Operations Manual

The most important thing we build is trust.

User, Messenger VETA Receiver Decoder (MVRD)

Cobham Tactical Communications and Surveillance
1916 Palomar Oaks Way Ste 100 Carlsbad, CA 92008
TEL: 760-496-0055 FAX: 760-496-0057

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Revision History

Version	Date	Main Changes from Previous version	Created by
X1	02-24-2010	Initial Release	RM
X2	06-11-2010	Genlock and Embedded Audio are added	RM
X2A	09-30-2010	LCD Menu changes are added	RM
1	04-26-2011	Transferred from 100-M0145X2A	SDM

1. Acronyms

This section lists and describes the various acronyms used in this document.

Name	Meaning
16QAM	16-state Quadrature Amplitude Modulation
A/V	Audio/Video
AES	Advanced Encryption System
ABS	Basic Encryption System (8 bit)
COFDM	Coded Orthogonal Frequency Division Multiplexing
CVBS	Composite Video
BDC	Block-Down Converter
FEC	Forward Error Correction
GUI	Graphical User Interface
I/O	Input/ Output
KBaud	Kilobaud per second
Kbps	Kilobits per second
M2D	Messenger Decoder
M2T	Messenger 2 Transmitter
Mbps	Megabits per second
MDL	Messenger Digital Link
MER	Modulation Error Rate
MPEG	Moving Picture Experts Group
MVRD	Messenger VETA Receiver Decoder
NTSC	National Television System Committee
PAL	Phase Alternation Line
QPSK	Quadrature Phase Shift Keying
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
RX	Receiver
S/N	Signal-to-Noise Ratio
THD	Total Harmonic Distortion
TS	Transport Stream
TX	Transmitter
VDC	Volts (Direct Current)
VR	VETA Receiver
VT	VETA Transmitter
VDR	VETA Digital Repeater
CSM	Compact Surveillance Modem
UDP	User Datagram Protocol
VNA	VETA Network Adapter

2. Introduction

2.1 About the Manual

Cobham User Manuals focus on providing the end user an easy to understand operational instructions to quickly setup and deploy the equipment. The Cobham Technical Operation Manuals focus on the technical details and setup of the equipment. The Technical Manuals also provide a more in depth explanation of the settings and specifications of the equipment that technicians can use to verify the operational status.

This manual provides information on how to operate the MVRD (Messenger VETA Receiver Decoder) as well as pertinent technical information related to the overall system.
The manual is divided into three main sections:

Getting started and basic operation
This section describes to users how to deploy and use a MVRD unit (section 4).

Advanced operation
This section describes the operation of the system in more detail, concentrating particularly on advanced use of Local Control Panel and the GUI (section 5).

Technical reference
This section provides technical specification and control protocol data and will be of interest to those integrating the MVRD into larger systems or using unusual configurations (section 5.3).

The MVRD is pre-configured by Cobham prior to shipment (based on customer requirements), thus is ready to work "right out of the box".
MVRD is supplied with the following cables:

- 4001954 Power Cable w/AC/DC Power Supply
- 4001950 MVRD USB Control Cable

☛ Additional cables and antennas may be delivered by Cobham based on customer application. Contact Cobham for further information.

2.2 Warranty

Cobham offers a 12 month standard product warranty. During this period, should the customer encounter a fault with the equipment we recommend the following course of action:

- Check the support section of the website for information on that product and any software/firmware upgrades.
- If fault persists call our support line and report the fault. If fault persists and you are informed to return the product, please obtain an RMA number from the Cobham support department or website and ship the equipment with the RMA number displayed and a description of the fault. Please email the support section the airway bill/consignment number for tracking purposes.

Depending on the nature of the fault Cobham endeavor to repair the equipment and return it to the customer within 14 days of the item arriving at our workshops. Obviously it is impossible to cater for all types of faults and to manage 100% replacement part availability, and delays are sometimes inevitable. Please contact Cobham for details of packages that can be tailored to meet your individual needs, whether they are service availability, technical training, local geographic support or dedicated spares holdings.

2.3 Safe Operating Procedures

- Ensure that the power supply arrangements are adequate to meet the requirements of VETA product.
- Operate within the environmental limits specified for the product.
- Only authorized, trained personnel should open the product. There are no functions that required the User to gain access to the interior of the product.

3. General System Information

The MVRD (Messenger VETA Receiver Decoder) receives and demodulates DVB-T 2 k carriers' signals with bandwidths of 6, 7 or 8 MHz; additionally, optional 1.25 or 2.5 MHz RF bandwidths with 400 carriers allow both increased reception range and larger quantity of simultaneous A/V links to operate in the same frequency band. The wider bandwidths provide greater throughput that allow the system to transfer the highest quality video.
The MVRD has dual Diversity inputs and internal RF Block-Down Converters (BDCs) with a user selected (at time of purchase) frequency band. The MVRD's Maximal Ratio Diversity Combiner provides optimum reception in difficult fading and multipath environments. Additionally, the Diversity combining can provide up to 2.5 dB in link performance, increasing the receiver's sensitivity to -97.5 dBm at 8 MHz bandwidth.
One of the biggest problems encountered in the transition from analog to digital A/V systems has been the inherent digital coding/decoding delays that in some digital systems are 400 ms or more. The VETA Transmitters & Receivers employ internal MPEG-2 or MPEG-4[(4)] (User Selectable) Encoders and Decoders with specially designed 'low-delay' coding technology, which provides an end to end latency down to 44 ms *without* the introduction of any further MPEG encoding artifacts. This ensures that the picture you see is what is happening *now* - crucial for applications such as surveillance, and law enforcement, where personnel are reacting to real-time events.
The MVRD also includes internal low-latency Audio/Video Decoder (MPEG-2 or MPEG-4[(*)]) and output circuits that provide video, two audio and data channels. Security of transmission is ensured by the use of Standard ABS encryption or, for greater security, the optional AES 128 or 256 bit scrambling algorithms.
Control and status monitoring can be accomplished via the VR Front Panel or via an external IBM PC and Cobham M.S. Windows application control software. Critical performance parameters like Signal to Noise Ratio (SNR), Pre and Post FEC Bit Error Rate (BER) and Packet Errors are provided both on the on the On-Screen Display and M.S. Windows control program.

The MVRD includes an optimal internal low-latency Audio/Video (SD Only) MPEG-2/4 Part 4 Decoder and output circuits that provide composite video and two audio channels. Ancillary Data extraction is available in all Modes. Security of transmission is ensured by the use of Standard ABS encryption or, for greater security, the optional AES 128 or 256 bit scrambling algorithms.

[(*)] Option Dependant

3.1 Product Control & Status Monitoring Approach

Cobham Transmitters and Receivers provide programmable presets or configurations that can be set up through special programming software by Administrators. Configurations are selected by the user though M.S. Windows Application programs. Administrators define the configurations for specific applications. Each configuration completely defines all of the Unit parameters including center frequency, output RF power level (for TX only), modulation parameters, Video, Audio, User data and encryption. Field personnel will select specific configuration via pre-determined guidance from the Administrators. Matching the Transmitter operation to the Receiver operation is as simple as selecting

the same configuration for both. For example: If the Transmitter is set to configuration #3, then the Receiver needs to be set to configuration #3 for them to operate together.

3.2 Understanding Configurations

MVRD equipment features sixteen user selectable and programmable configurations. These allow the user to store the most commonly used channels for quick selection. The *Current Config* is defined as the number of the currently selected configuration 1 to 16. The *Current Config* can be changed by loading one of the 16 Config-s in the Main Window of Control Software. The parameters in Current Config-s can be edited in the MVRD menu using the PC Control application. Any modifications made to system settings will be saved in the current Config. All changes that are applied saved permanently.

4. Initial Check Out

Prior to installing a MVRD unit into the desired target environment, an initial checkout should be performed to ensure proper operation of the unit. The initial checkout consists of configuring a basic MDL (Messenger Digital LINK) wireless link.

4.1 Deploying and Operating the MVRD

The MVRD is a tactical digital video receiver-decoder and the following guidelines should be employed when using the equipment.

- Depending on the RF environment (line of sight or non-line of sight) and the power of the transmitter (100 mW or 1 W), the MVRD will operate at a range typically 300 m to 1 km from the target transmitter in an urban environment.
- If the MVRD is being operated inside a building or vehicle, better results may be achieved by using the external antenna function and deploying the antennas to the outside of the building or vehicle.
- To prevent damage to the MVRD, it should not be operated too close to the transmitter (within 5m typically, further if the transmitter is greater than 1 W in power).

Figure 1shows a basic MDL configuration wireless link. The steps necessary to setup the configuration shown are stated below:

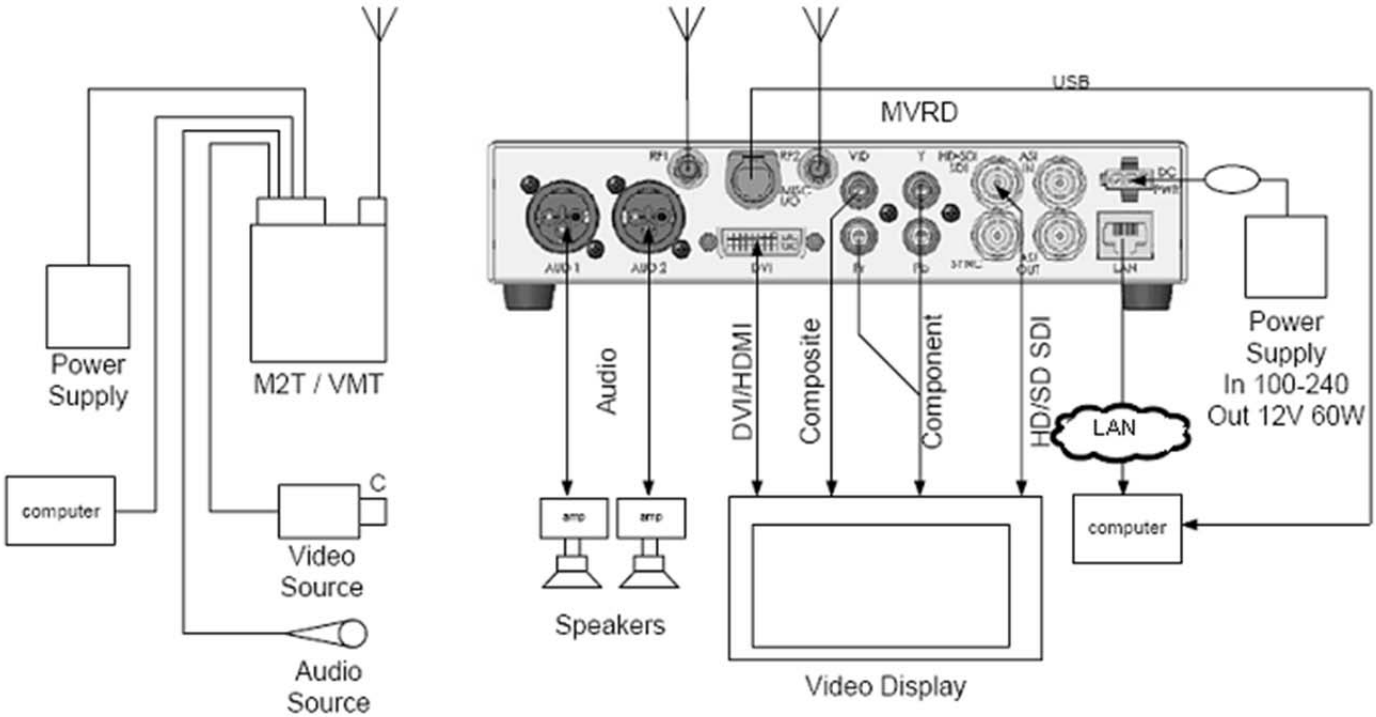


Figure 1 – Basic MDL Setup

- Install Omni-directional antennas (or ones best suited for the application) onto the RF IN A and RF IN B ports on the MVRD and one on the SMA RF connector on the Messenger 2 transmitter or VETA Messenger transmitter. If using VETA Transmitter, refer to Corresponding manual for interfaces.

☛ Using the VMT as your test TX allows you to check NTSC or PAL with MPEG-2 or MPEG-4 part 2 compression. In this mode, the only valid output video source on the MVRD will be the composite output port.

- Attach the M2T (Messenger 2 transmitter) power cable and apply **+12 VDC** to the red pigtail and GND to the black pigtail. Ensure power supply can supply at least 1.5A at +12 VDC.
- Attach a composite video source to the BNC video of either TX for SD testing and analog audio source to the XLR input cable's that is located on the M2T breakout cable. Connect a HD-SDI source to the M2T's BNC (Female) SDI input for HD/SD AVC testing.
- If you are using a M2T with factory default set-up groups, then set the first 2 rotary switches on the M2T to the desired preconfigured setting 1 – 20. See Appendix B for matching the M2T's 20 set-ups with the MVRD's 16 set-up

☛Note: Using the M2T as your test TX allows you to check NTSC, PAL, 480p, 720p, 1080i and 1080p with AVC (MPEG-4 part 10) compression. In this mode, all video output ports will be active. The composite output port is driven by an internal video scaler to produce a SD monitor output even when the system is processing SD. The video scaler currently has limited functionality.

- Attach the appropriate video output port on the MVRD to its matching video input port of a video display.
- Attach the audio output port on the MVRD to the input port of an audio amplifier.
- Attach the power cable assembly to the MVRD and AC power source.
- Turn on the audio/video source and audio amplifier and video display.
- Turn on the MVRD with the "**PWR**" switch on the front panel (up is ON). The 2 front LED's will turn on then off and the front display will light up.
- Once the MVRD has powered-up, use the front user interface to set the appropriate preconfigured setting to match the transmitter.
- After approximately 5 seconds the front "**LOCK**" LED should turn a solid green and video should appear on the video display.
- If the green "**LOCK**" LED light does not come on and/or there is no video playing on your display, check the following:
    - Ensure the receiver and transmitter configuration numbers are set accordingly to the configuration map.
    - If not, change the settings on either the transmitter or receiver so they match up.
    - Ensure the MVRD and the TX is turned **ON**.
    - Ensure the video and audio are properly connected to the MVRD and the TX.
    - If the TX and RX are physically too close to each other, the RX may overload causing no or distorted Video. You may move the TX & RX further apart.
    - If the red LED stays on and the green led goes off, recycle power. If it persist contact www.cobham/tcs.

The initial checkout described above is simply to check the basic video operation of the MVRD unit. Audio can also be checked by enabling audio in the test TX. See the operator's manual of the TX that you are using.

Figure 2 – OSD

4.2 Using of the On Screen Display

On Screen Display (OSD) tool, shown in Figure 2, is an extremely useful tool for system set-up and diagnostic. The displayed diagnostic data includes a spectrum display, signal to noise data, input power level and frequency. The received spectrum display is useful when checking for interference and signal quality.

After power up, OSD is available only when unit is locked to incoming RF signal. If the lock is lost afterwards, OSD still will be available.

When setting a VETA system up, the OSD should be used in the following way.

- Channel is clear. With the transmitter OFF, check that the channel is empty of interference signals, this is confirmed by ensuring that the reported power in the channel is at –95 dBm or lower and that the spectrum is shown as a rounded dome with no obvious spikes or tones.
- Check Quality of Link. Switch on the transmitter and confirm that SNR is 6 or greater and that power level is at least –92 dBm or greater. This represents approximately a 5dB margin. Failure of the link will occur when the power level reaches –97 dBm or the SNR reaches 3 dB.

5. Hardware Overview

5.1 Front Panel Description

Front Panel view of MVRD is shown in Figure 3.

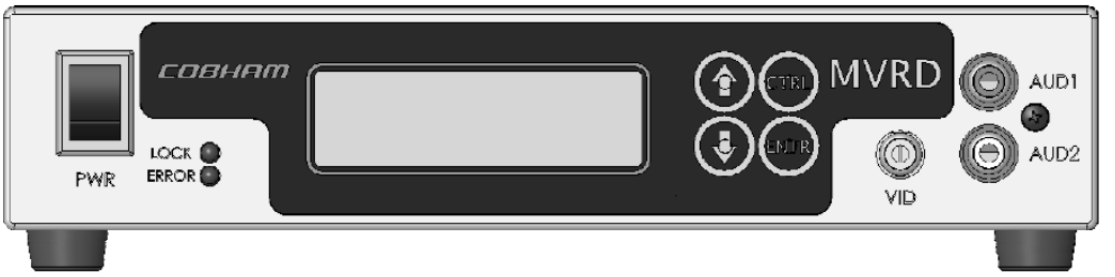


Figure 3 – MVRD, Front View

5.1.1 Power Control

Pushing the top portion of the switch turns the MVRD on.

5.1.2 Local Control Panel

Local Control Panel consists of Display (Backlit LCD, Dual line, 16 characters per line) and 4-button keypad (Enter, Control, Up and Down).
Control, CTRL, is used to switch between control or status screens or multiple menu item groups
Enter, ENTR, is used to switch current submenu.
UP and Down Arrows are used to move up and down menu items or option selection within a menu item.
Detailed front panel operations are described in Section

5.1.3 Status Indicators

Lock LED is lit when the MVRD is receiving a valid MPEG Transport Stream (TS). There are three valid source selections; RF, ASI, and LAN** for the TS. When RF is selected as the source the Lock LED also means that the receiver is receiving and demodulating a transmitted signal.
Error LED indicates that an error occurred in the unit. There are several reasons that the Error LED to light including:

- No TS
- PMT (Program MAP Table) indicates services that are not present in the TS
- Incompatible Compression Type – Cannot decode the incoming data.
- Internal HW/FW Error – Will output a code that is meaningful to factory personnel.

**Note: In Development

5.1.4 A/V Connectors

- Composite Video, Connector Type: RCA-F. This port is active for all valid operating modes of the MVRD. When processing SD MPEG-2, MPEG-4 Part 2 or MPEG 4 Pat 10 (AVC) the composite video output is directly from the associated decoder. When processing HD AVC the composite video comes from an internal Video Scaler.
- AUD 1 and AUD 2, Connector Type: RCA-F, Single Ended Line Level. Two RCA connectors are provided for audio outputs Left and Right. The output level is nominal line level with output impedance of 50 ohm. Audio is single ended. There are no audio gain adjustments.

5.2 Rear Panel Description

The Figure 4 shows rear view of MVRD unit. All the connectors are described below.

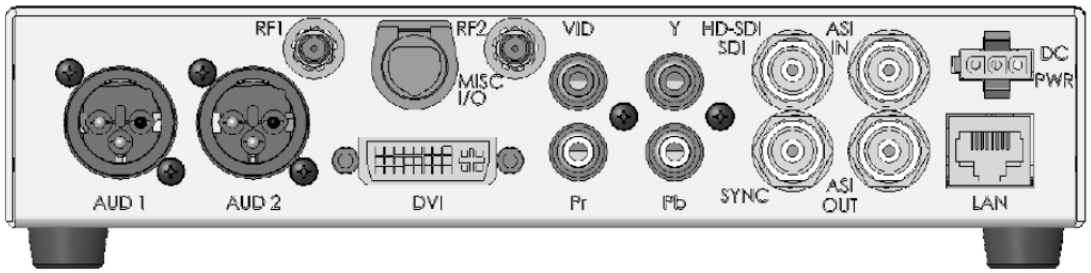


Figure 4 – MVRD, Rear View

5.2.1 DC Power

Mating Connector Type: AMD Tyco Electronics PN: 172166-1.

5.2.2 AUD1, AUD2

Signal: Audio, Balanced
Connector Type: XLR-M, 3 pin

5.2.3 RF1 and RF2

RF1 & RF2 – Receiver RF Inputs
Connector Type: SMA-F
Maximum Operational Input: -20 dBm
Damage Level: > = +17 dBm

5.2.4 MISC I/O

Miscellaneous connector – USB Control and Digital Audio Output**
Connector Type – Hypertronics D-series Circular connector

**Note: In Development

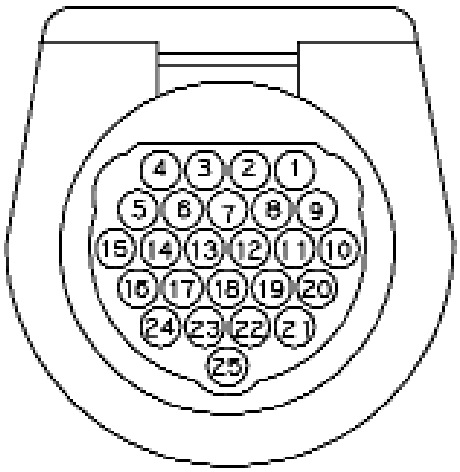


Figure 5 – Miscellaneous connector front view

5.2.5 DVI

Signal: Video, Component
Connector Type: DVI-I Socket – Female
☛Note: Can be converted to HDMI (Video Only) with external adapter. (Sold Separately)

5.2.6 Composite and Component VIDEO Outputs

VID
Signal: Video, Composite
Connector Type: RCA-F

Y, Pr, Pb
Signal: Video, Component
Connector Type: RCA-F

5.2.7 HD-SDI/SDI

SMPTE standardized Serial Digital Interface (High or Standard Definition)
Source: Follows active selection of TS source.
Connector Type: BNC-F

5.2.8 ASI In

Inputs MPEG2 or MPEG4 compressed signal.

TS: DVB Compliant
Connector Type: BNC-F

5.2.9 ASI Out

Outputs MPEG Transport Stream; source is ASI In (loop through) or RF In.
TS: DVB Compliant
Connector Type: BNC-F

5.2.10 SYNC

Sync is an input is used to ensure coincidence of signals in time at a combining or mixing or switching point.
Connector Type: BNC-F
Function: Genlock, AVC HD/SD only

5.2.11 LAN

Provided for Ethernet connection; can be used for Video Streaming, updating Firmware and Control.
Connector Type: RJ-45

5.3 Using breakout cables

5.3.1 Power Cable w/AC/DC Power Supply

Use pigtail Power Cable to connect from an AC outlet to the power connector on the MVRD.
See for detailed information on this cable (DWG #: 4001954).

☛Note: you can wire directly to the DC Power connector to run the MVRD off of DC.

5.3.2 MVRD CTRL Cable

Use 4001950 to connect from the MISC I/O circular connector to USB connector on the Personnel Computer (PC) that shall be used to control the MVRD.

6. MVRD Local Control

6.1 Introduction

As with all Cobham's surveillance products, the MVRD uses "Set-Up Configurations"/ "Groups" (Up to 16) to allow the receiver to be completely pre-configured by Administrators prior to deployment. These set-up groups define all of the operating parameters (e.g. frequency, bandwidth, FEC, Decryption On/Off) available to the users. Users on both the TX and RX side only need to be directed to which set-up group number to use. Normally, the TX and RX would each use the same set-up group number.
Cobham offers several control options, including local control and M.S. Windows Applications for remote control and status monitoring.

The MVRD's front panel display and keyboard are used for both local control and status monitoring. The MVRD has a local control panel that allows the selection of up to 16 set-up groups/configurations. Status indicators are provided for RF Signal Strength, Demod lock, SNR, the presence of a Transport Stream, audio, video, data, and Decryption Active.

This section describes the various displays and controls that are used for local control. In general the *CTRL* button sequences through the top level menus or if in a submenu it will traverse through each of the menu options within the submenu. The *ENTR* button allows the user to enter a submenu if presented with a choice to do so and it also allows the user to confirm a selection when more than one option is available. In some cases the *ENTR* button can act as a shortcut and allows the user to jump to a different menu. The *UP* and *DOWN* arrows allows the user to choose between various options when presented with them. The following symbol ⇳ indicates that user has other options to select from.

6.2 Main Display

The flow chart of the MVRD main display is shown in Figure 6. The LCD backlight lights up when the power switch is turned on. It takes an about 5 seconds for unit to boot. The initialization screen displays the product type. After another 5 seconds the display changes to Main Status Display. Depending on the mode that MVRD is in (ASI In or RF In) different menus will be displayed on the Front Panel. The screens are also a little different depending on the format (AVC or MPEG2) of the incoming signal.
Pressing the *CNTRL* button will take you through a series of *Select* or *Status* menus. Pressing Enter button takes you into the corresponding submenus.

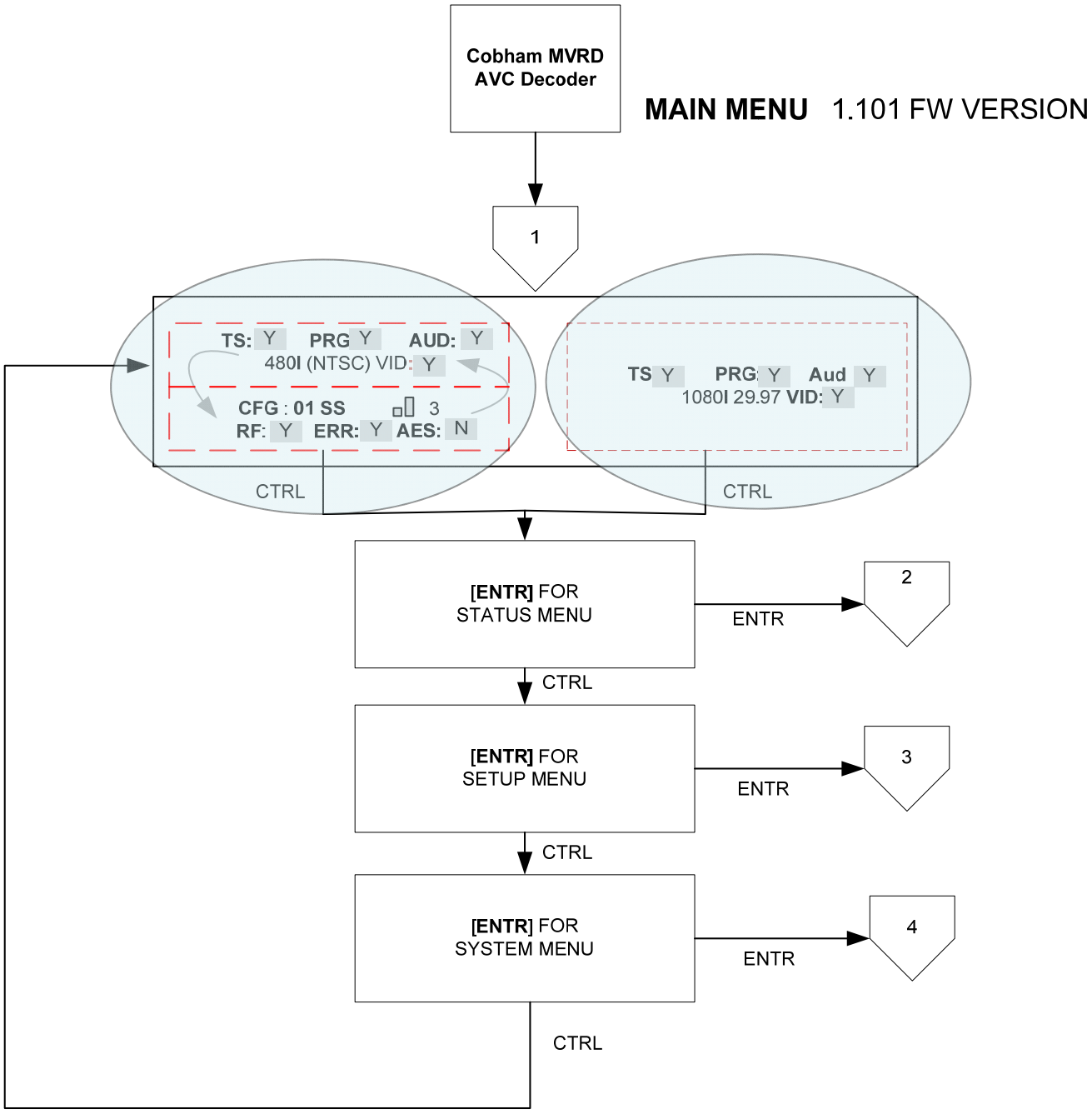


Figure 6 – Main Menu

6.2.1 Main Screen in *ASI IN* Mode

If the unit is in ASI In mode, the main screen will look as shown below for MPEG2 and AVC respectively:

ASI In, MPEG2

T	S	:	N		P	R	G	:	N		A	S	I	I	N
											V	I	D	:	N

ASI In, AVC

T	S	:	Y		P	R	G	:	Y		A	u	d		Y
1	0	8	0	I	2	9	.	9	7		V	I	D	:	Y

- ***TS***: – Transport Stream Present? Next character shows ***Y*** when the system is processing a TS and ***N*** when it is not.
- ***PRG***: – Program Present? ? Next character shows ***Y*** when the system detects at least one program in the TS and ***N*** when it is not; ***E*** – if the program is encrypted. Program is a group of services that includes one or more of audio, video and ancillary data. This is detected in the PAT table of the TS.
- ***ASI IN:*** – Indicates that the input mode is set to *ASI In*.
- Lower left 10 characters – If Video is Present shows the video format.
- ***VID***: – Is Video Present in the Program? Next character shows ***Y*** when the system is processing a TS and ***N*** when it is not.

6.2.2 Main Screen in *RF IN* mode

If the unit is in *RF IN* mode, the main screen will look as shown below for MPEG2 and AVC respectively:

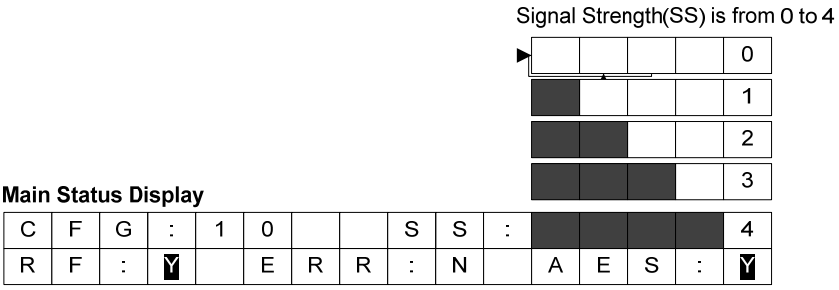
RF In, MPEG2

T	S	:	Y		P	R	G	:	Y			R	F	I	N
1	0	8	0	I	2	9	.	9	7		V	I	D	:	Y

RF In, AVC

T	S	:	Y		P	R	G	:	Y		A	u	d		Y
1	0	8	0	I	2	9	.	9	7		V	I	D	:	Y

In *RF In* mode, every 30 seconds the TS Screen will interchange with the RF Configuration screen, shown in the following Figure:



- ***CFG***: – Displays *Configuration Group* currently in use. The two digits to the right show the current configuration group (1 to 16).
- ***SS***: – Signal Strength. The digits to the right show the RF signal strength as both a bar graph and a level number. The channel with higher Signal Strength is displayed.
- ***RF***: – **Y/N** indicates that the receiver is locked to an incoming signal or not.
- ***ERR***: – Error Indicator. There are several reasons for Error to occur, including:
  - TS is not present
  - PMT (Program MAP Table) indicates services that are not present in the TS
  - Incompatible Compression Type , cannot decode the incoming data
  - Internal HW/FW Error, will output a code that is meaningful to factory personnel.
- ***AES***: – ***Y*** means that the incoming stream is encrypted. To receive and process the stream correctly decryption must be enabled with the correct key. ***N*** means that the incoming stream is not encrypted.

6.3 Status Menu

This menu can be accessed from the Main Display by pressing *CNTR* button once. The last display offers a chance to return to the *MAIN* menu. The flow chart of MVRD Status Menu is shown in Figure 7.

6.3.1 Signal Strength

If the unit is in ASI mode, this screen is not displayed. When the RX is in RF reception mode this status display shows the signal strength, SNR (Signal to Noise Ratio) and Packet Errors of each of two RF channels consequently.

S	S	1	:		-	5	2	.	0	8		R	F	:	Y
S	N	R	1	:		2	4	.	5		P	E	:		0

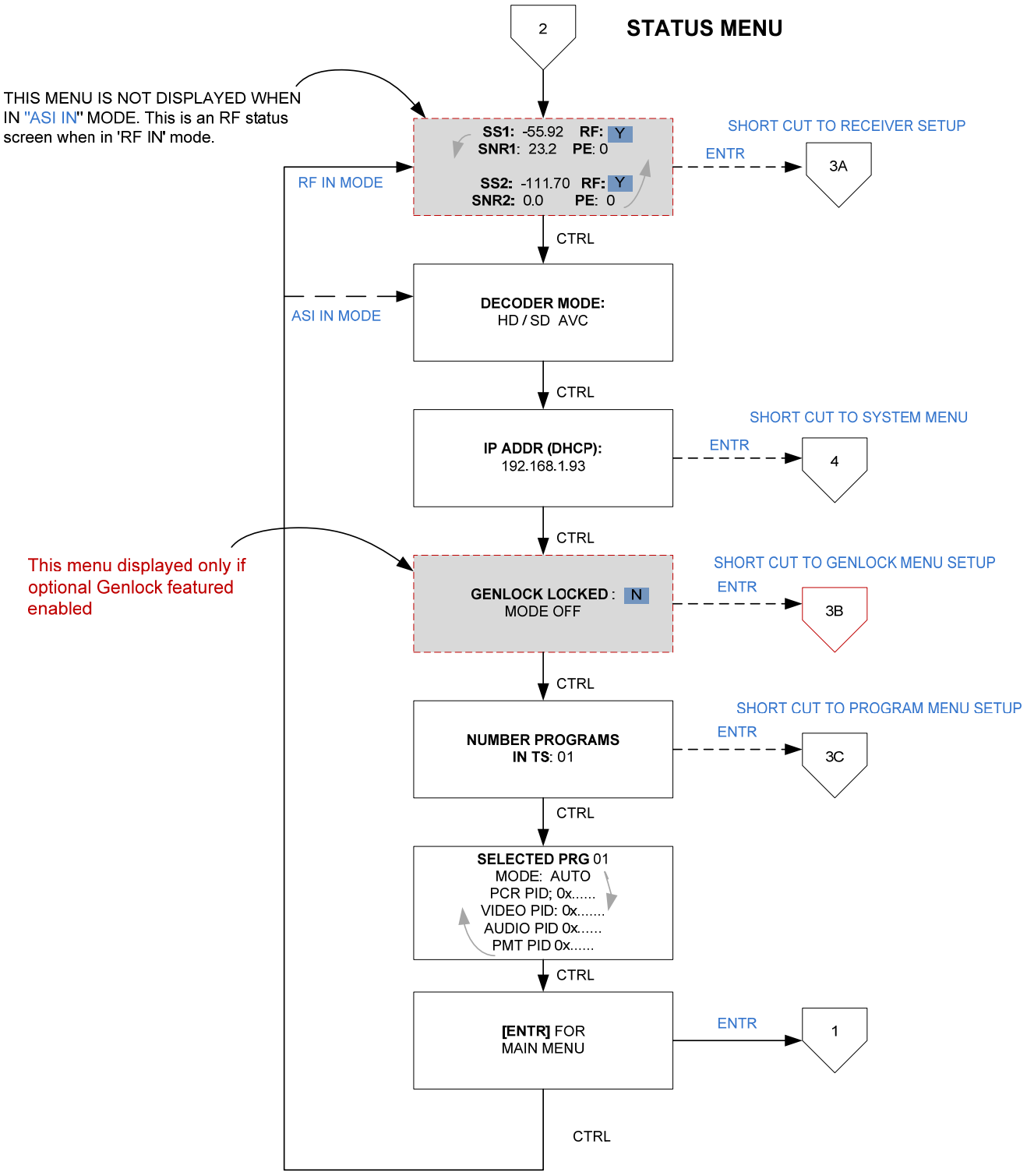


Figure 7 – Status Menu

6.3.2 Decoder Status

This screen shows the format of the incoming signal. If the decoder is not locked to incoming signal (no TS present or the TS is not recognized as valid), then *UNKNOWN* will be displayed. If the decoder is locked then the second line will show the compression type of the Video signal.

D	E	C	O	D	E	R		M	O	D	E	:			
U	N	K	N	O	W	N									

6.3.3 LAN IP ADDRS Status Display

The current IP Address is displayed in this screen. If the default DHCP Client is selected then an IP cable (from a network or a standalone PC) must be attached to the LAN input connector (on the rear of the M2D) and it must be on a network or PC which provides DHCP services otherwise no address is displayed but rather a *0.0.0.0.* If STATIC addressing is selected then it provides an initial default static address. This address can be changed using an Internet Browser and opening up the M2D web page. The internal web page of the M2D has a "Network" configuration page in which all the parameters associated with addressing can be changed. This is explained in more detailed later in the section 6.9.1.

LAN IP ADDRS Status Display

I	P		A	D	D	R		(	D	H	C	P	)		
x	x	x	.	x	x	x	.	x	x	x	.	x	x	x	

☛NOTE: Keep in mind you will need to know the current address when upgrading firmware.

6.3.4 Genlock Locked

Genlock is a means to ensure video signals are synchronized; this is an optional feature and is not available on all units.
This screen displays Genlock Status. It is only displayed if the unit has Genlock Option available and only functional in AVC format. First shows if the Genlock is locked. The second line shows the current mode (On, Off or Auto), and sequentially the reference signal Video format and decoded Output Video format. Display example is shown below.

G	e	n	l	o	c	k		L	o	c	k	e	d	:	N
M	o	d	e	:	N	/	A	-	N	O	T		A	V	C

- ***Genlock Locked:*** – shows if Genlock is locked.
- ***Mode***: – shows the mode and the reference signal/Output signal video format.

Pressing *Enter* will redirect to *Genlock Setup* Menu.

6.3.5 Number of Programs

This screen shows number of programs in current Transport Stream. Pressing the *Enter* key while in this screen will take you to Program Setup Menu.

6.3.6 Selected Program

This display shows the current selected program and then automatically cycles through PCR, Video, Audio and PMT PID-s for the selected program. The default mode is AUTO in which if there is more than one program it decodes the first program it finds in the PAT table. If the PROGRAM mode is set to MANUAL, the user chooses the program to be decoded. This is done from the PROGRAM Setup menu. Pressing the ENTR key while in this display take you immediately to the Program Setup menu.

6.4 Setup Menu

This menu can be accessed from the Main Display by pressing *CNTR* button twice. The flow chart of MVRD Status Menu is shown in Figure 8. It consists of submenus described below.

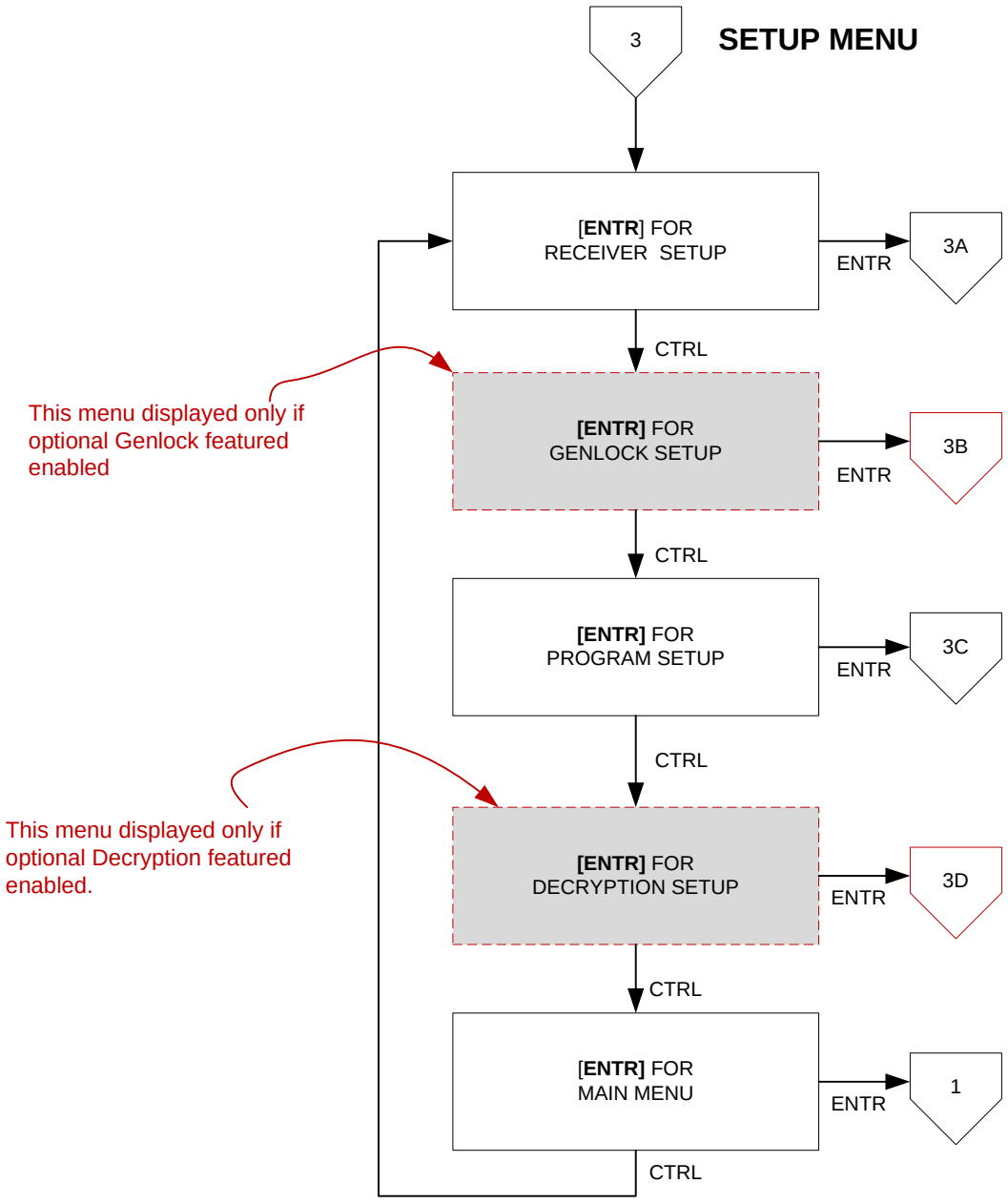


Figure 8 – Setup Menu

6.5 Receiver Setup

If the receiver in ASI Input mode, this will only lead to Setup and then to Main Menu. Flow chart for this submenu is shown in Figure 9.

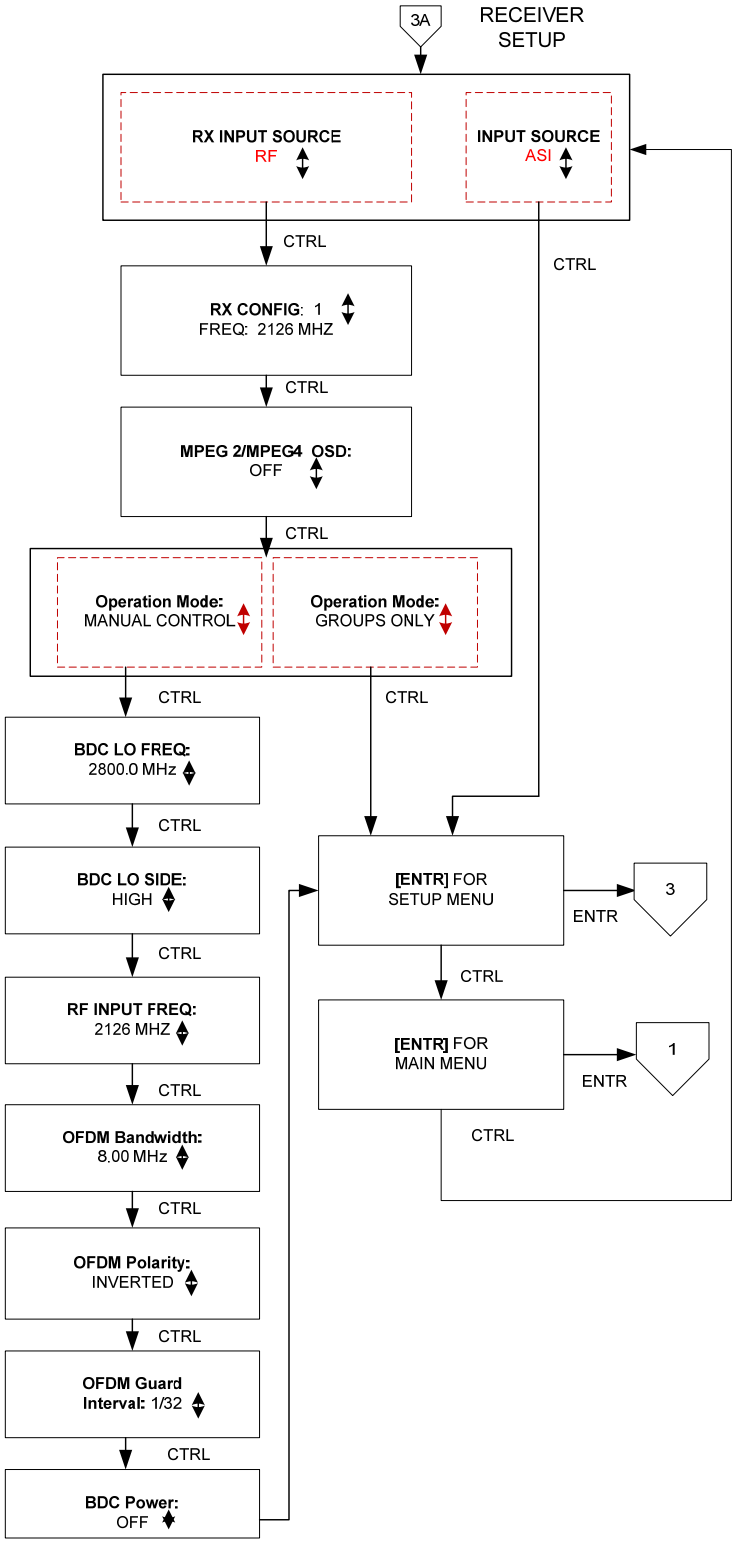


Figure 9 – Receiver Setup

6.5.1 RX Input Source

In this submenu the user can select the input mode – RF or ASI In.

R	X		I	n	p	u	t		S	o	u	r	c	e	:
A	S	I	↕												

6.5.2 RX Configuration

In this submenu the user can select the Configurations 1 to 16. Refer to section for details. The change will take place only after pressing *ENTR*. Second line displays the frequency in MHz's.

R	X		C	o	n	f	i	g	:		1	2	↕		
F	r	e	q	:		2	3	7	5	.	0	M	H	z	

6.5.3 OSD Control

This screen is available only in MPEG2 or MPEG4 in Narrow Band Mode. On-Screen Display (OSD) shows the RF reception status on the composite video signal when the system is processing MPEG2 video. It allows the user to select *OFF, On Spectrum A* or *On Spectrum B* by toggling ↓↑ buttons. *Enter* saves the selection.

M	P	E	G	2	/	M	P	E	G	4		O	S	D	:
O	N		(	S	P	E	C	T	R	U	M		A	)	↕

6.5.4 Operation Mode

In this mode the user can select *Groups Only* or *Manual Control*. If *Groups Only* is selected, then the control is returned to the *Setup Menu*.
If the unit is set into *Manual Control* Mode, then the user has an option to change the following parameters:

- ***BDC LO Freq:*** – This allows definition of the Local Oscillator Frequency of the BDC-s.
- ***BDC LO Side:*** **–** This field allows definition of the local oscillator side. Values are either *HIGH* or *LOW* side injection. High side injection means the LO is at a higher frequency than the RF. So if 'RF freq' – 'LO freq' = IF freq, then the IF Freq will be negative or the spectrum will be inverted. The opposite is true for LOW side injection. Selection of these values depends on the BDC-s used. They will vary depending on manufacturer.
- ***RF Input Freq:*** – RF input frequency at BDC (block down converter) input. The receive frequency can be changed by entering the new desired frequency in this field. In this submenu the user can change the RF Frequency in 0.1 MHz steps. Pressing ENTR will save the frequency in the current configuration.

- OFDM Bandwidth: – This field displays the bandwidth of the received OFDM signal. It should be set to the same bandwidth of the transmitter selected from the following values: *6, 7 or 8 MHz* or with optional narrow bands *1.25* or *2.5MHz.*
- ***OFDM Polarity:*** **–** This field displays whether OFDM signal is set to *Normal* or *Inverted Spectrum.*
- ***OFDM Guard:*** – User selects the guard interval which matches the transmitter. Guard interval sizes are selected from the following values *1/32, 1/16, 1/8 or ¼. When in narrow band (1.25 or 2.5 MHz) guard intervals are limited to either 1/16 or 1/8.*
- ***BDC Power:*** – This field determines if DC power is supplied to the BDC-s via the IF Cable. Values are *ON* or *OFF*. Caution: Make sure that the IF cable is not shorted prior to enabling DC power.

6.6 Genlock Setup

☛ This is an optional feature and may not be available in all units.

6.6.1 AVC Genlock On/Off

The first display presents the user with the options to turn Genlock *ON, OFF* or to *AUTO*. If the selection is *ON* and there is no reference signal or incorrect reference on the SYNC input (see section 5.2.6) the red error LED on the front panel lights. Otherwise, if the reference is correct the green LOCK LED on the front panel lights. The Genlock is disabled regardless of type of reference signal on the SYNC input if this mode set to *OFF*. In *AUTO* mode Genlock automatically locks if there is a reference signal on the SYNC in which it can lock to.

6.6.2 Genlock Offset

The next two displays are available only if Genlock set to *ON* or *AUTO*. They provide the user with an option of adjusting the Genlock signal offset in terms of pixels or lines. The number of pixels or lines is determined by the type of reference signal on the SYNC input.

The remaining displays allow the user to either return to the MAIN menu or to the SETUP menu. Once Genlock has been setup it can be monitored in the STATUS menu, see section 6.3. The *STATUS* menu Genlock screen shows if Genlock is locked, if it is ON, OFF, or in AUTO mode, if a reference signal is present (and the format), and the output video format the decoder is decoding.

6.7 Program Setup

The *PROGRAM* menu allows the user to choose *AUTO* or *MANUAL* mode detection. If decoding a multi-program stream then MANUAL mode offers the user the ability to choose the program to be decoded. For TS with a single program AUTO mode is recommended. If the Transport Stream has

multiple programs and the unit is in AUTO mode, then the first program detected (from the PAT table) is decoded.

6.7.1 AVC Program

The flow chart of the Program Setup submenu is shown in . Pressing *ENTR* will take the menu to the following screen:

A	V	C		P	r	o	g	r	a	m					
M	o	d	e	:		M	A	N	U	A	L	↕			

The user can change the Program Mode in this submenu.
The next screen is only available in Manual mode. It will display the selected Program number and a message if the decoder is not locked.

M	a	n	u	a	l		P	r	o	g	a	m	:		
				1	↕		N	O	T		A	V	A	I	L

☛Note: If the unit is power cycled and it was previously set for MANUAL program detection it remembers the specific program number it was decoding. Hence if for some reason that particular program number is no longer present then another program number needs to be selected from the "MANUAL PROGRAM" display in order for decoding to continue.

6.7.2 Selected Program

Selected program submenu contains information about the following PID-s: PCR, Video, Audio and PMT. These items are displayed one line at the time and are continuously cycled until the CTRL key is pressed.

6.8 Decryption Setup

☛ Note: This is an optional feature and with exception of ABS, may not be available in all units.

6.8.1 Decryption Mode

This screen allows the user to turn decryption On/Off and select Decryption type. The Decryption can be classified in 3 types depending on the key size – ABS (64 symbols), 128 or 256 bits. The following encryption algorithms are available:

- B-crypt 128
- B-crypt 128+
- B-crypt 256
- B-crypt 256+
- Alink Basic

- AES 128
- AES128+
- AES256
- AES256+

This will support a wide variety of Transmitters that might have a fewer types of Encryption.
The remaining two screens enable the user to return to the *SETUP MENU* or to the *MAIN MENU*.

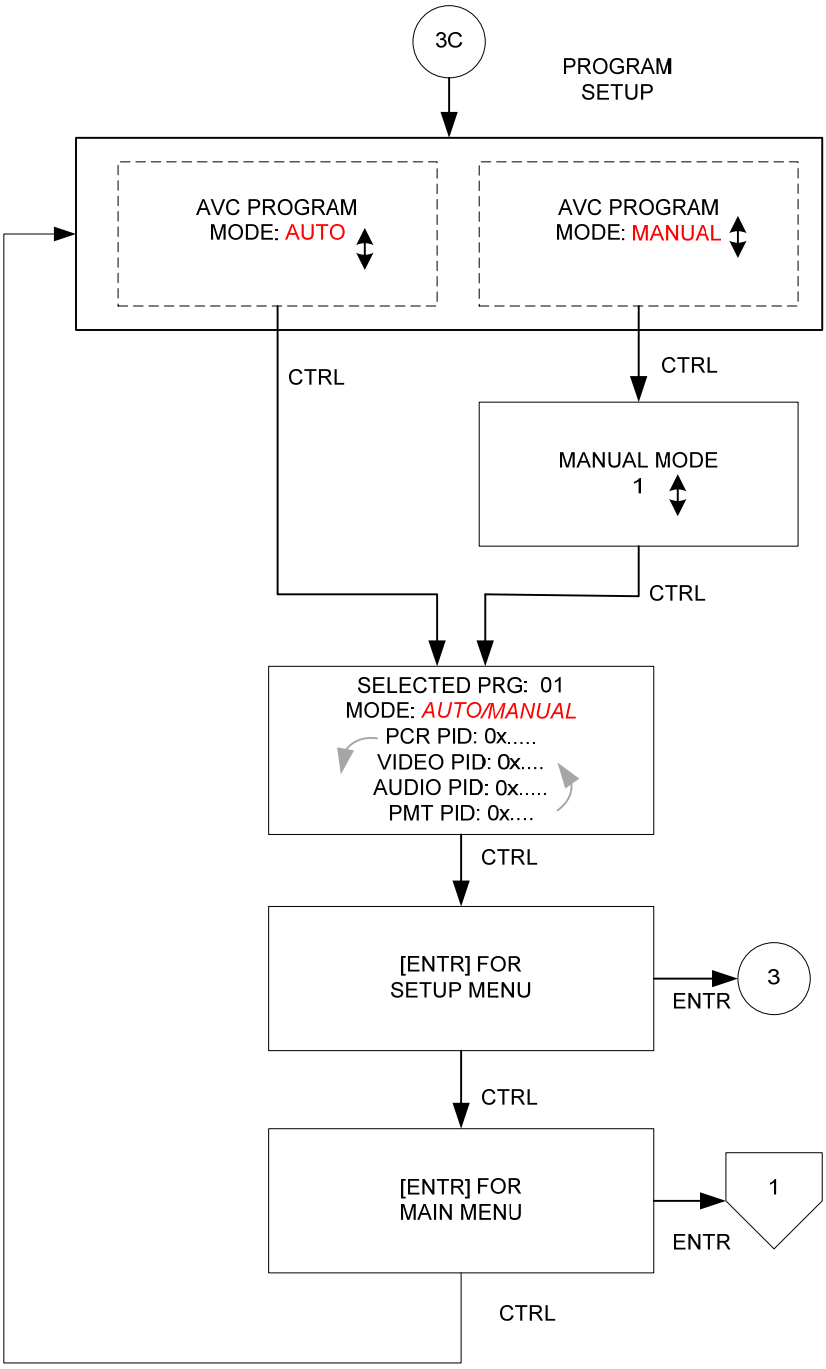


Figure 10 – Program Setup Menu

6.9 System Menu

The flow chart depicting the System Menu is shown in. System Menu displays Versions for Firmware Components, Hardware Version and unit serial number. Most of the screens are self-explanatory and

display versions of different components of the MVRD and information about available features of the particular unit.

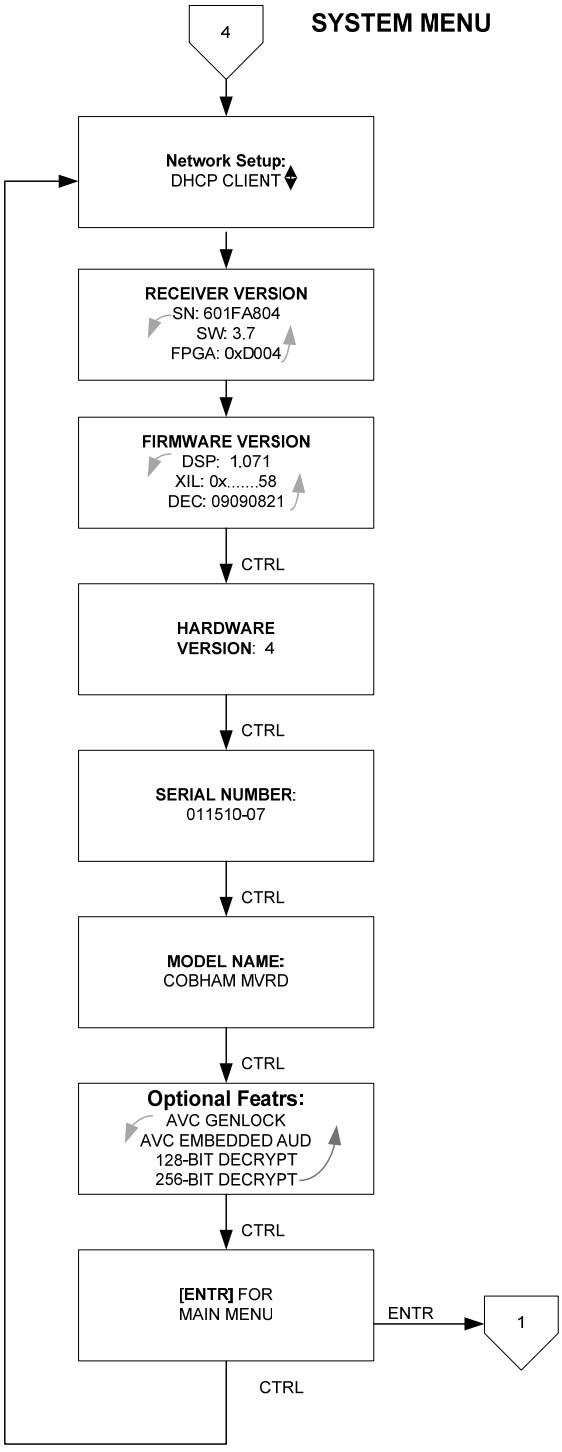


Figure 11 – System Menu

6.9.1 Network Setup

This Menu allows the user to choose either *DHCP* (Dynamic Host Configuration Protocol) *Client* or *STATIC* addressing. The default is *DHCP Client* and it is the most practical one to use, assuming the server network (or PC) to which the MVRD is attached provides DHCP services. The server automatically issues an address to MVRD. The current assigned address can be found under the *STATUS MENU* (section 6.3) under the second screen.
With *DHCP Client* the MVRD Receiver/Decoder must be attached to the network (or PC) for the address to appear otherwise "0.0.0.0" is displayed. Once the address is known, an Internet Browser can be used to communicate with the MVRD for updating new firmware, changing address configuration or entering codes to enable new features.
If *STATIC* addressing is used the MVRD initially provides a default static address (current assigned address can be found under the STATUS MENU). In order to change the default address you need to note the default address and then establish communication with the PC or network. Use an Internet Browser to open up the MVRD web page. The address and other parameters can be changed under the Network Configuration page.

6.9.2 Receiver Version

This screen will display the following information: serial number, FW version and FPGA version of the receiver block. The versions are displayed on the second line and continuously cycled until CTRL key is pressed.

R	e	c	e	i	v	e	r		V	e	r	s	i	o	n
F	P	G	A	:	0	x	D	0	0	4					

6.9.3 FW Version

The next screen is the FW version and contains firmware versions labeled DSP, Xil, and Dec. The firmware versions are displayed on the second line one at a time (briefly) and the versions are continuously cycled until the CTRL key is pressed.

F	i	r	m	w	a	r	e		V	e	r	s	i	o	n
D	S	P		1	.	1	0	1							

Appendix A – Default Settings C2-Band

PARAMETER	CONFIGURATIONS															
Config #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Unit Mode	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T	DVB-T
BDC LO	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200
BDC Side	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
BDC Gain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COFDM BW	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	8Mhz	6Mhz	6Mhz	6Mhz	7Mhz	8Mhz	8Mhz	8Mhz
RF Frequency	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400	4700	5000	4400	4400	4700	5000
Modulation GI	1/4	1/4	1/4	1/8	1/8	1/8	1/8	1/8	1/8	1/32	1/32	1/32	1/16	1/4	1/4	1/4
OFDM Polarity	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
NTSC Format	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC	NTSC
Blue Screen on no Video	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MPEG4 deblocking Filter	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
On screen Display	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Auto Spect Detect	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Descrambling	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LNB Power	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Power up Video Format	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525	525

Appendix B – Configuration Map

M2T Group Number	MVRD Group Number	M2T Group Number	MVRD Group Number
GP1	GP10	GP11	GP7
GP2	GP11	GP12	GP8
GP3	GP12	GP13	GP9
GP4	GP10	GP14	GP7
GP5	GP12	GP15	GP9
GP6	GP10	GP16	GP7
GP7	GP11	GP17	GP9
GP8	GP12	GP18	GP7
GP9	GP10	GP19	GP9
GP10	GP12	GP20	GP9

Appendix C – Troubleshooting Section

Fault	Action
No RF Link	• Check if Input Source selected as RF • Check if the following parameters of the Transmitter and corresponding Receiver match: -Frequency and Bandwidth -Guard Interval -Spectral Inversion • Check if the down converters operate correctly: -Correct LO is set -BDC power is On.
Poor Link Performance	• Interference. Should an interfering RF signal occur on the same frequency the performance of the link will be affected. Remove the interferer or move to an alternative frequency. • Reduced transmit power, ensure that the attenuation setting on the transmitter is appropriate for direct output, or for amplifiers connected. • No Diversity operation. Ensure both down converters are operational.
Blue screen or Frozen screen at receiver	Check RF/Demod Lock– see "No RF Link" section above. If Demod Lock is OK but Packet errors are not 0 then see section Poor Link Performance above. If the RF/Demod Lock is OK and packet errors are 0 then - Check video is enabled at the transmitter with the proper/matching format. -Check correct unit name is selected at the receiver to match the transmitter. -Check scrambling keys are matched.
Reduced Image quality	•Image quality is affected by the selected horizontal resolution. The image will become progressively softer for each horizontal resolution below the sharpest resolution of 704 pixels. It is advisable to select a horizontal resolution that matches the resolution of the camera. •Image quality is also affected by the video bit rate which can be read from the video bit rate field of the transmitter controller. The standard setting is 2.3Mb/s. However enabling audio, particularly the high quality audio modes, will reduce the video bit rate substantially. Therefore ensure an appropriate audio mode is selected or audio is fully disabled.

No Video Out	•TS = Y, PRG = Y and VID = Y Check the video out BNC connectors and ensure they are correctly connected to the video monitors, that the video monitors are on and they are capable of receiving the format indicated. • TS = Y, PRG = Y and VID = Y but no video format is displayed Ensure video source into the TX is present and the selected video format of the TX and MVRD are the same
No Audio	•Ensure Audio is enabled in the TX. • Ensure the volume level is sufficient (either at the transmitter end or an external amplifier)
Genlock Error	•Genlock is on but MVRD can't lock to the reference Genlock clock. • Genlock reference input signal does not match the video format which is decoded.

Appendix D – References

For more detailed information on Cobham products described in this manual, download the manuals below from Cobham's WEB site (www.cobham.com/tcs) or contact Cobham customer Service department.

- Operations Manual, MVRD OP1920614
- Operations Manual, VETA Receiver 100-M0087
- Operations Manual, VETA Receiver SW OP1920616
- Operations Manual, VETA Transmitter 100-M0089
- Operations Manual, M2D Decoder 100-M0134