RFX-CMT Clip-On

OPERATORS MANUAL

Applicable to model

UNGA-CCAM-7024

(Software)

UNSW-CCAM-7024-01

CONTENTS

1 General safety information

The information that follows, together with local site regulations, must be studied by personnel concerned with the operation or maintenance of the equipment, to ensure awareness of potential hazards.

WARNING- RF Power Hazard : High levels of RF power are present in the unit. Exposure to RF or microwave power can cause burns and may be harmful to health.

Switch off supplies before removing covers or disconnecting any RF cables, and before inspecting damaged cables or antennas.

Avoid standing in front of high gain antennas (such as a dish) and never look into the open end of a waveguide or cable where RF power may be present.

Users are strongly recommended to return any equipment that requires RF servicing to RF Central.

WARNING- GaAs / BeO Hazard : Certain components inside the equipment contain Gallium Arsenide and Beryllium Oxide that are **toxic substances.** Whilst safe to handle under normal circumstances, individual components **must not** be cut, broken apart, incinerated or chemically processed. In the case of Beryllium Oxide, a white ceramic material, the principal hazard is from the dust or fumes, which are carcinogenic if ingested, inhaled or entering damaged skin.

Please consult your local authority before disposing of these components.

CAUTION- Tantalum Capacitors: When subjected to reverse or excess forward voltage, ripple current or temperature these components may rupture and could potentially cause personal injury.

CAUTION: This system contains MOS devices. Electro-Static Discharge (ESD) precautions should be employed to prevent accidental damage.

1.1 Health & Safety

Exposure to Non-Ionizing (RF) Radiation/Safe Working Distances

The safe working distance from a transmitting antenna may be calculated from the relationship:

$$D = \sqrt{\frac{P_T . G_R}{4\pi . w}}$$

In which: D = safe working distance (metres)
PT = transmitter or combiner power output (watts)
GR = antenna gain ratio = anti log (gain dBi ÷10)
w= power density (watts/square metre)

The RF power density value is determined by reference to safety guidelines for exposure of the human body to non-ionizing radiation. It is important to note that such safety guidelines are different throughout the world. Such safety guidelines are, from time-to-time, revised. For this product, a maximum power density limit of 1w/m² is to be applied when calculating minimum safe working distances.

Antenna			**Transmitter Power**			
Type	**Gain (dBi)**	**Gain Ratio**	**2W**	**4W**	**10W**	**30W**
Omni	4	2.5	1	1	1.5	2.5

1.2 Maximum RF Power Density Limits

The recommended RF Radiation Power Density limit is based upon the following published documents:

a.) IEEE standard C95.1 1999 - IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

b.) Guidelines for Limiting Exposure to Time-varying Electric, Magnetic & Electromagnetic Fields (up to 300 GHz) published in 1998 by the Secretariat of the International Commission on Non-Ionising Radiation Protection (ICNIRP).

Both documents define RF power density limits for "controlled" and "uncontrolled" environments. An uncontrolled environment is defined as one in which the person subjected to the RF radiation may be unaware of and has no control over received energy radiation. Uncontrolled environment conditions can arise, even in the best regulated conditions; for this reason the limits defined for the uncontrolled environment have been assumed for the recommended limit.

Documents (a) and (b) also show the RF power density guidelines to be frequency dependent. Different power density / frequency characteristics are presented in the two documents.

To avoid complexity and to avoid areas of uncertainty, we recommend the use of a single power density limit across the frequency range 100 kHz to 300 GHz. The 1w/m² power density limit we recommend satisfies the most stringent of the guidelines published to date.

Footnote: The IICNIRP document may be freely downloaded (PDF) from the internet at www.icnirp.de/emfgdl; The IEEE standard is available www.ieee.org for a fee.

Issue Status

Issue	Date	Changes
1	27/02/2007	First Issue, this model variant

1.3 RF Safety Comments

Important Note: It must be remembered that any transmitting equipment radiating power at frequencies of 100 kHz and higher, has the potential to produce thermal and athermal effects upon the human body.

Mandatory Safety Instructions to Installers & Users
Use only the manufacturer or dealer-supplied transmitting antenna.

Antenna Minimum Safe Distance: 8 inches (20 cm)
Antenna Gain: 4.0 dBi referenced to a dipole. The Federal Communications Commission (FCC) has adopted a safety standard for human exposure to RF (Radio Frequency) energy which is below the OSHA (Occupational Safety and Health Act) limits.

Antenna Mounting: The antenna supplied by the manufacturer or radio dealer must not be mounted at a location that, during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna provided. For this transmitter and antenna, the safe distance is 8 inches (20 cm). To comply with current FCC RF Exposure limits, the antenna must be installed at, or greater than: (1) The minimum safe distance as described above and (2) In accordance with the requirements of the antenna manufacturer or supplier.

Base Station Installation: The antenna should be fixed-mounted on an outdoor permanent structure. RF Exposure compliance must be addressed at the time of installation.

Antenna Substitution: Do not substitute any antenna for the one supplied or recommended by the manufacturer or radio dealer. Such a substitution may expose a person or persons to excess radio frequency radiation. You may contact your radio dealer or the manufacturer for further instructions.

Warning: Maintain a separation distance from the antenna to a person(s) of at least 8 inches (20 cm). You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure that the minimum separation distance (see above) is maintained between the antenna and nearby persons in order to maintain RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational/Controlled Exposure Environments, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

To be safe:

a) Operators should not stand or walk in front of any antenna, nor should they allow anyone else to do so.

b) Operators should not operate any RF transmitter or power amplifier with any of its covers removed, nor should they allow anyone else to do so.

2 Introduction

This manual is specific for the RFX_CMT Clip-On transmitter (model UNGA-CCAM-7024) incorporating software suite UNSW-CCAM-7024-01. The unit incorporates features such as: selectable standard delay or dedicated ultra low delay. Other notable features are memory presets and manual setup of COFDM modulator configurations.

- The Standard Delay mode uses conventional MPEG-2 frame-based encoding with choice of: MP@ML (4.2.0); MP@ML (4.2.2) plus special profiles optimized for low delay (100 ms typical).

- The Ultra-low Delay version uses field-based encoding with special profiles optimized for ultra low delay (40 ms throughout for all video bit rates).

The RFX-CMT Clip-On Wireless Camera system is designed for all applications (both indoor and outdoor) in which a mobile camera is essential to the production of television programs.

The unique modular design of the RFX-CMT Clip-On transmitter ensures complete flexibility in the choice of compression and modulation techniques to suit any required task, from the highest video quality to the most rugged of RF signal paths.

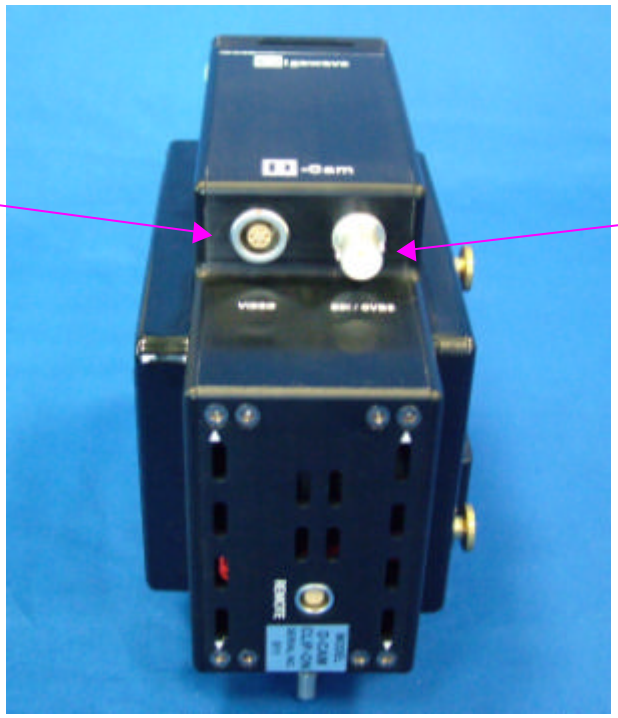
The Clip-On transmitter contains an audio encoder, video encoder, COFDM modulator, power supplies and an RF power amplifier. The transmitter accepts the attachment of an Omni-directional antenna via an N- type connector.

External view of the D-Cam Clip-On

3 Specifications

Frequency Band	5.725 – 5.85 GHz band	
Tuning Range	300 MHz standard bandwidth. Wider bandwidths available to special order	
Frequency Selection	Up to 16 pre-set channels or tuning in ½ MHz steps via side mounted panel control.	
Transmit Power	100 mW	
Transmit Antenna	Omnidirectional 4 dBi gain (nom.)	
Modulation	COFDM DVB-T (2K Carriers)	
Modulation Modes	QPSK, 16QAM, 64QAM	
	FEC: $^{1}/_{2}$ $^{2}/_{3}$ $^{3}/_{4}$ $^{5}/_{6}$ $^{7}/_{8}$	
	Guard interval: $^{1}/_{32}$ $^{1}/_{16}$ $^{1}/_{8}$ $^{1}/_{4}$	
	Menu selectable via side mounted panel control	
Data Rate	4.98 to 31.7 Mbit/s	
Bandwidth	8 MHz (7 MHz & 6 MHz available)	
Encoding Options	MPEG-2 4.2.0/4.2.2 high quality (DVB standard)	
Latency	Standard delay - selectable to less than three frames minimum, Tx to Rx	
	Ultra low delay – one frame (40 ms), Tx to Rx (all video bit rates)	
Video Input	Digital:	SDI 270Mbit/s
	Analogue:	YUV, Y/C Component
		CVBS Composite Video (NTSC/PAL)
Audio Input	2 x Analog inputs (Mic/Line selectable)	
Power Requirements	Available with interface plates to mate with Anton/Bauer, IDX, PAG and other batteries (to be specified at time of order) or 11 - 16VDC (18W) via standard 4-pin XLR socket	
Mechanical Interface	Transmitter normally mounts between battery and battery interface plate	
Size	160 x 130 x 54mm	
Weight	0.95kg (including antenna)	
Environmental	Temperature:	-20° to +50°C
	Altitude:	4500m
	Humidity:	95% humidity long term

4 Connector pin outs



3.1 ASI/SDI / CVBS Video BNC

Either ASI or SDI or Composite video, blanking & sync (CVBS) input. Switched via the control panel. See 5.5.3.4

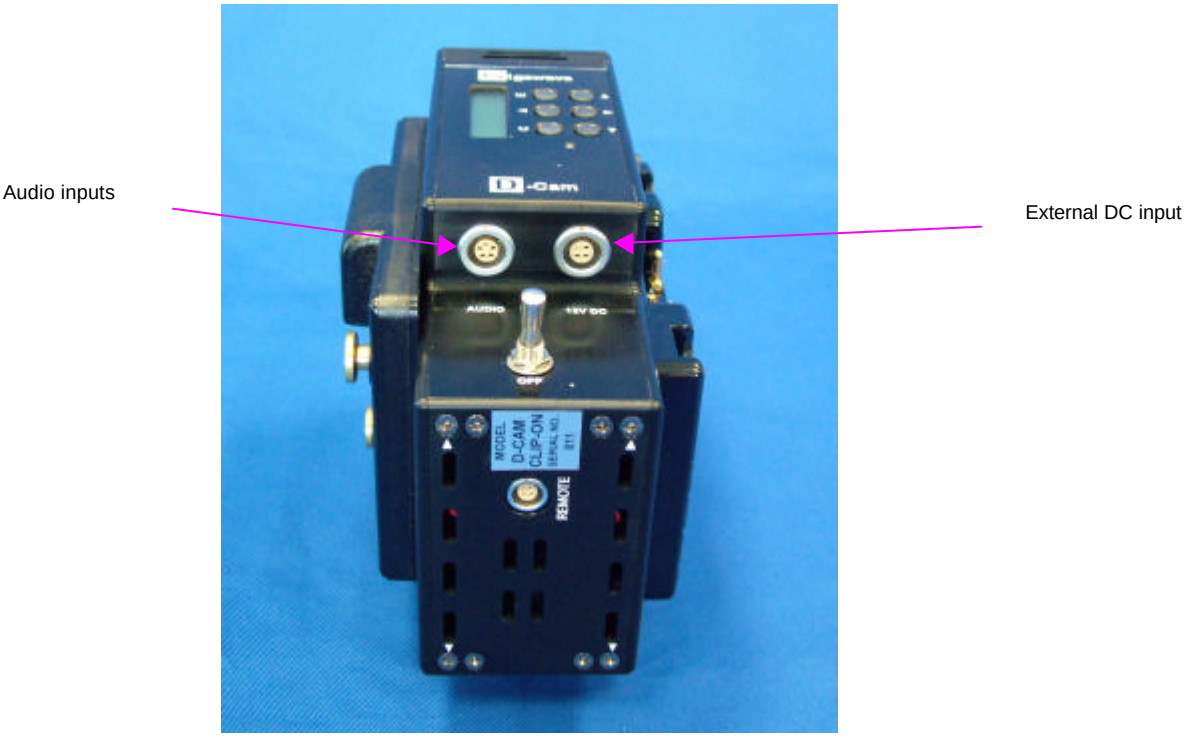
75Ω BNC connector

3.2 Video Connector

Component YC / YUV / CVBS

6Pin Lemo Plug FGG.1B.306.CLAD62Z

Pin	CVBS	YC	YUV
1	0V	Y(0v)	Y(0v)
2	CVBS	Y	Y
3		C(0v)	U(0v)
4		C	U
5			V(0v)
6			V



Audio Connector

Line / Mic Hi Z

5 Pin Lemo Plug FGG.1B.305.CLAD62Z

Pin	Function
1	0V (Screen)
2	Ch1 +
3	Ch1 -
4	Ch2 +
5	Ch2 -

3.3 Power Connector

Remote connector

9-18V DC 18W (CMT power only)

This connector can be used to take power from the docked battery (5A Max) to power external cameras, if the CMT Clip-On is not docked directly to the camera.

The power switch is used to control only the RFX-CMT Clip-On. The power supply to the camera is always available from the battery interface or external power connector.
The camera on/off switch should therefore be used to control the camera independently.

4 Pin Lemo Connector FGG.1B.304.CLAD62Z

Pin	Function
1	0V
2	0V
3	+12V
4	+12V

3.4 Remote Connector

RS232. 19200 Baud, 8 bit, 1 stop, No parity
4 Pin Lemo Plug FGG.0B.304.CLAD62Z

Pin	Function
1	0V
2	Tx (Data out from unit)
3	Rx (Data into unit)
4	0V

Please note that the remote setup feature is not implemented In the version of the CMT described in this manual.

4 Module Descriptions

The RFX-CMT Clip-On is based upon the highly successful D-Cam dockable Wireless Camera system. Internally, it is very different!

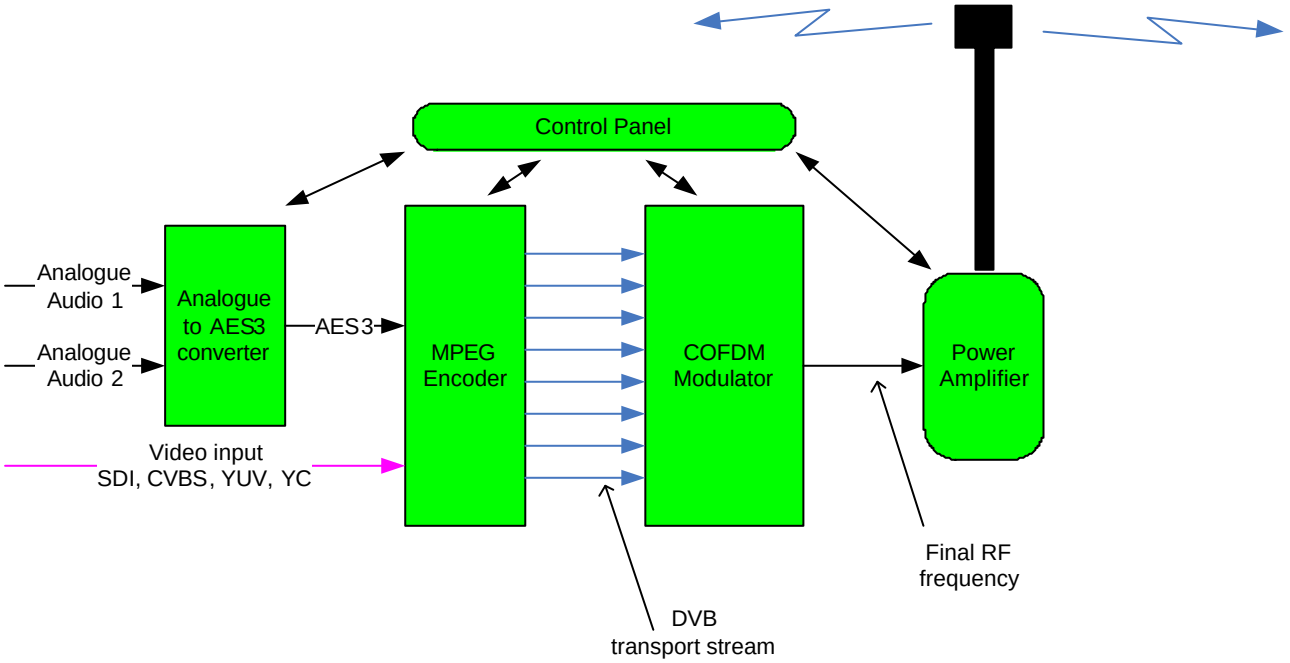
Our engineers have completely redesigned the CMT to compress all the circuitry from five circuit boards onto two. This greatly reduces space and weight compared with the original D-Cam product.

The result is a Digital Wireless Camera system featuring exceptional RF performance, is well-balanced and easy to use.

The RFX-CMT Clip-On contains four circuit board assemblies:

- Audio / Video Encoder
- COFDM Modulator
- RF Power Amplifier
- Display / System Controller

4.1 Block diagram



Clip-On block diagram

4.2 Audio / Video Encoder

The Encoder board consists of the following main functions:

- Cable equalizer function for ASI/SDI digital inputs
- SDI to Digital de-serializer. Converts the SMPTE-259M-C serial digital video input to an 8 bit parallel digital video bus.
- Analog to Digital Video Converter, 10-bit over-sampling ADC. Accepts either Composite Video (CVBS, 75 ?/1v p-p), Y/C or YUV inputs in either NTSC / PAL format and converts to an 8-bit parallel digital video bus.
- Analog to Digital Audio Converter, 48kHz, 24 bit
  Two high impedance analog inputs. Audio 1 (left channel). Audio 2 (right channel). The two channels are first buffered by a variable gain stage to cater for either Mic or Line level inputs. A switchable 20 dB stage is also included to cater for low level Mic inputs. The two audio channels are then converted into an I²S serial data stream.
- FPGA. Selects the required 8 bit-parallel digital video bus from either the SDI de-serializer or the video ADC for input to the MPEG-2 Encoder. A relay is used to route the input from the BNC (either SDI or CVBS) to either the de-serialiser or ADC. Selects the I²S from the ASE/EBU receiver or the audio ADC for input to the MPEG-2 encoder. Generates the video test bars and audio test tones.
- Micro-controller. Writes control data and reads status data to/from the MPEG2 Encoder.
- MPEG-2 Encoder

  The MPEG encoder is switchable from the front panel menu between standard delay mode and Ultra Low delay mode.

  A set of encoding parameters is loaded into the encoder at power up. These are selected from one of the ‘preset’ encoder memories, or by automatic video rate alignment when in the modulator is manual configuration. See 5.5.3.2
- DC Power Supplies
  Switching DC/DC converters are used to generate the various supplies from the incoming 11-18V battery supply. These include 2.5, 3.3V, 5V, 8V and +/-5V supplies.

There are no field replaceable parts on the Encoder board. If a fault occurs with the board, contact RF Central for technical support.

4.3 COFDM Modulator

COFDM - “Coded Orthogonal Frequency Division Multiplexing” – this is the modulation scheme which is used by the DVB-T digital television system.

The COFDM modulator has been designed to take its input from the MPEG-2 encoder, or from the direct ASI input. This Transport stream is then modulated directly to the 1.5/2/2.5/3.5/4.5/6.5/7GHz band as appropriate.

The COFDM bandwidth is switchable 6/7/8 MHz from the front panel menu.

The COFDM modulator RF output is via the SMB connector. This output is then fed into the power amplifier, via the short RF cable. The nominal RF output level of the Modulator is –9dBm.

The modulator is automatically configured to match the data rate of the MPEG-2 Encoder.

The modulator can support modulation schemes and data rates according to the chart in section 7 – Appendix B; operationally the modulator is configured according to preset parameter sets as described in 5.5.3.1

There are no field replaceable parts on the COFDM modulator. If a fault occurs with the board please contact Gigawave for technical assistance.

4.4 Power Amplifier

The function of the power amplifier is to amplify the signal from the COFDM modulator to a suitable level for transmission via the N-type connector into the antenna. The amplifier is required to be highly linear to accommodate the multiple carrier signal formats employed for digital system operation, with very low distortion (low inter-modulation between carriers). The nominal output power is +20 dBm (100 mW) across the 1.5/2/2.5/3.5/4.5/6/5/7GHz band (as appropriate). Nominal overall gain is 29 dB, thus the nominal RF input level is –9 dBm. The amplifier operates from a single +8 Volt supply. Nominal operational supply current is 700 mA.

The status of the PA is provided by LEDs to monitor RF output level (Green) and DC present (Red) and also monitored by the main controller and displayed as the status monitoring menu. See 5.3.

To ensure good RF practice, when power is applied to the RFX-CMT Clip-On Camera back, always make sure that there is a suitable load or antenna connected to the RF output.

4.5 Front Panel PCB

The Front Panel consists of a micro-controller, 16-character by 2-line LCD display, operator switches and interface circuits.

The Front Panel is the main system controller for the unit. All configuration of the unit hardware is from this board. An "I²C" two-wire interface is used to communicate with all other intelligent devices within the unit. This carries the command data and reads back status data from all boards within the unit. At power-up this board initializes all the other boards and during normal operation monitors all the major functions and reports any problems as part of the unit status.

All configuration parameters, video settings, audio settings, MPEG Encoder parameters, frequencies etc are held on this board. These parameter sets are held in the non-volatile memory of the front panel unit; this ensures that the unit holds the current configuration during power down and powers up to the current configuration.

5 System operation

5.1 Camera Interfaces

The RFX-CMT Clip-On can be supplied with any of three professional battery and camera interfaces:

- Sony ‘V’ Block / IDX
- Anton/Bauer Gold Mount
- PAG

These provide a flexible and versatile mounting system suitable for a wide range of cameras and battery options.

The CMT is first mounted onto the camera’s rear battery interface. If required, an appropriate battery can then be docked onto the rear of the CMT transmitter. The video and audio cables must then be connected between the camera and the CMT; see section 0.

If a battery is docked onto the rear of the CMT, no external DC power lead is required. A separate lead is only required if a battery belt or external power supply is used.

Care should be taken to prevent damage to an external power supply if a battery is docked, since current can be taken FROM the Power Connector.

5.2 Powering up the Clip-On with the PA disabled

To disable the RF Power Amplifier the front panel buttons **C** and ? are both pressed down together as the unit is switched on. This allows the transmit frequency to be checked before the PA is switched on. In this condition the front panel LED will be flashing RED. PA status can be checked according to section “**Error! Reference source not found.**.

The PA can be re-enabled by cycling <OFF/ON> the power to the CMT.

5.3 Status Monitoring (front panel LED)

The front panel LED indicates the condition of the CMT as follows,

GREEN	Normal Operating condition
GREEN FLASHING	Clip-On is functioning but has no video, or ASI, input
RED FLASHING	The PA is turned off.
RED	Clip-On internal fault condition, (consult the status menu through the LCD display – see section **Error! Reference source not found.**).

5.4 Operator Controls / Menus

The RFX-CMT Clip-On has three control menus: “Operations menu for internal MPEG encoder mode”; “Operations menu for external ASI mode”; “Engineering menu”. To access the Engineering menu press **C** to reach the menu top level, and then press and hold the **C** and ? buttons simultaneously (hold for 2 to 10 seconds). Note: after the Engineering menu has been accessed the CMT will revert to the “Ops” menu after an interval 30 Secs., if the “Eng” menu is not being navigated.

The CMT is configured using an LCD display and six push buttons. These are arranged as four navigation buttons (? ? ? ?), plus **E**nter and **C**lear.

The **E**nter button is used to store the modified parameter in non-volatile memory, this parameter will then be used to configure the D-Cam Clip-On and will also become the default value when next powered on. The **C**ancel button can be used to exit a menu without storing the parameter in memory.

Various menu levels are provided to allow the operator to access the different hardware and operating parameters:

The layouts of the “Operations” and “Engineering” menus can be found at the end of this section. The following paragraphs describe how each of the major functions are monitored and controlled.

5.4.1 Initialization screen

At switch on the status of the initialization is displayed. If any errors are found with the initialisation of the major functions; Video, Audio, Encoder and Modulator; an error message will be displayed. During initialisation the Status LED will be off.

5.4.2 Current operational state screens

The display screen during normal operation of the CMT and indicates the Tx frequency, Channel number (or Manual frequency) and the current modulation mode, FEC rate and Guard Interval.

Additional screens showing the current operational state are accessed via the ? ? buttons. These show video bit rate, encoder preset, DVB PIDs, video set-up, audio set-up, status warnings

Video input OK	- video is present at the input
PA not inhibited	- PA not inhibited by system software
MOD TS	- the transport stream is present
MOD rate	- the modulator data rate is correctly aligned to the encoder video data rate
Synth. locked	- the RF synthesiser is locked to correct frequency

5.5 System Configuration – Operations Menu (MPEG mode)

The ? ? buttons are used to select the required sub-menus; the **E**nter button is then used to select the required function.

5.5.1 Ch / Frequency Menu

This menu is used to select one of the sixteen pre-programmed channels (CH1 – Ch16) or 'manual' frequency selection. The 'Man' setting allows control of the transmit frequency in 0.5MHz steps within preset limits.

The **E**nter button allows the ? ? buttons to select the required digit, the ? ? buttons then select the required value. The **E**nter button then stores the value and returns to the Main menu.

5.5.2 Select ASI Menu

This menu is used to switch the unit into ASI input mode. Once ASI mode is selected the menu changes to "OPS MENU - ASI MODE" see the appropriate menu chart and paragraph 5.6

5.5.3 Select MPEG Menu

The full MPEG set-up menu is shown on Sheet 2, details are as follows:

5.5.3.1 Encoder Pre-set

The unit is programmed with pre-set MPEG and COFDM parameter sets for both standard and Ultra low delay modes. These are held in sixteen preset memories (0 – 15). Details of the pre-sets are shown on a chart which is shipped with the equipment. After scrolling to the chosen memory pre-set additional information <i> can be accessed though the ? ? buttons. As an alternative the modulation may be manually set as in paragraph 5.5.3.2

The Encoder Pre-set menu selects the MPEG encoder profile; 4.2.2, 4.2.0 and SP@ML (low delay), video data rate, Modulation mode, and FEC rate. In the case of Ultra Low Delay all profiles are SP@ML and the latency is 40ms for all video bit rates.

Pre-programmed encoder parameter sets can vary according to individual customer requirements; a separate chart is included in the documentation accompanying the equipment when shipped from the factory

5.5.3.2 Encoder Manual Pre-set

Instead of using one of the 16 encoder pre-sets, as in paragraph 5.5.3.1, the modulation parameters may be manually set for – Constellation, COFDM RF bandwidth, Guard interval, FEC code rate. In this mode the video data rate is automatically adjusted to match the modulation, and encoding profile is set at standard delay.

5.5.3.3 PID menu

The PIDs which are inserted into the DVB transport stream as part of the encoding process may be set via this menu.

5.5.3.4 Video Input

The CMT can accept:-

SDI digital video via BNC connector.
Component, Y/C, YUV inputs via the six pin LEMO connector.
Composite video via BNC connector
Internal test bar patterns of either 75%, 100% or alternating between these.

Note: The CVBS LEMO input (Pin 1 & 2) is paralleled with the BNC input when CVBS is selected; the operator should connect to only one of these inputs otherwise an incorrect signal level may result.

Signal routing is managed by the controller according to the selected options.

5.5.3.5 Audio Menu

The Audio menus are split into two levels: Select Input and Set Level. The input can be selected to:

Analog
SDI embedded
Internal test tones, 0 dB FS or –18 dB FS

When in analog audio input mode both channels, Ch1 and Ch 2, can be individually set for either Line or Mic input; selecting Mic gives a fixed +30 dB gain. There is also a level adjustment providing a +/- 20 dB adjustment in 0.5 dB steps.

The analog audio input impedance can be set to either 600 O or 50K O through the Engineering menu paragraph 5.7.5

5.6 System Configuration – Operations Menu (ASI mode)

5.6.1 Ch / Frequency Menu

This menu is identical to that mentioned in paragraph 5.5.1

5.6.2 Select MPEG Menu

This menu is used to switch the unit into internal MPEG Encoder mode. Once MPEG mode is selected the menu changes to “OPS MENU - MPEG MODE” see the appropriate menu chart and paragraph 5.5

5.6.3 Select ASI Menu

This menu the modulation parameters to be individually set when the unit is operated in the ASI input mode. Details are as follows:-

5.6.3.1 Constellation

Allows the modulation to be set QPSK, 16QAM, 64QAM

5.6.3.2 Code rate

Allows the Viterbi FEC to be set 1/2, 2/3,3/4, 5/6, 7/8

5.6.3.3 Guard Interval

Allows the Guard Interval to be set 1/4, 1/8, 1/16, 1/32

5.6.3.4 Constellation

Allows the COFDM modulation bandwidth to be set 6, 7 or 8MHz

5.7 System Configuration – Engineering Menu

The engineering menu is entered by pressing the ? and ‘C’ buttons simultaneously for ~10seconds, then releasing the ‘C’ button.

5.7.1 Prog Channels

Each of the sixteen frequency channels can be independently assigned to the required frequency with 0.5MHz resolution.

The ? ? buttons are used to select the Channel to be assigned. The **E**nter button then allows the four ? ? ? ? to edit the required frequency. The **E**nter button then stores the value and returns to the top level of the “Engineering” menu.

5.7.2 Cable equalizer

This feature allows the selection of an automatic equalizer on the digital SDI or ASI input designed to compensate for long cables, up to 300 meters of high quality SDI cable. The equalizer should be set to *active* for cables longer than 10 meters

The equalizer is not designed for short cables and should be set to *bypass* for cables less than 10 metres (i.e. when the CMT is mounted on a camera)

5.7.3 LCD Contrast

This menu allows the contrast of the LCD display to be adjusted.

The ? ? buttons are used to select the required contrast. The **E**nter button then stores the value and returns to the top level of the “Engineering” menu.

5.7.4 Inventory

The firmware version for the encoder and main unit controller can be read from this menu

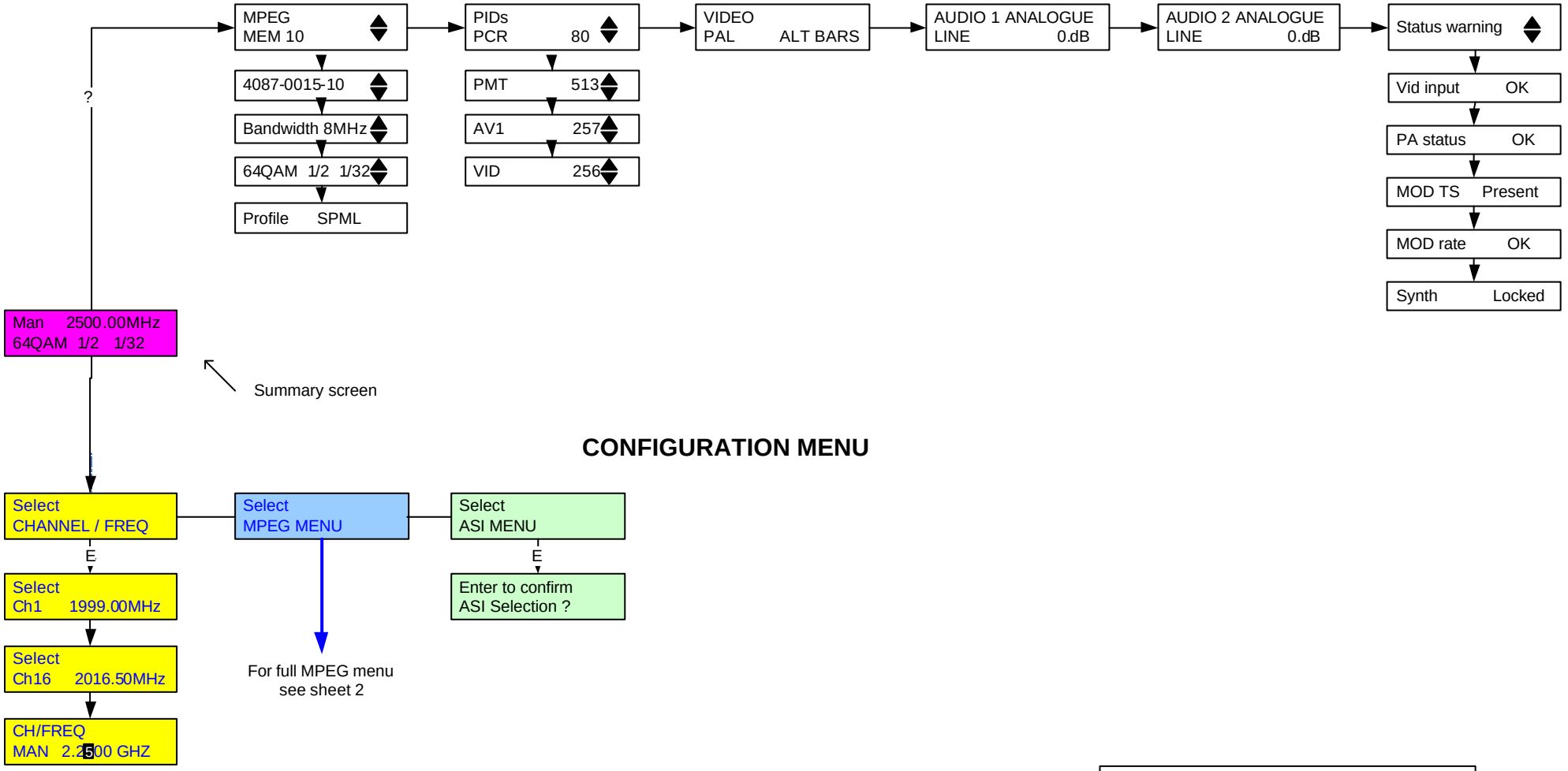
5.7.5 Audio input impedance (Z)

The input impedance (Z) of the analogue audio inputs can be set to 600O or 50KO through this menu

5.7.6 Video Format (video line standard)

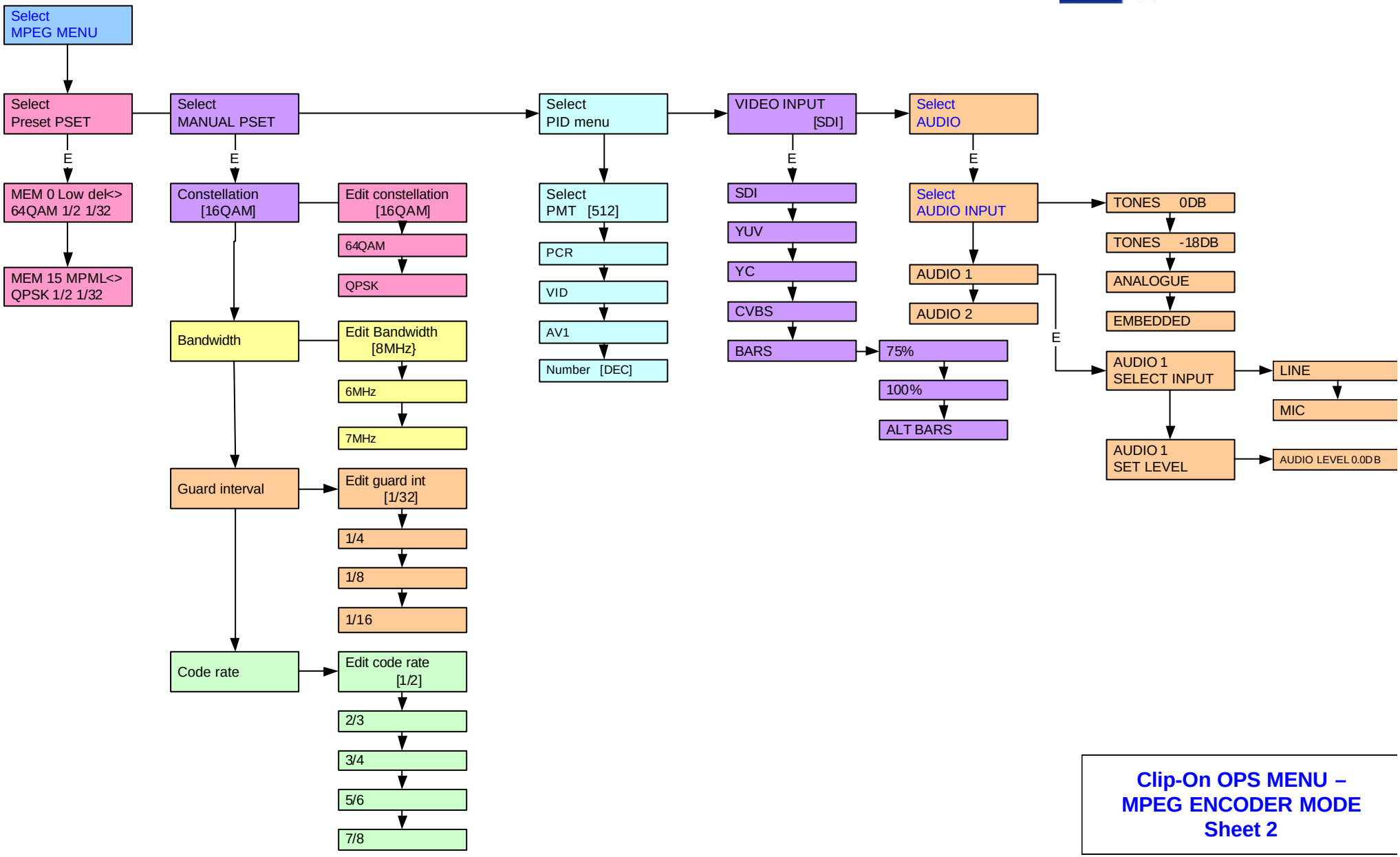
This function selects either PAL (625) or NTSC (525) line standard.

CURRENT OPERATIONAL STATE



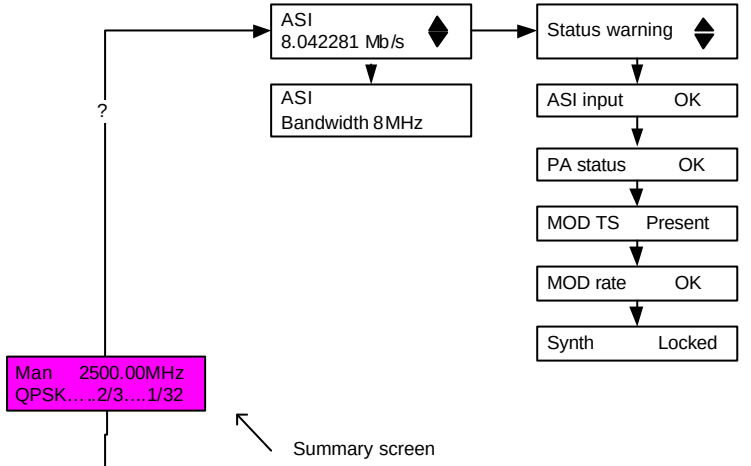
CONFIGURATION MENU

Clip-On OPS MENU – MPEG ENCODER MODE Sheet 1

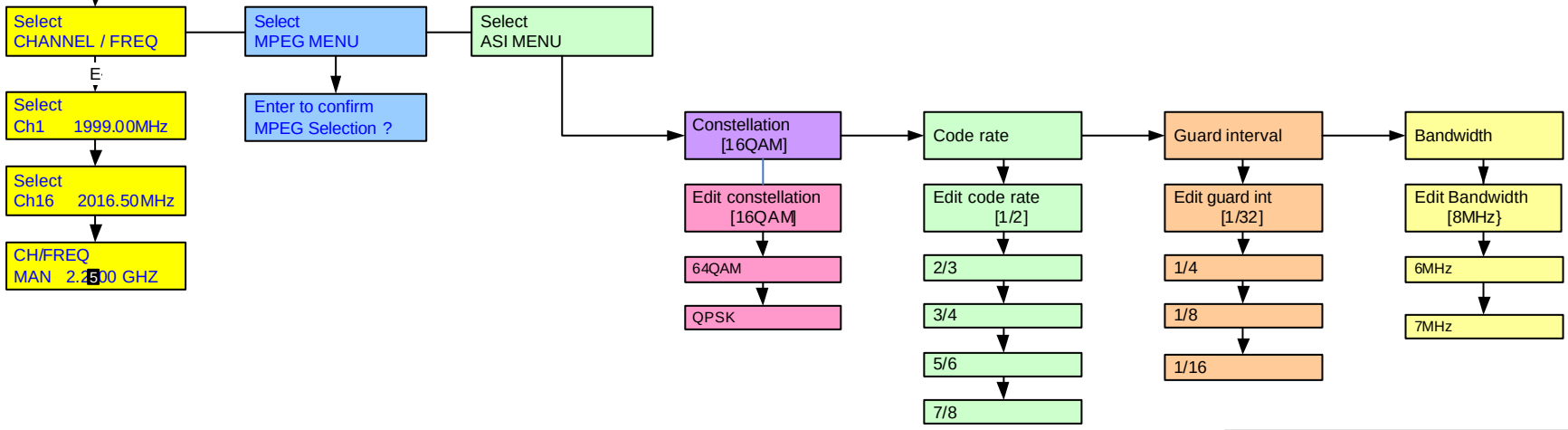


Clip-On OPS MENU –
MPEG ENCODER MODE
Sheet 2

CURRENT OPERATIONAL STATE

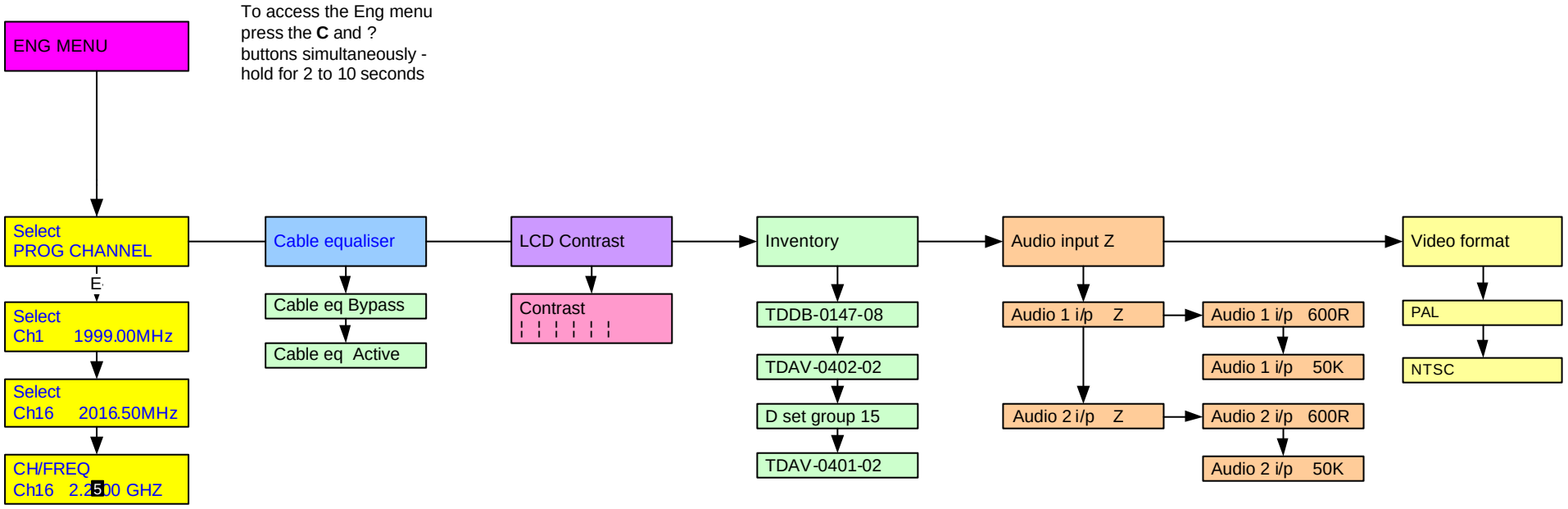


CONFIGURATION MENU



Clip-On OPS MENU – ASI MODE

ENGINEERING MENU



Clip-On ENG MENU

6 Preparing for operation

EQUIPMENT PREPARATION

Before going out for operation, we recommend that the following equipment checks be made.

6.1 The CMT Clip-On transmitter

Check that the Camera Adapter is securely fastened to the camera.

Check that the batteries to be used are fully charged and that an emergency spare battery is available and fully charged.

To enable the frequency to be checked without transmitting RF power the D-Cam Clip-On can be powered up with the PA disabled, see paragraph 5.2.

6.2 The Receiving Equipment

The CMT transmitter may operate in conjunction with a variety of RFX-Series receivers.

When used with the CMT, RFX-Series receiving equipment produces two analog audio channels, duplicated as one (stereo) AES3; - the third and fourth audios are non-functioning at the receiver when used with the Clip-On TX. Video outputs include SDI and composite video outputs, later receivers also have an ASI output. If extension cables are necessary, ensure that the connectors are compatible and of good quality to avoid problems at site.

Check that the receiving antenna-to-receiver interfaces are clean and free from dust and other unwanted materials.

If tripods are to be used to mount the equipment, make sure that some means of securing the tripod or of weighting it down is provided. Gusty wind conditions may put installations at risk, particularly when parabolic receive antenna dishes are to be used.

Make sure that all batteries, if used, are fully charged and whenever possible, provide a spare with the cable to connect it to the Receiver.

Check that the Receiver channel frequencies are compatible with those of the CMT Transmitter and set the channel selector switch to the channel number required. The Receiver is labelled with channel number and frequency information.

Whenever practical, set up the system and test it before site setup to ensure that all components of the system are working. Checking at “home base”, where adjustments and corrective actions can be made, will pay off when setting up on-site.

7 Appendix B: Table of DVB-T Bit Rates

8 MHz COFDM RF Bandwidth

Modulation	Code rate	Bit Rate (Mbit/s) at each Guard Interval (symbol fraction)			
QPSK		1/32	1/16	1/8	1/4
	1/2	6.03	5.85	5.53	4.98
	2/3	8.04	7.81	7.37	6.64
	3/4	9.05	8.78	8.29	7.46
	5/6	10.1	9.76	9.22	8.29
	7/8	10.6	10.2	9.68	8.71
16-QAM		1/32	1/16	1/8	1/4
	1/2	12.1	11.7	11.1	9.95
	2/3	16.1	15.6	14.7	13.3
	3/4	18.1	17.6	16.6	14.9
	5/6	20.1	19.5	18.4	16.6
	7/8	21.1	20.5	19.4	17.4
64-QAM		1/32	1/16	1/8	1/4
	1/2	18.1	17.6	16.6	14.9
	2/3	24.1	23.4	22.1	19.9
	3/4	27.1	26.3	24.9	22.4
	5/6	30.2	29.3	27.6	24.9
	7/8	31.7	30.7	29.0	26.1