Instruction Manual

Tektronix

TSG 131A
Multiformat Signal Generator
SN B030000 to B039999

070-8663-07

Warning
The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

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Tektronix, Inc., P.O. Box 1000, Wilsonville, OR 97070–1000

WARRANTY

Tektronix warrants that this product that it manufactures and sells will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option either will repair the defective product without change for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packing and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment location is within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair, or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Use Proper Voltage Setting. Before applying power, ensure that the line selector is in the proper position for the power source being used.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Wear Eye Protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual’s installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:

WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

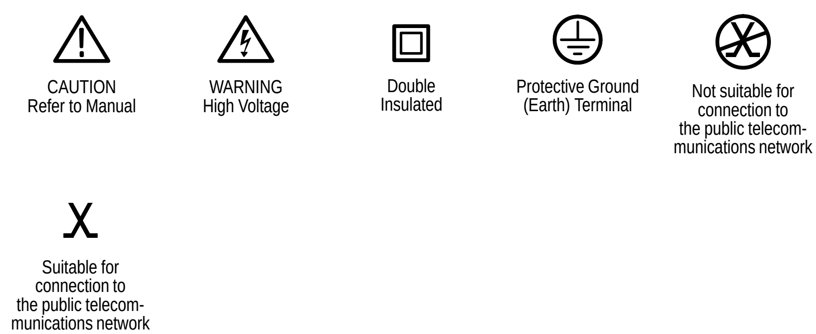
Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

SECTION 1
INTRODUCTION

The TSG 131A Multiformat Signal Generator is a simple, cost-effective test signal generator designed for the service environment. The TSG 131A digitally generates a full complement of test signals in four different formats: PAL/YC; Y, B-Y, R-Y; Y, CTDM; and GBR.

Tables 1-1 lists the test signals available from the TSG 131A and Table 1-2 give what is available from each rear panel output in each of the four modes. The rest of the tables, Tables 1-3 through 1-9, list the special signals and outputs available from each of the various options.

Besides a full complement of video signals in four formats, the TSG 131A supplies two channels of a balanced 1 kHz XLR-audio tone with a jumper-selectable ID click. The frequency of the ID click is also adjustable.

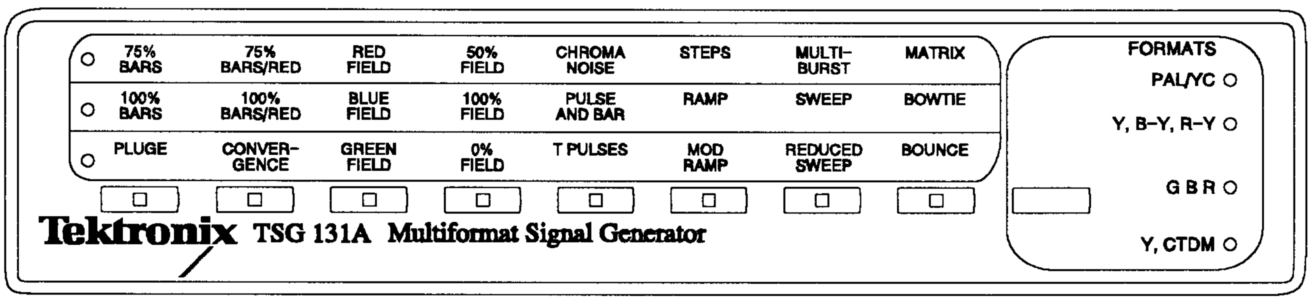


Fig. 1-1. Front panel of the TSG 131A.

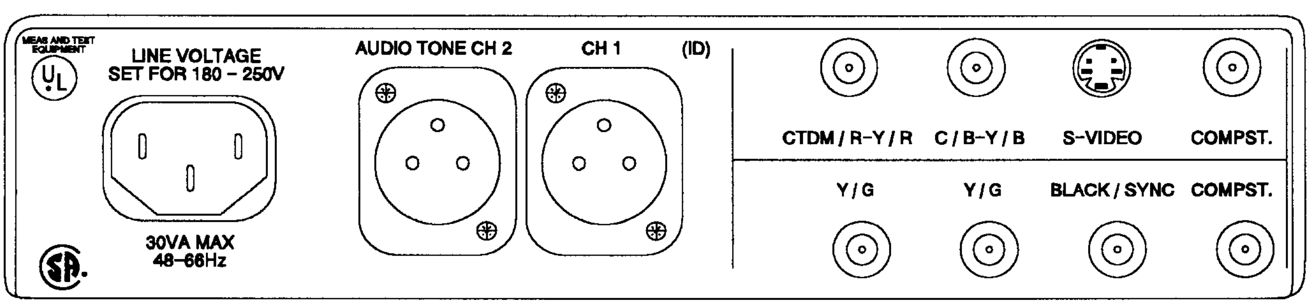


Fig. 1-2. Rear panel of the TSG 131A.

Physical Description

The TSG 130A consists of circuit boards and five cables in a rectangular sheet-aluminum chassis with a top cover. The major internal components are:

1. A main board that performs most of the TSG 131A's functions.
2. A front panel board that decodes front panel button selections.
3. A ribbon cable that feeds decoded front panel information to the main board.
4. A ribbon cable that supplies signals from the main board to the top BNC connector mounting board.
5. Two BNC connector mounting boards: the top board contains one SVHS and three BNC connectors; the bottom board contains four BNC connectors.
6. A ribbon cable that supplies signals from the main board to the bottom BNC connector mounting board.
7. An audio board which provides the audio signals and an optional id click.
8. A cable that supplies power to the audio board.

Table 1-1. TSG 131A Test Signal Summary.
Standard and Option 02 (Black Burst) Signal Set
(Front Panel Matrix — Represents where the signals are found on the Front Panel)

Format	1	2	3	4	5	6	7	8
PAL/YC	75% Color Bars	75% Color Bars over Red	Red Field	50% Flat Field	Chrominance Noise	5-Step	Multiburst	Matrix
	100% Color Bars	100% Color Bars over Red	Blue Field	100% Flat Field	Pulse & Bar	Ramp	Sweep	
	Pluge	Convergence	Green Field	0% Flat Field		Mod Ramp	Reduced Sweep	Bounce
Y, B-Y, R-Y (Betacam 3 Wire)	75% Color Bars	75% Color Bars over Red		50% Flat Field			Multiburst	Matrix
	100% Color Bars	100% Color Bars over Red		100% Flat Field	Pulse & Bar	Valid 5-Step	Sweep	Bowtie
				0% Flat Field	T Pulses		Reduced Sweep	
G B R	75% Color Bars		Red Field			10-Step	Multiburst	
	100% Color Bars		Blue Field		Pulse & Bar		Sweep	Bowtie
		Convergence	Green Field					
Y, CTDM (Betacam 2 Wire)	75% Color Bars			50% Flat Field				
	100% Color Bars			100% Flat Field				
				0% Flat Field				

Table 1-2. Available Outputs for the Standard TSG 131A in the Various Output Formats.

Format	Rear Panel Output					
	COMPOSITE	S-VIDEO	BLACK / SYNC	C / B-Y / B	Y / G	CTDM / R-Y / R
PAL / YC	PAL	Y / C	No Output	C	Y	Illegal Signal
Y, B-Y, R-Y (BetaCam)	Illegal Signal (Y + B-Y)	Y / B-Y	No Output	B-Y	Y	R-Y
G B R	Illegal Signal (G + B)	G / B	No Output	B	G (with/without sync)	R
Y, CTDM (BetaCam)	Y	Y / 0 Volts	No Output	0 Volts	Y	CTDM

Table 1-3.
List of the available outputs in the various formats for the TSG 131A Opt. 02.

Format	Rear Panel Output					
	COMPOSITE	S-VIDEO	BLACK / SYNC	C / B-Y / B	Y / G	CTDM / R-Y / R
PAL / YC	PAL	Y / C	BLACK / SYNC	C	Y	Illegal Signal
Y, B-Y, R-Y (BetaCam)	Illegal Signal (Y + B-Y)	Y / B-Y	BLACK / SYNC	B-Y	Y	R-Y
G B R	Illegal Signal (G + B)	G / B	BLACK / SYNC	B	G (with sync / no sync)	R
Y, CTDM (BetaCam)	Y	Y / 0 Volts	BLACK / SYNC	0 Volts	Y	CTDM

Table 1-4. TSG 131A Test Signal Summary.
Option 01 (MII Signal Set)
(Front Panel Matrix — Represents where the signals are found on the Front Panel)

Format	1	2	3	4	5	6	7	8
PAL/YC	75% Color Bars	75% Color Bars over Red	Red Field	50% Flat Field	Chrominance Noise	5-Step	Multiburst	Matrix
	100% Color Bars	100% Color Bars over Red	Blue Field	100% Flat Field	Pulse & Bar	Ramp	Sweep	
	Pluge	Convergence	Green Field	0% Flat Field		Mod Ramp	Reduced Sweep	Bounce
Y, B-Y, R-Y (Betacam 3 Wire)	75% Color Bars	75% Color Bars over Red		50% Flat Field			Multiburst	Matrix
	100% Color Bars	100% Color Bars over Red		100% Flat Field	Pulse & Bar	Valid 5-Step	Sweep	Bowtie
				0% Flat Field	T Pulses		Reduced Sweep	
G B R	75% Color Bars		Red Field			10-Step	Multiburst	
	100% Color Bars		Blue Field		Pulse & Bar		Sweep	Bowtie
		Convergence	Green Field					
Y, CTDM (MII 2 Wire)	75% Color Bars[1]			50% Flat Field[1]				
	100% Color Bars[1]			100% Flat Field[1]				
				0% Flat Field[1]				

1. Unique MII signals.

Table 1-5. Available Outputs for the Option 01 TSG 131A in the Various Output Formats.

Format	Rear Panel Output					
	COMPOSITE	**S-VIDEO**	**BLACK / SYNC**	**C / B-Y / B**	**Y / G**	**CTDM / R-Y / R**
PAL / YC	PAL	Y / C	No Output	C	Y	Illegal Signal
Y, B-Y, R-Y (BetaCam)	Illegal Signal (Y + B-Y)	Y / B-Y	No Output	B-Y	Y	R-Y
G B R	Illegal Signal (G + B)	G / B	No Output	B	G (with sync)	R
Y, CTDM (BetaCam)	Y	Y / 0 Volts	No Output	0 Volts	Y	CTDM

Table 1-6. TSG 131A Test Signal Summary.
for Option -03 Betacam signals with Black Burst Output (Front Panel Matrix — Represents where the signals are found on the Front Panel)

Format	1	2	3	4	5	6	7	8
PAL/YC	75% Color Bars[1]	75% Color Bars over Red[1]	Red Field[1]	50% Flat Field[1]	Chrominance Noise[1]	5-Step[1]	Multiburst	Matrix
	100% Color Bars[1]	100% Color Bars over Red[1]	Blue Field[1]	100% Flat Field[1]	Pulse & Bar	Ramp[1]	Sweep[1]	
	Pluge	Convergence[1]	Green Field[1]	0% Flat Field		Mod 5-Step	Reduced Sweep[1]	Bounce
Y, B-Y, R-Y (Betacam 3 Wire)	75% Color Bars[1]			50% Flat Field[1]	Sin x/x *	5-Step*	60% Multiburst[1]	Matrix
	100% Color Bars[1]			100% Flat Field*	Pulse & Bar1	Quad Phase*	Multiburst*	Bowtie[1]
				0% Flat Field	T Pulses*	"Line 17"*	Sweep*	
G B R	75% Color Bars		Red Field			10-Step	Multiburst	
	100% Color Bars		Blue Field		Pulse & Bar		Sweep	Bowtie
		Convergence	Green Field					
Y, CTDM (Betacam 2 Wire)	75% Color Bars[1]							

1. Timing is different from the standard signal.
* Unique signal.

Table 1-7.
Various rear panel outputs available in the various formats of the TSG 131A Opt. 03.

Format	Rear Panel Output						
	COMPOSITE	S-VIDEO	BLACK / SYNC	C / B-Y / B	Y / G (LEFT)	Y / G (RIGHT)	CTDM / R-Y / R
PAL / YC	PAL	Y / C	BLACK BURST or COMP SYNC	C	Y	COLOR FLAG REFERENCE PULSE	Illegal Signal
Y, B-Y, R-Y (BetaCam)	Illegal Signal (Y + B-Y)	Y / B-Y	BLACK BURST or COMP SYNC	B-Y	Y	COLOR FLAG REFERENCE PULSE	R-Y
G B R	Illegal Signal (G + B)	G / B	BLACK BURST or COMP SYNC	B	G (with sync / no sync)	COLOR FLAG REFERENCE PULSE	R
Y, CTDM (BetaCam)	Y	Y / 0 Volts	BLACK BURST or COMP SYNC	0 Volts	Y	COLOR FLAG REFERENCE PULSE	CTDM

Table 1-8. TSG 131A Test Signal Summary.
for Option -04 MII signals with COMP SYNC on the Optional Output
(Front Panel Matrix — Represents where the signals are found on the Front Panel)

Format	1	2	3	4	5	6	7	8
PAL/YC	75% Color Bars*	75% Color Bars over Red*	Red Field	50% Flat Field	Chrominance Noise	5-Step	60% Multiburst *	Matrix
	100% Color Bars	100% Color Bars over Red	Blue Field	100% Flat Field	Pulse & Bar	Ramp*	100% Sweep*	
	Pluge	Convergence	Green Field	0% Flat Field		Mod Ramp*		Bounce
Y, B-Y, R-Y (Betacam 3 Wire)	75% Color Bars*			50% Flat Field		5-Step*		100% Bowtie*
	100% Color Bars			100% Flat Field	Pulse & Bar*	Over-sized Ramp*	100% Sweep*	50% Bowtie
	75% Color Bars with Level Reference*			0% Flat Field	T Pulses*		60% Sweep*	
G B R	75% Color Bars		Red Field			10-Step	Multiburst	
	100% Color Bars		Blue Field		Pulse & Bar		Sweep	Bowtie
		Convergence	Green Field					
Y, CTDM (MII 2 Wire)								
	100% Color Bars*							

* Unique signal.

Table 1-9.
Rear Panel Outputs in the various formats for the TSG 131A Opt. 04.

Format	Rear Panel Output						
	COMPOSITE	S-VIDEO	BLACK / SYNC	C / B-Y / B	Y / G (LEFT)	Y / G (RIGHT)	CTDM / R-Y / R
PAL / YC	PAL	Y / C	COMP SYNC (TTL or Video)	C	Y	COLOR FRAME SQUARE WAVE	Illegal Signal
Y, B-Y, R-Y (MII)	Illegal Signal (Y + B-Y)	Y / B-Y	COMP SYNC (TTL or Video)	B-Y	Y	COLOR FRAME SQUARE WAVE	R-Y
G B R	Illegal Signal (G + B)	G / B	COMP SYNC (TTL or Video)	B	G (with/without sync)	COLOR FRAME SQUARE WAVE	R
Y, CTDM (MII)	Y	Y / 0 Volts	COMP SYNC (TTL or Video)	0 Volts	Y	COLOR FRAME SQUARE WAVE	CTDM

SECTION 2
CONTROLS & CONNECTIONS

Operating Instructions

This section describes the front panel controls, the rear panel connectors, and how to use them.

For information on configuring the internal jumpers see Section 5, Installation and Maintenance.

For information on configuring the power supply for 110 V_{AC} or 220 V_{AC} operation, see Section 5.

CAUTION

The TSG 131A is shipped from the factory configured for 220 V_{AC} operation. Attempting to operate the TSG 131A at any other voltage without reconfiguring the power supply may cause damage. Refer to the Installation and Maintenance Section for further information.

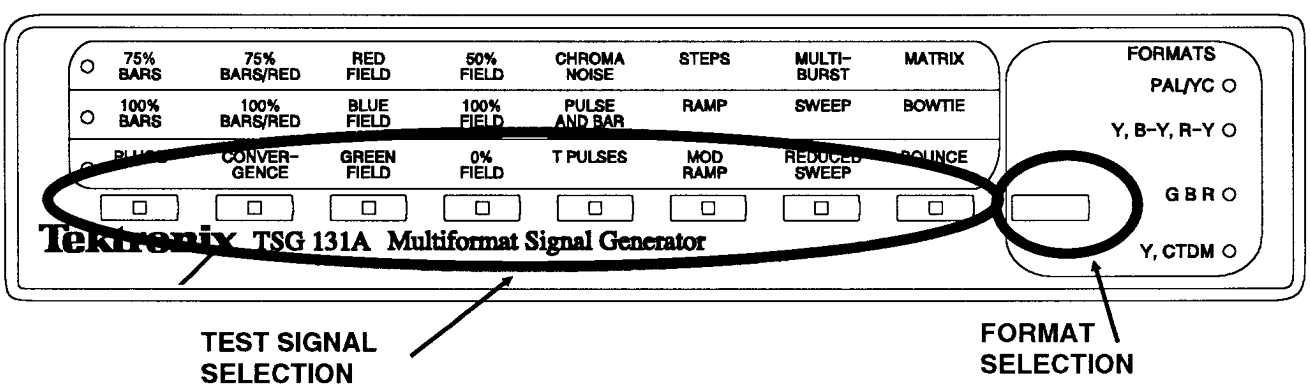


Fig. 2-1. Front panel of the TSG 131A.

Front Panel Controls
(See Fig. 2-1)

The front panel is organized into two sections.

The right section is a format selection area. This area contains a single button, the Format Selection button. It selects one of the four video test signal formats. Pressing the button switches between the formats moving from top to bottom. The TSG 131A powers up in the PAL/YC format. An LED indicates the signal format selected.

The left section contains eight Test Signal Selection buttons. Above the buttons are three rows of test signal selections, arranged in columns. On the left side are three LEDs, one for each row. These LEDs indicate the test signal row selected. There is an LED in the center of each Test Signal Selection button. The button lights to indicate which column is selected. To determine which test signal is selected, use the left LEDs to determine which row and the LED in the button to identify the column. See Fig. 2-2 for an example.

Pressing a Test Signal Selection button for the first time lights the top-row LED, if the signal format selected (for example, Y, B-Y, R-Y) offers that particular test signal. Successive presses of the same button select other test signals in the column above the button. If a test signal is not available in a selected format, the selection indicator moves to the top of the column or first available signal. If the format is changed and no test signals are offered from that column in the selected format, the indicator moves to 75% Bars.

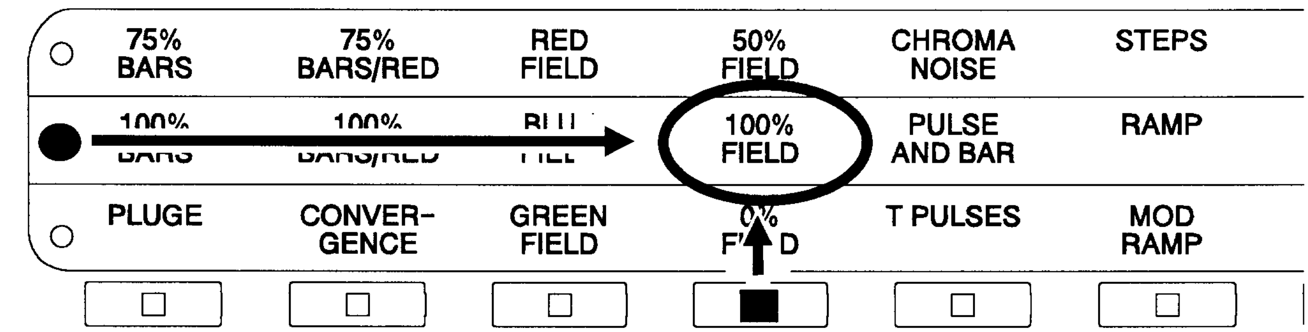


Fig. 2-2.
How to determine which signal is selected from the TSG 131A.
Row 2 / Column 4 indicates that the 100% Field signal has been selected.

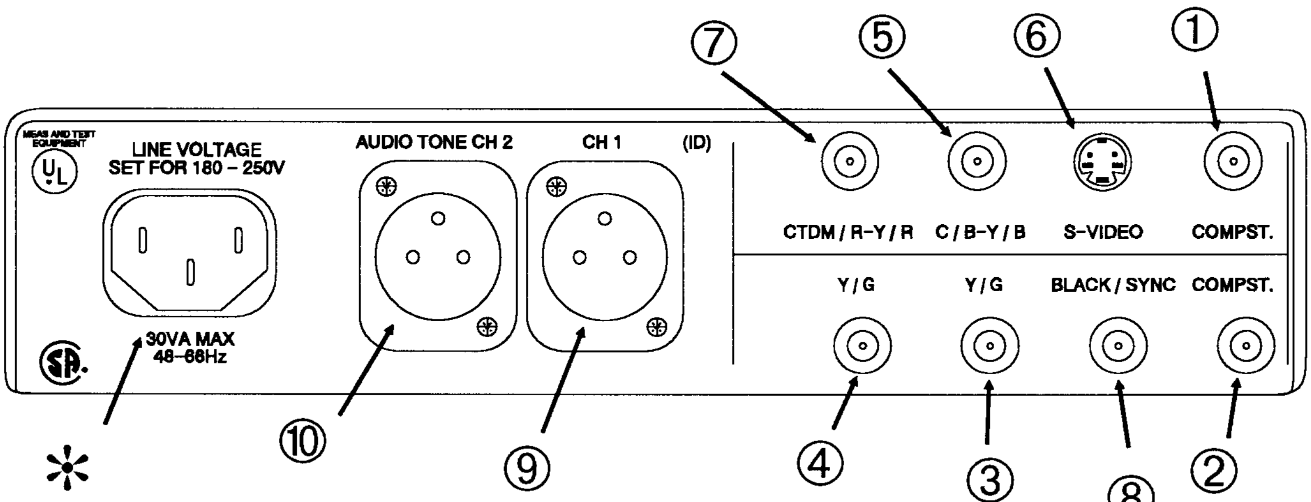


Fig. 2-3. Rear panel of the TSG 131A.

Rear Panel Connections (See Fig. 2-3)

This section describes the TSG 131A rear panel connections.

The rear panel provides the following outputs:

Multi-purpose Outputs

NOTE

Only the output associated with the "active signal set" selected from the front panel has a valid signal on it. For example, if PAL/YC is active There is not a valid signal on the CTDM / R-Y / R output.

① **COMPST.** PAL test signal output (PAL/YC format only).

② **COMPST.** PAL test signal output (PAL/YC format only).

③ **Y/G.** Luminance output for all formats except GBR, when it outputs Green. Outputs only Color Frame Square Wave in Option 04. Outputs only Color Flag Reference Pulse in Option 03.

④ **Y/G.** Luminance output for all formats, except GBR, when it outputs Green.

⑤ **C/B-Y/B.** Chrominance output (PAL/YC format); B-Y output in Y, B-Y, R-Y format; Blue in GBR format.

⑥ **S-VIDEO.** Y/C output (see S-Video connector pinout). The TSG 131A offers an S-Video output as an *alternative* to the Y and C outputs.

NOTE

It is recommended that the S-Video output not be used simultaneously with the Y and C BNC outputs. Using the S-Video output while also using the Y and C BNC outputs will degrade Y-channel output accuracy.

⑦ **CTDM/R-Y/R.** R-Y output in Y, B-Y, R-Y format; CTDM output in CTDM format; and Red in GBR format.

⑧ **Option.** Not used on the standard instrument and Opt. 01. Outputs either Black Burst or Comp Sync in Options 02 and 03. Outputs only Comp Sync for Option 04.

Audio Tone ID

CAUTION

The Audio Outputs are designed to drive a 600Ω load ***ONLY****. Attempting to drive any other load could damage the instrument.*

⑨ **CH 1 (ID).** 1 kHz audio tone output with jumper-selectable ID click. The frequency of the ID click may be changed, or the click may be disabled. (See the Installation Section to disable the click and the adjustment procedures to change the frequency.)

⑩ **AUDIO TONE CH 2.** 1 kHz audio tone output in phase with CH 1. The TSG 131A's audio tone output is a balanced 1 kHz XLR audio tone. Audio output gain is adjustable via internal potentiometers (see the Adjustment Section).

Power Supply

CAUTION

There is not an ON/OFF switch for the power supply. If the instrument is plugged in to a power source it is "on".

✳ **LINE VOLTAGE.** Electrical mains input, factory set for 220 VAC (to change the power supply operating voltage, see *Section 5, Installation*).

Using the Controls & Connectors (Standard Instrument ONLY)

The following figures illustrate which test signals are available under a given format and what are valid outputs from the rear panel.

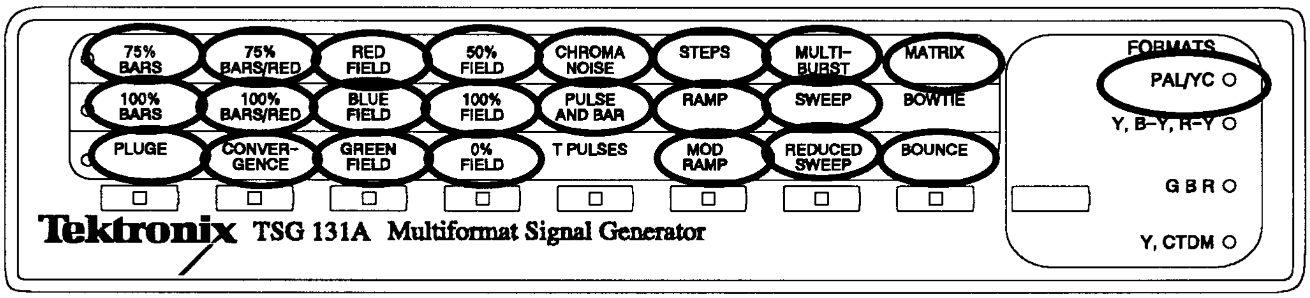


Fig. 2-4. Signals available in PAL/YC format.

1	2	3	4	5	6	7	8
75% Color Bars	75% Color Bars over Red	Red Field	50% Flat Field	Chrominance Noise	5-Step	Multiburst	Matrix
100% Color Bars	100% Color Bars over Red	Blue Field	100% Flat Field	Pulse & Bar	Ramp	Sweep	
Pluge	Convergence	Green Field	0% Flat Field		Mod Ramp	Reduced Sweep	Bounce

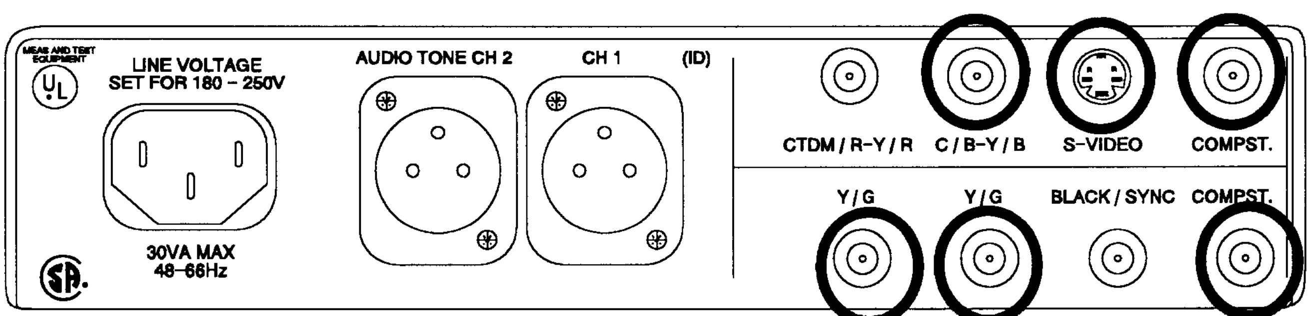


Fig. 2-5. Valid outputs in the PAL/YC mode.

COMPOSITE	S-VIDEO	C / B-Y / B	CTDM / R-Y / R	BLACK / SYNC	Y / G
PAL	Y / C	C	Illegal Signal	No Output	Y

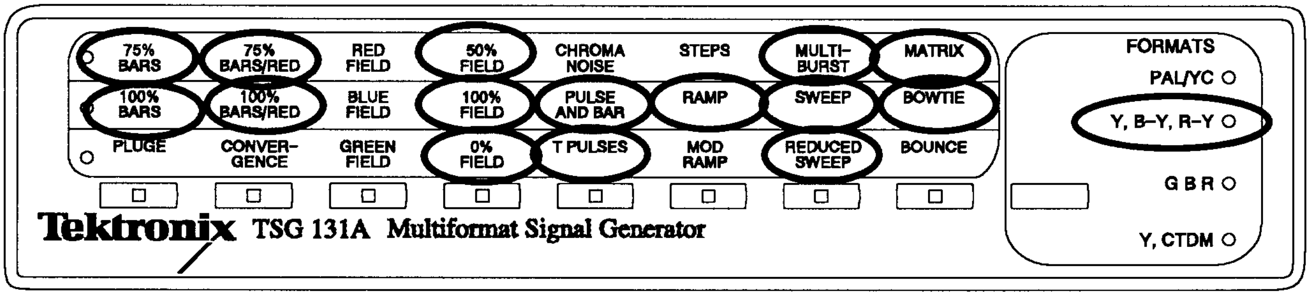


Fig. 2-6. Signals available in Y, B-Y, R-Y format.

1	2	3	4	5	6	7	8
75% Color Bars	75% Color Bars over Red		50% Flat Field			Multiburst	Matrix
100% Color Bars	100% Color Bars over Red		100% Flat Field	Pulse & Bar	Valid 5-Step	Sweep	Bowtie
			0% Flat Field	T Pulses		Reduced Sweep	

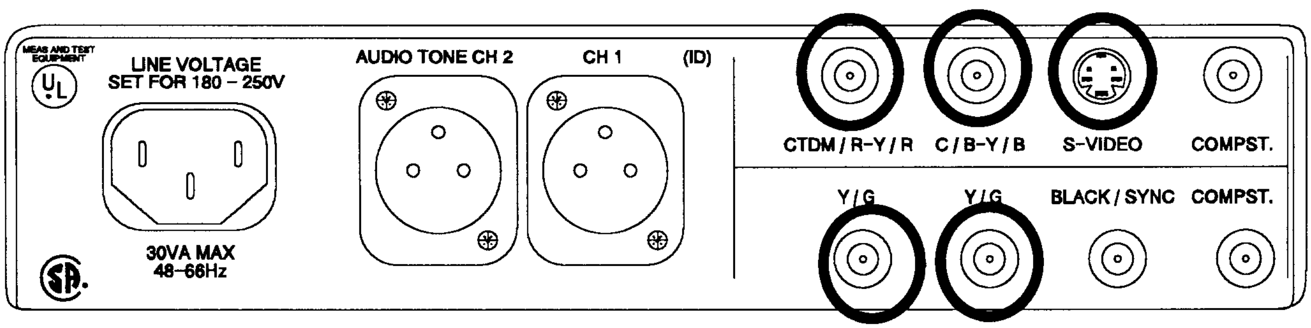


Fig. 2-7. Outputs available in the Y, B-Y, R-Y format.

COMPOSITE	S-VIDEO	C / B-Y / B	CTDM / R-Y / R	BLACK / SYNC	Y / G
Illegal Signal (Y + B-Y)	Y / B-Y	B-Y	R-Y	No Output	Y

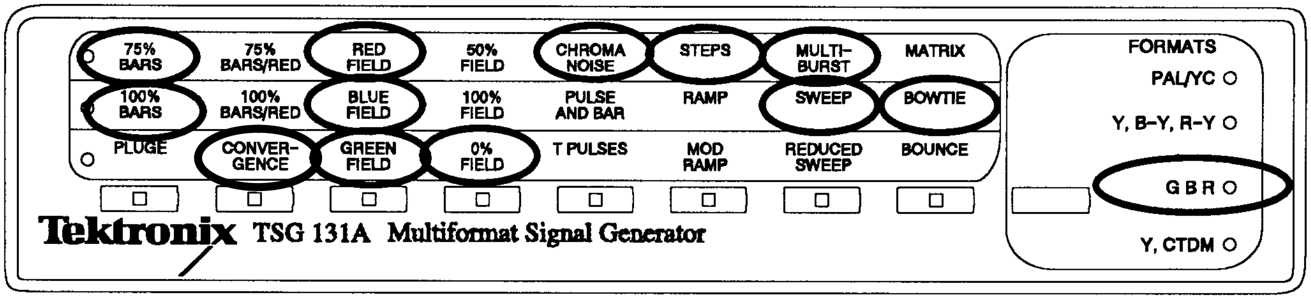


Fig. 2-8. Signals available in GBR format.

1	2	3	4	5	6	7	8
75% Color Bars		Red Field			10-Step	Multiburst	
100% Color Bars		Blue Field		Pulse & Bar		Sweep	Bowtie
	Convergence	Green Field					

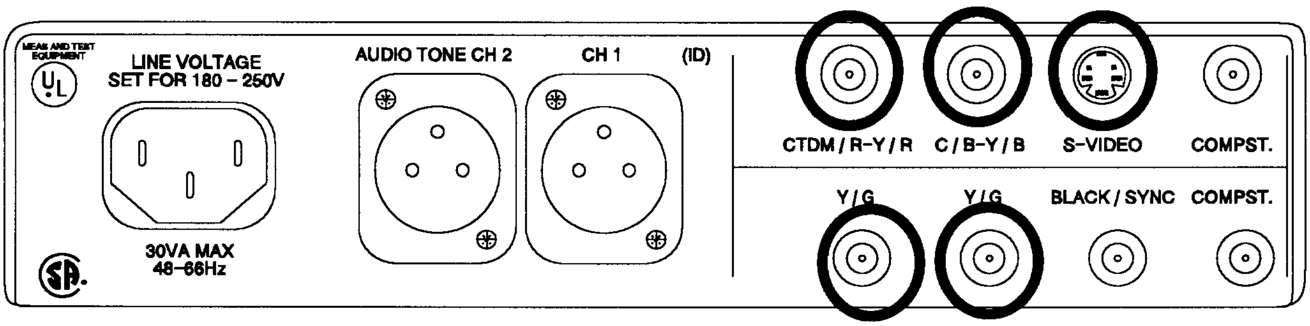


Fig. 2-9. Outputs available in the GBR format.

COMPOSITE	S-VIDEO	C / B-Y / B	CTDM / R-Y / R	BLACK / SYNC	Y / G
Illegal Signal (G + B)	G / B	B	R	No Output	G

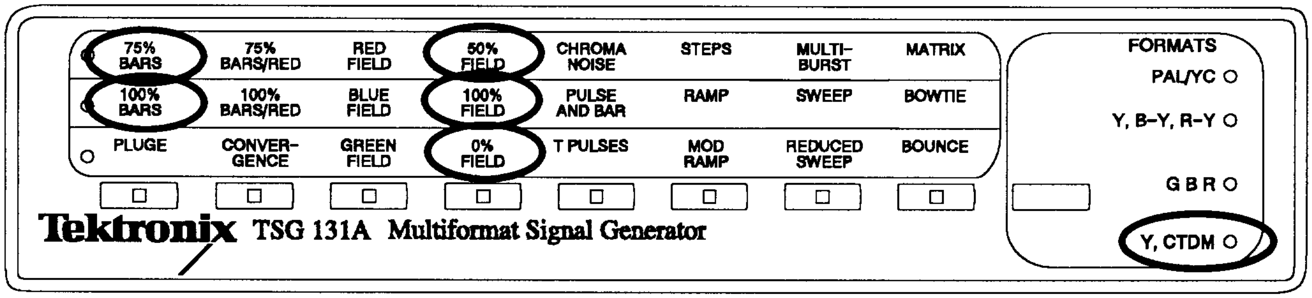


Fig. 2-10. Signals available in CTDM format.

1	2	3	4	5	6	7	8
75% Color Bars		50% Flat Field					
100% Color Bars		100% Flat Field					
		0% Flat Field					

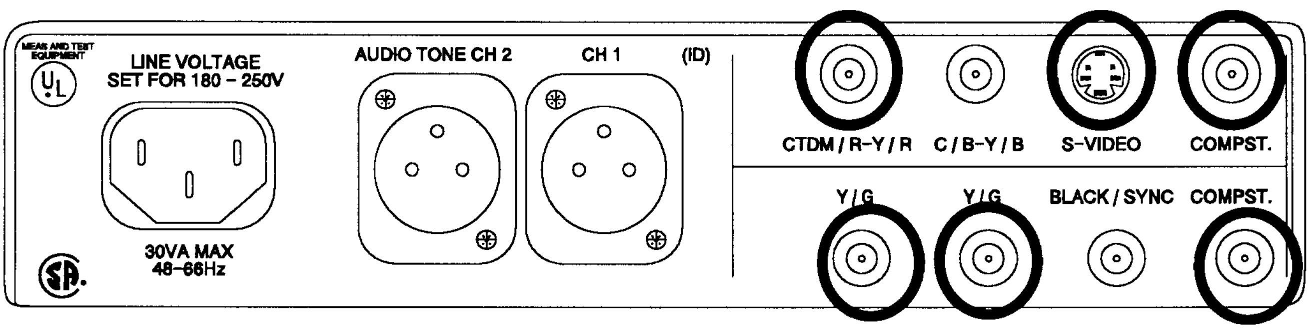


Fig. 2-11. Outputs available in the Y, CTDM format.

COMPOSITE	S-VIDEO	C / B-Y / B	CTDM / R-Y / R	BLACK / SYNC	Y / G
Y	Y / 0 Volts	0 Volts	CTDM	No Output	Y

SECTION 3
SIGNAL GENERATOR SPECIFICATIONS

The material in this section is organized into two main groupings: the specification tables and the supporting figures. The specification tables include:

1. General test signal specifications for all formats.
2. PAL/YC general and test signal specifications
3. Component test signal specifications
4. GBR test signal specifications.
5. CTDM test signal specifications.
6. Signal level specifications
7. Power supply, physical, and environmental specifications.

The supporting figures (waveform diagrams and related data) follow the specification tables.

Performance Conditions

The Performance Requirements are valid within the environmental limits if the instrument is adjusted at 25°C ± 5°C, and a minimum warm-up time of 20 minutes is allowed.

Electrical Specifications

NOTE

All figures referenced in this section are found after the Specification tables.

Table 3-1.
General Test Signal Characteristics.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Amplitude Accuracy Channel Matching	 ± 1% ± 0.5%	 B & R relative to G. Measured using GBR signals.	PAL = 6. Y = 21. Blue = 47. Red = 54. G to B = 59. G to R = 59.
Delay Channel Matching	 within 5 ns	 B-Y & R-Y relative to Y.	Y to B-Y = 57. Y to R-Y = 58.
Frequency Response Y, PAL, G, B, & R B-Y & R-Y Channels	 Flat to 6.0 MHz ± 2%. Flat to 3.0 MHz ± 1%.		PAL = 18. B-Y = 39. R-Y = 44 Green = 45. Blue = 48. Red = 52.
Rise Time Luminance Chrominance Burst Sync Color Difference	 250 ns ± 25 ns 350 ns ± 35 ns 350 ns ± 35 ns 250 ns ± 25 ns 350 ns ± 35 ns	Except as otherwise specified.	Sync = 16. Y = 17. C = 34. Burst = 33. B-Y = 37. R-Y = 42.
Sync Amplitude PAL/YC BetaCam MII 3 wire MII 2 wire GBR (sync on Green only)	 300 mV ± 6 mV 300 mV ± 6 mV 300 mV ± 6 mV 300 mV ± 6 mV 300 mV ± 6 mV		PAL = 3. Y = 23. G = 46.
Line Sync Duration PAL/YC BetaCam 3 wire BetaCam 2 wire MII	 4.7 µs ± 50 ns 4.7 µs ± 50 ns 5.0 µs ± 50 ns 4.7 µs ± 50 ns	50% amplitude point	PAL = 15. Y= 24.
Front Porch Duration (625/50)	1.55 µs minimum		

Table 3-1. Cont.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Line Blanking Interval	12.0 μs ± 0.15 μs	Measured at the 50% point of active video.	PAL = 14.
Vertical Serration Duration	4.7 μs ± 50 ns	50% amplitude point	PAL = 13. Y = 30.
Equalizing Pulse Duration	2.35 μs ± 50 ns	50% amplitude point	PAL = 13. Y = 30.
DC Level	0 V_{dc} ± 50 mV_{dc}		PAL =2. Y = 22. B-Y = 35. R-Y = 40.
Sine Squared Pulses Accuracy	HADs accurate within 25 ns.	Except as otherwise specified.	PAL = 12. Y = 29. B-Y = 38. R-Y = 43.
Step Staircase Linearity Error	≤ 1%	Relative step matching.	PAL = 5. Y = 25. Blue = 49. Red = 53.
Field Tilt		< 0.5%	
Line Tilt	< 0.5%		PAL = 9. Y = 26. Blue = 50. Red = 55.
Pulse to Bar Ratio	1:1 ± 1%		PAL = 11. Y = 28. B = 51. R = 56.
2T K Factor (K_{2T} Factor) Pulse Ringing (2T Pulse)	< 0.6%	≤ 1% peak	PAL = 10. Y = 27. B-Y = 36. R-Y = 41.
Output Impedance		75 Ω	
Return Loss		≥ 36 dB to 5 MHz	
Crosstalk		≥ 60 dB down	
Residual Subcarrier		≥ 60 dB down	

Table 3-1. Cont.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Oscillator Frequency Stability Normal Option 10	 $F_{CLK} \pm 40$ Hz over 5°C to 35°C $F_{CLK} \pm 20$ Hz over 5°C to 35°C	$F_{CLK} = 17.734375$ MHz temperature range after a 30 minute warm-up. Oscillator to be adjusted annually. (Divide by 4 to obtain subcarrier specification.)	1.
Subcarrier Frequency Stability Normal Option 10	 $F_{sc} \pm 10$ Hz over 5°C to 35°C $F_{sc} \pm 5$ Hz over 5°C to 35°C	$Fsc = \frac{1135H + 100}{4} = 4.43361875$ MHz $H = \frac{1}{64\ \mu s}$	

Table 3-2. General PAL/YC Signal Charateristics.
(The following specifications apply to the PAL/YC formats only.)

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Diiferential Gain	0.7% maximum.	Typical 0.3%.	19.
Differential Phase	0.5° maximum.	Typical 0.3°. When averaged by a TEK 1781 or VM700 the quantization errors in the mod ramp are greatly reduced allowing a more accurate measurement of dg and dφ.	19.
Chrominance-to-Luminance Gain	± 1%		8.
Chrominance Accuracy on C Output	± 1%	Measured with the Chroma Noise signal.	7. & 31.
Burst Amplitude	300.0 mV_{p-p} ± 2%		4. & 32.
Burst Delay from Sync Burst Duration	 5.6 µs ± 50 ns 2.255 µs ± 0.1 µs	 from 50% point of sync 10 cycles of subcarrier.	
Breezeway Duration	900 ns ± 50 ns		
SC/H Phase	$0^{\circ} \pm 5^{\circ}$		20.
Chrominance-to-Luminance Delay	≤ 5 ns		8.

Table 3-3.
NTSC/YC Test Signal Definitions.

CHARACTERISTICS	SIGNAL DEFINITIONS			SUPPLEMENTAL INFORMATION
75% Bars				See Figs. 3-2, 3-32, & 3-33.
Luminance Rise Times	150 ns ± 25 ns			
	Luminance Amplitude *mV*	Subcarrier Amplitude *$mV_{p\text{-}p}$*	Subcarrier Phase *degree*	For Opt 03 see Figs. 3-149 & 3-150.
White	700.0	0.0	0.0	
Yellow	465.1	470.5	167.1	
Cyan	368.0	663.8	283.5	
Green	308.2	620.1	240.7	
Magenta	216.8	620.1	60.7	
Red	157.0	663.8	103.5	
Blue	59.9	470.5	347.1	
100% Bars				See Figs. 3-4, 3-36, & 3-37.
Luminance Rise Times	150 ns ± 25 ns			
	Luminance Amplitude *mV*	Subcarrier Amplitude *$mV_{p\text{-}p}$*	Subcarrier Phase *degree*	For Opt 03 see Figs. 3-153 & 3-154.
White	700.0	0.0	0.0	
Yellow	620.2	627.3	167.1	
Cyan	490.7	885.1	283.5	
Green	410.9	826.8	240.7	
Magenta	289.1	826.8	60.7	
Red	209.3	885.1	103.5	
Blue	79.8	627.3	347.1	
75% Color Bars over Red				See Figs. 3-2, 3-3 , 3-32, 3-33, 3-34, 3-35.
Luminance Rise Times	150 ns ± 25 ns			
Field Timing				
Color Bars	Lines 24 - 166 & 336 - 478			
Red	Lines 167 - 310 & 479 - 622			
	Luminance Amplitude *mV*	Subcarrier Amplitude *$mV_{p\text{-}p}$*	Subcarrier Phase *degree*	For Opt 03 see Figs. 3-149, 3-150, 3-151, & 3-152.
White	700.0	0.0	0.0	
Yellow	465.1	470.5	167.1	
Cyan	368.0	663.8	283.5	
Green	308.2	620.1	240.7	
Magenta	216.8	620.1	60.7	
Red	157.0	663.8	103.5	
Blue	59.9	470.5	347.1	

Table 3-3 Cont.

CHARACTERISTICS	SIGNAL DEFINITIONS			SUPPLEMENTAL INFORMATION
100% Color Bars over Red				See Figs. 3-4, 3-5, 3-36, 3-37, 3-38, & 3-39.
Luminance Rise Times	150 ns ± 25 ns			
Field Timing				
Color Bars	Lines 24 - 166 & 336 - 478			
Red	Lines 167 - 310 & 479 - 622			
	Luminance Amplitude *mV*	Subcarrier Amplitude *mV_{p-p}*	Subcarrier Phase *degree*	For Opt 03 see Figs. 3-153, 3-154, 3-155, & 3-156.
White	700.0	0.0	0.0	
Yellow	620.2	627.3	167.1	
Cyan	490.7	885.1	283.5	
Green	410.9	826.8	240.7	
Magenta	289.1	826.8	60.7	
Red	209.3	885.1	103.5	
Blue	79.8	627.3	347.1	
Red Field				See Figs. 3-6, 3-32, & 3-33.
Luminance Pedestal	157.0 mV			
Chrominance Amplitude	663.8 mV_{p-p}			For Opt 03 see Figs. 3-151 & 3-152.
Chrominance Phase	103.5°			
Green Field				See Figs. 3-8, 3-44, 3-45.
Luminance Pedestal	308.2 mV			
Chrominance Amplitude	620.1 mV_{p-p}			For Opt 03 see Figs 3-159 & 3-160.
Chrominance Phase	240.7°			
Blue Field				See Figs. 3-7, 3-42, & 3-43.
Luminance Pedestal	59.9 mV			
Chrominance Amplitude	470.5 mV_{p-p}			For Opt 03 see Figs. 3-157 & 3-158.
Chrominance Phase	347.1°			
Flat Field				See Figs. 3-9, 3-46, 3-47, 3-10, 3-48, 3-49, 3-11, 3-50, & 3-51.
50%	350 mV			
100%	700 mV			
0%	0 mV			For Opt 03 see Figs. 3-161 & 3-162.
Chrominance Noise				See Figs. 3-12, 3-52, & 3-53.
Luminance Pedestal	350 mV			
Chrominance Amplitude	700 mV_{p-p}			
Chrominance Phase	103.5° (Red)			For Opt 03 see Fig. 3-163 & 3-164.

Table 3-3 Cont.

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
Convergence Amplitude Pattern Pulse HAD	 525.0 mV 14 lines/field and 19 lines/horiz 225 ns	See Figs. 3-15, 3-14, 3-68, 3-69, & 3-70. For Opt 03 see Figs. 3-173 & 3-174.
5-Step (Gray Scale) Amplitude	 700 mV	See Figs. 3-13, 3-56, & 3-57. For Opt 03 see Figs. 3-165 and 3-166.
Ramp/Modulated Ramp Luminance Amplitude Chrominance Amplitude	 700 mV 280.0 mV_{p-p}	See Figs. 3-16, 3-17, 3-58, 3-59, 3-60, & 3-61. For Opt 03 see Figs. 3-167 and 3-168. Ramp only For Opt. 04 see Figs. 3-217, 3-218, 3-219, and 3-220.
Pulse & Bar with Window 20T Modulated Pulse HAD Chroma Phase Amplitude 2T Pulse HAD White Bar Amplitude Window Field Timing	 2000 ns ± 20 ns 60.7° 700 mV 200 ns 700 mV Lines 96 - 238	See Figs. 3-18, 3-54, & 3-55.
Multiburst White Reference Bar Amplitude Packet Amplitudes Pedestal Burst Frequencies Packet Rise Time	 420 mV_{p-p} 420 mV_{p-p} (Equal width packets) 350 mV 0.5, 1.0, 2.0, 4.0, 4.8, & 5.8 MHz 350 ns typical	See Figs. 3-19, 3-62, & 3-63.
Line Sweep Frequency Amplitude Markers	 500 kHz to 6.5 MHz 700 mV_{p-p} 1, 2, 3, 4, 5, and 6 MHz.	See Figs. 3-20, 3-64, & 3-65. For Opt 03 see Fig. 3-169.
60% Reduced Line Sweep Frequency Amplitude Markers	 500 Hz to 6.5 MHz 420 mV_{p-p} 1, 2, 3, 4, 5, and 6 MHz.	See Figs. 3-21, 3-66, & 3-67. For Opt 03 see Fig. 3-171. Not available on Opt 04.

Table 3-3 Cont.

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
Pluge Matrix Pluge Levels Lum Ref Levels	 -14 mV and +14 mV 700 mV, 450 mV, 200 mV, and 110 mV	See Figs. 3-22, 3-40, & 3-41.
Bounce Amplitude Rate	 0 or 700 mV flat field ≈ 1.3 second high, 1.3 second low	
Matrix (Standard and Opts 01 & 02)	<u>Signal</u> .... <u>Lines</u> CCIR 17 .... 24-47 & 336-359 CCIR 330 .... 48-71 & 360-383 CCIR 331 .... 72-95 & 384-407 CCIR 18 .... 96-119 & 408-431 75% Color Bars ... 120-143 & 432-455 Sin x/x .... 144-166 & 456-478 75% Red Field .... 167-190 & 479-502 15 kHz Square Wave .... 191-214 & 503-526 50% Flat Field .... 215-238 & 527-550 Shallow Ramp .... 239-262 & 551-574 UK ITS 1 .... 263-286 & 575-598 UK ITS 2 .... 287-310 & 599-622	 See Fig. 3-24. See Fig. 3-26. See Fig. 3-27. See Fig. 3-25 See Fig. 3-28. See Fig. 3-29. See Fig. 3-30. See Fig. 3-31. See Fig. 3-23.
Matrix (Opts 03 and 04)	75% Bars Red, Modulated Ramp, Line Sweep, Pulse & Bar, and 50% Flat Field.	
Modulated 5-Step		See Figs. 3-XX and 3-YY. Option. 03 only.

Table 3-4.
Component Test Signal Definitions (Y, B-Y and R-Y Format).

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
75% Bars		See Figs. 3-71, 3-72, & 3-73. For Option 03 see Figs. 3-175, 3-176, & 3-177. For Opt 04 see Figs. 3-221, 3-222, & 3-223.
75% Bars over Red		See Figs. 3-71, 3-72, 3-73, 3-77, 3-78, & 3-79. Not available in Opts 03 & 04.

Table 3-4. Cont.

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
75% Bars and Level Reference (Opt 04 only)		See Figs. 3-221, 3-222, 3-223, 3-224, & 3-225.
100% Bars		See Figs. 3-74, 3-75, & 3-76. For Opt 03 see Figs. 3-178, 3-179, & 3-180.
100% Bars over Red		See Figs. 3-74, 3-75, 3-76, 3-80, 3-81, & 3-82. Not available in Opts 03 & 04.
Flat Field		See Figs. 3-83, 3-84, & 3-85.
Nominal Amplitude		
Y Channel, 50%	350 mV	For Option 03 see Figs. 3-184, 3-185, 3-186, & 3-187.
Y Channel, 100%	700 mV	
Y Channel, 0%	0 mV	
B-Y & R-Y (Opt 03 only)	262 mV	
Valid 5-Step		See Figs. 3-86, 3-87, & 3-88.
Amplitude	700 mV in each channel with simultaneous offsetting signals in the other two channels.	Not available in Opts 03 & 04.
Linearity	1% relative step matching.	
Pulse & Bar		See Figs. 3-89, 3-90, & 3-91.
Bar		
Risetime	192.9 ns ± 20 ns	For Opt 03 see Figs. 3-181, 3-182, & 3-183.
Pulse		
HAD (T = 100 ns)	2T and 10T	
Amplitude		For Opt 04 see Figs. 3-226, 3-227, & 3-228.
Y Channel	700 mV	
B-Y Channel	± 350 mV	
R-Y Channel	± 350 mV	
T Pulses		See Figs. 3-92 & 3-93.
Y Channel Pulses		
2T Pulse HAD	200 ns	For Opt 03 see Figs. 3-195 & 3-196.
3T Pulse HAD	300 ns	
5T Pulse HAD	500 ns	
B-Y, R-Y Channel Pulses		For Opt 04 see Figs. 3-229 & 3-230.
4T Pulse HAD	400 ns	
8T Pulse HAD	800 ns	
Bar Amplitude		
Y Channel	0 - 700 mV	
B-Y, R-Y Channels	± 350 mV	

Table 3-4. Cont.

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
Line Sweep		See Figs. 3-94, 3-95, 3-96, & 3-97.
Sweep Amplitude		
Y Channel	420 mV_{p-p}	Reduced sweep not available on
B-Y, R-Y Channel	420 mV_{p-p}	Opt 03.
Reduced Sweep Amplitude		
Y Channel	350 mV_{p-p}	For Opt 03 see Figs. 3-203 &
B-Y, R-Y Channel	350 mV_{p-p}	3-204.
Frequency Response		
Y Channel	200 kHz to 6.5 MHz	For Opt 04 see Figs. 3-233, 3-234,
B-Y, R-Y Channel	100 kHz to 3.25 MHz	3-235, & 3-236.
Markers		
Y Channel	1, 2, 3, 4, 5, and 6 MHz	
B-Y, R-Y Channel	0.5, 1, 1.5, 2, 2.5, & 3 MHz	
Channel Timing (Bowtie)		See Figs. 3-98, 3-99, & 3-100.
Amplitude		
Y Channel (50%)	350 mV	For Opt 03 see Figs. 3-205, 3-206,
B-Y, R-Y Channel (50%)	± 175 mV	& 3-207.
Y 100% (Opt 04 only)	700 mV	
B-Y & R-Y 100%		For Opt 04 (100%) see Figs.
(Opt 04 only)	± 350 mV	3-239, 3-240, & 3-241.
Frequency		
Y Channel	500 kHz	
B-Y, R-Y Channel	502 kHz	
Timing Markers		Eleven timing markers indicating 20 ns delay/advance between channels. Two timing markers centered about the center marker indicating 5 ns delay/advance between channels.
12T Pulses (Opt 03 only)		See Figs. 3-208, 3-209, & 3-210 for the 12T pulses.
Multiburst		See Figs. 3-101 & 3-102.
Amplitude		
Y Channel	420 mV_{p-p}	Centered on 350 mV
R-Y, B-Y	420 mV_{p-p}	Centered on 0 mV
White Flag	420 mV_{p-p}	For Option 03 see Figs. 3-199 & 3-200.
Frequencies		
Y Channel	0.5, 1.0, 2.0, 3.0, 4.0, & 5.0 MHz	Not available on Opt 04.
R-Y, B-Y	0.5, 1.0, 1.5, 2.0, & 2.5 MHz	

Table 3-4. Cont.

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
Wide Multiburst (Opt 03 only) Amplitude Y Channel R-Y, B-Y White Flag Frequencies Y Channel R-Y, B-Y	 420 mV_{p-p} 420 mV_{p-p} 420 mV_{p-p} 0.5, 1.0, 2.0, 3.0, 4.0, 5.0, & 6.0 MHz 0.5, 1.0, 1.5, 2.0, & 2.5 MHz	See Figs. 3-201 & 3-202. Centered on 350 mV Centered on 0 mV
5-Step Amplitude	 700 mV	Only available on Opts 03 and 04. Opt. 03 see Figs. 3-190 & 3-191. Opt 04 see Figs. 3-231 & 3-232.
"Line 17" (Opt 03 only)		See Figs. 3-197 & 3-198.
Sin(x)/x (Opt 03 only)		See Figs. 3-188 & 3-189.
Quad Phase (Opt 03 only)		See Figs. 3-192, 3-193, & 3-194.
Oversized Ramp (Opt 04 only)		See Figs. 3-237 & 3-238.
Matrix	75% Bars, 50% Flat Field, Bowtie, Bowtie Markers, 5-Step, Multiburst, and T Pulses.	This is the matrix for the standard instrument and Opts. 01, 01/02, and 02.
Matrix (Opt. 03 only)	100% Color Bars 60% Wide Multiburst Bowtie Bowtie Markers "Line 17" T Pulses	

Table 3-5.
Component Test Signal Definitions (CTDM Format).[1]

CHARACTERISTICS	SIGNAL DEFINITION Standard	SIGNAL DEFINITION MII	SUPPLEMENTAL INFORMATION Standard	SUPPLEMENTAL INFORMATION MII
75% Bars			See Figs. 3-103 & 3-104. For Opt 03 see Figs. 3-211 & 3-212.	Opt 01 only. See Figs. 3-141 & 3-142.
100% Bars			See Figs. 3-105 & 3-106. Not available in Opt 03.	For Opt. 01 see Figs. 3-143 & 3-144. For Opt 04 see Figs. 3-242 & 3-243.
Flat Field Nominal Amplitude Y Channel, 50% Y Channel, 100% Y Channel, 0%	 350 mV 700 mV 0 mV		See Figs. 3-108, 3-109, 3-110, & 3-107. Not available in Opt 03.	Opt 01 only. See Figs. 3-145, 3-146, 3-147, & 3-148.

• 1. Standard 2-wire component test signals are available on the TSG 131A standard instrument and Options 02 and 03. MII component test signals are available on the TSG 131A Options 01 and 04.

Table 3-6.
Test Signal Generator — Test Signal Definitions, GBR Format.

CHARACTERISTICS	SIGNAL DEFINITIONS	SUPPLEMENTAL INFORMATION
75% Bars		See Figs. 3-111 to 3-113.
100% Bars		See Figs. 3-114 to 3-116.
10-Step Staircase Amplitude (B & R)	 700 mV	See Figs. 3-129 and 3-130.
2T Pulse & Bar with Window Window Timing 2T Pulse HAD Bar Amplitude	 Lines 72 to 202 250 ns 700 mV	See Figs. 3-131 and 3-132.
Color Fields Red Field Green Field Blue Field	 700 mV on R Channel 700 mV on G Channel 700 mV on B Channel	 See Figs. 3-117 to 3-119. See Figs. 3-123 and 3-124. See Figs. 3-120 to 3-122.
Multiburst Amplitude White Flag Frequencies	 420 mV_{p-p} centered on 350 mV 420 mV_{p-p} centered on 350 mV 1, 2, 3, 4, 5, and 6 MHz	See Figs. 3-133 and 3-134.
100% Line Sweep Amplitude Frequency Range Markers	 700 mV 100 kHz to 6.6 MHz	See Figs. 3-135 and 3-136. 1, 2, 3, 4, 5, and 6 MHz
Bowtie G Channel B Channel R Channel Channel Amplitudes Timing Markers	 500 kHz sine wave 502 kHz sine wave 502 kHz sine wave 350 mV (all Channels) 13 timing markers	See Figs. 3-137 to 3-140. Marker spacing indicates 20 ns delay or advance between channels.
Convergence Amplitude Pattern	 525 mV (75%) Crosshatch 14 horizontal lines and 19 vertical lines per field.	See Figs. 3-125, 3-126, 3-127, and 3-128.

Table 3-7. Black Burst Output (Opts. 02 & 03).

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Black Amplitude	0 mV ± 50 mV		61.
Blanking Width	12.0 μs ± 0.15 μs		
Sync Timing	See Fig. 3-1.		

Table 3-8. Video Comp Sync (Opts. 2, 3, & 4).

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Duration Horizontal Sync Vertical Serrations Equalizing Pulses	 4.7 μs ± 100 ns 4.7 μs ± 100 ns 2.35 μs ± 100 ns		63.
Amplitude	-2.0 ± 0.4 V	Jumper Selectable to -4 V.	64.
Rise and Fall Times	250 ns ± 50 ns		65.
Impedance		75Ω	
Return Loss		≥ 30 dB to % MHz	

Table 3-9.
Audio Tone Characteristics.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER. CHECK STEP #
Amplitude	0 to +8 dBu adjustable.	50 Ω output balanced XLR impedance to drive a 600 Ω load ***ONLY***.	
Frequency	1 kHz		
Distortion (THD)	≤ 0.5% THD		60.
Audio ID “click” Frequency Range (one channel only)	Rate adjustable from 0.2 Hz to 4 Hz.		

Table 3-10.
Power Supply Specifications.

CHARACTERISTICS	PERFORMANCE REQUIREMENT	SUPPLEMENTAL INFORMATION
Supply Accuracy +5 V -5.2 V -12 V +12 V		 +5 V ± 250 mV -5.2 V +300 mV to -500 mV -12 V ± 600 mV +12 V ± 600 mV
Power Limit		18 Watts
Hum +5 V -5.2 V -12 V +12 V		Typical 10 mV 20 mV 10 mV 10 mV
Noise +5 V -5.2 V -12 V +12 V		 ≤ 50 mV (5 MHz bandwidth) ≤ 50 mV (5 MHz bandwidth) ≤ 50 mV (5 MHz bandwidth) ≤ 50 mV (5 MHz bandwidth)
Line Voltage Range 115 V_{ac} 240 V_{ac}		 90 - 130 V_{ac} 180 - 250 V_{ac}
Fuse Data 110 V Setting 230 V Setting		 250 V, 0.4 A Med. Blow 250 V, 0.4 A Med. Blow
Power Consumption, Typical		15 Watts
Line Frequency		48 - 62 Hz

Mechanical Specifications

Table 3-11.
Physical Characteristics.

CHARACTERISTICS	SUPPLEMENTAL INFORMATION
Dimensions Height Width Length	 43.4 mm (1.71 in) 205.7 mm (8.10 in) 381.0 mm (15.0 in)
Net Weight	1.47 kg (4 lbs 6 oz)
Shipping Weight	3.2 kg (7 lbs 1 oz)

Enivironmental Specifications

Table 3-12.
Environmental Characteristics

CHARACTERISTICS	SUPPLEMENTAL INFORMATION
Temperature Non-Operating Operating	 -40 to +65 °C 0 to +35 °C
Altitude Non-Operating Operating	 To 50,000 feet To 15,000 feet
Vibration (Operating)	5 minutes each axis at 0.060 inch, with frequency varied from 5-15-5 cycles per second with instrument secured to vibration platform. 5 minutes each axis at 0.020 inch, with frequency varied from 25-55-25 cycles per second with instrument secured to vibration platform. 5 minutes each axis at 0.040 inch, with frequency varied from 15-25-15 cycles per second with instrument secured to vibration platform. Ten minutes each axis at any resonant point or at 33 cycles per second.
Shock	50 g, ½ sine, 11 ms duration, 3 guillotine-type shocks per side.
Transportation	Qualified under PAL Test Procedure 1A, Category II (24 inch drop).

Table 3–13: Certifications and compliances

Category	Standards or description
EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Union: EN 50081-1 Emissions: EN 55022 — Class B Radiated and Conducted Emissions EN 50082-1 Immunity: IEC 801-2 — Electrostatic Discharge Immunity IEC 801-3 — RF Electromagnetic Field Immunity IEC 801-4 — Electrical Fast Transient/Burst Immunity High quality shielded cables must be used to ensure compliance with the above listed specifications.
Australia/New Zealand Declaration of Conformity – EMC	Complies with EMC provision of Radiocommunications Act per the following standard(s): AN/NZS 2064.1/2 — Industrial, Scientific, and Medical Equipment: 1992 AN/NZS 3548 — Information Technology Equipment: 1995
EMC Compliance	Meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility when it is used with the product(s) stated in the specifications table. Refer to the EMC specification published for the stated products. May not meet the intent of the directive if used with other products.
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.
EC Declaration of Conformity – Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union: Low Voltage Directive 73/23/EEC, amended by 93/69/EEC EN 61010-1:1993 — Safety requirements for electrical equipment for measurement control and laboratory use.
U.S. Nationally Recognized Testing Laboratory Listing	UL1244 — Standard for electrical and electronic measuring and testing equipment.
Canadian Certification	CAN/CSA C22.2 No. 231 — Safety requirements for electrical and electronic measuring and test equipment.
Additional Compliance	ANSI/ISA S82.01:1994 — Safety standard for electrical and electronic test, measuring, controlling, and related equipment. IEC61010-1 — Safety requirements for electrical equipment for measurement, control, and laboratory use.
Installation (Overvoltage) Category	Terminals on this product may have different installation (overvoltage) category designations. The installation categories are: CAT III — Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location. CAT II — Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected. CAT I — Secondary (signal level) or battery operated circuits of electronic equipment.

Table 3–13: Certifications and compliances (cont.)

Category	Standards or description	
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.	
	Pollution Degree 1	No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
	Pollution Degree 2	Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
	Pollution Degree 3	Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.
	Pollution Degree 4	Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Waveform Illustrations

NOTE

In the following waveform drawings, the time is referenced to the half-amplitude point (or the peak for a pulse) unless otherwise specified.

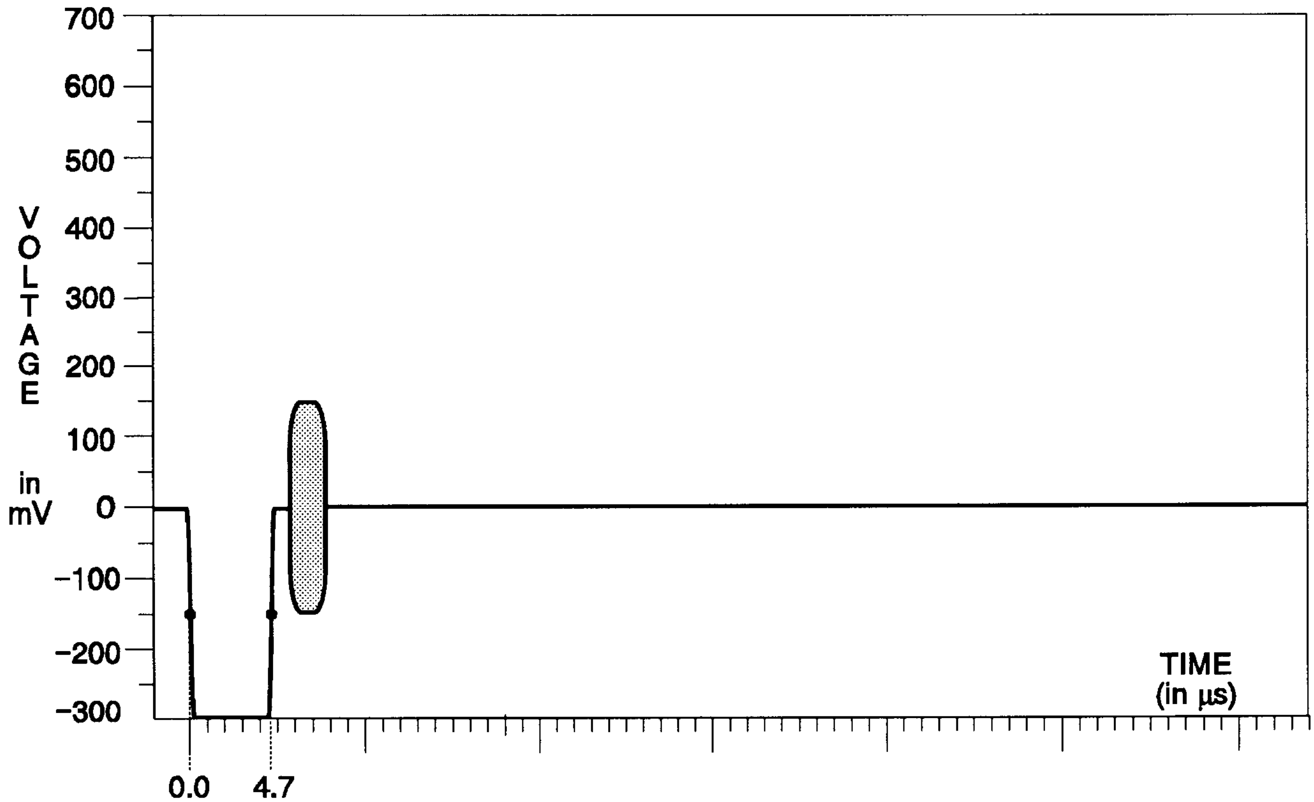


Fig. 3-1. Black Burst.

Composite Signals

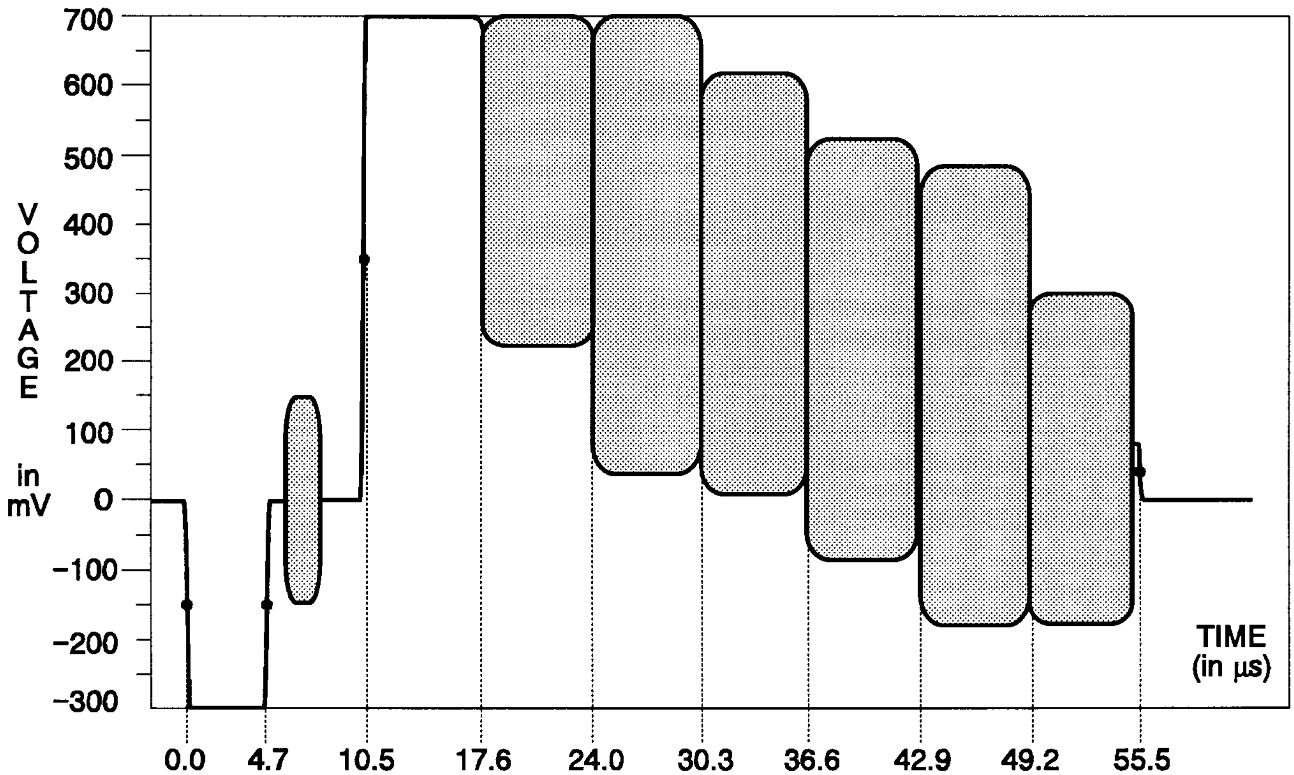


Fig. 3-2. 75% Color Bars.

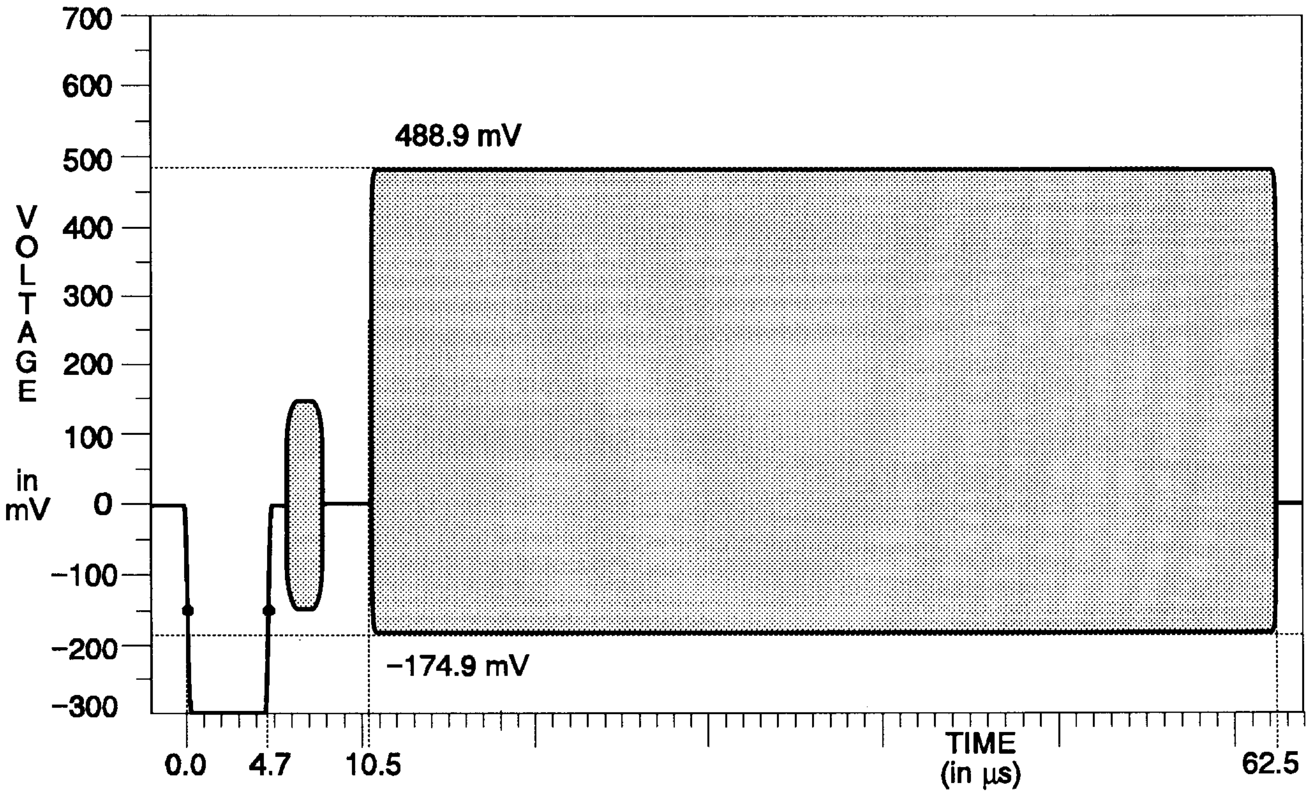


Fig. 3-3. 75% Red.

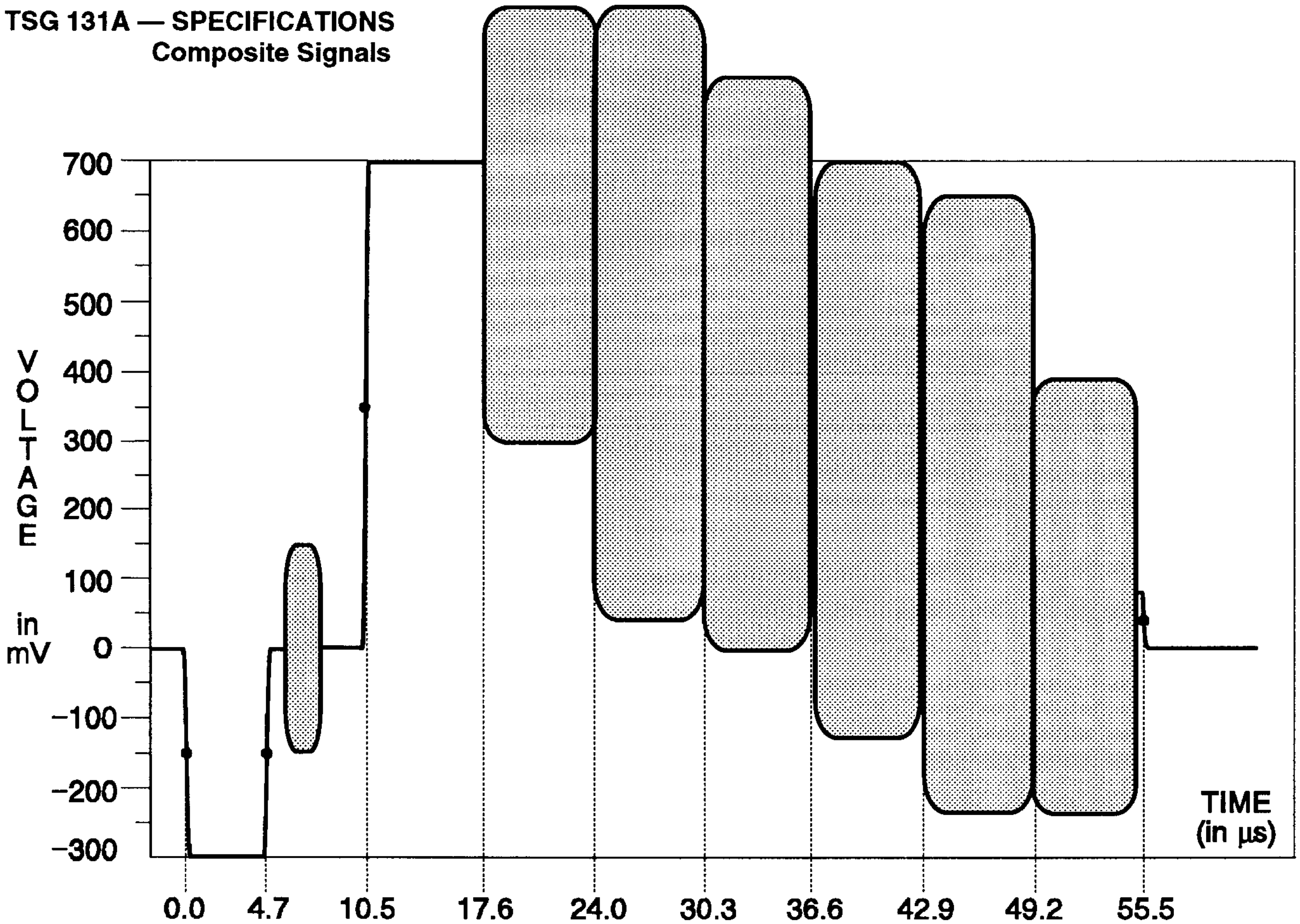


Fig. 3-4. 100% Color Bars.

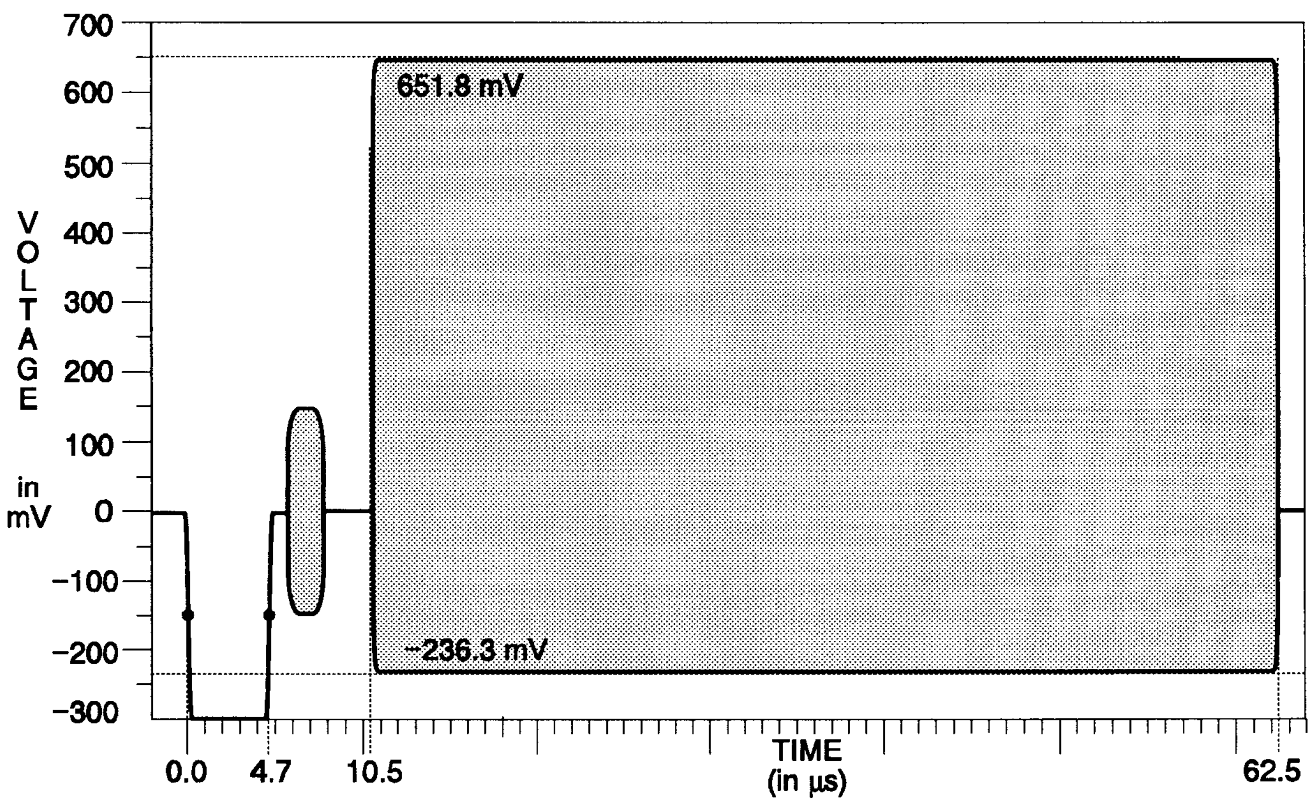


Fig. 3-5. 100% Red.

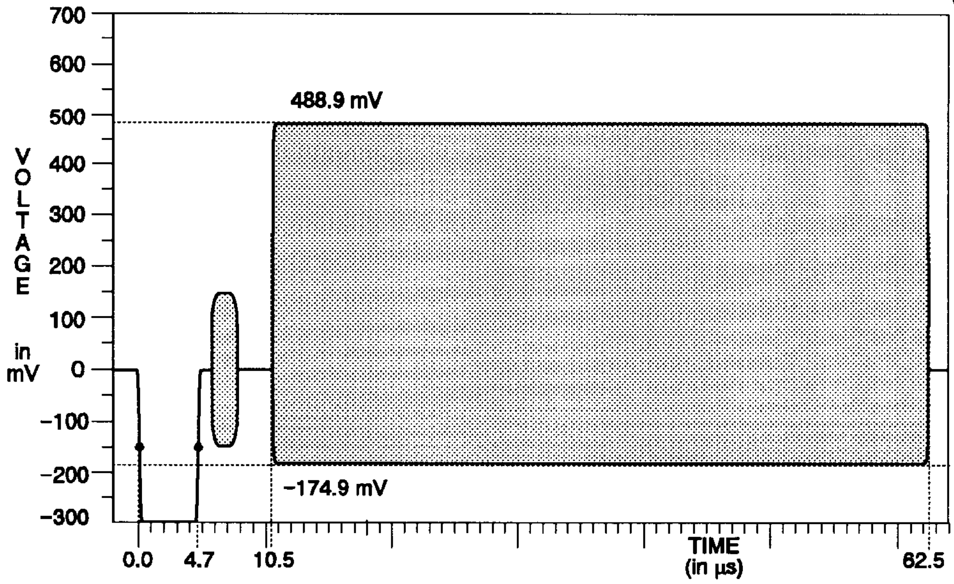


Fig. 3-6. Red Field.

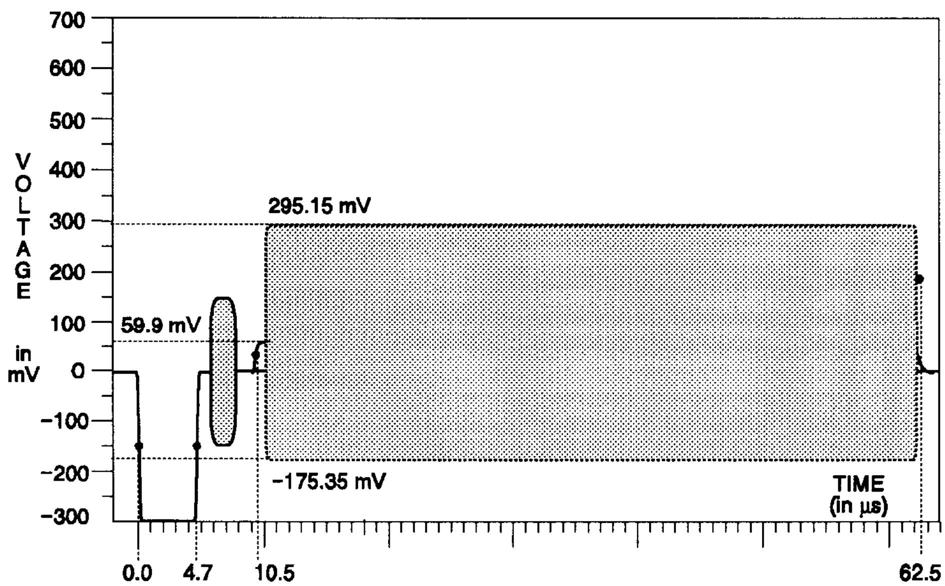


Fig. 3-7. Blue Field.

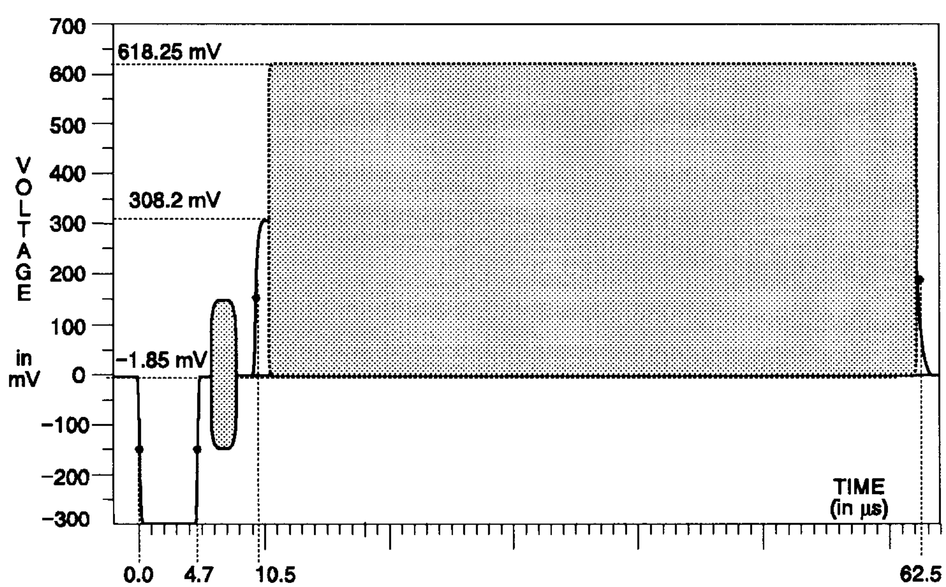


Fig. 3-8. Green Field.

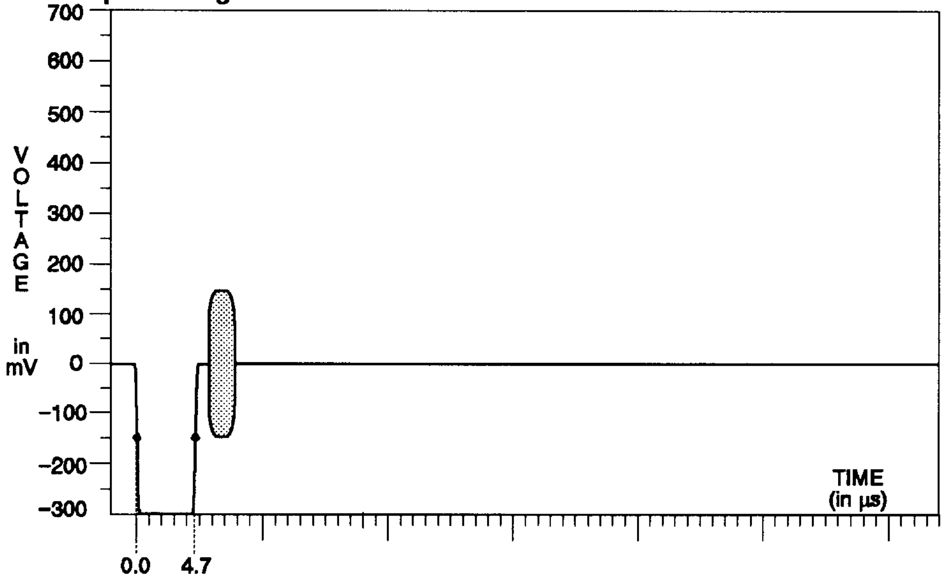


Fig. 3-9. 0% Flat Field.

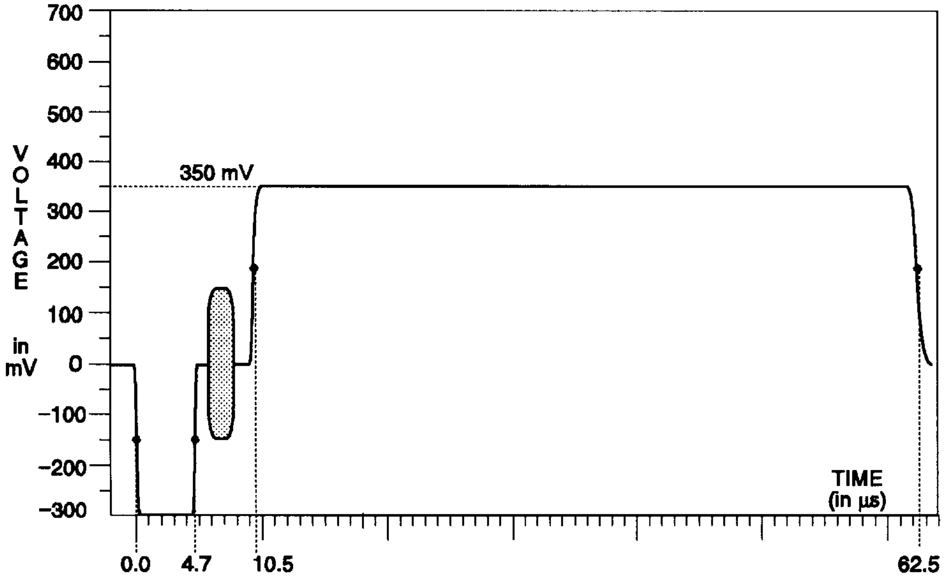


Fig. 3-10. 50% Flat Field.

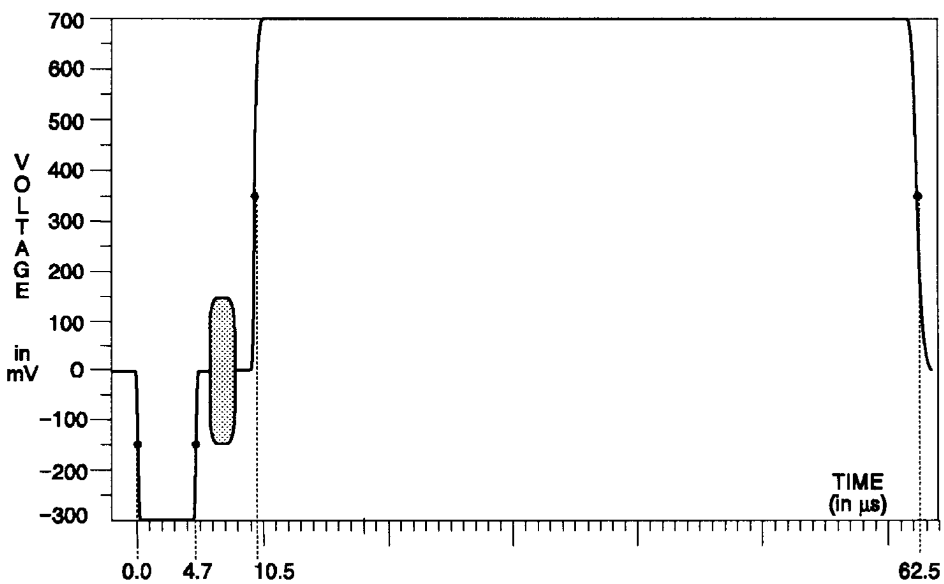


Fig. 3-11. 100% Flat Field

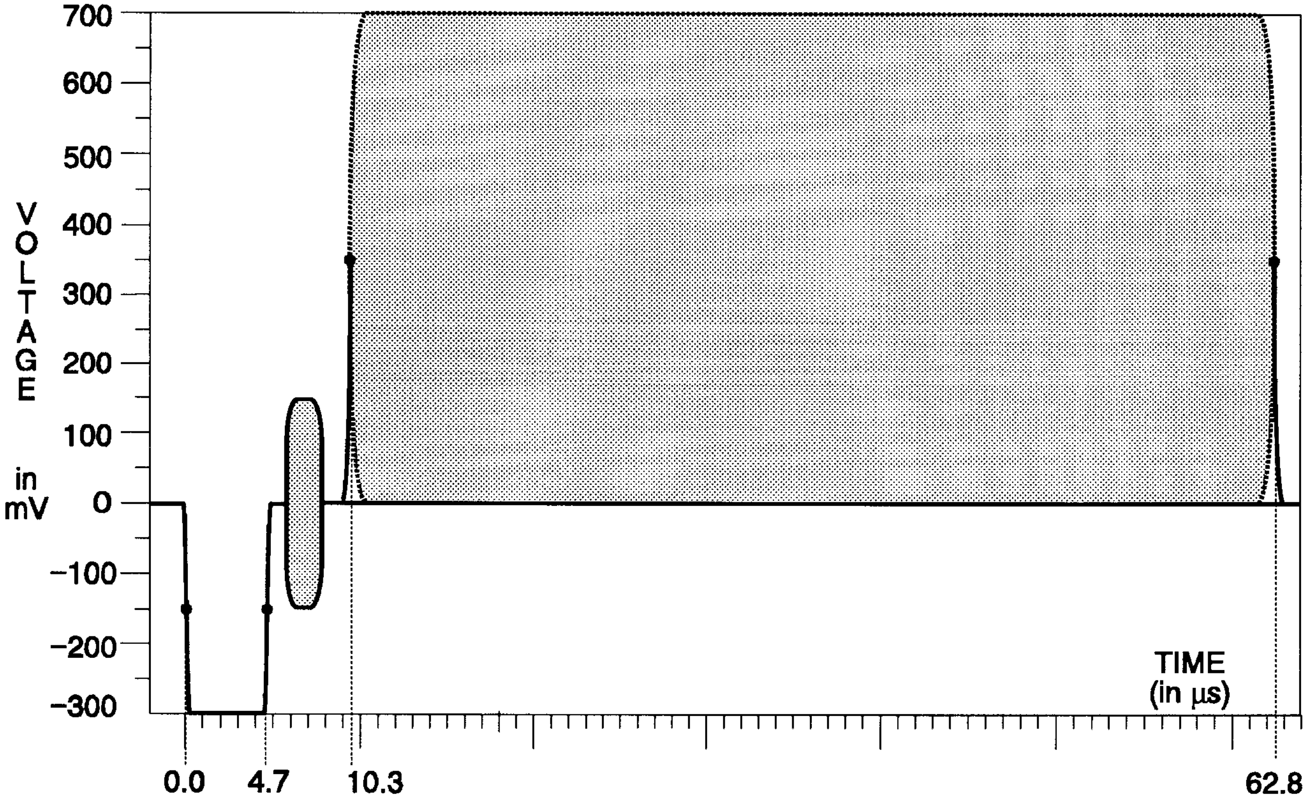


Fig. 3-12. Chroma Noise.

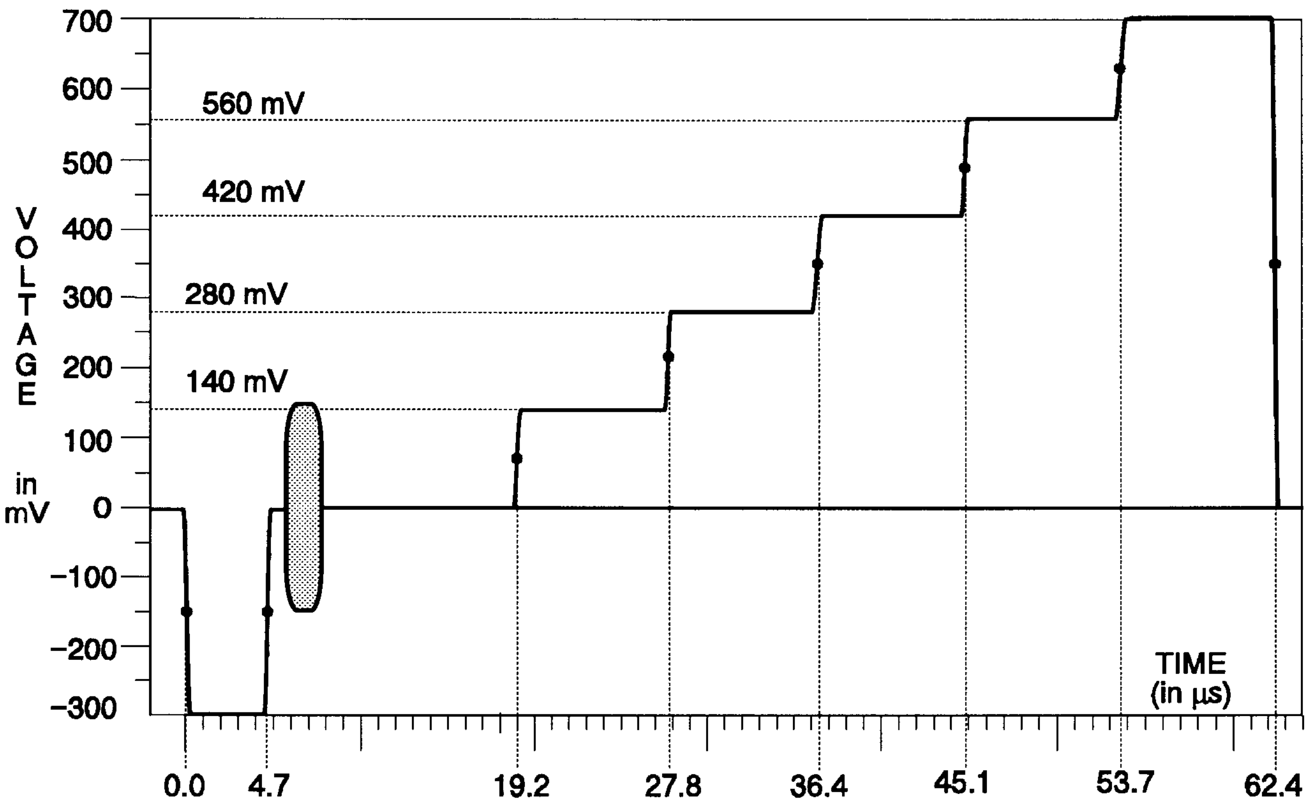


Fig. 3-13. 5-Step (Gray Scale).

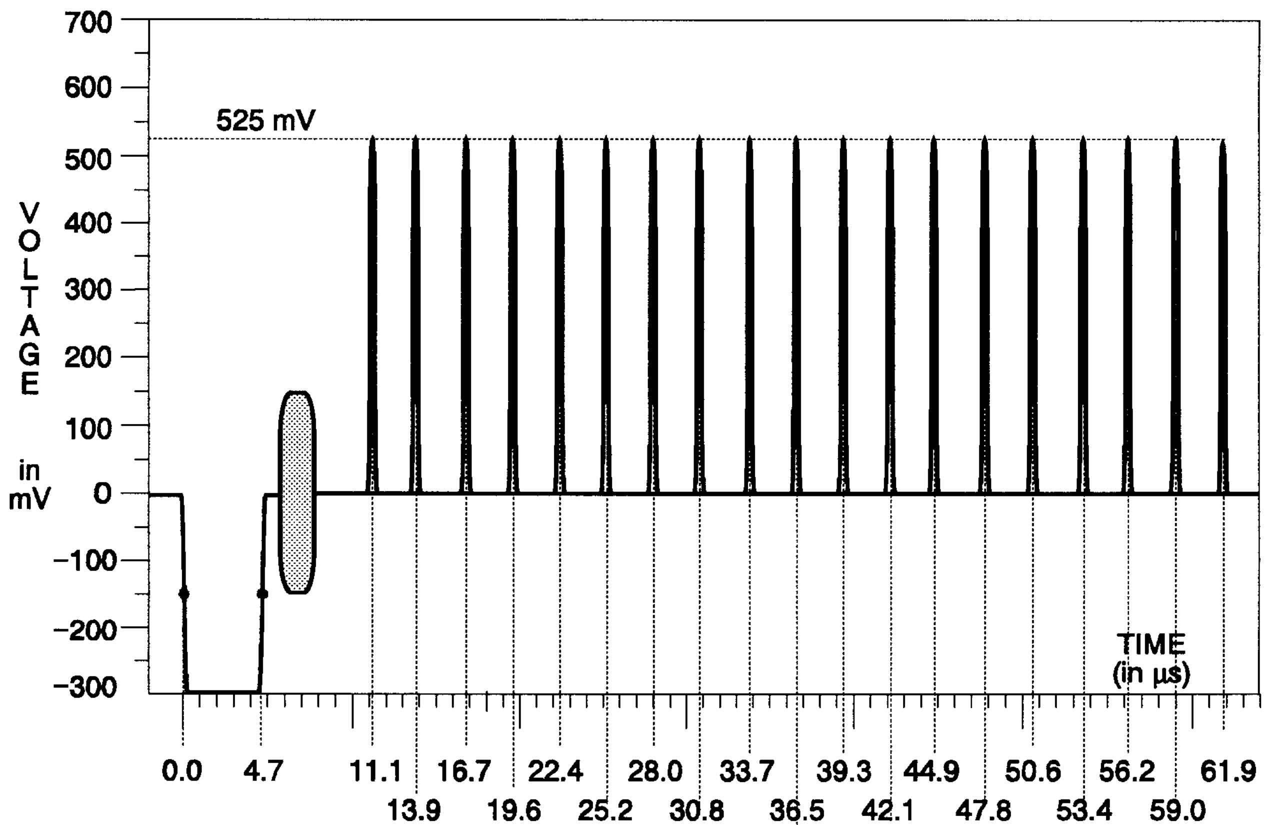


Fig. 3-15. Convergence (vertical).

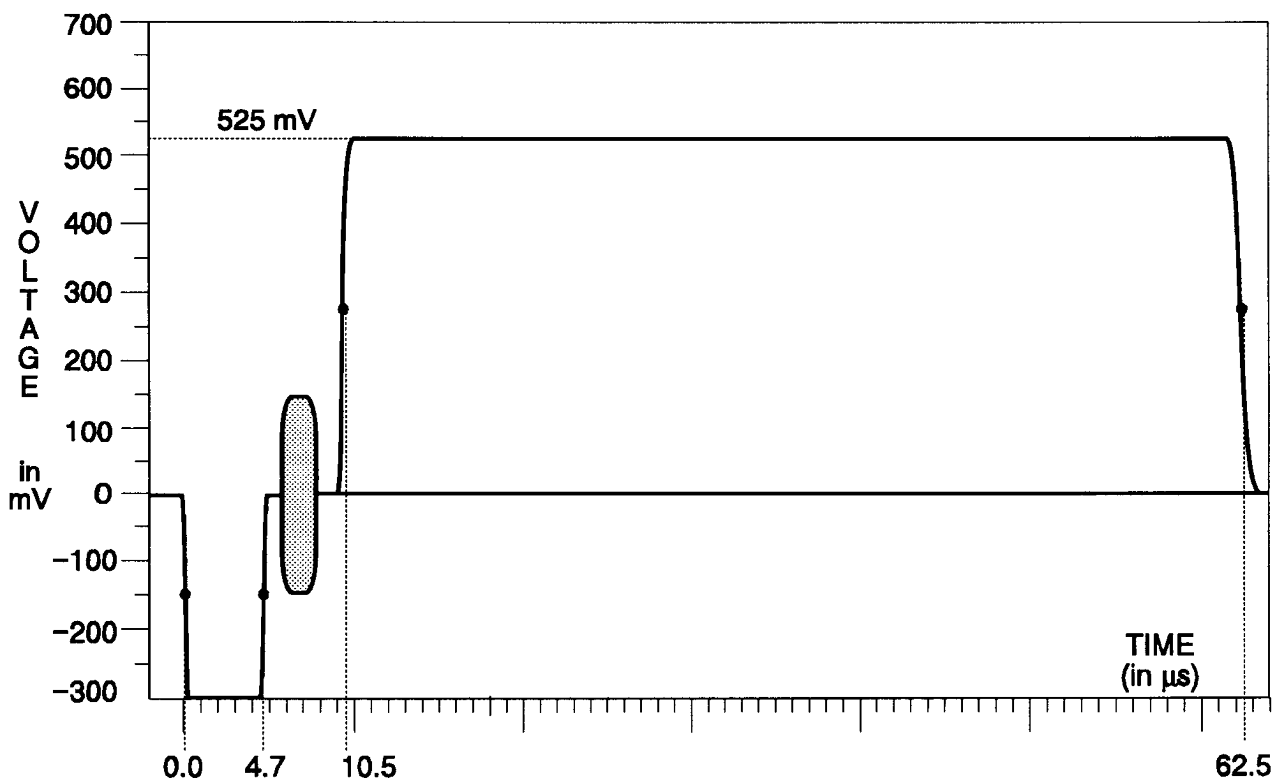


Fig. 3-14. Convergence (horizontal).

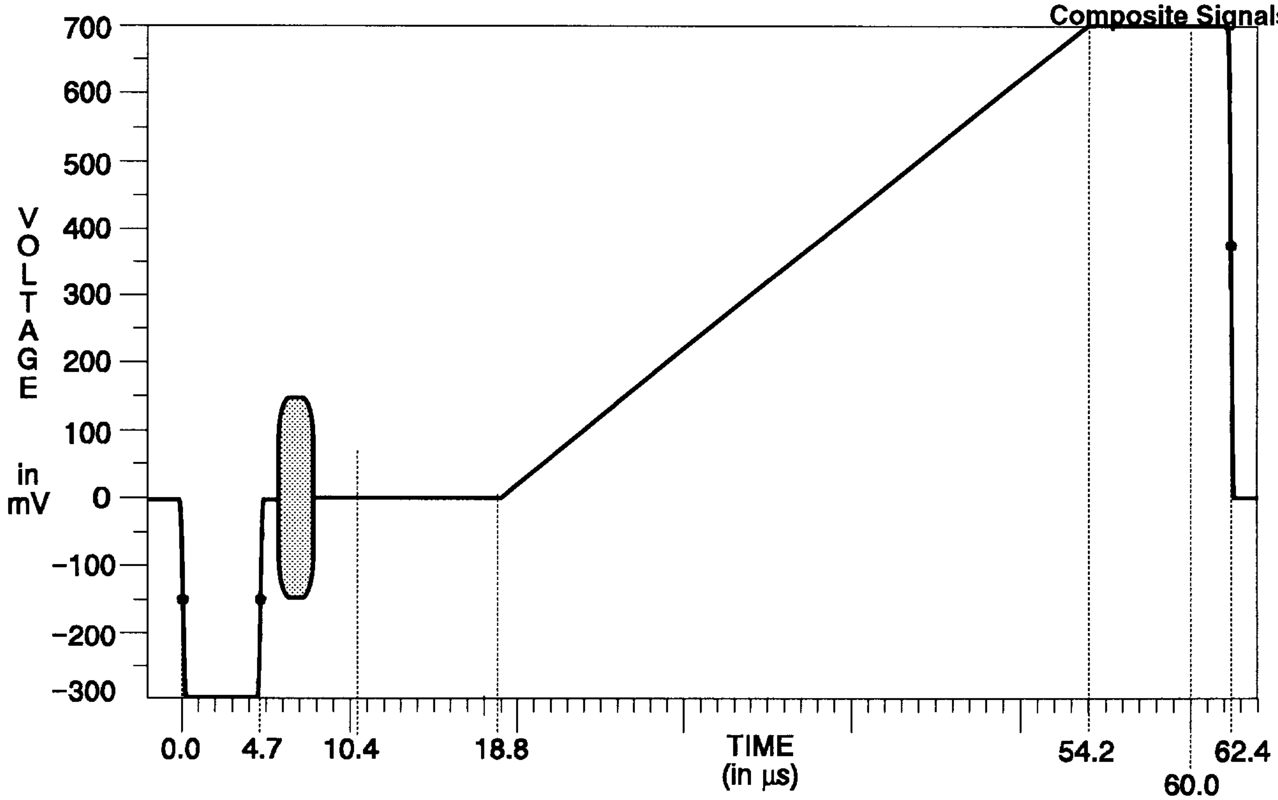


Fig. 3-16. Ramp.

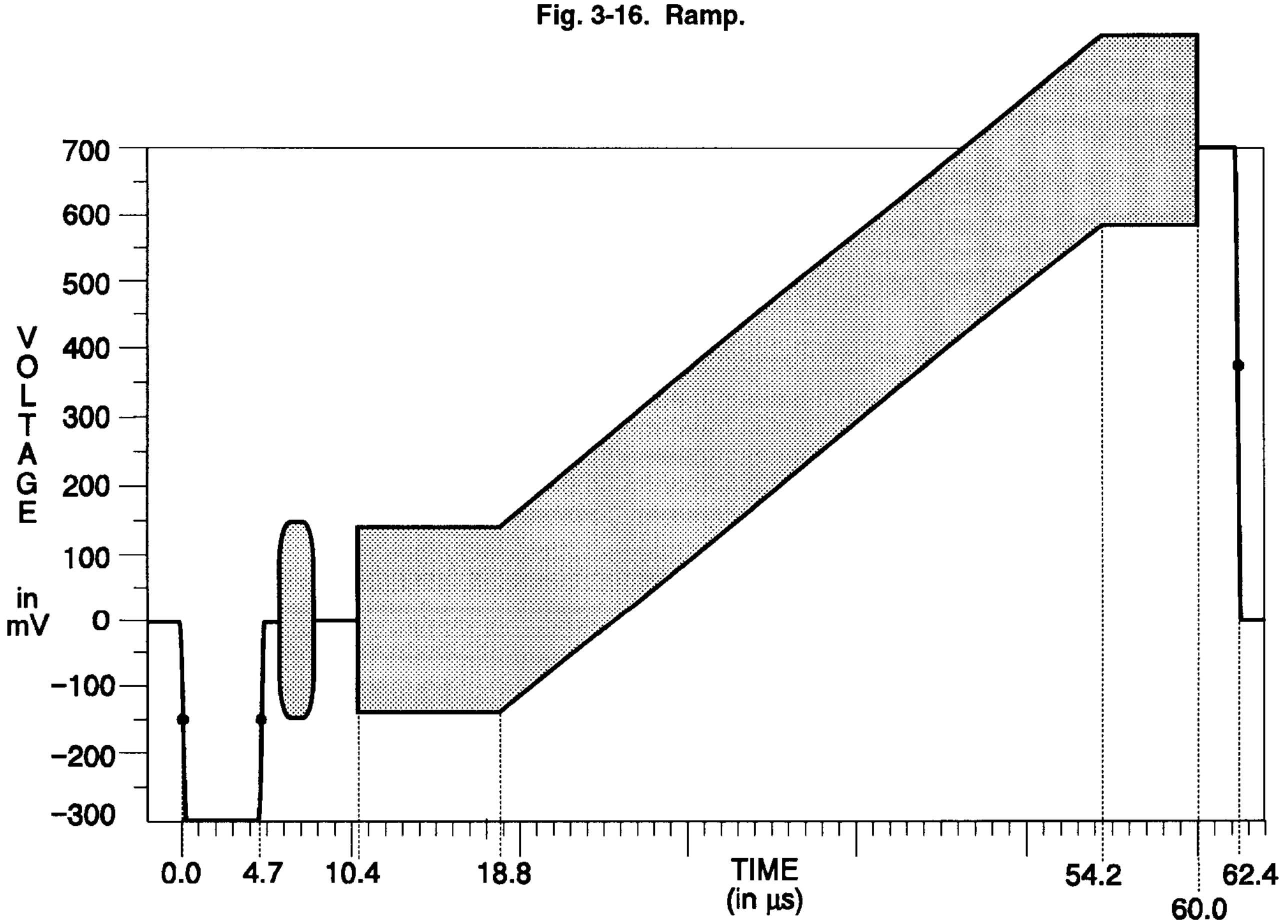


Fig. 3-17. Modulated Ramp.

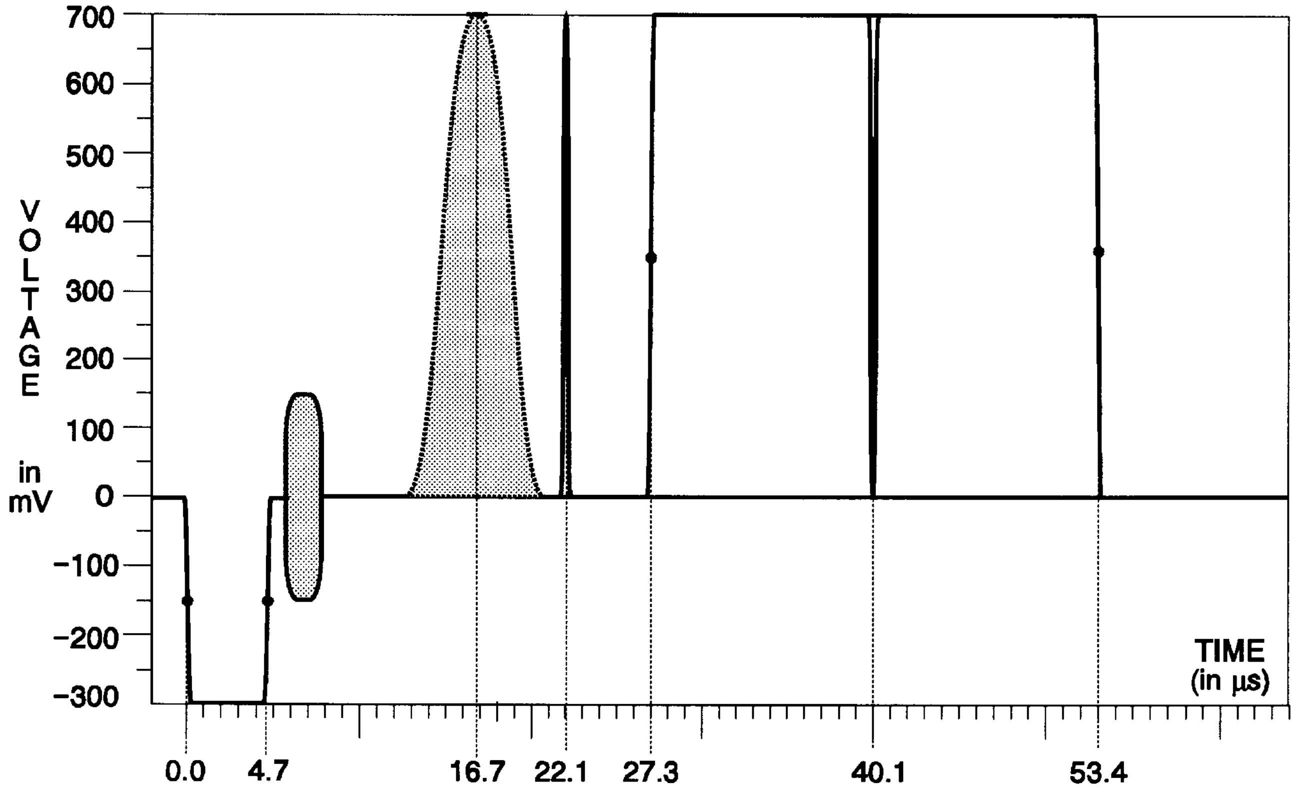


Fig. 3-18. Pulse & Bar with Window.

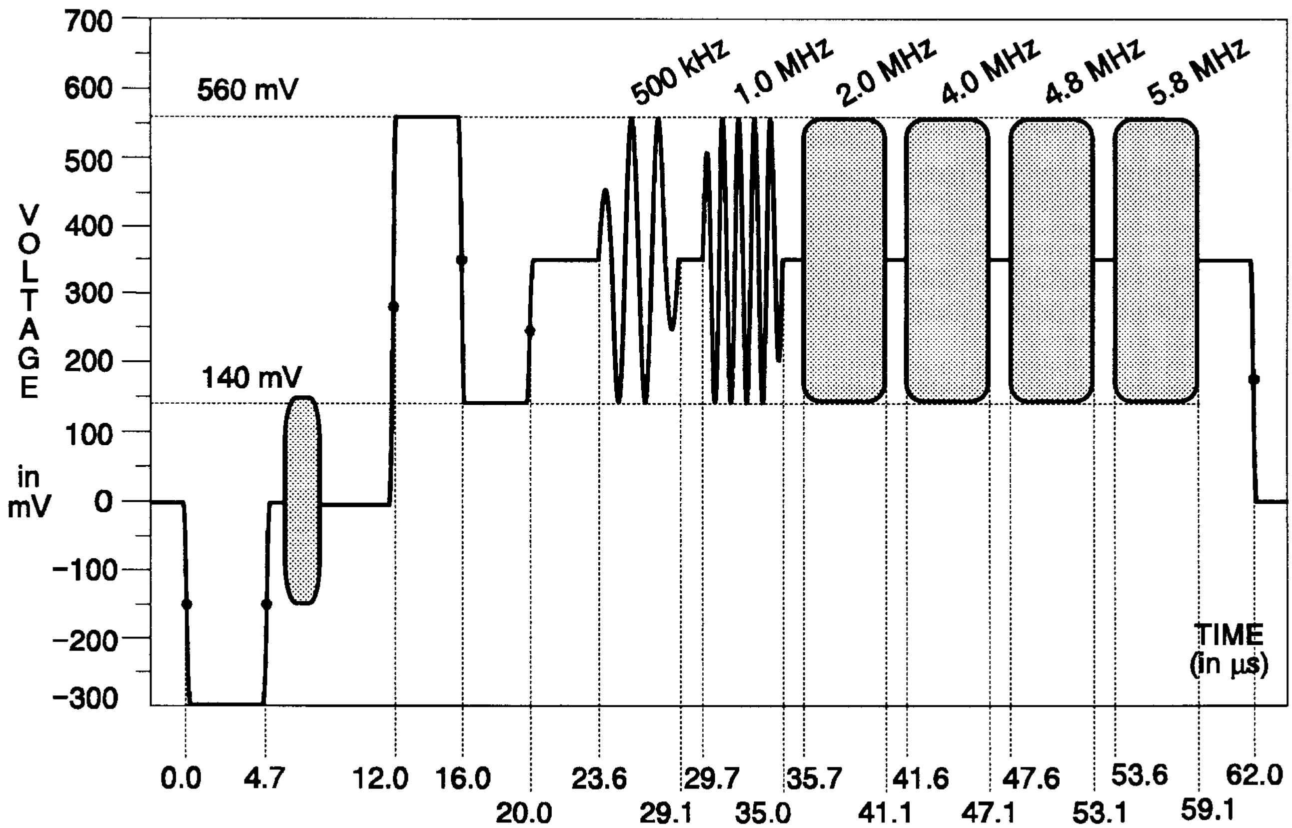


Fig. 3-19. Multiburst.

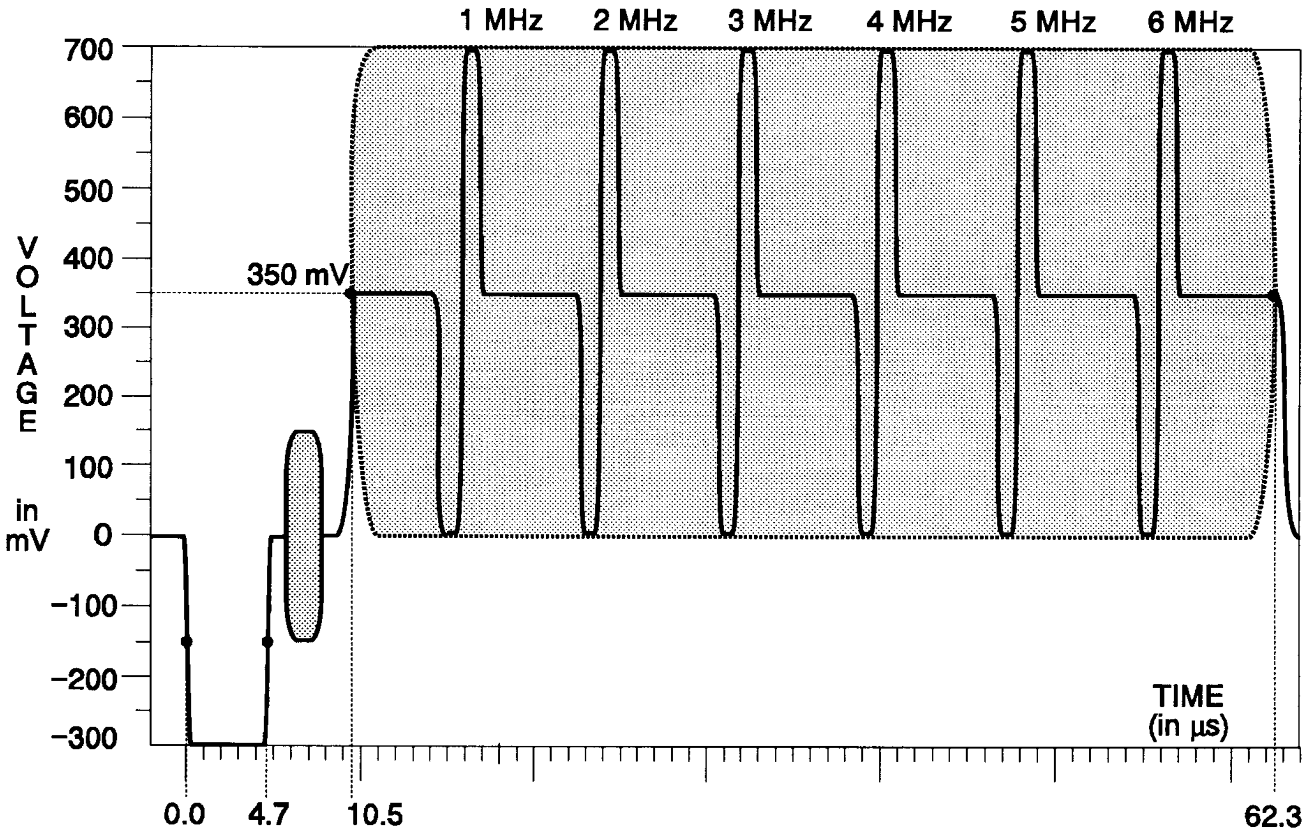


Fig. 3-20. Line Sweep.

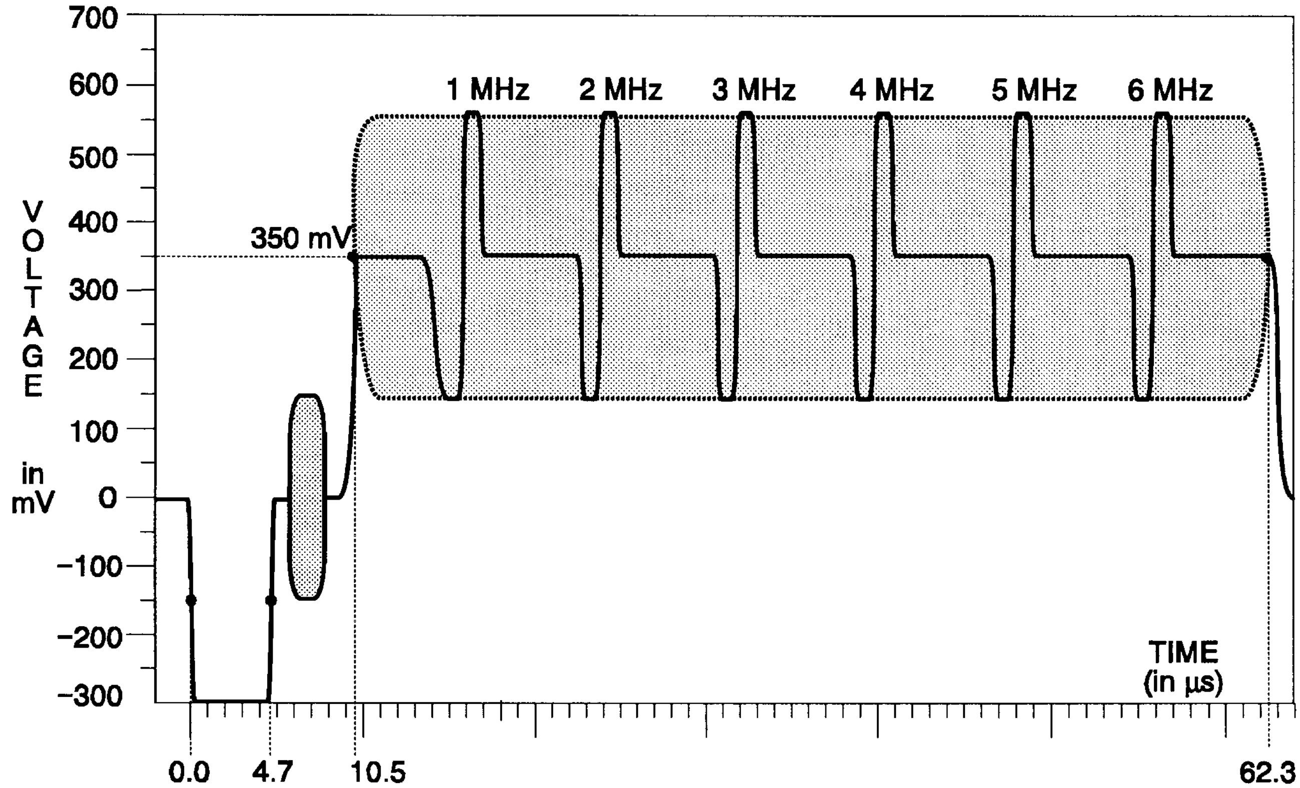


Fig. 3-21. Reduced Sweep.

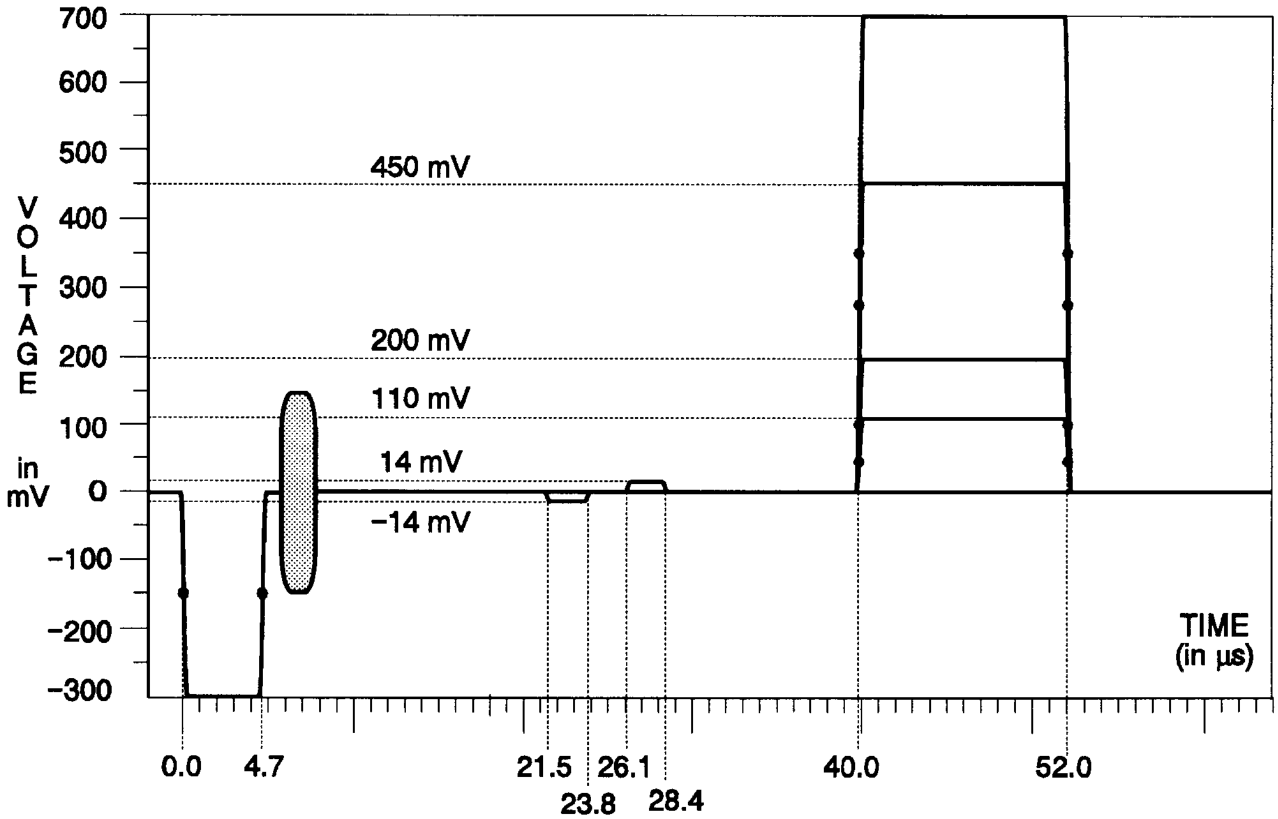


Fig. 3-22. Pluge.

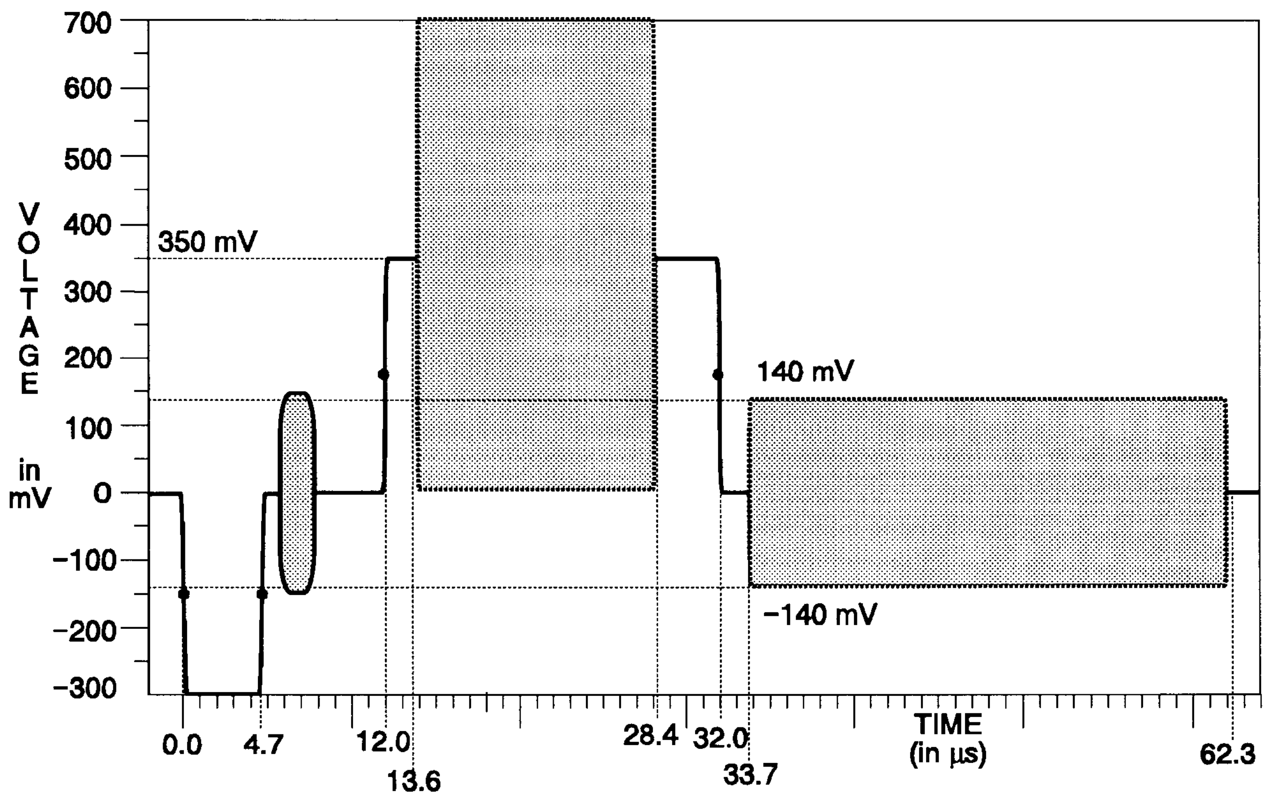


Fig. 3-23. Matrix Signal — UK ITS 2.

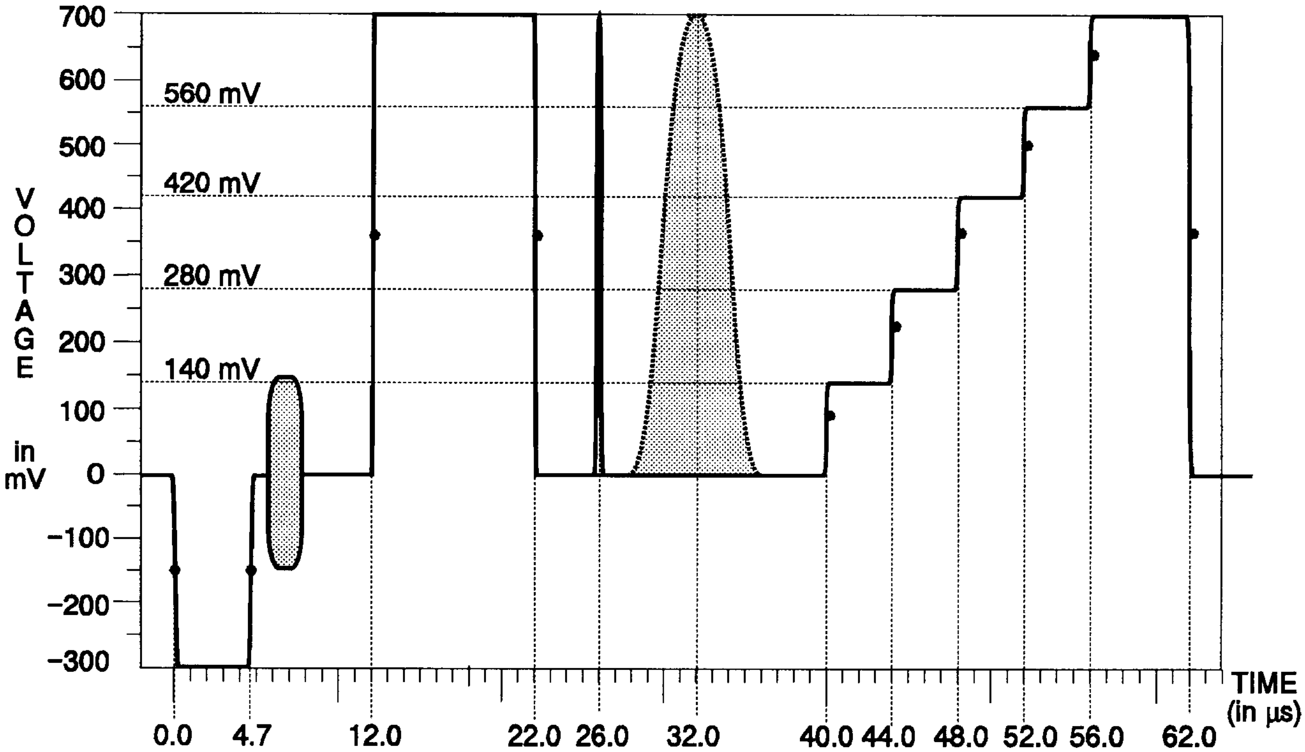


Fig. 3-24. Matrix Signal — CCIR Line 17.

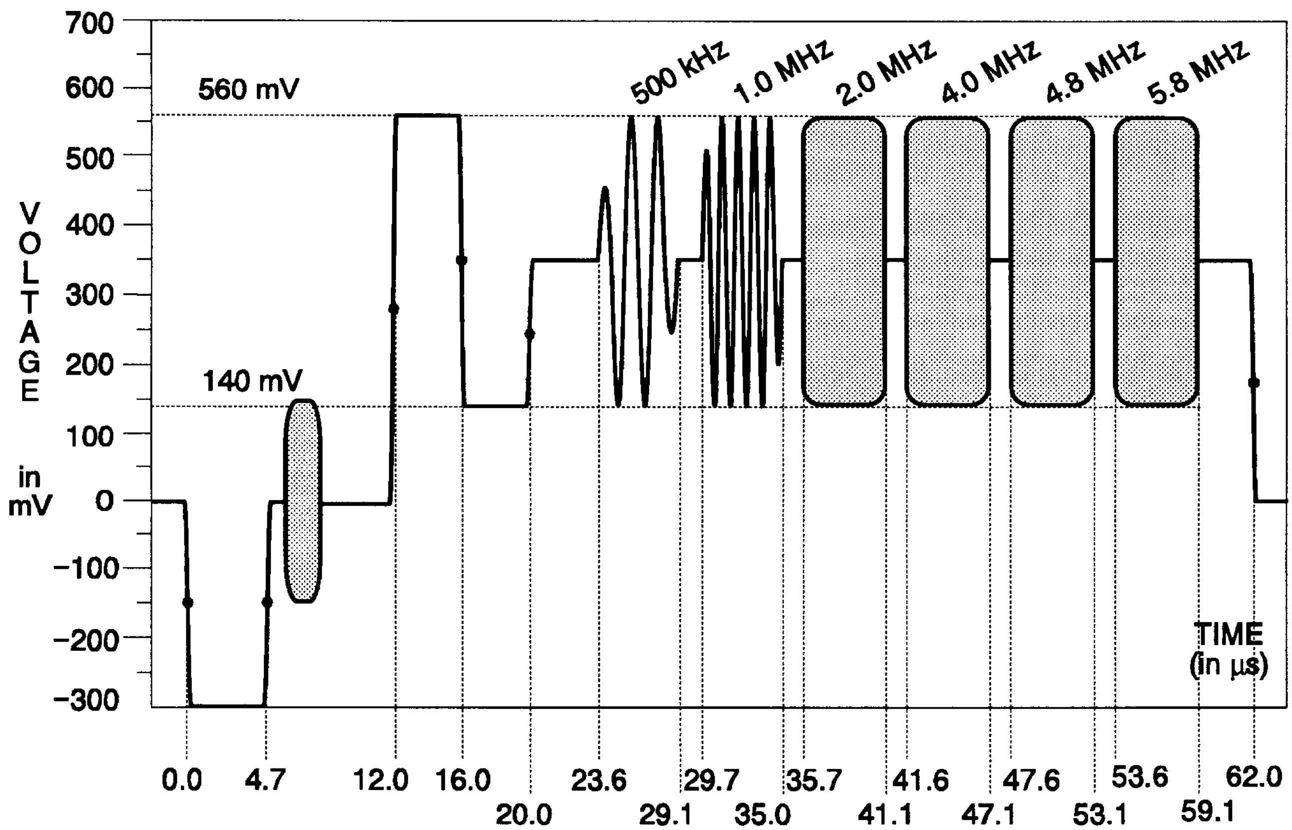


Fig. 3-25. Matrix Signal — CCIR Line 18.

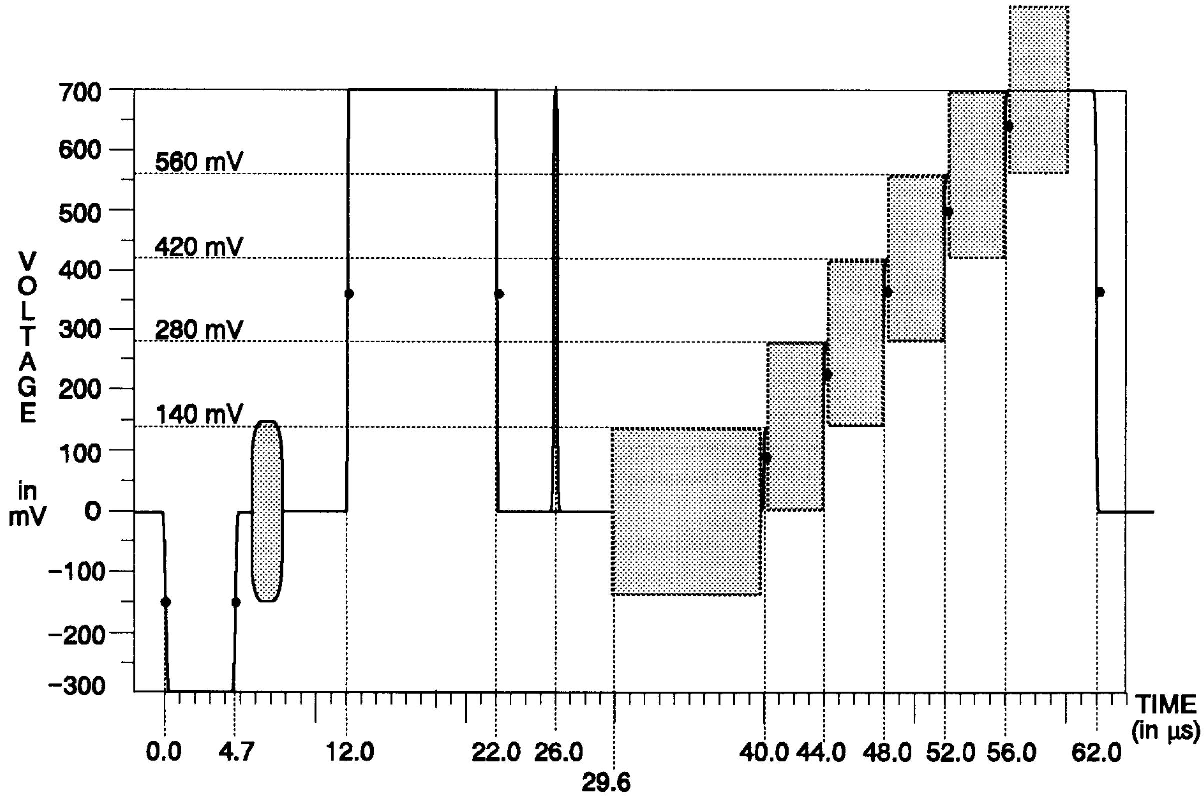


Fig. 3-26. Matrix Signal — CCIR Line 330.

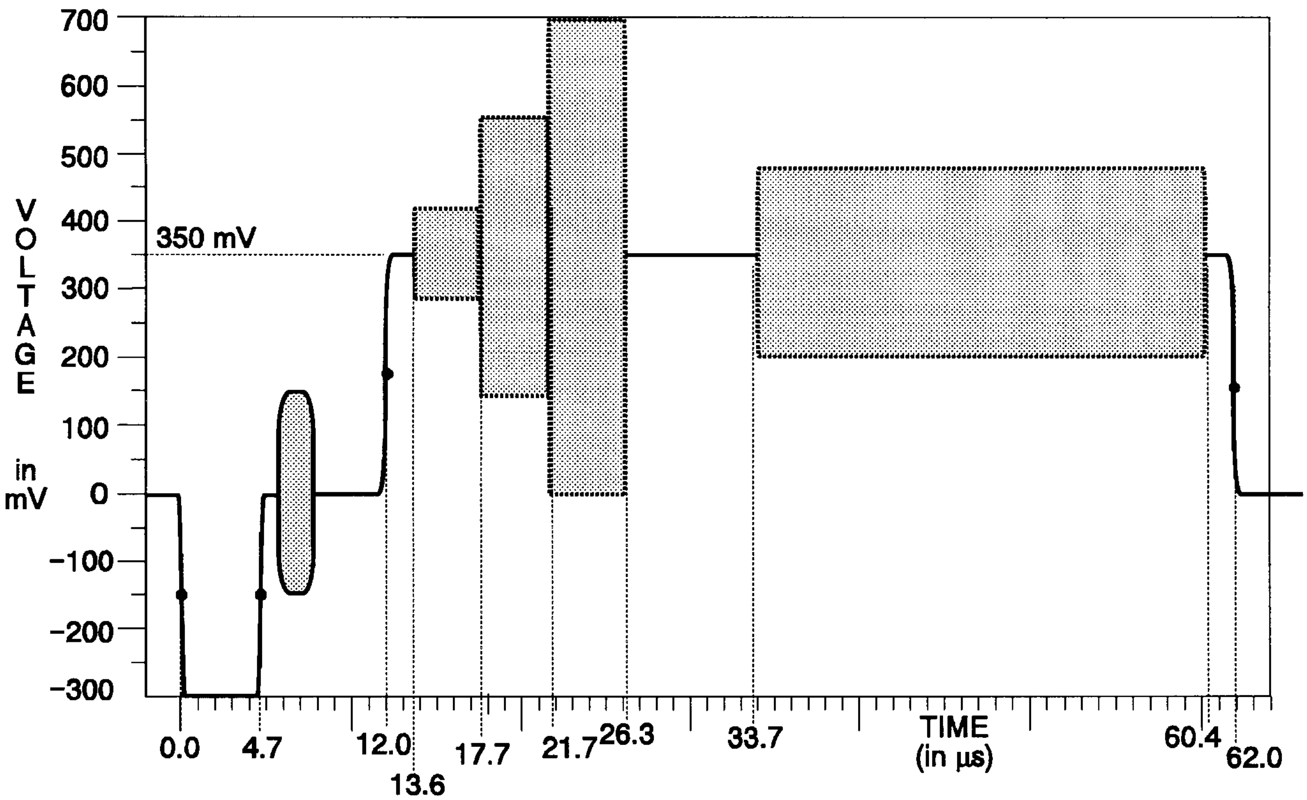


Fig. 3-27. Matrix Signal — CCIR Line 331.

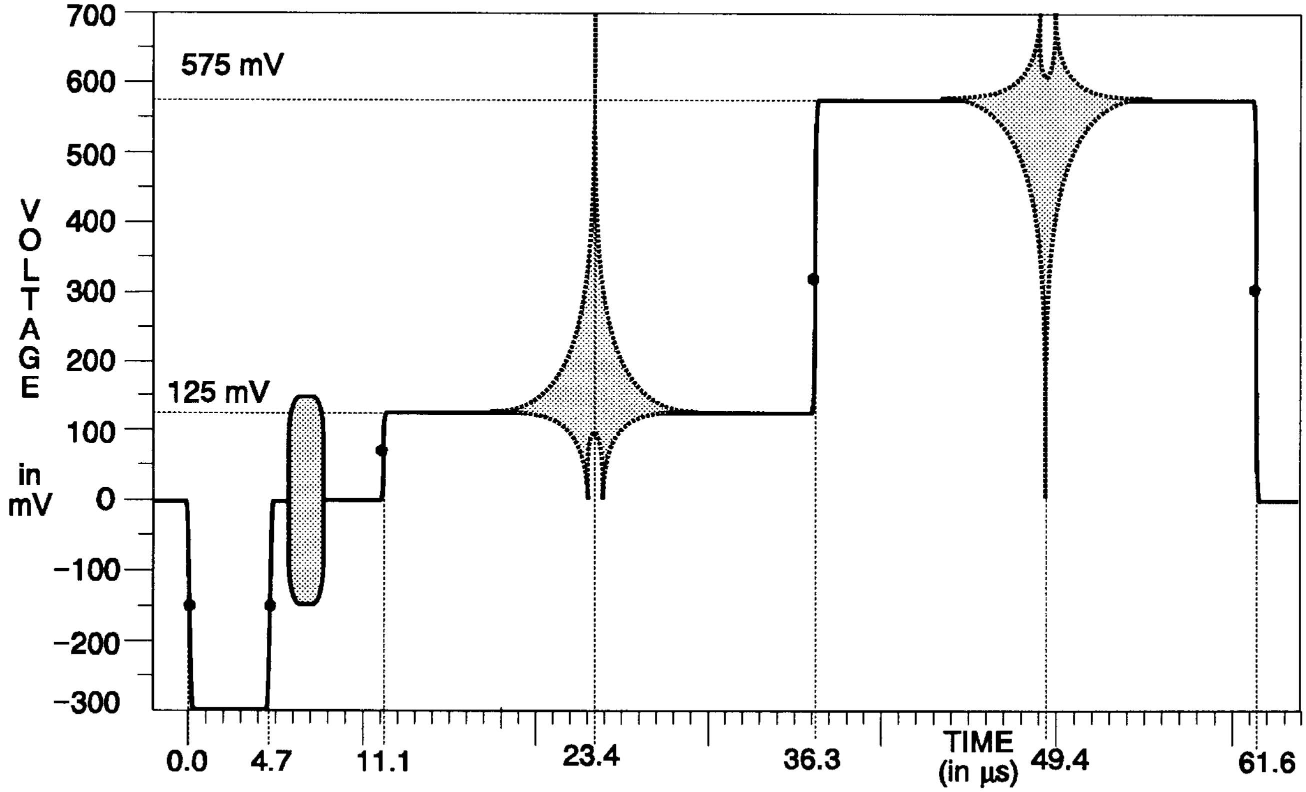


Fig. 3-28. Matrix Signal — Sin(x)/x.

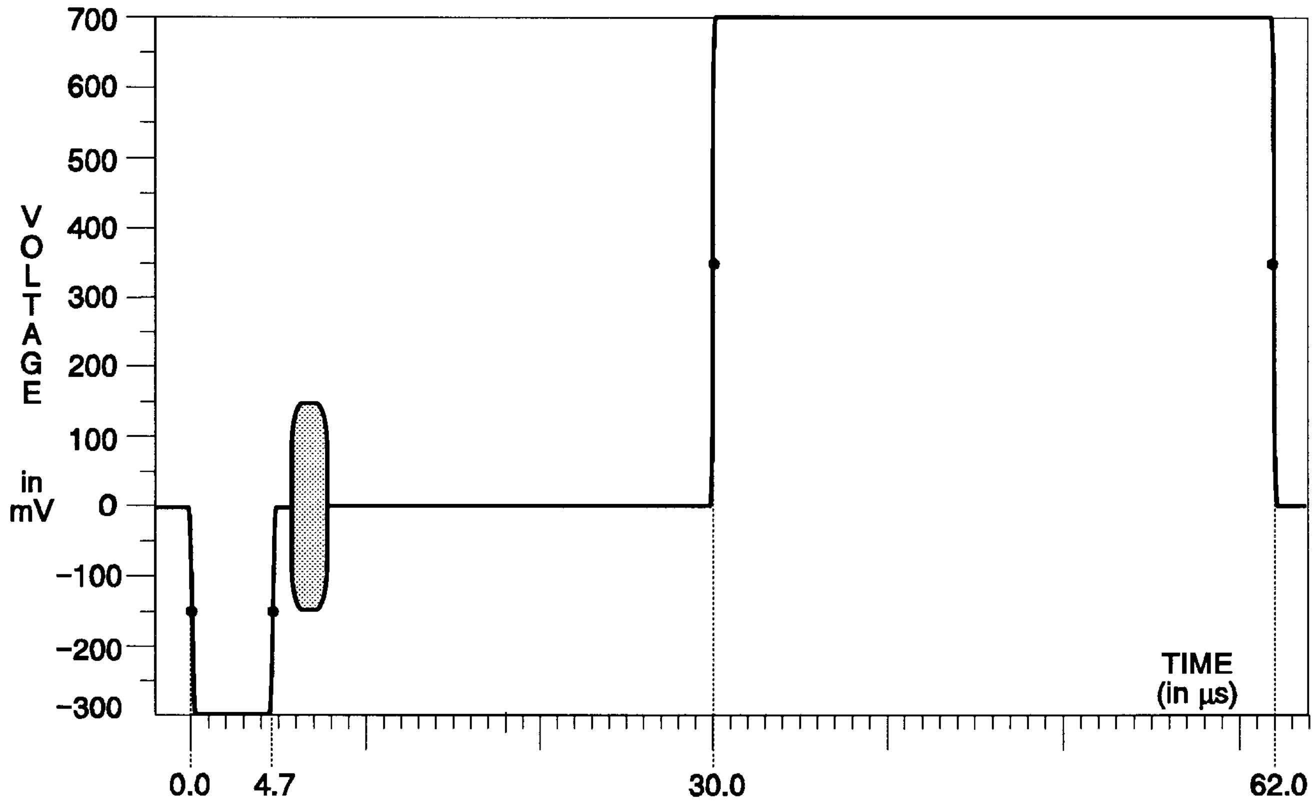


Fig. 3-29. Matrix Signal — 15 kHz Square Wave.

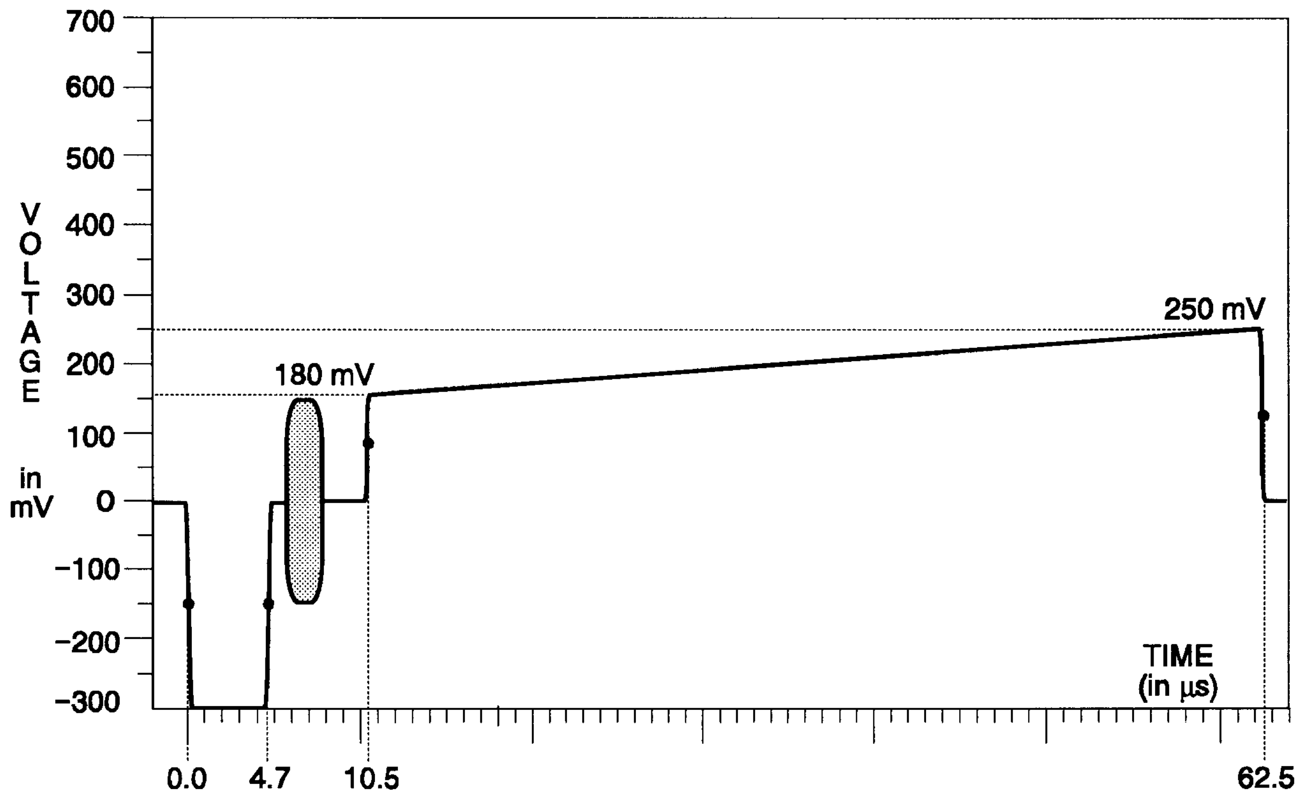


Fig. 3-30. Matrix Signal — Shallow Ramp.

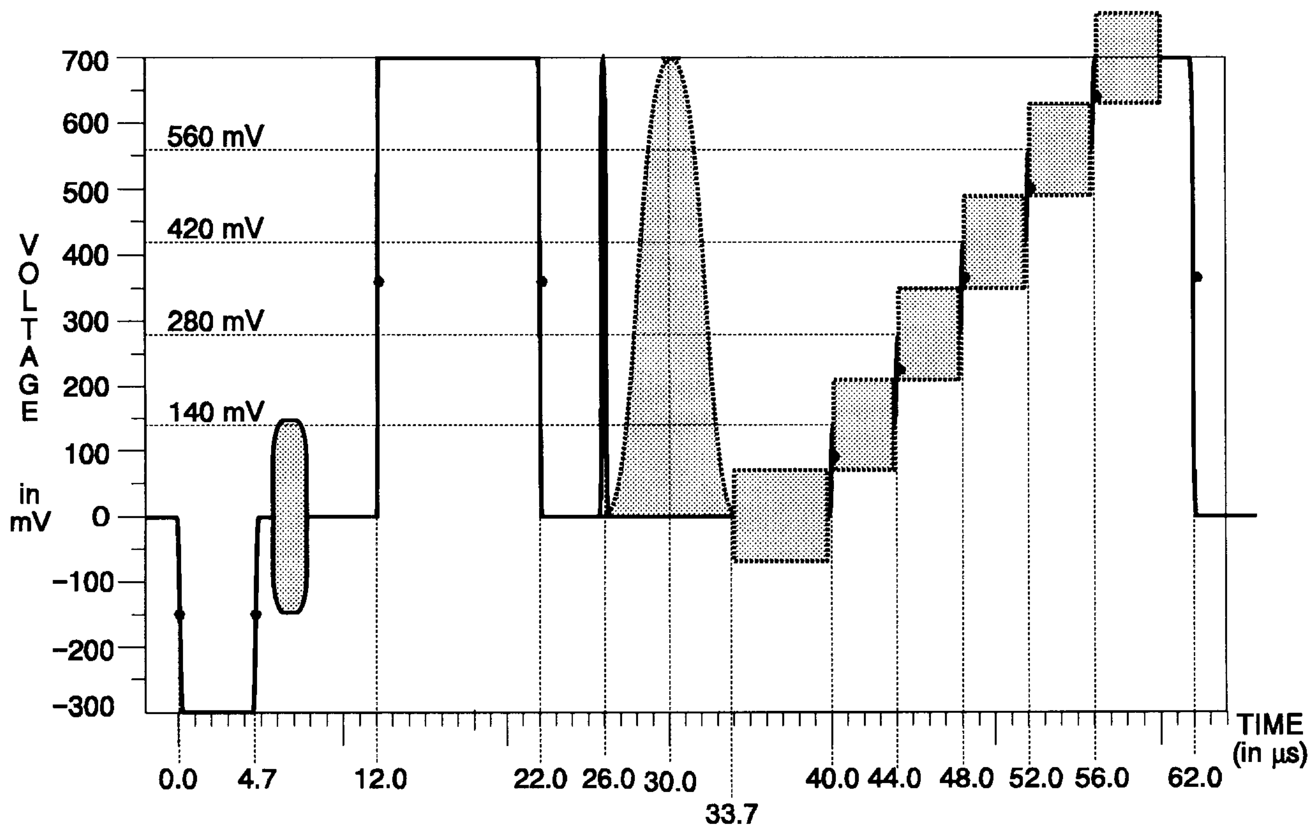


Fig. 3-31. Matrix Signal — UK ITS 1.

Y-C Signal Format

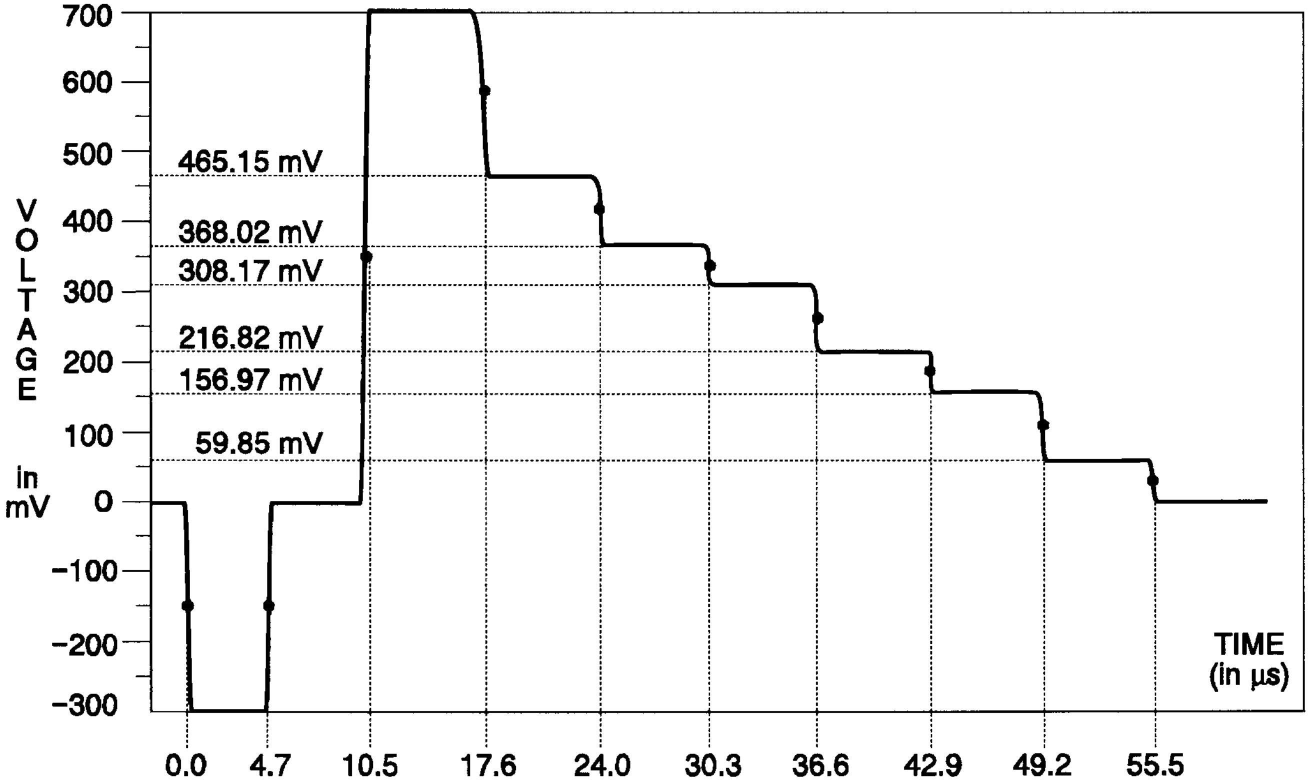


Fig. 3-32. Y Channel — 75% Bars.

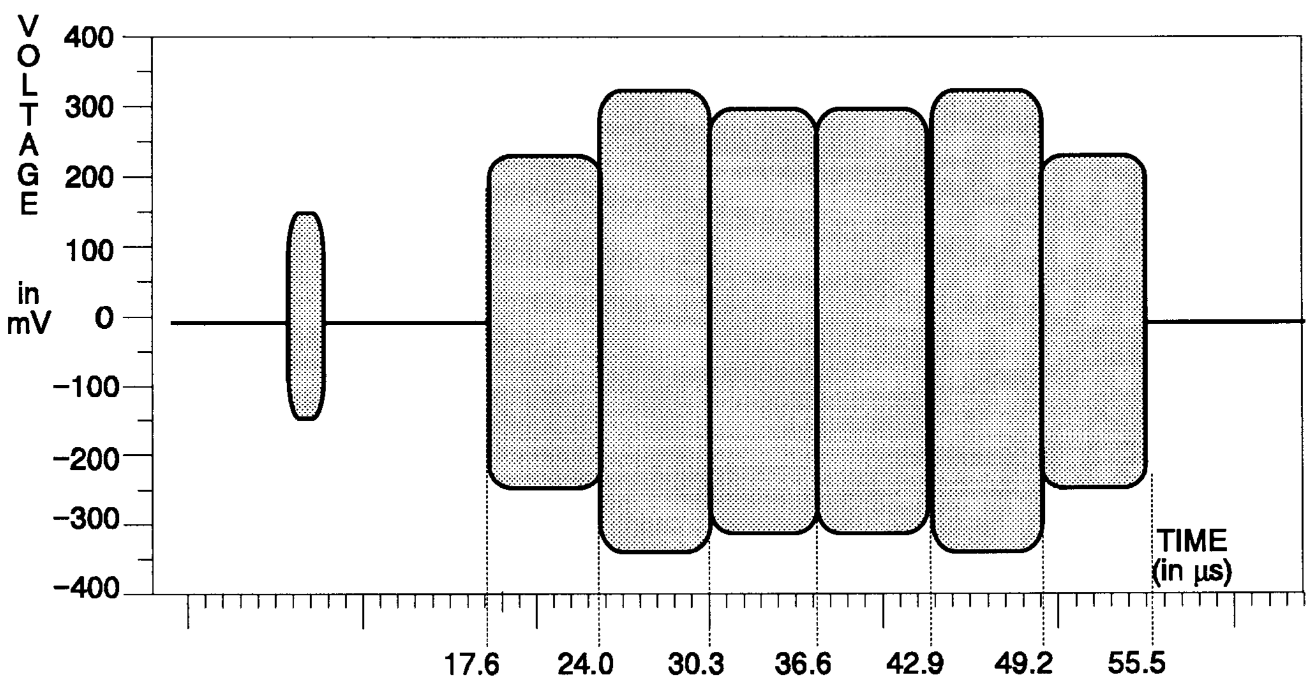


Fig. 3-33. C Channel — 75% Bars.

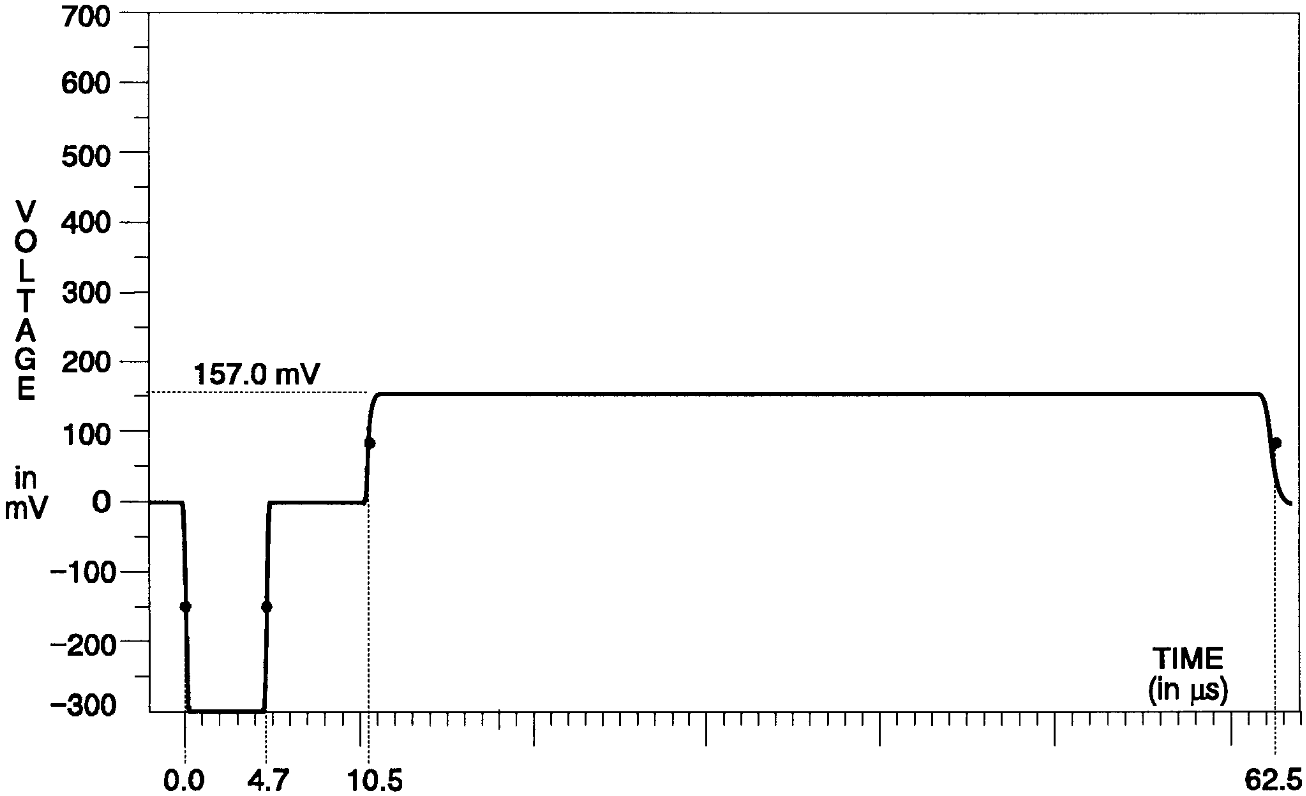


Fig. 3-34. Y Channel — 75% Red.(Same as Red Field)

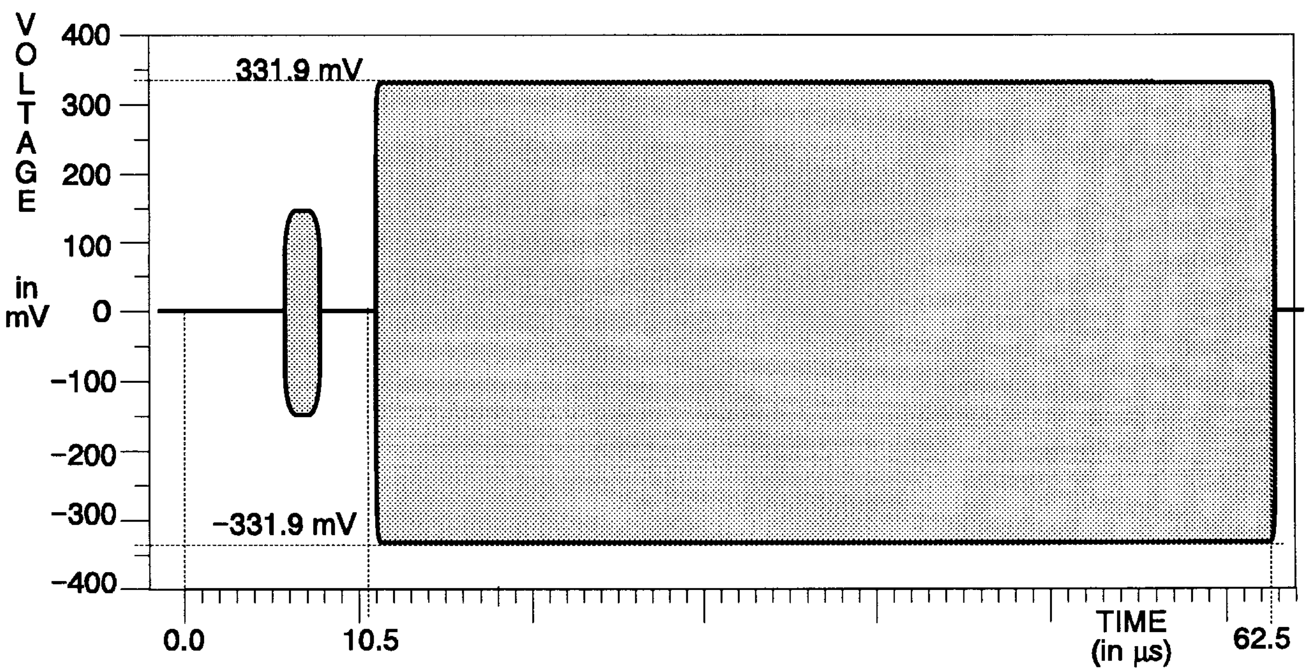


Fig. 3-35. C Channel — 75% Red (Same as Red Field)

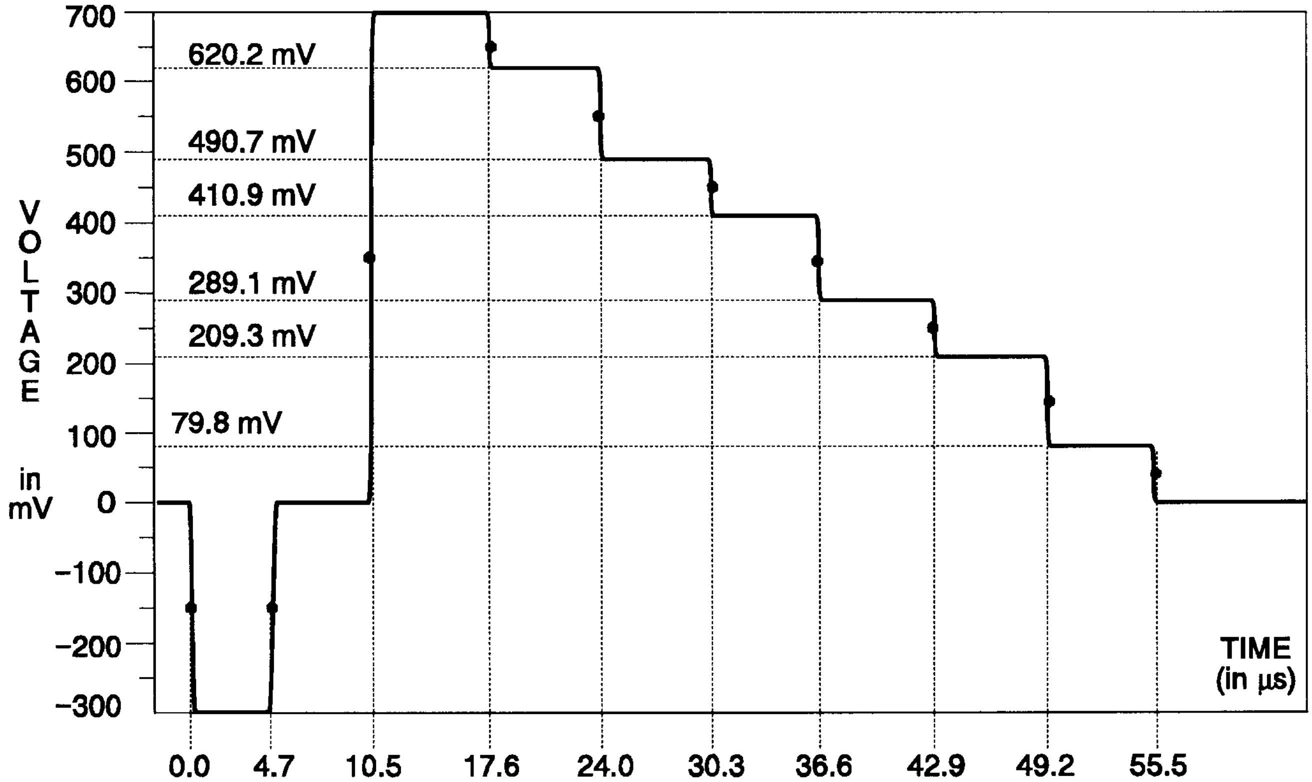


Fig. 3-36. Y Channel — 100% Bars.

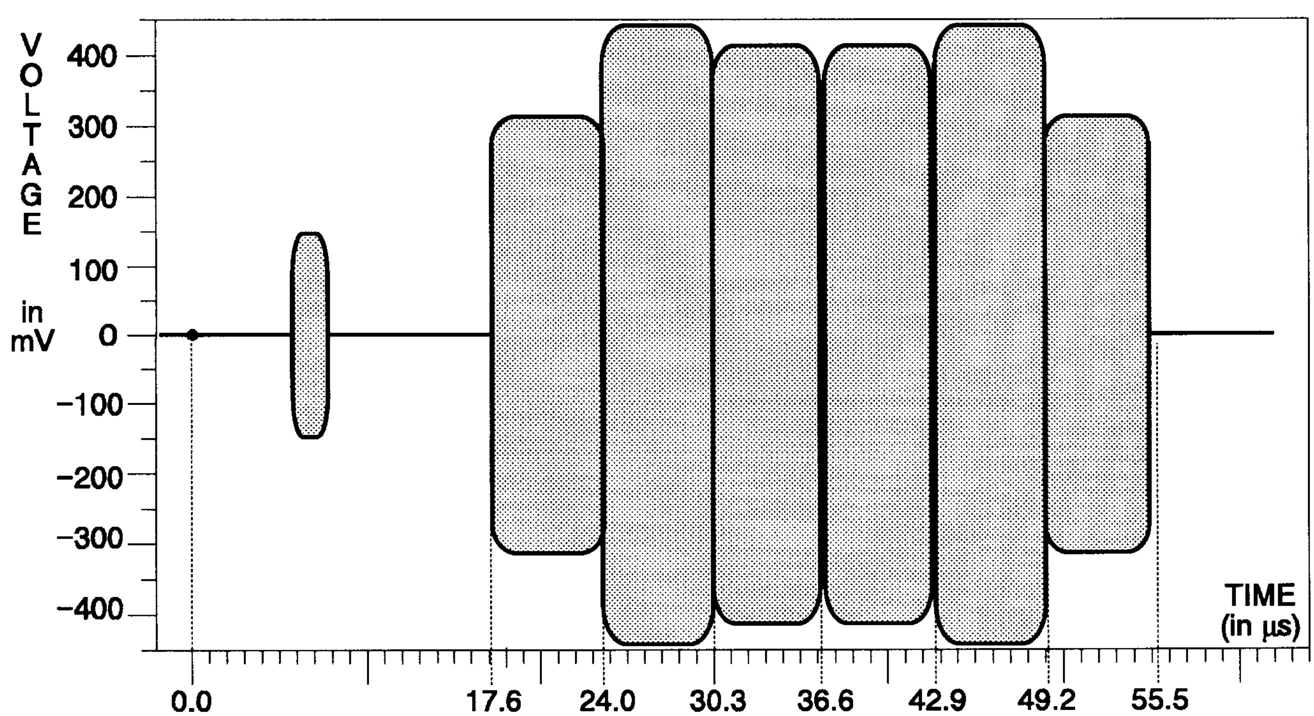


Fig. 3-37. C Channel — 100% Bars.

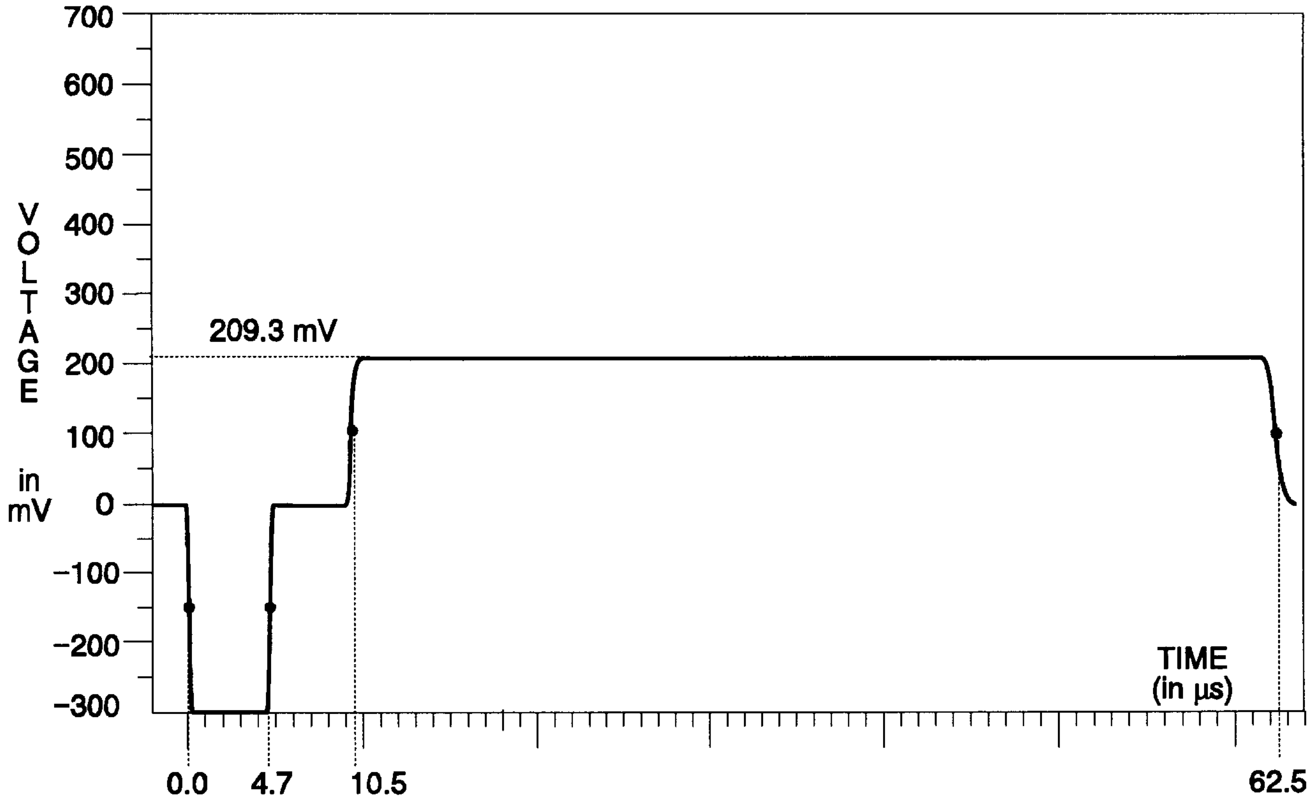


Fig. 3-38. Y Channel — 100% Red.

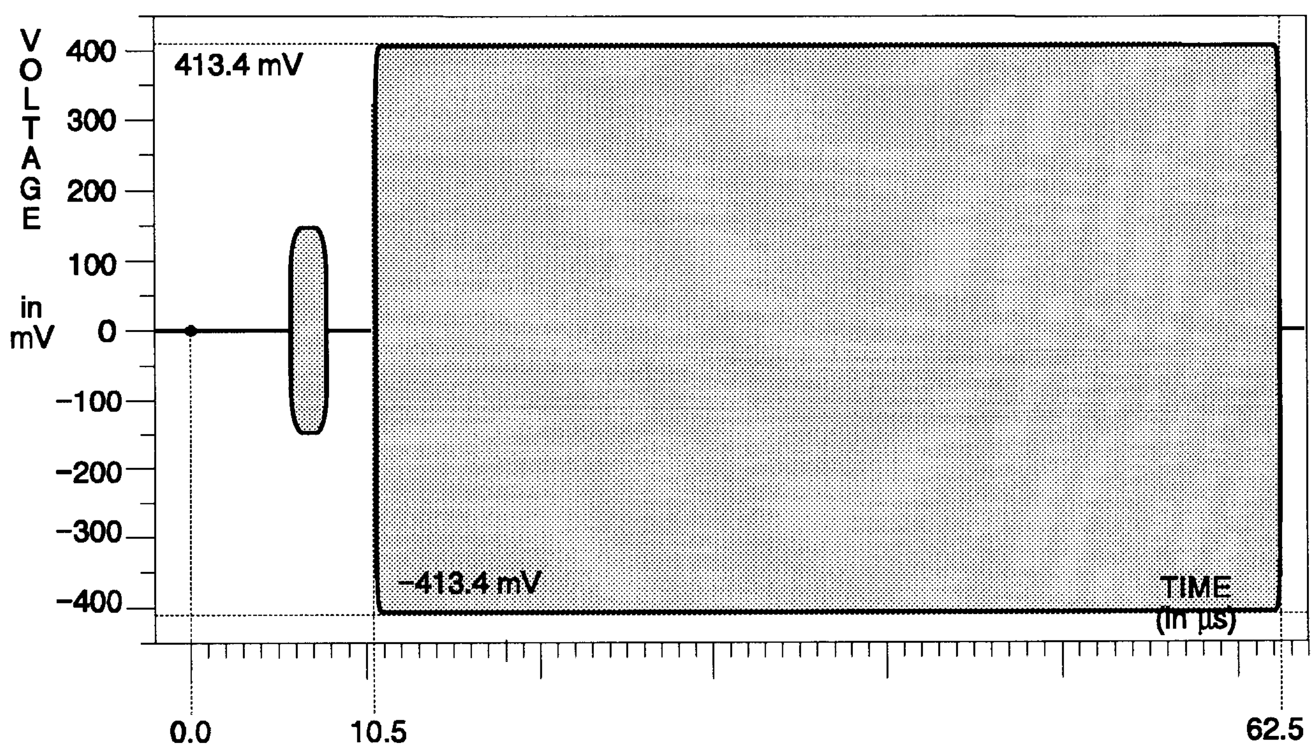


Fig. 3-39. C Channel — 100% Red.

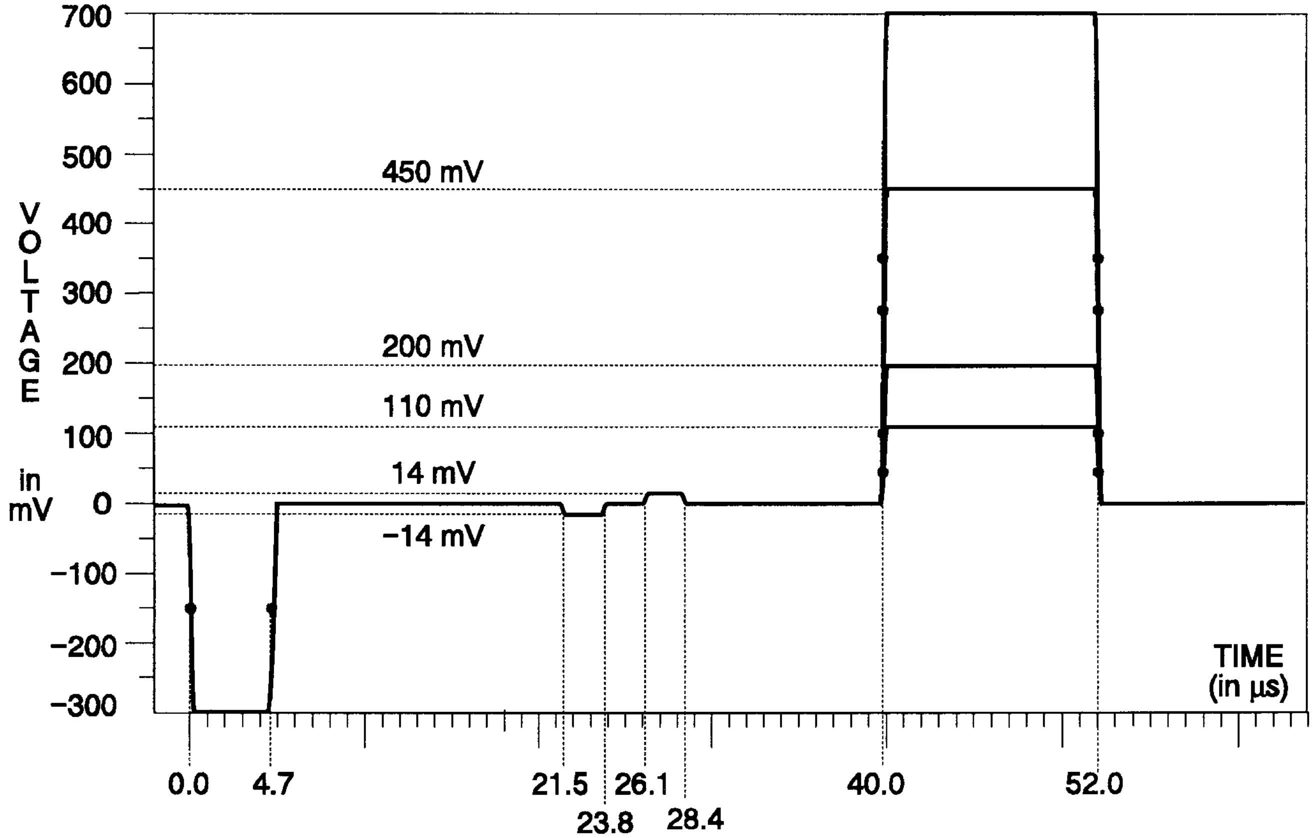


Fig. 3-40. Y Channel — Pluge.

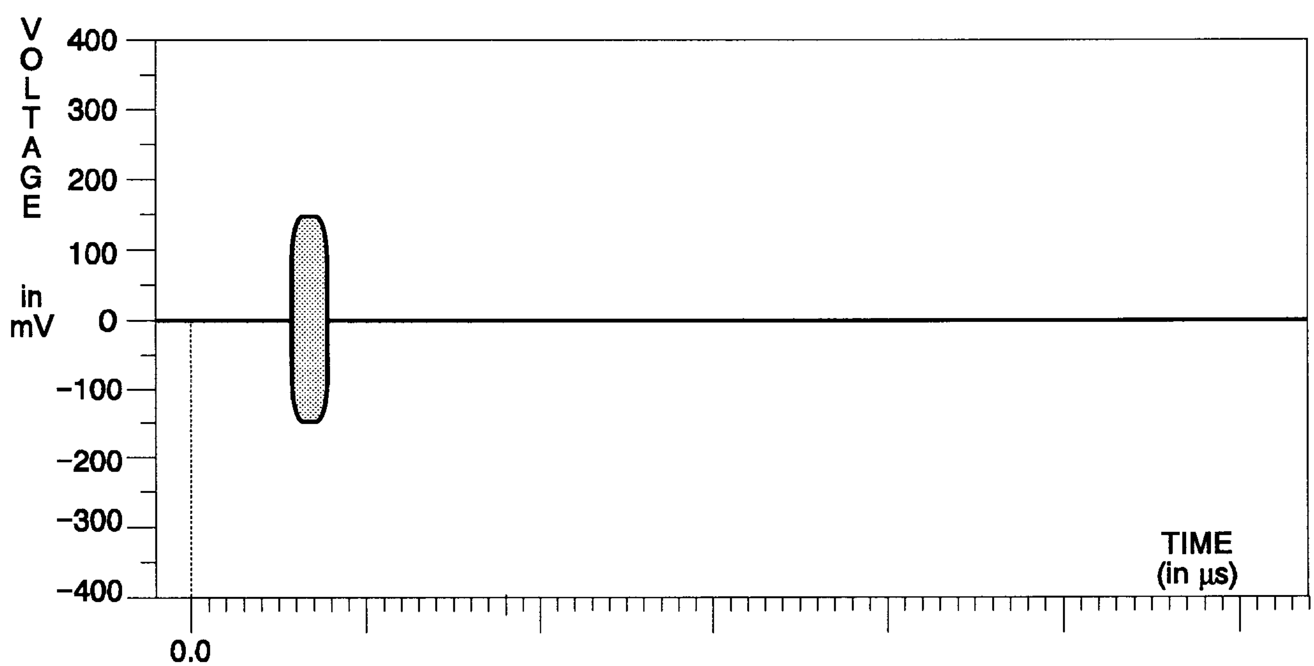


Fig. 3-41. C Channel — Pluge.

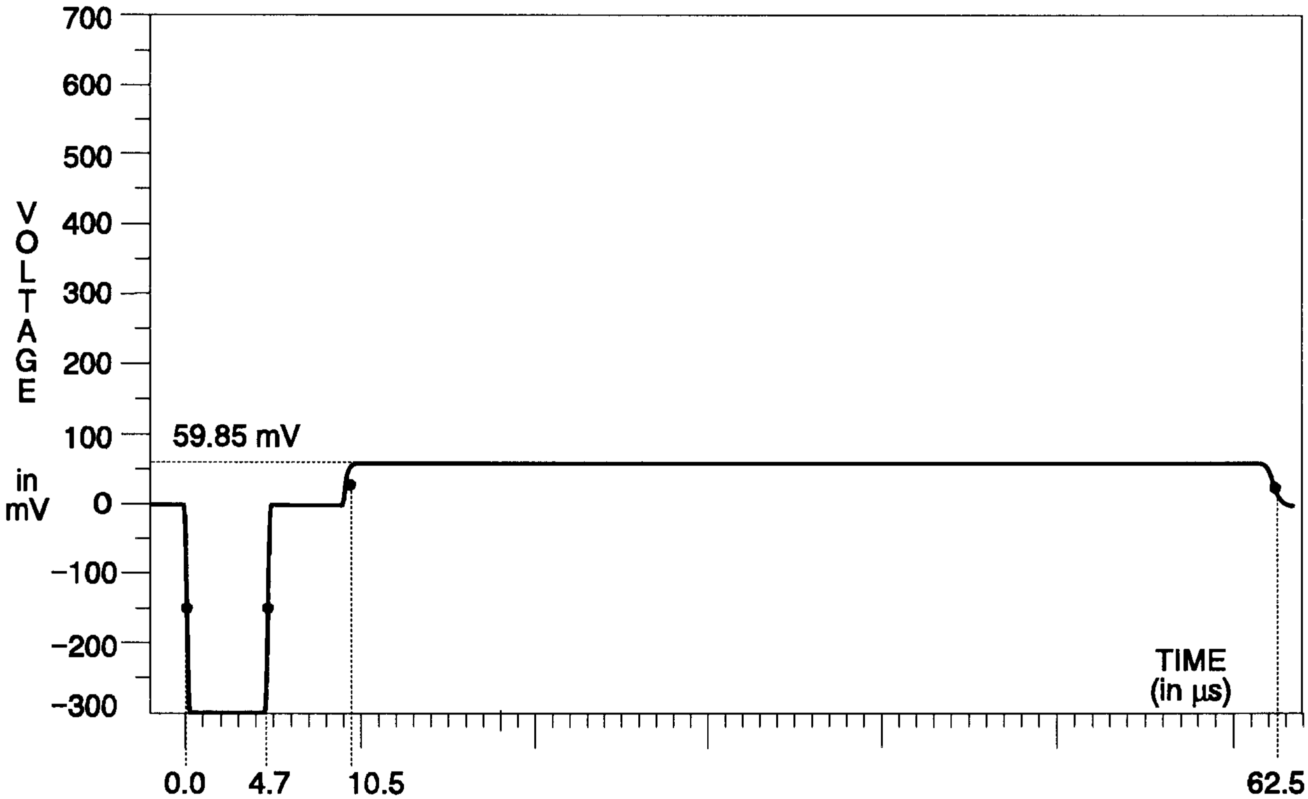


Fig. 3-42. Y Channel — Blue Field.

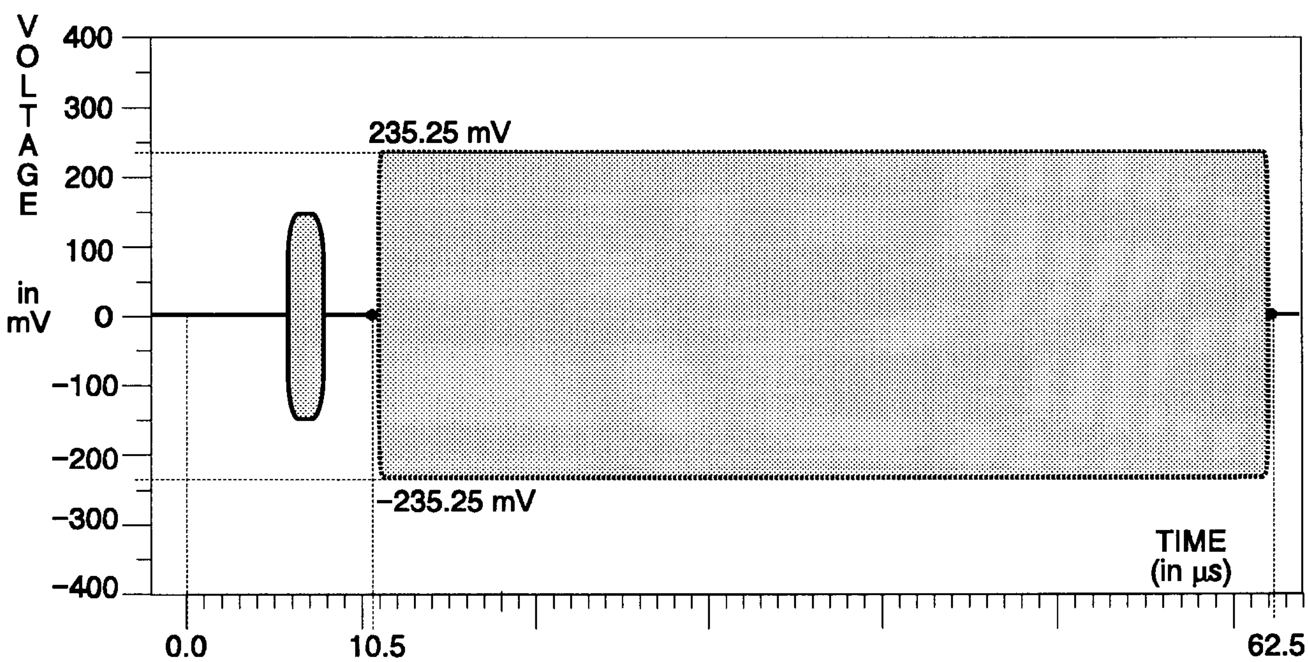


Fig. 3-43. C Channel — Blue Field.

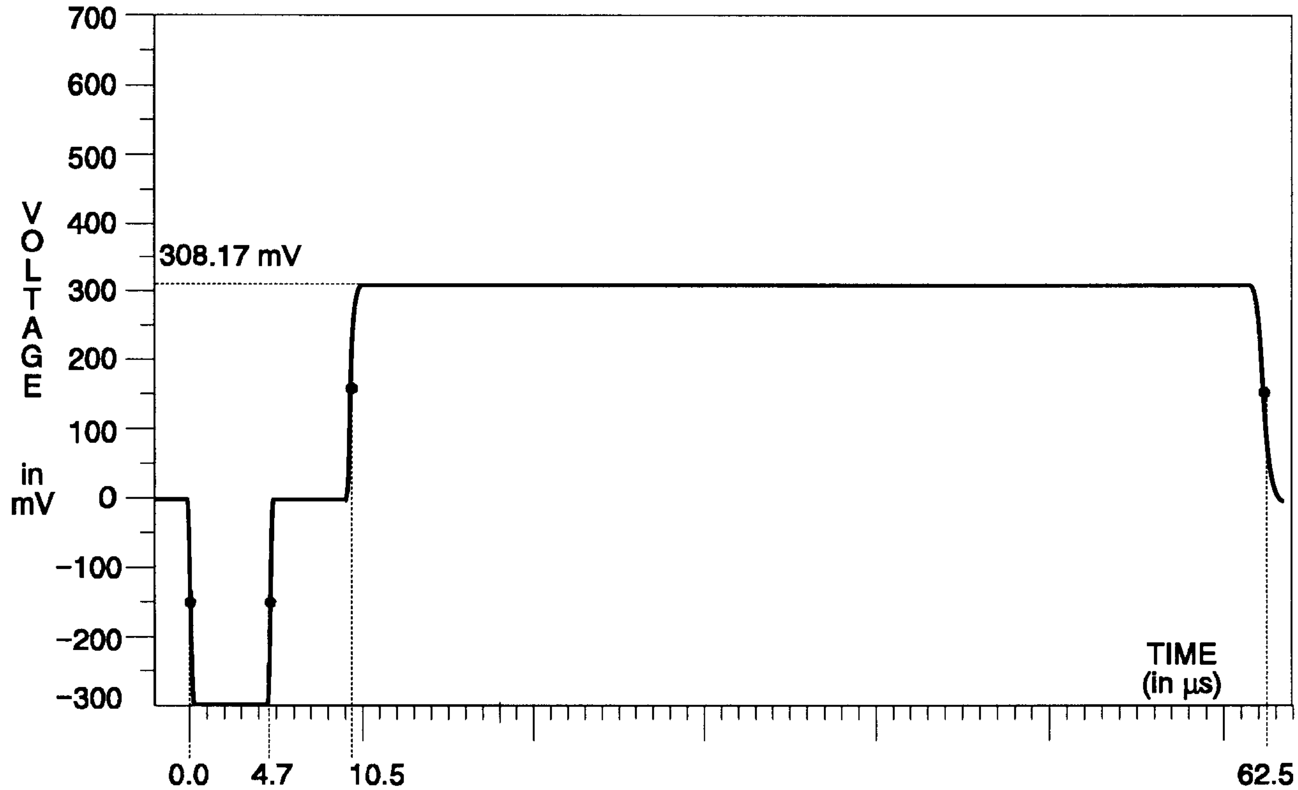


Fig. 3-44. Y Channel — Green Field.

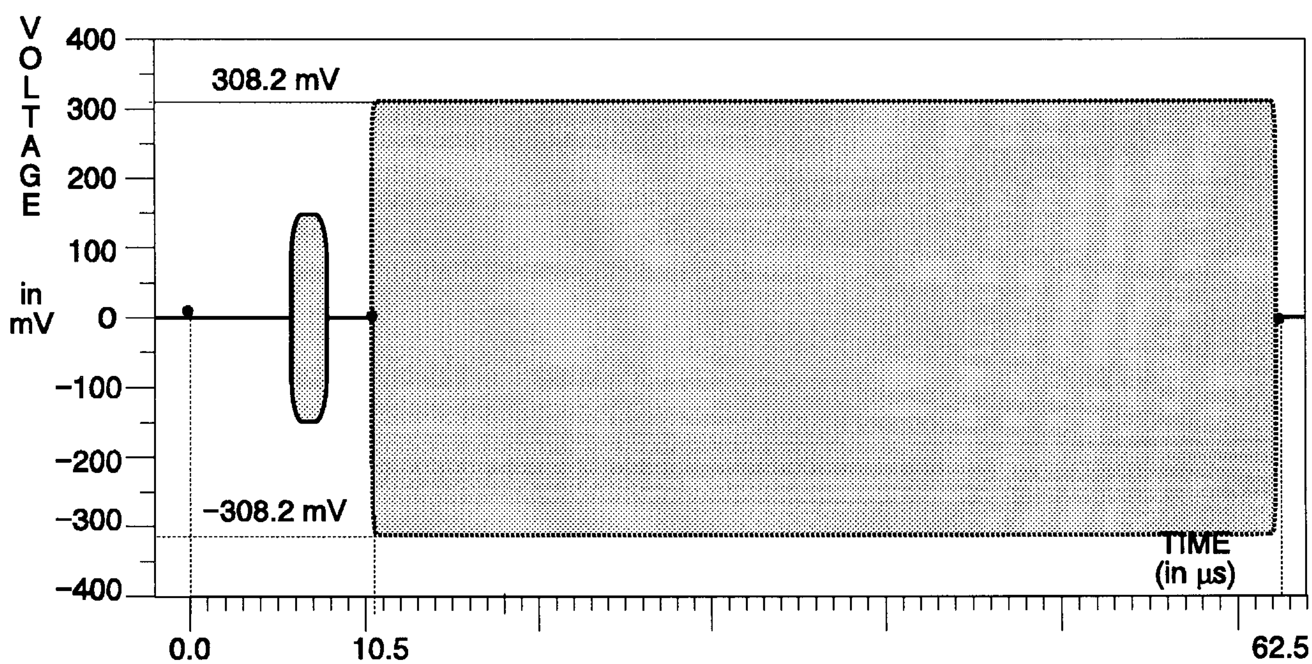


Fig. 3-45. C Channel — Green Field.

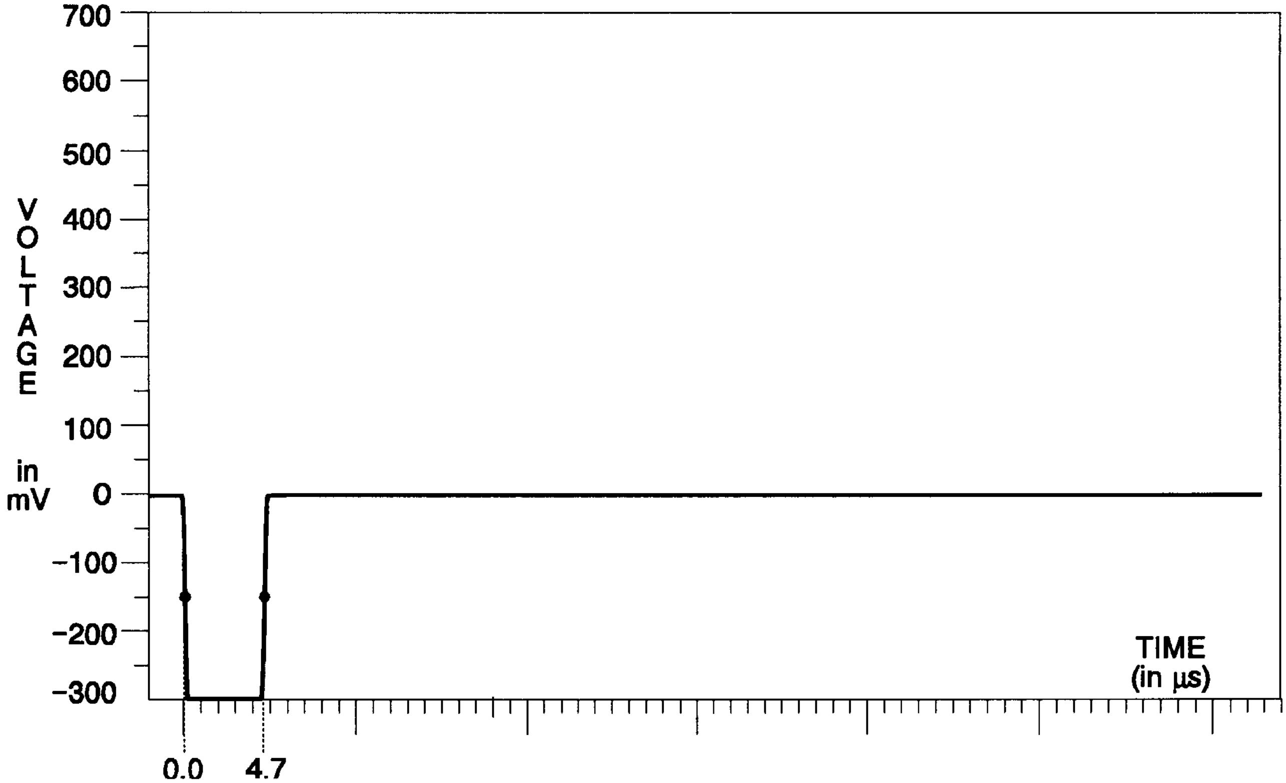


Fig. 3-46. Y Channel — 0% Flat Field.

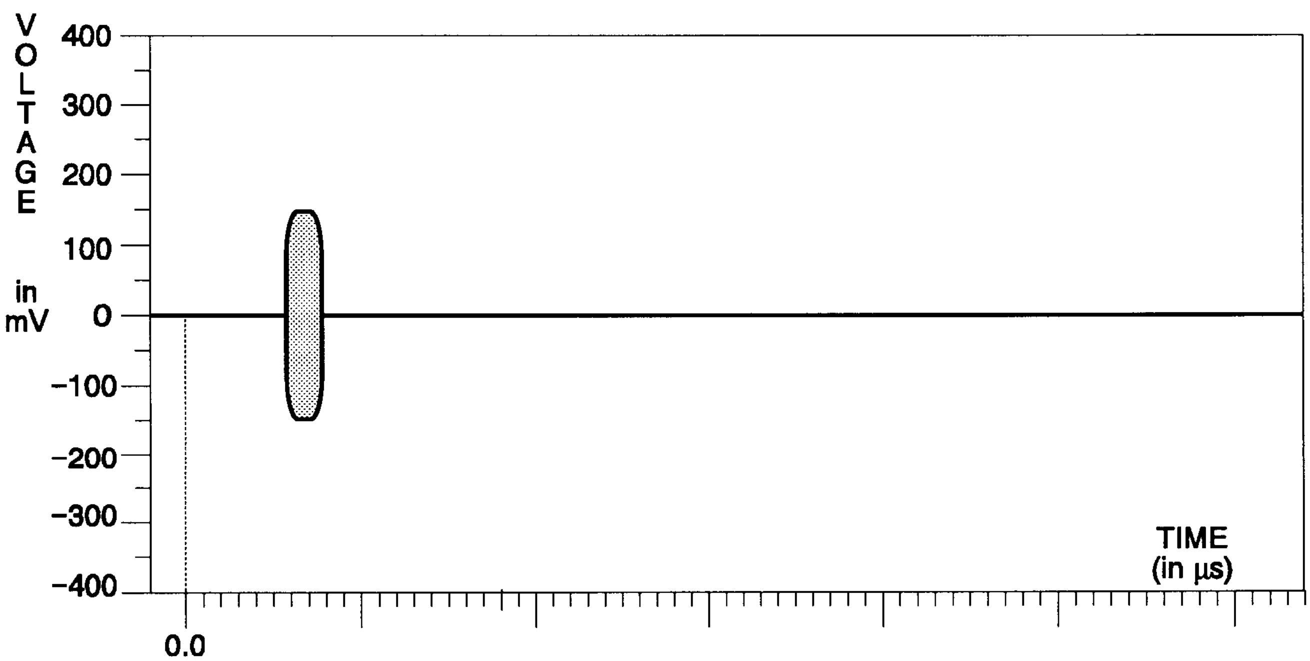


Fig. 3-47. C Channel — 0% Flat Field.

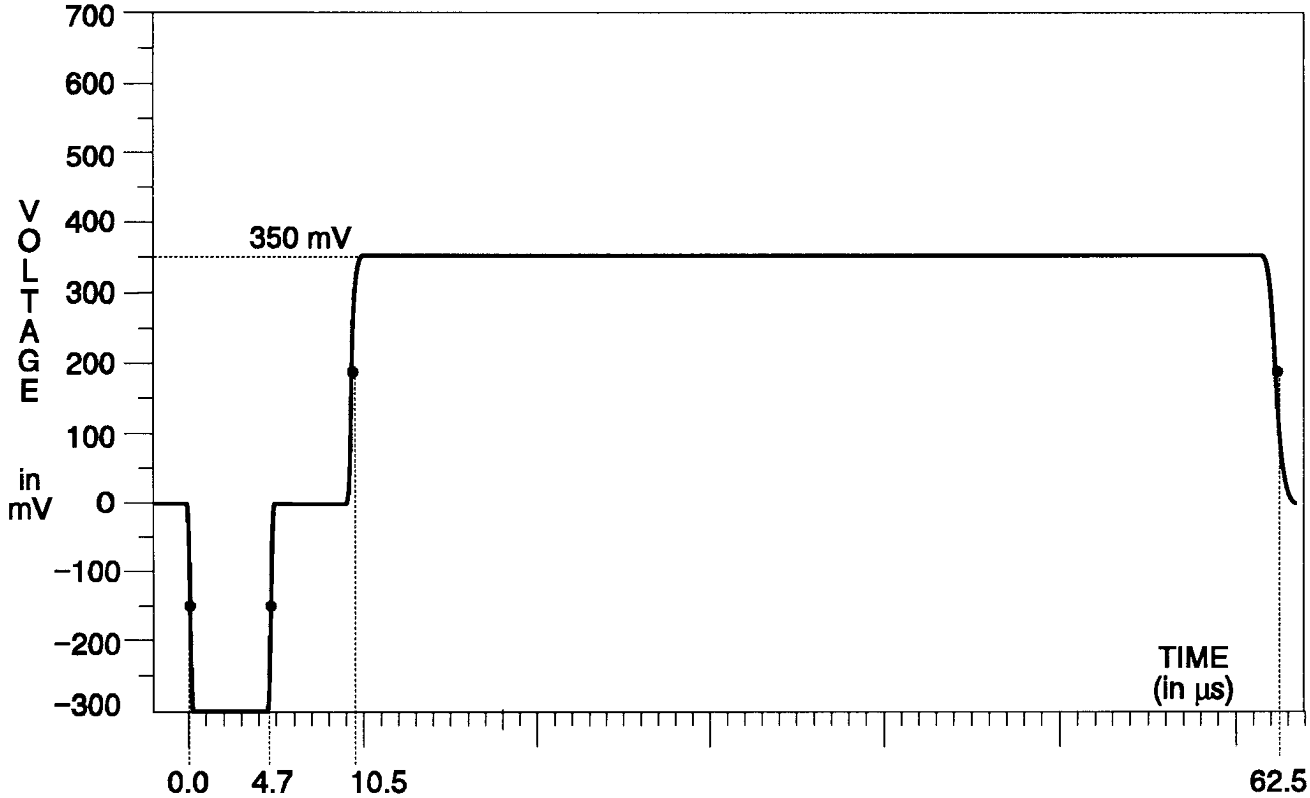


Fig. 3-48. Y Channel — 50% Flat Field.

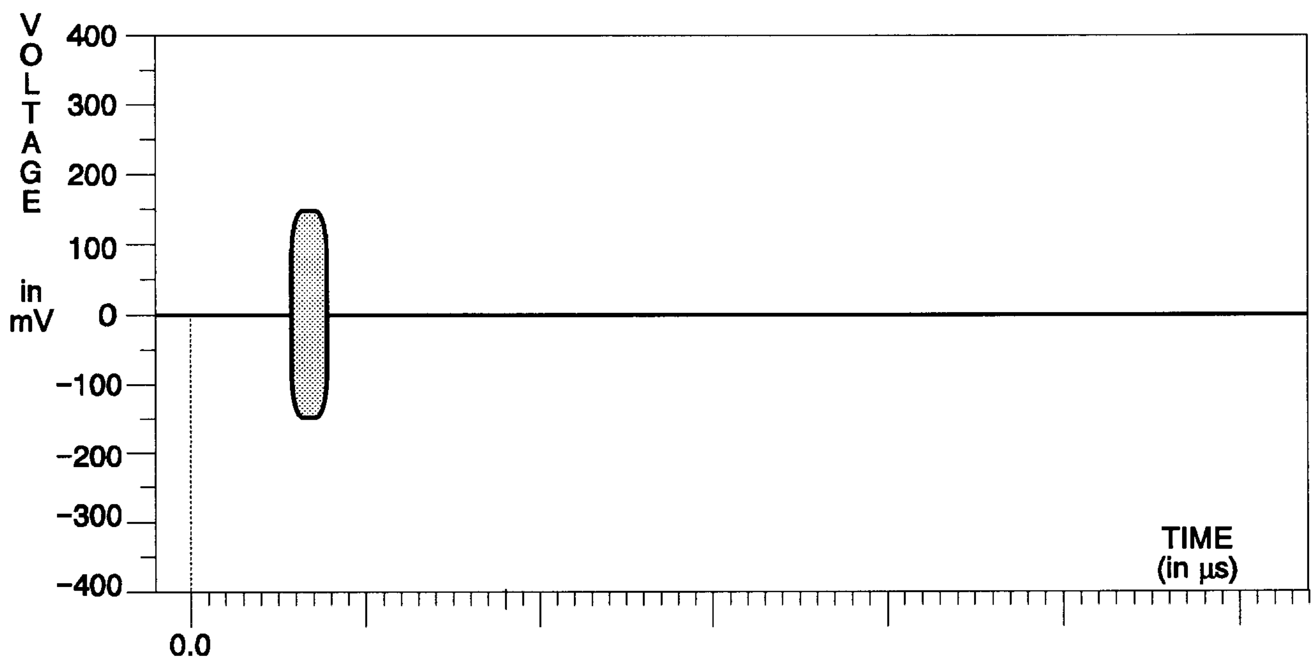


Fig. 3-49. C Channel — 50% Flat Field.

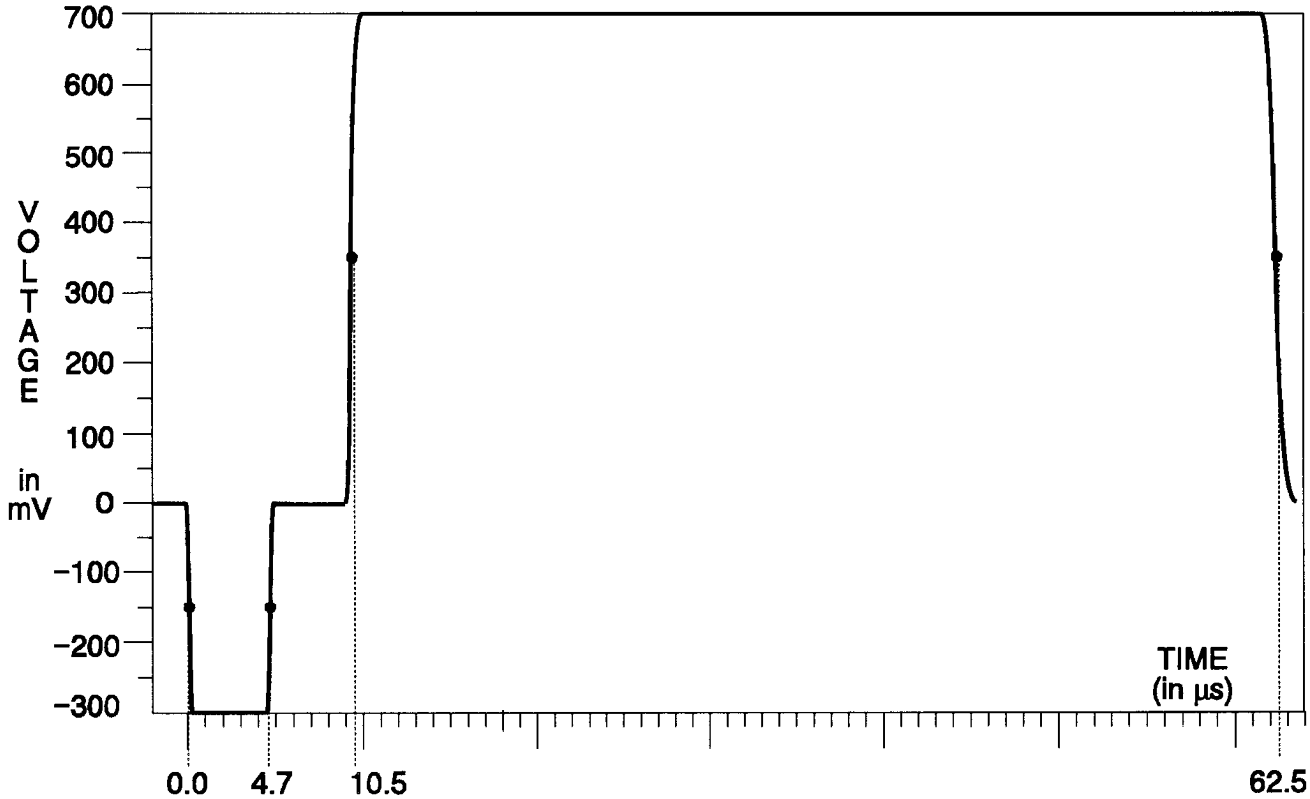


Fig. 3-50. Y Channel — 100% Flat Field.

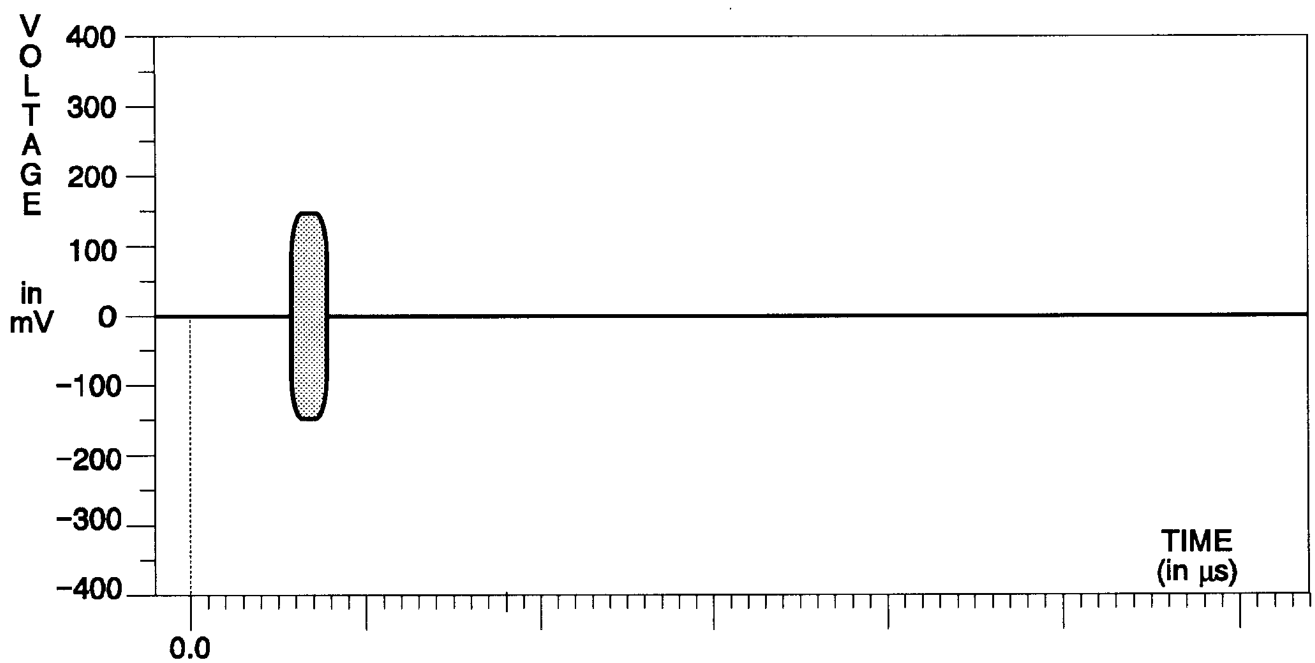


Fig. 3-51. C Channel — 100% Flat Field.

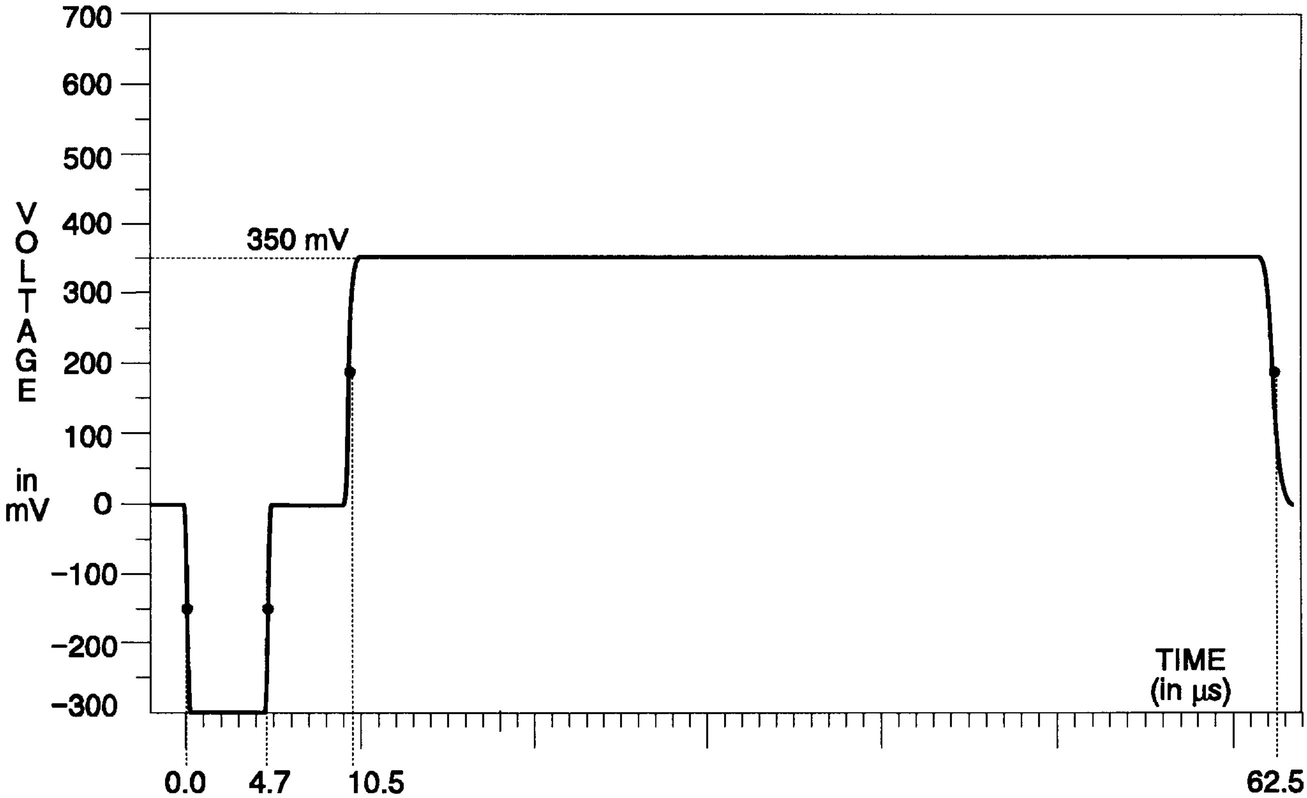


Fig. 3-52. Y Channel — Chroma Noise.

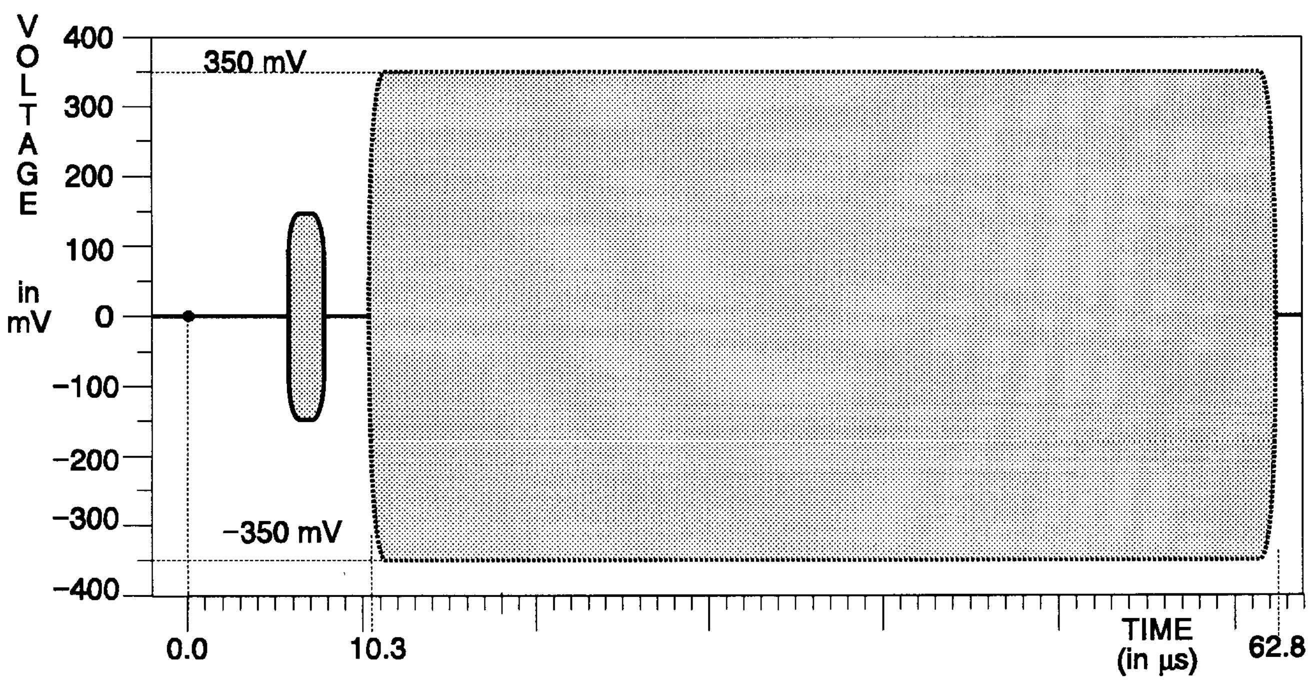


Fig. 3-53. C Channel — Chroma Noise.

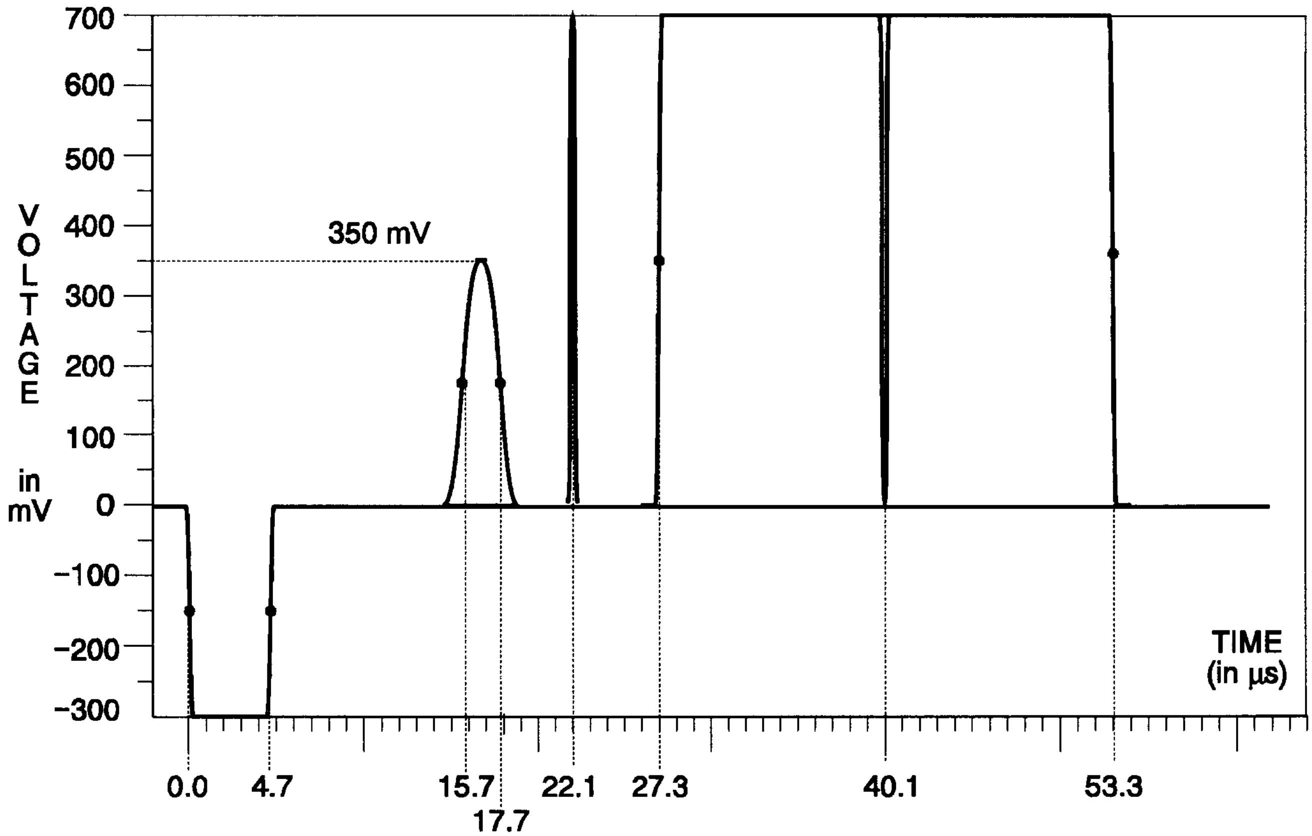


Fig. 3-54. Y Channel — Pulse & Bar with Window.

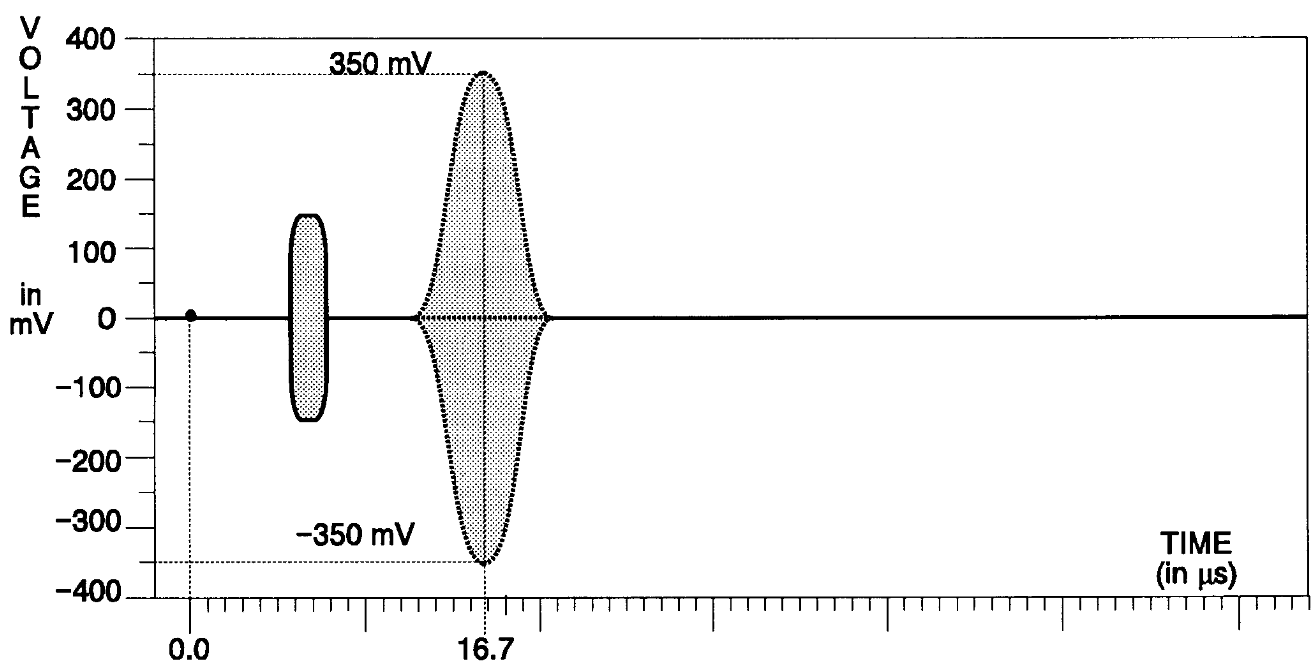


Fig. 3-55. C Channel — Pulse & Bar with Window.

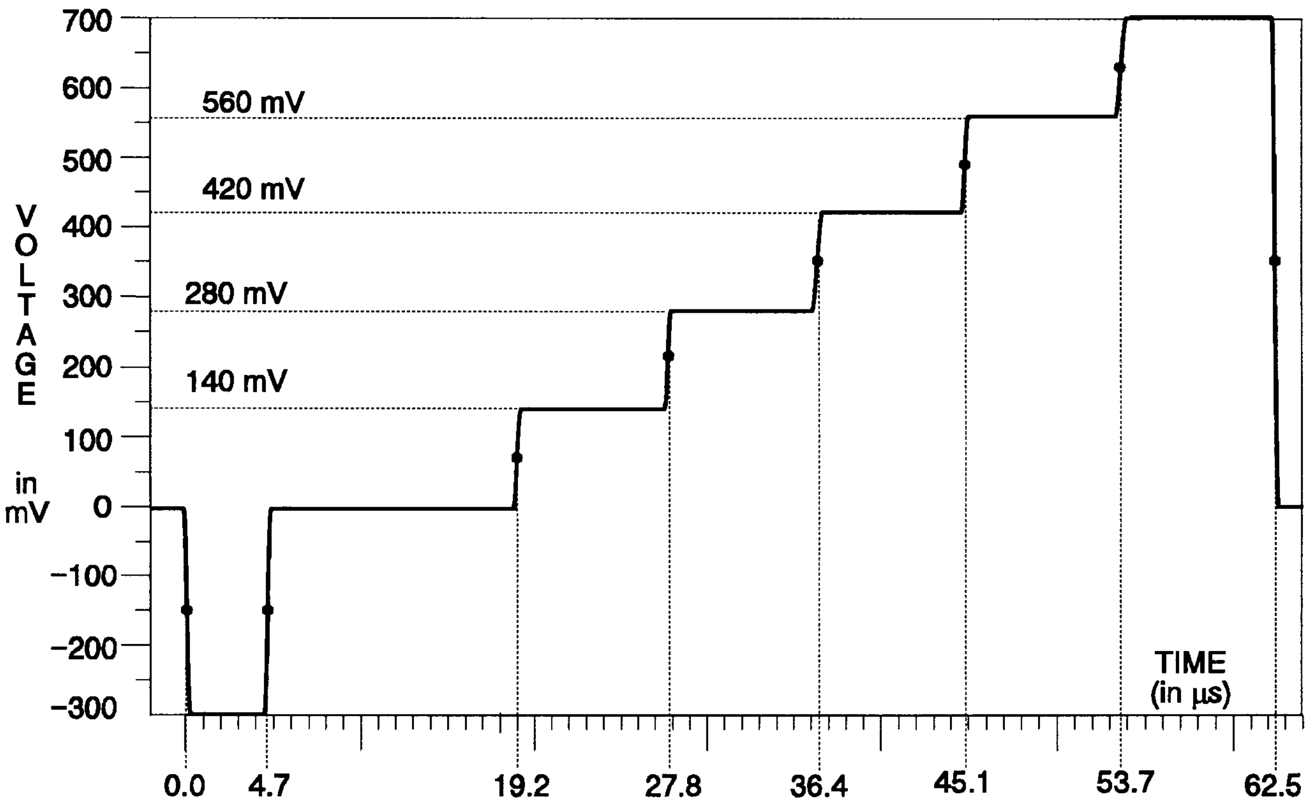


Fig. 3-56. Y Channel — 5-Step.

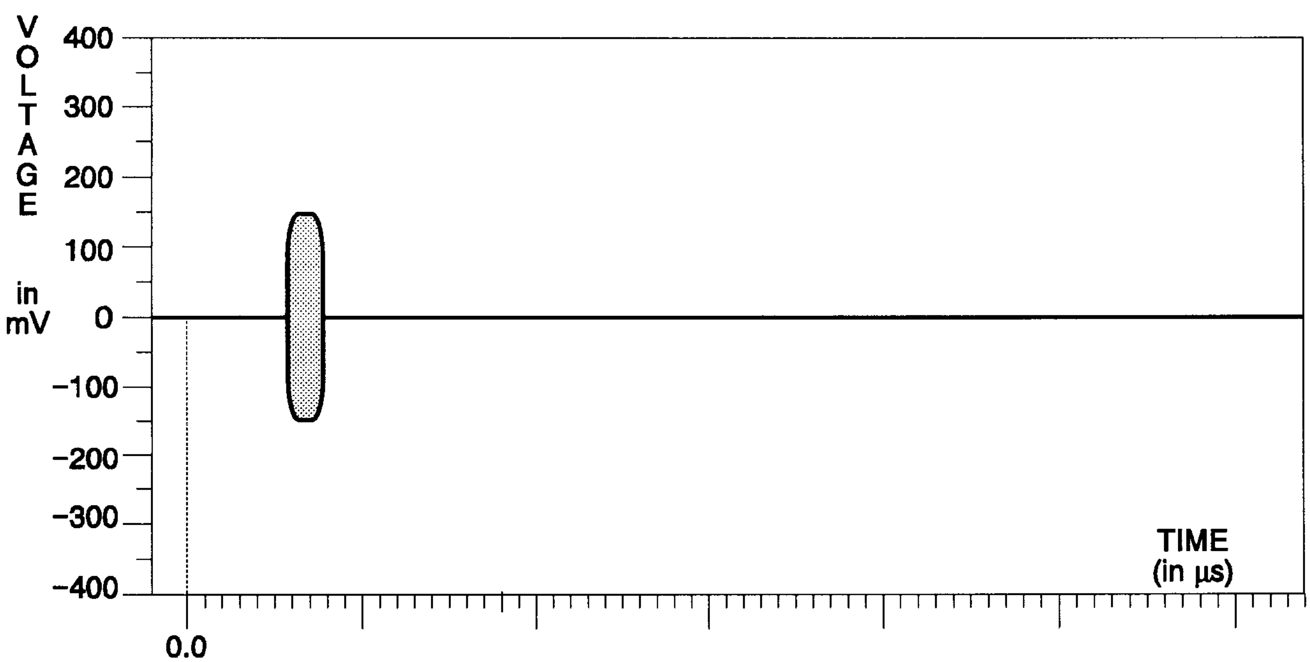


Fig. 3-57. C Channel — 5-Step.

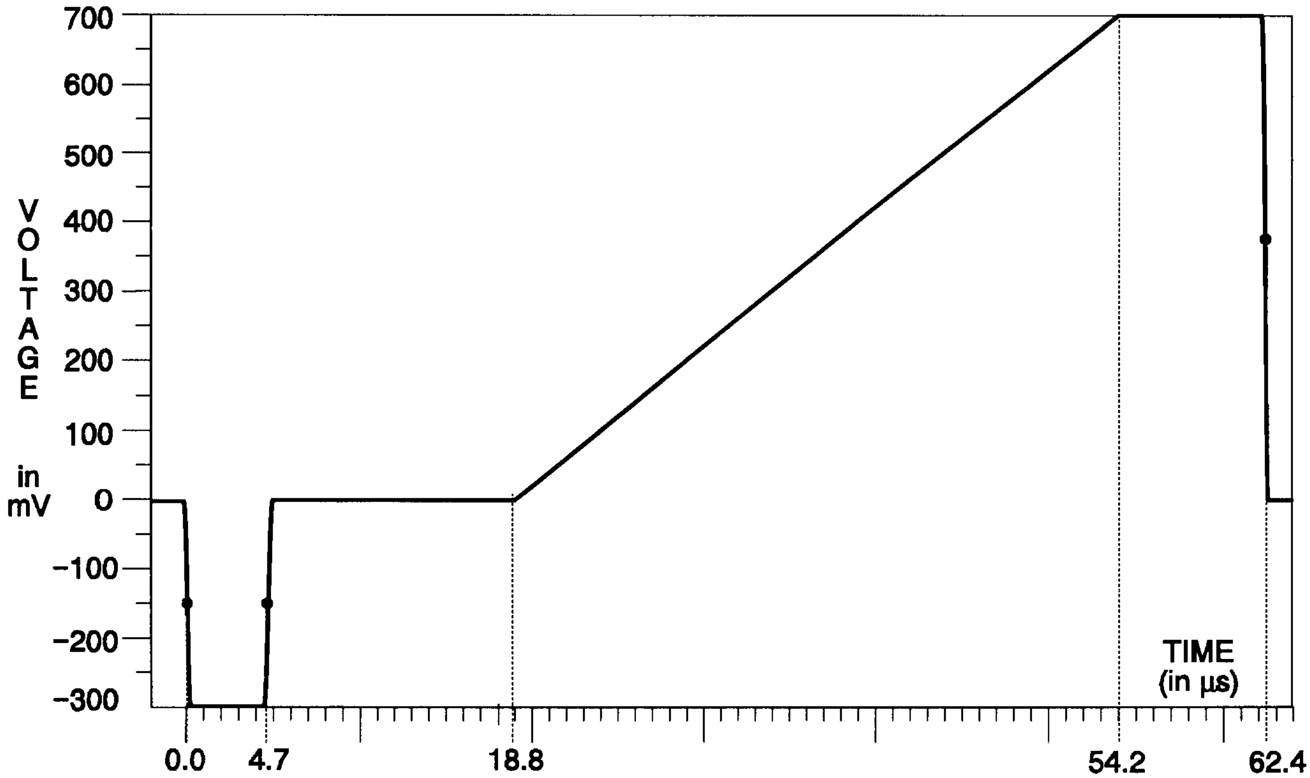


Fig. 3-58. Y Channel — Ramp.

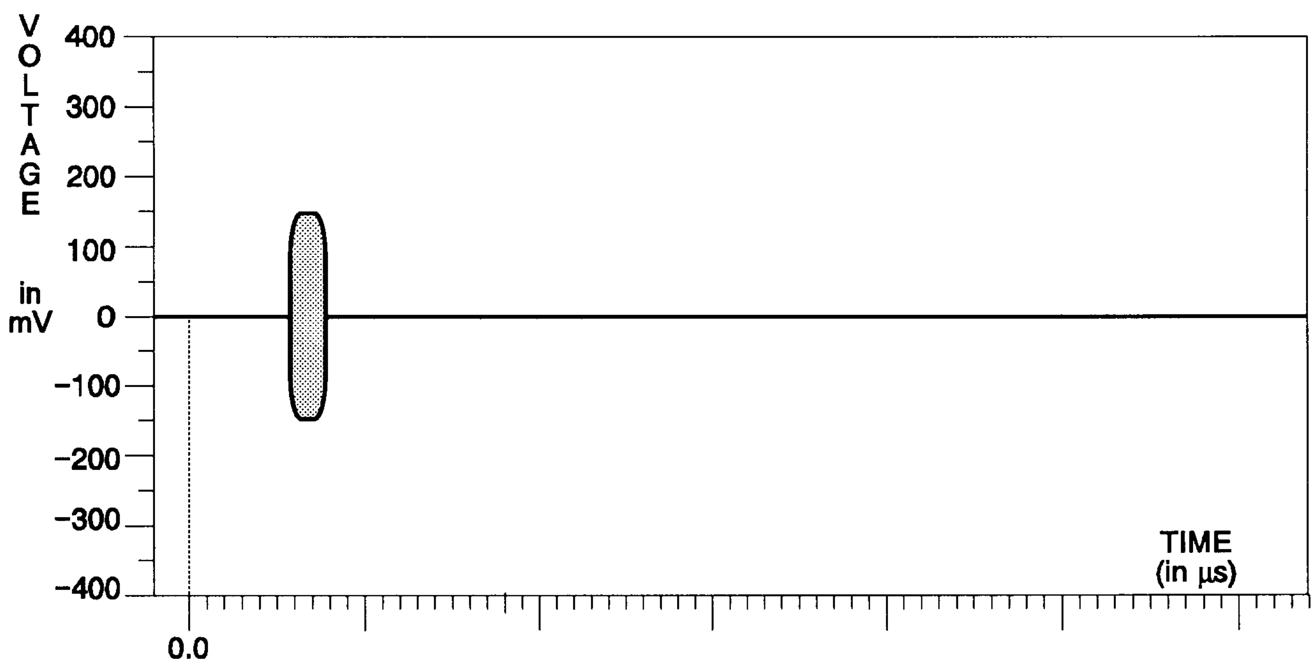


Fig. 3-59. C Channel — Ramp.

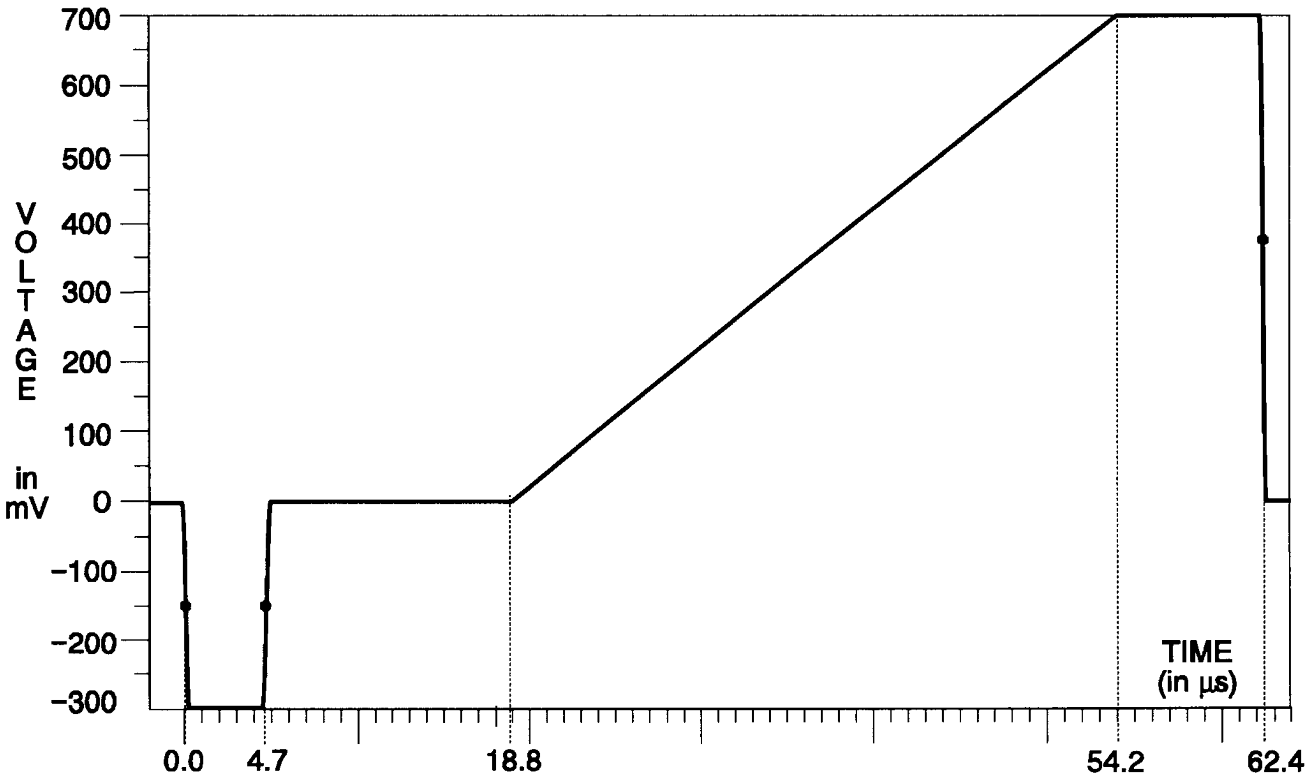


Fig. 3-60. Y Channel — Modulated Ramp.

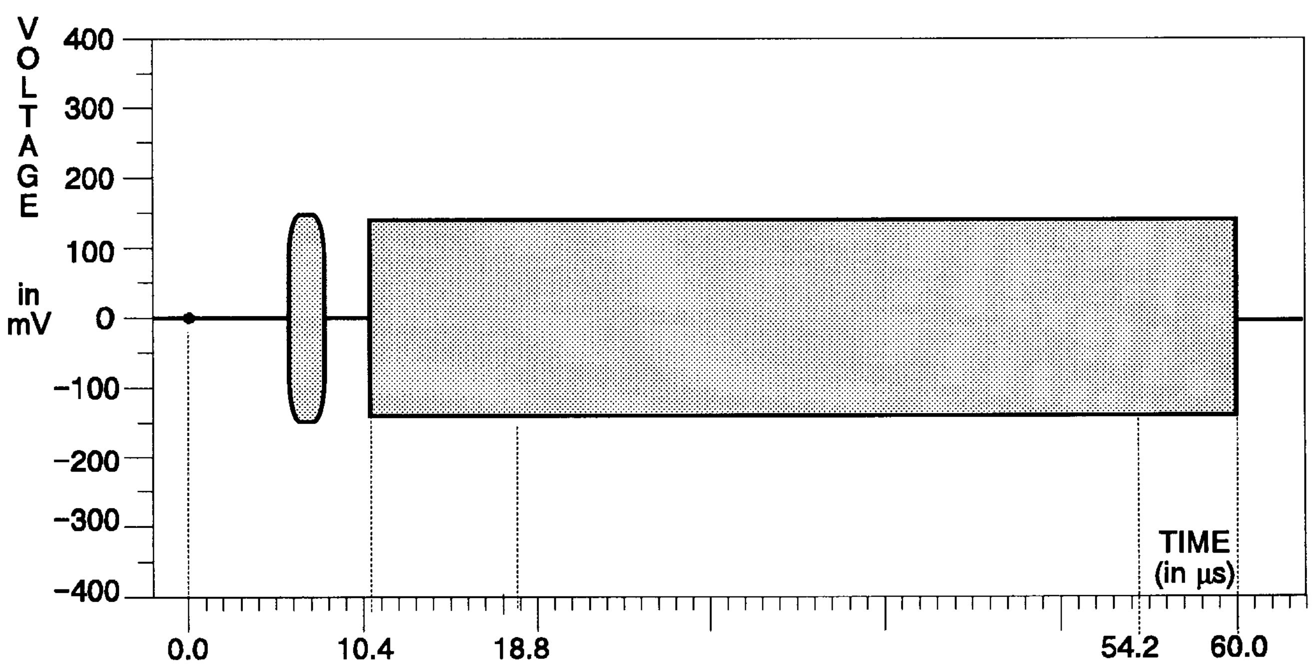


Fig. 3-61. C Channel — Modulated Ramp.

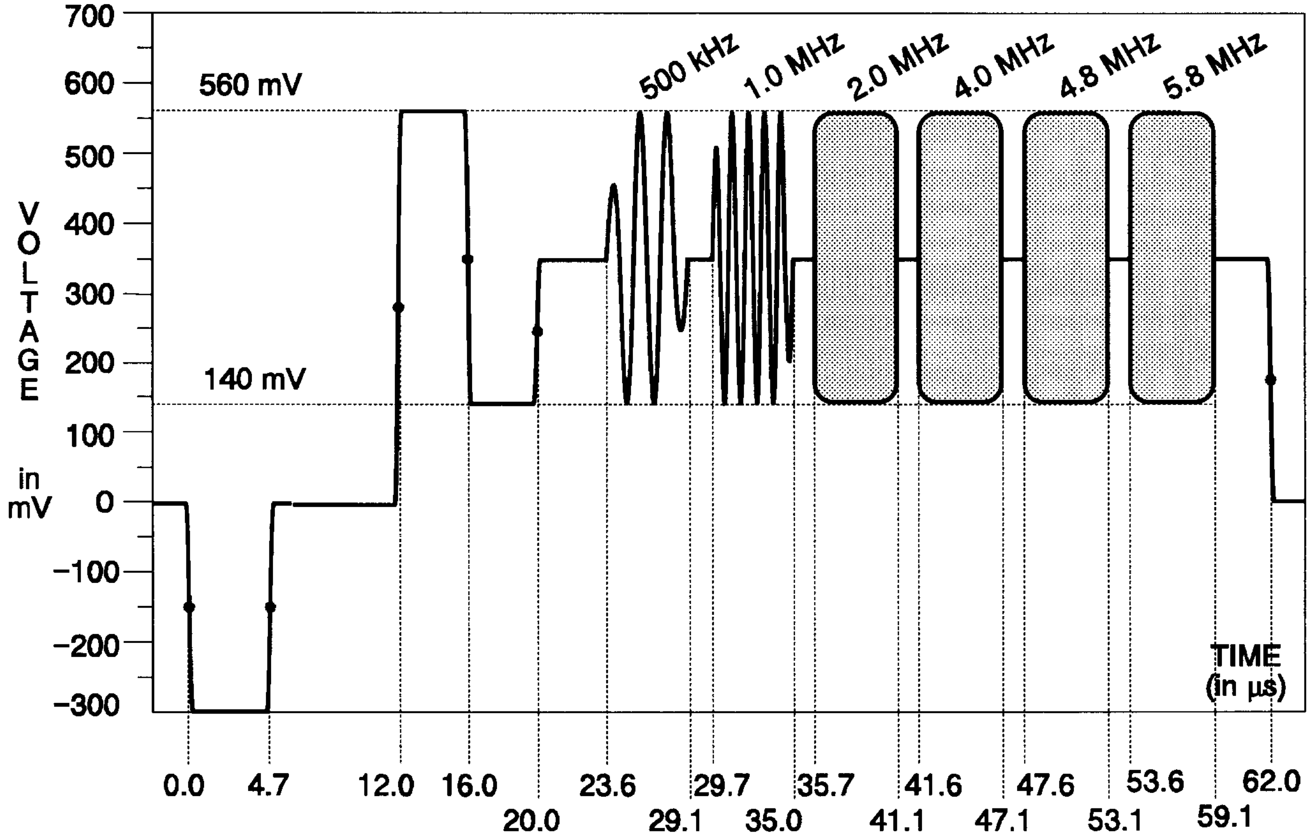


Fig. 3-62. Y Channel — Multiburst.

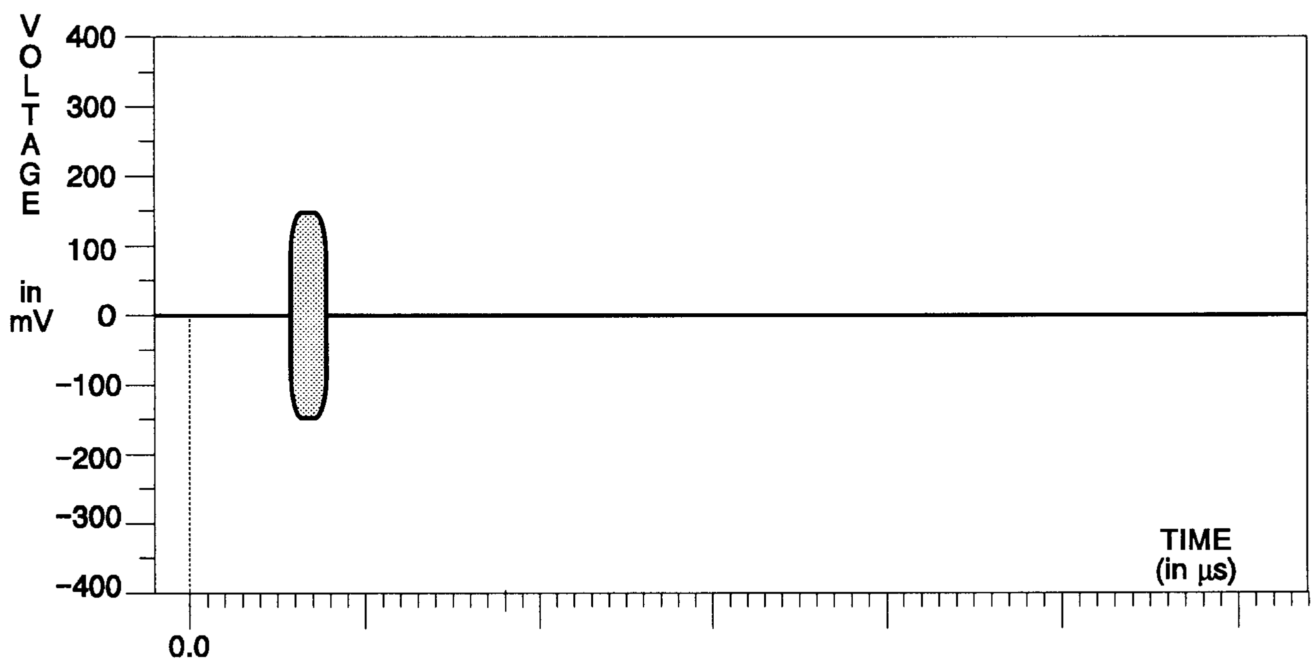


Fig. 3-63. C Channel — Multiburst.

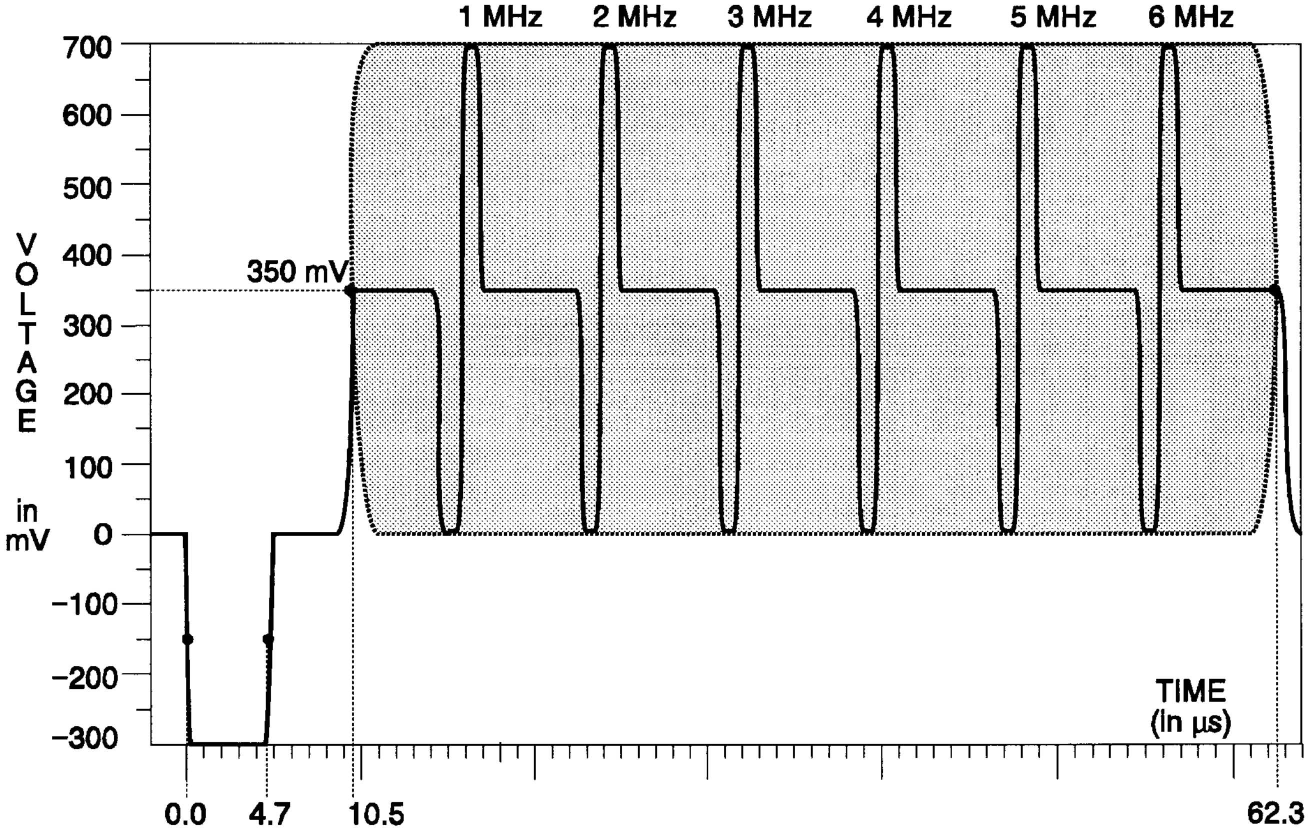


Fig. 3-64. Y Channel — Sweep.

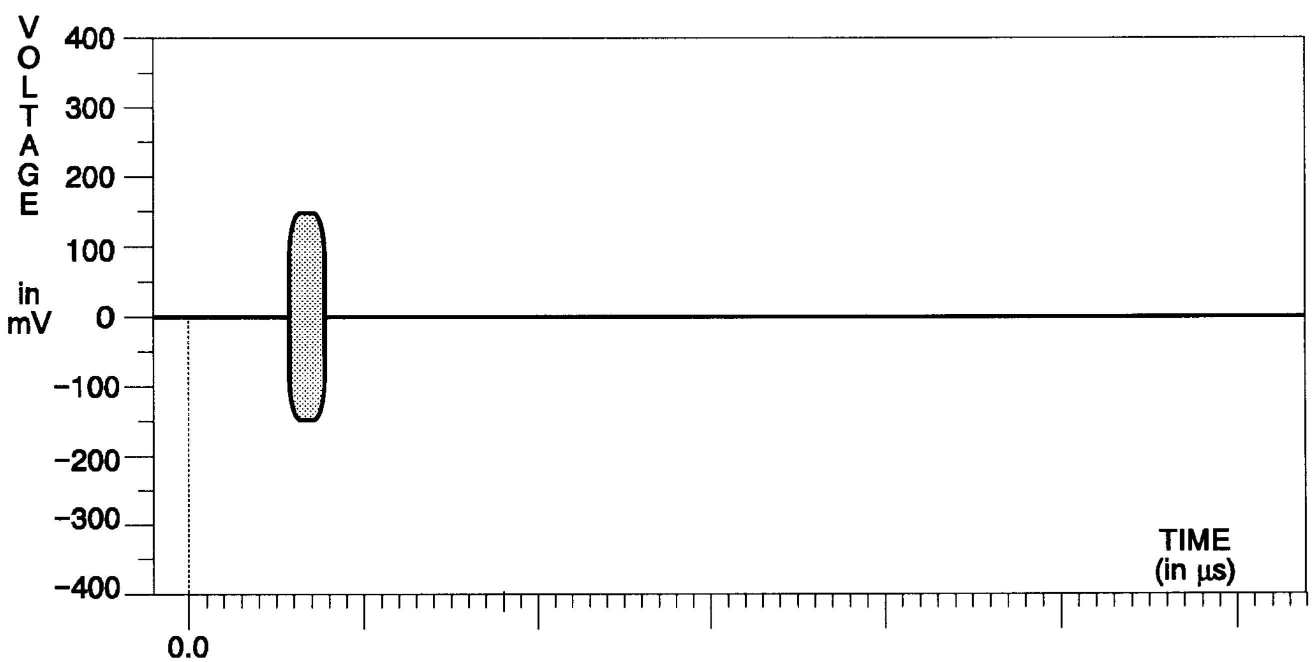


Fig. 3-65. C Channel — Sweep.

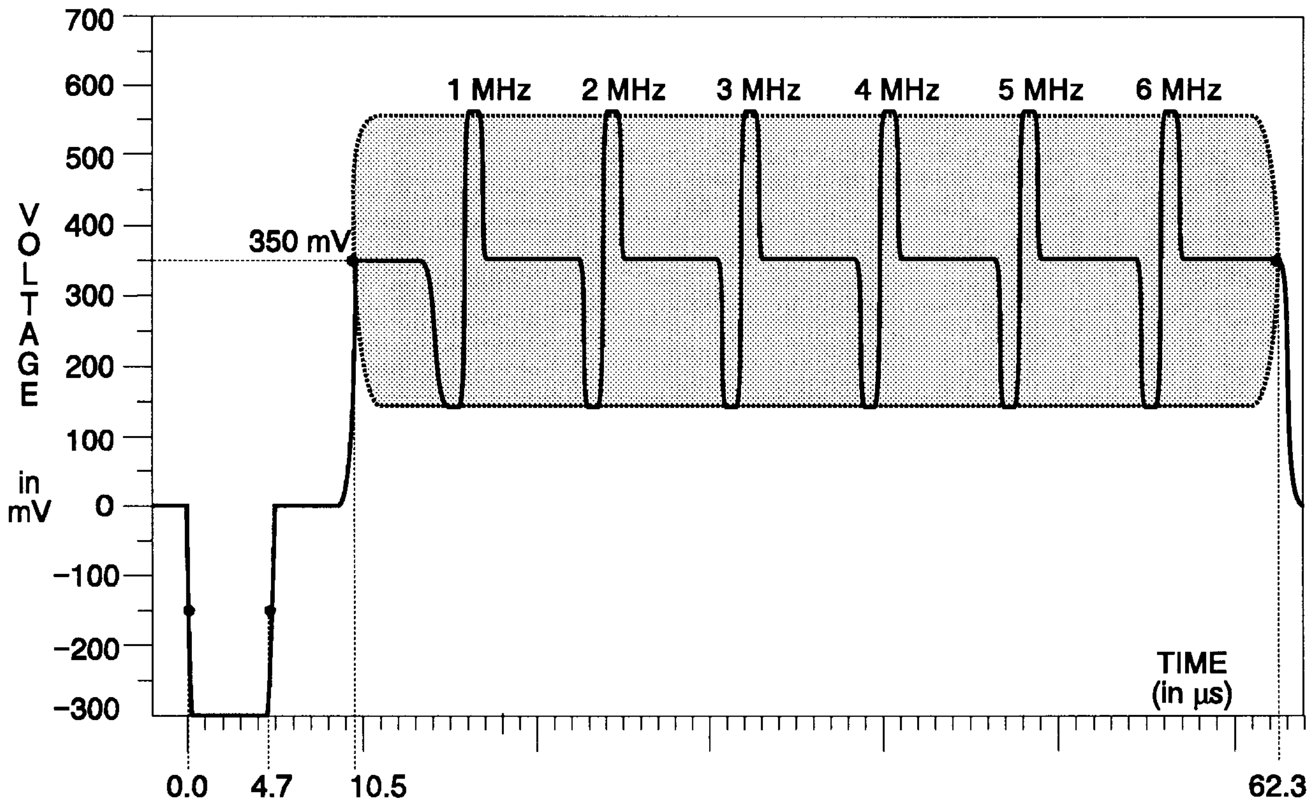


Fig. 3-66. Y Channel — Reduced Sweep.

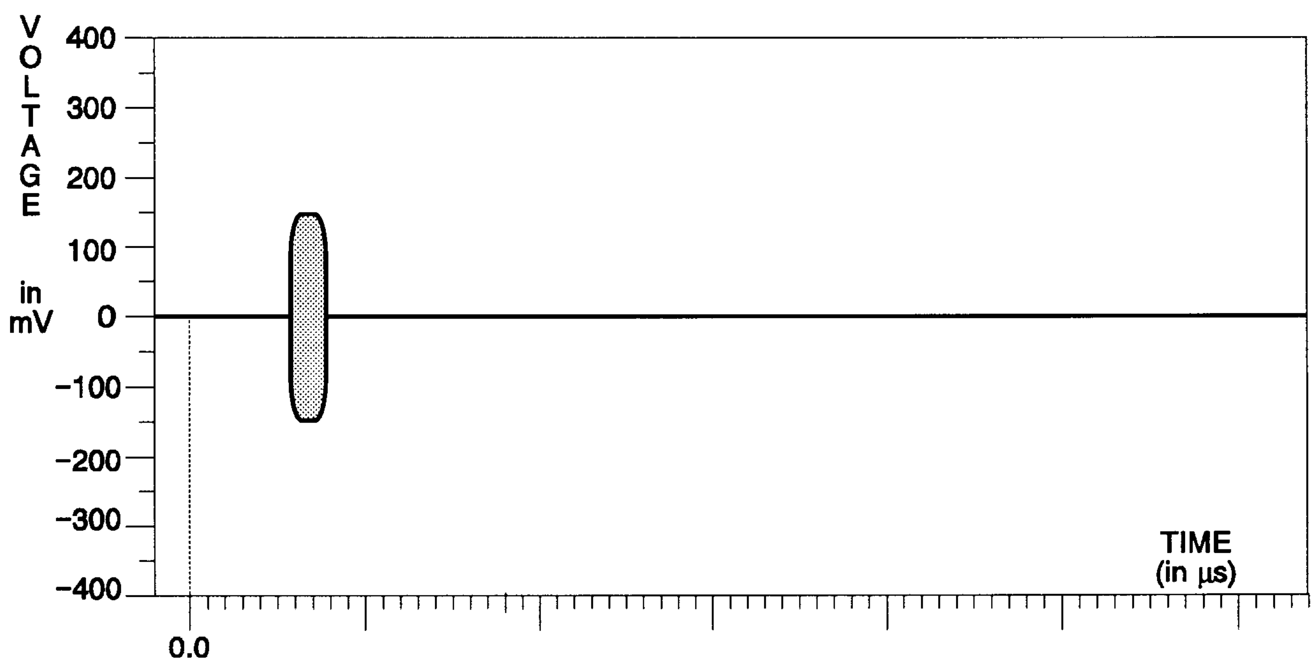


Fig. 3-67. C Channel — Reduced Sweep.

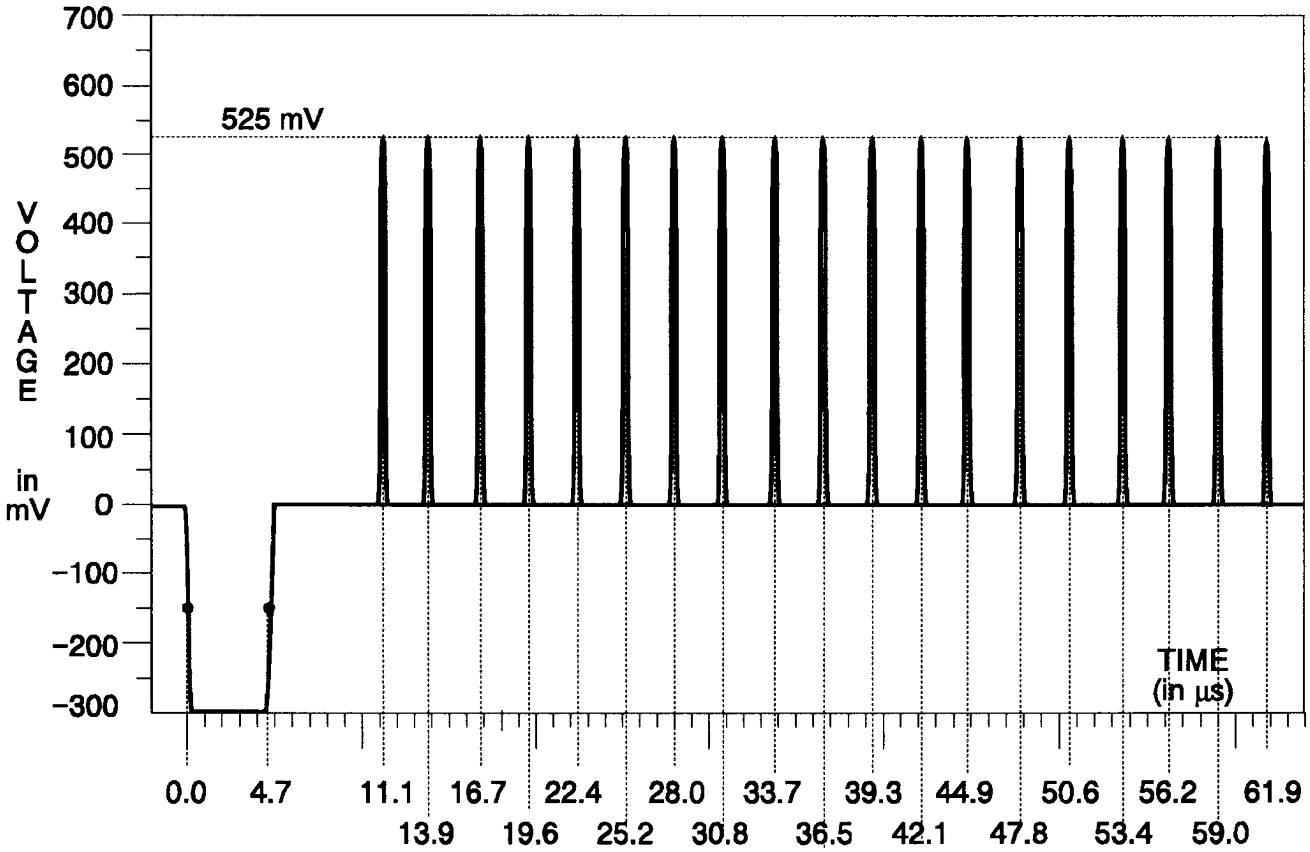


Fig. 3-68. Y Channel — Convergence (Vertical).

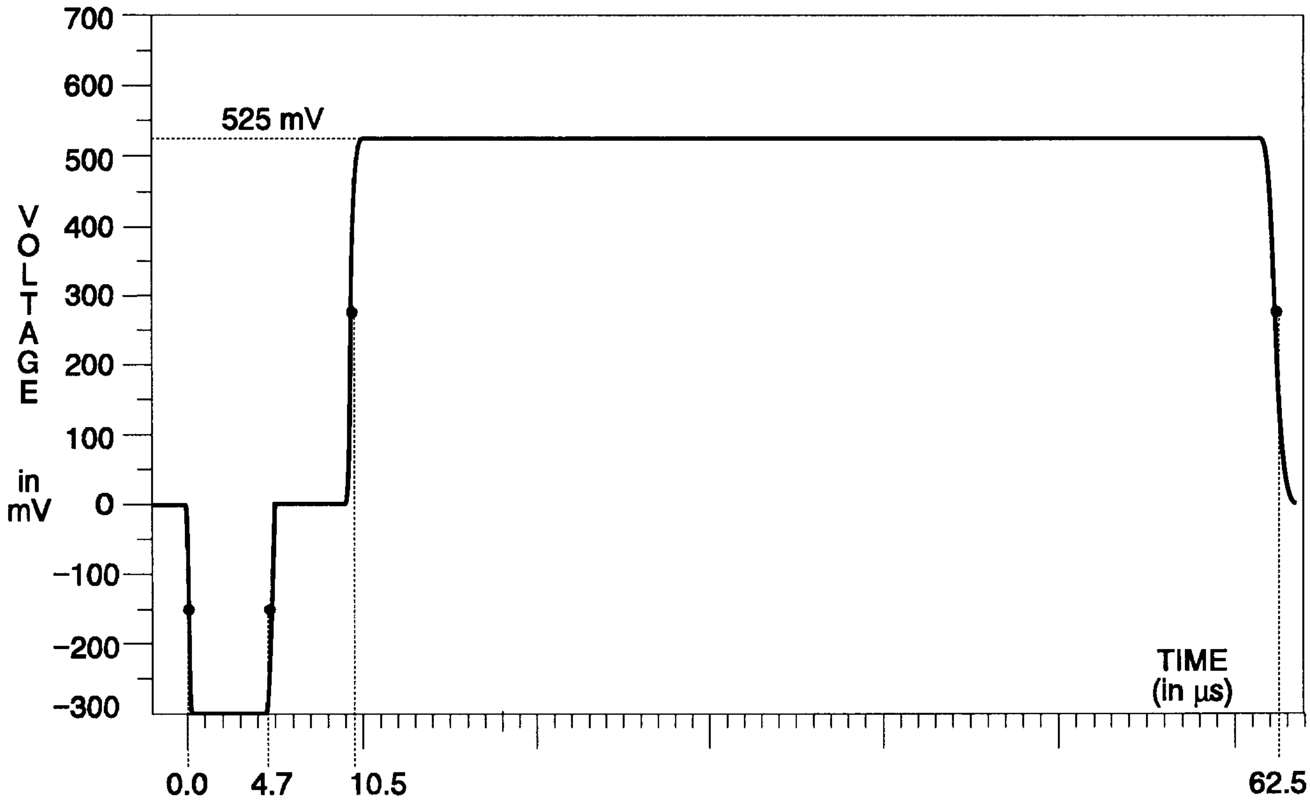


Fig. 3-69. Y Channel — Convergence (Horizontal).

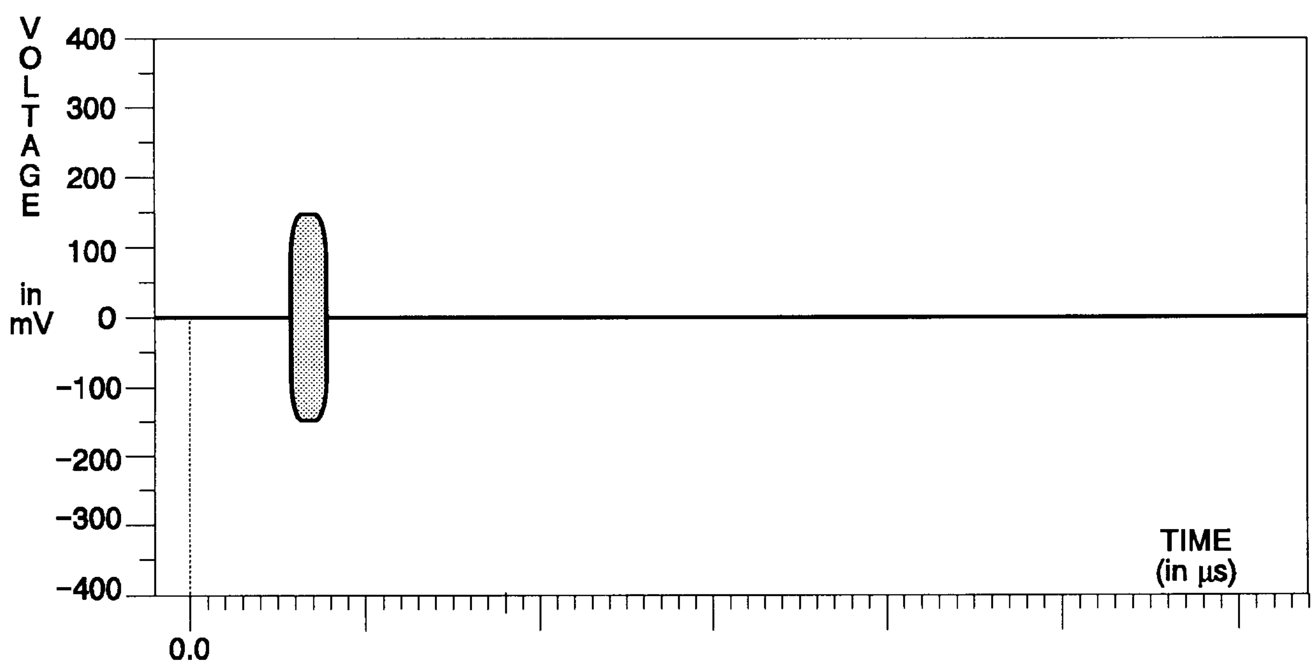


Fig. 3-70. C Channel — Convergence.

Component Signals

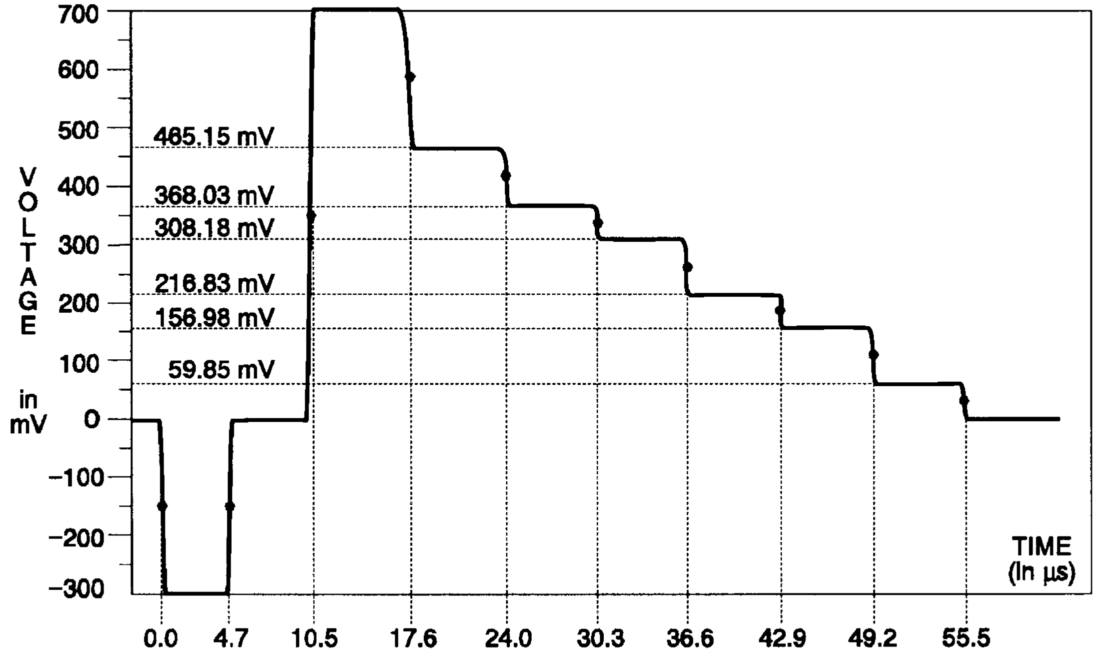


Fig. 3-71. Y Channel — 75% Bars.

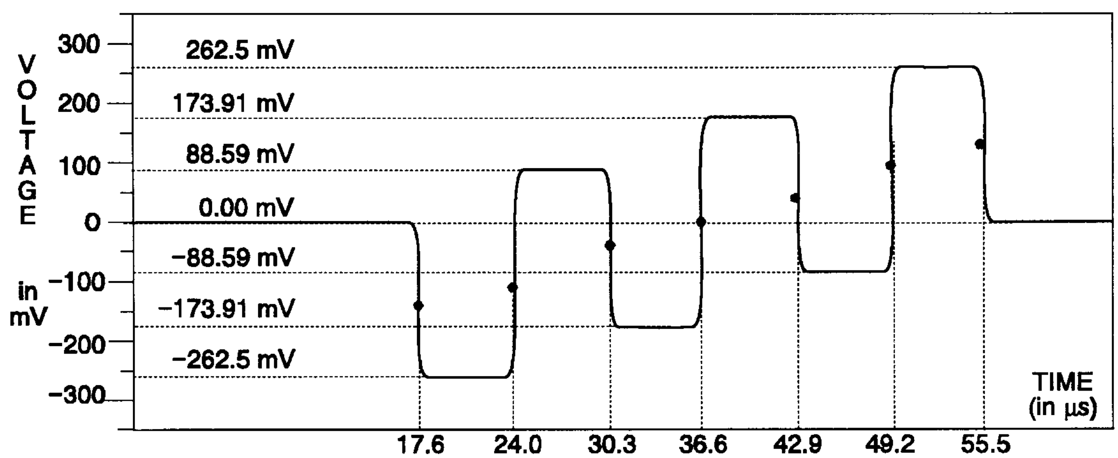


Fig. 3-72. B-Y Channel — 75% Bars.

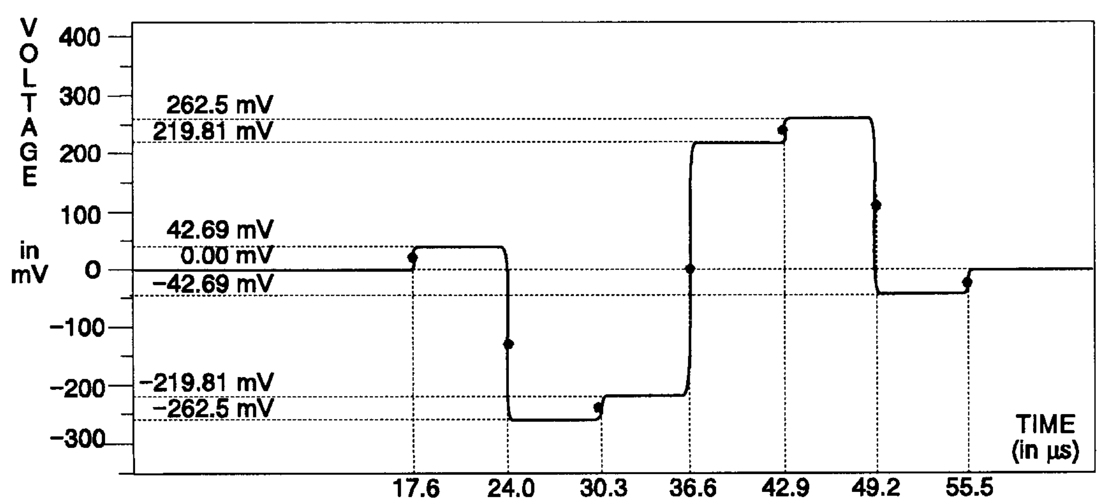


Fig. 3-73. R-Y Channel — 75% Bars.

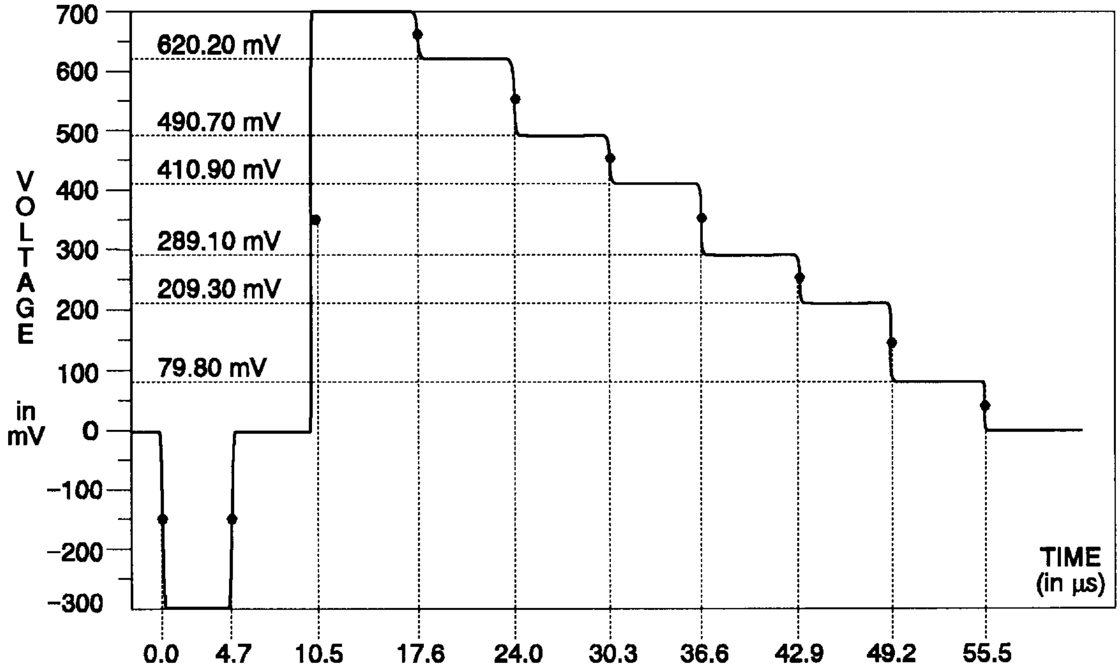


Fig. 3-74. Y Channel — 100% Bars.

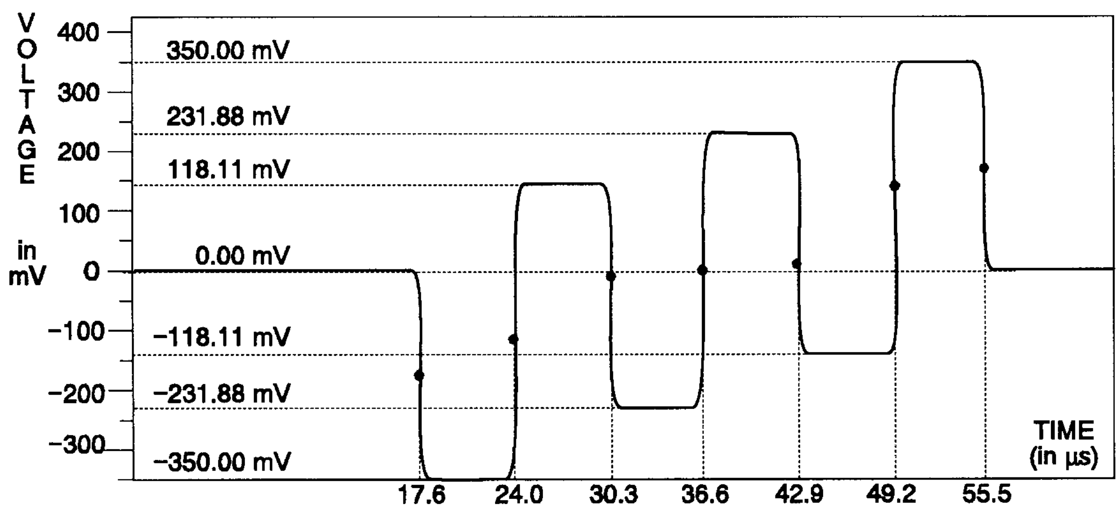


Fig. 3-75. B-Y Channel — 100% Bars.

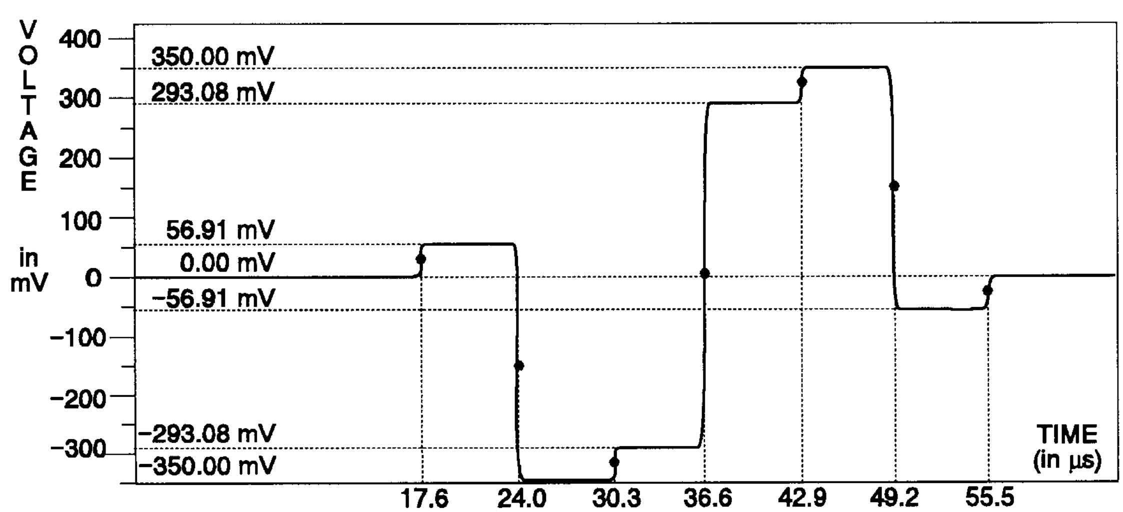


Fig. 3-76. R-Y Channel — 100% Bars.

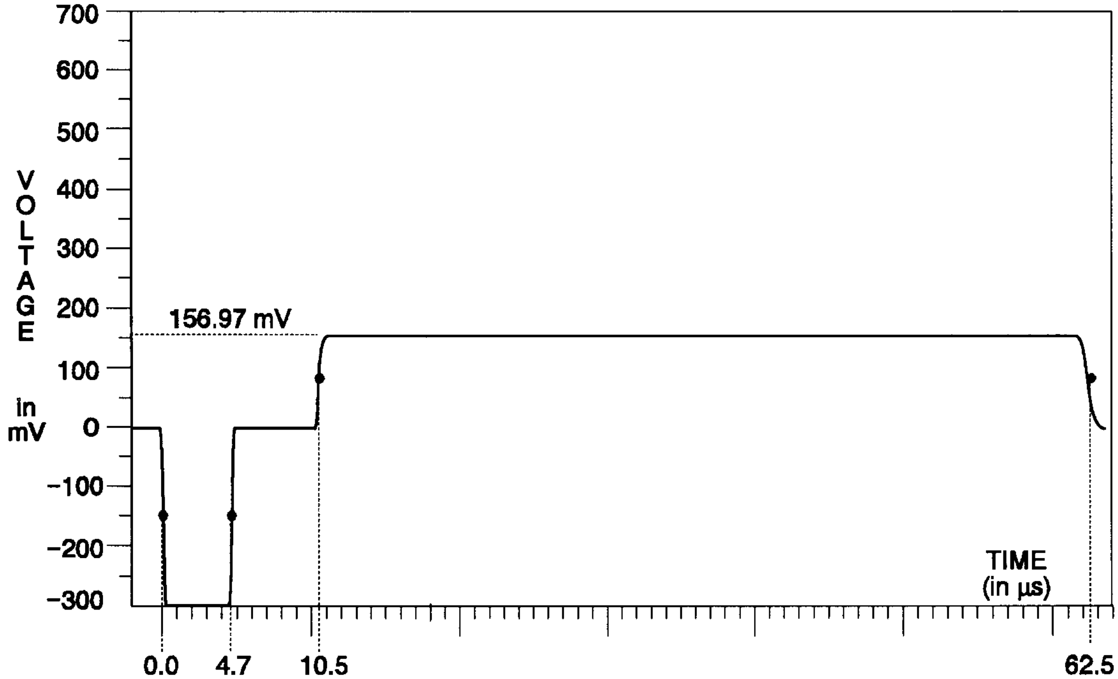


Fig. 3-77. Y Channel — 75% Red.

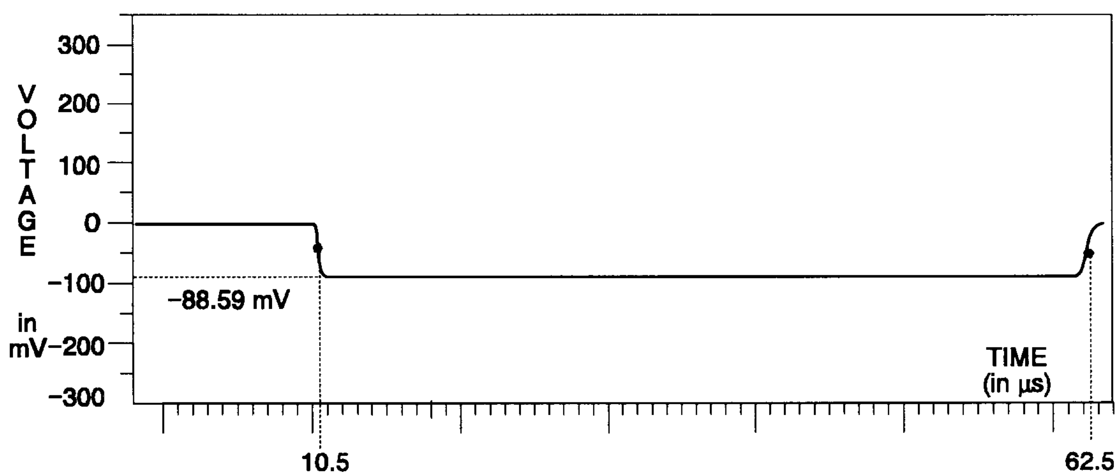


Fig. 3-78. B-Y Channel — 75% Red.

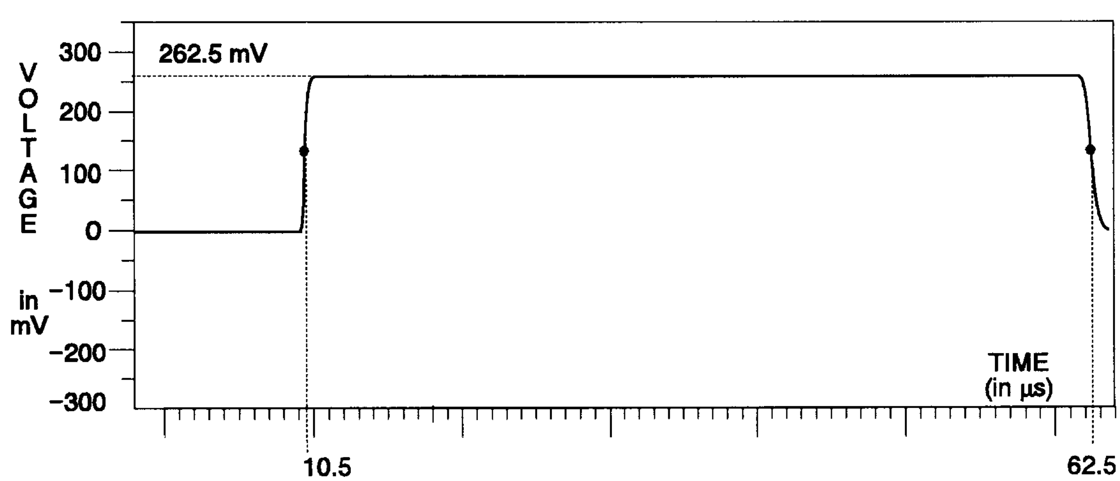


Fig. 3-79. R-Y Channel — 75% Red.

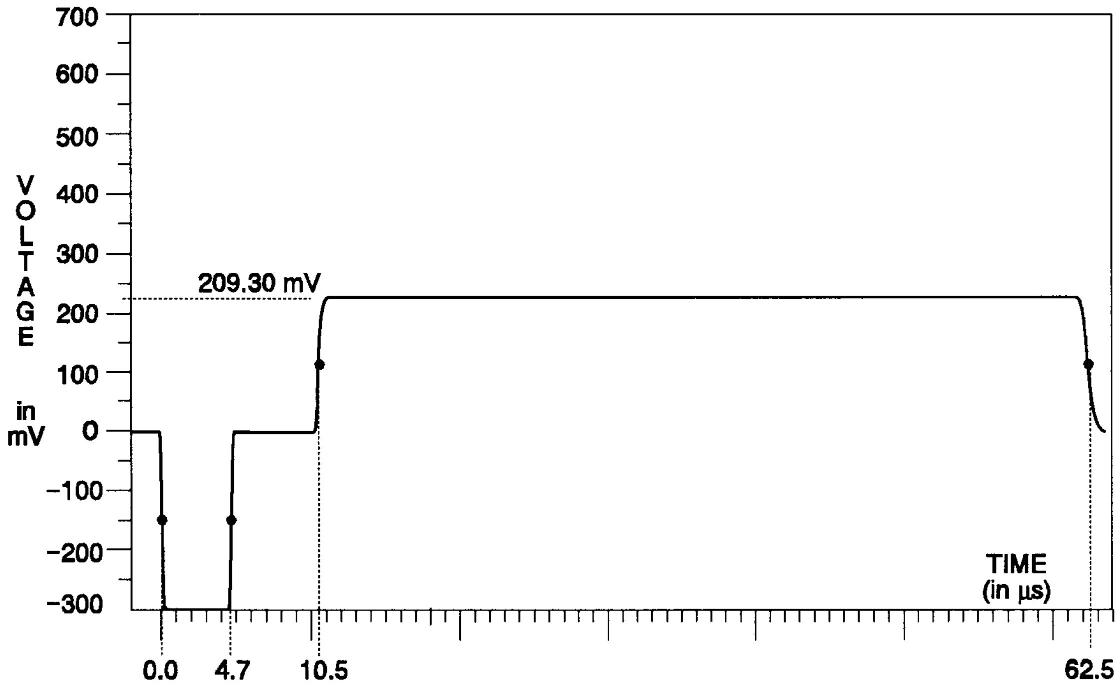


Fig. 3-80. Y Channel — 100% Red.

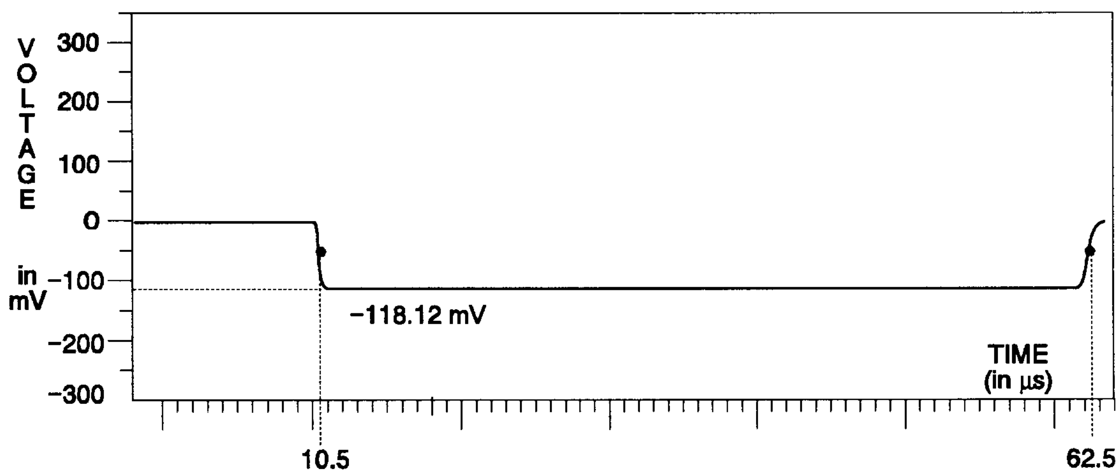


Fig. 3-81. B-Y Channel — 100% Red.

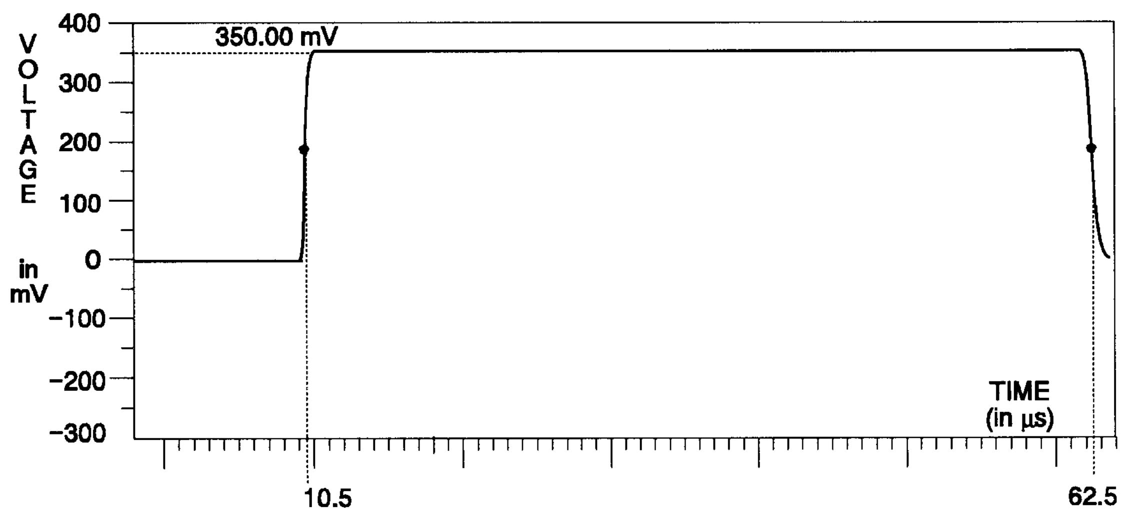


Fig. 3-82. R-Y Channel — 100% Red.

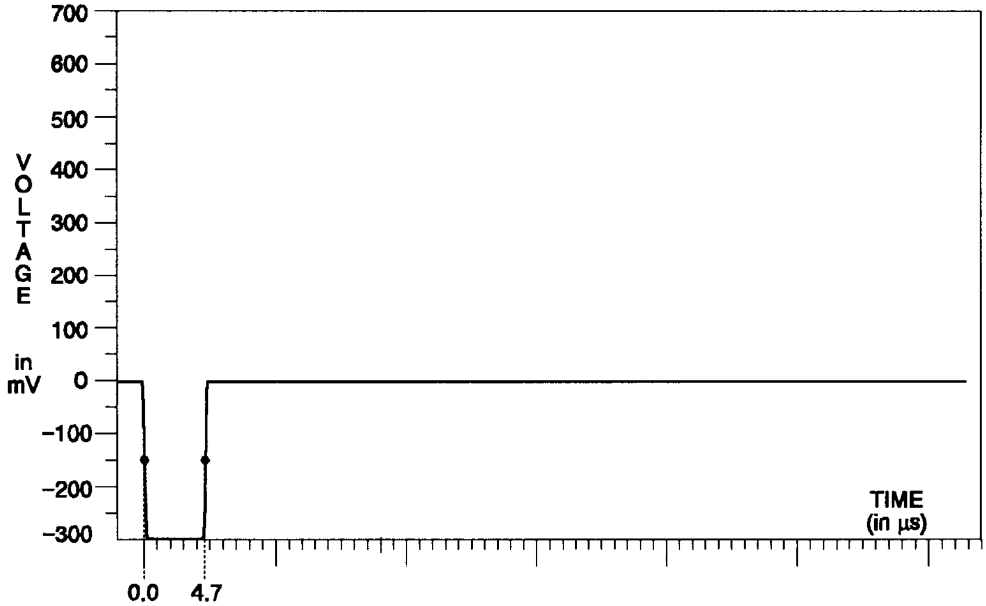


Fig. 3-83. Y Channel — 0% Flat Field.

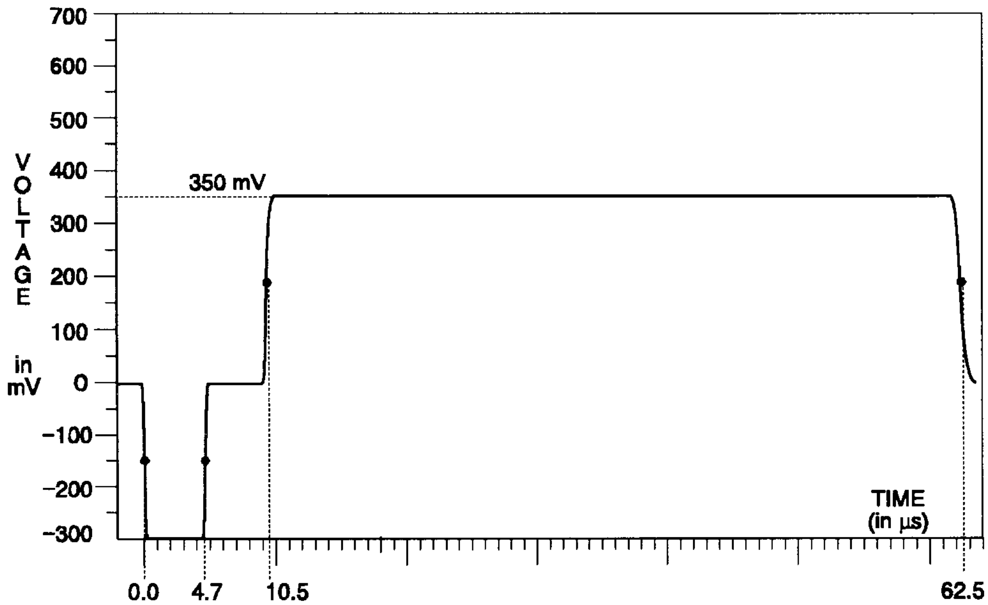


Fig. 3-84. Y Channel — 50% Flat Field.

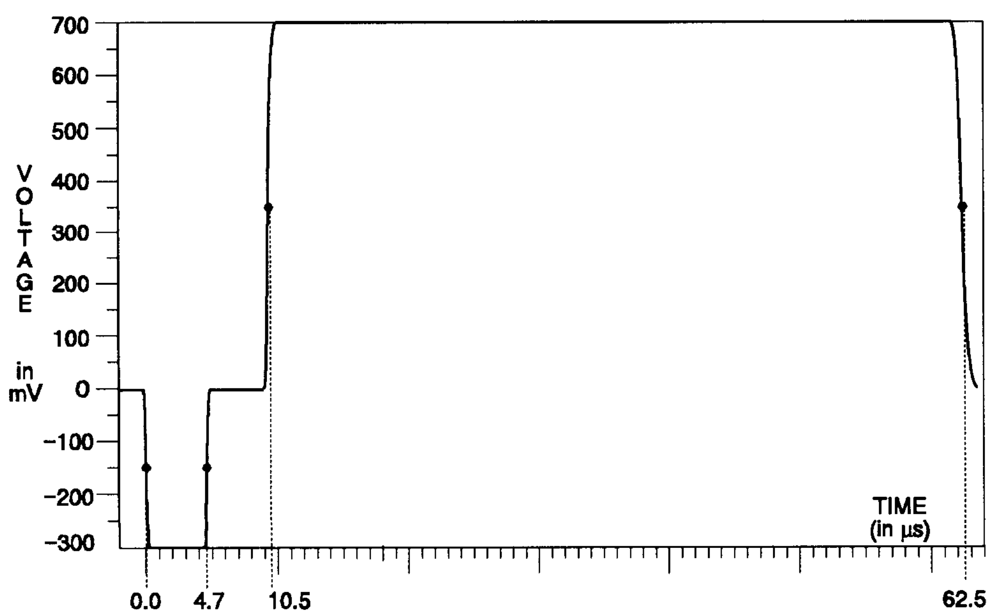


Fig. 3-85. Y Channel — 100% Flat Field.

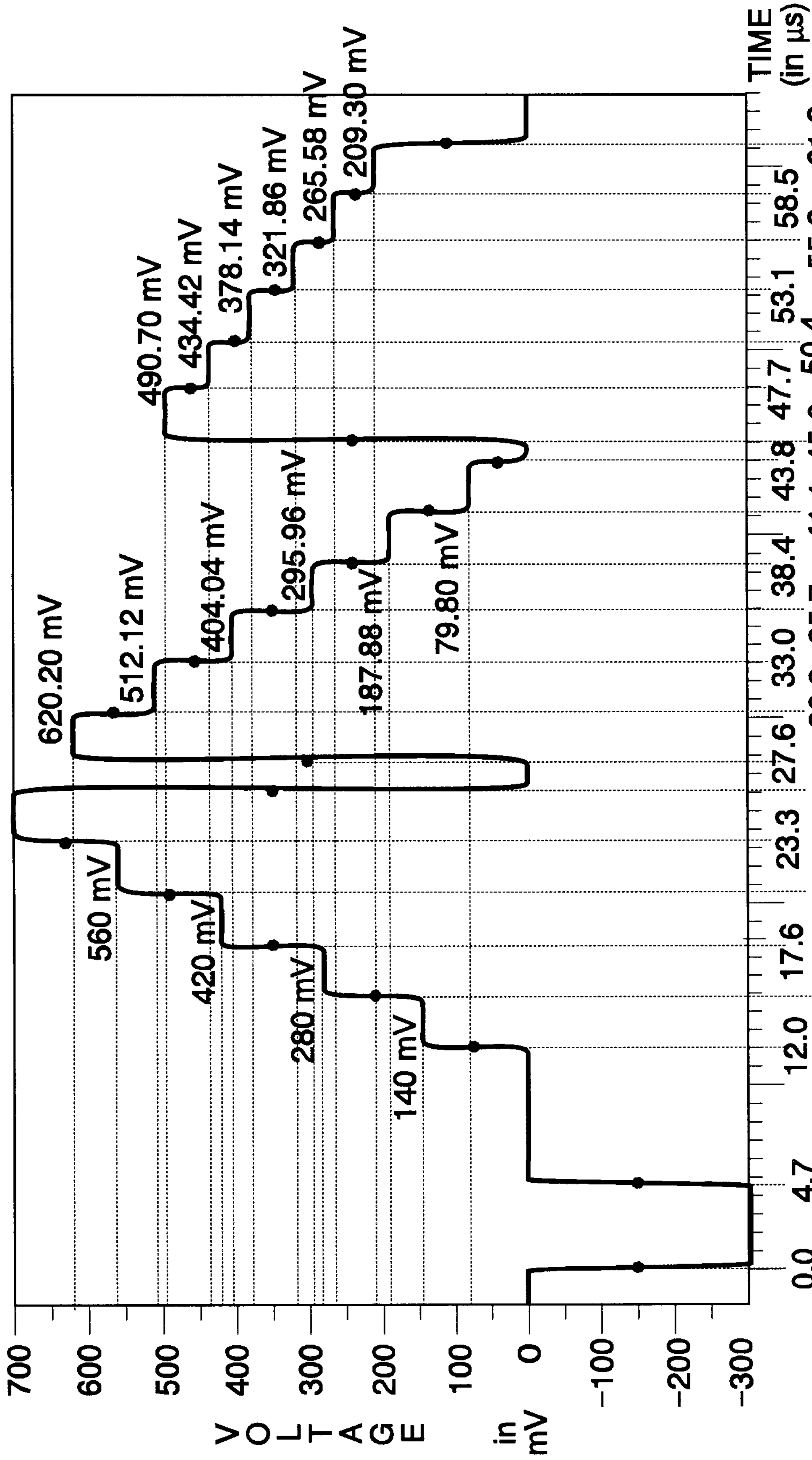


Fig. 3-86. Y Channel — Valid 5-Step.

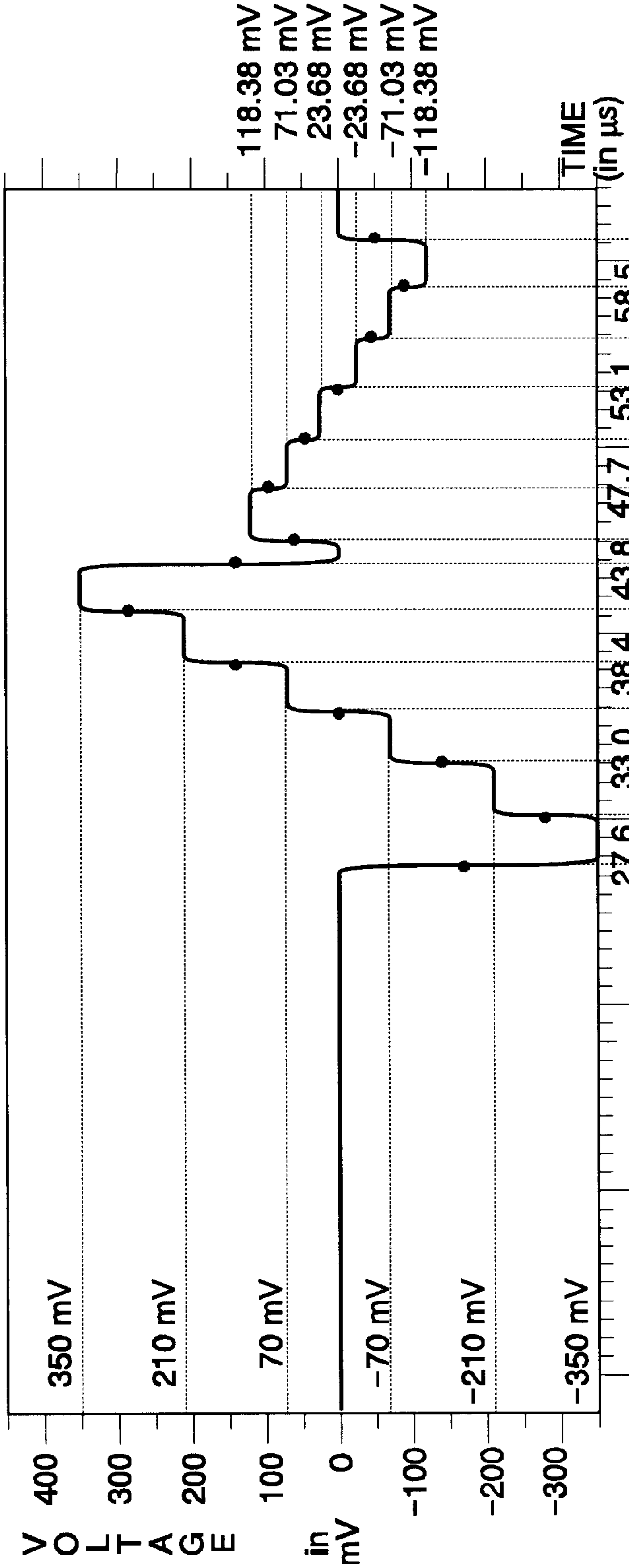


Fig. 3-87. B-Y Channel — Valid 5-Step

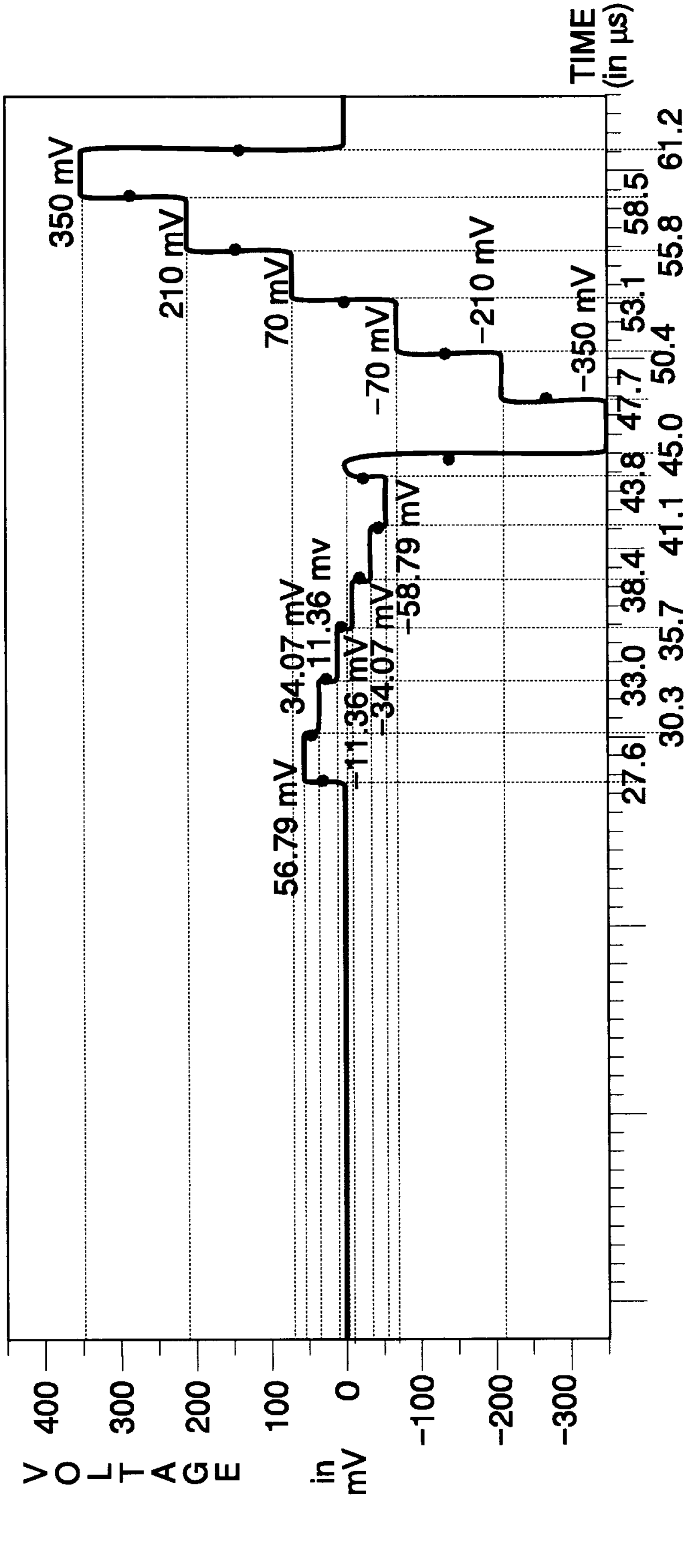


Fig. 3-88. R-Y Channel — Valid 5-Step.

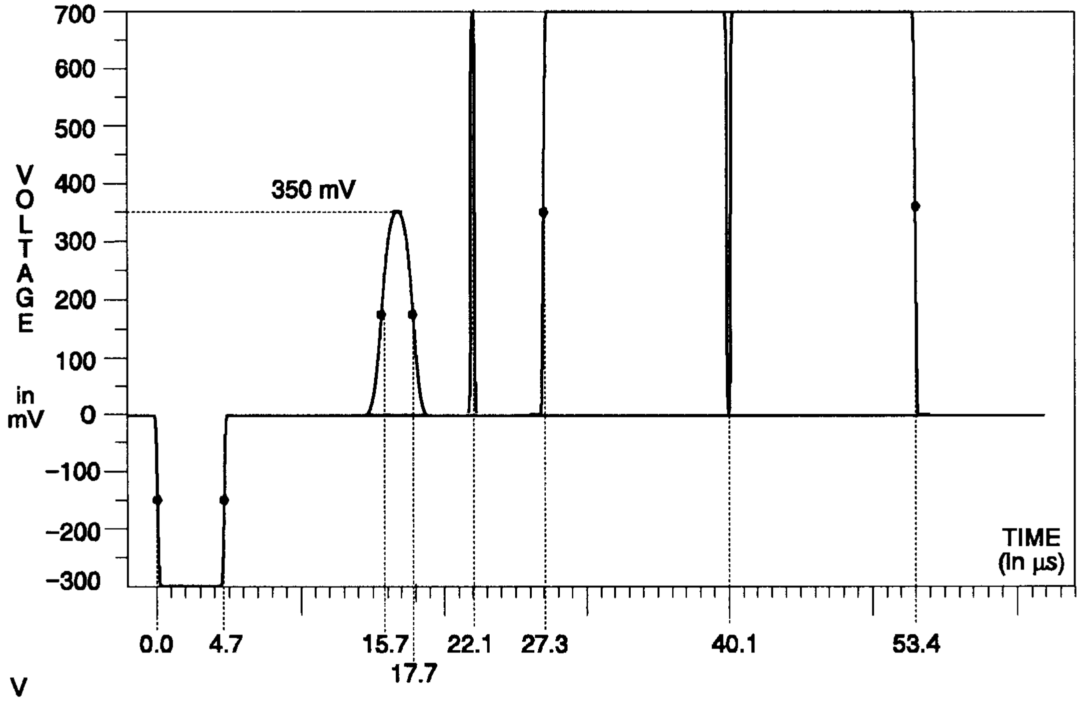


Fig. 3-89. Y Channel — Pulse & Bar with Window.

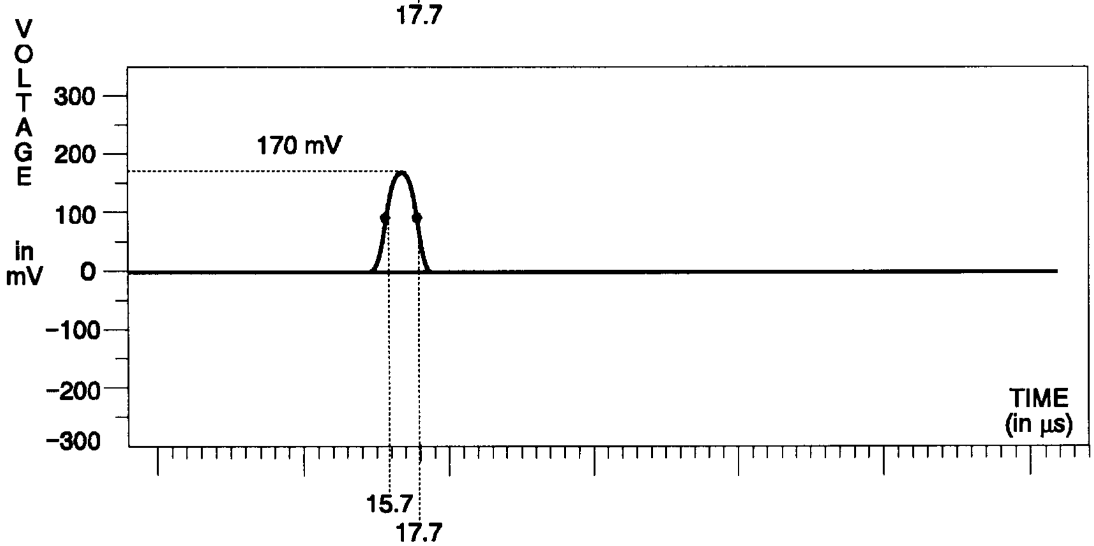


Fig. 3-90. B-Y Channel — Pulse & Bar with Window.

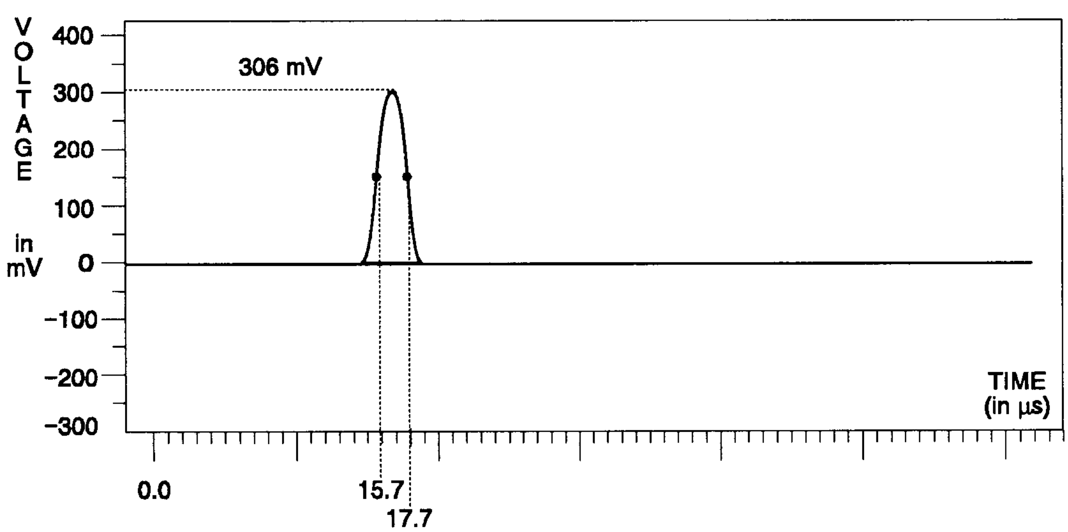


Fig. 3-91. R-Y Channel — Pulse & Bar with Window.

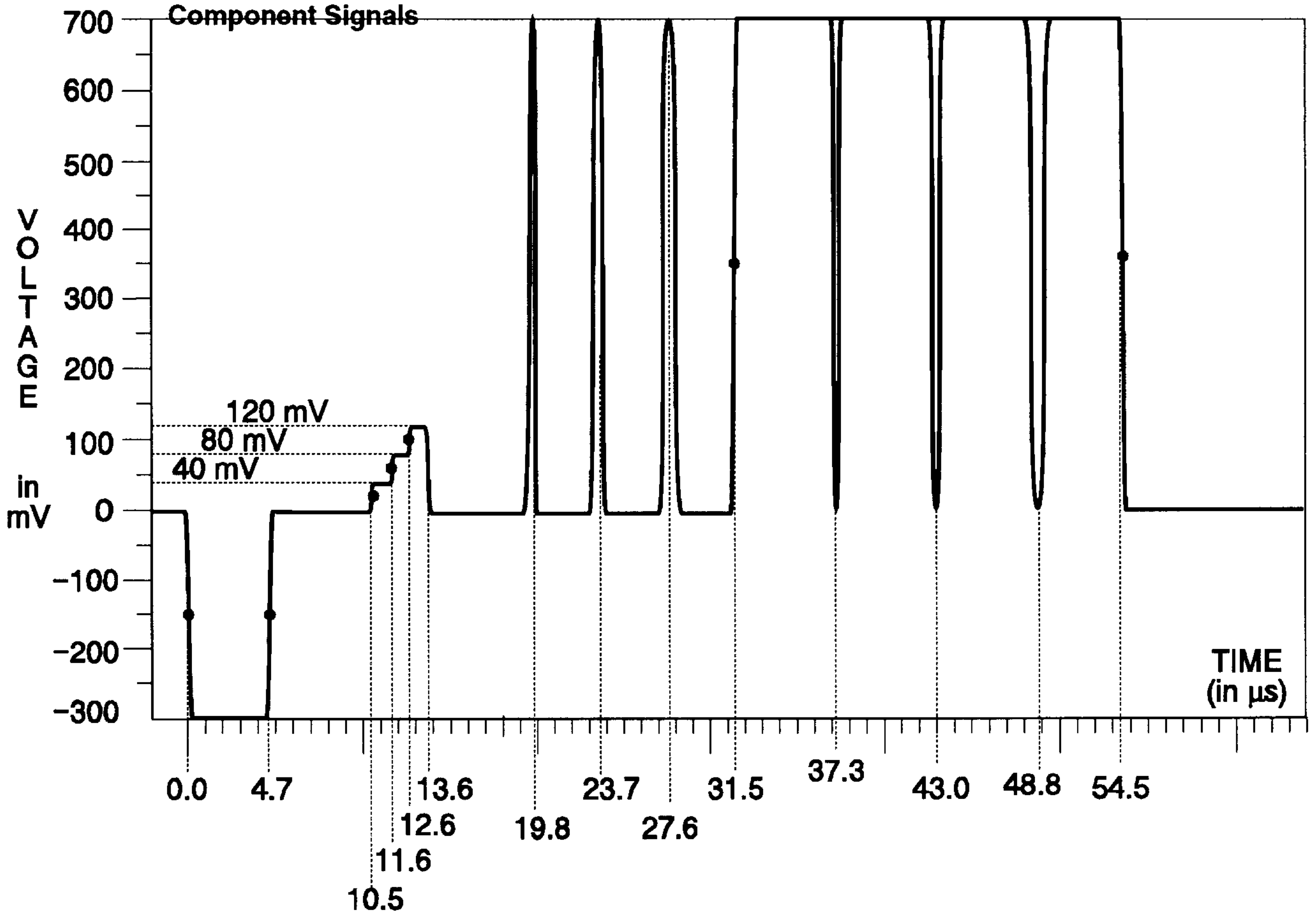


Fig. 3-92. Y Channel — T Pulses.

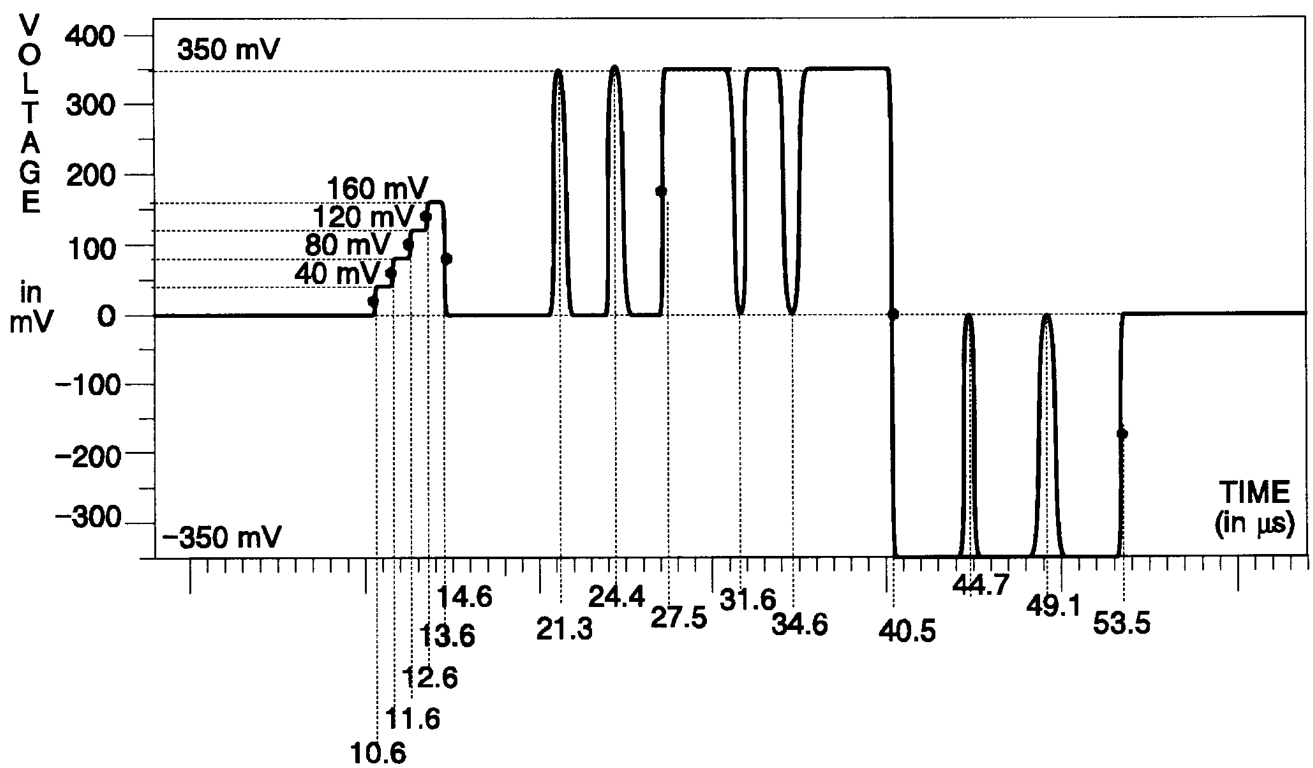


Fig. 3-93. B-Y Channel — T Pulses.

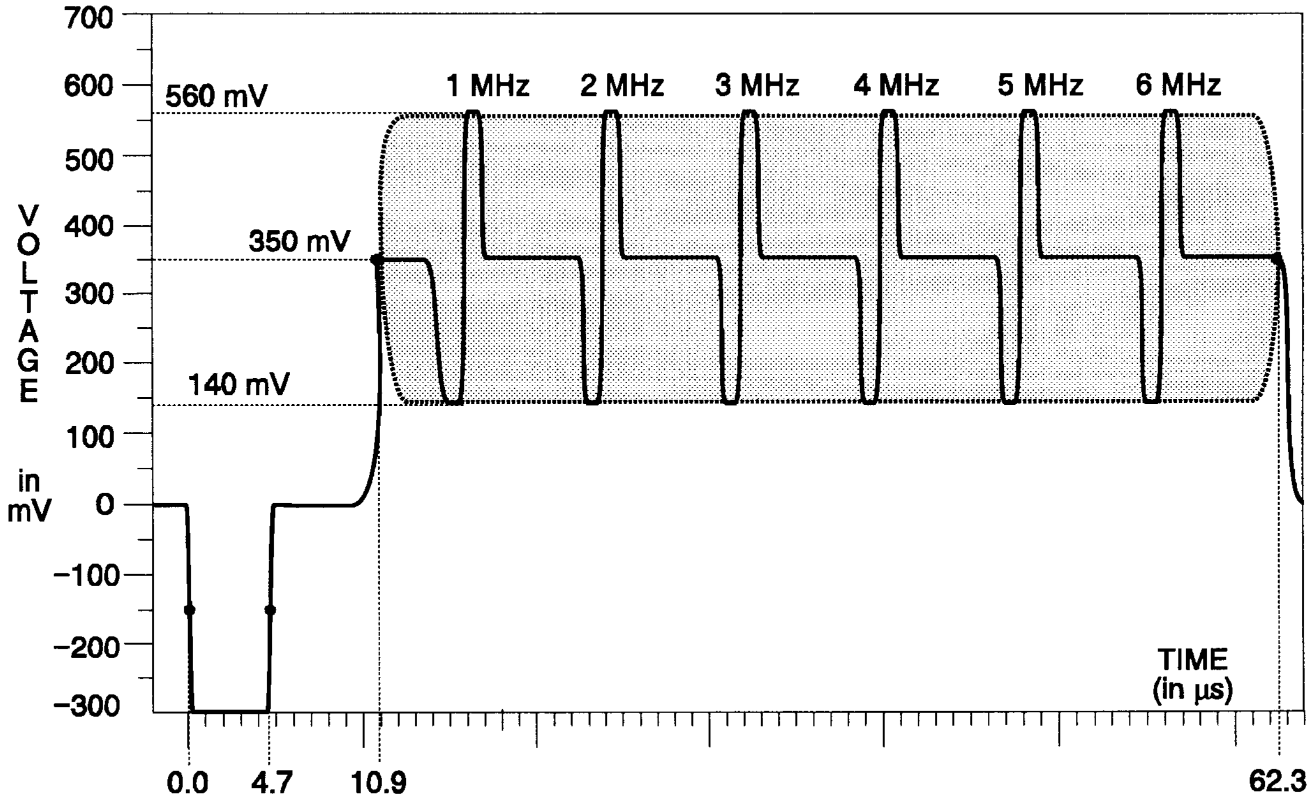


Fig. 3-94. Y Channel — Line Sweep.

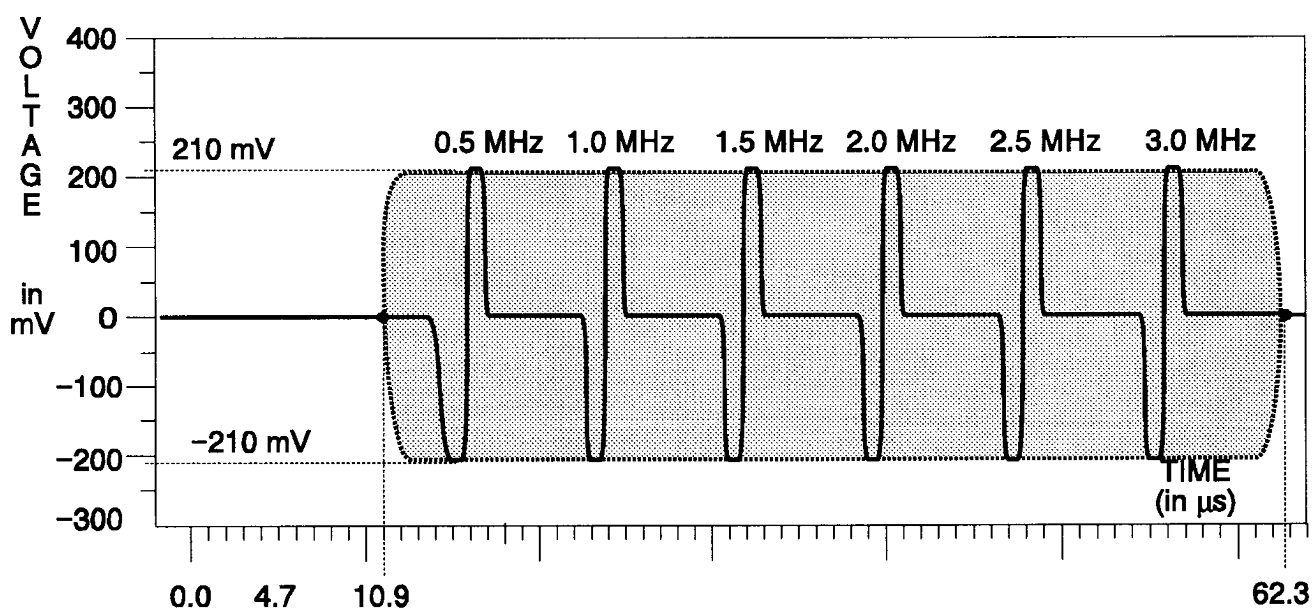


Fig. 3-95. B-Y & R-Y Channel — Line Sweep.

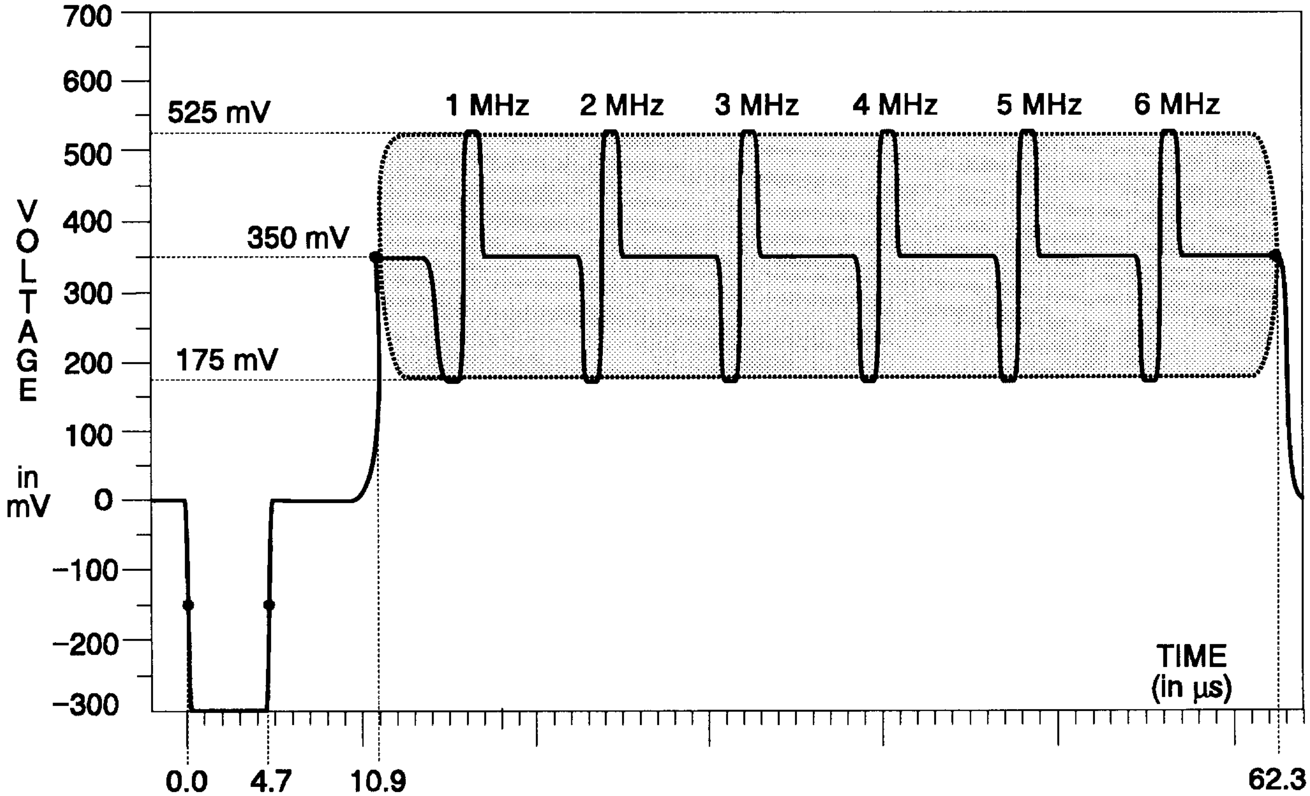


Fig. 3-96. Y Channel — Reduced Line Sweep.

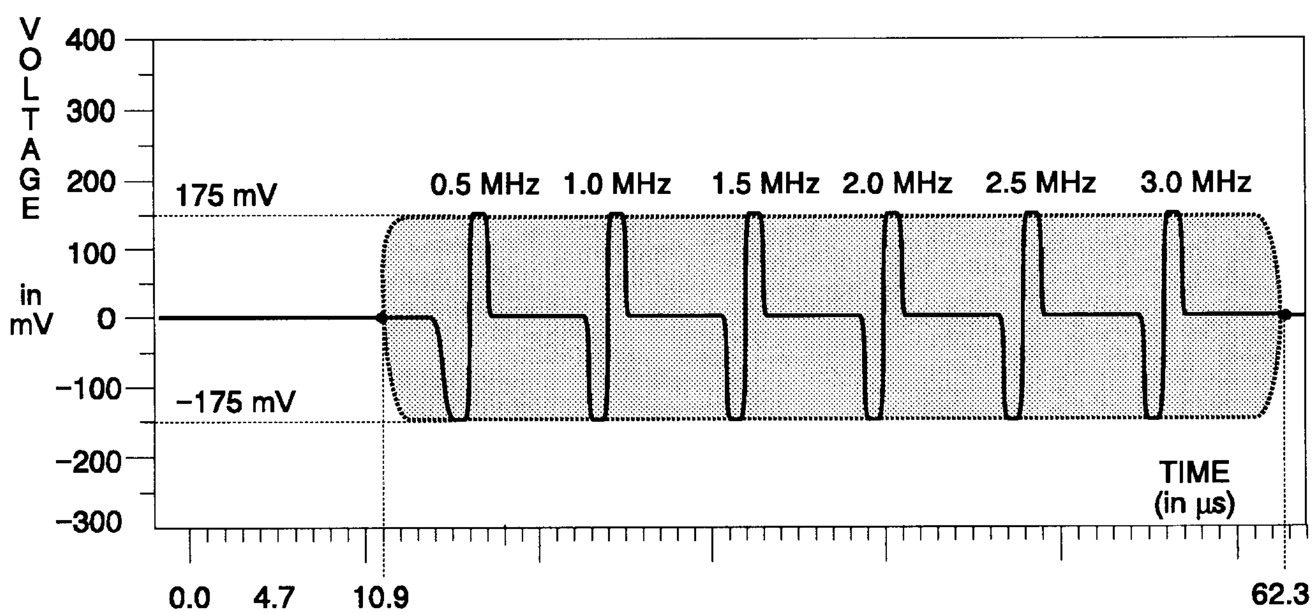


Fig. 3-97. B-Y & R-Y Channel — Reduced Line Sweep.

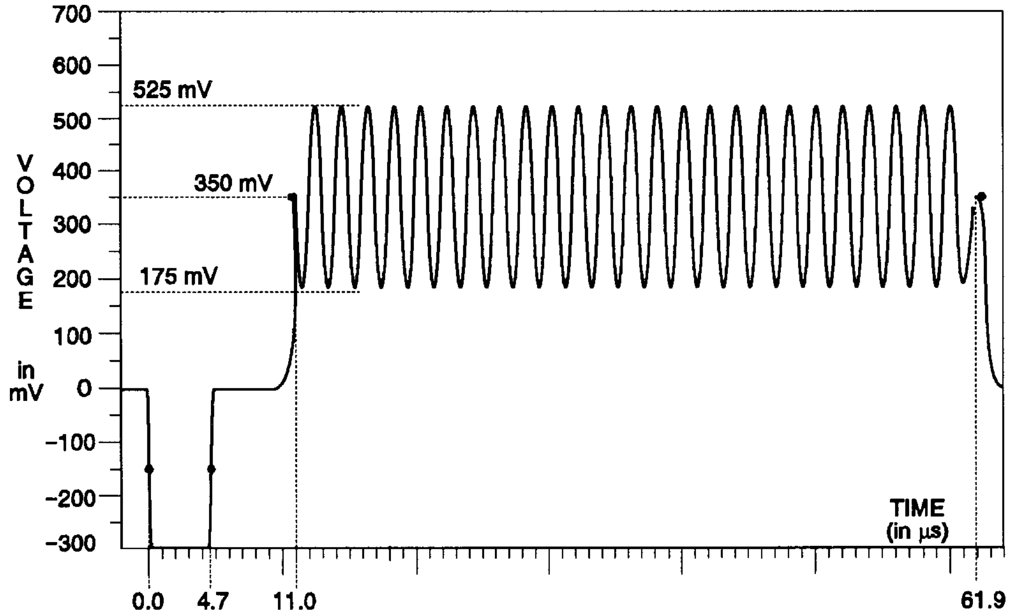


Fig. 3-98. Y Channel — Bowtie.

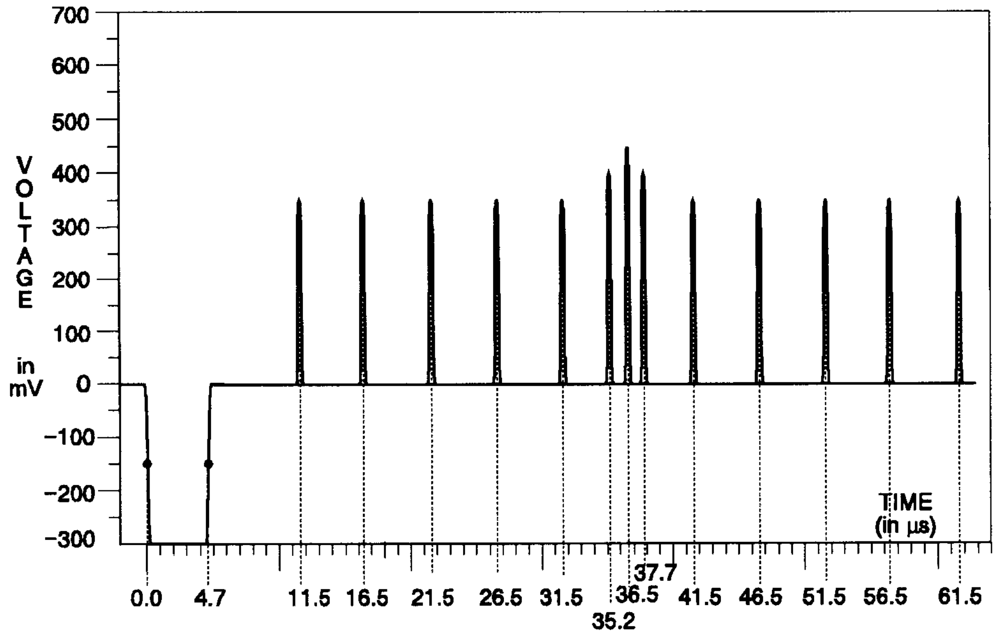


Fig. 3-99. Y Channel — Bowtie Markers.

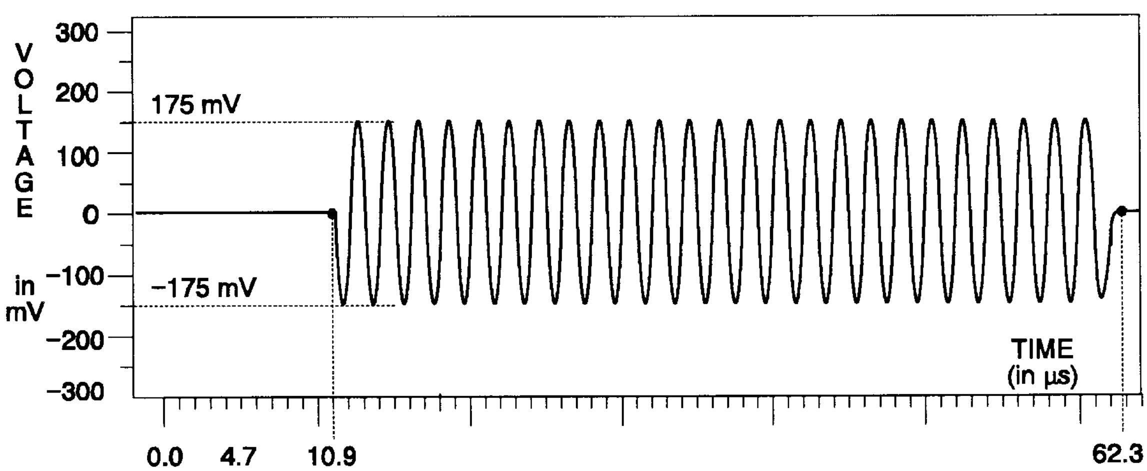


Fig. 3-100. B-Y & R-Y Channels — Bowtie.

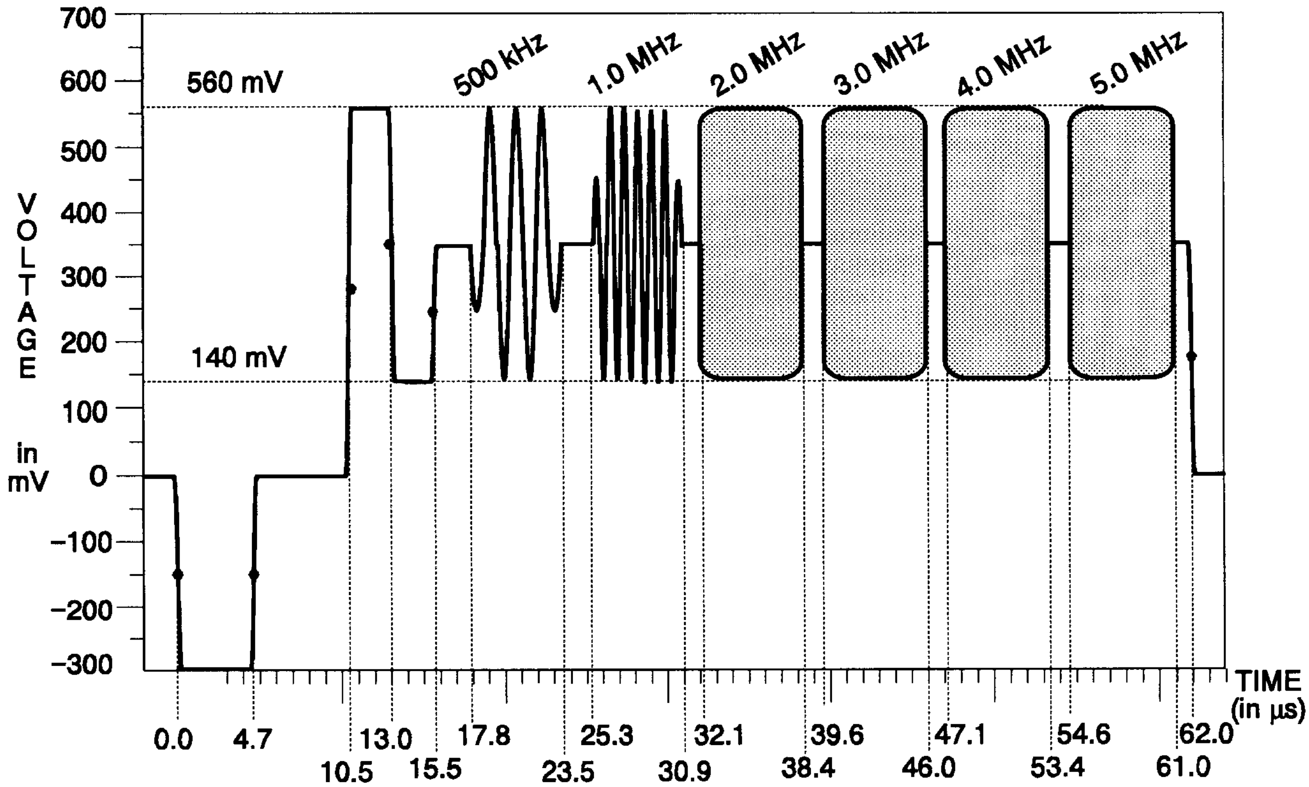


Fig. 3-101. Y Channel — Multiburst.

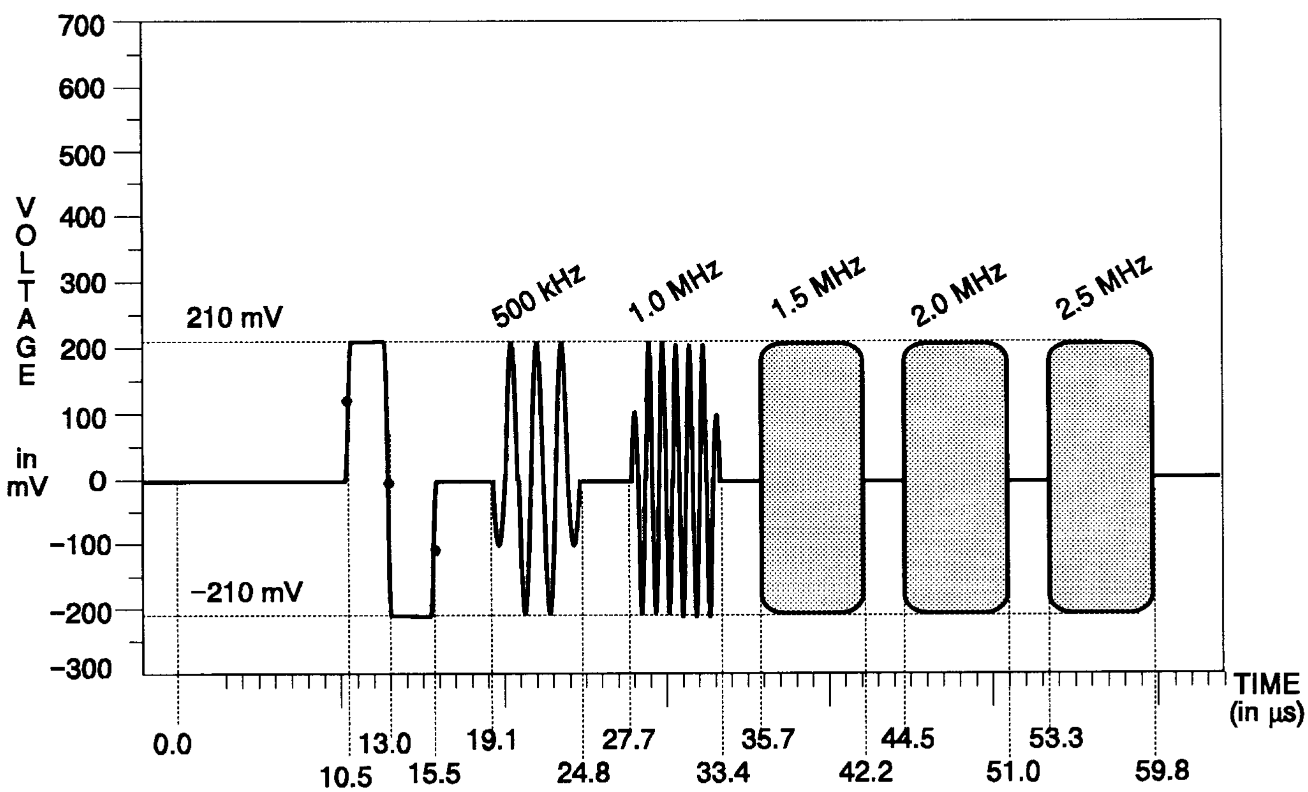


Fig. 3-102. B-Y & R-Y Channels — Multiburst.

CTDM Format

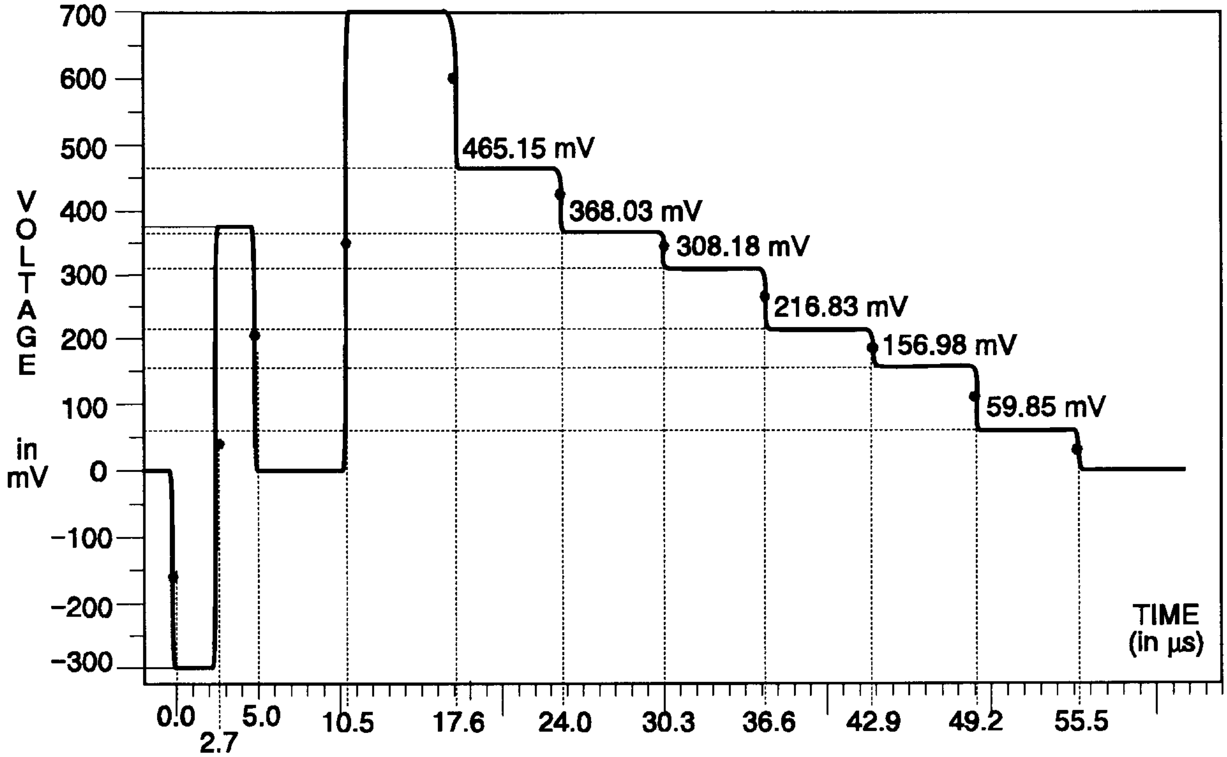


Fig. 3-103. Y Channel — 75% Bars.

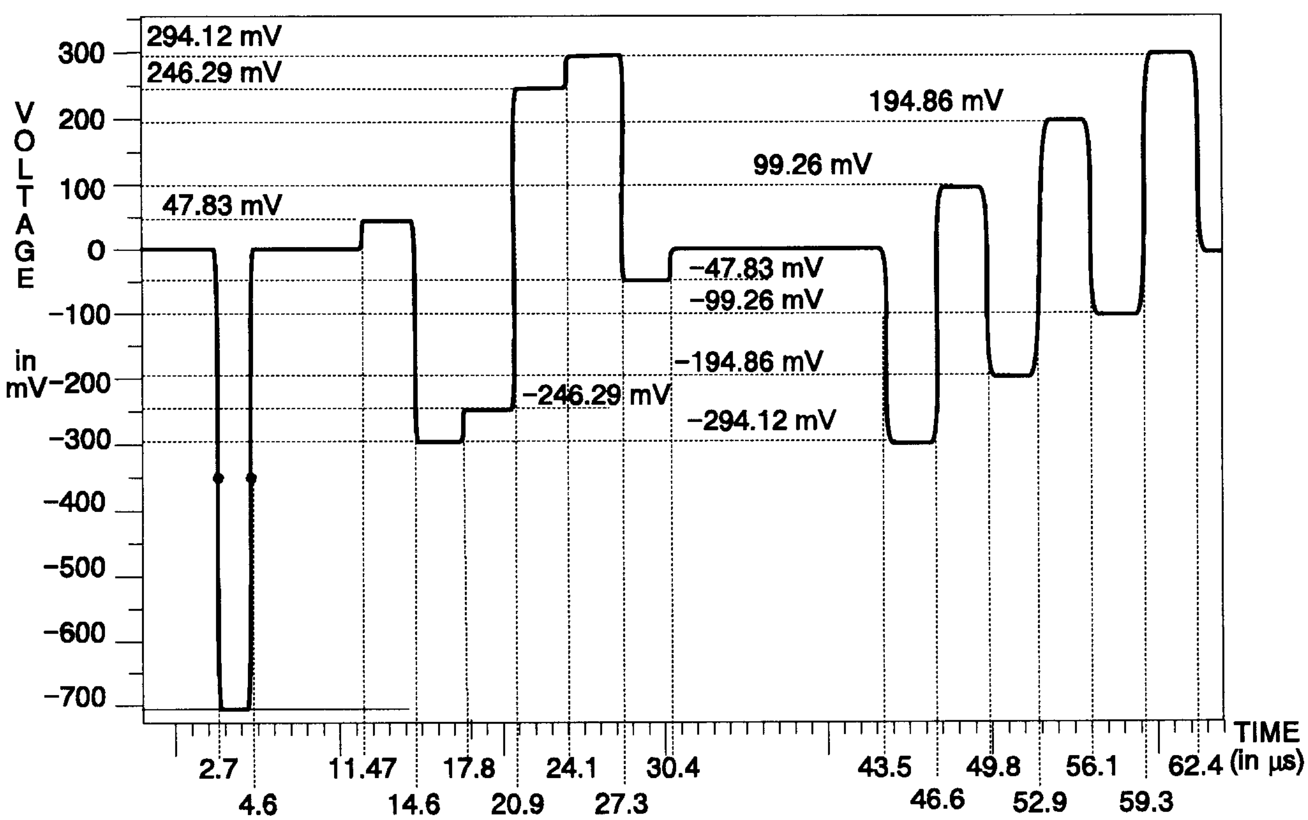


Fig. 3-104. C Channel — 75% Bars.

Component Signals

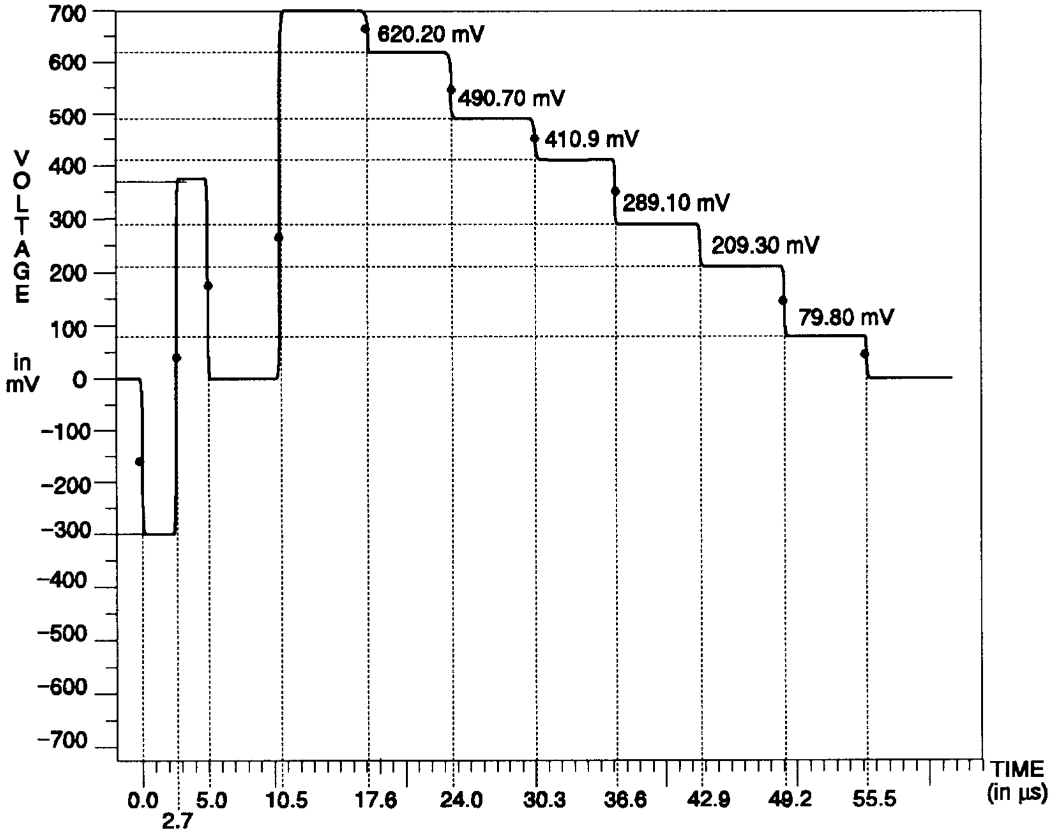


Fig. 3-105. Y Channel — 100% Bars.

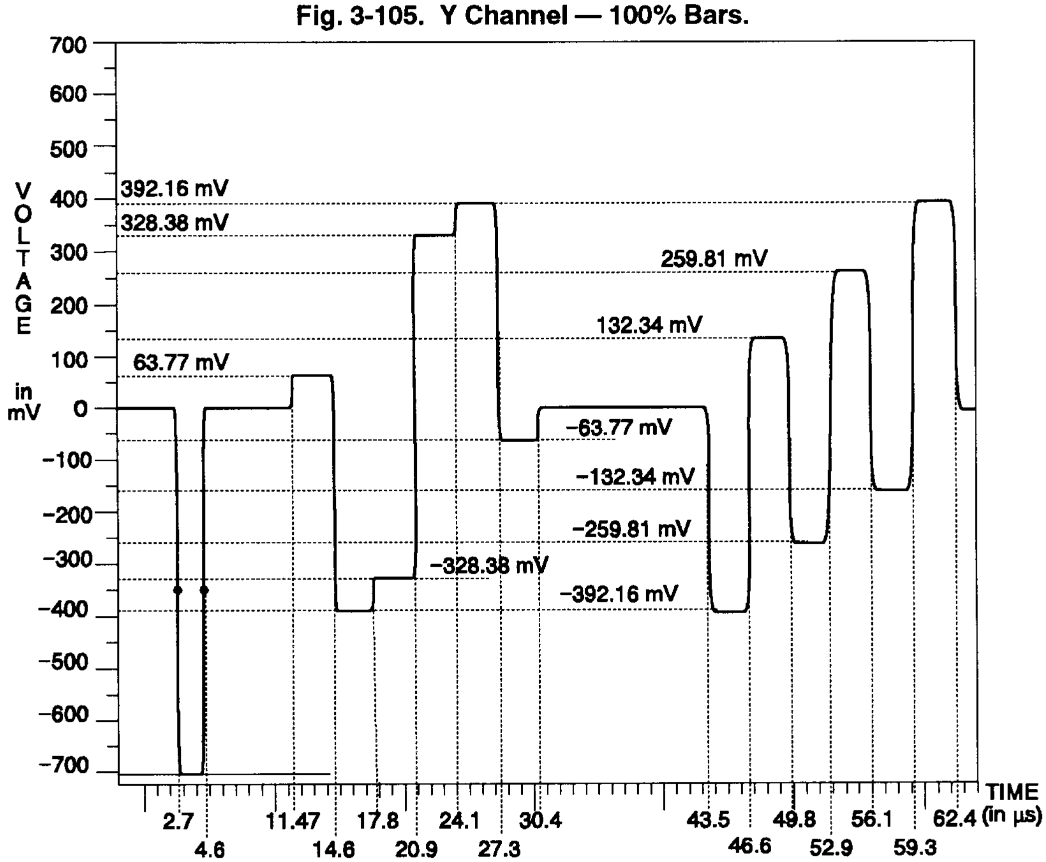


Fig. 3-106. C Channel — 100% Bars.

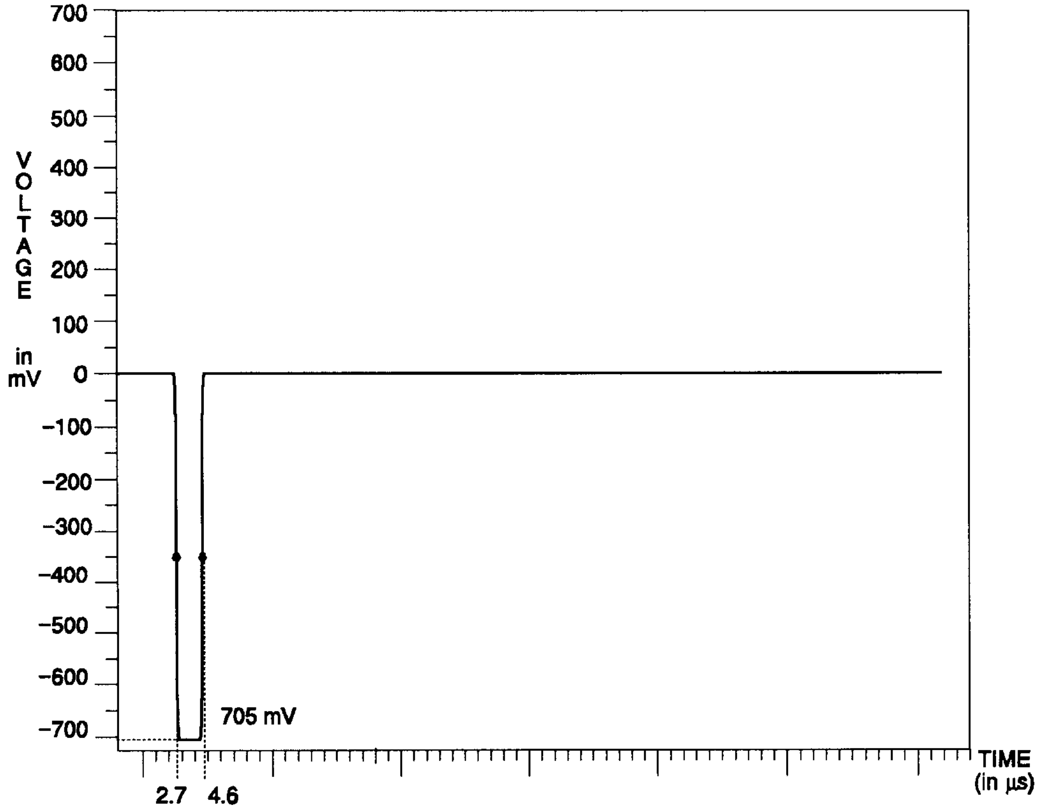


Fig. 3-107. C Channel — All Flat Field Signals.

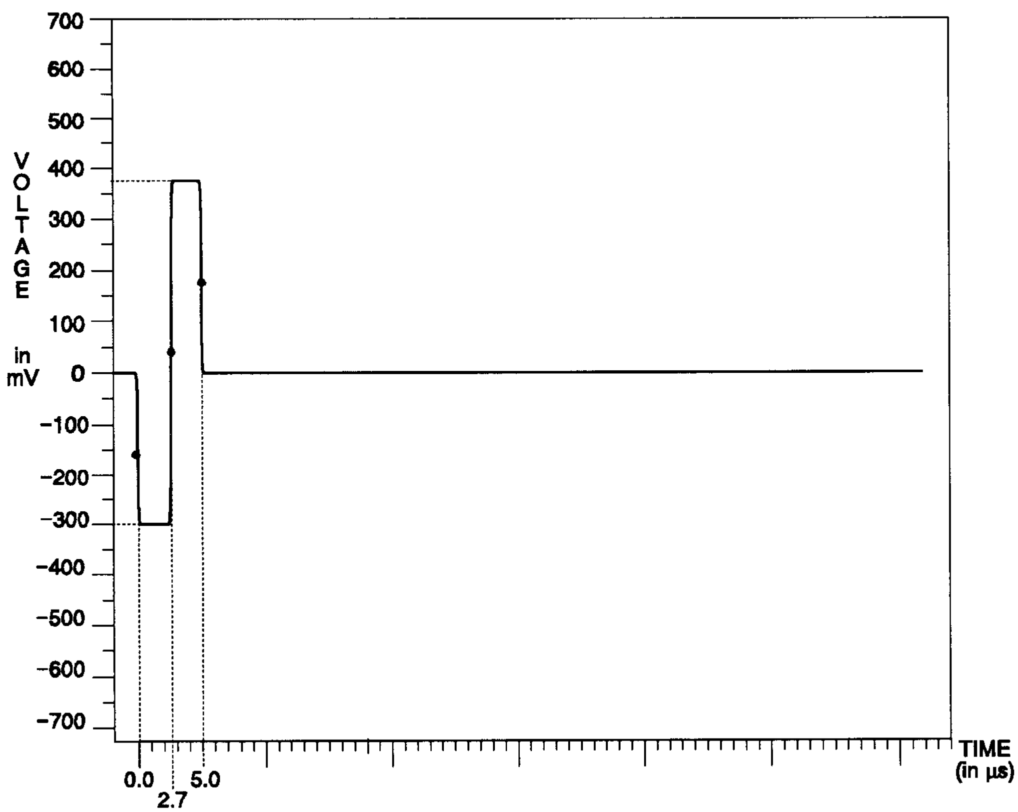


Fig. 3-108. Y Channel — 0% Flat Field.

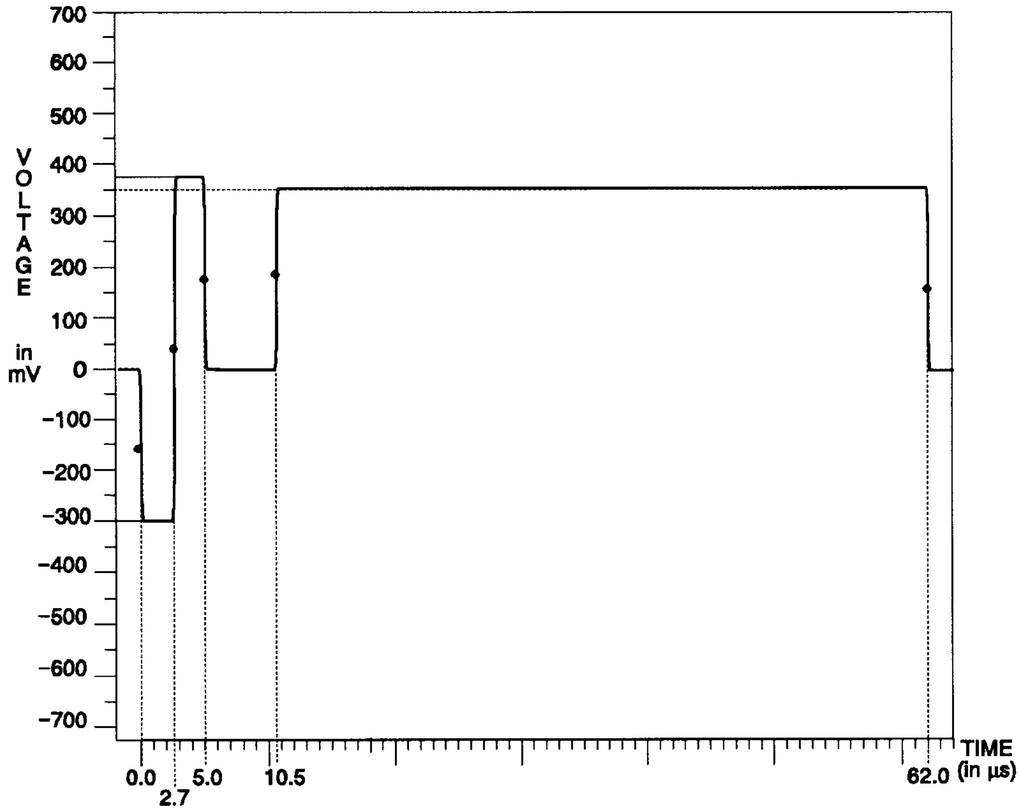


Fig. 3-109. Y Channel — 50% Flat Field.

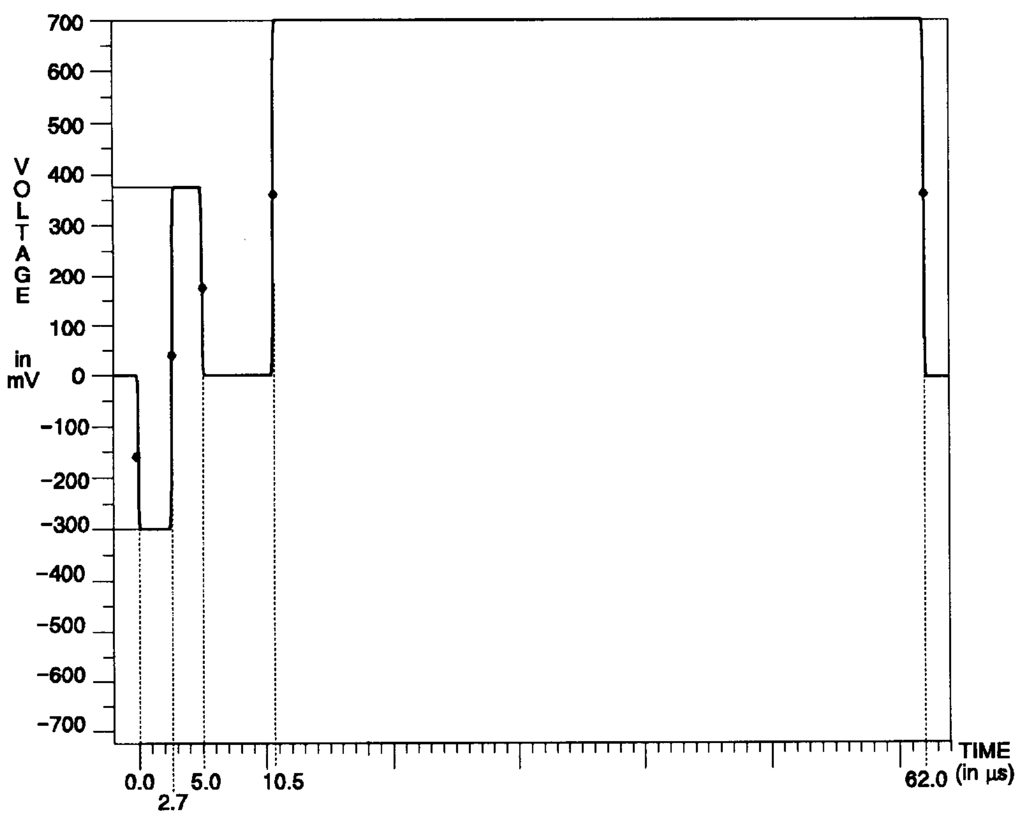


Fig. 3-110. Y Channel — 100% Flat Field.

GBR Signals

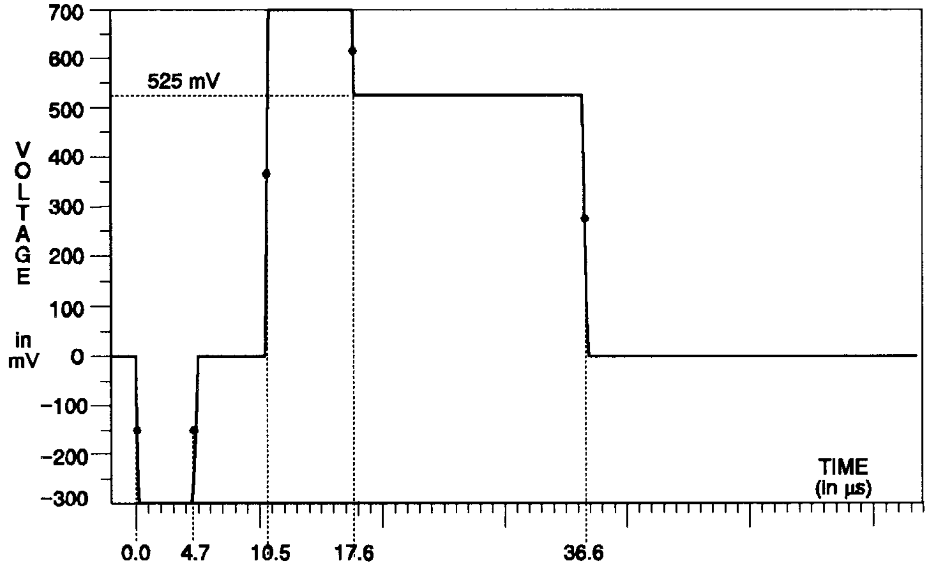


Fig. 3-111. Green Channel — 75% Color Bars.

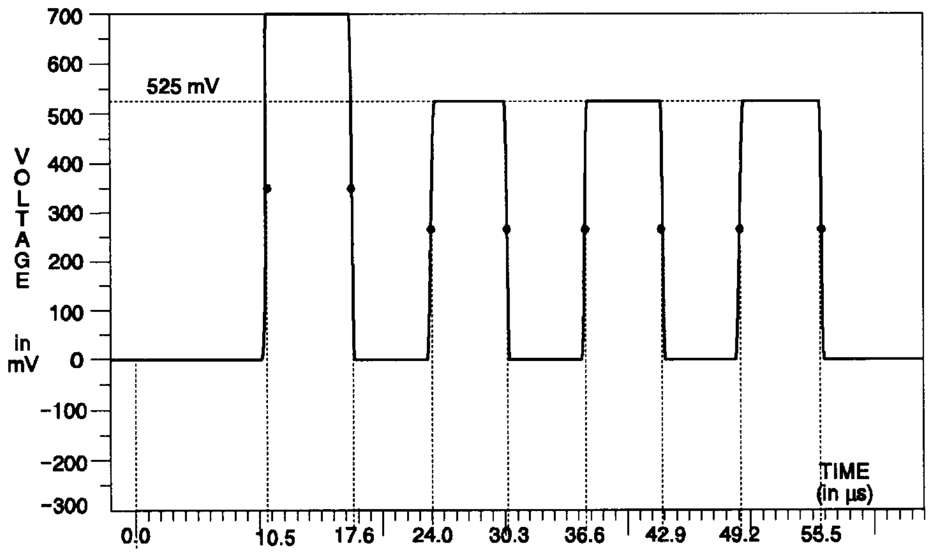


Fig. 3-112. Blue Channel — 75% Color Bars.

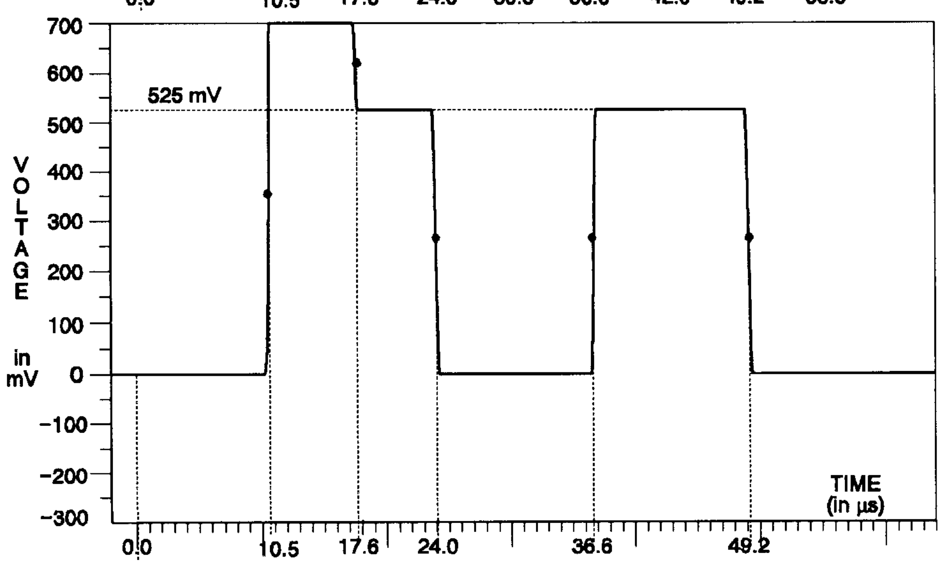


Fig. 3-113. Red Channel — 75% Color Bars.

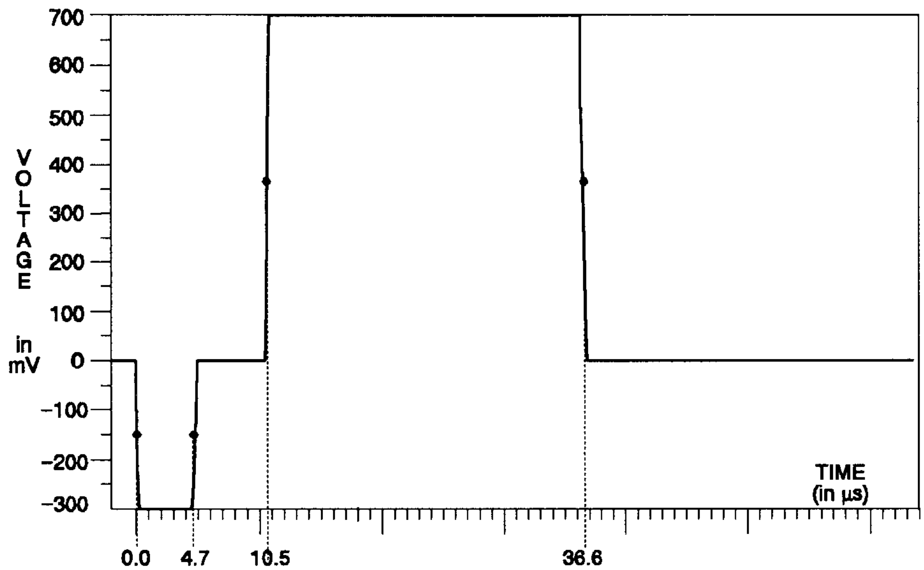


Fig. 3-114. Green Channel — 100% Color Bars.

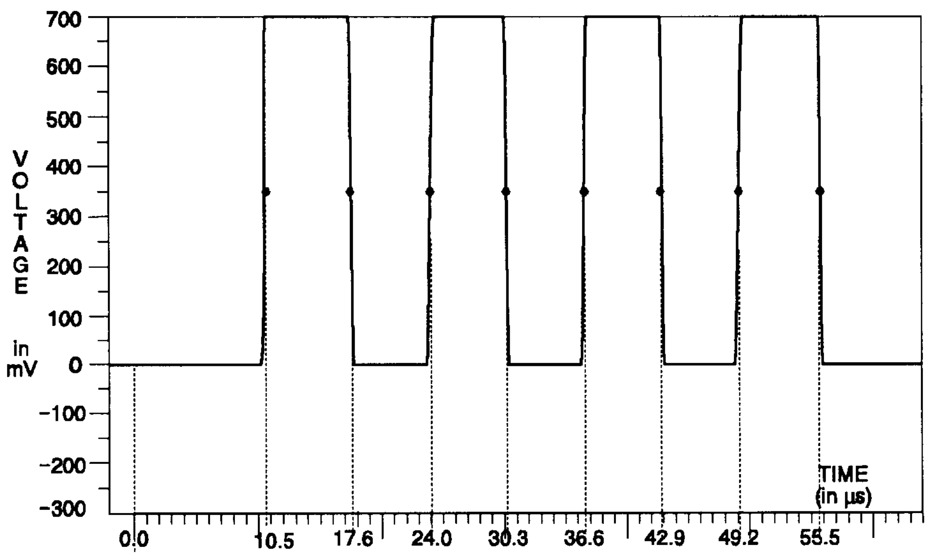


Fig. 3-115. Blue Channel — 100% Color Bars.

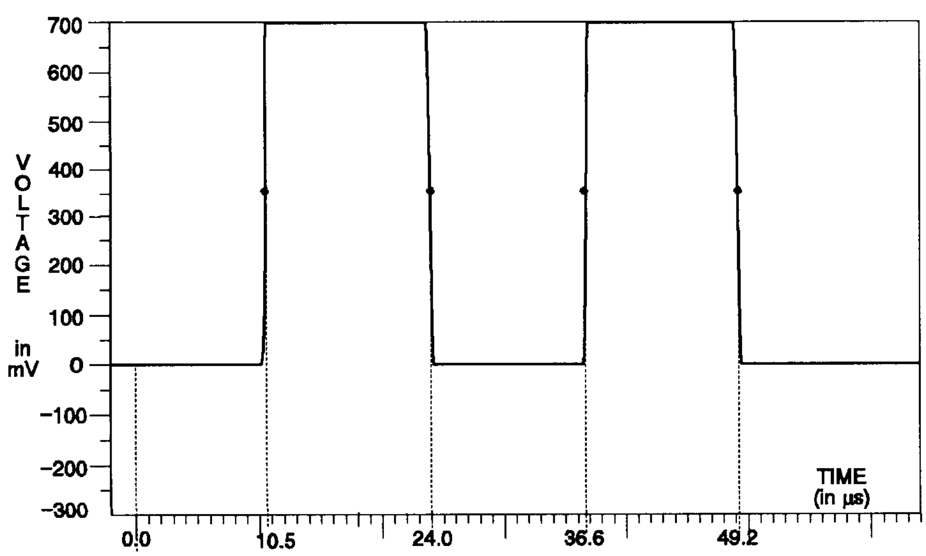


Fig. 3-116. Red Channel — 100% Color Bars.

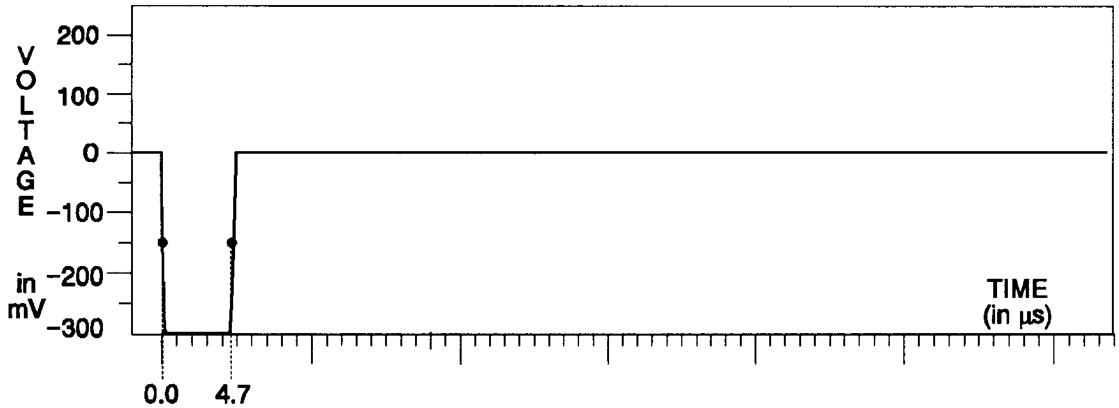


Fig. 3-117. Green Channel — Red Field.

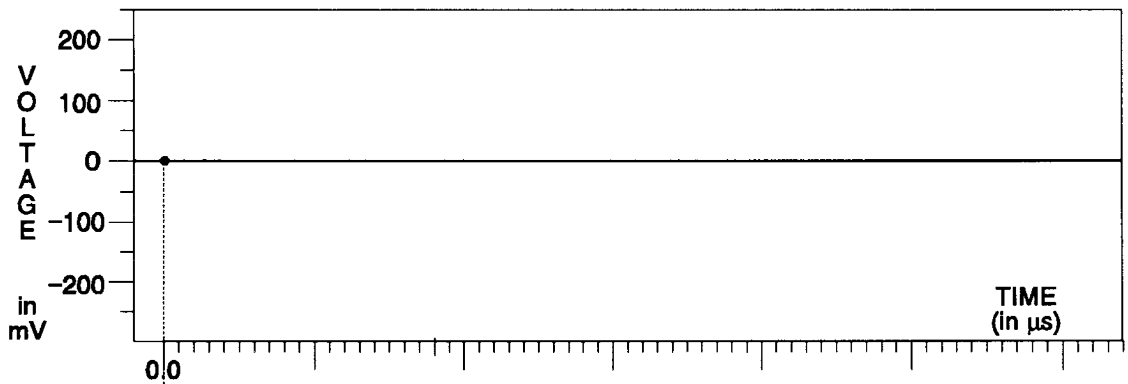


Fig. 3-118. Blue Channel — Red Field.

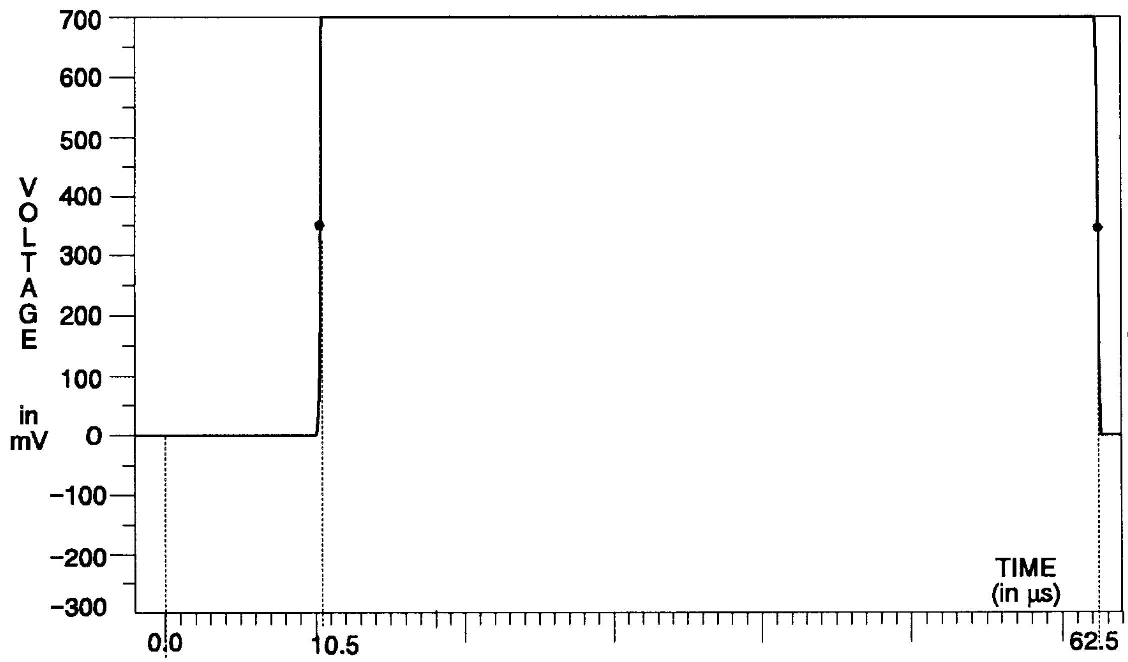


Fig. 3-119. Red Channel — Red Field.

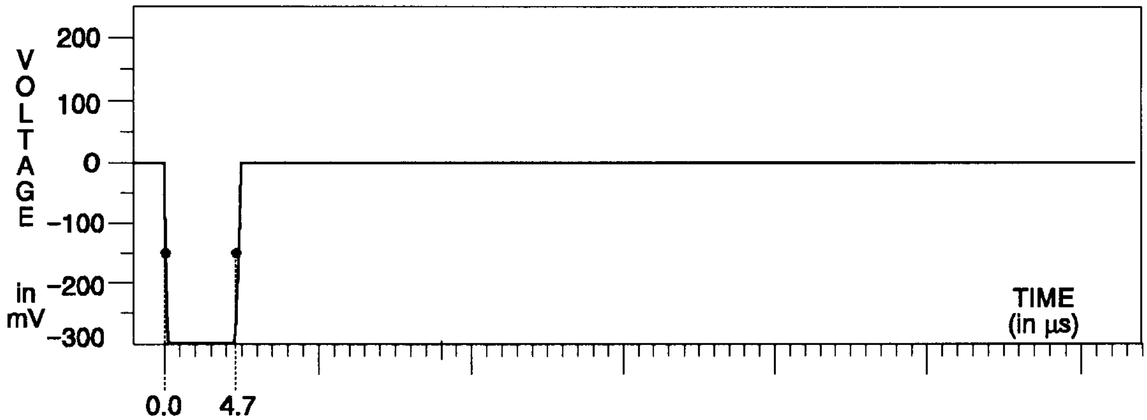


Fig. 3-120. Green Channel — Blue Field.

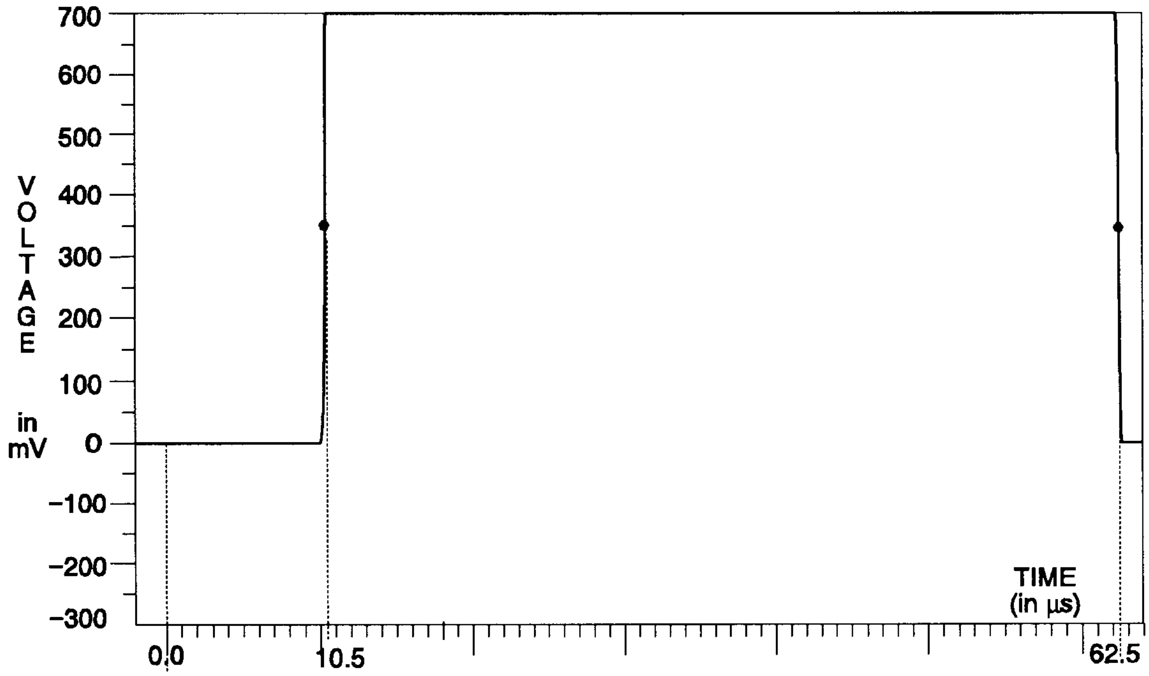


Fig. 3-121. Blue Channel — Blue Field.

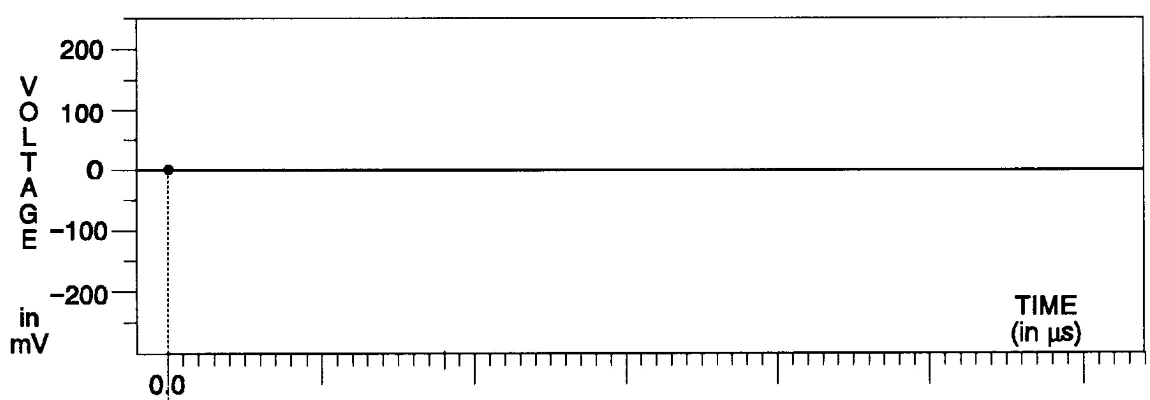


Fig. 3-122. Red Channel — Blue Field.

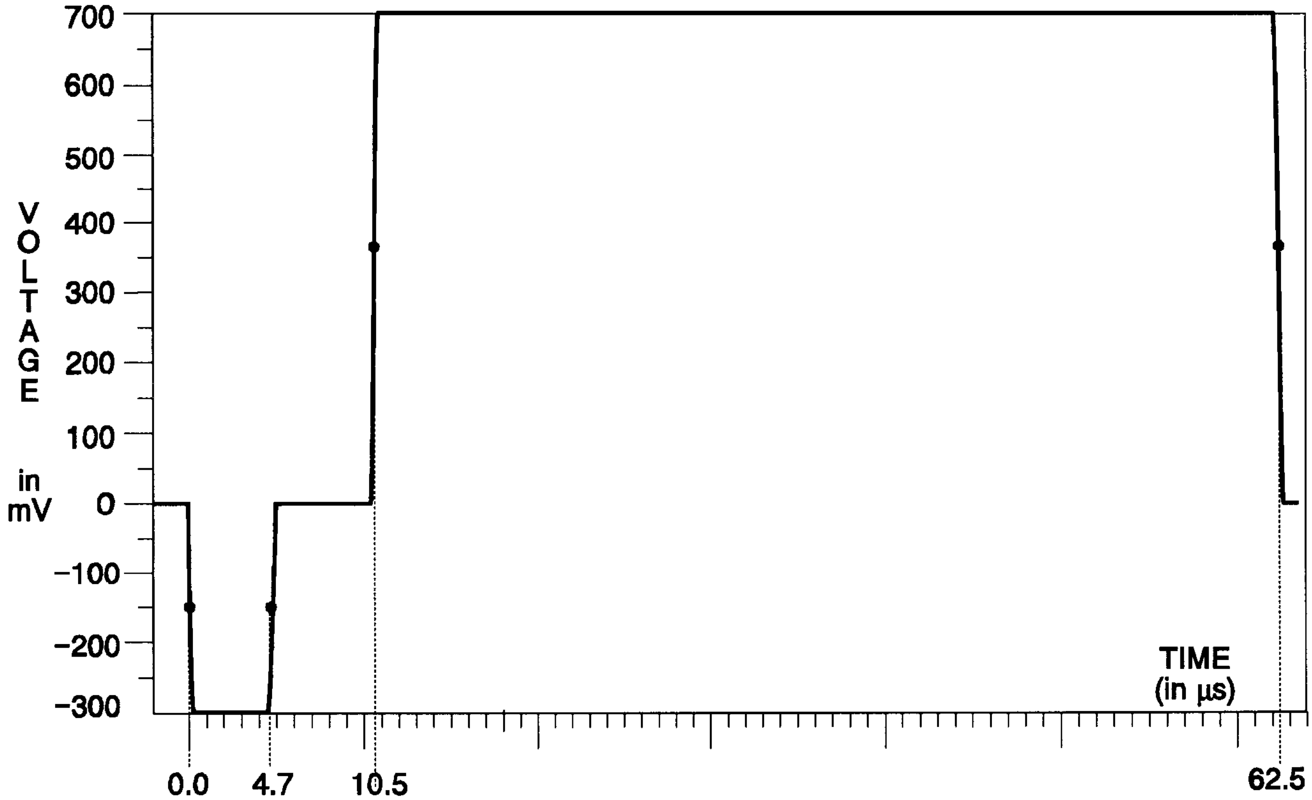


Fig. 3-123. Green Channel — Green Field.

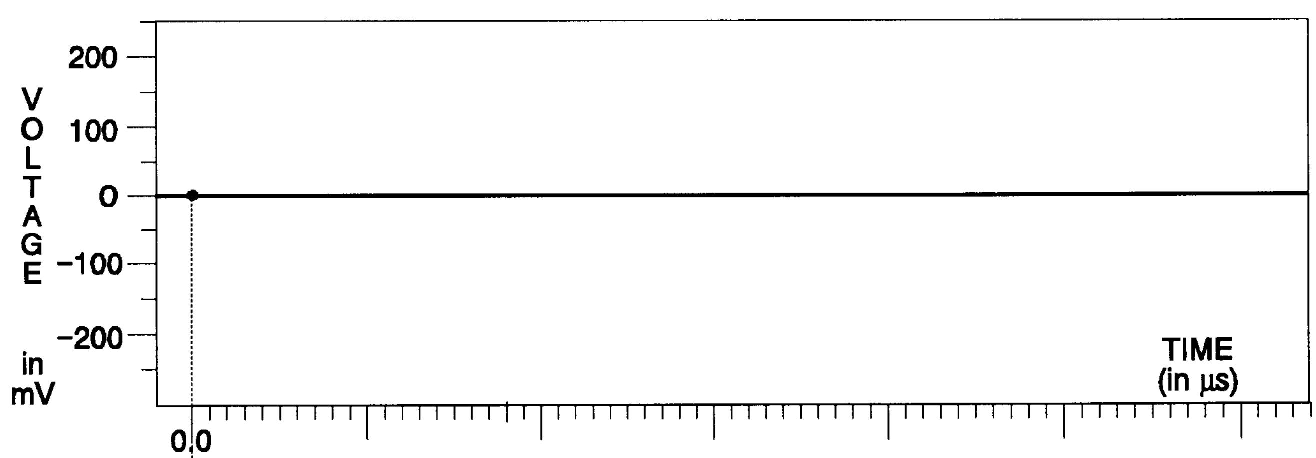


Fig. 3-124. Blue & Red Channels — Green Field.

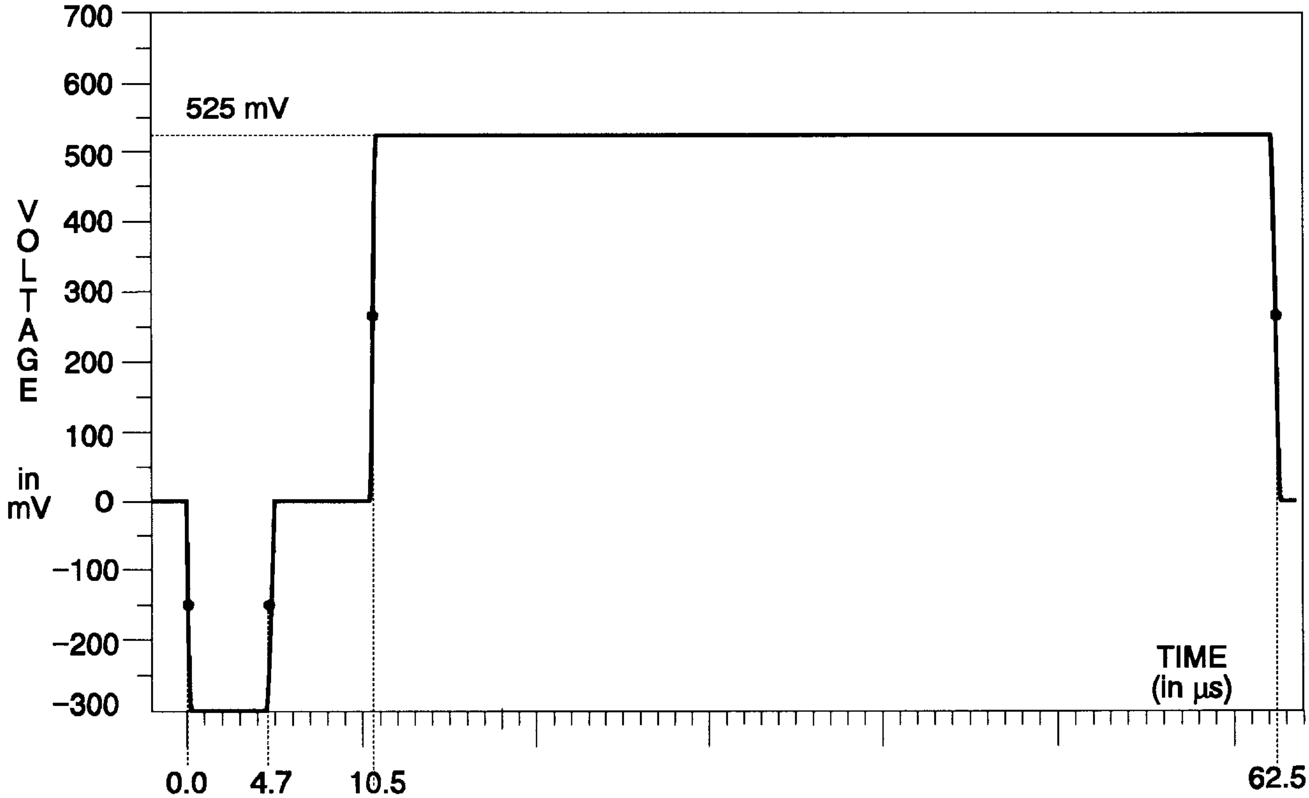


Fig. 3-125. Green Channel — Convergence (hor).

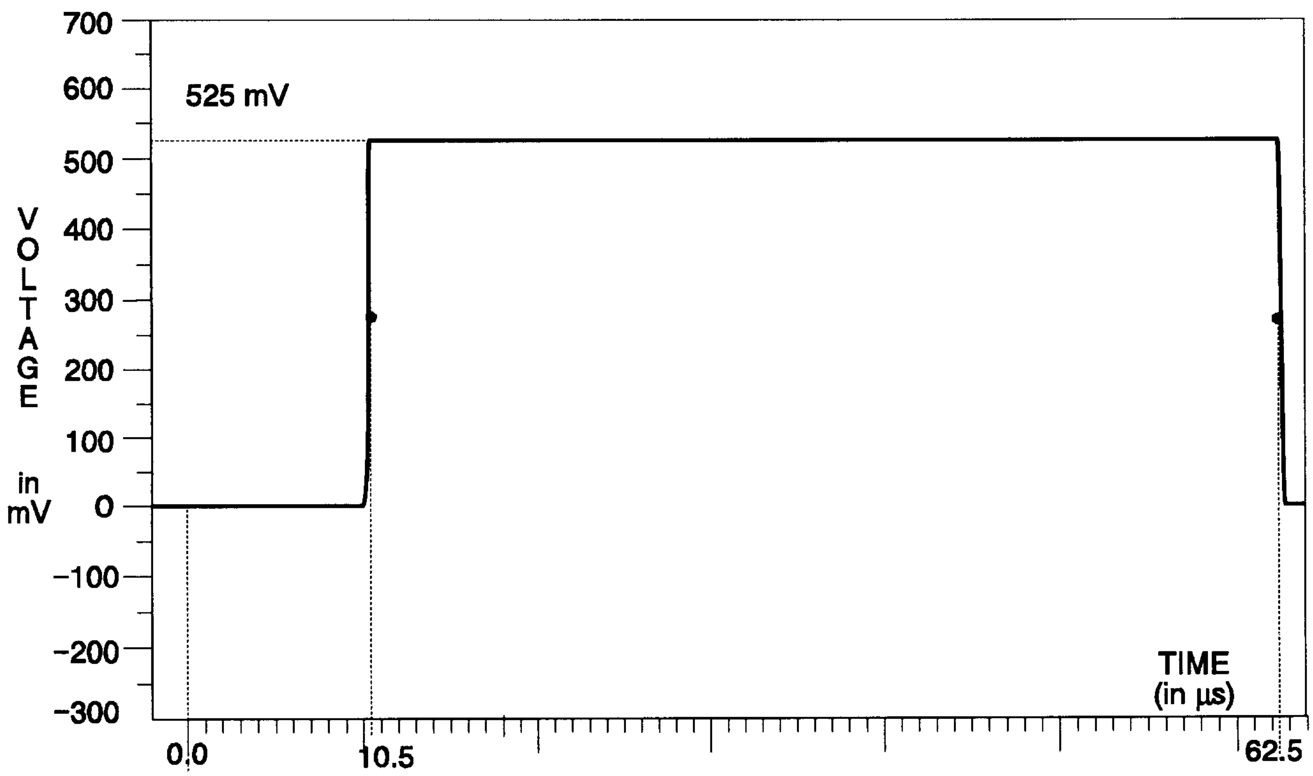


Fig. 3-126. Blue & Red Channels — Convergence (hor).

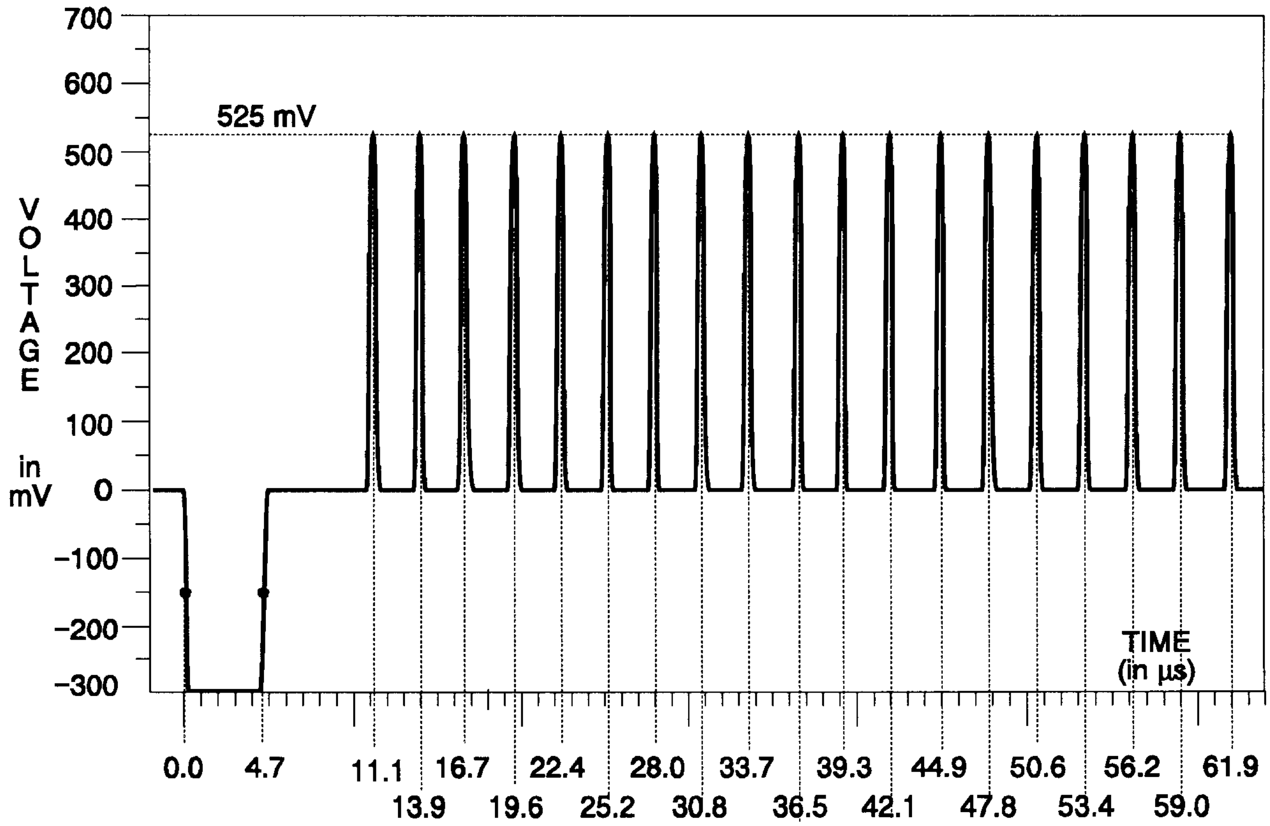


Fig. 3-127. Green Channel — Convergence (vertical).

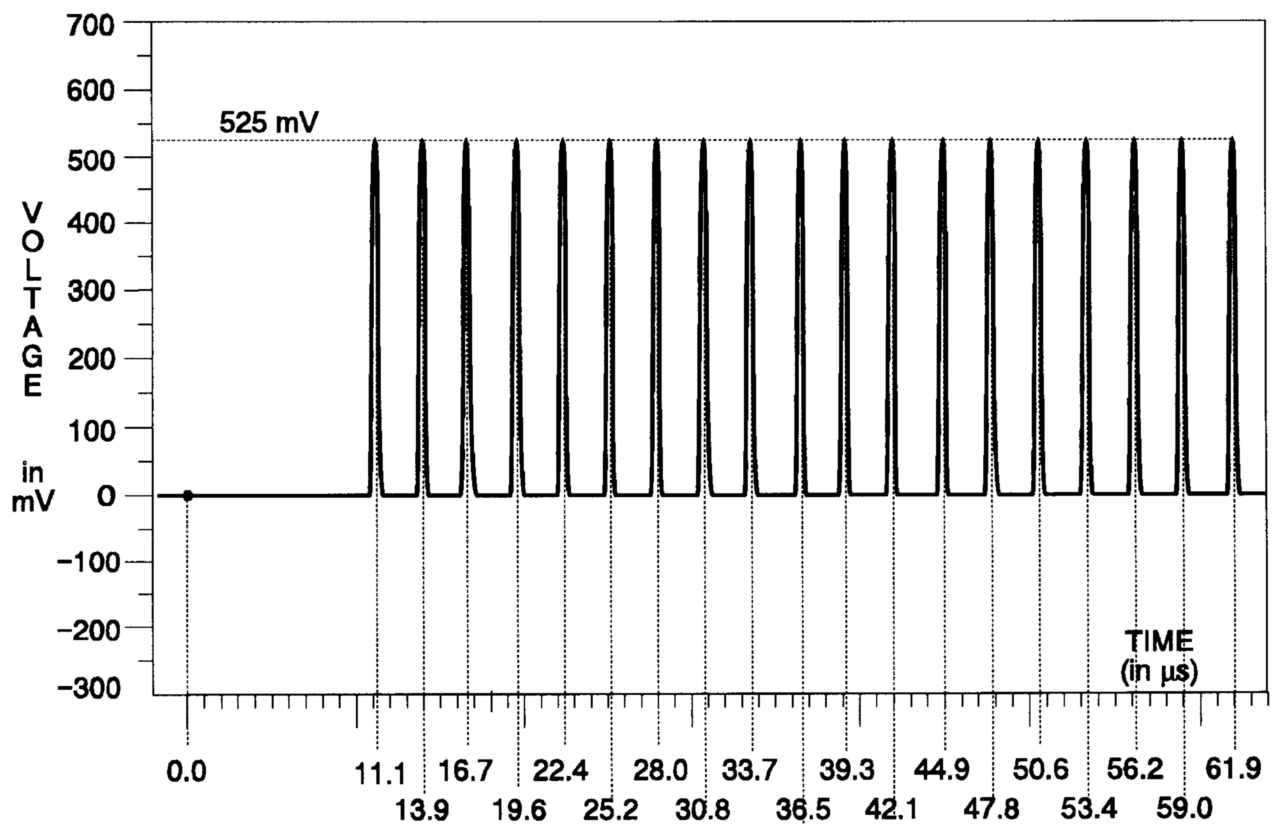


Fig. 3-128. Blue & Red Channels — Convergence (vrt).

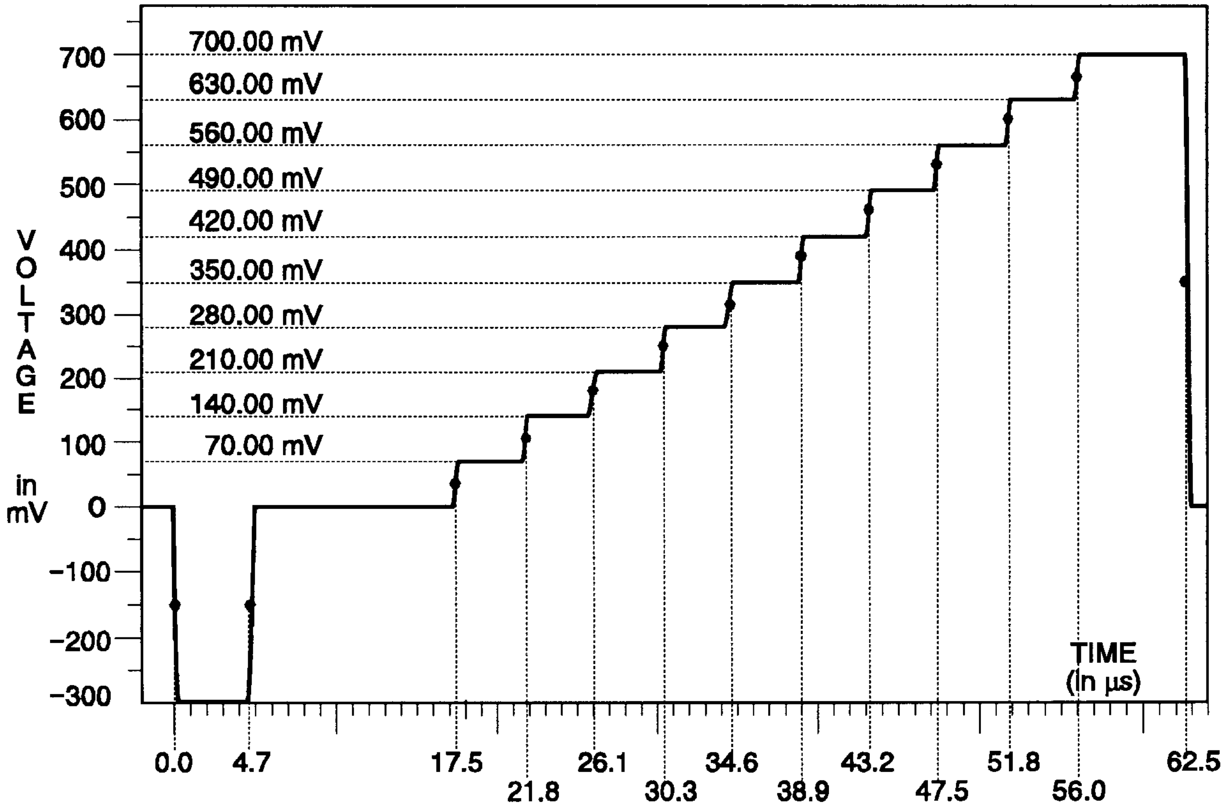


Fig. 3-129. Green Channel — 10-Step.

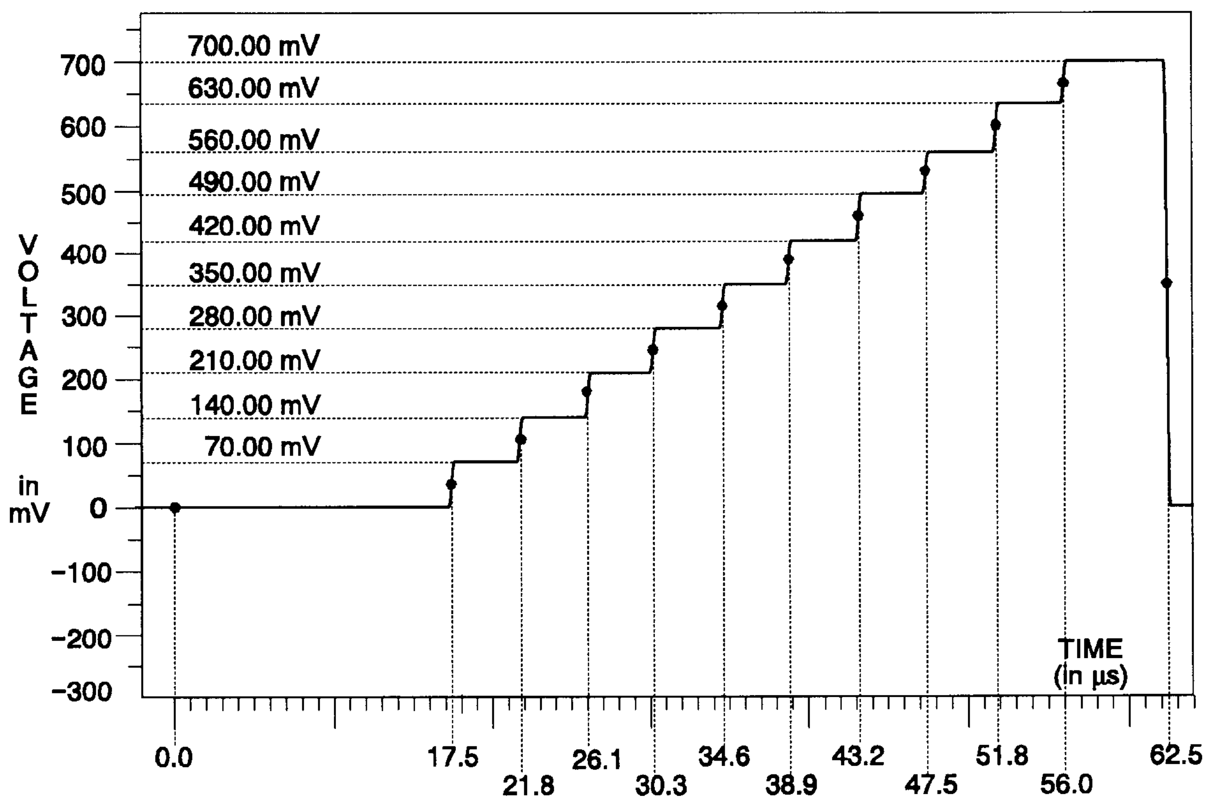


Fig. 3-130. Blue & Red Channels — 10-Step.

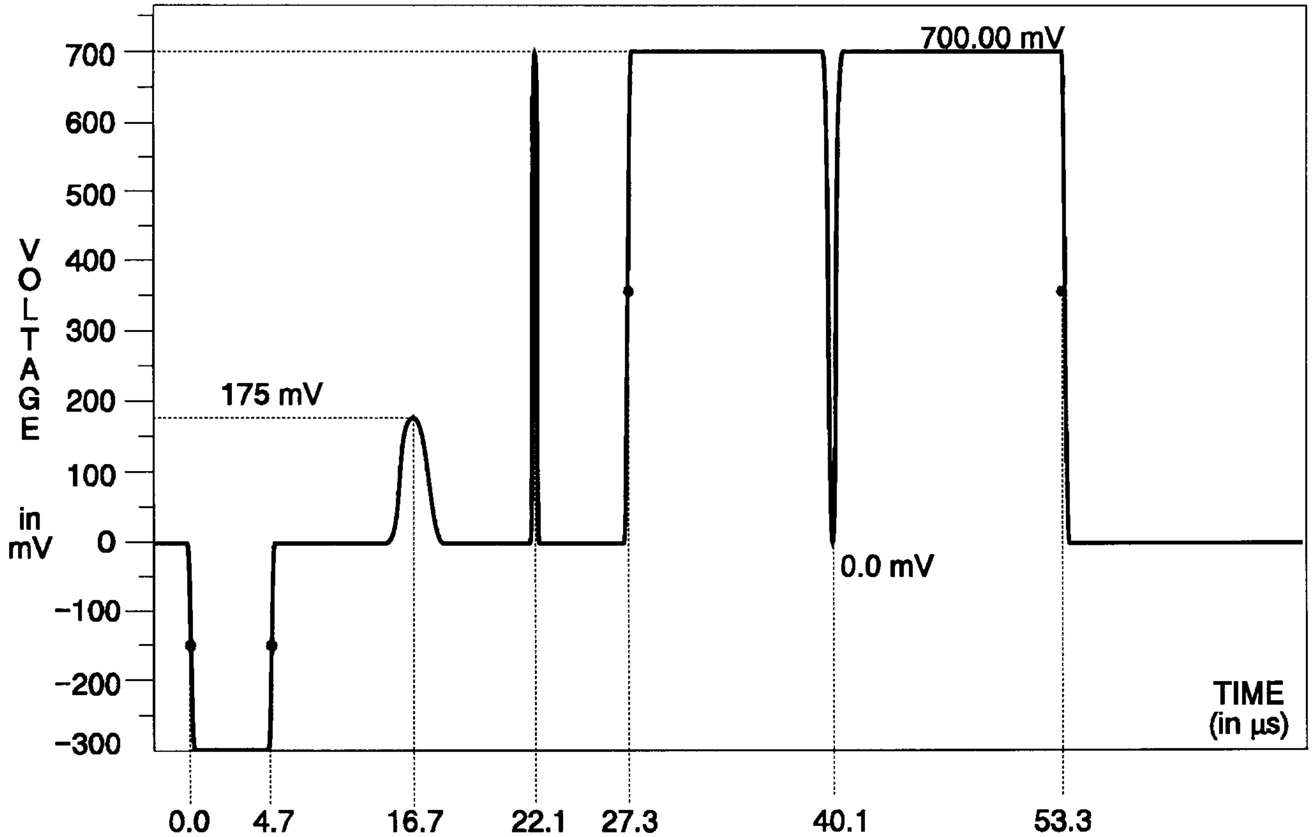


Fig. 3-131. Green Channel — Pulse & Bar.

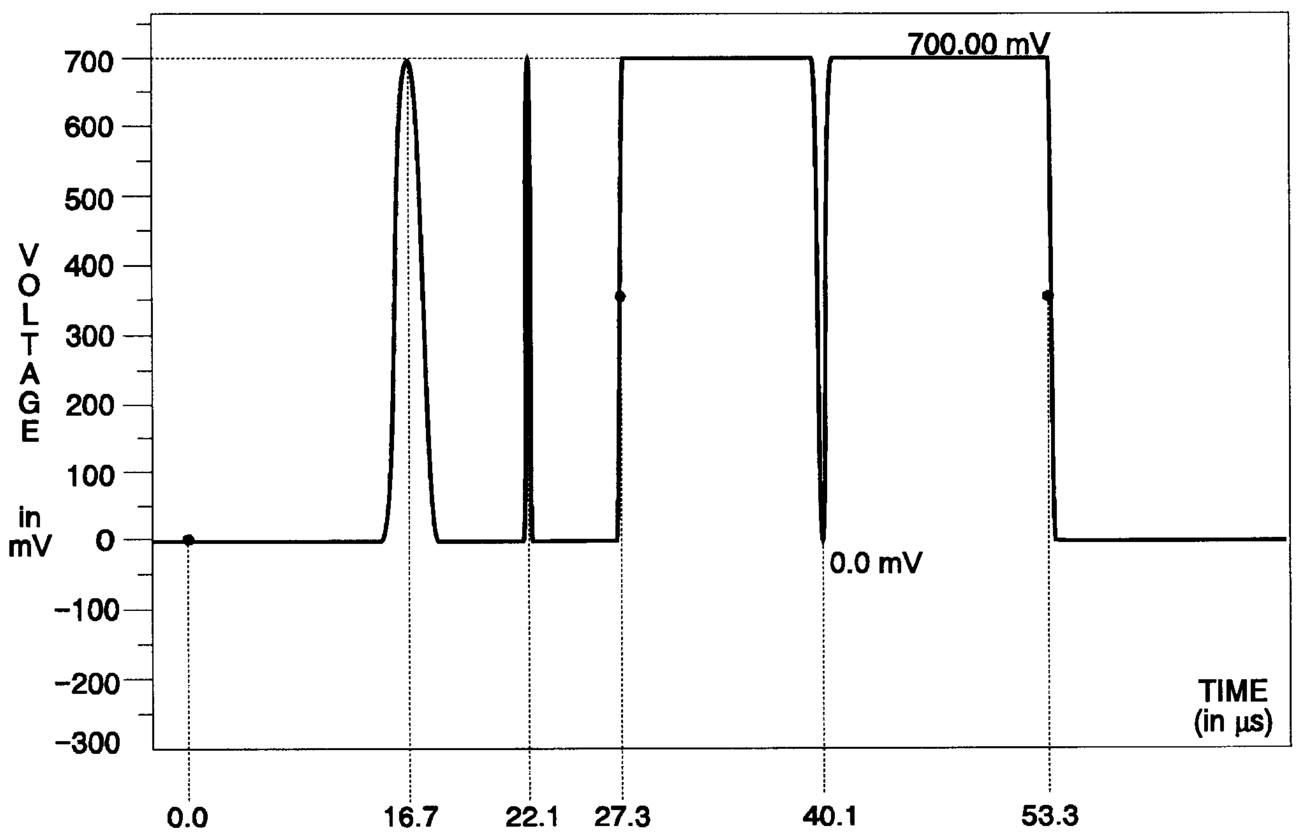


Fig. 3-132. Blue & Red Channels — Pulse & Bar.

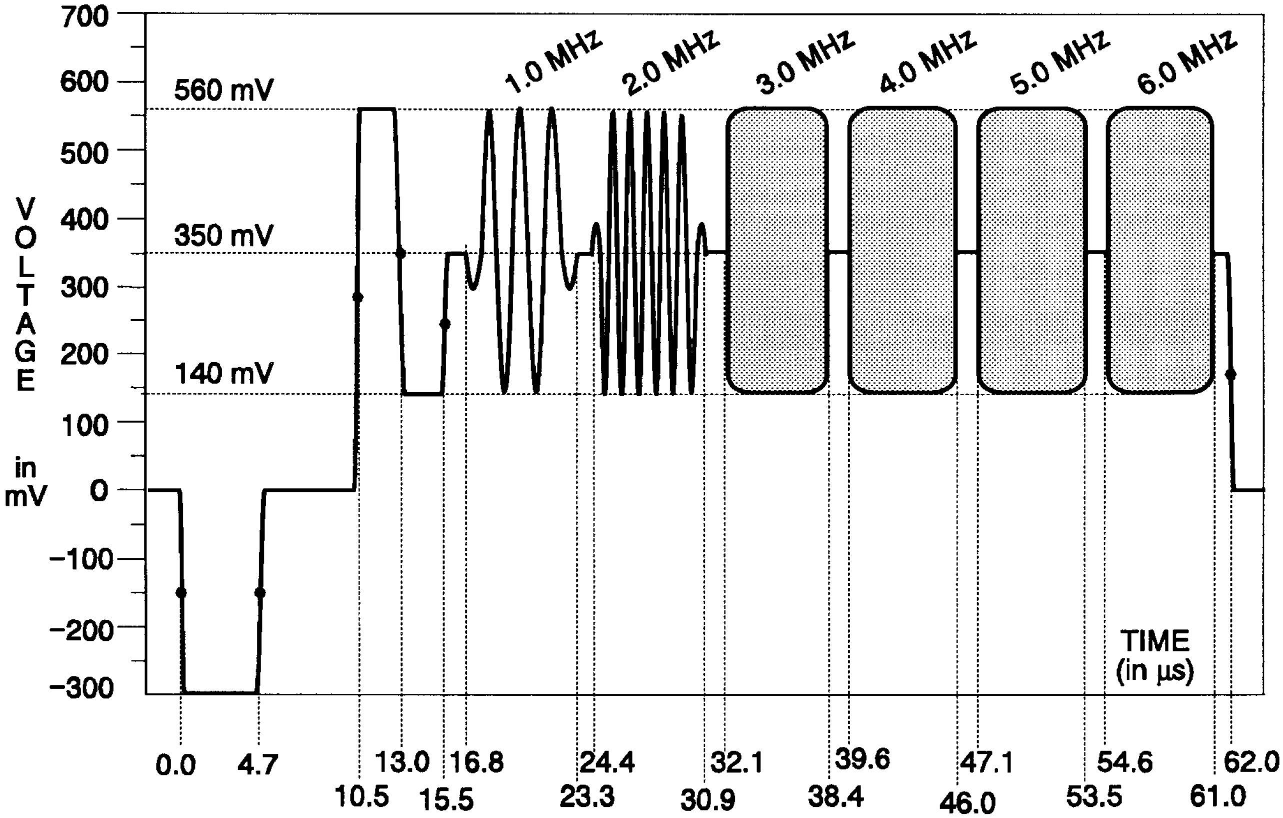


Fig. 3-133. Green Channel — Multiburst.

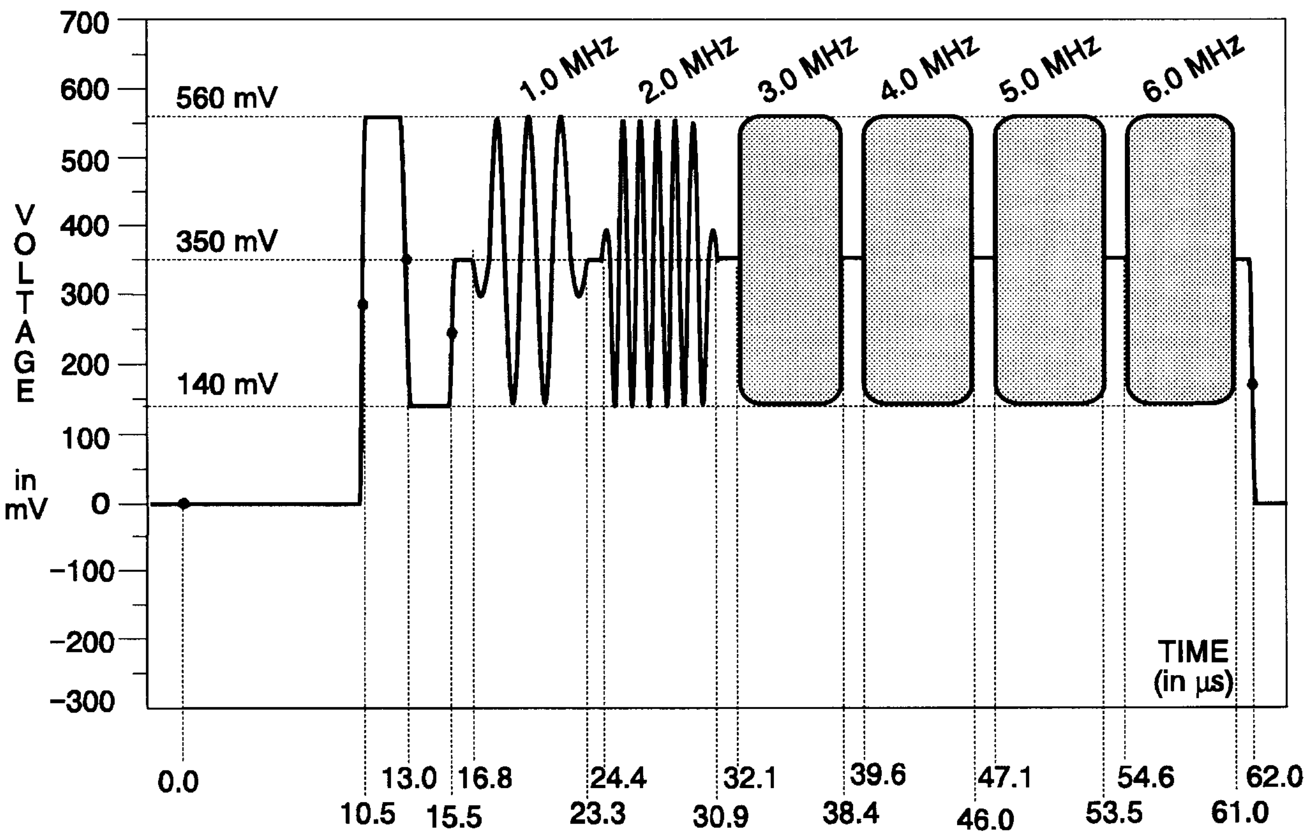


Fig. 3-134. Blue & Red Channels — Multiburst.

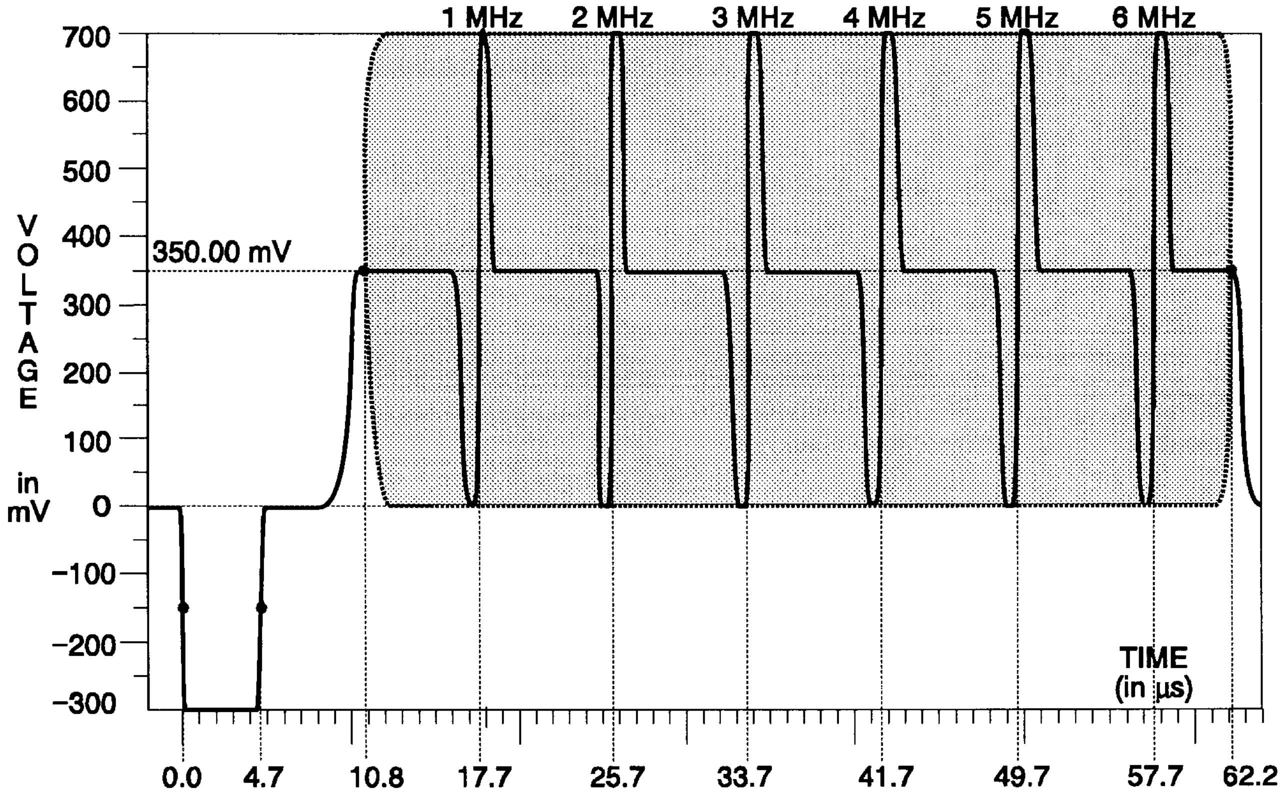


Fig. 3-135. Green Channel — Sweep.

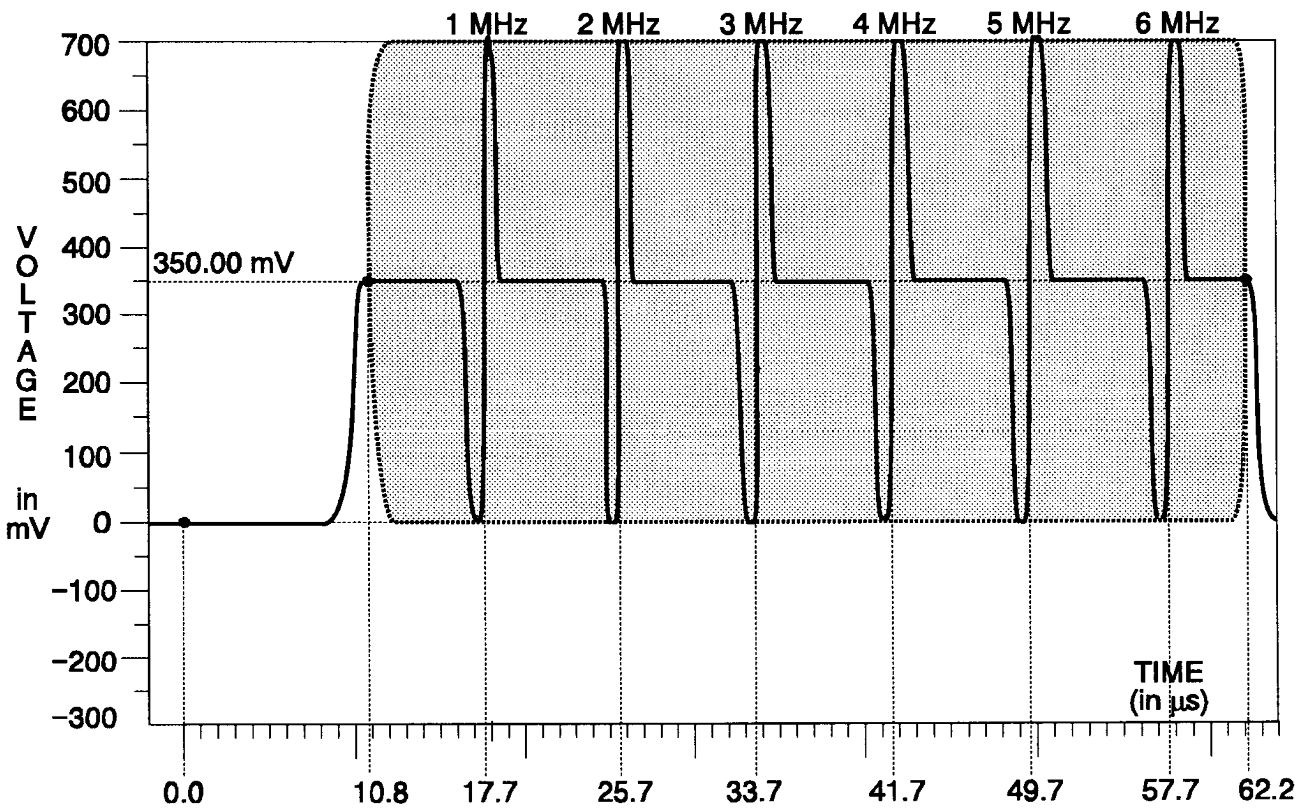


Fig. 3-136. Blue & Red Channels — Sweep.

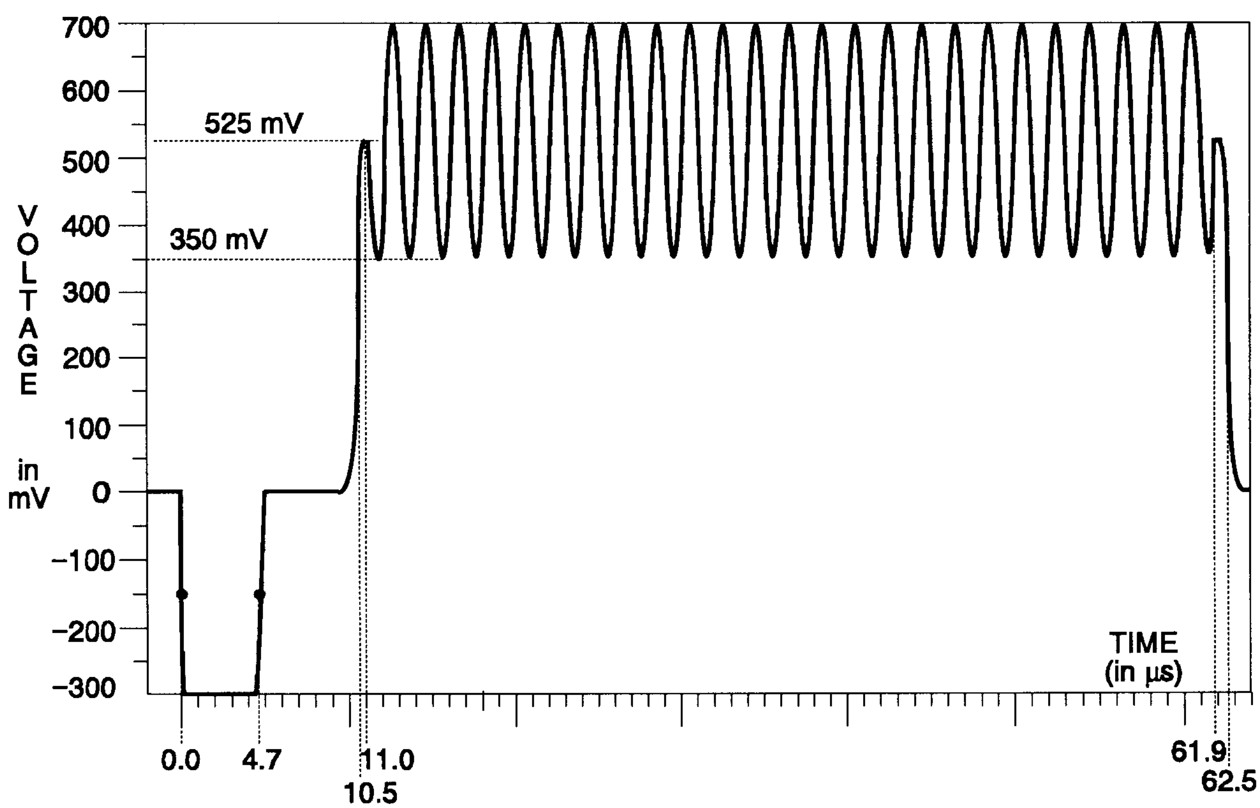


Fig. 3-137. Green Channel — Bowtie.

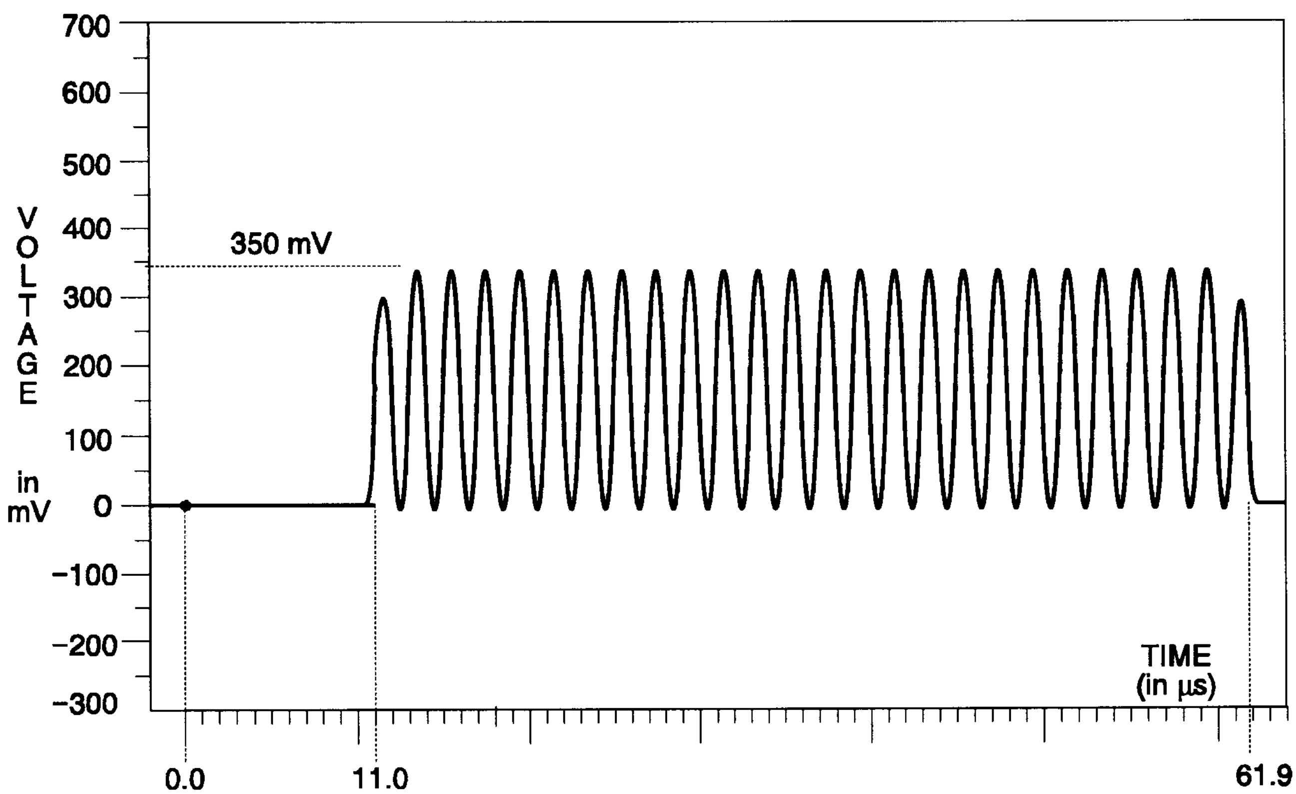


Fig. 3-138. Blue & Red Channels — Bowtie.

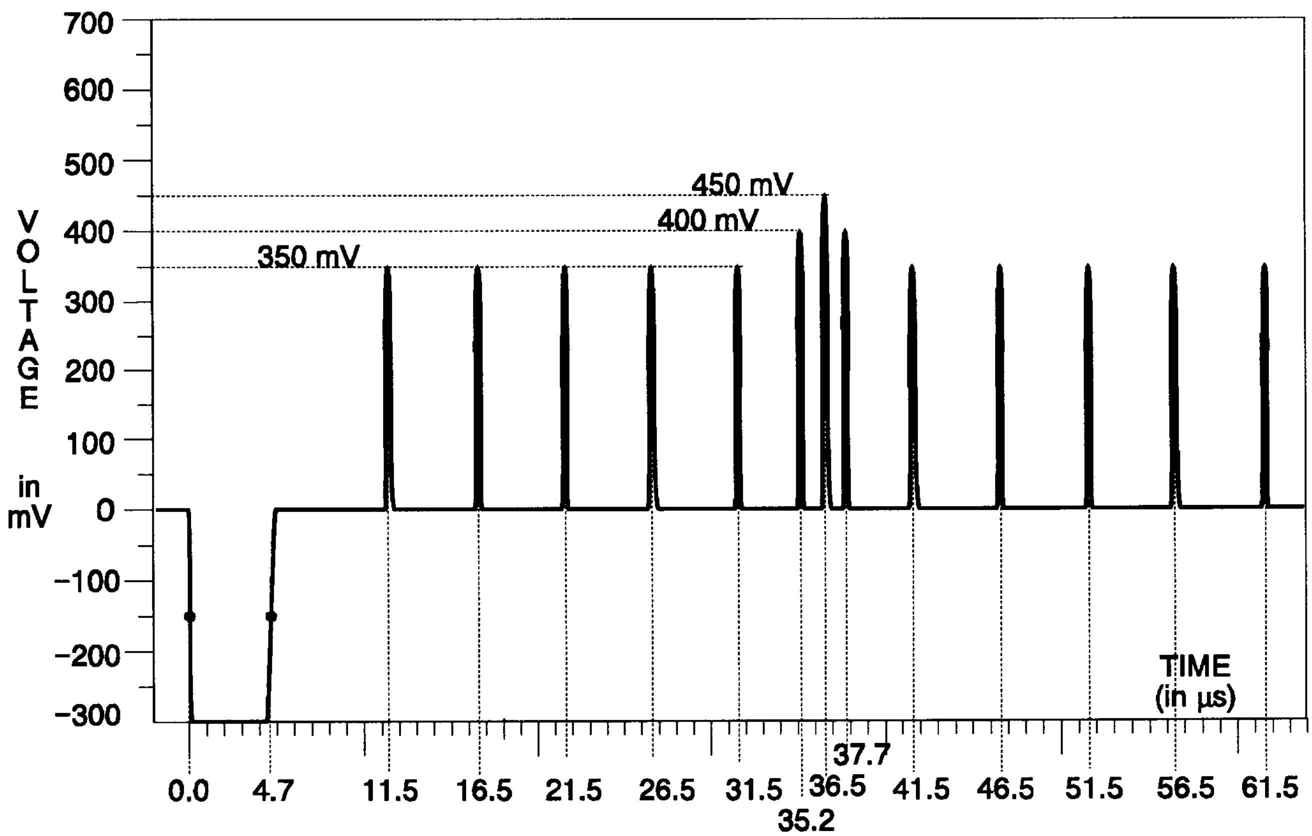


Fig. 3-139. Green Channel — Bowtie Markers.

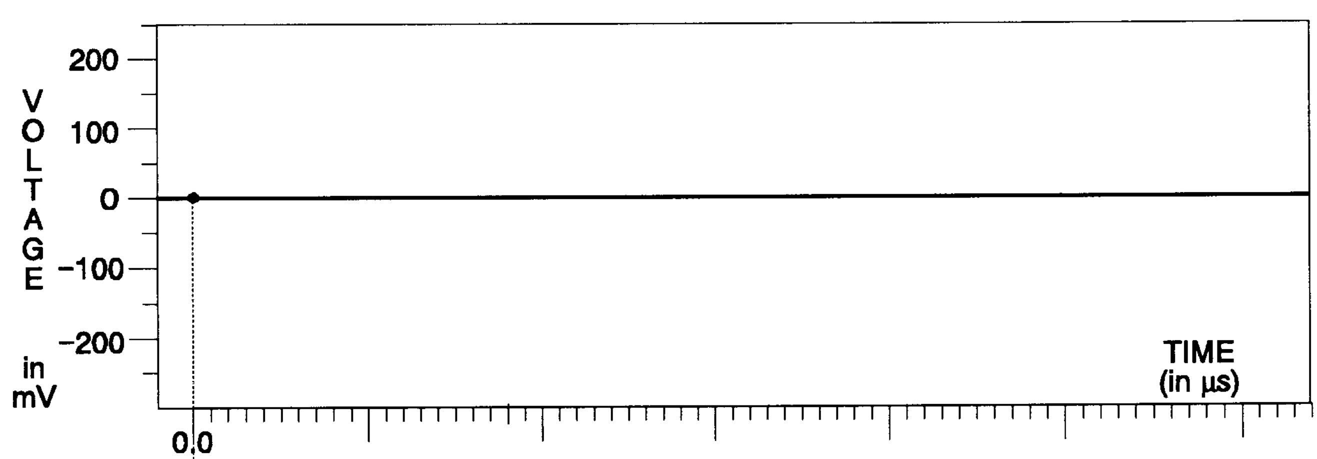


Fig. 3-140. Blue & Red Channels — Bowtie Markers.

Option 01 Signals MII CTDM (2-Wire)

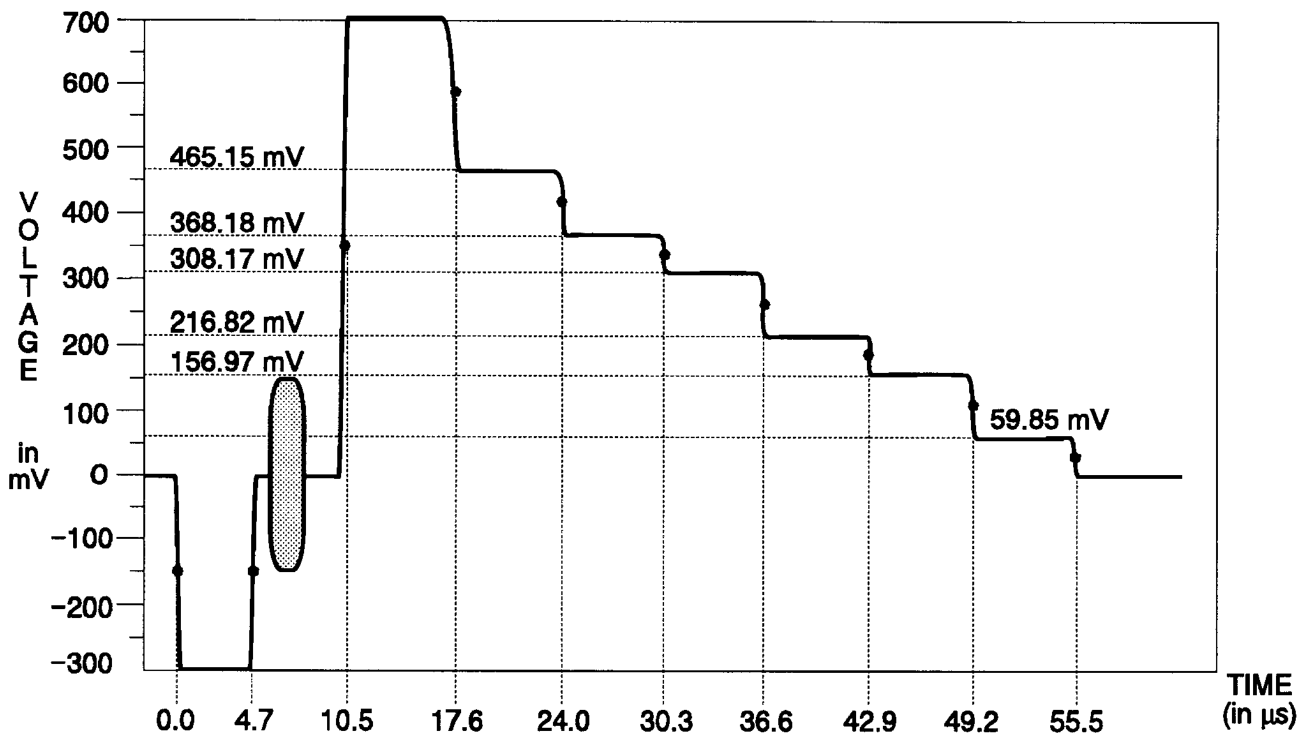


Fig. 3-141. Y Channel — 75% Color Bars.

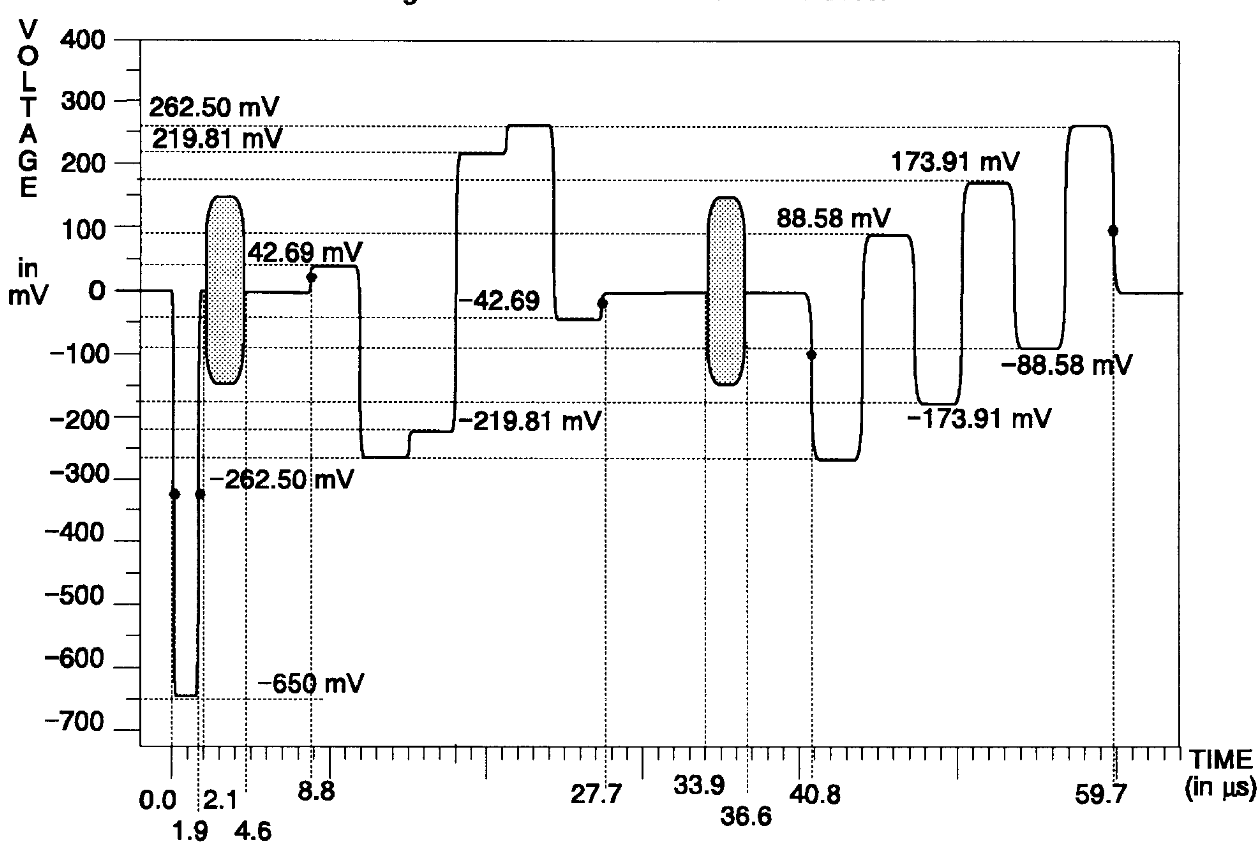


Fig. 3-142. C Channel — 75% Color Bars.

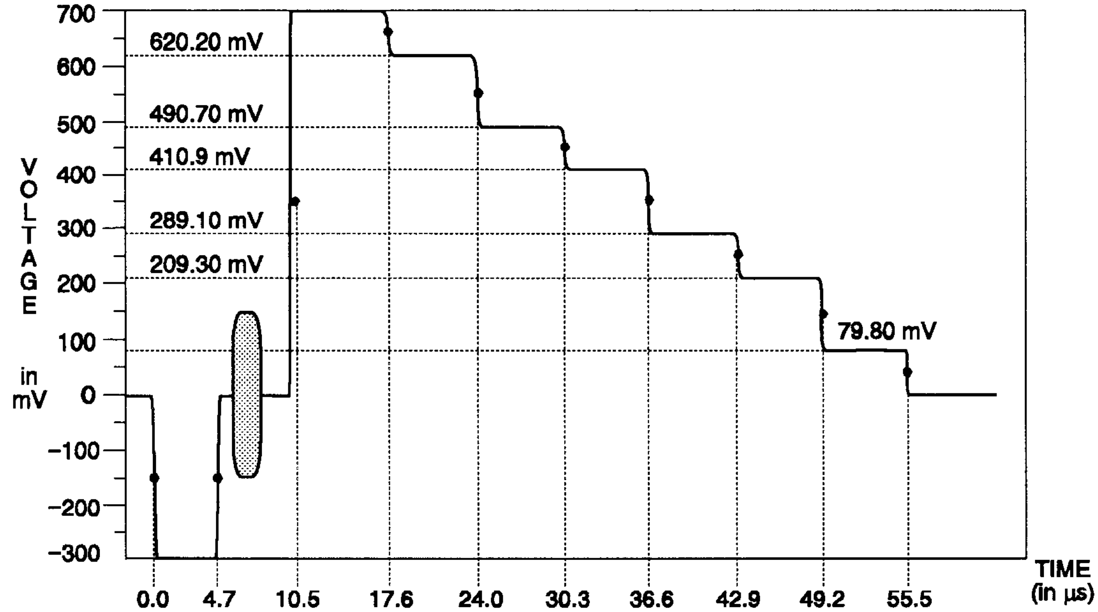


Fig. 3-143. Y Channel — 100% Color Bars.

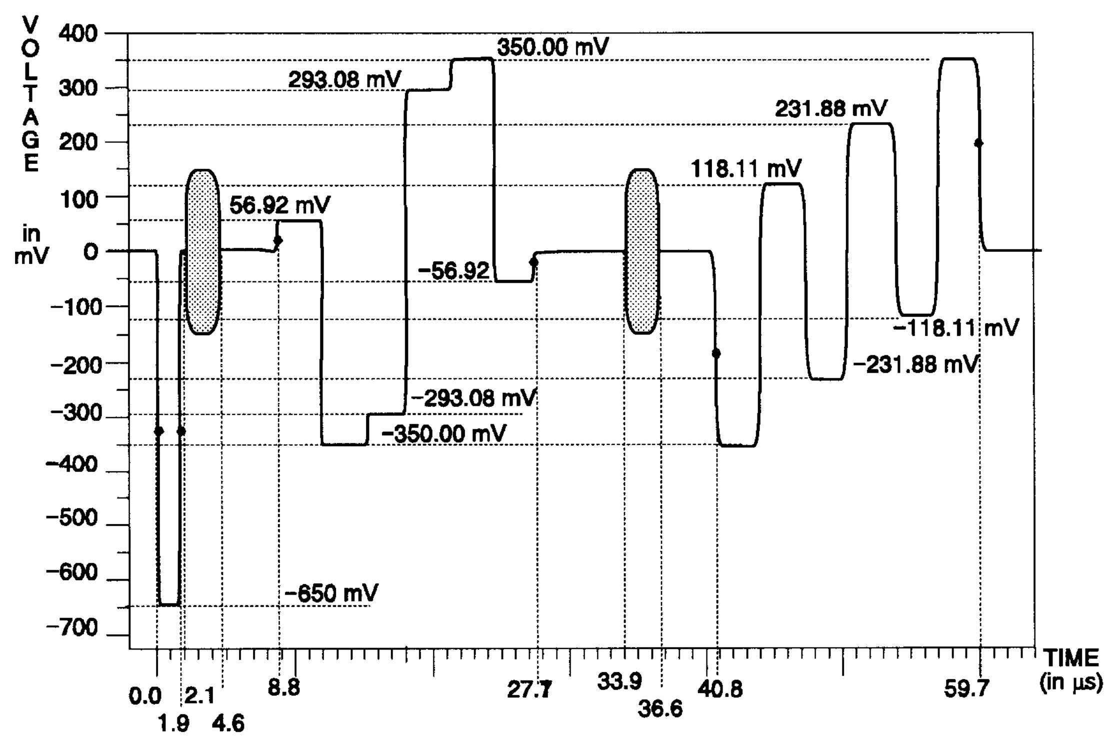


Fig. 3-144. C Channel — 100% Color Bars.

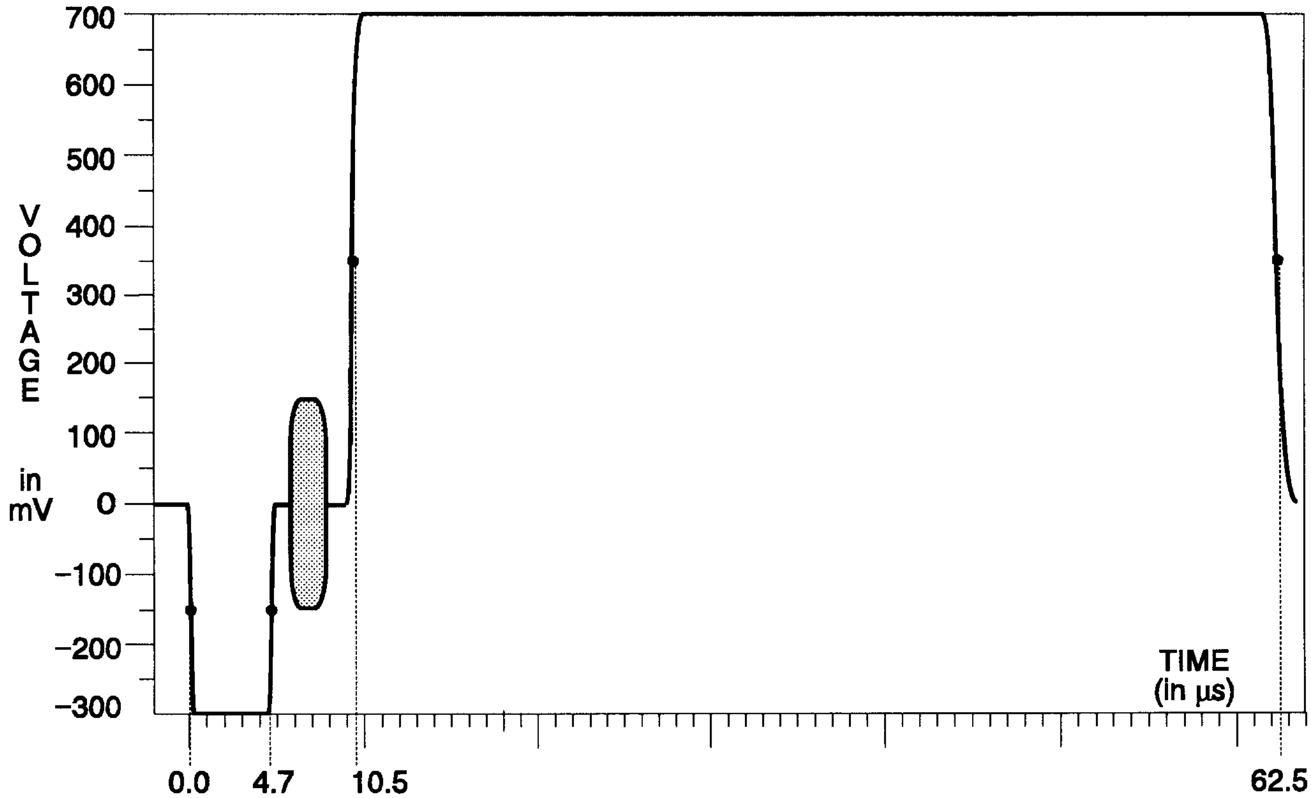


Fig. 3-145. Y Channel — 0% Flat Field.

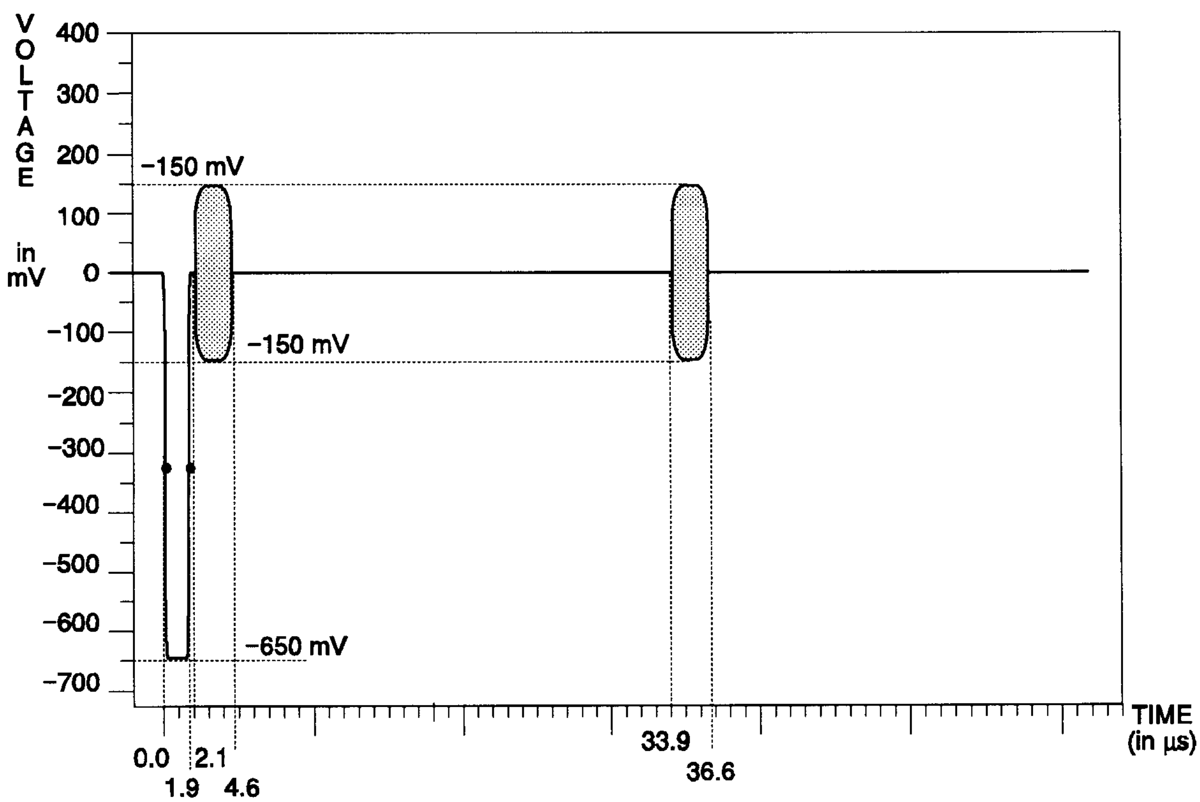


Fig. 3-146. C Channel — All Flat Field Signals.

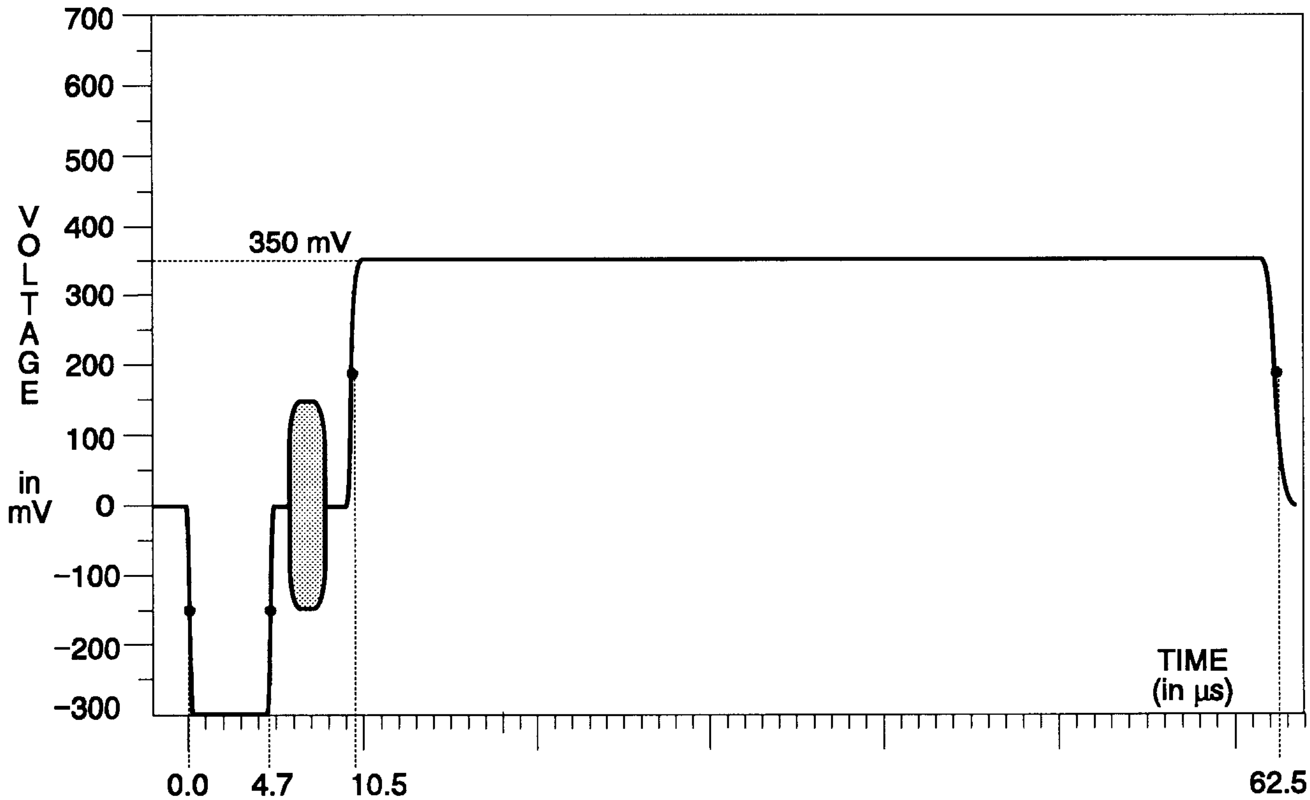


Fig. 3-147. Y Channel — 50% Flat Field.

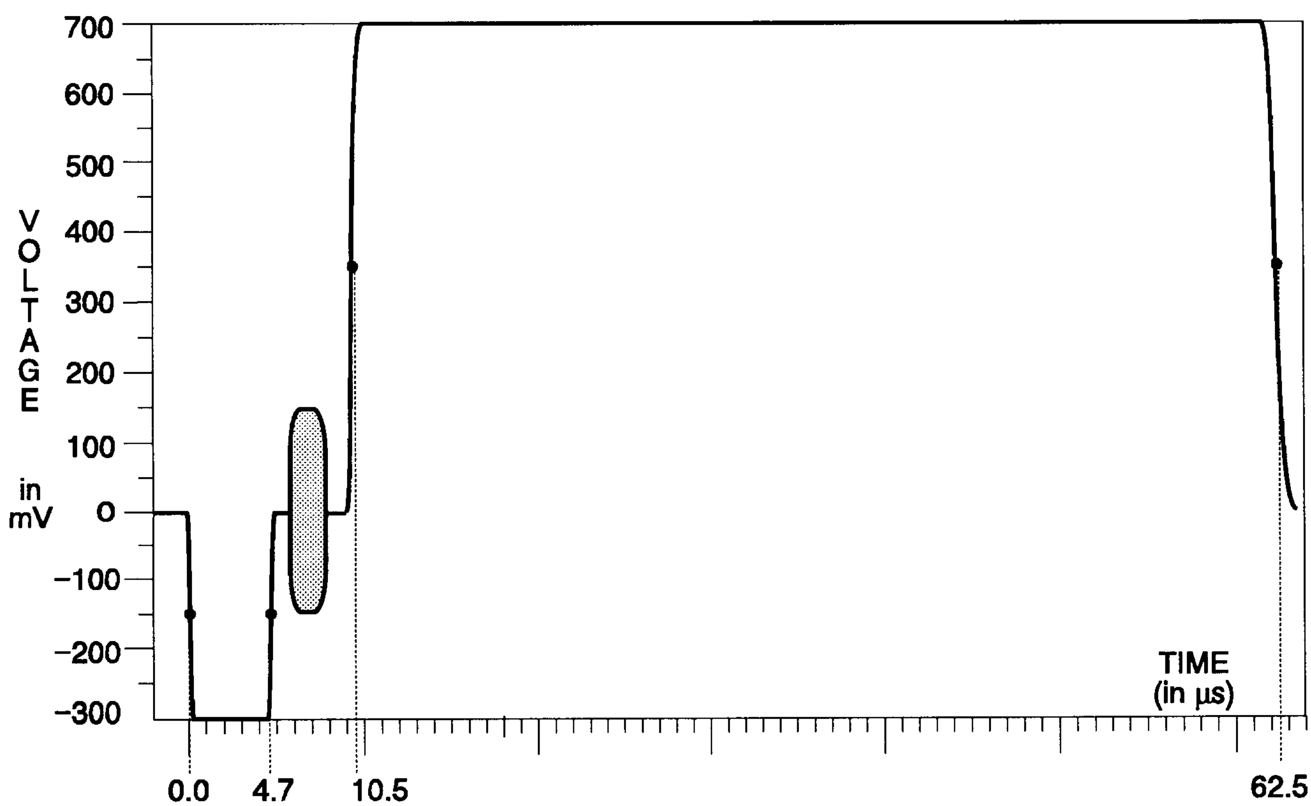


Fig. 3-148. Y Channel — 100% Flat Field.

Option 03 Signals — Y-C Unique Signals

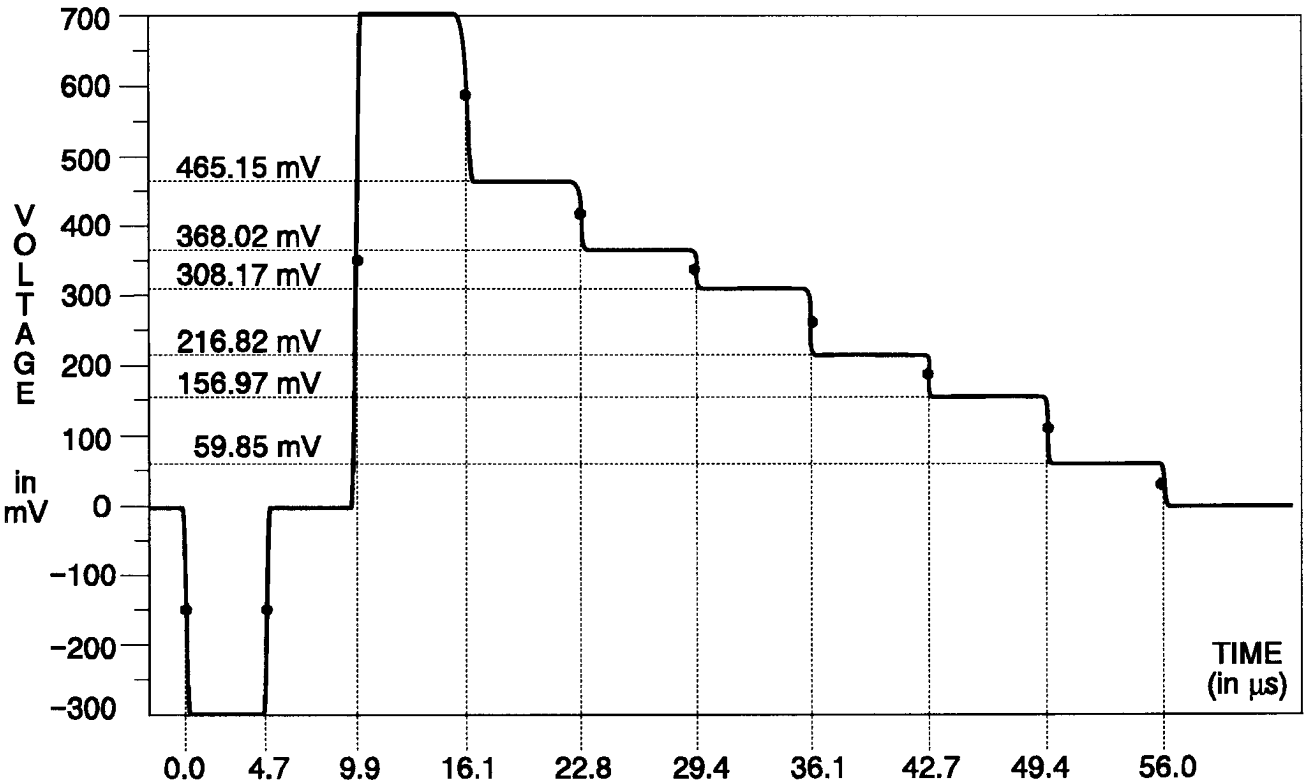


Fig. 3-149. Y Channel — 75% Bars.

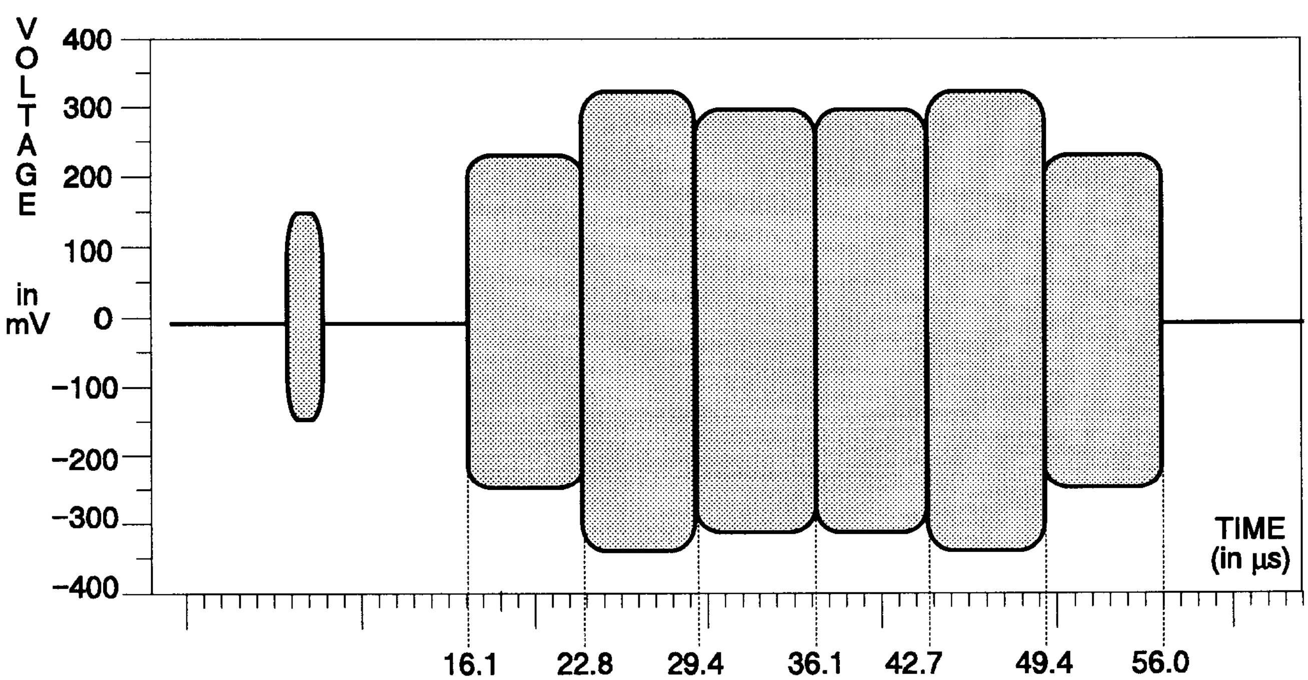


Fig. 3-150. C Channel — 75% Bars.

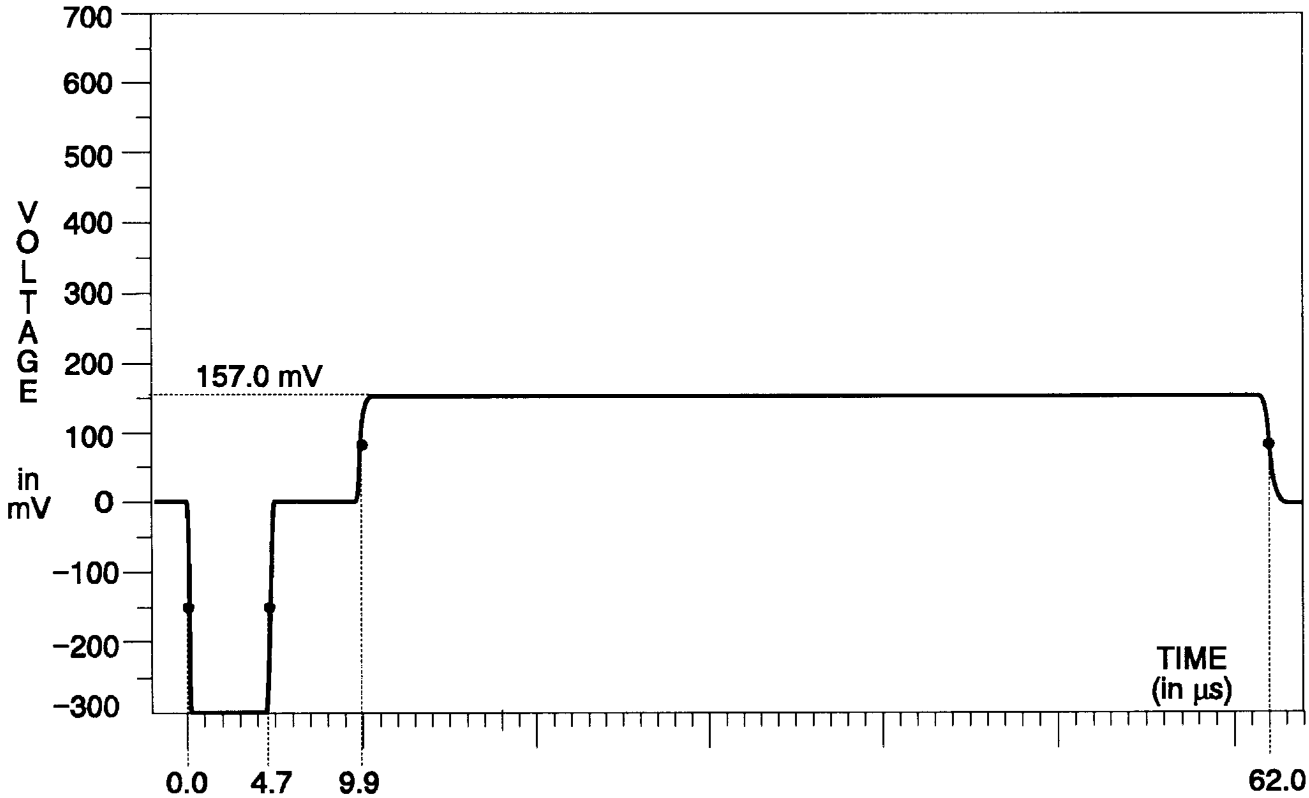


Fig. 3-151. Y Channel — 75% Red (same as Red Field).

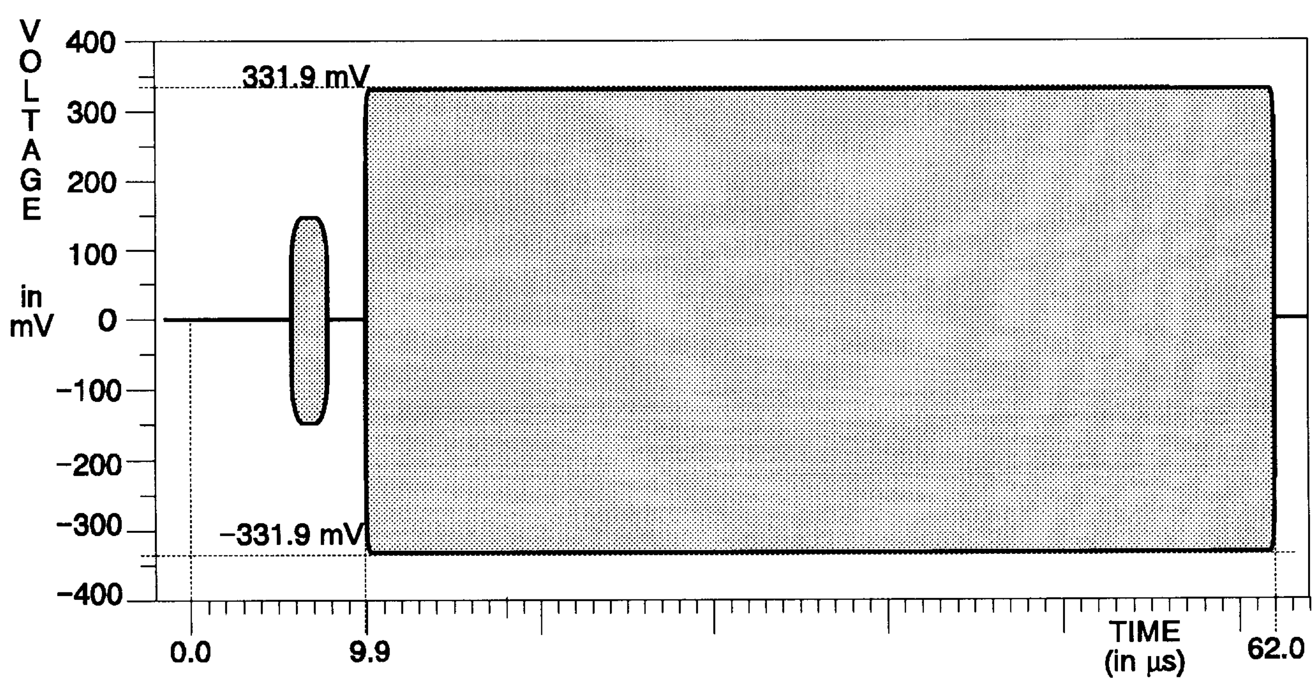


Fig. 3-152. C Channel — 75% red (same as Red Field).

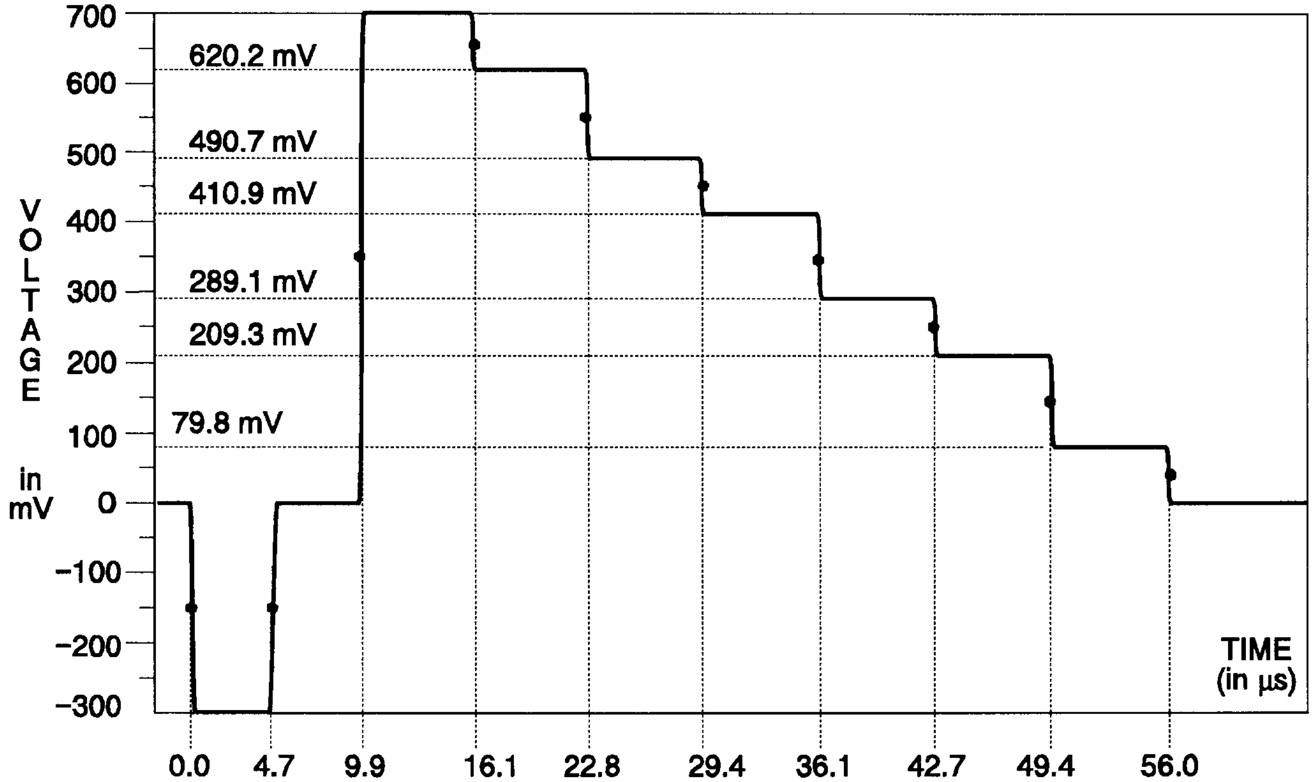


Fig. 3-153. Y Channel — 100% Bars.

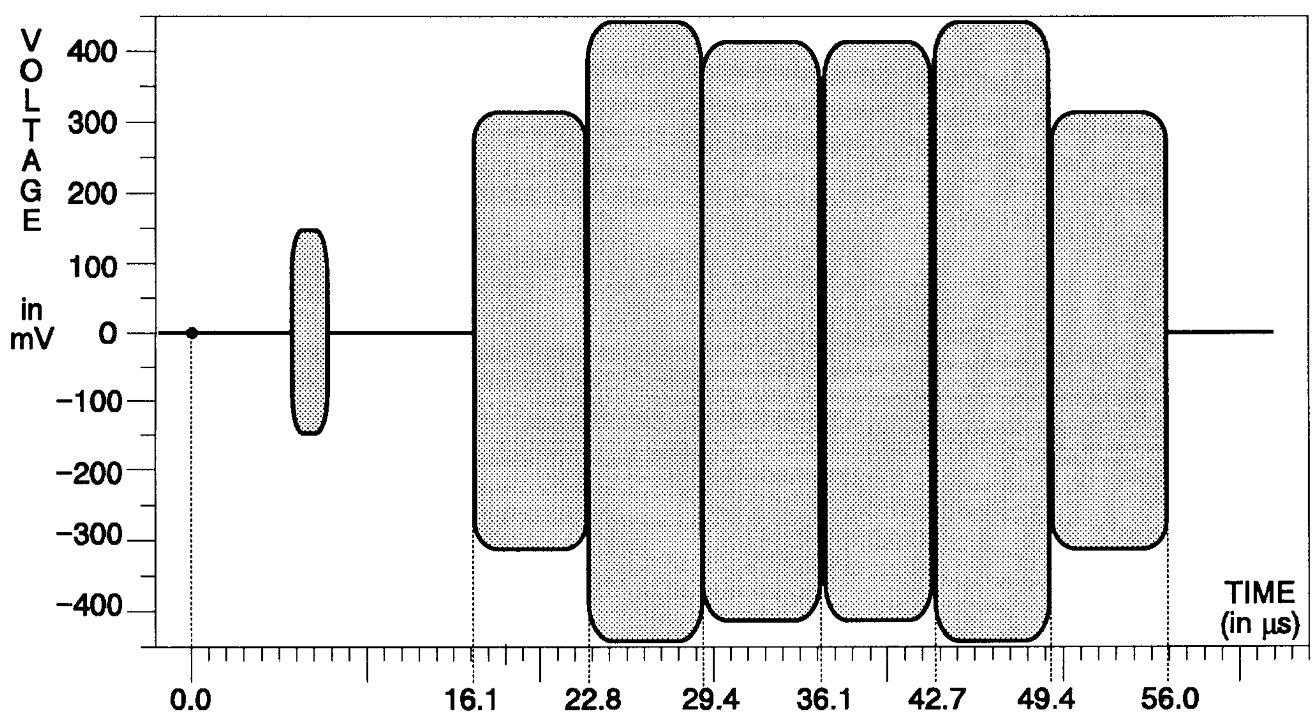


Fig. 3-154. C Channel — 100% Bars.

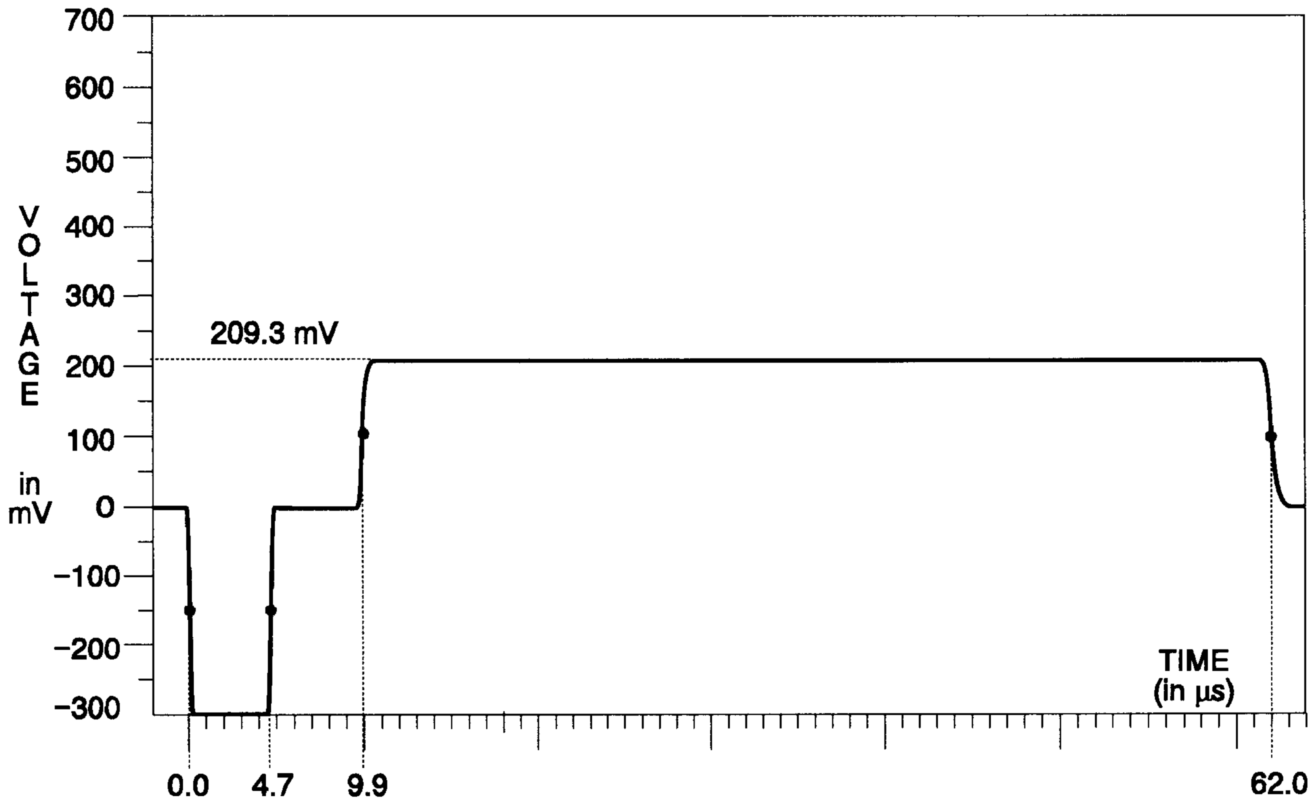


Fig. 3-155. Y Channel — 100% Red.

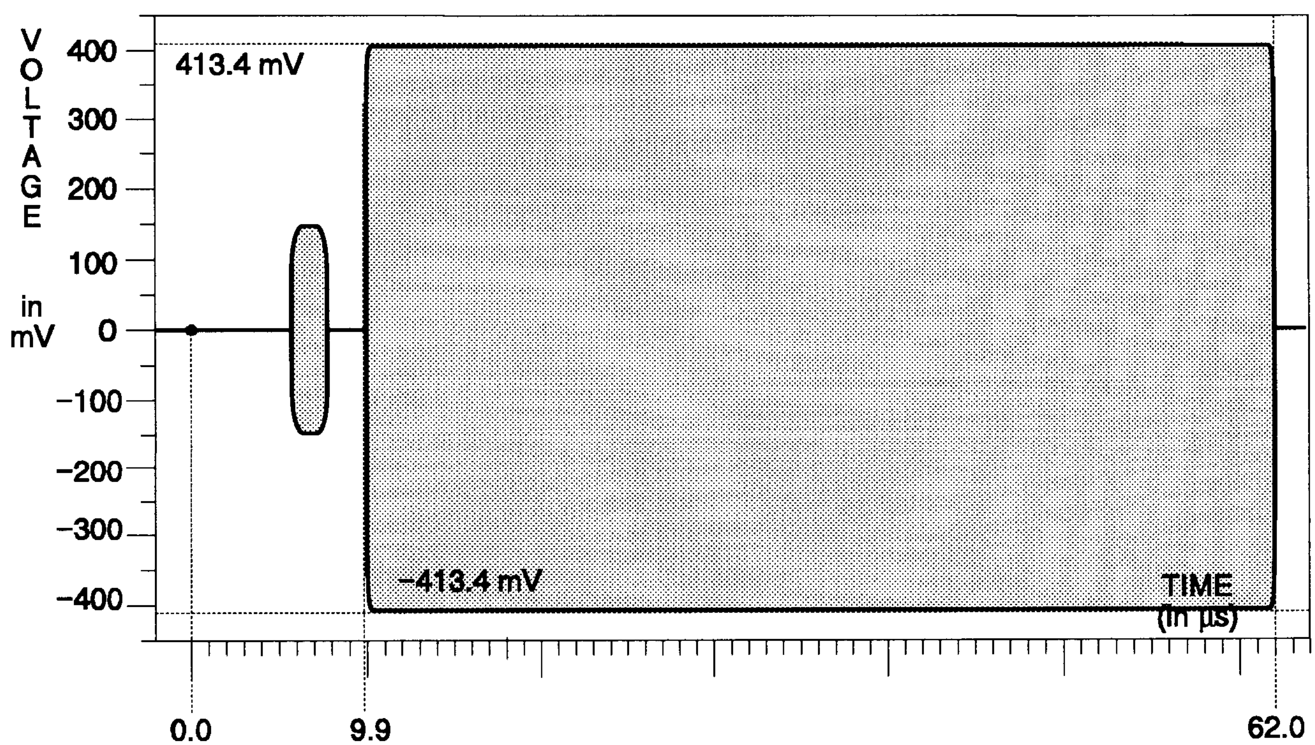


Fig. 3-156. C Channel — 100% Red.

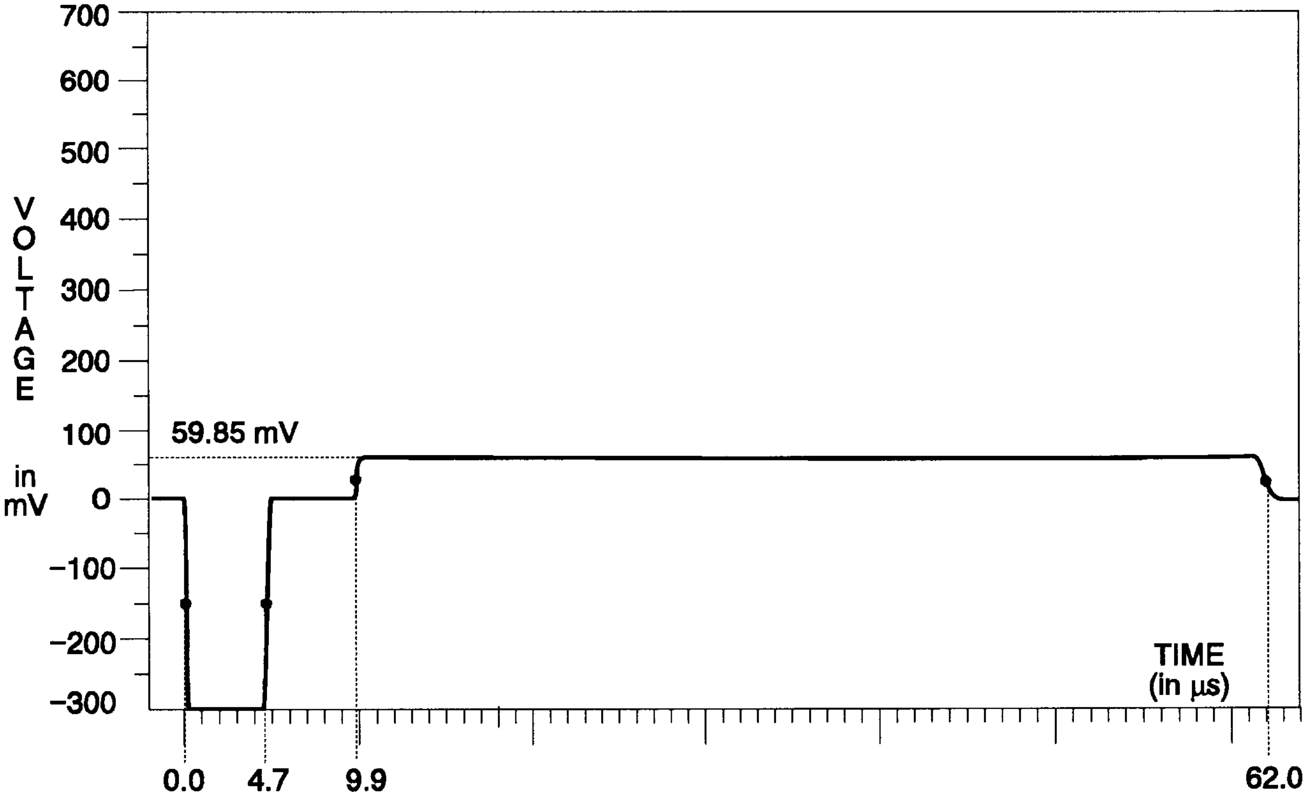


Fig. 3-157. Y Channel — Blue Field.

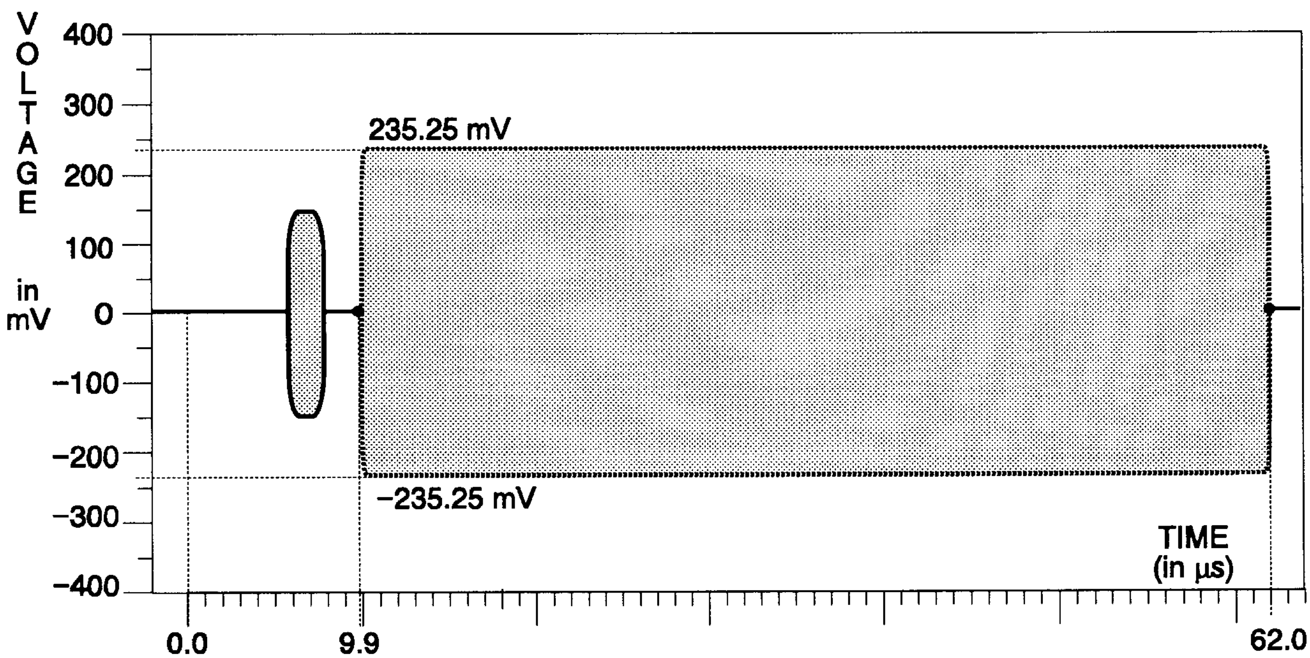


Fig. 3-158. C Channel — Blue Field.

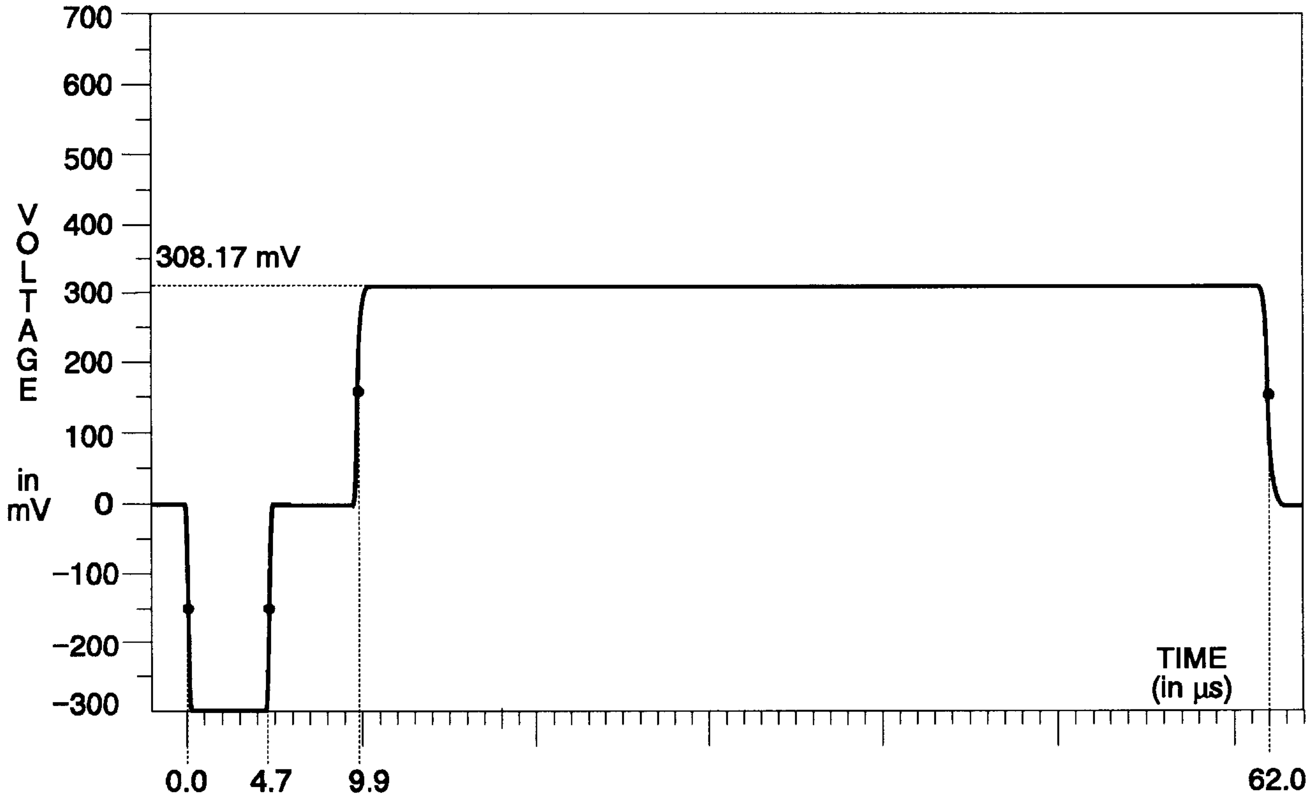


Fig. 3-159. Y Channel — Green Field.

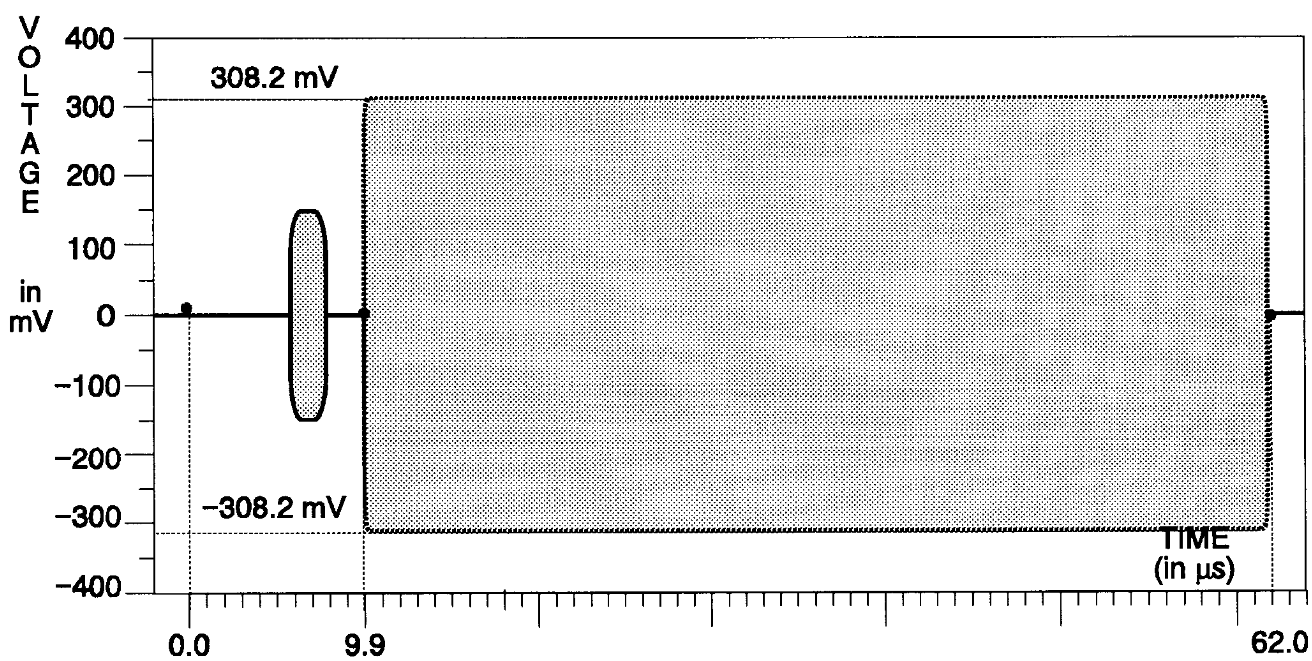


Fig. 3-160. C Channel — Green Field.

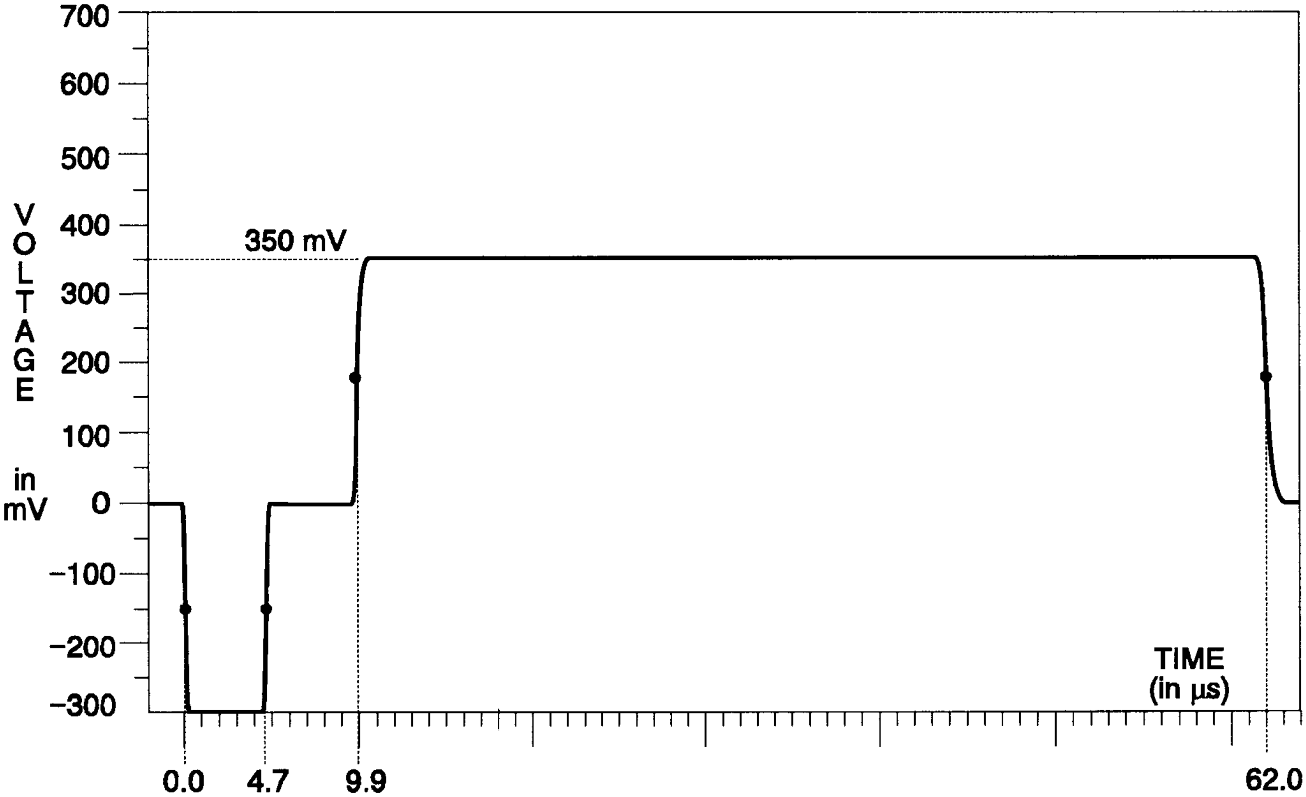


Fig. 3-161. Y Channel — 50% Flat Field.

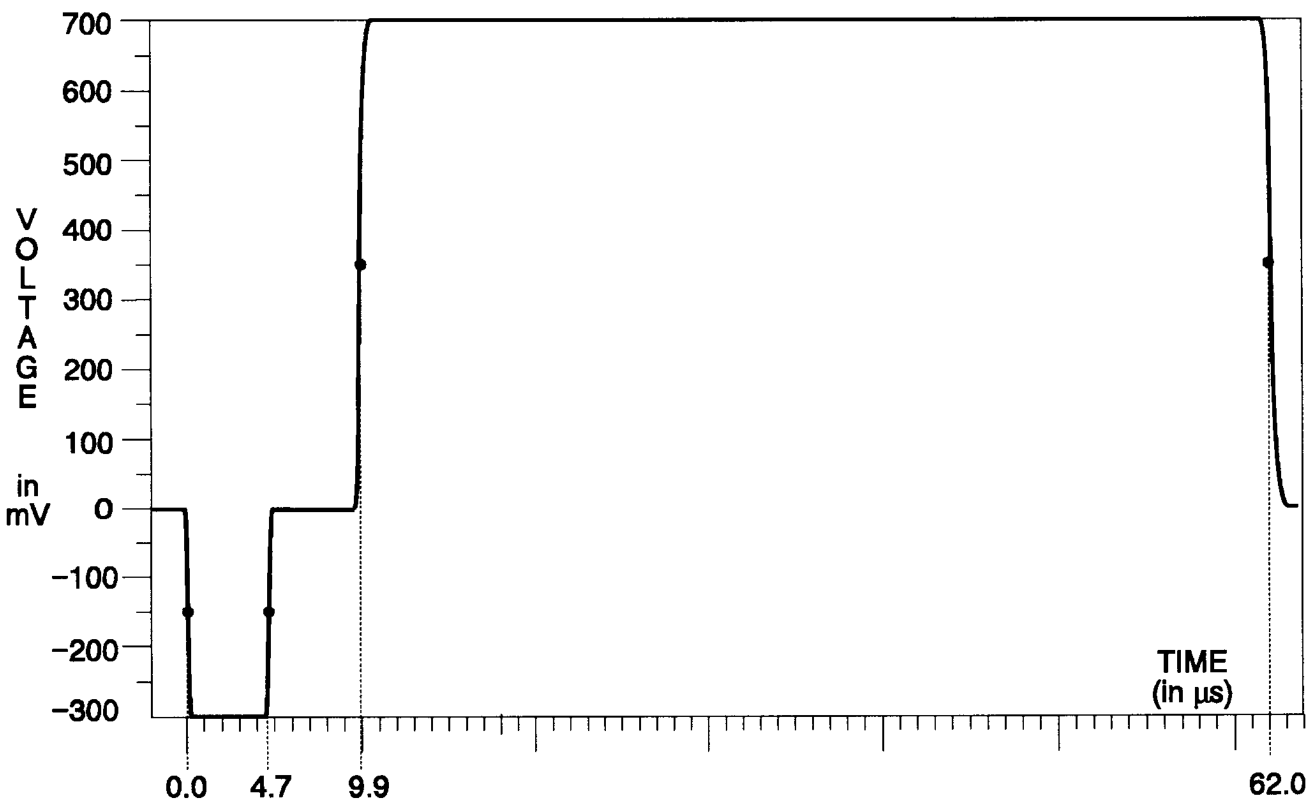


Fig. 3-162. Y Channel — 100% Flat Field.

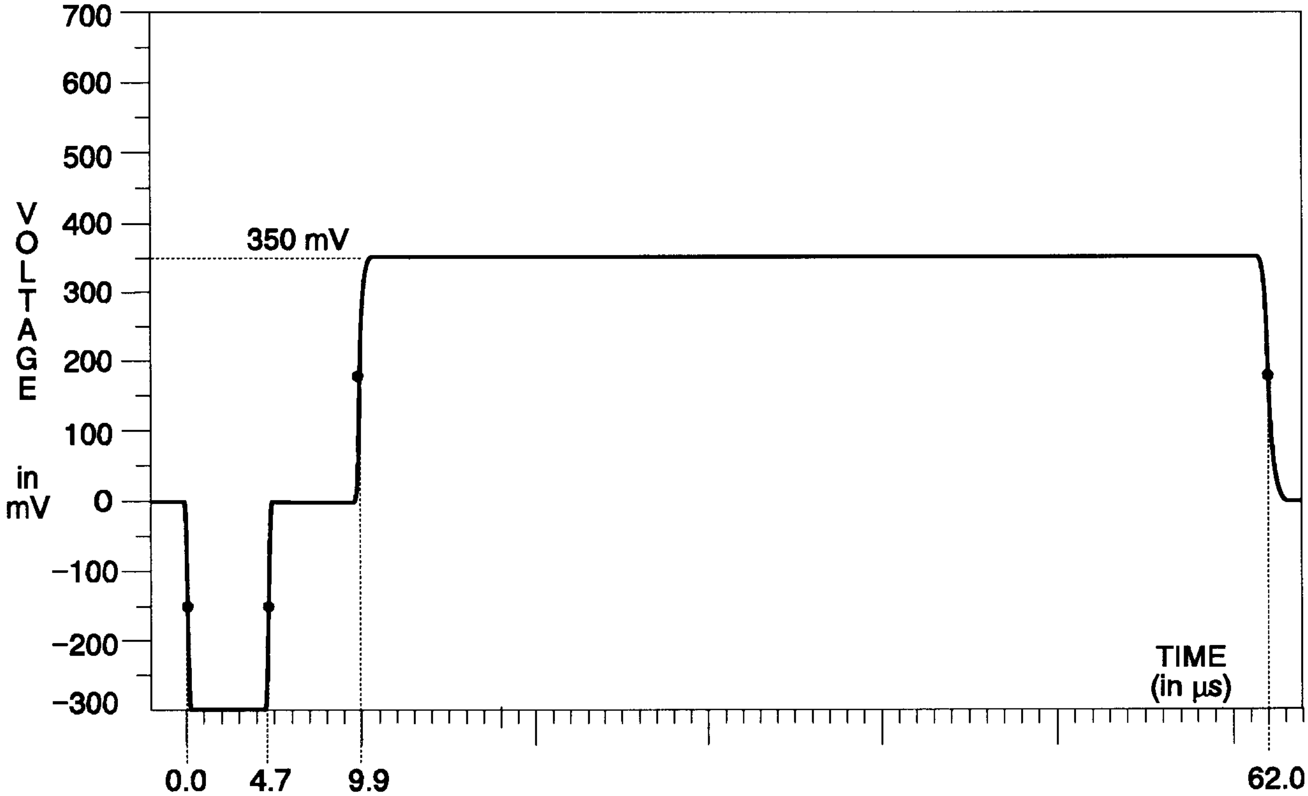


Fig. 3-163. Y Channel — Chroma Noise.

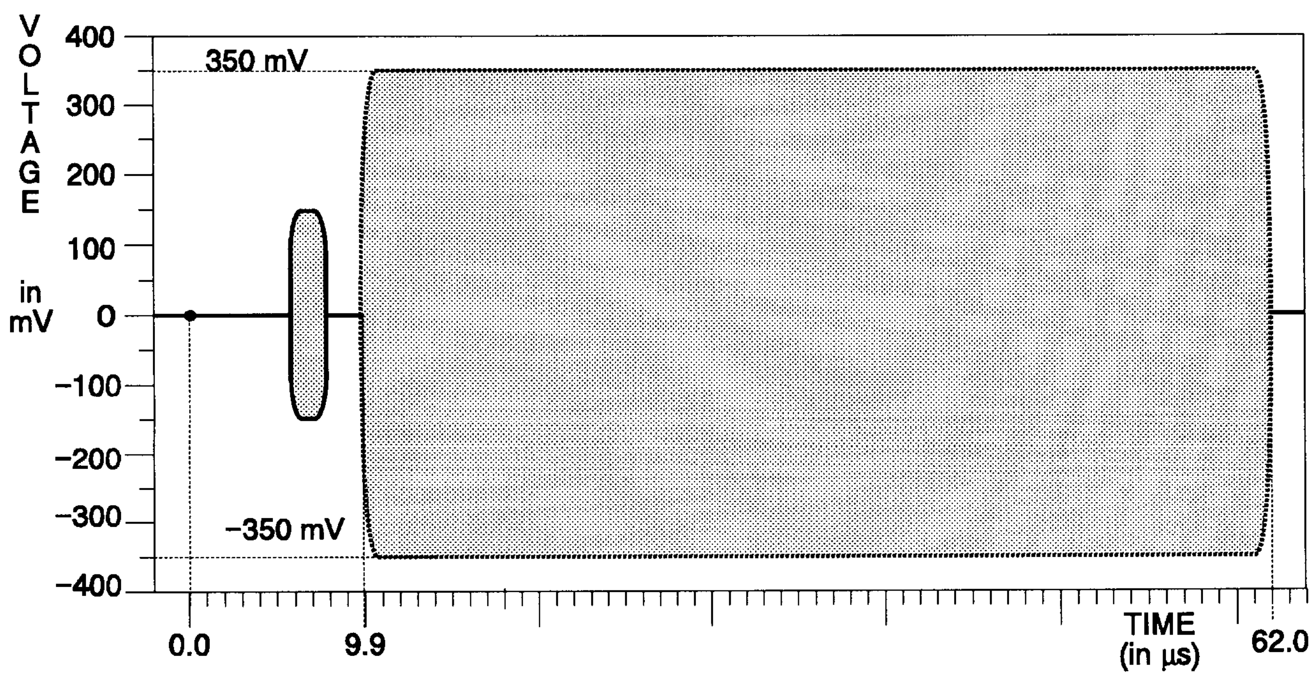


Fig. 3-164. C Channel — Chroma Noise.

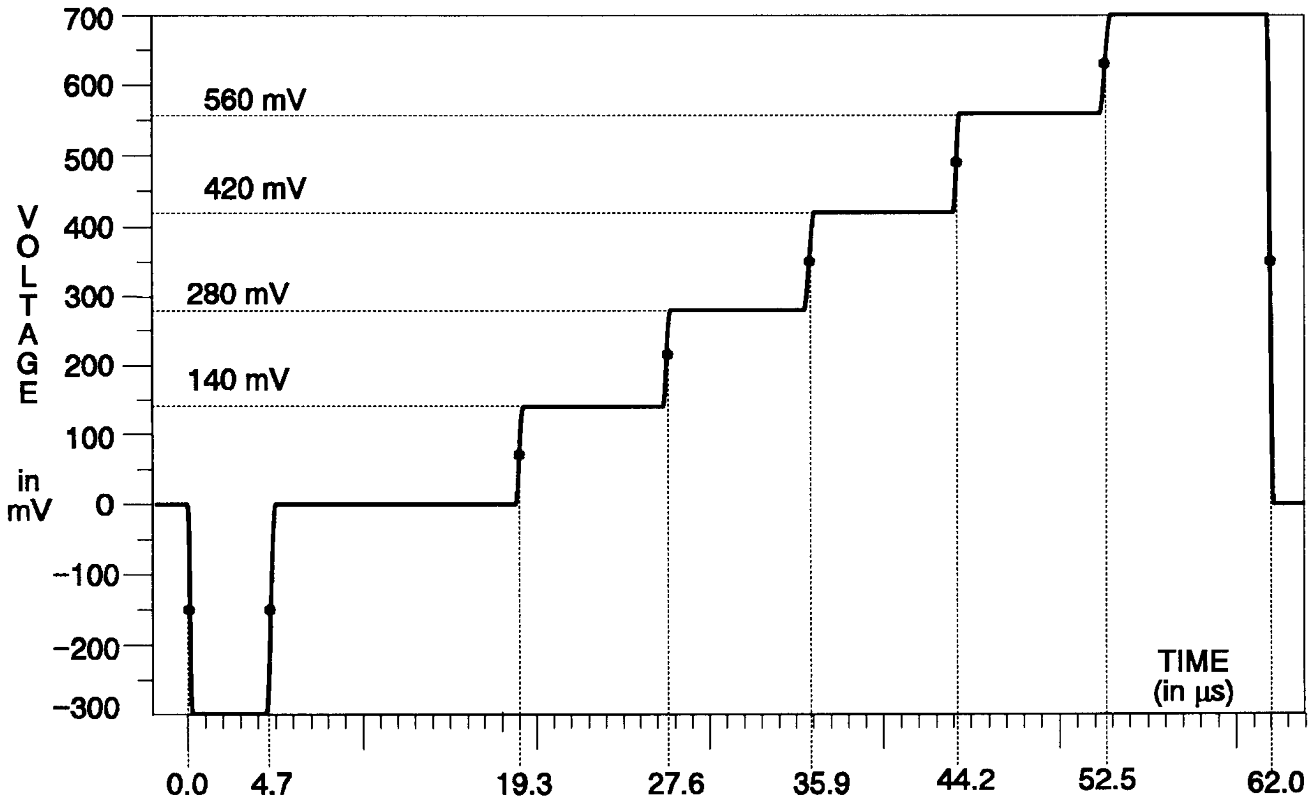


Fig. 3-165. Y Channel — 5-Step.

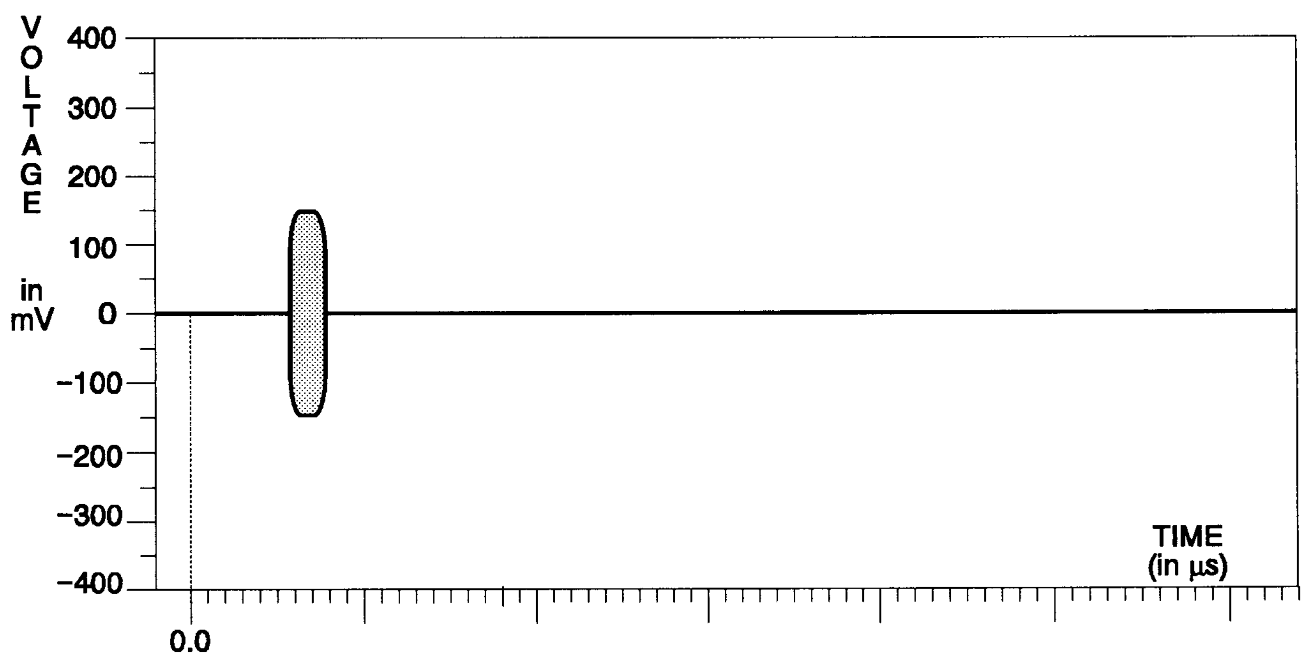


Fig. 3-166. C Channel — 5-Step.

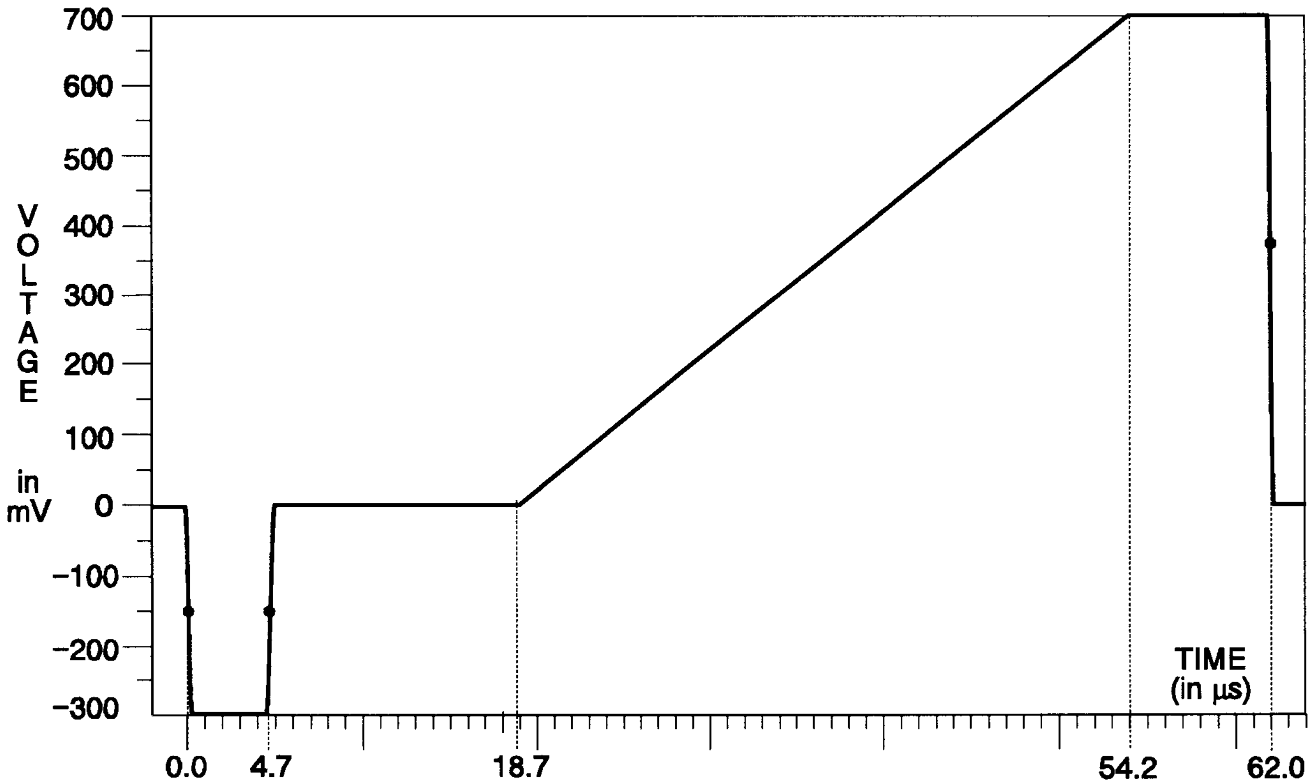


Fig. 3-167. Y Channel — Ramp.

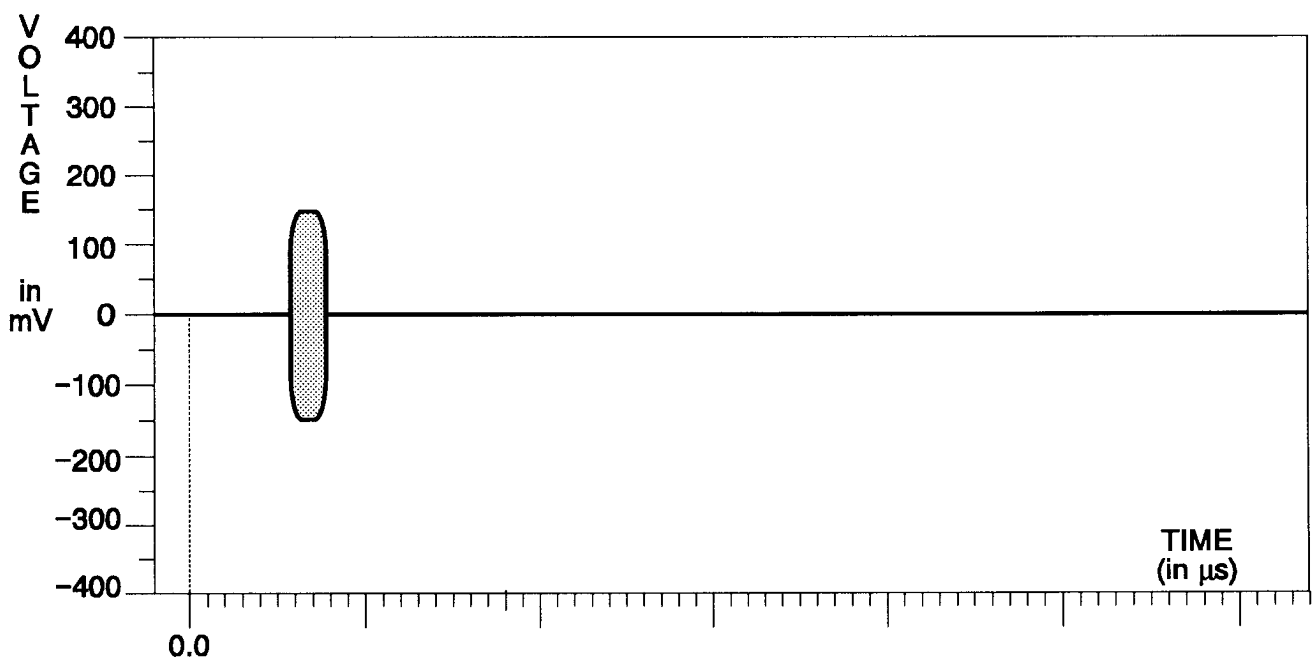


Fig. 3-168. C Channel — Ramp.

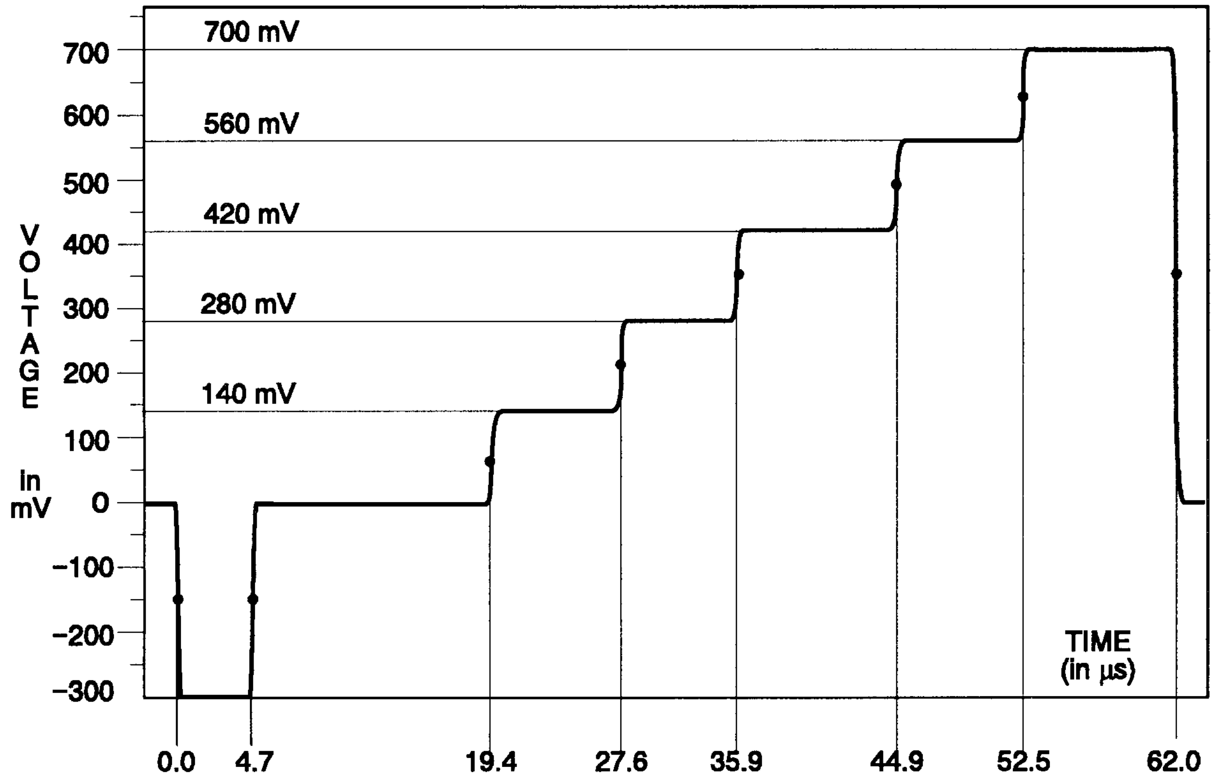


Fig. 3–168A Y Channel — Modulated 5-Step.

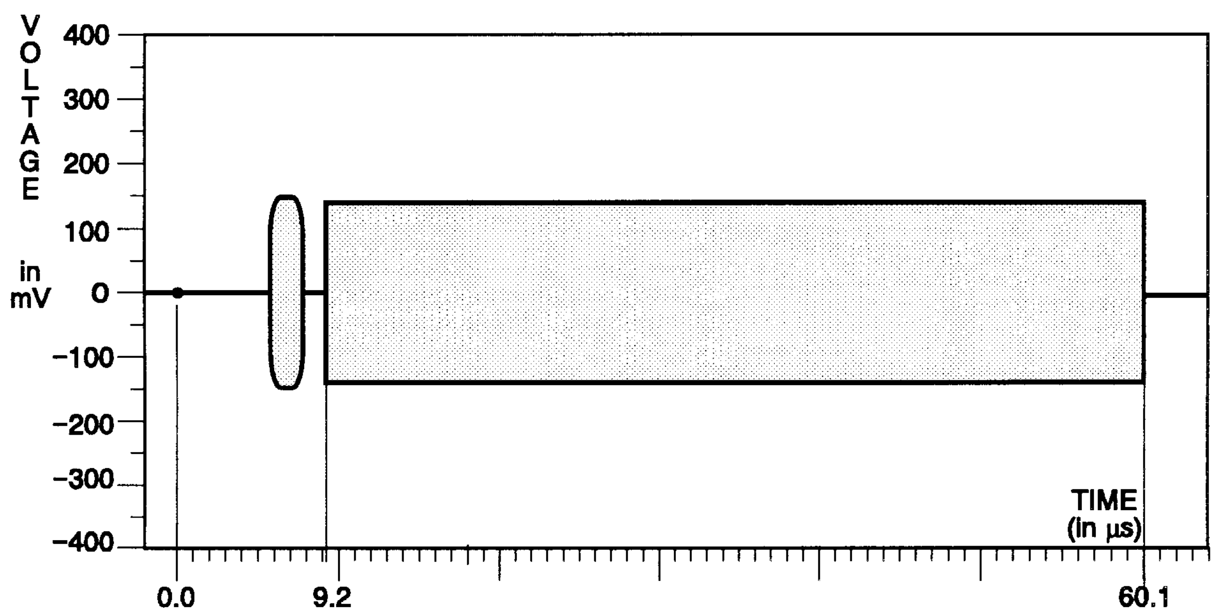


Fig. 3–168B C Channel — Modulated 5-Step.

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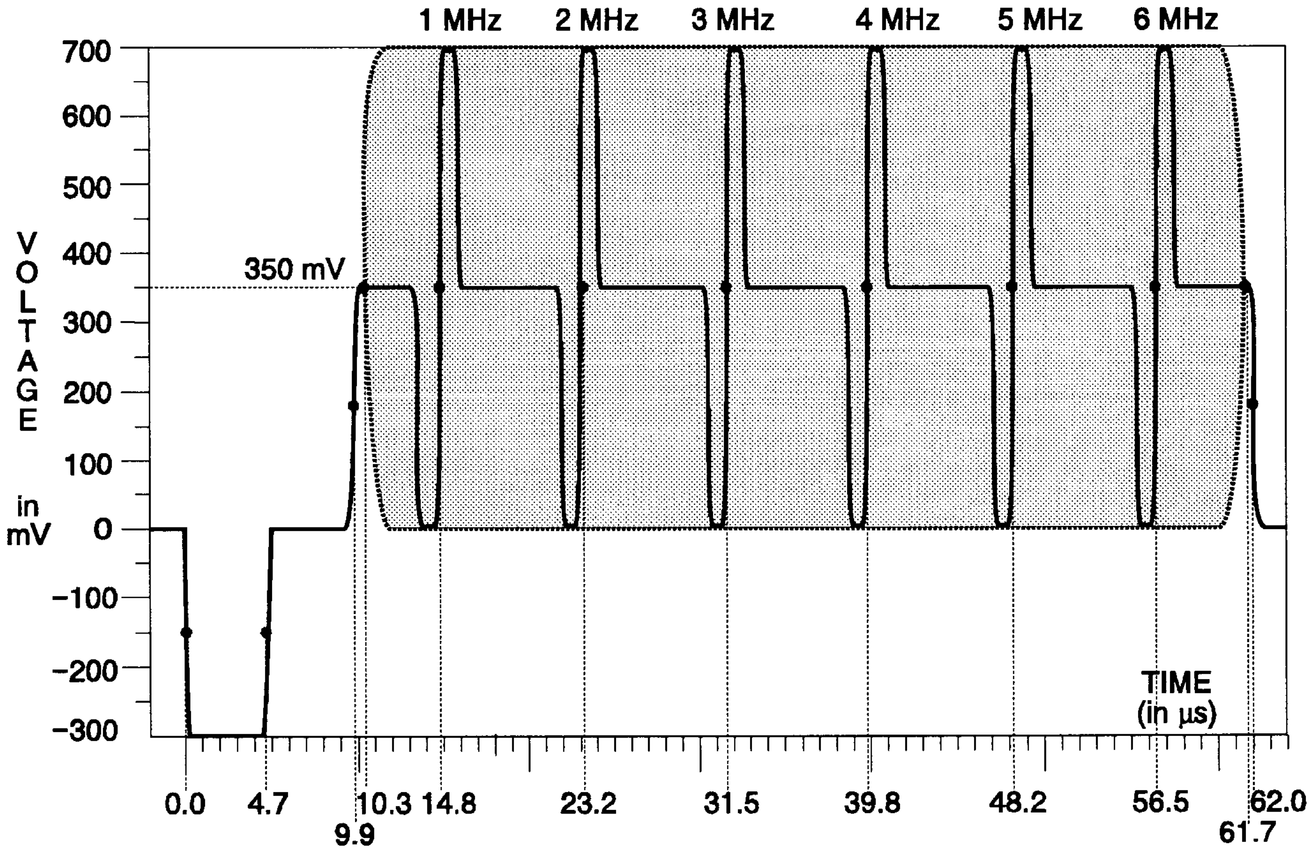


Fig. 3-169. Y Channel — Sweep.

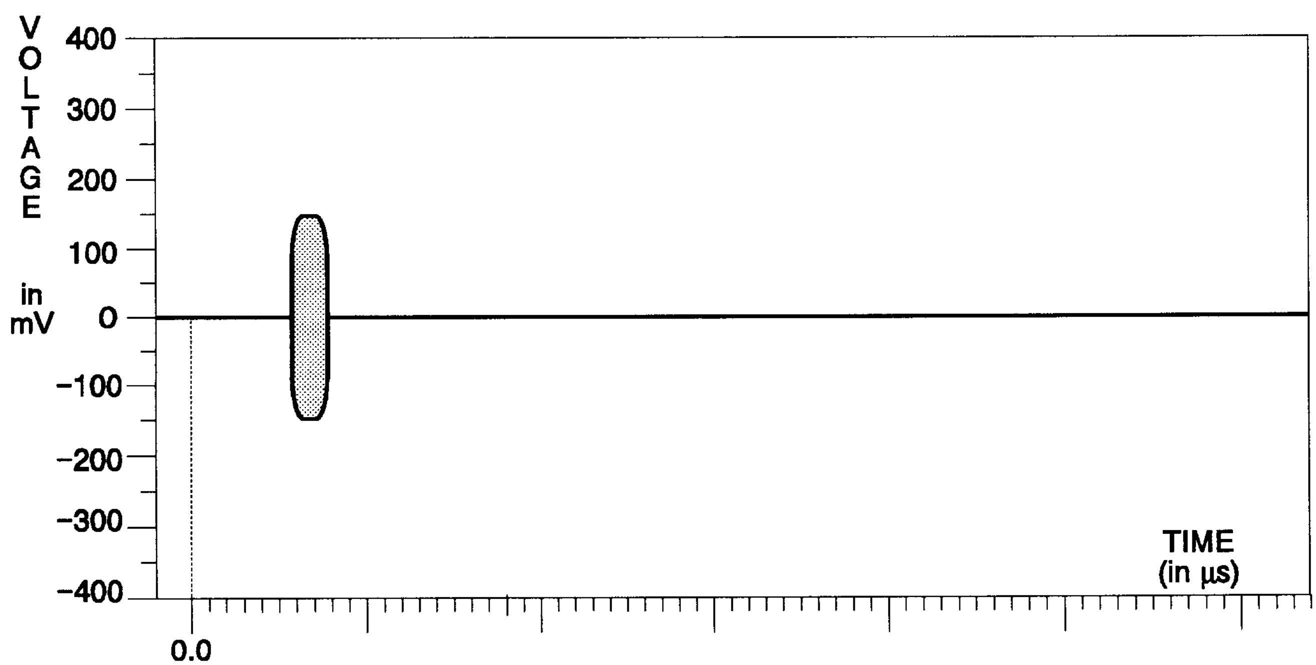


Fig. 3-170. C Channel — Sweep.

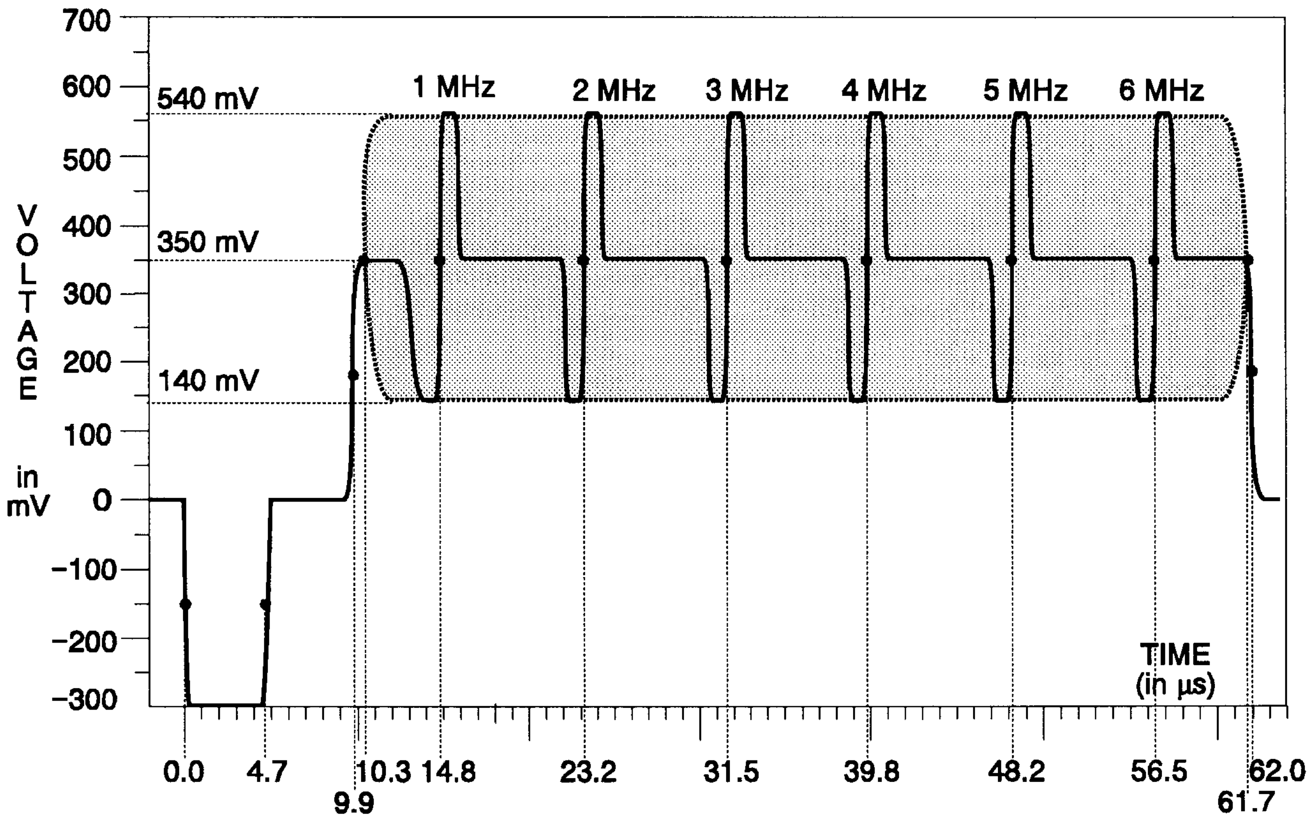


Fig. 3-171. Y Channel — Reduced Sweep.

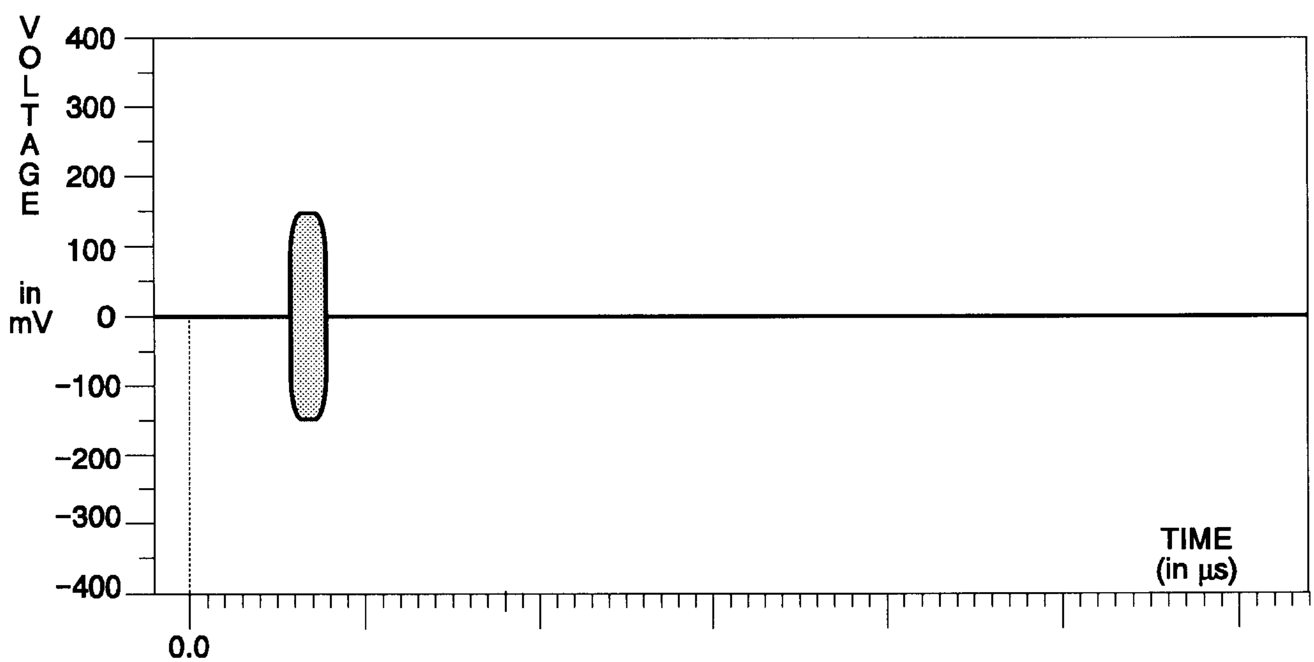


Fig. 3-172. C Channel — Reduced Sweep.

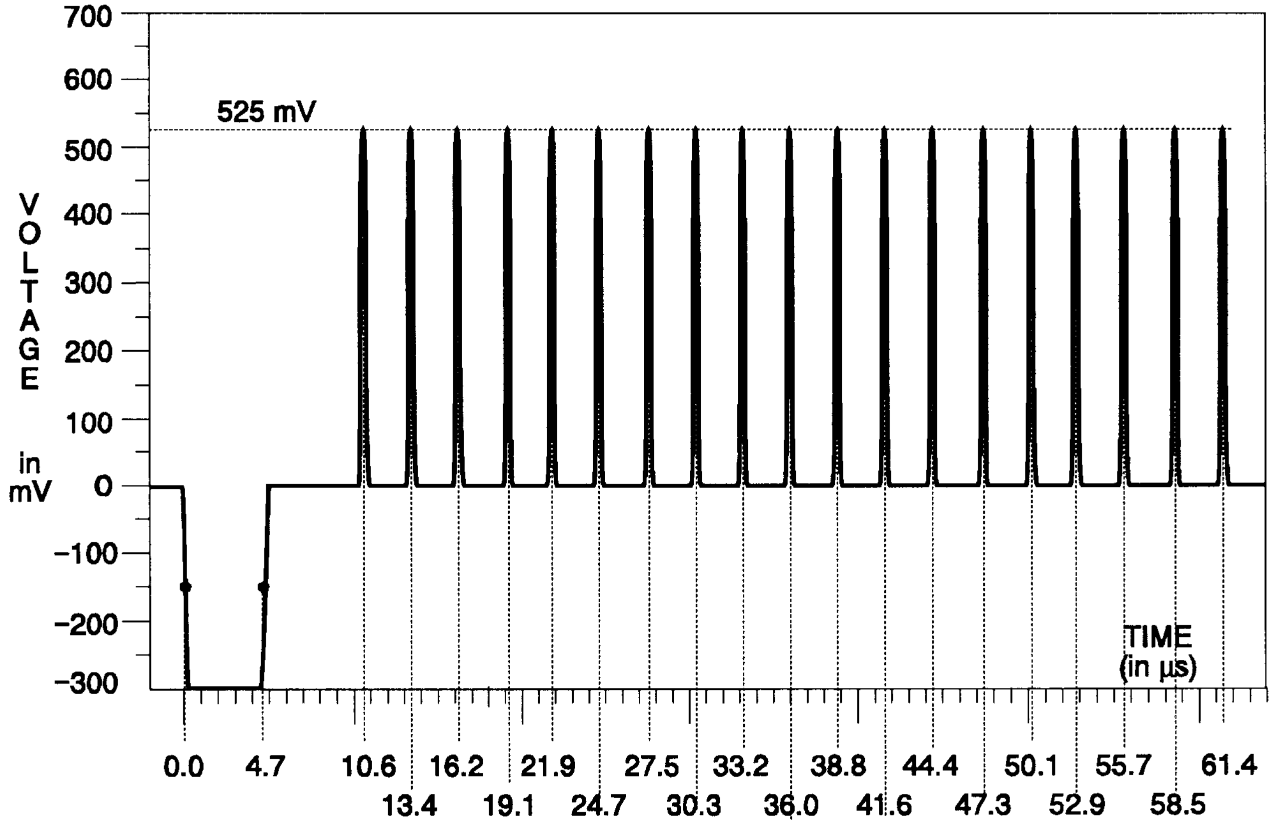


Fig. 3-173. Y Channel — Convergence (Vertical).

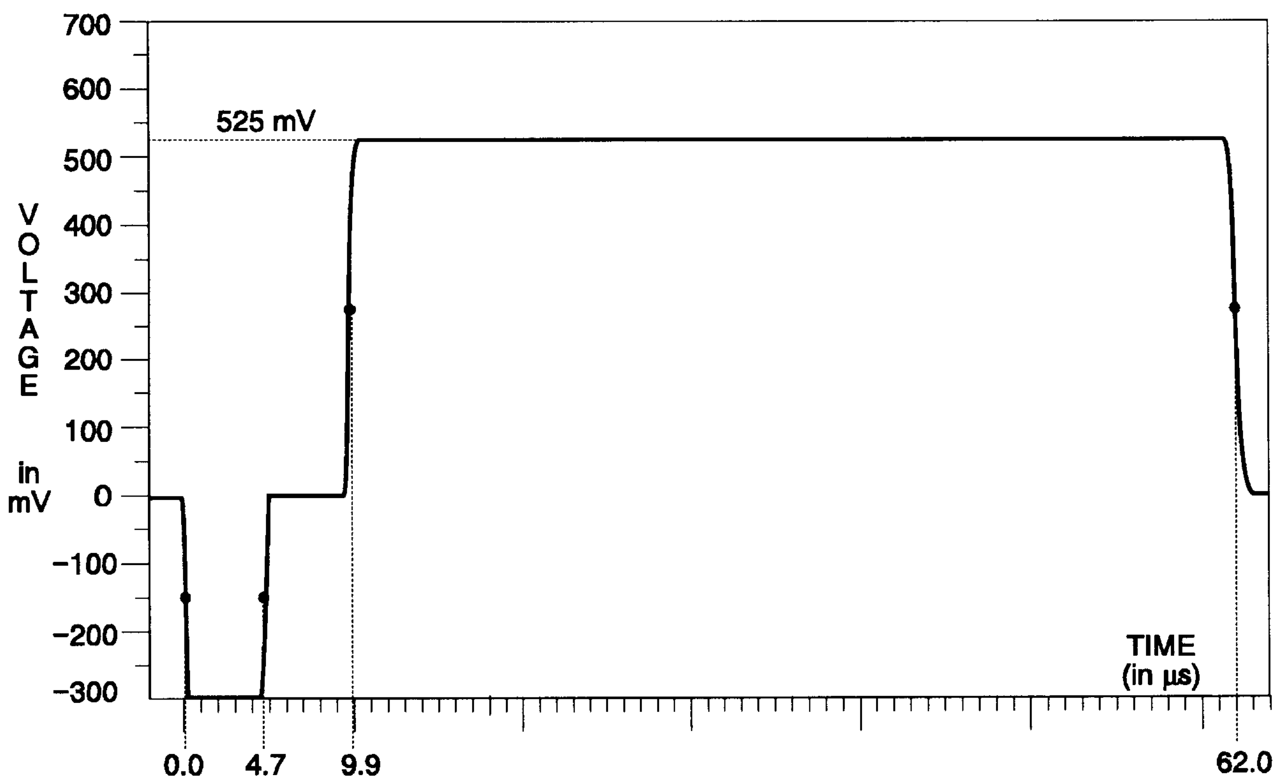


Fig. 3-174. Y Channel — Convergence (Horizontal).

Option 03 Signals — BetaCam 3-Wire Unique Signals

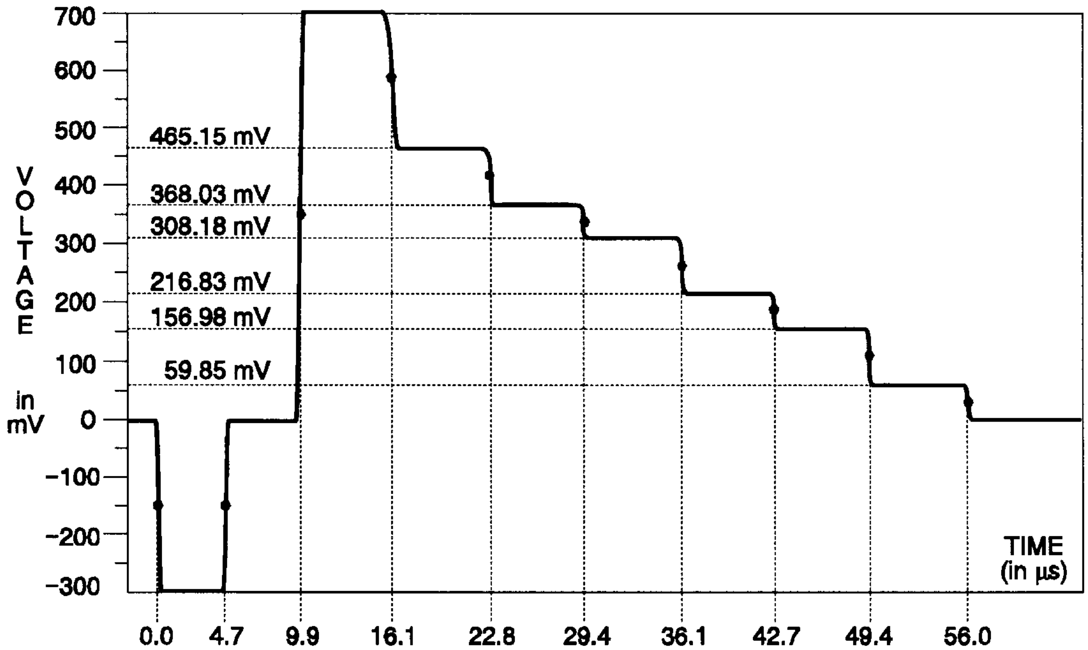


Fig. 3-175. Y Channel — 75% Color Bars.

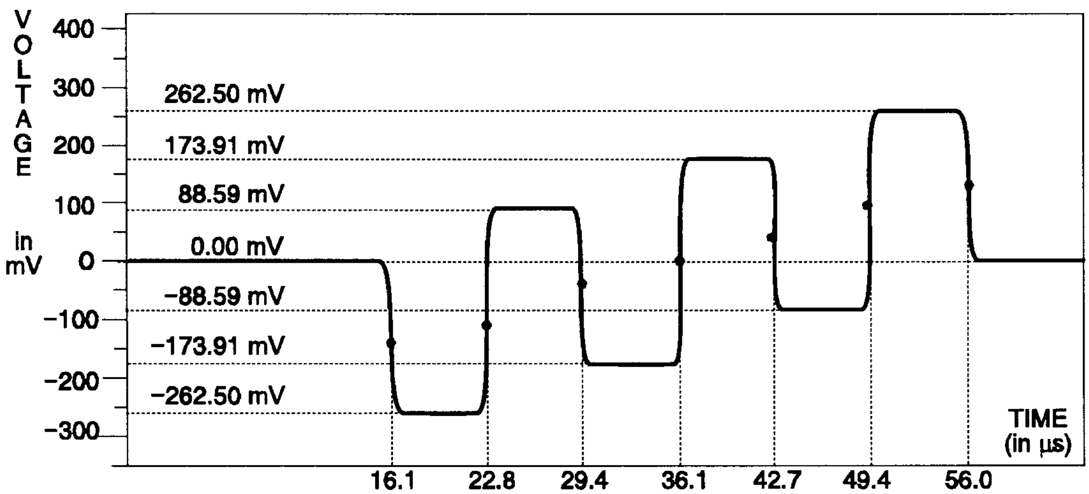


Fig. 3-176. B-Y Channel — 75% Color Bars.

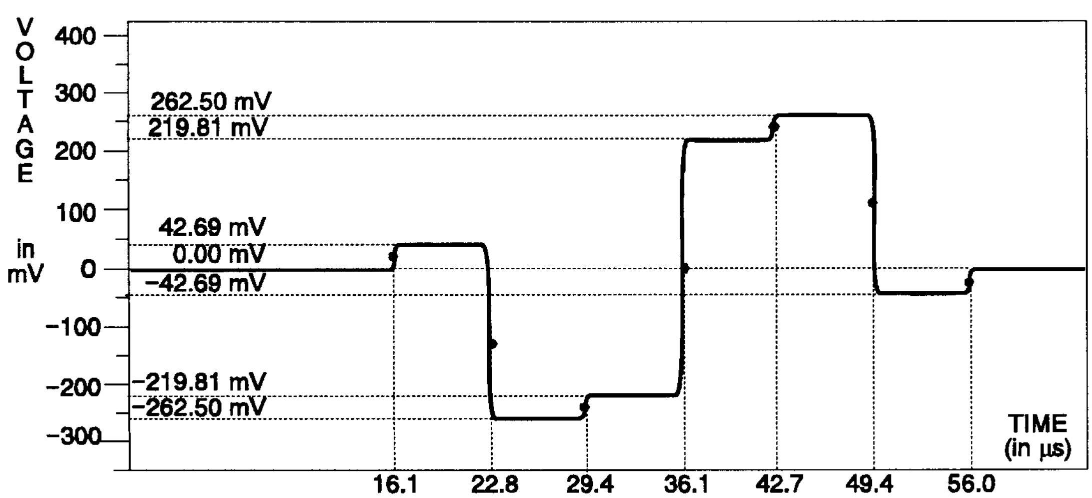


Fig. 3-177. R-Y Channel — 75% Color Bars.

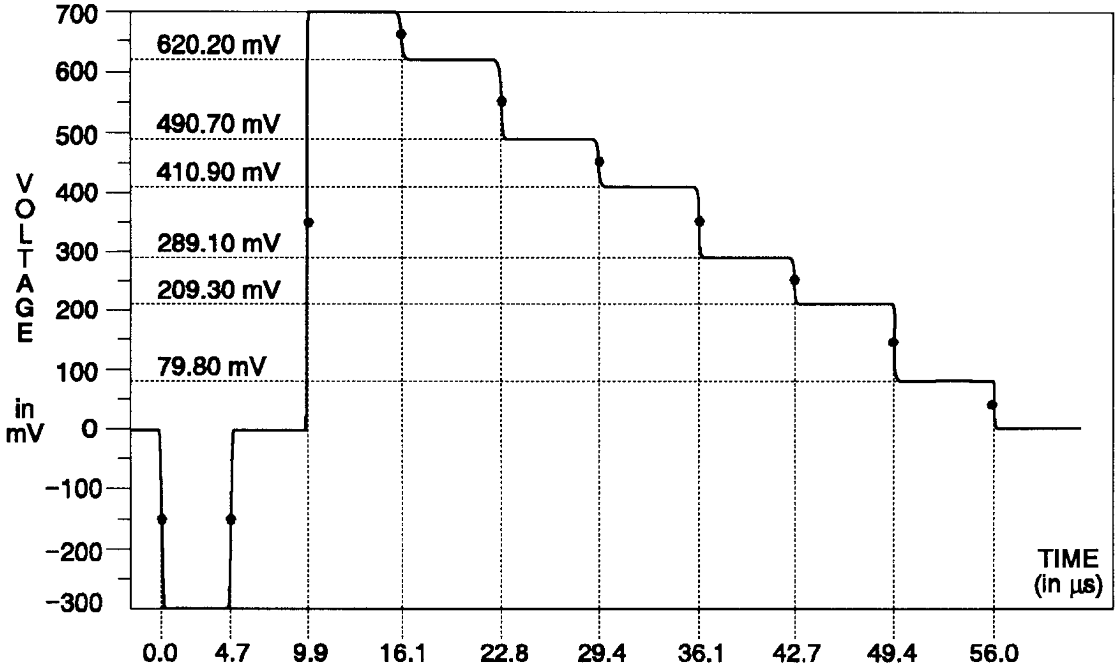


Fig. 3-178. Y Channel — 100% Color Bars.

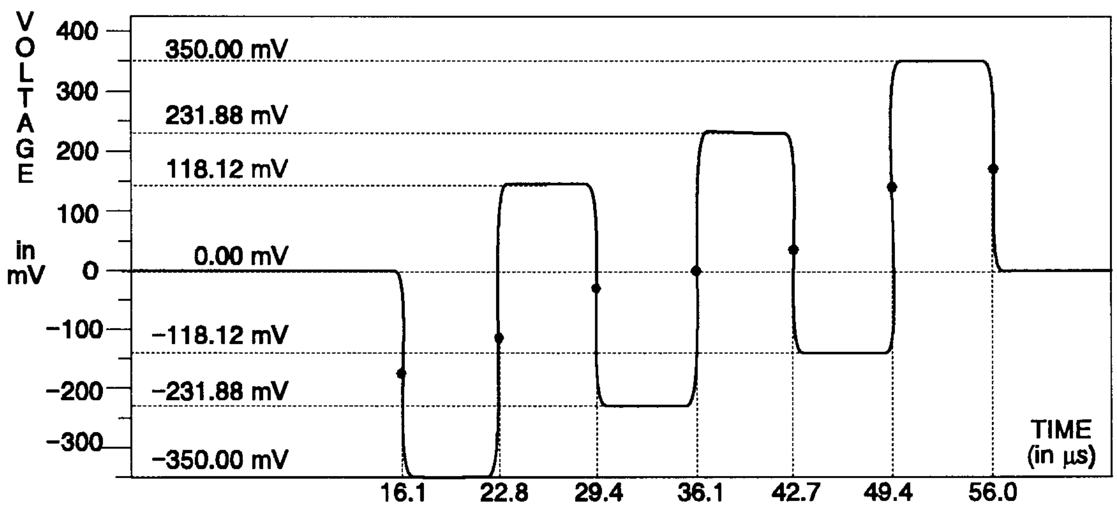


Fig. 3-179. B-Y Channel — 100% Color Bars.

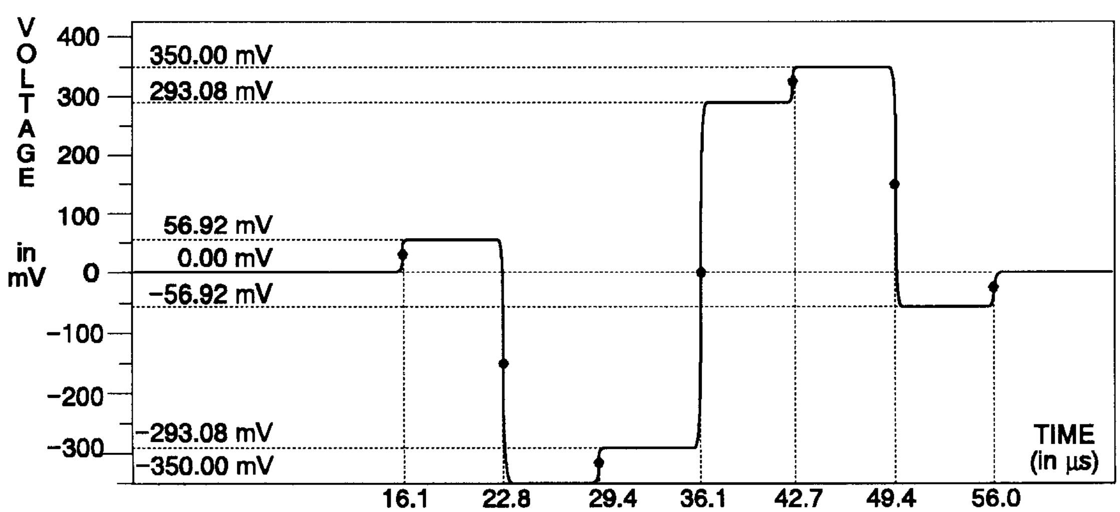


Fig. 3-180. R-Y Channel — 100% Color Bars.

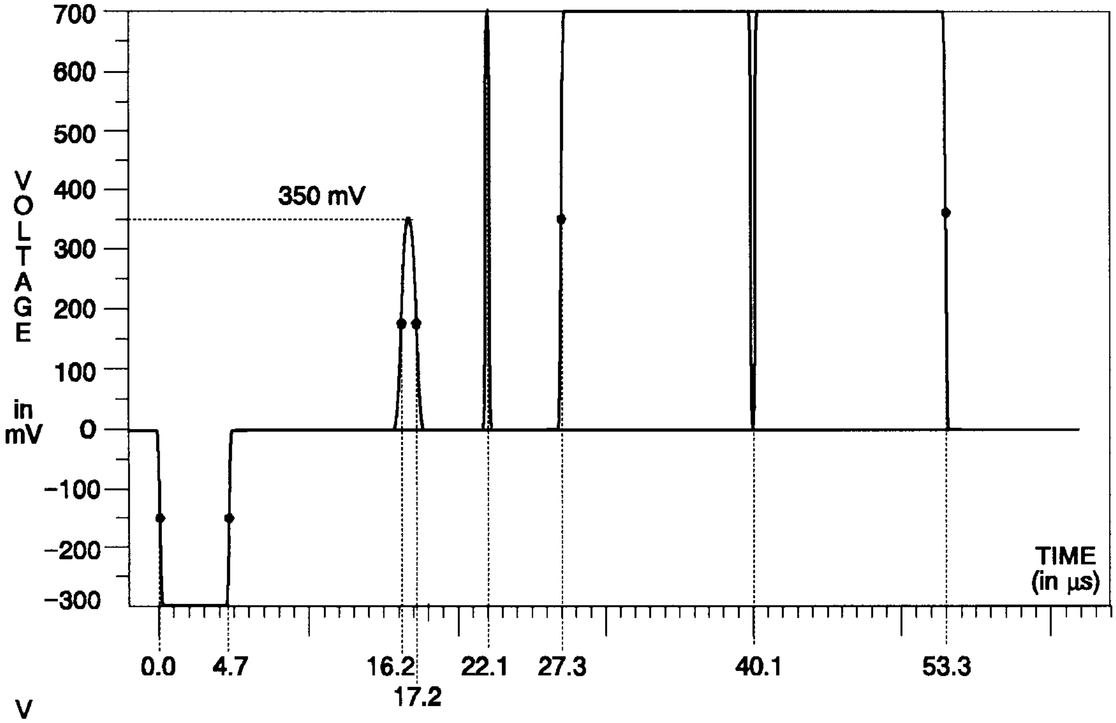


Fig. 3-181. Y Channel — Pulse & Bar.

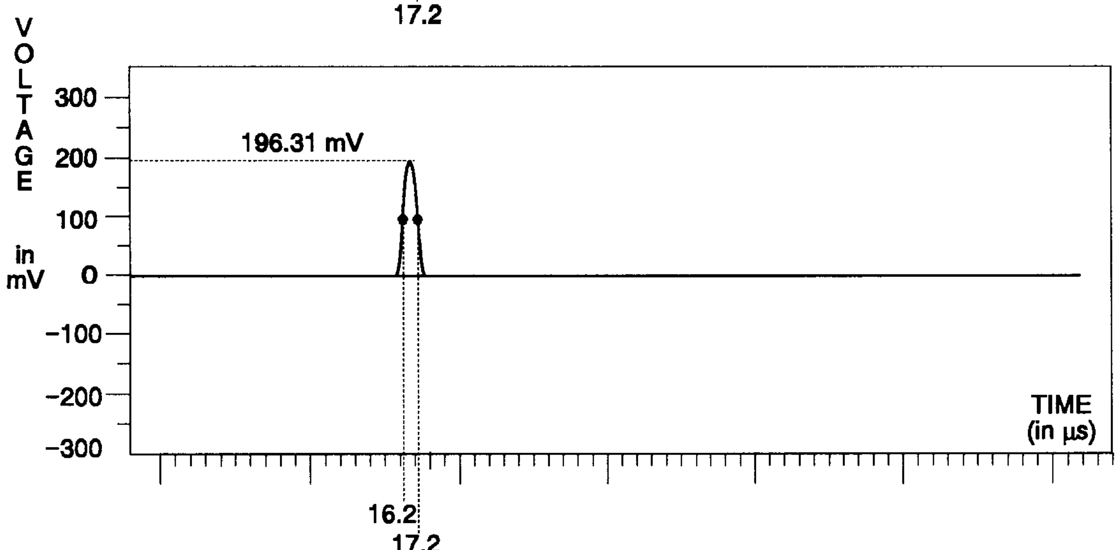


Fig. 3-182. B-Y Channel — Pulse & Bar.

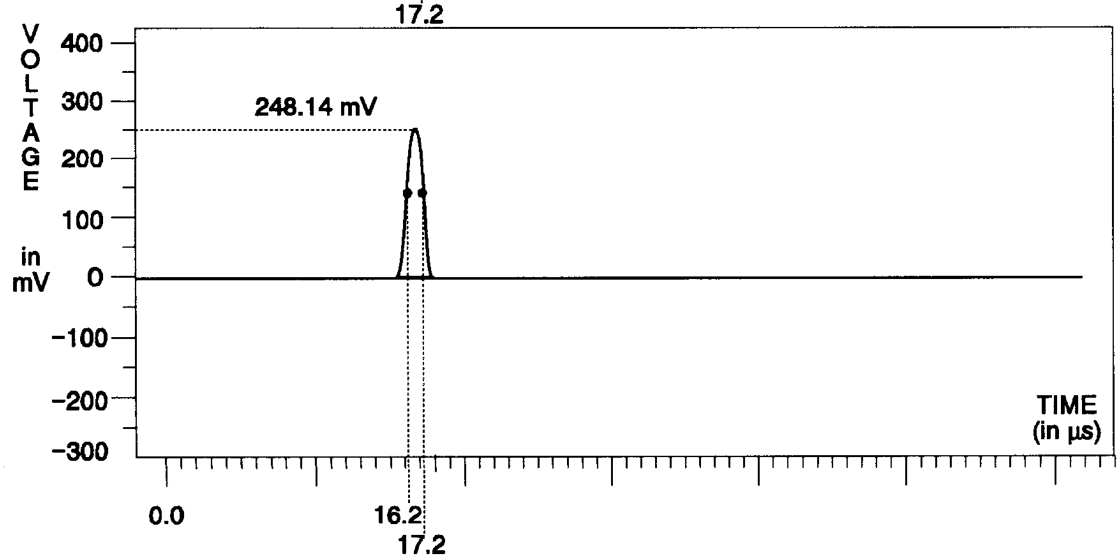


Fig. 3-183. R-Y Channel — Pulse & Bar.

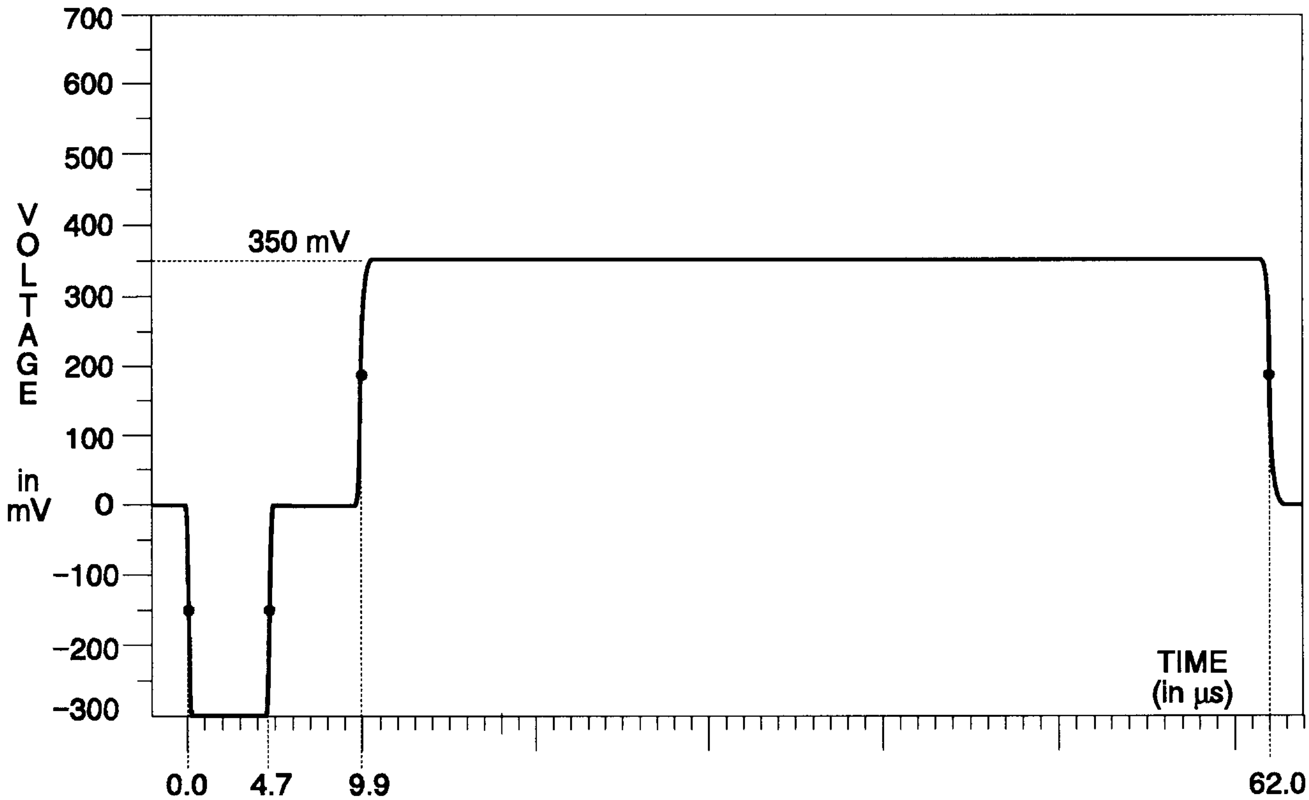


Fig. 3-184. Y Channel — 50% Flat Field.

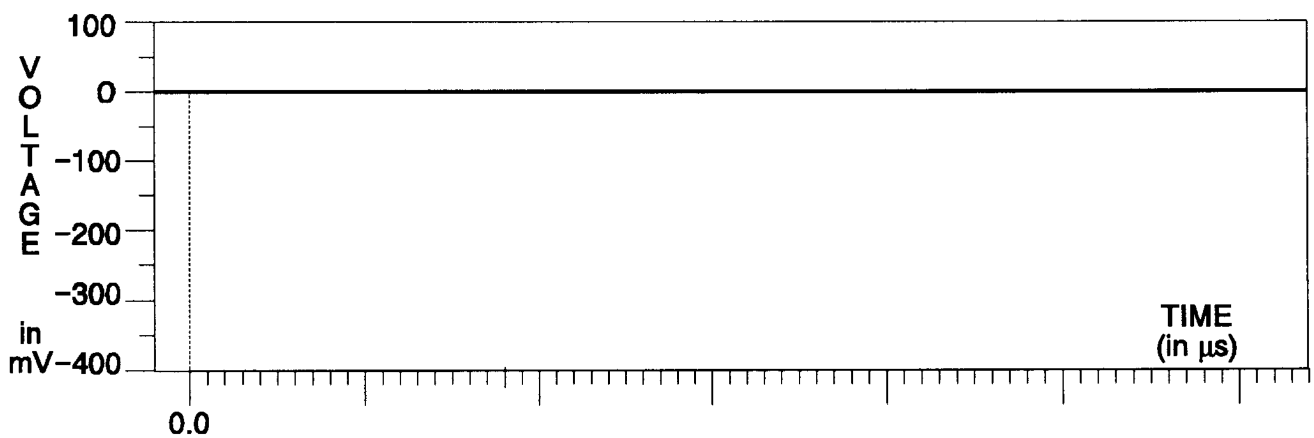


Fig. 3-185. B-Y & R-Y Channels — 50% Flat Field.

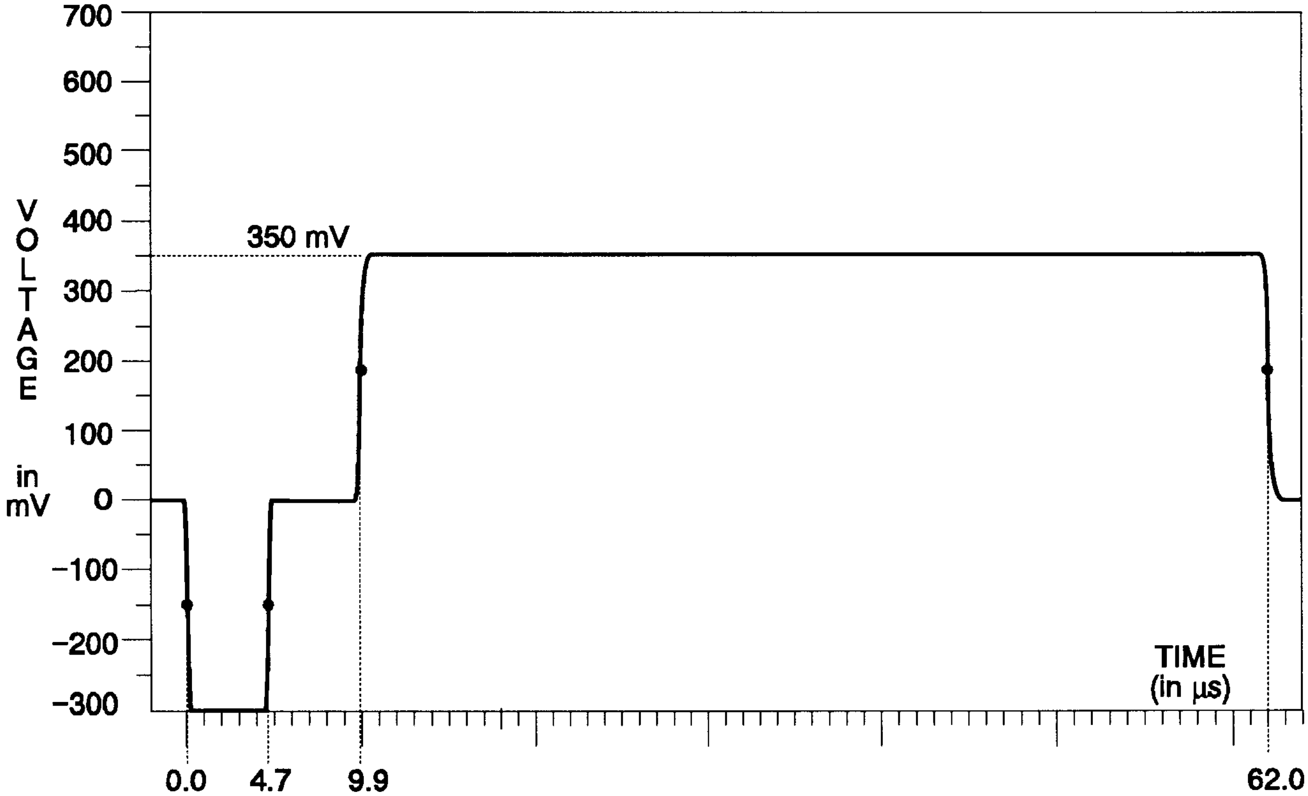


Fig. 3-186. Y Channel — Flat Field in all Channels.

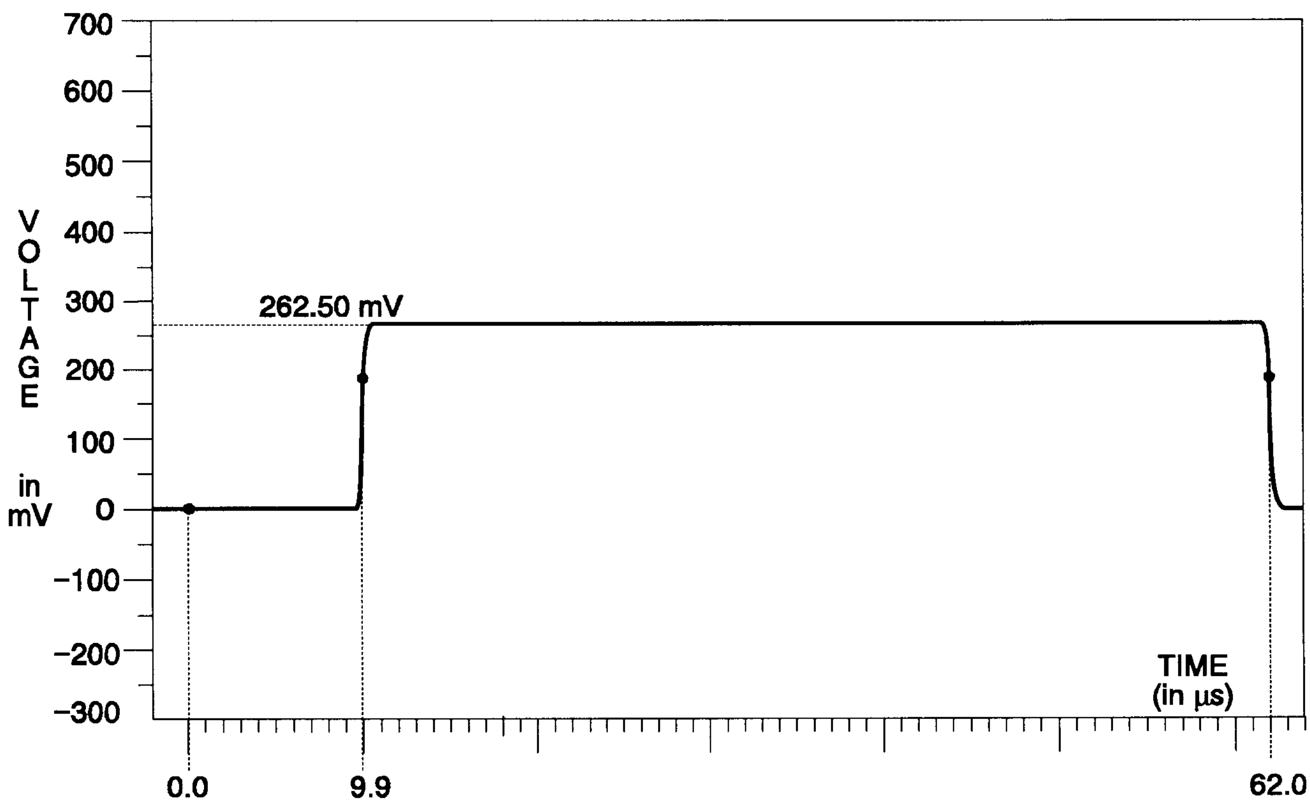


Fig. 3-187. B-Y & R-Y Channels — Flat Field.

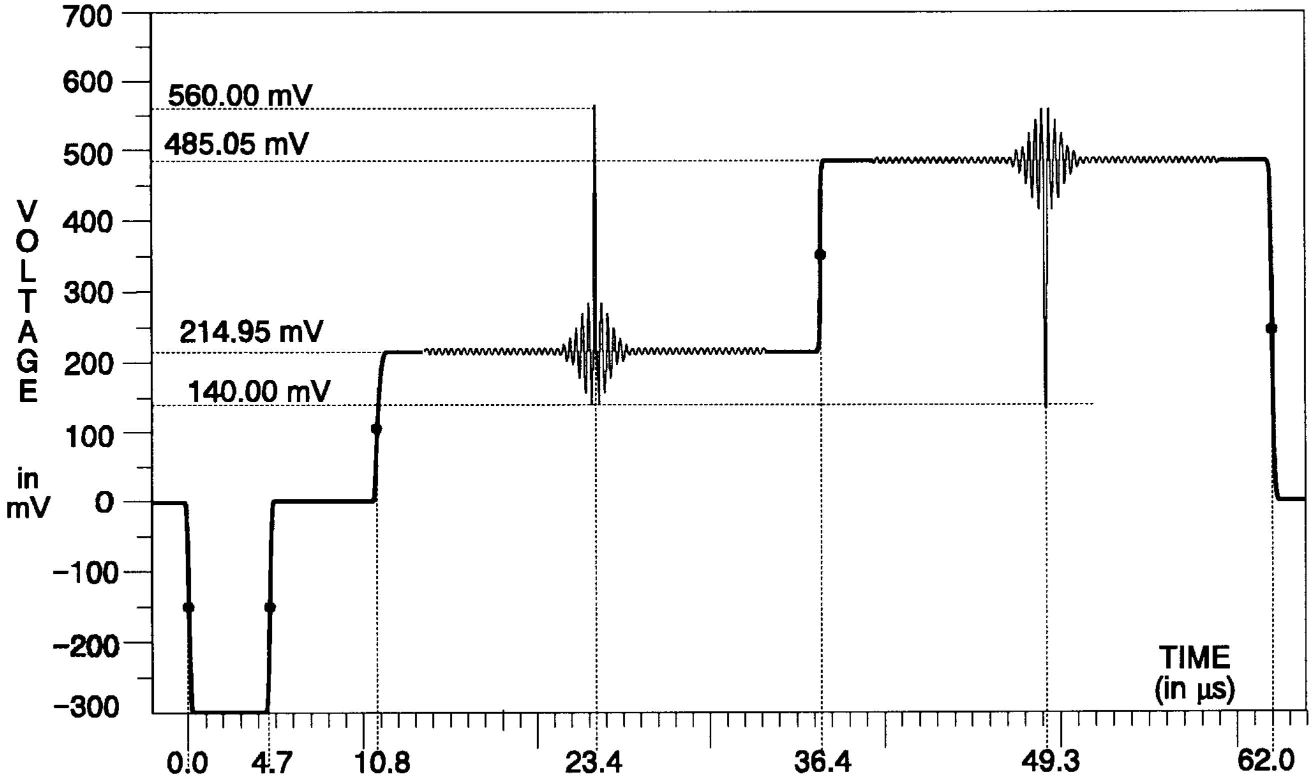


Fig. 3-188. Y Channel — Sin(x)/x.

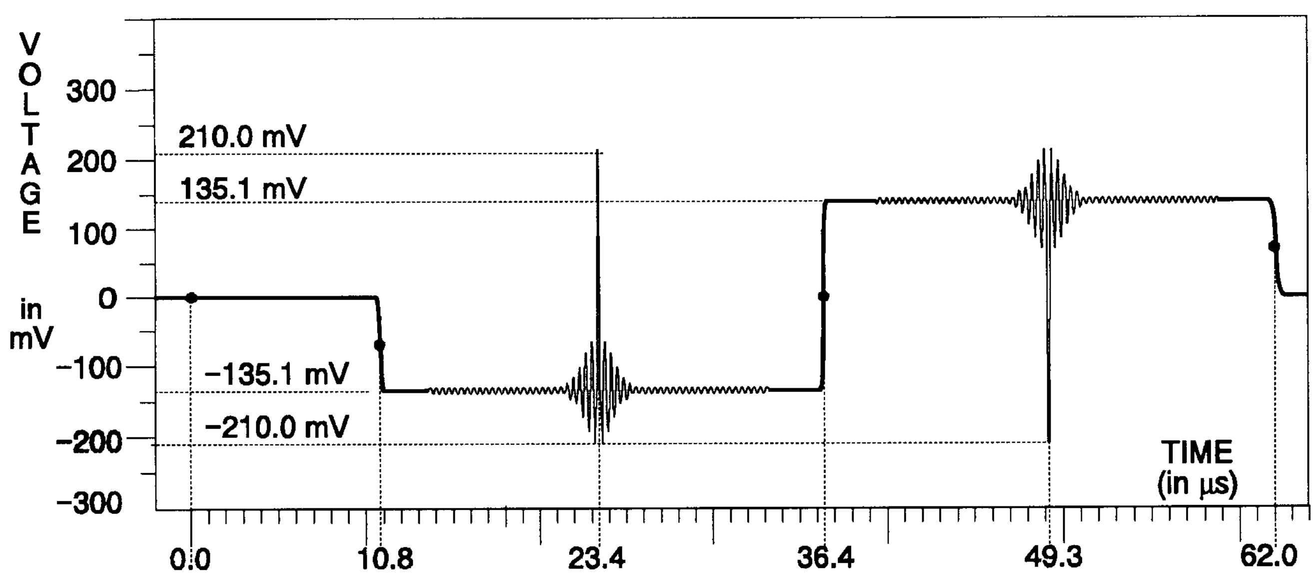


Fig. 3-189. B-Y & R-Y Channels — Sin(x)/x.

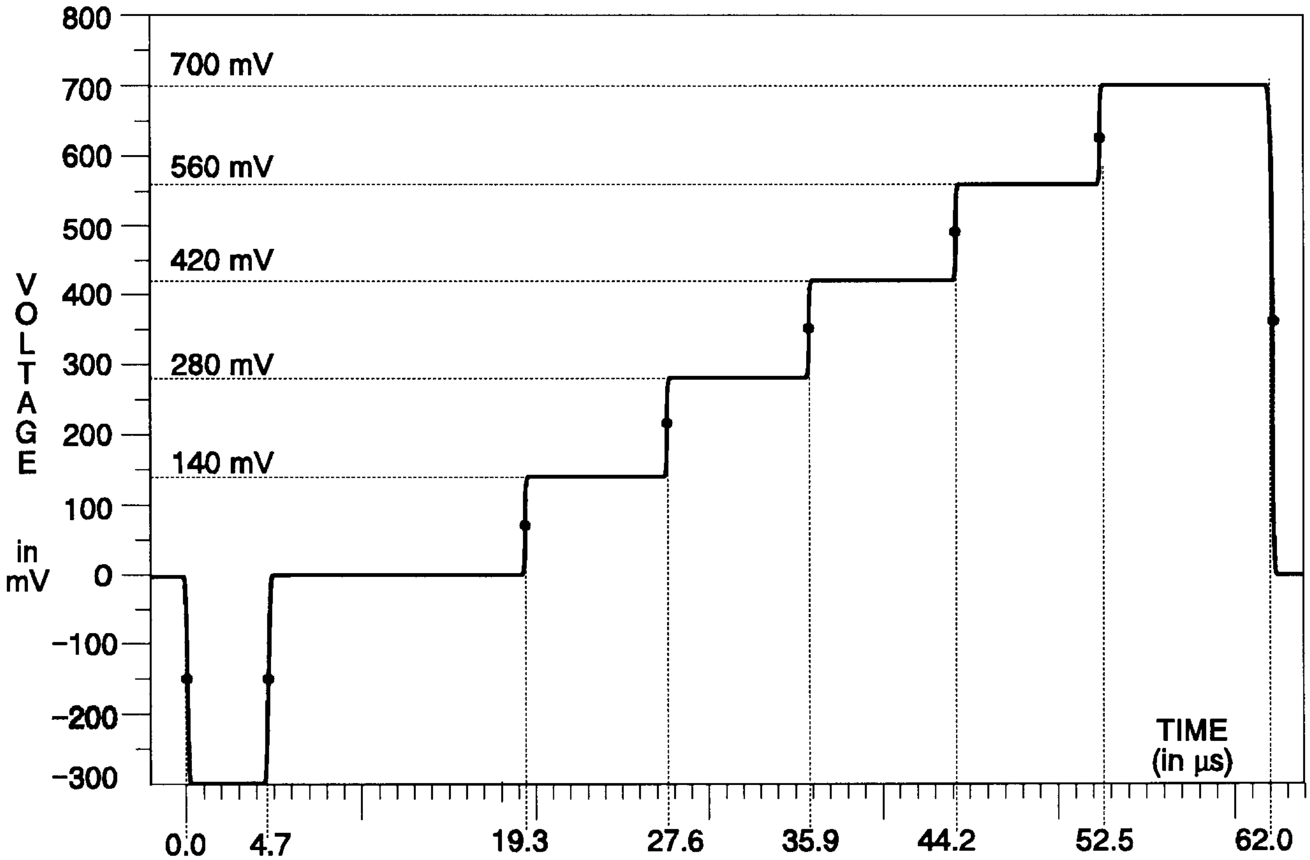


Fig. 3-190. Y Channel — 5-Step.

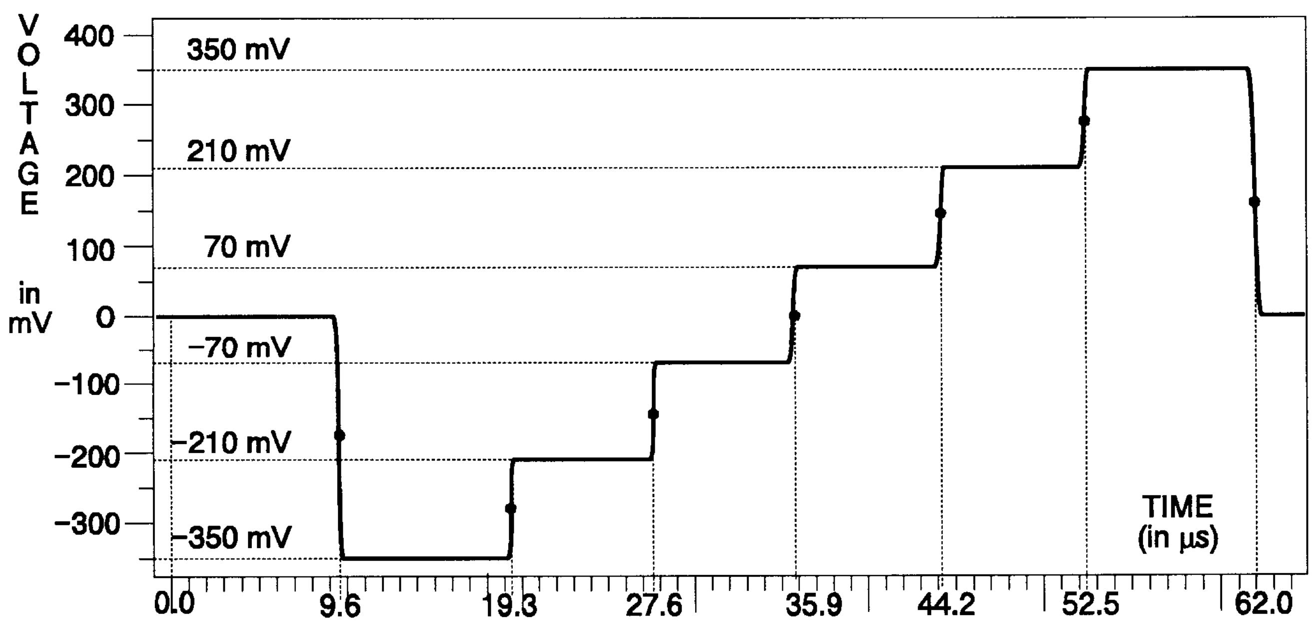


Fig. 3-191. B-Y & R-Y Channels — 5-Step.

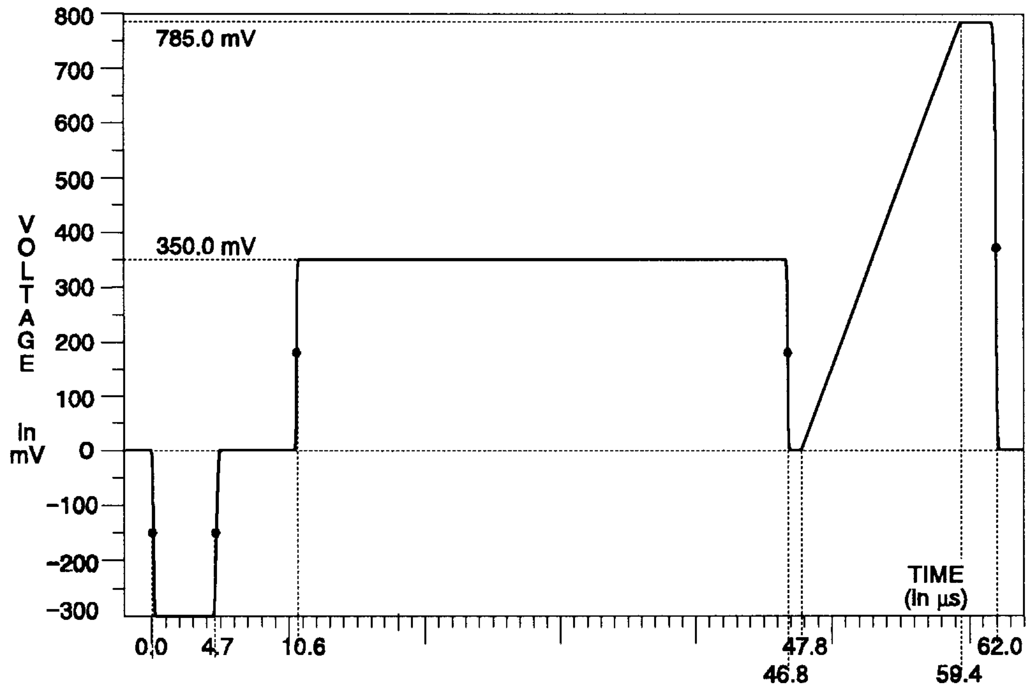


Fig. 3-192. Y Channel — Quad Phase.

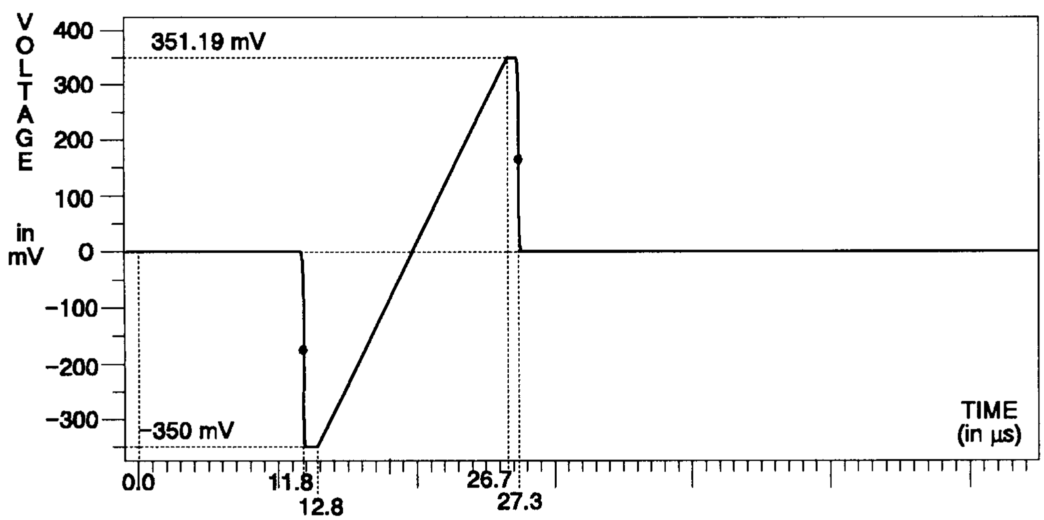


Fig. 3-193. B-Y Channel — Quad Phase.

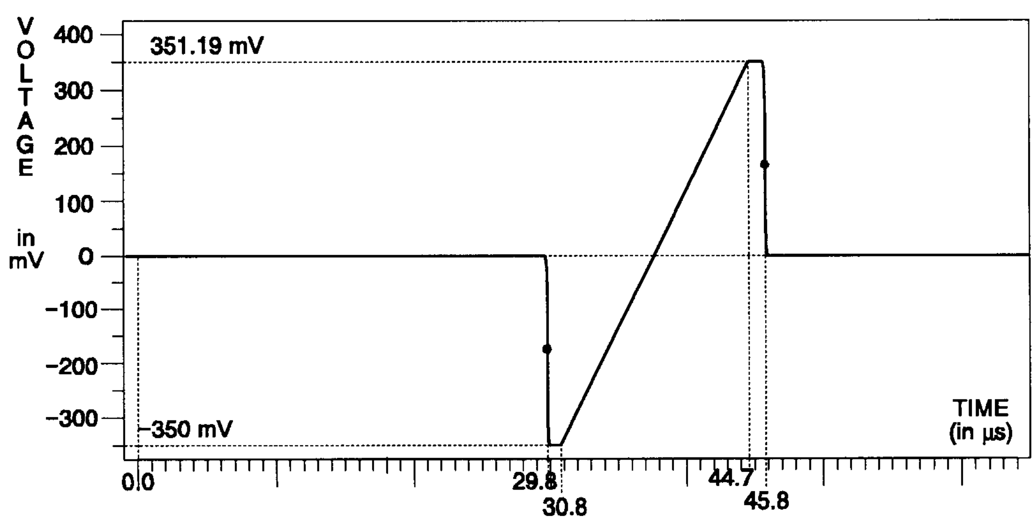


Fig. 3-194. R-Y Channel — Quad Phase.

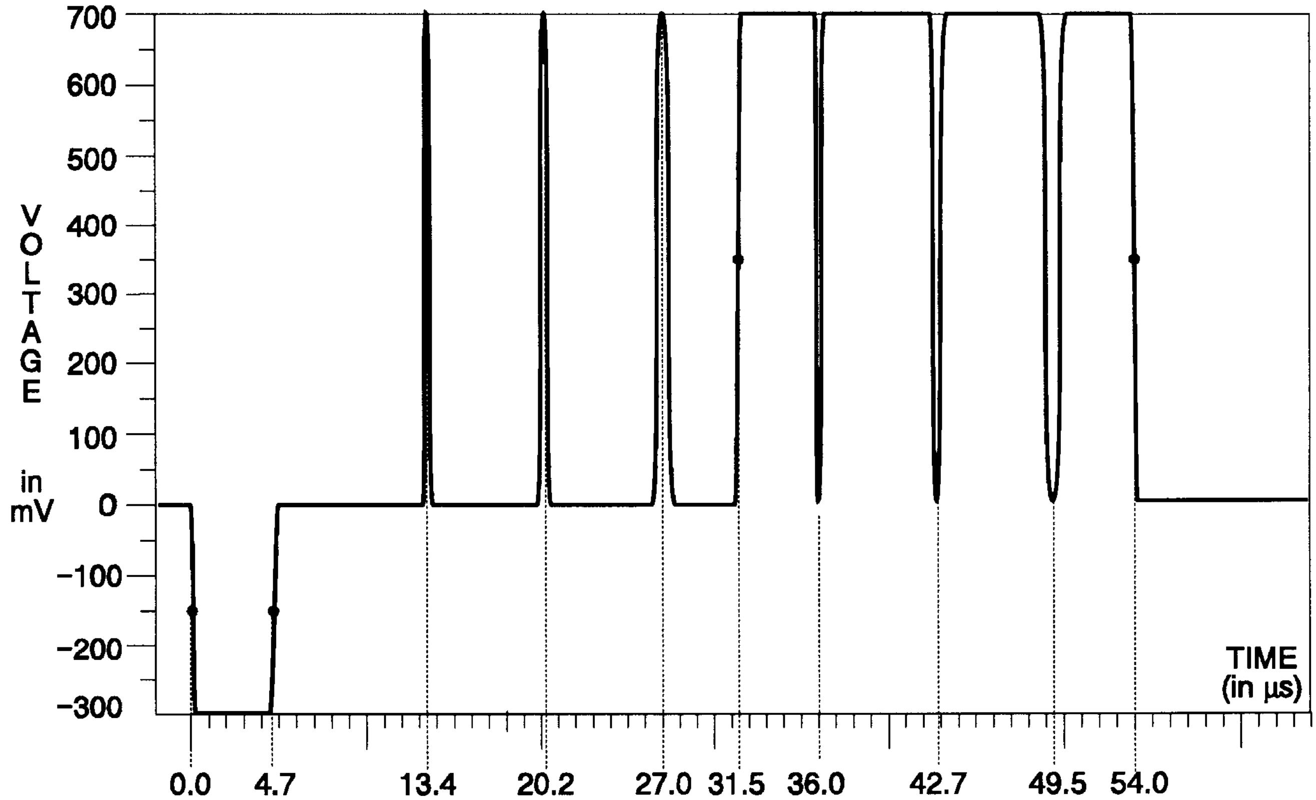


Fig. 3-195. Y Channel — T Pulses.

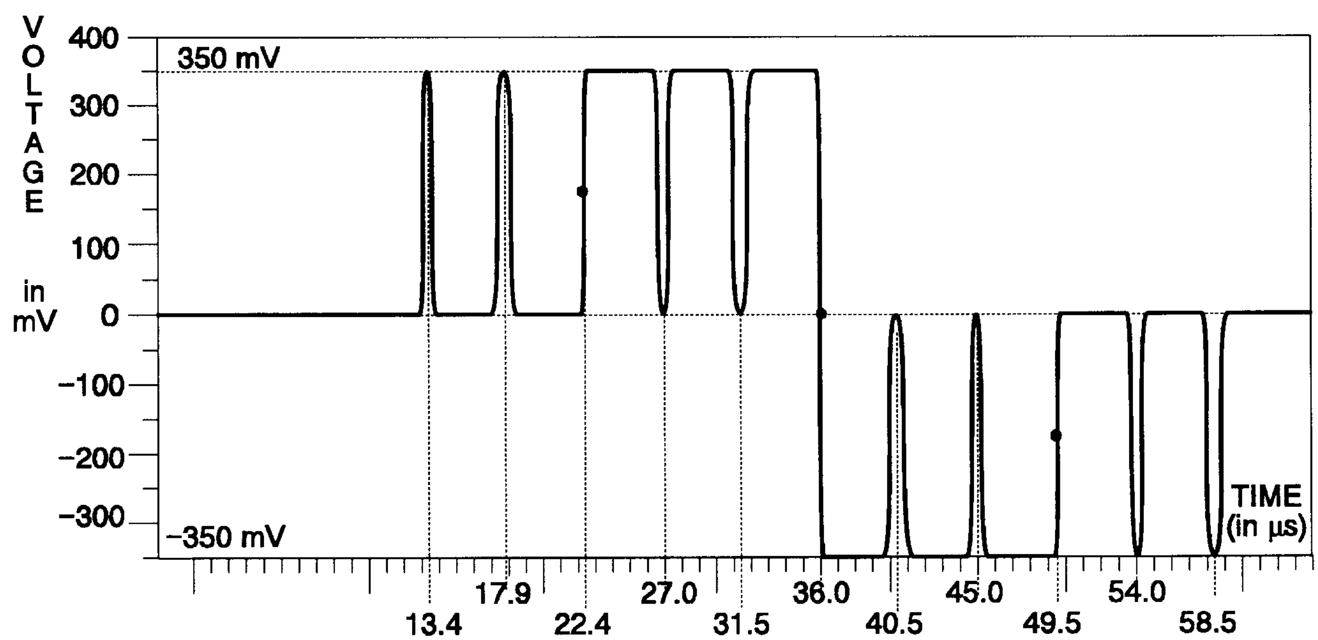


Fig. 3-196. B-Y Channel — T Pulses.

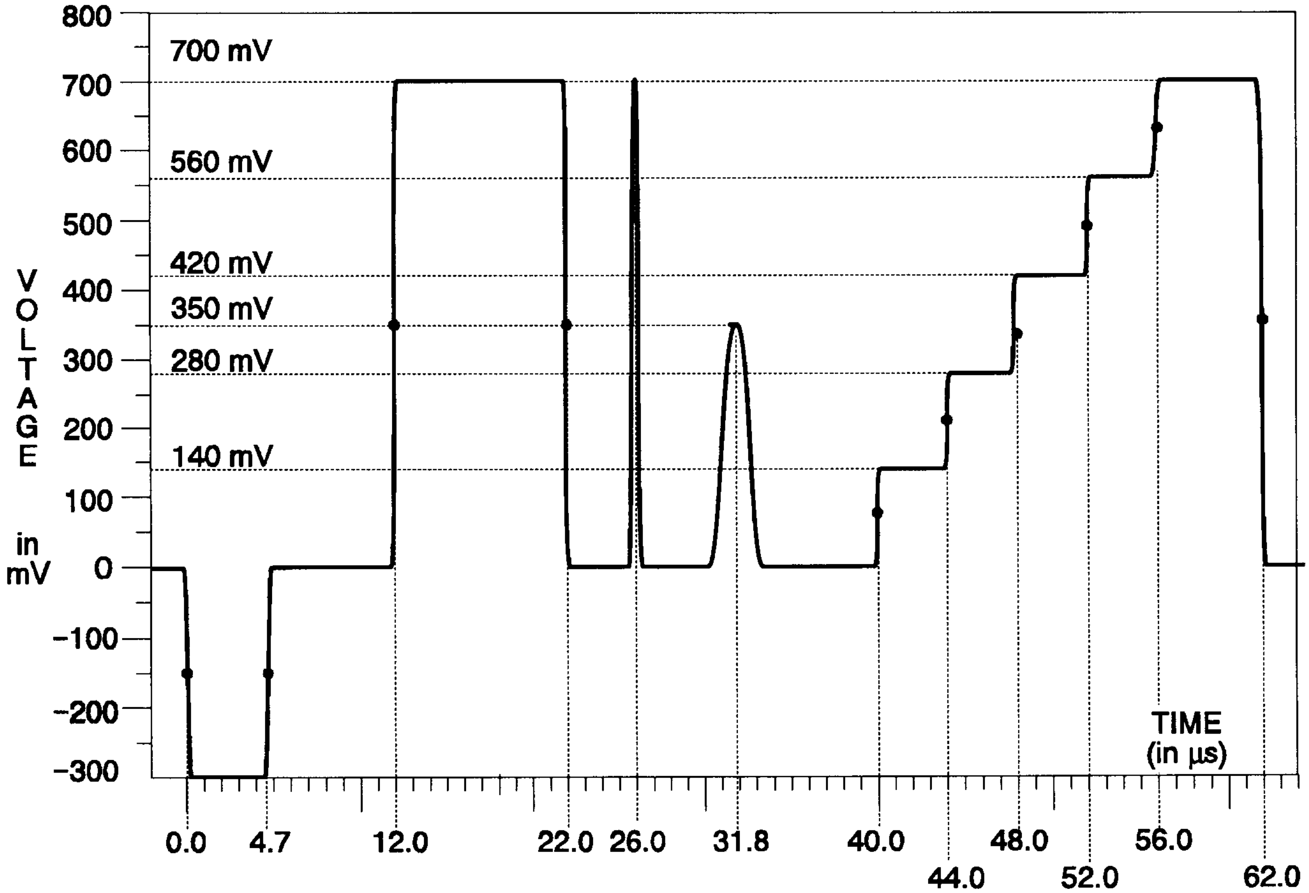


Fig. 3-197. Y Channel — Line 17.

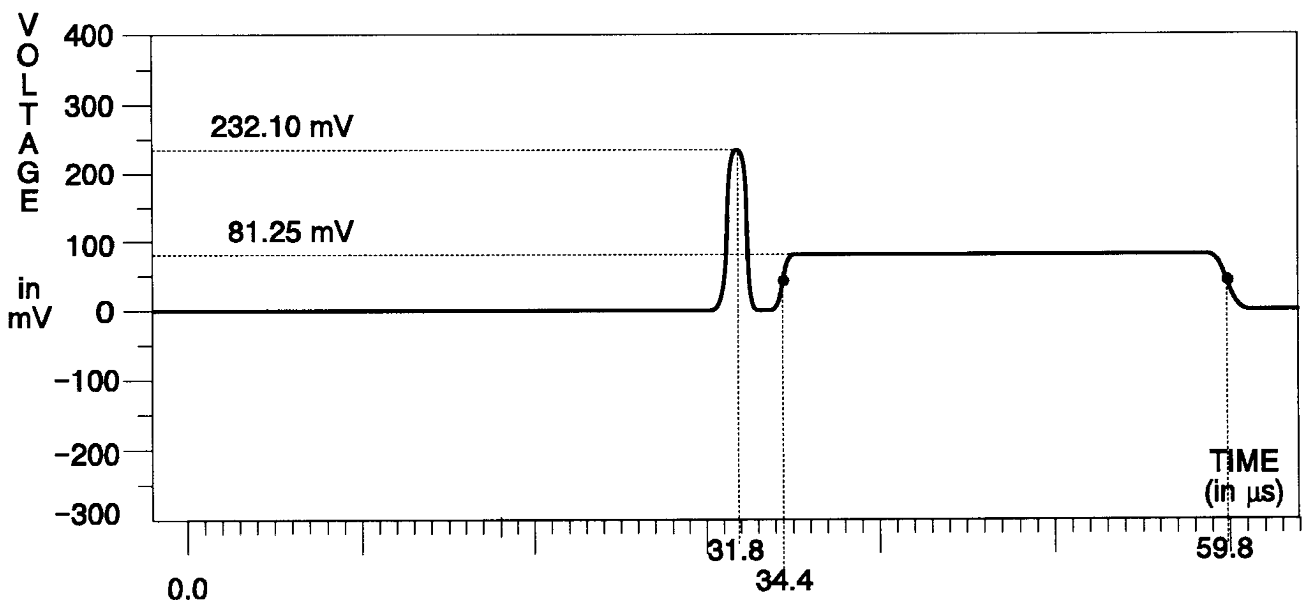


Fig. 3-198. B-Y & R-Y Channels — Line 17.

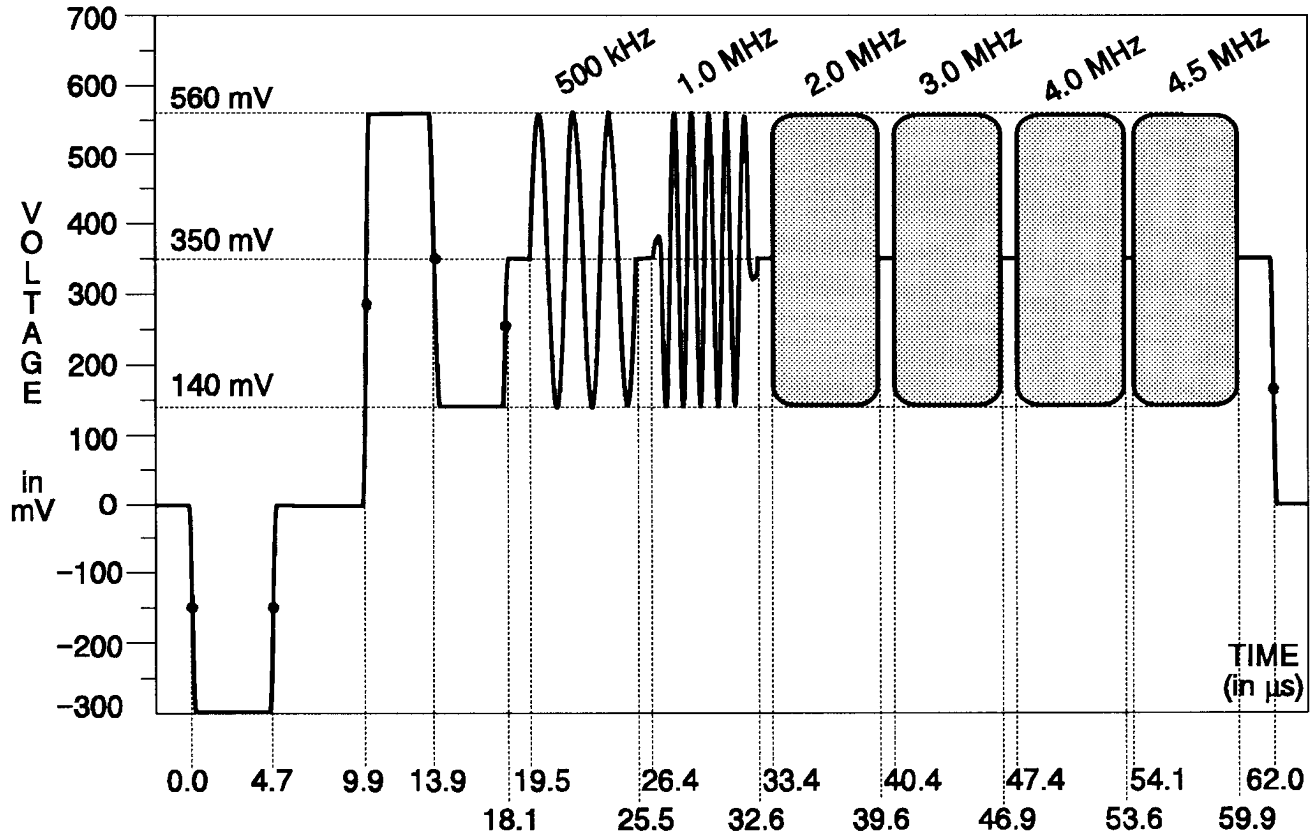


Fig. 3-199. Y Channel — 60% Narrow Multiburst.

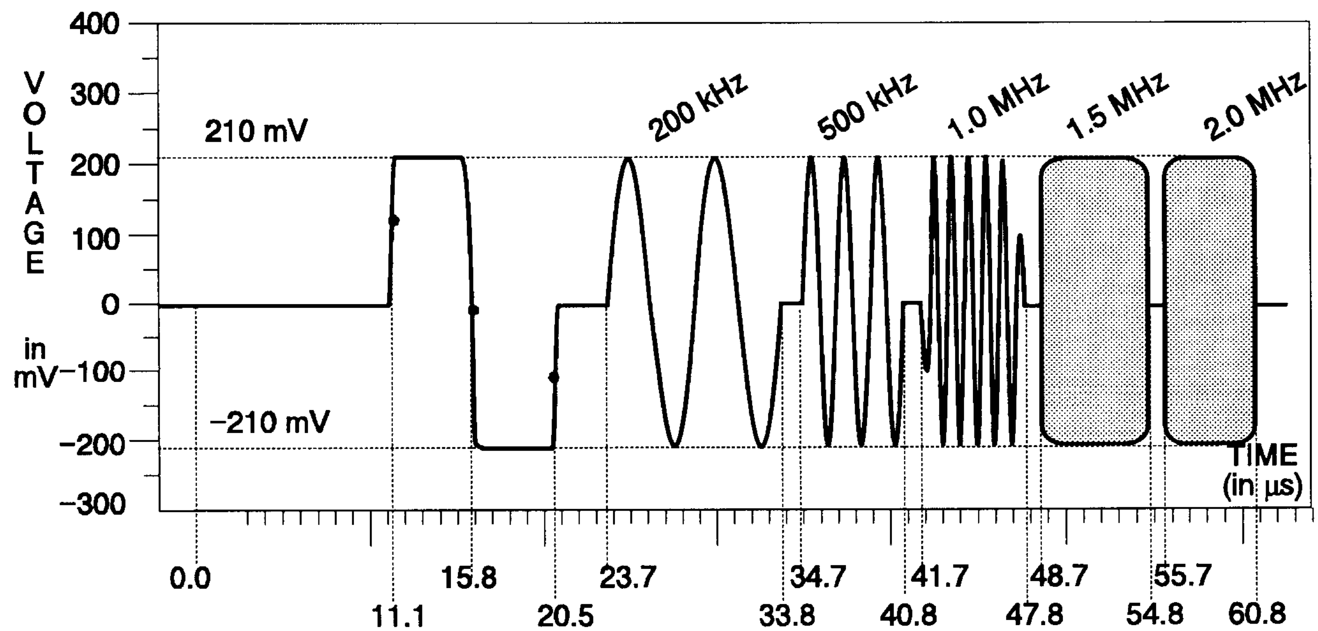


Fig. 3-200. B-Y & R-Y Channels — Narrow Multiburst.

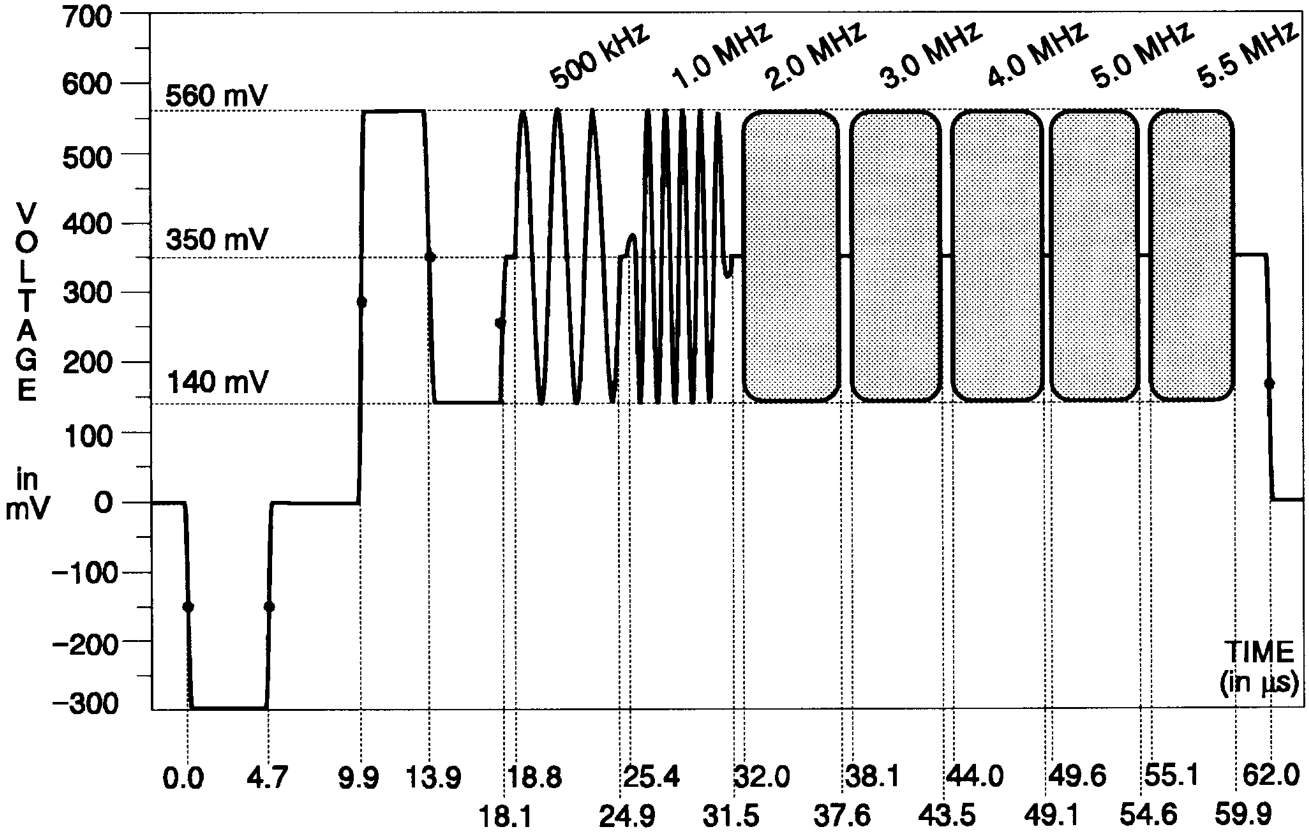


Fig. 3-201. Y Channel — 60% Wide Multiburst.

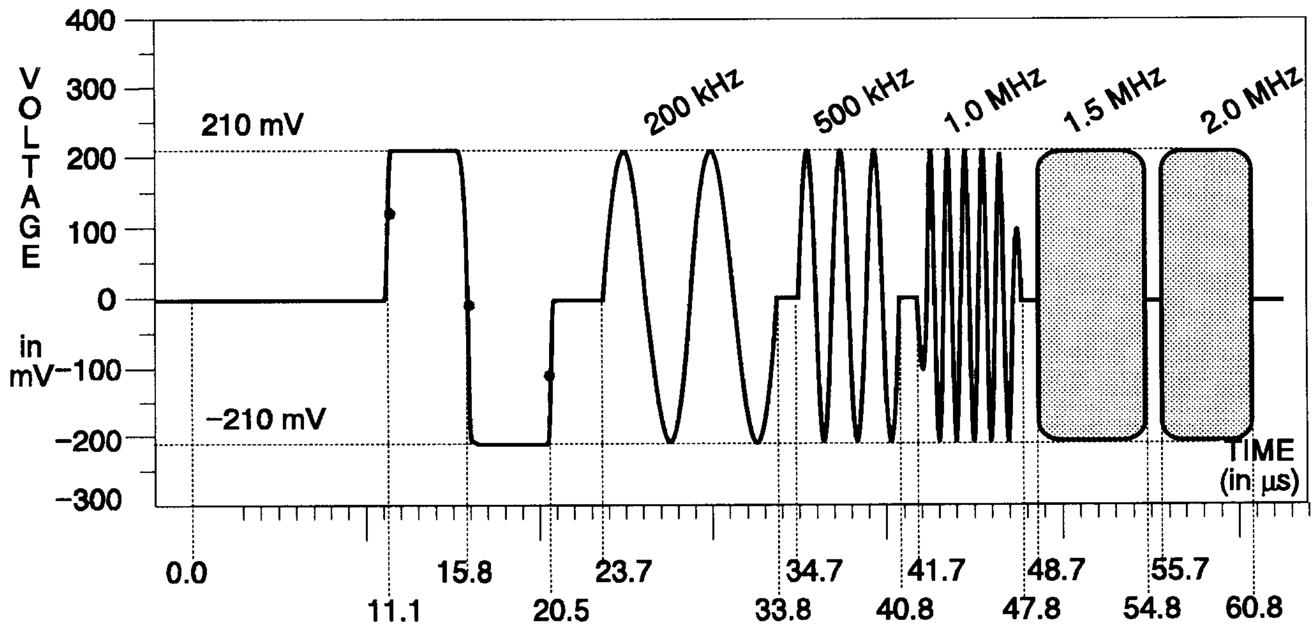


Fig. 3-202. B-Y & R-Y Channels — Wide Multiburst.

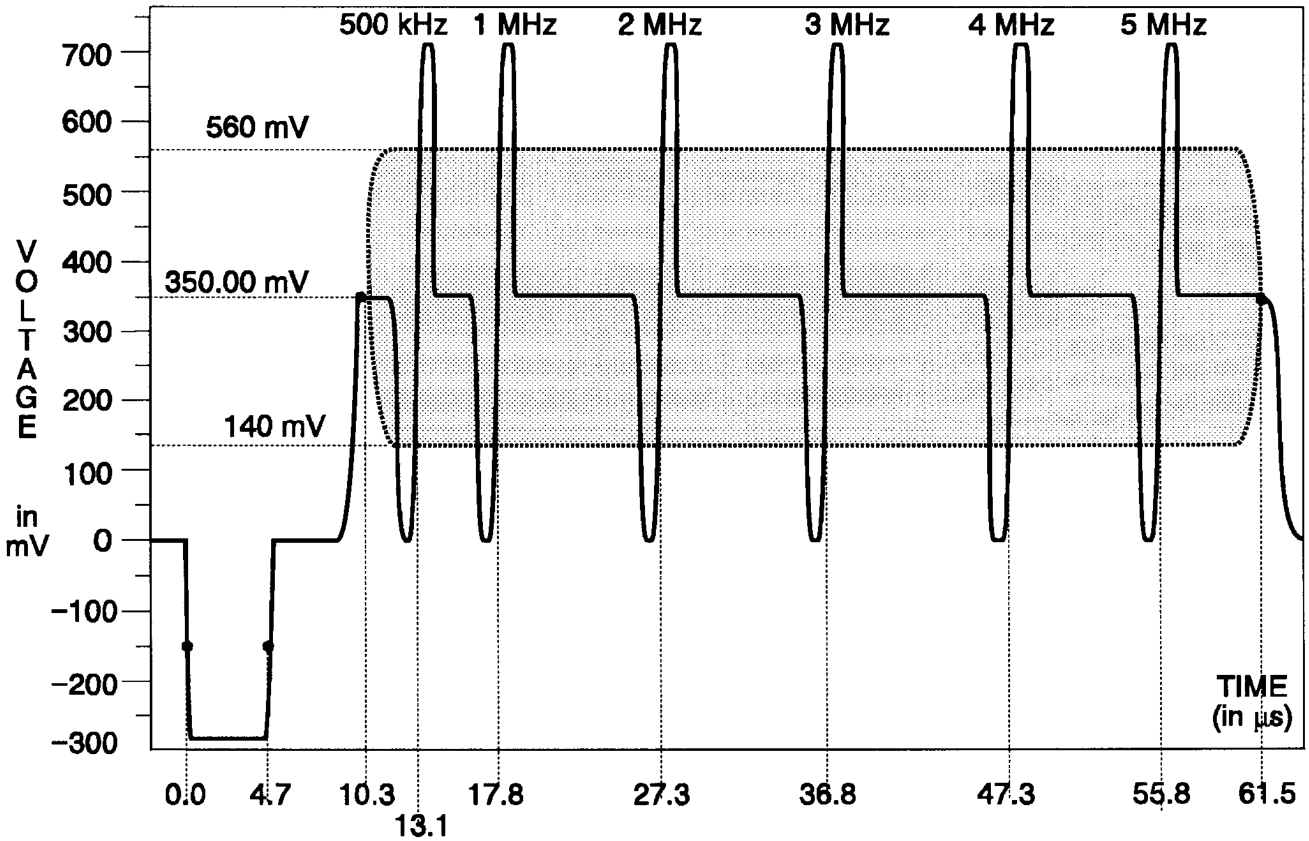


Fig. 3-203. Y Channel — 60% Narrow Sweep.

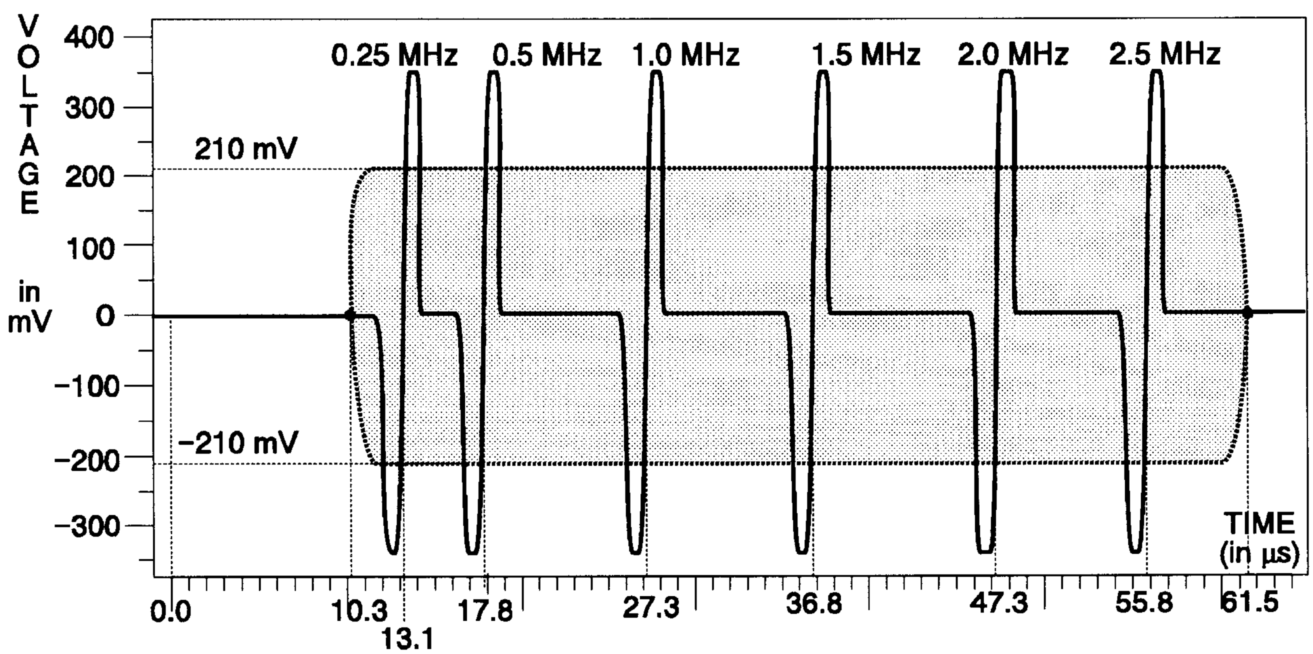


Fig. 3-204. B-Y & R-Y Channels — 60% Narrow Sweep.

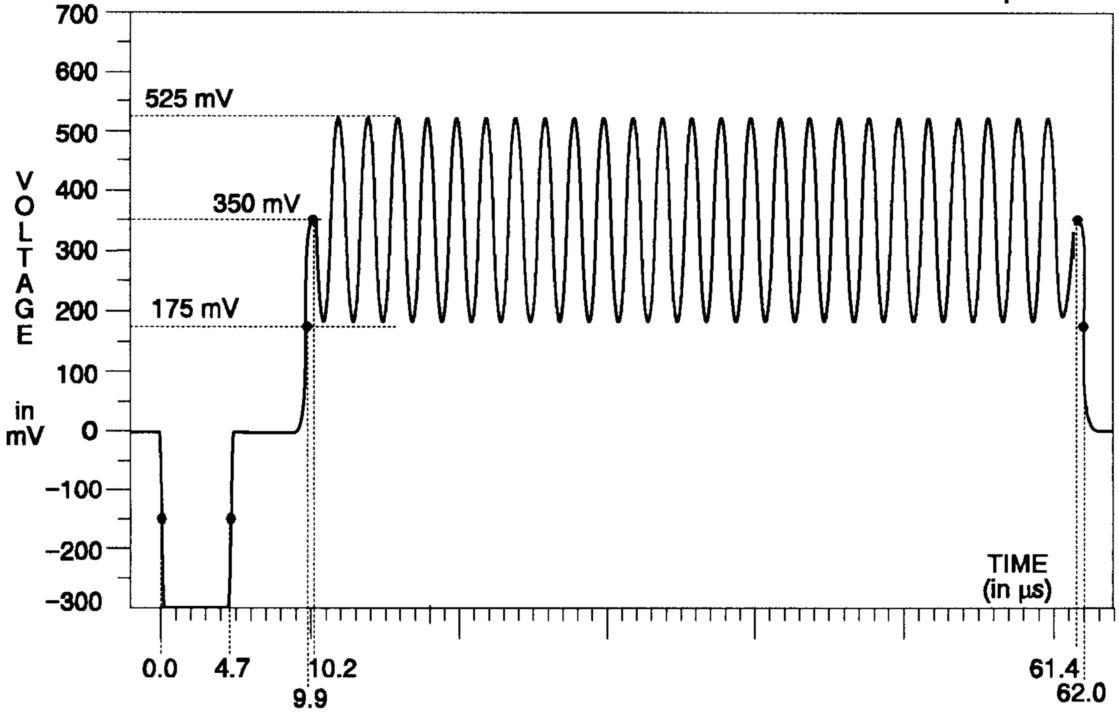


Fig. 3-205. Y Channel — Bowtie.

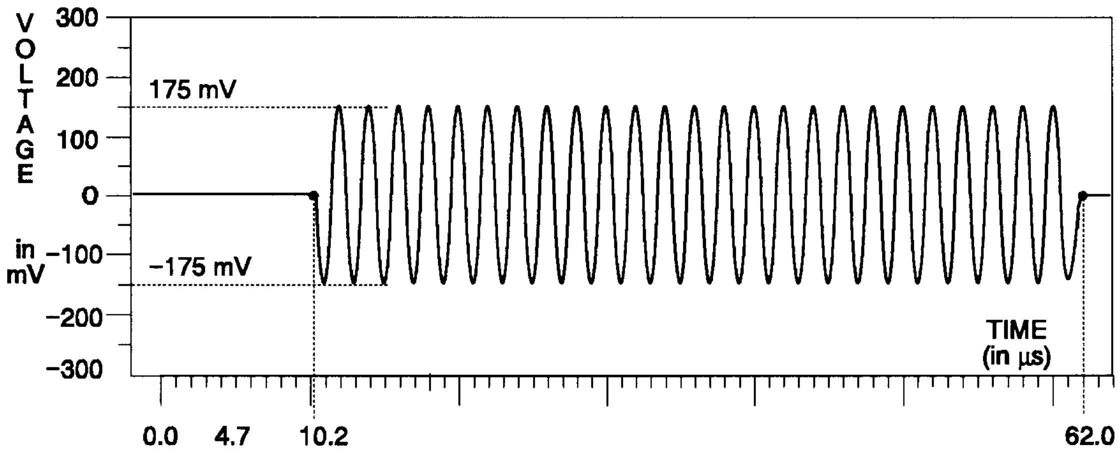


Fig. 3-206. B-Y & R-Y Channels — Bowtie.

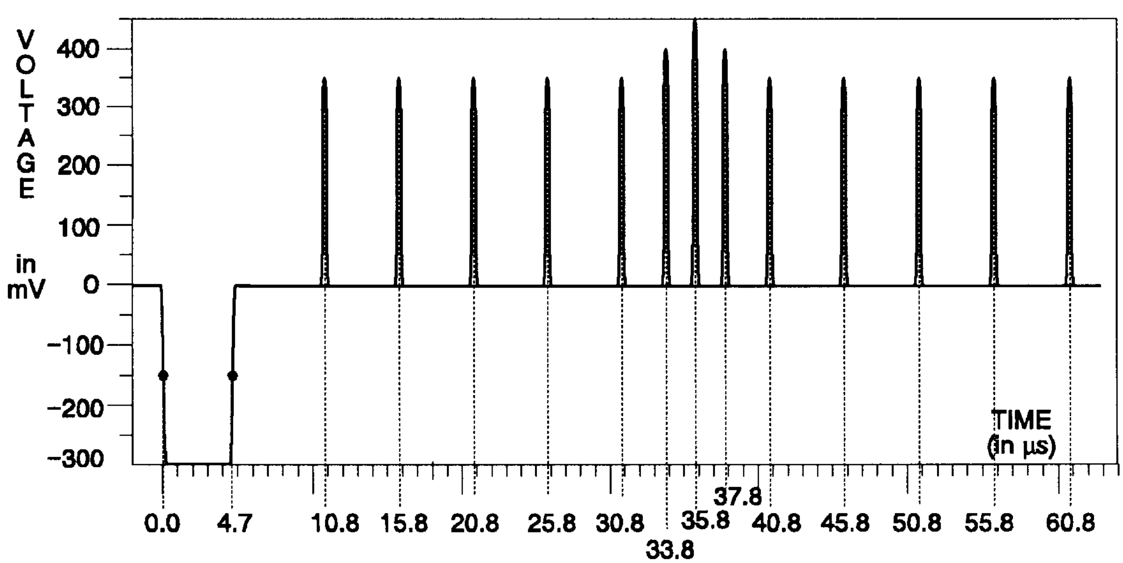


Fig. 3-207. Y Channel — Bowtie Markers.

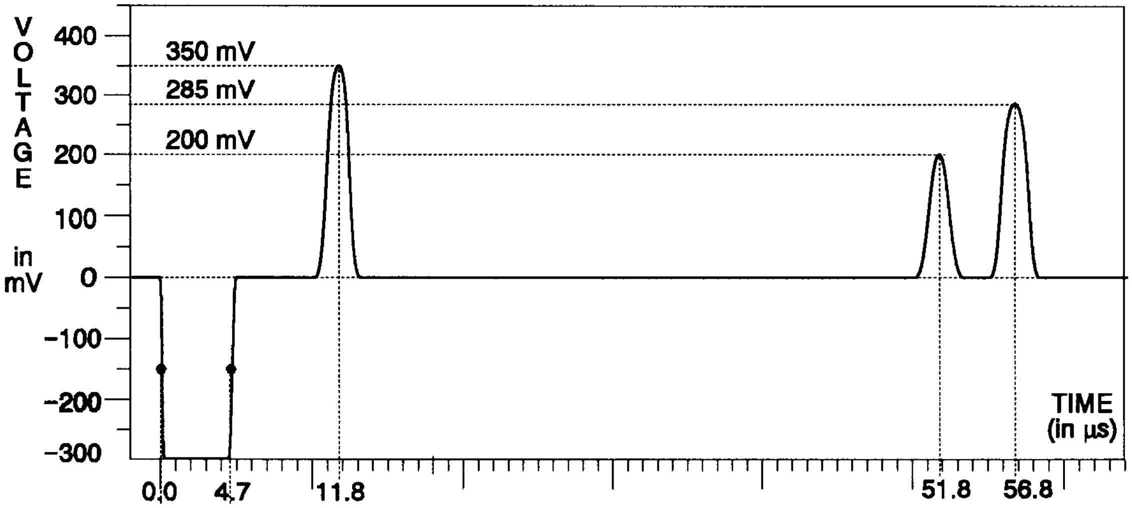


Fig. 3-208. Y Channel — 12T Pulses.

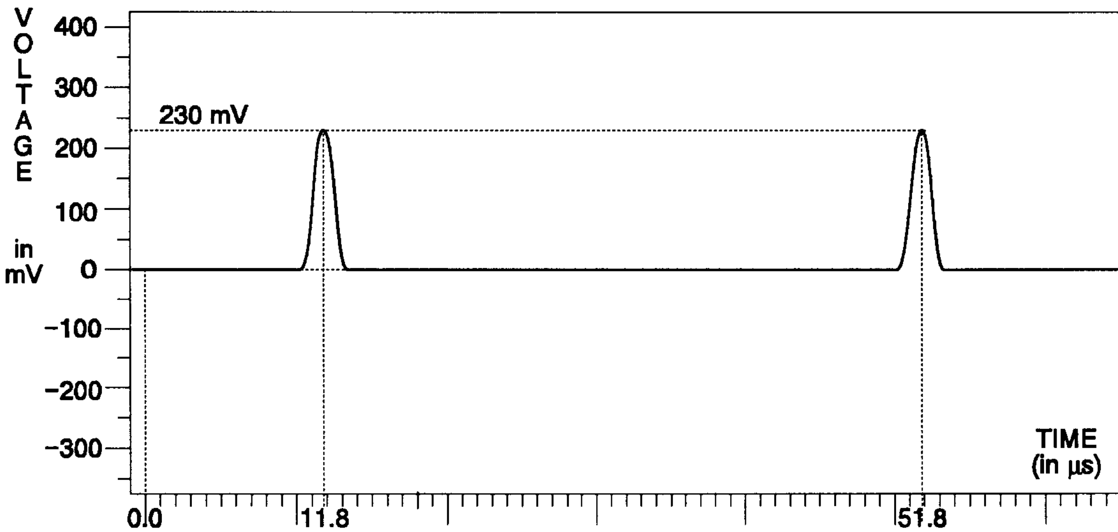


Fig. 3-209. B-Y Channel — 12T Pulses.

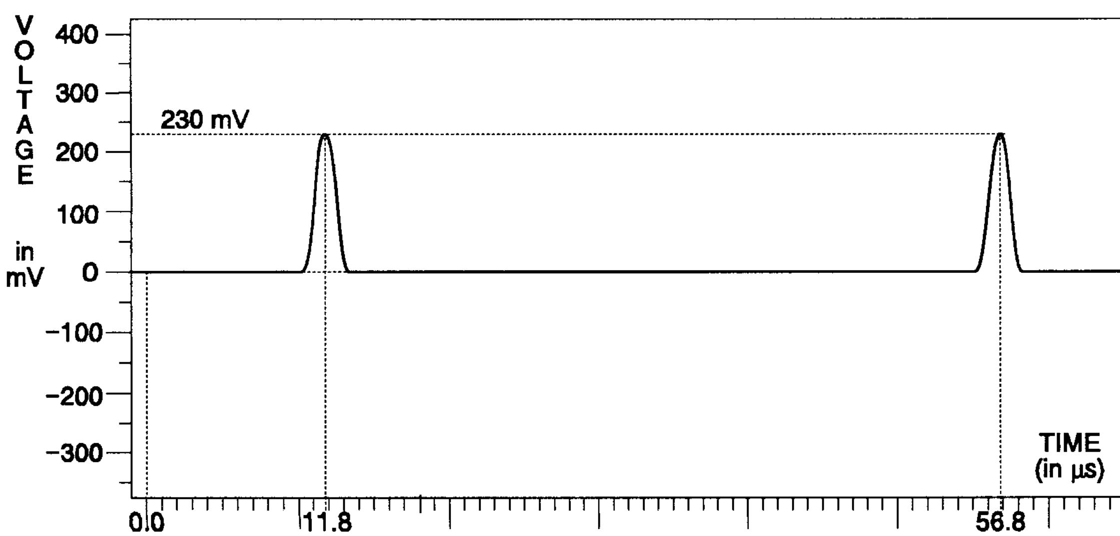


Fig. 3-210. R-Y Channel — 12T Pulses.

Option 03 Signals — CTDM (2-Wire) Unique Signals

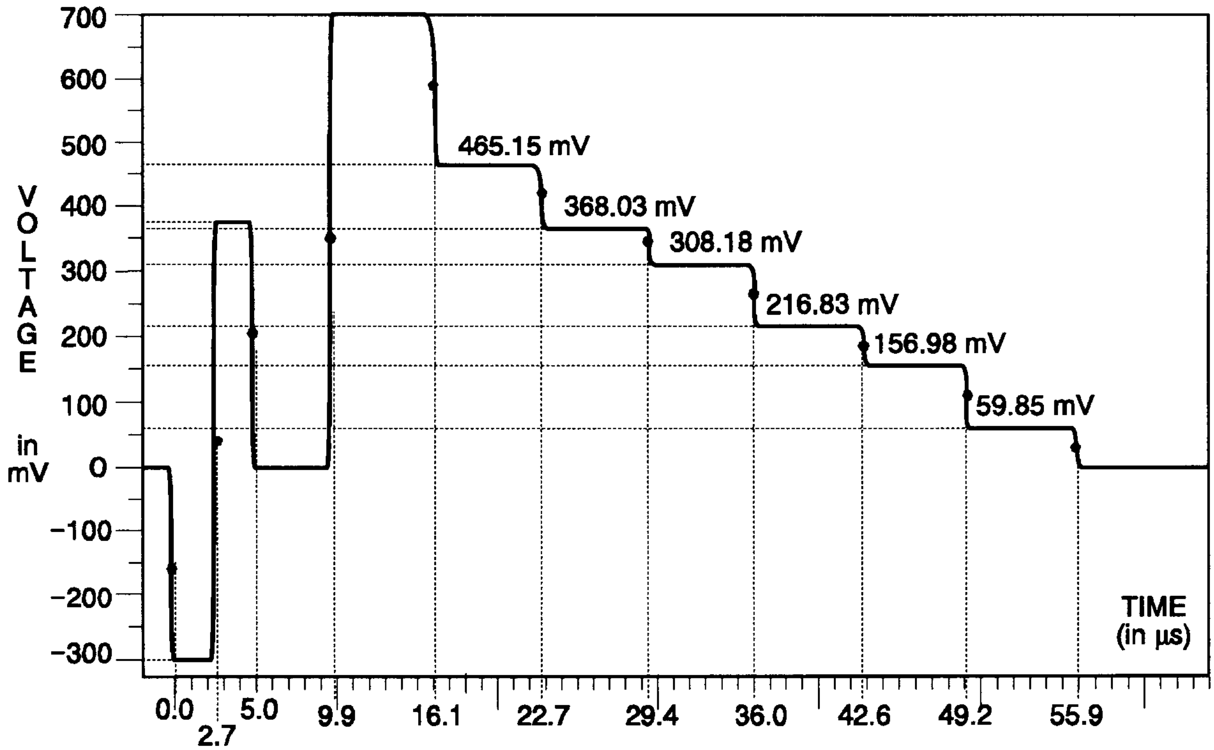


Fig. 3-211. Y Channel — 75% Bars.

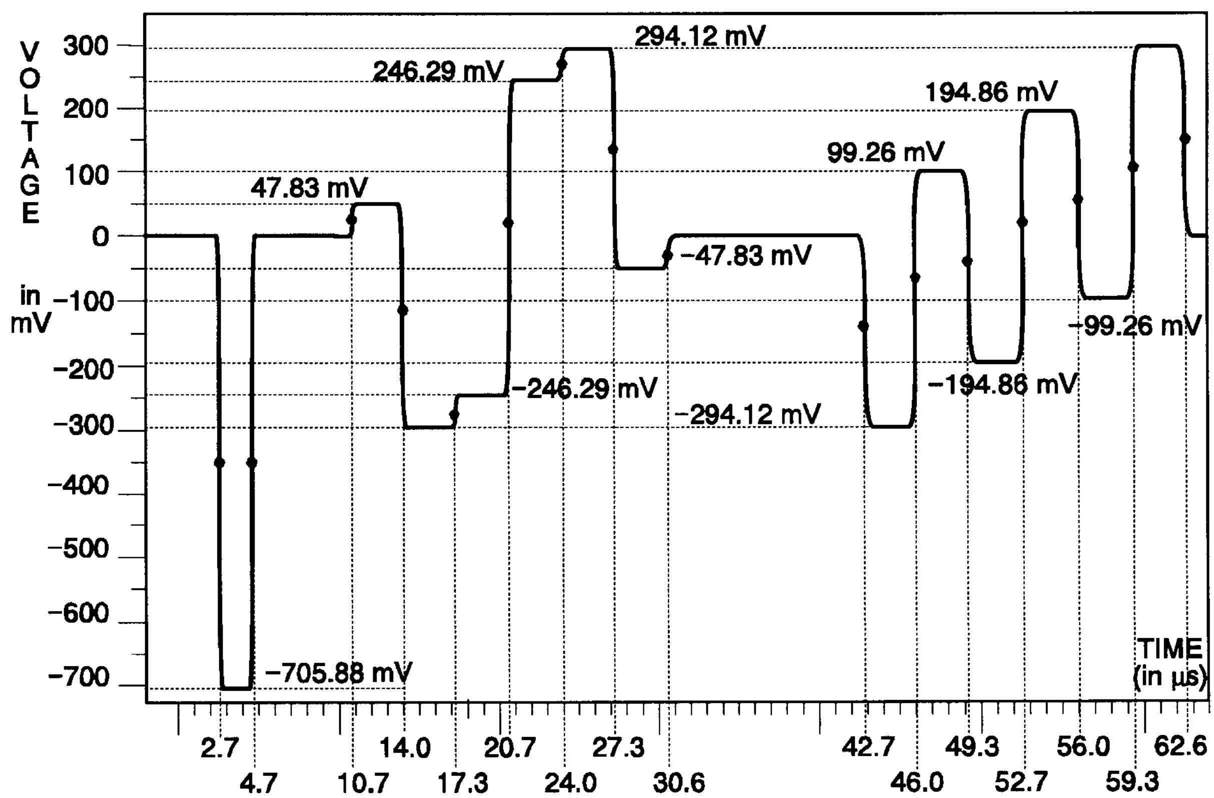


Fig. 3-212. C Channel — 75% Bars.

Option 04 Unique Signals — Composite Signals Y-C Format

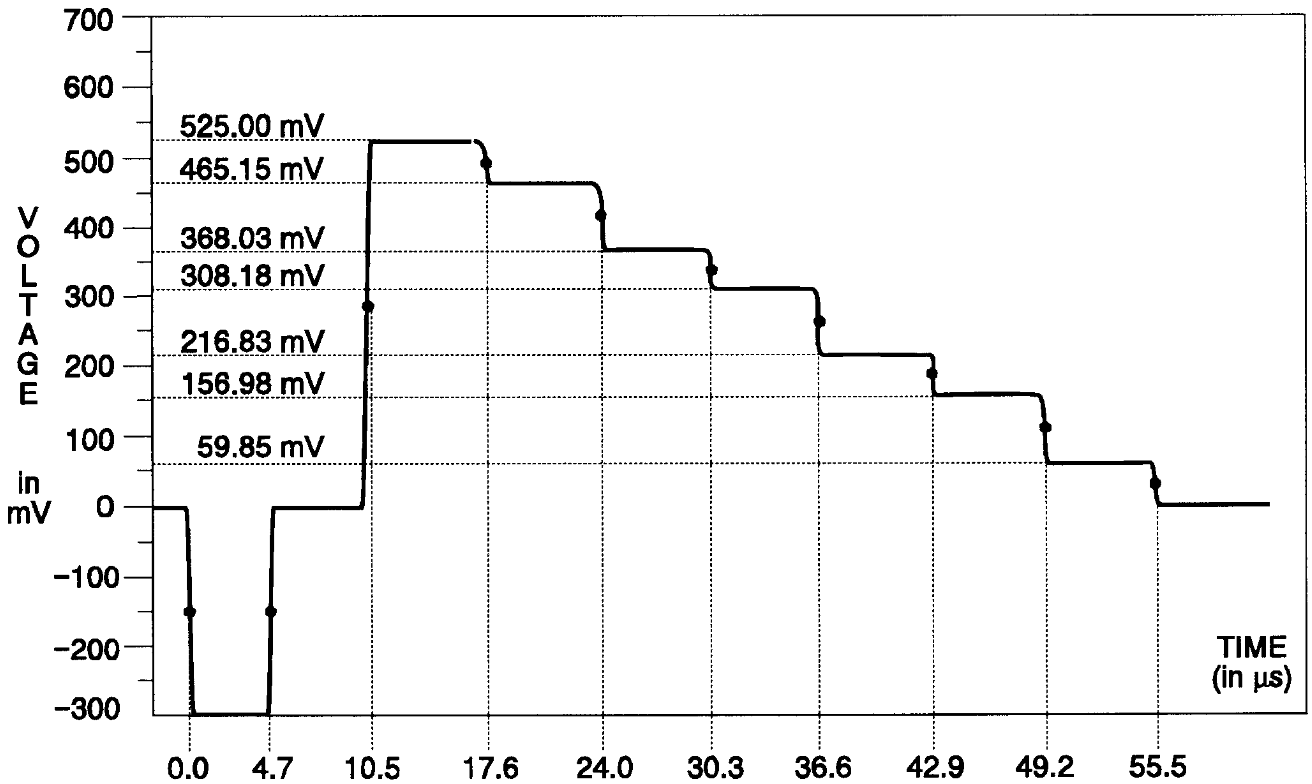


Fig. 3-213. Y Channel — 75% Color Bars.

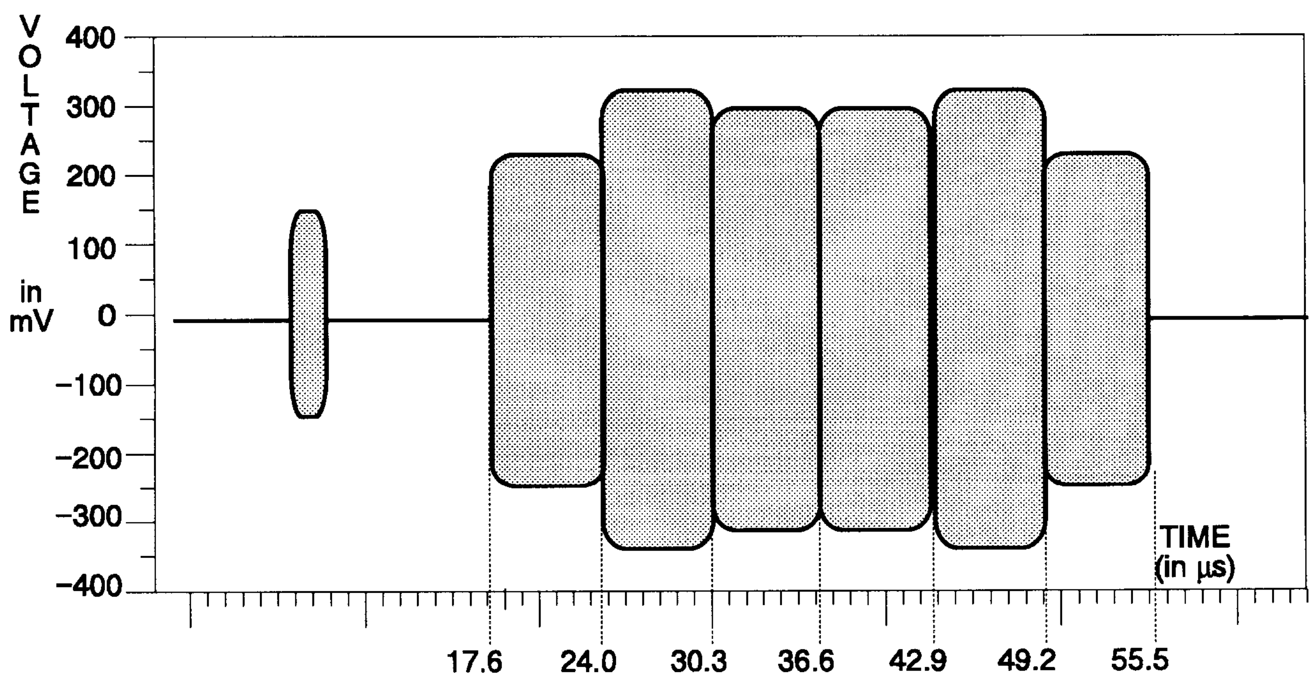


Fig. 3-214. C Channel — 75% Color Bars.

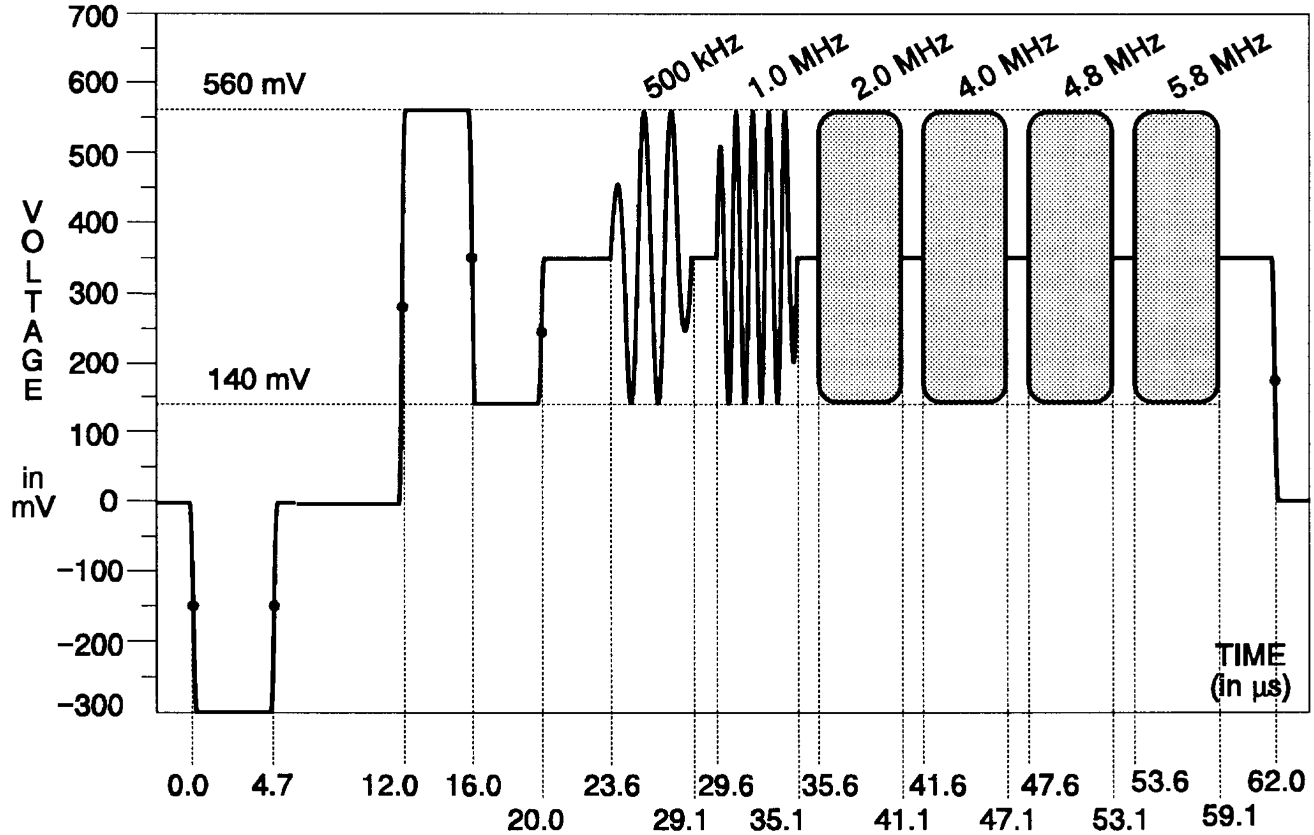


Fig. 3-215. Y Channel — Multiburst.

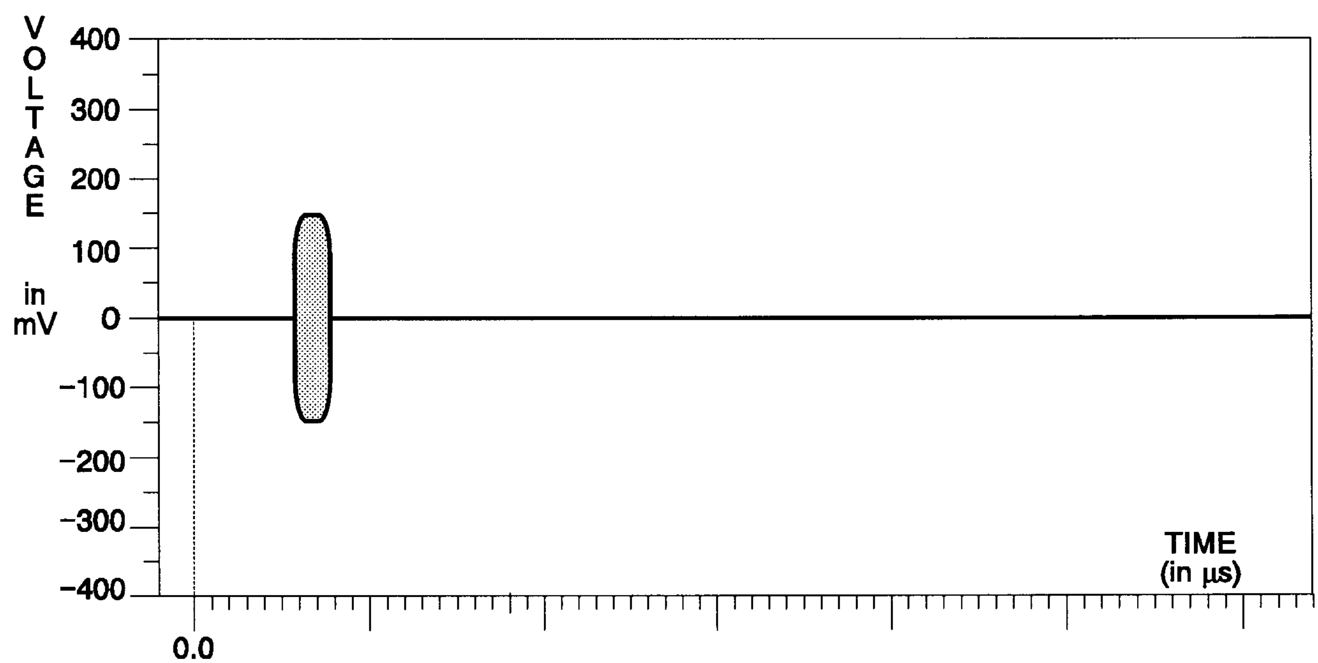


Fig. 3-216. C Channel — Multiburst.

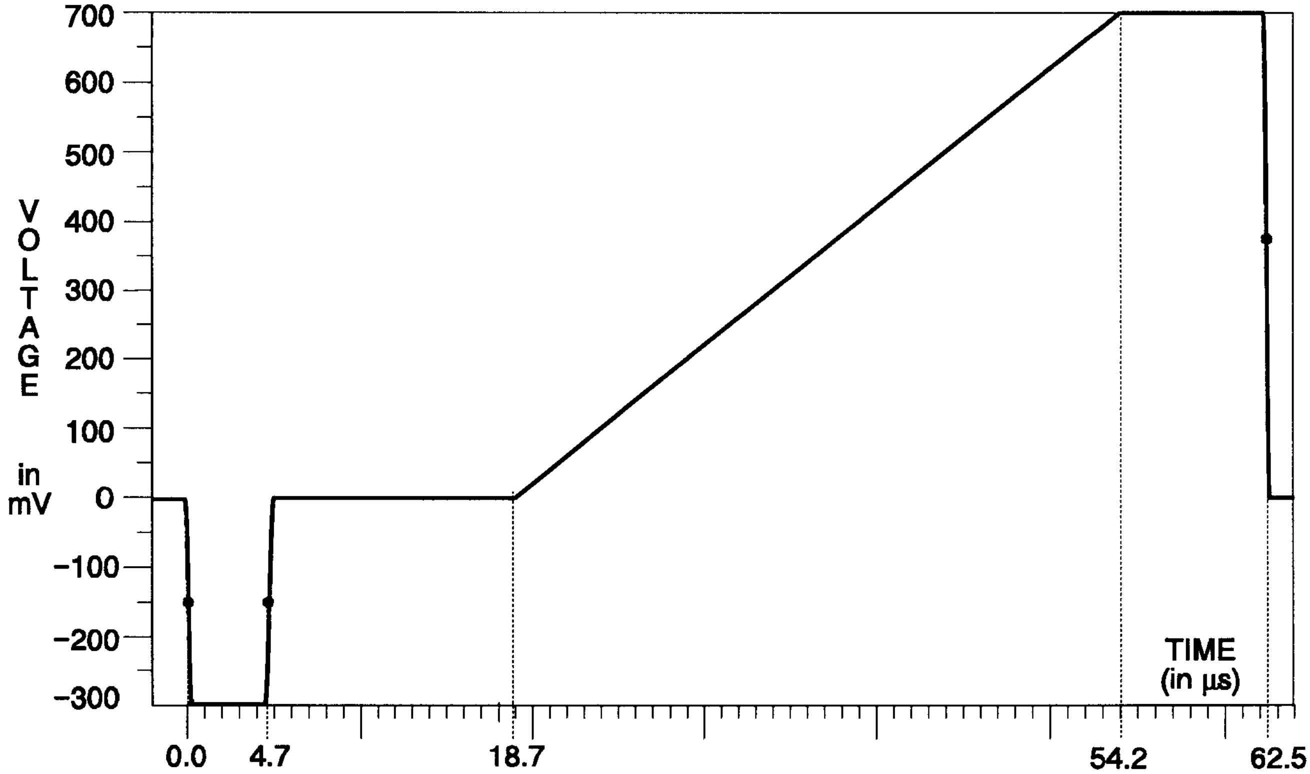


Fig. 3-217. Y Channel — Ramp.

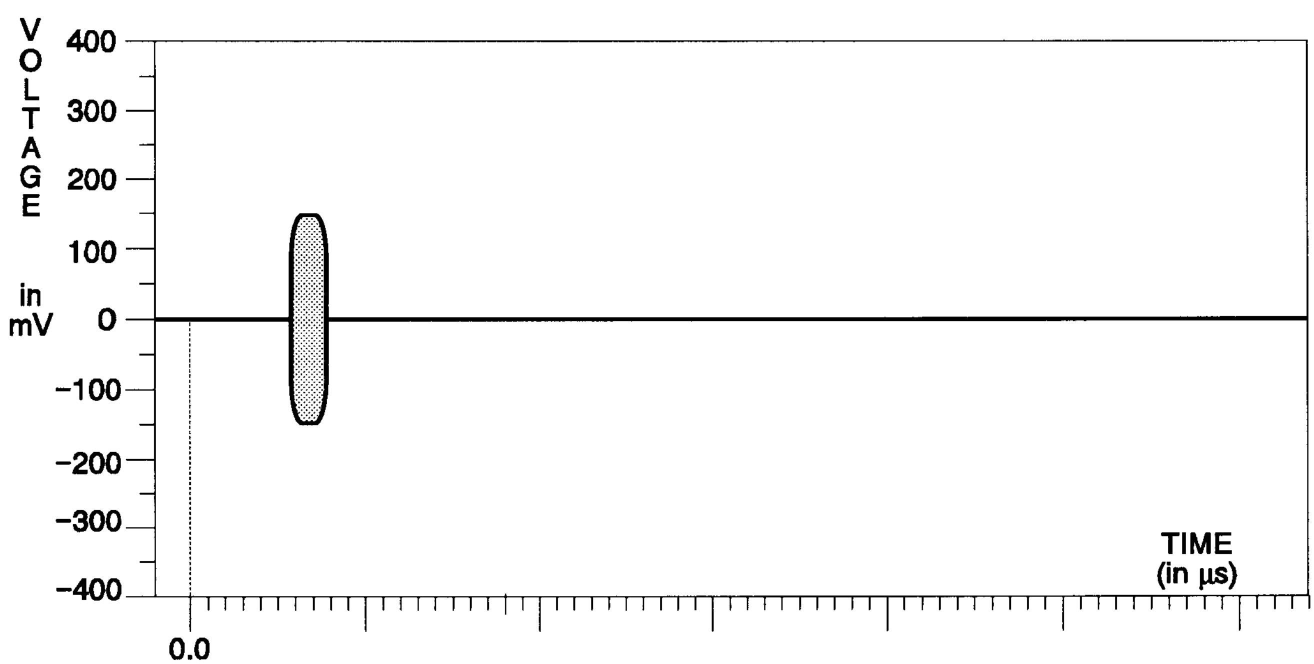


Fig. 3-218. C Channel — Ramp.

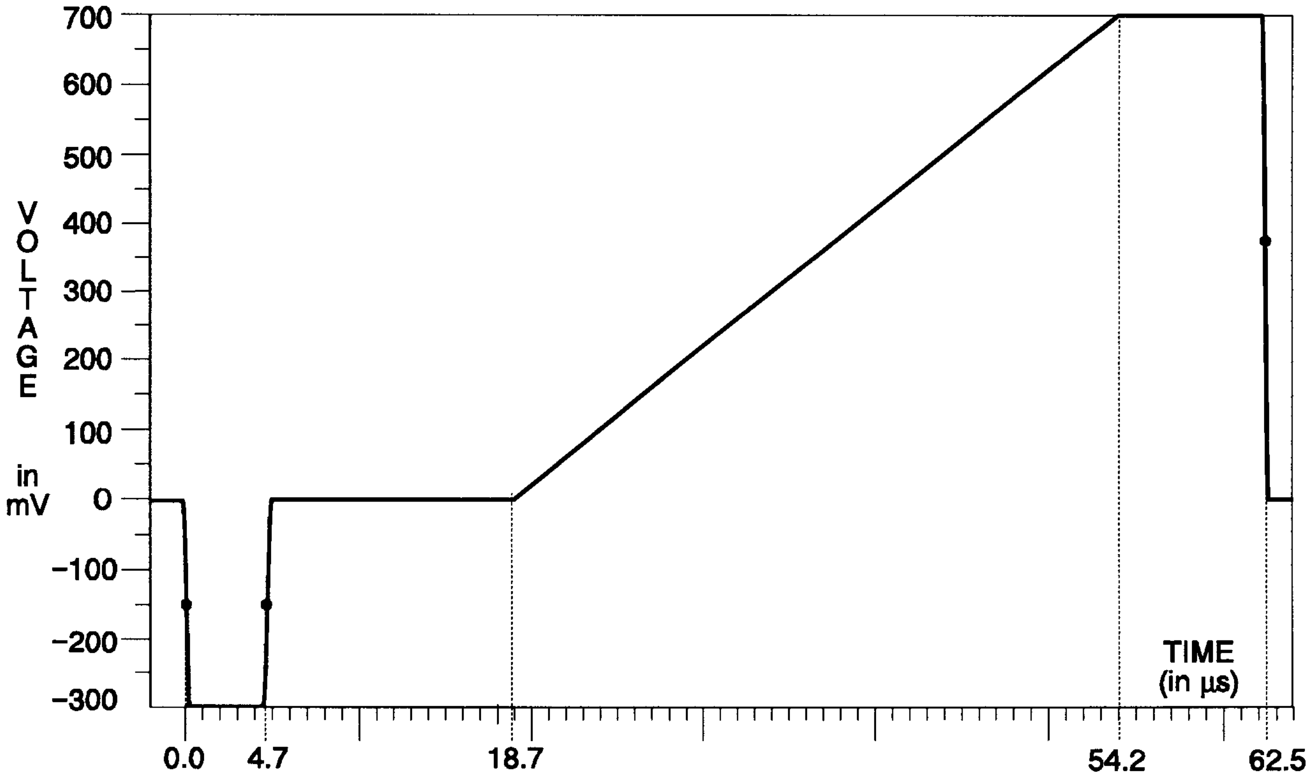


Fig. 3-219. Y Channel — Modulated Ramp.

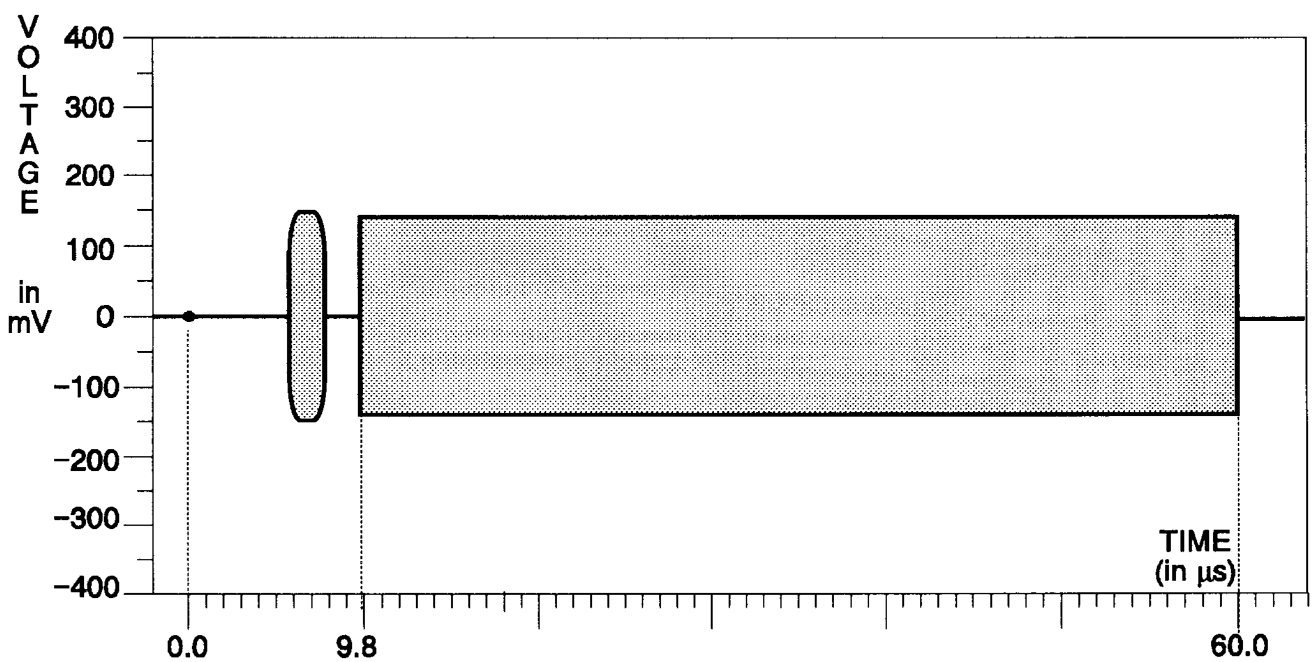


Fig. 3-220. C Channel — Modulated Ramp.

Option 04 Unique Signals — 3-Wire Signals Y, B-Y, R-Y Format

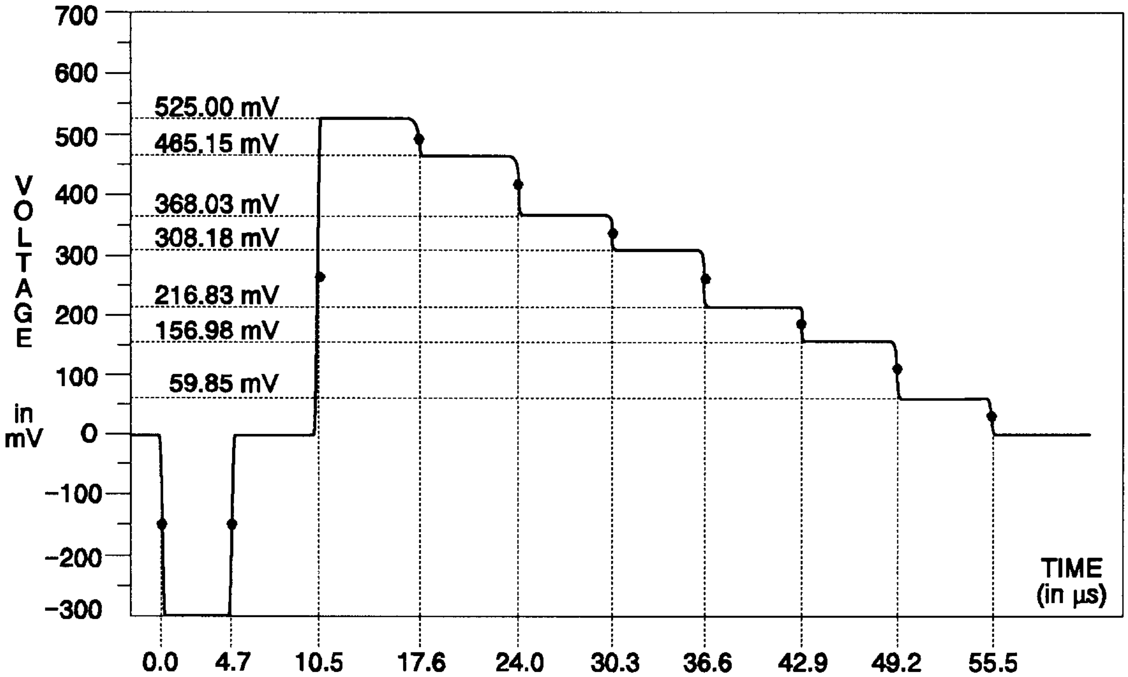


Fig. 3-221. Y Channel — 75% Bars.

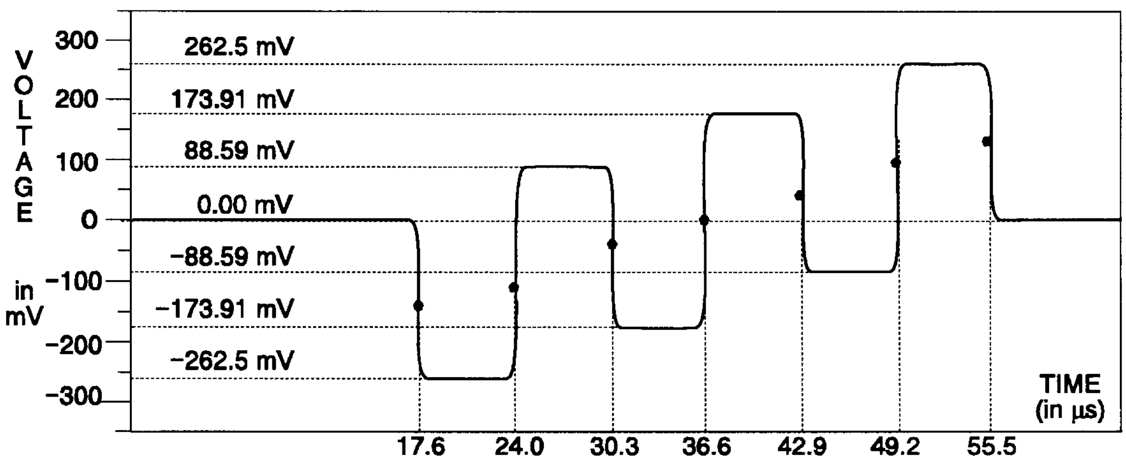


Fig. 3-222. B-Y Channel — 75% Bars.

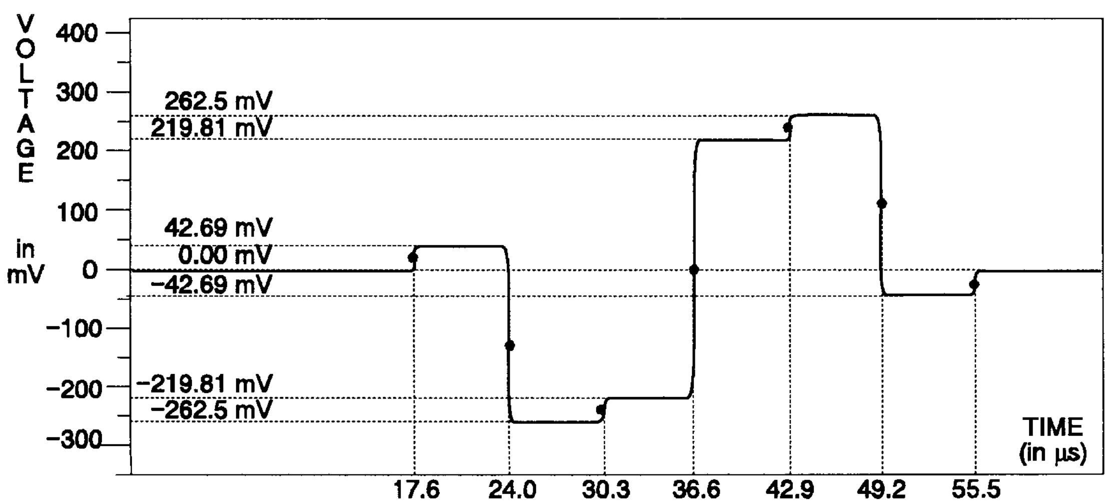


Fig. 3-223. R-Y Channel — 75% Bars.

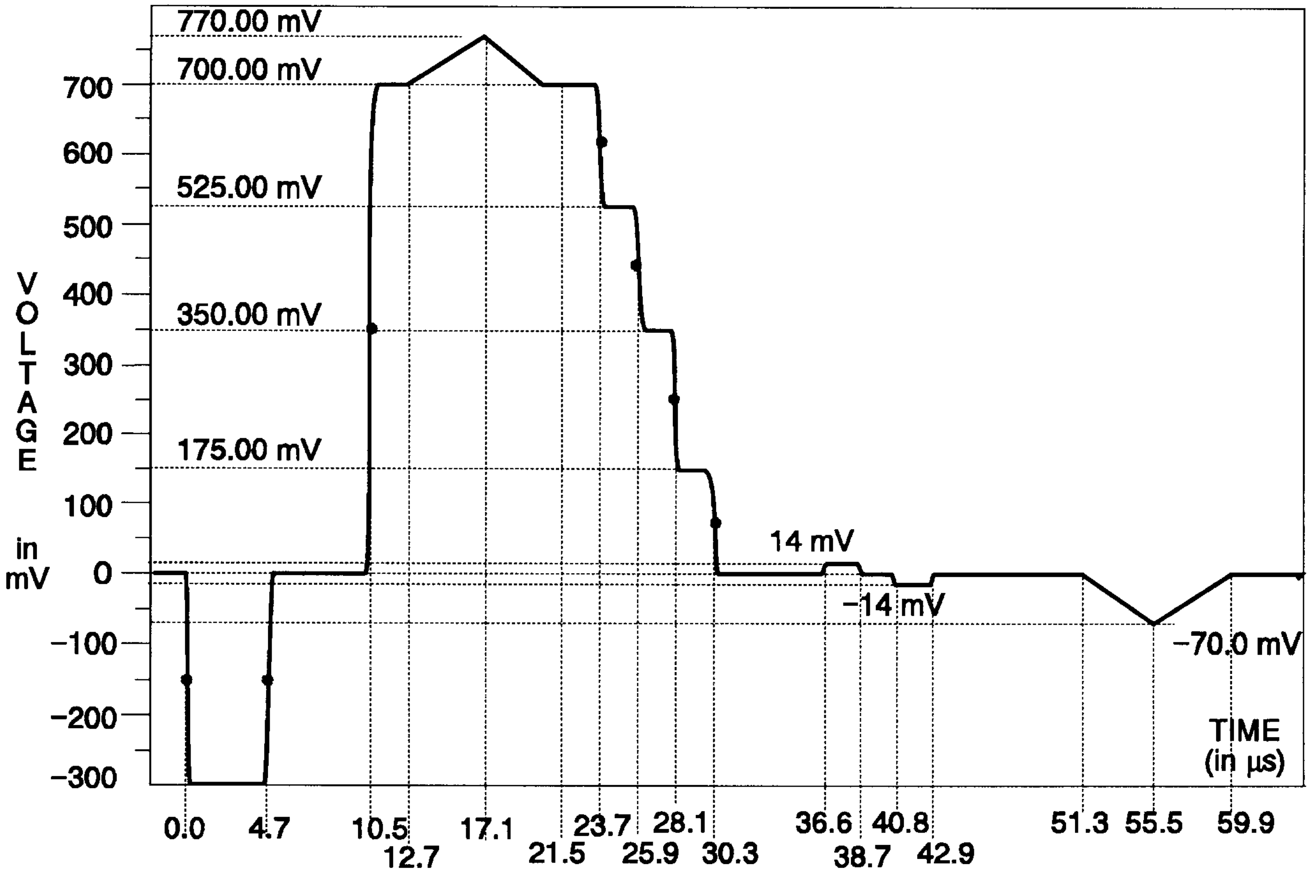


Fig. 3-224. Y Channel — Level Reference.

Fig. 3-225. B-Y & R-Y Channels — Level Reference.

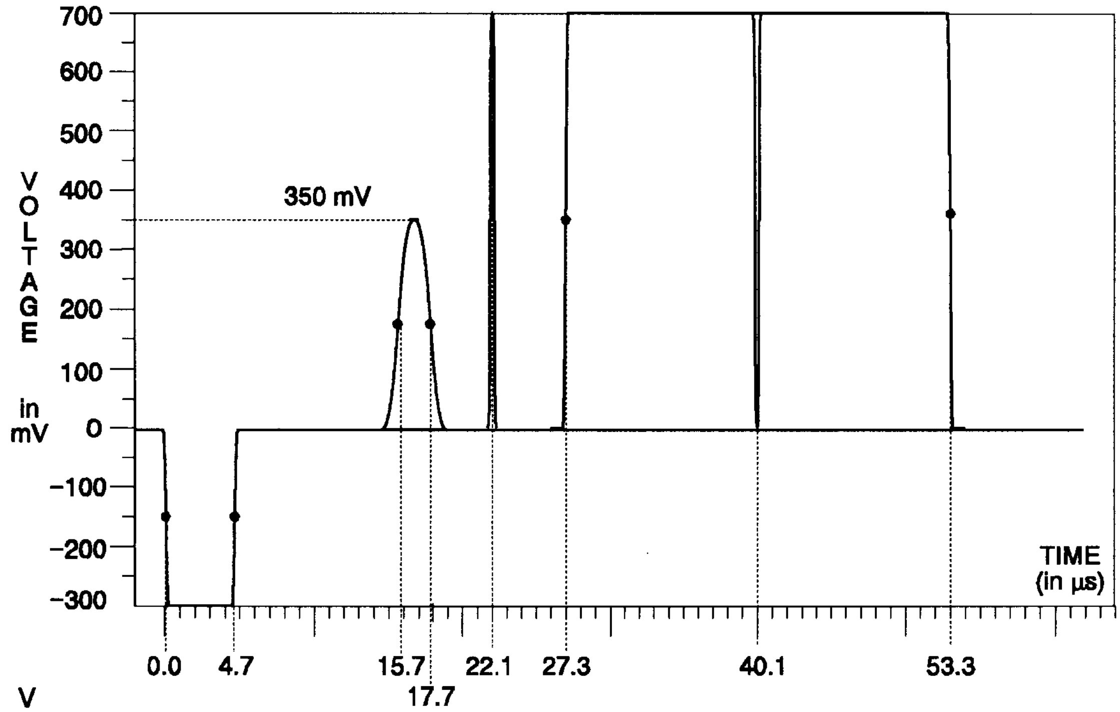


Fig. 3-226. Y Channel — Pulse & Bar.

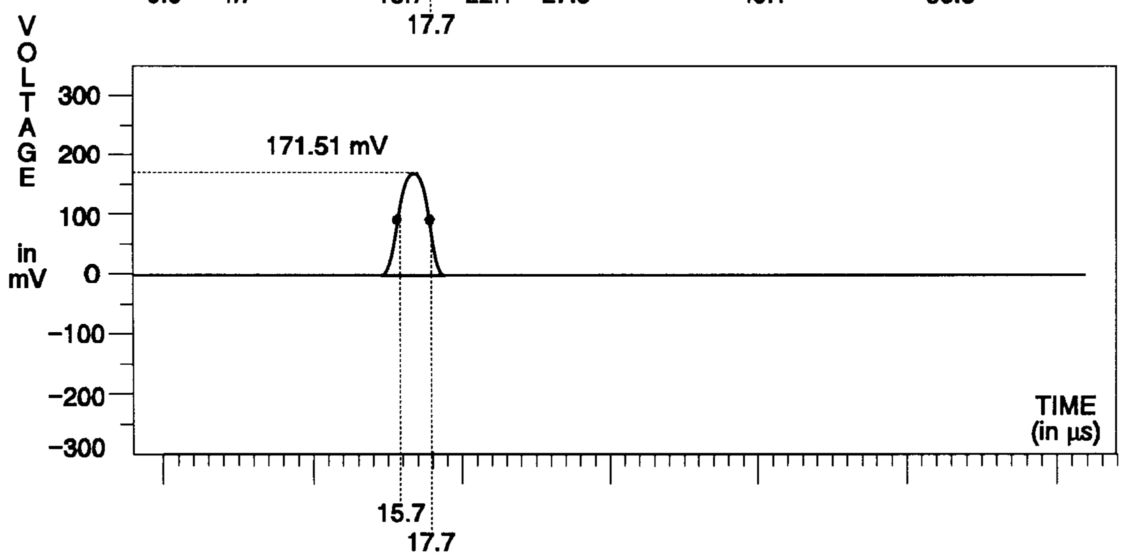


Fig. 3-227. B-Y Channel — Pulse & Bar.

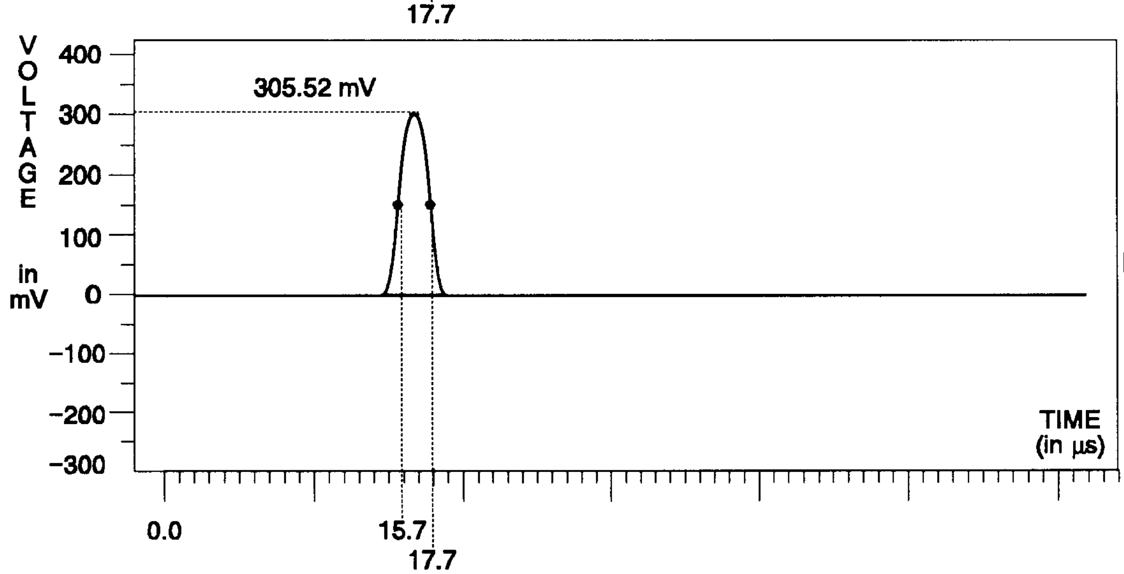


Fig. 3-228. R-Y Channel — Pulse & Bar.

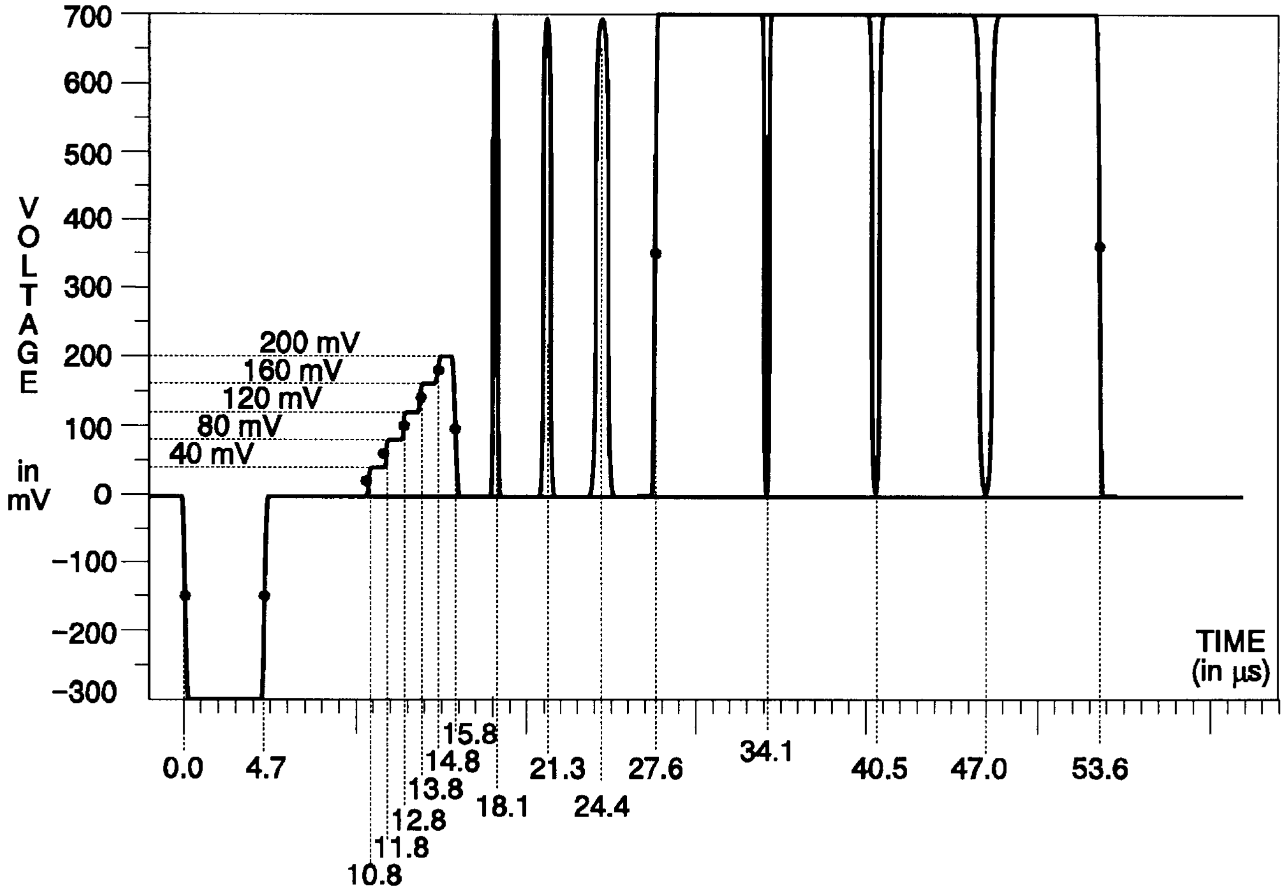


Fig. 3-229. Y Channel — T Pulses.

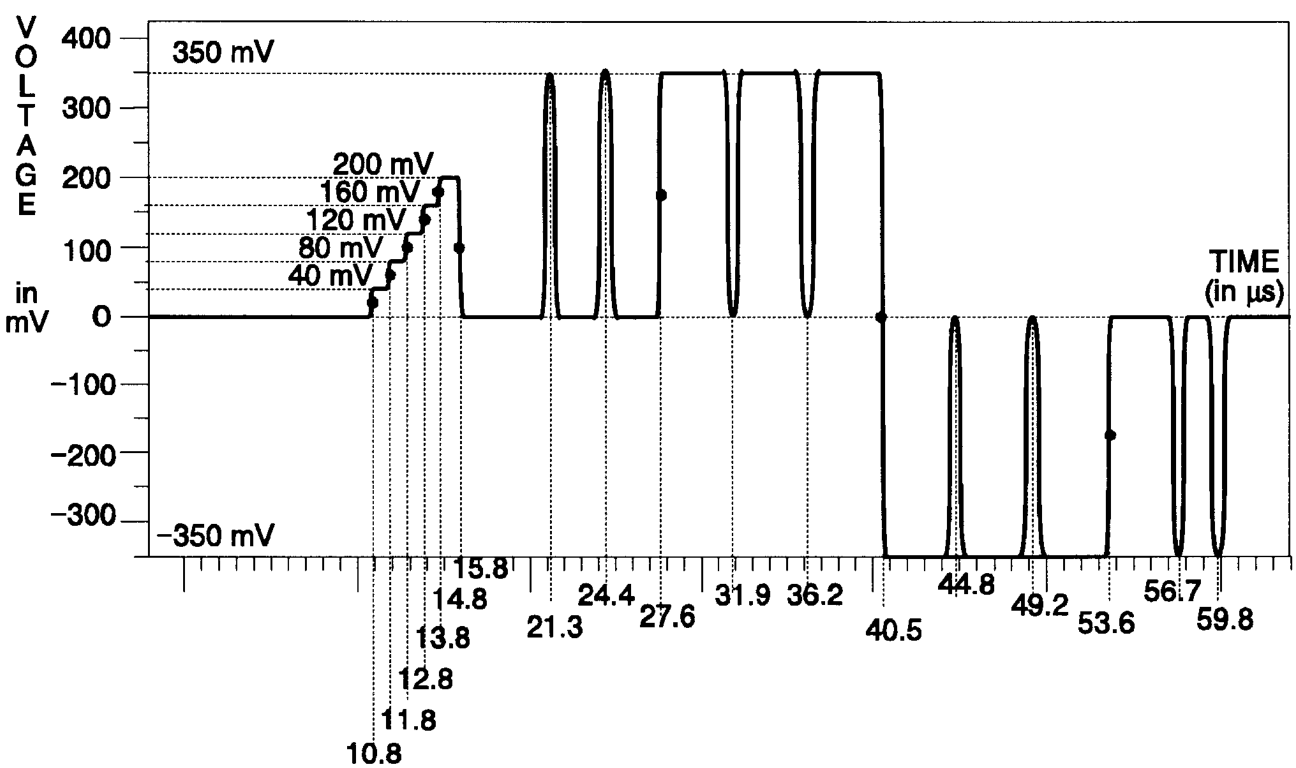


Fig. 3-230. B-Y & R-Y Channels — T Pulses.

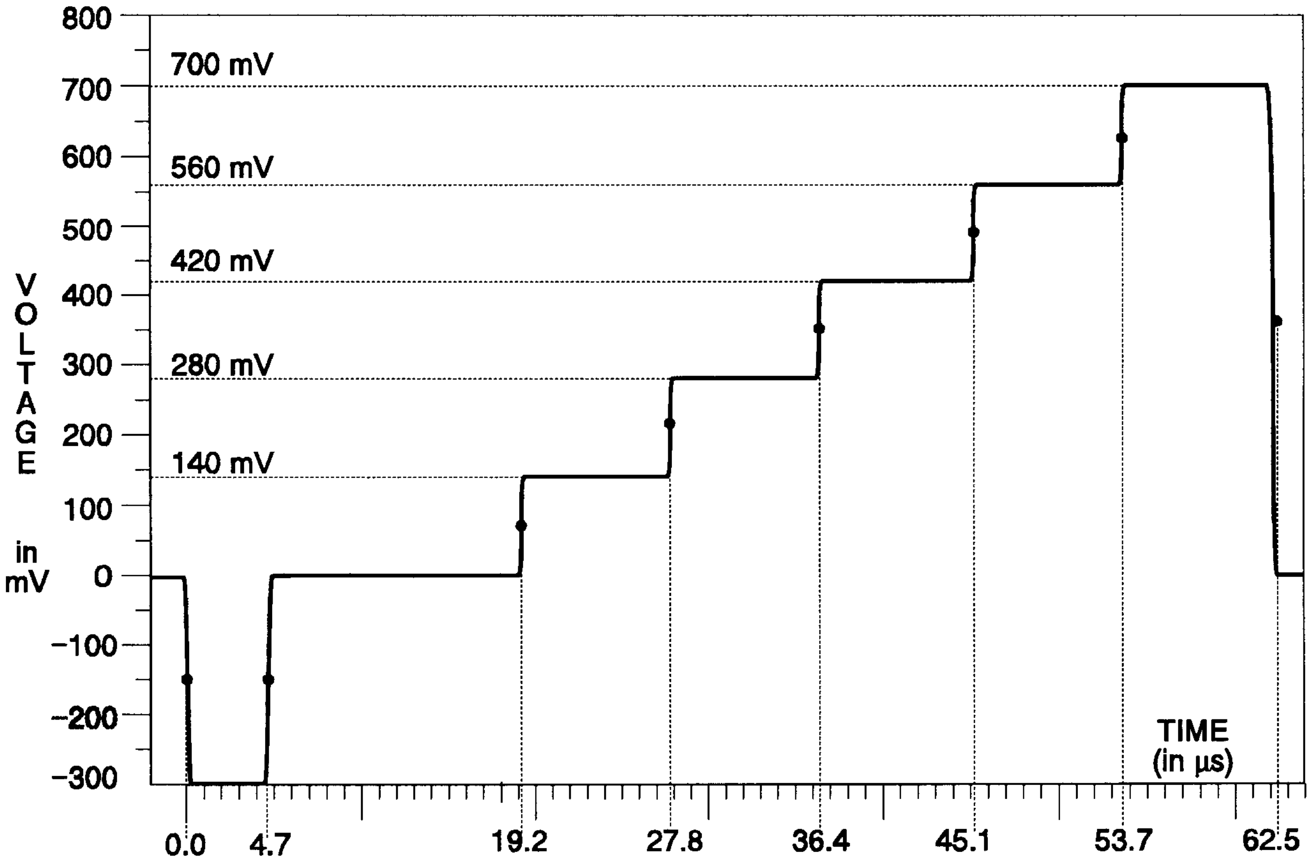


Fig. 3-231. Y Channel — 5-Step.

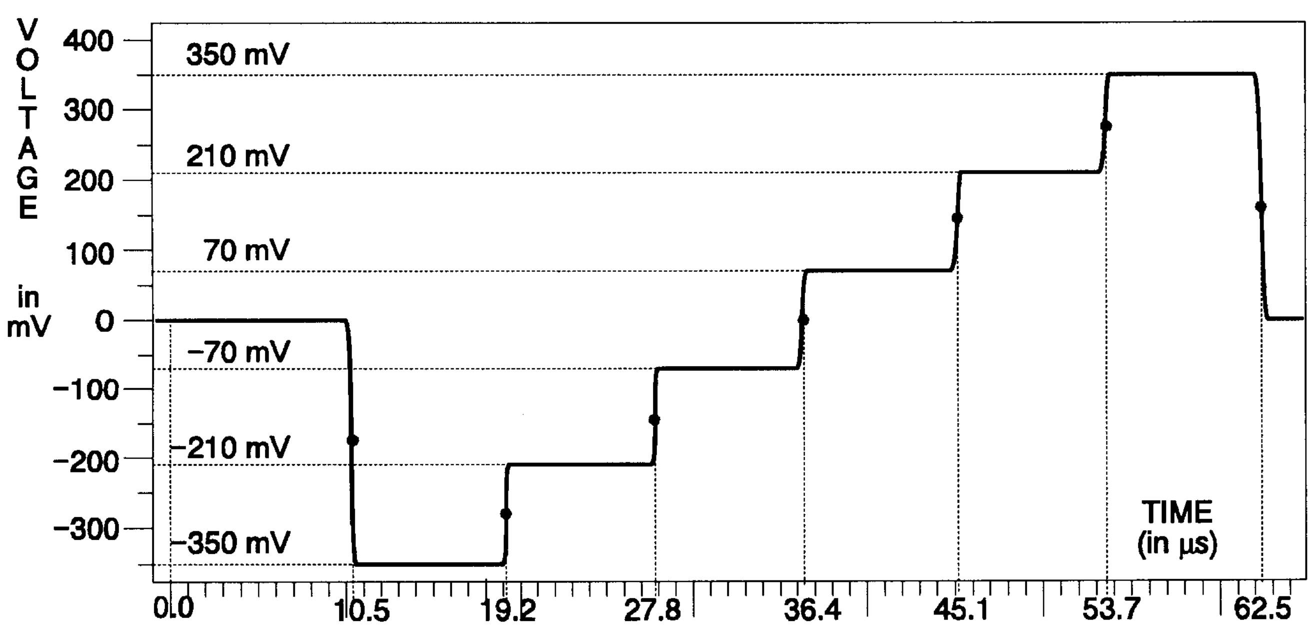


Fig. 3-232. B-Y & R-Y Channels — 5-Step.

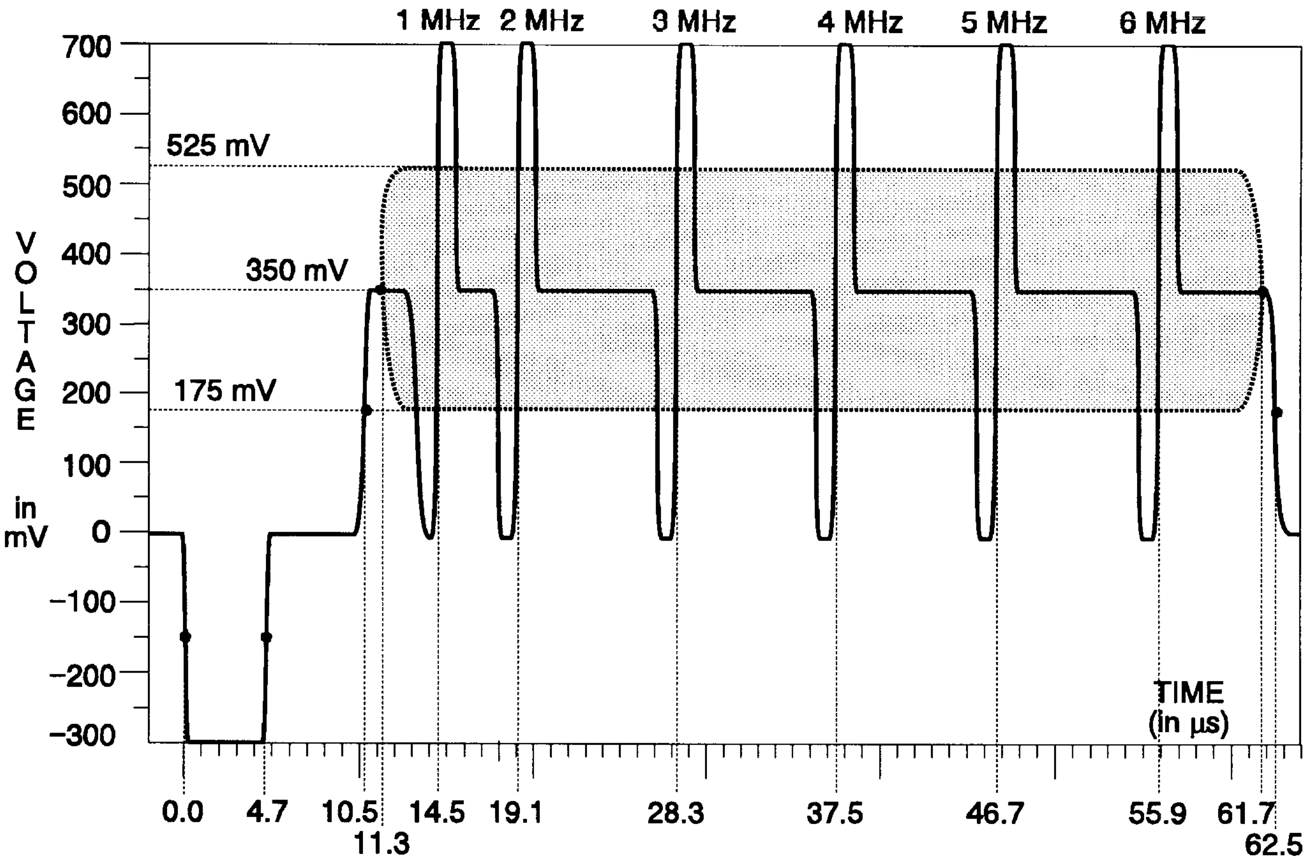


Fig. 3-233. Y Channel — 60% Sweep.

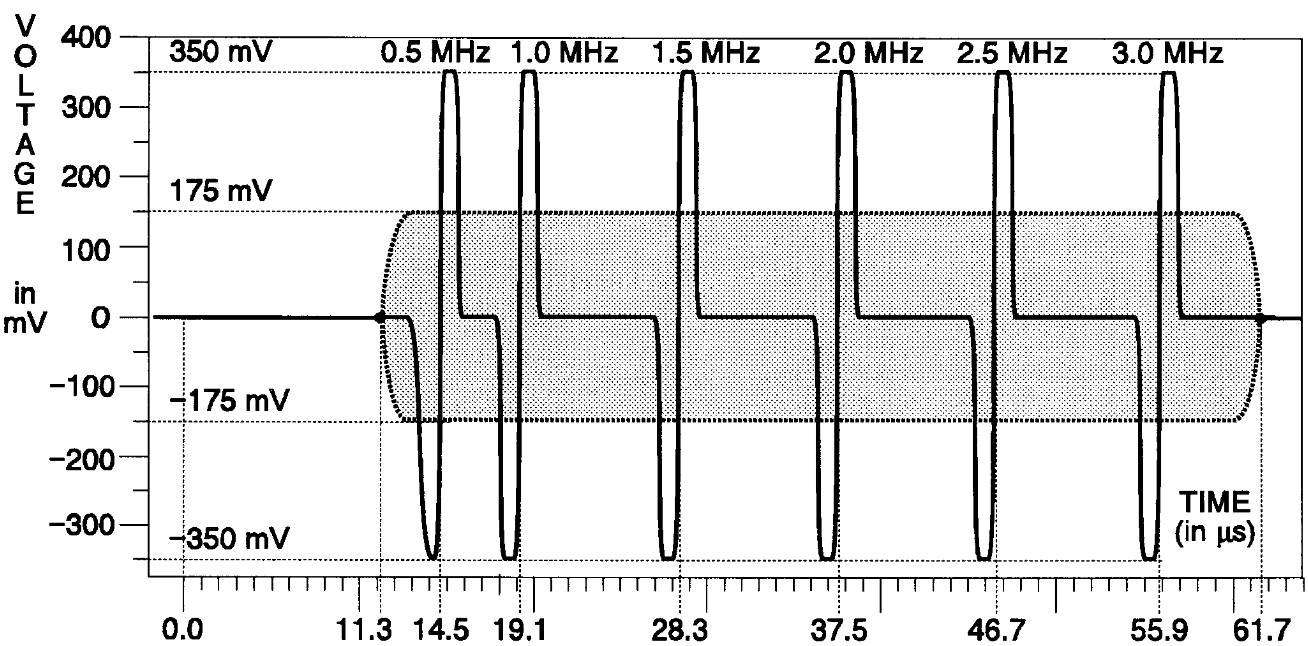


Fig. 3-234. B-Y & R-Y Channels — 60% Sweep.

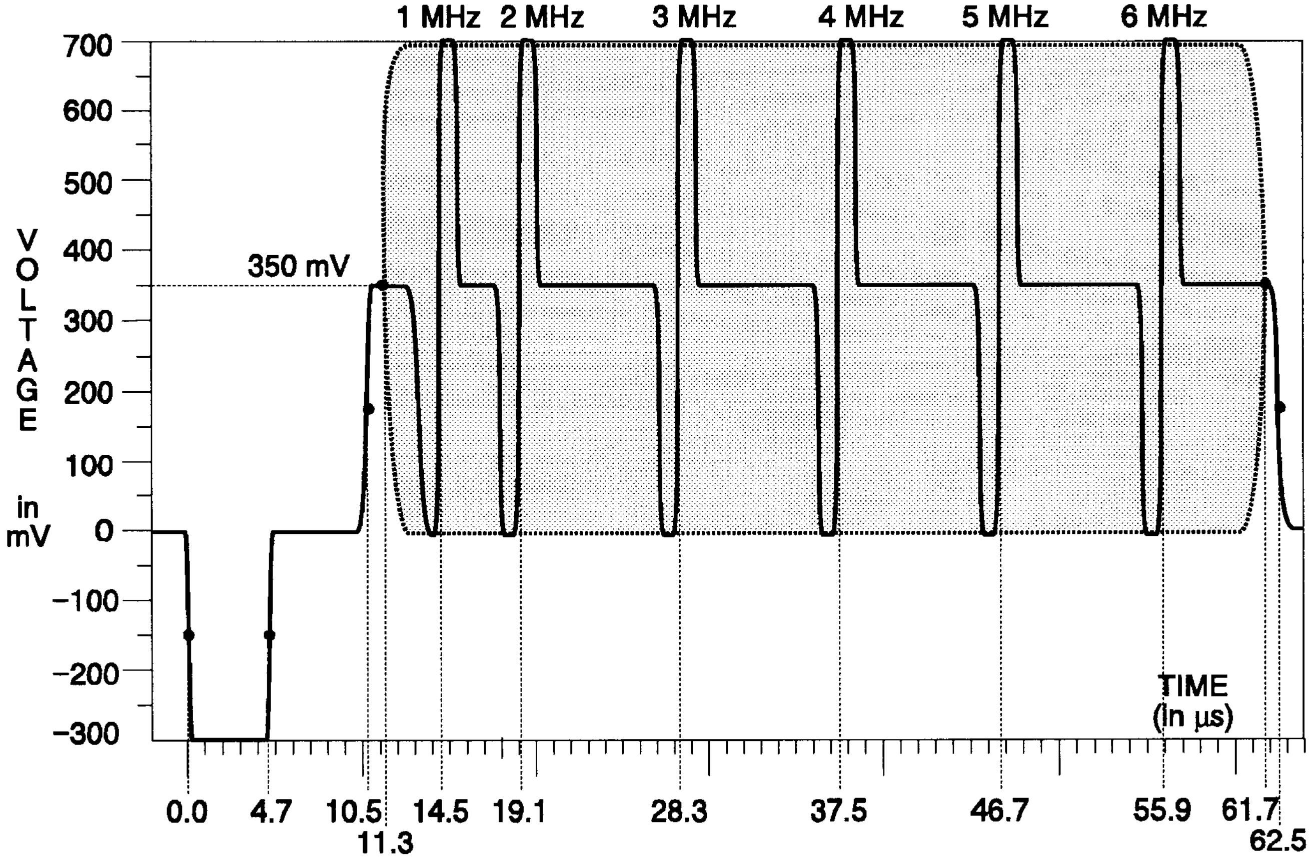


Fig. 3-235. Y Channel — 100% Sweep.

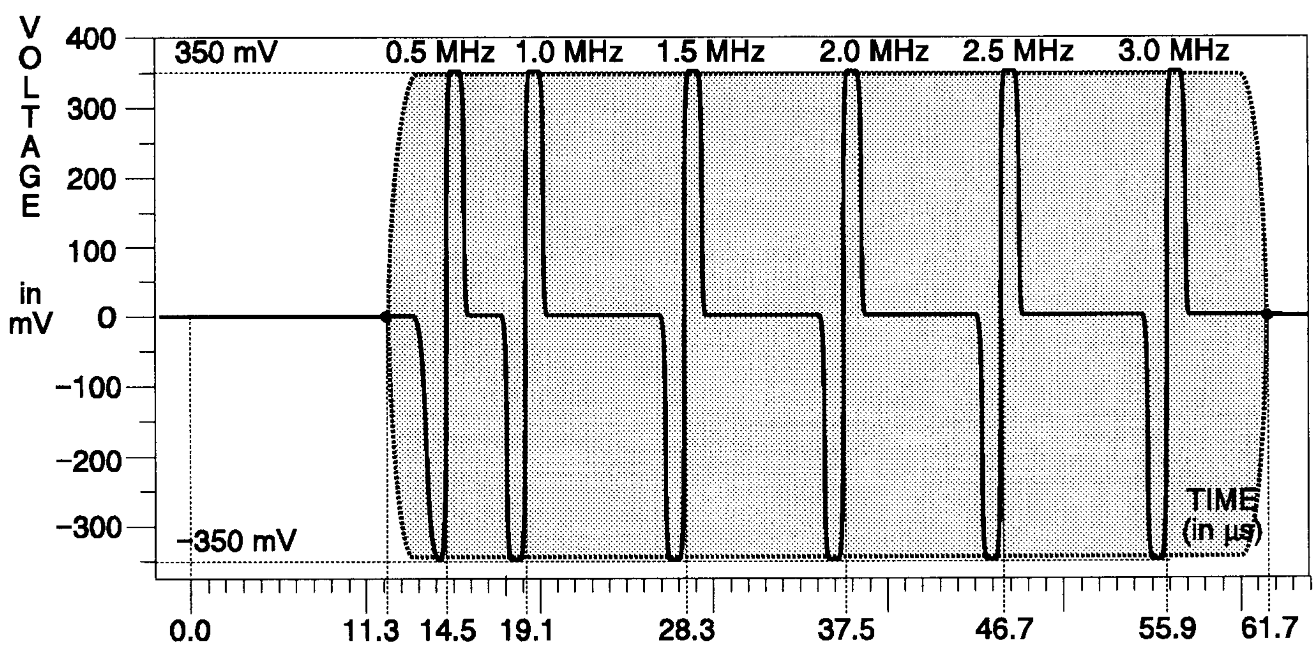


Fig. 3-236. B-Y & R-Y Channels — 100% Sweep.

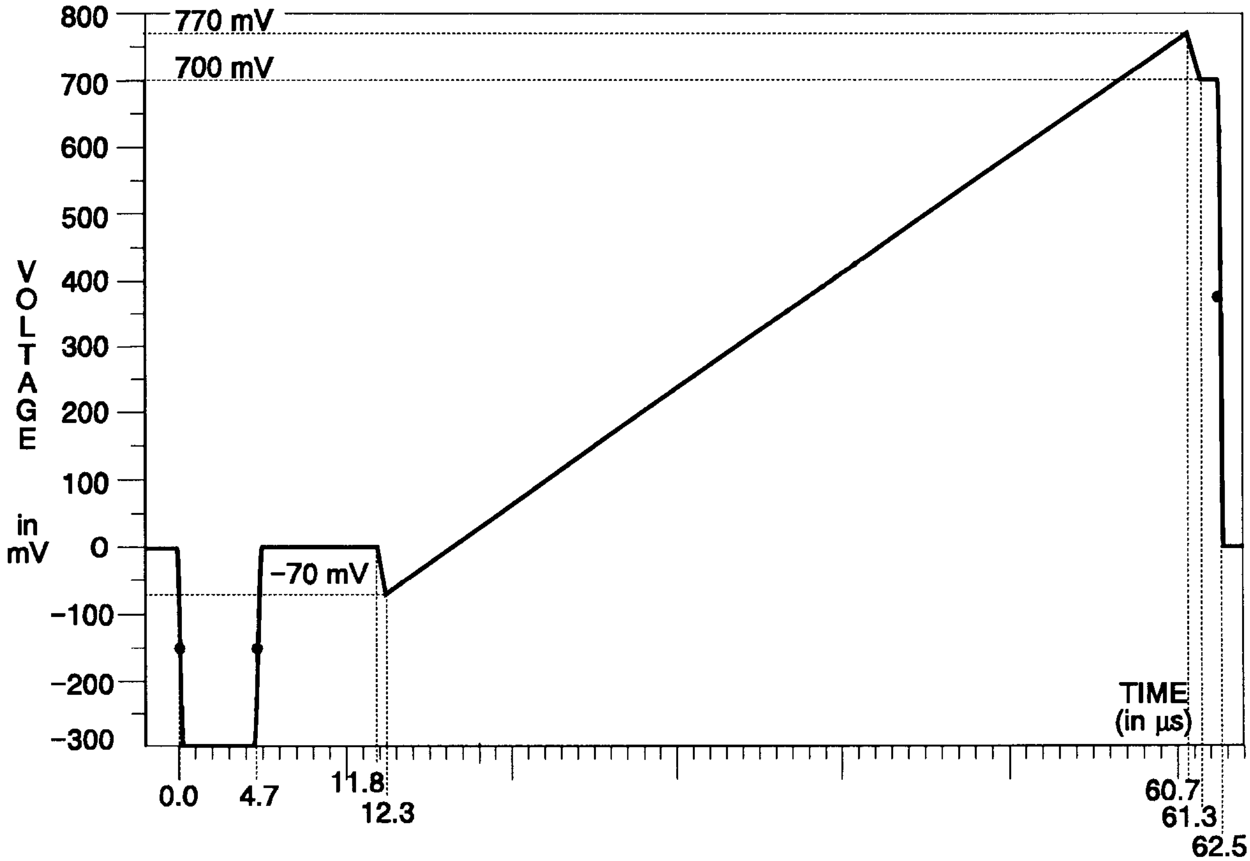


Fig. 3-237. Y Channel — Oversized ramp.

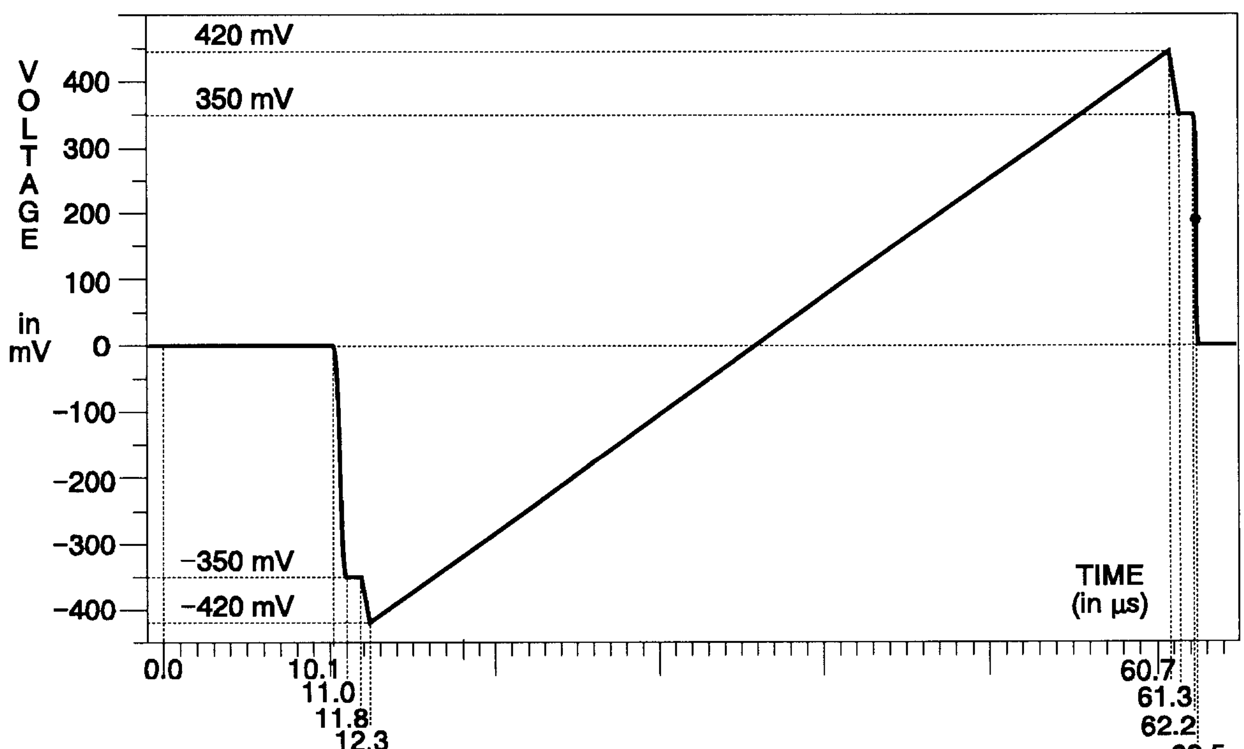


Fig. 3-238. B-Y & R-Y Channels — Oversized Ramp.

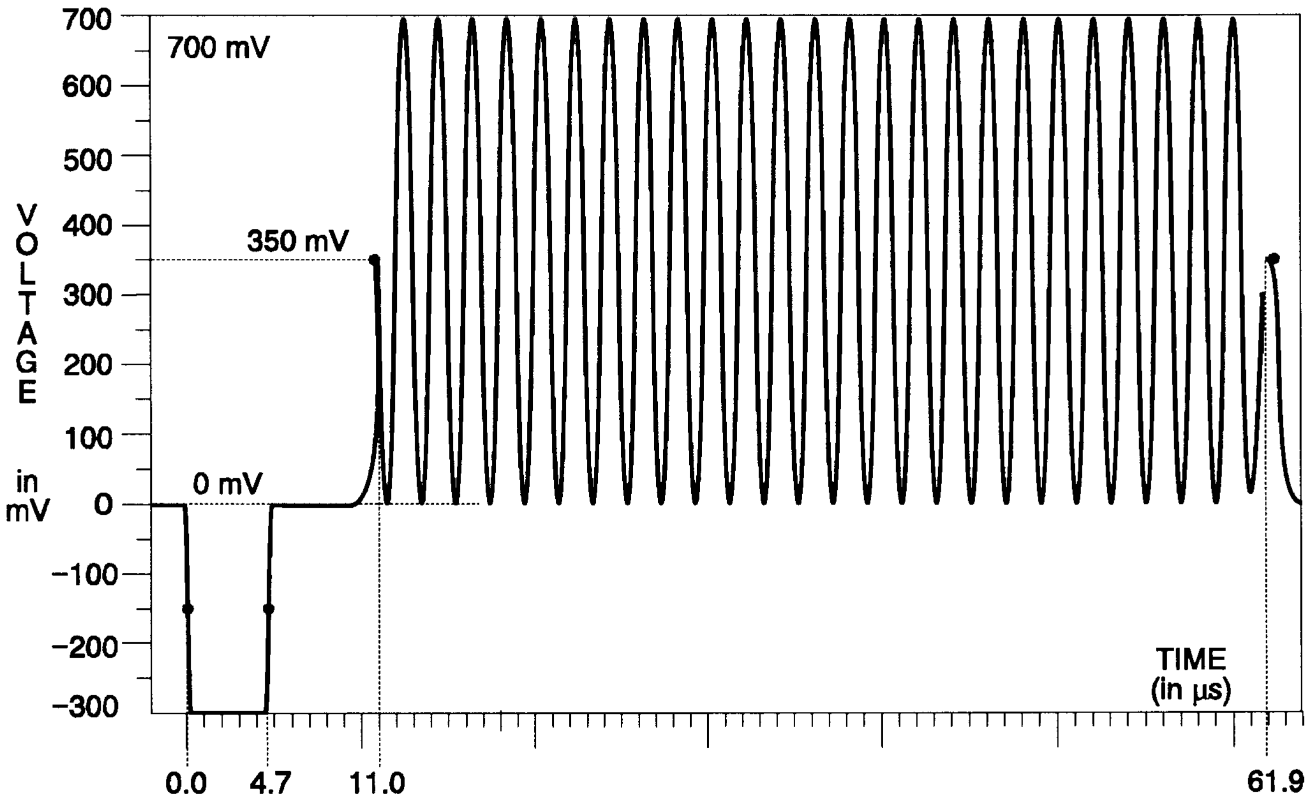


Fig. 3-239. Y Channel — 100% Bowtie.

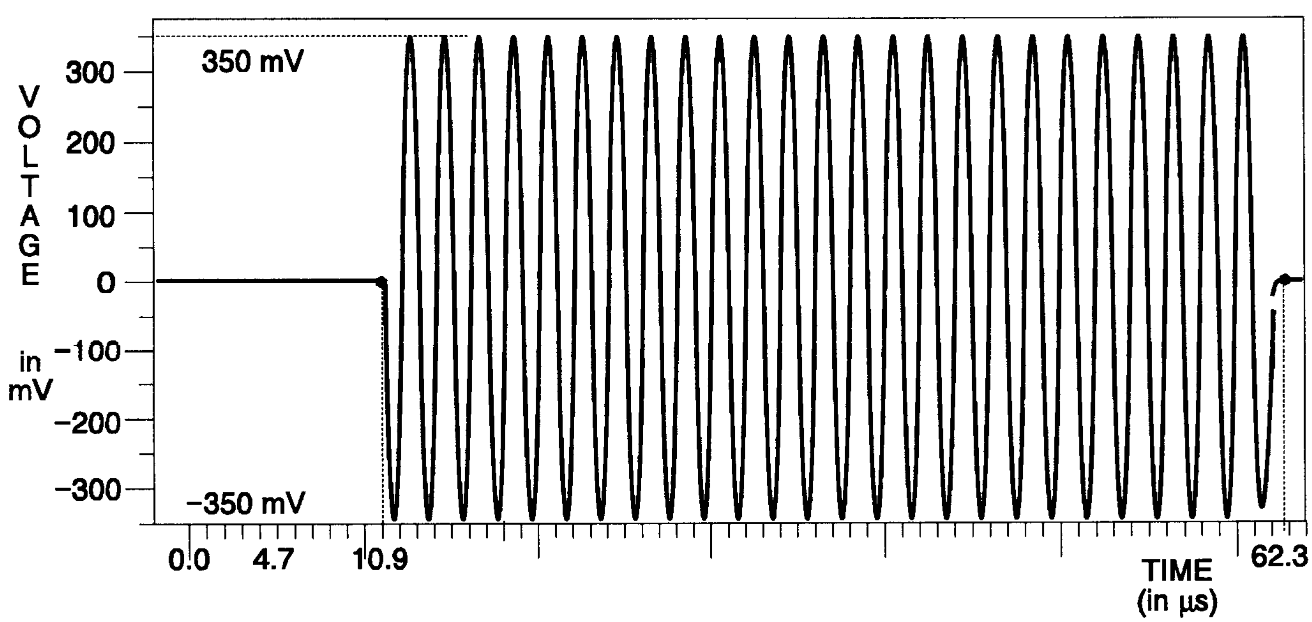


Fig. 3-240. B-Y & R-Y Channels — 100% Bowtie.

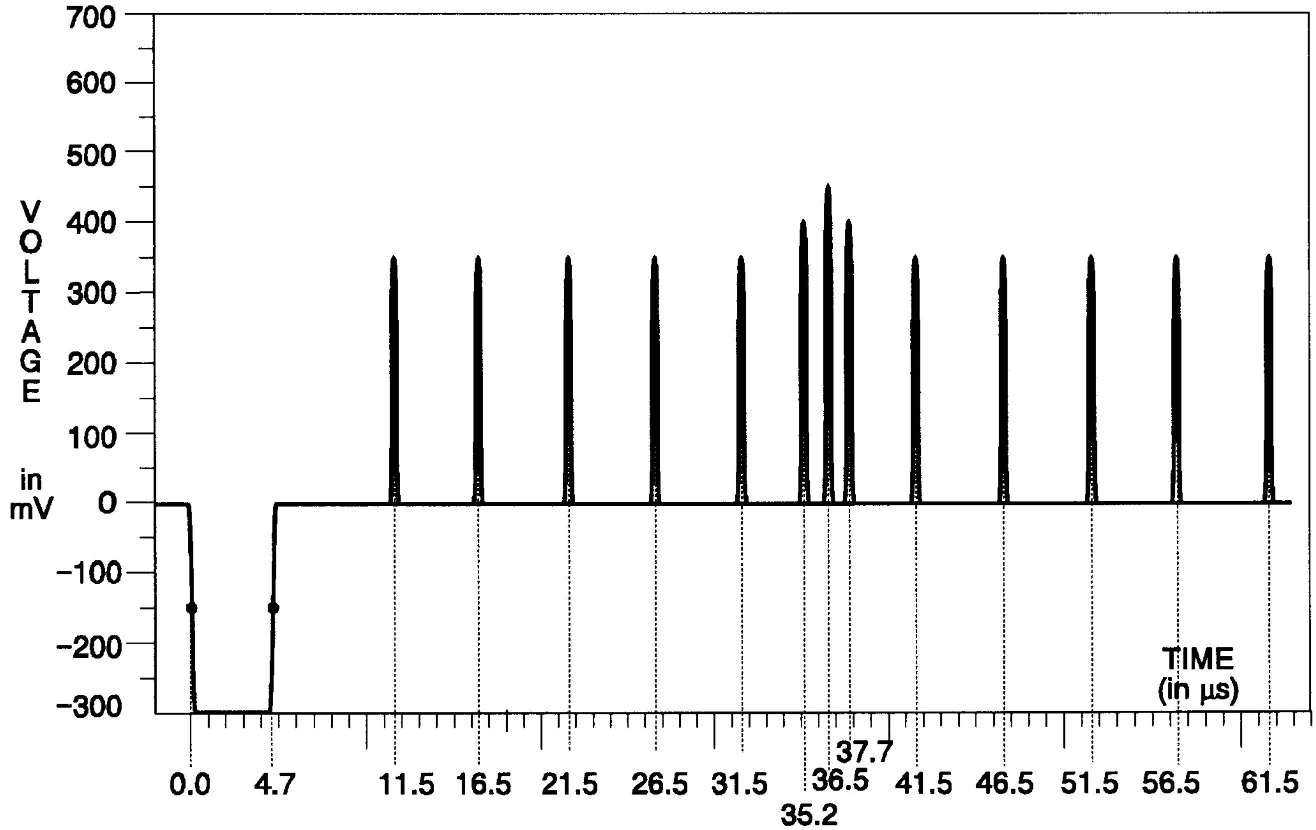


Fig. 3-241. Y Channel — 100% Bowtie Markers.

Option 04 Signals — CTDM (2-Wire) Format

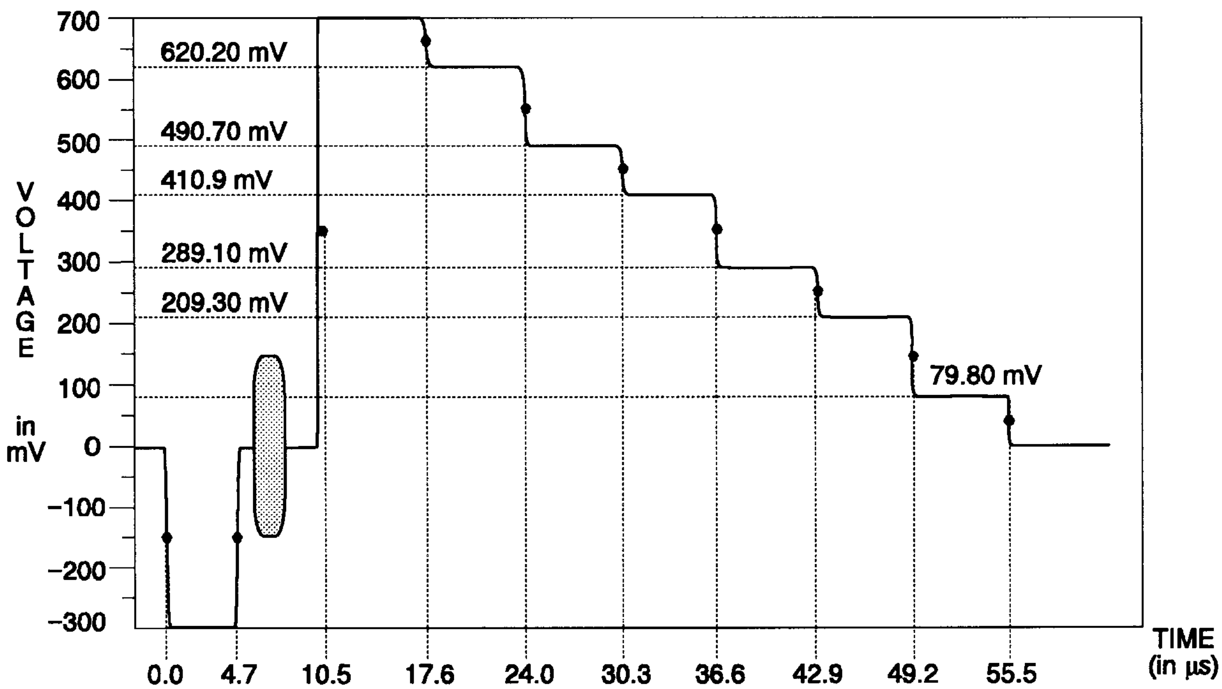


Fig. 3-242. Y Channel — 100% Bars.

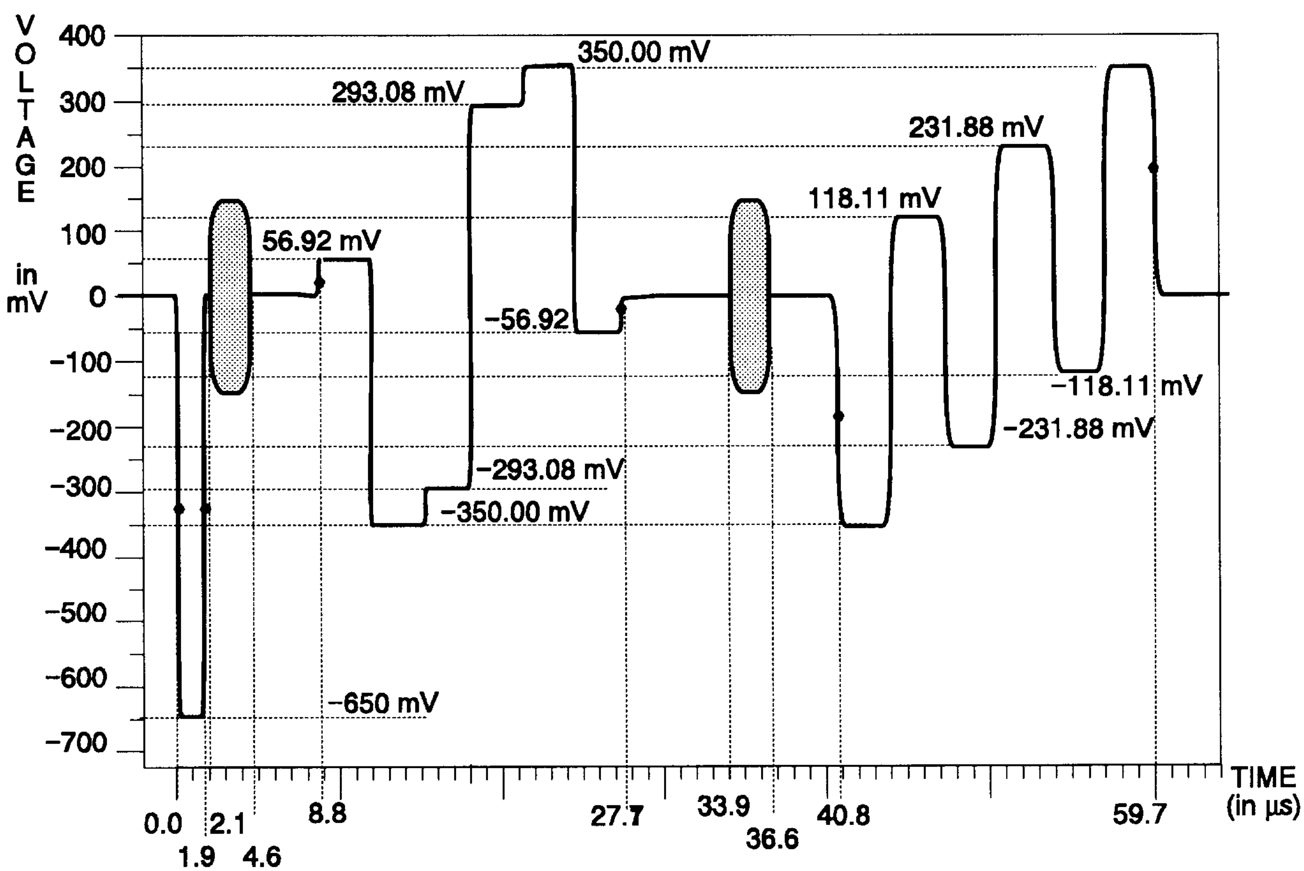


Fig. 3-243. C Channel — 100% Bars.

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

SECTION 4
PERFORMANCE CHECK & ADJUSTMENT PROCEDURE

This section consists of checklists and detailed procedures to use in verifying and adjusting TSG 131A performance parameters.

The order of these procedures has been chosen to minimize changes in equipment setup. Performance parameters may be checked in any order. However, because many adjustment steps are interactive, care must be taken when adjusting individual parameters to ensure that all others remain within specification.

The following is a list of equipment required for Performance Check and Adjustment. The equivalent of this may be used, but the use of inadequate equipment may result in faulty measurements or adjustment.

1. **PAL Video Measurement Set**. For measuring and displaying field-rate and line-rate waveforms, differential phase and gain, and SC/H phase.
   Example: Tektronix 1781R Video Measurement Set.

2. **Frequency Counter.** Must be accurate to within 2.5 Hz out of 5 MHz.
   Example: Tektronix DC 503A: plugs into a TM 503A Power Mainframe.

3. **Distortion Analyzer.** Must test power output over 0 - 8 dBm and be capable of detecting THD of 0.01% or less.
   Example: Tektronix AA501A.

4. **Audio Amplifier**. 600Ω impedance.

NOTE

It is very important for both the Performance Check and the Adjustment Procedure that the length and the propagation delay of the coax cables are identical.

5. **BNC Coax Cables (5).** 75Ω impedance.
   Example: Tektronix part number 012-0074-00.
   Note that it is imparitive that the cable lengths match.

6. **End-Line Terminations (5).** 75Ω terminations equipped with a BNC connector.
   Example: Tektronix part number 011-0102-00.

7. **Audio Connector-to-Triple Banana Cable**.
   Example: ITT Pamona Electronics, Model 4953-J-36. Must be configured to match the TSG 131A audio output. Pin 1, shield; pin 2, +; pin 3, -.

8. **Test Oscilloscope & 1x Probe.** (only needed if Opt. 02, 03, or 04 is installed.) With the following minimum capibilities: 50 MHz bandwidth, 5 ns/div to 5 µs/div sweep speeds, and triggering to 5 MHz.
   Example: Tektronix 2430A Oscilloscope & 1x probe P6101A.

9. **Pozzi-driver tips and hex driver.** For removal of Audio Board. Small disconnects the Audio connectors from the rear panel and Medium is used to remove the cover and Audio board from its standpost.
   Example General Tool 640-121 (small POZIDRIV® tip), 640-122 (medium POZIDRIV® tip), 624-440 (hex driver).

PERFORMANCE CHECK CHECKLIST

Oscillator Frequency

1. Oscillator Frequency
17.734375 MHz ± 40 Hz (20 Hz Opt. 10)

NOTE

After initial delivery or long storage, allow a two-hour warm up to re-age the crystal. Thereafter, a 30 minute warm up is sufficient.

COMPOSITE Test Signal

2. DC Level
$0\ mV_{dc} \pm 50\ mV_{dc}$
3. Sync Amplitude
300 mV ± 1%
4. Burst Amplitude
300 mV ± 2%
5. Steps (5-Step) Staircase Linearity
< 1%
6. Luminance Amplitude Accuracy
± 1%
7. Chrominance Accuracy
± 1%
8. Chrominance-to-Luminance Delay and Gain
≤ 5 ns and ± 1%
9. Line Tilt
± 0.5%
10. Ringing & K_{2T} Factor
≤ 1% of peak & < 0.6%
11. Pulse-to-Bar Ratio
1:1 ± 1%
12. Sine Squared Pulse Accuracy
HADs accurate within 25 ns
13. Horizontal Sync Duration, Vertical Serration Duration, & Equalizing Pulse Duration
Sync = 4.7 µs ± 50 ns
Vertical Serration = 4.7 µs ± 50 ns
Equalizing Pulse = 2.35 µs ± 50 ns
14. Line Blanking Interval
12.0 µs ± 0.15 µs
15. Line Sync Duration
4.7 µs ± 50 ns
16. Sync Rise Times
250 ns ± 25 ns
17. Luminance Rise Times
250 ns ± 25 ns
18. Frequency Response
Flat to 6.0 MHz ± 2%
19. Differential Phase and Gain
0.5° & 0.7% maximum
20. SC/H Phase
$0^{\circ} \pm 5^{\circ}$

Y Channel (Luminance) Output

21. Luminance Amplitude Accuracy
± 1%
22. DC Level
$0\ mV_{dc} \pm 50\ mV_{dc}$
23. Sync Amplitude
300 mV ± 2%
24. Line Sync Duration
4.7 µs ± 50 ns
5.0 µs ± 50 ns for 2 wire BetaCam
25. Steps (5-Step) Staircase Linearity
< 1%
26. Line Time Distortion (Line Tilt)
< 0.5%
27. Ringing & K_{2T} Factor
≤ 1% of peak & < 0.6%
28. Pulse-to-Bar Ratio
1:1 ± 1%
29. Sine Squared Pulse Accuracy
HADs accurate within 25 ns
30. Horizontal Sync Duration, Vertical Serration Duration, & Equalizing Pulse Duration
Sync = 4.7 µs ± 50 ns
Vertical Serration = 4.7 µs ± 50 ns
Equalizing Pulse = 2.35 µs ± 50 ns

C Channel (Chrominance)

31. Chrominance Amplitude
± 1%
32. Burst Amplitude
$300\ mV_{p-p} \pm 2\%$
33. Burst Rise Times
350 ns ± 35 ns
34. Chrominance Rise Times
350 ns ± 35 ns

B-Y Signals

35. B-Y DC Level
$0\ mV_{dc} \pm 50\ mV_{dc}$

36. B-Y Ringing & K_{2T} Factor
    ≤ 1% of peak & < 0.6%
37. B-Y Rise Times
    350 ns ± 35 ns
38. B-Y Sine Squared Pulse Accuracy
    HADs accurate within 25 ns
39. Frequency Response
    Flat to 3.0 MHz ± 1%

R-Y Signals

40. R-Y DC Level
    0 mV_{dc} ± 50 mV_{dc}
41. R-Y Ringing & K_{2T} Factor
    ≤ 1% of peak & < 0.6%
42. R-Y Rise Times
    350 ns ± 35 ns
43. R-Y Sine Squared Pulse Accuracy
    HADs accurate within 25 ns
44. Frequency Response
    Flat to 3.0 MHz ± 1%

Green Channel

NOTE

Before using the GBR signal format, check that the Green Channel has sync enabled. (It can be disabled in some options.) If there is no sync on the Green signal, move jumper J123 to the 2-3 position.

45. Green Frequency Response
    Flat to 6.0 MHz ± 2%
46. Sync Amplitude
    300.0 mV ± 1%

Blue Channel

47. Blue Gain
    ± 1%
48. Blue Frequency Response
    Flat to 6.0 MHz ± 2%
49. Blue Staircase Linearity
    < 1%
50. Line Tilt
    ± 0.5%
51. Pulse-to-Bar Ratio
    1:1 ± 1%

Red Channel

52. Red Frequency Response
    Flat to 6.0 MHz ± 2%
53. Staircase Linearity
    ≤ 1%
54. Red Gain
    ± 1%
55. Line Tilt
    ± 0.5%
56. Pulse-to-Bar Ratio
    1:1 ± 1%

Inter-Channel Timing & Amplitude

57. Y to B-Y Timing
    within 5 ns
58. Y to R-Y Timing
    within 5 ns
59. GBR Amplitude Matching
    ± 0.5%

Audio Outputs

60. Total Harmonic Distortion

BLACK BURST Output Opt. 02 & 03 only

61. BLACK BURST Amplitude
    0 mV ± 50 mV

Color Flag Reference Pulse Option 03 Only

62. Amplitude & Position

Composite Sync Option 02, 03, & 04 Only

63. Timing
    Horizontal Sync 4.7 µs ± 100 ns
    Veritical Serrations 4.7 µs ± 100 ns
    Equalizing Pulses 2.35 µs ± 100 ns
64. Amplitude
    -2.0 V ± 0.4 V
65. Rise & Fall Times
    250 ns ± 50 ns

Color Frame Square Wave Option 04 Only

66. Amplitude & Position

PERFORMANCE CHECK PROCEDURES

Oscillator Frequency

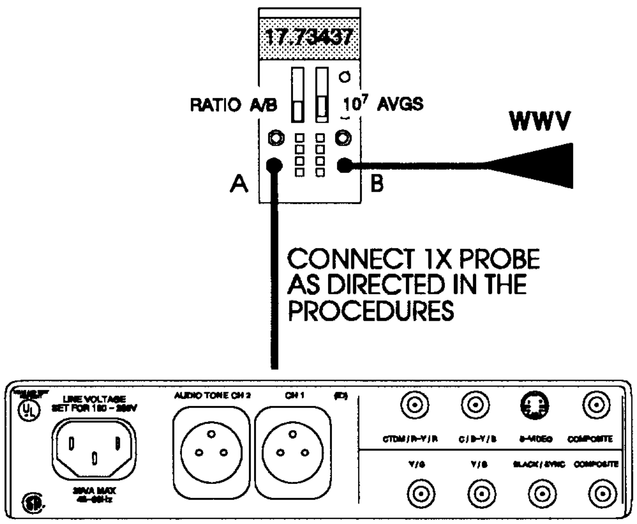


Fig. 4-1. Setup to check the crystal frequency.

1. **Oscillator Frequency**
17.734375 MHz ± 40 Hz (± 20 Hz Opt. 10)

NOTE

After initial delivery or long storage, allow a two-hour warm up to re-age the crystal. Thereafter, 30 minutes warm up is sufficient.

a. Connect the equipment as shown in Fig. 4-1, attaching the probe to W180.

b. Set the frequency counter to count at a rate using ratio A/B.

c. **CHECK** — that the measured oscillator frequency is 17.734375 MHz ± 40 Hz (20 Hz if Opt. 10 is installed) at room temperature.

The following table lists the suggested Tektronix 1781R setup for the Performance Checks.

Table 4-1. Basic setup for the 1781R.

Configure	
Coupling	DC
Vector Grat	INT
WFM Grat	INT
ABS Units	mV
Vector Readout	ON
WFM Readout	ON
Front Panel	
Left Display	VECT
Right Display	WFM
WFM Horizontal	ONE/LINE
REF	INT
Filter	FLAT
Waveform Gain	OFF

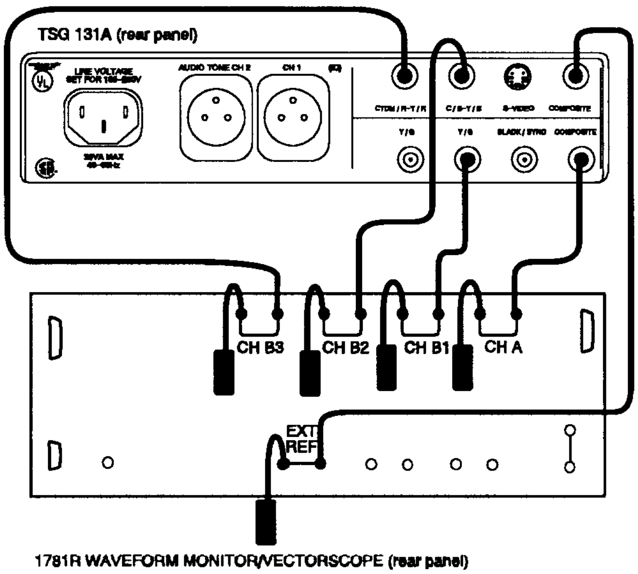


Fig. 4-2. Basic setup for the Performance Checks.

NOTE

If the TSG 131A under check has an optional Black Burst signal installed, use that signal as the waveform monitor EXT REF input.

COMPOSITE Test Signal

2. DC Level
0 mV$_{dc}$ ± 50 mV$_{dc}$

a. Connect the equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the Steps (5-Step) signal in PAL/YC format from the TSG 131A.

d. Confirm that any DC-restorer feature of the waveform monitor is off.

e. Toggle the display between DC coupled and ground reference.

f. Use the vertical position adjustment of the waveform monitor to set the ground line to a convenient reference graticule.

g. Return to DC coupling.

h. **CHECK** — that the blanking level is on the reference graticule ± 50 mV.

3. Sync Amplitude
300 mV ± 30 mV

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the Steps (5-Step) signal in PAL/YC format from the TSG 131A.

d. With the WFM + CAL function of the measurement set match the dc level of the lower waveform to the sync tip of the upper waveform.

e. **CHECK** — that the sync amplitude is 300 mV ± 30 mV.

4. Burst Amplitude
300 mV ± 2%

a. Connect the test equipment as shown in Fig. 4-2.

b. Select any signal from the TSG 131A in the PAL/YC format.

c. Display CH A on the waveform monitor in WFM + CAL mode.

d. If necessary, adjust the measurement set to match the top of the lower burst to the bottom of the upper burst.

e. **CHECK** — for a burst amplitude of 300 mV ± 6 mV.

5. Steps (5-Step) Staircase Linearity
< 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. With the Steps (5-Step) signal selected in the PAL/YC format, set the test equipment to view the signal through the differentiated step filter.

d. **CHECK** — using the voltage cursors, that the difference between the highest and lowest spikes (differentiated steps) is < 1%.

6. Luminance Amplitude Accuracy
± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the 100% Field signal in PAL/YC format from the TSG 131A.

d. Put the waveform monitor in WFM + CAL mode.

e. Set the test equipment to match the top of the lower waveform with the blanking level of the upper waveform.

f. **CHECK** — that the signal amplitude is 700 mV ± 7 mV.

g. Note the value for use in step 8.

7. Chrominance Accuracy
± 1%

a. Connect the test equipment as shown in Fig. 4-2. Keep the waveform monitor in WFM + CAL.

b. Display CH A on the waveform monitor.

c. Select the Chroma Noise signal from the TSG 131A in PAL/YC format.

d. Adjust the test equipment to match the top of the lower waveform with the DC Level of the upper.

e. **CHECK** — that the signal amplitude is 700 mV ± 7 mV.

f. Note the value for use in step 8.

8. Chrominance-to-Luminance Delay and Gain
≤ 5 ns and ± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the Pulse & Bar signal in PAL/YC format from the TSG 131A.

d. Set the waveform monitor to view the bottom of the 20T modulated pulse.

e. Use the Chroma/Luma measurement mode of the Tektronix 1781R to measure both C/Y delay and gain.

f. **CHECK** — that the delay is < 5 ns and the gain is < 1%.

g. Compare the measured values for luminance amplitude (from part 6.) and chrominance amplitude (from part 7.)

h. **CHECK** — that these numbers are equal within 7 mV (1%).

i. Use whichever value is greater (from part f or part h) for the C/Y gain.

9. Line Tilt
± 0.5%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the 100% Field signal in PAL/YC format from the TSG 131A.

d. If necessary, normalize the signal gain so that the blanking level of the waveform is on the baseline and the top of the signal passes through 1000 mV at its midpoint.

e. Center the signal over a horizontal graticule.

f. **CHECK** — that the line tilts no more than 0.5% (3.5 mV_{p-p}) over its length. Ignore the first and last microsecond of the bar.

10. Ringing & K_{2T} Factor
≤ 1% of peak & < 0.6%

a. Connect the test equipment as shown in Fig. 4-2.

b. With the TSG 131A's Pulse & Bar in PAL/YC format still selected, set the waveform monitor to display the bottom of the 2T pulse.

c. **CHECK** — using the voltage cursors or graticule, that the ringing is < 1% (7 mV).

d. Use the 1781R's special measurement feature to measure the K_{2T} Factor.

e. **CHECK** — that the K_{2T} Factor is < 0.6%.

11. Pulse-to-Bar Ratio
1:1 ± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the Pulse & Bar signal in PAL/YC format from the TSG 131A.

d. Set the waveform monitor to display the tip of the inverted pulse of the Pulse and Bar signal.

e. **CHECK** — that the inverted pulse tip is within 1% of blanking level, using the WFM + CAL signal.

12. Sine Squared Pulse Accuracy
HADs accurate within 25 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor in the line display mode.

c. Set the waveform monitor to display the 2T pulse on the Pulse and Bar signal in PAL/YC format.

d. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

e. Using the timing cursors, measure the time between the 500 mV points.

f. **CHECK** — that the HAD of the 2T pulse is 200 ns ± 25 ns.

13. Horizontal Sync Duration, Vertical Serration Duration, & Equalizing Pulse Duration
Sync = 4.7 μs ± 50 ns
Vertical Serration = 4.7 μs ± 50 ns
Equalizing Pulse = 2.35 μs ± 50 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select any signal from the TSG 131A in the PAL/YC format.

d. Use the variable vertical gain to normalize the sync to 0 - 1000 mV.

e. **CHECK** — that horizontal sync duration between 50% points is 4.7 μs ± 50 ns.

f. Set the waveform monitor to display the serrations and equalizing pulses in the vertical interval.

g. **CHECK** — that the half-amplitude duration of the vertical serrations is 4.7 μs ± 50 ns.

h. **CHECK** — that the half-amplitude duration of the equalizing pulses is 2.35 μs ± 50 ns.

14. Line Blanking Interval
12.0 μs ± 0.15 μs

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor in 2 line mode.

c. Select the 100% Field signal in PAL/YC format from the TSG 131A.

d. Set the waveform monitor to display horizontal blanking.

e. **CHECK** — that the horizontal blanking interval is 12.0 μs ± 0.15 μs between the 50% points of the signal.

15. Line Sync Duration
4.7 μs ± 50 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor in the line display mode.

c. Set the waveform monitor to display the sync on any TSG 131A test signal in PAL/YC format.

d. Use the variable gain control to normalize the sync to 700 mV and set the top and bottom of the sync to 700 and 0 mV respectively.

e. Using the timing cursor, measure the time from the 350 mV points of the sync.

f. **CHECK** — that the sync duration is 4.7 μs ± 50 ns.

16. Sync Rise Times
250 ns ± 25 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Set the waveform monitor to display the sync on any TSG 131A test signal in PAL/YC format.

d. Identify the 10% and 90% points of the sync transitions. This can be done with voltage cursors or graticule, and may be aided by using variable gain to normalize the sync to 1000 mV.

e. **CHECK** — that rise time between 10% and 90% is 250 ns ± 25 ns, using the timing cursors.

17. Luminance Rise Times
250 ns ± 25 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Set the TSG 131A to output the 100% Field signal in the PAL/YC format.

c. Display CH A on the waveform monitor.

d. Set the waveform monitor to display the rise from 0 - 1000 mV.

e. Use the variable vertical gain to normalize the signal to 0 - 1000 mV and use the horizontal magnification to display the rise on the waveform monitor.

f. Use the timing cursors to measure the rise time from the 100 mV graticule (10%) to the 900 mV graticule (90%).

g. **CHECK** — that rise time is between 250 ns ± 25 ns.

18. Frequency Response
Flat to 6.0 MHz ± 2%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor.

c. Select the Sweep signal in PAL/YC format from the TSG 131A.

d. **CHECK** — that the Sweep flat within 2% to 6.0 MHz.

19. Differential Phase and Gain
0.5° & 0.7% maximum

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor using internal reference.

c. Select the Mod Ramp signal in PAL/YC format from the TSG 131A.

d. Set the 1781R to measure differential phase. (Use the double trace method, if possible.)

e. **CHECK** — for differential phase of ≤ 0.5°.

f. Set the test equipment to measure differential gain. (Again, use a double trace, if possible.)

g. **CHECK** — that the differential gain of the modulated ramp is ≤ 0.7%.

20. SC/H Phase
0° ± 5°

NOTE

Accurate SC/H measurements may be difficult without test equipment having modes intended for that purpose. The SC/H phase error in TSG 131A test signals is typically less than 1°.

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH A on the waveform monitor using ***internal reference***. (Internal reference is necessary for this measurement to measure the absolute SC/H phase of the signal instead of the SC/H relative to the external reference.)

c. Select any test signal in PAL/YC format from the TSG 131A.

d. Confirm that the measurement set is internally referenced and set it to display the SC/H phase of the signal.

e. **CHECK** — that the SC/H phase error is < 5°.

f. Return the waveform monitor to external reference.

Y Channel (Luminance) Output

21. Luminance Amplitude Accuracy
± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Select the 100% Field signal in PAL/YC format from the TSG 131A.

d. With the WFM + CAL function of the measurement set match the top of the lower 100% Field waveform with the blanking level of the upper waveform.

e. **CHECK** — that the 100% Field amplitude is 700 mV ± 7 mV (1%).

22. DC Level
0 mV_{dc} ± 50 mV_{dc}

a. Connect the equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Select the Steps (5-Step) signal in PAL/YC format from the TSG 131A.

d. Confirm that any DC-restorer feature of the monitor or oscilloscope is off.

e. Toggle the display between DC coupled and ground reference.

f. Use the vertical position adjustment of the waveform monitor to set the ground line to a convenient reference graticule.

g. Switch back to DC coupling.

h. **CHECK** — that the blanking level is on the reference graticule ± 50 mV.

23. Sync Amplitude
300 mV ± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Select any signal from the TSG 131A in the PAL/YC format.

d. Using the WFM + CAL, match the signal level of the lower waveform to the sync tip of the upper waveform.

e. **CHECK** — that the sync amplitude is 300 mV ± 1%.

f. Select the 0% Field from the TSG 131A in the Y/CTDM format.

g. Using the WFM + CAL, match the blanking level of the lower waveform to the sync tip of the upper waveform.

h. **CHECK** — that the sync amplitude is 300 mV ± 1%.

i. Select the 0% Field from the TSG 131A in the Y, B-Y, R-Y format.

j. Using the WFM + CAL, match the signal level of the lower waveform to the sync tip of the upper waveform.

k. **CHECK** — that the sync amplitude is 300 mV ± 1%.

24. Line Sync Duration
4.7 µs ± 50 ns
5.0 µs ± 50 ns for 2 wire BetaCam

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor in the line display mode.

c. Set the waveform monitor to display the sync on any TSG 131A test signal in the PAL/YC mode.

d. Use the variable gain control to normalize the sync to 1000 mV and set the top and bottom of the sync to 1000 and 0 mV respectively.

e. Using the timing cursor, measure the time from the 50% (500 mV graticule) points of the sync.

f. **CHECK** — that the sync duration is 4.7 µs ± 50 ns.

NOTE

Only do the rest of these steps (g through j) if the instrument is standard or one of the BetaCam options is installed.

g. Set the waveform monitor to display the sync on any TSG 131A test signal in the Y/CTDM mode using internal reference.

h. Use the variable gain control to normalize the sync to 1000 mV and set the top and bottom of the sync to 1000 and 0 mV respectively.

i. Using the timing cursor, measure the time from the 50% (500 mV gratitule) points of the sync.

j. **CHECK** — that the sync duration is 5.0 µs ± 50 ns.

25. Steps (5-Step) Staircase Linearity
< 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Select the Steps (5-Step) signal in PAL/YC format. Set the test equipment to view the Y output through the Differentiated Step filter.

d. **CHECK** — using the voltage cursors, that the difference between the highest and lowest spikes (differentiated steps) is no greater than 1%.

26. Line Time Distortion (Line Tilt)
< 0.5%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Select the 100% Field signal from the TSG 131A in PAL/YC format.

d. Normalize the signal gain so that the blanking level of the waveform is on the baseline and the top of the signal passes through 1000 mV at the midpoint of the line tilt.

e. Center the bar horizontally over a graticule.

f. **CHECK** — that the signal tilts no more than 0.5% (3.5 mV absolute or 5 mV graticule) over its length. Ignore the first and last microsecond of the signal.

27. Ringing & K_{2T} Factor
≤ 1% of peak & < 0.6%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Select the Pulse & Bar signal in PAL/YC format from the TSG 131A.

d. Normalize the signal gain so that the blanking level of the waveform is on the baseline and the top of the 2T pulse is at 1000 mV

e. Set the equipment to display the bottom of the 2T pulse at line rate.

f. **CHECK** — with voltage cursors or graticule that ringing is < 1% (7 mV peak).

g. Use the special measurement mode of the 1781R to measure the K_{2T} Factor.

h. **CHECK** — that the K_{2T} Factor is < 0.6%.

28. Pulse-to-Bar Ratio
1:1 ± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor.

c. Set the waveform monitor to display the tip of the inverted pulse of the Pulse & Bar with signal in PAL/YC format.

d. **CHECK** — that the inverted pulse tip is within 1% (7 mV) of blanking level, using the WFM+CAL signal.

29. Sine Squared Pulse Accuracy
HADs accurate within 25 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B1 on the waveform monitor in the line display mode using internal reference.

c. Set the waveform monitor to display the 2T pulse on the T Pulses signal in Y, B-Y, R-Y format.

d. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

e. Using the timing cursors, measure the time between the 50% points (500 mV graticule).

f. **CHECK** — that the HAD of the 2T pulse is 200 ns ± 25 ns.

g. Set the waveform monitor to display the 3T pulse on the T Pulses signal in Y, B-Y, R-Y format.

h. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

i. Using the timing cursors, measure the time between the 50% points (500 mV graticule).

j. **CHECK** — that the HAD of the 3T pulse is 300 ns ± 25 ns.

k. Set the waveform monitor to display the 5T pulse on the T Pulses signal in Y, B-Y, R-Y format.

l. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

m. Using the timing cursors, measure the time between the 50% points (500 mV graticule).

n. **CHECK** — that the HAD of the 5T pulse is 500 ns ± 25 ns.

30. Horizontal Sync Duration, Vertical Serration Duration, & Equalizing Pulse Duration
Sync = 4.7 µs ± 50 ns
Vertical Serration = 4.7 µs ± 50 ns
Equalizing Pulse = 2.35 µs ± 50 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Select any signal in the PAL/YC format.

c. Display CH B1 on the waveform monitor.

d. **CHECK** — that horizontal sync duration between 50% points is 4.7 µs ± 50 ns.

e. Set the waveform monitor to display the serrations and equalizing pulses in the vertical interval.

f. **CHECK** — that the half-amplitude duration of the vertical serrations is 4.7 µs ± 50 ns.

g. **CHECK** — that the half-amplitude duration of the equalizing pulses is 2.35 µs ± 50 ns.

C Channel (Chrominance)

31. Chrominance Amplitude
± 1%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B2 on the waveform monitor using external reference.

c. Select Chroma Noise signal in PAL/YC format from the TSG 131A.

d. Using the WFM + CAL, adjust the waveform to match the top of the lower waveform with the bottom of the upper.

e. **CHECK** — that the chrominance amplitude is 700 mV_{p-p} ± 7 mV (1%)

32. Burst Amplitude
300 mVp-p ± 2%

a. Connect the test equipment as shown in Fig. 4-2.

b. Display CH B2 on the waveform monitor using external reference.

c. Select any test signal in the PAL/YC format.

d. Use the WFM + CAL feature to match the top of the lower burst with the bottom of the upper.

e. **CHECK** — that burst amplitude is 300 mVp-p ± 2%.

33. Burst Rise Times
350 ns ± 35 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Set the TSG 131A to output the any signal in the PAL/YC format.

c. Display CH B2 on the waveform monitor using external reference.

d. Set the waveform monitor to display the burst on the B2 channel.

e. Use the variable vertical gain to normalize the burst to 1000 mV and use the horizontal magnification to display the rise on the waveform monitor.

f. Use the timing cursors to measure the rise time of the burst envelope from the 450/550 mV graticule (10%) to the 50/950 mV graticule (90%).

g. **CHECK** — that rise time is 350 ns ± 35 ns.

34. Chrominance Rise Times
350 ns ± 35 ns

a. Connect the test equipment as shown in Fig. 4-2.

b. Set the TSG 131A to output the Chroma Noise signal in the PAL/YC format.

c. Display CH B2 on the waveform monitor using external reference.

d. Set the waveform monitor to display the rise on the B2 channel.

e. Use the variable vertical gain to normalize the rise to 1000 mV and use the horizontal magnification to display the rise on the waveform monitor.

f. Use the timing cursors to measure the rise time of the chrominance envelope from the 450/550 mV graticule (10%) to the 50/950 mV graticule (90%).

g. **CHECK** — that rise time is 350 ns ± 35 ns.

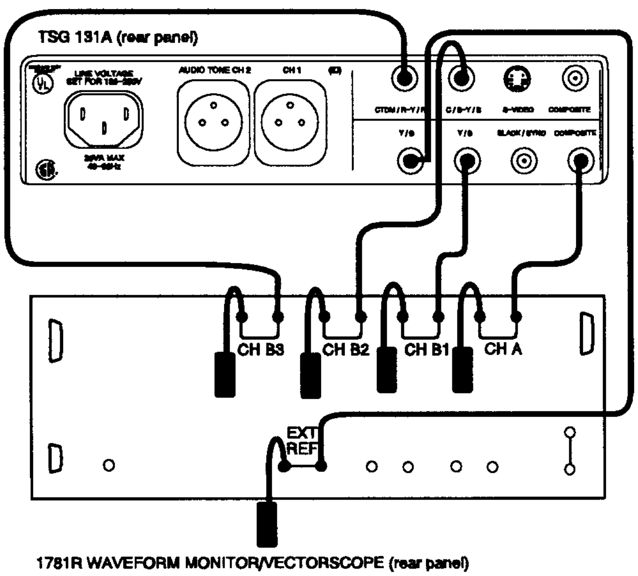


Fig. 4-3.
Setup for the rest of the standard Performance Checks. Note that the EXT REF cable has been moved to the Y/G output.

NOTE

If the TSG 131A under check has an optional Black Burst signal installed, use that signal as the waveform monitor EXT REF input (and no change in setup is required).

B-Y Signals

35. B-Y DC Level
0 mV$_{dc}$ ± 50 mV$_{dc}$

a. Connect the equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor using external reference.

c. Select any signal from the TSG 131A in Y, B-Y, R-Y format.

d. Toggle the display between DC coupled and ground reference.

e. Use the vertical position adjustment of the waveform monitor to set the ground line to a convenient reference graticule.

f. Return to DC coupling.

g. **CHECK** — that the blanking level is on the reference graticule ± 50 mV.

36. B-Y Ringing & K$_{2T}$ Factor
≤ 1% of peak & < 0.6%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor using external reference.

c. With the Y, B-Y, R-Y format and the T Pulses test signal selected, display the base of the smallest pulse with horizontal magnification to view the ringing.

d. **CHECK** — that the ringing is ≤ 1%.

e. Use the internal measurement mode of the 1781R to measure the K$_{2T}$ Factor.

f. **CHECK** — that the K$_{2T}$ Factor is < 0.6%.

37. B-Y Rise Times
350 ns ± 35 ns

a. Connect the test equipment as shown in Fig. 4-3.

b. Set the TSG 131A to output the T Pulses signal in the Y, B-Y, R-Y format.

c. Display CH B2 on the waveform monitor using external reference.

d. Set the waveform monitor to display the rise on the bar on the B2 channel (B-Y).

e. Use the variable vertical gain to normalize the signal to 1000 mV and use the horizontal magnification to display the rise of the bar on the waveform monitor.

f. Use the timing cursors to measure the rise time of the bar from the 100 mV graticule (10%) to the 900 mV graticule (90%).

g. **CHECK** — that the rise time is 350 ns ± 35 ns.

38. B-Y Sine Squared Pulse Accuracy
HADs accurate within 25 ns

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor in the line display mode using external reference.

c. Set the waveform monitor to display the 4T pulse on the T Pulses signal in Y, B-Y, R-Y format.

d. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

e. Using the timing cursors, measure the time between the 50% points (500 mV graticule).

f. **CHECK** — that the HAD of the 4T pulse is 400 ns ± 25 ns.

g. Set the waveform monitor to display the 8T pulse on the T Pulses signal in Y, B-Y, R-Y format.

h. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

i. Using the timing cursors, measure the time between the 50% points.

j. **CHECK** — that the HAD of the 8T pulse is 800 ns ± 25 ns.

39. Frequency Response
Flat to 3.0 MHz ± 1%

a. Connect the equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor, using external reference.

c. Select the Multiburst signal in Y, B-Y, R-Y format.

d. **CHECK** — that the packets are flat within 1% out to 3.0 MHz.

R-Y Signals

40. R-Y DC Level
0 mV_{dc} ± 50 mV_{dc}

a. Connect the equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor using external reference.

c. Select any signal from the TSG 131A in the Y, B-Y, R-Y format.

d. Toggle the display between DC coupled and ground reference.

e. Use the vertical position adjustment of the waveform monitor to set the ground line to a convenient reference graticule.

f. Return to DC coupling.

g. **CHECK** — that the blanking level is on the reference graticule ± 50 mV.

41. R-Y Ringing & K_{2T} Factor
≤ 1% of peak & < 0.6%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor using external reference.

c. Select Y, B-Y, R-Y format and the T Pulse test signal from the TSG 131A.

d. Display the base of the first pulse with horizontal magnification to view the ringing.

e. **CHECK** — that the ringing is ≤ 1% of peak.

f. Use the internal measurement mode of the 1781R to measure the K_{2T} Factor.

g. **CHECK** — that the K_{2T} Factor is < 0.6%.

42. R-Y Rise Times
350 ns ± 35 ns

a. Connect the test equipment as shown in Fig. 4-3.

b. Set the TSG 131A to output the T Pulses signal in the Y, B-Y, R-Y format.

c. Display CH B3 on the waveform monitor using external reference.

d. Set the waveform monitor to display the rise on the bar on the B3 channel (R-Y).

e. Use the variable gain to normalize the signal to 1000 mV

f. Use the timing and voltage cursors to measure the rise time from the 10% to 90% points.

g. **CHECK** — that the rise time is 350 ns ± 35 ns.

43. R-Y Sine Squared Pulse Accuracy
HADs accurate within 25 ns

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor in the line display mode using external reference.

c. Set the waveform monitor to display the 4T pulse on the T Pulses signal in Y, B-Y, R-Y format.

d. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

e. Using the timing cursors, measure the time between the 50% points (500 mV graticule).

f. **CHECK** — that the HAD of the 4T pulse is 400 ns ± 25 ns.

g. Set the waveform monitor to display the 8T pulse on the T Pulses signal in Y, B-Y, R-Y format.

h. Use the variable gain control to normalize the pulse to 1000 mV and use the horizontal magnification to make the pulse fill the waveform monitor display.

i. Using the timing cursors, measure the time between the 50% points.

j. **CHECK** — that the HAD of the 8T pulse is 800 ns ± 25 ns.

44. Frequency Response
Flat to 3.0 MHz ± 1%

a. Connect the equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor, using external reference.

c. Select the Multiburst signal in Y, B-Y, R-Y format.

d. **CHECK** — that the packets are flat within 1% out to 3.0 MHz.

Green Channel

NOTE

Before using the GBR signal format, check that the Green Channel has sync enabled. (It can be disabled in some options.) If there is no sync on the Green signal, move jumper J150 to the 1-2 position.

45. Green Frequency Response
Flat to 6.0 MHz ± 2%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B1 on the waveform monitor.

c. Select the Sweep signal from the TSG 131A in GBR format.

d. **CHECK** — using the WFM + CAL function, that the signal amplitude is flat within 2% to 6.0 MHz.

46. Sync Amplitude
300.0 mV ± 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B1 on the waveform monitor.

c. Select any signal from the TSG 131A in the GBR format.

d. Using the WFM + CAL, match the signal level of the lower waveform to the sync tip of the upper waveform.

e. **CHECK** — that the sync amplitude is 300.0 mV ± 1%.

Blue Channel

47. Blue Gain
± 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor using external reference.

c. Select GBR format and the Blue Field test signal from the TSG 131A.

d. Use the WFM + CAL feature to match the top of the lower waveform with the bottom of the upper.

e. **CHECK** — that signal amplitude is 700 $mV_{p\text{-}p}$ ± 7 mV (1%).

48. Blue Frequency Response
Flat to 6.0 MHz ± 2%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor using external reference.

c. Select GBR format and the Sweep test signal from the TSG 131A.

d. Use the WFM + CAL feature to match the top of the lower waveform with the bottom of the upper.

e. **CHECK** — that the sweep portion of the signal is flat within 2% out to 6.0 MHz.

49. Blue Staircase Linearity
< 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor using external reference.

c. Select GBR format and the Steps (10-Step) test signal from the TSG 131A.

d. Set the test equipment to view the signal through a differentiated step filter.

e. **CHECK** — using the voltage cursors, that the upward spikes (differentiated steps) are equal within 1%.

50. Line Tilt
± 0.5%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display channel B2 on the waveform monitor using external reference.

c. Select the Blue Field signal from the TSG 131A in the GBR format.

d. Normalize the signal gain so that the blanking level of the waveform is on the baseline and the top of the signal passes through 1000 mV at its midpoint.

e. Center the signal over a horizontal graticule, if the monitor has one.

f. **CHECK** — that the line tilts no more than 0.5% (3.5 mV absolute or 5 mV using the graticule) over its length. Ignore the first and last microsecond of the bar.

51. Pulse-to-Bar Ratio
1:1 ± 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B2 on the waveform monitor using external reference.

c. Set the TSG 131A to output the Pulse & Bar signal in the GBR format.

d. Set the waveform monitor to display the tip of the inverted pulse of the Pulse & Bar signal.

e. **CHECK** — that the inverted pulse tip is within 1% of the 0 mV reference graticule, using the WFM + CAL signal.

Red Channel

52. Red Frequency Response
Flat to 6.0 MHz ± 2%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor using external reference.

c. Select GBR format and the Sweep test signal from the TSG 131A.

d. Use the WFM + CAL feature to match the top of the lower waveform with the bottom of the upper.

e. **CHECK** — that the sweep portion of the signal is flat within 2% out to 6.0 MHz.

53. Staircase Linearity
≤ 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor using external reference.

c. Select GBR format and the Steps (10-Step) test signal from the TSG 131A.

d. Set the test equipment to view the signal through a differentiated step filter.

e. **CHECK** — that the upward spikes (differentiated steps) are equal within 1%.

54. Red Gain
± 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor using external reference.

c. Select GBR format and Red Field test signal from the TSG 131A.

d. Use the WFM + CAL to align to top of the lower waveform with the blanking level of the upper.

e. **CHECK** — that signal amplitude is 700 mV ± 7 mV (1%).

55. Line Tilt
± 0.5%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display channel B3 on the waveform monitor using external reference.

c. Select the Red Field signal from the TSG 131A in GBR format.

d. Normalize the signal gain so that blanking level of the waveform is on the baseline and the top of the signal passes through 1000 mV at its midpoint.

e. Center the signal over a horizontal graticule, if the monitor has one.

f. **CHECK** — that the line tilts no more than 0.5% over its length. Ignore the first and last microsecond of the bar.

56. Pulse-to-Bar Ratio
1:1 ± 1%

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B3 on the waveform monitor in external reference.

c. Set the TSG 131A to output the Pulse & Bar signal in the GBR format.

d. Set the waveform monitor to display the tip of the inverted pulse of the Pulse & Bar signal.

e. **CHECK** — that the inverted pulse tip is within 1% of blanking level, using the WFM + CAL signal.

Inter-Channel Timing & Amplitude

**57. Y to B-Y Timing
within 5 ns**

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B1-B2 on the waveform monitor using external reference.

c. Select Y, B-Y, R-Y format and the Bowtie test signal from the TSG 131A.

d. Use 5X waveform gain to accentuate the bowtie.

e. **CHECK** — that the crossover point of the bowtie falls within the 5 ns markers (see Fig. 4-4).

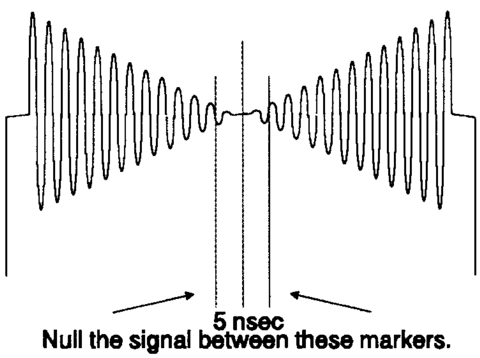


Fig. 4-4. Bowtie crossover.

**58. Y to R-Y Timing
within 5 ns**

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B1-B3 on the waveform monitor using external reference.

c. Select Y, B-Y, R-Y format and the Bowtie test signal from the TSG 131A.

d. Use 5X waveform gain to accentuate the bowtie.

e. **CHECK** — that the crossover point of the bowtie falls between the 5 ns markers (see Fig. 4-4).

**59. GBR Amplitude Matching
± 0.5%**

a. Connect the test equipment as shown in Fig. 4-3.

b. Display CH B1, B2, and B3 on the waveform monitor using external reference in overlay mode.

c. Select GBR format and the 100% Bars test signal from the TSG 131A.

d. Use the channel offset to set the bottom of the waveforms (active video) to the 0 mV graticule.

e. Use the X5 gain to display any differences in the amplitude at the top of the signals.

f. **CHECK** — that the amplitude of the signals are equal within 0.5%.

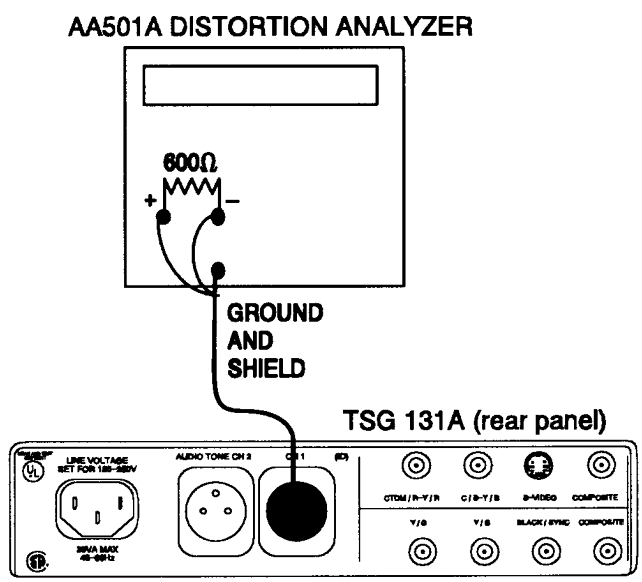


**Fig. 4-5.
Setup to measure the total harmonic distortion.**

Audio Output

60. Total Harmonic Distortion

a. Disable the CH 1 ID click by moving jumper J12 to pins 2 and 3.

b. Connect the equipment as shown in Fig. 4-5, placing a 600Ω resistor across the analyzer's + and - terminals (to represent the system load).

c. Set the distortion analyzer to measure THD.

d. **CHECK** — that the THD on CH 1 is ≤ 0.5%.

e. Return jumper J12 to pins 1 and 2.

f. Move the cable at the TSG 131A from audio Channel 1 to audio Channel 2.

g. **CHECK** — that the THD on Channel 2 is ≤ 0.5%.

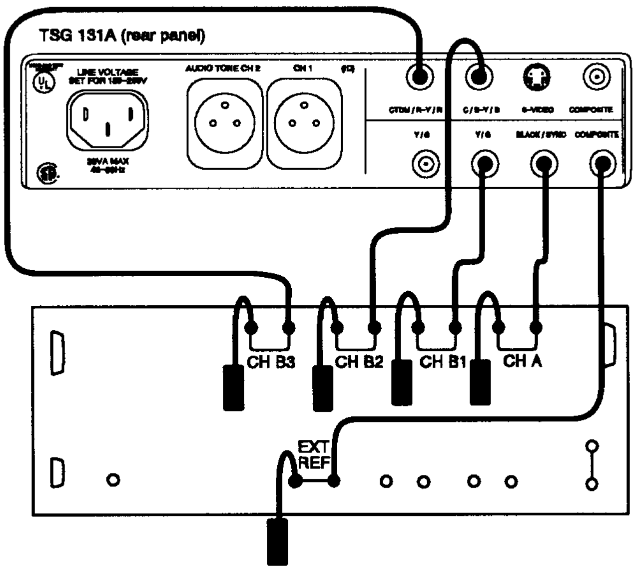


Fig. 4-6. Setup to Check the BLACK BURST output.

BLACK BURST Output (Opt. 02 & 03 only)

61. BLACK BURST Amplitude 0 mV ± 50 mV

a. Connect the equipment as shown in Fig. 4-6.

b. Display CH A in the WFM + CAL mode.

c. **CHECK** — that the amplitude of the signal is 0 mV ± 50 mV.

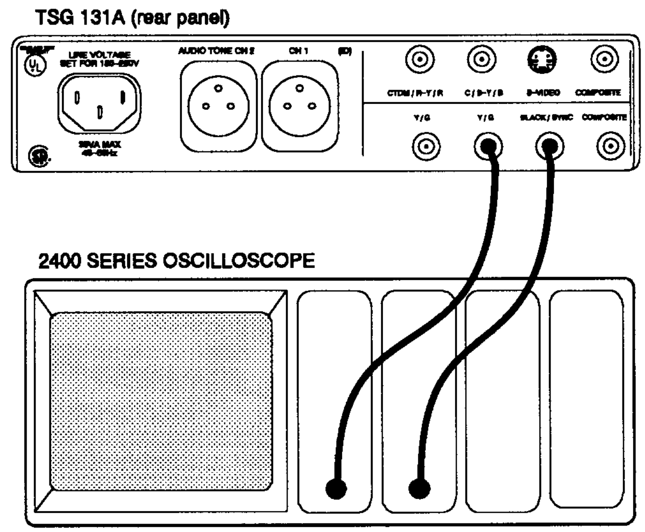


Fig. 4-7. Setup to check the pulse outputs for Options 02, 03, & 04.

Color Flag Reference Pulse Option 03 Only

62. Amplitude & Position

a. Connect the TSG 131A BLACK/SYNC output to one of the oscilloscope inputs, using a 75Ω coax and a 75Ω feed-through terminator. Set this input to 1 or 2 V/div.

b. Connect the left Y/G output to a second oscilloscope input. Set this input to 2 V/div.

c. Set the oscilloscope to trigger from the BLACK/SYNC input, at a 10 ms sweep rate, displaying both inputs.

d. **CHECK** — that there is a negative going pulse of approximately 5 V occurring on the Y/G output once every four fields, just before the F1L10 pulse on the Black Burst signal from the BLACK/SYNC output.

e. Expand the oscilloscope horizontal to display this pulse at 100 µs/div.

f. **CHECK** — that the color frame reference pulse is approximately 200 µs in duration, and aligns with the vertical sync pulse interval of the Black Burst signal.

Composite Sync
Option 04 Only

63. Timing
Horizontal Sync 4.7 µs ± 100 ns
Veritical Serrations 4.7 µs ± 100 ns
Equalizing Pulses 2.35 µs ± 100 ns

a. Connect the equipment as shown in Fig. 4-6.

b. Display CH A on the waveform monitor.

c. **CHECK** — that horizontal sync duration between 50% points is 4.7 µs ± 100 ns.

d. Set the waveform monitor to display the serrations and equalizing pulses in the vertical interval.

e. **CHECK** — that the half-amplitude duration of the vertical serrations is 4.7 µs ± 100 ns.

f. **CHECK** — that the half-amplitude duration of the equalizing pulses is 2.35 µs ± 100 ns.

64. Amplitude
-2.0 V ± 0.4 V

a. Connect the equipment as shown in Fig. 4-6.

b. Display CH A on the waveform monitor.

c. **CHECK** — using WFM+CAL, that the amplitude is -2.0 V ± 0.4 V.

65. Rise & Fall Times
250 ns ± 50 ns

a. Connect the equipment as shown in Fig. 4-6.

b. Display CH A on the waveform monitor.

c. Use the variable gain to normalize the signal to 1000 mV

d. Use the timing and voltage cursors to measure the rise and fall time from the 10% to 90% points.

e. **CHECK** — that the rise and fall time is 250 ns ± 50 ns.

Color Frame Square Wave
Option 04 Only

66. Amplitude & Position

a. Connect the BLACK/SYNC output to one input of the oscilloscope and COMPOSITE to the other.

b. Select the 0% Field from the TSG 131A in PAL/YC mode.

c. **CHECK** — that the amplitude of the Color Frame Square Wave is -5 V within 200 mV.

d. **CHECK** — that the timing of the Color Frame Square Wave is low for fields 1 & 2 and high for fields 3 & 4. The transition should occur on line 11.

Adjustment Procedure Checklist

1. Oscillator Frequency — Y1
2. Audio Output Amplitude — R123 & R122
3. Audio ID Click Frequency — R126
4. Y/G Channel DC Level and Gain — R82 & R79
5. Y/G Channel Sin(x)/x Compensation — C69
6. C/B-Y/B Channel DC Level and Gain — R63 & R60
7. C/B-Y/B Channel Sin(x)/x Compensation — C47
8. CTDM/R-Y/R Channel DC Level and Gain — R101 & R98
9. CTDM/R-Y/R Channel Sin(x)/x Compensation — C99
10. Interchannel Gain Matching — R79, R60, & R98
11. COMPOSITE DC Level and Gain — R20 & R18
12. COMPOSITE Chrominance Gain — R23
13. COMPOSITE Sin(x)/x Compensation and Chroma Response — C19 & C21

NOTE

Steps 14 - 17 are interactive. Repeat them in sequence until the best possible results are obtained. If satisfactory results cannot be achieved, repeat steps 4 - 13 before returning to this sequence.

14. Inter-Channel Timing — C30 & C32
15. Chrominance-to-Luminance Delay
16. SC/H Phase
17. Channel 1 to Channel 2 Timing (Recheck)

NOTE

The following parts adjusted in steps 18 & 19 are only loaded in Options: 02 & 03.

18. Black Burst DC Level and Gain — R325 & R328
19. Black Burst Channel Sin(x)/x Compensation — C329

Adjustment Procedures

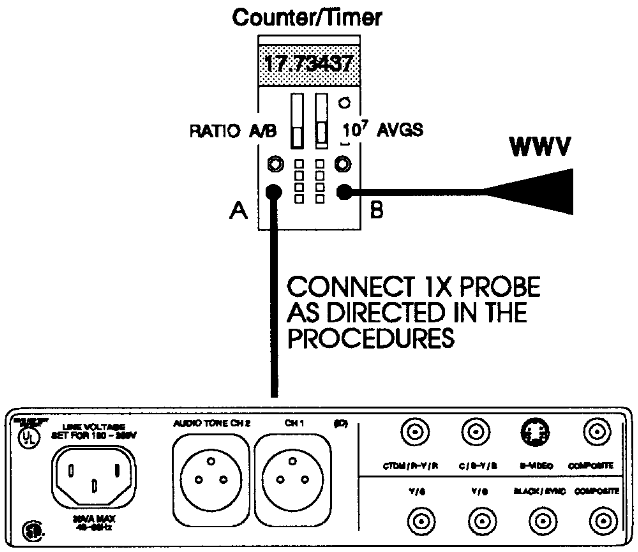


Fig. 4-8. Setup to adjust the oscillator frequency.

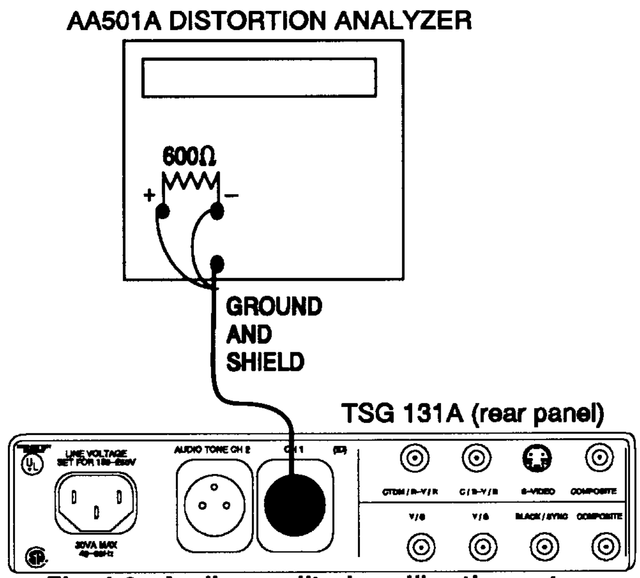


Fig. 4-9. Audio amplitude calibration setup.

NOTE

After initial delivery or long storage, allow a two-hour warm up to re-age the crystal. Thereafter, a 30 minute warm up is sufficient.

1. **Oscillator Frequency — Y1**

   a. Connect the equipment as shown in Fig. 4-8. Connect the probe to W180.

   b. Set the DC503A to count a frequency referenced to channel B (ratio A/B).

   c. Remove the round plastic cap from the top of the oscillator (Y1).

   d. Fine-adjust the oscillator frequency to bring $4F_{SC}$ to 17.734375 MHz ± 40 Hz (20 Hz for Opt. 10). (On Opt. 10, the oscillator adjustment may be located on the side of the oscillator can. In these cases, the front panel may need to be removed. To do this: unscrew 2 screws located on the bottom panel towards the front of the instrument and pull the front panel straight out.)

   e. Reinstall the plastic cap.

2. **Audio Output Amplitude — R123 & R122**

   a. Connect the equipment as shown in Fig. 4-9 with the following AA501A (Distortion Analyzer) settings:

Table 4-2. Setup for the AA501A Distortion Analyzer.

Function	Setting
Input Level Range	Auto range
dBm Switch	In
Level Switch	In
All Filter Switches	Out

   b. Disable the CH 1 ID click by moving jumper J12 to pins 2 and 3.

   c. Adjust R123 to obtain the desired dB output for Audio 1 (factory setting is + 8 dBm).

   d. Return jumper J12 to the 1-2 position.

e. Move the cable at the TSG 131A from audio CH 1 to audio CH 2.

f. Adjust R122 to obtain the desired output level for Audio 2. (Factory setting is + 8 dBm.)

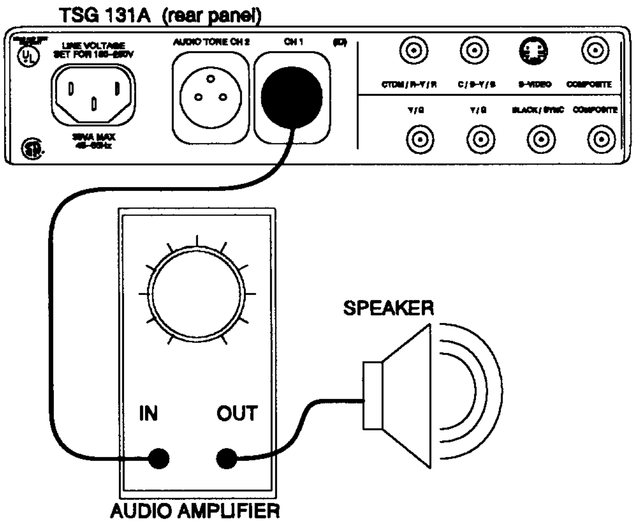


Fig. 4-10. Audio ID click frequency adjustment setup.

3. Audio ID Click Frequency — R126

a. Connect the equipment as shown in Fig. 4-10.

b. Adjust R126 for the desired interval between ID clicks. The range of adjustment is about 0.2- 4 seconds.

NOTE

For the remaining adjustment steps, move jumper J112 from pins 1 - 2 to pins 2 - 3. This changes the signals available through the second signal-select button when PAL/YC format is active. Instead of the 75% Bars/Red, 100% Bars/Red, and Convergence signals, the buttons select the (from top to bottom) Composite Matrix, Component Matrix, and GBR Field Square Wave diagnostic signals. See Fig. 4-11.

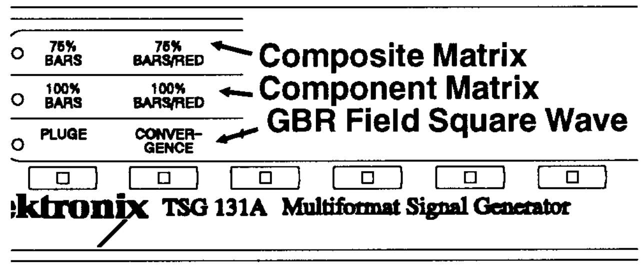


Fig. 4-11. Signals available in the diagnostic mode.

Button	Signal Name	Description
75% Bars over Red	Composite Matrix	Multiburst Pulse & Bar UK ITS 1
100% Bars over Red	Component Matrix	100% Color Bars Multiburst Pulse & Bar Bowtie 10 Step
Convergence	GBR Field Square Wave	Alterntes Black and White Between Fields.

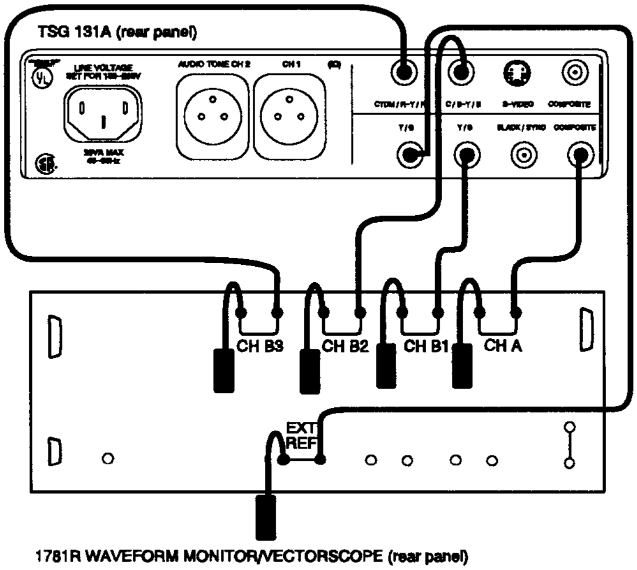


Fig. 4-12. Basic setup for the calibration procedures.

NOTE

If the TSG 131A under adjustment has an optional Black Burst signal installed, use that signal as the waveform monitor EXT REF input.

Table 4-3. Initial setup of the 1781R.

Configure	Front Panel
Coupling	DC
Left Display	VECT
Vector Grat	INT
Right Display	WFM
WFM Grat	INT
REF	EXT
ABS Units	IRE
Filter	FLAT
Vector Readout	ON
WFM Horizontal	ONE/LINE
WFM Readout	ON
Waveform Gain	X5

4. Y/G Channel DC Level and Gain — R82 & R79

a. Begin with the 1781R reference setup shown in the table and select channel B1 as the input.

b. Select the 0% Field signal in PAL/YC format from the TSG 131A.

c. Set the 1781R to GND coupling and center the trace on a reference graticule.

d. Switch to DC coupled.

e. Adjust R82 for a dc level of 0 V (set the blanking level to the reference graticule).

f. Select the 100% Field signal in PAL/YC format from the TSG 131A.

g. Select WFM + CAL, set CAL for 700 mV.

h. Adjust R79 to match the top of the lower waveform with the blanking level of the upper.

i. Repeat these procedures as necessary to get satisfactory results.

5. Y/G Channel Sin(x)/x Compensation — C69

a. Begin with the reference setup of the measurement set and select channel B1 as the input.

b. Select the Sweep from the TSG 131A in PAL/YC format.

c. Choose WFM + CAL at the 1781R and match the top of the lower sweep with the bottom of the upper.

d. Adjust C69 for as flat a frequency response as possible from the beginning of the sweep out to 6.0 MHz within 2%.

6. C/B-Y/B Channel DC Level and Gain — R63 & R60

a. Begin with the 1781R reference setup and display channel B2 using external reference.

b. Select the 100% Bars signal in Y, B-Y, R-Y format from the TSG 131A.

c. Set the 1781R to GND coupling and center the trace on a reference graticule.

d. Switch to DC coupled.

e. Adjust R63 for a DC Level of 0 V (set the blanking level to the reference graticule).

f. Select the Blue Field signal in GBR format from the TSG 131A.

g. Select WFM + CAL at the right display section of the 1781R, set CAL for 700 mV.

h. Adjust R60 to match the top of the lower waveform with the blanking level of the upper.

i. Repeat these steps as necessary to produce satisfactory results.

7. C/B-Y/B Channel Sin(x)/x Compensation — C47

a. Begin with the reference setup and select channel B2 as the input using external reference.

b. Select the Sweep in the GBR format from the TSG 131A.

c. Choose WFM + CAL at the 1781R and match the top of the lower sweep with the bottom of the upper; use the dual trace to aid adjustment.

d. Adjust C47 for as flat a frequency response as possible from the beginning of the sweep within 2% out to 6.0 MHz.

e. Check that the Sweep in the Y, B-Y, R-Y mode is flat within 1% out to 2.75 MHz. If not, readjust C47 to bring the signal within spec.

f. Recheck that the Sweep in the GBR format is stll flat within 2% out to 6 MHz. If not, repeat steps d and e until both signals meet spec.

8. CTDM/R-Y/R Channel DC Level and Gain — R101 & R98

a. Begin with the 1781R reference setup and select channel B3 as the input using external reference.

b. Select the 100% Bars signal in GBR format from the TSG 131A.

c. Set the 1781R to GND coupling and center the trace on a reference graticule.

d. Switch to DC coupling.

e. Adjust R101 for a DC Level of 0 V by setting the blanking level to the reference graticule.

f. Select the Red Field signal in GBR format from the TSG 131A.

g. Select WFM + CAL at the right display section of the 1781R, set CAL for 700 mV.

h. Adjust R98 to match the top of the lower waveform with the blanking level of the upper.

i. Repeat these steps as necessary for best results.

9. CTDM/R-Y/R Channel Sin(x)/x Compensation — C99

a. Begin with the reference setup and select channel B3 as the input using external reference.

b. Select the Sweep in the GBR format from the TSG 131A.

c. Choose WFM + CAL at the 1781R and match the top of the lower sweep with the bottom of the upper; use the dual trace to aid adjustment.

d. Adjust C99 for as flat a frequency response as possible from the beginning of the sweep out to 6.0 MHz (within 2%).

e. Check that the Sweep in the Y, B-Y, R-Y mode is flat within 1% out to 2.75 MHz. If not, readjust C99 to bring the signal within spec.

f. Recheck that the Sweep in the GBR format is stll flat within 2% out to 6 MHz. If not, repeat steps d and e until both signals meet spec.

10. Interchannel Matching —

DC Level	**R82, R63, & R101**
Gain	**R79, R60, & R98**

a. Begin with the reference setup of the measurement set and select B1, B2, & B3 in overlay mode.

b. Select the 100% Bars signal in GBR format.

c. Set the offset to zero.

d. Set the vertical gain to X5 and display the blanking level of the waveform.

e. Set the coupling to GND and set the ground trace to a convient graticule.

f. Return the coulping to dc.

g. **CHECK** — that all of the blanking level are with 50 mV of each other and the reference graticule.

h. Adjust, if necessary, the dc level to bring them into spec. (R82 for Green, R63 for Blue, and R101 for Red)

i. Set the vertical gain to X5 and display the top of the waveform.

j. **CHECK** — to see if all of the amplitudes are within 0.5% of each other.

k. Adjust, if necessary, R79 for green, R60 for blue, and R98 for red to bring the amplitudes into spec.

l. If any adjustments need to be made, repeat steps 4 -9 until these adjustment are no longer necessary.

11. COMPOSITE DC Level and Gain — R20 & R18

a. Begin with the reference setup and select channel A as the INPUT.

b. Select the Steps (5-Step) signal in PAL/YC format from the TSG 131A.

c. Set the 1781R to GND coupling and center the trace on a reference graticule.

d. Switch to DC coupling and adjust R20 for a DC Level of 0 V by setting the blanking level to the reference graticule.

e. Select WFM + CAL at the right display section of the 1781R, set CAL for 700 mV.

f. Adjust R18 to match the top of the lower waveform with the blanking level of the upper.

g. Repeat these steps as necessary for best results.

12. COMPOSITE Chrominance Gain — R23

a. Begin with the reference setup and select CH A as the INPUT.

b. Select the Chroma Noise signal from the TSG 131A in PAL/YC format.

c. Select WFM + CAL at the right display section of the 1781R, set CAL for 700 mV.

d. Adjust R23 to match the bottom of the chrominance portion of the signal to blanking within 1%.

13. COMPOSITE Sin(x)/x Compensation and Chroma Response — C19 & C21

a. Begin with the reference setup and select channel A as the input.

b. Select the Sweep in PAL/YC format from the TSG 131A.

c. Choose WFM + CAL at the 1781R and match the top of the lower sweep with the bottom of the upper; use the dual trace to aid adjustment.

d. Adjust C19 for as flat a frequency response as possible from the beginning of the sweep out to 6.0 MHz (within 2%).

e. Select any signal from the TSG 131A in PAL Y/C format.

f. Again, use WFM + CAL to create a dual trace to aid adjustment.

g. Set the WFM + CAL to 300 mV.

h. Adjust C21 to match the top of the burst of the lower waveform to the bottom of the burst of the upper waveform.

NOTE

Steps 14 -17 are interactive. Repeat them in sequence until the best possible results are obtained. If satisfactory results cannot be achieved, repeat steps 4 - 13 before returning to this sequence.

14. Inter-Channel Timing — C30 & C32

a. Begin with the reference setup of the measurement set and select B1-B2 as the input.

b. Select the Bowtie signal in GBR format from the TSG 131A.

c. Adjust C30 to place the crossover point of the bowtie on the center (highest amplitude) marker.

d. Select B1-B3 as the input.

e. Adjust C32 to center the crossover point (see Fig. 4-13).

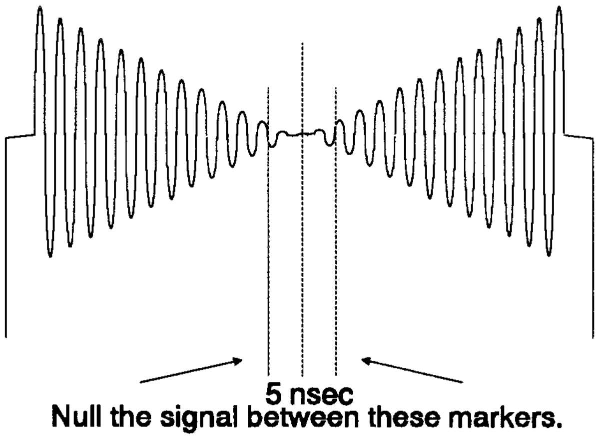


Fig. 4-13. Bowtie crossing.

15. Chrominance-to-Luminance Delay

a. Begin with the reference setup and select channel A as the input.

b. Select the Pulse & Bar signal in PAL/YC format from the TSG 131A.

c. Display the bottom of the modulated pulse, using horizontal magnification to view the sine wave distortion.

d. **CHECK** — using the 1781R's C-Y measurement feature, the chroma-to-luma delay.

e. If the delay is > 5 ns, adjust C30 for a delay of < 5 ns.

16. SC/H Phase

a. With channel A as the input, change the 1781R REF setting to **INT**ernal, and the LEFT DISPLAY to SC/H.

b. **CHECK** — for and SC/H of < 5°.

c. If the SC/H is > 5°, adjust C30 for an SC/H Phase difference of < 5°.

d. Return to EXT REF.

17. Channel 1 to Channel 2 Timing (Recheck)

a. Change the 1781R input to B1-B2.

b. Select the Bowtie signal from the TSG 131A.

c. **CHECK** — that the cross over point remains in the ± 5 ns markers. (See Fig. 4-13.)

d. If the cross over point is outside the markers return to step 14. Otherwise go on to step 18.

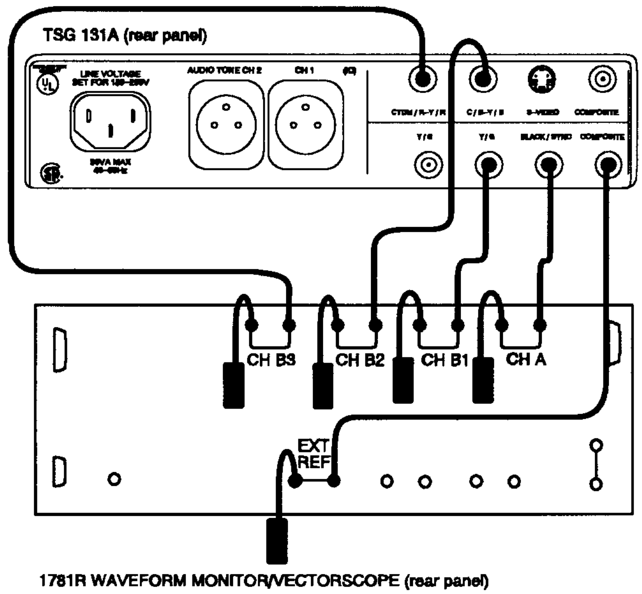


Fig. 4-14. Setup to calibrate the BLACK BURST output.

NOTE

The following parts adjusted in steps 18 &19 are only loaded in Options: 02 and 03.

NOTE

The instrument needs to be disassembled to perform steps 18 & 19. Please check to make sure that the Black Burst signal is out of spec before disassebling the instrument to make these adjustmentss. See Section 5 for instuctions to remove the Audio board.

18. Black Burst DC Level and Gain — R325 & R328

a. Begin with the 1781R setup shown in Fig. 4-14 select channel A as the input.

b. Set the 1781R to GND coupling and center the trace on a reference graticule.

c. Switch to DC coupled.

d. Adjust R325 so that the DC Level of the signal is on the reference graticule.

e. Select WFM + CAL at the right display section of the 1781R, set CAL for 300 mV.

f. Adjust R328 to match the top of the lower waveform's sync with the sync level of the upper waveform.

g. Repeat these procedures as necessary to get satisfactory results.

19. Black Burst Channel Sin(x)/x Compensation — C329

a. Begin with the reference setup and select channel A as the input.

b. Select any signal in the PAL/YC format from the TSG 131A.

c. Choose WFM + CAL at the 1781R and set it to 300 mV.

d. Adjust C329 to match the burst amplitude to the WFM + CAL signal.

SECTION 5
INSTALLATION & MAINTENANCE

This section describes configuring the power supply for 110 V_{AC} operation, removing and replacing the audio board for maintenance of the circuits below it, accessing the Diagnostic signal set, and setting the internal jumpers for customized uses.

WARNING

Dangerous voltages are present in the power supply. To ensure safety, only qualified service personnel should perform the following procedures.

Selecting the Power Supply Mains Voltage

The TSG 131A is shipped from the factory configured for 220 V_{AC}, 60 Hz operation. To configure the TSG 131A for 110 V_{AC} operation, follow this procedure.

WARNING

Dangerous voltages are present in the power supply. Remove the power cord from the electrical mains supply before attempting this procedure. Failure to remove the power cord can result in life-threatening electrical shock.

1. Remove the TSG 131A power cord from the electrical mains supply.
2. Remove the instrument access cover.
3. Locate J122 near the AC line filter and power receptacle at the right rear of the main board.
4. For 220 V_{AC} instrument operation (the factory setting), the jumper should be in the 2-3-4-5 position.
5. For 110 V_{AC} instrument operation, the jumper should be in the 1-2-3-4 position.
6. Reinstall the instrument access cover.
7. **CHECK** — that the fuse is the proper value. For 220 V_{AC} operation, fuse F1 should be 0.2 Amp Med blow. For 110 V_{AC} operation the fuse should be 0.4 Amps Med blow.

Removing & Replacing the Audio Board

To Remove the Audio Board:

a. Make sure that all connections, especially the power supply are removed from the instrument.

b. Remove the top cover. (There are 8 Pozidrive® screws holding the top cover to the instrument.)

c. Using Fig. 5-1 as a guide, remove one screw from the Audio board and four screws from the rear panel AUDIO TONE connectors. (Total of five screws.)

d. Pull the two audio connectors straight out from the rear panel.

e. Gently, slide the Audio board towards the front of the instrument until the part of the audio connectors that are soldered to the board clear the rear-panel holes.

f. Lift the board up, flipping it over at the same time. (J128, attached to the board towards the front of the instrument, forces it to flip over revealing the component side of the board.)

g. The adjustments for the Black Burst and Comp Sync can now be made.

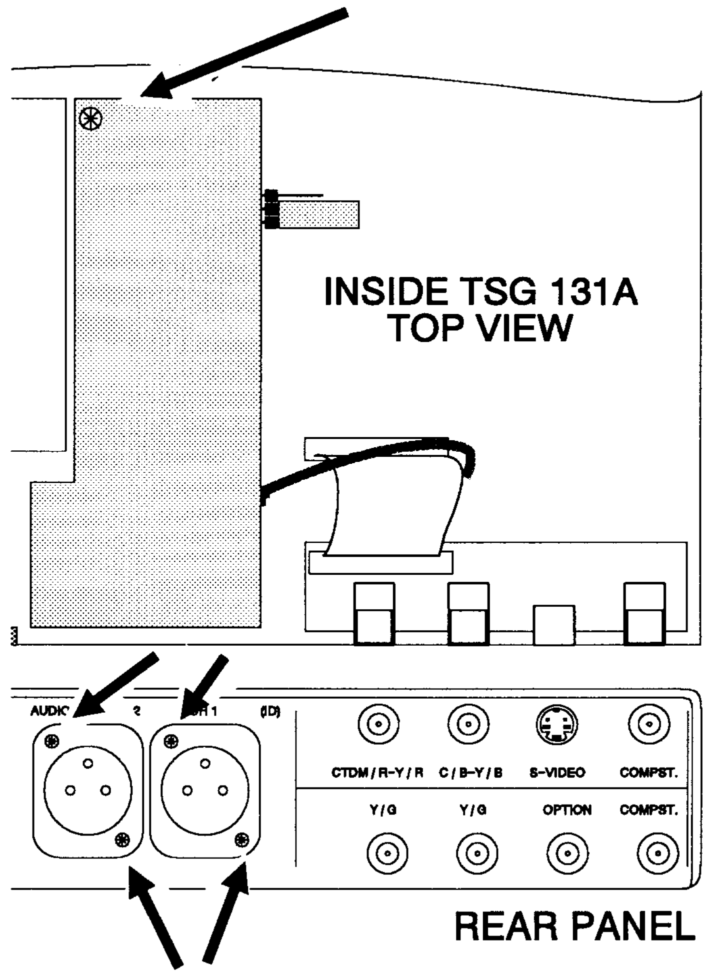


Fig. 5-1. Remove these 5 screws with a Pozidrive® screwdriver in order to take out the Audio board for adjustment of the Black Burst/Comp Sync output.

To Reassemble the Audio Board:

h. Flip the Audio board back over so that the components are facing down.

i. Slide the audio connectors that are soldered on the board back through the rear-panel holes.

j. Slide the external audio connectors back through the rear-pannel holes. The text on the audio connectors should be **"UPSIDE DOWN"**.

k. Screw the one screw on the board back in.

l. Screw the four audio connector screws.

m. Replace the top cover.

Special Diagnostic Signal Set

The TSG 131A has a special set of Diagnostic signals that can be accessed from the front panel. They are listed in Table 5-1.

Table 5-1. List of the Diagnostic Signals available.

Button	Signal Name	Description
75% Bars over Red	Composite Matrix	Multiburst Pulse & Bar UK ITS 1
100% Bars over Red	Component Matrix	100 Collor Bars Multiburst Pulse & Bar Bowtie 10 Step
Convergence	GBR Field Square Wave	Alterntes Black and White Between Fields.

These Diagnostic Signals replace the signals in the second row of the front panel (75% Bars over Red, 100% Bars over Red, and Convergence) when J112 is in the 2-3 position. No other signals are changed and the TSG 131A can be left in this mode if the Diagnostic signals are more useful to the operator than the standard signal set.

When the user wants the standard signal set, return J112 to the 1-2 position.

Setting the Internal Jumpers

See Table 5-2 for the available jumper functions and set the instrument according to individual needs.

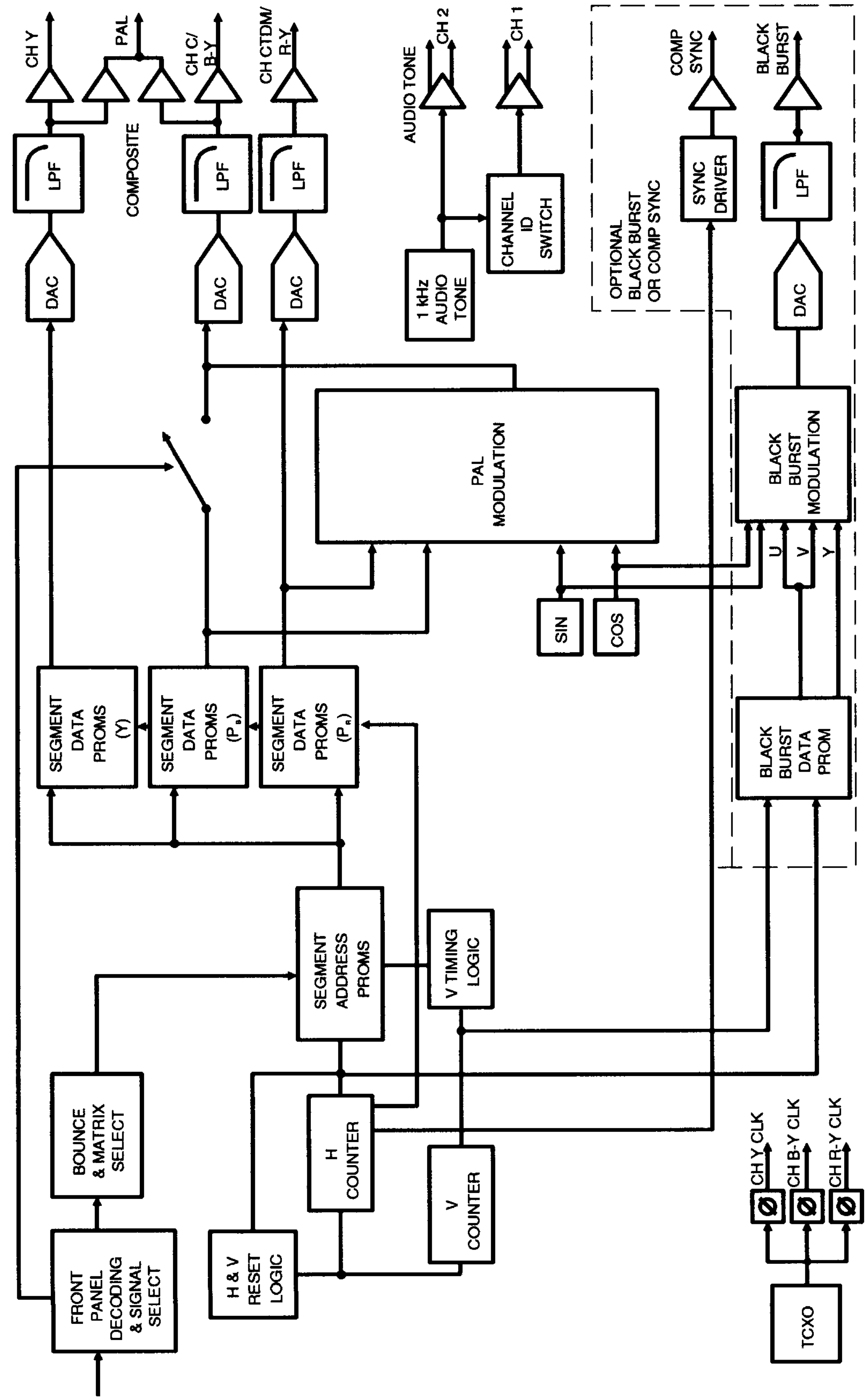
Table 5-2. List of Jumpers for the TSG 131A.

JUMPER		POSITION	FUNCTION
Diagnostic Signals	J112 ◇2	1-2	Enables standard front panel operation.
		2-3	Allows selection of diagnostic test signals.
Black Burst F1L7 Reference	J110 ◇2	1-2	Enables whites flag on Field 1 Line 7.
		2-3	Disables white flag on Field 1 Line 7.
GBR SYNC on Green	J150 ◇2	1-2	Enables sync on G output.
		2-3	Disables sync on G output.
	J111 ◇2	1-2	Factory set.
		2-3	For future use.
25 Hz Offset	J124 ◇2	1-2	Enable.
		2-3	Disable.
Y Channel Test Signal Disable	J7 ◇6	1-2	Normal
		2-3	Y Channel Output Disable
C Channel Test Signal Disable	J6 ◇6	1-2	Normal
		2-3	C Channel Disable
	J113 ◇6	not installed	For future use.
R-Y Channel Test Signal Disable	J8 ◇7	1-2	Normal
		2-3	R-Y Channel Disable
Black Burst Disable	J130 ◇7	1-2	Black Burst output enabled.
		2-3	Black Burst output disabled.
BLACK/COMP SYNC Output only one at a time (located under the Audio board)	J145 ◇7	installed	BLACK/COMP SYNC outputs Black Burst.
	J152 ◇7	installed	BLACK/COMP SYNC outputs Comp Sync.

Table 5-2. List of Jumpers for the TSG 131A. (cont.)

JUMPER		POSITION	FUNCTION
Comp Sync Output Level	J151 7	1-2	-2 V level
		2-3	-4 V level
Audio Click	J12 9	1-2	Audio Click Enable
		2-3	Audio Click Disable
Power Supply Voltage Configuration	J122 10	2-3 4-5	Power supply configured for 110 V operation.
		3-4	Power supply configured for 220 V operation. (Standard)
+12 V Power Supply Test Jumper	J40 10	1-2 installed	Service use only.
-12 V Power Supply Test Jumper	J50 10	1-2 installed	Service use only.
-5 V Power Supply Test Jumper	J60 10	1-2 installed	Service use only.
+5 V Power Supply Test Jumper	J70 10	1-2 installed	Service use only.

SECTION 6
TSG 131A BLOCK DIAGRAM



TSG 131A Theory of Operation

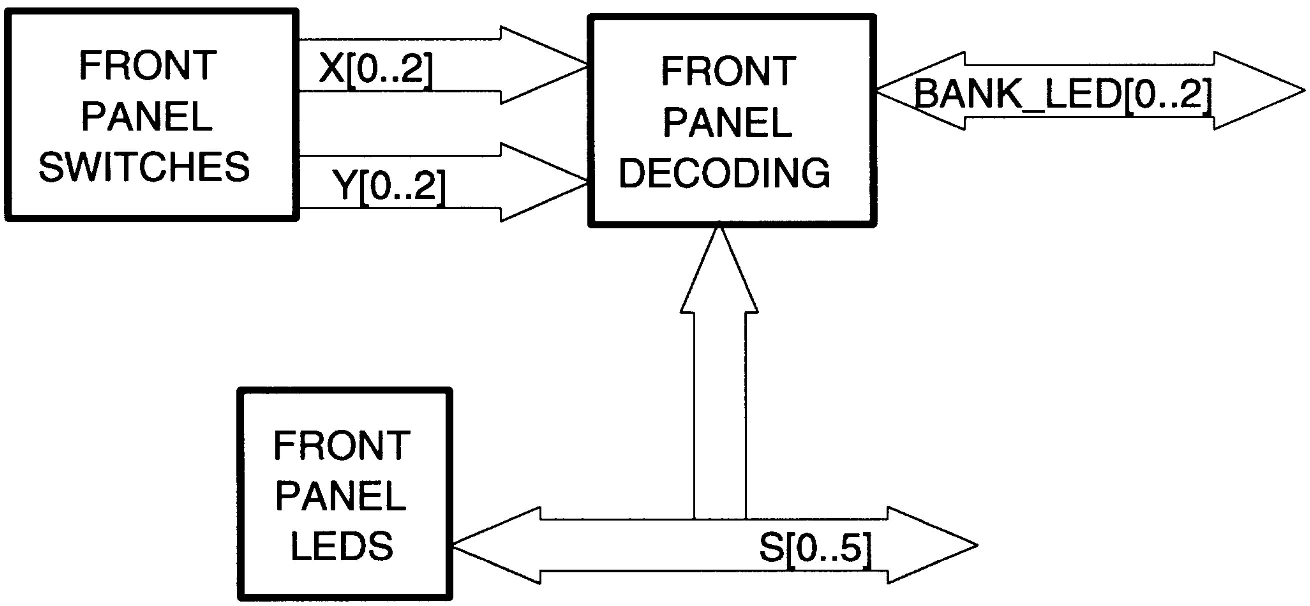


Fig. 1. Block diagram for <1>.

Front Panel <1>

The front panel switches (S201A through S209A) select which signals are available at the rear-panel BNCs and which LEDs are lit on the front panel. When one of the momentary contact switches closes, it sends a pulse to the encoder, U204, which translates it into signal KPAD[0..3]. EPROM U210 translates KPAD[0..3] into FMT[0..1] and K[0..2] for PROM U207. U210 also drives the Format LEDs (DS211, DS214, DS215, and DS218) with active low FMTLED[0..3].

U207 looks at the signal that is currently selected, S[0..5], along with the format and key selection information from U210, to determine the desired signal. The desired signal is output as S[0..5]. This signal is also translated in U209 to drive the LEDs in the push buttons, S202B through S209B. S[0..5] goes to U245 <2> on the Main board. U207 also generates BANK_LED[0..1] for U201 <2>. U201 then drives the row indicator LEDs (DS219, DS220, and DS221) with BANK_LED[0..2].

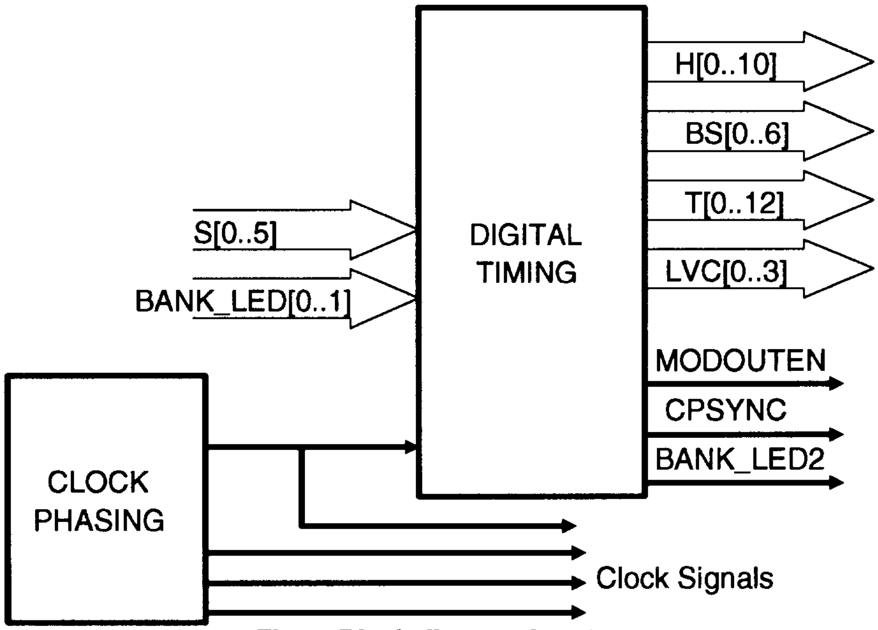


Fig. 2. Block diagram for <2>.

Digital Generation and Clock <2>

Clock Phasing

The clock for the instrument is a very stable 17.734375 MHz crystal, Y1. The TTL level of this signal is converted to ECL levels at pin 5 of U106. One copy of this signal is fed straight through to U108 and converted back to TTL level (CHY2_CLK). This signal is the general purpose clock used in the rest of the instrument. The other copy of the signal is timed by an RLC network (R231, L71, and C263) to assure that all clocks are in phase, then converted back to TTL level by U108 pins 2 and 3. The resulting signal is CHY1_CLK which is used by the Y Channel DAC. This signal is then fed back to U106 at pins 10 and 11. The resulting clocks then go through RLC networks where the capacitor (C30 or C32) is used to adjust the interchannel timing. These signals then go to the ECL to TTL converter, U108, and become CHBY_CLK and CHRY_CLK. These clocks are used by the other two channel's output DACs.

Digital Timing

The Digital Timing circuit has several purposes: to control the vertical and horizontal timing, to request the correct signal (according to the timing information), and to determine whether or not the signal should be modulated.

The selected signal, from the front panel, is coded in S[0..5]. That signal is latched in U245 where it is combined with other information (sync on green, F1L7 pulse on or off, and diagnostic signals) and converted to DS[0..6] (data segment). DS[0..6] drives EPROM U202.

U202 contains a horizontal, bounce, and vertical counter in addition to a timing decoder and signal selection decoders. H[0..11] is the output of the horizontal counter. It drives the Signal Segment Address Memory <3> and clocks its latches. BS[0..6] is a decoded version of the signal selection from the front panel. It is a modification of the signal selected to incorporate the bounce signal or a special signal required due to signal variations from line to line. For example, a convergence signal has several lines of one signal and then a white line. The same is true of any matrix signal.

The levels of MODOUTEN and (MODOUTEN) are determined by the signal format selected. MODOUTEN is high for composite signals where the chrominance modulator, U222 <4>, output is enabled to drive to DAC (U31 <6>) inputs. MODOUTEN is low during component signals, which tri-states the modulator output and enables the line buffer, U230 and U231, to drive the DAC (U31 <6>) directly.

CPSYNC is the composite sync pulse output (available only on options 02, 03, and 04).

The other control signals tie together U202 with U201 which is predominantly a vertical counter followed by a decoder. 2FLDCLR makes sure that both vertical counters in the U201 and U202 are locked together. VCNTREN enables U201's vertical counter.

EPROM U201 has several purposes: to derive the control signal for the row indicator on the front panel <1>, to generate the 25 Hz offset timing T[0..12] for the Lookup Table <4>, and to provide the vertical matrix timing LVC[0..3] for the Signal Segment Address Memory <3>.

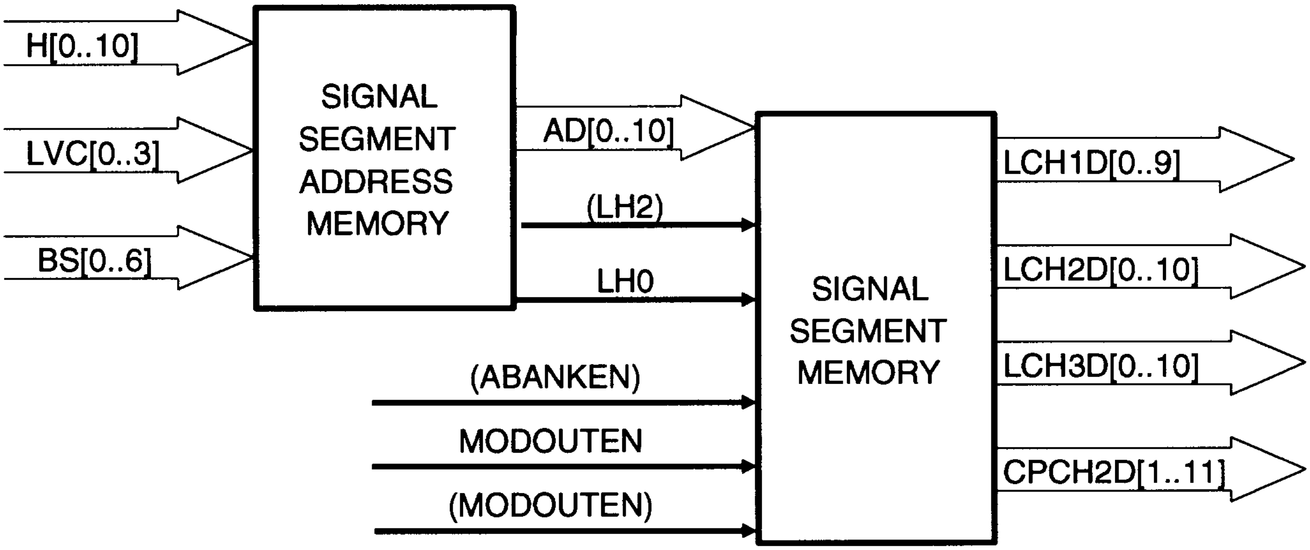


Fig. 3. Block diagram for <3>.

Signal Memory <3>

Signal Segment Address Memory

Signal information, LVC[0..3] and BS[0..6], along with the horizontal timing, H[3..10], are used by U104 and U102 to find the address for the signal segment required to create the selected signal. The output of these EPROMs are latched by U150 and U140. AD[0..10] is clocked out of these latches by a clock pulse derived from H3 (every eighth horizontal count). The address goes to the Signal Segment Memory.

Signal Segment Memory

On the opposite clock count from when it was loaded into the U150 and U240, the address is clocked into the Signal Segment Memory PROMs. U21 contains the data for the first channel (Y and Green). U23 contains the data for the second channel (half of C, B-Y, and Blue). U25 contains the data for the third channel (the other half of C, R-Y, and Red). U27 contains the LSBs for all of the channels. The first channel's signal, LCH1D[0..9], is always luminance (therefore never modulated), so it goes directly to the first channel's DAC (Channel Y/G/Y DAC), U34 <6>.

The other two channels need to be modulated only when the format is composite PAL. Therefore signals LCH2D[0..10] and LCH3D[0..10] don't need to be sent to the modulator for all the other output formats. Buffers U230 and U231 drive the second channel DAC (Channel C/B/B-Y DAC) U31 <6> with CPCH2D[1..11] when the second channel is not modulated. This is controlled by MODOUTEN and (MODOUTEN) from U202 on <2>. When the second and third channels need to be modulated - LCH2D[0..10] and LCH3D[0..10] go to the Modulator, U222 <4>.

Note that the output of the third channel is always invalid whenever the signal needs to be modulated (composite PAL).

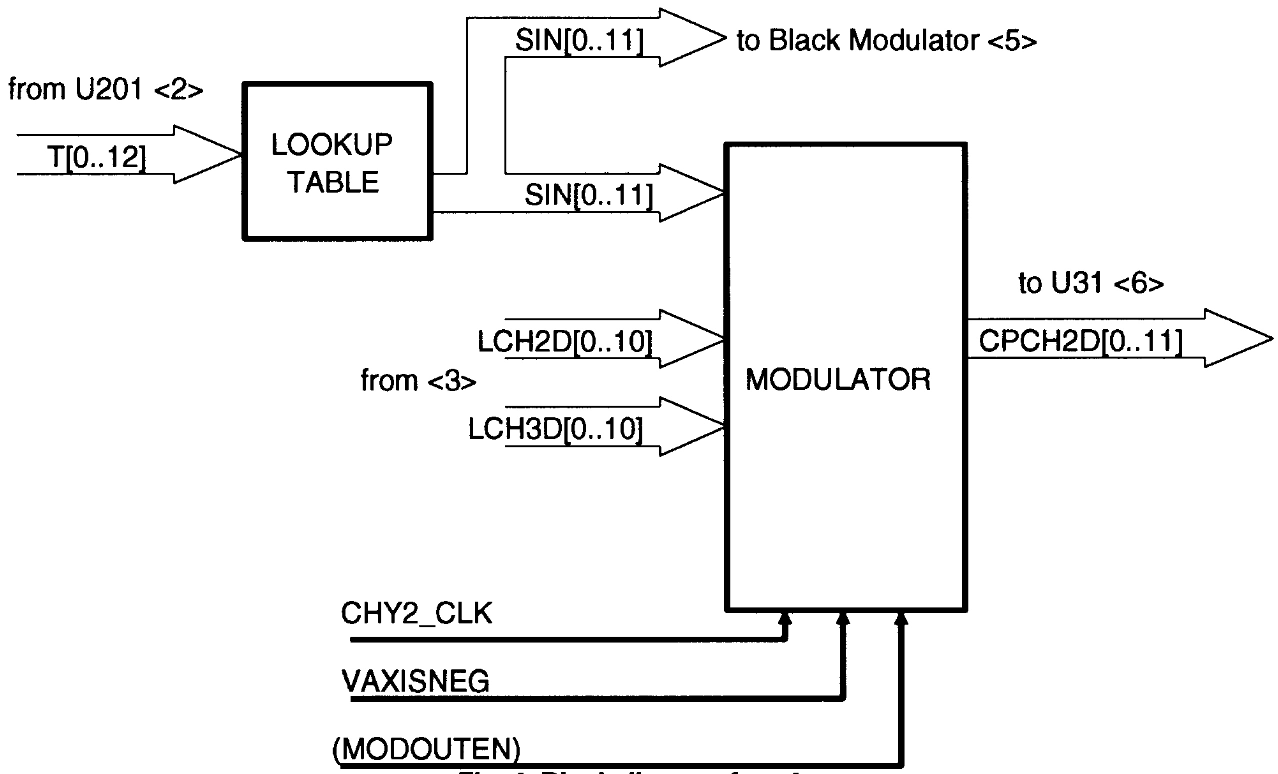


Fig. 4. Block diagram for <4>.

Digital Modulator and Lookup Table <4>

Lookup Table

U228 and U229 get their timing signal, T[0..12], from the Digital Timing circuit <2> and use that signal to derive the SIN[0..11] signal which is used by the modulator to determine how to modulate the signal. The SIN[0..11] signal is also used by the Black Burst Modulator (U235 <5>). This includes the 25 Hz offset to the modulation.

Modulator

U222 modulates the chrominance information for the PAL signal. If (MODOUTEN) is high, then the Modulator is turned off and the output is tri-stated, allowing the second channel information to come from U230 and U231 <3>. When (MODOUTEN) is low, it combines LCH2D[0..10] and LCH3D[0..10], using SIN[0..11] as the modulation offset, into the signal for the second channel. The output is CPCH2D[0..11] which drives the second output channel's DAC <6>.

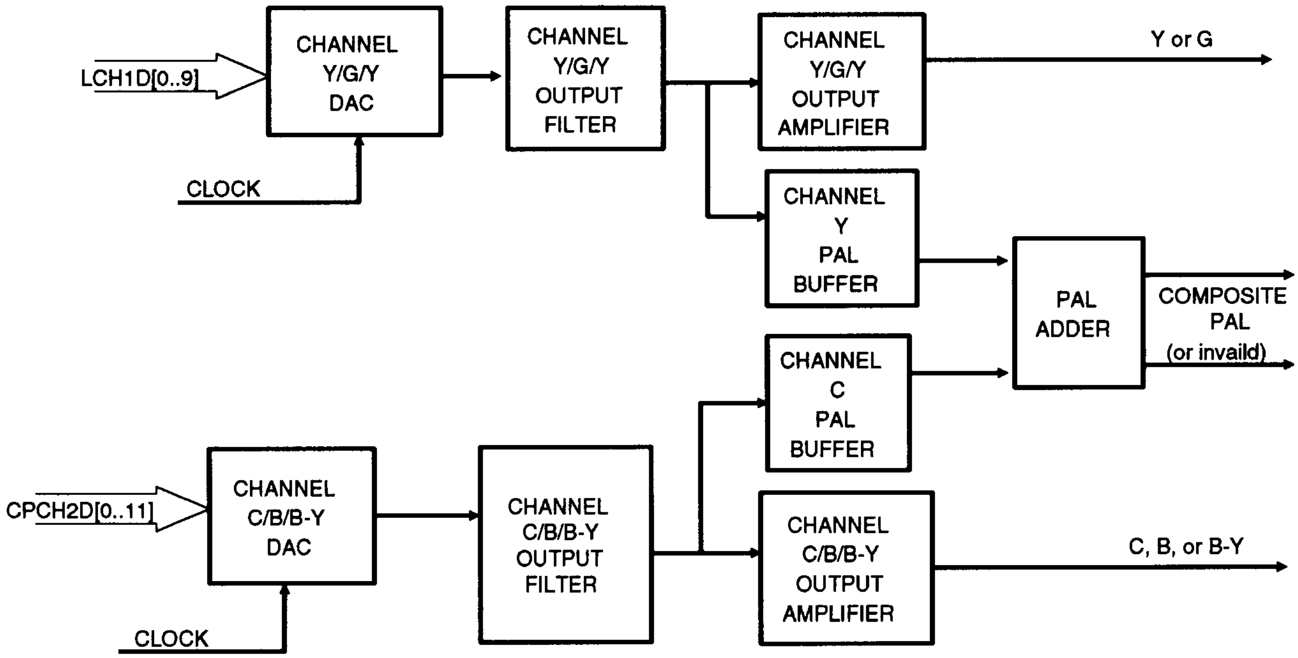


Fig. 5. Block diagram for <6>.

Y and C Analog Outputs <6>

Channel Y/G/Y DAC

U34 is a 10-bit DAC that converts the luminance or green information, LCH1D[0..9], from the Signal Segment Memory to a voltage. The voltage is sent to the Channel Y/G/Y Output Filter.

Channel Y/G/Y Output Filter

FL1 is a lowpass filter that removes any high frequency components caused by digitizing and makes the signal fit the defined PAL bandwidth. The lowpassed signal is then ready to be amplified by either the Output Amplifier or the Channel Y PAL Buffer.

Channel Y/G/Y Output Amplifier

Op amp U33 is the heart of the Output Amplifier. The amplifier raises the signal level a sufficient amount to drive 1 volt into 75 Ω. In the Output Amplifier, R79 is in the feedback path and is used to control the gain. The DC offset is adjusted by R82. C69 adjusts the frequency response of the gain cell. The outputs of this amplifier are Y1, Y2, and Y3. Y1 and Y2 are the outputs available at the Y/G outputs at the rear of the instrument, while Y3 drives the Y component on the rear-panel S-Video output.

Channel Y PAL Buffer

This amplifier is identical to the Channel Y/G/Y Output Amplifier except instead of directly driving the outputs, it drives the PAL Adder. U1 is the op amp. R18 is in the feedback loop and controls the gain. The frequency response is corrected by C19. The DC offset is not adjustable in this amplifier. The output goes to the PAL Adder.

Channel C/B/B-Y DAC

U31 is the DAC for the second channel. CPCH2D[0..11] from either the Signal Segment Memory (for B and B-Y signals) <3> or the Modulator (for C signals) <4> drives the DAC. The 12-bit DAC converts the signal into a voltage.

Channel C/B/B-Y Output Filter

FL2 is a lowpass filter that removes any high frequency components caused by digitizing and makes the signal fit into the defined PAL bandwidth. The lowpassed signal is then ready to be amplified by either the Output Amplifier or the Channel C PAL Buffer.

Channel C/B/B-Y Output Amplifier

U30, is the same as U33, the Channel Y/G/Y Output Amplifier. Its purpose is to amplify the signal so that it can drive 1 volt into 75 Ω. R50 controls the gain. R63 adjusts the DC offset. C47 adjusts the frequency response. The output is C/B-Y1 and C/B-Y2. C/B-Y1 drives the C/B-Y/B output on the rear panel, while C/B-Y2 drives the C output on the S-Video connector.

Channel C PAL Buffer

This is the same as the Output Amplifier. The input signal is CH_C_BUFFER from the Channel C/B/B-Y Output Filter. U2 is an op amp at the heart of the buffer. R23 controls the gain. R20 controls the DC offset. C21 controls the frequency response. The output of this amplifier drives the PAL Adder.

PAL Adder

The PAL Adder is a balanced resistor network that takes the signal from channel 1 (either Y, G, or Y) and adds it to the output of Channel 2 (either C, B-Y, or B) and adds them together (Y + C = PAL signal). There is no intelligence in this adder, so if anything other than PAL/YC is requested from the front panel the output of this amplifier makes no sense or is otherwise confusing (B + G and B-Y + Y). The outputs are PAL1 and PAL2 which drive the two COMPOSITE outputs at the rear panel.

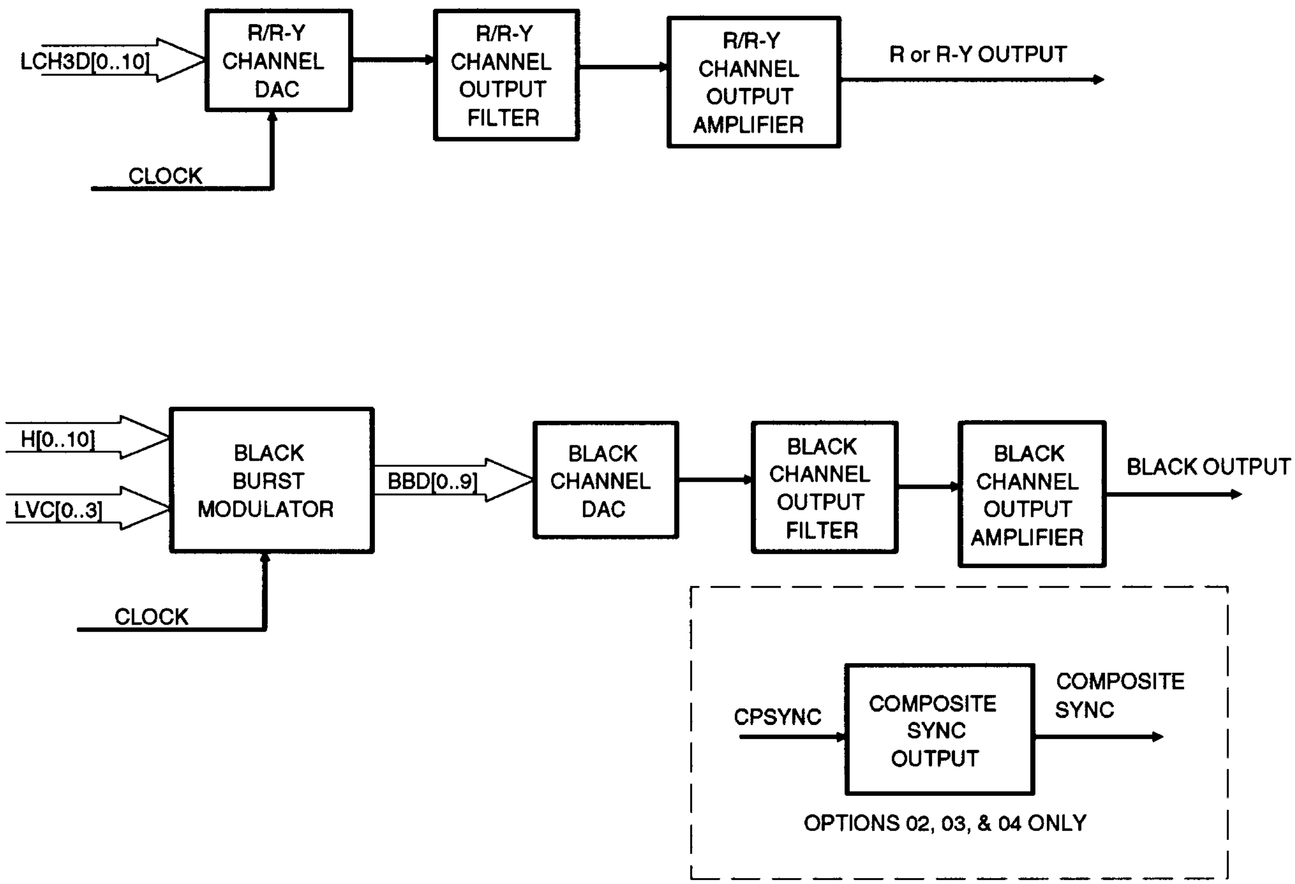


Fig. 6. Block diagram for <5> and <7>.

CTDM/R-Y and Black/Sync Outputs <7>

The complete Black circuitry is only installed in options 02 and 03.

R/R-Y Channel DAC

U5 is a 12-bit DAC that take the LCH3D[0..10] signal from the Signal Segment Memory and converts it to an analog voltage. The resulting analog signal goes to the R/R-Y Channel Output Filter.

R/R-Y Channel Output Filter

FL3 is a lowpass filter that removes any high frequency components caused by digitizing and makes the signal fit the defined PAL bandwidth. The lowpassed signal is then ready to be amplified by the Output Amplifier.

R/R-Y Channel Output Amplifier

U4 is the op amp at the heart of this output amplifier. R98 adjusts the Gain. R101 adjusts the DC offset. C99 adjusts the frequency response. The output of this amplifier, CTDM/R-Y, drives 1 volt into 75 Ω. This signal drives the CTDM/R-Y/R rear-panel output.

Black Burst Modulator on <5>

The Black Burst Modulator is made of two parts: the modulator (U235) and the black signal memory EPROM (U236).

U236 is given the horizontal and vertical timing information from the Signal Segment Memory <2>. It then uses this information to generate the luminance portion and the burst U and V components of the signal. U235, using the U and V components from U236 and the sine wave data from U228 and U229 <4> with 25 Hz offset, generate the chrominance portion of the signal. This is then added to the luminance portion BBCHY[0..8] of the signal. U235 outputs a digital composite Black Burst signal that drives U238, the Black Burst DAC.

Black Channel DAC

U238 is a 10-bit DAC that takes the BBD[0..9] signal from the Black Burst Modulator and converts it into an analog voltage. The analog signal is sent to the Output Filter.

Black Channel Output Filter

FL4, a lowpass filter, removes any high frequency components caused by digitizing and has the signal fit the defined PAL bandwidth. The lowpassed signal is then ready to be amplified by the Output Amplifier.

Black Channel Output Amplifier

U255 is the op amp for the Output Amplifier. R328 controls the gain, R325 adjusts the DC offset, and C329 adjusts the frequency response. The output has enough gain to drive 1 volt into 75 Ω. The output of this channel is available at the Black/Sync output on the rear panel.

Composite Sync Output (only available on options 02, 03, and 04)

The CPSYNC pulse comes from U202 <2>. The signal is amplified by the transistor network enough to drive -2 V or -4 V into a 75 Ω load.

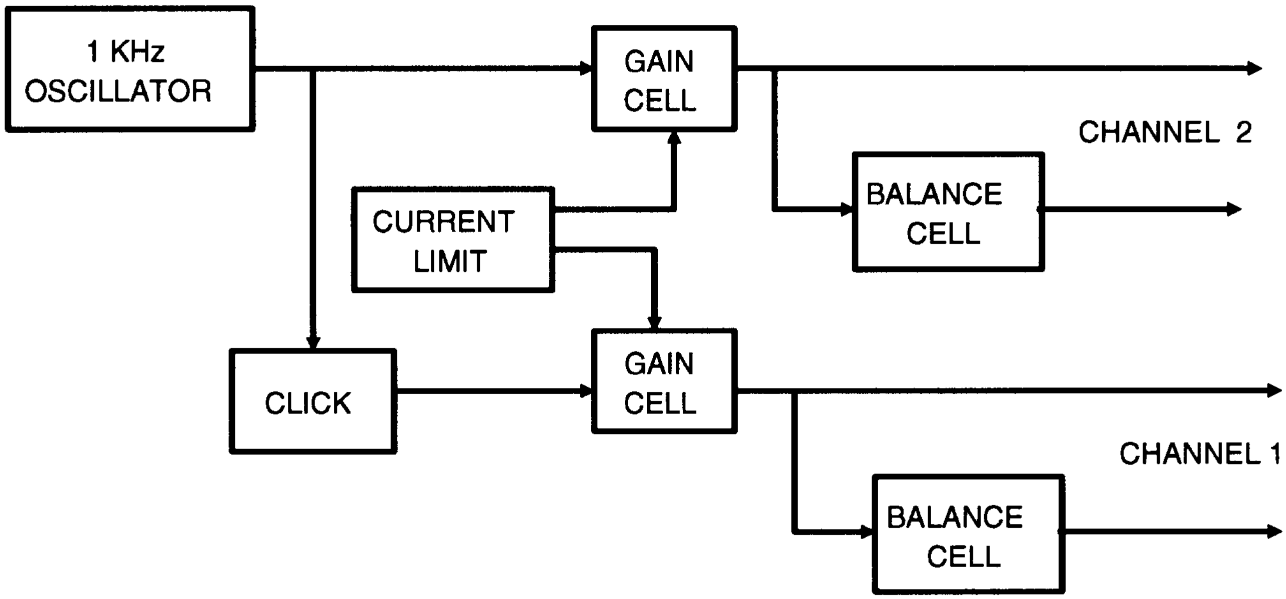


Fig. 7. Block diagram of the Audio circuitry.

Audio Tone <9>

1 KHz Oscillator

U40A is configured as a Wein oscillator, employing both positive and negative feedback. The positive feedback loop controls the frequency of oscillation, with C111, R107, R105, and C100 forming a bandpass filter tuned to 1 KHz. The negative feedback loop controls the gain to keep the circuit in oscillation.

The circuit is designed to operate with a gain of three. This occurs when the positive and the negative feedback is balanced, and produces an output signal of approximately 0.7 Vp-p. If the output amplitude starts to die off, the peak detector (U408 and associated components) reduces the drive to Q2, which increases the gain by increasing the current to the negative feedback loop.

On the other hand, if the output amplitude increases, then the peak detector increases the drive to Q2, decreasing the current to the negative feedback loop, decreasing the gain.

The output of the 1 KHz oscillator goes to the Gain Cells.

Click Circuit

The Click circuit consists of a 555 timer U43, its associated components, and an FET Q1. The rate at which the timer sends out pulses is adjustable by R125 or it can be disabled by removing R125 from the circuit with J12. When a pulse is output from pin 3, it slams the FET to ground, which in turn pulls the channel 1 to ground and creates the "click" sound.

Gain Cells

There are two gain cells, one for channel 1 and one for channel 2. The gain cells consist of an op amp (U42A or U41A) with a negative feedback loop used to adjust the gain. R122 or R123 adjust the gain in the feedback loop by increasing or decreasing the feedback resistance. The output of the gain cell goes to pin 3 of the audio connectors and to the Balance Cell.

Balance Cells

The balance cells are basically inverters that take a copy of the output of the gain cell and inverts it to create the other channel for a balanced audio signal. The Outputs go to pin 2 of the audio connectors.

Current Limits

Q3 & Q4 and Q5 & Q6 are the Current Limit circuitry. If the outputs of the Audio circuits are shorted for any reason they will draw a tremendous amount of current and overheat the transformer in the power supply. This circuit limits the amount of current that the audio output can draw.

The +10 V and -10 V to the gain cells are limited in the amount of current that they can draw by the amount of current that can flow through the base-emitted junction of the Q3/Q4 and Q5/Q6 transistors.

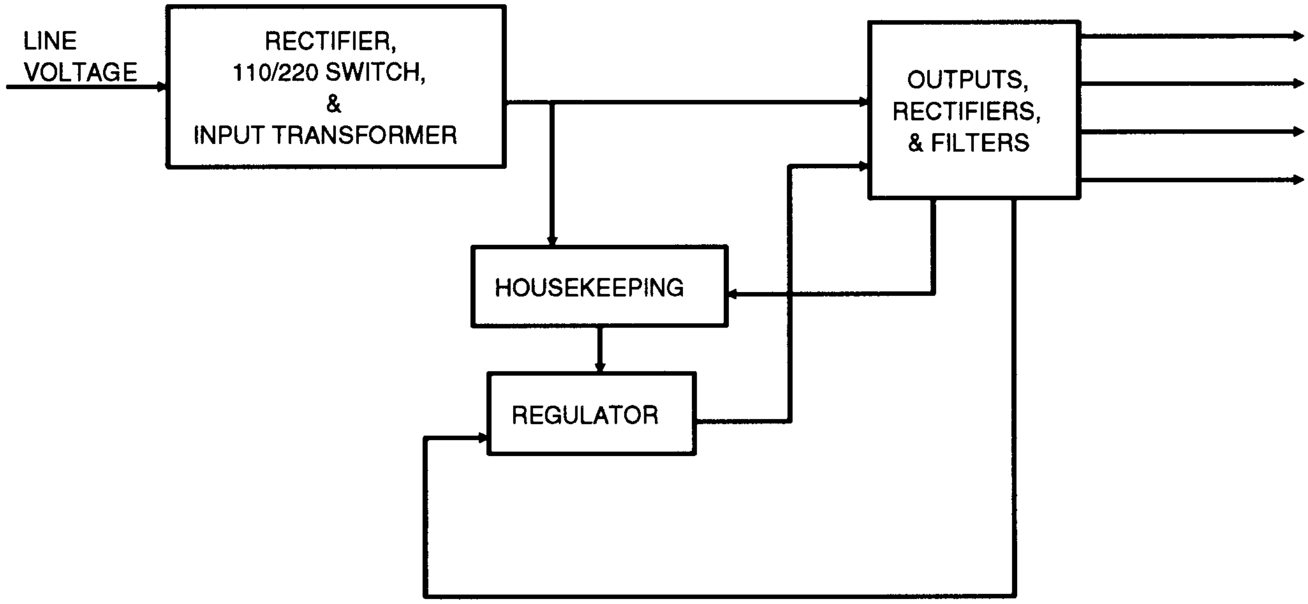


Fig. 8. Block diagram of the Power Supply circuitry.

Power Supply <10>

Rectifier & Input Transformer and 110/220 Switch

The input voltage can either be 110 V or 220 V. If it is 110 V, P10 and P122 are in, which puts all of transformer T1's windings in the circuit. If the Input voltage is 220 V then P11 is in, which removes half of T1's windings from the circuit. The available input voltage on the output side of T1 is then the same. The output of off the line transformer, T1, is a relative low voltage of approximately 20 volts.

This voltage is then rectified by CR10, CR11, CR12, and CR13. The rectifiers convert the sine wave into positive going sine-shaped pulses. C183 smooths the pulses to approximately 16 volts with ripple.

Housekeeping

VR30 and Q30 make up the Housekeeping circuitry. Its purpose is to supply 11 V to the Regulator (U200) during power-up conditions.

After power up, the Housekeeping circuit is shut down. The voltage from CR85 goes up to 15 V, which shuts down Q30.

Regulator

U200 is a Pulse Width Modulator that is a current mode controller. It uses inputs from the primary circuit and from the +5 V output to vary the width of the pulse controls, Q100. This regulates the secondary voltages through variations of input voltage, output load, etc.

Current mode control works by allowing the current flowing in the primary to reach peak level that is set by the output of the +5 V output. The current in the primary is sensed by the R267 and C308 and applied to U200 at pin 3 as a voltage. At the start of the cycle, the oscillator within the Pulse Width Modulator internal oscillator sets the internal flip-flop which turns on Q100. The primary current, and therefore the voltage to U200 pin 3, ramps up until the ISEN input level is high enough to trip the comparator. This rests the flip-flop, ending to drive pulse to Q100, and the energy stored in the transformer is transferred to the secondaries.

Line regulation, then, is a function of line voltage. As the line voltage varies, so will the primary current. An increase in line voltage causes an increase in primary current, so the slope of the ramp increases and the trip point is reached sooner. This results in a shorter pulse width. A decrease in line voltage causes a decrease in primary current, the slope of the ramp decreases and it takes longer to reach the trip point. However, the same peak current is reached in both cases, so the same amount of energy is transferred to the load. Line regulation is then achieved without having to wait for output voltage variations.

Power Inductor Operation (T2)

The heart of this power supply is T2, the power induction.

Inductor, T2, is initially uncharged (zero magnetic flux). Q100, acting as a switch, is turned on by the base drive from the regulator (U200). The polarity of this voltage is such that the voltage induced in the secondary will reverse bias their respective diodes (note the polarity dots). In this way, there is no current flowing in the secondaries while it is flowing in the primary. C303 and R262 are a snubber circuit used to reduce noise.

The primary current builds a linear ramp, storing the energy in T2 according to the relationship $E=\frac{1}{2}Li^2$, where L is the primary inductance and i is the current flowing through it.

The current path is broken when Q100 is switched off, so current stops flowing in the primary. The flyback action of T2 then causes the voltage in the secondaries to linearly ramp down to zero as the energy which was stored in T2's primary is delivered to the load, charging its own capacitors.

When all of the energy which was stored in T2 during the first half of the cycle is delivered to the load, the current in the secondaries is zero, and the diodes turn off. There is no current flowing in either the primaries or the secondaries until Q100 is turned back on to start the next cycle. As there is not a continuous flow of energy in T2, this is called a discontinuous flyback operation.

Load regulation is provided by sensing the +5 V supply with a resister divider, R264 and R265. When +5 V goes too high, U200 narrows the pulse width. This reduces the amount of energy stored in T2, and therefore the amount of energy transferred to the load, so the +5 V goes down. Inversely, when the +5 V is too low, the pulse width is increased, increasing the amount of energy stored in T2 and then transferred to the load, so the voltage goes up.

Outputs, Rectifiers, & Filters

There are four separate circuits in the output: +5 V, -5 V, +12 V, and -12 V. They all work in a very similar manner.

During the first half of the cycle, when Q100 is shut off, the flyback action reverses the polarities of the secondary, and the diodes are forward-biased. This allows the energy within T2 to charge up the capacitors in the secondaries. The +5 V and the -5 V supplies use LC filters from this point, to further smooth the voltage and eliminate most of the ripple.

The +12 and -12 V supplies actually start as +15 and -15 V, at the transformer. Then they are filtered and applied to linear regulators, U212 and U50, which provide clean +12 V and -12 V outputs, respectively.

SECTION 7
OPTIONS

This is a summary of the catalog options available for the Tektronix TSG 131A Multiformat Signal Generator. Custom modifications are negotiated (and documented) on an individual basis.

Power Options

The standard power configuration is 220 V.

Power Cords

The standard power cord for the TSG 131A is a 220 V, 16 amp rated power cord with the Universal European three-prong power plug (Fig. 7-2). It is possible to order instruments with other power options.

The other power options are:

Option 52 a 120 V, 15 Amp cord equipped with standard North American three-prong power plug, as shown in Fig. 7-1.

Option A2 (Fig. 7-3) uses a 240 V, 15 amp rated power cord with the United Kingdom three-prong power plug.

Option A3 (Fig. 7-4) uses a 240 V, 10 amp rated power cord with the Australian three-prong power plug.

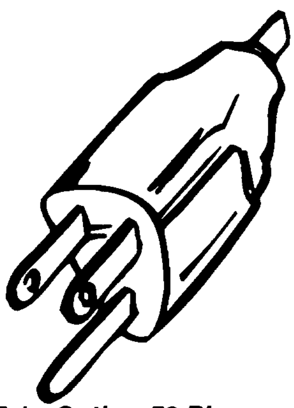


Fig. 7-1. Option 52 Plug.

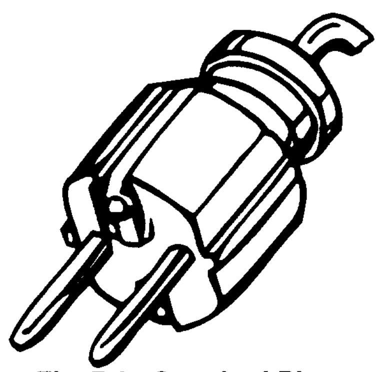


Fig. 7-2. Standard Plug.

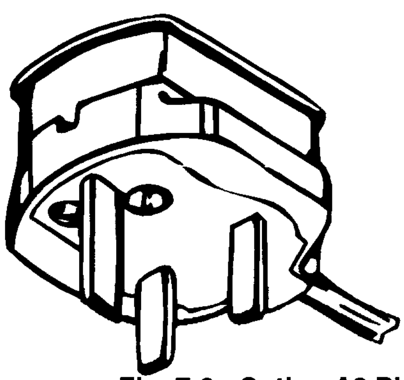


Fig. 7-3. Option A2 Plug.

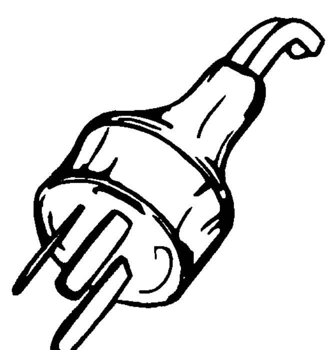


Fig. 7-4. Option A3 Plug.

Configuration Options

A summary of these options is given below and in Table 7-1 which gives a quick comparison between the various options.

For Options 01, 02, 03, 04, and 10 the information needed for the Performance Check and the Adjustment Procedure is given along with the standard procedures.

TSG 131A Option 01

This option changes the CTDM format to the MII standard. The rest of the instrument is identical to the standard.

TSG 131A Option 02

This option adds Black Burst or Composite Sync (selectable by internal jumper) from the BLACK/SYNC output, to the standard instrument. It also allows the Green signal to have the sync on or off (also selectable by an internal jumper).

TSG 131A Option 03

Option 03 has a longer blanking width (11.8 μs) and a Color Flag Reference Pulse from one of the Y/G outputs. The sync on green is jumper selectable and is has a Black Burst or Composite Sync output. It also has a custom signal set for both the composite and BetaCam component signals.

TSG 131A Option 04

The 04 Option has VIR on line 19 and only Composite Sync from the BLACK/SYNC output. There is a Color Frame Square Wave from one of the Y/G outputs. It also has custom signal sets for both the composite and the MII component signals.

TSG 131A Option 10

The Option 10 is a tighter frequency specification crystal. Instead of the standard ± 10 Hz subcarrier range, the Option 10 has a ± 5 Hz range. This option can be ordered in conjunction with any other option or the standard instrument.

Table 7-1. Comparision between the various options of the TSG 131A.

	STANDARD	01	02	03	04	10
2 Wire Signal BetaCam or MII	BetaCam	MII	BetaCam	BetaCam	MII	any
Black Burst Output	—	—	Black Burst	Black Burst	Composite Sync	any
Blanking Width	10.9 μs	10.9 μs	10.9 μs	11.8 μs	10.9 μs	any
Sync on Green	always	always	jumper selectable	jumper selectable	always	any
Color Flag Reference Pulse	—	—	—	from one of the Y/G outputs (low F1L1-3)	—	any
Color Frame Square Wave	—	—	—	—	from one of the Y/G outputs (low F1,2,3,&4 high F5,6,7,&8)	any
VISC on L22 & 335	—	—	—	—	yes	any
Special Composite Signal Set	Standard	Standard	Standard	Special	Special	any
Special Component Signal Set	Standard BetaCam Set	Standard MII Set	Standard BetaCam Set	Special	Special	any
Subcarrier Frequency Tolerance	± 10 Hz	± 10 Hz	± 10 Hz	± 10 Hz	± 10 Hz	± 5 Hz

Replaceable Electrical Parts

Section 8
Replaceable Electrical Parts

This section contains a list of the components that are replaceable for the TSG 131A. Use this list to identify and order replacement parts. There is a separate Replaceable Electrical Parts list for each instrument.

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest circuit improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc., Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

Using the Replaceable Electrical Parts List

The tabular information in the Replaceable Electrical Parts list is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replaceable parts.

Cross Index–Mfr. Code Number to Manufacturer

The Mfg. Code Number to Manufacturer Cross Index for the electrical parts list is located immediately after this page. The cross index provides codes, names, and addresses of manufacturers of components listed in the electrical parts list.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1.

List of Assemblies

A list of assemblies can be found at the beginning of the electrical parts list. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

Column Descriptions

Component No. (Column 1)

The component circuit number appears on the diagrams and circuit board illustrations, located in the diagrams section. Assembly numbers are also marked on each diagram and circuit board illustration, in the Diagram section and on the mechanical exploded views, in the mechanical parts list. The component number is obtained by adding the assembly number prefix to the circuit number.

Example a.

Component Number

A23R1234 **A23** **R1234**

Assembly Number Circuit Number

Read: Resistor 1234 of Assembly 23

Example b.

Component Number

A23A2R1234 **A23** **A2** **R1234**

Assembly Number Subassembly Number Circuit Number

Read: Resistor 1234 of Subassembly 2 of Assembly 23

The electrical parts list is arranged by assemblies in numerical sequence (A1, with its subassemblies and parts, precedes A2, with its subassemblies and parts).

Mechanical subparts to the circuit boards are listed in the electrical parts list. These mechanical subparts are listed with their associated electrical part (for example, fuse holder follows fuse).

Chassis-mounted parts and cable assemblies have no assembly number prefix and are located at the end of the electrical parts list.

Tektronix Part No. (Column 2)

Indicates part number to be used when ordering replacement part from Tektronix.

Serial/Assembly No. (Column 3 and 4)

Column three (3) indicates the serial or assembly number at which the part was first used. Column four (4) indicates the serial or assembly number at which the part was removed. No serial or assembly number entered indicates part is good for all serial numbers.

Name and Description (Column 5)

An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

The mechanical subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column five (5).

Mfr. Code (Column 6)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

Mfr. Part No. (Column 7)

Indicates actual manufacturer's part number.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008–4229
07716	TRW INC TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
09023	CORNELL–DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO	2652 DALRYMPLE ST	SANFORD NC 27330
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067–0760
22229	SOLITRON DEVICES INC SEMICONDUCTOR GROUP SAN DIEGO OPERS	8808 BALBOA AVE	SAN DIEGO CA 92123
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT ELECTRONICS DEPT	515 FISHING CREEK RD	NEW CUMBERLAND PA 17070–3007
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834–2611
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051–0606
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507–2114
54473	MATSUSHITA ELECTRIC CORP OF AMERICA	ONE PANASONIC WAY PO BOX 1501	SECAUCUS NJ 07094–2917
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195–4526
57668	ROHM CORP	8 WHATNEY PO BOX 19515	IRVINE CA 92713
58361	QUALITY TECHNOLOGIES CORP		
59660	TUSONIX INC	7741 N BUSINESS PARK DR PO BOX 37144	TUCSON AZ 85740–7144
61964	OMRON ELECTRONICS INC	650 WOODFIELD ST	SCHAUMBURG IL 60195–5008
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
75042	IRC ELECTRONIC COMPONENTS PHILADELPHIA DIV TRW FIXED RESISTORS	401 N BROAD ST	PHILADELPHIA PA 19108–1001
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
76493	BELL INDUSTRIES INC JW MILLER DIV	19070 REYES AVE PO BOX 5825	COMPTON CA 90224–5825
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630–1314
91506	AUGAT INC	33 PERRY AVE P O BOX 779	ATTLEBORO MA 02703–2417
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601–3632
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
S4307	SCHAFFNER ELECTRONIK AG		LUTERBACH SWITZERLAND
TK1345	ZMAN & ASSOCIATES		
TK1450	TOKYO COSMOS ELECTRIC CO LTD	2–268 SOBUDAI ZAWA	KANAGAWA 228 JAPAN

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (STANDARD ONLY)	80009	671–2712–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 01 ONLY)	80009	671–2712–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 02 ONLY)	80009	671–2712–01
A1	671–2758–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 03 ONLY)	80009	671–2758–01
A1	671–2761–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 04 ONLY)	80009	671–2761–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 10 ONLY)	80009	671–2712–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 01/10 ONLY)	80009	671–2712–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 02/10 ONLY)	80009	671–2712–01
A1	671–2758–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 03/10 ONLY)	80009	671–2758–01
A1	671–2761–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 04/10 ONLY)	80009	671–2761–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 01/02/10 ONLY)	80009	671–2712–01
A1	671–2712–01			CIRCUIT BD ASSY:FRONT PANEL (OPTION 01/02 ONLY)	80009	671–2712–01
A1C201	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C202	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C250	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C251	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C252	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1C253	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A1DS211	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1DS214	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1DS215	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1DS218	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1DS219	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1DS220	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1DS221	150–1029–00			LT EMITTING DIO:GREEN,565NM,35MA	58361	Q6480/MV5274C
				MOUNTING PARTS		
	352–1012–00			HOLDER,LED:BLACK,ABS	80009	352–1012–00
				END MOUNTING PARTS		
A1J201	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131–0608–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
				(QUANTITY 16)		
A1R201	322–3143–00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 301E
A1R204	322–3143–00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 301E
A1R207	322–3143–00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 301E
A1S201	260–2401–00			SWITCH,KEY:NO LED,B3E–1000	61964	B3E–1000
				ATTACHED PARTS		
	366–0683–00			PUSH BUTTON:SWITCH CAP	80009	366–0683–00
				END ATTACHED PARTS		
A1S202	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S203	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S204	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S205	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S206	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S207	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S208	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1S209	260–2402–00			SWITCH,PUSH:W/LED	80009	260–2402–00
				ATTACHED PARTS		
	366–0682–00			PUSH BUTTON:LIGHTED CAP,INSERT ASSY	80009	366–0682–00
				END ATTACHED PARTS		
A1U204	156–1215–01			IC,DIGITAL:CMOS,MUX/ENCODER;20–KEY ENCODER;74C923,DIP18.3,TUBE,SCRN	27014	MM74C923JA+
A1U207	160–4415–00	671–2712–01		IC,DIGITAL:CMOS,2048 X 8 REGISTERED,PRGM, 7C245–35,DIP24	80009	160–4415–00
A1U207	160–4418–00	671–2758–01		IC,MEMORY:CMOS,PROM;2048 X 8,REGISTERED, 7C245–35,DIP24	80009	160–4418–00
A1U207	160–4642–00	671–2761–01		MICROCKT,DGTL:CMOS,2048 X 8,REGISTERED, 7C245–35,DIP24	80009	160–4642–00
				MOUNTING PARTS		
	136–0925–00			SOCKET,DIP::	91506	224–AG30D
				END MOUNTING PARTS		
A1U209	160–4416–00	671–2712–01		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA, 16V8–25,DIP20.3,TUBE	80009	160–4416–00
A1U209	160–4419–00	671–2758–01		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA, 16V8–25,DIP20.3	80009	160–4419–00
A1U209	160–4644–00	671–2761–01		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA; 16V8–25,DIP20.3,TUBE	80009	160–4644–00
				MOUNTING PARTS		
	136–0752–00			SKT,PL–IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P–108
				END MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A1U210	160–9066–00			IC,DIGITAL:CMOS,PLD;OPT,DUAL CLOCK,16 MA-CROCELL,35NS,EP610,DIP24.3	80009	160–9066–00
				MOUNTING PARTS		
	136–0925–00			SOCKET,DIP::	91506	224–AG30D
				END MOUNTING PARTS		
A1W201	174–2965–00			CA ASSY,SP,ELEC:RIBBON,;IDC,16,28 AWG,3.0 L,2X8,0.1 CTR,RECPT BOTH ENDS	80009	174–2965–00
A2	671–2539–03			CIRCUIT BD ASSY:MAIN (STANDARD ONLY)	80009	671–2539–03
A2	671–2440–03			CIRCUIT BD ASSY:MAIN (OPTION 01 ONLY)	80009	671–2440–03
A2	671–2760–03			CIRCUIT BD ASSY:MAIN (OPTION 02 ONLY)	80009	671–2760–03
A2	671–2759–03			CIRCUIT BD ASSY:MAIN (OPTION 03 ONLY)	80009	671–2759–03
A2	671–2762–03			CIRCUIT BD ASSY:MAIN (OPTION 04 ONLY)	80009	671–2762–03
A2	671–2808–03			CIRCUIT BD ASSY:MAIN (OPTION 10 ONLY)	80009	671–2808–03
A2	671–2817–03			CIRCUIT BD ASSY:MAIN (OPTION 01/10 ONLY)	80009	671–2817–03
A2	671–2819–03			CIRCUIT BD ASSY:MAIN (OPTION 02/10 ONLY)	80009	671–2819–03
A2	671–2816–03			CIRCUIT BD ASSY:MAIN (OPTION 03/10 ONLY)	80009	671–2816–03
A2	671–2820–03			CIRCUIT BD ASSY:MAIN (OPTION 04/10 ONLY)	80009	671–2820–03
A2	671–2827–03			CIRCUIT BD ASSY:MAIN (OPTION 01/02/10 ONLY)	80009	671–2827–03
A2	671–2572–02			CIRCUIT BD ASSY:MAIN (OPTION 01/02 ONLY)	80009	671–2572–02
				ATTACHED PARTS		
	337–3760–00			SHIELD,ELEC:TIN PLATED BRASS	80009	337–3760–00
				END ATTACHED PARTS		
A2C1	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C2	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C3	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C5	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C6	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C7	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C8	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C9	290–0973–03			CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	UVX1V101MPA1TD
A2C10	290–0973–03			CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	UVX1V101MPA1TD
A2C13	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C15	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C18	281–0810–00			CAP,FXD,CER:MLC;5.6PF,+/–0.5PF,100V, 0.100 X 0.170;AXIAL,MI	04222	SA101A5R6DAA
A2C19	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C20	281–0810–00			CAP,FXD,CER:MLC;5.6PF,+/–0.5PF,100V, 0.100 X 0.170;AXIAL,MI	04222	SA101A5R6DAA
A2C21	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C23	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C30	281–0123–00			CAP,VAR,CER DI:5–25PF,100V	59660	518–000A5–25
A2C32	281–0123–00			CAP,VAR,CER DI:5–25PF,100V	59660	518–000A5–25
A2C37	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C38	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C39	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C40	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C41	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2C42	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C43	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C46	281–0810–00			CAP,FXD,CER:MLC;5.6PF,+/–0.5PF,100V, 0.100 X 0.170;AXIAL,MI	04222	SA101A5R6DAA
A2C47	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C59	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C60	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C61	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C62	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C63	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C64	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C68	281–0810–00			CAP,FXD,CER:MLC;5.6PF,+/–0.5PF,100V, 0.100 X 0.170;AXIAL,MI	04222	SA101A5R6DAA
A2C69	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C88	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C89	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C91	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C92	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C93	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C94	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C95	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C98	281–0810–00			CAP,FXD,CER:MLC;5.6PF,+/–0.5PF,100V, 0.100 X 0.170;AXIAL,MI	04222	SA101A5R6DAA
A2C99	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C142	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C153	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C160	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C161	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C183	290–1290–00			CAP,FXD,ALUM:2200UF,20%,25V,16 X 31.5MM;RADIAL,LOW IMPED,105 DEG,BULK	80009	290–1290–00
A2C186	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C187	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C188	290–0943–02			CAP,FXD,ELCTLT:47UF,20%,25V	55680	UVX1E470MDA1TD
A2C190	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C191	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C192	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C193	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C194	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C197	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C198	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C254	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C255	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C256	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C257	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C258	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C263	283–0637–00			CAP,FXD,MICA DI:20PF,2.5%,500V	80009	283–0637–00
A2C268	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C269	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C270	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C271	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C272	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C273	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C274	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C275	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C276	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C277	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C278	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C281	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C282	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2C283	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C284	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C290	283–0203–00			CAP,FXD,CER DI:0.47UF,20%,50V	80009	283–0203–00
A2C291	290–0845–00			CAP,FXD,ELCTLT:330UF,+50–10%,25V	54473	ECE–A25V330L
A2C292	283–0203–00			CAP,FXD,CER DI:0.47UF,20%,50V	80009	283–0203–00
A2C293	283–0203–00			CAP,FXD,CER DI:0.47UF,20%,50V	80009	283–0203–00
A2C294	290–0845–00			CAP,FXD,ELCTLT:330UF,+50–10%,25V	54473	ECE–A25V330L
A2C295	290–0845–00			CAP,FXD,ELCTLT:330UF,+50–10%,25V	54473	ECE–A25V330L
A2C296	290–0845–00			CAP,FXD,ELCTLT:330UF,+50–10%,25V	54473	ECE–A25V330L
A2C297	290–1301–00			CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM (0.492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE, BULK	80009	290–1301–00
A2C298	283–0203–00			CAP,FXD,CER DI:0.47UF,20%,50V	80009	283–0203–00
A2C299	283–0203–00			CAP,FXD,CER DI:0.47UF,20%,50V	80009	283–0203–00
A2C300	290–0973–01			CAP,FXD,ALUM:;100UF,20%,25VDC;8 X 11MM,0.2 LS;RADIAL,T&A	55680	UVX1E101MPA1TA
A2C301	290–0973–01			CAP,FXD,ALUM:;100UF,20%,25VDC;8 X 11MM,0.2 LS;RADIAL,T&A	55680	UVX1E101MPA1TA
A2C302	283–0398–00			CAP,FXD,CER DI:680PF,2%,100V	04222	SR201A681GAA
A2C303	283–0398–00			CAP,FXD,CER DI:680PF,2%,100V	04222	SR201A681GAA
A2C304	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C305	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C306	283–0203–00			CAP,FXD,CER DI:0.47UF,20%,50V	80009	283–0203–00
A2C307	283–0005–00			CAP,FXD,CER DI:0.01UF,+100–0%,250V	04222	SR30VE103ZAA
A2C308	283–0032–00			CAP,FXD,CER DI:470PF,5%,500V	80009	283–0032–00
A2C320	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C321	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C322	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C323	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C324	283–0220–02			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR075C103MAAAP1
A2C325	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C326	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C327	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C328	281–0810–00			CAP,FXD,CER:MLC;5.6PF,+/–0.5PF,100V, 0.100 X 0.170;AXIAL,MI	04222	SA101A5R6DAA
A2C329	281–0153–00	671–2539–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2760–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2759–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2762–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2819–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2816–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2820–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C329	281–0153–00	671–2827–03		CAP,VAR,AIR DI:1.7–10PF,250V	80009	281–0153–00
A2C330	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A2C336	281–0775–01	671–2760–03		CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C336	281–0775–01	671–2759–03		CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C336	281–0775–01	671–2762–03		CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C351	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C352	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C353	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2C355	281–0911–00			CAP,FXD,CER DI:12PF,10%,50V	04222	SA102A12OKAA
A2C356	283–0796–01			CAP,FXD,MICA DI:100PF,5%,500V,TAPE & AMMO	09023	CDA10FD101J03
A2C359	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	80009	283–0692–00
A2CR10	152–0601–01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A2CR11	152–0601–01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A2CR12	152–0601–01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A2CR13	152–0601–01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A2CR40	152–0601–01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A2CR50	152–0601–01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL

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A2CR60	152–0670–00			DIO,RECT:SCHTKY,;40V,3A,IFSM=80A,VF=525MV AT 3A,IR=2.0MA AT 40V,AXIAL LEAD;1N5822	80009	152–0670–00
A2CR70	152–0670–00	671–2572–02		DIO,RECT:SCHTKY,;40V,3A,IFSM=80A,VF=525MV AT 3A,IR=2.0MA AT 40V,AXIAL LEAD;1N5822	80009	152–0670–00
A2CR71	152–0670–00			DIO,RECT:SCHTKY,;40V,3A,IFSM=80A,VF=525MV AT 3A,IR=2.0MA AT 40V,AXIAL LEAD;1N5822	80009	152–0670–00
A2CR85	152–0141–02			DIO,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO–35,T&R	80009	152–0141–02
A2CR86	152–0141–02			DIO,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO–35,T&R	80009	152–0141–02
A2F1	159–0044–00			FUSE,CARTRIDGE:3AG,0.2A,250V,20SEC	71400	MDL 2/10
				MOUNTING PARTS		
	344–0329–00			CLIP,ELECTRICAL: (QUANTITY 2)	S3629	0G 751.0052
				END MOUNTING PARTS		
A2FL1	119–4316–00			FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2FL2	119–4316–00			FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2FL3	119–4316–00			FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2FL4	119–4316–00	671–2572–02		FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2FL4	119–4316–00	671–2760–03		FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2FL4	119–4316–00	671–2819–03		FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2FL4	119–4316–00	671–2827–03		FILTER,LOWPASS:PCB,SIP;DELAY EQUALIZED, 6MHZ CUTOFF;,,	80009	119–4316–00
A2J4	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131–0608–00
A2J6	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J7	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J8	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J40	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2J50	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2J60	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2J70	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2J106	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 16)	80009	131–0608–00
A2J107	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 16)	80009	131–0608–00
A2J110	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J111	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J112	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J113	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2J122	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 5)	80009	131–0608–00
A2J124	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131–0608–00

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				(QUANTITY 3)		
A2J128	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131–0608–00
A2J130	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J145	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2J150	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J151	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131–0608–00
A2J152	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131–0608–00
A2L1	108–1491–00			COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L2	108–1491–00			COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L4	108–0538–00			COIL,RF:FIXED,2.7UH	80009	108–0538–00
A2L5	108–0538–00			COIL,RF:FIXED,2.7UH	80009	108–0538–00
A2L7	108–1491–00			COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L13	108–1491–00			COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L19	108–1491–00			COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L28	108–0245–00			CHOKE,RF:FIXED,3.9UH, +/– 10 %, Q 35, DCR 0.264 OHM, SRF 61 MHZON POWERED IRON FORM	76493	B6310–1
A2L29	108–0245–00			CHOKE,RF:FIXED,3.9UH, +/– 10 %, Q 35, DCR 0.264 OHM, SRF 61 MHZON POWERED IRON FORM	76493	B6310–1
A2L60	108–1263–00			COIL,RF:FXD,10UH, 10%,Q=70,SRF 27 MHZ,DCR 0.043 OHM,I MAX 2.1ARADIAL LEAD	80009	108–1263–00
A2L70	108–1263–00			COIL,RF:FXD,10UH, 10%,Q=70,SRF 27 MHZ,DCR 0.043 OHM,I MAX 2.1ARADIAL LEAD	80009	108–1263–00
A2L71	108–0538–00			COIL,RF:FIXED,2.7UH	80009	108–0538–00
A2L81	108–1491–00	671–2539–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2760–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2759–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2762–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2819–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2816–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2820–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2L81	108–1491–00	671–2827–03		COIL,RF:FXD,TOROIDAL,9.0UH,5.5%	TK1345	108–1491–00
A2LF1	119–1946–00			FILTER,RFI:1A,250V,400HZ W/PC TERMINAL	S4307	FN326–1/02–K–D–T
A2P6	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P7	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P8	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P40	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P50	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P60	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P70	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P110	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2P112	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P122	198–5783–00			WIRE,SET ELEC:TSG111/TSG121/TSG131	80009	198–5783–00
A2P124	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2572–02		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2760–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2759–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2762–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2819–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2816–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2820–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P130	131–0993–02	671–2827–03		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2P150	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2P151	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2Q30	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q100	151–1171–00			TRANSISTOR,PWR:MOS,N–CH;50V,12A,0.12 OHM;BUZ71A/IRFZ22/MTP15N05E,TO–220	80009	151–1171–00
A2Q101	151–0190–00	671–2760–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q101	151–0190–00	671–2759–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q101	151–0190–00	671–2762–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q101	151–0190–00	671–2819–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q101	151–0190–00	671–2816–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q101	151–0190–00	671–2820–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q101	151–0190–00	671–2827–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q102	151–0188–00	671–2760–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2760–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2759–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2762–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2819–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2816–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2820–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q103	151–0188–00	671–2827–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2760–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2759–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2762–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2819–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2816–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2820–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q104	151–0188–00	671–2827–03		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A2Q105	151–0195–02	671–2760–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02
A2Q105	151–0195–02	671–2759–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02
A2Q105	151–0195–02	671–2762–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02
A2Q105	151–0195–02	671–2819–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02
A2Q105	151–0195–02	671–2816–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02
A2Q105	151–0195–02	671–2820–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02

Replaceable Electrical Parts

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2Q105	151–0195–02	671–2827–03		TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA, 200MHZ,AMPLIFIER;MPS6521,TO–92 EBC,T&A	80009	151–0195–02
A2Q106	151–0190–00	671–2760–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q106	151–0190–00	671–2759–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q106	151–0190–00	671–2762–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q106	151–0190–00	671–2819–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q106	151–0190–00	671–2816–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q106	151–0190–00	671–2820–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q106	151–0190–00	671–2827–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2760–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2759–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2762–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2819–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2816–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2820–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2Q107	151–0190–00	671–2827–03		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A2R14	307–0051–00			RES,FXD,CMPSN:2.7 OHM,5%,0.5W	80009	307–0051–00
A2R15	307–0051–00			RES,FXD,CMPSN:2.7 OHM,5%,0.5W	80009	307–0051–00
A2R16	322–3133–00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50–2F237R0F
A2R17	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R18	311–0634–00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311–0634–00
A2R19	322–3297–00			RES,FXD:METAL FILM;12.1K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 12K1
A2R20	311–0633–00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3329H–L58–502
A2R21	322–3133–00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50–2F237R0F
A2R22	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R23	311–0634–00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311–0634–00
A2R24	322–3274–00			RES,FXD,FILM:6.98K OHM,1%,0.2W,TC=T0	91637	CCF502G69800FT
A2R29	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–2–G1500F
A2R30	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–2–G1500F
A2R31	322–3231–00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0	80009	322–3231–00
A2R32	322–3230–00			RES,FXD,FILM:2.43K OHM,1%,0.2W,TC=T0	80009	322–3230–00
A2R40	322–3085–07	671–2539–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R40	322–3085–07	671–2440–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R40	322–3085–07	671–2760–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R40	322–3085–07	671–2808–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R40	322–3085–07	671–2817–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2R40	322–3085–07	671–2819–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R40	322–3085–07	671–2827–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R40	322–3085–07	671–2572–02		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R41	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R42	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A2R45	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R46	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R48	317–0036–00			RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R49	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R50	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322–3126–00
A2R51	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K21
A2R52	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R53	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R54	317–0036–00			RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R57	322–3133–00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50–2F237R0F
A2R58	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R59	322–3215–00			RES,FXD,FILM:1.69K OHM,1%,0.2W,TC=T0	91637	CCF50–2F16900F
A2R60	311–0634–00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311–0634–00
A2R61	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R62	322–3302–00			RES,FXD,FILM:13.7K OHM,1%,0.2W,TC=T0	80009	322–3302–00
A2R63	311–0633–00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3329H–L58–502
A2R64	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R65	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R67	317–0036–00			RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R68	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R69	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322–3126–00
A2R70	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K21
A2R71	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R72	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R73	317–0036–00			RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R76	322–3133–00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50–2F237R0F
A2R77	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R78	322–3218–00			RES,FXD:METAL FILM;1.82K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3218–00
A2R79	311–0634–00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311–0634–00
A2R80	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R81	322–3301–00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R82	311–0633–00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3329H–L58–502
A2R83	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R84	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R85	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R86	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R87	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322–3126–00
A2R88	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K21
A2R89	317–0036–00			RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2R90	317–0036–00			RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R92	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R93	322–3068–00			RES,FXD:METAL FILM;49.9 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3068–00
A2R94	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A2R95	322–3133–00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50–2F237R0F
A2R96	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R97	322–3215–00			RES,FXD,FILM:1.69K OHM,1%,0.2W,TC=T0	91637	CCF50–2F16900F
A2R98	311–0634–00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311–0634–00
A2R99	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R100	322–3301–00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R101	311–0607–00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	80009	311–0607–00
A2R140	315–0100–00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A2R181	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A2R182	322–3068–00			RES,FXD:METAL FILM;49.9 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3068–00
A2R193	322–3012–00			RES,FXD,FILM:13 OHM,1%,0.2W,TC=T0	57668	CRB20FXE301E
A2R194	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A2R195	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R196	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–2–G1500F
A2R197	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–2–G1500F
A2R198	307–0503–00			RES NTWK,FXD,FI:(9) 510 OHM,20%,0.125W	91637	CSC10A01511GDO3
A2R199	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A2R211	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R231	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R232	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R233	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R235	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R248	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R260	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R261	315–0101–00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315–0101–00
A2R262	315–0331–00			RES,FXD,FILM:330 OHM,5%,0.25W	80009	315–0331–00
A2R263	322–3235–00			RES,FXD:METAL FILM;2.74K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K74
A2R264	322–3235–00			RES,FXD:METAL FILM;2.74K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K74
A2R265	322–3235–00			RES,FXD:METAL FILM;2.74K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K74
A2R266	322–3414–00			RES,FXD:METAL FILM;200K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF501G20002F
A2R267	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3258–00
A2R268	322–3181–00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322–3181–00
A2R269	308–0463–00			RES,FXD,WW:0.3 OHM,1%,3W	80009	308–0463–00
A2R270	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A2R271	315–0100–00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A2R273	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 100E

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A2R274	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2R300	322–3193–00	671–2539–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3193–00	671–2440–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3193–00	671–2760–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3193–00	671–2759–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3264–00	671–2762–03		RES,FXD,FILM:5.49K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 5K49
A2R300	322–3193–00	671–2808–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3193–00	671–2817–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3193–00	671–2819–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3264–00	671–2816–03		RES,FXD,FILM:5.49K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 5K49
A2R300	322–3193–00	671–2820–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R300	322–3193–00	671–2827–03		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R301	322–3133–00			RES,FXD,FILM:237 OHM,1%,0.2W,TC=T0	91637	CCF50–2F237R0F
A2R302	322–3301–00	671–2539–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3301–00	671–2440–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3301–00	671–2760–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3301–00	671–2759–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3255–00	671–2762–03		RES,FXD,FILM:4.42K OHM,1%,0.2W,TC=T0	80009	322–3255–00
A2R302	322–3301–00	671–2808–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3301–00	671–2817–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3301–00	671–2819–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3255–00	671–2816–03		RES,FXD,FILM:4.42K OHM,1%,0.2W,TC=T0	80009	322–3255–00
A2R302	322–3301–00	671–2820–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R302	322–3301–00	671–2827–03		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0	80009	322–3301–00
A2R303	322–3212–00			RES,FXD,FILM:1.58K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K58
A2R304	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R305	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R315	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R316	317–0036–00	671–2572–02		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2760–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2759–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2762–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2819–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2816–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2820–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R316	317–0036–00	671–2827–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2572–02		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2760–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2729–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2762–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2819–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2816–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2820–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R317	317–0036–00	671–2827–03		RES,FXD,CMPSN:3.6 OHM,5%,0.125W	80009	317–0036–00
A2R318	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K21
A2R319	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322–3126–00
A2R320	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R321	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62
A2R322	322–3213–00			RES,FXD,FILM:1.62K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K62

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A2R323	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R325	311–2234–00			RES,VAR,TRMR:CERMET;5K OHM,20%,0.5W,0.197 SQ,TOP ADJUST;T&R	TK1450	GF06UT 5K
A2R327	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R328	311–2230–00			RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197 SQ,TOP ADJUST;T&R	TK1450	GF06UT 500
A2R336	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R340	322–3056–01			RES,FXD,FILM:37.4 OHM,0.5%,0.2W,TC=T0	57668	CRB20 DXE 37E4
A2R341	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R342	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R343	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R344	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R345	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R346	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R347	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R348	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R349	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R350	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R351	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R352	322–3085–07			RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R355	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R356	322–3085–07	671–2759–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R356	322–3085–07	671–2762–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R356	322–3085–07	671–2816–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R356	322–3085–07	671–2820–03		RES,FXD:METAL FILM;75 OHM,0.1%,0.2W,TC=25 PPM;AXIAL,T&R,SMALL BODY	91637	CCF502–C75ROOBT
A2R357	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R358	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–1–G33200F
A2R359	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R360	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A2R361	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50–2–G1500F
A2R362	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0	80009	322–3171–00
A2R363	322–3113–00			RES,FXD,FILM:147 OHM,1%,0.2W,TC=T0	80009	322–3113–00
A2R364	322–3025–00			RES,FXD:METAL FILM;17.8 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20FXE1K50
A2R365	322–3073–00			RES,FXD:METAL FILM;56.2 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3073–00
A2R366	321–0103–00			RES,FXD,FILM:115 OHM,1%,0.125W,TC=T0	07716	CEAD115R0F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2R367	323–0085–00			RES,FXD,FILM:75.0 OHM,1%,0.5W,TC=T0	80009	323–0085–00
A2R368	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	75042	CEBT0–56R20F
A2R369	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	75042	CEBT0–56R20F
A2R370	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A2R371	322–0178–00			RES,FXD,FILM:698 OHM,1%,0.25W,TC=T0	75042	CEBT0–6980F
A2T1	120–1902–00			TRANSFORMER,PWR:	80009	120–1902–00
A2T2	120–1785–00			TRANSFORMER:FLYBACK,+/– 5V 2A, +/– 15V 0.2A, 20W, POT CORE	75498	128–7045–EA
A2TP1	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP2	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP3	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP4	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP5	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP6	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP8	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP9	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP10	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP11	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP13	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP14	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP16	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2TP17	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL-LAR	26364	104–01–02
A2U1	156–4024–00			IC,LINEAR:BIPOLAR,OP–AMP;190MHZ,CURRENT FEEDBACK,1 TO 40 GAIN RANGE;AD9617JN,DIP08.3	80009	156–4024–00
A2U2	156–4024–00			IC,LINEAR:BIPOLAR,OP–AMP;190MHZ,CURRENT FEEDBACK,1 TO 40 GAIN RANGE;AD9617JN,DIP08.3	80009	156–4024–00
A2U4	156–4170–00			IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CURRENT; OPA603AP,DIP08.3	80009	156–4170–00
A2U5	156–6376–00			IC,CONVERTER:BIPOLAR,D/A;12–BIT,20MHZ, 2LSB,CURRENT OUT,LATCHED;TDC1012RSC1, PLCC28.3	80009	156–6376–00
				MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
	136–1005–00			SKT,PL–IN ELEK:	00779	3–821581–1
				END MOUNTING PARTS		
A2U21	160–4672–02	671–2539–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4672–02
A2U21	160–9453–02	671–2440–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9453–02
A2U21	160–4672–02	671–2760–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4672–02
A2U21	160–9309–02	671–2759–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9309–02
A2U21	160–9319–02	671–2762–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9319–02
A2U21	160–9453–02	671–2817–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9453–02
A2U21	160–4672–02	671–2819–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4672–02
A2U21	160–9309–02	671–2816–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9309–02
A2U21	160–9319–02	671–2820–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9319–02
A2U21	160–9453–02	671–2827–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9453–02
A2U21	160–4672–02	671–2808–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4672–02
A2U21	160–9453–02	671–2572–02		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9453–02
				MOUNTING PARTS		
	136–1038–00			SOCKET,DIP:	00779	2–641873–1
				END MOUNTING PARTS		
A2U23	160–4975–02	671–2539–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4975–02
A2U23	160–9454–02	671–2440–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9454–02
A2U23	160–4975–02	671–2760–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4975–02
A2U23	160–9310–02	671–2759–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9310–02
A2U23	160–9320–02	671–2762–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9320–02
A2U23	160–9454–02	671–2817–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9454–02
A2U23	160–4975–02	671–2819–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4975–02
A2U23	160–9310–02	671–2816–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9310–02
A2U23	160–9320–02	671–2820–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9320–02
A2U23	160–9454–02	671–2827–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9454–02
A2U23	160–4975–02	671–2808–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4975–02
A2U23	160–9454–02	671–2572–02		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9454–02
				MOUNTING PARTS		
	136–1038–00			SOCKET,DIP:	00779	2–641873–1
				END MOUNTING PARTS		
A2U25	160–4976–02	671–2539–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4976–02
A2U25	160–9455–02	671–2440–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9455–02

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2U25	160–4976–02	671–2760–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4976–02
A2U25	160–9311–02	671–2759–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9311–02
A2U25	160–9321–02	671–2762–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9321–02
A2U25	160–9455–02	671–2817–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9455–02
A2U25	160–4976–02	671–2819–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4976–02
A2U25	160–9311–02	671–2816–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9311–02
A2U25	160–9321–02	671–2820–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9321–02
A2U25	160–9455–02	671–2827–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9455–02
A2U25	160–4976–02	671–2808–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–4976–02
A2U25	160–9455–02	671–2572–02		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9455–02
				MOUNTING PARTS		
	136–1038–00			SOCKET,DIP:	00779	2–641873–1
				END MOUNTING PARTS		
A2U27	160–9303–02	671–2539–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9303–02
A2U27	160–9456–02	671–2440–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9456–02
A2U27	160–9303–02	671–2760–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9303–02
A2U27	160–9312–02	671–2759–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9312–02
A2U27	160–9322–02	671–2762–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9322–02
A2U27	160–9456–02	671–2817–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9456–02
A2U27	160–9303–02	671–2819–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9303–02
A2U27	160–9312–02	671–2816–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9312–02
A2U27	160–9322–02	671–2820–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9322–02
A2U27	160–9456–02	671–2827–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9456–02
A2U27	160–9303–02	671–2808–03		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9303–02
A2U27	160–9456–02	671–2572–02		IC,MEMORY:CMOS,PROM;32K X 8,40NS;REGISTERED,7C277,DIP28.3	80009	160–9456–02
				MOUNTING PARTS		
	136–1038–00			SOCKET,DIP:	00779	2–641873–1
				END MOUNTING PARTS		
A2U29	156–3019–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE; 1.235V,1.0%,150PPM,SHUNT,MICROPOWER; LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U30	156–4170–00			IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEEDBACK,100MHZ,HIGH OUTPUT CURRENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U31	156–6376–00			IC,CONVERTER:BIPOLAR,D/A;12–BIT,20MHZ,2LSB,CURRENT OUT,LATCHED;TDC1012RSC1,PLCC28.3	80009	156–6376–00
				MOUNTING PARTS		
	136–1005–00			SKT,PL–IN ELEK:	00779	3–821581–1
				END MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2U32	156–3019–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;1.235V,1.0%,150PPM,SHUNT,MICROPOWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U33	156–4170–00			IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEEDBACK,100MHZ,HIGH OUTPUT CURRENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U34	156–6172–00			IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
				MOUNTING PARTS		
A2U34	136–1005–00			SKT,PL–IN ELEK:	00779	3–821581–1
				END MOUNTING PARTS		
A2U37	156–3019–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;1.235V,1.0%,150PPM,SHUNT,MICROPOWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U50	156–0872–00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE,–12V,1.0A,4%;MC7912CT,TO–220	04713	MC7912CT
A2U102	160–9304–02	671–2539–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9304–02
A2U102	160–9457–02	671–2440–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9457–02
A2U102	160–9304–02	671–2760–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9304–02
A2U102	160–9313–02	671–2759–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9313–02
A2U102	160–9323–02	671–2762–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9323–02
A2U102	160–9457–02	671–2817–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9457–02
A2U102	160–9304–02	671–2819–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9304–02
A2U102	160–9313–02	671–2816–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9313–02
A2U102	160–9323–02	671–2820–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9323–02
A2U102	160–9457–02	671–2827–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9457–02
A2U102	160–9304–02	671–2808–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9304–02
A2U102	160–9457–02	671–2572–02		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9457–02
				MOUNTING PARTS		
	136–0963–00			SKT,PL–IN ELEK:MICROCKT,32 PIN	00779	2–644018–3
				END MOUNTING PARTS		
A2U104	160–9305–02	671–2539–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9305–02
A2U104	160–9458–02	671–2440–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9458–02
A2U104	160–9305–02	671–2760–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9305–02
A2U104	160–9314–02	671–2759–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9314–02
A2U104	160–9324–02	671–2762–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9324–02
A2U104	160–9458–02	671–2817–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9458–02
A2U104	160–9305–02	671–2819–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9305–02
A2U104	160–9314–02	671–2816–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9314–02
A2U104	160–9324–02	671–2820–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9324–02

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2U104	160–9458–02	671–2827–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9458–02
A2U104	160–9305–02	671–2808–03		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9305–02
A2U104	160–9458–02	671–2572–02		IC,MEMORY:CMOS,EPROM;512K X 8,150NS;27C040,DIP32.6	80009	160–9458–02
				MOUNTING PARTS		
	136–0963–00			SKT,PL–IN ELEK:MICROCKT,32 PIN	00779	2–644018–3
				END MOUNTING PARTS		
A2U106	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL;10124,DIP16.3,TUBE	80009	156–0368–03
A2U108	156–0316–04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;10125,DIP16.3,TUBE	04713	MC10125P/L
A2U150	156–3120–00			IC,DIGITAL:FCTCMOS,FLIP FLOP;OCTAL D–TYPE, 3–STATE;74FCT374A,DIP20.3,TUBE	80009	156–3120–00
A2U200	156–4104–00			IC,LINEAR:	80009	156–4104–00
A2U201	160–9306–01	671–2539–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9306–01
A2U201	160–9306–01	671–2760–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9306–01
A2U201	160–9459–00	671–2759–03		IC,DIGITAL:PRGM	80009	160–9459–00
A2U201	160–9325–00	671–2762–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9325–00
A2U201	160–9306–01	671–2817–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9306–01
A2U201	160–9306–01	671–2819–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9306–01
A2U201	160–9459–00	671–2816–03		IC,DIGITAL:PRGM	80009	160–9459–00
A2U201	160–9325–00	671–2820–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9325–00
A2U201	160–9306–01	671–2827–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9306–01
A2U201	160–9306–01	671–2572–02		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9306–01
				MOUNTING PARTS		
	136–1047–00			SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN;,,	80009	136–1047–00
				END MOUNTING PARTS		
A2U202	160–9307–02	671–2539–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CESS,30NS,EPMR064,PLCC44,TUBE	80009	160–9307–02
A2U202	160–9307–02	671–2760–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CESS,30NS,EPMR064,PLCC44,TUBE	80009	160–9307–02
A2U202	160–9316–01	671–2759–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9316–01
A2U202	160–9326–00	671–2762–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9326–00
A2U202	160–9307–02	671–2817–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CESS,30NS,EPMR064,PLCC44,TUBE	80009	160–9307–02
A2U202	160–9307–02	671–2819–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CESS,30NS,EPMR064,PLCC44,TUBE	80009	160–9307–02
A2U202	160–9316–01	671–2816–03		IC,DIGITAL:CMOS,PLD;OTP,5064,64 MACRO-CELL,30NS,5064–30,PLCC44,TUBE	80009	160–9316–01
A2U202	160–9326–00	671–2820–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9326–00
A2U202	160–9307–02	671–2827–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CESS,30NS,EPMR064,PLCC44,TUBE	80009	160–9307–02
A2U202	160–9307–02	671–2572–02		IC,DIGITAL:CMOS,PLD;OTP,64 MACRO-CESS,30NS,EPMR064,PLCC44,TUBE	80009	160–9307–02
				MOUNTING PARTS		
	136–1047–00			SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
				END MOUNTING PARTS		
A2U212	156–1160–00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POS-ITIVE,12V,100MA,4%;LM78L12ACH,TO–39	80009	156–1160–00
A2U220	156–2338–00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D–TYPE;74AS74,DIP14.3,TUBE	80009	156–2338–00
A2U222	156–3156–00			IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/MODULATOR;TMC2249,PGA120	80009	156–3156–00
				MOUNTING PARTS		
	136–0904–00			SOCKET,PGA::	80009	136–0904–00
				END MOUNTING PARTS		
A2U225	156–4170–00	671–2539–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4170–00	671–2440–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4170–00	671–2760–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4170–00	671–2759–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4024–00	671–2762–03		IC,LINEAR:BIPOLAR,OP–AMP;190MHZ,CURRENT FEEDBACK,1 TO 40 GAIN RANGE;AD9617JN,DIP08.3	80009	156–4024–00
A2U225	156–4170–00	671–2808–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4170–00	671–2817–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4170–00	671–2819–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4170–00	671–2816–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U225	156–4024–00	671–2820–03		IC,LINEAR:BIPOLAR,OP–AMP;190MHZ,CURRENT FEEDBACK,1 TO 40 GAIN RANGE;AD9617JN,DIP08.3	80009	156–4024–00
A2U225	156–4170–00	671–2827–03		IC,LINEAR:BIPOLAR OP–AMP;CURRENT FEED-BACK,100MHZ,HIGH OUTPUT CUR-RENT;OPA603AP,DIP08.3	80009	156–4170–00
A2U227	156–3019–00	671–2572–02		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U227	156–3019–00	671–2760–03		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U227	156–3019–00	671–2759–03		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U227	156–3019–00	671–2762–03		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U227	156–3019–00	671–2819–03		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U227	156–3019–00	671–2816–03		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U227	156–3019–00	671–2820–03		IC,LINEAR:BIPOLAR,VOLTAGE REF-ERENCE;1.235V,1.0%,150PPM,SHUNT,MICRO-POWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2U227	156–3019–00	671–2827–03		IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;1.235V,1.0%,150PPM,SHUNT,MICROPOWER;LM385BZ–1.2,TO–92	27014	LM385BZ–1.2
A2U228	160–9409–00			IC,MEMORY:PROGRAMMED 156–4251–00	80009	160–9409–00
				MOUNTING PARTS		
	136–0925–00			SOCKET,DIP::	91506	224–AG30D
				END MOUNTING PARTS		
A2U229	160–9410–00			IC,MEMORY:PROGRAMMED 156–4251–00	80009	160–9410–00
				MOUNTING PARTS		
	136–0925–00			SOCKET,DIP::	91506	224–AG30D
				END MOUNTING PARTS		
A2U230	156–4152–00			IC,DIGITAL:FCTCMOS,BUFFER;NONINV OCTAL LINE DRIVER, 3–STATE;74FCT241A,DIP20.3	80009	156–4152–00
A2U231	156–4152–00			IC,DIGITAL:FCTCMOS,BUFFER;NONINV OCTAL LINE DRIVER, 3–STATE;74FCT241A,DIP20.3	80009	156–4152–00
A2U235	156–3156–00	671–2572–02		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2760–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2759–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2762–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2819–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2816–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2820–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
A2U235	156–3156–00	671–2827–03		IC,LINEAR:CMOS,DIGITAL QUADRATURE MIXER/ MODULATOR;TMC2249,PGA120	80009	156–3156–00
				MOUNTING PARTS		
	136–0904–00	671–2572–02		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2760–03		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2759–03		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2762–03		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2816–03		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2819–03		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2820–03		SOCKET,PGA::	80009	136–0904–00
	136–0904–00	671–2827–03		SOCKET,PGA::	80009	136–0904–00
				END MOUNTING PARTS		
A2U236	160–9318–00	671–2572–02		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9318–00
A2U236	160–9318–00	671–2760–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9318–00
A2U236	160–9318–00	671–2759–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9318–00
A2U236	160–9328–00	671–2762–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9328–00
A2U236	160–9318–00	671–2819–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9318–00
A2U236	160–9318–00	671–2816–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9318–00
A2U236	160–9328–00	671–2820–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9328–00
A2U236	160–9318–00	671–2827–03		IC,DIGITAL:CMOS,PLD;OTP,64 MACROCELL,30NS,EPM5064,PLCC44,TUBE	80009	160–9318–00
				MOUNTING PARTS		
	136–1047–00	671–2572–02		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
	136–1047–00	671–2760–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
	136–1047–00	671–2759–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
	136–1047–00	671–2762–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
	136–1047–00	671–2816–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
	136–1047–00	671–2819–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
	136–1047–00	671–2820–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
	136–1047–00	671–2827–03		SOCKET,PLCC:PCB,;44 POS,0.05 CTR,0.360 H X 0.125 TAIL,TIN	80009	136–1047–00
				END MOUNTING PARTS		
A2U238	156–6172–00	671–2572–02		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2760–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2759–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2762–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2819–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2816–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2820–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
A2U238	156–6172–00	671–2827–03		IC,CONVERTER:BIPOLAR,D/A;10 BIT,20MHZ,CURRENT OUTPUT,0.5LSBINL;TDC1041R3C1,PLCC28–1,TUBE	80009	156–6172–00
				MOUNTING PARTS		
	136–1005–00	671–2572–02		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2760–03		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2759–03		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2762–03		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2816–03		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2819–03		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2820–03		SKT,PL–IN ELEK:	00779	3–821581–1
	136–1005–00	671–2827–03		SKT,PL–IN ELEK:	00779	3–821581–1
				END MOUNTING PARTS		
A2U240	156–3120–00			IC,DIGITAL:FCTCMOS,FLIP FLOP;OCTAL D–TYPE, 3–STATE;74FCT374A,DIP20.3,TUBE	80009	156–3120–00
A2U245	160–9308–00	671–2539–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45	80009	160–9308–00
A2U245	160–9308–00	671–2572–02		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45	80009	160–9308–00
A2U245	160–9308–00	671–2760–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45	80009	160–9308–00
A2U245	160–9317–00	671–2759–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45,DIP24	80009	160–9317–00
A2U245	160–9327–00	671–2762–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45,DIP24	80009	160–9327–00
A2U245	160–9308–00	671–2817–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45	80009	160–9308–00
A2U245	160–9308–00	671–2819–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45	80009	160–9308–00
A2U245	160–9317–00	671–2816–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45,DIP24	80009	160–9317–00
A2U245	160–9327–00	671–2820–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45,DIP24	80009	160–9327–00
A2U245	160–9308–00	671–2827–03		IC,DIGITAL:CMOS,PROM;1024 X 8,7C281–45	80009	160–9308–00
				MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
	136–0925–00			SOCKET,DIP::	91506	224–AG30D
				END MOUNTING PARTS		
A2VR30	152–0520–00			DIO,ZENER:,;12V,5%,1W;1N4742A,DO–41,TR	80009	152–0520–00
A2W155	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W156	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W157	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W158	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W159	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W166	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W167	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W168	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W169	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W179	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W180	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2W182	131–4566–00			BUS,CONDUCTOR:0 OHM,300 SPACING,SM BODY	80009	131–4566–00
A2Y1	119–4281–00	671–2539–03		XTAL UNIT,QTZ:17.734375MHZ,1PPM,TCXO,TUNE RANGE 5PPM,TTL,PKG 1.5 SQ X 0.7 HIGH	80009	119–4281–00
A2Y1	119–4281–00	671–2440–03		XTAL UNIT,QTZ:17.734375MHZ,1PPM,TCXO,TUNE RANGE 5PPM,TTL,PKG 1.5 SQ X 0.7 HIGH	80009	119–4281–00
A2Y1	119–4281–00	671–2760–03		XTAL UNIT,QTZ:17.734375MHZ,1PPM,TCXO,TUNE RANGE 5PPM,TTL,PKG 1.5 SQ X 0.7 HIGH	80009	119–4281–00
A2Y1	119–4281–00	671–2759–03		XTAL UNIT,QTZ:17.734375MHZ,1PPM,TCXO,TUNE RANGE 5PPM,TTL,PKG 1.5 SQ X 0.7 HIGH	80009	119–4281–00
A2Y1	119–4281–00	671–2762–03		XTAL UNIT,QTZ:17.734375MHZ,1PPM,TCXO,TUNE RANGE 5PPM,TTL,PKG 1.5 SQ X 0.7 HIGH	80009	119–4281–00
A2Y1	119–4282–00	671–2808–03		XTAL UNIT,QTZ:17.734375MHZ,0.5PPM,TCXO, TUNE RANGE 5PPM,TTL,PKG 1.2 SQ X 0.7 HIGH	80009	119–4282–00
A2Y1	119–4282–00	671–2817–03		XTAL UNIT,QTZ:17.734375MHZ,0.5PPM,TCXO, TUNE RANGE 5PPM,TTL,PKG 1.2 SQ X 0.7 HIGH	80009	119–4282–00
A2Y1	119–4282–00	671–2819–03		XTAL UNIT,QTZ:17.734375MHZ,0.5PPM,TCXO, TUNE RANGE 5PPM,TTL,PKG 1.2 SQ X 0.7 HIGH	80009	119–4282–00
A2Y1	119–4282–00	671–2816–03		XTAL UNIT,QTZ:17.734375MHZ,0.5PPM,TCXO, TUNE RANGE 5PPM,TTL,PKG 1.2 SQ X 0.7 HIGH	80009	119–4282–00
A2Y1	119–4282–00	671–2820–03		XTAL UNIT,QTZ:17.734375MHZ,0.5PPM,TCXO, TUNE RANGE 5PPM,TTL,PKG 1.2 SQ X 0.7 HIGH	80009	119–4282–00
A2Y1	119–4282–00	671–2827–03		XTAL UNIT,QTZ:17.734375MHZ,0.5PPM,TCXO, TUNE RANGE 5PPM,TTL,PKG 1.2 SQ X 0.7 HIGH	80009	119–4282–00
A2Y1	119–3175–00	671–2572–02		OSCILLATOR:14.31818MHZ	80009	119–3175–00
A3	671–2183–01			CIRCUIT BD ASSY:TOP BNC	80009	671–2183–01
A3J401	131–3378–00			CONN,RF JACK:	00779	227677–1
A3J402	131–5223–00			CONN,CIRC::PCB,MINI DIN;FEMALE,RTANG,4 POS,0.503 H X 0.137 TAIL,SILVER	80009	131–5223–00
A3J403	131–3378–00			CONN,RF JACK:	00779	227677–1
A3J404	131–3378–00			CONN,RF JACK:	00779	227677–1
A3J405	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 16)	80009	131–0608–00
A3W405	174–2966–00			CA ASSY,SP,ELEC:RIBBON,;IDC,16,28 AWG,1.9 L,2X8,0.1 CTR,RECPT BOTH ENDS,ACCOM 0.L025 SQ PIN	80009	174–2966–00
A4	671–2184–01			CIRCUIT BD ASSY:BOTTOM BNC	80009	671–2184–01
A4J501	131–3378–00			CONN,RF JACK:	00779	227677–1
A4J502	131–3378–00			CONN,RF JACK:	00779	227677–1
A4J503	131–3378–00			CONN,RF JACK:	00779	227677–1
A3J505	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131–0608–00
A4J504	131–3378–00			CONN,RF JACK:	00779	227677–1
A4J506	131–3766–00			CONN,HDR:PCB,;MALE,RTANG,1 X 2,0.1 CTR,0.235 MLG X 0.110 TAIL,30 GOLD,0.025 SQ	00779	A7232–2
A4W505	174–2337–01			CA ASSY,SP,ELEC:10,28 AWG,1.6 L,RIBBON	80009	174–2337–01

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5	671–2737–02	B030000		CIRCUIT BD ASSY:AUDIO	80009	671–2737–02
	214–4528–01			SPRING, GROUND	80009	214–4528–01
A5C4	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C81	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C83	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C84	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C85	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C86	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C110	283–0594–02			CAP,FXD,MICA DI:1000PF,1%,100V,T&A	09023	CDA15FA102F03
A5C111	283–0594–02			CAP,FXD,MICA DI:1000PF,1%,100V,T&A	09023	CDA15FA102F03
A5C112	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A5C113	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C114	290–1313–00			CAP,FXD,AL:10UF,20%,50V	80009	290–1313–00
A5C150	290–1313–00			CAP,FXD,AL:10UF,20%,50V	80009	290–1313–00
A5C259	281–0777–00			CAP,FXD,CER:MLC;51PF,5%,100V,0.100 X 0.170;AXIAL,MI	80009	281–0777–00
A5C260	281–0777–00			CAP,FXD,CER:MLC;51PF,5%,100V,0.100 X 0.170;AXIAL,MI	80009	281–0777–00
A5C261	281–0777–00			CAP,FXD,CER:MLC;51PF,5%,100V,0.100 X 0.170;AXIAL,MI	80009	281–0777–00
A5C262	281–0777–00			CAP,FXD,CER:MLC;51PF,5%,100V,0.100 X 0.170;AXIAL,MI	80009	281–0777–00
A5C350	281–0775–01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A5C351	290–0943–02			CAP,FXD,ELCTLT:47UF,20%,25V	55680	UVX1E470MDA1TD
A5C352	290–0943–02			CAP,FXD,ELCTLT:47UF,20%,25V	55680	UVX1E470MDA1TD
A5CR1	152–0141–02			DIO,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO–35,T&R	80009	152–0141–02
A5CR2	152–0141–02			DIO,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO–35,T&R	80009	152–0141–02
A5FL1	119–4225–00	671–2737–02		FILTER,EMI:T-CIRCUIT;25MHZ CUTOFF,1 NS LOSS 25DB@100–1000MHZ,C 0.5A,50V.180PF.70	80009	119–4225–00
A5FL2	119–4225–00	671–2737–02		FILTER,EMI:T-CIRCUIT;25MHZ CUTOFF,1 NS LOSS 25DB@100–1000MHZ,C 0.5A,50V.180PF.70	80009	119–4225–00
A5FL3	119–4225–00	671–2737–02		FILTER,EMI:T-CIRCUIT;25MHZ CUTOFF,1 NS LOSS 25DB@100–1000MHZ,C 0.5A,50V.180PF.70	80009	119–4225–00
A5FL4	119–4225–00	671–2737–02		FILTER,EMI:T-CIRCUIT;25MHZ CUTOFF,1 NS LOSS 25DB@100–1000MHZ,C 0.5A,50V.180PF.70	80009	119–4225–00
A5J9	131–3987–00			CONN,CIRC::PCB,AUDIO,;MALE,RTANG,3 POS,1.22 H X 1.024 W,CTR PLZ,LATCHING	82389	E3MRA
				MOUNTING PARTS		
	213–0055–00			SCREW,TPG,TF:2–32 X 0.188,TYPE B,PNH,STL	93907	ORDER BY DESCR
				END MOUNTING PARTS		
A5J10	131–3987–00			CONN,CIRC::PCB,AUDIO,;MALE,RTANG,3 POS,1.22 H X 1.024 W,CTR PLZ,LATCHING	82389	E3MRA
				MOUNTING PARTS		
	213–0055–00			SCREW,TPG,TF:2–32 X 0.188,TYPE B,PNH,STL	93907	ORDER BY DESCR
				END MOUNTING PARTS		
A5J12	131–1426–00			CONN,HDR:PCB,;MALE,RTANG,1 X 36,0.1 CTR,0.23 MLG X 0.195 TAIL,GOLD,STACKABLE	22526	65524–136
A5J128	131–0608–00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131–0608–00
A5P12	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A5Q1	151–1045–00			TRANSISTOR,SIG:JFET,P–CH;4.5V(SELECTED), 5MA,1MS,GENERAL;2N5460_SPECIAL,TO–92	80009	151–1045–00
A5Q2	151–1025–00			TRANSISTOR,SIG:JFET,N–CH;6V,15MA,4.5MS,AMPLIFIER;J304,TO–92,SDG	22229	F2263
A5Q3	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00
A5Q4	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA, 300MHZ,AMPLIFIER;2N3904,TO–92 EBC	80009	151–0190–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5Q5	151–0188–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A5Q6	151–0188–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA, 250MHZ,AMPLIFIER;2N3906,TO–92 EBC	80009	151–0188–00
A5R102	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A5R103	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3289–00
A5R104	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A5R105	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A5R106	322–3404–00			RES,FXD,FILM:158K OHM,1%,0.2W,TC=T0	91637	CCF50–2F15802F
A5R107	322–3404–00			RES,FXD,FILM:158K OHM,1%,0.2W,TC=T0	91637	CCF50–2F15802F
A5R108	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A5R109	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3289–00
A5R110	322–3318–00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 20K0
A5R111	322–3453–00			RES,FXD,FILM:511K OHM,1%,0.2W,TC=T0	91637	CCF50–2F51102F
A5R112	322–3275–00			RES,FXD,FILM:7.15K OHM,1%,0.2W,TC=T0	80009	322–3275–00
A5R113	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A5R114	322–3409–00			RES,FXD,FILM:178K OHM,1%,0.2W,TC=T0	80009	322–3409–00
A5R115	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A5R116	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3289–00
A5R117	322–3039–00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0	80009	322–3039–00
A5R118	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3289–00
A5R119	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322–3289–00
A5R120	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A5R121	322–3280–00			RES,FXD,FILM:8.06K OHM,1%,0.2W,TC=T0	80009	322–3280–00
A5R122	311–2269–00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5W	80009	311–2269–00
A5R123	311–2269–00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5W	80009	311–2269–00
A5R124	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A5R125	322–3326–00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC–T0	91637	CCF50–2F24301F
A5R126	311–2262–00			RES,VAR,NONWW:TRMR,1M OHM,20%,0.5W	80009	311–2262–00
A5R127	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W, TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K21
A5R150	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A5R151	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A5R152	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A5R153	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A5R209	321–0673–07			RES,FXD,FILM:17K OHM,0.1%,0.125W,TC=T9	07716	CEAE17001B
A5R210	321–0962–07			RES,FXD,FILM:8K OHM,0.1%,0.125W,TC=T9	80009	321–0962–07
A5R211	322–3056–00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0	91637	CCF50–2F37R40F
A5R212	322–3056–00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0	91637	CCF50–2F37R40F
A5R213	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	80009	322–3487–00
A5R214	322–3264–00			RES,FXD,FILM:5.49K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 5K49
A5R215	322–3264–00			RES,FXD,FILM:5.49K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 5K49
A5R216	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	80009	322–3487–00
A5TP12	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COL- LAR	26364	104–01–02
A5U40	156–1291–00			IC,LINEAR:BIFET,OP–AMP;DUAL,LOW POW- ER;TL062CP,DIP08.3	80009	156–1291–00
A5U41	156–1272–00			IC,LINEAR:BIPOLAR,OP–AMP;DUAL,HIGH OUT- PUT DRIVE,LOW NOISE;NE5532N,DIP08.3	80009	156–1272–00
A5U42	156–1272–00			IC,LINEAR:BIPOLAR,OP–AMP;DUAL,HIGH OUT- PUT DRIVE,LOW NOISE;NE5532N,DIP08.3	80009	156–1272–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5U43	156–0402–00			IC,MISC:BIPOLAR,TIMER;;LM555CN,DIP08.3	80009	156–0402–00
A5W128	174–2967–00			CA ASSY,SP,ELEC:RIBBON,;IDC,10,28 AWG,1.6 L,2X5,0.1 CTR,RECPT BOTH ENDS,ACCOM 0.025 SQ PIN	80009	174–2967–00

DIAGRAMS/CIRCUIT BOARD ILLUSTRATIONS

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

Both overline and parenthesis indicate a low asserting state.

Example: $\overline{\text{ID CONTROL}}$ or (ID CONTROL)

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

Y14.15, 1966 — Drafting Practices.
Y14.2, 1973 — Line Conventions and Lettering.
Y10.5, 1968 — Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

American National Standard Institute
1430 Broadway, New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

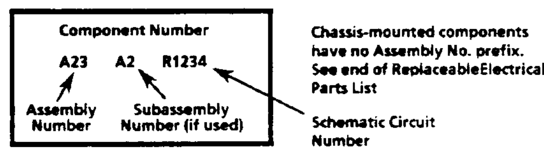
Capacitors:
Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

The following information and special symbols may appear in this manual.

Assembly Numbers

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the diagram (in circuit board outline), circuit board illustration title, and lookup table for the schematic diagram.

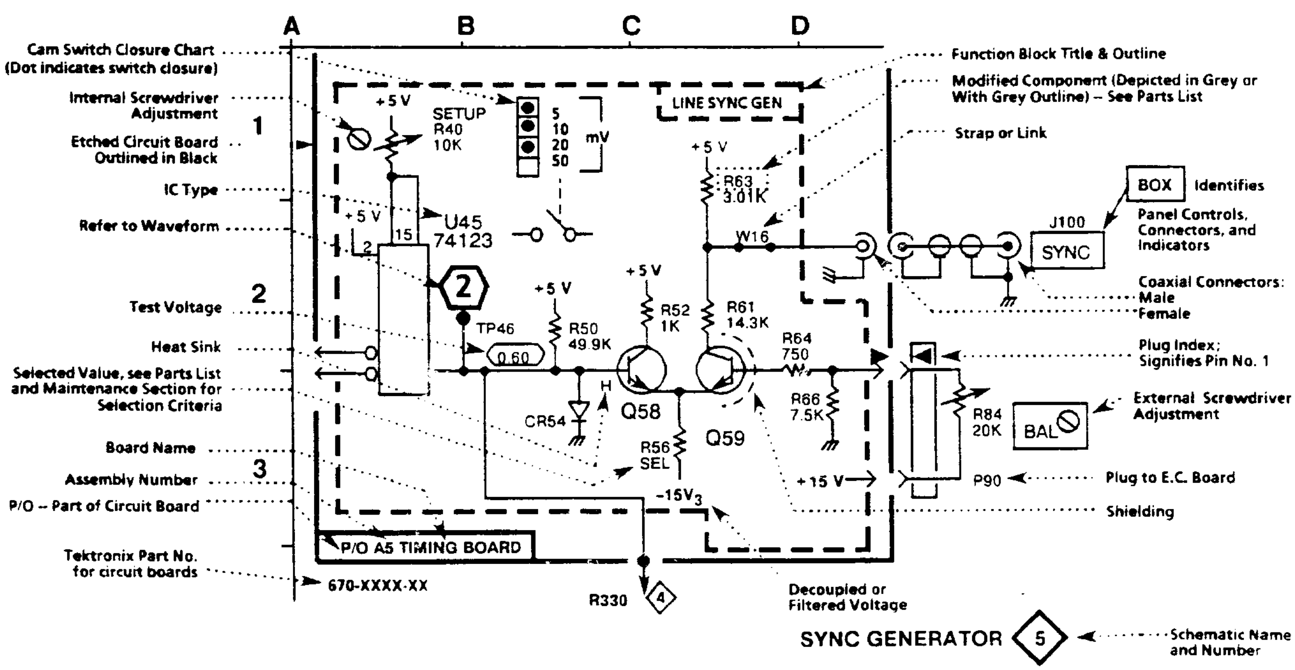
The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:



Grid Coordinates

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table.

When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram; the lookup table will list the diagram number of other diagrams that the other circuitry appears on.

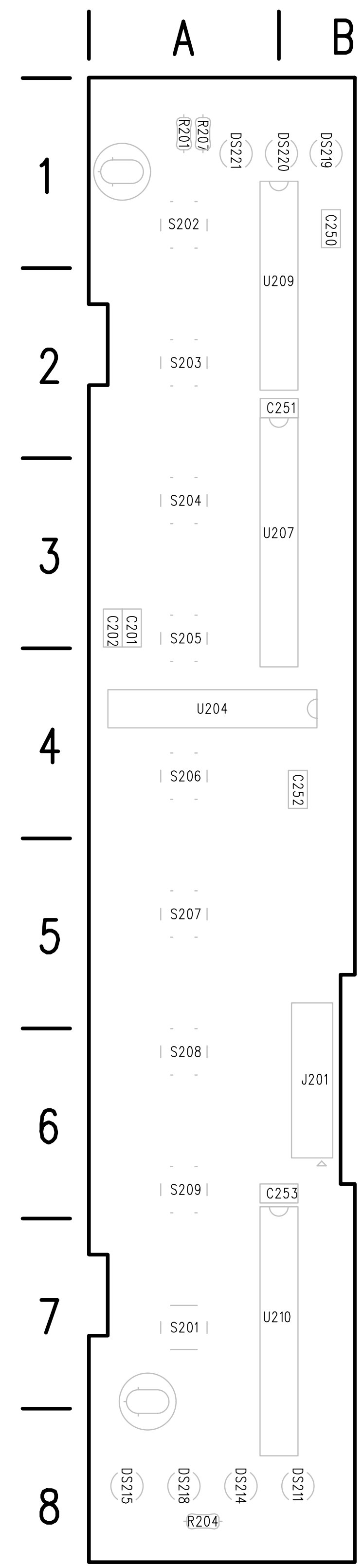


Front Panel Board and Schematic Diagram <1> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

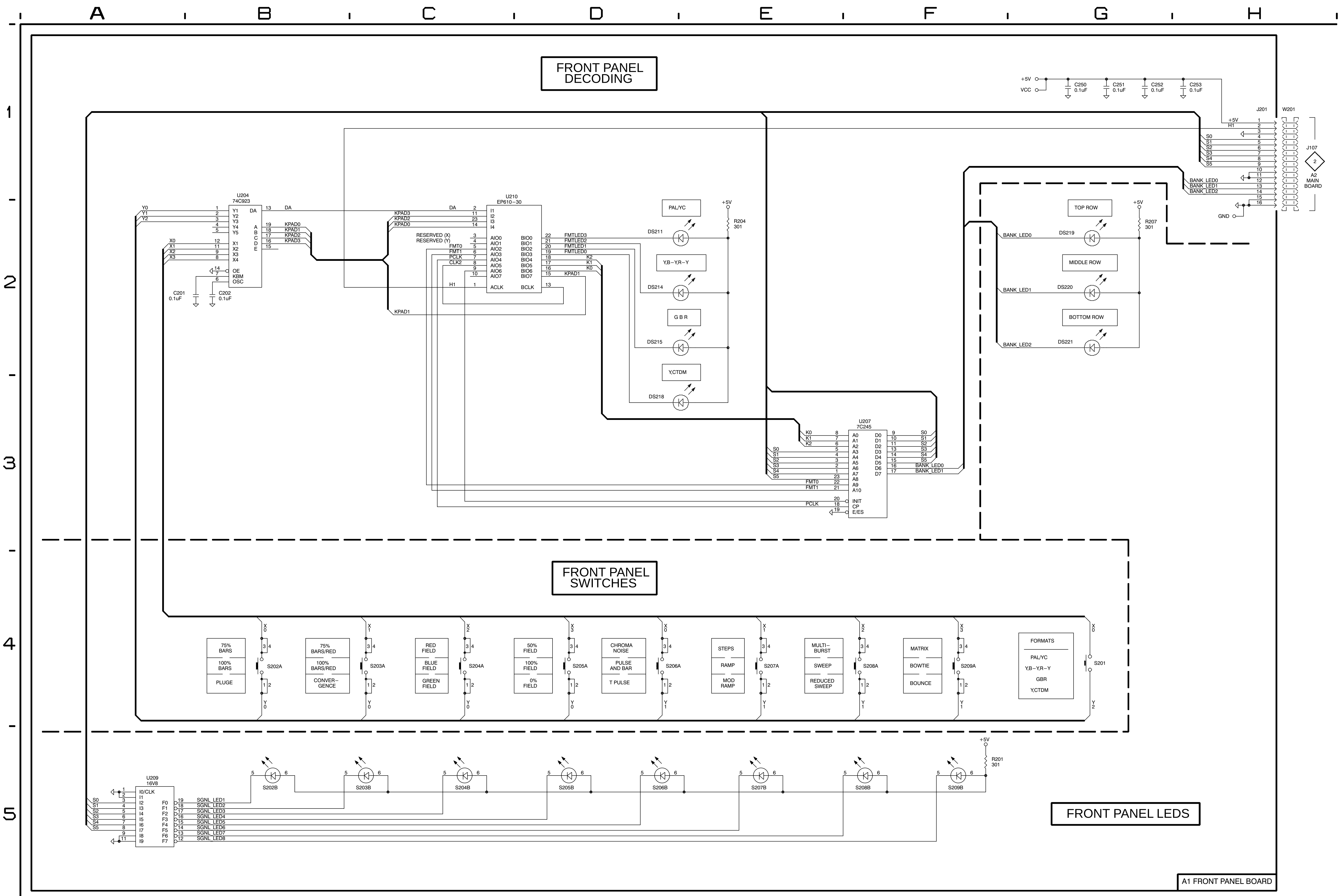
Assembly A1

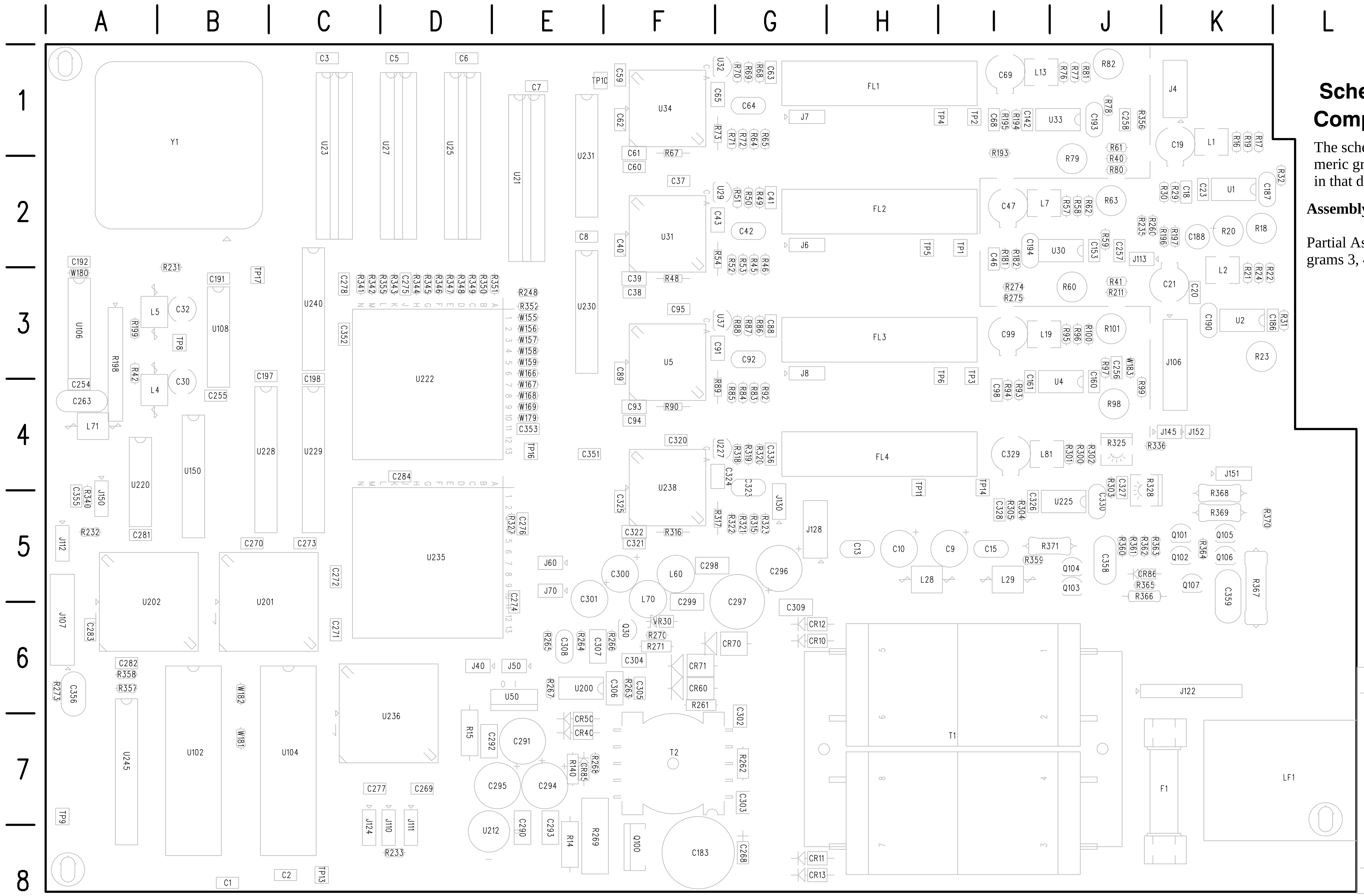
Comp No	Diag Loc	Bd Loc
C201	B2	A3
C202	B2	A3
C250	G1	B1
C251	G1	A2
C252	G1	B4
C253	H1	A6
DS211	D2	B8
DS214	D2	A8
DS215	D2	A8
DS218	D3	A8
DS219	G2	B1
DS220	G2	A1
DS221	G2	A1
J201	H1	B6
R201	F5	A1
R204	E2	A8
R207	G2	A1
S201	G4	A7
S202A	B4	A1
S202B	B5	A1
S203A	C4	A2
S203B	C5	A2
S204A	C4	A3
S204B	C5	A3
S205A	D4	A3
S205B	D5	A3
S206A	D4	A4
S206B	D5	A4
S207A	E4	A5
S207B	E5	A5
S208A	F4	A6
S208B	F5	A6
S209A	F4	A6
S209B	F5	A6
U204	B2	B4
U207	F3	A2
U209	A5	A1
U210	C2	A6
W201	H1	



Front Panel Board
671–2712–01

Static Sensitive Devices
See Maintenance Section


FRONT PANEL DECODING
U204 74C923
U210 EP610−30
U207 7C245
J201
W201
J107
A2 MAIN BOARD
PAL/YC
Y,B−Y,R−Y
G B R
Y,CTDM
TOP ROW
MIDDLE ROW
BOTTOM ROW
FRONT PANEL SWITCHES
75% BARS
100% BARS
PLUGE
75% BARS/RED
100% BARS/RED
CONVER−GENCE
RED FIELD
BLUE FIELD
GREEN FIELD
50% FIELD
100% FIELD
0% FIELD
CHROMA NOISE
PULSE AND BAR
T PULSE
STEPS
RAMP
MOD RAMP
MULTI−BURST
SWEEP
REDUCED SWEEP
MATRIX
BOWTIE
BOUNCE
FORMATS
PAL/YC
Y,B−Y,R−Y
GBR
Y,CTDM
U209 16V8
FRONT PANEL LEDS
A1 FRONT PANEL BOARD



Static Sensitive Devices
See Maintenance Section

Board component lookup chart is on the back side of Schematic Diagram 2.

A2 MAIN BOARD
671–2539–03

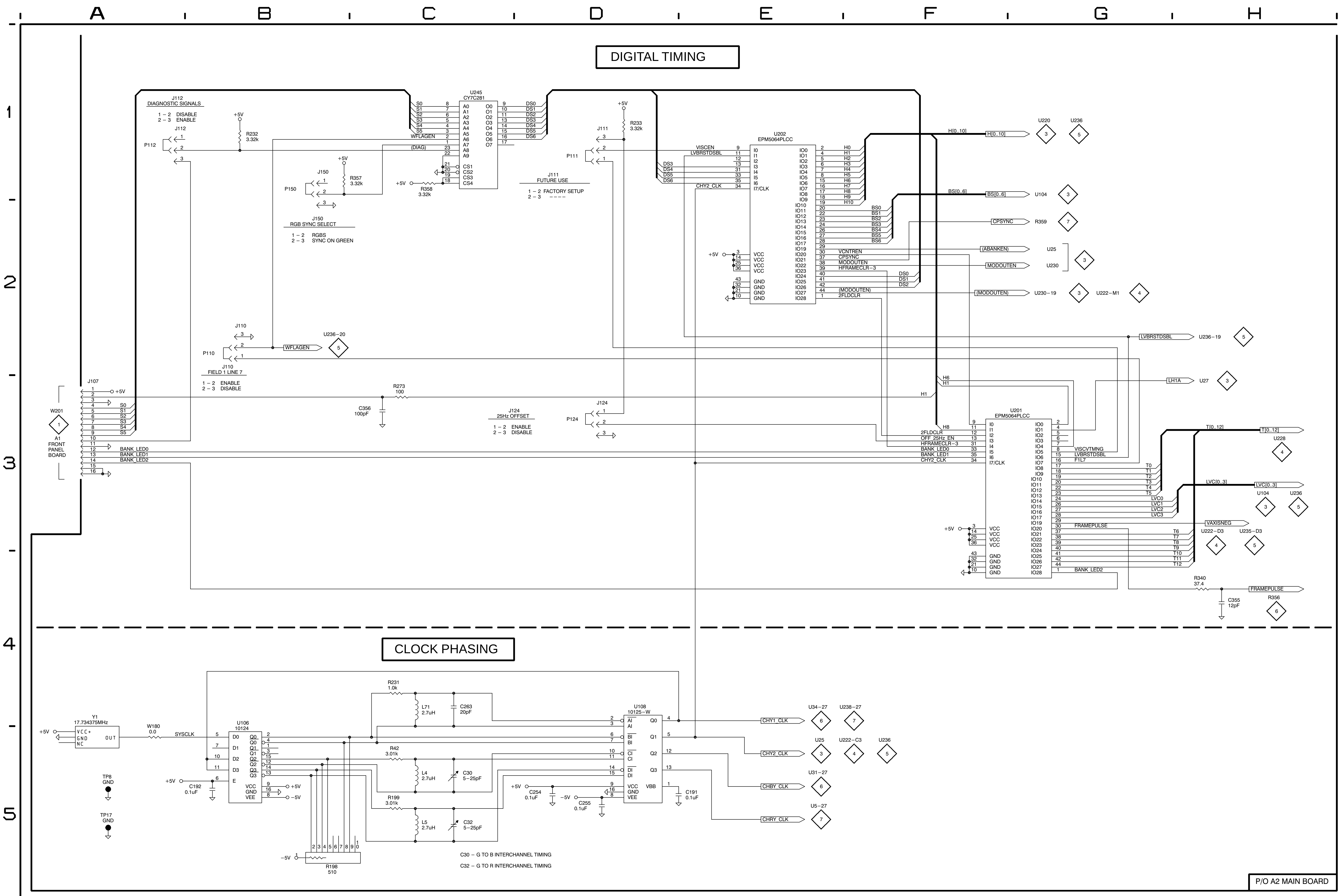
Schematic Diagram <2> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

Partial Assembly A2 also shown on Diagrams 3, 4, 5, 6, 7, and 10.

Comp No	Diag Loc	Bd Loc
C30	C5	B4
C32	C5	B3
C191	D5	B3
C192	B5	A2
C254	D5	A4
C255	D5	B4
C263	C4	A4
C355	H4	A4
C356	C3	A6
J107	A3	A6
J110	B2	D7
J111	D1	D7
J112	A1	A5
J124	D3	C7
J150	B1	A4
L4	C5	A4
L5	C5	A3
L71	C4	A4
P110	B2	
P111	D1	
P112	A1	
P124	D3	
P150	B1	
R42	C5	A3
R198	B5	A3
R199	C5	A3
R231	C4	B3
R232	B1	A5
R233	D1	D8
R273	C3	A6
R340	H4	A5
R357	B1	A6
R358	C1	A6
TP8	A5	B3
TP17	A5	B3
U106	B5	A3
U108	D4	B3
U201	F3	B6
U202	E1	A5
U245	C1	A6
W180	A5	A3
Y1	A5	B1



DIGITAL TIMING
CLOCK PHASING
U245
CY7C281
U202
EPM5064PLCC
U201
EPM5064PLCC
U106
10124
U108
10125–W
Y1
17.734375MHz
J112
DIAGNOSTIC SIGNALS
1 – 2 DISABLE
2 – 3 ENABLE
J150
RGB SYNC SELECT
1 – 2 RGBS
2 – 3 SYNC ON GREEN
J111
FUTURE USE
1 – 2 FACTORY SETUP
J110
FIELD 1 LINE 7
1 – 2 ENABLE
2 – 3 DISABLE
J124
25Hz OFFSET
1 – 2 ENABLE
2 – 3 DISABLE
A1
FRONT
PANEL
BOARD
C30 – G TO B INTERCHANNEL TIMING
C32 – G TO R INTERCHANNEL TIMING
P/O A2 MAIN BOARD

A2 MAIN BOARD Component Locator *(with cross-references to schematic diagrams 2, 3, 4, 5, 6, 7, and 10)*

Comp No	Diag No	Diag Loc	Bd Loc
C1	10	F4	B8
C2	10	G4	C8
C3	10	G4	C1
C5	10	G4	D1
C6	10	G4	D1
C7	10	G4	E1
C8	10	H4	E2
C9	10	G4	I5
C10	10	G3	H5
C13	10	H3	H5
C15	10	H4	I5
C18	6	F3	K2
C19	6	F3	J1
C20	6	F4	K3
C21	6	F4	J3
C23	6	F2	K2
C30	2	C5	B4
C32	2	C5	B3
C37	6	C4	F2
C38	6	C4	F3
C39	6	C4	F3
C40	6	B4	F2
C41	6	A4	G2
C42	6	B4	G2
C43	6	B4	G2
C46	6	E5	I2
C47	6	E5	I2
C59	6	C1	F1
C60	6	C1	F2
C61	6	C2	F1
C62	6	B1	F1
C63	6	A2	G1
C64	6	B2	G1
C65	6	B2	G1
C68	6	E2	I1
C69	6	E2	I1
C88	7	A2	G3
C89	7	B1	F3
C91	7	B2	G3
C92	7	B2	G3
C93	7	C2	F4
C94	7	C1	F4
C95	7	C1	F3

Comp No	Diag No	Diag Loc	Bd Loc
C98	7	E2	I4
C99	7	E2	I3
C142	6	E1	I1
C153	6	E4	J2
C160	7	E1	J3
C161	7	E1	I3
C183	10	C1	F8
C186	6	F3	K3
C187	6	F2	K2
C188	6	F3	K2
C190	6	F4	K3
C191	2	D5	B3
C192	2	B5	A2
C193	6	E1	J1
C194	6	E5	I2
C197	10	F4	B4
C198	10	G4	C4
C254	2	D5	A4
C255	2	D5	B4
C256	7	D2	J3
C257	6	E5	J2
C258	6	E2	J1
C263	2	C4	A4
C268	10	C1	G8
C269	10	F5	D7
C270	10	G5	B5
C271	10	G5	C6
C272	10	G5	C5
C273	10	G5	C5
C274	10	G5	E5
C275	10	H5	D3
C276	10	H5	E5
C277	10	F5	C7
C278	10	G5	C3
C281	10	G5	A5
C282	10	G5	A6
C283	10	G5	A6
C284	10	G5	D4
C290	10	F2	E7
C291	10	F3	E7
C292	10	E3	D7
C293	10	E2	E7

Comp No	Diag No	Diag Loc	Bd Loc
C294	10	E2	E7
C295	10	E3	E7
C296	10	E3	G5
C297	10	E4	G5
C298	10	E3	F5
C299	10	E4	F6
C300	10	E3	F5
C301	10	E4	E6
C302	10	D3	G6
C303	10	D3	G7
C304	10	C4	F6
C305	10	C4	F6
C306	10	C2	F6
C307	10	B5	E6
C308	10	C5	E6
C309	10	B1	G5
C320	7	C3	F4
C321	7	C4	F5
C322	7	C4	F5
C323	7	B4	G4
C324	7	B4	G4
C325	7	B4	F5
C326	7	E3	I5
C327	7	D4	J4
C328	7	E4	I5
C329	7	E4	I4
C330	7	E3	J5
C336	7	A4	G4
C351	10	F5	E4
C352	10	G5	C3
C353	10	G5	E4
C355	2	H4	A4
C356	2	C3	A6
C358	7	F4	J5
C359	7	G5	K5
CR10	10	C1	G6
CR11	10	C1	G8
CR12	10	C1	G6
CR13	10	C1	G8
CR40	10	D2	E7
CR50	10	D3	E7
CR60	10	D3	F6

Comp No	Diag No	Diag Loc	Bd Loc
CR70	10	D4	G6
CR71	10	E4	F6
CR85	10	D2	E7
CR86	7	F5	J5
F1	10	A1	K7
FL1	6	C1	H1
FL2	6	C3	H2
FL3	7	C1	H3
FL4	7	C3	H4
J4	6	H1	K1
J6	6	C3	G2
J7	6	C1	G1
J8	7	C1	G3
J40	10	F2	D6
J50	10	F3	E6
J60	10	F3	E5
J70	10	F4	E5
J106	6	H4	K3
J107	2	A3	A6
J110	2	B2	D7
J111	2	D1	D7
J112	2	A1	A5
J113	6	G3	J3
J122	10	B1	J6
J124	2	D3	C7
J128	10	H2	H5
J130	7	C3	G5
J145	7	H3	K4
J150	2	B1	A4
J151	7	H5	K4
J152	7	H3	K4
L1	6	F3	K1
L2	6	F4	K2
L4	2	C5	A4
L5	2	C5	A3
L7	6	E5	I2
L13	6	E2	I1
L19	7	E2	I3
L28	10	G3	H5
L29	10	G4	I5
L60	10	E3	F5

Comp No	Diag No	Diag Loc	Bd Loc
L70	10	E4	F5
L71	2	C4	A4
L81	7	E4	I4
LF1	10	A1	K7
P6	6	C3	
P7	6	C1	
P8	7	C1	
P10	10	A1	
P11	10	A1	
P40	10	F2	
P50	10	F3	
P60	10	F3	
P70	10	F4	
P110	2	B2	
P111	2	D1	
P112	2	A1	
P122	10	A1	
P124	2	D3	
P130	7	C3	
P150	2	B1	
P151	7	H5	
Q30	10	C2	F6
Q100	10	D4	F8
Q101	7	F4	K5
Q102	7	F5	K5
Q103	7	F4	J5
Q104	7	F4	I5
Q105	7	G5	K5
Q106	7	G5	K5
Q107	7	F5	K5
R14	10	E2	E8
R15	10	E3	D7
R16	6	F3	K1
R17	6	F3	K1
R18	6	F2	L2
R19	6	F3	K1
R20	6	F4	K2
R21	6	F4	K3
R22	6	F4	K3
R23	6	F4	L3
R24	6	F4	K3
R29	6	G2	K2

Comp No	Diag No	Diag Loc	Bd Loc
R30	6	G2	K2
R31	6	F4	L3
R32	6	F2	L2
R40	6	H1	J2
R41	6	H4	J3
R42	2	C5	A3
R45	6	B3	G2
R46	6	C3	G2
R48	6	C4	F3
R49	6	B4	G2
R50	6	B4	G2
R51	6	B5	G2
R52	6	A4	G2
R53	6	B4	G2
R54	6	B4	G2
R57	6	E5	J2
R58	6	E5	J2
R59	6	E5	J2
R60	6	E5	J3
R61	6	H1	J1
R62	6	E5	J2
R63	6	E5	J2
R64	6	B1	G1
R65	6	C1	G1
R67	6	C2	F2
R68	6	B2	G1
R69	6	B2	G1
R70	6	B2	G1
R71	6	A2	G1
R72	6	B1	G1
R73	6	B2	G1
R76	6	E1	J1
R77	6	E1	J1
R78	6	E1	J1
R79	6	E1	J2
R80	6	H5	J2
R81	6	E1	J1
R82	6	E2	J1
R83	7	B1	G4
R84	7	A1	G4
R85	7	A2	G4
R86	7	B2	G3

Comp No	Diag No	Diag Loc	Bd Loc
R87	7	B2	G3
R88	7	B2	G3
R89	7	B2	G4
R90	7	B2	F4
R92	7	C1	G4
R93	7	D1	I4
R94	7	D1	I4
R95	7	E1	J3
R96	7	E1	J3
R97	7	E1	J3
R98	7	E1	J4
R99	7	E1	J4
R100	7	D1	J3
R101	7	D2	J3
R140	10	C4	E7
R181	6	E4	I2
R182	6	E5	I2
R193	6	D1	I2
R194	6	E1	I1
R195	6	E1	I1
R196	6	G3	J2
R197	6	G3	K2
R198	2	B5	A3
R199	2	C5	A3
R211	6	H5	J3
R231	2	C4	B3
R232	2	B1	A5
R233	2	D1	D8
R235	6	G3	J2
R248	4	E3	E3
R260	6	G3	J2
R261	10	D4	F6
R262	10	D3	G7
R263	10	C4	F6
R264	10	B4	E6
R265	10	B4	E6
R266	10	B4	F6
R267	10	B5	E6
R268	10	C5	E7
R269	10	D5	E8
R270	10	C2	F6
R271	10	C2	F6

Comp No	Diag No	Diag Loc	Bd Loc
R273	2	C3	A6
R274	6	E3	I3
R275	6	E3	I3
R300	7	E4	J4
R301	7	E4	J4
R302	7	D4	J4
R303	7	E3	J4
R304	7	D3	I5
R305	7	D3	I5
R315	7	B3	G5
R316	7	B4	F5
R317	7	B4	G5
R318	7	B4	G4
R319	7	B4	G4
R320	7	B4	G4
R321	7	A3	G5
R322	7	A4	G5
R323	7	C3	G5
R325	7	D4	J4
R327	5	E3	E5
R328	7	E3	K4
R336	7	H3	J4
R340	2	H4	A5
R341	4	G1	C3
R342	4	G1	C3
R343	4	G1	D3
R344	4	G1	D3
R345	4	G2	D3
R346	4	G2	D3
R347	4	G2	D3
R348	4	G2	D3
R349	4	G2	D3
R350	4	G2	D3
R351	4	G2	E3
R352	4	G2	E3
R355	3	D1	D3
R356	6	H1	J1
R357	2	B1	A6
R358	2	C1	A6
R359	7	F4	I5
R360	7	G4	J5
R361	7	G4	J5
R362	7	F4	J5

Comp No	Diag No	Diag Loc	Bd Loc
R363	7	F5	J5
R364	7	F5	K5
R365	7	F5	J5
R366	7	F5	J5
R367	7	G5	K5
R368	7	H5	K5
R369	7	G5	K5
R370	7	G5	K5
R371	7	F4	I5
T1	10	B1	J6
T2	10	D3	F7
TP1	6	D3	I2
TP2	6	D1	I1
TP3	7	D1	I3
TP4	6	D1	I1
TP5	6	D4	H2
TP6	7	D1	I3
TP8	2	A5	B3
TP9	3	A5	A7
TP10	3	A5	E1
TP11	7	D1	H4
TP13	4	H5	C8
TP14	7	D3	I4
TP16	5	H5	E4
TP17	2	A5	B3
U1	6	F2	K2
U2	6	F3	L3
U4	7	E1	J3
U5	7	B1	F3
U21	3	E2	E1
U23	3	E3	C1
U25	3	E4	D1
U27	3	E1	C1
U29	6	B4	F2
U30	6	E4	J2
U31	6	B3	F2
U32	6	B2	F1
U33	6	E1	J1
U34	6	B1	F1
U37	7	B2	F3
U50	10	E3	E7

Comp No	Diag No	Diag Loc	Bd Loc
U102	3	B3	B6
U104	3	B2	B6
U106	2	B5	A3
U108	2	D4	B3
U150	3	C2	B4
U200	10	C4	E6
U201	2	F3	B6
U202	2	E1	A5
U212	10	E2	D8
U220A	3	B1	A4
U220B	3	B1	A4
U222	4	F1	E3
U225	7	E3	J4
U227	7	B4	F4
U228	4	B2	B4
U229	4	B2	C4
U230	3	F5	E2
U231	3	F5	E1
U235	5	F1	E4
U236	5	B1	C6
U238	7	B3	F4
U240	3	C3	C2
U245	2	C1	A6
W155	4	E3	E3
W156	4	E3	E3
W157	4	E4	E3
W158	4	E4	E3
W159	4	E4	E3
W166	4	E4	E3
W167	4	E4	E4
W168	4	E5	E4
W169	4	E5	E4
W179	4	E5	E4
W180	2	A5	A3
W181	3	B4	B7
W182	3	B4	B6
W183	7	H3	J3
VR30	10	C2	F6
Y1	2	A5	B1

Board illustration is on the back of Schematic Diagram 1.

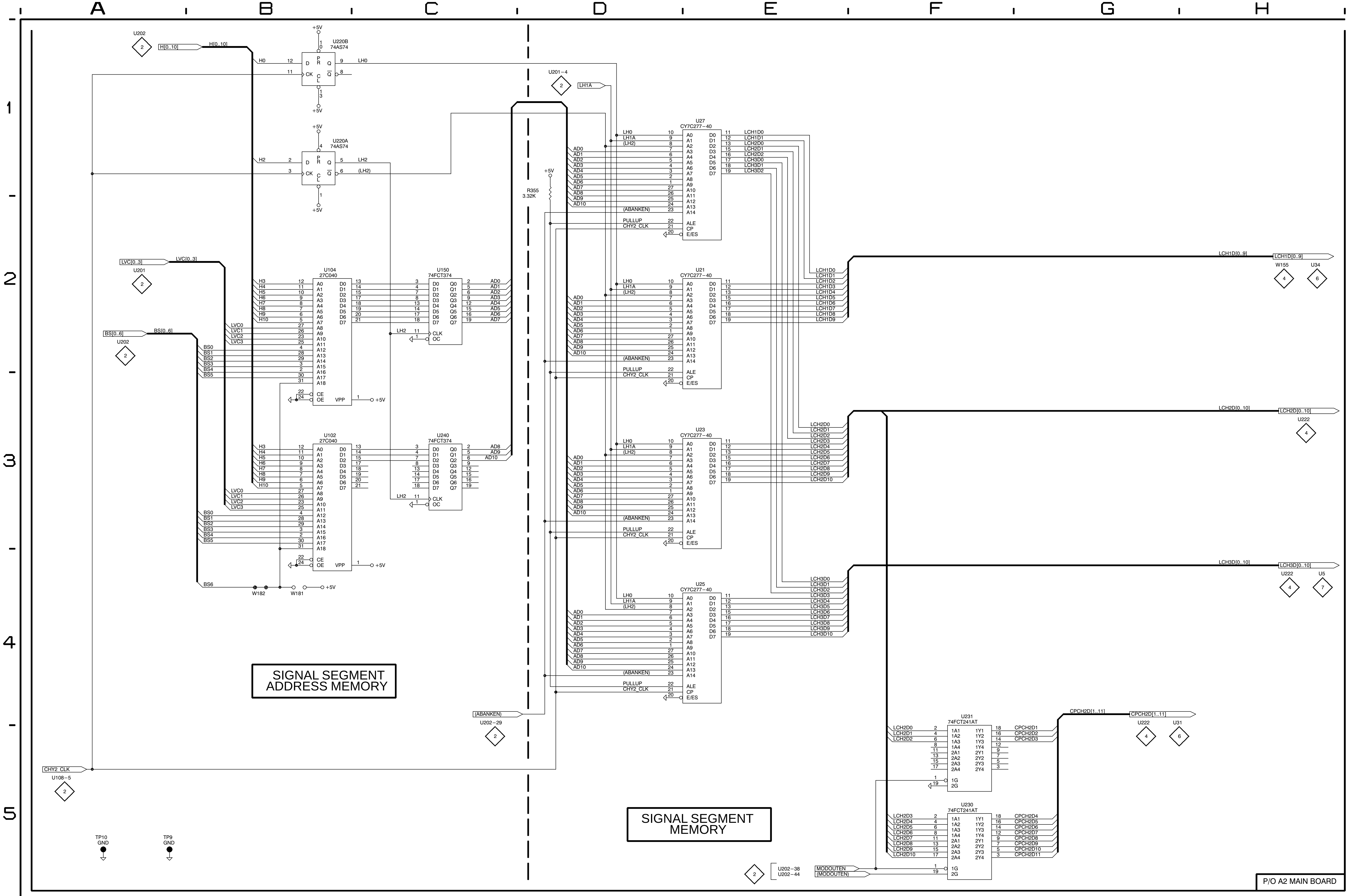
Schematic Diagram <3> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

Partial Assembly A2 also shown on Diagrams 2, 4, 5, 6, 7, and 10.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
R355	D1	D3	U150	C2	B4
			U220A	B1	A4
TP9	A5	A7			
TP10	A5	E1	U220B	B1	A4
			U230	F5	E2
U21	E2	E1	U231	F5	E1
U23	E3	C1	U240	C3	C2
U25	E4	D1			
U27	E1	C1	W181	B4	B7
U102	B3	B6	W182	B4	B6
U104	B2	B6			


SIGNAL SEGMENT
ADDRESS MEMORY
SIGNAL SEGMENT
MEMORY
P/O A2 MAIN BOARD

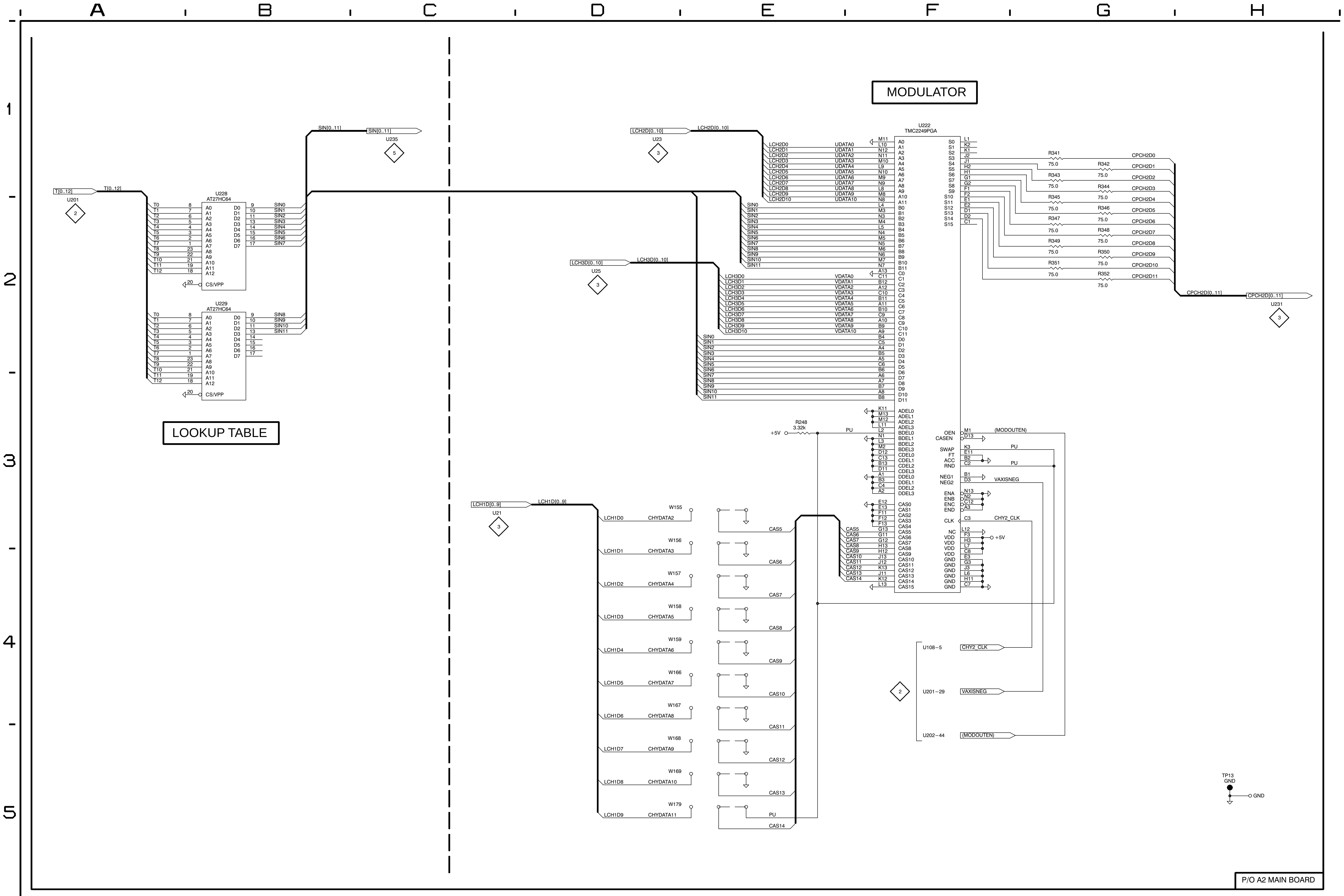
Schematic Diagram <4> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

Partial Assembly A2 also shown on Diagrams 2, 3, 5, 6, 7, and 10.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
R248	E3	E3	U222	F1	E3
R341	G1	C3	U228	B2	B4
R342	G1	C3	U229	B2	C4
R343	G1	D3			
			W155	E3	E3
R344	G1	D3	W156	E3	E3
R345	G2	D3	W157	E4	E3
R346	G2	D3	W158	E4	E3
R347	G2	D3			
			W159	E4	E3
R348	G2	D3	W166	E4	E3
R349	G2	D3	W167	E4	E4
R350	G2	D3	W168	E5	E4
R351	G2	E3			
R352	G2	E3	W169	E5	E4
			W179	E5	E4
TP13	H5	C8			


MODULATOR
LOOKUP TABLE
U222
TMC2249PGA
U228
AT27HC64
U229
AT27HC64
P/O A2 MAIN BOARD

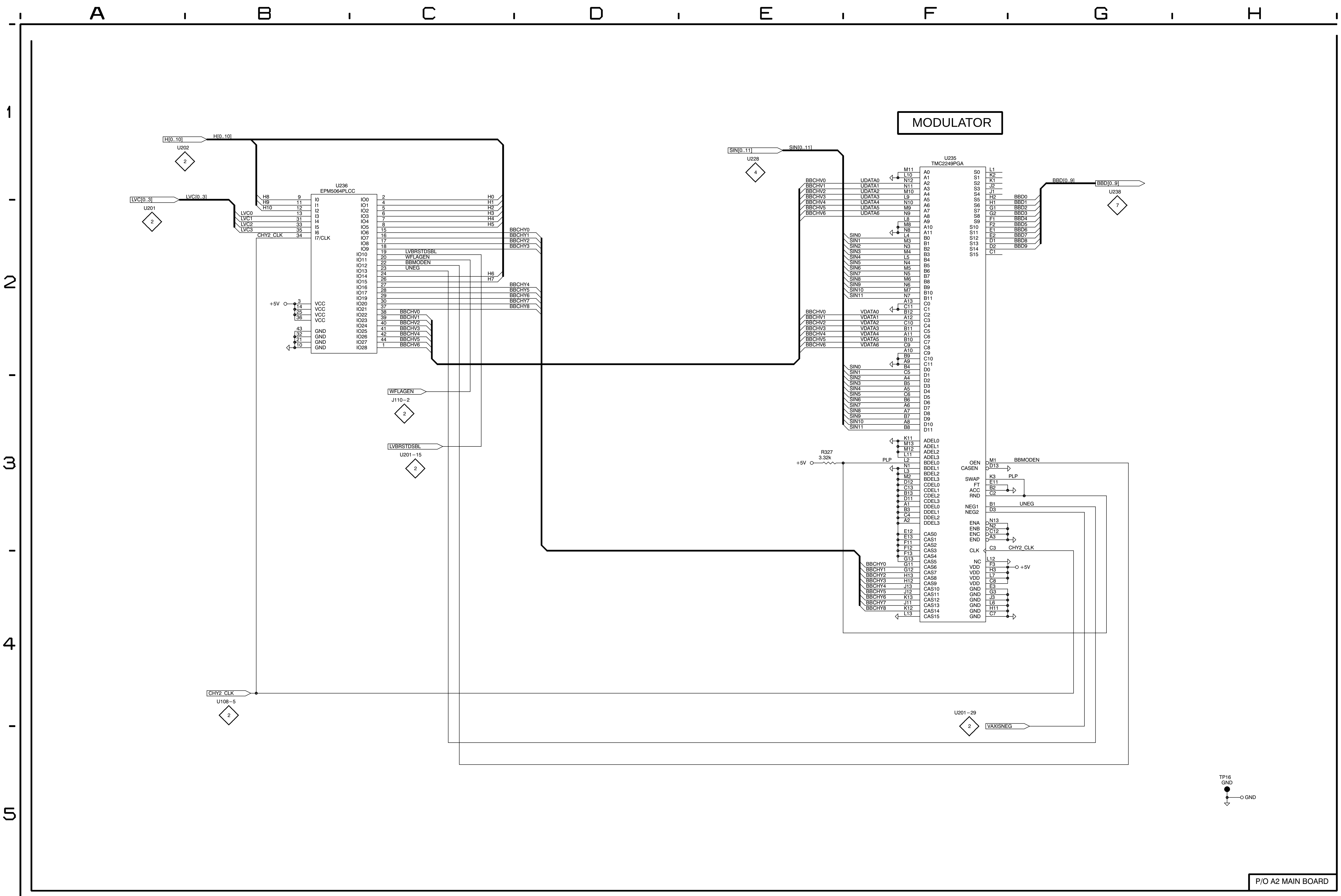
Schematic Diagram <5> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

Partial Assembly A2 also shown on Diagrams 2, 3, 4, 6, 7, and 10.

Comp No	Diag Loc	Bd Loc
R327	E3	E5
TP16	H5	E4
U235	F1	E4
U236	B1	C6


MODULATOR
U236
EPM5064PLCC
U235
TMC2249PGA
H[0..10]
LVC[0..3]
SIN[0..11]
BBD[0..9]
WFLAGEN
LVBRSTDSBL
CHY2_CLK
VAXISNEG
R327
3.32k
TP16
GND
P/O A2 MAIN BOARD

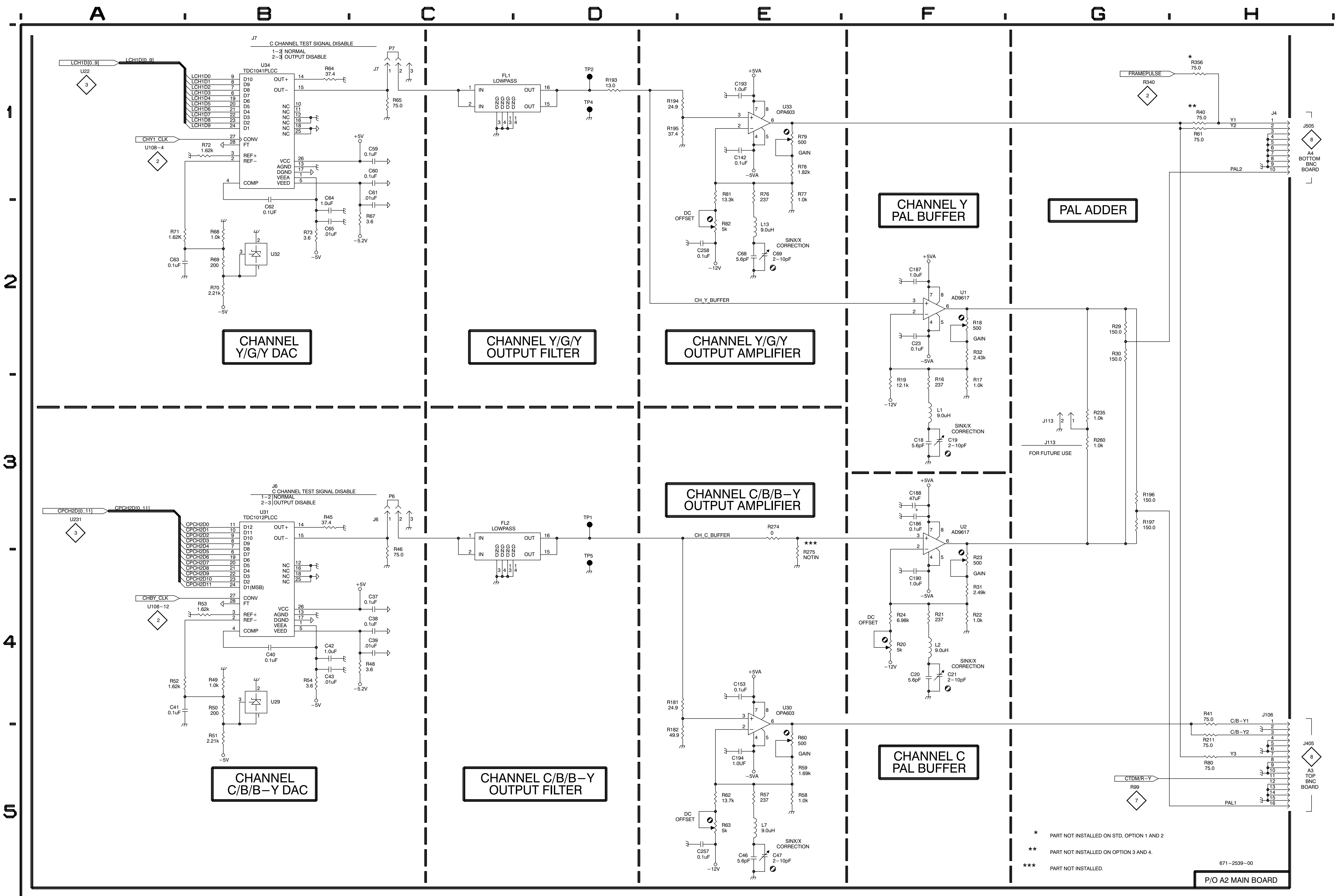
Schematic Diagram <6> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

Partial Assembly A2 also shown on Diagrams 2, 3, 4, 5, 7, and 10.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C18	F3	K2	L1	F3	K1	R69	B2	G1
C19	F3	J1	L2	F4	K2	R70	B2	G1
C20	F4	K3	L7	E5	I2	R71	A2	G1
C21	F4	J3	L13	E2	I1	R72	B1	G1
C23	F2	K2				R73	B2	G1
			P6	C3				
C37	C4	F2	P7	C1		R76	E1	J1
C38	C4	F3				R77	E1	J1
C39	C4	F3	R16	F3	K1	R78	E1	J1
C40	B4	F2	R17	F3	K1	R79	E1	J2
C41	A4	G2	R18	F2	L2	R80	H5	J2
			R19	F3	K1			
C42	B4	G2	R20	F4	K2	R81	E1	J1
C43	B4	G2				R82	E2	J1
C46	E5	I2	R21	F4	K3	R181	E4	I2
C47	E5	I2	R22	F4	K3	R182	E5	I2
C59	C1	F1	R23	F4	L3	R193	D1	I2
			R24	F4	K3			
C60	C1	F2	R29	G2	K2	R194	E1	I1
C61	C2	F1				R195	E1	I1
C62	B1	F1	R30	G2	K2	R196	G3	J2
C63	A2	G1	R31	F4	L3	R197	G3	K2
C64	B2	G1	R32	F2	L2	R211	H5	J3
			R40	H1	J2			
C65	B2	G1	R41	H4	J3	R235	G3	J2
C68	E2	I1				R260	G3	J2
C69	E2	I1	R45	B3	G2	R274	E3	I3
C142	E1	I1	R46	C3	G2	R275	E3	I3
C153	E4	J2	R48	C4	F3	R356	H1	J1
			R49	B4	G2			
C186	F3	K3	R50	B4	G2	TP1	D3	I2
C187	F2	K2				TP2	D1	I1
C188	F3	K2	R51	B5	G2	TP4	D1	I1
C190	F4	K3	R52	A4	G2	TP5	D4	H2
C193	E1	J1	R53	B4	G2			
			R54	B4	G2	U1	F2	K2
C194	E5	I2	R57	E5	J2	U2	F3	L3
C257	E5	J2				U29	B4	F2
C258	E2	J1	R58	E5	J2	U30	E4	J2
			R59	E5	J2	U31	B3	F2
FL1	C1	H1	R60	E5	J3			
FL2	C3	H2	R61	H1	J1	U32	B2	F1
			R62	E5	J2	U33	E1	J1
J4	H1	K1	R63	E5	J2	U34	B1	F1
J6	C3	G2	R64	B1	G1			
J7	C1	G1	R65	C1	G1			
J106	H4	K3	R67	C2	F2			
J113	G3	J3	R68	B2	G1			



CHANNEL Y/G/Y DAC
CHANNEL Y/G/Y OUTPUT FILTER
CHANNEL Y/G/Y OUTPUT AMPLIFIER
CHANNEL Y PAL BUFFER
PAL ADDER
CHANNEL C/B/B−Y OUTPUT AMPLIFIER
CHANNEL C/B/B−Y DAC
CHANNEL C/B/B−Y OUTPUT FILTER
CHANNEL C PAL BUFFER
C CHANNEL TEST SIGNAL DISABLE
1−2 NORMAL
2−3 OUTPUT DISABLE
* PART NOT INSTALLED ON STD, OPTION 1 AND 2
** PART NOT INSTALLED ON OPTION 3 AND 4.
*** PART NOT INSTALLED.
671−2539−00
P/O A2 MAIN BOARD

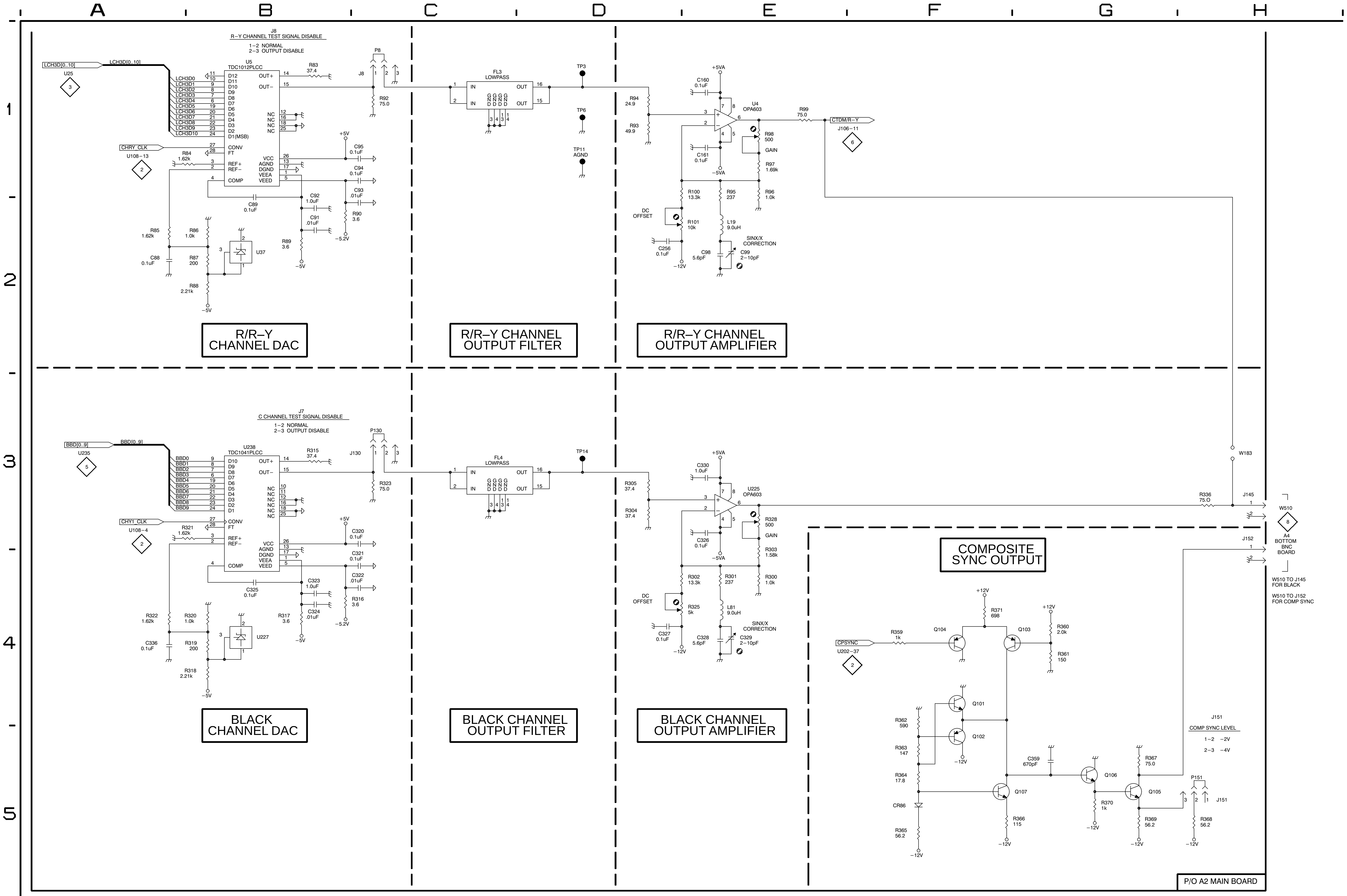
Schematic Diagram <7> Component Locator Chart

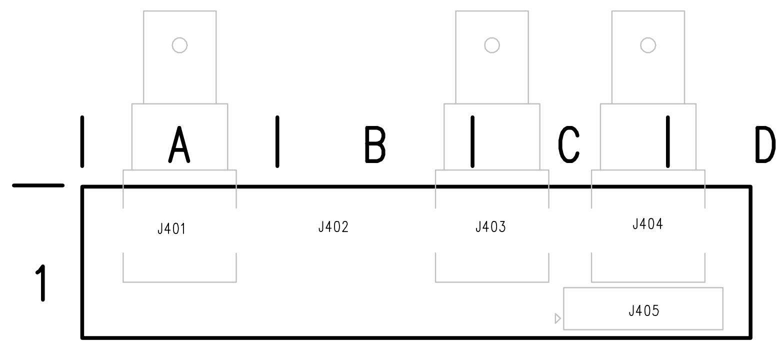
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

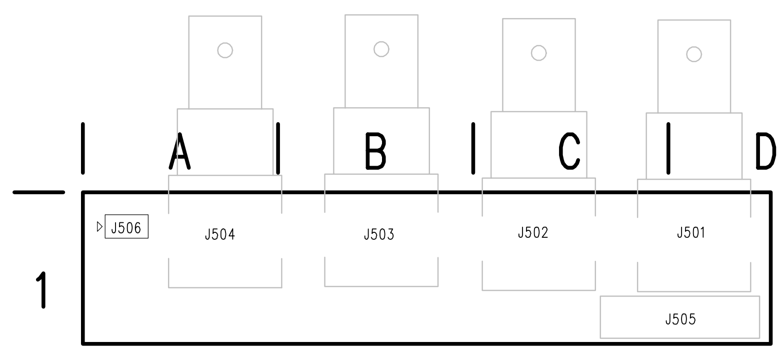
Partial Assembly A2 also shown on Diagrams 2, 3, 4, 5, 6, and 10.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C88	A2	G3	P8	C1		R317	B4	G5
C89	B1	F3	P130	C3		R318	B4	G4
C91	B2	G3	P151	H5		R319	B4	G4
C92	B2	G3				R320	B4	G4
C93	C2	F4	Q101	F4	K5			
			Q102	F5	K5	R321	A3	G5
C94	C1	F4	Q103	F4	J5	R322	A4	G5
C95	C1	F3	Q104	F4	I5	R323	C3	G5
C98	E2	I4	Q105	G5	K5	R325	D4	J4
C99	E2	I3				R328	E3	K4
C160	E1	J3	Q106	G5	K5			
			Q107	F5	K5	R336	H3	J4
C161	E1	I3				R359	F4	I5
C256	D2	J3	R83	B1	G4	R360	G4	J5
C320	C3	F4	R84	A1	G4	R361	G4	J5
C321	C4	F5	R85	A2	G4	R362	F4	J5
C322	C4	F5	R86	B2	G3			
			R87	B2	G3	R363	F5	J5
C323	B4	G4				R364	F5	K5
C324	B4	G4	R88	B2	G3	R365	F5	J5
C325	B4	F5	R89	B2	G4	R366	F5	J5
C326	E3	I5	R90	B2	F4	R367	G5	K5
C327	D4	J4	R92	C1	G4			
			R93	D1	I4	R368	H5	K5
C328	E4	I5				R369	G5	K5
C329	E4	I4	R94	D1	I4	R370	G5	K5
C330	E3	J5	R95	E1	J3	R371	F4	I5
C336	A4	G4	R96	E1	J3			
C359	G5	K5	R97	E1	J3	TP3	D1	I3
			R98	E1	J4	TP6	D1	I3
CR86	F5	J5				TP11	D1	H4
			R99	E1	J4	TP14	D3	I4
FL3	C1	H3	R100	D1	J3			
FL4	C3	H4	R101	D2	J3	U4	E1	J3
			R300	E4	J4	U5	B1	F3
J8	C1	G3	R301	E4	J4	U37	B2	F3
J130	C3	G5				U225	E3	J4
J145	H3	K4	R302	D4	J4	U227	B4	F4
J151	H5	K4	R303	E3	J4	U238	B3	F4
J152	H3	K4	R304	D3	I5			
			R305	D3	I5	W183	H3	J3
L19	E2	I3	R315	B3	G5			
L81	E4	I4						
			R316	B4	F5			


R/R–Y CHANNEL DAC
R/R–Y CHANNEL OUTPUT FILTER
R/R–Y CHANNEL OUTPUT AMPLIFIER
BLACK CHANNEL DAC
BLACK CHANNEL OUTPUT FILTER
BLACK CHANNEL OUTPUT AMPLIFIER
COMPOSITE SYNC OUTPUT
P/O A2 MAIN BOARD



A3 Top BNC Board 671–2183–01



A4 Bottom BNC Board 671–2184–01

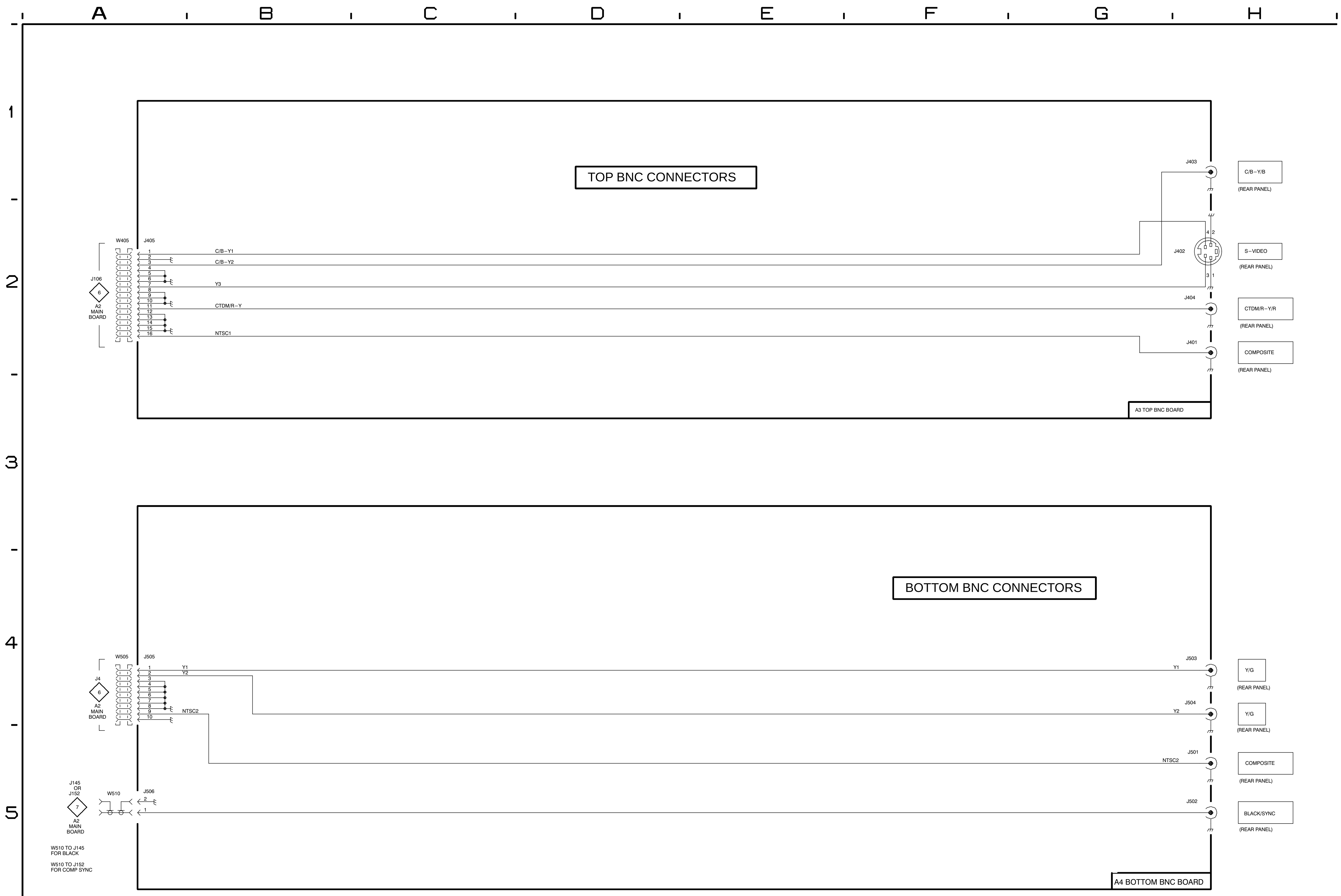
Static Sensitive Devices
See Maintenance Section

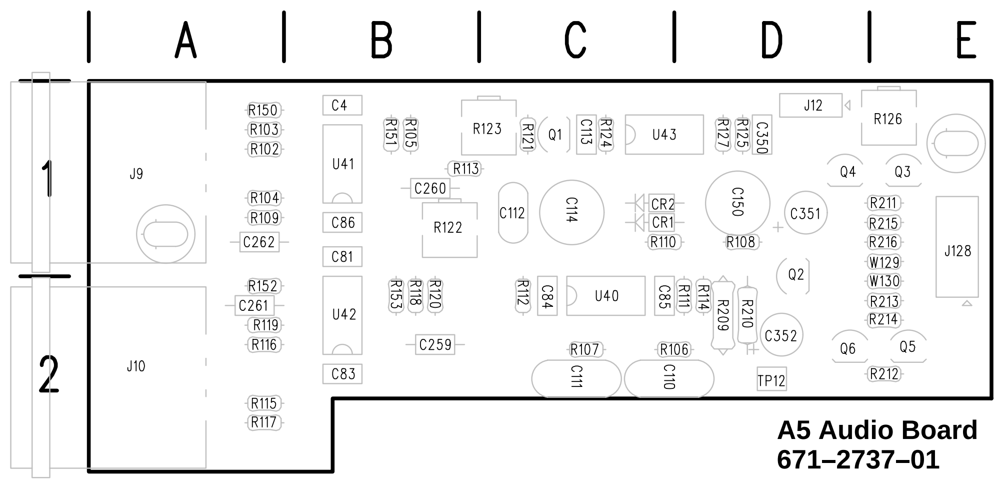
BNC Boards and Schematic Diagram <8>
Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assemblies A3 and A4.

Comp No	Diag Loc	Bd Loc
A3 Top BNC		
J401	H2	A1
J402	H2	B1
J403	H1	C1
J404	H2	C1
J405	A2	C1
W405	A2	
A4 Bottom BNC		
J501	H5	D1
J502	H5	C1
J503	H4	B1
J504	H4	A1
J505	A4	D1
J506	A5	A1
W505	A4	
W510	A5	


TOP BNC CONNECTORS
BOTTOM BNC CONNECTORS
A3 TOP BNC BOARD
A4 BOTTOM BNC BOARD
W405
J405
J106
A2 MAIN BOARD
C/B–Y1
C/B–Y2
Y3
CTDM/R–Y
NTSC1
J403
C/B–Y/B
(REAR PANEL)
J402
S–VIDEO
J404
CTDM/R–Y/R
J401
COMPOSITE
W505
J505
J4
Y1
Y2
NTSC2
J503
Y/G
J504
J501
J502
BLACK/SYNC
J145 OR J152
W510
J506
W510 TO J145 FOR BLACK
W510 TO J152 FOR COMP SYNC



A5 Audio Board
671–2737–01

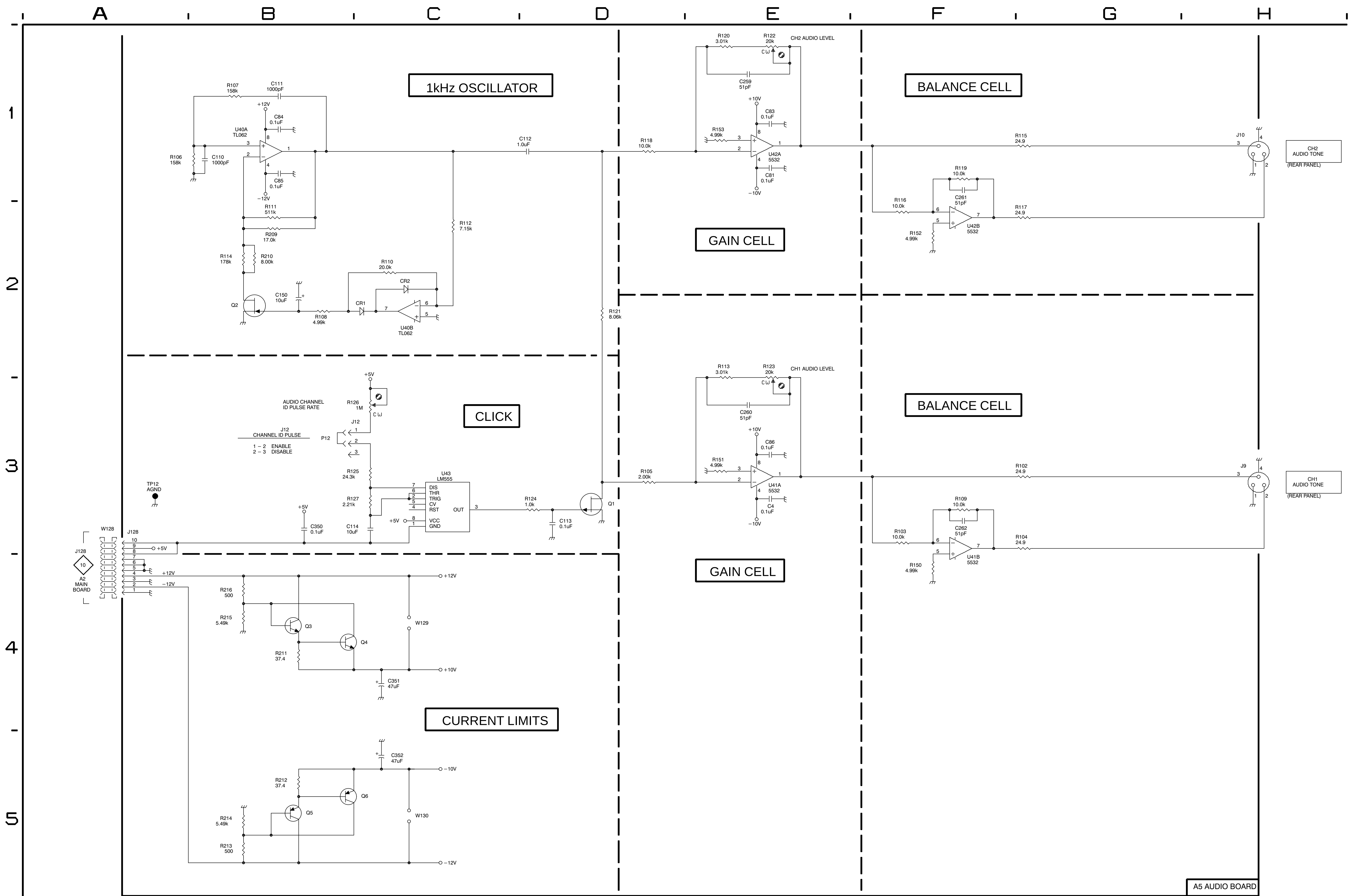
Static Sensitive Devices
See Maintenance Section

Audio Board and Schematic Diagram <9>
Component Locator Chart

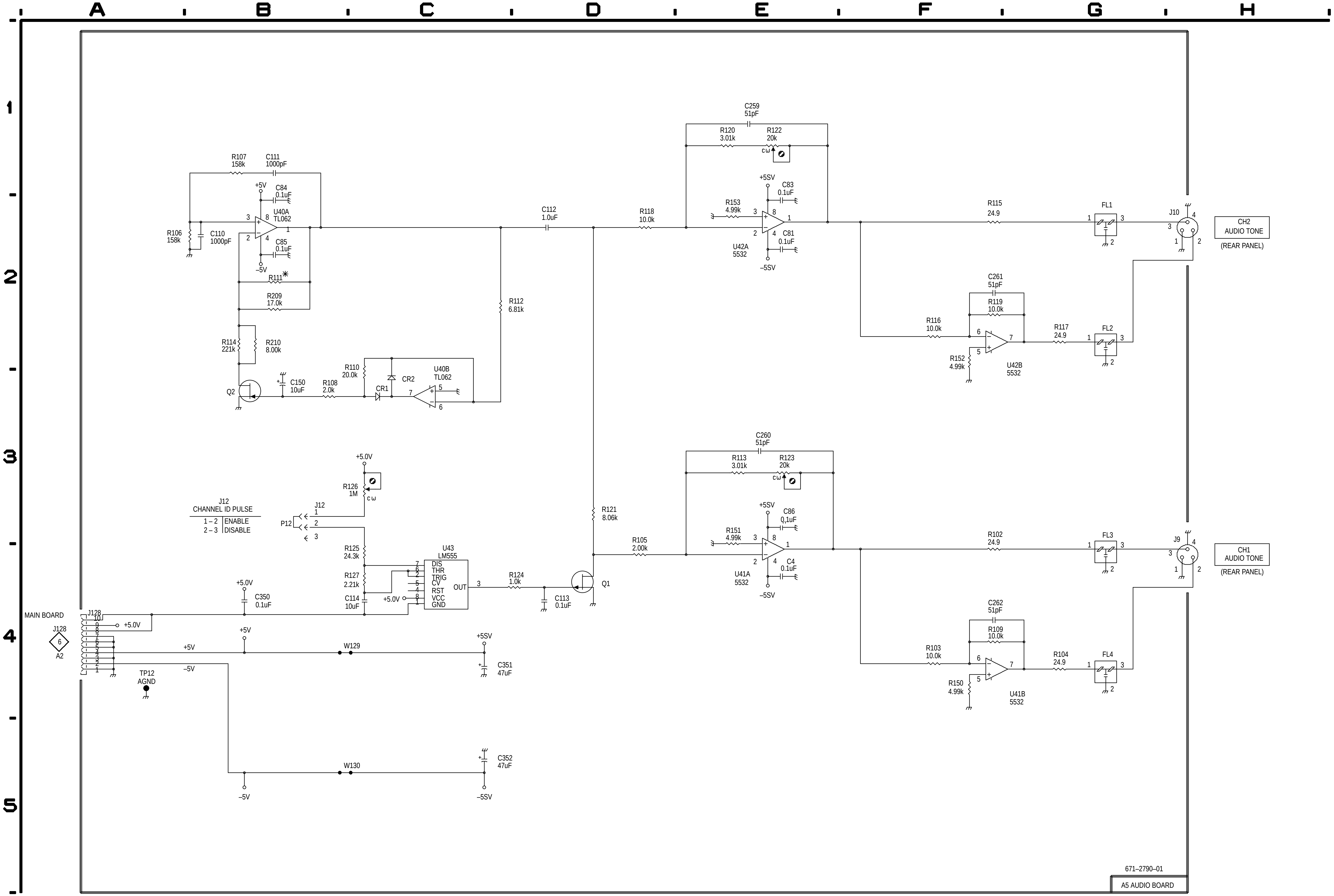
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A5.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C4	E3	B1	Q2	B2	D2	R125	C3	D1
C81	E1	B1	Q3	B4	E1	R126	C3	E1
C83	E1	B2						
C84	B1	C2	Q4	B4	D1	R127	C3	D1
C85	B1	C2	Q5	B5	E2	R150	F4	A1
			Q6	B5	D2	R151	E3	B1
C86	E3	B1				R152	F2	A2
C110	B1	C2	R102	G3	A1	R153	E1	B2
C111	B1	C2	R103	F3	A1			
C112	D1	C1	R104	G3	A1	R209	B2	D2
C113	D3	C1	R105	D3	B1	R210	B2	D2
			R106	B1	C2	R211	B4	E1
C114	C3	C1				R212	B5	E2
C150	B2	D1	R107	B1	C2	R213	B5	E2
C259	E1	B2	R108	B2	D1			
C260	E3	B1	R109	F3	A1	R214	B5	E2
C261	F1	A2	R110	C2	C1	R215	B4	E1
			R111	B2	D2	R216	B4	E1
C262	F3	A1						
C350	B3	D1	R112	C2	C2	TP12	A3	D2
C351	C4	D1	R113	E2	B1			
C352	C5	D2	R114	B2	D2	U40A	B1	C2
			R115	G1	A2	U40B	C2	C2
CR1	C2	C1	R116	F2	A2	U41A	E3	B1
CR2	C2	C1				U41B	F3	B1
			R117	G2	A2			
J9	H3	A1	R118	D1	B2	U42A	E1	B2
J10	H1	A2	R119	F1	A2	U42B	F2	B2
J12	B3	D1	R120	E1	B2	U43	C3	C1
J128	A3	E1	R121	D2	C1			
						W129	C4	E1
P12	B3		R122	E1	B1	W130	C5	E2
			R123	E2	B1			
Q1	D3	C1	R124	D3	C1			



A
B
C
D
E
F
G
H
1
2
3
4
5
1kHz OSCILLATOR
CLICK
CURRENT LIMITS
GAIN CELL
GAIN CELL
BALANCE CELL
BALANCE CELL
CH2 AUDIO LEVEL
CH1 AUDIO LEVEL
AUDIO CHANNEL
ID PULSE RATE
J12
CHANNEL ID PULSE
1 – 2 ENABLE
2 – 3 DISABLE
TP12
AGND
A2
MAIN
BOARD
CH2
AUDIO TONE
(REAR PANEL)
CH1
AUDIO TONE
(REAR PANEL)
U40A
TL062
U40B
TL062
U42A
5532
U42B
5532
U41A
5532
U41B
5532
U43
LM555
DIS
THR
TRIG
CV
RST
VCC
GND
OUT
R107
158k
C111
1000pF
R106
158k
C110
1000pF
C84
0.1uF
C85
0.1uF
R111
511k
R209
17.0k
R114
178k
R210
8.00k
C150
10uF
R108
4.99k
R110
20.0k
CR1
CR2
R112
7.15k
C112
1.0uF
R121
8.06k
R118
10.0k
R120
3.01k
R122
20k
C259
51pF
R153
4.99k
C83
0.1uF
C81
0.1uF
R115
24.9
R116
10.0k
R119
10.0k
C261
51pF
R152
4.99k
R117
24.9
J10
R113
3.01k
R123
20k
C260
51pF
R151
4.99k
C86
0.1uF
C4
0.1uF
R105
2.00k
R102
24.9
R103
10.0k
R109
10.0k
C262
51pF
R150
4.99k
R104
24.9
J9
R126
1M
P12
R125
24.3k
R127
2.21k
C114
10uF
C350
0.1uF
R124
1.0k
C113
0.1uF
Q1
Q2
W128
J128
R216
500
R215
5.49k
Q3
Q4
R211
37.4
W129
C351
47uF
C352
47uF
R212
37.4
Q5
Q6
R214
5.49k
R213
500
W130
+12V
–12V
+10V
–10V
+5V
A5 AUDIO BOARD


A
B
C
D
E
F
G
H
1
2
3
4
5
R107
158k
C111
1000pF
+5V
C84
0.1uF
U40A
TL062
R106
158k
C110
1000pF
C85
0.1uF
–5V
R111
R209
17.0k
R114
221k
R210
8.00k
Q2
C150
10uF
R108
2.0k
R110
20.0k
CR1
CR2
U40B
TL062
R112
6.81k
C112
1.0uF
R118
10.0k
C259
51pF
R120
3.01k
R122
20k
+5SV
C83
0.1uF
R153
4.99k
C81
0.1uF
U42A
5532
–5SV
R115
24.9
FL1
J10
CH2
AUDIO TONE
(REAR PANEL)
C261
51pF
R119
10.0k
R116
10.0k
R117
24.9
FL2
R152
4.99k
U42B
5532
C260
51pF
R113
3.01k
R123
20k
+5.0V
R126
1M
J12
CHANNEL ID PULSE
1 – 2 ENABLE
2 – 3 DISABLE
J12
P12
R121
8.06k
+5SV
C86
0,1uF
R151
4.99k
R105
2.00k
R102
24.9
FL3
J9
CH1
AUDIO TONE
(REAR PANEL)
U41A
5532
C4
0.1uF
–5SV
R125
24.3k
U43
LM555
DIS
THR
TRIG
CV
RST
VCC
GND
OUT
R127
2.21k
C114
10uF
+5.0V
R124
1.0k
C113
0.1uF
Q1
+5.0V
C350
0.1uF
MAIN BOARD
J128
10
+5.0V
J128
6
A2
+5V
+5V
W129
+5SV
C351
47uF
–5V
TP12
AGND
C262
51pF
R109
10.0k
R103
10.0k
R104
24.9
FL4
R150
4.99k
U41B
5532
W130
C352
47uF
–5V
–5SV
671–2790–01
A5 AUDIO BOARD

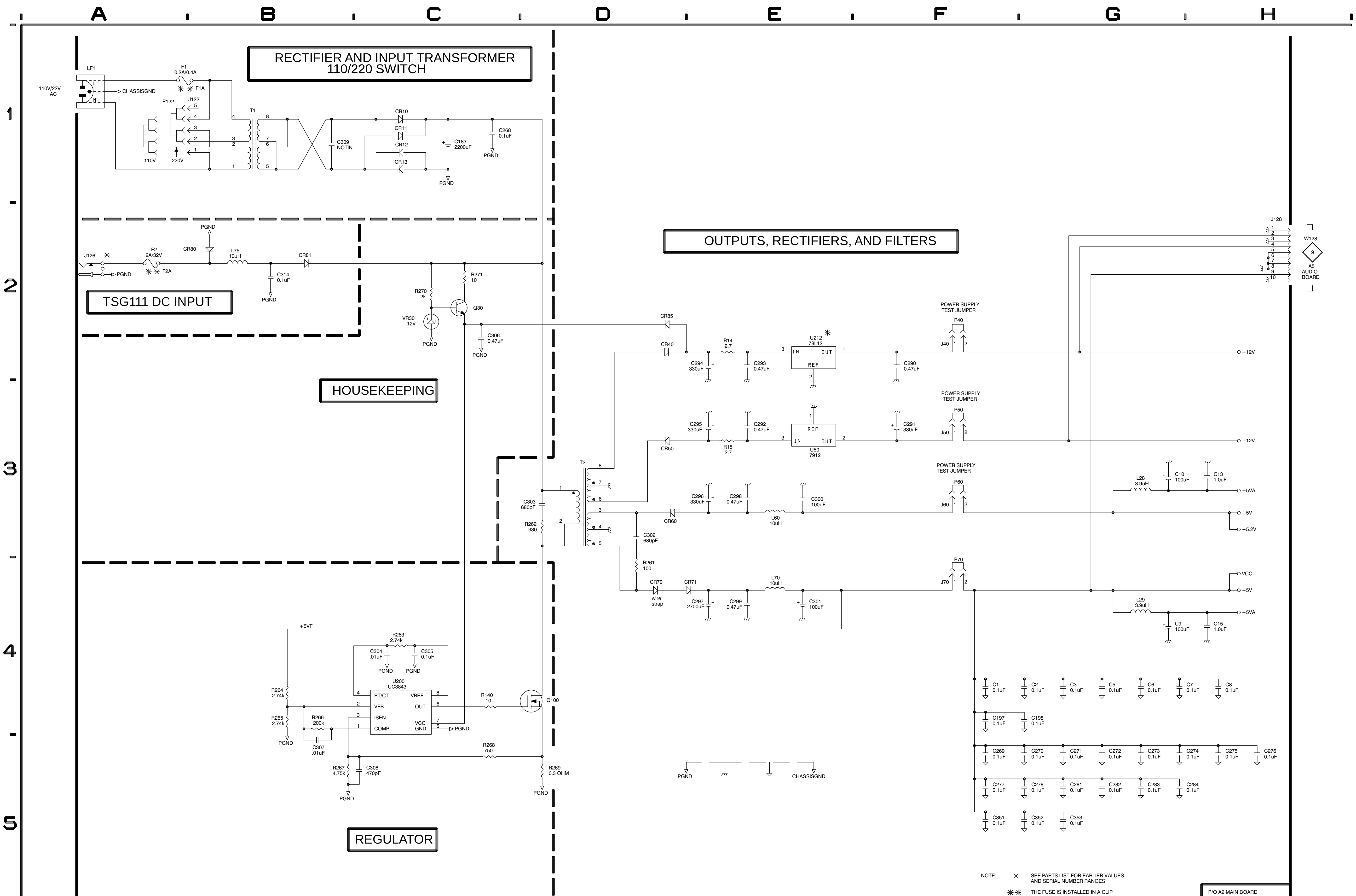
Schematic Diagram <10> Component Locator Chart

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram.

Assembly A2.

Partial Assembly A2 also shown on Diagrams 2, 3, 4, 5, 6, and 7.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C1	F4	B8	C296	E3	G5	L28	G3	H5
C2	G4	C8	C297	E4	G5	L29	G4	I5
C3	G4	C1	C298	E3	F5	L60	E3	F5
C5	G4	D1	C299	E4	F6	L70	E4	F5
C6	G4	D1	C300	E3	F5	LF1	A1	K7
C7	G4	E1	C301	E4	E6	P10	A1	
C8	H4	E2	C302	D3	G6	P11	A1	
C9	G4	I5	C303	D3	G7	P40	F2	
C10	G3	H5	C304	C4	F6	P50	F3	
C13	H3	H5	C305	C4	F6	P60	F3	
						P70	F4	
C15	H4	I5	C306	C2	F6	P122	A1	
C183	C1	F8	C307	B5	E6			
C197	F4	B4	C308	C5	E6	Q30	C2	F6
C198	G4	C4	C309	B1	G5	Q100	D4	F8
C268	C1	G8	C351	F5	E4			
						R14	E2	E8
C269	F5	D7	C352	G5	C3	R15	E3	D7
C270	G5	B5	C353	G5	E4	R140	C4	E7
C271	G5	C6				R261	D4	F6
C272	G5	C5	CR10	C1	G6	R262	D3	G7
C273	G5	C5	CR11	C1	G8			
			CR12	C1	G6	R263	C4	F6
C274	G5	E5	CR13	C1	G8	R264	B4	E6
C275	H5	D3	CR40	D2	E7	R265	B4	E6
C276	H5	E5				R266	B4	F6
C277	F5	C7	CR50	D3	E7	R267	B5	E6
C278	G5	C3	CR60	D3	F6			
			CR70	D4	G6	R268	C5	E7
C281	G5	A5	CR71	E4	F6	R269	D5	E8
C282	G5	A6	CR85	D2	E7	R270	C2	F6
C283	G5	A6				R271	C2	F6
C284	G5	D4	F1	A1	K7			
C290	F2	E7				T1	B1	J6
			J40	F2	D6	T2	D3	F7
C291	F3	E7	J50	F3	E6			
C292	E3	D7	J60	F3	E5	U50	E3	E7
C293	E2	E7	J70	F4	E5	U200	C4	E6
C294	E2	E7	J122	B1	J6	U212	E2	D8
C295	E3	E7	J128	H2	H5			
						VR30	C2	F6


RECTIFIER AND INPUT TRANSFORMER 110/220 SWITCH
TSG111 DC INPUT
HOUSEKEEPING
OUTPUTS, RECTIFIERS, AND FILTERS
REGULATOR
POWER SUPPLY TEST JUMPER
NOTE: ✳ SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES
✳✳ THE FUSE IS INSTALLED IN A CLIP
P/O A2 MAIN BOARD

Replaceable Mechanical Parts

Section 10
Replaceable Mechanical Parts

This section contains a list of the components that are replaceable for the TSG 131A. Use this list to identify and order replacement parts. There is a separate Replaceable Mechanical Parts list for each instrument.

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest circuit improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc., Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

Using the Replaceable Mechanical Parts List

The tabular information in the Replaceable Mechanical Parts list is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replaceable parts.

Cross Index–Mfr. Code Number to Manufacturer

The Mfg. Code Number to Manufacturer Cross Index for the mechanical parts list is located immediately after this page. The cross index provides codes, names, and addresses of manufacturers of components listed in the mechanical parts list.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1.

Chassis Parts

Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts list.

Column Descriptions

Figure & Index No. (Column 1)

Items in this section are referenced by figure and index numbers to the illustrations.

Tektronix Part No. (Column 2)

Indicates part number to be used when ordering replacement part from Tektronix.

Serial No. (Column 3 and 4)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

Qty (Column 5)

This indicates the quantity of mechanical parts used.

Name and Description (Column 6)

An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

Following is an example of the indentation system used to indicate relationship.

1 2 3 4 5 Name & Description
Assembly and/or Component
Mounting parts for Assembly and/or Component
MOUNTING PARTS/*END MOUNTING PARTS*
    Detail Part of Assembly and/or Component
    Mounting parts for Detail Part
    MOUNTING PARTS/*END MOUNTING PARTS*
        Parts of Detail Part
        Mounting parts for Parts of Detail Part
        MOUNTING PARTS/*END MOUNTING PARTS*

Mounting Parts always appear in the same indentation as the Item it mounts, while the detail parts are indented to the right. Indented items are part of and included with, the next higher indentation. **Mounting parts must be purchased separately, unless otherwise specified.**

Mfr. Code (Column 7)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

Mfr. Part Number (Column 8)

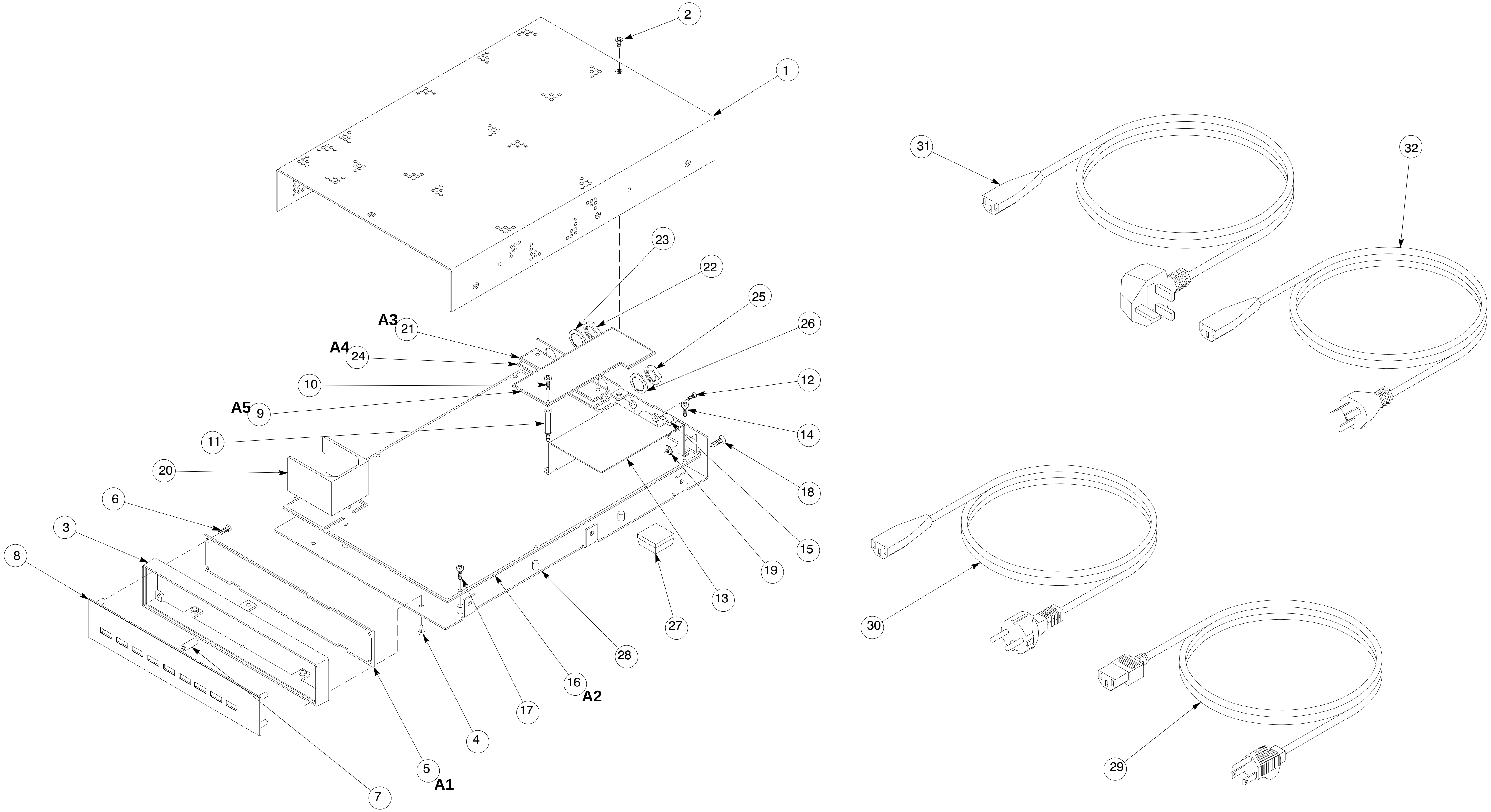
Indicates actual manufacturer's part number.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
52152	MINNESOTA MINING AND MFG CO INDUSTRIAL SPECIALTIES DIV	3M CENTER	ST PAUL MN 55144–0001
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0858	STAUFFER SUPPLY CO (DIST)		
TK1373	PATELEC–CEM (ITALY)	10156 TORINO	VAICENTALLO 62/45S ITALY

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1–1	200–3898–01			1	COVER,TOP:SAFETY CONTROLLED	80009	200–3898–01
					MOUNTING PARTS		
–2	211–0119–00			8	SCREW,MACHINE:4–40 X 0.25,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
–3	426–2420–01			1	FRAME,FRONT:ALUMINUM	80009	426–2420–01
					MOUNTING PARTS		
–4	211–0119–00			2	SCREW,MACHINE:4–40 X 0.25,FLH,100 DEG,STL	93907	ORDER BY DESCR
					END MOUNTING PARTS		
–5	––––– –––––			1	CIRCUIT BD ASSY:FRONT PANEL FAMILY FLAT (SEE A1 REPL)		
					MOUNTING PARTS		
–6	211–0244–00			5	SCR,ASSEM WSHR:4–40 X 0.312,PNH STL	TK0858	211–0244–00
–7	129–1411–00			1	SPACER,POST:0.280 X 0.200,ABS	80009	129–1411–00
					END MOUNTING PARTS		
–8	333–4059–00			1	PANEL,FRONT:TSG131A	80009	333–4059–00
–9	––––– –––––			1	CIRCUIT BD ASSY:AUDIO (SEE A5 REPL)		
					MOUNTING PARTS		
–10	211–0244–00			1	SCR,ASSEM WSHR:4–40 X 0.312,PNH STL	TK0858	211–0244–00
					END MOUNTING PARTS		
–11	129–1394–00			1	SPACER,POST:1.05 SPACING,4–40 INT & 4–40 X 0.187 EXT THD,0.250 HEX,STAINLESS STEEL	80009	129–1394–00
–12	211–0101–00			4	SCREW,MACHINE:4–40 X 0.25,FLH,100 DEG,STL	93907	ORDER BY DESCR
–13	337–3784–01			1	SHIELD,ELEC:TSG131A	80009	337–3784–01
					MOUNTING PARTS		
–14	211–0244–00			1	SCR,ASSEM WSHR:4–40 X 0.312,PNH STL	TK0858	211–0244–00
					END MOUNTING PARTS		
–15	337–3892–00			1	SHIELD,ELEC:BE CU,CLIP ON,1 X 60	80009	337–3892–00
–16	––––– –––––			1	CIRCUIT BD ASSY:FAMILY FLAT (SEE A2 REPL)		
					MOUNTING PARTS		
–17	211–0244–00			8	SCR,ASSEM WSHR:4–40 X 0.312,PNH STL	TK0858	211–0244–00
–18	211–0025–00			2	SCREW,MACHINE:4–40 X 0.375,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
–19	210–0586–00			2	NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL	78189	211–041800–00
					END MOUNTING PARTS		
–20	337–3750–00			1	SHIELD,ELEC:PLASTIC	80009	337–3750–00
–21	––––– –––––			1	CIRCUIT BD ASSY:TOP BNC (SEE A3 REPL)		
					MOUNTING PARTS		
–22	220–0497–00			3	NUT,PLAIN,HEX:0.5–28 X 0.562 HEX,BRS CD PL	80009	220–0497–00
–23	210–1039–00			3	WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	24931	ORDER BY DESCR
					END MOUNTING PARTS		
–24	––––– –––––			1	CIRCUIT BD ASSY:BOTTOM BNC (SEE A4 REPL)		
					MOUNTING PARTS		
–25	220–0497–00			4	NUT,PLAIN,HEX:0.5–28 X 0.562 HEX,BRS CD PL	80009	220–0497–00
–26	210–1039–00			4	WASHER,LOCK:0.521 ID,INT,0.025 THK,SST	24931	ORDER BY DESCR
					END MOUNTING PARTS		
–27	348–0844–00			4	PAD,CUSHIONING:0.05 SQ X 0.23 H,POLYURETHAN E W/PRESSURE SENS ADHESIVE	52152	SJ–5018–GRAY
–28	200–3936–03			1	COVER,BOTTOM:SAFETY CONTROLLED	80009	200–3936–03
	200–3936–04	B030000		1	COVER,BOTTOM:SAFETY CONTROLLED	80009	200–3936–04
	334–3388–00			1	MARKER,IDENT:MARKED TEKTRONIX BEAVERTON	80009	334–3388–00

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
					STANDARD ACCESSORIES		
–29	161–0066–00			1	CABLE ASSY,PWR,:3,18AWG,98 L,SVT,GREY/BLK,60 DEG C,IEC BME X STR,IEC RCPT,10A/125V (STANDARD ONLY)	80009	161–0066–00
	070–8663–XX			1	MANUAL,TECH:TSG131A	80009	070–8663–XX
					OPTION ACCESSORIES		
–30	161–0066–09			1	CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (EUROPEAN OPTION A1 ONLY)	80009	161–0066–09
–31	161–0066–10			1	CABLE ASSY,PWR,: (UNITED KINGDOM OPTION A2 ONLY)	TK1373	24230
–32	161–0066–11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (AUSTRALIAN OPTION A3 ONLY)	80009	161–0066–11
	––––– –––––			1	TVGF11A:RACK MOUNT KIT		



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