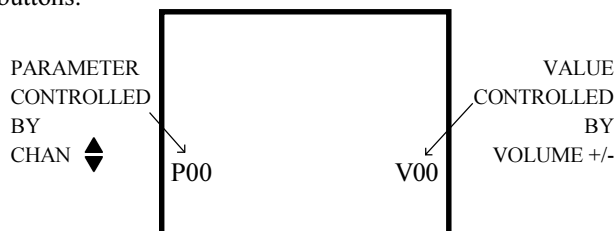


## SERVICE ADJUSTMENTS - CHASSIS/TUNER ALIGNMENT

### Service Menu

The service menu is provided to facilitate instrument alignment and service adjustments. The service menu is accessed by pressing two combinations of buttons on the front panel keyboard. With the instrument "on" press and hold the menu button and simultaneously press the power button, then while continuing to hold the menu button release the power button and press the volume + button. The instrument should immediately display a one line menu on the screen, release buttons.



The decimal value on the left is the parameter number and the decimal value on the right is the current value of that parameter. The channel up and down buttons increment and decrement the parameter number. The volume + and the volume - buttons adjust the current value of that parameter. There are three parameter categories which are used for security reasons. They are employed to protect the factory alignments from being modified by the user. The first security parameter, 00, requires a specific value to be selected with the

volume +/- keys before other parameters may be selected.

**NOTE:** If the channel up/down buttons are pressed without the correct security pass-number set, the service mode is exited.

There are three main groups of parameters: the service adjustment parameters, the chassis alignment parameters, and the tuner alignment parameters. The chassis and tuner alignment parameters are each preceded by a security pass-number for added protection. Most of the service adjustment and chassis alignment parameters correspond to individual (unpacked) register fields in the T-Chip. When these parameters are modified, the T-Chip and the corresponding EEPROM location is updated.

**NOTE:** When setting the kine bias/drive parameters, the Menu button may be used to enable the vertical collapse setup line-it functions as a toggle. The setup line has the following characteristics: -Selects S-Video source (make sure no signal is connected to the S-Video input); -Contrast is automatically set to minimum; -Brightness is set to 7.5 IRE; -Vertical kill is enabled. When the setup line is toggled off, the characteristics modified above will return to their prior settings. Changing to another parameter (with channel up/down buttons) will also toggle off

## SERVICE ADJUSTMENTS

**NOTE:** All service adjustments, except Focus and Screen adjust, are bus controlled. They are accessible only through entry of the correct parameter #. See the Service Menu Chart in this service data.

### Focus Adjust

Adjust focus control to provide best overall picture focus.

### Horizontal Frequency

1. Enter parameter # 01 (see chart).
2. Adjust value range for stable or slowly moving horizontal lines.

### Horizontal Phase

1. Enter parameter # 02 (see chart).
2. Adjust value range to center picture left to right.

### Pincushion EW DC (some models)

1. Enter parameter # 03 (see chart).
2. Adjust value range to provide approximately 1/2 inch overscan left and right sides.

### Pincushion EW Amplitude (some models)

1. Enter parameter # 04 (see chart).
2. Connect crosshatch generator to antenna terminals.
3. Adjust value range for straight vertical lines left and right sides.

### Vertical DC Adjust

1. Enter parameter # 05 (see chart).
2. Adjust value range to center picture top to bottom.

### Vertical Size

1. Enter parameter # 06 (see chart).
2. Adjust value range to provide approximately 1/4 inch overscan at top and bottom of screen.

### Set Up Position (Collapsed Raster Service Line)

Access to the set up position (collapsed raster service line) is allowed only during adjustment of the red, green and blue bias and drive parameters. See color temperature adjustment procedure.

### High Voltage

High voltage on this chassis is NOT adjustable. To check high voltage connect a VTVM with high voltage probe to the picture tube high voltage anode, negative lead to picture tube ground strap (use 500 volt scale).

**NOTE:** The meter (VTVM with high voltage probe) used for measuring high voltage must have a resistance of 1000 megohm or more and be accurate within 5% or better.

Nominal high voltage for this chassis (at maximum beam current) is 25.1 kV (19 & 20 inch), 26.4 kV (25, 26 & 27 inch) and 29.1 kV (31 & 35 inch) when measured with a VTVM (with high voltage probe) as described and must not exceed 29.0kV (19 thru 27 inch) and 32.0kV (31 & 35 inch) under any circumstances.

## SERVICE ADJUSTMENTS (Continued)

### X-Radiation Protection Shutdown Check

**NOTE:** When service is required, especially in the horizontal deflection, high voltage, or regulated B+ circuits the X-Radiation Protection circuit should be tested for proper operation as follows:

1. Apply 120 volts AC using a variac (variable AC) transformer for accurate AC input voltage.

2. Allow for instrument warm up and adjust user controls or maximum brightness and contrast levels.
3. Locate the x-ray protect test stakes labeled XRP1 and XRP2(J4901 located to the rear and center of the chassis).
4. Momentarily short stake XRP1 to stake XRP2. The instrument must shutdown and then restart.

### SERVICE MENU CHART

**NOTE:** During the Service Menu Mode the channel up/dn will change the parameter # while the volume +/- will change the value range. Therefore channel changes, when in the service menu mode, must be accomplished by random access using the remote transmitter. To access channels 100 thru 125, press and hold the channel 1 button on the remote control until the number 1, and two dashes are displayed on the screen, then press the second two digits.

Parameter #	Parameter Name	Value Range	Comment:
Chan to Change		Vol to adjust	
00	Pass No. for Serv. adjust	Must set to 76	May not advance until value set

#### Service Adjustment Parameters

01	Horiz. Freq.	00-63	Sync is killed
02	Horiz. Phase	00-15	
03	EW DC (width)	00-15	Some models
04	EW Amplitude	00-07	Some models
05	Vertical DC	00-15	
06	Vertical size	00-31	
07	Red Bias	00-127	Press Menu button for setup line
08	Green Bias	00-127	Press Menu button for setup line
09	Blue Bias	00-127	Press Menu button for setup line
10	Red Drive	00-63	Press Menu button for setup line
11	Green Drive	00-63	Press Menu button for setup line
12	Blue Drive	00-63	Press Menu button for setup line
13	Security pass no. for chassis align parameters	Must set to 77	May not advance to higher param. until value set

#### Chassis Alignment Parameters

14	PLL Tuning	00-63	
15	4.5 MHz Trap	00-7	
16	Video Level	00-7	
17	FM Level	00-15	
18	B+ Trim	00-15	CTC175 only
19	RF AGC	00-31	
20	D-PIP chroma	00-127	
21	D-PIP tint	00-255	Wraps around
22	D-PIP brightness	00-31	
23	D-PIP contrast	00-63	
24	Factory tint	00-63	
25	dbx: input level	00-15	Refer to DBX alignment procedure
26	dbx: stereo VCO free run freq.	00-63	Refer to DBX alignment procedure
27	dbx: SAP VCO free run freq.	00-15	Refer to DBX alignment procedure
28	dbx: stereo low pass filter	00-63	Refer to DBX alignment procedure
29	dbx: SAP band pass filter	00-15	Refer to DBX alignment procedure
30	dbx: wideband alignment	00-63	Refer to DBX alignment procedure
31	dbx: spectral alignment	00-63	Refer to DBX alignment procedure
32	Security pass no. for tuner alignment	Must set to 78	May not advance to higher param. until value set

## SERVICE ADJUSTMENTS - CHASSIS ALIGNMENT

### Test Equipment Required

**External Marker Generator**-Capable of furnishing 41.25 MHz, 45.75 MHz and 4.5 MHz markers and AF modulation.

### Digital Voltmeter

**External Bias Supply**-Well regulated, isolated AC operated variable DC bias supply.

**NOTE:** All alignment adjustments, are bus controlled. They are accessible only through entry of the correct code. See the parameter # and value range adjustment chart in this service data.

### PLL Tuning (IF VCO Free Run)

1. Enter parameter # 14 (see chart).
2. Apply 4.0 volt DC bias to IF AGC TP2305 (pin 14 of U1001).
3. Short RF AGC TP7102 (tuner side of R2313) to ground.
4. Apply 41.25 MHz marker (300 mV output) to IF input (pin 1 of SF2301).
5. Connect oscilloscope to TP1201 (pin 55 of U1001). Set scope for 1uS per division.
6. Adjust parameter reading to provide a 2.2uS sine wave response

**NOTE:** If a 2.2uS sine wave response cannot be achieved set parameter reading to approximate mid range and adjust L2302 for a 2.2uS response.

**L2302 is preset at the time of manufacture and should require no further adjustment unless a 2.2uS response cannot be achieved during the parameter adjustment.**

### 4.5 MHz Trap

1. Enter parameter # 15 (see chart).
2. Short RF AGC TP7102 (tuner side of R2313) to ground.
3. Apply 45.75 MHz (300mV output) and 41.25 MHz (100mV output) to IF input (pin 1 of SF2301).
4. Connect oscilloscope to TP2302 (pin 63 of U1001).
5. Adjust parameter reading to produce minimum 4.5 MHz indication (sine wave just stops losing amplitude).

### Video Level

1. Enter parameter # 16 (see chart).
2. Connect color bar generator to antenna input (100% modulation) set for super pulse display.
3. Connect oscilloscope to TP2302 (pin 63 of U1001).
4. Adjust value range to produce 2.0 volt p-p (sync to white) response.

### FM Level (Wideband Audio)

1. Enter parameter # 17 (see chart).
2. Connect signal generator to sound output TP1201 (pin 55 of U1001) with 4.5 MHz carrier, 1 KHz modulation, with 25 KHz deviation
3. Apply 4.0 volts DC bias to IF AGC TP2305.
4. Connect oscilloscope to TP1202 (WBA output pin 3 U1001).
5. Adjust value range for 1.2 volt p-p indication of the 1KHz component (a 1.8 KHz component also exists).

### RF AGC

The RF AGC has been preset at the time of manufacture for optimum operation over a wide range of RF signal input conditions. Readjustment should not be required unless—the tuner has been repaired, IC 1001 has been replaced, IC 3101 has been replaced, IC 3201 has been replaced, or unusual signal conditions exist such as:

1. Cable TV—adjacent channel interference.
2. Picture bending and/or channel 6 color beats which are usually due to excessive RF signal input. This occurs when the receiver location is too close to the transmitting tower. It may also occur when the receiver is connected to an antenna distribution system where the RF signal has been amplified. The signal should be attenuated at the antenna input to a more satisfactory level.
3. Picture Noise caused by “broadcast noise” or weak signal. If the broadcast is “clean” and the received signal is at least 1 mV, the picture will be noise free in any area.

**NOTE:** Adjustment of the RF AGC parameters may not have any visible effect except under unusual conditions. Adjusting the RF AGC to one extreme of its parameter limits will usually provide a relatively poor signal-to-noise ratio, while adjustment to the other extreme of its parameter limits will cause a degradation of overload conditions such as channel 6 color beats or Cable TV adjacent channel interference. If the RF AGC parameter setting is adjusted, check all local channels for proper operation. Use weakest local signal to adjust RF AGC parameter setting.

## SERVICE ADJUSTMENTS - COLOR TEMPERATURE ADJUSTMENT (Preferred Method)

**NOTE:** See service adjustment chart for sequence required to obtain entry to color temperature adjustment parameters.

1. Preset Video controls:  
Color— Set to minimum.  
Contrast— Set to minimum.  
Brightness— Set to mid-range.
2. Set instrument for Auxiliary Input (Channel 00) Make sure that there is no signal input to the SVHS input on models with SVHS jacks.
3. Preset red, green and blue drive parameter values to mid-range (approximate setting of 32).
4. Enter parameter # 07 for red bias adjustment. Press Menu button (on instrument front panel) for setup line.

**NOTE:** Access to the set up line (collapsed raster service line) is only allowed during adjustment of the drive and bias parameters.

5. Using an DC voltmeter, preset red, green and blue bias parameters to provide 120 volts DC at the collector of their respective output transistors on the kine socket circuit board.

**NOTE:** When the voltmeter probe is placed on the green cathode, the Service Menu On-Screen-Display may be difficult to read.

6. Adjust the screen control to just produce a centerline (red, green or blue).
7. Enter parameter #s for the remaining two bias control colors and obtain proper mix to produce a white setup line.

**NOTE:** Each time a parameter is exited and a new parameter is entered the Menu button (on instrument front panel) must be pressed to reinstate the setup line.

8. Set brightness and contrast controls to maximum.
9. Enter access codes for the color drive controls (10 for red, 11 for green and 12 for blue) in random sequence. Adjust their respective parameters to obtain a 6500 degree kelvin color temperature (warm white) raster.
10. Check the low light to high light gray scale tracking (black and white picture). Should any color other than gray or white be dominant in low light to high light areas the color temperature settings have not been properly performed. Repeat the procedure if necessary.

**NOTE:** Color bias adjustments affect the low light (dark) areas while color drive adjustments affect the high light (white) areas.

### D-PIP Adjustment

**NOTE:** See service adjustment chart for sequence required to obtain entry to D-PIP adjustment parameters.

1. Enter parameter # 23 for chroma level adjustment. Adjust value level to match big pix chroma level.
2. Enter parameter # 24 for tint level adjustment. Adjust value level to match big pix tint level.
3. Enter parameter # 25 for brightness level adjustment. Adjust value level to match big pix brightness level.
4. Enter parameter # 26 for contrast level adjustment. Adjust value level to match big pix contrast level.

## STEREO (MPX) ADJUSTMENT

**NOTE:** Make sure that the EXPANDED STEREO function is turned off, otherwise the stereo separation and output amplitudes will be in error.  
The following alignments must be performed in the order given.

### Set-up

1. Unsolder and lift the bottom end of R1609 from the circuit board (end closest to Main circuit board). This is the Wideband Audio input (WBA) to the CXA1734 stereo IC.
2. Connect an audio generator to the unsoldered end of R1609 (WBA).

### Attenuator

1. Enter parameter # 25 (see chart)
2. Adjust the generator output for 100 Hz, 424 mV rms, +/- 10 mV. This corresponds to a full 25KHz carrier deviation mono audio signal from the sound IF.

3. Connect an AC voltmeter to MPX CBA pin #JS106, RIGHT CHANNEL OUTPUT. This is also the *bottom* end of R612. (Do not use the top end, or oscillations may result.) Adjust the parameter value using the volume control buttons to set the DAC (parameter value) for an output level as close to 489 mV rms as possible. Each value step will change the output level by about 25 mv.
4. Observe on an oscilloscope that the audio output at MPX CBA pins #5 (LEFT) and #6 (RIGHT) are clean and undistorted.
5. Confirm that the rms amplitude of both pins #5 and #6 are within 20 mVrms of each other.

**NOTE:** If the final DAC alignment value is not within the range of 7 - 11, check to make sure that the signal amplitude is proper. (Do not use 1KHz, because the internal deemphasis filter will cause an amplitude error.)

## SERVICE ADJUSTMENTS - STEREO (MPX) (Continued)

### Stereo VCO

*This alignment is also a course adjustment for the next alignment.*

1. Enter parameter # 26 (see chart). Remove the audio generator connection from the bottom end of R1609. False VCO frequency will be generated if WBA input is not open.
2. Connect a frequency counter to MPX CBA pin #6. ( $4 \times f_H$  vco is automatically routed to pin #6 when in parameter #26 is selected).
3. Adjust the parameter value for a frequency of 62,936 Hz  $\pm 200$  Hz. ( $4 \times f_H$ ). The frequency increment for each DAC step is approximately 300 Hz.

### SAP VCO

*This is not a direct frequency measurement. It uses the internal status registers of the stereo IC to indicate PLL lock. The previous alignment (STVCO) is a coarse adjust for this alignment.*

1. Enter parameter # 27 (see chart).
2. Connect an audio generator as described in *Set-up* and adjust for 78.67 KHz, 254 mv rms,  $\pm 10$  mv.
3. Adjust the parameter value to 0. Observe TV screen. No star (\*) should be present.
4. Increment the parameter value once per second or slower until the star (\*) becomes present. Record this value setting. (A flashing \* is OK. Usually, one more value increment will stop the flashing.)
5. Set the parameter value to step # 15. Observe that no \* is present. Decrement the parameter value until \* once again becomes present. Record this value setting.
6. Average the parameter value settings from steps 4 and 5. Set the parameter value to this averaged value. This is the proper alignment value for SAP VCO. Setting will usually be 6 - 10. If not, verify that the previous steps were done properly.

### Stereo Lowpass Filter

*This alignment is also a course adjustment for the next alignment.*

1. Enter parameter # 28 (see chart)
2. Adjust audio generator for 9.4 KHz, 1.04 V rms at WBA input.
3. Set the parameter value to step # 0. Observe TV screen. No "STEREO" indicator should be present.
4. Increment the parameter value once per second or slower until "STEREO" indicator becomes present. Record this value setting. (It is OK for the "STEREO" indicator to flash. Usually, one more value increment will stop the flashing.)
5. Set the parameter value to step # 63. Observe that no "STEREO" indicator is present. Decrement the value until "STEREO" indicator once again becomes present. Record this value setting.

6. Average the parameter value settings from steps 4 and 5. Set the parameter value to this averaged value. This is the proper alignment value for Stereo Lowpass Filter.

### SAP Bandpass Filter

1. Enter parameter # 29 (see chart)
2. Adjust audio generator for 88 KHz, 206 mV rms,  $\pm 10$  mv.
3. Adjust the parameter value to 0. Observe TV screen. No star (\*) should be present.
4. Increment the parameter value once per second or slower until the star (\*) becomes present. Record this value setting. (A flashing \* is OK. Usually, one more value increment will stop the flashing.)
5. Set the parameter value to step # 15. Observe that no \* is present. Decrement the parameter value until \* once again becomes present. Record this value setting.
6. Average the value settings from steps 4 and 5. Set the parameter value to this averaged value. This is the proper alignment value.

### Wideband/Spectral Separation

*This alignment is for the dbx wideband detector.*

1. Enter parameter # 30 (see chart).
2. Set stereo generator for stereo left channel only signal, 300 Hz, 85 mV rms at 30% modulation.
3. Connect AC rms voltmeter to the MPX CBA pin #6.
4. Set the parameter value to step # 31 (DAC midpoint).
5. Start incrementing the parameter value (or decrementing, as necessary) while observing voltmeter reading. Find the parameter value setting which produces a minimum voltmeter reading (null setting). Record this value setting. The exact null setting will typically be difficult to determine, because the null range is rather broad.
6. Measure MPX CBA pin #5, left channel out, and check for at least 20 dB separation between left and right channel outputs.
7. Enter parameter # 31 (see chart).
8. Increase the generator from 300 Hz to 3000 Hz and repeat steps 3 thru 6.

**NOTE:** If a generator capable of producing 3000 Hz is not available, set the parameter value to the preset of 31.

9. Return the generator to 300 Hz and the parameter to 30.
10. Increment (or decrement) the parameter value for minimum voltmeter reading (null setting).

**SERVICE ADJUSTMENTS - TUNER ALIGNMENT****Equipment Required**

**TOB Service Alignment Fixture-** RCA Stock No 215568  
(TAG001)

**VCR-** Used as signal source for TOB service alignment fixture (tuner service modulator).

**DVM-** Digital volt meter.

**External DC Power Supply-** Voltage source to power service modulator.

**NOTE:** Monitor RF AGC at + leg of C2306 (TP7102) or pin 12 of the T-Chip (U1001) and adjust for minimum voltage each step. Top and bottom covers must be in place with bottom cover soldered. The entire electronic tuner alignment procedure, once started, must be completed in it's entirety.

**Electronic Tuner Alignment Parameters**

Parameter # Chan to Change	Parameter Name	Value Range Volume to adjust
100	Ch. 2 secondary	00-63
101	Ch. 2 primary	00-63
102	Ch. 2 single	00-63
103	Ch. 6 secondary	00-63
104	Ch. 6 primary	00-63
105	Ch. 6 single	00 63
106	Ch. 14 secondary	00-63
107	Ch. 14 primary	00-63
108	Ch. 14 single	00-63
109	Ch. 17 secondary	00-63
110	Ch. 17 primary	00-63
111	Ch. 17 single	00 63
112	Ch. 18 secondary	00-63
113	Ch. 18 primary	00-63
114	Ch. 18 single	00-63
115	Ch. 13 secondary	00-63
116	Ch. 13 primary	00-63
117	Ch. 13 single	00-63
118	Ch. 34 secondary	00-63
119	Ch. 34 primary	00-63
120	Ch. 34 single	00-63
121	Ch. 37 secondary	00-63
122	Ch. 37 primary	00-63
123	Ch. 37 single	00-63
124	Ch. 48 secondary	00-63
125	Ch. 48 primary	00-63
126	Ch. 48 single	00-63
127	Ch. 50 secondary	00-63

Parameter # Chan to Change	Parameter Name	Value Range Volume to adjust
128	Ch. 50 primary	00-63
129	Ch. 50 single	00-63
130	Ch. 51 secondary	00-63
131	Ch. 51 primary	00 63
132	Ch. 51 single	00-63
133	Ch. 57 secondary	00-63
134	Ch. 57 primary	00-63
135	Ch. 57 single	00-63
136	Ch. 63 secondary	00-63
137	Ch. 63 primary	00-63
138	Ch. 63 single	00 63
139	Ch. 76 secondary	00-63
140	Ch. 76 primary	00-63
141	Ch. 76 single	00-63
142	Ch. 83 secondary	00-63
143	Ch. 83 primary	00-63
144	Ch. 83 single	00-63
145	Ch. 93 secondary	00-63
146	Ch. 93 primary	00-63
147	Ch. 93 single	00-63
148	Ch. 110 secondary	00-63
149	Ch. 110 primary	00-63
150	Ch. 110 single	00-63
151	Ch. 117 secondary	00-63
152	Ch. 117 primary	00 63
153	Ch. 117 single	00-63
154	Ch. 125 secondary	00-63
155	Ch. 125 primary	00-63
156	Ch. 125 single	00-63

**SERVICE ADJUSTMENTS - TUNER ALIGNMENT (Continued)****Tuner Coil Alignment (Mechanical)**

**NOTE:** The tuner coil alignment is preset at the time of manufacture and should require no further adjustment. The following recommended procedure should be performed only in the unlikely event that complete tuner alignment is necessary (when necessary this procedure must be performed prior to the electronic tuner alignment). Bottom cover must be in place and soldered. Use a plastic or wooden stick for knifing coils.

1. Manually tune instrument and tuner service modulator to channel 125 (Band 3) and enter parameter # 154.
2. Connect DVM to tuner side of R7525.
3. If voltage reading is not between 4.55V and 4.75V expand or compress L303 to set voltage within these limits.
4. Manually tune instrument and tuner service modulator to channel 50 (Band 2) and enter parameter # 127.
5. Retain DVM connection step 2.
6. If voltage reading is not between 4.80V and 5.00V expand or compress L304 to set voltage within these limits.
7. Manually tune instrument and tuner service modulator to channel 17 (Band 1) and enter parameter # 109.
8. Retain DVM connection step 2.
9. If voltage reading is not between 4.40V and 4.60V expand or compress L305 to set voltage within these limits.
10. Manually tune instrument and tuner service modulator to channel 125 (band 3) and enter parameter 154.
11. Connect DVM to positive leg of C7503 (RF AGC to tuner).
12. Set parameter value range to 31.
13. Expand or compress L105 for minimum RF AGC voltage.
14. Enter parameter 155 and set parameter value range to 31.
15. Expand or compress L104 for minimum RF AGC voltage.
16. Enter parameter 156 and set parameter value range to 31.
17. Expand or compress L102 for minimum RF AGC voltage.
18. Manually tune instrument and tuner service modulator to channel 50 (band 2) and enter parameter 127.
19. Set parameter value range to 31.
20. Expand or compress L113 for minimum RF AGC voltage.
21. Enter parameter 128 and set parameter value range to 31.
22. Expand or compress L111 for minimum RF AGC voltage.
23. Enter Parameter 129 and set parameter value range to 31.
24. Expand or compress L107 for minimum RF AGC voltage.
25. Manually tune instrument and service modulator to channel 17 (band 1) and enter parameter 109.
26. Set parameter value range to 31.
27. Expand or compress L114 for minimum RF AGC voltage.
28. Enter parameter 110 and set parameter value range to 31.
29. Expand or compress L112 for minimum RF AGC voltage.
30. Enter parameter 111 and set parameter value range to 31.
31. Expand or compress L106 for minimum RF AGC voltage.
32. Perform electronic tuner alignment in it's entirety.

# **TUNER VOLTAGE CHARTS OFF-AIR OPERATION**

**U7301**

Pin	Lo V Chan.		Hi V Chan.		UHF Chan.		
No.	2	6	7	13	14	40	69
1.	5.43V	5.42V	5.38V	5.38V	5.30V	5.22V	5.30V
2.	2.93V	2.98V	2.95V	2.95V	3.18V	3.16V	3.18V
3.	7.80V	7.81V	7.75V	7.69V	7.56V	7.51V	7.56V
4.	2.99V	2.99V	2.96V	2.97V	3.18V	3.16V	3.18V
5.	7.82V	7.81V	7.75V	7.71V	7.56V	7.51V	7.56V
6.	0V	0V	0V	0V	0V	0V	0V
7.	3.06V	3.06V	3.04V	3.01V	0V	0V	0V
8.	9.06V	9.03V	8.97V	8.89V	8.84V	8.80V	8.84V
9.	3.02V	3.02V	2.98V	2.98V	3.36V	3.33V	3.36V
10.	3.25V	3.25V	3.22V	3.19V	2.88V	2.87V	2.88V
11.	4.94V	5.00V	5.06V	5.02V	9.62V	9.58V	9.62V
12.	3.25V	3.23V	3.22V	3.19V	2.87V	2.87V	2.88V
13.	0V	0V	0V	0V	0V	0V	0V
14.	9.05V	9.04V	8.97V	8.90V	5.43V	5.39V	5.46V
15.	3.43V	3.43V	3.40V	3.37V	2.88V	2.84V	2.88V
16.	3.44V	3.43V	3.40V	3.38V	2.89V	2.89V	2.89V

**U7501**

Pin	Lo V		Hi V		UHF		
No.	2	6	7	13	14	40	69
1.	1.36V	1.96V	1.58V	1.93V	1.74V	2.90V	4.84V
2.	1.36V	1.96V	1.58V	1.93V	1.74V	2.90V	4.84V
3.	1.35V	1.95V	1.57V	1.92V	1.73V	2.89V	4.83V
4.	33.0V	33.0V	33.0V	33.0V	33.0V	33.0V	33.0V
5.	1.06V	1.74V	1.47V	1.87V	1.46V	2.53V	4.08V
6.	1.06V	1.74V	1.47V	1.87V	1.46V	2.54V	4.09V
7.	1.06V	6.05V	4.09V	7.03V	3.95V	11.8V	23.2V
8.	0.68V	4.57V	3.46V	6.19V	4.41V	12.3V	24.0V
9.	1.01V	1.54V	1.39V	1.76V	1.52V	2.60V	4.19V
10.	1.01V	1.54V	1.39V	1.76V	1.52V	2.60V	4.19V
11.	0V	0V	0V	0V	0V	0V	0V
12.	1.05V	1.75V	1.36V	1.72V	1.44V	2.51V	4.15V
13.	1.05V	1.75V	1.36V	1.72V	1.44V	2.51V	4.15V
14.	1.01V	6.10V	3.24V	5.92V	3.78V	11.6V	23.6V

**U7401**

	Lo V	Hi V	UHF
1.	1.75V	2.11V	1.72V
2.	2.11V	2.11V	2.11V
3.	2.11V	2.11V	2.11V
4.	4.78V	4.78V	4.78V
5.	4.71V	4.71V	4.71V
6.	0V	0V	0V
7.	1.32V	1.32V	1.34V
8.	11.5V	0V	0V
9.	7.41V	7.41V	0V
10.	4.85V	4.85V	4.85V
11.	2.30V	2.30V	2.30V
12.	2.30V	2.30V	2.30V
13.	0V	0V	0V
14.	0.60V	0.60V	0.60V

**Q7101**

	Lo V 2	Hi V 7	UHF 14
G1	0V	0V	4.84V
G2	5.03V	6.54V	7.19V
D	0.16V	0.20V	11.3V
S	0.19V	0.17V	4.83V

**Q7102**

G1	4.64V	4.58V	4.61V
G2	5.32V	6.85V	7.19V
D	11.3V	11.2V	11.4V
S	4.08V	4.20V	11.3V

**Q7401**

E	0V	0V	0V
B	0.60V	0.60V	0.60V
C	2.06V	3.85V	17.8V

**Q7402**

E	11.4V	11.2V	11.3V
B	11.3V	10.5V	10.6V
C	-14.9V	11.1V	11.2V

**Q7403**

E	0V	0V	0V
B	0.70V	0.70V	0V
C	0.10V	0.10V	11.3V

**Q7404**

E	11.4V	11.2V	11.3V
B	11.0V	10.9V	10.6V
C	0.11V	0.11V	11.3V



# **TUNER VOLTAGE CHARTS CABLE OPERATION**

## **U7301**

Pin No.	Band 1		Band 2		Band 3		
	2	17	18	50	51	75	99
1.	5.44V	5.40V	5.41V	5.40V	5.30V	5.28V	5.48V
2.	2.99V	2.96V	2.96V	2.96V	3.18V	3.17V	3.00V
3.	7.80V	7.78V	7.77V	7.75V	7.57V	7.57V	7.89V
4.	2.99V	2.96V	2.96V	2.97V	3.18V	3.17V	3.00V
5.	7.82V	7.78V	7.75V	7.77V	7.56V	7.57V	7.89V
6.	0V	0V	0V	0V	0V	0V	0V
7.	3.06V	3.04V	3.05V	3.05V	0V	0V	3.08V
8.	9.02V	9.01V	8.97V	8.89V	8.84V	8.83V	9.14V
9.	3.02V	3.02V	2.98V	2.98V	3.36V	3.35V	3.01V
10.	3.25V	3.23V	3.22V	3.23V	2.88V	2.87V	3.28V
11.	4.96V	5.04V	5.06V	5.16V	9.62V	9.58V	5.14V
12.	3.26V	3.23V	3.22V	3.23V	2.87V	2.87V	3.28V
13.	0V	0V	0V	0V	0V	0V	0V
14.	9.05V	9.00V	8.97V	9.00V	5.43V	5.42V	9.13V
15.	3.43V	3.41V	3.42V	3.41V	2.88V	2.87V	3.46V
16.	3.41V	3.41V	3.40V	3.41V	2.89V	2.89V	3.47V

## **U7501**

Pin No.	Band 1		Band 2		Band 3		
	2	17	18	50	51	75	99
1.	1.36V	4.63V	1.30V	5.52V	1.20V	2.21V	2.86V
2.	1.36V	4.63V	1.30V	5.52V	1.20V	2.21V	2.86V
3.	1.36V	4.63V	1.30V	5.52V	1.20V	2.21V	2.86V
4.	33.0V	33.0V	33.0V	33.0V	33.0V	33.0V	33.0V
5.	1.06V	3.62V	1.16V	4.68V	0.99V	1.90V	2.54V
6.	1.06V	3.62V	1.16V	4.68V	0.99V	1.90V	2.54V
7.	1.06V	19.8V	1.78V	27.6V	0.54V	7.2V	11.9V
8.	0.68V	24.2V	1.03V	25.3V	0.86V	7.63V	12.5V
9.	1.01V	4.22V	1.10V	4.38V	1.01V	1.96V	2.62V
10.	1.01V	4.22V	1.10V	4.38V	1.01V	1.96V	2.62V
11.	0V	0V	0V	0V	0V	0V	0V
12.	1.05V	4.36V	1.07V	4.76V	0.99V	1.86V	2.66V
13.	1.05V	4.36V	1.07V	4.76V	0.99V	1.86V	2.66V
14.	1.01V	25.2V	1.12V	28.1V	0.54V	6.91V	12.7V

## **U7401**

	Band 1		Band 2		Band 3	
	2	18	51			
1.	1.75V	1.74V	1.74V			
2.	2.11V	2.11V	2.11V			
3.	2.11V	2.11V	2.11V			
4.	4.78V	4.78V	4.78V			
5.	4.71V	4.71V	4.71V			
6.	0V	0V	0V			
7.	NC	NC	NC			
8.	11.5V	0V	0V			
9.	7.47V	7.42V	0V			
10.	4.85V	4.85V	4.85V			
11.	2.30V	2.30V	2.30V			
12.	2.30V	2.30V	2.30V			
13.	0V	0V	0V			
14.	0.60V	0.60V	0.60V			

## **Q7101**

	Band 1		Band 2		Band 3	
	2	17	51			
G1	0V	0V	4.84V			
G2	5.05V	4.17V	7.19V			
D	0V	0.10V	11.3V			
S	0.10V	0.10V	4.83V			

## **Q7102**

G1	4.59V	4.65V	4.61V
G2	5.44V	4.50V	7.19V
D	11.3V	11.2V	11.1V
S	4.08V	3.71V	11.0V

## **Q7401**

E	0V	0V	0V
B	0.60V	0.60V	0.60V
C	2.06V	1.65V	1.00V

## **Q7402**

E	11.3V	11.4V	11.4V
B	11.4V	10.6V	10.6V
C	-14.5V	11.2V	11.2V

## **Q7403**

E	0V	0V	0V
B	0.70V	0.70V	0V
C	0.10V	0.10V	11.3V

## **Q7404**

E	11.4V	11.4V	11.3V
B	11.0V	10.9V	10.6V
C	0.11V	0.11V	11.3V