VEGA®

TELEX® Signaling Product Company

Model TRA223
Tone Remote Panel

Technical Manual

December 17, 2004 **P.N. 803570 Rev B**

Table of Contents

1 General

The Vega TRA223 tone-remote adapter provides a reliable means of remotely controlling two-way-radio base stations. The adapter can be used in conjunction with all Vega consoles, or other manufacturers' (such as Motorola and MA-COM Ericsson GE) remote consoles, which use the industry-standard sequential tone-keying format.

The TRA223 provides the following features:

PTT Relay
Monitor Relay
PTT and Monitor LED indications
Hardware gain control
Front panel test points and level setting potentiometers
Three monitor modes

The TRA223 is interconnected to the distant remote control console(s) by any voice-grade transmission medium such as a microwave link, a leased telephone line, or a twisted-pair 600-ohm line. All TRA223s are capable of decoding the PTT (push-to-talk/transmitter-on) tone sequence and the voice-plus-tone signals during transmission. The tone portion of the voice-plus-tone signal is removed from the transmitted voice. TRA223 are prepared for conversion from two-wire-line operation to four-wire-line operation via a front panel DIP-Switch. In the four-wire mode, the panels are full duplex capable.

The TRA223 provides a "monitor" decode function that operates a relay used for turning off subaudible-tone-decoder circuits in the radio receiver, allowing the console operator to monitor the channel for other users before transmitting. (Required by FCC regulations on stations equipped with Continuous-Tone-Coded-Squelch-Signaling)

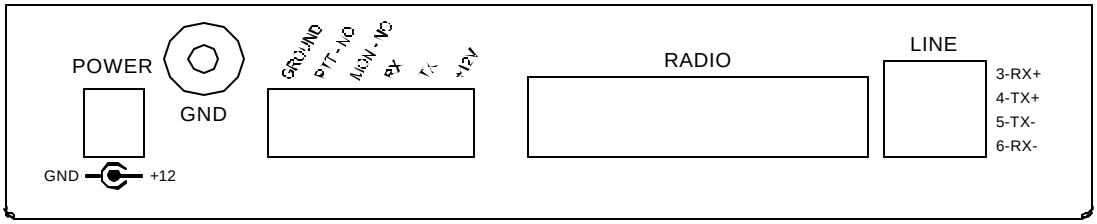
Transient protection has been provided near all audio inputs and outputs. This is adequate for nearly all transients.

The TRA223 line transformers are not designed to operate on lines carrying direct current. If a DC voltage is on the line, isolate with external capacitors. If the line termination must conduct direct current, install a 600:600-ohm transformer designed for the current involved.

1.1 Accessories

The TRA223 can be ordered with several optional accessories.
TO-23 – Transformer isolation on transceiver interface
DSP223RACK – 1 unit high rack shelf to hold up to two TRA223 units
Power Supply

2 Installation



2.1 Power Supply

The TRA223 requires a 12 to 16 volt DC, 500ma, of clean power. Two connectors are provided to connect the unit to power. The first is a 2.5mm plug receptacle on the rear left of the unit. The positive terminal is the center conductor. The second power connection option is the DB25 connector. Figure 1 shows the pin out of this connector. Connect an external 12 to 16 volt DC supply with the positive connected to Pin 20 and the Ground connected to Pin 7.

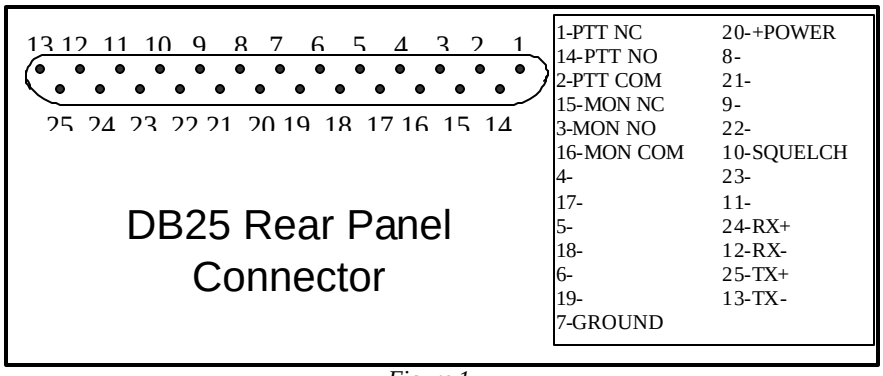


Figure 1

2.2 Line Connection

The line connector *Figure.2* is the right most connector on the rear of the TRA223. Connect the two-wire leased line to pins 4 and 5 of the RJ-45 modular connector, making sure that SW-1 position 1 is “ON” and position 2 is “OFF”. For four-wire operation, move SW-1 position 1 is “OFF” and position 2 is “ON”, connect the outgoing line to pins 4 and 5, and the receive pins to 3 and 6.

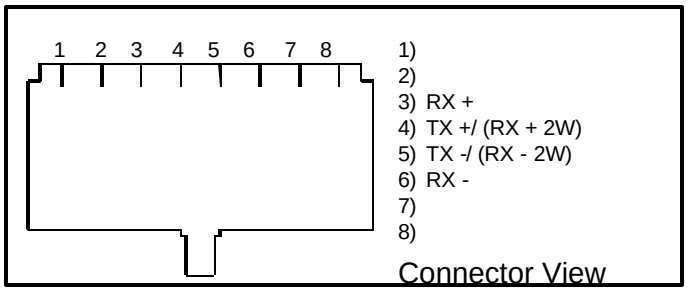


Figure 2

Note: Pins 4&5 of the Line connector are the RX audio from the radio. They are transmitted back down the line to the console. Pins 3&6 of the Line connector are inputs from the console and the audio present on this pair will be sent to the radio.

SW-1 on the front of the TRA223 control 2 or 4 wire operation. Set the Dipswitches according to your connection requirements.

2 Wire / 4 Wire Selection:	SW1-1	SW1-2
2 Wire	ON	OFF
4 Wire	OFF	ON

2.2.1 Full Duplex

The TRA223 is shipped from the factory set to 2-wire half duplex, for Full-duplex set SW1 position 3 to “ON”.

2.3 Radio Connection

2.3.1 TX Audio Connection

The TRA223 is shipped from the factory with a single ended connection for TX Audio to the radio. If the microphone input of the radio is a high-impedance type, shielded cable is recommended. If the radio has a high-level microphone input, move SW-1 position 6 to "OFF", otherwise SW-1 position 6 should stay in the "ON" position.

TX Audio is available from the TX+ pin on the DB25 or can be accessed on the smaller 6-pin rear connector. The 6 Pin connector pin out appears in Figure 3. The optional TO-23 provides balanced 600-Ohm I/O to the radio, balanced audio is only available on the DB25 connector on the rear panel; see Figure 1 for pin out.

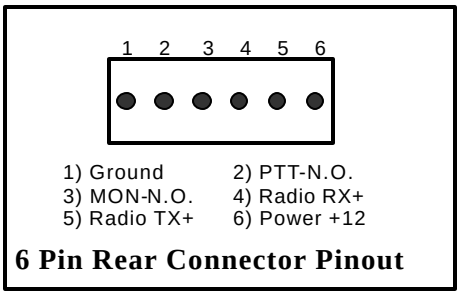


Figure 3

2.3.2 RX Audio Connection

The TRA223 is shipped from the factory with a single ended high impedance connection for RX Audio from the radio. If a high-impedance point in the receiver is used, shielded cable is recommended. To connect a receive audio from a speaker output to the TRA223 set the front panel Dip-switch SW1 position 5 to "ON".

Note: That when the speaker output is used, the radio volume control will affect the audio levels of the TRA223.

Single ended RX audio can be connected at pin 24 of the rear DB25 or pin 4 of the rear 6-pin connector can be used. The audio source must be after the squelch circuit, to prevent sending continuous noise to the remote console. The optional TO-23 provides balanced 600-Ohm I/O to the radio, balanced audio is only available on the DB25 connector on the rear panel; see Figure 1 for pin out.

2.3.3 TO-23 Balanced Transformer option

To connect the TRA223 to a radio that requires balanced audio connections the main PCB has been designed for the option TO-23. To install the TO-23 option remove main PCB from case and solder transformer P/N 3180246 into T3 and P/N 3180259 into T4, remove R98, R99, R100 and R101.

Note: For 600 ohm RX input impedance; replace R77 with a 680-ohm resistor.

2.3.4 PTT Connection

Connect the radio PTT circuit to the PTT relay contact terminals of the panel. This can be done on either the rear DB25 or the 6 pin connectors. Usually the common of the relay contact switch is grounded and the normally open contact connects to the PTT input. It is also possible to ground the common of the relay internal to the unit by setting SW1 position 7 to "ON".

2.3.5 Monitor Connection

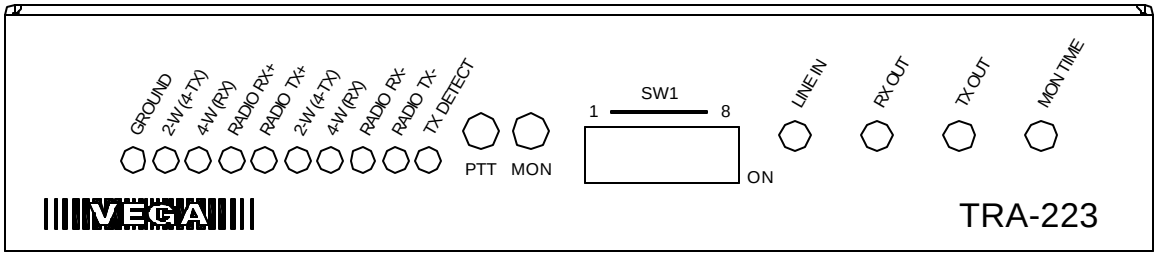
Connect the radio MON circuit to the MON relay contact terminals of the panel. This can only be done on the rear DB25 connector. Usually the common of each relay contact switch is grounded and the normally open contact connects to the MON input. It is also possible to ground the common of the relay internal to the unit by setting SW1 position 8 to "ON".

2.3.6 RX Squelch

The TRA223 has a RX squelch feature that allows gating of the receiver audio to the remote consoles when the COR input is pulled. The COR input is active High or Low, R103 installed is active LOW, R104 installed is active HIGH. Front panel Dip-switch SW1 position 4 controls the Squelch feature.

3 Level Settings and Adjustments

Once the unit is connected into the system, as it will be in general usage, the level potentiometers can be set.



3.1 Line Receive Level

It is a critical level as all of the tone decoding is based on this level. Connect an oscilloscope, RMS voltmeter, or dbm meter to the front Ground and Line RX audio test points on the front of the TRA223. Disable transmitter PTT circuit; adjust R92 (Line input) to Full clockwise, generate a continuous PTT command (no voice) with a external generator or a console. The panel should respond by energizing the PTT relay and lighting the PTT LED. Adjust R92 for –10dbm at Line RX test jack (TP3) reference to Ground (TP2).

3.2 Radio TX Level

Due to the large range of input requirements for the radios that can be connected to the TRA223, there is not a prescribed way of setting the Radio TX levels. Test points on the front panel of the TRA223 provide a location to measure the actual value being placed into the radio TX inputs. The Radio TX gain potentiometer R93 can be used to adjust these levels. Note that if the unit is placed into single ended mode that Radio TX+ should be measured with respect to ground. The user also has the option of placing SW1-6 into the "ON" position to decrease the output of the TX line by a factor of 10. The final adjustment should allow for undistorted audio to be transmitted for the full range of transmission levels at the desired deviation.

3.3 Line TX Level

The Line TX level is adjusted using R94 with the unit connected to the 600 Ohm line, connect an oscilloscope, RMS voltmeter with an output in dbm to the Line TX test points on the front of the TRA223 and adjust for 0dbm on the line.

3.4 Monitor Adjustments

Momentarily jumper E4 to E9 (ground), the monitor relay and LED should light for a timed period. Adjust R46 Monitor Timer for the desired monitor period, repeat as required. The Monitor relay can be configured to operate in one of three modes:

1. *Timed mode* (as shipped), provides the monitor function for a timed period (adjustable for up to 9 seconds) or until a PTT command is decoded
2. *Latch mode*, latches upon a monitor command until reset by PTT command.
3. *Refreshable Timed mode* provides the monitor function for a timed period upon any tone-burst command. Any command received during the timed period refreshes the timer for another full timer period.

Monitor Mode	SJ1	SJ2	SJ3
Timed	open	open	open
Latched	closed	open	open
Refreshed	open	closed	closed

4 Theory of Operation

4.1 Voice Circuits

In the "PTT ON" condition, the voice-signal audio path is from the line through J1 pins 4&5, EMI/RFI filtering circuits, T1 and to the 2-wire flag (2-wire), or through J1 pins 3&6, EMI/RFI filtering circuits, T2 and to the 4-wire flag (4-wire). 2 or 4-wire selection occurs via the front panel Dip-Switch SW1 and is routed to U14A as the 2/4 flag, U14A feeds U11D, R70, U15A, R93, U15B, U10B, C30, R79 and to TX-HI at both 6-pin and DB26 radio connectors. The PTT tone frequency (2175Hz) and audio from U11D is passed through U14B,C,D bandpass filter and is applied to U15A 180 out of phase, and at equal amplitude to the signal path through R70. This results in a deep notch at 2175Hz and effectively eliminates the PTT tone signal.

In the receive condition, the receiver audio path is from either the 6-pin and DB26 radio connectors through R86, R94 line output control, U15C, U17, U11C, R70, U15A, U11A, U13, T1, EMI/RFI Filter and to J1 pins 4&5 of the Line Connector. In the Full-duplex mode (SW1 position 3 "ON"), the path is from U15C through U17, U11B to U13.

4.2 2175Hz Decoder Circuits

The tone sequence generated at the remote-control console upon PTT switch operation typically is 2174Hz at +10dbm for 130ms (guard tone), followed by a function-tone frequency at 0dbm for 40ms, followed by 2175Hz at –20dbm (PTT holding tone) for the duration of PTT-switch operation.

Guard-tone and PTT-tone signal path is from the line through J1 pins 4&5, EMI/RFI filtering circuits, T1 and to the 2-wire flag (2-wire), or through J1 pins 3&6, EMI/RFI filtering circuits, T2 and to the 4-wire flag (4-wire). 2 or 4 wire selection occurs via the front panel Dip-Switch SW1 and is routed to U14A as the 2/4 flag, input level control R92, pre-filter stage U5D, first bandpass filter U5C,A,B and second bandpass filter U4C,B,A to the 2175Hz detector U1B.

4.3 Logic Circuits

CMOS logic is used in these circuits, when the tern "low" is used the DC voltage is near ground potential. When the term "high" is used, the voltage is near +10Vdc.

When the first 2175Hz tone (guard tone) is detected, TP1 goes low; the high to low transition at TP1 triggers the 240ms timer at U2A-5, causing U2A-6 and U10A-13 to go high. This enables the audio path from the 2/4 flag, U14A and U4D to be routed through U10A and passed to the monitor detector circuits U3A,B,C,D and U18A. The low generated by detection of the 2050Hz monitor burst at U18A is passed to U9F and U2B-12 the monitor relay control timer. The low to high transition at U8A-5 from U9F triggers a 50ms timer and a 62ms timer at U8B-12, U8B-9 goes low and if TP1 has gone low again due to the presence of the PTT tone the PTT relay K2 is energized from U6B through U9C. The high at U6B-4 during PTT decode disables the receive analog gates and enables the transmit analog gates through U7B and U7A. The U8B-9 and TP1 lows also hold U8B-14 low through U6C and U12A; this U8B-14 low disables timeout of the 62ms timer by holding capacitor C18 in a discharged condition.

When TP1 goes high from absence of PTT tone (the console operator has released the PTT switch), the timing capacitor C18 charges to the timeout voltage in 62ms the PTT relay is de-energized and audio analog gates reset. When the 62ms timer has timed out a new PTT command is required to reenergize the PTT relay; however, if a PTT tone returns before timeout of the 62ms timer, the PTT relay reenergizes. This minimizes PTT losses from high level noise transients or from microwave flutter.

4.4 Monitor Function Circuits

When a monitor-function command is sent, the guard-tone detector at TP1 triggers the 240ms timer U2A, which enables audio-signal passage through analog gate U10A. U4D and U3A are both high gain stages and therefore the function tone signal at U3A is a rail-to-rail square wave. The square wave function tone signal from U3A-1 is applied to the monitor bandpass filter U3B,C,D through R32. Monitor-bandpass-filter output is rectified by CR3 and after filtering is applied to comparator op-amp U18A-3. U18A-1 goes high triggering the 50ms timer at U8A-5 through U9F, upon 50ms timer timeout the 62ms timer is triggered, but since TP1 is high due to the absence of PTT tone the PTT relay is not energized.

The low-to-high transition at U18A-1 triggers the monitor timer U2B through R31; U2B-10 goes high and energizes the monitor relay K1 through U9A for a timed period. If a PTT command is decoded before timeout of the monitor timer, the high at U6B-4 resets the monitor timer at U2B-13 through R47 and U6D

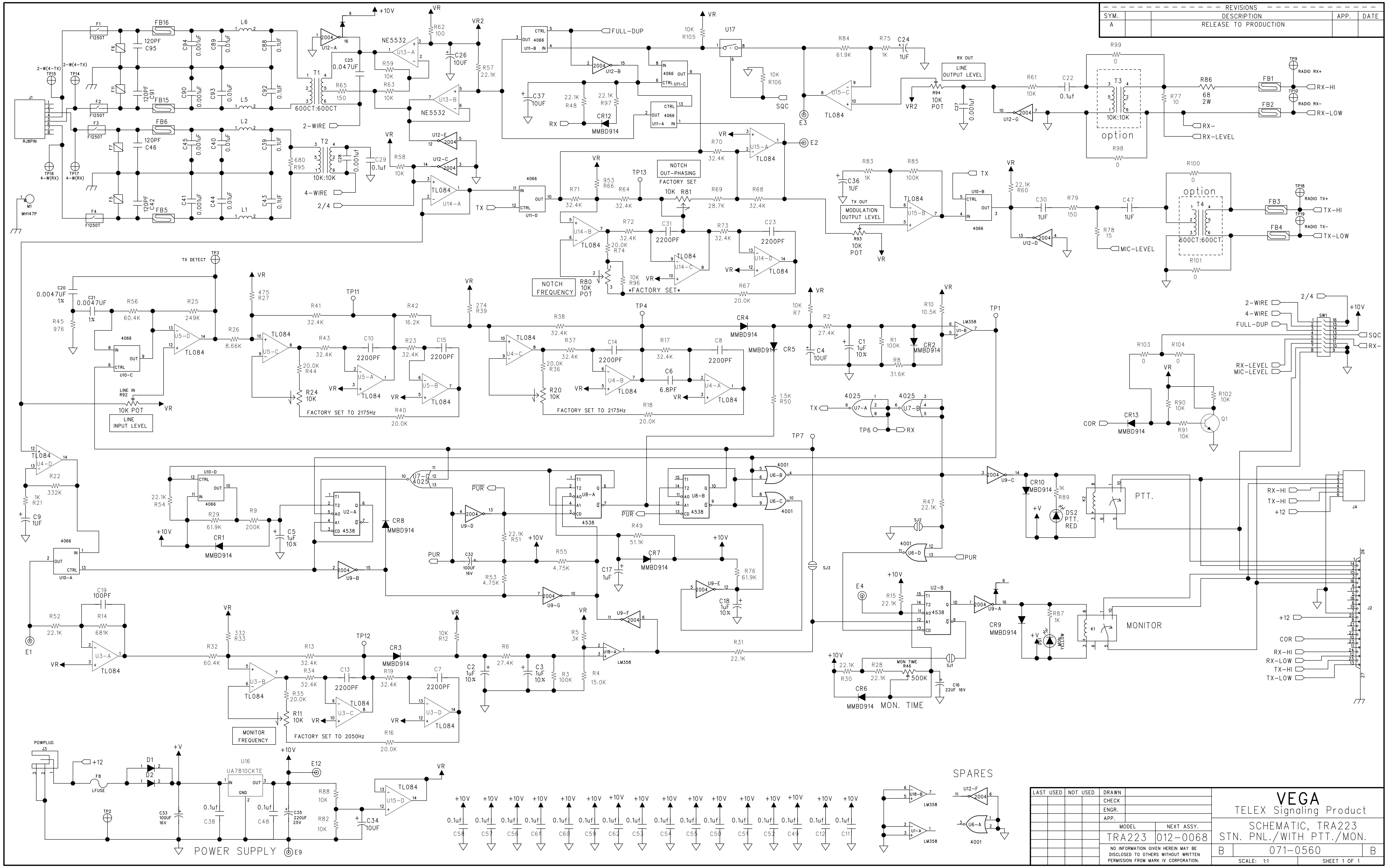
In the latched mode of operation, SJ1 is closed and when U2B is triggered, U2B-7 goes low, effectively short-circuiting the C16 charging path through R30, R28 and R46. Upon a PTT command, U6B-4 goes high and resets the monitor latch at U2B through R47 and U6D, U2B-10 goes low and monitor relay K1 is de-energized.

In the refresh-monitor-timed mode of operation with SJ1 open and SJ2 and SJ3 closed, upon the decode of any valid command, TP7 goes high, triggering the monitor timer at U2B-12 through SJ3. A PTT command will not reset the timer in this mode, because the reset path is short-circuited by SJ2.

4.5 RX Squelch Function Circuits

The TRA223 offers the ability to gate radio RX audio by using COR or other control logic; pin-10 of J2 the DB25 connector is the input for this feature, control logic can be either logic Hi or Low. The RX audio is gated by U17 with control coming from J2-10 through CR13, R103 (R104 removed) and SW1-4 for logic low, control for logic high signals come through CR13, Q1, R104 (R103 removed) and SW1-4.

5 Schematics and Parts Lists



REVISIONS				
SYM.		DESCRIPTION	APP.	DATE
A		RELEASE TO PRODUCTION		

LAST USED	NOT USED	DRAWN	
		CHECK	
		ENGR.	
		APP.	
		MODEL	NEXT ASSY.
		TRA223	012-0068

NO INFORMATION GIVEN HEREIN MAY BE DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION FROM MARK IV CORPORATION.

VEGA
TELEX Signaling Product

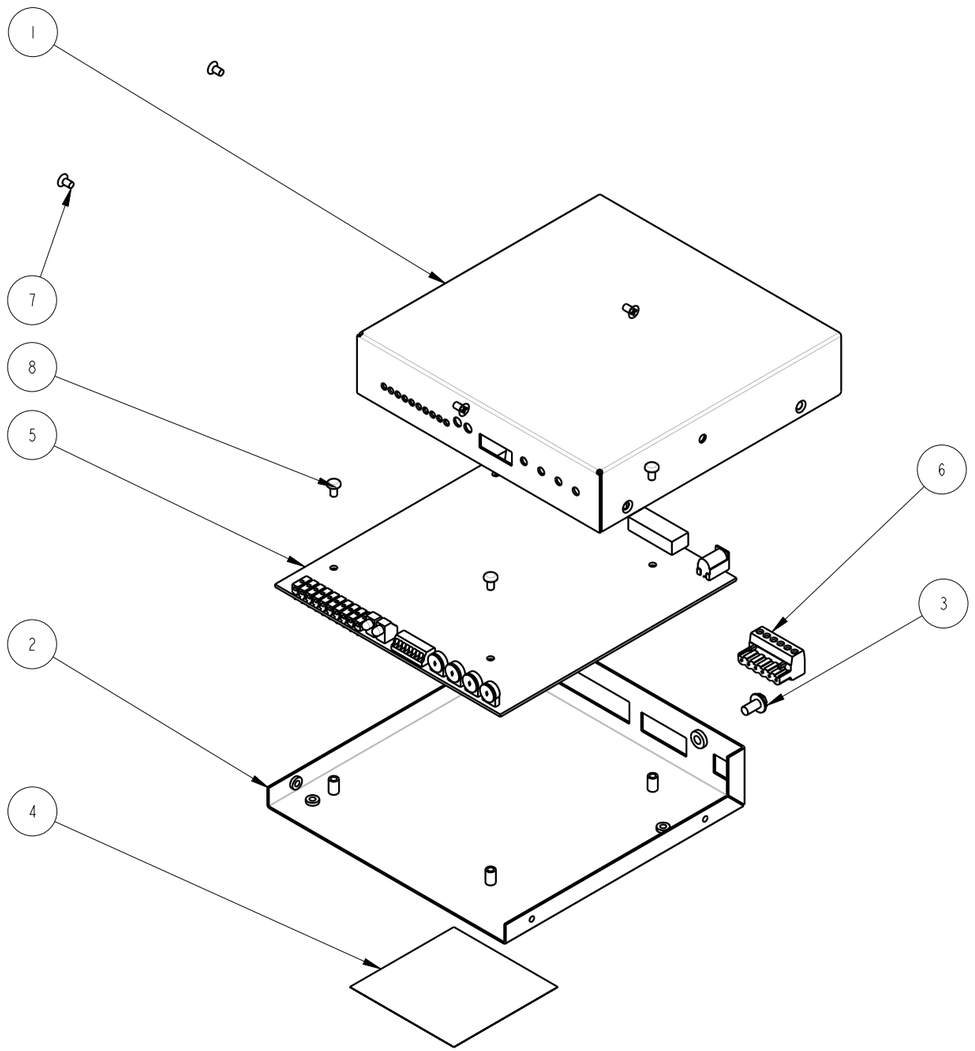
SCHEMATIC, TRA223
STN. PNL./WITH PTT./MON.

B | 071-0560 | B

SCALE: 1:1
SHEET 1 OF 1

879610

REVISIONS				
CHG NO	LTR	DESCRIPTION	DATE	APPD
-	A	RELEASE FOR PRODUCTION	5/17/02	



4	SCREW, 6-32 X 1/4 PH	8	5280022	
4	SCREW, 6-32 X 1/4 FH	7	5270269	
1	6 POLE TERMINAL STRIP PLUG CONNECTOR	6	2862055	
1	TRA-223 PC BOARD ASSEMBLY	5	879611	
1	C-6200 PRODUCT LABEL	4	803568	
1	SCREW, 10-32 X 3/8 GREEN HH	3	500124	
1	TRA-223 BOTTOM COVER	2	378335	
1	TRA-223 TOP COVER	1	378334	

UNSPECIFIED LIMITS OF TOLERANCE
DECIMAL: FRACTION:
.X = ±.030 IN MACHINED
.XX = ±.010 IN FINISH 64
.XXX = ±.005 IN

STRAIGHTNESS AND/OR FLATNESS .005 IN./1 IN.
ANGLES ± 1°, BENDS ±2°

CONCENTRICITY

UNMARKED ANGLES, BENDS AND INTERSECTIONS 90°

THREADS - EXT. CLASS 2A
INT. CLASS 2B

DATE	5/17/02
DR BY	S K LLOYD
CHK BY	PBH
APPR'D	PBH
PROD	CLS

MAT'L

SEE TABLE

Telex®
TELEX COMMUNICATIONS INC.
Lincoln Nebraska U.S.A.

TITLE
TRA-223 ASSEMBLY

SIZE	CODE IDENT	DWG. No.
C	57010	879610
SCALE: N/A		SHEET: 1 OF 1

Telex Communications INC.

Lincoln, Nebraska USA

PART NO: **879611**

APPROVALS:	DR BY: SBC DATE: 06/26/2002	CHKD BY: SBC	APPD BY:	PROD:	REV LEVEL:	C

TITLE: **PCB ASSY, TRA-223**

REVISIONS

REV	DESCRIPTION	ECO NO	DATE	APPD
1	PROTOTYPE		6/26/02	
2	ITEM 70 TO QTY 1 - REMOVED T4		08/08/02	
	ITEM 71 TO QTY 1 - REMOVED T3			
A	ADDED ITEM 86 - 50K POT - PART # 1300779	08-93-02	08/28/02	
	ITEM 48 CHANGED QTY FROM 4 TO 3			
	ITEM 84 IS SCHEMATIC 770778			
B	ITEM 86 CHANGED PART NUMBER TO 1300780	09-11-02	09/05/02	
C	ITEM 28 TO QTY 2 ITEM 1 TO QTY 9	04-07-03	04/02/03	PBH

Telex Communications INC.

Lincoln, Nebraska USA

PART NO: **879611**

APPROVALS:	DR BY: SBC DATE: 06/26/2002	CHKD BY:	APPD BY:	PROD:	REV LEVEL:	**C**

TITLE: **PCB ASSY, TRA-223**

ITEM	NEW	QTY	TYPE	DESCRIPTION	PART NO.	DESIGNATOR
1		9	CAP	1UF 16V TANT A	72343719	C1 C2 C3 C5 C17 C18 C24 C36 C9
2		1	CAP	22UF 16V ELEC. SMT	102884313	C16
3		1	CAP	100PF 0805	72341125	C19
4		2	CAP	0.0047UF 0805	102881146	C20 C21
5		24	CAP	0.1UF 0805	102881186	C22 C12 C29 C11 C38 C48 C49 C50 C51 C52 C53 C54 C55 C56 C57 C58 C59 C60 C61 C62 C39 C43 C88 C92
6		1	CAP	0.047UF 0805	102881185	C25
7		6	CAP	0.001UF 0805	102881138	C27 C28 C41 C45 C90 C94
8		2	CAP	100UF 16V ELECT. SMT	102884416	C32 C33
9		1	CAP	220UF 25V ELEC. SMT	102884417	C35
10		4	CAP	10UF 16V TANT B	102877065	C4 C26 C34 C37
11		4	CAP	0.01UF 0805	102881150	C40 C44 C89 C93
12		4	CAP	120PF 0805	72341126	C42 C46 C91 C95
13		2	CAP	1UF 0805	102881875	C47 C30
14		1	CAP	6.8PF 0805	72341111	C6
15		8	CAP	2200PF 0805	72341141	C7 C8 C10 C13 C14 C15 C23 C31
16		12	DIODE	MMBD914 SOT-23	58711000	CR1 CR2 CR3 CR4 CR5 CR6 CR7 CR8 CR9 CR10 CR12 CR13
17		2	DIODE	4004 1A DIODE SMT	16016481SMT	D1 D2
18		1	YEL	RT ANG. LED YEL	1610631	DS1
19		1	LED	RED RT ANGEL	1610630	DS2
20		4	FUSE	F1250T	710109	F1 F2 F3 F4
21		4	THYRISTOR	TVB170SA	710106	F5 F6 F7 F11
22		1	FUSE	SMT FUSE WITH HOLDER	710105	F8
23		8	FERRITE	FERRITE 0805	723511	FB1 FB2 FB3 FB4 FB5 FB6 FB15 FB16
24		1	CONN	RJ-45 8 PIN RECPT.	2862013	J1
25		1	CONN	RT ANGLE DB25-TH	640136	J2
26		1	CONN	DC PWR JACK 2.5MM	59697000	J3
27		1	CONN	6 PIN RT ANGLE	2862056	J4
28		2	RELAY	SPDT 12V SMT	730142	K1 K2
29		4	INDUCTOR,	820UH 1812	723510	L1 L2 L5 L6
30		1	TRANSISTOR	MMBT3904 SOT-23	54671200	Q1
31		3	RES	100K 0805	102515400	R1 R3 R85
32		1	RES	10.5K 0805	102515302	R10
33		4	RES VAR	10K LOG VADJ	1300639	R11 R20 R24 R81
34		14	RES	10K 0805	102515300	R12 R58 R59 R61 R63 R82 R7 R88 R90 R91 R96 R102 R105 R106
35		1	RES	681K 0805	102515480	R14
36		1	RES	332K 0805	102515450	R22
37		1	RES	249K 0805	102515438	R25
38		1	RES	8.66K 0805	102515290	R26
39		1	RES	475 OHMS 0805	102515165	R27
40		12	RES	22.1K 0805	102515333	R28 R30 R31 R47 R48 R51 R52 R54 R57 R60 R15 R97
41		1	RES	332 OHMS 0805	102515150	R33
42		15	RES	32.4K 0805	102515349	R34 R43 R13 R37 R38 R41 R64 R68 R70 R71 R72 R73 R17 R19 R23

Telex Communications INC.

Lincoln, Nebraska USA

PART NO: **879611**

APPROVALS:	DR BY: SBC DATE: 06/26/2002	CHKD BY:	APPD BY:	PROD:	REV LEVEL:	C

TITLE: **PCB ASSY, TRA-223**

ITEM	NEW	QTY	TYPE	DESCRIPTION	PART NO.	DESIGNATOR
43		1	RES	274 OHMS 0805	102515142	R39
44		1	RES	15.0K 0805	102515317	R4
45		8	RES	20K 0805	102515329	R40 R44 R35 R36 R16 R67 R74 R18
46		1	RES	16.2K 0805	102515320	R42
47		1	RES	976 OHMS 0805	102515195	R45
48		3	POT	10K HORIZ. ADJ. T/H	1300778	R92 R93 R94
49		1	RES	51.1K 0805	102515368	R49
50		1	RES	3K 0805	102515246	R5
51		1	RES	1.5K 0805	102515217	R50
52		2	RES	4.75K 0805	102515265	R55 R53
53		2	RES	60.4K 0805	102515375	R56 R32
54		2	RES	27.4K 0805	102515342	R6 R2
55		1	RES	100 OHMS 0805	102515100	R62
56		2	RES	150 OHMS 0805	102515117	R65 R79
57		1	RES	953 OHMS 0805	102515194	R66
58		1	RES	28.7K 0805	102515344	R69
59		5	RES	1K 0805	102515200	R75 R83 R87 R89 R21
60		3	RES	61.9K 0805	102515376	R76 R84 R29
61		1	RES	10 OHMS 2010	102405100	R77
62		1	RES	15 OHMS 0805	102515017	R78
63		1	RES	31.6K 0805	102515348	R8
64		1	POT	10K 15 TURN VADJ	1300673	R80
65		1	RES	68 OHMS 2 WATT LEADED	1311853	R86
66		1	RES	200K 0805	102515429	R9
67		1	RES	680 OHMS 0805	102515180	R95
68		6	RES	0 OHMS 0805	102506000	R98 R99 R100 R101 R103 R104
69		1	SWITCH	PIANO DIP 8 POS	57590004	SW1
70		1	XFMR	600CT:600CT	3180259	T1
71		1	XFMR	10KCT:10KCT	3180246	T2
72		10	TEST POINT	TP/PROBE	2861965	TP2 TP3 TP9 TP10 TP14 TP15 TP16 TP17 TP18 TP19
73		2	IC	LM358AM	53227104	U1 U18
74		2	IC	4066B SO14	53266108	U10 U11
75		1	IC	NE5532 DUAL OP AMP	760268	U13
76		1	IC	UA7810CKTER	760275	U16
77		1	IC	DG417DY SO8	760332	U17
78		2	IC	CD4538BCM SO16	53266112	U2 U8
79		5	IC	TL084CD QUAD OP AMP	4300047	U3 U4 U5 U14 U15
80		1	IC	CD4001BD	53266115	U6
81		1	IC	CD4025BM	4300106	U7
82		2	IC	ULN2004AD SO16	16030008SMS	U9 U12
83		1	PCB	PRINTED CIRCUIT BOARD	750623	
84		0	REFERENCE	SCHEMATIC	770778	
85		A/R	PASTE	SOLDERPASTE	BE738	
86		1	POT	500K LOG	1300780	R46

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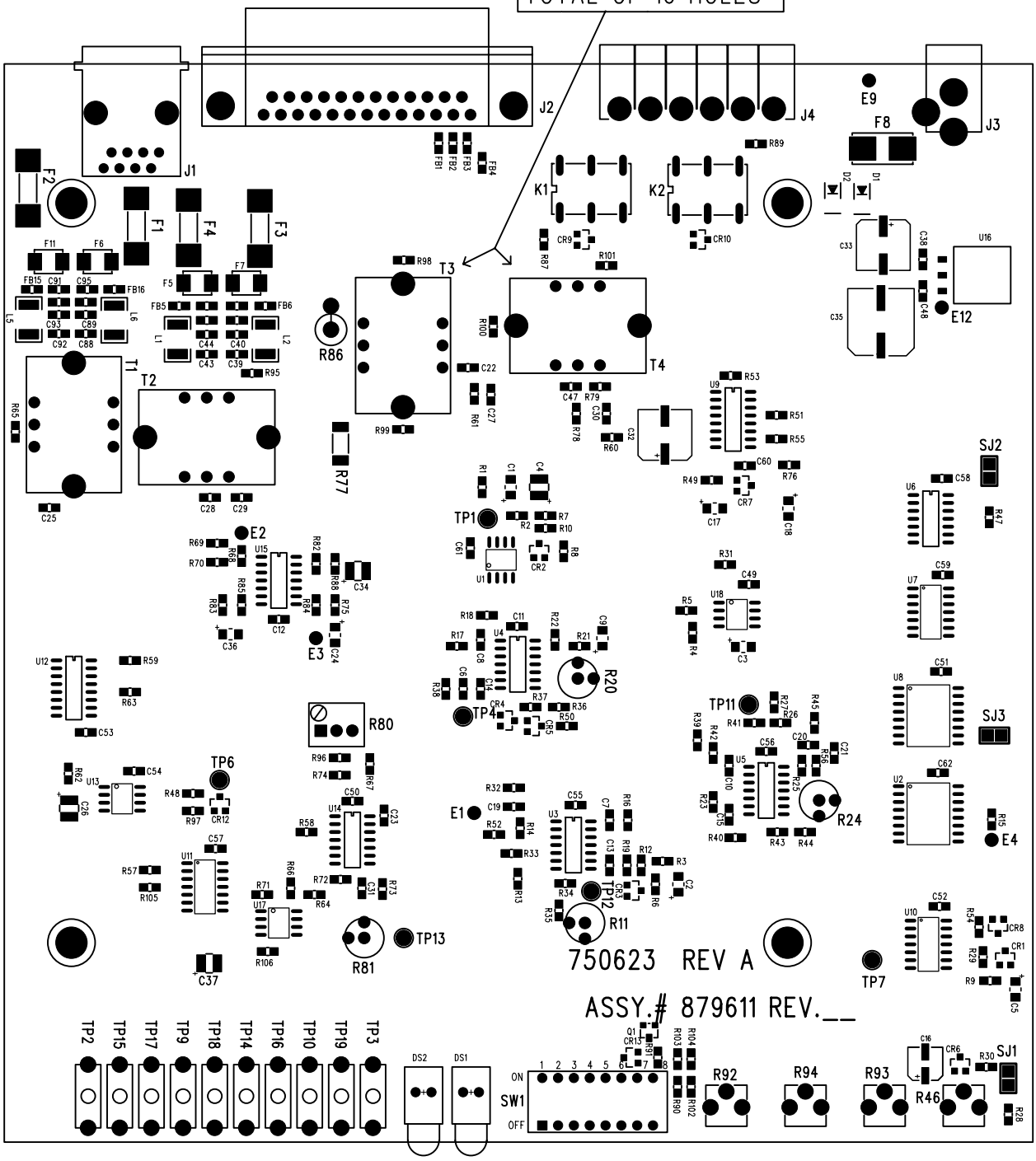
APPROVALS	DR BY: SBC DATE: 06/26/02	CHKD BY:	APPD BY:	PROD:	REV LEVEL:	C
TITLE:	PCB ASSY, TRA223					

750623 REV. A
TOP SIDE

NOTE: PLACE CHEMASK IN ALL HOLES FOR T3 AND T4
TOTAL OF 16 HOLES



TOP ASSEMBLY

LN, BE

750623A.pcb – Wed Apr 02 10:43:08 2003

6 Pin out and Jumper Settings Quick Reference Table

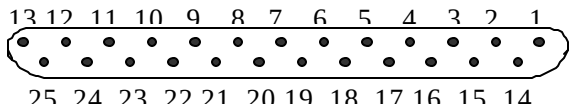
6.1 Adjustments

Line Input Level (R92)
Line Output Level (R93)
Radio TX Modulation (R93)
Monitor Timer (R46)

6.2 SW1 Dip-switch Positions

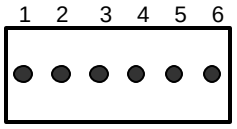
1. 2-Wire “ON” / 4-Wire “OFF”
2. 4-Wire “ON” / 2-Wire “OFF”
3. Full-Duplex
4. Squelch
5. Radio RX Level “ON” = Speaker / “OFF” = High-Impendence
6. Radio TX Level “ON” = Low level / “OFF” = High level
7. Ground on PTT relay common
8. Ground on Monitor relay common

6.3 Radio Connections



DB25 Rear Panel Connector

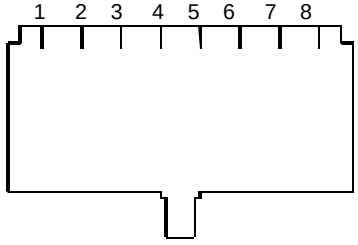
1-PTT NC	20-+POWER
14-PTT NO	8-
2-PTT COM	21-
15-MON NC	9-
3-MON NO	22-
16-MON COM	10-SQUELCH
4-	23-
17-	11-
5-	24-RX+
18-	12-RX-
6-	25-TX+
19-	13-TX-
7-GROUND	



1) Ground 2) PTT-N.O.
3) MON-N.O. 4) Radio RX+
5) Radio TX+ 6) Power +12

6 Pin Rear Connector Pinout

6.4 Line Connections



1)
2)
3) RX +
4) TX +/ (RX + 2W)
5) TX -/ (RX - 2W)
6) RX -
7)
8)

Connector View

6.5 DB25 Cable Color codes

DB25 Pin		Signal	Color	PIN ON RADIO CONNECTOR
1	=	PTT N.C.	Brown	
2	=	PTT COM	Red	
3	=	MON N.O.	Orange	
4	=		Pink	
5	=		Yellow	
6	=		Green	
7	=	GROUND	Lt. Green	
8	=		Blue	
9	=		Violet	
10	=		Gray	
11	=		White	
12	=	RX-	Black	
13	=	TX-	Brown/WHT	
14	=	PTT N.O.	Red/WHT	
15	=	MON N.C.	Red/BLK	
16	=	MON.COM	Orange/WHT	
17	=		Orange/BLK	
18	=		Pink/BLK	
19	=		Yellow/BLK	
20	=	+V	Green/WHT	
21	=		Green/BLK	
22	=		Blue/WHT	
23	=		Violet/WHT	
24	=	RX+	Gray/BLK	
25	=	TX+	Black/WHT	
Shell	=		Shield	

7 Warranty, Service, Repair, and Comments

Important! Be sure the exact return address and a description of the problem or work to be done are enclosed with your equipment.

Warranty (Limited)

All Telex Communications, Vega signaling products are guaranteed against malfunction due to defects in materials and workmanship for three years, beginning at the date of original purchase. If such a malfunction occurs, the product will be repaired or replaced (at our option) without charge during the three-year period, if delivered to the Telex factory. Warranty does not extend to damage due to improper repairs, finish or appearance items, or malfunction due to abuse or operation under other than the specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives the customer specific legal rights, and there may be other rights which vary from state to state.

Factory Service Center

TELEX Communications, Inc.
Vega Signaling Products
8601 East Cornhusker Highway, Lincoln, Nebraska, 68507
Phone: (402) 465-7026 / (800) 752-7560 Fax: (402) 467-3279
E-mail: vega@telex.com, Web: www.vega-signaling.com

Claims

No liability will be accepted for damages directly or indirectly arising from the use of our materials or from any other causes. Our liability shall be expressly limited to replacement or repair of defective materials.

Suggestions or Comments

We'd appreciate your input. Please send us your suggestions or comments concerning this manual, by fax (402-467-3279) or e-mail them to: **vega@telex.com**

Visit our web site at **www.vega-signaling.com**

8 TRA223 Specifications

Operating Temperature Range: 0 to 55°C for full specifications

Power Requirements: +12 to +16 Vdc, semi-regulated, 500ma.

Relay Contact Ratings: 1A at 125Vac

Radio Interface: ±45 Vdc withstand rating

Line to TX Output Gain: -26dB to +16dB into mic input load or –10 to +22db into 600Ω load

Radio Output Level: -60 to –18 dbm for microphone level or -40 to +2dBm into 600Ω load, adjustable

Radio Output Impedance: 22Ω TX ON, typical; 22KΩ TX OFF, typical, 600Ω for balanced mode (TO-23 option)

Radio Input Level: 100mVrms to 16Vrms, adjustable

Audio Distortion: 2% THD maximum

Frequency Response: ±1.5 dB, 300 to 3000 Hz, except at 2175 Hz notch frequency

Line Output Level: -30 to +12dBm, adjustable

Line Input/Output Impedance: 600Ω nominal

Sensitivity: Ultimate sensitivity, -60dBm PTT tone

MON timer: 1 to 10 seconds, adjustable

PTT Tone Detect Bandwidth: ± 50 Hz around 2175Hz, with sensitivity set 12dB above threshold of detection

Notch Frequency Rejection: 45 dB minimum

Notch Frequency Bandwidth: 70 Hz at -3dB points. ±1Hz at –40dB.

Dimensions: 7” Wide, 7” Deep, by 1.5” High

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