off. This is to avoid accidental switching of the unit due to knocking the power switch.

When power is applied to the L1500 it will revert to the condition when the power was removed. E.g. If the L1500 was off when the power was removed; the power switch will need to be pressed to turn the unit on. If the L1500 was on when the power was removed the unit will automatically power on.

a. L1500 Display

i. Status Display



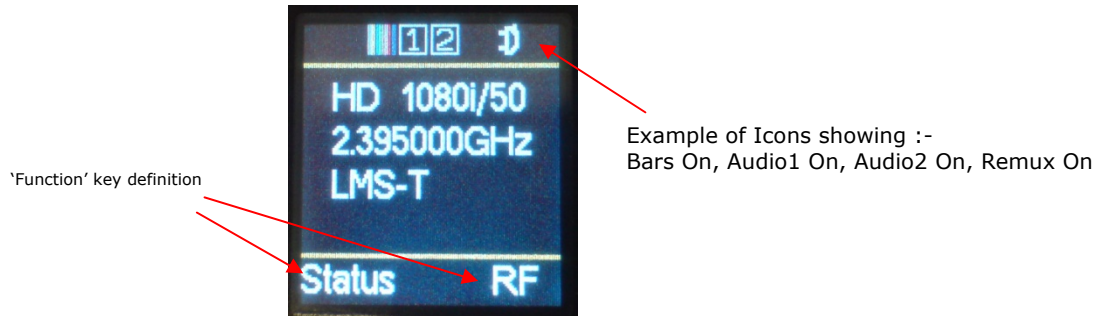
The 'normal' status display gives confirmation of the main operating configuration of the L1500 unit. The video format , transmit frequency and RF modulation mode.

Images are for illustration only and may differ from components supplied



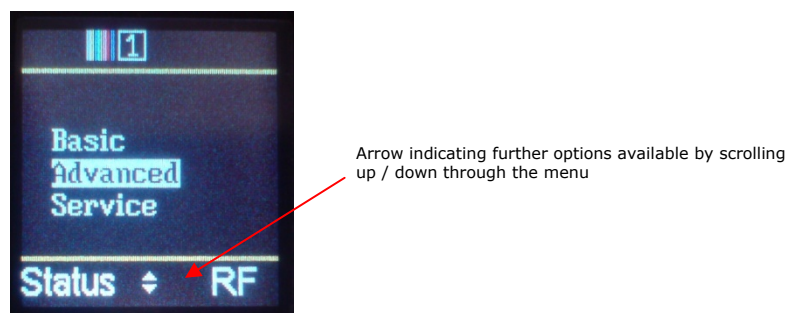
ii. Icons

The top line of the display shows various icons that give information about the configuration of the L1500.



Icon	Condition	Format
Tx Icon	RF On	Icon with green background
	RF off	Not displayed
	Carrier On	Icon with flashing green background
	Sideband on	Icon with flashing orange background
Bars Icon	Video loss has bars selected	Colour stripes
Audio Ch1 Icon	Audio Enabled	White '1' symbol on black background.
Audio Ch2 Icon	Audio Enabled	White '2' symbol on black background.
Video Icon	Video lock detected	White Camera symbol on black background
Remux Icon	Remux enabled	White 'And' gate symbol on black background
Remux Icon	Remux active	White 'And' gate symbol on flashing green background

Pressing the **Enter** button will enter the top level menu where either of the three sub menus can be selected.



Example of a sub menu showing the use of highlighted options to show the currently selected item.

The arrows on the lower line of the display indication whether further items are available by scrolling up or down from the current position.

b. L1500 Menus

The **Greyed Out** parameters not available with the current version of code.
Some functions are only available in HD mode; these are highlighted in **Green** shading.

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The table below is split into the three 'Levels' corresponding to BASIC, ADVANCED and SERVICE levels of operation.

The BASIC functions are also included in the ADVANCED level, this is to allow all functions of the unit to be configured by a competent operator; the normal operational functions can then be changed at the BASIC level.

The SERVICE functions are intended for diagnostics and servicing by a technician / engineer.

i. BASIC FUNCTIONS

	Options	Function	Comment
Modulator	Frequency	Range dependent on module fitted	Only if module detected and NOT in ASI mode
	RF Output Level	10,50,100,250mW	
	RF Output Mod. Mode	On/Off	
		QPSK,16QAM,64QAM	
Video Source	Video Input	1080i/50,720p30 etc etc	Options dependent on either SD or HD
	Test Pattern	On/Off	
	Video Loss	Bars, Blank, Bars+Audio	If no video input detected sets Bars On
Audio Ch1	Enabled Input	On/Off	Mic adds +25dB gain & optional Phantom Power Only if Mic is selected
		Analogue, Test Tone, Embedded, Channel ID's	
	Mic/Line	Mic or Line level input	
	Phantom Power	On / Off	
	Level Left Level Right	Sets required gain	
Audio Ch2	As Ch1		
Status	Temperature	Display units internal temp	Should be quoted in all enquiries with service department Tied to serial number of unit
	Service Name	Display / set units current Service Name	
	Serial Number	Display units serial number	
	Licence Code	Allows entry of licence code	
Camera Control	Camera Type	Selects camera type in use	
	Frequency	Sets UHF receiver frequency	



ii. ADVANCED FUNCTIONS

	Options	Function	Comment
System	Auto Set Service	1...	Sets PID information for multiple camera operation
	Restore default	Yes / No	Sets unit configuration to Default values
	Save Profile	1...	Stores current configuration
	Load Profile	Yes / No	Loads saved configuration
	Save to Stick	Yes / No	Saves all profiles to USM memory stick
	Load from Stick	Yes / No	Loads all profiles from USB memory stick
	Contrast	30-50	Used to adjust display contrast, lower the value=increased contrast.
Modulation	Unit Fans	On/Off/Auto	Control units fans
	Frequency	Range dependent on module fitted	Only if module detected
	RF Output Level	10,50,100,250mW	
	RF Output	On/Off	
	Mod. Mode	QPSK,16QAM, 64QAM	LMS-T QPSK & 16QAM only
	Mod. Type	LMS-T, DVB-T	
	Guard Interval	1/32	
	FEC	1/2	
	Bandwidth	6,7,8,10 & 20MHz	LMS-T 10 & 20MHz; DVB-T 6,7,8MHz
	Mod. Polarity	Normal, Invert	
Multiplexer	Delivery Desc	On/Off	
	OFDM Offset	+/- 4KHz, none	Allows 4KHz offset to COFDM
	ASI Packet	Off,188,204 bytes	
	ASI Bit Rate	10.000Mb/s	Display / set output bit rate
	Service Name	'Any text'	
	Network Name	'Any text'	
	PMT PID	Sets PID 0 - 9999	
	PCR PID	Sets PID 0 - 9999	
	Local Service	On, Off	
	Program ID	Sets ID 0 - 9999	
Video Encoder	Network ID	Sets ID 0 - 9999	
	TS ID	Sets ID 0 - 9999	
	Video Input	1080i/50,720p30 etc etc	Options dependent on either SD or HD
	Test Pattern	On/Off	
	Video Loss	Blank,Bars,Bars+Audio	Bars with or without tone
	Percentage	75%,100%	Selects required Bars type
	Bars Text	On,Off	Adds scrolling 'Service Name' test
	SD / HD	HD / SD	Selects either SD or HD video input formats
	Encoder	On / Off	Turns of local encoder
	Auto Bit Rate	On / Off	Encoder set to maximum rate for TS or modulation setting
Audio Ch1	Enc Bit Rate	12.456Mb/s	Shows current bit rate. If NOT auto bit rate sets encoder bit rate setting.
	MPEG	4:2:0 / 4:2:2	
	GOP Length	8....	Sets required GOP Length
	Video PID	0-9999	Sets required Video PID
	Enc Mode	Std / Low Delay	Only if SD encoder
	Enabled	On/Off	
	Input	Test Tone, Analogue, Embedded	
	Mic/Line	Mic or Line level input	Mic adds +25dB gain & optional Phantom Power
	Phantom power	On/Off	Only if Mic selected
	Level Left	Sets required gain	
	Level Right		
	Type	MPEG L1,L2, Linear	
	Bit Rate	320Kbs	
	Mode	Dual Mono, Stereo	
	Language	Eng, Fre, Ger, Spa	
	Tone Level	-18dBFS	Sets output level of Test Tone
	PID	0-9999	

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	DID	0-9999	
	HD DID	0-9999	
Audio Ch2	As Ch1		
Remux	Enable	On, Off	Turns the remux (external ASI input) on / off
	Rxd Input Rate	12.456Mb/s	Display incoming ASI rate
	Status	Not Active	Shows condition of remux input
Scrambling	Scrambling	Off,BISS-1,EBS	
	Key	*****	Enter required encryption key
RS232 Data	Data	On, Off, Low delay, TTV	
	Baud Rate	9600	
	Data PID	0-9999	

iii. SERVICE FUNCTIONS

	Options	Function	Comment
Encoder	Serial Number	PCB serial number	Should be quoted in all enquiries with service department
	Licence Code	Allows Licence code changes	Defines units enabled features *Caution-if an invalid code is entered the unit will become in-operable *
	Software Revision	1a2	Displays Encoder firmware revision
	Enc Temp	45.5degC	Display encoder temperature
Module1	Status	Not Fitted	Camera Control – if fitted
Module2	Status	Health of module	0001 - OK
	Type	2.5GHz	Type of module fitted
	PA Temperature	46degC	PA temperature
	Build Rev	1a2	Displays module firmware revision
	Serial Number	PCB serial number	
	Carrier Only	On/Off	Provided for test purposes-normal OFF
	RF Power Control	On/Off	Provided for test purposes-normal ON
	RF Atten	Read only	Provided for test purposes
	RF Scaling	Read only	Provided for test purposes
	PA On/Off	On/Off	
	Sideband On/Off	On/Off	Provided for test purposes
	Sideband Pol	Norm/Inv	Provided for test purposes
	Sideband Freq	2,4,8MHz	Provided for test purposes
Versions	Unit Version	V005	Main unit firmware release-USB stick file
	Code Version	V1_06	Main menu firmware version
	Kernel Version	V1_04	Linux Kernel version
	Encoder Version	3b19	Encoder firmware
	FP FPGA	V00_d	Front Panel FPGA
	UC Version	V00_06	L1510 (UpConvertor) firmware
	CC Version	n/a	L1520 (Camera Control) firmware
	FP PIC	V10_03	Front Panel version
	Enc PIC	V10_02	Encoder PIC version
	Serial Number	12345678	Encoder PCB serial number
	Licence Mask	000fa0ec	Defines which features are licensed
Cust. Support	Contact Details		

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iv. Default Settings

Following a 'Restore Factory Defaults' (Advance/System/Restore Defaults) it will be necessary to select the required operating mode and modulation configuration. This will take several seconds to update all the sub systems within the L1500.

If the unit is licensed for HD operation it will default to HD, else it will default to SD operation.

The default settings are :-

System	Auto Set Service	1
	Unit Fans	On
Modulation	Frequency	2.395MHz
	RF Output Level	100mW
	RF Output	Off
	Mod. Mode	16QAM
	Mod. Type	LMS-T
	Guard Interval	1/16
	FEC	2/3
	Bandwidth	10MHz
	Mod. Polarity	Normal
Multiplexer	ASI Packet	188bytes
	ASI Bit Rate	19.5156Mb/s
	Service Name	Service01
	Network Name	Net 1
	PMT PID	0256
	PCR PID	0512
	Local Service	On
	Program ID	0001
	Network ID	0001
	TS ID	0001
Video Encoder	Video Input	1080i/50
	Test Pattern	Off
	Video Loss	Bars
	SD / HD	HD
	Encoder	On
	Auto Bit Rate	On
	Enc Bit Rate	18.7419Mb/s
	MPEG	4:2:2
	GOP Length	12
	Video PID	0512
Audio Ch1	Enabled	On
	Input	Analogue
	Mic/Line	Mic level
	Phantom Power	On
	Level Left	31.5dB
	Level Right	31.5dB
	Type	MPEG L1
	Bit Rate	224Kbs
	Mode	Stereo
	Language	Eng
	Tone Level	-18dBFS
	PID	4112
	DID	767
Audio Ch2	Enabled	Off
Remux	Enable	Off
	Rxd Input Rate	0Mb/s
	Status	Not Active
RS232 Data	Data	Off
	Baud Rate	9600
	Data PID	0100



c. Transmitter Setup

i. Modulator

It is important that when changing between modes of operation it is necessary to check and re-select certain operating parameters due to interaction of some of these parameters.

For example when changing from DVB-T to LMS-T mode it will be necessary to reset the required modulation scheme.

In the following examples the menus are described by :-- Level / Sub Menu / Function.

Some of the settings can be made from either the BASIC or the ADVANCED menus; the more 'complex' are only available from the ADVANCED level.

1. DVB-T Operation

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

Step	Menu	Sub Menu	Option	Setting
1	Advanced	Modulation	Modulation Type	DVB-T
2	Advanced	Modulation	Guard Interval	Must match receiver
3	Advanced,Basic	Modulation	Modulation Mode	As Required
4	Advanced	Modulation	FEC Rate	As Required
5	Advanced	Modulation	Polarity	Must Match Receiver
6	Advanced	Modulation	BandWidth	Fixed at 8MHz
7	Advanced,Basic	Modulation	Power	As Required
8	Advanced,Basic	Modulation	Frequency	As Required
9	Advanced,Basic	Modulation	RF Output	On

The MPEG2 encoder will set the data rate appropriately to match the modulation scheme settings.

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

Modulation	GI CR	1/4	1/8	1/16	1/32
QPSK	1/2	4.97	5.52	5.85	6.03
QPSK	2/3	6.63	7.37	7.80	8.04
QPSK	3/4	7.46	8.29	8.78	9.04
QPSK	5/6	8.29	9.21	9.75	10.05
QPSK	7/8	8.70	9.67	10.24	10.55
16QAM	1/2	9.95	11.05	11.70	12.06
16QAM	2/3	13.27	14.74	15.61	16.08
16QAM	3/4	14.92	16.58	17.56	18.09
16QAM	5/6	16.58	18.43	19.51	20.10
16QAM	7/8	17.41	19.35	20.49	21.11
64QAM	1/2	14.92	16.58	17.56	18.09
64QAM	2/3	19.90	22.11	23.41	24.12
64QAM	3/4	22.39	24.88	26.34	27.14
64QAM	5/6	24.88	27.64	29.27	30.16
64QAM	7/8	26.12	29.02	30.73	31.66

The selections greyed out are available in the transmitter , but not in the current version of the receiver firmware. Check Support for updates.

These rates can be confirmed by checking the Advanced/Multiplexer/ Bit Rate menu.

It should be noted that this corresponds to the total data rate from the multiplexer which includes the video, audio and any user data.



2. LMS-T Operation

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

Step	Menu	Sub Menu	Option	Setting
1	Advanced	Modulation	Modulation Type	LMS-T
2	Advanced	Modulation	Guard Interval	As Required. 1/8 or 1/16. Must match receiver
3	Advanced,Basic	Modulation	Modulation	As Required 16Q or QPSK
4	Advanced	Modulation	FEC Rate	2/3 Only
5	Advanced	Modulation	Polarity	Normal
6	Advanced	Modulation	Width	10MHz or 20MHz
7	Advanced,Basic	Modulation	Power	As Required
8	Advanced,Basic	Modulation	Frequency	As Required
9	Advanced,Basic	Modulation	RF Output	On

The encoder will set the data rate appropriately to match the modulation scheme settings.

The Table below defines the corresponding bit rates for LMS-T operation for both 10MHz and 20MHz operation.

Modulation	GI	1/8		1/16	
		10MHz	20MHz	10MHz	20MHz
QPSK	2/3	9.2	18.4	9.7	19.5
16QAM	2/3	18.4	36.8	19.5	39
64QAM	2/3	27.6	45.2	29.2	58.5

Note 64 QAM not available on current software.

These rates can be confirmed by checking the Advanced/Multiplexer/Bit Rate menu.

It should be noted that this corresponds to the total data rate which includes the video, audio and any user data.

Due to the improvement that LMS-T has over DVB-T these settings give approximately 50% improvement of bit rates for the same level of ruggedness of the RF link.

For example DVB-T 16QAM, 1/32 GI, 1/2 CR gives 12Mbits whereas LMS-T 16QAM gives 18Mbits

3. ASI Operation

The L1500 can be used as an MPEG2 HD encoder providing an ASI output. The modulator and RF Up converter are not required in this operating mode.

This provides ASI streams up to 90Mbits.

Step	Menu	Sub Menu	Option	Setting
1	Advanced	Modulation	Modulation Type	ASI
2	Advanced	Multiplexer	ASI Bit Rate	As Required
3	Advanced	Video Encoder	Bit Rate	As Required

The encoder bit rate cannot be set above the Mux bit rate, if an attempt is made to exceed the mux setting the encoder value will clamp to the highest allowed rate.

4. Remux Operation

The L1500 can be used to re-multiplex an additional service into the ASI data stream. This allows two services can be transmitted on one RF Channel.

Step	Menu	Sub Menu	Option	Setting
1	Advanced	Remux	Enable	On

It is important that the remultiplexed service multiplexer rate and the internal generated service multiplexer data rate are within the available RF modulated data rate.



5. Interleaving Operation

The L1500 has a licensable interleaving option. This option adds an extra layer of error correction to the ASI data stream that allows long breaks in RF reception to be corrected. The user can select the amount of FEC used and the duration of RF break that can be corrected. Adding interleaving to an ASI stream reduces the ASI bit rate available for video/audio etc. and adds a delay to the signal. The additional delay is shown in the menu and the effect on the bit rate can be seen in Advanced/Video Encoder/Bit Rate.

The L1500 is capable of deeper interleaving than the L2134 supports. Interleaving depths that are not supported are shown as 0 ms on the L2134 front panel for either burst or delay.

Step	Menu	Sub Menu	Option	Setting
1	Advanced	Multiplexer	Interleave FEC	Off, 1/2, 2/3 ... 7/8, 14/15
2	Advanced	Multiplexer	Interleave Burst	1 ... 2000 ms

Link's interleaving scheme does not touch the encoded bit stream from the transmitter other than to add extra data. It is this extra data that is interleaved. This effect of this is that when a break in RF occurs that is longer than the set burst length, then the break in signal seen at the receiver is the same as the original RF break.

ii. Video

It is important that the encoder is configured to match the incoming video format. The rates MUST match otherwise the encoder may appear to operate correctly but then fail with changing video images.

Menu	Sub Menu	Option	Setting
Advanced	Video	HD Input Unit	As required

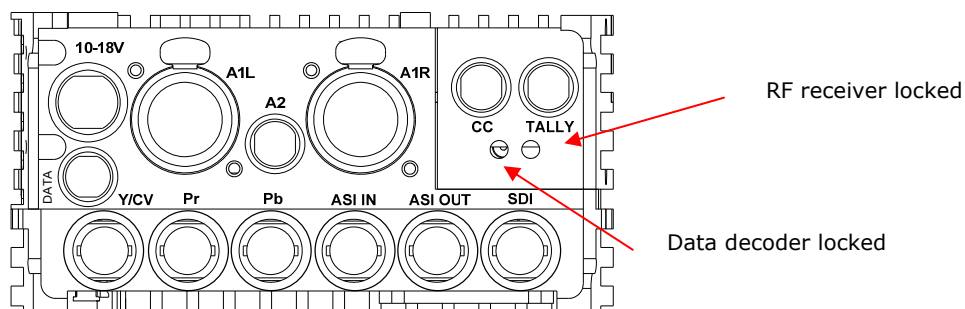
iii. Audio

Step	Menu	Sub Menu	Option	Setting
1	Advanced	Audio A or B	Type	Encoding as required
2	Advanced,Basic	Audio A or B	Input	As Required
3	Advanced	Audio A or B	Bit Rate	As Required
4	Advanced	Audio A or B	Mode	As Required
5	Advanced,Basic	Audio A or B	Line / Mic	As required
6	Advanced,Basic	Audio A or B	Phantom Pwr	If Mic selected
7	Advanced,Basic	Audio A or B	Mic or Line Level	Set required gain



d. L1500 Connector Interface

- Top Panel Connector** RF out N Type Male 50 ohm connector.
- Side Panel Connectors** USB, serial interface used for firmware upgrades etc
- Lower Panel Connectors** Position of panel connectors on the L1500 transmitter.



Connector type	Legend	Description
BNC 75Ω bayonet socket	SDI In	SD/ HD-SDI (SMPTE 259M / SMPTE 292M)
BNC 75Ω bayonet socket	ASI OUT	DVB-ASI – output from the MPEG2 encoder
BNC 75Ω bayonet socket	ASI IN	DVB-ASI – into the Remux for modulation
BNC 75Ω bayonet socket	Y/CV	PAL or NTSC (625 / 525) SD only, also Y for SD component
BNC 75Ω bayonet socket	Pr	Component SD only
BNC 75Ω bayonet socket	Pb	Component SD only
XLR3 Female	A1L / A1R	Ch1 Analogue audio inputs. Line or Mic level
6 way LEMO	A2	Ch2 Analogue audio inputs. Line or Mic level
6 way LEMO	DATA	RS232 connection for Link Control
4 way LEMO	PWR	External 12V battery supply if rear 'clip on' battery is not used. It is also possible to take power from the 'clip on' battery. Care must be taken to ensure that the 'clip on' battery on the rear of the L1500 is not 'back fed' by an external battery or power supply.

e. L1520 Camera Control Module

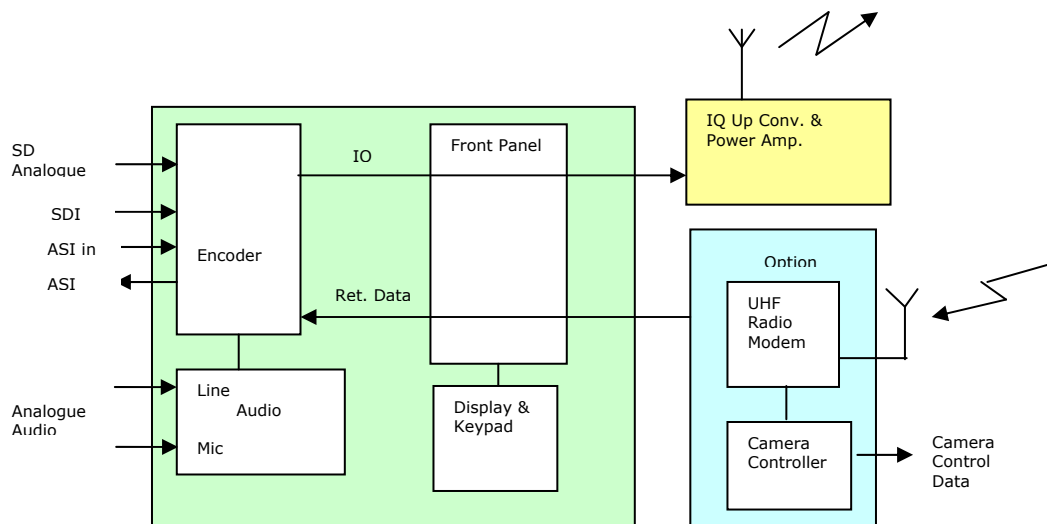
Connector type	Legend	Description
5 way LEMO	CC Data	Serial data interface to / from camera
6 way LEMO	Tally	Interface for external Tally light

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f. L1500 HD Transmitter Description and Specification

The complete transmitter unit contains three main assemblies which can provide a flexible and upgradeable transmitter system:-

- Main unit, contains encoder, audio pre-amps, display and controller
- Modular RF Up Converter, available in various frequency bands



- Camera Controller (optional) or a 'dummy' unit must be fitted

i. Video Formats

The L1500 transmitter unit will accept HD-SDI inputs in any of the following HD formats :-

Standard	Total lines per frame	Total samples per line	Active lines per frame	Active samples per line	Interlace or Progressive	V freq	H freq
1080/60I	1125	2200	1080	1920	I	60 Hz	33.75 KHz
1080/59.9I	1125	2200	1080	1920	I	60/1.001	33.716 KHz
1080/50I	1125	2640	1080	1920	I	50 Hz	28.125 KHz
1080/30P	1125	2200	1080	1920	P	30 Hz	33.75 KHz
1080/29.9P	1125	2200	1080	1920	P	30/1.001	33.716 KHz
1080/25P	1125	2640	1080	1920	P	25 Hz	28.125 KHz
1080/24P	1125	2750	1080	1920	P	24 Hz	27.0 KHz
1080/23.9P	1125	2750	1080	1920	P	24/1.001	26.973 KHz
1080/60P	1125	2200	1080	1920	P	60 Hz	33.75 KHz
1080/50P	1125	2640	1080	1920	P	50 Hz	28.125 KHz
1080/24PsF	1125	2750	1080	1920	SF	48 Hz	27.0 KHz
1080/23.9PsF	1125	2750	1080	1920	SF	48/1.001	26.973 KHz
720/60P	750	1650	720	1280	P	60 Hz	45 KHz
720/59P	750	1650	720	1280	P	60/1.001	44.955 KHz
720/50P	750	1980	720	1280	P	50 Hz	37.5 KHz



The L1500 will also accept SD inputs as either composite (CVBS), component (Y/Pr/Pb) or SDI in the following formats :-

Standard	Input Connector
SDI 625	SDI
SDI 525	SDI
PAL	CV
NTSC	CV
NTSC No Ped	CV
PAL-M	CV
PAL-N	CV
YPbPr 625	Y/Pr/Pb
YPbPr 525	Y/Pr/Pb
Betacam	Y/Pr/Pb

g. Input / Output Connections

This following section details the connector types and pin-outs of the interface connectors on the L1500 Transmitter unit.

i. SDI Video Input

75 Ω chassis mounted BNC jack socket for input of HD-SDI (SMPTE 292M) or SD-SDI (SMPTE 259M) video.

ii. SD Analogue Video Inputs

Three 75 Ω chassis mounted insulated BNC jack sockets for input of composite (CV) or component analogue (YPrPb) SD video. The CV and Y inputs share a common connector.

iii. ASI

Both ASI input and ASI output are connected to the transmitter unit via 75 Ω chassis mounted BNC jack sockets.

iv. Audio - Ch1

A stereo pair, differential inputs at Mic level (with or without phantom power) or Line Level. A switched 25dB gain and a variable (+31.5 to -95dB) level control. Line / Mic and phantom power is independently switchable on Ch1 and Ch2.

>20k Ω input impedance
 Frequency response 50Hz to 15kHz <0.1dB
 Frequency response 20Hz to 20kHz <0.5dB
 +18dB clipping level (+18db $\equiv$ 0dBFS)

2 Chassis Socket Connectors:- XLR3

XLR Pin	Function
Pin 1	Gnd
Pin 2	Live / +ve
Pin 3	Ret / -ve

v. Audio - Ch2

A stereo pair, differential inputs at Mic level (with or without phantom power) or Line Level. A switched 25dB gain and a variable (+31.5 to -95dB) level control. Line / Mic and phantom power is independently switchable on Ch1 and Ch2.

>20k Ω input impedance
 Frequency response 50Hz to 15kHz <0.1dB
 Frequency response 20Hz to 20kHz <0.5dB
 +18dB clipping level (+18db $\equiv$ 0dBFS)

Chassis Socket Connector	:-	LEMO EEG0B305CLV
Mating Cable Plug	:-	LEMO FGG0B305CLAD52Z
Link Cable Assembly – 2 x XLR3	:-	L0001

Images are for illustration only and may differ from components supplied



LEMO Pin	Function
Pin 1	Left Line + (Line)
Pin 2	Left Line - (Return)
Pin 3	GND
Pin 4	Right Line + (Line)
Pin 5	Right Line - (Return)

vi. DC Power

L1500 ~28W 12V DC nominal (10V minimum, 18V maximum)

Power dependent upon frequency of L1510, RF output power and camera control options.

Performance is degraded below 11.0V.

Chassis Socket Connector :- LEMO ECG1B304CLV
Mating Cable Plug :- LEMO FGG1B304CLAD62Z
Link Cable Assembly- flying leads :- L0003

LEMO Pin	Function
1	GND
2	GND
3	+12V supply
4	+12V supply

vii. RF

100mW into 50Ω – switchable. 10, 50 ,100 and 250mW.

Note:- 250mW is for use in FCC regulatory regions only.

50Ω chassis mounted 'N' type bulkhead socket.

viii. RS232 Data & Control Port

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

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

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

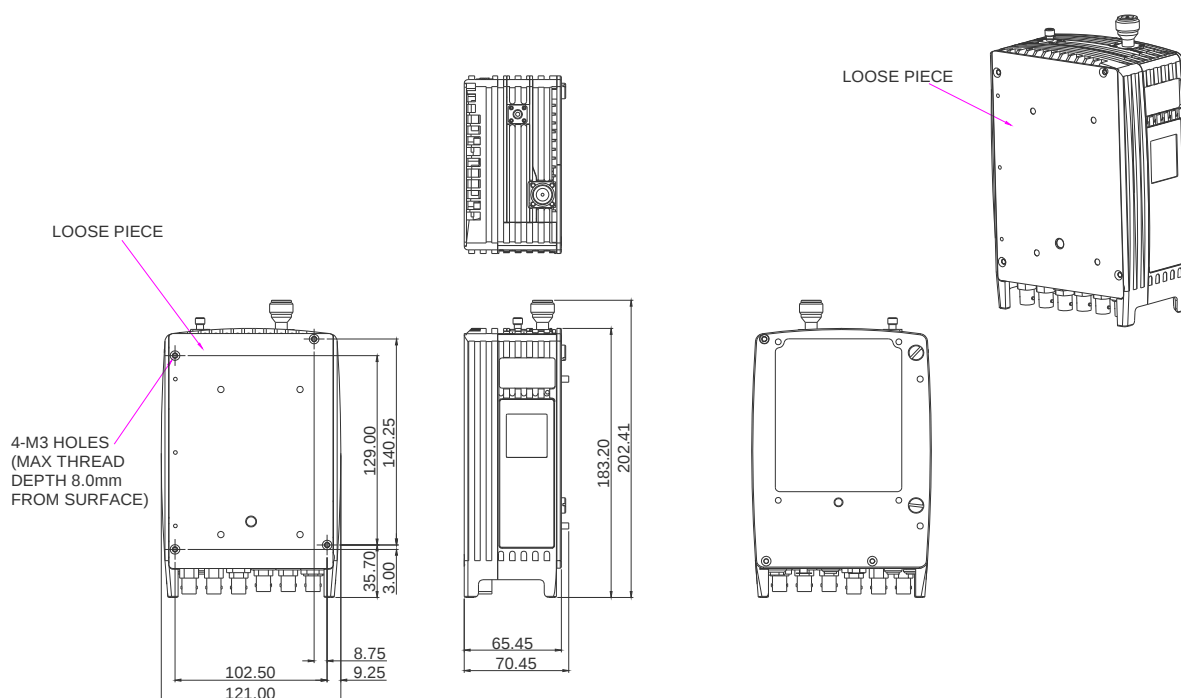
ix. USB Data Port

A USB2 'Mini B' style connector is to allow for serial communication with the unit.

Chassis Socket Connector :- Molex 67503-0020

USB Pin	Function
Pin 1	Vbus
Pin 2	D-
Pin 3	D+
Pin 4	
Pin 5	0V

h. Mechanical



Unit shown with no battery mount or camera interface mounts fitted.

3. Receiver – Optional

L1520 Camera Controller / Data

All configuration of the camera controller is via the main L1500 LCD display and operators menu. :-
Setup/Camera Control/Cam Type.

The only functions that require to be configured are :-

Camera Type- Thomson (LDK6000)
Sony (HDC1500)
Ikegami

Frequency- Dependent upon the configuration of the UHF radio, please contact Support for details.

The following leads are supplied for connection between the camera controller (**CC Data** connector) and camera head.

Thompson- LDK6000 L0016
Sony L0017

Connector type	Legend	Description
4 way LEMO	Tally	Connection to external Tally light – future design
6pin LEMO	CC Data	Serial control data to camera head.



4.

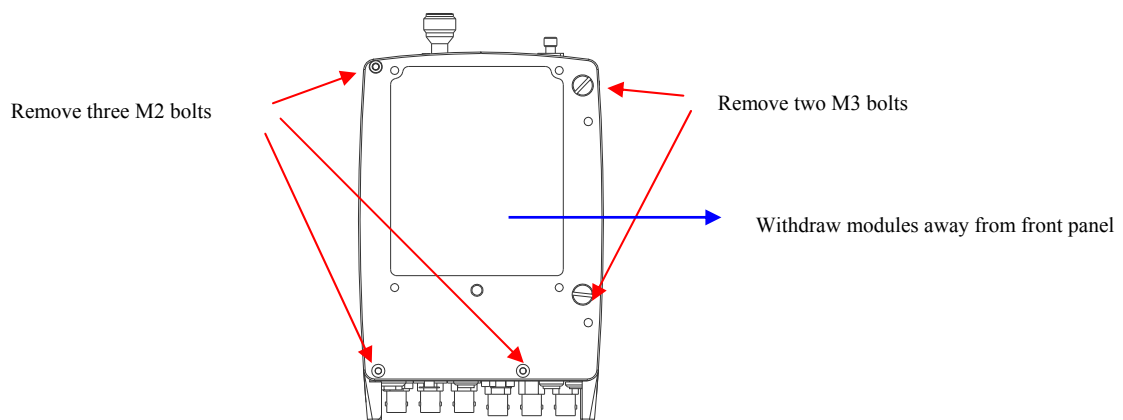
Maintenance & Firmware Upgrades

a. L1500 RF / Up Converter and Camera Control Module Removal

WARNING

Before removal of the L1500 modules ensure that the battery or external DC power supply is removed from the L1500.

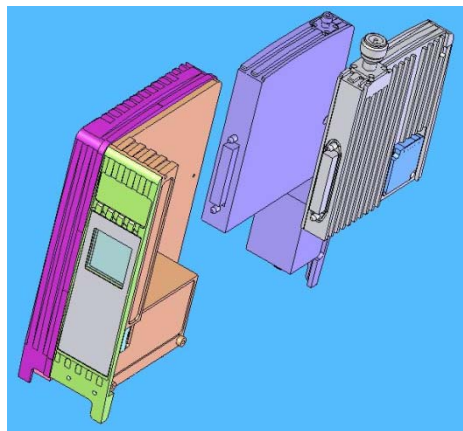
Also please take precautions to avoid static damage to both the removed modules and the main L1500 unit. Avoid contact with the module connectors and store in anti static packaging.



Removing the five fixing bolts from the battery side of the L1500 allows the plate to be removed from the main assembly. Care should be taken as the battery connector loom will need to be disconnected from the main interface board to allow complete removal of the battery plate.

The RF and Camera control module can then be withdrawn (as a pair) from the main unit by pulling away from the front panel. The RF module and Camera Control module can then be separated.

Before replacing the modules into the main housing ensure that they are both mated together and the dowel on the Camera Control module is inserted into the RF module. The pair can then be replaced into the main housing.



It is recommended that the default settings are restored after a module has been changed; (Advance/System/Restore Defaults). This ensures the correct parameters are loaded for the modules fitted.

Images are for illustration only and may differ from components supplied



b. L1500 Firmware Upgrades

Link Research equipment is designed to allow for firmware upgrades providing new features and continual improvements during the life of the product.

Please consult the Link Research website for details of the latest firmware releases.

<http://www.vislinknews.com/resource-center-downloads.htm>

The L1500 unit, including any modules; can be upgraded via the USB port. The required file can be downloaded from the Link Research website and copied onto a suitable USB memory stick after first deleting any previous builds from the memory stick.

First remove the power from the L1500 unit; either battery or external Lemo connector.

Insert the USB memory stick and apply power to the unit. The upgrade process will then start automatically; the display will indicate the status of the upgrade process. Depending on the number of devices that require to be updated this may take several minutes; only the firmware requiring upgrade is modified. The display will indicate when the update process is complete and power should not be removed whilst the upgrade is in process.

When completed, remove the USB stick and cycle the power to the unit.

As the firmware is held on the module this upgrade process should be repeated when a module is replaced and the firmware may be of an older release. The versions of the individual firmware within the L1500 can be checked in the Service/Versions menu.



5.

L1500 Product Part Numbers

Link Part Number	Product Description	Details
L1500	L1500 Transmitter – Base Unit	
L1510-1415	L1500 RF Module / UpConverter	1.435 – 1.525 GHz Green
L1510-1927	L1500 RF Module / UpConverter	1.95 – 2.7 GHz Black
L1510-2729	L1500 RF Module / UpConverter	2.7 – 2.9 GHz Red
L1510-3236	L1500 RF Module / UpConverter	3.2 – 3.6 GHz Grey
L1510-5259	L1500 RF Module / UpConverter	5.2-5.925 GHz Blue
L1510-6471	L1500 RF Module / UpConverter	6.4 – 7.1GHz Purple
L1510-6875	L1500 RF Module / UpConverter	6.8 – 7.5GHz Orange
L1520-4549	L1500 CC Module 450-490MHz	
L1520-4145	L1500 CC Module 410-450MHz	

6.

Part Numbers for L1500 Accessories

Link Part Number	Description	Details
L9965	IDX/Sony Battery Interface	
L9966	PAG Battery Interface	
L9967	Anton Bauer Battery Interface	
L9962	IDX /Sony Camera Interface	
L9963	PAG Camera Interface	
L9964	Anton Bauer Camera Interface	
L9938	IDX/Sony LDK6000 Bracket	
L9939	PAG LDK6000 Bracket	
L9940	Anton Bauer LDK6000 Bracket	
L0001	Lemo to XLR for line audio	I/P audio cable for Transmitter And CCU unit
L0002H	Lemo to RS232 Remote/Data	Cable for remote and data/prog
L0003	Lemo power cable for user	
L0014	10m BNC to BNC D/C cable	
L3421	Antenna TX Omni Spring 3 dBi 1.95-2.7GHZ	
L3423	Antenna TX Omni Spring 3 dBi 1.95-2.7GHZ	Extra Long version
L3430	Antenna TX Omni Spring 3 dBi 6.0-7.5GHZ	
L3435	Antenna TX Omni Spring 3 dBi 3.4-3.7GHZ	
		Contact Support for further antenna options
L3520	Antenna Omni Short 3dBi 1.95-2.7GHZ	
L3530	Antenna Omni Short 3dBi 3.4- 3.7GHZ	
L3535	Antenna Omni Short 3dBi 6.0-7.5GHZ	
L3025 -1925	Downconverter 1.95 – 2.7GHz	(Other frequency bands available from 1.785 – 7.5GHz)

End of Document