Operating Conditions

Unless otherwise noted, the following conditions must be observed when aligning the ATC311 chassis:

Chassis must be operated from a 120VAC isolation transformer, with line voltage set to 120VAC (±2.0V).

Picture controls (black level, contrast, etc.) must be set to factory presets via the Picture Quality menu.

Procedures must be performed in the sequence given.

A 10X probe must be used for oscilloscope and frequency measurements.

The audio output leads must not be shorted together or to ground with the chassis on.

All video signals must have -40 IRE sync tips unless specified otherwise.

Chassis AC power must be removed for 10 seconds before disconnecting any cable.

A 3-minute warm-up is required for chassis or module related alignments. A 15-minute warm-up is required for Kine related alignments.

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)
- YPrPb Signal Generator (DVD player w/YPrPb)
- HDTV Signal Generator (Sencore VP301, or equivalent)
- DC Power Supply (5.0V/0.25A) for TAG001
- Chipper Check® software
- Chipper Check® interface box and computer
- Personal Computer (IBM Compatible w/ CD ROM and Sound Card)

It is recommended that all alignments be done using Chipper Check® software and interface box.

X-Ray Shutdown Check

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

Set Black Level and Contrast to maximum.

Momentarily apply a short between the shutdown test point (JW14901- located at back edge of chassis) and ground. The instrument must shutdown immediately, then turn back on after ~ 2 seconds.

Apply and maintain a short between JW14901 and ground. The instrument must shutdown immediately and remain shutdown (the instrument will attempt to restart three times, then remain off).

Remove the short from JW14901.

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. Some alignments can be accessed and modified through the front panel service mode. It is recommended that all adjustments should be made by modifying parameter values using Chipper Check. When parameter values are modified the corresponding registers and EEPROM locations are updated.

Entering the TV 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 and CHANNEL DOWN buttons simultaneously.
3. The Service menu should appear.
4. Select the service alignment option.

The instrument should display the following one line menu:

```
Parameter   Value
    ↓          ↓
   P:0        V:0
```

- The **VOL +** and **VOL -** buttons on the FPA or remote control are used to change the value (**V**).
- The **CH** /\ and **CH** \/ buttons on the front panel or the remote control are used to change the parameter (**P**) number.

NOTE: Attempting to change the parameter number (using **CH** Ù or **CH** Ú) before the security code is entered 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 (V) must be set to 50 for Error Code access, (V) set to 76 for Front Panel access to chassis alignments, (V) set to 80 for Digital Convergence, (V) set to 82 to locate PTV sensor positions, (V) set to 83 to restore Digital Convergence factory alignment data, (V) set 84 to save PTV digital convergence factory alignment data to Factory EEPROM, and a value (V) of 200 for Chipper Check®. Once Chipper Check® mode (V=200) is selected, the Chipper Check® interface box will take control of the instrument and the front panel will become inoperative. Chipper Check has the ability to detect compatible chassis types when the instrument is directly connected to the service adapter. With Chipper Check connected and the instrument turned on and placed in the service mode, click the Detect Chassis button to enable the Chipper Check auto detection function.

Value		*Parameter Group*
50		Error Code Access
76		Instrument
80		Digital Convergence
82		Locates PTV Sensor positions
83		Restores PTV digital convergence factory alignment data
84		Saves PTV digital convergence factory alignment data to Factory EEPROM
200		Selects Service Computer Mode - must unplug TV to get out of the Service Computer Mode.

Fig. 1 - Security Codes

Instrument Alignment

When the service mode is first turned on, use **VOL +** to change the parameter number to 76 - alignment security code. Once a security code has been set, pressing **CH** Ù will result in the following display:

```
Parameter   Value
    ↓          ↓
   P:0        V:0
```

Where:

P: XX = Parameter Number
V: XX = Current Value

The **CH UP** and **CH DOWN** 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.

Exiting The Service Mode

The service mode can be exited at any time by pressing the **Power** button on the FPA or the **On/Off** on the remote control (except when in ChipperCheck® mode). No additional steps are required to write new data into the EEPROM; new data is entered as parameter values are changed.

CHASSIS ALIGNMENT

The ATC311 chassis requires the use of ChipperCheck®, a TV/PC interface box, and a suitable computer for the majority of the alignments. Basic geometry and color temperature are the only alignments accessible through the front panel (see the following Parameter List). These adjustments have been included in this service manual as front panel procedures but it is not recommended that they be adjusted without using ChipperCheck®. 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.

Geometry Alignment (Parameters 01 thru 11)

The Geometry alignments on this chassis are very critical and must be performed using ChipperCheck®. Even though some of the geometry alignments are available through the front panel service menu, adjustment is not recommended. Alignment in one mode may interact and affect the displays of the other modes.

High Voltage Adjustment

The high voltage in this instrument is very critical and requires special test equipment to measure and adjust. Field alignment is not recommended. If any of the HV regulator components are replaced the remainder of the components listed must be replaced at the same time. These components are packaged together in a kit (see parts list for stock number). Adjustment of high voltage will not be necessary.

Note: To remove the high voltage leads, twist the lead (at least 360deg) while pulling up.

XRP Adjustment

The XRP circuit in this instrument requires special test equipment to measure and adjust. Field alignment is not recommended. If any of the XRP components are replaced the remainder of the components listed must be replaced at the same time. These components are packaged together in a kit (see parts list for stock number). Adjustment of XRP will not be necessary.

Focus Adjustment

Note: Instrument must be warmed up at least 15 minutes prior to adjustment.

1. Tune the instrument to receive a crosshatch signal.
2. Preset Contrast to maximum.
3. Adjust each tube separately and cover the two other tubes not being adjusted.
4. Adjust the *Green Mechanical Focus* control, located on the CRT assembly for best overall focus.
5. Adjust the *Green Electrical Focus* control, located behind the speaker grill for best overall focus.
6. Repeat procedure for the red and blue CRT's.

ALIGNMENT PROCEDURES (Continued)

Gemstar Adjustments (Parameters 21, 22, 23, 24, 25)

1. Adjust Gemstar Horizontal OSD Position (parameter 21) to center the Gemstar display horizontally on the screen. Press the On/Off button to exit the adjustment.
2. Adjust Gemstar Vertical OSD Position (parameter 22) to center Gemstar display vertically on the screen. Press the On/Off button to exit the adjustment.
3. Adjust Gemstar Horizontal PIP Position (parameter 23) to horizontally position the PIP picture in the Gemstar PIP window.
4. Adjust Gemstar Vertical PIP Position (parameter 24) to vertically position the PIP picture in the Gemstar PIP window.
5. Adjust Gemstar PIP Window Vertical Size (parameter 25) to change the size of the Gemstar PIP window.

Error Codes

If certain failures occur in the chassis, error codes will be stored in the chassis EEprom. These error codes can be accessed by entering the service menu and setting the VALUE to 50. With the VALUE set to 50, pressing the Channel up button will toggle through the 4 error codes. Error code "0" stores the error code for the first failure experienced by the instrument. Similarly, error code "1" stores the error code for the second failure. Error code "2" stores the error code for the third failure. Error code "3" displays the error code for the most recent failure experienced by the instrument. Information is displayed in the following order: Error #, Date, Time, Type, Count, Code. If an Error of the same TYPE is already logged, then the error will overwrite the existing error of that type and the count will be increased. Error codes are summarized in Fig. 3.

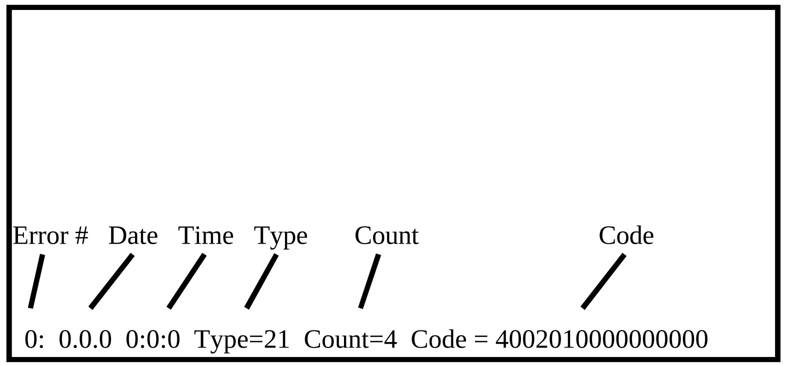


Fig. 2 - Error Code Display

Type (hex)	Description	Detail	Data ("Code") (hex) 0	1	2	3	4	5	6	7
1	Chassis (General)	BEP POR	20	0	0	0	0	0	0	0
2	Convergence	Parity Error	30	0	0	0	0	0	0	0
		Loop Fault	31	0	0	0	0	0	0	0
		Output Inactive	32	0	0	0	0	0	0	0
		Bus Fault	33	0	0	0	0	0	0	0
		Other	34	0	0	0	0	0	0	0
		I2C	35	0	0	0	0	0	0	0
		REF_EE	36	0	0	0	0	0	0	0
3	Power	Initial Power Fault	10	Additional Data				0	0	0
		Other	14	Additional Data				0	0	0
4	Deflection	EEProm Corrupt	11	0	0	0	0	0	0	0
		POR	12	0	0	0	0	0	0	0
5	XRP	XRP	13	0	0	0	0	0	0	0
21	IIC Read		Chip	Bus	Details	0	0	0	0	0
22	IIC Write		Chip	Bus	Details	0	0	0	0	0
31	App (General)		?	?	?	?	?	?	?	?
32	Reset Count		0	0	0	0	0	0	Reset Count	
41	Watchdog		Task Id	Task Id	Task Id	Task Id	Task Id	Task Id	Task Id	Task Id
51	Guide	Process Termination	Process Exit Code				0	0	0	0

Fig. 3 - Error Code list for the ATC311

ALIGNMENT PROCEDURES (Continued)

The presence of "Empty" for the error code indicates that no failures have occurred since the time the error codes were reset. The error codes can (and should) be reset to "0" after servicing. Press the clear button to clear the error code that is currently being displayed.

1. Enter the Service Menu.
2. Press Volume Up Until V is 50.
3. Press Channel Up to View The First Error.
4. Press Channel Up/Down to View the Next/Previous Error.
5. Press Clear to Clear the Error Code that is Currently Being Displayed.
6. Press Power Off to Return to the P:0 V:50 Display.
7. Press Power Off Again to Return to Normal TV Viewing.

To use the Error Code charts, first look up the "Type" displayed in the error code (Fig. 2). Then find the Type number (Hex) in the first error code chart (Fig. 3). The description column indicates the general area of the problem and the Detail column gives additional information for some Error Codes.

If the Error Code "Type" is 21 or 22, additional information is available as shown in Fig. 4. Refer to the last string of hex characters referred to as Data or Code in Fig. 2. The first two characters hex value of the string refer to the "Chip" information in Fig. 4. The second two characters hex value in the string refer to the "Bus" information in Fig. 4. The third two characters hex value in the string refer to the "Details" information in Fig. 4.

If the Error Code "Type" is 41, additional information is available as shown in Fig. 5. Refer to the last string of hex characters referred to as Data or Code in Fig. 2. The first two characters hex value refer to the "Watchdog" information in Fig. 5.

Additional Data Description ("Code")				
Type				
21,22	**Bus**	**0**	5 Bus	
		1	Run 1 Bus	
		2	Run 2 Bus	
	Details	**1**	chip did not acknowledge when was expected to	
		2	some hardware error detected, maybe one of the lines is grounded	
		3	some software error, e.g. not enough memory, or could not acquire the mutex to the driver	
	Chip	**Bus**	**Module**	**Comment**
	40	Run 2	Deflection	Deflection DAC
	50	5 Bus	DM2	VSB
	54	5 Bus	DM2	GPIP
	78	Run 1	Audio	Audio Bus Expander
	80	5 Bus	DM2	Micronas Audio Processor
	84	Run 1	A/V Input	CXA2151 2H Switch
	88	Run 2	BEP	TA1316 Back End Video Processor
	8C	Run 1	Audio	Sound Processor
	8C	Run 2	Deflection	TA1317 Deflection Processor
	8E	5 Bus	DM2	Dual IF
	90	Run 1	A/V Input	LA79500 1H A/V Switch
	A0	5 Bus	DM2	DM2 Main EEProm
	A0	Run 2	Deflection	Deflection EEProm (lower 256 bytes)
	A2	Run 2	Deflection	BEP EEProm (upper 256 bytes of Deflection EEProm)
	A4	5 Bus	DM2	Tuner EEProm
	B0	5 Bus	DM2	Link Lock
	B8	5 Bus	DM2	Link Lock
	B8	Run 1	A/V Input	Frame Comb
	C0	5 Bus	DM2	PIP Tuner
	C4	5 Bus	DM2	Main Tuner PLL
	C6	5 Bus	DM2	Main Tuner DAC
	DC	Run 2	Convergence	Convergence Micro

Fig. 4 - Type 21, 22 Error Code Details

Additional Data Description		
The first Task Id is the first task to count down to zero. The remaining 7 Ids are any tasks whose counts are at or below 16.		
Type	**Watchdog**	
41	**Thread Name**	**Hex Value**
	UNKNOWN_TASK_ID = 0,	00
	APG_TASK_ID,	1
	AV_MAIN_DRV_TASK_ID,	2
	AV_PIP_DRV_TASK_ID,	3
	CA_MAIN_TASK_ID,	4
	CA_PIP_TASK_ID,	5
	CC_TASK_ID,	6
	CC_DRAW_TASK_ID,	7
	CHANACQ_MAIN_TASK_ID,	8
	CHANACQ_PIP_TASK_ID,	9
	CHANEPG_MAIN_ENUM_TASK_ID,	A
	CHANEPG_PIP_TASK_ID,	B
	COMPORT_TASK_ID,	C
	DC_TASK_ID,	D
	EEPROM_TASK_ID,	E
	EPG_ACQ1_TASK_ID,	F
	EPG_ACQ2_TASK_ID,	10
	EPG_ACQ3_TASK_ID,	11
	HWCTRL_TASK_ID,	12
	ICP_TASK_ID,	13
	IIC_IST_TASK_ID,	14
	LINE_SELECT_ID,	15
	OSD1394_CONS_TASK_ID,	16
	OSD1394_PROD_TASK_ID,	17
	POWERFAIL_TASK_ID,	18
	SCHED_TASK_ID,	19
	SWITCHING_TASK_ID,	1A
	TIMER_TASK_ID,	1B
	TRANSPORTLIB_DATA_TASK_ID,	1C
	TP_BRIDGE_DATA_TASK_ID,	1D
	TPOVERFLOW_TASK_ID,	1E
	TPSIMULATOR_TASK_ID,	1F
	IEEE1394TASK_ID,	20
	IEEE1394_MON_TASK_ID,	21
	TUNER0_ATSC_NTSC_ID,	22
	TUNER1_NTSC_ID,	23
	UI_TASK_ID,	24
	UPG_TASK_ID,	25
	WATCHDOG_TASK_ID,	26
	TV_PWR_TASK_ID,	27
	SOCK_CLIENT_TASK_ID,	28

Fig. 5 - Details for Type 41 Error Codes

Additional Data Description		
The first Task Id is the first task to count down to zero. The remaining 7 Ids are any tasks whose counts are at or below 16.		
Type	**Watchdog**	
41	VIDEO_CCD_TASK_ID,	29
	FACTORY_TASK_ID,	2A
	MODE_DETECT_TASK_ID,	2B
	DEFLECTION_TASK_ID,	2C
	TA1316_TASK_ID,	2D
	CHASSIS_REFRESH_TASK_ID,	2E
	PIP_MOVEMENT_TASK_ID,	2F
	PIP_VERTICAL_TASK_ID,	30
	DM2_TASK_ID,	31
	IE_MONITOR_THREAD_TASK_ID,	32
	IE_MAINWND_TASK_ID,	33
	AUDIO_APU_TASK_ID,	34
	PER_UPD_TASK_ID,	35
	AV_DRV_AUDIO_STATUS_TASK_ID,	36
	PipXDSDataThread,	37
	CHAN_ACQ_0_STATE_TASK_ID,	38
	CHAN_ACQ_1_STATE_TASK_ID,	39
	HWCTL_LINE_MON_TASK_ID,	3A
	HWCTL_POWER_STATUS_TASK_ID,	3B
	FLASH_TASK_ID,	3C
	SOCKET_IN_TASK_ID,	3D
	SOCKET_OUT_TASK_ID,	3E
	SOCKET_ERR_MON_TASK_ID,	3F
	TRANS_BRIDGE_TASK_ID,	40
	TUNER0_MONITOR_THREAD_ID,	41
	TUNER1_MONITOR_THREAD_ID,	42
	IE_MONITOR_TASK_ID,	43
	AUDIO_STATUS_TASK_ID,	44
	FPA_SCAN_TASK_ID,	45
	FPIR_TIMEOUT_TASK_ID,	46
	FPIR_REM_TASK_ID,	47
	FPIR_KBDKY_TASK_ID,	48
	FPIR_KBDPTR_TASK_ID,	49
	FPIR_KEYUP_TASK_ID,	4A
	FPIR_KEYREPEAT_TASK_ID,	4B
	KEYMGR_TASK_ID,	4C
	SockThreadIn_TASK_ID,	4D
	SOCKET_CLIENT_TASK_ID,	4E
	SOCKET_CLIENT_ERR_TASK_ID,	4F
	AV_DRV_VIDEO_STATUS_TASK_ID,	50
	RTC_TASK_ID,	51

Fig. 6 - Details for Type 41 Error Codes (Continued)

Parameter #	Parameter name	Value range	Notes and Comments
00	Security code for alignment parameters	Set to **76**	Must not advance to these parameters until value set
01 - 03	Not used		For Error Code Access, select Security Parameter 0, Value 50
04	Horizontal Phase	00 .. 127	Write to Horizontal Phase TDA9151 reg, and EEPROM
05	Width Align	00 .. 127	Write to Width Align TDA8444 reg, and EEPROM
06	E/W Parabola	00 .. 63	Write to E/W Parabola TDA9151 reg, and EEPROM
07	E/W Trap	00 .. 127	Write to E/W Trap TDA9151 Reg, and EEPROM
08	E/W Top Corner	00 .. 31	Write to E/W Top Corner TDA9151 Reg, and EEPROM
09	E/W Bottom Corner	00 .. 31	Write to E/W Bottom Corner TDA9151 Reg, and EEPROM
10	E/W Corner	00 .. 31	Write to E/W Corner TDA9151 Reg, and EEPROM
11	Vertical Size	00 .. 127	Write to Vertical Size TDA9151 reg, and EEPROM
12	Red Cutoff (Bias)	00 .. 255	Write to EEPROM Address depending on the source
13	Green Cutoff (Bias)	00 .. 255	Write to EEPROM Address depending on the source selected.
14	Blue Cutoff (Bias)	00 .. 255	Write to EEPROM Address depending on the source selected.
15	Brightness Offset	00 .. 255	Write to EEPROM Address depending on the source selected.
16	Red Drive	00 .. 127	Write to EEPROM Address depending on the source selected.
17	Uni-color (Green Reference)	00 .. 127	Write to EEPROM Address depending on the source selected.
18	Blue Drive	00 .. 127	Write to EEPROM Address depending on the source selected.
19	AKB Mode	00 .. 03	0 = off, 1= on (5ire), 2= on (10ire), 3= on (20ire),
20	RGB Output Mode	00 .. 03	0 = Normal, 1 = Red only, 2 = Green only, 3 = Blue only
21	Gemstar Horizontal OSD Position	00 .. 255	Write to EEPROM Address
22	Gemstar Vertical OSD Position	00 .. 255	Write to EEPROM Address
23	Gemstar Horizontal PIP Position	00 .. 255	Write to EEPROM Address
24	Gemstar Vertical PIP Position	00 .. 255	Write to EEPROM Address
25	Gemstar PIP Window Vertical Size	00 .. 13	Write to EEPROM Address
26	Digicon Bus Control	00 .. 01	*00 = Enables communication between the convergence micro & the digital convergence IC.* *01 = Disables communication between the convergence micro & the digital convergence IC.*

Fig. 7 - Front Panel Accessible Parameter List

Geometry Adjustments

The Geometry alignments on this chassis are very critical and should be performed using ChipperCheck®. Even though some of the geometry alignments are available through the front panel service menu, adjustment is not recommended.

Geometry must be performed in both 2H and 2.14H deflection modes.

The following front panel alignments are provided for slight field touchups only.

2H Component Mode Geometry Alignment

1. Input a 2H 480i (16x9) crosshatch signal to the Component Video input.
2. Using the Customer Controls, reset the Picture Controls.
3. Enter the Service Menu mode.
4. Set P7 (E/W Trap) to “V=63”.
5. Set P8 (E/W Top Corner Correction) to **“**V=16**”**.
6. Set P9 (E/W Bottom Corner Correction) to **“**V=16**”**.
7. Adjust P11 (Vertical size) for 7.5% overscan.
8. Adjust P6 (E/W Parabola) to obtain straight vertical lines on the left and right of the display.
9. Adjust P8 (E/W Top Corner Correction) and P9 (E/W Bottom Corner Correction) to straighten the top and bottom lines if necessary.
10. Repeat steps 7 through 9 until desired results are achieved.
11. Adjust P4 (Horizontal Phase) to center the picture horizontally.
12. Record the final values for P5, P6, P7, P8, P9 and P11.
13. Press the Power button to exit the Service menu mode.

Note: These values will be written to the EEPROM automatically without exiting the Service Menu mode.

2H (1H Upconverted) Video Mode Geometry Alignment

1. Input and select a 1H NTSC crosshatch signal to the Video input.
2. Using the Customer Controls, reset the Picture Controls.
3. Enter the Service Menu mode.
4. Using the Service Menu, enter the Parameter Values (P5, P6, P7, P8, P9 and P11) previously recorded in the “2H Component Mode Geometry Alignment”.
5. Adjust P4 (Horizontal Phase) to center the picture horizontally.

2.14H Component Mode Geometry Alignment

1. Input a 2.14H 1080i (16x9) crosshatch signal to the Component Video input.
2. Using the Customer Controls, reset the Picture Controls.
3. Enter the Service Menu mode.
4. Set P7 (E/W Trap) to “V=63”.
5. Set P8 (E/W Top Corner Correction) to **“**V=16**”**.
6. Set P9 (E/W Bottom Corner Correction) to **“**V=16**”**.
7. Adjust P11 (Vertical size) for 7.5% overscan.
8. Adjust P6 (E/W Parabola) to obtain straight vertical lines on the left and right of the display.
9. Adjust P8 (E/W Top Corner Correction) and P9 (E/W Bottom Corner Correction) to straighten the top and bottom lines if necessary.
10. Repeat steps 7 through 9 until desired results are achieved.
11. Adjust P4 (Horizontal Phase) to center the picture horizontally.
12. Record the final values for P5, P6, P7, P8, P9 and P11.
13. Press the Power button to exit the Service menu mode.

2.14H HDTV Mode Geometry Alignment

1. Connect and select an HDTV RF signal with a geometry pattern suitable to adjust Horizontal Phase.
2. Enter the Service Menu mode.
4. Using the Service Menu, enter the Parameter Values (P5, P6, P7, P8, P9 and P11) previously recorded in the “2.14H Component Mode Geometry Alignment”.
5. Adjust P4 (Horizontal Phase) to center the picture horizontally.

Yoke Centering Ring Adjustment

If Chipper Check is not available it is possible to replace a single CRT and realign geometry by using the centering rings on the CRT.

Using the convergence pattern available when in service menu V:80, the pattern from the replacement CRT may be adjusted to align with either of the two remaining CRT's using the centering rings shown in Figure 8.

First make certain the replacement CRT and yoke are assembled and placed back in the mounting as close as possible to the original CRT and yoke. At this point having the convergence pattern on screen will assist in the mechanical mounting.

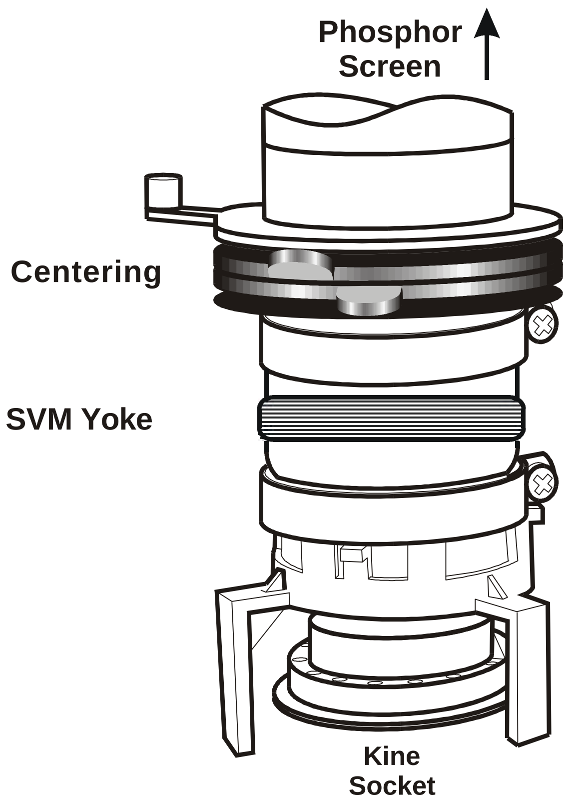


Figure 8 - Centering Rings

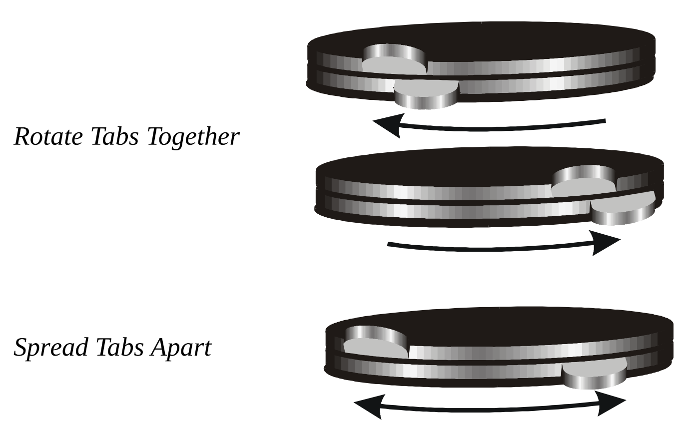


Figure 9 - Centering Ring Tab Movement

Using the centering rings and observing the convergence pattern, rotate and move the pattern until the replacement color overlays as close as possible to the two colors not replaced. Moving the ring tabs together around the neck of the CRT draws the raster in small circles. Spreading the tabs apart moves the raster in more linear angles. The closer the tabs are together, the less affect on the CRT beam they have.

When the raster is as close as possible fix the magnets with paint or nail polish to prevent further movement.

After fixing the magnets, if gross geometry errors are apparent, geometry alignment is indicated. If the raster is close, use the "Auto-convergence" feature provided in the consumer menu to re-align convergence. This should correct most minor geometry problems. Follow auto-convergence with the consumer red and blue centering adjustments, then evaluate the raster again.

In most cases convergence will now be acceptable. If only slight convergence errors are noted the technician should enter the manual digital convergence menu at V:80 and begin "touch-up" of the screen.

If gross geometry errors are still apparent re-evaluate whether the errors are noticable on the replacement CRT or whether they are global, affecting all three CRT's. If the errors affect all three CRT's a full geometry alignment is indicated. If the errors only affect one CRT, particulary the replacement, return to the mechanical placement and centering ring adjustments and begin those procedures again.

Digital Convergence

There are four security locations associated with digital convergence. Their exact functions will be explained later.

They are:

V: 76; The main service alignment location. Contains the geometry alignments associated with convergence.
V: 80; The main digital convergence location.
V: 82; PTV sensor positioning.
V: 83; Restore factory Digital Convergence values.
V: 84; Save current alignments.

When the chassis is in service mode and digital convergence is active (V:80) the following remote control functions are enabled:

On/Off; Toggles the convergence mode off after alignments are completed
CH+/CH-; Adjusts the selected alignment point up or down.
VOL+/VOL-; Adjusts the selected alignment point right or left.
Cursor Arrow Buttons; Moves the cursor in the appropriate direction.
INFO; Toggles the convergence mode through the following four states.

Red to Green: Allows adjustment of red convergence using the green pattern as a template.
Blue to Red: Allows adjustment of blue convergence using the red pattern as a template.
All: Provides a white convergence pattern allowing comparison of the pattern for more accurate results. The green pattern can be adjusted in this mode.

Green: Allows adjustment of the green convergence. This should be used only with a mylar template or strings placed on the front screen.

All other buttons are ignored by System Control and the Digital Convergence microprocessor during convergence alignment.

After placing the instrument in service mode, use either the remote control or the front panel button VOL UP to advance the right side screen number (V:) to 80. Then push CH UP. This places the instrument in digital convergence mode.

Convergence Pattern

The convergence pattern displayed when in the digital convergence mode (V:80) appears as in Figure 10. Shown is the cursor at center screen. This is how the convergence pattern appears when the technician initially enters the digital convergence alignment mode.

Convergence Mode

During digital convergence mode, the display will blank incoming video allowing only the digital convergence crosshatch pattern with the cursor at the center location. The initial adjustment is red. Green is fixed. Red and blue will be aligned to green.

The volume and channel buttons will provide adjustment of the selected cursor location up, down, left and right in single steps. The cursor position is indicated by a crosshair. The intersection of the highlighted crosshair is the alignment currently being adjusted. Note only a portion of the crosshair will be seen when it is positioned to adjust the off-screen points along the picture edges. Use the small line segments that extend to the picture edge to adjust these points.

NOTE: In the extreme diagonal positions, the cursor is invisible but the point is still adjustable. Do not adjust these off-screen corner points.

For best results, adjust the pattern beginning at the upper left of the screen. Then continue the adjustments from left to right and top to bottom as if reading a book.

The four navigation "MOVE" buttons adjust the movement of the selected color at the cursor point. They will move the alignment point for the selected color up, down, right or left. Adjust so that it is centered on green with minimum fringing on either side.

The "INFO" or “DISPLAY” button will toggle the display through 4 states:

1. Yellow crosshatch, Yellow cursor, Red adjustment, no other OSD or video.
2. Cyan crosshatch, Cyan cursor, Blue adjustment, no other OSD or video.
3. White crosshatch, White cursor, no adjustment available. Used to observe convergence results.
4. Green crosshatch, Green Cursor.

The PWR button returns the receiver to normal operation, however the adjustments are not stored to EEPROM. More on the actual storing of data to the digital convergence EEPROM later.

Digital Convergence Alignment Overview

There are two convergence modes in the ATC311 corresponding to the two deflection (scan) modes. Each requires complete convergence alignment and stores the alignment points in separate EEPROMS. There is also another EEPROM containing convergence data installed at the time of manufacture. It is always available to allow a "starting" point in cases where catastrophic failure of convergence data has occured. This EEPROM is larger than the others and contains reference data for all four scan modes.

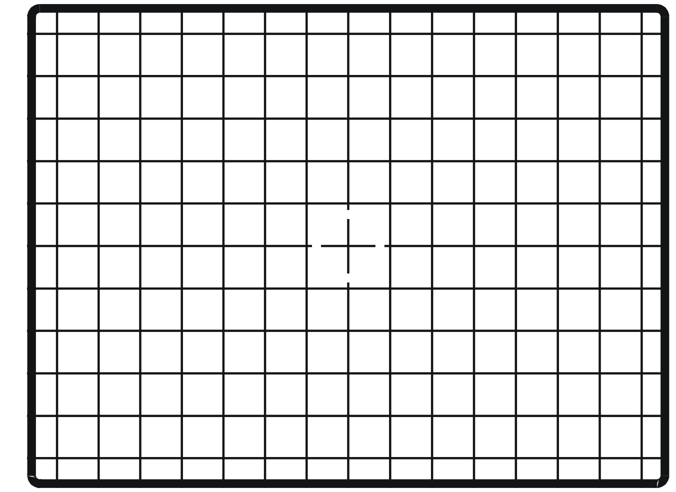


Figure 10 - Main Convergence Screen with Cursor at Center

As previously discussed, there are also four service menu locations associated with digital convergence. They are:

V: 80; The main digital convergence location.
V: 82; PTV sensor positioning.
V: 83; Restore factory Digital Convergence values.
V: 84; Save current alignments.

V:80 is the main digital convergence menu. It contains an "all-points" adjustment procedure very much like other recent PTV chassis. When convergence alignments are complete, the technician exits this menu by pressing "On/Off" on the remote control or "Power" on the front panel. Convergence alignments for the selected scan mode are stored in the current mode EEPROM at this point and will be used until they are changed during the next menu V:80 alignment procedure or the consumer accesses the "Auto-Convergence" procedure. In that case, the original factory alignment data will be placed back into the EEPROM and the screen aligned to the faulty data.

To prevent this, once alignments are complete for the selected mode, the service menu must be entered again, this time V:84 will be selected. At V:84, press CH UP. This transfers the new alignment data for the selected deflection mode to the factory EEPROM. A green block will appear when this step is finished. Then the service menu is decremented to V:82 and CH UP is again pressed. This starts a routine to allow the optical sensors located on the screen frame to "memorize" the new alignment data. It looks similar to the consumer "Auto-convergence" procedure. A green block will appear when this step is finished. Once the routine is completed "Auto-convergence" will function correctly, returning the screen to the convergence setup by the technician. This new data becomes the "factory default" data from this point forward, only changing if a new set of alignments is placed into the EEPROM using the same procedure.

Menu V:83 performs the same convergence routine as selecting "Auto-convergence" from the consumer menu.

NOTE: Do not perform the “Consumer Center Convergence” more than two times after performing “Auto-convergence”. If adjusted more than twice, “Auto-convergence” must be performed again.

ATC311 Color Temperature Alignment

Color temperature is setup for only one user mode, then the remainder of the settings are calculated and placed into the proper EEPROM locations. Proper color temperature setup is dependant upon screen control setup. This adjustment is done only once and used as a "reference" for the remaining adjustments.

Screen Control Setup

If screen control setup is done properly, the original color temperature settings will probably be acceptable.

PRESETS:

To begin, set the instrument to receive a "Comp" input on the Component Video Input (Y, PR, PB) on the rear jack panel using a clean average video signal. Preheat the instrument for at least 20 minutes with an active video display.

In the consumer menu, under Picture Quality, select Reset Controls. Then using the Picture Controls, set Contrast to "maximum". Set Color Warmth to "Normal".

In the consumer menu under Screen, set the Menu Background Color to "Transparent".

Four test patterns, will be required for the procedure. TP1 is a 13 IRE <10% display window for setting the screen controls, lowlights. TP2 is a 0 IRE flat field for setting cathode cutoffs. TP3 is a 100 IRE flat field for setting highlights. TP4 is a 100 IRE <10% Window for setting light output.

Screen Control Adjustments:

1. Apply a 0 IRE Flat Field pattern (TP2) to the Component Video Input (Y, PR, PB).
2. Make certain the preheat and preset conditions have been met.
3. Enter the serviceman menu using the front panel buttons by pressing simultaneously "MENU" and "CHANNEL DOWN" . Use "VOL UP" to place the "V:" value to "76". When a parameter is specified use "CH UP" or "CH DN" to change to the correct parameter number, then use "VOL UP" or "VOL DN" to change the value of the paramter.
4. Set all three screen controls on the focus/screen assembly to minimum (full CCW). If any or all colors of the On Screen Display are badly out of focus, the individual screen control for those colors will need to be turned back up until they regain focus.
5. Set Red Cutoff (P:12) to V:32.
6. Set Green Cutoff (P:13) to V:32.
7. Set Blue Cutoff (P:14) to V:32.
8. Set Brightness Offset (P:15) to V:127.
9. Set Red Drive (P16) to V:64.
10. Set Uni-Color (Green Reference - P:17) to V:64.
11. Set Blue Drive (P18) to V:64.
12. Set AKB (P:19) to V:2.
13. Making certain the 0 IRE Flat Field pattern (TP2) is still displayed, observe the LED's located on the kine boards on the neck of the CRT's. Adjust the red, blue and green screen controls to light all three led's. The goal is to have all three led's full on.

DO NOT ADJUST THE SCREEN CONTROLS AGAIN AFTER THIS STEP!!!

14. Set Red Cutoff (P:12) to V:45.
15. Set Green Cutoff (P:13) to V:200.
16. Set Blue Cutoff (P:14) to V:45.
17. Set Red Drive (P16) to V:50.
18. Set Blue Drive (P18) to V:50.

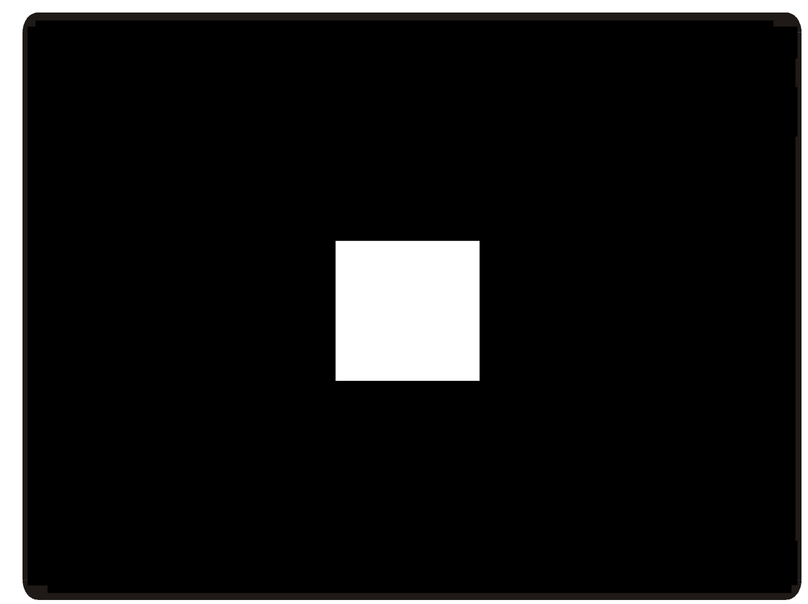
Color Temperature Without a Colorimeter

1. If a colorimeter is not available, input and select a gray stairstep test pattern. Set highlight temperature using the Red and Blue Drives. Alternately adjust the Red and Blue Drives (P16, P18) to achieve white highlight with no color tinting. Record the values set for the Drives (P16, P18).
2. Set lowlight temperature using the Red and Green Cutoffs (P12, P14). Alternately adjust the Red and Green Cutoffs to achieve gray lowlight and black with no color tinting.

Caution: Red, Green and Blue Cutoffs must not be set to a value lower than "32" minimum to allow AKB to have an active range.

3. Exit the Service Menu Mode.
4. Using the Picture Controls, set Color Warmth to "Warm" and re-enter the Service Menu mode.
5. Transfer the DAC values recorded for the Normal Red and Blue drives (P16, P18).
6. Set the Blue Drive (P18) to -13 steps down from the value recorded for the Normal Blue drive setting.
7. Set the Red Drive (P16) to +5 steps up from the value recorded for the Normal Red drive setting.
8. Exit the Service Menu Mode.
9. Using the Picture Controls, set Color Warmth to "Cool" and re-enter the Service Menu mode.
10. Transfer the DAC values recorded for the Normal Red and Blue drives (P16, P18).
11. Set the Blue Drive (P18) to +7 steps up from the value recorded for the Normal Blue drive setting.
12. Set the Red Drive (P16) to -3 steps down from the value recorded for the Normal Red drive setting.
13. Using the Picture Controls, set Color Warmth to "Normal" and re-enter the Service Menu mode.
14. Set AKB Mode (P19) to V:0 to turn AKB off.
15. Adjust the Cutoffs (P12, P13, P14) and Brightness Offset (P15) for proper low light color tracking.
16. Set AKB Mode (P19) to V:2 to turn AKB back on.
17. Exit the Service Menu Mode.
18. Using the Picture Controls, set Color Warmth to "Cool".
19. Using the Picture Controls, select Reset Controls.

13 IRE Test Pattern



100 IRE Test Pattern

Window Patterns for Color Temperature Setup

Color Temperature Using a Colorimeter

1. Perform the Screen Control setup.
2. Using the customer control menu set the black level to +10 steps (60%).
3. Enter the Service Menu Mode.
4. Set the RGB Output Mode (P:20) to V:2. This changes the screen output to green only.
5. Input and select TP#1 (13 IRE 50% window) test pattern.
6. Using a colorimeter, adjust the Brightness Offset (P:15) for Y=1.3.
7. Change the video test pattern to TP3 (100 IRE Flat Field). Measure the light output with the colorimeter and record as LO#1_____ .
8. Change the video test pattern to TP4 (100 IRE Window). Measure the light output with the colorimeter and adjust the Uni-color Green reference(P:17) to obtain a reading 1.6 times that of LO#1. Record it as LO#2______ .
9. Change the video pattern back to TP1 and repeat step 5-8 if necessary.
10. To return all three colors, set the RGB Output Mode (P:20) to “V:0”.
11. Exit the Service Menu Mode.
12. Using the customer control menu set the black level to -10 steps (40%).
13. Enter the Service Menu Mode.
14. To return all three colors, set RGB Output Mode (P:41) to V:0.
15. Input and select TP#1 (13 IRE window) test pattern and adjust the Red and Green Cutoffs (P:12, P:14) and Brightness Offset (P:15) for x=0.285, y=0.294, Y=0.600.

Caution: Red, Green and Blue Cutoffs must not be set to a value lower than “32” minimum to allow AKB to have an active range.

16. Change the video test pattern to TP3 (100 IRE Flat Field). Set highlight temperature using the Red and Blue Drives (P:16 and P:18) for x=0.285, y=0.294.
17. Repeat steps 15 and 16 as needed for accuracy.
18. Record the values for the Red and Blue Drives (P:16 and P:18). These values will be transfered to the same parameters in the "Warm and Cool Color Temp Mode" to be used as a starting point.
19. Exit the service menu.
20. Using the Picture Controls, set Color Warmth to "Warm" and re-enter the Service Menu mode.
21. Transfer the DAC values recorded for the Normal Red and Blue drives (P16, P18).
22. Set the Blue Drive (P18) to -13 steps down from the value recorded for the Normal Blue drive setting.
23. Set the Red Drive (P16) to +5 steps up from the value recorded for the Normal Red drive setting.
24. Exit the Service Menu Mode.
25. Using the Picture Controls, set Color Warmth to "Cool" and re-enter the Service Menu mode.
26. Transfer the DAC values recorded for the Normal Red and Blue drives (P16, P18).
27. Set the Blue Drive (P18) to +7 steps up from the value recorded for the Normal Blue drive setting.
28. Set the Red Drive (P16) to -3 steps down from the value recorded for the Normal Red drive setting.
29. Using the Picture Controls, set Color Warmth to "Normal" and re-enter the Service Menu mode.
30. Set AKB Mode (P19) to V:0 to turn AKB off.
31. Adjust the Cutoffs (P12, P13, P14) and Brightness Offset (P15) for proper low light color tracking.
32. Set AKB Mode (P19) to V:2 to turn AKB back on.
33. Exit the Service Menu Mode.
34. Using the Picture Controls, set Color Warmth to "Cool".
34. Using the Picture Controls, select Reset Controls.

Conclusion

The purpose of screen control alignment is to match the electronic video signal to the CRT electrical characteristics. In other words, if the video signal requires beam current to stop, the CRT must know that value. Screen control setup is an exact adjustment.

On the other hand, color temperature can be perceived differently depending upon room lighting and environment, original program material, electrical adjustment of the video processing and control circuits and finally, the viewer. What looks red to a technician, may look purple or orange or any other color to another viewer. The technician should strive to provide a "trained" eye by knowing what proper color tracking is. "Color Tracking" itself is a misnomer. Color temperature alignment is actually striving for a uniform gray, with no hint of color tinting, as the ideal for any light output level of the CRT.