

Model 1509 Sequential Tone Generator



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Contents

General	2
Connections	3
Operation	3
PIN Assignments	5
LED indicators	5
Jumper Settings	6
Tone frequencies	6
Transmit Line Amplifier	7
Vega FaxBack	7
Technical Assistance	7
Warranty	7
Parts List	8
Components Locator	9
Model 1509 Specification	10

General

The Vega Model 1509 sequential audible tone generator is intended for use in systems to remotely control radio base stations and repeaters. It provides the required tone sequences to interface with Vega 223 series tone-remote station panels and other remote adapters (such as GE, Motorola, etc.) conforming to the industry-standard sequential-tone-control format. The 1509 is not a stand-alone unit, because it does not include the audio-processing functions necessary to implement a complete tone-remote console. The 1509 is intended primarily as a component in large multifunction consoles, paging terminals, centralized dispatch systems, and related applications. It may also be used to update existing DC control consoles to tone-format remote control.

The sequential audible frequencies generated by the 1509 are developed from a crystal oscillator and are highly stable. The 1509 supplies a guard-tone burst and PTT holding tone frequency of 2175 Hz, a monitor-enable burst frequency of 2050 Hz, and radio-frequency-select control burst tones of 1950 Hz to 850 Hz. In accordance with industry practice, the 1509, when combined with the Model 1690 audio processor card, or other appropriate amplifier module, provides a 130 ms burst of 2175 Hz guard tone at +10dBm or 0 dBm, followed by a 40 ms function tone burst (2050 Hz monitor, 1950 Hz through 850 Hz) at 0 dBm or -10dBm, followed by the 2175Hz PTT holding tone at -20dBm.

The 1509 card is capable of generating a single function tone or dual function tone format. In some field applications a dual function tone burst is required to select multiple functions.

Connections

Refer to the schematics and table 1 (shows the card edge connector Pin Assignment of Model 1509)

Card Edge	Function	Card Edge	Function
1	Mute Output	2	No Connection
3	No Connection	4	No Connection
5	No Connection	6	No Connection
7	Audio Gate Control	8	No Connection
9	No Connection	10	No Connection
11	No Connection	12	No Connection
13	No Connection	14	No Connection
15	Guard Tone Test	16	Function Tone Test
17	Remote tone 1 Test	18	Remote tone 2 Test
19	Push To Talk (PTT)	20	Monitor
21	Inhibit	22	Remote/Local Mode
23	Remote tone 1 - bit 0 (LSB)	24	Remote tone 1 - bit 1
25	Remote tone 1 - bit 2	26	Remote tone 1 - bit 3 (MSB)
27	Remote tone 2 - bit 0 (LSB)	28	Remote tone 2 - bit 1
29	Remote tone 2 - bit 2	30	Remote tone 2 - bit 3 (MSB)
31	No Connection	32	No Connection
33	No Connection	34	No Connection
35	Line Out (-)	36	Line Out (+)
37	No Connection	38	No Connection
39	Ground	40	Ground
41	No Connection	42	No Connection
43	No Connection	44	No Connection
45	No Connection	46	No Connection
47	No Connection	48	No Connection
49	No Connection	50	No Connection
51	No Connection	52	No Connection
53	No Connection	54	No Connection
55	Positive 12 VDC Input	56	Positive 12 VDC Input

Table 1: The 1509 card Edge Connector Pin Assignment.

Operation

A PTT input (P1-19 pulled to ground) to the 1509 causes either a single-tone or dual-tone burst format to be generated. A single-tone burst will be generated when the unit is in LOCAL mode; P1-22 floating. A dual tone format will be generated when the card is in REMOTE mode; P1-22 tied to ground. These modes are described next page.

LOCAL mode:

When in the LOCAL mode, P1-22 is floating or JP1 is installed, the 1509 transmits a 2175 Hz guard tone (130ms at +10dBm or 0dBm) followed by a selected by a single function tone, monitor, or F1-F12 (40ms at 0dBm or -10dBm) followed by the 2175 Hz PTT holding tone (-20dBm continuous). The tone frequency in LOCAL mode is selected by the front panel rotary switch and an associated LED will illuminate indicating the frequency selected.

REMOTE mode:

In the REMOTE mode (P1-22 is pulled to ground and JP1 is open), the 1509 transmits a 2175 Hz guard tone (130ms at +10dBm or 0dBm) followed by a selected pair of function tone bursts (40 ms at 0 dBm or -10 dBm each), followed by the 2175 Hz hold tone (-20dBm continuous). If either one of the tone bursts is NO TONE, the 1509 transmits only a single function tone followed by a 2175 Hz hold tone. The frequencies of the transmitted tone pair are determined by grounding certain pins on the card edge connector. The function tones will change when the binary input pins from the card edge connector change. Pins P1-23 through P1-26 determine the frequency of the first tone transmitted and pins P1-27 through P1-30 determine the frequency of the second tone transmitted. Refer to the following table:

PIN #				
Remote Tone 1	23	24	25	26
Remote Tone 2	27	28	29	30
NO TONE	1	1	1	1
F1 - 1950 Hz	0	1	1	1
F2 - 1850 Hz	1	0	1	1
F3 - 1750 Hz	0	0	1	1
F4 - 1650 Hz	1	1	0	1
F5 - 1550 Hz	0	1	1	1
F6 - 1450 Hz	1	0	0	1
F7 - 1350 Hz	0	0	0	1
F8 - 1250 Hz	1	1	1	0
F9 - 1150 Hz	0	1	1	0
F10-1050 Hz	1	0	1	0
F11- 950 Hz	0	0	1	0
F12- 850 Hz	1	1	0	0

Table 2: Input frequencies are determined by 4-bit binary codes

0: Pin tied to ground

1: Pin is floating

Note: The values used to select frequencies are inverted BCD value for the decimal frequency desired.

PIN Assignments

Audio Gate Control (Output):

The P1-7 will be pulled to ground when any tone is being produced by the card. It can be used as an audio gate control to other cards in the system.

Mute (Output):

The Mute Output (P1-1) will be pulled to ground while the 1509 card sends either a guard tone burst or a function tone burst. It can be used to mute audio signals in the system that may interfere with the tone burst.

Monitor (Input):

When P1-20 is pulled to ground, a monitor tone burst consisting of a 2175 Hz guard tone at +10dBm or 0 dBm for 130ms followed by a 2050 Hz tone burst at 0 dBm or -10dBm for 40ms is generated. The monitor pin (P1-20) must be pulled to ground for at least 20 ms to be considered valid. However, this pin must be floated prior to using the PTT or frequency select functions.

Inhibit (Input):

As long as P1-21 is pulled to ground, the 1509 will not change state or respond to either PTT or monitor inputs. The 1509 card is in a disabled state. If the Inhibit pin is pulled low while a function is in progress, the 1509 will be disable right after that function tone burst is transmitted.

Note: The LED F1 will be blinked during the Inhibit pin (P1-21) is pulled to ground.

Guard Tone, single or dual Function Tone check:

In the LOCAL mode (JP1 is installed or P1-22 is floating), a frequency 2175 Hz guard tone is transmitted as long as P1-15 is pulled to ground. A selected single function tone is transmitted as long as P1-16 is pulled to ground. In the REMOTE mode (JP1 is open and P1-22 is pulled to ground), the frequency of Remote Tone 1 is transmitted as long as P1-17 is pulled to ground, and the frequency of Remote Tone 2 is transmitted as long as P1-18 is pulled to ground. If these test pins are pulled low while a function is in progress, the 1509 will be disable immediately.

LED indicators

PTT LED:

The PTT LED will illuminate while P1-19 is pulled to ground. This indicates that a PTT is in progress.

REMOTE LED:

This LED is illuminated when the 1509 card is in the REMOTE mode (P1-22 is tied to ground). Otherwise, the 1509 card is in LOCAL mode (P1-22 is floating)

Rotary Switch with F1-F12 LED's:

Used to select the single tone frequencies F1 – F12. The 1509 will transmit a single tone burst each time the switch is rotated to a new position. The illuminated LED indicates which frequency has been selected for single tone mode.

Jumper Settings

To disable the ability to place the card into the REMOTE mode by P1-22, install JP1. This will lock out the input to the REMOTE/LOCAL signal at the edge connector. The 1509 will only respond in the single tone mode and the function tone frequencies are selected by the rotary switch on the front of the card.

JP1 is closed: Remote Mode is disabled

JP1 is open : Remote Mode will be enabled when P1-22 is pulled to ground.

The Guard Tone and Function Tone levels can be setup by JP3 and JP2 as shown in table 3.

Level Settings	Jumper Position A	Jumper Position B
JP3 – Function Tone	0 dBm	-10 dBm
JP2 – Guard Tone	+10 dBm	0 dBm

Table 3: Jumper levels settings

Tone Frequencies

The following list shows the current frequency assignments to F1 –F12.

F1 - 1950 Hz
 F2 - 1850 Hz
 F3 - 1750 Hz
 F4 - 1650 Hz
 F5 - 1550 Hz
 F6 - 1450 Hz
 F7 - 1350 Hz
 F8 - 1250 Hz
 F9 - 1150 Hz
 F10 - 1050 Hz
 F11 - 950 Hz
 F12 - 850 Hz

If you need to have a different frequencies list, please contact customer service at (626) 442-0782 or fax (626) 575-3569.

Transmit Line Amplifier

Amplifier U12 drives a 600 Ohm unbalanced line. The transmit output level can be adjusted from -25 dBm to +14.5 dBm through the front panel.

Vega FaxBack

Information including more detailed procedures, schematics, and other Vega products is available 24 hours per day from Vega's FaxBack System. Simply call (626) 444-2017 or (800) 274-2017, then follow the voice instructions.

Technical Assistance

Vega products are engineered to meet your requirements of performance, reliability, and compatibility. Technical assistance is offered by correspondence or telephone, should it be required, to assure your satisfaction.

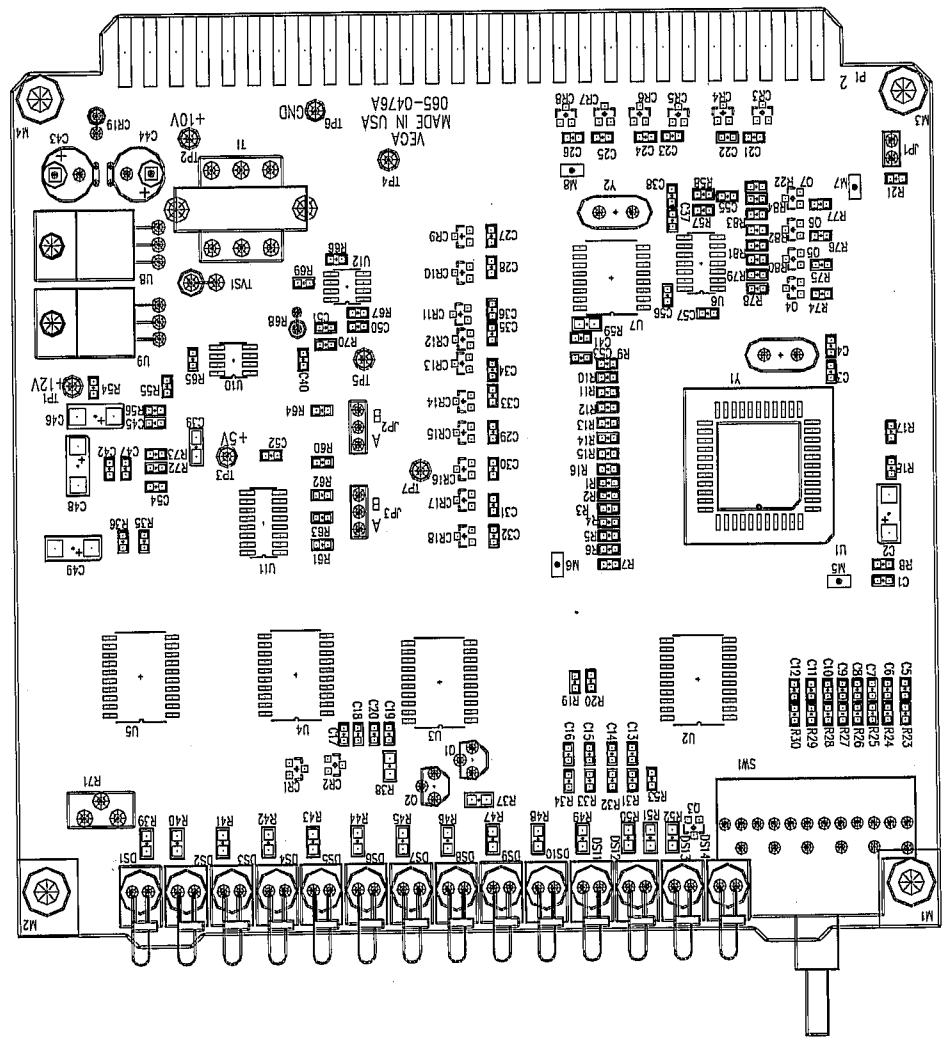
Warranty

Vega signaling products are guaranteed to be free from defects in material and workmanship for a period of three years from the date of shipment. Warranty is for factory repair or replacement only.

PART NUMBER:	012-0102	DESCRIPTION:	ASSY PCB 1509 SEQ TN EN
PART NO	QTY	DESCRIPTION	CKT SYM
065-0476	1	PCB 1509 SHQ	
071-0583	0	SCHEMATIC	
112-1609	2	CAP 100MF 20% 25V	C43, C44
124-0002	1	CAP 1UF TA20V CS3216	C39
124-0022	4	CAP 10UF 20V TA6032	C2, C46, C48, C49
129-0006	1	CHIP RES 10K	R37
129-0012	1	CHIP RES 33K	R38
129-0022	15	CHIP RES 270	C59, R39-R52
130-0779	1	RES VAR 50K	R71
136-0022	1	RES COMP 150	R68
140-0003	4	CHIP RES 1K	R58, R75-R77
140-0007	36	CHIP RES 10K	R1-R36
140-0008	11	CHIP RES 15K	R22, R55, R56, R78, R79, R80-R84
140-0027	6	CHIP RES 33K	R66, R67, R69, R70, R72, R73
140-0038	1	CHIP RES 0 OHM	R54
140-0047	1	CHIP RES 1 MEG	R57
141-0026	2	CHIP RES 75.0K	R61, R64
141-0028	1	CHIP RES 316K	R62
141-0029	1	CHIP RES 681K	R60
141-0030	1	CHIP RES 22.1K	R63
143-0009	44	CHIP CAP, .01 UF	C1, C5-C36, C40-C42, C45, C47, C52-C57
143-0031	2	CHIP CAP 470PF	C50, C51
143-0041	4	CHIP CAP 12 PF	C3, C4, C37, C38
149-0642	1	XSTR 2N7000	Q2
149-0643	1	XSTR 2N3904	Q1
150-0002	5	XSTR MMBT3904	Q3-Q7
150-0014	18	DIODE PMBD914	CRL-CR18
161-0630	2	LED RED	DS1, DS14
161-0631	12	LED YELLOW	DS2-DS13
161-0636	1	DIODE SHTKY1N5819	CR19
161-0638	1	TVS VBR20	TVS1
165-1230	2	CRYSTAL 4.194 MHZ	X1, X2
286-1766	3	CONNECTOR PLUG	JP1-JP3
286-1788	.4	CONNECTOR HEADER	JP1-JP3
286-1964	7	TEST POINT YELLOW	TP1-TP7
295-0516	1	SWITCH ROT 1P 12 POS	SW1
318-0259	1	TRANSFORMER 600CT-600CT	T1
395-0063	1	SOCKET 44 PIN	U1
425-0102	1	IC 7805CT	U9
425-0530	1	IC LM2937	U8
430-0012	2	IC BA15532F	U10, U12
430-0029	2	IC 74HC573	U4, U5
430-0035	1	IC 74HC04	U6
430-0050	1	IC DG212BDY	U11
430-0064	2	IC 74HC541M	U2, U3
430-0088	1	IC ML2036CS	U7
433-0016	1	MICROCONTROLLER	U1

PCB ASSY	012-0102	SIZE: A	SCALE: 1:1	PLOT SCALE: 1:1	PAGE 1 OF 1
MODEL NUMBER	1509	PCB NUMBER	065-0476	REV	A

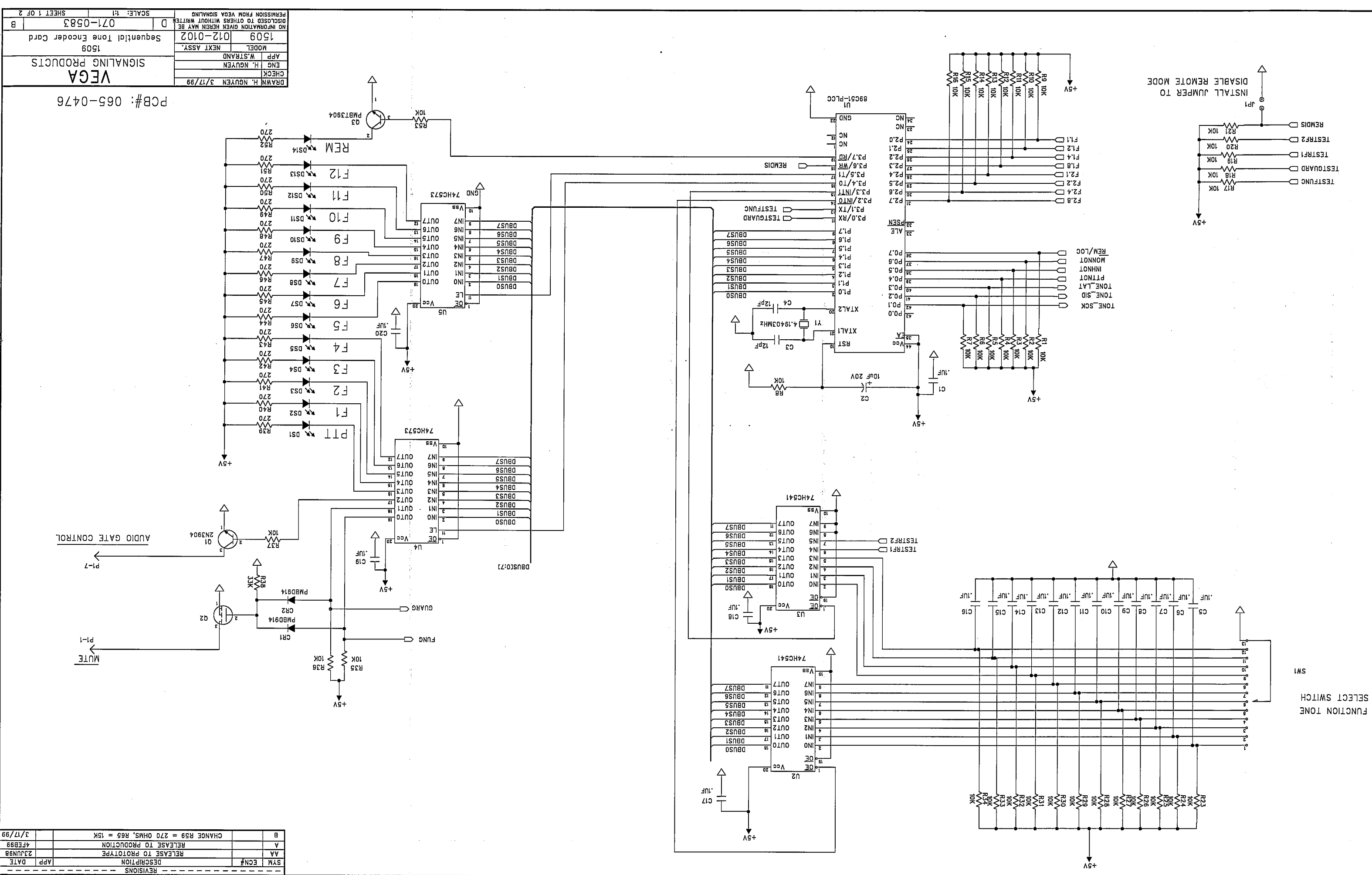
SEQUENTIAL TONE GENERATOR CARD (COMPONENT SIDE)

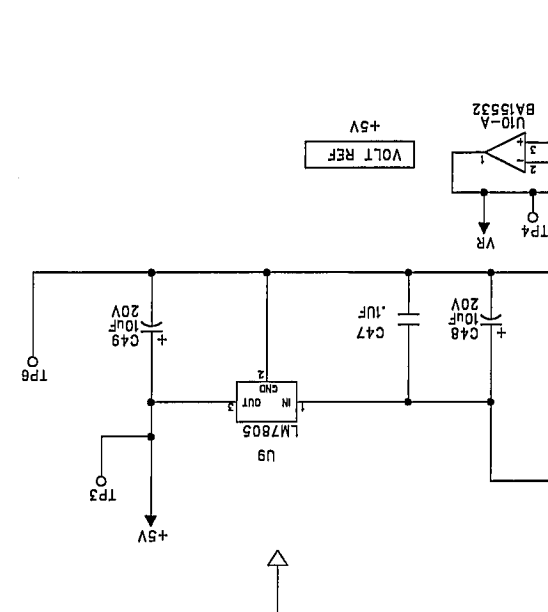
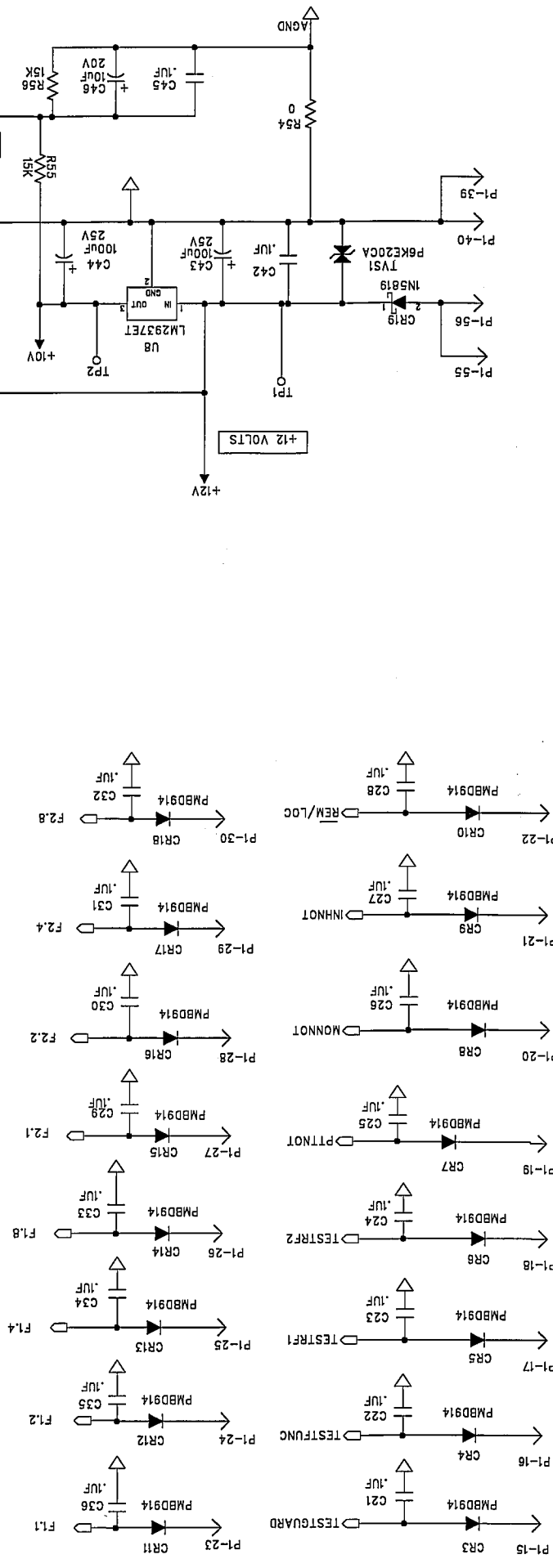


SYN	ECN#	DESCRIPTION	APP	DATE
AA		RELEASE TO PROTOTYPE		23JUN98
A		RELEASE TO PRODUCTION		4FEB99
B		CHANGE R59 = 270 OHMS, R65 = 15K		3/17/99

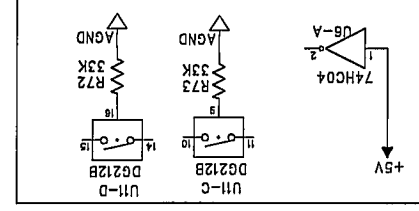
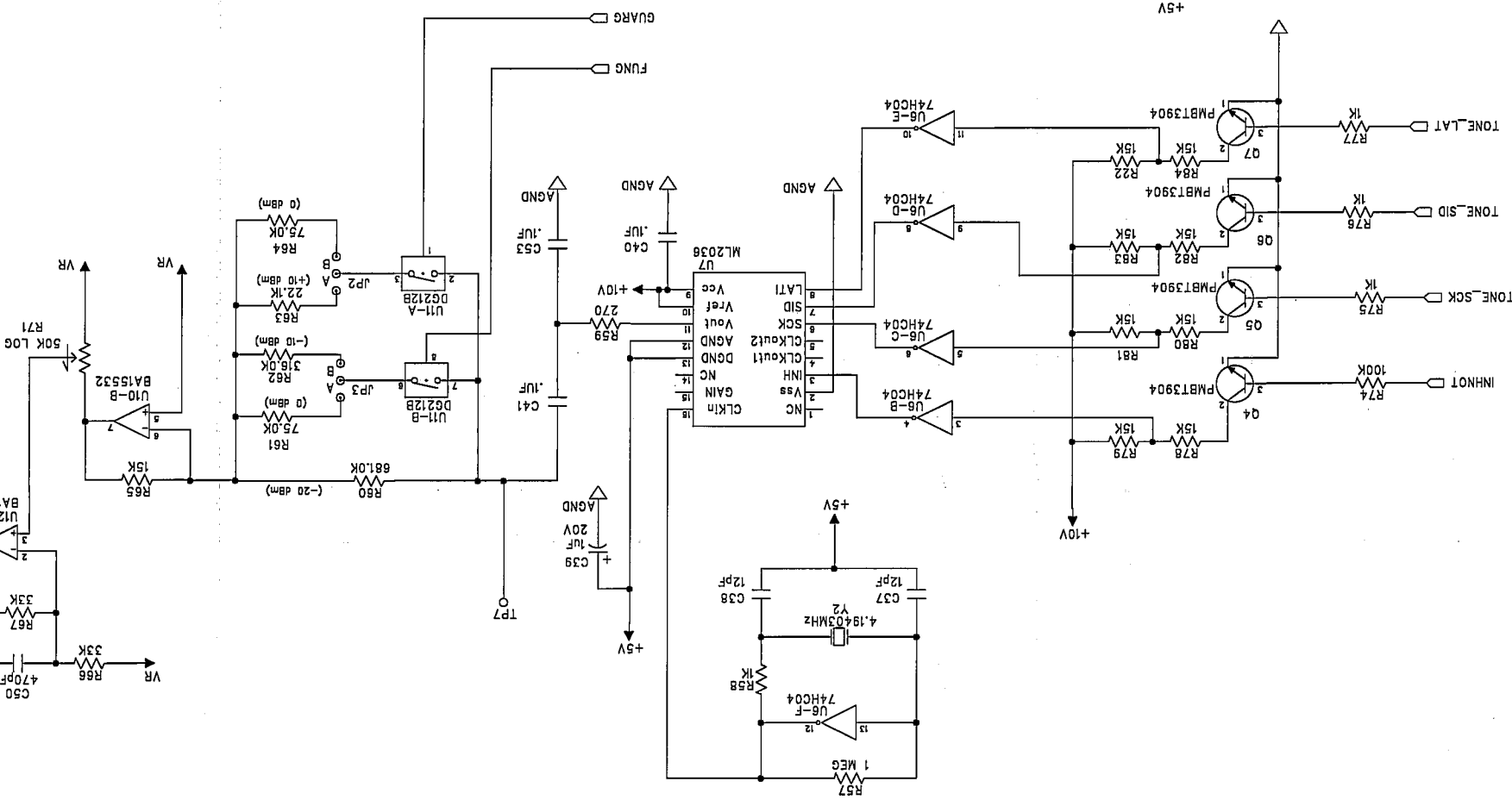
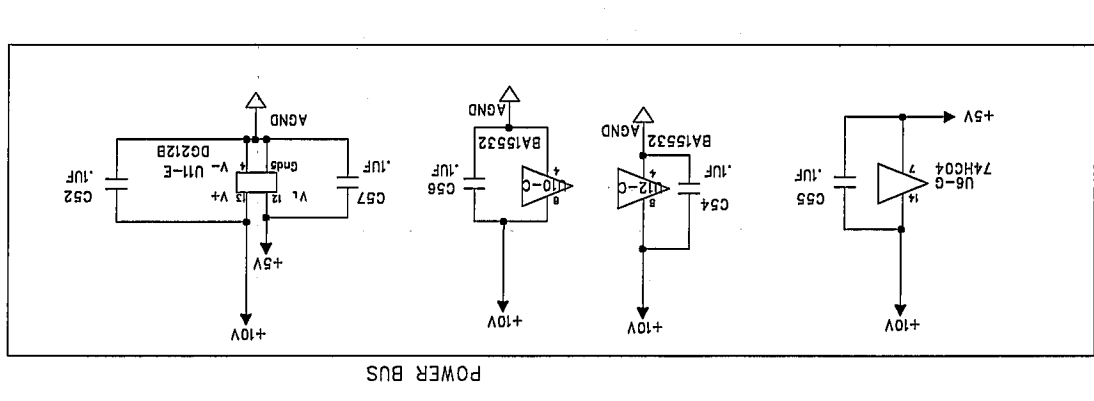
VEGA	SIGNALING PRODUCTS	1509	Sequential Tone Encoder Card	071-0583	SHEET 1 OF 2
CHECK	ENG H. NGUYEN	APP W. STRAND	MODEL	1509	012-0102
					NO INFORMATION GIVEN HEREIN MAY BE DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION FROM VEGA SIGNALING
					DRAWN H. NGUYEN 3/17/99

PCB#: 065-0476





FUNCTION TONE MODES		4-BIT BINARY INPUTS	
MSB	BIT 3	BIT 2	BIT 1
LSB	BIT 0	BIT 1	BIT 2
REMOTE FUNCTION 1		F1.8	F1.4
REMOTE FUNCTION 2		F2.8	F2.4
		F2.2	F2.1



VEGA 1509 SIGNALING PRODUCTS

PCB # : 065-0476

1509 012-0102

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SCALE: 1:1

SHEET 2 OF 2

REVISIONS

SYM	ACT#	DESCRIPTION	DATE	APP
AA	23JUN98	RELEASE TO PROTOTYPE	2/4/99	
A		RELEASE TO PRODUCTION		
B		CHANGE R59 = 270 OHMS, R55 = 15K	3/17/99	

1509 Specifications

Output Impedance: 600 Ohms unbalanced

Output Level: -25 dBm to +14.5 dBm, adjustable

Frequency Accuracy: 0.015% (PTT/guard, 2175 Hz); 0.35% (monitor and function tone)

Operating Temperature Range: 0°C to +70°C

Visual Indicator: PTT, Local set Function Tone, and Local/Remote status

Power Requirements: 12.00 - 12.5 VDC regulated, or 12.5 - 16.0 VDC unregulated at 55 mA idle, 100 mA maximum.

Control Inputs: PTT, Monitor, Local and Dual Remote frequencies (F1 - F12)

Outputs: Audio Gate Control and Mute, 12.5 VDC and 100mA maximum; tone, +10dBm maximum, into 600 Ohms load.

Factory-Adjusted Tone-Burst Sequence Output (PTT Input): 2175 Hz at +10dBm for 140ms, 1950 Hz - 850 Hz at -10dBm for 40ms, and 2175 Hz PTT tone until termination of PTT input.

Output Level change, with frequency: ± 0.5 dB, 875 Hz to 2200 Hz; ± 2 dB, 875 Hz to 3000 Hz

Size: 5.58 in (14.2cm) W x 1.40 in (3.6cm) H x 5.43 in (13.8cm) D