ANYWAVE

ACT-9X
ATSC Exciter
User Manual

Version 1.4

ACT-9XU-A -C

May 23, 2014

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Contents

1 Product Appearance

1.1 Front Panel

LCD:

40×2 LCD with power saving backlight

6 Buttons:

Left, Right, Up, Down, OK, ESC

6 LEDs:

TS1: When illuminated, TS_IN_1A or TS_IN_1B or SMPTE_310 senses a valid stream and the signal is OK.

TS2: When illuminated, TS_IN_1C or TS_IN_1D senses a valid stream and the signal is OK.

TSErr: Red light on indicates that one or more input signals have error (Refer to Chapter 5).

GPS: Blinking LED indicates that the internal GPS is currently acquiring satellite information. LED On indicates that the GPS has achieved lock.

RF On: Indicates that the exciter is generating RF output power.

SysErr: On indicates that the exciter is in Local mode. Flashing indicates that the exciter does not see one of its required external inputs. When indication is off, no errors are reported.

1 BNC connector:

RFMON: RF monitoring port of after filter feedback signal.

1.2 Back Panel

RF IN A: Feedback signal for SNR/IMD displayed and AGC RF feedback option, sampled after the band-pass filter (-5 to -15dBm)

RF IN B: Feedback signal, sampled before the band-pass filter (-5 to -15dBm)

AGC IN: AGC DC feedback option (voltage: 0-5VDC)

RF MON: Loop out of exciter output for monitoring (10 dB below RF OUT)

RF OUT: Main RF signal output (nominal 0 dBm output)

DIO / TOD IN (RS232): Optional

REMOTE (RS232/RS485): Serial port for remote control

REMOTE (RJ45): 10M/100M Ethernet for remote control with SNMP support

TSoIP (RJ45): TS over IP input connection (use of this input is an option)

GPS ANT External GPS Antenna Connection

10M IN: 10 MHz input from external GPS receiver

1PPS IN: 1 PPS input from external GPS receiver

10M OUT: 10 MHz output from the exciter

1PPS OUT: 1 PPS output from the exciter

SMPTE 310: One dedicated SMPTE 310 input

TS OUT: TS loop out of ASI input or SMPTE310 input

TS IN 1A: The first ASI input of Group 1

TS IN 1B: The second ASI input of Group 1

TS IN 1C: The first ASI input of Group 2

TS IN 1D: The second ASI input of Group 2

TSoIP OUT: Output of the TS over IP converter to be connected to TS IN 1A when TS over IP option is installed.

L/R/V: Composite video and stereo audio input for Analog TV (optional)

2 Operation Specifications

- Environment
  - Operating Temperature: -10 ~ 50 °C
  - Operating Humidity: ≤ 95%
  - Atmospheric Pressure: 86 kPa ~ 106 kPa
- Power Supply
  - Voltage: 88 ~ 264 VAC
  - Frequency: 50 / 60 Hz
- Inputs/Outputs
  - RF IN A /RF IN B (AGC RF Feed-Back option via RF IN A)
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: -30 dBm ~ 0 dBm
      Recommended range: -15 dBm ~ -5 dBm
    - Location: Back Panel
  - AGC IN (AGC DC Feed-Back option)
    - Connector: BNC female
    - Impedance: 50 Ω
    - Input Type DC Voltage 0 V ~ 5 V
    - Location: Back Panel
  - RF OUT
    - Connector: N-type female
    - Impedance: 50 Ω
    - Level: -25 dBm ~ +5 dBm
    - VSWR: > 15 dB
    - Location: Back Panel
  - RF MON (loop out of RF OUT)
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: 10 dBm coupling of Exciter output level
    - Location: Back Panel
  - GPS ANT
    - Connector: BNC female
    - Impedance: 50 Ω
    - Location: Back Panel
  - 10M IN
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: AC-coupled, $V_{P-P} \geq 300$ mV
    - Location: Back Panel
  - 1PPS IN

- Connector: BNC female
- Impedance: 50 Ω
- Level: 3.3 V-TTL
- Input trigger: Positive Transition
- Location: Back Panel

■ 10M OUT
- Connector: BNC female
- Impedance: 50 Ω
- Level: 0 dBm
- Location: Back Panel

■ 1PPS OUT
- Connector: BNC female
- Impedance: 50 Ω
- Level: 3.3 V-TTL
- Location: Back Panel

■ SMPTE 310
- Connector: BNC female
- Impedance: 75 Ω

■ TS IN 1A/1B/1C/1D
- Connector: BNC female
- Impedance: 75 Ω
- Level: See Table 1
- Location: Back Panel

■ TS OUT
- Connector: BNC female
- Impedance: 75 Ω
- Location: Back Panel

■ TSoIP OUT
- Connector: BNC female
- Impedance: 75 Ω
- Location: Back Panel

Table 1 ASI Input Specifications

No	Content	Unit	Value
1	Input Level	mv	≥ 200
2	Positive Transition (20%~80%)	ps	≤ 1200
3	Negative Transition (20%~80%)	ps	≤ 1200
4	Deterministic Jitter	%	≤ 10
5	Random Jitter	%	≤ 8

Note

1) The electrical interface characteristics are measured under normal conditions. Values may vary.
2) Operating in abnormal conditions may result in damage to the equipment. Long operating hours in severe environments may reduce the reliability of the entire system, which may cause permanent damage to equipment. Make sure all electrical interface characteristics and environmental parameters are within the defined range listed above before operating this equipment.

3 Menu

3.1 Initialization

Connect the power supply of the ACT-9X and then turn on the exciter via the power switch located on the rear of the unit. The initialization process takes about 5 seconds to finish while the RF output level gradually increases to the pre-set value.

The ACT-9X may be configured to operate in Legacy (A/53 8VSB), M/H (A/153), or SFN (A/110:2011) modes and supports ASI, SMPTE310, and TSoIP input streams. The unit operates upon a TS signal applied to the TS inputs on the back of the unit and performs a modulation at the specified transmit frequency. The ACT-9X also has composite video and stereo audio input which can support NTSC and PAL if analog TV option is installed.

The first step after turning on the unit is to confirm the desired operating frequency. Please see Table 4 below for details.

3.2 Query Mode

Query mode is a mode which displays parameters and status of the exciter. There are four pages in query mode. Press the "Right" or "Left" button to switch between different pages which are shown in Table 2 through Table 5 below.

Note: The settings shown in the tables below for illustration purposes only and may be different from those in actual use.

Table 2 First Page in Query Mode

FWD	SNR	LID	UID
100%	38.5	43.5	44.0

Table 3 Second Page in Query Mode

INPUT	STATUS	TS_RATE	MH	TEMP
1A	USED	19.392658	9%	104.90°F

Table 4 Third Page in Query Mode

FREQ	MODE	AGC	GPS	1PPS	CTRL	ADPC
683M	MH	OFF	LOCK	OK	RMT	OFF

Table 5 Fourth Page in Query Mode (internal GPS)

YYYY-MM-DD	SAT	ANT	Status	Freq
HH-MM-SS	0	OK	0	+1E-07

Note:

1) The "SNR", "LID" and "UID" in Table 2 are the measurement of feedback signal quality. This feedback signal could be from the transmitter RF System coupling ports and their range is from -30 dBm to 0 dBm (Recommended range is -15 dBm to -5 dBm). These measurements are derived from the After-filter Feedback Signal connected to the rear port [RF IN A] BNC connector. If there is no signal connected, these readings will not be available or not valid. The "SNR" is measured with equalization on. It takes about 10 seconds to get the first reading of "SNR", and about 3 seconds to get the first reading of "LID" and "UID". After averaging, the upper limit of the "SNR" display is about 41 dB and the upper limit of the IMD display is about 61 dB.

2) The Exciter has 4 ASI inputs which are divided into "GRP1" and "GRP2". It also has one SMPTE310 input. In “AUTO” mode, the priority between "GRP1", "GRP2" and SMPTE310 is "GRP1">SMPTE310>"GRP2". "GRP1" consist of [TS_IN_1A] and [TS_IN_1B], the former input has higher priority than the latter input. And "GRP2" consist of [TS_IN_1C] and [TS_IN_1D], both inputs have the same priority. Each input has three statuses: "USED", "RDY" and "ERR". For example, "A_USED" of "GRP1" means input stream connected to [TS_IN_1A] is synced and used. If at the same time, an input stream is connected to [TS_IN_2B] is synced as well, since "GRP1" has higher priority than "GRP2" in "AUTO" mode, so "GRP2" status is "B_RDY" which means the input stream of Group 2 is standby. Refer to Chapter 5 Troubleshooting for more detailed information.

3) The "CTRL" status in Table 4 indicates "RMT" (Remote) mode or "LCA" (Local) mode. When in "LCA" mode, the exciter can only be controlled by the front panel interface and when in "RMT" mode, settings from the front panel keyboard are ignored - with the exception of "RMT"/"LCA" setting - and while in RMT mode, only commands from the remote control interface, such as the WEB, serial port, or Dry Loop are processed.

4) If the internal GPS receiver is selected as the system time reference, its "GPS" and "1PPS" status are shown on the third page in query mode with additional details are shown on the fourth page (as shown in Table 5).
   In Table 5, “YY-MM-DD” and “HH-MM-SS” is the current date and time, which are only available or valid after the internal GPS is locked. "SAT" is the number of satellites acquired by the internal GPS receiver, and “ANT” is the status of the GPS antenna.
   "Status" and "Freq" show the sync-up status of system clock with the internal GPS. "Status" is a Hex number value from 0x0 to 0xF. A higher number represents better sync and higher frequency stability. "Freq" is the current frequency accuracy number in the format of $\pm A \times 10^{-B}$ and has $\pm 1 \times 10^{-7}$ as original value.

3.3 User Menu

In Control mode, the user may modify configuration settings of the exciter. There are two levels of control, the User Menu and the Advanced Menu. To enter the User Menu, press ***both*** the "Left" and "Right" buttons ***at the same time*** while in query mode. The User Menu in control mode is shown below in Table 6. In the next section we will present the Advanced Menu.

Table 6 Main Menu

Welcome to setting interface!						
*SYSTEM	RF	FREQ	NET	MODE	CONFIG	TS

The Main User Menu consists of 6 sub-menus: SYSTEM, RF, FREQ, NET, MODE, CONFIG and TS.

Once at the main menu, press the "Left" or "Right" buttons to move the cursor and navigate to the desired sub-menu. Once the cursor is positioned just above the desired sub-menu, press the "OK" button to enter the target sub-menu. When in the corresponding sub-menu, press "Left" or "Right" button to move the cursor to the target parameter and then press the "Up" or "Down" buttons to select different options from the drop-down boxes. Once you have selected the desired option, ***press the "OK" button to apply and save, or press the "ESC" button to skip the changes and return to the upper menu.***

All the parameters of sub-menus are shown in Tables 7 through Table 14 respectively.

Table 7 System Menu

	*CTL	MODE	ADPC	NET	GRP	INPUT	GPS
Default	RMT	Legacy	OFF	MFN	AUTO	AUTO	AUTO
Options	RMT	Legacy	OFF	MFN	AUTO	AUTO	AUTO
	LCA	MH	UPDATE	SFN	GP1	A/C	EXT
			HOLD		GP2	B/D	INT
					SM310		

Note:

1) The "CTL" (Control) setting has two options, "RMT" (Remote) and "LCA" (Local). The exciter can be switched between these two modes only via the front panel interface. When in "Local" mode, the exciter can only be controlled by the front panel interface and all commands from serial port or WEB are ignored. When in "Remote" mode, settings from the front panel keyboard are ignored - with the exception of "RMT"/"LCA" setting, and only commands from the remote control interface, such as serial port or WEB, are processed. Notice that LED "SysErr" remains on all the time in "LCA" mode, and only indicates a SysErr when it is flashing.

2) If the exciter supports "MH" option, then the "MODE" parameter in "SYSTEM" sub-menu has 2 options available: "Legacy" and "MH". If "Legacy" is selected, the exciter will operate according to the ATSC (A_53) Legacy standard, otherwise if option "MH" is selected, the exciter will operate in compliance with the ATSC_MH (A_153) standard.

3) If the exciter supports "SFN" option, then the "NET" parameter in "SYSTEM" sub-menu has 2 options available: "MFN" and "SFN".

4) The "ADPC" parameter in the "SYSTEM" sub-menu has options of "UPDATE", "HOLD" and "OFF". If option "OFF" is selected, the ADPC function will be turned off (no correction applied). If option "HOLD" is selected, the exciter will ***apply*** the last stored linear and non-linear correction coefficients. If both feedback signals are connected properly and option "UPDATE" is selected, this will cause the exciter to run the Adaptive Digital PreCorrection (ADPC) function, automatically computing coefficients for ***both the linear and non-linear*** pre-correction for the entire transmission system including the distortion of both transmitter and band-pass filter. This process takes about 8 to 10 minutes, after which the computed corrections are automatically stored in nonvolatile memory. Please refer to Chapter 4 for detailed information.

5) "GRP" and "INPUT" are used together to configure specific input streams. The default settings are both "AUTO", which allow the exciter to run auto-detection and switchover among all 4 ASI inputs and 1 SMPTE310 input. Under the default settings, the priority of all 5 inputs is 1A>1B>SMPTE310>1C=1D.

6) The "GPS" parameter in "SYSTEM" sub-menu has options "EXT", "INT" and "AUTO". If option "EXT" is selected, it will use external 10 MHz and 1PPS signals from port [10M_IN] and Port [1PPS_IN] as clock reference. If option "INT" is selected, it will use internal GPS receiver as time reference. Or if option "AUTO" (default) is selected, it will switch between these two options and external GPS has a higher priority than the internal GPS receiver, which means only when there is no external GPS connected to the exciter, it will use the internal GPS receiver as time reference. Keep in mind that the internal GPS receiver would not start properly if an antenna is connected after it's powered up. So the correct order is to connect the antenna first and then to power up the exciter afterward.

Table 8 RF Menu

	RF	POWER	AGC	LVL	REF
Default	ON	+0.00	OFF	000	000
Options	ON	-25.00	OFF	000~255	000~255
	OFF	-24.95	ON		
		-24.90			
		...			

		...			
		...			
		+4.90			
		+4.95			
		+5.00			

Note:

1) The RF parameter in the “RF” sub-menu turns the RF output of the exciter ON or OFF.
2) The POWER parameter specifies the RF output power level in dB (in the range of -25 to +5 dBm, note: typical exciter output level is < or = 0 dBm).
3) The "AGC" parameter in the "RF" sub-menu is used to engage or disengage the exciter system-level automatic gain control. AGC has options "ON" and "OFF". "LVL" and "REF" are decimal numbers whose range is from 0 to 255. "LVL" provides a reading of the DC voltage from [AGC IN] or the RF signal level from [RF_IN_A] which reflects the AGC feedback signal level, and "REF" is the reference value (or target) of the AGC function. When AGC is turned ON for the first time, the "LVL" will be saved automatically to "REF" as a reference. So if the AGC feedback signal level changes due to temperature differences or mismatch impedance, etc., the reading of "LVL" will be different from that of "REF", and the AGC function starts to slowly adjust the output level of the exciter to approach to the pre-set reference level. The AGC adjustable range is from +1 dB to -10 dB.

Table 9 FREQ Menu

	FREQ	Hz
Default	653M	+00000
Options	473M	-50000
	479M	-49999
	485M	-49998
	...	...
	...	...
	...	...
	875M	+49998
	881M	+49999
	887M	+50000

Note:

1) The FREQ parameter in the “FREQ” sub-menu specifies the channel frequency for the modulated RF output signal of the exciter.
2) The "Hz" parameter provides a direct adjustment (offset) of the frequency of the FREQ RF output signal. The range is -50,000 Hz to +50,000 Hz, with steps of 1 Hz. This feature is designed for up to 50 kHz spectrum shift as ATSC standard required, or adjustment of the output frequency for carrier

accuracy.

Table 10 NET Sub-menu in Control Mode

	*DELAY	TXID	NETID	BRATIO
Default Value	0000.0μs	READ-ONLY	READ-ONLY	READ-ONLY
Options/Values	0000.0μs	000	000	21dB
	0000.1μs	001	001	24dB
	0000.2μs	…	…	…
	...	FFE	FFE	39dB
	1000.0μs	FFF	FFF	OFF

Note:

1) "DELAY" is a configurable parameter for time adjustment in SFN mode, and "TXID", "NETID" and "BRATIO" are READ-ONLY parameters whose value are retrieved from SFN streams. All of these are applicable only in SFN mode.

Table 11 MODE Menu

	MODE
Default	LEGACY
Options	LEGACY/M/H

Table 12 MODE Sub-menu in Control Mode (when MODE is LEGACY)

8VSB

Table 13 MODE Sub-menu in Control Mode (when MODE is MH)

	*SYNC	TCP_C	ZP1F	PID_DET
Default Value	TCP	DISABLE	0	READ-ONLY
Options	TCP	DISABLE	0	
	Dummy	ENABLE	1	

Note:

1) The MODE menu provides settings for the modulation mode selected. The ACT-9X Exciter operates in ATSC Legacy (A/53), and MH (A/153).
2) When in "MH" mode:
    a. "PID_DET" is read-only parameter whose value is retrieved from MH streams.
    b. "Sync" parameter in "MODE" sub-menu has options "TCP" (default) and "dummy". To select "TCP" means that the synchronization in MH mode is done according to the ATSC A/110:2011 standard. Select "dummy" for the exciter to use "dummy bytes" to do the synchronization.

c. "TCP_C' and "ZP1F" are defined in standard A/110:2011and are used in SFN mode only.

Table 14 CONFIG Menu

	*ID	bps	IP	GATEWAY	MASK	STANDARD	UPGRADE
Default	ID: 80H	19200	192.168.001.143	192.168.001.001	255.255.255.000	ASTC	NO
Options	ID: 00H	19200	***.***.***.***	***.***.***.***	***.***.***.***	ATSC	NO
	ID: 01H	9600				ATV	YES
	...	38400					
	ID: FEH						
	ID: FFH						

Note:

1) "IP", "GATEWAY", and "MASK" are used to establish a valid Ethernet connection for remote control via the REMOTE RJ45 located on the rear panel. The exciter has a built-in WEB GUI which requires only a standard web browser run by a PC. Simply by entering specified IP address, which is setup in CONFIG sub-menu, in a browser's address bar, the login interface will pop up and give user prompts to input the user name and password. There are two tiers of web interface available. The first "guest" tier is limited in monitoring and control, allowing users to retrieve information such as SNR and shoulder measurements, user configuration, and alarms. The guest account is accessed with a user name and password of "guest" and "guest" (case sensitive). The second "admin" tier provides full status and control of the exciter and is accessed with a username and password of "anywavecom" and "anywavecom" (case sensitive).
2) "STANDARD" is used to select between different TV standards, the default value is "ATSC". There is also an option to support NTSC and PAL if the analog TV option is installed.
3) "UPGRADE" is a reserved mode to perform an upgrade of the code inside the exciter unit.

3.4 Advanced Menu

To enter the Advanced Menu, first enter the User Menu by pressing both the ***"Left" and "Right"*** buttons at the same time to arrive at the menu shown below.

Table 15 User Menu

Welcome to setting interface!				
*SYSTEM	RF	NETWORK	MODE	CONFIG

Then, press both the ***"Up" and "Down"*** buttons at the same to enter Advanced Menu, as shown below.

Table 16 Advanced User Menu

Welcome to advanced interface!					
*AD1	MUTE	AD3	DPD	A_DPD	SN

Table 17 through Table 22 show the corresponding sub-menus.

Table 17 AD1 Menu

	PCRL	SW_UP	SW_Down	SW_RT	POWER_MAX
Default	1	OFF	OFF	03	+5dBm
Options	0: Null packet deletion ON but NO PCR	ON	ON	03~FF	+5dBm~-25dBm
	1: Null packet deletion ON and PCR ON	OFF	OFF		
	2: NO null packet deletion and NO				
	3: NO null packet deletion but PCR				

Note:

1) "PCRL" in Advanced User Menu contains 3 bits. Its default value is 1 which means both PCR function and NULL packet deletion is turned on. It's only applicable in Legacy mode. In MH mode, all input streams remain untouched.

   a) Bit2 is the switch of Insert-NULL-Packet.

   It's not used now (reserved) because when TS rate is lower than desired rate and FIFO is Almost Empty (less than 2.5% of its capacity), if the system does not insert NULL packets into the stream automatically, the whole FIFO will be reset and lose more useful bytes.

   b) Bit1 is the switch of Delete-NULL-Packet.

   When value is "0":

   If FIFO is Half Full (higher than 50% of its capacity), then the system will DELETE all new incoming NULL packets from the stream automatically, until FIFO is less than 50%.

   When value is "1":

   If the FIFO is Half Full, the system will NOT DELETE any new coming packets.

c) Bit0: The switch of Program Clock Reference Correction function
"1" means PCR function is ON;
"0" means PCR function is OFF

2) "Sw_Up" and "Sw_Down" are a pair of switches which control the "Slow_Up / Down" function. If "Sw_Up" is "ON", when there is a power raise, it will go up gradually. Likewise if "Sw_Down" is "ON", when there is a power decrease, it will go down gradually too. This "Slow Up / Down" function is designed for safety consideration and to prevent the transmitter connected from any possible damage due to the dramatic change of power.
3) SW RT establishes the RF ramp up time, with larger numbers producing a slower ramp to full output power.
4) “POWER_MAX” is used to set the maximum level of RF output. The default value is +5 dBm, which means the adjusted range of RF output is -25 dBm ~ +5 dBm.

Table 18 MUTE Menu

	M_TS	M_10M	M_1PPS	M_DLY
Default	0	0	0	01/00/00
Options	0	0	0	Hours/Minutes/Seconds
	1	1	1	

Note:
1) "M_TS" is the selection of MUTE/PRBS on loss/failure of TS input.
M_TS =1: RF Mute on loss/failure of TS input/sync.
M_TS =0: Output PRBS instead on loss/failure of TS input/sync.
2) "M_10M" is the selection of MUTE/NOT MUTE on loss of 10MHz.
M_10M =1: RF Mute on loss of 10MHz.
M_10M =0: RF NOT Mute on loss of 10MHz.
3) "M_1PPS" is the selection of MUTE/NOT MUTE on loss of 1PPS.
M_1PPS =1: RF Mute on loss of 1PPS.
M_1PPS =0: RF NOT Mute on loss of 1PPS.
4) "M_DLY" is the user configurable time to hold over before muting on loss of 1PPS.
Minimum Delay: 4 seconds.
Maximum Delay: 99hours, 59 minutes and 59 seconds.

Table 19 AD3 Menu

	CRM	FWD_CAL	CW	RST
Default	WEB	OK	OFF	NO
Options	WEB	OK	OFF	NO
	IO	CAL	ON	YES

Note:
1) “CRM” determines where the RF On/Off command comes from:

"IO" means from Pin 2 of DIO;
"WEB" means from either Serial or Web interface.

2) "FWD_CAL": Default value is "OK". "FWD_CAL" is used to calibrate the 100% FWD power level.

Table 20 DPD Menu

	PDT	CFR	ADPC	FSSI
Default	5	F	OFF	0%~100%
Options	0~F	0~F	HOLD	
			UPDATE1	
			UPDATE2	
			UPDATE3	

Note:

1) "PDT" is the pre-set time for the ADPC function which ranges from 0x0 to 0xF, and recommended value is 0x5 which means about 7 minutes in "UPDATE3" part and about 10 minutes for the entire ADPC process (all 4 steps together).

2) "CFR" is the pre-set crest factor reduction level which ranges from 0x0 to 0xF. The lower the parameter's value is, the harder the reduction of crest factor will be. A value of 0xF will bypass the whole CFR function (No reduction at all).
Note: If ADPC (Pre-correction) is ongoing, the system will disable automatically the CFR function (clipping) and will only resume the function after ADPC is finished.

3) "ADPC" here has the same function as that in control mode (default user menu) but separates into 3 steps. And the control here and there (default user menu) sync up to each other. All 3 steps still have to be run in strict sequence to get a complete compensation done. However going step by step provides an opportunity to monitor each step's performance more closely. Among all 3 steps, "UPDATE1" is to compensate the linear distortion before band-pass filter, and "UPDATE2" is for the linear distortion after band-pass filter. "UPDATE3" is for both linear and non-linear distortion in the whole transmitting system (including both the power amplifier and the band-pass filter). Performing an "UPDATE" executes the following ADPC correction steps in the following order -> "UPDATE1", "UPDATE2", "UPDATE3", and "UPDATE2".

4) "FSSI" is and indicator of feedback signal strength and its range is from 0% to 100%.
At +5 dB level, FSSI=100%.
At -5 dB level, FSSI=75%
At -15 dB level, FSSI=50%
At -20 dB level, FSSI= 25%
*The readings listed above are typical values. There may be variations on different frequencies or different units. Overall the recommended level of feedback signal is -15 dBm to -5 dBm, which

roughly corresponds to an ideal FSSI signal strength in the range of 40-60%. When FSSI is less than 20% or higher than 75%, the reading will keep flashing, indicating the feedback level may need to be adjusted.

Table 21 A_DPD Menu

	TIME	A_SNR	A_IMD	R_SNR	R_IMD	DPD	C_T
Default	0	32	36	02	04	NEW	READ_ONLY
Options	0~MAX					NEW	
						CON	
						CLR	

Note:

1) "TIME": The maximum times of Auto Correction.
When "TIME"="0": Auto Correction function is turned off.
When "TIME"="N": Auto Correction function will run no more than N times after exciter boots up.
When "TIME"="MAX": Times of Auto Correction function is unlimited.

2) "A_SNR" and "A_IMD": Absolute thresholds of triggering an Auto Correction.
If "ADPC" is "HOLD", and current average SNR≤A_SNR or LID ≤A_IMD or UID≤A_IMD, then exciter will run a complete NEW auto ADPC correction as long as "C_T" ≥ 1.

3) "R_SNR" and "R_IMD": Relative thresholds of triggering an Auto Correction.
If "ADPC" is "HOLD", and current average SNR≤(M_SNR-R_SNR), or LID ≤(M_IMD-R_IMD) or UID≤(M_IMD-R_IMD), then exciter will run an auto ADPC correction (NEW or Continued) as long as "C_T" ≥ 1. The type of correction (NEW or Continued) is decided by setting of "DPD"'.

4) "DPD":
When "DPD"="NEW": The current curve is cleared first then the exciter starts a complete NEW ADPC process based on NO pre-stored curve.
When "DPD"="CON": The current curve is kept and then the exciter starts a Continued ADPC process based on last saved curve.
"CLR": Clear the last saved curve manually.

5) "C_T" (Read-Only): It's the current Auto Correction times counter. Its maximum value equals to "TIME". If an AUTO ADPC has been run successfully, the value will be reset to "TIME", otherwise it will deduct 1 automatically. When "C_T"="0", exciter is not able to start Auto Correction any more.

Table 22 SN Menu

	SN	GUI_KEY
Default	0000000000000	00000000

Options		

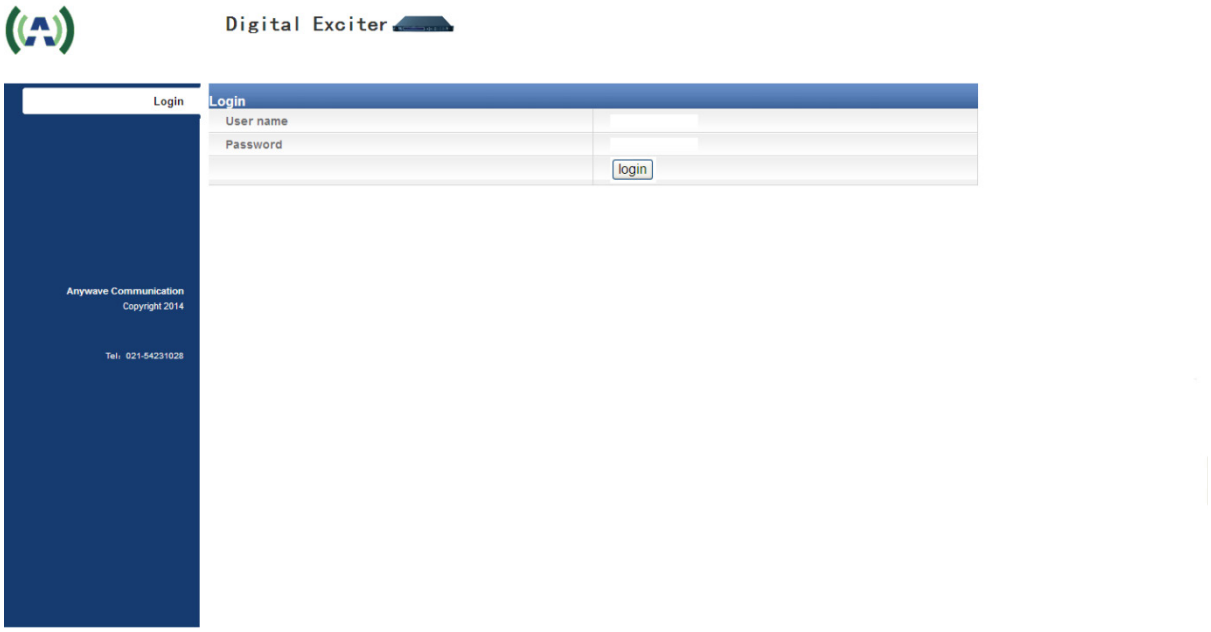
Note:

1) "SN": The serial number of the exciter. This value is set by the manufacturer and cannot be reset by the customer.
2) "GUI_KEY": If the Test and Monitoring option is included, then a valid "GUI_KEY" is required to enter here to allow the customer to access to the Test and Monitoring software.

3.4 Web Interface

The ACT-9X exciter has a built-in web interface accessible via the rear port REMOTE RJ-45 connection, Once networked to your PC, the built-in web interface may be accessed via a web browser (such as Internet Explorer or Firefox, etc.) by entering the IP address of the exciter (default 192.168.1.143, see Table 10 in section 3 for changing the default IP address).

Launching a web browser and entering the exciter IP address (192.168.1.143) will bring up the following login window.

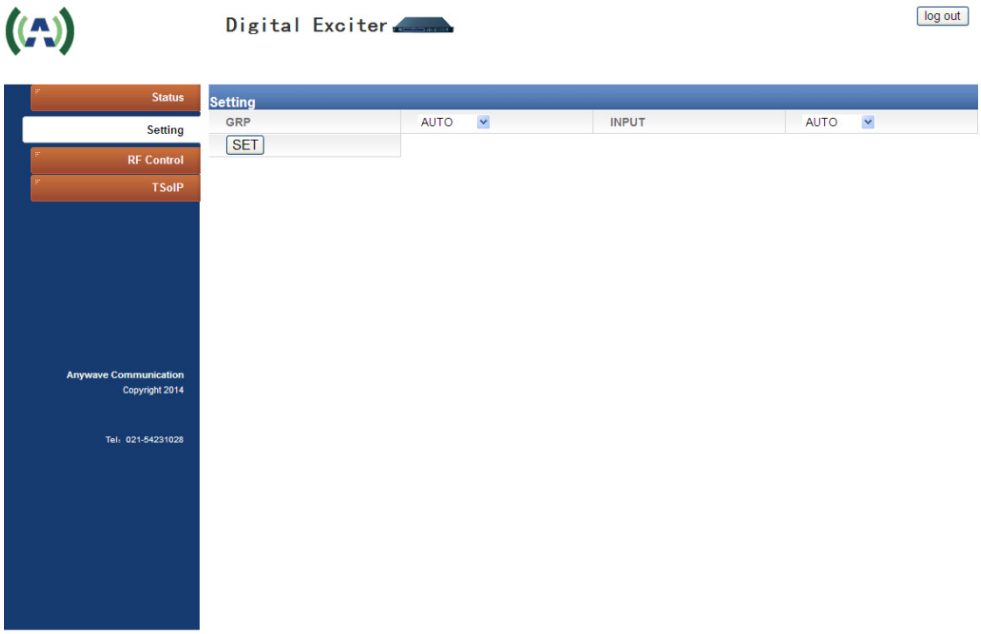


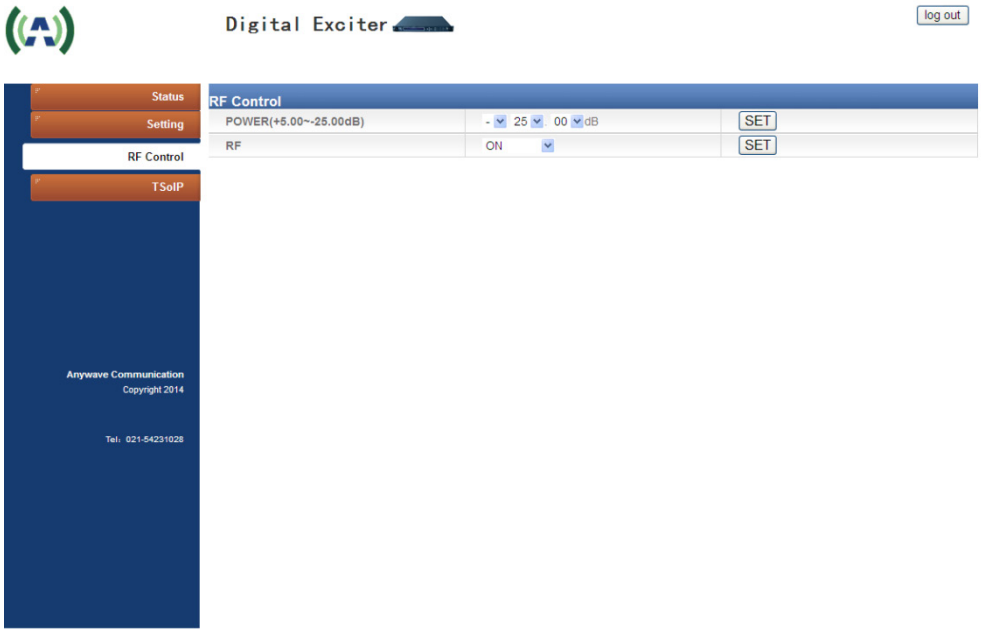
There are two tiers of web interface available. The first “guest” tier is limited in monitoring and control, allowing users to retrieve information such as SNR and shoulder measurements, user configuration, and alarms. The guest account is accessed with a user name and password of "guest" and "guest" (case sensitive). The second “admin” tier provides full status and control of the exciter and is accessed with a username and password of "anywavecom" and "anywavecom" (case sensitive).

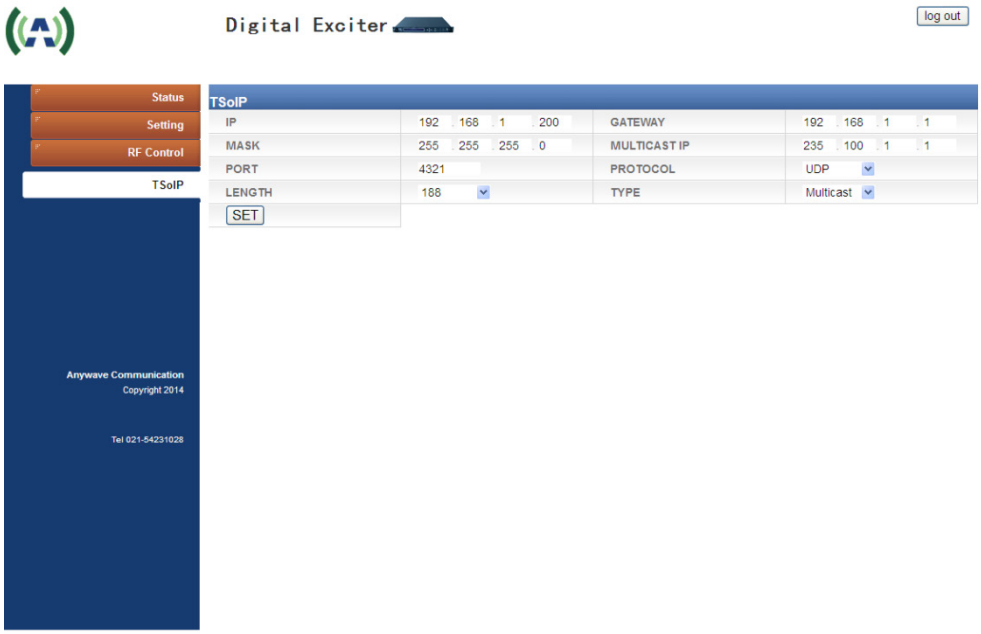
The screenshots below highlight the status and control available via the guest and admin web interfaces.

Guest web interface

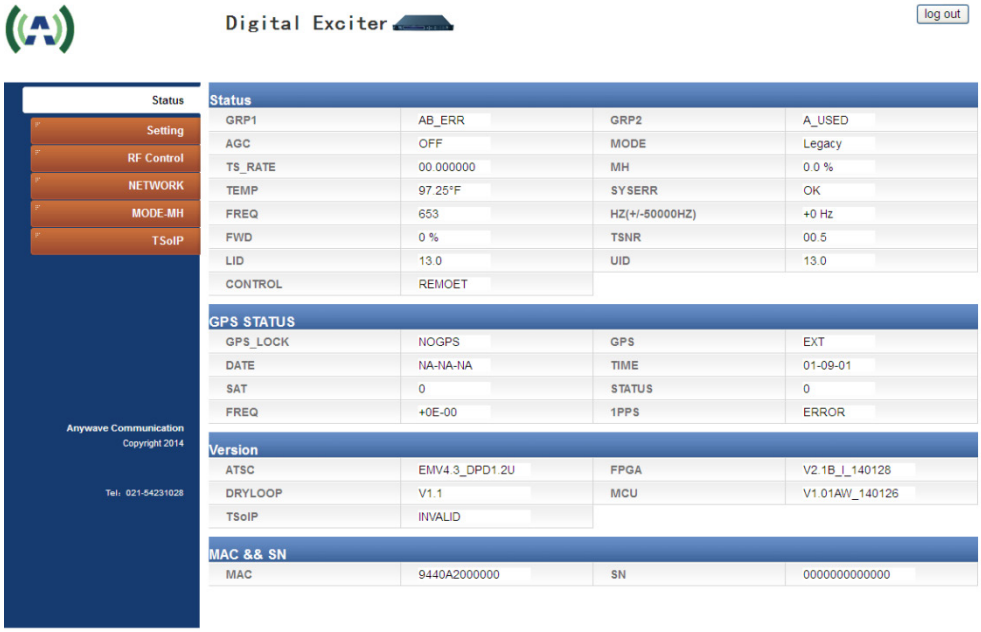

Digital Exciter
log out
Status
Setting
RF Control
TSoIP
Anywave Communication
Copyright 2014
Tel: 021-54231028
Status
GRP1 AB_ERR GRP2 A_USED
AGC OFF MODE Legacy
TS_RATE 00.000000 MH 0.0 %
TEMP 97.70°F SYSERR OK
FWD 0 % TSNR 00.5
LID 13.0 UID 13.0
CONTROL REMOET
GPS STATUS
GPS_LOCK NOGPS GPS EXT
Version
ATSC EMV4.3_DPD1.2U FPGA V2.1B_I_140128
DRYLOOP V1.1 MCU V1.01AW_140126
TSoIP INVALID
MAC && SN
MAC 9440A2000000 SN 0000000000000

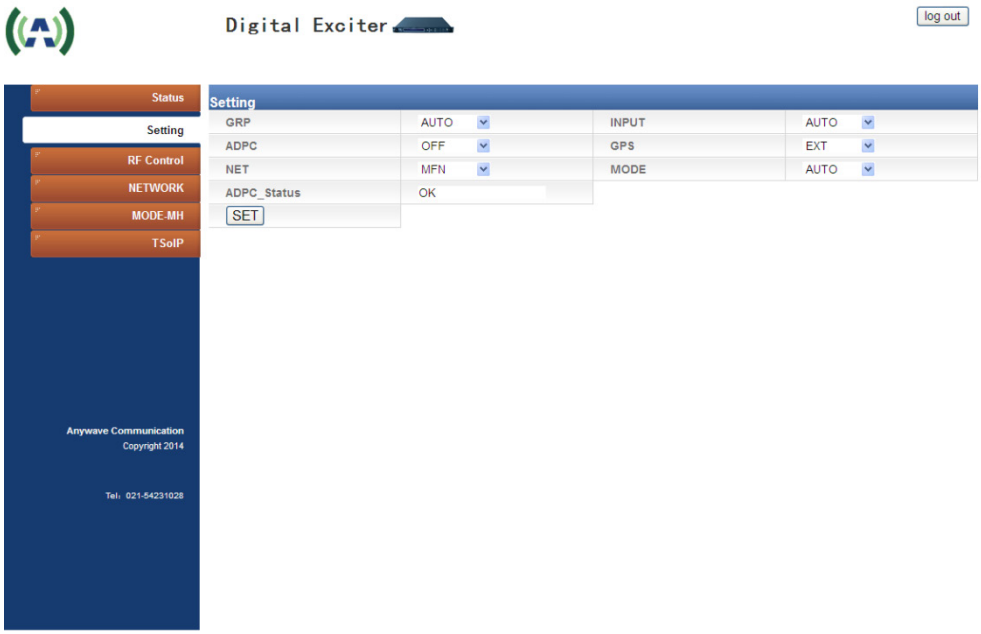

Digital Exciter
log out
Status
Setting
RF Control
TSoIP
Anywave Communication
Copyright 2014
Tel: 021-54231028
Setting
GRP AUTO INPUT AUTO
SET

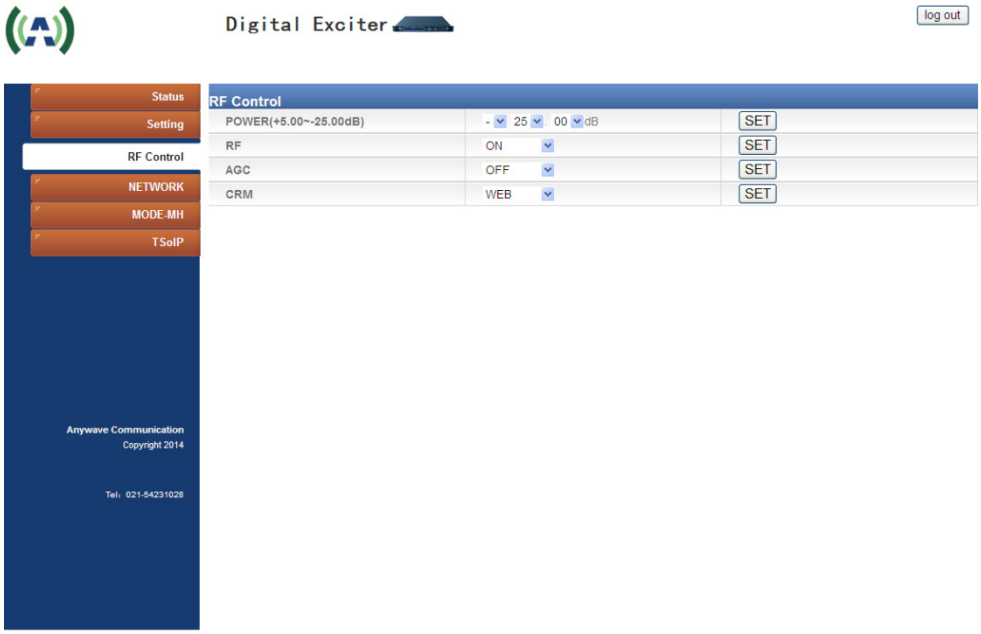


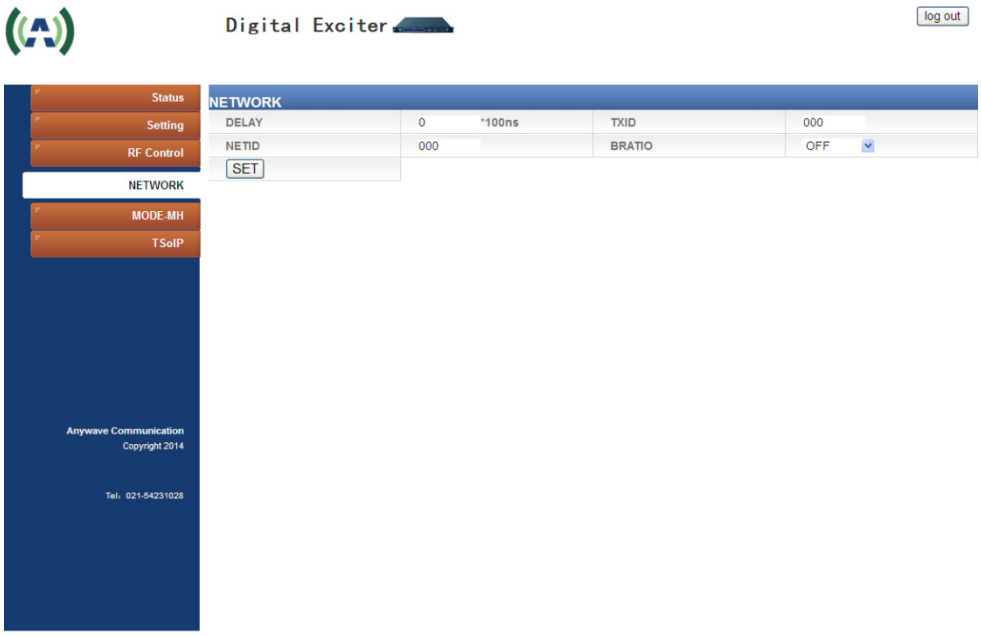


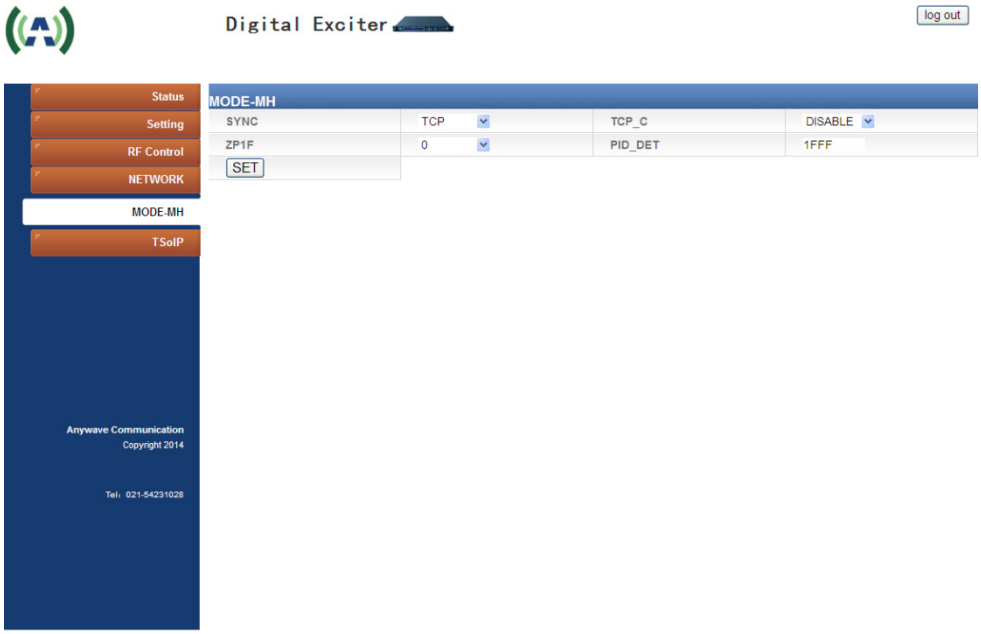
Admin web interface

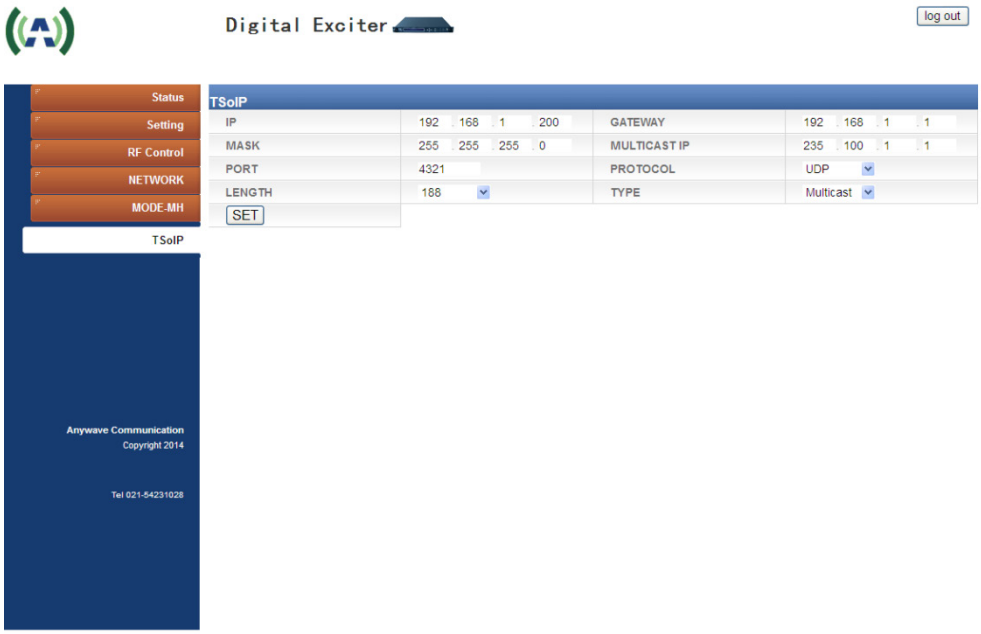

Digital Exciter
log out
Status
Setting
RF Control
NETWORK
MODE-MH
TSoIP
Anywave Communication
Copyright 2014
Tel：021-54231028
Status
GRP1 AB_ERR GRP2 A_USED
AGC OFF MODE Legacy
TS_RATE 00.000000 MH 0.0 %
TEMP 97.25°F SYSERR OK
FREQ 653 HZ(+/-50000HZ) +0 Hz
FWD 0 % TSNR 00.5
LID 13.0 UID 13.0
CONTROL REMOET
GPS STATUS
GPS_LOCK NOGPS GPS EXT
DATE NA-NA-NA TIME 01-09-01
SAT 0 STATUS 0
FREQ +0E-00 1PPS ERROR
Version
ATSC EMV4.3_DPD1.2U FPGA V2.1B_I_140128
DRYLOOP V1.1 MCU V1.01AW_140126
TSoIP INVALID
MAC && SN
MAC 9440A2000000 SN 0000000000000


Digital Exciter
log out
Status
Setting
RF Control
NETWORK
MODE-MH
TSoIP
Anywave Communication
Copyright 2014
Tel：021-54231028
Setting
GRP AUTO INPUT AUTO
ADPC OFF GPS EXT
NET MFN MODE AUTO
ADPC_Status OK
SET


Digital Exciter
log out
Status
Setting
RF Control
NETWORK
MODE-MH
TSoIP
Anywave Communication
Copyright 2014
Tel: 021-54231028
RF Control
POWER(+5.00~-25.00dB)
- 25 00 dB
SET
RF
ON
SET
AGC
OFF
SET
CRM
WEB
SET


Digital Exciter
log out
Status
Setting
RF Control
NETWORK
MODE-MH
TSoIP
Anywave Communication
Copyright 2014
Tel: 021-54231028
NETWORK
DELAY
0
*100ns
TXID
000
NETID
000
BRATIO
OFF
SET


Digital Exciter
log out
Status
Setting
RF Control
NETWORK
MODE-MH
TSoIP
Anywave Communication
Copyright 2014
Tel：021-54231028
MODE-MH
SYNC
TCP
TCP_C
DISABLE
ZP1F
0
PID_DET
1FFF
SET


Digital Exciter
log out
Status
Setting
RF Control
NETWORK
MODE-MH
TSoIP
Anywave Communication
Copyright 2014
Tel 021-54231028
TSoIP
IP
192 . 168 . 1 . 200
GATEWAY
192 . 168 . 1 . 1
MASK
255 . 255 . 255 . 0
MULTICAST IP
235 . 100 . 1 . 1
PORT
4321
PROTOCOL
UDP
LENGTH
188
TYPE
Multicast
SET

4 Connection

4.1 Connect the Transmitter

- Don’t turn On or Off the exciter when the transmitter is running. The correct order is:
  - First, turn on the exciter.
  - Measure the RF output level of the exciter to make sure it meets the requirement of the transmitter input level. If the output level is out of range, change the parameter "POWER" in "RF" sub-menu in control mode to make the adjustments. Refer to Table 8, Chapter 3 for details. If the output signal level is within range, connect the exciter output (port [RF_OUT] on back panel) to the transmitter's input.
  - After the exciter is stable, turn on the transmitter.
  - Likewise, turn off the transmitter first before making any change to the exciter settings. Restart the transmitter after the exciter is stable again.

4.2 Start ADPC function

1) After the exciter is connected to a transmitter, first of all measure the level of the transmitter's output. Second, check the feedback levels (both ***before and after*** band-pass filter) to ensure they meets the requirement of exciter feedback level (-30 dBm ~ 0 dBm and recommended range is -15 dBm to -5 dBm).
   1) If the signal level is out of range, use extra devices, e.g. attenuator, to make adjustments.
   2) If the signal level is within the range, connect the transmitter feedback signals which are ***before the*** band-pass filter to port [RF_IN_B] and ***after*** the band-pass filter to port [RF_IN_A] respectively. Figure 1 below demonstrates the correct connection.

- Start ADPC function
  - With AGC turned OFF, Select option "UPDATE" under "ADPC" of the “SYSTEM” sub-menu. Press the OK button to start the correction process, which will in sequence run Linear and Non-linear correction showing the status ("Wait a moment...") and readings of "SNR", "LID" and "UID" on the front panel LCD. Usually this takes about 10 minutes to finish the total compensation of both ***the linear and non-linear*** distortion in the whole transmission system including both power amplifier and band-pass filter. Once the new correction coefficients have been computed and applied, there is an automatic "Saving" process which stores the ADPC data into the on-board memory.
  - Readings of "SNR", "LID" and "UID" provide a continuous measurement and display of quality of feedback signal during the ADPC process. Compare these readings before and after the ADPC process as the reference of correction performance.
  - There is a "Loading" process that takes roughly 10-15 seconds when the exciter is first turned on again with the ADPC "HOLD" option selected. This ***restores*** the ADPC data saved the last time an entire ADPC process was successfully completed.

Note:

1) Do not change the connection status during the ADPC process otherwise it may affect the performance.
2) If any abnormal situation occurs during the ADPC process, the system will bypass all the pre-correction data immediately and leave the corresponding status on the front panel LCD. Press any key to cancel the ADPC function manually and restart the ADPC function again after the problems are resolved. Refer to Chapter 5 for further information.

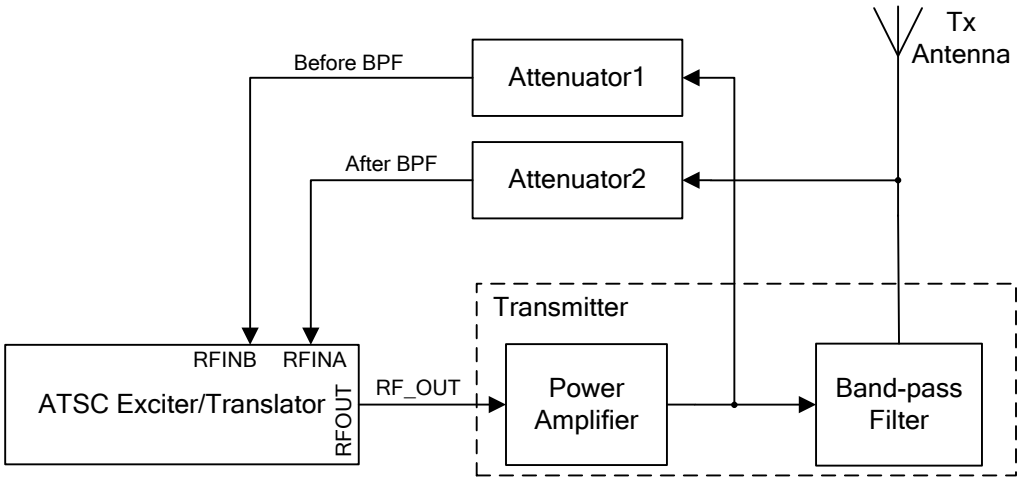


Figure 1 Connection with Transmitter of UPDATE Function

5 Troubleshooting

5.1 TS Input

- TS1 ERROR
  - Alarm message
    - LCD: TS1 ERR or SMPTE310 ERR
    - LED_ TS1: Off
    - LED_ TSErr: On
  - Cause: Input signal to TS_IN_1A or TS_IN_1B (Group 1) or SMPTE310 is lost or has invalid format.
  - Solution: Check the stream to make sure input signal has valid format.
- TS2 ERROR
  - Alarm message
    - LCD: TS2 ERROR
    - LED_ TS2: Off
    - LED_ TSErr: On
  - Cause: Input signal to TS_IN_1C or TS_IN_1D (Group 2) is lost or has invalid format.
  - Solution: Check the stream to make sure input signal has valid format.
- Transport Stream Rate Overflow or Underflow
  - Alarm message
    - LCD: TS_RATE Overflow or Underflow
    - LED_ TSErr: Flashing (Only applicable under MH mode)
  - Cause: The input TS bit rate is higher or lower than the bit rate required.
  - Solution: Adjust the TS input bit rate. Or connect all devices with the same reference clock (GPS).

  Note:

  1) When in Legacy mode, the Exciter operates in bit rate adaptation mode, dropping or inserting null packets as necessary to achieve the accurate acquired bit rate. This function is able to be turned off in the advanced settings.
  2) When in MH mode, the exciter and MH multiplexer must be locked to the same 10MHz reference signal in order to maintain flow control between the Mux and Exciter. When in SFN mode, the exciter and the SFN MUX/Adaptor must be locked to the same 10MHZ and 1PPS reference signals to establish proper synchronization. In MH and SFN modes, the Exciter does not perform any stream adaptation. This function is able to be modified in the advanced settings.

5.2 GPS

- No GPS
  - Alarm message
    - LCD: GPS NoGPS
    - LED_ GPS: Off

- LED_ SysErr: Flashing only when MH mode selected

- Cause: If option "EXT" of "GPS" is selected and no external GPS is connected, it will cause this warning. Or option "AUTO" of "GPS" is selected and internal GPS has not been initialized properly will cause this warning too.
- Solution: Check the connection with the external GPS device (option "EXT"), or restart the exciter (option "AUTO").

Note:

1) To assure the internal GPS module (option) works properly, GPS antenna MUST be well connected before exciter is turned on.

➢ GPS Unlocked

- Alarm message
  - LCD: GPS UNLOCK
  - LED_ GPS: Off
  - LED_ SysErr: Flashing only when MH mode selected
- Cause: The selected reference clock (either external or internal GPS) is unstable.
- Solution: Check the status of external GPS device. If internal GPS is selected, turn to the fourth page of query mode to check its status. Typically it needs "FS" ≥ "G2" and "Status" ≥ "6". Sometimes it may take up to 30 minutes to stabilize.

5.4 ADPC

➢ Feedback Signal Level

- Alarm message
  - LCD: "FEEDBACK TOO BIG! Press Any key to Esc"
    Or "FEEDBACK TOO SMALL! Press Any key to Esc"
  - LED_ SysErr: Flashing (during the ADPC process)
- Cause: Feedback signal level is too high or too low from the very beginning of each part of ADPC function.
- Solution: Cancel the ADPC function manually and then adjust the input level of the feedback signal according to the messages on the LCD. Start the ADPC function again after the problem is resolved.

Note:

1) The acceptable range of feedback signal from port [RF_IN_A] or [RF_IN_B] is -30 dBm to 0 dBm, and the recommended range is from -15 dBm to -5 dBm.

➢ Feedback Signal Connection Error

- Alarm message
  - LCD: “FEEDBACK LINK ERROR! Press Any key to Esc”
  - LED_ SysErr: Flashing (during the ADPC process)
- Cause: Feedback signal connection is interrupted, or signal level changes dramatically during the ADPC process.
- Solution: Cancel the ADPC function manually and then check the connection and the level of the

feedback signal. Start the ADPC function again after the problem is resolved.

- ADPC Error
  - Alarm message
    - LCD:“ADPC ERROR! Press Any key to Esc”
    - LED_ SysErr: ON (during ADPC process)
  - Cause: The measured IMD or SNR during ADPC process does not pass the pre-set threshold.
  - Solution: Cancel the ADPC function manually and then check the status of connection and entire transmitting system. Start the ADPC function again after the problem is resolved.

5.5 Other Problems

- Temperature
  - Alarm message
    - LCD:TEMP HIGH
    - LED_ SysErr: ON
  - Cause: The Temperature of the exciter is too high.
-
  - Solution: Cool the exciter.
- No RF output
  - Alarm message
    - LCD: None
    - LED_ RFON: Off
    - Dry Loop: 0 V (RF not Present)
  - Cause: The exciter will MUTE its RF output on loss of TS input, 10 MHz and 1PPS (user configurable in advanced settings). And RF output can also be turned off by front panel or serial port or WEB interface. If the exciter breakdowns, there would be no RF output either.
  - Solution: First of all, rule out all muting conditions. Then check the setting of "RF" via front panel, serial port or WEB and ensure it’s turned ON. Restart the exciter if necessary. If the problem still exists, contact the manufacturer for further solution.

  Note:

  1) If "Slow ON/OFF" function is turned on (user configurable in advanced settings), during power changing process, LED_RFON may be flashing.

6 ATV (option)

6.1 Query Mode

There are two pages in ATV's query mode. Press the "Right" or "Left" button to switch between different pages which are shown in Table 23 through Table 24 below.

Note: The settings shown in the tables below for illustration purposes only and may be different from those in actual use.

Table 23 First Page in Query Mode

LOS	LOB	OVFV	OVFL	OVFR
OK	OK	OK	OK	OK

Note:

1. LOS means "Loss-of-Sync Logic Output". LOS goes high when the input sync amplitude goes below the loss-of-sync threshold (VLOS) for 32 consecutive horizontal lines. LOS is pulled low when the input sync amplitude exceeds VLOS for 32 consecutive horizontal lines. When LOS is active, the output enters a high impedance state.
2. LOB means "Loss-of-Burst Logic Output". LOB goes high when the output color burst goes below the LOB threshold (VLOB) for 32 consecutive horizontal lines when the equalizer is at its maximum gain. LOB goes low when the output color burst exceeds VLOB for 32 consecutive horizontal lines. When LOB is active, the device enters the fixed equalization mode. LOB is valid only when LOS is low.
3. OVFV: overflow flag of the input video signal.
4. OVFL/R: overflow flags of the input audio (L&R) signals.

Table 24 Second Page in Query Mode

FREQ	TEMPERATURE
683M	104.90°F

6.2 User Menu

There are two levels of control, the User Menu and the Advanced Menu. To enter the User Menu, press ***both*** the "Left" and "Right" buttons ***at the same time*** while in query mode. The User Menu in control mode is shown below in Table 25. In the next section we will present the Advanced Menu.

Table 25 Main Menu

Welcome to setting interface!

*SYSTEM	RF	FREQ	ATV	CONFIG

The Main User Menu consists of 5 sub-menus: SYSTEM, RF, FREQ, ATV and CONFIG.

Once at the main menu, press the "Left" or "Right" buttons to move the cursor and navigate to the desired sub-menu. Once the cursor is positioned just above the desired sub-menu, press the "OK" button to enter the target sub-menu. When in the corresponding sub-menu, press "Left" or "Right" button to move the cursor to the target parameter and then press the "Up" or "Down" buttons to select different options from the drop-down boxes. Once you have selected the desired option, ***press the "OK" button to apply and save, or press the "ESC" button to skip the changes and return to the upper menu.***

All the parameters of sub-menus are shown in Tables 26 through Table 30 respectively.

Table 26 System Menu

	*CTL	ADPC
Default	RMT	OFF
Options	RMT	OFF
	LCA	UPDATE
		HOLD

Table 27 RF Menu

	RF	POWER	AGC	LVL	REF
Default	ON	+0.00	OFF	000	000
Options	ON	-25.00	OFF	000~255	000~255
	OFF	-24.95	ON		
		-24.90			
		...			
		...			
		...			
		+4.90			
		+4.95			
		+5.00			

Table 28 Freq Menu

	FREQ	Hz

Default	653M	+00000
Options	473M	-50000
	479M	-49999
	485M	-49998
	...	...
	...	...
	...	...
	875M	+49998
	881M	+49999
	887M	+50000

Table 29 ATV Menu

	MODE	AUDIO_RATE
Default	NTSC	-12dB
Options	NTSC	-30dB
	PAL	-29dB
		...
		-1dB
	...	0dB
	...	OFF

Table 30 Config Menu

	*ID	bps	IP	GATEWAY	MASK	STANDARD	UPGRADE
Default	ID: 80H	19200	192.168.001.143	192.168.001.001	255.255.255.000	ATV	NO
Options	ID: 00H	19200	***.***.***.***	***.***.***.***	***.***.***.***	ATSC	NO
	ID: 01H	9600				ATV	YES
	...	38400					
	ID: FEH						

	ID: FFH						