CHASSIS ALIGNMENT

Note: Chassis alignment procedures must be performed in the following sequence, unless specified otherwise. AC line voltage should be approximately 120VAC. Customer controls should be set to nominal (PICTURE RESET in the *Video* menu) unless specified otherwise.

Regulated B+ Standby Adjustment

Test Point:	TP4101 (Reg B+)	Main PCB
Adjust:	R4113 (Standby Adj)	Main PCB

1. Place the instrument in the standby mode (AC power applied, instrument OFF).
2. Connect a DC voltmeter to TP4101 (pin 9 of T4102); use pin 5 of T4102 as ground reference.
3. Adjust the *Regulated B+ Standby* control (R4113) for 140.0 ± 0.5 VDC.

Video Detector Alignment

Test Point:	TP2305 (IF AGC)	Main PCB
Adjust:	L2304 (Video Detector)	Main PCB

1. Connect an external marker generator to the chassis IF input (Tuner pin 3) through a 1000pF capacitor; use the tuner shield as ground reference. Set the marker generator for a 45.75 MHz (CW) marker.
2. Short TP2310 (+ lead of C2307) to ground (− lead of C2307).
3. Connect a DC voltmeter to TP2305 (+ lead of C2304); use the tuner shield as ground reference.
4. Adjust the *Video Detector* coil (L2304) for minimum voltage at TP2305.

4.5 MHz Detector Alignment

Test Point:	U1001-52 (Audio Out)	Main PCB
Adjust:	L1202 (4.5 MHz Det)	Main PCB

1. Tune the instrument to receive a signal with audio modulation.
2. Connect a scope probe (0.1V/0.5msec/div.) to U1001 pin 52; use the tuner shield as ground reference.
3. Adjust the *4.5 MHz Detector* coil (L1201) for maximum signal at U1001-52.

NOTE: L1201 tuning is very broad. For proper alignment, identify the range of the control in which the signal is maximum, then center the control within that range.

AFT Alignment

Test Point:	TP2309 (AFT)	Main PCB
Adjust:	L2303 (AFT)	Main PCB

1. Connect an external marker generator to the chassis IF input (Tuner pin 3) through a 1000pF capacitor; use the tuner shield as ground reference. Set the marker generator for a 45.75 MHz (CW) marker.
2. Connect a DC voltmeter to TP2309 (U1001 pin 50); use the tuner shield as ground reference.
3. Preset the *AFT* coil (L2303) fully clockwise; the DC voltmeter should read approximately 2.5 VDC.
4. Adjust L2303 counterclockwise until the voltage at TP2309 reaches a maximum, then decreases to 2.5 ± 0.1 VDC.

RF AGC Alignment

Test Point:	Observe Display	
Adjust:	R2311 (RF AGC)	Main PCB

The *RF AGC* control (R2311) has been aligned for optimum performance over a wide range of RF signal conditions. Readjustment of R2311 should not be necessary unless:

a. the tuner has been replaced,
b. the CTV IC (U1001) has been replaced,
c. R2311 has been replaced or misadjusted, or
d. unusual signal conditions exist, such as cable TV adjacent channel interference, picture bending, channel 6 color beats, broadcast noise or weak signal conditions.

Cable TV ajacent channel interference, picture bending and channel 6 color beats are usually a result of excessive signal level, and may be improved by adjusting R2311 to lower the gain of the tuner; however, this may result in a reduction in S/N ratio (noise due to weak signal).

Broadcast noise and weak signal may be improved adjusting R2311 to increase the gain of the tuner; however, this may result in a degradation of overload capabilities (interference or distortion due to excessive signal).

If the *RF AGC* control must be adjusted, use the weakest local broadcast channel as a signal source. After adjusting the control, check performance on all available channels.

Wide Band Audio Level Adjustment

Test Point:	TP1205 (WB Audio)	Main PCB
Adjust:	R1204 (WBA Level)	Main PCB

1. Tune the instrument to receive the signal from a MTS generator (B&K model 2009, or equivalent). Set the generator to provide an L+R modulating signal with 300 Hz audio.
2. Connect a scope probe (0.1V/5msec/div.) to TP1205 (JS1907 of the Digital Audio sip); use pin JS1906 as ground reference.
3. Adjust the *Wide Band Audio Level* control (R1204) for 75 ± 5 mVRMS at TP1205.

CHASSIS ALIGNMENT (Continued)

Sub Brightness Adjustment

Test Point:	KS5001R-8 (Red Cathode)	Kine Drive PCB
Adjust:	R3346 (Sub Bright)	Main PCB

1. Tune the instrument to receive a super pulse signal (RCA model WR-515A, or equivalent).
2. Connect a scope probe (20V/20μsec/div.) to pin 8 of the kine socket on the Red Kine Driver board; use J5002 as ground reference.
3. Adjust the *Sub Brightness* control (R3346) for 50.0 ± 1.0 Vp-p, with 0 IRE black level (refer to Figure 4).

Contrast Preset Adjustment

Test Point:	Q2906-E (Luma Out)	Main PCB
Adjust:	R2730 (Contrast Preset)	Main PCB

1. Tune the instrument to receive a super pulse signal (RCA model WR-515A, or equivalent).
2. Connect a scope probe (0.5V/20μsec/div.) to the emitter of Q2906 (or JW454); use the tuner shield as ground reference.
3. Adjust the *Contrast Preset* control (R2730) for 2.0 ± 0.1 Vp-p at the emitter of Q2906.

Analog Comb Filter Adjustment (CTC169M,N only)

Test Point:	U2601-7 (Luma Out)	Main PCB
Adjust:	L2601 (Notch Freq)	Main PCB
	R2603 (Notch Depth)	Main PCB

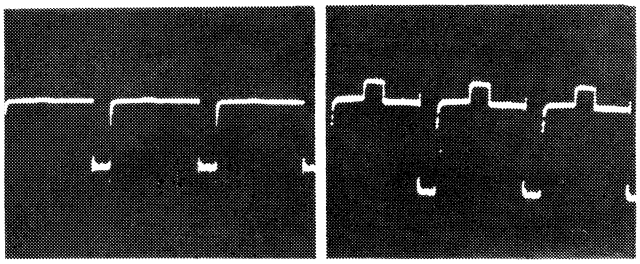
1. Tune the instrument to receive a color bar signal.
2. Connect a scope probe (500mV/20μsec/div.) to pin 7 of U2601; use the tuner shield as ground reference.
3. Alternately adjust the *Notch Frequency* control (L2601) and the *Notch Depth* control (R2603) to minimize the level of the chroma burst portion of the signal.

Chroma Filter Alignment

Test Point:	Observe Display	
Adjust:	R2802 (Filter Adj)	Main PCB

1. Tune the instrument to receive a color bar signal.
2. Adjust the *Chroma Filter* control (R2802) for proper color display with clean transitions between bars.

NOTE: With R2802 set fully clockwise, colors in the display will be faded. With R2802 set fully counterclockwise, the display will be monochrome (no color). The correct setting should be near midrange. After completing the adjustment, check various broadcast channels to insure that there is no delay in color reproduction when a channel is tuned.



Properly adjusted Misadjusted

Fig. 4 - Sub Brightness Adjustment

Tint Preset Adjustment

Test Point:	Observe Display	
Adjust:	R2816 (Tint Preset)	Main PCB

1. Tune the instrument to receive a strong local broadcast.
2. Using the *Video* menu, set *Tint* to center.
3. Adjust the *Tint Preset* control (R2816) for proper flesh tone reproduction.

High Voltage Check

High voltage is NOT adjustable. High voltage at maximum beam current (bright picture) is 30.0 kV ± 0.6 kV. High voltage must not exceed 32.0 kV under any conditions.

High Voltage Measurement

1. Tune the instrument to receive a strong signal with bright picture content.
2. Using the *Video* menu, set *Brightness* and *Contrast* to maximum.
3. Connect a high impedance (> 20Megohm) DC voltmeter between the emitter of Q4701 (+ lead) and ground (− lead); both test points are located on the HV Splitter circuit board.

   HV = (meter reading + 0.6V) x 487

Shutdown Check

The following procedure must be performed prior to servicing, and after servicing deflection, high voltage or regulated B+ circuits, to assure proper operation of the shutdown circuit.

1. Using the VIDEO menu, set *brightness* and *contrast* to maximum.
2. Short stakes TP4902 (XRPI) and TP4901 (XRP2) together. The instrument must shut down, cycle on and off three times and then shut down and remain off, even if the short is removed. Once the short is removed, the instrument should not return to normal operation until the power button is pressed.

PIX-IN-PIX (S-PIP) ALIGNMENT

Note: S-PIP alignment procedures must be performed in the following sequence, unless specified otherwise. AC line voltage should be approximately 120VAC. Customer controls should be set to nominal (PICTURE RESET in the *Video* menu) unless specified otherwise.

3.58 MHz Oscillator Alignment

Test Point:	Q8410-E (Osc Out)	S-PIP PCB
Adjust:	C8403 (3.58MHz Osc)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Short U8401 pin 1 to ground; this allows the 3.58 MHz oscillator to free-run.
4. Connect a frequency counter (use a 100X probe) to the emitter of Q8410; use the PIP shield as ground reference.
5. Adjust the *3.58 MHz Oscillator* control (C8403) for 3.579545 kHz ± 15 Hz at Q8410-E.
6. Remove the short added in step 3.

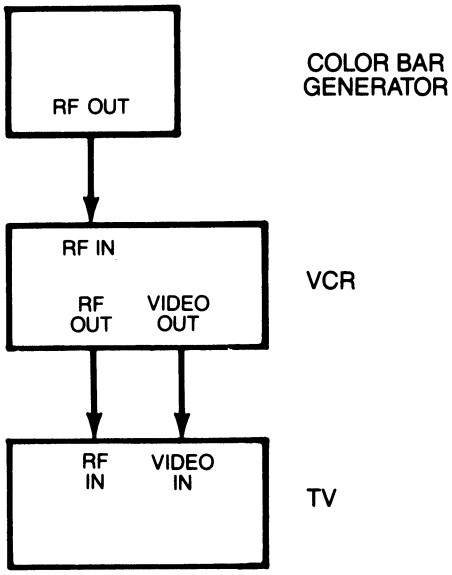


Fig. 5 - S-PIP Alignment Set-Up

14.318 MHz Oscillator Alignment

Test Point:	U8301-19 (3.58MHz)	S-PIP PCB
Adjust:	C8329 (14.318MHz Osc)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Short U8301 pin 6 to ground to allow the 14.318 MHz oscillator to free-run; the insert pix should lose color.
4. Connect a frequency counter (use a 100X probe) to U8301 pin 19; use the PIP shield as ground reference.
5. Adjust the *14.318 MHz Oscillator* control (C8329) for 3.579795 kHz ± 5 Hz at U8301-19.
6. Remove the short added in step 3.

125 kHz Oscillator Alignment

Test Point:	Observe Display	
Adjust:	L8501 (125kHz Osc)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Short U8503 pin 3 to ground; the insert picture should lose horizontal sync.
4. Adjust the *125 kHz Oscillator* control (L8501) to minimize the movement of the insert pix.
5. Remove the short added in step 3; the insert pix should be stable.

Burst Blanking Adjustment

Test Point:	U8301-3 (PIP Chroma)	S-PIP PCB
Adjust:	R8326 (Burst Blanking)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Connect a scope probe (50mV/10µsec/div.) to U8301 pin 3 (JW301); use the PIP shield as ground reference.
4. Adjust the *Burst Blanking* control (R8326) to eliminate burst from the chroma signal.

NOTE: As the control is adjusted through its range, the level of burst *and* chroma signal will vary. Start with the control preset fully counterclockwise. As the control is adjusted clockwise, the signal should reach a peak, then a null, then a second peak. The correct setting for the control is at the null between the two peaks.

Luma Gain (Insert Pix) Adjustment

Test Point:	Q8306-C (Insert Luma)	S-PIP PCB
Adjust:	R8336 (Luma Gain)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Connect a scope probe (0.5V/20µsec/div.) to the collector of Q8306; use the PIP shield as ground reference.
4. Adjust the *Luma Gain* control (R8336) for 1.30 ± 0.10 Vp-p (black-to-white) at Q8306-C.

PIX-IN-PIX (S-PIP) ALIGNMENT (Continued)

Color Saturation Adjustment

Test Point:	Q8302-C (V IN)	S-PIP PCB
Adjust:	R8324 (Saturation)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Connect a scope probe (0.2V/20μsec/div.) to the collector of Q8302; use the PIP shield as ground reference.
4. Adjust the *Saturation* control (R8324) for 1.3V ± 0.1 Vp-p at Q8203-C.

Luma Reference Level Adjustment

Test Point:	Observe Display	
Adjust:	R8517 (Y Ref)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.
2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.

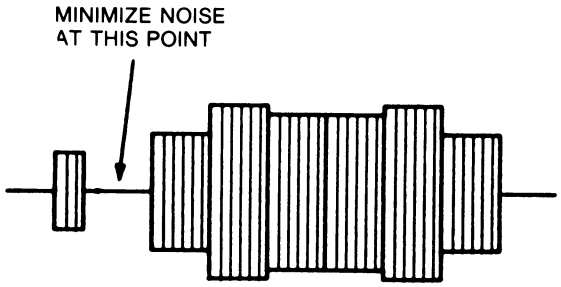


Fig. 6 - R − Y/B − Y Null Adjustment

3. Using the VIDEO menu, set the customer color control to minimum.
4. Adjust the *Y Reference* control (R8517) to match the luminance levels of the main pix and the insert pix.

Chroma Reference Level Adjustments

Test Point:	Q8210-E (PIP Chroma)	S-PIP PCB
Adjust:	R8422 (R − Y Null)	S-PIP PCB
	R8424 (B − Y Null)	S-PIP PCB
	R8307 (Tint)	S-PIP PCB
	R8518 (U/V Ref)	S-PIP PCB

1. Connect test equipment as shown in Figure 5.

R − Y/B − Y Null Adjustments

2. Tune the instrument to receive a color bar signal. Select PIP mode to display the color bar signal in both the main pix and insert pix.
3. Connect a scope probe (0.1V/20μsec/div.) to the emitter of Q8210; use the PIP shield as ground reference.
4. Alternately adjust the *R − Y Null* control (R8422) and the *B − Y Null* control (R8424) to minimize the non-chroma portion of the signal at Q8210-E (see Fig. 6).

Tint and U/V Reference Adjustments

5. Tune the instrument to receive a local broadcast color signal. Select PIP mode to display the signal in both the main pix and insert pix.
6. Adjust the *Tint* control (R8307) and the *U/V Reference* control (R8518) to match the flesh tones and chroma saturation of the insert pix to the flesh tones and chroma saturation of the big pix.
7. Repeat steps 2 through 6.

DIGITAL COMB FILTER

Sync Level Adjust

This adjustment is sealed at time of manufacture and should require no further adjustment. If control (R6488) is replaced or adjustment is deemed necessary the following procedure is recommended.

Test Point:	JS6407	Comb SIP
Adjust:	R6488	Comb SIP

1. Apply 75% split field NTSC color bar signal to instrument.
2. Connect oscilloscope probe (2.0V/20μS per Div.) to JS6407.
3. Adjust R6488 to produce 2.0V p-p response.

Reference Voltage Adjust (White Stretch)

Test Point:	CR6401	Comb SIP
Adjust:	R6421	Comb SIP

1. Apply 75% split field NTSC color bar signal to instrument.
2. Adjust: *Color control* to mid-range,
   Contrast control to 3/4 range,
   Brightness control to mid-range.
3. Allow OSD menu to time out (disappear).
4. Connect DVM across zener diode CR6401.
5. Adjust R6421 for 0 ± .005VDC.
6. Remove test equipment.

MPX (STEREO) ALIGNMENT

Test Equipment Required:

Audio Generator-Capable of generating 99404 Hz and 15734 Hz.
Frequency Counter-20 Mhz.
Oscilloscope-Wideband
Digital Volt Meter-Triplett 3550 or equivalent.
Stereo Generator-B & K 2009 or equivalent.

Preparation:

Remove AC power from instrument. Clip jumper wire JW377.

Procedure:

Stereo LPF/SAP BPF Alignment

1. Apply 99404 Hz signal from Audio Generator to JW377 (sound input to pin 2 of U1600).
2. Connect oscilloscope or DVM to negative leg of C1602 (pin 3 of U1600).
3. Apply AC power to instrument and adjust R1604 for minimum indication.
4. Remove test equipment.

Stereo VCO Adjust

1. Connect 10 uFD capacitor from pin 2 of U1600 to ground.
2. Short pins 38 & 45 to pin 47 (U1600).
3. Connect frequency counter to pin 41 of U1600.
4. Adjust R1616 for 15734 Hz +/- 20 Hz.
5. Remove capacitor from pin 2 of U1600 and short from pins 38 & 45 to pin 47.

Baseband LPF Responses

1. Apply 15734 Hz signal from Audio Generator to JW377.
2. Short pin 39 to pin 40 (U1600) or positive leg to negative leg of C1616.
3. Connect oscilloscope or DVM to negative leg of C1615.
4. Adjust R1606 for minimum response.
5. Remove test equipment.

Remove AC power from instrument and solder JW377 back together (previously clipped).

Low Frequency Separation

1. Apply AC power to instrument and make sure audio is present. Set audio menu for stereo operation with Expanded Stereo (SRS) OFF.
2. Connect MPX (Stereo) Generator to antenna input terminal.
3. Apply L only stereo signal 300 Hz (pilot ON).
4. Connect oscilloscope or DVM to JW207.
5. Adjust R1609 for minimum response.

High Frequency Separation

1. Use same connections as used for Low Frequency Separation except apply L only stereo signal 8 kHZ.
2. Adjust R1611 for minimum response.

Note: If minimum response is obtained only at one end of R1611 rotation, reset R1611 to center of rotation and adjust R1709 for minimum response.

3. Remove all test equipment.

ALIGNMENT–BLACK STRETCH

Sync Amplitude Adjust

1. Apply any convenient test signal.
2. Monitor luma output at JS6407.
3. Adjust R6448 to set blanking level (0 IRE) at 2.8 ± 0.1V DC.