8. OPERATIONAL DESCRIPTION - MODEL Axcera-LHV20AL

8.1 General Description

The LHV20AL is a complete 20-watt VHF solid-state, internally diplexed television translator. It operates at a nominal visual output power of 20 watts peak sync and an average aural output power of 2 watts, at an A/V ratio of 10 dB, 10% sound.

8.2 Technical Specifications

Type of Emissions:
- Visual 5M75C3F
- Aural 250KF3E

Frequency Range..... 174 MHz to 216 MHz (any 6-MHz channel)

Output Power
- Visual ..... 20 watts peak sync
- Aural ..... 2 watts average

Maximum Power Rating
- Visual ..... 20 watts peak visual
- Aural ..... 2 watts average aural

Power Consumption ..... 300 watts

8.3 Performance Specifications

Visual Performance

Operating Frequency Range ..... 174 MHz to 216 MHz

RF output - Nominal:
- Power ..... 20 watts peak sync
- Impedance ..... 50 ohms
- Connector ..... Type N

Visual Sideband Response:
- -1.25 MHz and below ..... -20B
- -0.75 to -0.5 MHz..... +0.5, -2.0dB
- -0.5 MHz to +3.58 MHz..... ±0.5 dB
- 3.58 MHz to 4.18 MHz..... +0.5, -1.0 dB

Variation of Frequency Response with Brightness..... ±0.5 dB
Differential Phase ..... ±3°
Incidental Phase Modulation..... ±3°
Differential Gain 5%
Low Frequency Linearity 5%
Intermodulation Products .....-52 dB or better (red field)
Output Variation (Over 1 Frame) 2%
Regulation of Output..... 3%
Signal-to-Noise Ratio ..... 55 dB
2t K-Factor 2%

Harmonic Radiation .....-60 dB
Spurious (>3 MHz from channel edge) .....-50 dB
Carrier Frequency Stability..... ±1000 Hz
Noise Figure w/Input Preamp .....3 dB (Max.)
Input Dynamic Range (no Preamp) ..... -60 to -15 dBm

Aural Performance

RF Output – Nominal
Power .....2 watts
Impedance .....50 ohms
Connector ..... Type N

Electrical Requirements

Power Line Voltage .....117/230 volts, 50/60 Hz
Power Consumption ..... 300 watts

Environmental

Maximum Altitude .....8,500 feet
Operational Temperature Range .....0°C to +50°C

Mechanical

Dimensions:
Width .....19 inches
Depth .....23 inches
Height..... 8.75 inches
Weight .....45 lbs

8.4. System Overview

The LHV20AL is made up of the trays listed in Table 8-1.

Table 8-1. LHV20AL Major Trays and Assemblies

MAJOR ASSEMBLY DESIGNATOR	TRAY / ASSEMBLY NAME
A1	VHF Exciter

The VHF Exciter can operate using a 45.75 MHz IF carrier from either the (A1) Receiver tray's output, or that from a Modulator tray. Both of these carriers must be diplexed with a 41.25 MHz aural carrier, at an A/V ratio not to exceed –10dB.

The (Optional) (A11-A2) SAW Filter/Amplifier Board is also contained in the IF Filter/ALC Enclosure. The SAW Filter/Amplifier Board connects to J5 and J6 of the IF Filter/ALC Board if more attenuation of the Out Of Band products is needed. If the SAW Filter/Amplifier Board is not needed, a jumper connects the Combined IF from J5 to J6 on the IF Filter/ALC Board.

The Combined IF is then bandpass filtered to the needed 6 MHz IF bandwidth around the 41.25 MHz + 45.75 MHz Combined IF signal and amplified by U3 to the -41 dBm to +4 dBm Level before it is split. One output is detected by U4 for use as the ALC reference level to the Pin Diode Attenuator Circuit. The ALC comparator drives the Pin Diode Attenuator Circuit to maintain the desired output level, typically +2 dBm. The other split output connects to J2 the Combined IF Output of the board that is cabled to the IF Output Jack of the Tray at J4 (+2 dBm).

The AC input to the Tray is 117 VAC or 230 VAC and is directed thru Jack J2, of the (A1) Power Entry Module to the step down Toroid (A2). The Power Entry Module contains an On/Off Switch, a 4 Amp Slo-Blo Fuse and three MOVs, which protect the Tray from transients or surges which may occur on the AC Input Lines. When the On/Off Switch is switched On, AC is applied to the (A2) Toroid. The Toroid steps down the voltage into two 16 VAC outputs which are fed to (A3) the +12V(3A)/-12V Power Supply Board The 16 VAC Inputs are connected to the two full wave bridge networks one for +12 VDC and one for -12 VDC. The output of the +12 VDC rectifier is fed to three 7812 IC regulators (U1, U2 and U3) and the output of the -12 VDC rectifier is fed to one 7912 IC regulator (U4). The ±12V Power Supply Board provides the voltage regulated and current limited +12 VDC and -12 VDC to the rest of the boards in the Tray.

8.4.1 Exciter Tray

The input to the Exciter Tray is a modulated Internally Diplexed IF signal. This signal is connected to the input of the IF Processor Module.

8.4.1.1 Receiver Module

The UHF/VHF Receiver converts a low level RF input signal to an IF frequency of 44 MHz, filters off any unwanted out of band energy, and normalizes the level so that it can be applied to the IF processor assembly. It consists of three boards. The RF input is applied first to the UHF/VHF preamplifier board, which filters off out of channel energy and amplifies the input signal. The RF output is applied to the Mixer/PLL board, which converts the signal down to an IF frequency of 44 MHz. The IF output is applied to the IF ALC board, which amplifies the signal, filters off any unwanted out of band energy and controls its own IF gain to make sure that the IF output level is constant.

There is also a provision to apply +12V to the RF input center conductor to power an external preamplifier.

8.4.1.2 IF Processor Module

The (A3) IF Processor Assembly contains the IF Processor Board (1301977). The IF Processor provides pre-correction to ensure broadcast quality output signal. The pre-correction consists of amplitude linearity correction, Incidental Carrier Phase Modulation (ICPM) correction and frequency response correction.

The IF Processor module is configured either for an analog or digital system. Pin 13C of the IF Processor module is grounded in analog systems and left not connected in digital systems. An IF Processor Interlock signal is used to report the presence of the IF Processor module to the Control Monitoring board. If the IF Processor interlock signal is not present, the Translator/Exciter Driver RF output is Muted (turned off). If an analog IF Processor module is installed and the Modulation Present signal is not true, the Translator / Exciter Driver output is Muted (turned off).

The Control & Monitoring/Power Supply module uses the IF Processor module for System output power control. Through the front panel display or a remote interface, an operator can set the translator's RF output power. The range of RF power adjustment is between 0% (full off) and 105% (full power plus). A front panel IF Processor module potentiometer sets the upper limit of RF power at 120%. The system's Control Monitoring board compares the RF Power Monitoring module RF power level with the desired level and uses the IF Power Control PWM line to correct for errors.

The IF Processor module provides a reference ALC voltage to the system's Upconverter. When the ALC voltage decreases, the Upconverter automatically lowers the system output power through the AGC circuits.

The IF Processor module has a front panel switch to select Auto or Manual ALC. When Manual ALC is selected, the reference ALC voltage is set by a front panel potentiometer. In this condition, the RF power level control circuit is removed from use. When the ALC select switch is changed to Auto, the RF power level control circuit will start at low power and increase the RF output until the desired output power is attained.

The IF Processor module Modulation Present signal is monitored. If the modulation level is too low or non-existent, a Modulation Present fault is reported to the Control Monitoring board. When the controller detects this fault, it can be set to Automatically Mute the translator or in Manual mode the translator will continue to operate at 25% output.

The IF Processor module Input Signal level is monitored. If the signal level is too low or non-existent, an Input fault is reported on the Control Monitoring board. When the IF Processor board detects an Input Signal fault it automatically Mutes the translator. The system controller does not Mute on an IF Processor Input fault.

8.4.1.3 VHF/UHF Upconverter Module

The Upconverter converts an IF input signal to a RF output signal on the desired channel frequency using a high stability oven controlled oscillator with very low phase noise and an Automatic Level Control (ALC) for stable output signal level.

Several control voltages are used for translator power control. Automatic gain control (AGC) circuits set the RF output level of the translator system.

AGC #1 is provided by the Translator/Exciter Driver Power Amplifier module. This voltage is used by the Upconverter to maintain a constant RF output level at the Power Amplifier module output. If this voltage exceeds 0.9 VDC, the system is in an over-drive condition. The 0.9 VDC over-driver threshold is set by a front panel Upconverter module potentiometer. When an over-drive condition is detected, the Upconverter module reduces its RF output level. For values less than 0.9 VDC, the Upconverter uses the AGC #1 voltage for automatic gain control by setting it's RF output to maintain AGC #1 equal to the AGC voltage set by another front panel potentiometer. When the Upconverter is set for manual gain, the RF output of the Upconverter is set by the front panel AGC potentiometer. In manual gain operation, the AGC #1 feedback voltage from the PA is not used to adjust the RF level unless an over-drive condition is detected.

AGC #2 is provided by each of the optional external amplifier modules. Diodes are used in each of the external amplifier forward power circuits to capture the highest detected

sample voltage. This voltage is used by the Upconverter to maintain a constant RF output of the system. As with AGC #1, the Upconverter module reduces its RF output level if AGC #2 is too high. AGC #1 and ACG #2 are diode ORed together in the Upconverter gain circuit. Both AGC voltages are first reduced by an on-board potentiometer before being amplified. If an over-drive condition does not exist, the higher of the two AGC voltages is used to control the Upconverter gain circuit.

An AFC Voltage is generated to control the VCXO of the UHF Generator portion of the Upconverter module. The typical AFC voltage is 1.5 VDC but it can be as high as +5 VDC.

The Upconverter can operate on either it's internal 10 MHz source or on a 10 MHz external reference signal. When an external 10 MHz source is present on J10, it is automatically selected. An external reference present signal is provided to the controller for display purposes. The selected 10 MHz signal from the Upconverter is buffered then sent to the backplane on two ports. One port is sent to the Modulator module, if present, and the other is routed to a BNC connect or (J11) on the backplane for a system 10 MHz output signal.

A National Semiconductor frequency synthesizer IC is used in the frequency conversion of the IF signal to a RF signal. The frequency synthesizer IC uses a 10MHz reference frequency for signal conversion. Typically the IF input frequency is 45.75 MHz for analog system and 44 MHz for DTV. To obtain different output RF frequencies, the synthesizer IC is serial programmed by the Control Monitoring board. The part is programmed to use a 5 kHz phase detection frequency. With a 10 MHz input signal, the R counter is set to 2000. With these settings the N counter is set to the desired LO frequency in kHz / 5 kHz. The maximum LO frequency setting with these parameters is 1310.715 MHz.

An Upconverter PLL Lock indicator is used to insure that the frequency control circuits are operating properly. When the Upconverter PLL is locked, the frequency synthesizer IC is programmed and the Power Amplifier module(s) can be enabled.

The RF output of the VHF/UHF Upconverter Module is at J23 on the rear chassis

8.4.1.4 Control & Monitoring / Power Supply Module

The (A4) Control & Monitoring/Power Supply Assembly is made up of a Control Board (1302021), a Power Protection Board (1302837) and a Switch Board (1527-1406). The Assembly also contains a switching power supply that provides ±12 VDC to the rest of the modules in the chassis and +32 VDC to the Power Amplifier module.

The Assembly provides all translator control and monitoring functions. The Front panel LCD allows monitoring of system parameters, including forward and reflected power, transistor currents, module temperatures and power supply voltages.

8.4.1.5 Power Amplifier Module

The (A6) Power Amplifier Module Assembly 1305833 contains a 25-Watt VHF Driver Pallet, a VHF HB Coupler Board 1211-1004 and Amplifier Control Board. The RF input (+4 dBm) is applied to the RF input jack on the (A2) Driver Assembly Pallet. The pallet is an assembly manufactured by Delta RF and has a gain of approximately +30dB. The RF

output, approximately+34 dBm and connects to the RF input jack on (A4) the coupler board assembly.

The +30 VDC bias voltage connects from the amplifier control board at TB18 to the feed thru capacitor FL2 on the module assembly that is wired to the $+V_{dd}$ input on the 25-Watt VHF Amplifier Assembly.

The Power Amplifier of the Translator/Exciter Driver is used to amplify the RF output of the Upconverter module. A cable, located on the rear chassis, connects the RF output from the Upconverter at J23 to J24 the RF input to the PA Assembly. Control and monitoring lines to the Power Amplifier module are routed through the floating blind-mate connector of the Control & Monitoring/Power Supply module.

The RF power detector circuit outputs vary with operating frequency. These circuits must be calibrated at their intended operating frequency. Front panel adjustment potentiometers are used to calibrate the following:

Table 1: Power Amplifier Calibration Adjustments in Analog Systems

R201 Reflected Power Cal
R202 Visual / Forward Power Cal
R203 Aural Power Cal
R204 Visual Offset Zero
R205 Aural Null

In analog systems, the Aural power of an Exciter Driver Power Amplifier and the Aural power of any external amplifier will not be reported by the system Control Monitoring module. Additionally the Visual power of these amplifiers, is reported as Forward Power just like in digital systems. In analog systems, aural and visual power will only be reported for the final system RF output.

If the Control Monitoring module is monitoring a 5-50 Watt Translator, system power is measured in the Power Amplifier module. The wired connections are transferred through the power supply connector to the backplane board on a five position header. All four positions of control board switch SW1 must be set on to route these lines as the system's RF power signals. In systems of output power greater than 50 Watts, system power is monitored by an external module that is connected to TB31 and control board SW1 switches must be set off.

The Forward Power of the Translator/Exciter Driver Power Amplifier module is routed to the Upconverter module as AGC #1. A system over-drive condition is detected when this value rises above 0.9 VDC. When an over-drive condition is detected, the Upconverter module reduces its RF output level. For values less than 0.9 VDC, the Upconverter uses this voltage for automatic gain.

8.5 Control and Status

8.5.1 Exciter Tray (Driver)

Table 8-1. Receiver Front Panel Switch

SWITCH	FUNCTION
MAN/AUTO ALC	When Manual ALC is selected, the level is set by the Manual

SW1	ALC Pot R57 located on the mixer/PLL board. (**NOTE**: The pot is factory set and needs no adjustment by the customer). When Auto ALC is selected, the level control circuit will automatically increase or decrease the ALC to maintain the desired output level.

Table 8-2. Receiver Front Panel Status Indicators

LED	FUNCTION
PLL1 Fault DS6	Displays the status of the Local oscillator PLL
PLL 2 Fault DS8	Displays status of optional input frequency correcting PLL
DC on center conductor DS4	Displays whether or not DC is applied to the RF input center conductor
Man ALC Gain DS7	Displays when ALC is switched to Manual bypass
ALC Fault DS5	Displays ALC status

Table 8-3. Receiver Front Panel Control Adjustments

POTENTIOMETERS	DESCRIPTION
Manual Gain R57	Adjusts the gain of the receiver when the ALC is bypassed.
A/V Ratio R50	Adjusts the ratio between the visual and aural carriers.

Table 8-4. Receiver Front Panel Samples

SMA CONNECTORS	DESCRIPTION
Receiver IF J13	Sample of the IF output of the IF ALC Board.
Receiver LO J2	Sample of the LO generated on the UHF Mixer PLL Board.

Table 8-5. IF Processor Front Panel Switch

SWITCH	FUNCTION
MAN/AUTO ALC	When Manual ALC is selected, the reference ALC voltage is set by the ALC Gain front panel potentiometer. When Auto ALC is selected, the IF level control circuit will automatically increase the IF output until the desired output power is attained.

Table 8-6. IF Processor Front Panel Status Indicators

LED	FUNCTION
INPUT FAULT (Red)	When lit it indicates that there is a loss of the IF Input signal to the IF Processor. Translator can be set to Mute on an IF Input Fault.
ALC Fault (Red)	When lit it indicates that the required gain to produce the desired output power level has exceeded the operational range of the ALC circuit. The LED will also be lit when ALC is in Manual.
MUTE (Red)	When lit it indicates that the IF input signal is cut back but the enable to the Power Supply is present and the +32 VDC remains on.

Table 8-7. IF Processor Front Panel Control Adjustments

POTENTIOMETERS	DESCRIPTION
FREQUENCY RESPONSE EQUALIZER	These three variable resistors, R103, R106 & R274, adjust the depth of gain for the three stages of frequency response correction.
ALC GAIN	Adjusts the gain of the translator when the translator is in the Auto ALC position.
MAN GAIN	Adjusts the gain of the translator when the translator is in the Manual ALC position.
LINEARITY CORRECTION	These three variable resistors adjust the threshold cut in for the three stages of linearity pre-correction. R211 and R216, the top two pots, are adjusted to correct for in phase amplitude distortions. R 231, the bottom pot, is adjusted to correct for quadrature phase distortions.

Table 8-8. IF Processor Front Panel Sample

SMA CONNECTOR	DESCRIPTION
IF SAMPLE	Sample of the pre-corrected IF output of the IF Processor

Table 8-9. VHF/UHF Upconverter Front Panel Switch

SWITCH	FUNCTION
MAN/AUTO AGC	When Manual AGC is selected, the reference AGC voltage is set by the AGC Manual Gain front panel potentiometer. When Auto AGC is selected, the RF power level control circuit will automatically increase the RF output until the desired output power is attained.

Table 8-10. VHF/UHF Upconverter Front Panel Status Indicator

LED	FUNCTION
AGC CUTBACK (Red)	When lit it indicates that the required gain to produce the desired output power level has exceeded the level set by the AGC Cutback (Override) adjust. Translator will cut back power to 25%

Table 8-11. VHF/UHF Upconverter Front Panel Control Adjustments

POTENTIOMETERS	DESCRIPTION
MAN GAIN ADJ	Adjusts the gain of the translator when the translator is in the Manual AGC position.
AGC CUTBACK ADJ (AGC OVERRIDE)	Adjusts the point at which the translator will cut back in power when the Translator is in the Auto AGC position.

Table 8-12. VHF/UHF Upconverter Front Panel Samples

SMA CONNECTOR	DESCRIPTION
LO SAMPLE	Sample of the LO signal to the Upconverter as generated by the UHF Generator Board.
RF SAMPLE	Sample of the On Channel RF Output of the Upconverter

Table 8-13. Controller/Power Supply Display

DISPLAY	FUNCTION
LCD	A 4 x 20 display providing a four-line readout of the internal functions, external inputs, and status. See Chapter 3, Controller/Power Supply Display Screens, for a listing of displays.

Table 8-14. Controller/Power Supply Status Indicator

LED	FUNCTION
OPERATE (green)	When lit it indicates that the translator is in the Operate Mode. If translator is Muted the Operate LED will stay lit, the translator will remain in Operate, until the input signal is returned.
FAULT (red or green)	Red indicates that a problem has occurred in the translator. The translator will be Muted or placed in Standby until the problem is corrected.
DC OK (red or green)	Green indicates that the switchable fuse protected DC outputs that connect to the modules in the translator are OK.

Table 8-15. Controller/Power Supply Control Adjustments

POTENTIOMETERS	DESCRIPTION
DISPLAY CONTRAST	Adjusts the contrast of the display for desired viewing of screen.

Table 8-16. Power Amplifier Status Indicator

LED	FUNCTION
ENABLED (Green)	When lit Green, it indicates that the PA is in the Operate Mode. If a Mute occurs, the PA will remain Enabled, until the input signal is returned.
DC OK (Green)	When lit Green, it indicates that the fuse protected DC inputs to the PA module are OK.
TEMP (GREEN)	When lit Green, it indicates that the temperature of the heatsink assembly in the module is below 78˚C.
MOD OK (Green)	When lit Green, it indicates that the PA Module is operating and has no faults.

Table 8-17. Power Amplifier Control Adjustments

POTENTIOMETERS	DESCRIPTION
RFL CAL	Adjusts the gain of the Reflected Power monitoring circuit
VISUAL CAL	Adjusts the gain of the Visual / Forward Power monitoring circuit
AURAL CAL	Adjusts the gain of the Aural Power monitoring circuit
VISUAL ZERO	Adjusts the offset of the Forward Power monitoring circuit
AURAL NULL	Adjusts the offset of the Forward Power monitoring circuit based on the Aural signal level..

Table 8-18. Power Amplifier Sample

DISPLAY	FUNCTION
FWD SAMPLE	RF sample of the amplified signal being sent out the module on J25.

8.6 Remote Interface Connections

8.6.1 Remote Interface Connections (Exciter)

Port	Type	Function	Ohm
J1	IEC	AC Input	N/A
TB02	Term	Base Band Audio Input	600
J3	BNC	Composite Audio Input	75
J4	BNC	SAP / PRO Audio Input	50
J5	BNC	CW IF Input	50
J6	BNC	Modulated IF Input	50
J7	BNC	Video Input (Isolated)	75
J8	BNC	Visual IF Loop-Thru Output	50
J9	BNC	Aural IF Loop-Thru Output	50
J10	BNC	10 MHz Reference Input	50
J11	BNC	10 MHz Reference Output	50
J12	BNC	Receiver RF Input	50
J13	BNC	Receiver IF Output	50
J17	BNC	Video Loop-Thru (Isolated)	75
J18	BNC	Visual IF Loop-Thru Input	50
J19	BNC	Aural IF Loop-Thru Input	50
J23	BNC	Upconverter RF Output	50
J24	BNC	Power Amplifier RF Input	50
J25	N	Power Amplifier RF Output	50
TB30	Term	Remote Control & Monitoring	
TB31	Term	Remote Control & Monitoring	
J32	RJ-45	SCADA (Input / Loop-Thru)	CAT5
J33	RJ-45	SCADA (Input / Loop-Thru)	CAT5
J34	RJ-45	System RS-485 Serial	CAT5

8.7 AC Input

8.7.1 Exciter Tray

The AC input to the Exciter Tray is 117 VAC or 230 VAC (factory selectable). The AC input is applied to the tray through Jack J1. MOV's are provided to protect the Tray from transients or surges, which may occur on the AC Input Lines.

8.8 System Operation

When the translator is in operate, as set by the menu screen located on the Control & Monitoring Module in the exciter/driver assembly. The IF Processor will be enabled, the mute indicator on the front panel will be extinguished. The +32 VDC stage of the Power Supply in the Control & Monitoring Module is enabled, the operate indicator on the front panel is lit and the DC OK on the front panel should also be green. The enable and DC OK indicators on the PA Module will also be green.

When the translator is in standby. The IF Processor will be disabled, the mute indicator on the front panel will be red. The +32 VDC stage of the Power Supply in the

Control & Monitoring Module is disabled, the operate indicator on the front panel will be extinguished and the DC OK on the front panel should remain green. The enable indicator on the PA Module is also extinguished.
If the translator does not switch to Operate when the operate menu is switched to Operate, check that all faults are cleared and that the remote control terminal block stand-by signal is not active.

The translator can be controlled by the presence of a modulated input signal. If the input signal to the translator is lost, the translator will automatically cutback and the input fault indicator on the IF Processor module will light. When the video input signal returns, the translator will automatically return to full power and the input fault indicator will be extinguished.

8.8.1 Principles of Operation

Operating Modes

This translator is either operating or in standby mode. The sections below discuss the characteristics of each of these modes.

Operate Mode

Operate mode is the normal mode for the translator when it is providing RF power output. To provide RF power to the output, the translator will not be in mute. Mute is a special case of the operate mode where the +32 VDC section of the power supply is enabled but there is no RF output power from the translator. This condition is the result of a fault condition that causes the firmware to hold the IF Processor module in a mute state.

Operate Mode with Mute Condition

The translator will remain in the operate mode but will be placed in mute when the following fault conditions exists in the translator.

- Upconverter is unlocked
- Upconverter module is not present
- IF Processor module is not present
- Modulator (if present) is in Aural/Visual Mute

Entering Operate Mode

Entering the operate mode can be initiated a few different ways by the transmitter control board. A list of the actions that cause the operate mode to be entered is given below:

- A low on the Remote Translator Operate line.
- User selects "OPR" using switches and menus of the front panel.
- Receipt of an “Operate CMD” over the serial interface.

There are several fault or interlock conditions that may exist in the translator that will prevent the translator from entering the operate mode. These conditions are:

- Power Amplifier heat sink temperature greater than 78˚C.
- Translator is Muted due to conditions listed above.
- Power Amplifier Interlock is high indicating that the amplifier is not installed.

Standby Mode

The standby mode in the translator indicates that the output amplifier of the translator is disabled.

Entering Standby Mode

Similar to the operate mode, the standby mode is entered using various means. These are:

- A low on the Remote Translator Stand-By line.

Depressing the “STB” key on selected front panel menus.
- Receipt of a “Standby CMD” over the serial interface.

Operating Frequency

The LX Series translator controller is designed to operate on VHF frequencies. The exact output frequency of the translator can be set to one of the standard VHF frequencies, or it can be set to a custom frequency using software set-up menus. Since RF performance of the translator requires different hardware for different frequency bands, not all frequency configurations are valid for a specific translator. The Power detectors in the translator have frequency dependency, therefore detectors of power amplifiers are calibrated at their frequency of use. The detectors for System RF monitoring are also calibrated at the desired frequency of use.