

CM-149/GX

CM-149/GX



# SERVICE MANUAL

## Z-LINE

DIRECT VIEW  
COLOR TV RECEIVER  
GX CHASSIS

INCLUDES:

9-1808 (25V)

Or

9-1809 (25V) W/Comb Filter

Or

9-1810 (27V)

Or

9-1811 (27V) W/Comb Filter

Or

9-1812 (32V)

Or

9-1813 (35V) W/Comb Filter

COMPLIMENTED WITH AUDIO JACK ASSY:

9-1814 PIP

9-1733 (MTS Stereo)

**Published by Technical Publications**

**ZENITH ELECTRONICS CORPORATION**

**1000 MILWAUKEE AVENUE**

**GLENVIEW, ILLINOIS 60025-2493**

# PRODUCT SAFETY SERVICING GUIDELINES FOR AUDIO-VIDEO PRODUCTS

950ART94  
1009

**CAUTION:** DO NOT ATTEMPT TO MODIFY THIS PRODUCT IN ANY WAY. NEVER PERFORM CUSTOMIZED INSTALLATIONS WITHOUT MANUFACTURER'S APPROVAL. UNAUTHORIZED MODIFICATIONS WILL NOT ONLY VOID THE WARRANTY, BUT MAY LEAD TO YOUR BEING LIABLE FOR ANY RESULTING PROPERTY DAMAGE OR USER INJURY.

SERVICE WORK SHOULD BE PERFORMED ONLY AFTER YOU ARE THOROUGHLY FAMILIAR WITH ALL OF THE FOLLOWING SAFETY CHECKS AND SERVICING GUIDELINES. TO DO OTHERWISE, INCREASES THE RISK OF POTENTIAL HAZARDS AND INJURY TO THE USER.

WHILE SERVICING, USE AN ISOLATION TRANSFORMER FOR PROTECTION FROM A.C. LINE SHOCK.

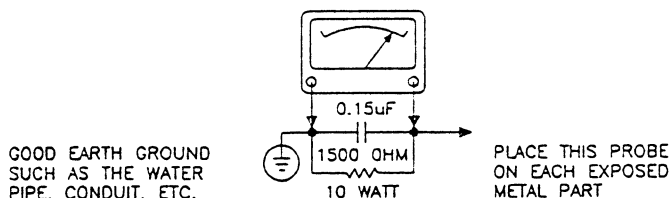
## SAFETY CHECKS

AFTER THE ORIGINAL SERVICE PROBLEM HAS BEEN CORRECTED, A CHECK SHOULD BE MADE OF THE FOLLOWING:

### SUBJECT: FIRE & SHOCK HAZARD

1. BE SURE THAT ALL COMPONENTS ARE POSITIONED IN SUCH A WAY AS TO AVOID POSSIBILITY OF ADJACENT COMPONENT SHORTS. THIS IS ESPECIALLY IMPORTANT ON THOSE MODULES WHICH ARE TRANSPORTED TO AND FROM THE REPAIR SHOP.
2. NEVER RELEASE A REPAIR UNLESS ALL PROTECTIVE DEVICES SUCH AS INSULATORS, BARRIERS, COVERS, SHIELDS, STRAIN RELIEFS, POWER SUPPLY CORDS, AND OTHER HARDWARE HAVE BEEN REINSTALLED PER ORIGINAL DESIGN. BE SURE, THAT THE SAFETY PURPOSE OF THE POLARIZED LINE PLUG HAS NOT BEEN DEFEATED.
3. SOLDERING MUST BE INSPECTED TO DISCOVER POSSIBLE COLD SOLDER JOINTS, SOLDER SPLASHES OR SHARP SOLDER POINTS. BE CERTAIN TO REMOVE ALL LOOSE FOREIGN PARTICLES.
4. CHECK FOR PHYSICAL EVIDENCE OF DAMAGE OR DETERIORATION TO PARTS AND COMPONENTS, FOR FRAYED LEADS, DAMAGED INSULATION (INCLUDING A.C. CORD), AND REPLACE IF NECESSARY. FOLLOW ORIGINAL LAYOUT, LEAD LENGTH AND DRESS.
5. NO LEAD OR COMPONENT SHOULD TOUCH A RECEIVING TUBE OR A RESISTOR RATED AT 1 WATT OR MORE. LEAD TENSION AROUND PROTRUDING METAL SURFACES MUST BE AVOIDED.
6. ALL CRITICAL COMPONENTS SUCH AS FUSES, FLAME-PROOF RESISTORS, CAPACITORS, ETC. MUST BE REPLACED WITH EXACT FACTORY TYPES. DO NOT USE REPLACEMENT COMPONENTS OTHER THAN THOSE SPECIFIED OR MAKE UNRECOMMENDED CIRCUIT MODIFICATIONS.
7. AFTER RE-ASSEMBLY OF THE SET ALWAYS PERFORM AN A.C. LEAKAGE TEST ON ALL EXPOSED METALLIC PARTS OF THE CABINET, (THE CHANNEL SELECTOR KNOB, ANTENNA TERMINALS, HANDLE AND SCREWS) TO BE SURE THE SET IS SAFE TO OPERATE WITHOUT DANGER OF ELECTRICAL SHOCK. DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST. USE AN A.C. VOLTMETER, HAVING 5000 OHMS PER VOLT OR MORE SENSITIVITY, IN THE FOLLOWING MANNER: CONNECT A 1500 OHM 10 WATT RESISTOR, PARALLELED BY A .15 MFD. 150.V A.C. TYPE CAPACITOR BETWEEN A KNOWN GOOD EARTH GROUND ( WATER PIPE, CONDUIT, ETC.) AND THE EXPOSED METALLIC PARTS, ONE AT A TIME. MEASURE THE A.C. VOLTAGE ACROSS THE COMBINATION OF 1500 OHM RESISTOR AND .15 MFD CAPACITOR. REVERSE THE A.C. PLUG AND REPEAT A.C. VOLTAGE MEASUREMENTS FOR EACH EXPOSED METALLIC PART. VOLTAGE MEASURED MUST NOT EXCEED .75 VOLTS R.M.S. THIS CORRESPONDS TO 0.5 MILLIAMPS A.C. ANY VALUE EXCEEDING THIS LIMIT CONSTITUTES A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED IMMEDIATELY.

### A.C. VOLTMETER



### SUBJECT: GRAPHIC SYMBOLS



THE LIGHTNING FLASH WITH ARROWHEAD SYMBOL, WITHIN AN EQUILATERAL TRIANGLE, IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF UNINSULATED "DANGEROUS VOLTAGE" THAT MAY BE OF SUFFICIENT MAGNITUDE TO CONSTITUTE A RISK OF ELECTRIC SHOCK.



THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE SERVICE PERSONNEL TO THE PRESENCE OF IMPORTANT SAFETY INFORMATION IN SERVICE LITERATURE.

### SUBJECT: X-RADIATION

1. BE SURE PROCEDURES AND INSTRUCTIONS TO ALL SERVICE PERSONNEL COVER THE SUBJECT OF X-RADIATION. THE ONLY POTENTIAL SOURCE OF X-RAYS IN CURRENT T.V. RECEIVERS IS THE PICTURE TUBE. HOWEVER, THIS TUBE DOES NOT EMIT X-RAYS WHEN THE HIGH VOLTAGE IS AT THE FACTORY SPECIFIED LEVEL. THE PROPER VALUE IS GIVEN IN THE APPLICABLE SCHEMATIC. OPERATION AT HIGHER VOLTAGES MAY CAUSE A FAILURE OF THE PICTURE TUBE OR HIGH VOLTAGE SUPPLY AND, UNDER CERTAIN CIRCUMSTANCES, MAY PRODUCE RADIATION IN EXCESS OF DESIRABLE LEVELS.
2. ONLY FACTORY SPECIFIED C.R.T. ANODE CONNECTORS MUST BE USED. DEGAUSSING SHIELDS ALSO SERVE AS X-RAY SHIELD IN COLOR SETS. ALWAYS RE-INSTALL THEM.
3. IT IS ESSENTIAL THAT SERVICE PERSONNEL HAVE AVAILABLE AN ACCURATE AND RELIABLE HIGH VOLTAGE METER. THE CALIBRATION OF THE METER SHOULD BE CHECKED PERIODICALLY AGAINST A REFERENCE STANDARD, SUCH AS THE ONE AVAILABLE AT YOUR DISTRIBUTOR.
4. WHEN THE HIGH VOLTAGE CIRCUITRY IS OPERATING PROPERLY THERE IS NO POSSIBILITY OF AN X-RADIATION PROBLEM. EVERY TIME A COLOR CHASSIS IS SERVICED, THE BRIGHTNESS SHOULD BE RUN UP AND DOWN WHILE MONITORING THE HIGH VOLTAGE WITH A METER TO BE CERTAIN THAT THE HIGH VOLTAGE DOES NOT EXCEED THE SPECIFIED VALUE AND THAT IT IS REGULATING CORRECTLY. WE SUGGEST THAT YOU AND YOUR SERVICE ORGANIZATION REVIEW TEST PROCEDURES SO THAT VOLTAGE REGULATION IS ALWAYS CHECKED AS A STANDARD SERVICING PROCEDURE, AND THAT THE HIGH VOLTAGE READING BE RECORDED ON EACH CUSTOMER'S INVOICE.
5. WHEN TROUBLESHOOTING AND MAKING TEST MEASUREMENTS IN A PRODUCT WITH A PROBLEM OF EXCESSIVE HIGH VOLTAGE, AVOID BEING UNNECESSARILY CLOSE TO THE PICTURE TUBE AND THE HIGH VOLTAGE SUPPLY. DO NOT OPERATE THE PRODUCT LONGER THAN IS NECESSARY TO LOCATE THE CAUSE OF EXCESSIVE VOLTAGE.
6. REFER TO HV, B+ AND SHUTDOWN ADJUSTMENT PROCEDURES DESCRIBED IN THE APPROPRIATE SCHEMATIC AND DIAGRAMS (WHERE USED).

### SUBJECT: IMPLOSION

1. ALL DIRECT VIEWED PICTURE TUBES ARE EQUIPPED WITH AN INTEGRAL IMPLOSION PROTECTION SYSTEM, BUT CARE SHOULD BE TAKEN TO AVOID DAMAGE DURING INSTALLATION. AVOID SCRATCHING THE TUBE. IF SCRATCHED REPLACE IT.
2. USE ONLY RECOMMENDED FACTORY REPLACEMENT TUBES.

### SUBJECT: TIPS ON PROPER INSTALLATION

1. NEVER INSTALL ANY PRODUCT IN A CLOSED-IN RECESS, CUBBYHOLE OR CLOSELY FITTING SHELF SPACE, OVER OR CLOSE TO HEAT DUCT, OR IN THE PATH OF HEATED AIR FLOW.
2. AVOID CONDITIONS OF HIGH HUMIDITY SUCH AS: OUTDOOR PATIO INSTALLATIONS WHERE DEW IS A FACTOR, NEAR STEAM RADIATORS WHERE STEAM LEAKAGE IS A FACTOR, ETC.
3. AVOID PLACEMENT WHERE DRAPERIES MAY OBSTRUCT REAR VENTING. THE CUSTOMER SHOULD ALSO AVOID THE USE OF DECORATIVE SCARVES OR OTHER COVERINGS WHICH MIGHT OBSTRUCT VENTILATION.
4. WALL AND SHELF MOUNTED INSTALLATIONS USING A COMMERCIAL MOUNTING KIT, MUST FOLLOW THE FACTORY APPROVED MOUNTING INSTRUCTIONS. A PRODUCT MOUNTED TO A SHELF OR PLATFORM MUST RETAIN ITS ORIGINAL FEET (OR THE EQUIVALENT THICKNESS IN SPACERS) TO PROVIDE ADEQUATE AIR FLOW ACROSS THE BOTTOM. BOLTS OR SCREWS USED FOR FASTENERS MUST NOT TOUCH ANY PARTS OR WIRING. PERFORM LEAKAGE TEST ON CUSTOMIZED INSTALLATIONS.
5. CAUTION CUSTOMERS AGAINST THE MOUNTING OF A PRODUCT ON SLOPING SHELF OR A TILTED POSITION, UNLESS THE PRODUCT IS PROPERLY SECURED.
6. A PRODUCT ON A ROLL-ABOUT CART SHOULD BE STABLE ON ITS MOUNTING TO THE CART. CAUTION THE CUSTOMER ON THE HAZARDS OF TRYING TO ROLL A CART WITH SMALL CASTERS ACROSS THRESHOLDS OR DEEP PILE CARPETS.
7. CAUTION CUSTOMERS AGAINST THE USE OF A CART OR STAND WHICH HAS NOT BEEN LISTED BY UNDERWRITERS LABORATORIES, INC. FOR USE WITH THEIR SPECIFIC MODEL OF TELEVISION RECEIVER OR GENERICALLY APPROVED FOR USE WITH T.V.'S OF THE SAME OR LARGER SCREEN SIZE.
8. CAUTION CUSTOMERS AGAINST THE USE OF EXTENSION CORDS, EXPLAIN THAT A FOREST OF EXTENSIONS SPROUTING FROM A SINGLE OUTLET CAN LEAD TO DISASTROUS CONSEQUENCES TO HOME AND FAMILY.

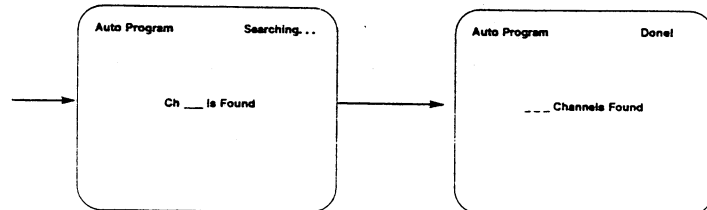
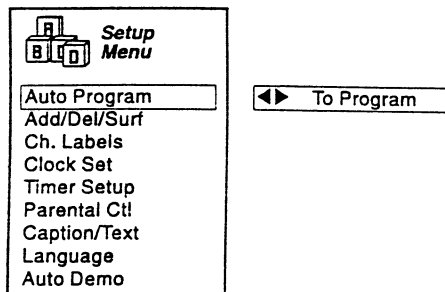
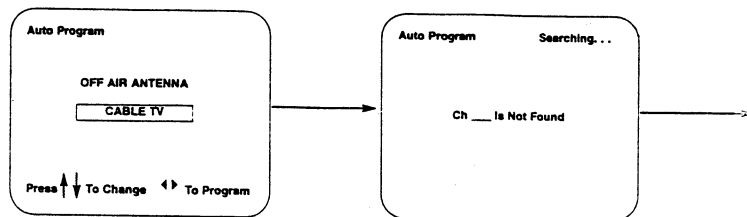
# TABLE OF CONTENTS

Operating Instructions . . . . .	1-10
Z-Line GX Chassis Overview . . . . .	11-37
GX Chassis Interconnect diagram . . . . .	38
Tuner 175-2700/175-2701/175-2707 . . . . .	39
Audio Module/Jack Pack MTS Stereo 9-1733 Series . . . . .	40
Audio Module/Jack Pack MTS Stereo 9-1733 Series Component Layout and SMD . . . . .	41
9-1814 PIP Module/component and SMD Layout . . . . .	42
GX Main Board - Switch Mode Regulator . . . . .	43
GX Main Board - Tuning Control . . . . .	44
GX Main Board - Video Processor . . . . .	45
GX Main Board - Sweep/SMPS . . . . .	46
GX Chassis - Video Output . . . . .	47
GX Main Module Component Layout . . . . .	48
GX Main Module SMD Layout . . . . .	49
Keyboard Schematic and Component Layout - A-18225/A18232/A18232 Series . . . . .	50
Keyboard Schematic and Component Layout - A-18295 . . . . .	51
Keyboard Schematic and Component Layout - A-18296 . . . . .	52
Keyboard Schematic and Component Layout - A-18498 . . . . .	53
A-17869 Detector AMP . . . . .	54
IC 201 Mixer/Oscillator . . . . .	55
IC 301 Phase-Locked Loop . . . . .	56
IC 804 SW2CH Audio AMP . . . . .	57
IC 1400 MTS Stereo Decoder . . . . .	58
IC 1402 Audio Volume Limiter . . . . .	59
IC 2109 Vertical Deflection . . . . .	60
IC X2200 IF/Video Processor . . . . .	61
IC 6001 4K Bit Serial EEPROM . . . . .	62
Model and Module Parts Lists . . . . .	
Z25X22S . . . . .	63
Z25X22SM . . . . .	66
Z25X31D . . . . .	63
Z25X31DM . . . . .	66
Z27X22D . . . . .	63
Z27X31D . . . . .	63
Z27X74W . . . . .	71
Z27X76R . . . . .	66
Z27X76RM . . . . .	66
Z312X31D . . . . .	71
Z32X31DM . . . . .	66
Z32X84R . . . . .	71
Z36X31D . . . . .	71
Z36X31DM . . . . .	66
9-1733 Audio Module w/Jacks . . . . .	77
9-1808 Main Module . . . . .	80
9-1809 Main Module . . . . .	99
9-1810 Main Module . . . . .	80
9-1811 Main Module . . . . .	80
9-1812 Main Module . . . . .	80
9-1813 Main Module . . . . .	99
9-1814 PIP Module . . . . .	116



## START AUTO PROGRAM

1. Press **MENU** repeatedly to see the **Setup Menu**.
2. Select Auto Program using the Up/Down arrows.
3. Use the Left/Right arrows to advance to next menu.
4. Select OFF AIR ANTENNA or CABLE TV.
5. Use the Left/Right arrows to begin channel search.

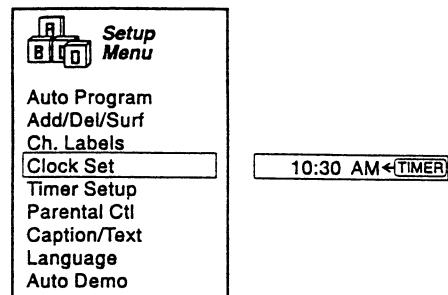
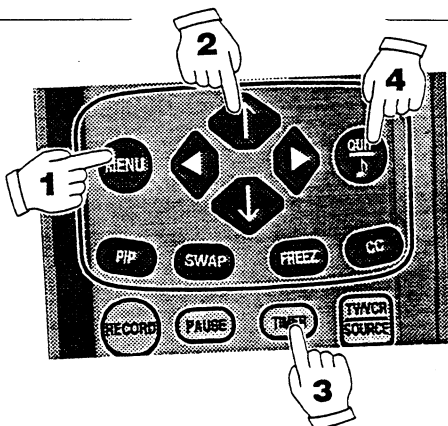


These screens appear while channel search is in progress.

Setup Menu with Auto Program Highlighted

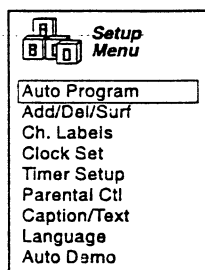
## SET THE CLOCK

1. Press **MENU** repeatedly to see the **Setup Menu**.
2. Select Clock Set using the Up/Down arrows.
3. Use the numbers on remote to enter the time and press **TIMER** to select AM or PM. (Or use the Left/Right arrows to set clock.)
4. Press **QUIT** to remove menu from view.



Setup Menu with Clock Set Highlighted

## OTHER MENU OPTIONS



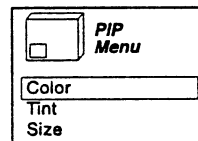
Press **MENU**



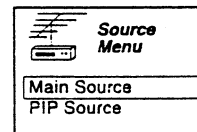
Press **MENU**



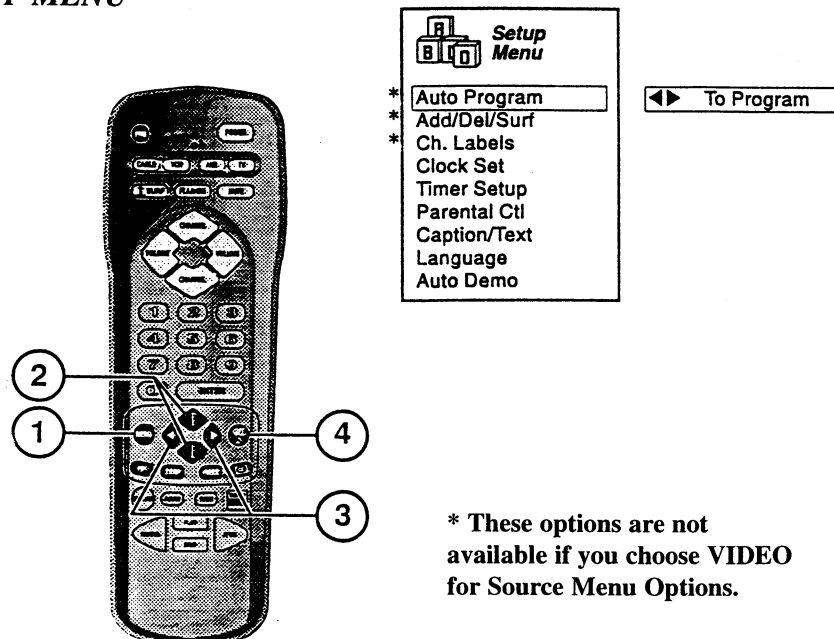
Press **MENU**



Press **MENU**



## SETUP MENU



### Menu Operation

1. Press **MENU** repeatedly to choose Setup Menu.
2. Press an Up/Down arrow repeatedly to select an option.
3. Press a Left/Right arrow repeatedly to adjust an option.
4. Press **QUIT** to remove a menu from view, or wait a few seconds and the menu will disappear.

\* These options are not available if you choose **VIDEO** for Source Menu Options.

### MENU OPTION AND FUNCTIONS

**Auto Program** finds and stores active channels to use with Channel Up/Down arrows.

**Add/Del/Surf** creates a list of favorite channels to use with Channel Up/Down arrows.

**Channel Labels** assigns a network/station label, name, or call letters to channels.

**Clock Set** sets the TV's clock.

**Timer Setup** sets the TV's Sleep Timer and On/Off Timer.

The Sleep Timer turns off the TV after a period from 15 minutes up to 4 hours.

The On/Off Timer turns the TV on and off at specific times.

**Parental Ctl** blocks channels, including the VIDEO input source.

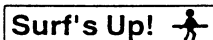
**Caption/Text** displays closed captions or text when available on the selected channel.

**Language** selects English, Spanish, or French for on-screen menus.

**Auto Demo** shows on-screen menus.

## ADD/DEL/SURF

To turn on Surf, press **SURF** on remote.



To turn off Surf, press **SURF** again.

**"Added"** channels are those found by Auto Program.

1. Use the Up/Down arrows to choose Add/Del/Surf.
2. Select a channel using numbers on remote.
3. Use the Left/Right arrows to show Added.
4. Press **QUIT** to remove menu from view.

**"Delete"** channels by using the numbers on remote.

1. Use the Up/Down arrows to choose Add/Del/Surf.
2. Select a channel using numbers on remote.
3. Use the Left/Right arrows to show Deleted.
4. Press **QUIT** to remove menu from view.

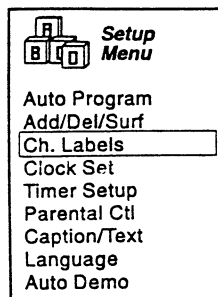
### To Set Up Surf Channels

When the "Surf" mode is on, these are the only channels you'll see with the Channel Up/Down arrows.

1. Use the Up/Down arrows to choose Add/Del/Surf.
2. Select a channel using the numbers on remote.
3. Use the Left/Right arrows to show Surf.
4. Repeat steps 2 and 3 to make your list of favorite channels.
5. Press **QUIT** to remove the menu from view.

## ASSIGN CHANNEL LABELS

1. Select Channel Labels.
2. Select a channel using the numbers on remote.
3. Use the Left/Right arrows to see your choices until the desired label appears. If you don't wish to create a label, select the dashes (-----).



Ch 2 CBS

Setup Menu  
with Ch.  
Labels  
Highlighted

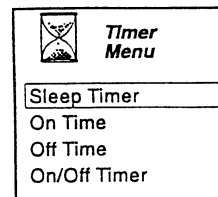
## SLEEP TIMER SETUP

### From Setup Menu

1. Make sure the TV's clock is set.
2. Select Timer Setup and press a Left/Right arrow to see the Timer menu.
3. Select Sleep Timer.
4. Press a Left/Right arrow repeatedly to set the time you wish the TV to stay on.

### Direct from Timer Button

1. Press **TIMER** on remote.
2. Press **TIMER** repeatedly to set the time you wish the TV to stay on.



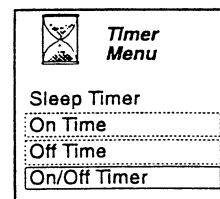
:30

Sleep Timer set  
to turn TV off  
in 30 minutes

## ON/OFF TIMER SETUP

### Set On/Off Timer

1. Make sure the TV's clock is set.
2. Select Timer Setup and press a Left/Right arrow to see the **Timer Menu**.
3. Select On Time and use numbers on remote to enter the TV's turn-on time. Press **TIMER** on remote to select AM or PM.
4. Select Off Time and use numbers on remote to enter the TV's turn-off time. Press **TIMER** on remote to select AM or PM.
5. Select On/Off Timer and use a Left/Right arrow to show On.
6. Press **QUIT** on remote to remove menu from view.



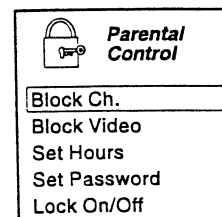
11:00 AM ◀TIMER  
1:00 PM ◀TIMER  
On

On/Off Timer set to turn TV on at  
11:00 am and Off at 1:00 pm

## PARENTAL CONTROL

### Blocking Channels or the Video Input Source

1. Select Parental Ctl and press a Left/Right arrow to see the **Parental Control** menu.
2. Select Block Ch.
3. Use numbers on remote to enter a channel number and press a Left/Right arrow to show Blocked.
4. Repeat steps 3 and 4 for each channel you want to block.
5. Select Block Video to block the video source input and press a Left/Right arrow to show Source Blocked.
6. After blocking channels and/or the Video source, select Set Hours and use the Left/Right arrows to choose the time period for Parental Control to be active: from 1-99 hours.
7. Select Set Password.
8. Press a Left/Right arrow and enter a 4-digit password when prompted. Verify.
9. Select Lock On/Off and use the Left/Right arrows to show On.
10. Press **QUIT** to remove the menu from view.



Ch 9 Blocked  
Source Blocked  
◀▶ 01 Hours  
Enter Code: x x x x  
On

Parental Control Menu

Remember your password!  
You need this to reenter  
parental control. Or, wait  
for specified time period to  
elapse.

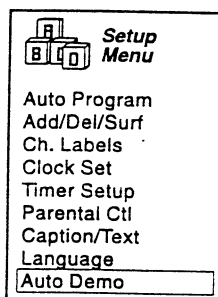
STOP

## AUTO DEMO

Auto Demo shows one-by-one the on-screen menus that control the TV's setup and operational features.

1. Select Auto Demo using the Up/Down arrows.
2. Use the Left/Right arrows to set Auto Demo to On.
3. Press **QUIT** to remove the menu from view.

Auto Demo continues to operate until you set it to Off in the Setup Menu.



## Setup Menu with Auto Demo Highlighted

On

## AUTO FIND OPTION (Alternate Programming Method)

Auto Find searches for the code you need. Follow these steps for each product you want to program. The remote may have to search all codes shown in the chart on the next page.

1. Turn On the product you want to operate.
2. Press and hold **PRG** using a blunt object. Release **PRG** after the indicator light turns on.
3. Press the key to be programmed: **CATV**, **VCR**, **AUX**, or **TV**.
4. Enter "000," then press **ENTER** within two seconds. Auto Find is active when the indicator light flashes and remains lit.
5. Point remote at product.
6. Press and release **POWER** about once a second until product turns Off. Indicator light turns Off when you press **POWER** and On when you release it.
7. Press **ENTER** immediately to save code. Indicator light flashes to indicate code has been saved.
8. Press **POWER** to turn On product.
9. Test product. If remote fails to operate functions used most often, use Auto Find again to search for a better code. (Auto Find resumes its search after last code entered and saved in step 7.)

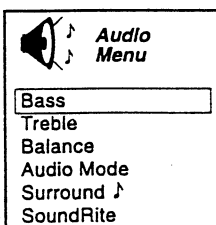
## Notes

- If the indicator light stays on as you press **POWER**, Auto Find has tried all of the codes. If the product you want to control has not turned off, your remote cannot work with that product.
- To cancel Auto Find, press **PRG** at any time during Auto Find.

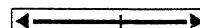
## AUDIO MENU

All Audio Menu adjustments are optional.

1. Press **MENU** repeatedly to choose **Audio Menu**.
2. Press an Up/Down arrow repeatedly to select an option.
3. Press a Left/Right arrow repeatedly to adjust an option.
4. Press **QUIT** to remove a menu from view, or wait a few seconds and menu will disappear.



## Audio Menu



## MENU OPTION AND FUNCTIONS

**Bass** adjusts the low frequency level.

**Treble** adjusts high frequency level.

**Balance** adjusts sound balance between the two speakers.

**Audio Mode** selects stereo, mono, or 2nd Audio/SAP speaker operations.

**Stereo** directs sound to the Left and Right speakers as supplied by your TV, VCR, etc.

**Mono** directs same sound to both Left and Right speakers, even if program is in stereo.

**2nd Audio/SAP** directs sound for the Second Audio Program to both Left and Right Speakers. SAP sound is always mono. (SAP is not available if Video is your viewing source.)

**Surround** lets you hear front channel surround sound from the TV's speakers. (Only if the stereo program is encoded with surround sound.)

**SoundRite** maintains TV's volume at a constant level (including commercials and audio from the auxiliary input source).

## Notes:

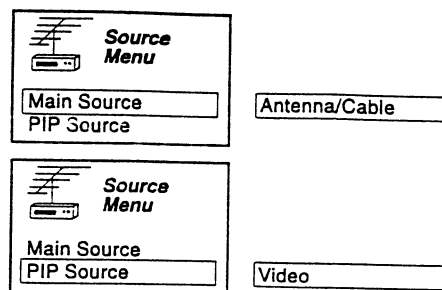
- If you select stereo as Audio Mode, TV switches between Stereo and Mono, depending on signal received.
- If you select SAP as Audio Mode, you'll hear SAP (usually a 2nd language) on stations broadcasting two audio signals. When the SAP ends, the TV switches between Stereo and Mono modes, depending on the audio signal being received. The TV switches back to 2nd Audio/SAP when the SAP broadcast ends.



### **SOURCE MENU**

1. Press **MENU** repeatedly to choose **Source Menu**.
2. Press an Up/Down arrow repeatedly to select an option.
3. Press a Left/Right arrow repeatedly to adjust an option.
4. Press **QUIT** to remove a menu from view, or wait a few seconds and the menu will disappear.

**Source Menu**



### **MENU OPTION AND FUNCTIONS**

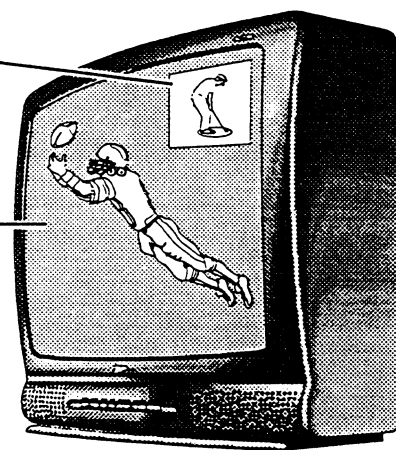
**Main Source:** Select either Antenna/Cable or Video for the source that's providing the main picture. It can be the antenna or cable box connected to the Antenna/Cable jack, or perhaps a VCR connected to the Aux Input A/V jacks.

**PIP Source:** Select either Antenna/Cable or Video for the source that's providing the PIP window picture.

**Note:** Change sources by pressing **TV/VCR SOURCE** on remote. If no PIP window is on, press **TV/VCR SOURCE** to select main picture source. if PIP window is on, press **TV/VCR SOURCE** to select PIP window source.

**PIP Window**  
Use the PIP Source to select the picture for the PIP window.

**Main Picture**  
Use the Main Source to select the picture for the main picture.



To see two different pictures at the same time, you must have two different picture sources connected to the TV. One source (antenna, cable box, etc.) must be connected to the Antenna/Cable jack, and a different source (VCR, laser disc, etc.) must be connected to the Aux Input A/V jacks.

# GET TO KNOW YOUR REMOTE (MBR3457)

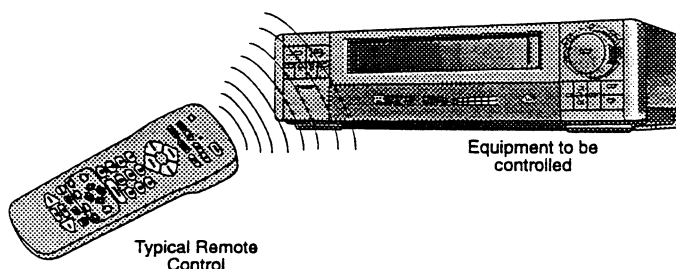
## AUTO FIND OPTION (ALTERNATE PROGRAMMING METHOD)

If you've tried all the codes for your product and none operates it, you can use Auto Find to search for the code you need. Follow the steps below for each product you want to program. Please be patient while using this method; the remote may have to search all of the codes shown in the chart on the next page.

To Auto Find a Code
1. Turn On the product you want to operate.
2. Press and hold <b>PRG</b> using a blunt object. Release <b>PRG</b> after the indicator light turns on.
3. Press the key to be programmed: <b>CATV</b> , <b>VCR</b> , <b>AUX</b> , or <b>TV</b> .
4. Enter "0-0-0," then press <b>ENTER</b> within two seconds. Auto Find is active when the indicator light flashes and remains lit.
5. Point the remote at the product.
6. Press and release <b>POWER</b> repeatedly, about once a second, until your product turns Off. The indicator light turns Off when you press <b>POWER</b> and On when you release it.
7. Press <b>ENTER</b> immediately to save the code. The indicator light flashes to indicate the code has been saved.
8. Press <b>POWER</b> to turn On your product.
9. Test your product. If the remote fails to operate the functions you use most often, use Auto Find again to search for a better code. (Auto Find resumes its search after the last code that was entered and saved in step 7.)

### Notes:

- ☐ If the indicator light stays on as you press **POWER**, Auto Find has tried all of the codes. If the product you want to control has not turned off, your remote cannot work with that product.
- ☐ To cancel Auto Find, press **PRG** at any time during Auto Find.



# GET TO KNOW YOUR REMOTE (MBR3457)

## OPERATING CODES BY BRAND NAME

TVS	
Admiral	116, 121, 130, 133
Adventura TV/VCR	154
Akai	104
Amark	103, 146
AOC	104
Bell & Howell	121
Broksonic	131, 136
Candle	139
Centurion	119
Ciizen	121, 139
Contec	141
Coronado	103
Crown	103
Curtis Mathes	116, 119, 121
Daewoo	149, 159
Daewoo TV/VCR	148
Daytron	119
Elektra	121
Emerson	103, 104, 123, 124, 131, 136, 145
Emerson TV/VCR	158
Fisher	109, 118
Funai TV/VCR	154
General	106, 107, 114, 116, 117, 161
Goldstar	103, 104, 119, 147
Goldstar TV/VCR	153
Hitachi	102, 103, 129, 163
J.C. Penney	104, 110, 114, 117, 119
JVC	125, 132, 164
KMC	103
KTV	103, 104, 138
Kurazai	121
Lodgenet	121
Logik	121
LXI	133, 137
Magnavox	103, 112, 113, 117, 119, 127, 128, 139, 165
Magnavox TV/VCR	173
Majestic	121
Marantz	104, 120, 155
Megaaron	146
Memorex	121
MGA/ Mitsubishi	104, 119, 120, 130, 140, 155
Montgomery Ward	103, 104, 105, 113, 114, 119, 121, 130, 133
NEC	104, 119
Panasonic	106, 107, 160, 166
Panasonic TV/VCR	174
Philco	103, 104, 112, 113, 139
Philips	112, 113
Pioneer	135
Portland	103
ProScan	116, 157, 162, 167
Quasar	106, 107

RCA	104, 116, 126, 157, 161, 162, 167, 168
Realistic	105, 123, 124
Sampo	119
Samsung	103, 119, 134, 141
Sanyo	108, 109, 118
Scott	119, 124
Sears	103, 108, 109, 110, 111, 118, 134
Sharp	103, 105, 122, 133, 137, 156, 169
Signature 2000	103, 104, 105, 113, 114, 119, 121, 130, 133
Sony	115, 143, 151, 170
Soundesign	139
Sylvania	112, 113, 117, 119, 127, 128, 139
Symphonic TV/VCR	154
Tatung	106
Teknika	103, 112, 121, 124, 139
Telerent	103, 121
Toshiba	110, 111, 134, 171
XR1000	121
Yorx	119
Zenith	101, 149, 175
Zenith TV/VCR	153, 154, 172

VCRS	
Admiral	208, 261
Adventura	231
Aiwa	231
Akai	223, 238, 241
Audio Dynamics	202, 218
Bell & Howell	206, 247
Broksonic	221, 226, 250, 255
Canon	214
Citizen	209
Craig	212
Curtis Mathes	214, 259
Daewoo	244, 246, 248, 254
Daytron	236, 246
DBX	202, 218
Emerson	203, 209, 221, 223, 226, 233, 235, 243, 250
Fisher	211, 212, 213, 247
Funai	231
General Electric	214, 216, 220
Goldstar	209
Go Video	256, 262, 263
Hitachi	215, 257
Instant Replay	214, 227
J.C. Penney	214, 215, 218, 227
JVC	202, 224, 225, 258
Kenwood	202
Logik	239
LXI	209, 231

Magnavox	207, 214, 231
Marantz	207, 218
Marta	209
Memorex	206, 212, 214, 231
Mitsubishi	204, 222, 252, 264
Montgomery Ward	208, 214, 216, 219, 231, 249
Multi Tech	239
NEC	202, 218
Orion	250
Panasonic	214, 251, 259
Pentax	215
Philco	207, 214
Philips	207, 214, 227
Pioneer	210, 215
Portland	246
Pro Scan	216, 260
Quasar	214, 259
RCA	215, 216, 220, 227, 240, 242, 249, 260
Realistic	206, 208, 212, 214, 231
Samsung	220, 230, 238
Sansui	239
Sanyo	206, 212, 247
Scott	204, 205, 233, 243
Sears	206, 209, 211, 212, 215
Sharp	208, 261
Shintom	239
Signature 2000	208, 214, 216, 219, 231, 249
Sony	217, 232, 237
Sylvania	207, 214, 227
Symphonic	231
Tashiko	209
Tatung	202
Teac	202, 231
Teknika	209, 234
Toshiba	205, 215
XR1000	239
Vector Research	204, 218
Yamaha	202, 218
Zenith	201, 224, 225, 229, 237

CABLE/SATELLITE	
Allegro	358, 362
Allegro A/B Switch	361
Gemini	305, 331, 338
General Electric	367
General Instrument	304, 305, 306, 307, 308, 309, 310, 318
Hamlin	302, 303, 345, 365, 366
Jerrold	304, 307, 308, 309, 310, 318, 360, 363
Kale Vision	335
Macom	314, 321
Magnavox	334

NSC	335, 339, 368, 369, 370
Oak	311, 332, 342
Panasonic	313, 320
Paragon	333
Philips	347, 350, 352, 354, 355
Pioneer	315, 343
RCA DSS	373
Regency	329
Samsung	335
Scientific Atlanta	316, 323, 336, 364
Sprucer	313
Standard Comp	335
Stargate	379
Texscan	339, 356, 371
Tocom	317, 318, 346
Unika	348, 362
United Satellite	344
Universal	358, 362
Vid Tech	340
Video Way	349
Viewstar	354, 355, 372
Zenith	301, 353, 374
Zenith Satellite	312, 328, 330, 351, 378

VIDEO DISC PLAYERS	
Pioneer	402, 403
Sanyo	401
Sony	404
Zenith	401

AUDIO CD PLAYERS	
Akai	409, 424
Crown	410
Denon	411
Fisher	412, 438
Goldstar	460
Harman/Kardon	413
JVC	415
Kenwood	412, 416, 417, 441
Magnavox	421, 422, 433, 434
Mitsubishi	423, 424
NAD	425, 426, 447
Nakamichi	427, 428
NEC	429
Onkyo	430
Panasonic	431, 432
Philips	421, 433, 434
Pioneer	431, 435
Quasar	432
Radio Shack	431, 436, 439, 440, 441
RCA	437
Sanyo	438, 439
Scott	440

Sharp	441, 442
Sony	443, 444, 445
Soundesign	461, 498, 501, 502
Sylvania	433
Teac	446
Technics	432, 459
Toshiba	447
Yamaha	448
Zenith	460, 461, 498, 501, 502

AUDIO TAPE DECKS	
Denon	455
Harman/Kardon	456
JVC	457
Kenwood	450
Onkyo	458
Philips DCC	454
Pioneer	451, 478
Sony	452
Technics	454, 497
Yamaha	453

AUDIO TUNERS AND AMPLIFIERS	
Denon	462, 463
Fisher	464
Goldstar	460
Harman/Kardon	465
JVC	466
Kenwood	468, 469
Marantz	472, 503
Onkyo	473
Philips	475, 476
Pioneer	477, 478, 479
Radio Shack	487, 488
Realistic	480
Sanyo	481
Scott	482
Sharp	483
Sherwood	487, 488
Sony	489, 490, 491, 492
Soundesign	461, 498, 501, 502
Teac	494, 495
Technics	497
Yamaha	496
Zenith	460, 461, 498, 501, 502

Ref: 124-212-37 and  
µP 221-952-02A

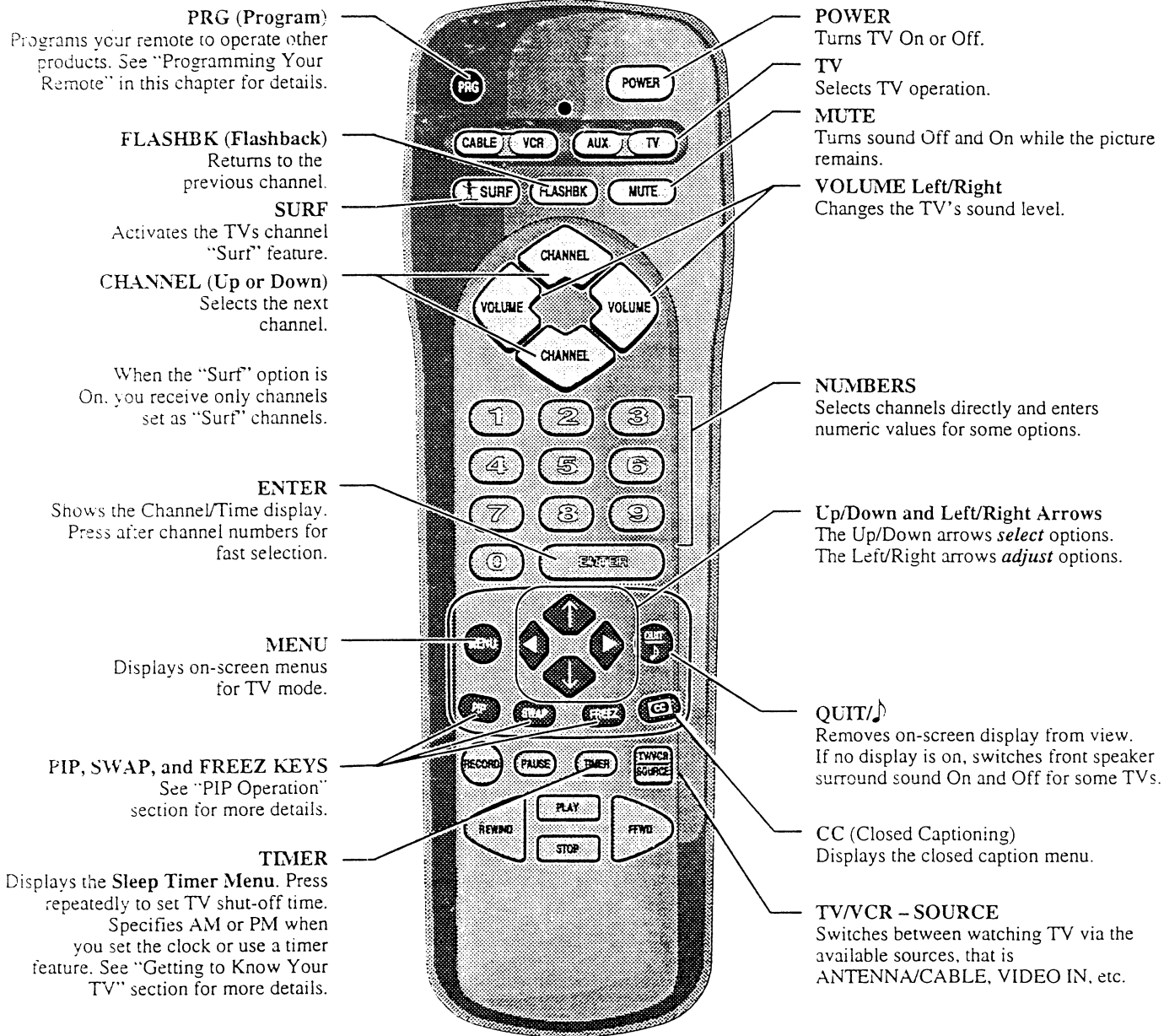
# GET TO KNOW YOUR REMOTE (MBR3457)

## TV OPERATIONS

Press TV on the remote to select TV operation.



Point Remote at TV



MBR3457 Remote

**Note:** Keys dedicated to VCR functions will still operate your VCR while the remote is in TV mode.

# GET TO KNOW YOUR REMOTE (MBR3457)

## PRESET CODES FOR ZENITH PRODUCTS

Key Name	TV Mode Zenith Code 101	VCR Mode Zenith Code 201	Cable Mode Zenith Code 353	AUX Mode Zenith Code 401
POWER	TV Power On/Off	VCR Power On/Off	Cable Power On/Off	AUX TV/Disc
CABLE	Selects Cable Mode	Selects Cable Mode	Selects Cable Mode	Selects Cable Mode
VCR	Selects VCR Mode	Selects VCR Mode	Selects VCR Mode	Selects VCR Mode
AUX	Selects AUX Mode	Selects AUX Mode	Selects AUX Mode	Selects AUX Mode
TV	Selects TV Mode	Selects TV Mode	Selects TV Mode	Selects TV Mode
SURF	Surf On/Off	VCR AM/PM	CABLE FC/Fav Ch	AUX Audio
FLASHBK	TV Flashback	VCR Flashback	CABLE Flashback	AUX Frame/Time
MUTE	TV Mute	TV Mute	TV Mute (See Note)	TV Mute
CHANNEL UP	TV Channel Up	VCR Channel Up	CABLE Channel Up	AUX Skip >>
CHANNEL DN	TV Channel Dn	VCR Channel Dn	CABLE Channel Dn	AUX Skip <<
VOLUME (Right)	TV Volume Up	TV Volume Up	TV Volume Up (See Note)	TV Volume Up
VOLUME (Left)	TV Volume Dn	TV Volume Dn	TV Volume Dn (See Note)	TV Volume Dn
1	TV Digit 1	VCR Digit 1	CABLE Digit 1	AUX Digit 1
2	TV Digit 2	VCR Digit 2	CABLE Digit 2	AUX Digit 2
3	TV Digit 3	VCR Digit 3	CABLE Digit 3	AUX Digit 3
4	TV Digit 4	VCR Digit 4	CABLE Digit 4	AUX Digit 4
5	TV Digit 5	VCR Digit 5	CABLE Digit 5	AUX Digit 5
6	TV Digit 6	VCR Digit 6	CABLE Digit 6	AUX Digit 6
7	TV Digit 7	VCR Digit 7	CABLE Digit 7	AUX Digit 7
8	TV Digit 8	VCR Digit 8	CABLE Digit 8	AUX Digit 8
9	TV Digit 9	VCR Digit 9	CABLE Digit 9	AUX Digit 9
0	TV Digit 0	VCR Digit 0	CABLE Digit 0	AUX Digit 0
ENTER	TV Enter	VCR Enter	CABLE Enter	AUX Display
MENU	TV Menu	VCR Menu	CABLE Menu	AUX Program
UP ARROW	TV Select Up	VCR Select Up	CABLE Up Arrow	AUX Part
DOWN ARROW	TV Select Dn	VCR Select Dn	CABLE Down Arrow	AUX Random
LEFT ARROW	TV Adjust Left	VCR Adjust Left	CABLE Left Arrow	AUX x3 FAST <
RIGHT ARROW	TV Adjust Right	VCR Adjust Right	CABLE Right Arrow	AUX x3 FAST >
QUIT/♪	TV SEQ Sound	VCR Quit	CABLE Quit	AUX Clear
PIP	TV PIP	VCR VCR+	CABLE Day Up	AUX Repeat-Side
SWAP	TV PIP Swap	VCR Channel Map	CABLE Day Down	AUX Repeat-A-B
FREEZ	TV PIP Freeze	VCR Search	CABLE Pg Up/★	AUX Repeat-Chap
CC	TV Closed Captions	VCR Memory	CABLE Pg Down/#	AUX Memory
TIMER	TV Timer	VCR Timer	CABLE Timer	AUX Still
TV/VCR/SOURCE	TV Sources	TV Tuner or VCR Tuner	CABLE Info	AUX TV/Disc
RECORD	VCR Record	VCR Record	CABLE Buy	AUX Edit
PAUSE	VCR Pause	VCR Pause	CABLE Guide	AUX Pause
REWIND	VCR Rewind	VCR Rewind	VCR Rewind	AUX Scan <<
PLAY	VCR Play	VCR Play	VCR Play	AUX Play
STOP	VCR Stop	VCR Stop	VCR Stop	AUX Stop/Eject
FFWD	VCR Fast Forward	VCR Fast Forward	VCR Fast Forward	AUX Scan >>

Reference: 124-212-37 and  
µP 221-952-02A

Note: You can change TV Volume Up/Down to Cable Vol/Mute when you program special code 399 into the remote.

# GET TO KNOW YOUR REMOTE (MBR3457)

## SPECIAL FEATURES

### AUX+1, AUX+2, AUX+3

Your remote can control up to seven products. If you've programmed the remote for four products using the **TV**, **VCR**, **CABLE**, and **AUX** keys, you can program it for up to three more by using **AUX+1**, **+2**, **+3**.

#### To Program AUX+1, AUX+2, and AUX+3

1. Locate the three-digit code for your product in the code table.
2. Press and hold **PRG** until the indicator lights.
3. Press **AUX** and **"1"** simultaneously to select **AUX+1**.
4. Enter the three-digit code, then press **ENTER**. The indicator light should flash, then turn off to indicate the code was accepted. If the light stays on, repeat steps 3 and 4 or try a different code.
5. Repeat steps 2 - 4 for **AUX+2** and **AUX+3**.
6. Write your codes on the label inside the battery compartment for future reference.

Hold down **AUX** and press **1**, **2**, or **3** to access **AUX +1**, **+2**, or **+3** mode.

### CABLE BOX VOLUME

Your remote can control cable box volume and muting, if available on your cable box.

#### To Program the Cable Box Volume

1. Program your cable box code into the **CABLE** or the **AUX** key.
2. Repeat the programming steps, using the same **CABLE** or **AUX** key as above, but enter special code **3-9-9**, followed by **ENTER**.

**Note:** To restore TV volume/mute control to the **CABLE** or **AUX** key, reprogram your cable code into that key.

### AMPLIFIER VOLUME OVERRIDE

Your remote can override your TV, VCR, or video disc player's volume functions with your amplifier's volume and muting.

#### To Program the Amplifier Volume Override

1. Program your amplifier code into the **CABLE** or **AUX** key.
2. Select the key on your remote (**TV**, **VCR**, etc.) where you want the **amplifier** volume control function to appear. For example, press **TV** if you want to operate your amplifier's volume and mute while the remote is in **TV** mode.
3. Enter special code **4-9-9**, followed by **ENTER**.

The amplifier volume and mute features are now available in the **TV** mode.

#### Notes:

- ☐ To restore normal volume and muting control to your remote, reprogram the remote for the product into each key (**TV**, **VCR**, etc.) to be restored.
- ☐ CD and tape players will automatically select amplifier volume and mute, if an amplifier code is programmed into the remote.

# GX CHASSIS

## INTRODUCTION

The New GX series chassis has been developed for screen sizes that include 19" through 35" stereo and mono models. Variations of the chassis have also been developed for use in the commercial products. The concept of the GX chassis is to make one board for all models in a particular screen size. During the manufacturing process, the microprocessor will be programmed for the added features. Also additional plug in boards will be added to the chassis to accommodate the different features; Stereo, Mono, PIP etc.

The New GX series chassis features four I<sup>2</sup>C compatible IC's for all signal, sync and sweep processing. ICX2200 handles all of the audio/video, sync and sweep drive processing. IC6000 is the microprocessor and IC6001 is the memory. The keyboard and IR detector are tied directly to IC6000. IC2100 handles the vertical sweep.

ICX3431 is in the power supply. This is a switching type supply powered by the bridge rectifier circuit. At turn on, voltages for the vertical and video output circuit are derived from the sweep circuit.

The 9-1807 module is used on the 19/20" sets. The 9-1808 module is used on 25" sets w/o comb filter. The 9-1810 module is used on 27" sets w/o comb filter. The 9-1812 is used on 32" sets. The 9-1813 module is used on 35" sets. The 9-1811 module is used on 27" sets w/comb filter. The 9-1812 and 9-1813 modules are used on 35" sets w/comb filter. The CRT module is attached to the main module. The 9-1733 jack pack assembly will be found on MTS stereo models.

## CUSTOMER MENU

The customer menus are displayed over video and appear at the left of the screen.

The color of the menu will vary depending on the "Level" of features. The level is set at the factory when the set is being manufactured.

Private Label sets are Level 0. Zenith is Level 1 and 2. The customer menu on private label sets will have a Dark Red background. Zenith level I sets will be in blue and Level 2 sets will be gray.

Each press of the menu key will toggle between the setup menu, video menu and on some models an audio menu, PIP menu and service menu.

Operation of the menus is simple. Press MENU to call up a menu. Then with the SELECT key bring up the item to be adjusted. The adjustment range of the item will be highlighted in white. Lastly, use the ADJUST key to make a change to the current setting. Always follow the "On Screen" instructions. Press ENTER or QUIT to exit the menu. If no key is pressed within 15 seconds, the on screen display will time out. (30 seconds for Parental Control Menu).

## SERVICE MENU

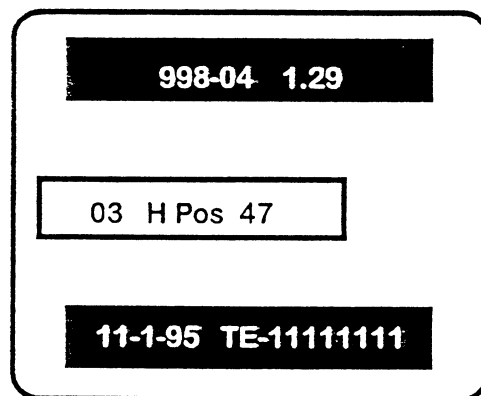
The Service Menu can be invoked by using the customer keyboard on the front of the set or by using the remote control.

Access to the Service Menu using the customer keyboard on the set:

Depress and hold down the menu key for 5 seconds (until the channel/time display disappears). Then depress the channel up and adjust right buttons simultaneously. This will bring up the service menu displaying item 3.

Access to the Service Menu using the remote control:

Press and hold the Menu key until the user menu display disappears, then press digit keys 9876 and then Enter. This will bring up item 3 of the service menu.



The black bar at the top indicates the part number of the software in the set. The black bar at the bottom has a date and a number. The date on the left indicates the date the module went through the factory. At the right is a number which indicates the module's test status.

When the Service menu comes up, it will always come up on the third item H Pos. Use the SELECT key to toggle through all of the adjustments.

# GX CHASSIS

**00 F MODE (Factory Mode)** Use the Select key to select item #00, which is the first item in the Service menu, the Factory Mode. This item is used by the factory when the module is being tested. In the field, this item should always be left "Off". 0 is "Off"!

When the factory mode is Off, only the first seven items in the service menu can be brought up. When the factory mode is set to 1, all 39 menu items will be available. Also they will come on the screen one at a time at the top left of the screen. The black bars at the top and bottom of the screen, will not be shown.

If the factory mode is "On", a double — line will appear at the top of the Customer Set Up menu. On other menus a number corresponding to the setting of a highlighted item will be shown. This is a quick way a technician can tell that the factory mode is on. Other unusual things may also happen when the factory mode is "On". The AC power on feature is always enabled regardless of the setting of "AC On" in the service menu. So the set will automatically come on when AC is applied.

When the factory mode is "On", the service menu can be accessed by pressing simultaneously the RIGHT ADJ. and CHANNEL UP buttons on the front of the set. Otherwise the hand control must be used to reenter the service menu to turn the factory mode off. The factory mode can also be turned off by setting the clock, or running the Auto Program feature in the customer Set Up menu.

**01 Pre Px** This is used to store the customer menu adjustments in the nonvolatile memory of the EAROM. The selections are Custom/Presets. Settings for Contrast, Brightness, Color, tint and start volume are stored in this manner. 0 is custom and 1 is Preset stored.

**02 V Pos** moves the On Screen Displays vertically. The range is from 0 to 31. Default setting is 10.

**03 H POS** Moves the On Screen Displays horizontally. The range is from 0 to 75. Default setting is 44.

**04 Level** There are three positions. 0, 1 and 2. The three different positions are used at the factory to program the module for the correct features. In order to change the level when replacing a main module in the field, temporarily short pins 3 and 4 together on connector 4G9 on the main module. Then use the Adjust button to change the level. Connector 4G9 is located on the left hand side of the module.



Be careful! If the wrong pins are shorted, the module can be damaged!

Level 0 is used for Private Label sets. In the private label mode the IR code is 21 or 121.

Level 1 and 2 is used for Zenith. In the Zenith label mode the IR code is 01 or 101.

## Feature Level Summary

### "LEVEL 0" Private Label

- Red Menus (with borders, italics)
- Auto Channel Set
- Set Channels
- Clock Set
- Caption/Text
- Languages (Trilingual)
- Sleep Timer

### "LEVEL 1" LowEnd Zenith

- Blue Menus (with borders, italics)
- Auto Program
- Ch Add/Del
- Clock Set
- On/Off Timer
- Caption/Text
- Languages (Trilingual)
- Sleep Timer

### "LEVEL 2" HighEnd Zenith

- Gray Menus (with borders, italics)
- ICONs
- Auto Program
- Ch Add/Del/Surf
- Channel Labels
- Clock Set
- On/Off Timer
- Parental Control
- Caption/Text
- Languages (Trilingual)
- AutoDemo
- Channel Surf
- Sleep Timer

## BE SURE TO REMOVE THE JUMPER AFTER THE LEVEL HAS BEEN SET

**05 Band** There are eight positions. 0 is Broadcast fixed, 1 is CATV afc, 2 is HRC afc, 3 is ICC afc, 4 is Broadcast afc, 5 is CATV fixed, 6 is HRC fixed, 7 is ICC fixed.

**06 AC On** There are two positions; 0 is off and 1 is AC On. In the on position the set will turn on and off when AC power is applied.

**07 C.Phase (Caption Phase)** It determines whether or not captioning will be received. It has a range of 00 to 254. Default setting is 80.

**08 C.Srch (Caption Search)** The range is 0 to 1. Default setting is 1.

**09 C.LINE (Caption Line)** The range is 0 to 32. Default setting is 17.

**10 Rf Bpf (Rf Bandpass)** The range is 0 to 1. Default setting is 0.

**11 3.58 T** This is the 3.58 MHz trap. The range is 0 to 1. Default setting is 0.

**12 RF Brt (RF Brightness)** This sets the subbrightness of the customer control for brightness in the RF mode. The range is from 0 through 63. Default setting is 20.

**13 Ax Brt (Auxiliary Brightness)** This sets the subbrightness of the customer control for brightness in the AUX mode. The range is from 0 through 63. Default setting is 20.

**14 MaxCon (Maximum Contrast)** This sets the adjustment range of the customer control for contrast. The range is from 0 to 63. Default setting is 63.



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## GX CHASSIS

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**15 VPhase (Vertical Phase)** The range is from 0 to 7. Default setting is 0.

**16 Hphase (Horizontal Phase)** The range is from 0 to 31. Default setting is 16.

**17 AudLvl (Audio Level)** This sets the gain for the Low Cost stereo and MTS Stereo. The range is from 0 to 63. Default setting is 46.

**18 AudAdj (Audio Adjust)** This set the balance between the right and left channel. The range is from 0 to 63. Default setting is 63. This item is not to be field adjusted.

**19 RF Agc** The range is from 0 to 63. Default setting is 40. Tune in the weakest channel and adjust for a snow free picture.

**20 H Afc** There are two settings 0 and 1. Default setting is usually 0.

**21 WhComp (White Compression)** there are two settings 0 and 1. Default setting is 1.

**22 60hzSw (60 Hertz Switched)** The range is 0 to 3. Default setting is generally set to 2.

**23 PifVco (PIF Voltage Controlled Oscillator)** The range is 0 to 127. Default setting is 63.

**24 R Cut** The range is 0 to 254. Default setting is 0.

**25 G Cut** The range is 0 to 254. Default setting is 0.

**26 B Cut** The range is 0 to 254. Default setting is 0.

**27 G Gain** The range is 0 to 254. Default setting is 75.

**28 B Gain** The range is 0 to 254. Default setting is 75.

**29 PipRas\* (Picture in Picture Raster)** The range is 0 to 254. Default setting is 1.

**30 Pip Sw\* (Picture in Picture Switch Delay)** The range is 0 to 15. Default setting is 11.

**31 PipLuD\* (Picture in Picture Luminance Delay)** The range is 0 to 7. Default setting is 3.

**32 In LEV\* (Input Level)** The range is 0 to 15. Default setting is 9.

**33 St Vco\* (Stereo Voltage Controlled Oscillator)** The range is 0 to 63. Default setting is 24.

**34 SapVco\* (Second Audio Program Voltage Controlled Oscillator)** The range is from 0 to 15. Default setting is 6.

**35 SapLpf\* (Second Audio Program Low Pass Filter)** The range is 0 to 15. Default setting is 8.

**36 St Lpf\* (Stereo Low Pass Filter)** The range is from 0 to 63. Default setting is 24.

**37 Spectr\*** This is high frequency separation. The range is from 0 to 63. Default setting is 42.

**38 WideBa\*** This is low frequency separation. The range is from 0 to 63. Default setting is 30.

**\* When changing PIP module or MTS modules in the field, these items must be adjusted.**

# GX CHASSIS

## FACTORY MENU RECOMMENDED SETTINGS

### GENERAL SETTINGS (Blue) Factory Mode 0

	ITEM	RANGE	19 - 20"	25"	27"	32"	35"
00	Fact Mode	0-1	0	0	0	0	0
01	Pre Px	0-1	1	1	1	1	1
02	V Pos	0-31	10	10	10	10	10
03	H Pos	0-75	44	44	44	44	44
04	Level	0-2	1*	1*	1*	1*	1*
05	Band	0-7	1	1	1	1	1
06	AC On	0-1	0	0	0	0	0

### TECHNICAL SETTINGS (Black) Factory Mode 1

07	C.Phas	0-254	80	80	80	80	80
08	C.Srch	0-1	0	0	0	0	0
09	C.Line	0-32	17	17	17	17	17
10	Rf Bpf	0-1	0	0	0	0	0
11	3.58T	0-1	0	0	0	0	0
12	RF Brt	0-63	30	30	30	30	30
13	Ax Brt	0-63	30	30	30	30	30
14	MaxCon	0-63	63	63	63	63	63
15	VPhase	0-7	0	0	0	0	0
16	HPhase	0-31	16	16	16	16	16
17	Aud Lvl	0-63	46	46	46	46	46
18	AudAdj	0-63	63	63	63	63	63
19	RF Agc	0-63	40	40	40	40	40
20	H Afc	0-1	1	1	1	1	1
21	WhComp	0-1	0	0	0	0	0
22	60hzSw	0-3	2	2	2	2	2
23	PifVco	0-127	63	63	63	63	63
24	R Cut	0-254	19	19	19	19	19
25	G Cut	0-254	0	0	0	0	0
26	B Cut	0-254	39	39	39	39	39
27	G Gain	0-254	90	90	80	93	89
28	B Gain	0-254	70	65	60	98	80

### PIP SETTINGS (White)

29	PipRas	0-254	1	1	1	1	1
30	PipSw	0-15	11	11	11	11	11
31	PipLuD	0-7	3	3	3	3	3

### \*\* AUDIO SETTINGS (Yellow)

32	In Lev	0-15	9	9	9	9	9
33	St Vco	0-63	24	24	24	24	24
34	SapVco	0-15	7	7	7	7	7
35	SapLpf	0-15	8	8	8	8	8
36	St Lpf	0-63	24	24	24	24	24
37	Spectr	0-63	50	50	50	50	50
38	WideBa	0-63	30	30	30	30	30

\* Level 0 is used for Private Label sets.

Level 1 and 2 is used for Zenith.

\*\*These are default settings. See Bar Code on jack pack for correct Factory Alignment  
For sets with the comb filter, Item 11, The 3.58 Trap should be set to 1.



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# GX CHASSIS

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## IC6000 MICROCONTROLLER SYSTEM

### Microprocessor Overview

- \*52 pin DIP, CMOS design, 12 Mhz Clock, 8 bit core
- \*On Screen Display (OSD) Generator
- \*Two I square - C, Communication busses
- \*Infared input Hardware
- \*Multiple 8 bit A/D converters
- \*Multiple D/A converters (PWMs)
- \*Multiple general purpose I/O ports
- \*Built-In Closed Caption Decoder

### General Description

IC6000 communicates with the various other IC's via two communication busses. Bus #1 (pins 33 and 34) Supports the Tuner, Video Processor, PIP module and MTS Audio module. Bus #2 (pins 30 and 31) supports the EAROM IC6001.

The 12 Mhz clock crystal for the chip is connected to pins 36 and 37. Power control is on pin 52.

The microprocessor controls brightness, color, contrast, tint and sharpness by sending bus commands to the video processor. It can also control tuning operations, MTS audio controls, or PIP controls by sending bus commands to the tuner, MTS audio module, or PIP module. Similarly, the microprocessor can permanently save or retrieve user settings by sending bus commands to the EAROM.

### On Screen Display (OSD) Generation

The On Screen Display is generated within IC6000 and is routed to the video processor on pins 24, 25 and 26.

### A/D Keyboard

The GX chassis supports a newly designed A/D keyboard, using a resistor ladder circuit. See Figure 9. The A/D keyboard produces a distinct DC voltage level depending on which key is pressed. For the GX keyboard, two separate resistor-ladder circuits are used. These voltage levels are fed to pins 19 and 20. The analog voltage reference is attached to pin 22. The IR signal from the keyboard is directed to pin 2.

# GX CHASSIS

## ITT CCZH 3005 MICROPROCESSOR PORT MODES, I/O, VOLTAGE LEVELS

PIN #	SPECIFIER	NAME	PORT MODE	INPUT / OUTPUT	VOLTAGE LEVELS
1	P34	FLASHCNT	PORT	OUTPUT	TV OFF = 0V, TV ON = 5V
2	P35 / IR-IN	IR-IN	SPECIAL	INPUT	NO IR = 5V, IR PULSES = 0V
3	P36	LOC-CTRL	PORT	OUTPUT	0V
4	P37	LOC-DATOUT	PORT	OUTPUT	0V
5	P00		PORT	OUTPUT	0V
6	P01		PORT	OUTPUT	0V
7	P02		PORT	OUTPUT	0V
8	P03		PORT	OUTPUT	0V
9	P04		PORT	OUTPUT	0V
10	P05		PORT	OUTPUT	0V
11	P06		PORT	OUTPUT	0V
12	P07		PORT	OUTPUT	0V
13	CDI	COMP VIDEO		INPUT	1.85V DC OFFSET, 1.5V P-P
14	SLCAP			INPUT	0V
15	NC-GND			INPUT	0V
16	ADC0			INPUT	0V
17	ADC1			INPUT	0V
18	ADC2	AFC		INPUT	2.5V WHEN OPTIMALLY TUNED
19	ADC3			INPUT	0V TO 5V
20	ADC4			INPUT	0V TO 5V
21	AVSS			INPUT	0V
22	AVDD			INPUT	5V
23	HALFV			OUTPUT	0V
24	B			OUTPUT	0V TO 5V
25	G			OUTPUT	0V TO 5V
26	R			OUTPUT	0V TO 5V
27	FB			OUTPUT	0V TO 5V
28	HSYNC			INPUT	0V TO 5V, POSITIVE PULSE
29	VSYNC			INPUT	0V TO 4.3V NEGATIVE PULSE
30	P10 / I'C-SDA <sub>1</sub>		SPECIAL	INPUT / OUTPUT	0.2V TO 5V
31	P11 / I'C-SCL <sub>1</sub>		SPECIAL	INPUT / OUTPUT	0.2V TO 5V
32	P12 / IDENT		PORT	INPUT	BUS2 UNFROZEN = 0V, BUS2 FROZEN BY TE = 5V
33	P13 / I'C-SDA <sub>2</sub>		SPECIAL	INPUT / OUTPUT	0.2V TO 5V
34	P14 / I'C-SCL <sub>2</sub>		SPECIAL	INPUT / OUTPUT	0.2V TO 5V
35	/ RESET			INPUT	5V
36	XTAL1			INPUT	0V TO 5V
37	XTAL2			INPUT	0V TO 5V
38	VSS			INPUT	0V
39	VDD			INPUT	5V
40	TEST			INPUT	0V
41	P20 / PWM0		PORT	OUTPUT	0V
42	P21 / PWM1		PORT	OUTPUT	0V
43	P22 / PWM2		PORT	OUTPUT	0V
44	P23 / PWM3		PORT	OUTPUT	0V
45	P24 / PWM4	VOL-CTRL	PWM	OUTPUT	0V TO 5V AT PIN, 0.8V TO 5V AT C6012
46	P25 / PWM5		PORT	OUTPUT	0V
47	P26	STEREO-IND	PORT	OUTPUT	STEREO PRESENT = 0V, STEREO NOT PRESENT = 4.3V
48	P27 / SYNC2		PORT	OUTPUT	0V
49	P30	FORCED MONO	PORT	INPUT / OUTPUT	STEREO = 0V, MONO = 5V
50	P31	AUX SWITCH	PORT	OUTPUT	AUX = 0V, RF = 5V
51	P32	MUTE	PORT	OUTPUT	MUTE OFF = 0V, MUTE ON = 5V
52	P33	PWR CONT	PORT	OUTPUT	TV OFF = 0V, TV ON = 5V

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# GX CHASSIS

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## VIDEO PROCESSOR

ICX2200 is the Picture IF, Sound IF, video, Chroma, Deflection (Horz/Vertical), RGB generator/driver and RGB mixer for the on screen displays. The LSI (Large Scale Integrated) circuitry allows combining a great many functions into one chip. All customer controls are addressed through the microprocessor and are sent to the video processing IC as pulse width modulated signals. The horizontal section of the sync/scan processing circuit employs a dual PLL loop system with a horizontal coincidence detector to control the gain of the phase detector for optimum performance. The coincidence detector is employed for fast signal acquisition during channel change or loss of signal

A video muting circuit is built into the sync separator, so when no signal is present at pin 41, the video is blanked. This feature is useful for the stabilization of the on-screen menus and also to keep the screen blanked when an auxiliary video is selected but there is no signal present.

The vertical section of ICX2200 employs a narrow range count-down circuit. The operating range for vertical synchronization is 60 Hz +/- 10%. This system differs from previous circuits in the absence of signal the default vertical frequency is 60 Hz. This will result in a minimal change of vertical size and on-screen menu position in the absence of signal.

The luminance signal processing section is similar to the current C-10, C-11 chassis. The video IF signal from the tuner is coupled to pins 7 and 8. The IF signal is processed by the chip and Video exits on pin 47. Video re-enters on pin 37. Auxiliary video in is on pin 39. The switched video out (Tuner or External) is on pin 41. This signal is processed by Q2202, Q2201, delay line DL2400 and associated components, to separate the chroma from the luminance component. The luminance signal re-enters ICX2200 at pin 42. The Chroma signal re-enters at pin 45. On screen R, G, B output to the video output module is on pins 19, 20 and 21.

The 4.5 Mhz audio IF signal is extracted from the detected video signal by filter U1200 and is coupled to pin 52 of ICX2200. This signal is processed by the chip. L1205 the detector coil is connected to pin 4. Composite audio out is on pin 2. Auxiliary audio in is on pin 55.

Video and audio switching is included in the video processor and is controlled by the micro IC6000.

Horizontal drive out is on pin 32. Vertical drive out is on pin 24.

## VERTICAL DEFLECTION

The Vertical deflection circuit is completely New in the GX chassis. A New IC is being used (IC2100), which allows for a common vertical circuit design. This design can be used on the 19, 20, 25, 32 and 35 inch screen sizes with only one circuit component change, that is resistor RX2126. On the 27 inch screen models resistor R2122 is the only other part that has a different value. Resistor RX2126 is in parallel with RX2115. These resistors are used to sample the vertical yoke current. The value of RX2126 trims the total resistance so that the proper yoke current produces a signal at RX2126, that is approximately 1.5 volts peak to peak. When this value is maintained, the vertical circuit will always be working with the same voltages no matter what screen size may be used.

The vertical drive pulse comes from pin 24 of ICX2200, the video processor. This Pulse waveform is routed through Q2200 which inverts it and applies it to pin 3 of IC2100, the vertical deflection processor. Capacitors C2114 and C2115 form the reference sawtooth voltage waveform as well as provide a point at their junction in which linearity correction signals can be introduced. Diode DX2101 and capacitor CX2100 form a voltage doubler circuit to provide the necessary voltage during retrace. The output to the yoke is on pin 1. Vertical size is controlled by R2133 and is tied to pin 4 of IC2100.

## HORIZONTAL DEFLECTION

Horizontal drive comes from pin 32 of ICX2200 and is routed to the base of Q3202 in the horizontal driver circuit. This transistor acts as an emitter follower to pass the signal on to Q3206 to get current gain. Resistor R3254 in the collector circuit

plays an important part because the voltage levels available from the video processor do not allow for more conventional current limiting at the base of Q3206. Transistor Q3206 the horizontal driver is responsible for driving the driver transformer, T3205. Resistor RX3299 is selected to control transistor Q3208's base current so the transistor is neither overdriven or underdriven. It's value will vary for each screen size because the best drive is a function of collector current, which is chassis dependent.

The output of the driver transformer T3205 drives the Horizontal output transistor QX3208. It is the power device for the horizontal deflection. The output device and the sweep transformer varies for the different screen sizes. The output transistor drives transformer TX3204 and develops 28 KV on 19 through 27 inch screen sizes. On the 32 and 35 inch screen sizes it develops 30 KV. Output to the yoke is on pins 1 and 2 of connector 3Y3. Control R3249 is for adjustment of horizontal width but will be found only on 27, 32 and 35 inch screen sizes. These are chassis that have a diode modulator circuit to correct horizontal pincushion. The horizontal pincushion correction is wound into the design of the yoke on 19 through 25 inch screen sizes. Diode DX3273, capacitor CX3268 provide +23 volts for the vertical circuit. Diode DX3287, capacitor CX3296 provide +245 volts for the video output module on 32 and 35 inch screen sizes and +215 volts for 19 through 27 inch screen sizes. Connector 2F5 provides filament current for the CRT. The High Voltage shutdown network consists of diodes DX3006, DX3004, capacitor CX3003 and associated resistor network, which feed the shutdown input, pin 29 of ICX2200 the video processor IC.

## AUDIO SYSTEM

The MTS Stereo circuit consists of IC1400 the Stereo decoder, IC1401 Aux/TV switch, IC1402 volume limiter and IC804 dual power amplifier. In the TV mode composite audio from pin 2 of ICX2200 the video/audio processor comes in on pin 4 of connector 9A4 and is coupled to pin 17 of IC1400 the decoder amplifier.

The composite audio is processed by the IC producing the Left channel audio output on pin 35 and Right channel output on pin 34. The pin 34 output is coupled to pin 8 of switcher IC1401 and pin 35 output is coupled to pin 4. Left channel Auxiliary audio enters on pin 11. Transistors Q1401 and Q1400 control the switching of IC1401 from pin 50 of IC6000 the micro. This signal is routed from pin 3 of 9B4 to the base of Q1400. A high signal on the base of Q1400 causes it to conduct, placing a low on pins 12 and 13 of IC1401 which is the TV position.

When pin 3 of 9B4 is low Q1400 is off and Q1401 is on placing a low on pins 5 and 6 which is the AUX position. Left channel output from the switcher is on pins 2, 3 and right channel output is on pins 9 and 10. This signal is coupled through IC resistor and 10Mf capacitor to pins 1 and 2 of IC1402. IC1402, limits the level of the tuner or auxiliary signal input to prevent excessive volume above normal audio programming. Resistor R1440M and R1441M connected to Pin 10 of IC1402 controls the peak threshold level of the audio limiting. Pin 11 is the enable line. If pin 11 is lower than 1.5 volts the circuit is on. If pin 11 is higher than 2 volts the circuit is off. Capacitor C1442 and resistor R1438M set the time constant control at milliseconds. The right channel output of the sound limiter is on pin 4 and is routed to pin 37 of IC1400. The left channel output is on pin 35 and is routed to pin 38 of IC1400 the Stereo decoder.

There are seven adjustments of the stereo decoder available through the Service Menu. There are no mechanical adjustments on the board. The right channel audio exits IC1400 on pins 5 and the left channel audio exits on pin 6. IC804 is the dual Stereo audio power amplifier. Input to the IC is on pins 2 and 5. Left channel audio output to the speakers is on pins 7. Right channel audio output is on pin 10. The volume and mute is bus controlled from the microprocessor. Q800 is used to mute the audio during turn on/off.

On those model with Non\_MTS Stereo, composite audio from ICX2200 is coupled to pin 5 of IC1601, the decoder amplifier. There are no adjustments for the stereo amplifier. All operating parameters are set by the values of the peripheral components. Transistor Q1601 and associated components form a De-emphasis filter for the stereo decoder. Best separation for this Non-MTS system occurs between 3 and 5 KHz. The composite audio signal is processed by IC1601 producing the stereo audio output. Right channel audio exits on pin 13. Left channel audio exits on pin 14. This audio is coupled to IC1602 voltage controlled amplifier. This IC processes the tuner audio and also has provision for processing and switching the external audio in. Switching is accomplished on pin 8 with transistor Q1602. External right channel audio enters IC1602 on pin 1. Left channel audio enters on pin 7. Volume and Mute (Pins 11 and 12) is controlled from the microprocessor on pin 45 via pin 4 of connector 9B4. Right channel audio exits IC1602 on pin 3 and is coupled to audio output amplifier IC802 pin 4. Left channel audio exits IC1602 on pin 5 and is coupled to audio output amplifier IC803 pin 4. Audio out from these chips is on pin 2. Pins 5, 6, 7 and 8 are tied to ground for heat sinking purposes on these power amplifier chips. Transistors Q802 and Q803 mute the audio output preventing disturbing noise from being reproduced in the speaker during on/off.

The base of these transistors are tied to pin 8 of connector 9B4, which receives its mute signal from pin 51 of the microprocessor.



# GX CHASSIS

## AUDIO MODULE / JACK PACK MTS STEREO

IC1400

221-954

MTS STEREO DECODER

1 0.015

2 C1401M

3 50V 6800PF

4 C1404M C1405

5 50V 100PF

6 50V 100PF

7 10V 100PF

8 10V 100PF

9 10V 100PF

10 10V 100PF

11 C1413

12 10V 100PF

13 10V 100PF

14 C1416

15 C1418

16 C1420

17 C1421

18 C1425

19 C1427

20 C1428

21 C1429

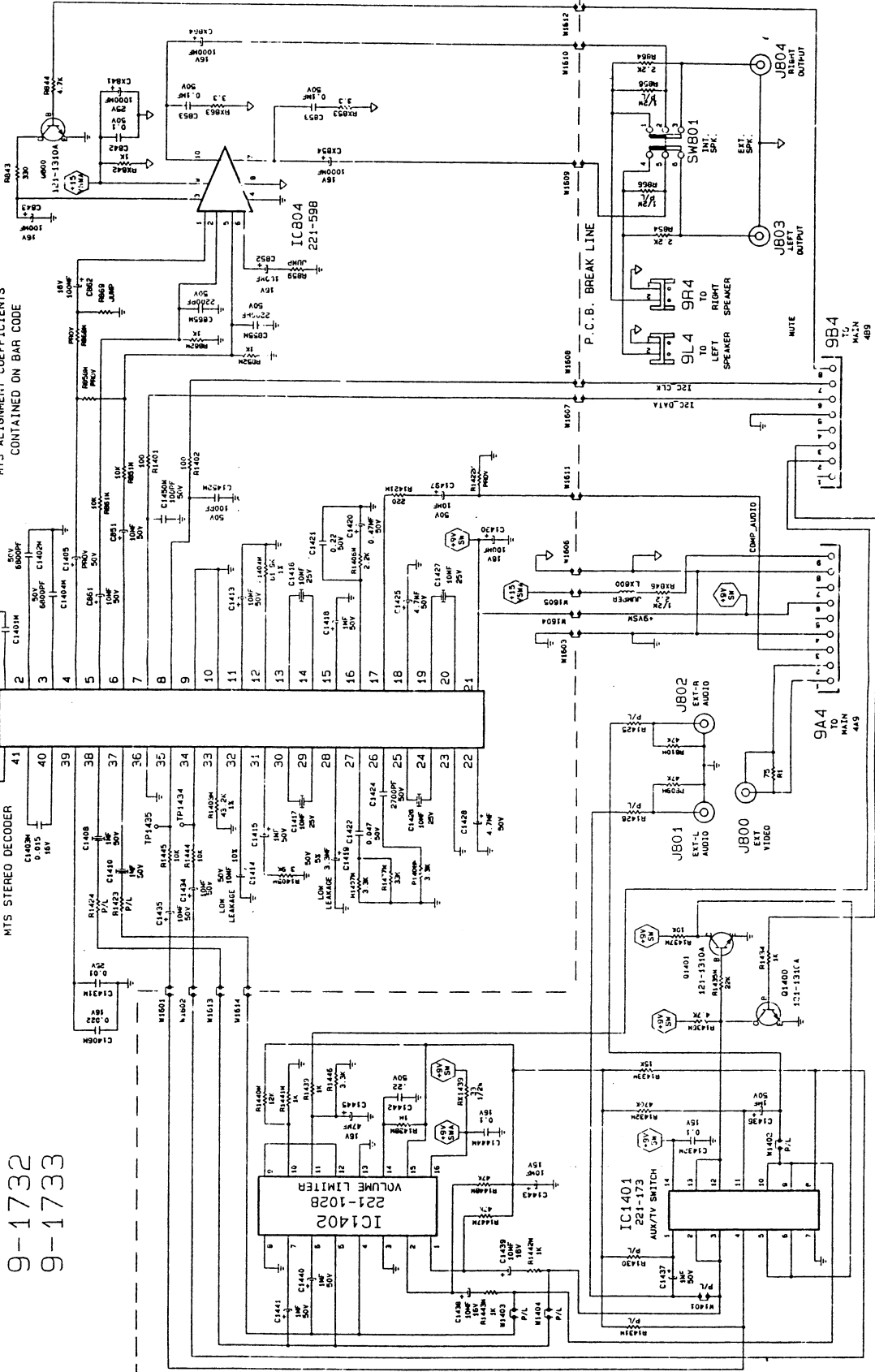
JACK PACK/MTS STEREO PLUG IN

MTS ALIGNMENT COEFFICIENTS

CONTAINED ON BAR CODE

9-1732

9-1733



AUDIO SYSTEM



# GX CHASSIS

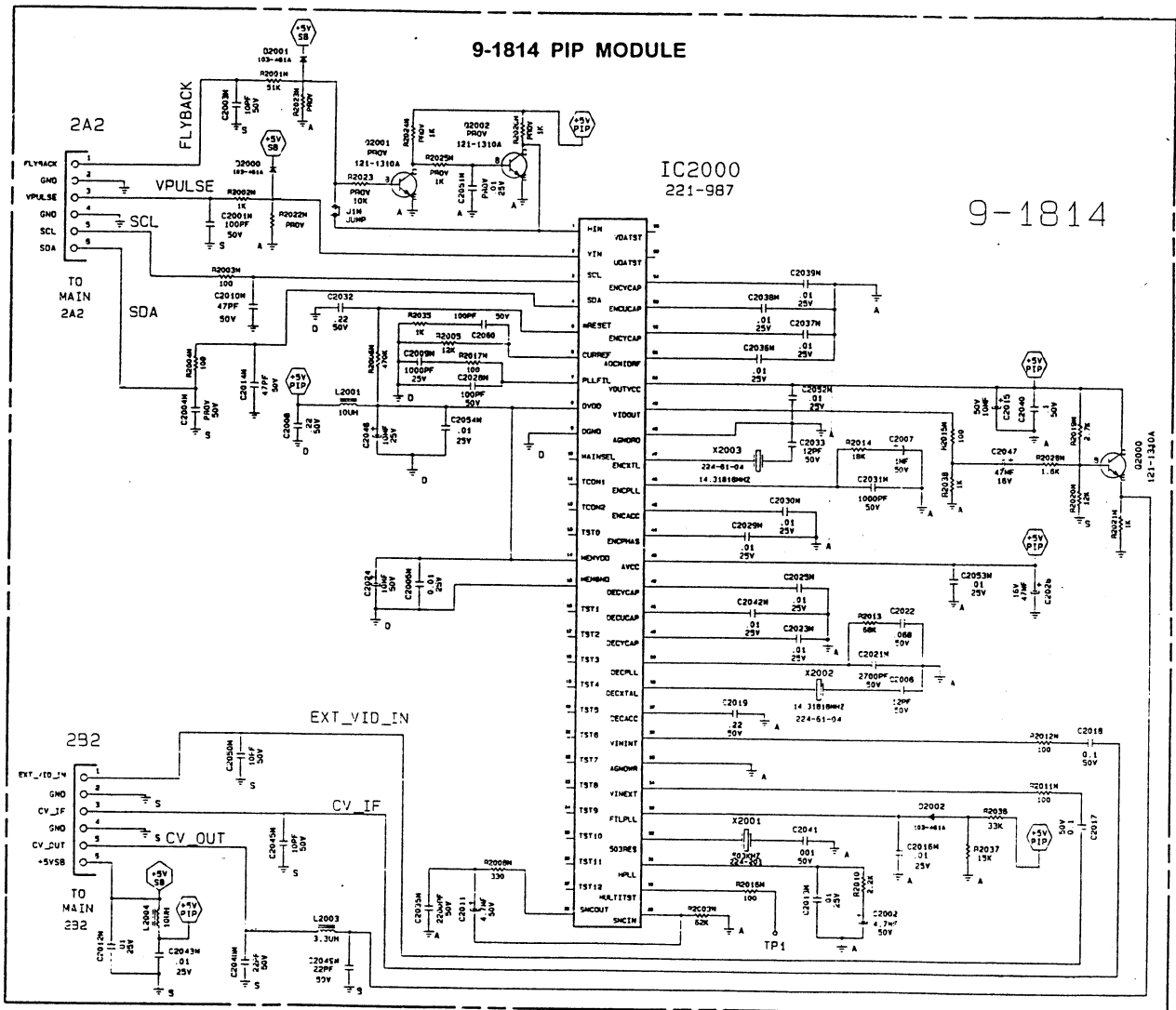
## PICTURE IN PICTURE

PIP operation is via remote control and can select any of the sources available. It initially turns on with the same source as the main picture display. When you press the source key on the remote control, you can then select one of the other signal sources available from the PIP Source Menu.

The 9-1814 is the PIP module consisting of IC2000 which is a signal chip PIP processor that handles all of the analog signal processing, logic and memory. It is used on those 27, 32 and 35 inch chassis designated with this feature.

The GX chassis has been designed so that when the PIP module is plugged in, the micro detects its presence and all video signals are routed to it. Composite video from ICX is coupled to IC2000 pin 36. Auxiliary video is coupled to pin 34. Control of IC2000 is from the main micro IC6000, via the #1 Bus entering in on pins 3 and 4.

The Horizontal flyback signal which is clamped at 5 volts in the PIP module is routed to pin 1. The vertical pulse signal which is also clamped at 5 volts is routed to pin 2. IC2000 has an internal switch which allows the source to be selected between either of the two composite video input signals. Video out is on pin 49. It consists of the main video plus the PIP video. The signal at this point is typically 2 volts PIP. The video is coupled to the base of transistor Q2000. The emitter output is coupled to pin 5 of connector 2B2. At this point the signal is divided down to a 1 volt P-P signal with a DC level of approximately 4 volts. This signal is added to the switched video output and re-enters ICX2200 at pins 43 and 45.



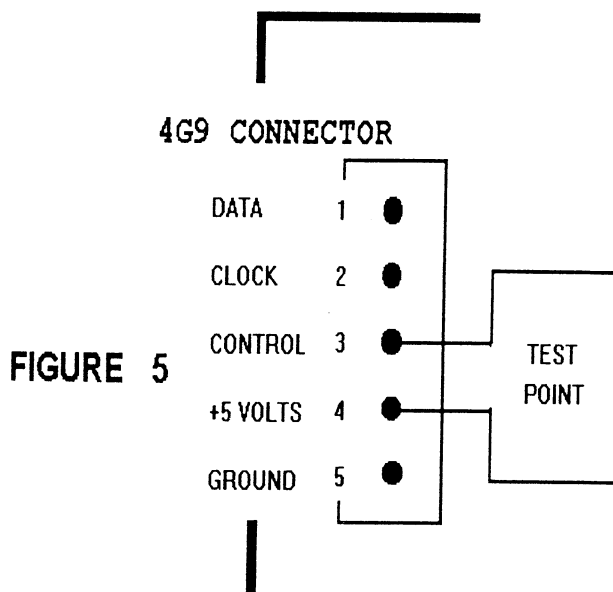
# GX CHASSIS

## SERVICING

### REPLACEMENT MODULES

#### MAIN MODULE (32 AND 35V ONLY)

Replacement main modules out of the box may not be set correctly to match the model being serviced. After a module is replaced, go into the Service Menu and check that all items are set properly. When the factory mode is off only the first seven items in the service menu are available. Place factory mode to 1 to see all Service Menu adjustments. Be sure the factory mode is set to 0, which is Off, when the Service menu is exited. Also make sure that item 04 LEVEL is set to match the Level as indicated on the model number sticker on the back of the set.



The level is changed (See Service Menu Pages 5 and 6) by placing a short across pin 3 and 4 of connector 4G9 on the main module. Then using the remote control, press the adjust button to make the change. Be sure to remove the shorting jumper when the adjustment is completed.

### STEREO MODULE

When the NON-MTS stereo module is replaced, be sure to unplug the AC power cord. This is important so the replacement module is recognized by the micro when power is reapplied. If only the set is turned off, the audio module may not operate properly.

After the audio module is replaced, go into the service menu and be sure the seven stereo adjustments 32 through 38 are set properly. The proper setting of these adjustments will be printed on the module label along with the bar code.

### PIP MODULE

When the PIP module is replaced be sure to unplug the AC power cord. This is the same as with the audio modules. If the main module is not unplugged, the PIP module may not be recognized by the micro and as a result it will not work correctly when the set is turned on.

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# GX CHASSIS

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## SERVICING

### POWER SUPPLY

#### Standby Voltages

+150 DC at RX3404

+130 DC at CX3420

+15 DC at emitter of Q3403

+5V DC at pin 3 of IC3442

#### Power On

keyboard input at IC6000 pin 19 and 20

IR input at IC6000 pin 2

Power on output at IC6000 pin 52

Q3402 power supply switching transistor

#### Switched Voltages

+9V DC at pin 3 of IC3441

+15V DC at collector of Q3404

#### Sweep Derived Voltages

+23V DC at junction of CX3268 and RX3242

+35V DC at CX3272

+245V DC at junction of CX3296 and RX3217

CRT Filament at pins 1 and 2 connector 2F5

### VIDEO PROCESSOR ICX2200

Key Operating Signals

Composite Video out at pin 41

Composite Audio out at pin 2

Horizontal Drive at pin 32

Vertical Drive at pin 24

Video Output Blue at 2C5 pin 3

Video Output Green at 2C5 pin 2

Video Output Red at 2C5 pin 1

B+ 9 volts- pins 9, 23, 33, 46 and 48

Serial Data, Serial Clock pins 30, 31

### VERTICAL CIRCUIT

Vertical drive pulse pin 3

+23 volts pin 2, 10 and 11

Vertical out pin 1

Poor linearity check C2114, C2115

### HORIZONTAL CIRCUIT

Horizontal drive to base of Q3202 predriver

Driver transformer output base of Q3208

Shutdown voltage cathode D2251

Scan derived voltages +23, +35 and +245 volts

### MICROPROCESSOR (IC6000)

IR in pin 2

Power Ctl pin 52

+5V pins 22, 39

Clock xstal pins 36,37

Serial Data, Clock pins 33, 34

Reset pin 35

H Sync pin 28, V Sync pin 29

R, G, B out pins 24, 25, 26

### SERVICE ADJUSTMENTS (Mechanical)

1. VERTICAL SIZE R2133-Adjust R2133 for about 1/2" overscan at the top and at the bottom of the picture.
2. HORIZONTAL WIDTH (Some Models)- Adjust R3249 for 1/2" overscan on both sides of the picture.

### G2 ADJUSTMENT

Use the following procedure when re-setting the G2.

1. Set the brightness and contrast in the Video Menu to mid range.
2. Set the color level to minimum.
3. Connect the output of a NTSC generator to the antenna input on the receiver. Select a color bar signal and turn the chroma off.
4. Adjust the G2 control so that the bar patterns range from completely black to a "not overdriven" (not saturated) white. There should be a distinct difference between the black and white bars. Also the different shades of gray should also be distinguishable if the G2 is set correctly.
5. Return the color level control to its normal setting. Leave the generator connected if the RGB cutoff is to be adjusted.

### ADJUSTMENT OF RGB CUTOFF

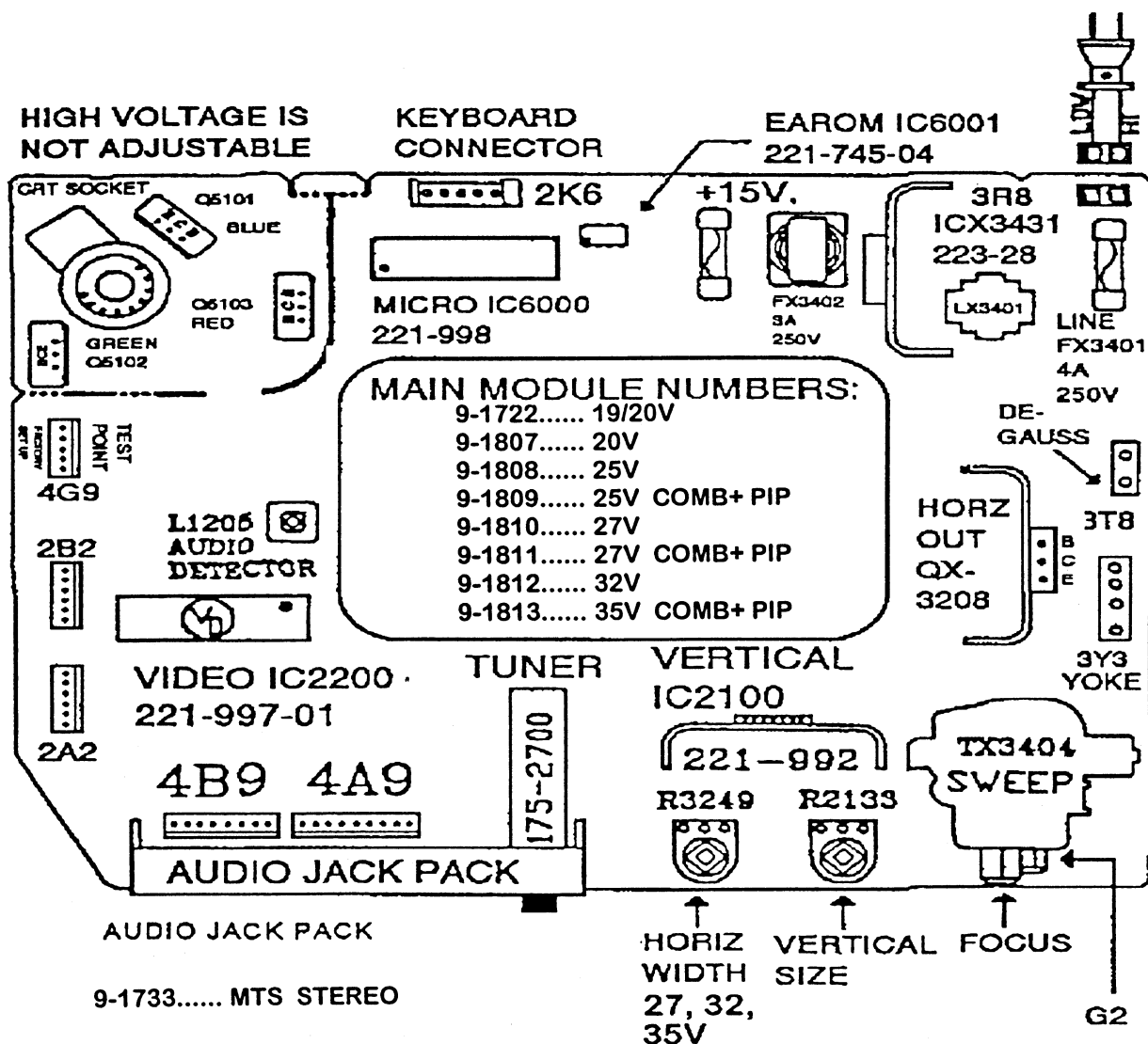
*The G2 control must be adjusted before RGB drive!*

1. If the main module or CRT has been replaced, set items #26 G GAIN and #27 B GAIN, in the service menu, to the default setting for the correct screen size as listed on the next page.
2. Set color level to minimum and Tint to midrange.
3. Connect the output of an NTSC generator to the antenna input of the receiver. Set the generator to a pure white signal, chroma off.
4. Enter the Service menu to gain access to the cutoff adjustments. (Factory mode item 00 must be set to 1 to gain access to these adjustments).
5. Set items 24 R Cut, 25 G Cut and 26 B Cut all to 0. These are the cutoff values.
6. Carefully observe which color is predominant on the CRT—DO NOT adjust the cutoff control for this color from its 0 setting. Adjust the other two cutoff controls for the best white screen display.
7. Set the generator to a color bar signal and turn the chroma off. Check that the set displays a good gray scale from black to white. If black level is too high readjust G2 slightly.
8. Return the color level control to normal.

# GX CHASSIS

## SERVICE ADJUSTMENTS (Mechanical)

1. VERTICAL SIZE R2133 - Adjust R2133 for about 1/2" overscan at the top and at the bottom of the picture.
2. HORIZONTAL WIDTH (Some Models) - Adjust R3249 for 1/2" overscan on both sides of the picture.



### IMPORTANT:

When replacing a main module, it will have to be setup for the correct feature level for the set.

The feature level can be changed by entering the service menu and selecting item 04 level, then temporarily short pins 3 and 4 together on connector 4G9. Then use the adjust button to change the level to either 0, 1 or 2 as shown on the model bar code label.

Be sure to remove the jumper after the level has been set.

# GX CHASSIS

## IF AND AUDIO ALIGNMENT PRODEDURE

### VIDEO DETECTOR

If no viewable picture, enter the service menu and check default settings for the following items:

Item 05 Band should be set to 0  
Item 19 RFAGc should be set to 40.  
Item 23 PIFVco should be set to 63.

With a high impedance DC meter, measure VDC at pin 44 on ICX2200 or on R1219 with good standard signals such as off-air. Adjust item 23 PIFVco for VDC = 2.5V.

NOTE: This is also the AFC Crossover point.

### AGC DELAY

With a strong noise free antenna signal, adjust service menu item 19 RFAGc setting lower until signal looks noisier, increase setting for a noise free picture.

NOTE: If you go too high above setting 40 the tuner input will overload under certain conditions, causing other beats in the picture.

A more accurate method is to apply a  $750\mu V \Omega$  at 75 channel 6 signal to the antenna and change Service Menu item 19 RFAGc until tuner Agc drops 1 VDC from typical. Voltage can be measured at (+) C6028.

### AUDIO DETECTOR

If no audio is present, enter the Service Menu and check default setting for the following items:

Item 17 AudLvl should be set to 46.

Item 18 AudAdj should be set to 63. This item is not to be field adjusted.

With a high impedance DC meter, measure VDC on ICX2200 Pin 54 or (+) of C1211 with a good standard signal such as off-air. Adjust L11205 for 4.0 VDC.

### STEREO LEVEL ADJUST

This adjustment can be made with jackpack removed or attached to the chassis.

Service Menu item 17 AudLvl should not be changed unless ICX2200 has been replaced on the main chassis. If a MTS jackpack is changed, the new coefficients (bar code data) must be entered in the Service Menu for proper stereo alignment.

### JACKPACK REMOVED:

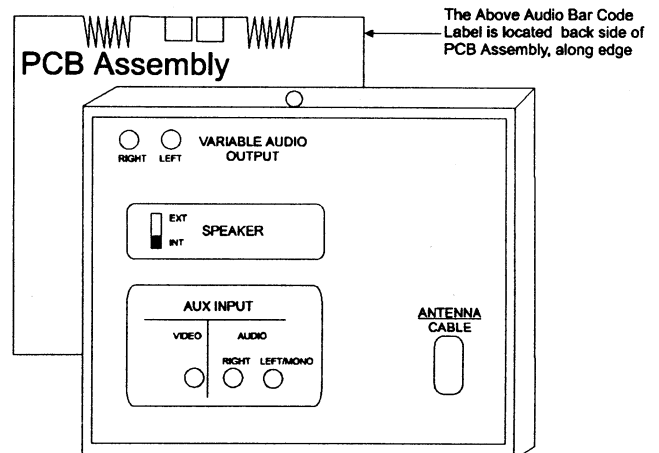
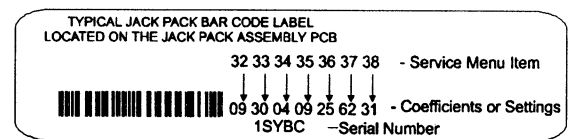
1. Attach a high impedance AC meter with a 47k load to pin 3 and ground lead to pin 4 of 4A9.
2. Ground pin 7 of 4A9.
3. Ground pin 2 of 4B9 through a 10k resistor.
4. Interrupt main ac power to reset microprocessor.
5. Apply a RF signal with good video and audio at 400 Hz and 100% modulation.
6. Go to Service Menu item 17 AudLvl and adjust setting for 490 to 500 mvac after 3 minutes.

### JACKPACK ATTACHED:

1. Attach a high impedance ac meter to W1611 and ground lead to W1603 on top of JackPack. Ground jumper W53 on main chassis to reduce high frequency noise.
2. Interrupt main ac power to reset microprocessor.
3. Apply a RF signal with good video and audio at 400 Hz and 100% modulation.
4. Go to service menu item 17 AudLvl and adjust setting for 490 to 500 mvac after 3 minutes.

### MTS STEREO ALIGNMENT COEFFICIENTS:

Enter coefficients (bar code data) attached to the jackpack at this tiem. Enter these settings in their appropriate locations in the service menu items 32 thru 38 (starting with the left most two digits for item 32)



# GX CHASSIS

## PURITY & CONVERGENCE SET-UP PROCEDURE FOR COTY CRTs

### PRELIMINARY SET-UP

1. Allow the receiver to warm up for 15 to 20 minutes.
2. Degauss the receiver.
3. Connect a crosshatch generator to the receiver and "rough in" the static (center) convergence. Follow the Convergence Procedure.
4. Adjust for best focus.

### PURITY ADJUSTMENT

1. Purity tab positioning.  
Set the 2 pole purity tabs together in the 3 or 9 o'clock positions and the 4 and 6 pole purity tabs together in the 12 or 6 o'clock positions.
2. Move yoke to the maximum forward funnel position.
3. Now switch the crosshatch generator to a red field.
4. Pull the yoke toward the rear of the CRT neck centered or red raster is displayed.
5. If the red raster is not displayed as a pure red field, adjust the 2 pole purity tabs until a pure field is obtained.
6. Check for proper yoke tilt setting.

### MASTER G2 ADJUSTMENT

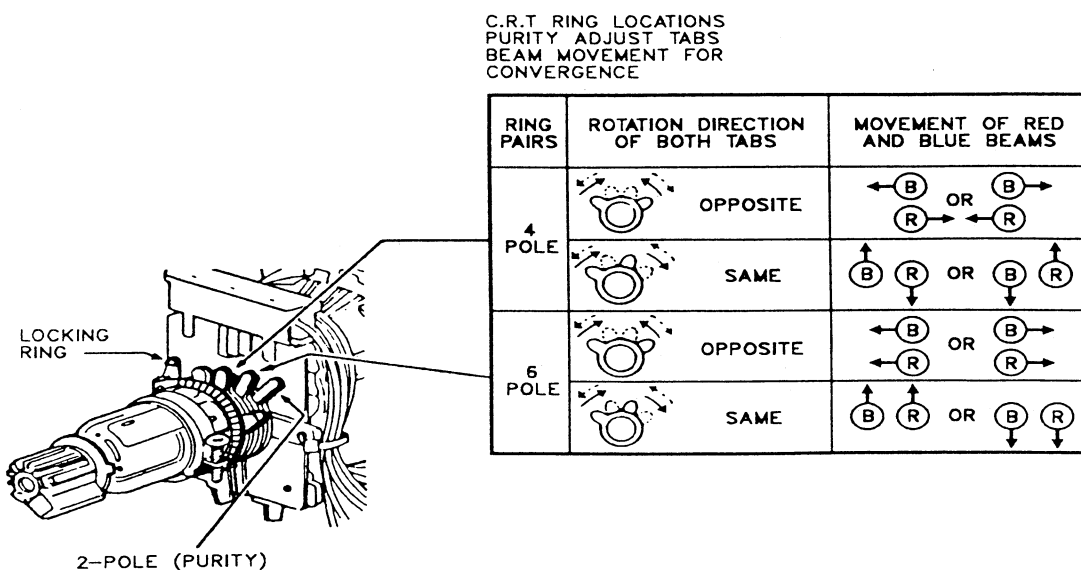
1. Adjust the G2 control until you can see the raster with retrace.

2. Now turn back the G2 control until the raster and retrace just disappear from view.

3. If focus is readjusted, you may want to check this setting again.

### CONVERGENCE ADJUSTMENT

1. Release locking assembly.
2. Connect crosshatch generator to the receiver and adjust static (center) convergence as follows:
  - a. Adjust the 4 pole static control by moving the two tabs separately to converge the red and blue lines horizontally. Move the two tabs together around the neck of the CRT (In a 45° arc) from the top dead center position to converge the red and blue lines vertically.
  - b. After the 4 pole control has been adjusted to super-impose the red and blue lines on top of one another. Use the 6 pole static adjustment to place the converged red and blue lines over the green line. Move the two tabs together around the neck of the CRT (in a 30° arc) from the top dead center position to move the lines vertically. Adjusting the two tabs separately will move converged beam to the left or right. Using a cross hatch generator capable of producing individual fields, adjust generator to produce a red field. Use the purity tabs to center a red stripe.





# GX CHASSIS

## VERTICAL-TILT WEDGE ADJUSTMENT

The vertical lines at 6 and 12 o'clock are converged by vertically tilting the yoke and inserting a wedge at the top of the yoke until it is firmly seated between the CRT glass and the horizontal coils.

## HORIZONTAL-TILT WEDGE ADJUSTMENT

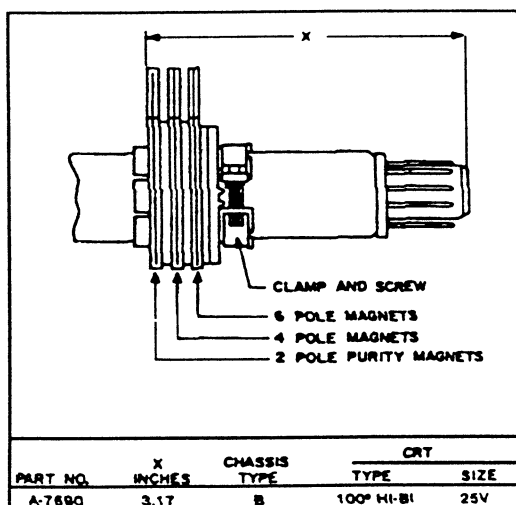
The vertical lines at 3 o'clock and 9 o'clock are converged by horizontally tilting the yoke and inserting a wedge.

First, at 4 or 8 o'clock, whichever has the larger space, until it is firmly seated between the CRT glass and yoke coils. Then insert the 3rd wedge in the remaining horizontal tilt position until firmly seated between the CRT glass and yoke coils. Convergence at 3 and 9 o'clock should be maintained during this operation.

When the 3 wedges are firmly installed for acceptable convergence lock the wedges in place by applying a strip of tape (2.5 inches long) across the tabs of each wedge, firmly against the CRT glass. The CRT glass surface should be clean and free of dust and other foreign material.

## UNUSUAL TILT CASE

There may be some cases of picture tube and yoke will require vertical tilt in the opposite (or up) direction to obtain to obtain convergence. In such cases, insert the vertical tilt wedge at the bottom (or "6" o'clock) position. Follow through the horizontal-tilt adjustment by using the 2" and 10" o'clock position and secure each wedge with a piece of tape as describe above.



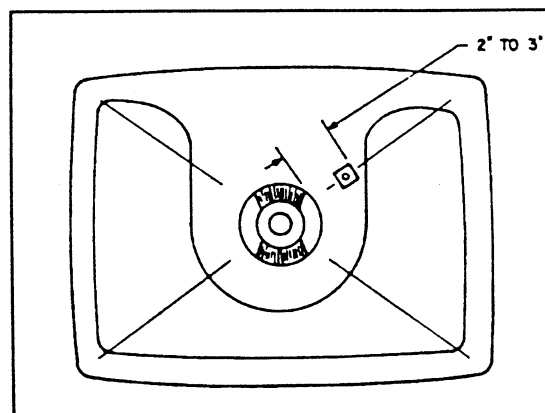
## IMPROVING CRT CORNER PURITY

CRTs that display corner purity problems even after following service procedures can be modified with a picture correction kit (P/N 949-50). The purity can be improved by placing a picture correction magnet (included in the kit) on the CRT funnel. Refer to the following modification steps and illustration to place the magnet properly.

## MODIFICATION

1. Place the magnet on the CRT funnel as shown, in the quadrant exhibiting impurity.
2. Rotate the magnet in place to the position shown for best purity.
3. Place a piece of 1/2" by 2" fiberglass tape over the magnet to hold it in place.
4. Degauss the CRT once the magnet is in place to insure that the magnet is not over the internal magnet shield.

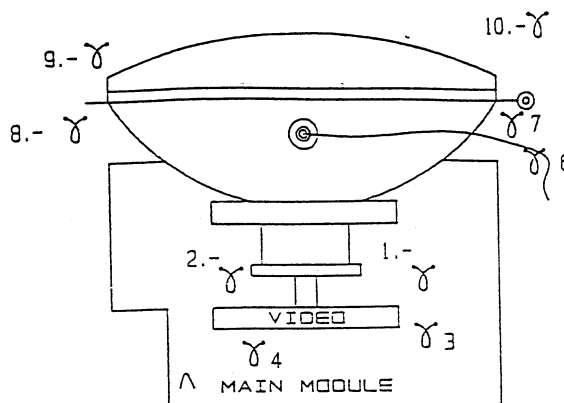
NOTE: If the magnet is placed over the internal magnet shield, any apparent purity correction will disappear after degaussing. Reposition the correction magnet off the internal shield and degauss again.



# GX CHASSIS

## CABLE TIES & LEAD DRESS

19"/20"  
PLASTIC SETS

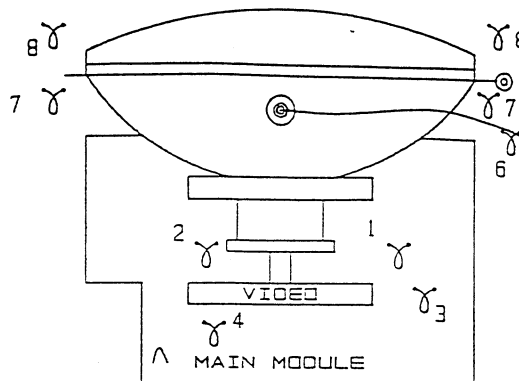


CINCH # : TIES :

- 1.- 019-00550 :3Y3, DEG LEADS
- 2.- 019-00550-3 :5C2/2C5
- 3.- 019-00550-3 :2F5/5F2
- 4.- 019-550-3 :G2, FOCUS
- 5.- 019-00733-4 :INFO BAG TO CAB. REAR (NO SHOWN)
- 6.- 019-00733-4 :SECURE ANODE LEAD
- 7.- 019-733-22 :DEGAUSSER COIL MTG (BOTTOM)
- 8.- 019-00733-22 :DEGAUSSER COIL MTG (BOTTOM)
- 9.- 019-00733-26 :DEGAUSSER COIL MTG (TOP).
- 10.- 019-00733-26 :DEGAUSSER COIL MTG (TOP).

## CABLE TIES & LEAD DRESS

FOR 25" WOOD  
FOR 25" PLASTIC



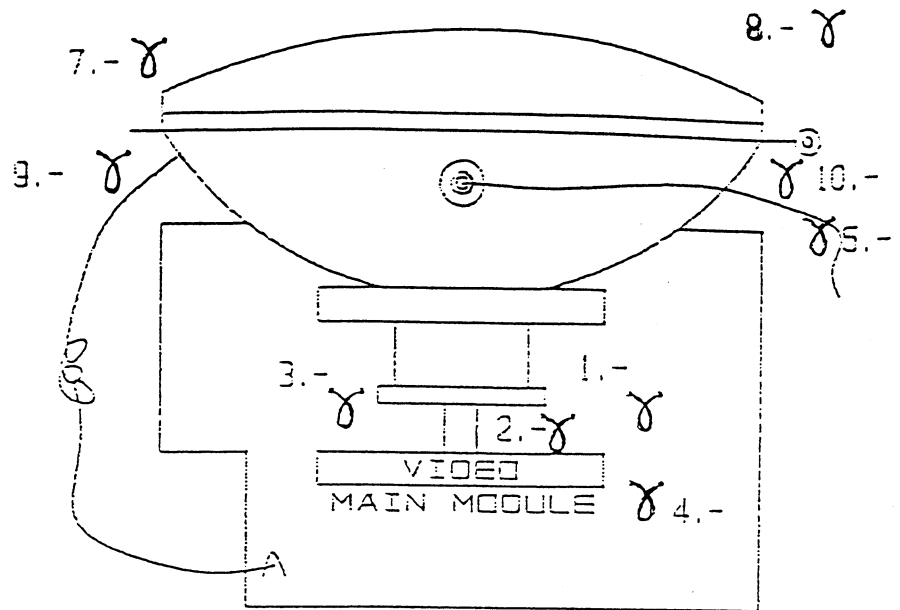
CINCH # : TIES :

- 1.- 019-00550 :3Y3,DEG, LEADS
- 2.- 019-00550-3 :5C2/2C5
- 3.- 019-00550-3 :2F5/5F2
- 4.- 019-00550-03 :G2, FOCUS
- 5.- 019-00733-4 :INFO BAG TO CABINET REAR (NOT SHOWN)
- 6.- 019-00733-4 :SECURE ANODE LEAD
- 7.- 019-733-5 :DEGAUSSER COIL - BOTTOM (2)
- 8.- 019-00733-5 :DEGAUSSER COIL - TOP (2)

# GX CHASSIS

## CABLE TIES & LEAD DRESS

FOR 27" PLASTIC  
WOOD



CINCH # : TIES :

- 1.- 019-00550 : Yoke & 3T8
- 2.- 019-00550-03 : G2 & FOCUS
- 3.- 019-00550-03 : 5C2/2C5
- 4.- 019-550-03 : 5F2/2F5
- 5.- 019-00733-04 : ANODE LEAD TO DEGAUSSER (SHOULD BE LOOSE)
- 6.- 019-00733-04 : INFO BAG TO CABINET REAR (NOT SHOWN)
- 7.- 019-733-15 : DEGAUSSER COIL MTG. - TOP
- 8.- 019-00733-15 : DEGAUSSER COIL MTG. - TOP
- 9.- 019-00733-05 : DEGAUSSER COIL BOTTOM (2) CHAINED  
CINCHS #11A & 11B
- 10.- 019-00733-05 : DEGAUSSER COIL MTG BOTTOM (2) CHAINED  
CINCHS #12A & 12B

NOTES: CINCHS 7,8, ARE USED ONLY IF THE MODEL DOES NOT  
USE A BRACKET FOR DEGAUSSER COIL MTG.

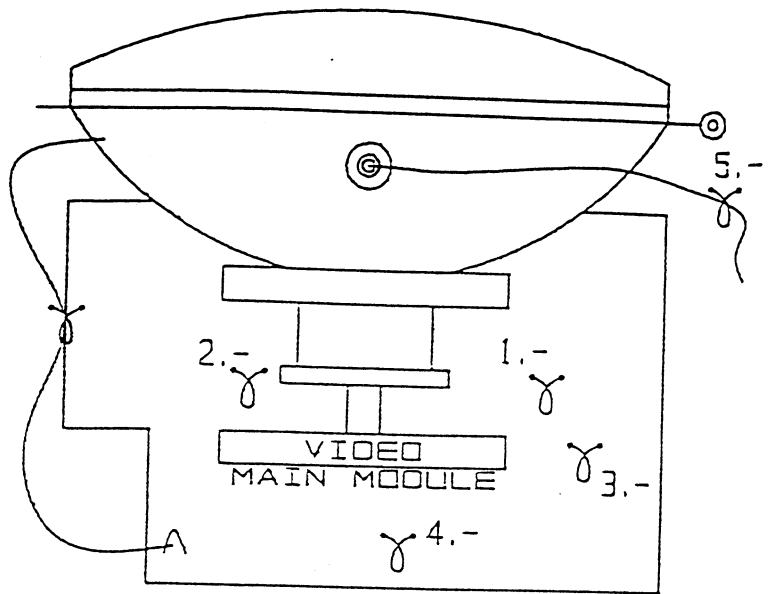
NOTES: CINCHS 8 IS USED WHEN CABINET REQUIRES IT.  
USE A BRACKET FOR DEGAUSSER COIL MTG.

## GX CHASSIS

### CABLE TIES & LEAD DRESS

FOR 32" PLASTIC/WOOD

SPEAKER CABLE  
IS TWISTED  
(WHEN REQUIRED)

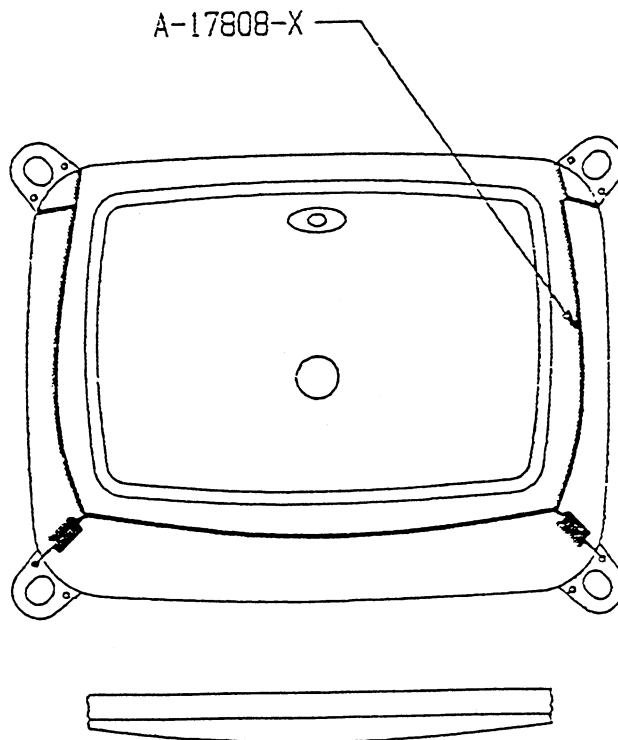
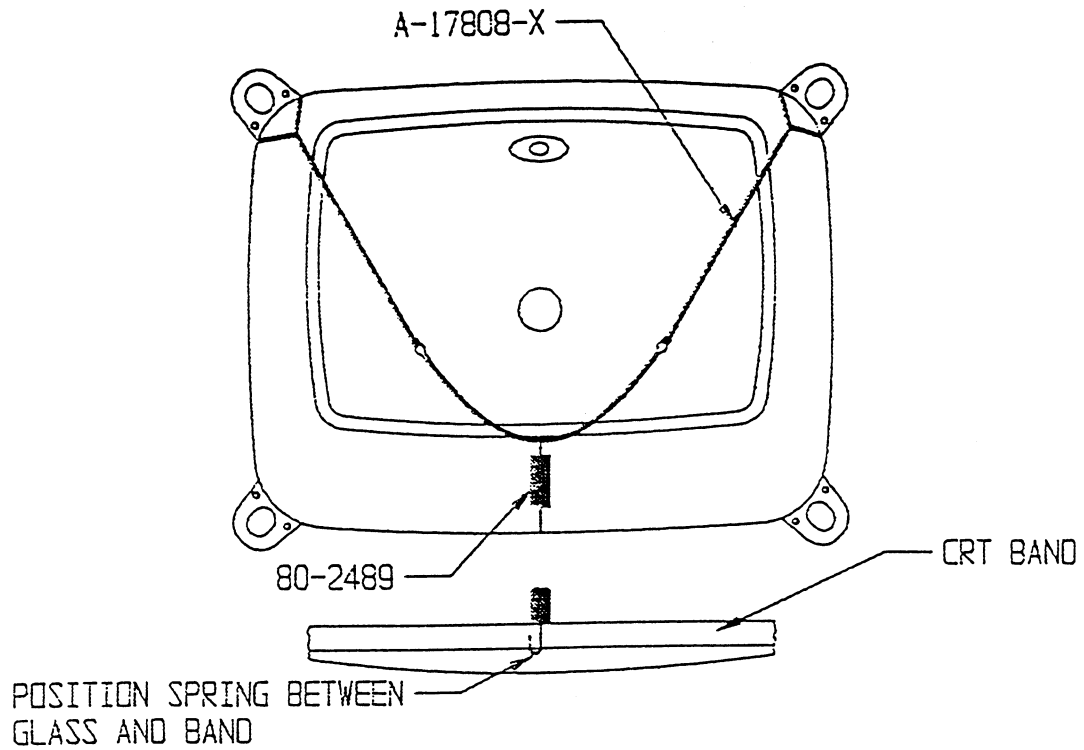


CINCH # : TIES :

- 1.- 019-00550 : YOKE, 3T8
- 2.- 019-00550-03 : G2 & FOCUS
- 3.- 019-00550-03 : 5C2/2C5
- 4.- 019-00550-03 : 5F2/2F5
- 5.- 019-00733-05 : ANODE LEAD TO DEGAUSSER (SHOULD BE LOOSE)
- 6.- 019-00733-04 : INFO BAG TO CABINET REAR (NOT SHOWN)

# GX CHASSIS

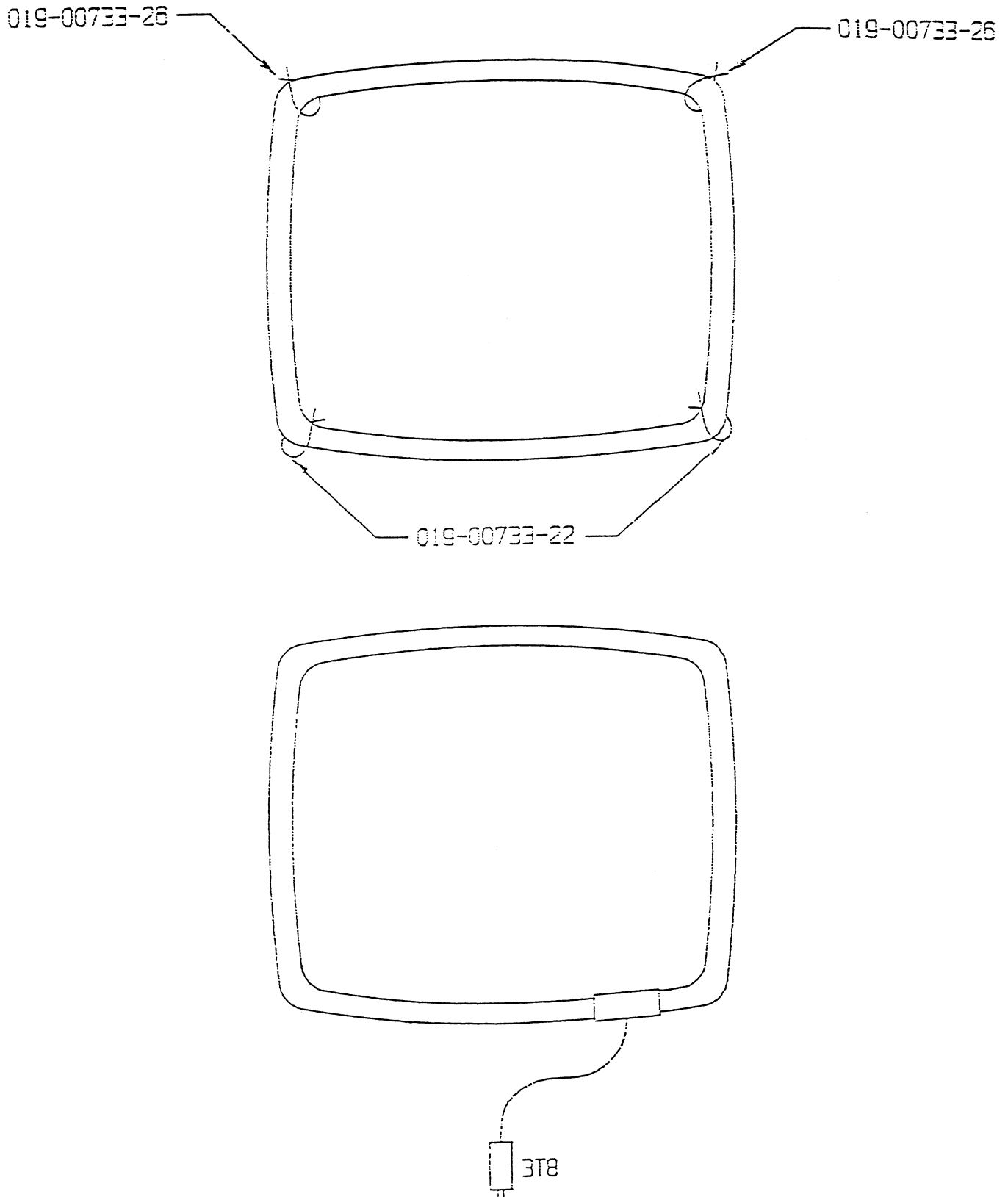
## CRT GROUND



# GX CHASSIS

## DEGAUSSER COIL

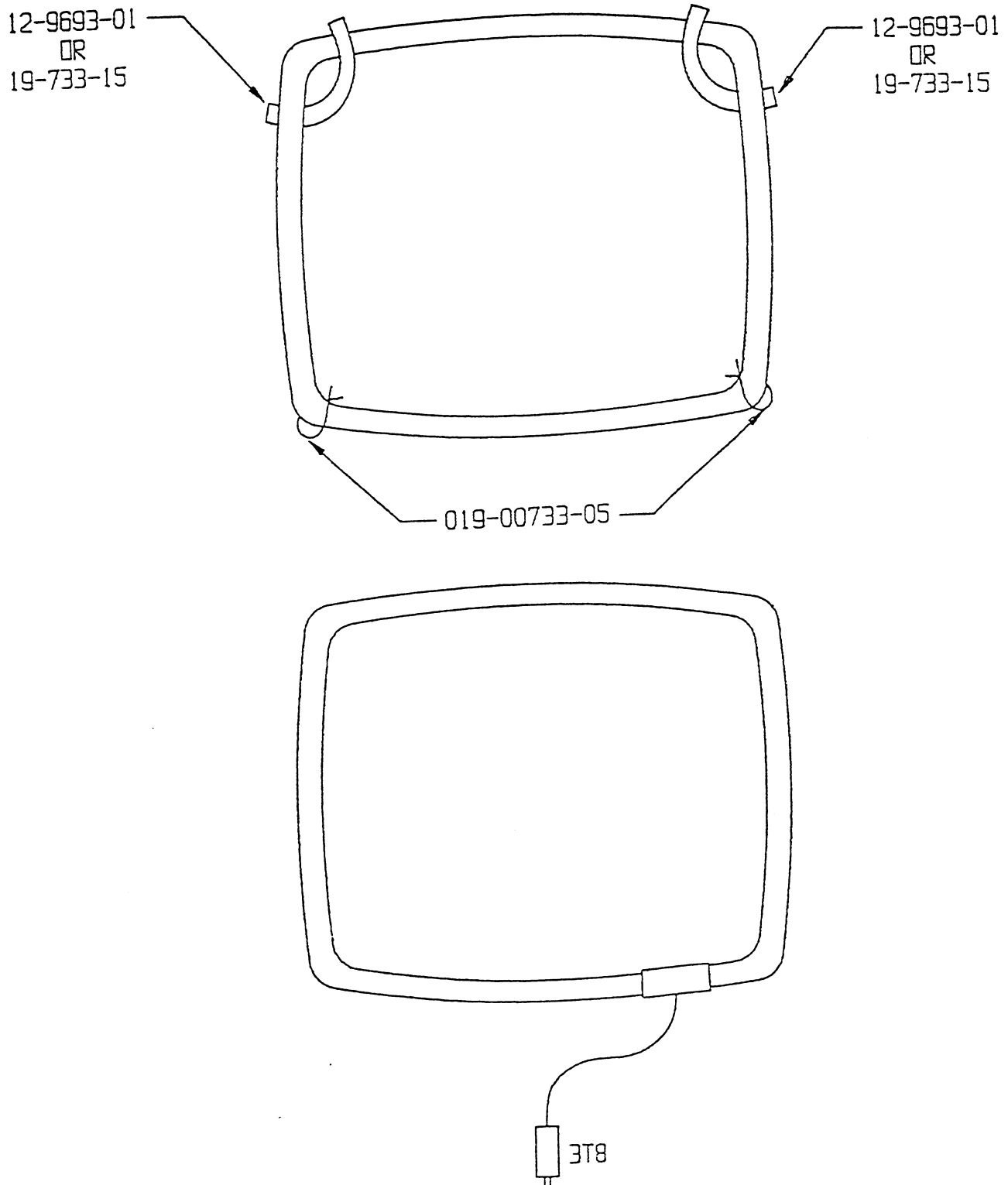
FOR 19/20" PLASTIC



# GX CHASSIS

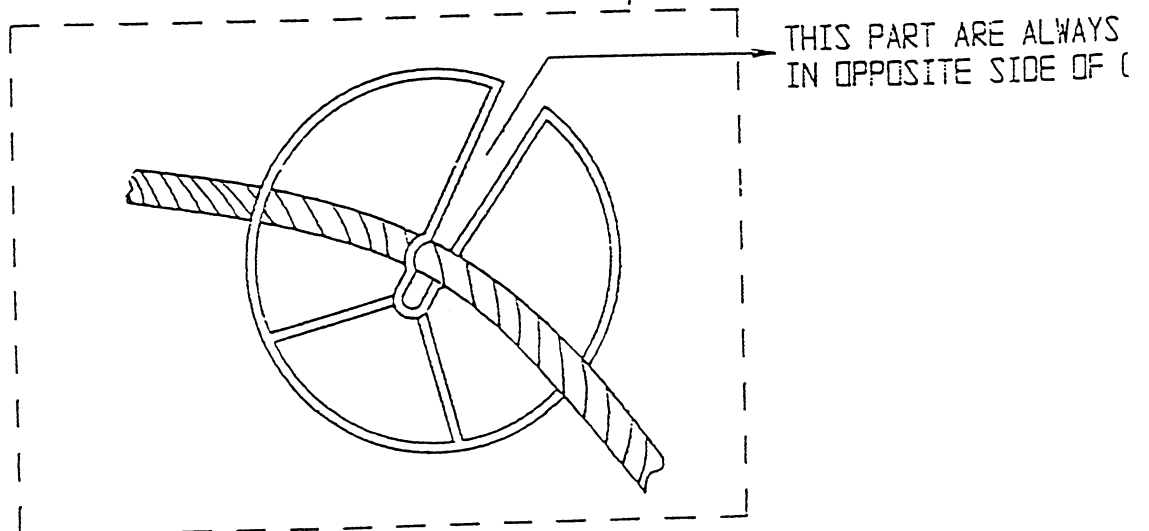
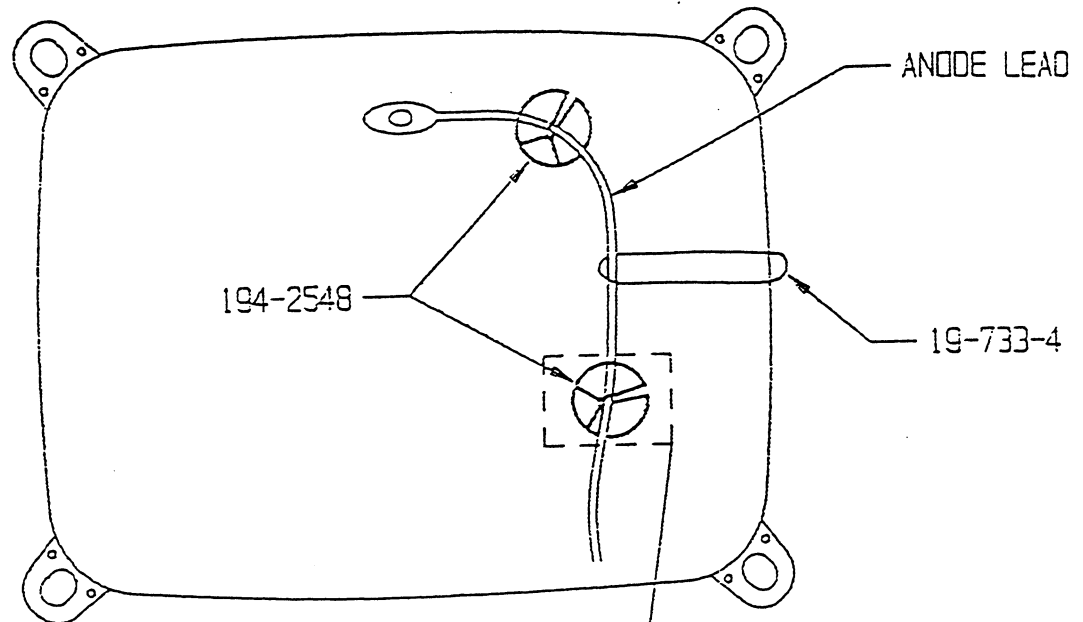
## DEGAUSSER COIL

FOR 25"-27" WOOD  
FOR 25"-27" PLASTIC



# GX CHASSIS

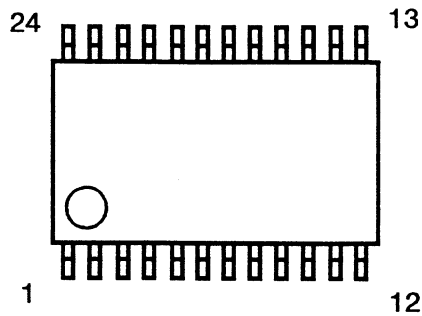
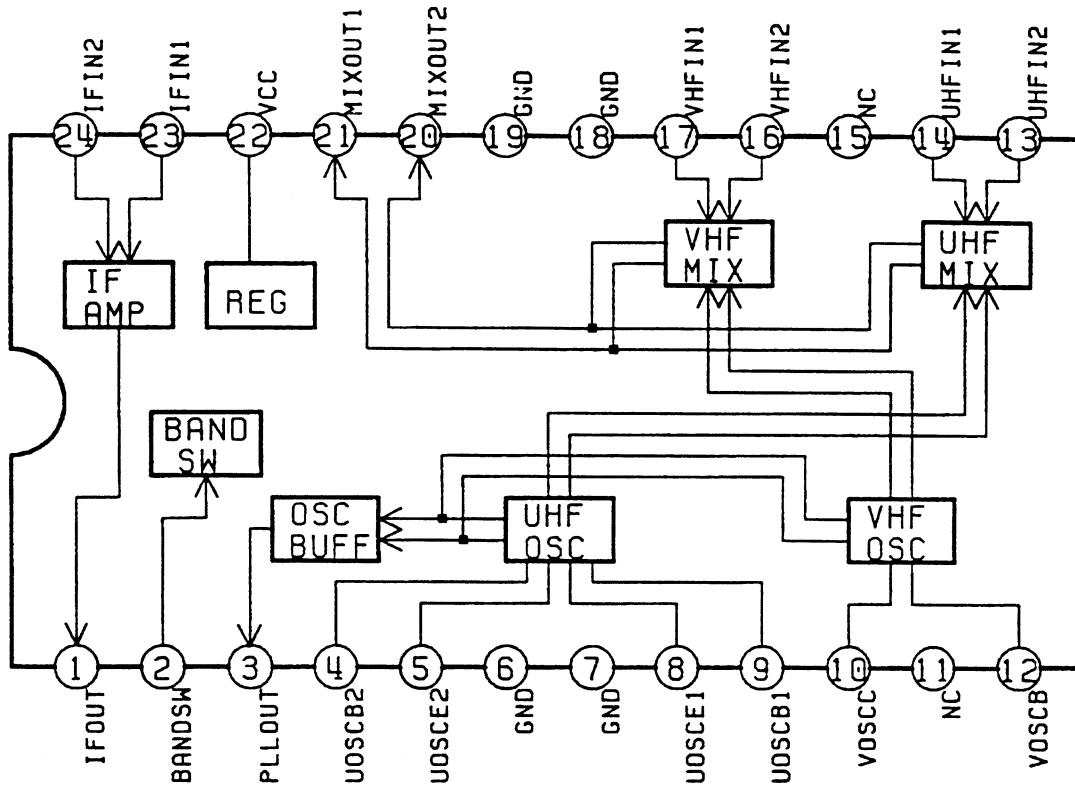
## CRT REAR VIEW





# IC201 MIXER / OSCILLATOR

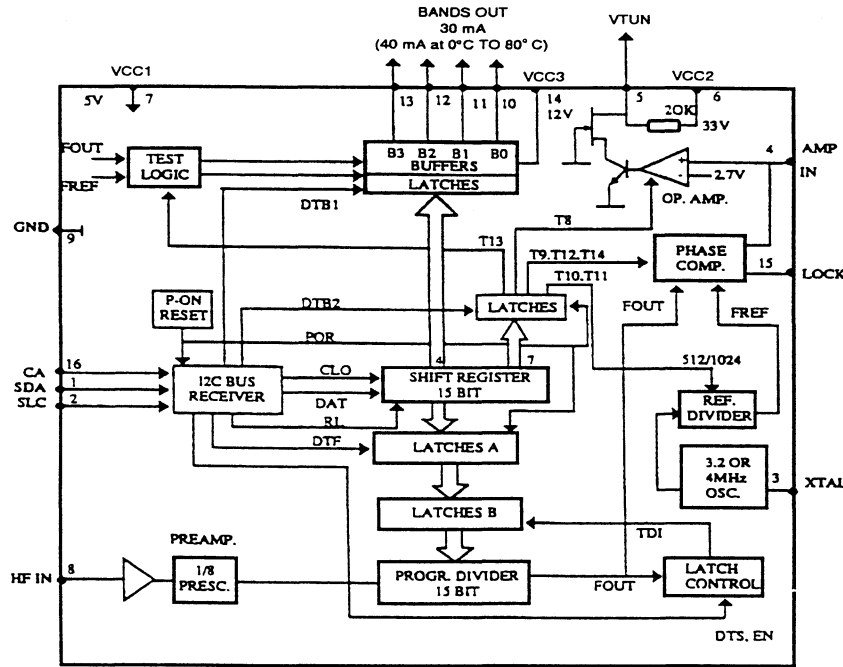
## BLOCK DIAGRAM & PIN CONFIGURATION



221-1011A

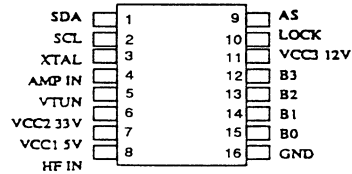
# IC301 PHASE-LOCKED LOOP

## BLOCK DIAGRAM



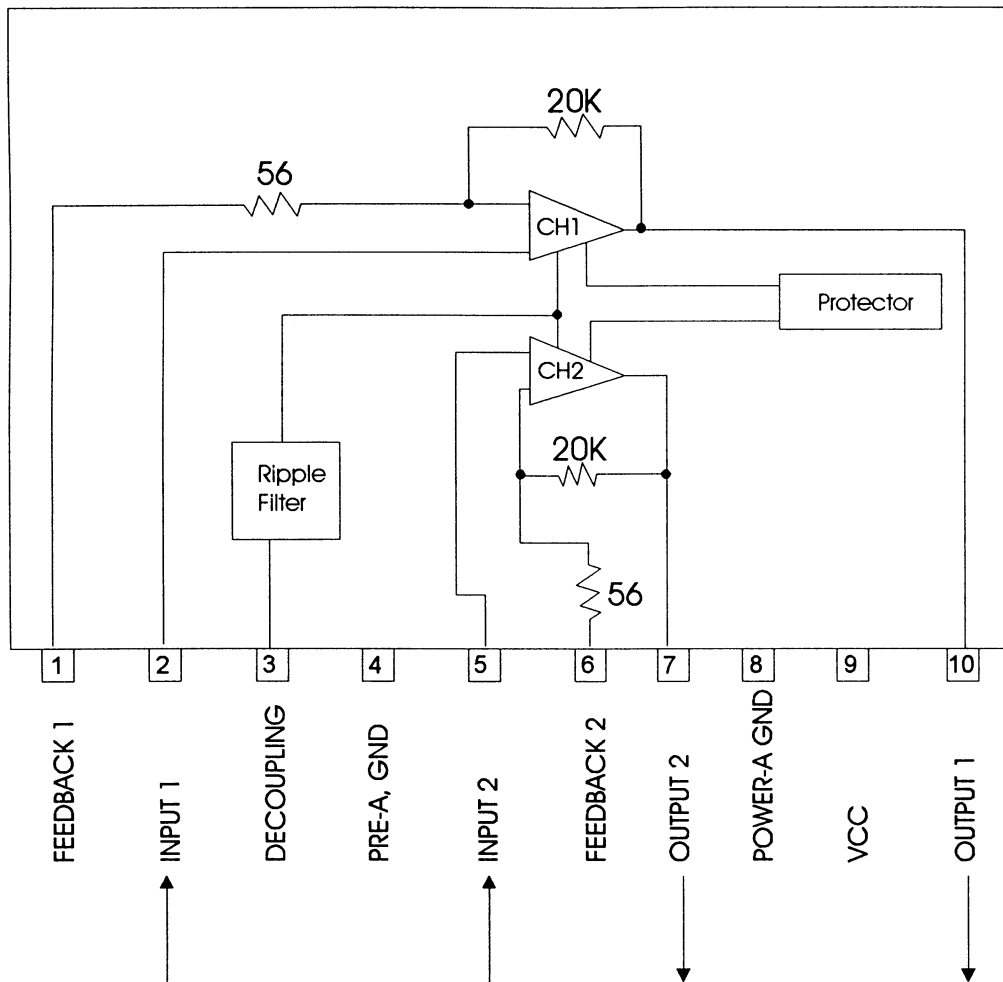
221-1010A

## PIN CONFIGURATION



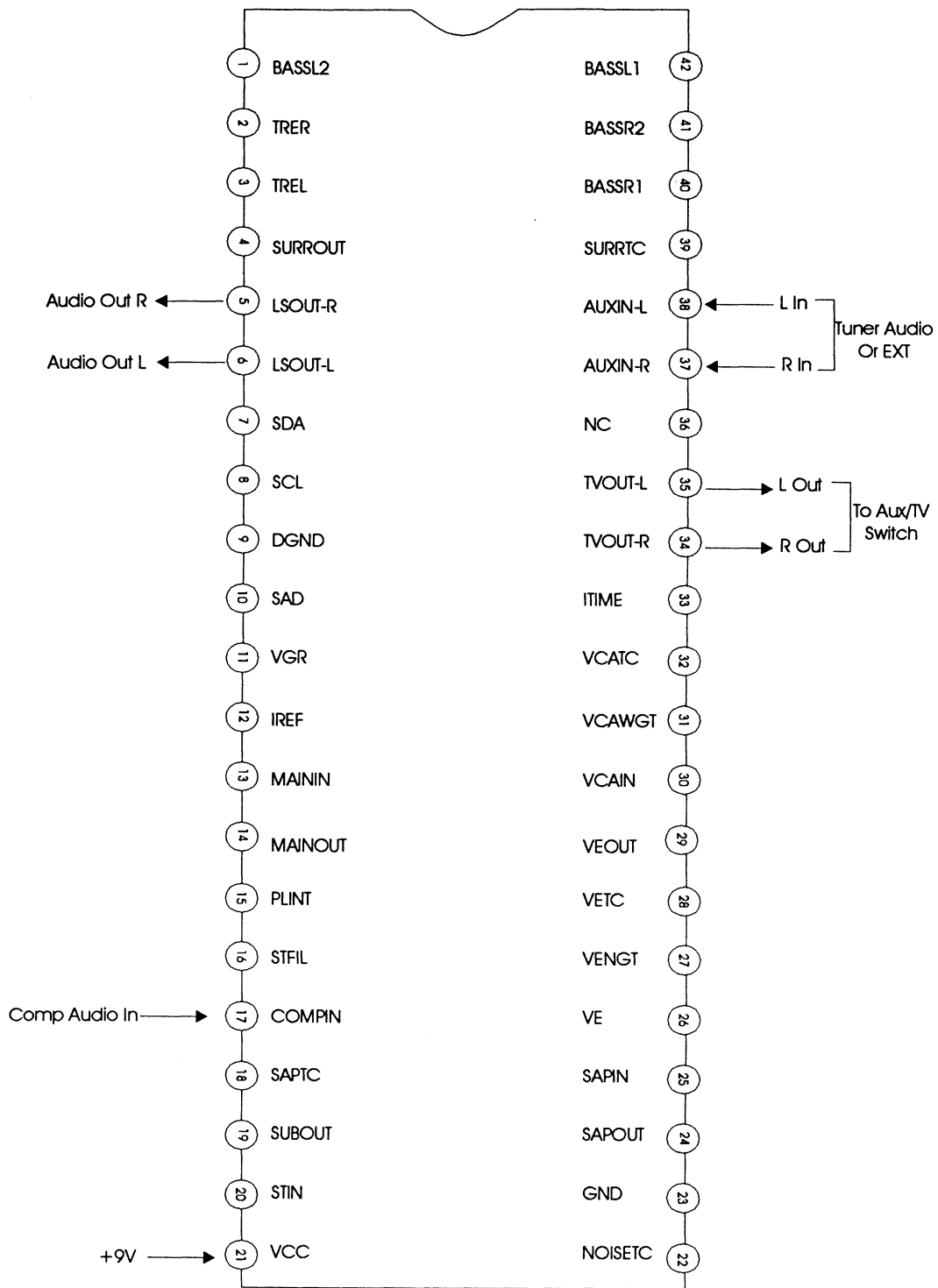
PIN	FUNCTION	DESCRIPTION
1	SDA	DATA INPUT (12C BUS)
2	SCL	CLOCK INPUT (SUPPLIED BY THE MICROPROCESSOR VIA 12C BUS)
3	XTAL	CRYSTAL OSCILLATOR (3.2 MHZ)
4	IN	NEGATIVE OPERATIONAL AMPLIFIER INPUT AND CHARGE PUMP
5	OUT	OPERATIONAL AMPLIFIER OUTPUT WHICH PROVIDES THE TUNING VOLTAGE
6	VCC2	OPERATIONAL AMPLIFIER POSITIVE SUPPLY (33V)
7	VCC1	POSITIVE SUPPLY OF THE CIRCUIT (5V)
8	HF IN	HF INPUT FROM LOCAL OSCILLATOR
9	GND	GROUND
10, 11, 12, 13	B0 TO B3	BAND BUFFER OUTPUTS CAN DRIVE UP TO 30 mA ( 40 mA AT 0 C TO 80 C)
14	VCC3	POSITIVE SUPPLY FOR INTEGRATED BAND BUFFERS (12V)
15	LOCK	LOCK DETECTOR OUTPUT
16	AS	ADDRESS SELECT

IC804  
EQUIVALENT CIRCUIT BLOCK DIAGRAM  
5W 2CH AUDIO AMP



221-598

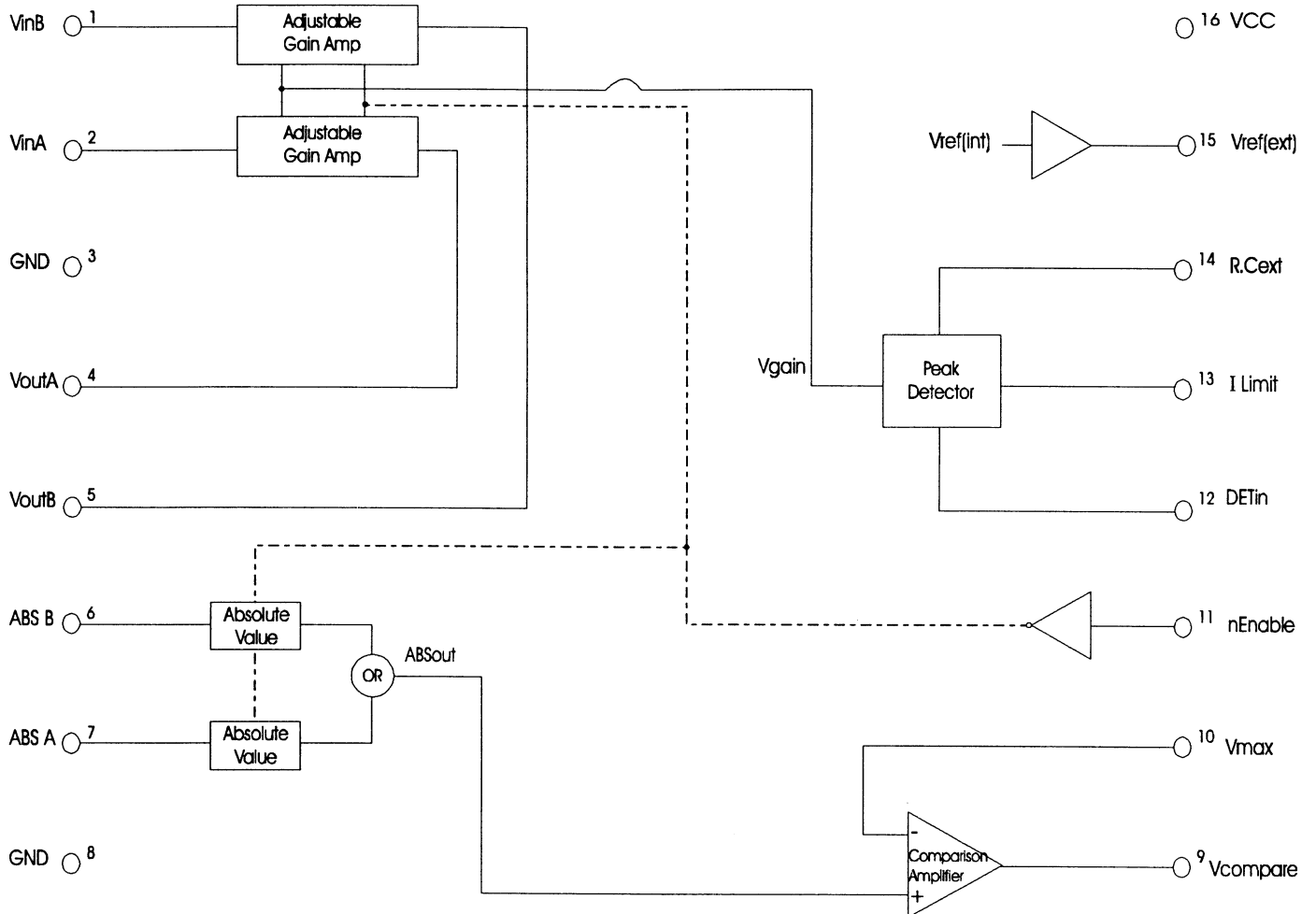
# IC 1400 MTS STEREO DECODER



221-954

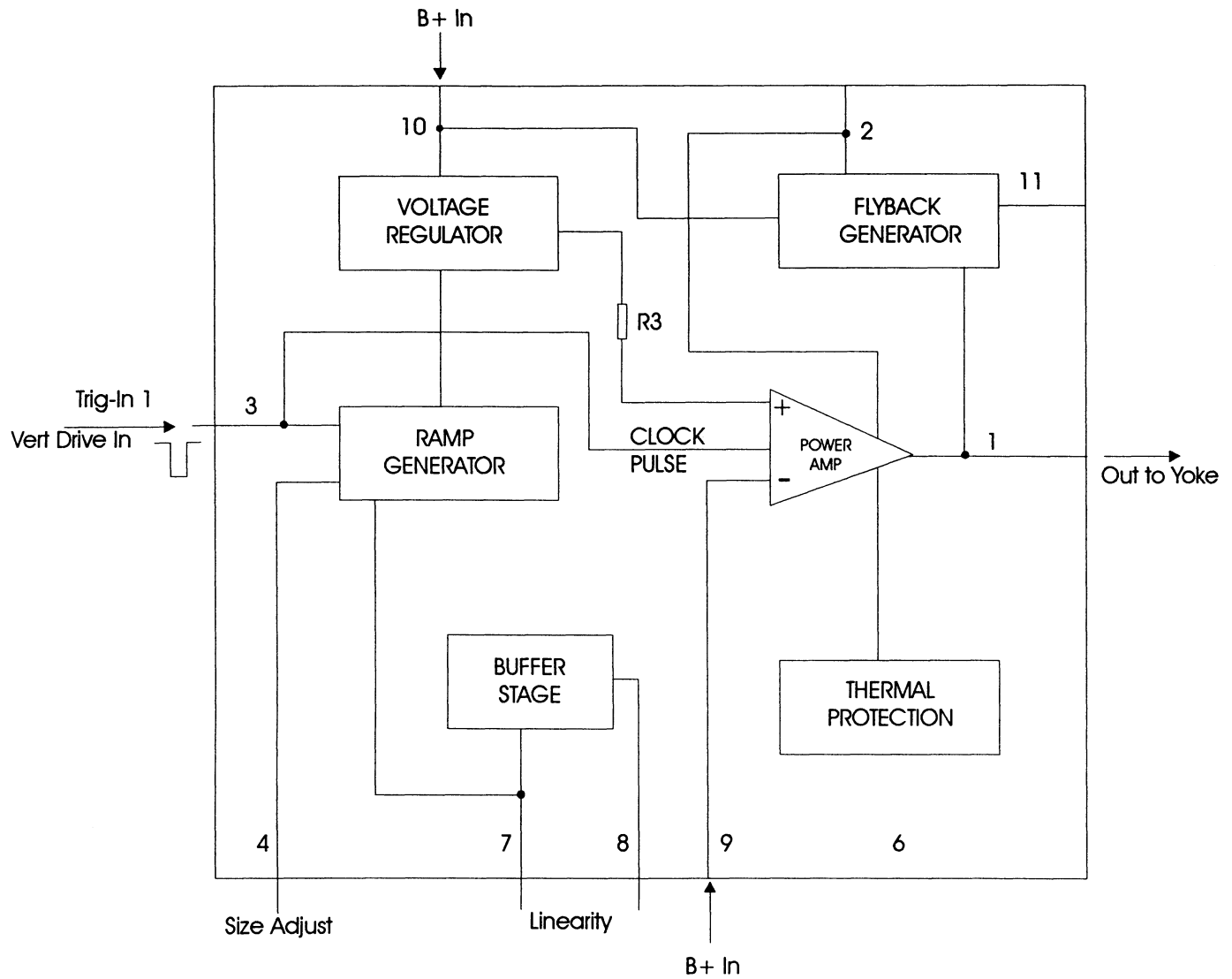
# Block Diagram IC 1402

## AUDIO VOLUME LIMITER



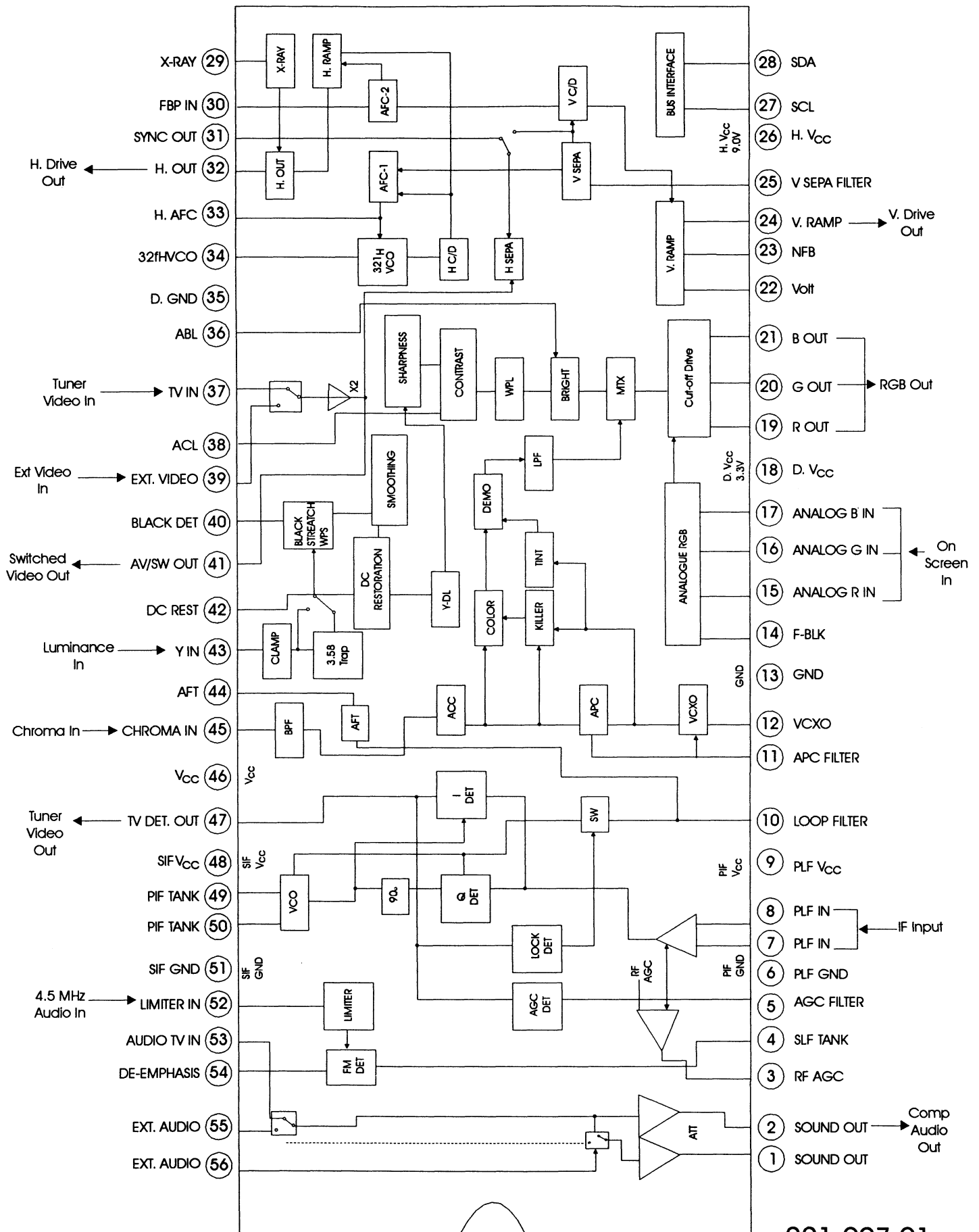
221-1028

IC2100  
FIGURE 1  
BLOCK DIAGRAM  
VERTICAL DEFLECTION

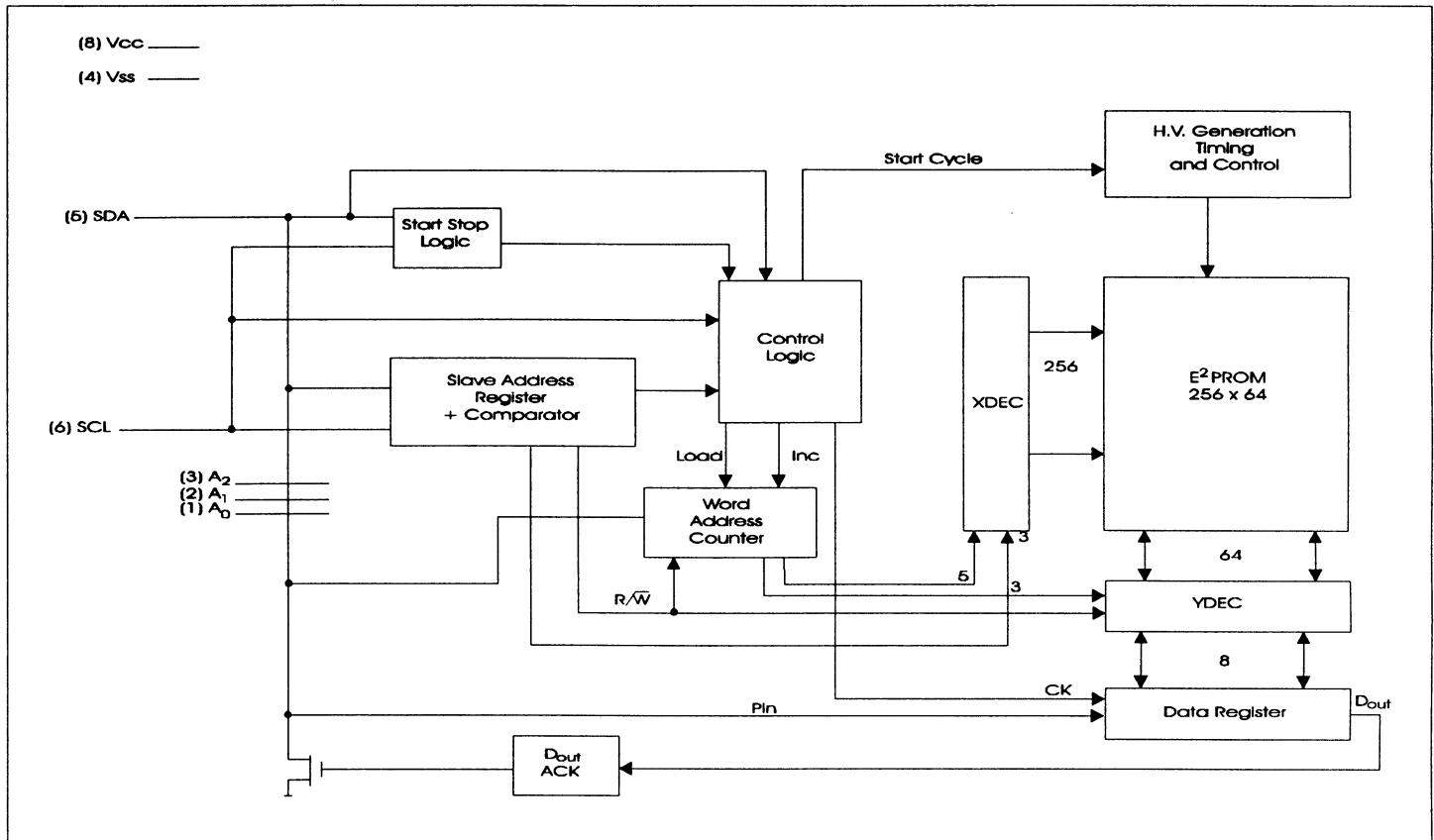


221-992

# ICX2200 BLOCK DIAGRAM IF / VIDEO PROCESSOR



# IC6001 4KBIT SERIAL EEPROM



221-745