SECTION : 3

ALIGNMENT PROCEDURES SUBINDEX

ALIGNMENT PROCEDURES

Operating Conditions

Unless otherwise noted, the following conditions must be observed when aligning the CTC197 chassis:

1. Chassis must be operated from a 120VAC isolation transformer, with line voltage set to 120VAC (±2.0V).
2. Picture controls (brightness, contrast, etc.) must be set to factory presets via the Picture Quality menu.
3. Procedures must be performed in the sequence given.
4. A 10X probe must be used for oscilloscope and frequency measurements.
5. Minimum warm-up time is 10 minutes.

Required Test Equipment

- Dual-Trace Oscilloscope
- Digital Voltmeter
- Frequency Counter
- Audio Signal Generator
- NTSC Signal Generator (B&K 1249, or equivalent)
- MTS Signal Generator (B&K 2009, or equivalent)
- Sweep/Marker Generator (or Standard Signal Generator)
- TAG001 Service Generator (stock # 215568)
- DC Power Supply (5.0V/0.25A) for TAG001
- Chipper Check® software
- Chipper Check® interface box and computer

All alignments with the exception of basic color temp and geometry require the use of Chipper Check® software and interface box.

X-Ray Shutdown Check

NOTE: R14911 is factory sealed - *do not adjust*. Refer to **Replacement Parts** for kit information.

The following procedure should be performed prior to, and upon completion of service:

1. Momentarily apply a short between the shutdown test point (BC14901- located at back edge of chassis near main tuner) and chassis ground (main tuner shield). The instrument must shutdown immediately, then turn back on after ~ 2 seconds.
2. Apply and maintain a short between the shutdown test point and chassis ground (tuner shield). The instrument must shutdown immediately and remain shutdown (the instrument will attempt to restart several times, then remain off).
3. Remove the short from BC14901.
4. Enter the **Service Mode** and reset the error code parameter(s) to "0".

Service Mode

Most of the alignments for this chassis are software-driven; adjustments are made by modifying parameter values using Chipper Check and the service menu. When parameter values are modified, the corresponding T-chip registers, tuner registers and EEprom locations are updated.

A list of the software alignment parameters accessable using the front panel is shown in Table 1. The remainder of the alignments require Chipper Check®.

Entering the Service Mode Using the Front Panel Controls

1. Press and release the POWER button to turn the instrument on.
2. Press and *hold* the MENU button.
   a. Press and release the POWER button.

   b. Press and release the VOL+ button.
3. Release the MENU button.

The instrument will display the following menu:

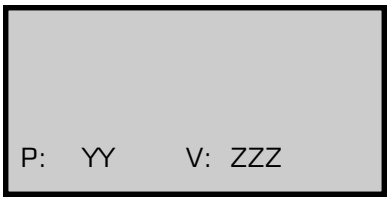
The CH ∧ and CH ∨ buttons on the front panel (or the remote transmitter) are used to change the parameter (P) number. The VOL + and VOL - buttons are used to change the parameter value (V).

NOTE: Attempting to change the parameter number (using CH ∧ or CH ∨) at this point will cause the instrument to exit the service mode. A valid security code must be entered (using VOL + or VOL -) before selecting an alignment parameter.

Security Codes

When the service mode is first turned on, the parameter will be "0", which does not correspond to an alignment. This is the security code parameter, the purpose of which is to prevent accidental entry into the parameter groups. The value for parameter "0" must be set to 76 for Front panel access or to 200 for Chipper Check®.

Once a security code has been set, pressing CH ∧ or CH ∨ will result in the following display:



Where: YY = parameter number
ZZZ = current value

Return to Index

ALIGNMENT PROCEDURES (Continued)

At this point, the CH ∧ and CH ∨ buttons can be used to change the parameter number and the VOL + and VOL - buttons can be used to change the value of the parameter selected.

Error Codes

If certain failures occur in the chassis, error codes will be stored in the chassis EEprom. These error codes are displayed in parameters "1", "2" and "3". Parameter "1" stores the error code for the first failure experienced by the instrument. Similarly, parameter "2" stores the error code for the second failure. Parameter "3" is automatically updated to display the error code for the most recent failure experienced by the instrument. Error codes are summarized in Table 2.

The presence of a "0" in the error code values indicates that no failures have occurred since the time when the error code parameters were reset. These error codes can (and should) be reset to "0" after servicing with the VOL + and VOL - buttons.

Because a failure of a bus IC is a possible reason for needing service, normal acknowledgment checking is disabled in the service mode. If an IIC device has failed, its address will be stored in the error code area.

Exiting The Service Mode

The service mode can be exited at any time by pressing the POWER button. No additional steps are required to write new data into the EEprom(s); new data is entered as parameter values are changed.

Parameter	Description
0	Security Pass
1	Error Code
2	Error Code
3	Error Code
4	Horizontal Phase
5	EW DC (Horizontal size)
6	Pincushion Amplitude
7	Pincushion Tilt
8	Pin Top Corner Correction
9	Pin Bottom Corner Correction
10	Vertical Centering
11	Vertical Size
12	Vertical Countdown Mode
13	Red Bias
14	Green Bias
15	Blue Bias
16	Red Drive
17	Green Drive
18	Blue Drive

Table 1 - Service Menu Parameters

Error Code (HEX)	Error	Condition Indicated
00	No Error Code Thrown	
02	Detected by micro	5.1V_run has fallen below acceptable voltage level
03	Detected by micro	12V_run has fallen below acceptable voltage level
06	Pal/PIP Module	Failure to communicate with matrix switch on PAL/PIP Module
08	T4 Chip	X-Ray protection was invoked
09	T4 Chip	T4 Chip power supply problem at reset
10	PIP Module Error	FPIP power supply problem at reset
11	Stereo Decoder	Stereo Decoder power supply problem at reset
12	Detected by micro	AVR input to micro is held low
16	Detected by micro	Run IIC clock or data is clamped at 0 logic state
17	Detected by micro	Standby IIC clock or data is clamped at 0 logic state
34	StarSight	Failure to receive acknowledgement from StarSight module
44	FPIP	Failure to receive acknowledgement from FPIP
56	Digital Convergence	Failure to receive acknowledgement from Digital Convergence device
64	Octal DAC	Failure to communicate with Octal DAC
128	Stereo Decoder	Failure to receive acknowledgement from Stereo Decoder IC
130	Audio	Failure to receive acknowledgement from Audio Compressor
134	Video Matrix switch	Failure to receive acknowledgement from Video Matrix switch
138	PAL/PIP Module	PAL/PIP C1
142	PAL/PIP Module	PAL/PIP C2
160	Main or 2nd Tuner EEPROM	Failure to receive acknowledgement from EEPROM
186	T4 Chip	Failure to communicate with T4 Chip
192	2nd Tuner PLL/DAC	Failure to communicate with Tuner PLL IC
194	2nd Tuner PLL/DAC	Failure to communicate with Tuner DAC IC
196	Main Tuner PLL/DAC	Failure to communicate with Tuner PLL IC
198	Main Tuner PLL/DAC	Failure to communicate with Tuner DAC IC

Table 2 - Service Menu Error Codes

Return to Index

ALIGNMENT PROCEDURES (Continued)

CHASSIS ALIGNMENT

The CTC197 chassis requires the use of ChipperCheck®, a TV/PC interface box, and a suitable computer (486DX/ 33MHz PC with 8Meg memory recommended) for the majority of the alignments. Basic geometry and color temperature are the only alignments accessable through the front panel. These adjustments have been included in this service manual as front panel procedures but can also be performed using ChipperCheck®.

ChipperCheck® software and the TV/PC interface box are available from:

TCE Publications
10003 Bunsen Way
Louisville, KY 40299
Tel. 502-491-8110

Instructions for the operation of ChipperCheck® software and connection of the TV/PC interface are included as context-sensitive help files in the ChipperCheck® software.

Horizontal Phase Adjustment

Test Points:	TP12704 (Luma)	Main PCB
	TP14303 (Filament)	Main PCB
Adjust:	Parameter #4	Range: 0 - 15

1. Tune the instrument to receive the color bar signal.
2. Connect the CH1 scope probe (100mV/2µsec/div.) to TP12704 (pin 38 of U16201); use the tuner shield as ground reference.
3. Connect the CH2 scope probe (100V/div.) to TP14303 (pin 8 of T14401).
4. Adjust *Horizontal Phase* (parameter #4) so that the time delay between the leading edge of horizontal sync (CH1) and the midpoint of the filament pulse (CH2) is 4.68µsec (± 0.5µsec), as shown in Figure 1.

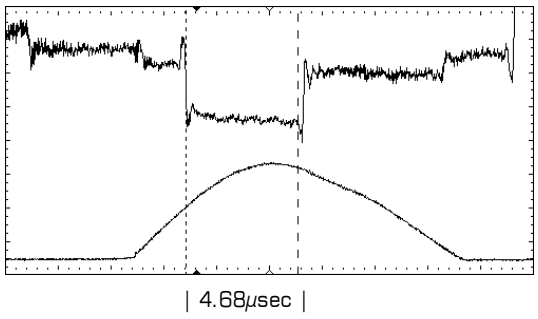


Fig. 1 - Horizontal Phase Adjust

Vertical Raster Adjustments

Test Point:	Observe Display	
Adjust:	Parameter #10	Range: 0 - 63
	Parameter #11	Range: 0 - 127
	Parameter #12	Range: 0 - 3

1. Tune the instrument to receive the crosshatch signal.
2. Preadjust *Vertical Size* (parameter #11) so that the top and bottom edges of the display are just visible.
3. Viewing the top and bottom edges of the crosshatch, adjust *Vertical Centering* (parameter #10) to center the display vertically.
4. Adjust *Vertical Size* (parameter #11) so that ~3.75% of the crosshatch pattern is hidden at both the top and bottom of the display (7.5% overscan). Tolerance is ±5%.

Note: Vertical countdown (Parameter 12) must be set properly:
0 = standard
1 = non-standard
2 = 50Hz
3 = 48Hz

EXAMPLE: If the crosshatch display has fourteen blocks vertically, adjust so that ~ 1/2 block is hidden at both the top and bottom of the display.

Horizontal Raster Adjustments

Test Point:	Observe Display	
Adjust:	Parameter #5	Range: 0 - 31
	Parameter #6	Range: 0 - 15
	Parameter #7	Range: 0 - 15
	Parameter #8	Range: 0 - 7
	Parameter #9	Range: 0 - 7

1. Tune the instrument to receive the crosshatch signal.
2. Preadjust *Horizontal Size* (parameter #5) so that ~3.75% of the crosshatch pattern is hidden at both the left and right of the display (7.5% overscan). Tolerance is ±5%.

EXAMPLE: If the crosshatch display has fourteen blocks horizontally, adjust so that ~ 1/2 block is hidden at both the left and right edges of the display.

3. Adjust *Pincushion Amplitude* (parameter #6) for straight vertical crosshatch lines at the left and right edges of the display. *Look only at the middle section of these lines at this time.* The top and bottom ends of the lines will be adjusted in the following steps.
4. Viewing the bottom left and right corners of the display, adjust *Pincushion Bottom Corner* (parameter #9) for straight vertical lines.
5. Viewing the top left and right corners of the display, adjust *Pincushion Top Corner* (parameter #8) for straight vertical lines.
6. Viewing the left and right edges of the display, adjust *Pincushion Tilt* (parameter #7) so that the vertical crosshatch lines are parallel to the sides of the picture tube mask.

Return to Index

ALIGNMENT PROCEDURES (Continued)

Focus Adjustment

Test Point:	Observe Display	
Adjust:	Focus Control(s)	Main PCB

1. Tune the instrument to receive the crosshatch signal.
2. Adjust the *Focus* control for best overall focus.

Color Temperature Adjustment

Test Point:	Observe Display	
Adjust:	Parameter #13 (Red Bias)	Range: 0 - 127
	Parameter #14 (Green Bias)	Range: 0 - 127
	Parameter #15 (Blue Bias)	Range: 0 - 127
	Parameter #16 (Red Drive)	Range: 0 - 63
	Parameter #17 (Green Drive)	Range: 0 - 63
	Parameter #18 (Blue Drive)	Range: 0 - 63

1. From the customer control menu, reset the customer controls with "Picture Reset".
2. Disconnect all signal sources.
3. Set the Color bias parameter values to 63.
4. Set the Drive parameter values to 32 for 25"/27" non VHP tubes. Set the Drive parameter values to 40 for 27" VHP tubes (XXXAEGXXXXX) and all tubes above 27".
5. Enter parameter # 13, 14 or 15 for bias adjustment. Press Menu button (on instrument front panel) for setup line. Press the Menu button again to toggle between the setup line and normal picture.
6. Adjust the screen control to just produce a centerline (red, green or blue). Do not adjust the bias parameters of the color displayed in this step for the remainder of the alignment procedure.
7. Enter parameter #s for the remaining two bias control colors and adjust them to produce a white setup line.
8. Press Menu button (on instrument front panel) to exit setup line.
9. Tune the instrument to receive a grey scale signal.
10. Adjust the screen control to produce even steps of the gray scale. The last gray scale bar must remain black.
11. Enter parameter #s for the color drive controls (16 for red, 17 for green and 18 for blue). Adjust their respective parameters to obtain a 6500 degree kelvin color temperature (warm white) raster.
12. 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 set. 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.

13. Press the Power button on the front panel to initiate the AKB setup and exit the service mode. The screen will momentarily flash either green or red. If the screen flashes green the AKB setup is properly set. If the screen flashes red the AKB could not be properly setup. In many cases the screen control is set either too high or too low. Repeat the procedure with a slightly different setting of the screen control.

High Voltage Check

High voltage for this chassis is *not* adjustable. To check high voltage, connect the positive lead of a voltmeter (using a high voltage probe) to the picture tube anode. Connect the negative lead to the picture tube ground strap. The meter used for measuring high voltage must have an impedance of 1000 Mohm or more and be accurate within 5%.

Nominal high voltage (at maximum beam current) for this chassis is 25.8kV (for 25"/27" instruments), 29.4kV (for 32"/35" instruments).

Maximum high voltage for this chassis is 29.7kV (for 25"/27" instruments), 34.0kV (for 32"/35" instruments).

Return to Index