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"I walk these streets with my mother every Sabbath, my mother who went to Auschwitz in 1944. My mother went straight to the gas chamber."

––– Quote from New York Assemblyman Dov Hikind after an alleged "swastika" was spray painted in his neighborhood. Dov Hikind was born on June 30, 1950.

(dailymail.co.uk/news/article–2060677)
(en.wikipedia.org/wiki/Dov_Hikind)

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FEATURE DOCUMENT

2-WIRE TOLL/TANDEM OPERATION FEATURE

2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

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NOTICE
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SECTION 231-090-372

FEATURE DEFINITION AND DESCRIPTION

1. DEFINITION/INTRODUCTION

DEFINITION

1.01 The 2-wire toll/tandem feature provides the ESS in a 2-wire switching environment with the ability to serve as a tandem (non-DDD) and toll switching center.

INTRODUCTION

1.02 This feature document provides a general description of the toll/tandem capabilities of 2-wire No. 1 and No. 1A ESS offices. References are made to other documents for most of the detailed information. The intent is to tie together the various 2-wire toll/tandem capabilities in one document.

1.03 The ESS unlike other switching systems (eg, crossbar) can be used for any combination of local, tandem, and toll switching functions. This flexibility makes the ESS particularly desirable for installations in which a relatively small amount of toll switching is to be done along with local switching; because in these instances, there is no need to buy a separate toll switcher.

1.04 The 2-wire ESS also has advantages as a moderate-size, pure toll switcher [eg, it is less expensive than a No. 4A crossbar office with similar capacity and it is capable of providing centralized automatic message accounting (CAMA) more easily].

2. USER PERSPECTIVE

TELEPHONE COMPANY

A. General

2.01 Various features are needed for performing the toll/tandem functions efficiently. These features are discussed in the following paragraphs.

B. Operator Tandem

2.02 This feature provides the 2-wire No. 1/1A ESS with the ability to recognize dialing patterns and to route traffic from incoming secondary intertoll, intertoll, and DDD access trunks. These dialing patterns include operator codes, test codes, terminating toll center codes, and all other address information associated with a combined local/toll office. See reference A(2) in Part 19.

C. Toll Operator Signaling and Compatibility With TSPS Residual Traffic (TORT) Feature

2.03 The TORT feature provides the ability to receive and transmit operator control signals such as ringback and ring forward when the No. 1/1A ESS office is acting as a toll office or as a combined local/toll office. If the office interfaces with a Traffic Service Position System (TSPS), certain operator-assisted calls require switchboard handling and are passed to a toll switchboard operator by a TSPS operator. The ability of the No. 1/1A ESS office to receive special signaling (double ring-forward disconnect) from the TSPS switcher is required. See reference B(5) in Part 19 for details of the TORT feature.

D. No Line Link Network (NOLLN) (No. 1 ESS Only)

2.04 This feature is necessary for the No. 1 ESS to function as a toll/tandem machine without having a line link network (LLN). The following functions are affected by the NOLLN feature.

- Network Access to the No-Test Vertical (NTV) Circuit of Junctor Switch Frames: In offices having an LLN, this access is provided via lines. The NOLLN feature provides the capability to perform NTV functions via trunks.

- Manual Trunk Testing From the Trunk and Line Test Panel (TLTP) or the Supplementary Trunk Test Panel (STTP): In offices having an LLN, trunk test requests made from the TLTP or STTP are transmitted to the central control over the master test line. The NOLLN feature provides the capability to transmit these requests over the master test trunk.

- Monitoring the Overall Sanity of the ESS: In offices having an LLN, this monitoring is done by generating line originations and determining whether dial tone is returned. The NOLLN feature, along with the receiver attachment delay report (RADR) feature, provides the capability to perform this function in a NOLLN office. See reference

B(8) in Part 19 for details of the RADR feature.

- Operation of the Remote Office Test Line (ROTL): While the operation of the ROTL does not require an LLN, it does require that the ROTL be assigned a directory number (DN) which may be reached over the DDD network and that the ROTL have access to the DDD network. An office with no LLN, and thus no subscriber lines, may not fulfill both of these requirements. In these applications, three foreign exchange trunks to a nearby class 5 office must be provided. See reference A(1) in Part 19 for details of the NOLLN feature.

E. Through Balance Test Facilities (TBTF) Feature

2.05 This feature provides a machine aid to simplify the balancing of the hybrids in the 4-wire intertoll trunk circuits. See reference B(1) in Part 19.

F. 2048 Junctor Trunk Link Network

2.06 The 2048 junctor trunk link network is a trunk switching network which terminates 2048 junctors. It provides an increase in both terminal and network traffic capacities, and it is intended for use in large toll/tandem ESS offices. See reference A(1) in Part 19.

G. Fast Repeat of Answer Supervision (FANS) Feature

2.07 The FANS feature reduces the time required to pass answer supervision through an ESS office. This reduces the probability of clipping of the called customer's initial response and reduces the possible distortion of the gateway wink signal on international direct distance dialing (IDDD) calls. See reference B(3) in Part 19.

H. Test Lines

2.08 Various test lines provide test facilities for toll trunks. These test lines are briefly described below.

2.09 The code 100 test line provides a test termination for one-way transmission loss and noise measurements. See reference A(4) in Part 19.

2.10 The code 101 test line feature provides a communication and test line to a testboard or test position which can be reached over any trunks incoming to the switching system served by the test position. See reference A(3) in Part 19.

2.11 The code 102 test line provides a test termination at the far end of a trunk for one-way transmission measurements. See reference A(5) in Part 19.

2.12 The code 103 test line feature provides for overall tests of the supervisory and signaling features of intertoll trunks. See reference A(6) in Part 19.

2.13 The code 104 test line feature provides a termination in an ESS central office for test calls directed to the transmission measuring and noise checking equipment originated from a distant testboard or automatic test circuit. It also transmits either a favorable or an unfavorable noise report to the originating end. See reference A(7) in Part 19.

2.14 The code 105 test line feature provides central office termination for test calls directed to a responder of the Automatic Transmission Measuring System (ATMS). The code 105 test line, in conjunction with an ATMS responder, provides for automatic 2-way loss and noise measurements of telephone trunks and lines requiring transmission testing. In addition to providing central office termination to an ATMS responder, a group of 105 test lines serves as a parking chain for 105-type test calls awaiting connection to the ATMS responder. See reference A(8) in Part 19.

2.15 The code 108 test line (echo suppressor test termination circuit) provides the far end loop-around termination for in-service testing of echo suppressors, and it is to be used in conjunction with the 58-type echo suppressor measuring system. See reference A(9) in Part 19.

I. Automatic Selection of Transmission Test Tone Level (TP02) Feature

2.16 The TP02 feature enables incoming trunks to be connected to the transmission test line (type 100, 102, 104, or 105) supplying a milliwatt test tone at 0 dBm (TP0) or -2 dBm (TP2) at the network terminals of the test line. The TP02

feature is covered in the appropriate (code 101, 102, 104, and 105) test line documents. See references A(3), A(5), A(7), and A(8) in Part 19.

J. Combined Operator Office Trunk (COOT) Feature

2.17 The COOT feature provides a single trunk facility for completion of calls from a toll switchboard to a step-by-step community dial office (CDO), from the CDO to the dial switchboard, and from the No. 1/1A ESS to the CDO. It is intended for use when a No. 1/1A ESS office is arranged for toll operation in conjunction with small step-by-step CDOs in a class 4 toll or local/toll environment. See reference B(9) in Part 19.

K. Centralized Automatic Message Accounting (CAMA) Feature

2.18 The CAMA feature enables the No. 1/1A ESS to provide toll billing for class 5 central offices on an automatic number identification or operator number identification basis. See reference B(8) in Part 19.

L. Network Management Feature

2.19 The network management feature provides the capabilities to improve total network processing by selectively limiting traffic destined for congested offices or areas. The capabilities include:

(a) Code blocking

(b) Trunk group controls [manual and automatic via receipt of dynamic overload control (DOC) signals]

(c) Generation of DOC signals

(d) Providing an interface for a remote display of office and network discrete indicators.

See references A(10) and B(9) in Part 19.

M. Incoming Trunk Service Observing (ITSO) Feature

2.20 The ITSO feature provides the telephone company the ability to monitor incoming trunk traffic that completes to another trunk or completes to a terminating line. See reference B(12) in Part 19.

3. SYSTEM PERSPECTIVE

SOFTWARE DATA STRUCTURES

A. General

3.01 For details of software data structures for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

B. Trunks

3.02 See Fig. 1 for trunk class code expansions for various non-CAMA toll/tandem trunks. For other trunk translations, see references A(2) and B(8) in Part 19.

HARDWARE

3.03 For details of hardware requirements for the various toll/tandem features, see references A(1) through A(10) and B(1) through B(11) in Part 19.

FEATURE OPERATION

3.04 For details of feature operation for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 The toll/tandem features are provided on a per-central office basis.

5. LIMITATIONS AND RESTRICTIONS

5.01 For details of limitations and restrictions for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

6. COMPATIBILITY AND INTERACTIONS

6.01 For details of compatibility and interactions for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

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23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	0	0	SDS	WDD	FE	BAT	*3	COMP		*1	OP			*2	SUPV = 1				0	TU = 0	
*	0 —																						0
*	0 —																						0
*	FA	0 —								0	FR	FT	TGT	PAD = 2		0	CPI = 2						

*1 - TSP/XT *2 - ICT = 1 *3 - SG/FHP

A. OUTGOING TOLL CONNECTING 2-WIRE, RB, WINK OR DELAY DIAL, DP, MF, RP, PCI, TT, OR NO PULSING; SD1A165-02 OR -05

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	0 —												0	*1	SUPV = 1				0	TU = 1	
*	COFN	HFNOC					NOCTN					0	QDR				SDS		RTG		INPUL		
*	0 —																						0
*	0 —								0	FR	FT	TGT	PAD = 2		0	CPI = 4							

*1 - ICT = 1

B. INCOMING TOLL CONNECTING 2-WIRE, RB, WINK OR DELAY DIAL, DP, MF, RP, PCI, TT, OR NO PULSING; SD1A166-02 OR -05

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	0	0	1	1	FE	0	*1	COMP		0	OP			1	SUPV = 3				0	TU = 2	
*	0	HFNOC					NOCTN					0	QDR				SDS = 1		RTG		INPUL = 2		
*	0 —																						0
*	FA	0 —								0	FR	FT	TGT	PAD = 2		0	CPI = 49						

*1 - SG/FHP

C. 2-WAY TOLL CONNECTING 2-WIRE, E&M, WINK, DP; SD1A163-02 OR -05

Fig. 1—Expanded Trunk Class Code Translation Words for Non-CAMA 2-Wire Toll/Tandem Use (Sheet 1 of 6)

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	0	0	1	0	0	0	BAT	*1	COMP		0	OP = 2			1	SUPV = 3				0	TU = 2	
*	0 — 0																						
*	0 — 0																						
*	1	0 — 0											PAD = 2		0	CPI = 49							

*1 - SG/FHP

D. 2-WAY COMBINED OPERATOR OFFICE TRUNK, 2-WIRE, E&M, NO START DIAL SIGNAL, DP; SD1A163-02

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	0 — 0													1	SUPV = 1				0	TU = 1	
*	COFN	0 — 0					NOCTN					0	QDR				SDS = 0		RTG = 0		INPUL = 2		
*	0 — 0																						
*	0 — 0												PAD = 2		0	CPI = 3							

E. INCOMING BYLINK TOLL CONNECTING, 2-WIRE, RB, NO START DIAL SIGNAL, DP; SD1A220-01 OR -05

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	*1	0	SDS	WDD	FE	0 — 0					OP			1	SUPV = 3				*2	TU = 2	
*	COFN	HFNOC					NOCTN					0	QDR				SDS		RTG		INPUL		
*	0 — 0												NT	CR	TS	*3	0 — 0				*4	WINK	OT
*	FA	0 — 0			*5	0	0	AIC	FR	FT	TGT		PAD = 2		OT	CPI = 7							

*1 - SDSTIM *2 - WORD 3 *3 - RECCOM *4 - INBND
*5 - OGT-ESB

F. 2-WAY TOLL CONNECTING, 2-WIRE, E&M, WINK OR DELAY DIAL, MF OR NO PULSING; SD1A252-01 OR -05

Fig. 1—Expanded Trunk Class Code Translation Words for Non-CAMA 2-Wire Toll/Tandem Use (Sheet 2 of 6)

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23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	*1	0	SDS	WDD	FE	0	*2	COMP		0	OP			1	SUPV = 4				0	TU = 2	
*	COFN	HFNOC					NOCTN					0	QDR				SDS		RTG		INPUL		
*	0 — 0																						
*	1	0 — 0										FR	FT	TGT	PAD = 2		0	CPI = 24					

*1 - SDSTIM *2 - SG/FHP

G. 2-WAY TOLL CONNECTING, 2-WIRE, HI-LO OUT, RB IN, WINK OR DELAY DIAL, MF, DP, TT/DP OR NO PULSING; SD1A264-01

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	0 — 0													1	SUPV = 1				0	TU = 1	
*	COFN	0 — 0					NOCTN					0	QDR				SDS = 1		RTG		INPUL		
*	0 — 0																						
*	0 — 0											FR	FT	0	PAD = 2		0	CPI = 51					

H. INCOMING TOLL CONNECTING, 2-WIRE, RB, DELAY DIAL, MF, DP, TT/DP OR NO PULSING; SD1A266-02 OR -05

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	0	1	SDS	WDD	FE	0	*1	COMP		*2	OP			1	SUPV = 4				*3	TU = 0	
*	0 — 0																						
*	0 — 0																				*4	WINK	OT
*	0 — 0									AIC	0	0	0	PAD = 2		OT	CPI = 15						

*1 - SG/FHP *2 - TSP/XT *3 - WORD 3 *4 - INBND

I. OUTGOING TOLL CONNECTING, 2-WIRE, TO CROSSBAR TANDEM OR TSPS NO. 1, HI-LO OUT, RB IN, WINK OR DELAY DIAL, MF OR DP, SD1A203-01 OR -05

Fig. 1—Expanded Trunk Class Code Translation Words for Non-CAMA 2-Wire Toll/Tandem Use (Sheet 3 of 6)

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0 —														0	1	SUPV = 1				0	TU = 1	
*	0 —														0	SDS = 2			0	0	INPUL = 1		
*	0 —																				0		
*	0 —												0	PAD = 2		0	CPI = 38						

J. INCOMING TSPS OPERATOR, 2-WIRE, RB, WINK, MF; SD1A321-01 OR -05

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	*1	0	SDS	WDD	0 —					0	OP			1	SUPV = 3				*2	TU = 2	
*	COFN	HFNOC					NOCTN					0	QDR			SDS		RTG			INPUL		
*	TONE		0	TTL	0 —							0	*3	NT	CR	TS	0 —			0	*4	WINK	OT
*	FA	0 —							0	FR	FT	TGT	PAD			OT	CPI = 21						

*1 - SDSTIM *2 - WORD 3 *3 - ACTO/TTO *4 - INBND

K. 2-WAY INTERTOLL OR TSPS OPERATOR, 4-WIRE, E&M, WINK OR DELAY DIAL, MF OR NO PULSING, SD1A236-02 OR -05

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
*	0	CONF	*1	0	SDS	WDD	0	0	*2	COMP		0	OP			1	SUPV = 3				*3	TU = 2	
*	COFN	HFNOC					NOCTN					0	QDR			SDS		RTG			INPUL		
*	TONE	0 —										0	*4	NT	CR	TS	0 —			0	*5	WINK	OT
*	FA	0 —							AIC	FR	FT	TGT	PAD			OT	CPI = 22						

*1 - SDSTIM *2 - SG/FHP *3 - WORD 3 *4 - ACTO/TTO
*5 - INBND

L. 2-WAY INTERTOLL 4-WIRE, E&M, WINK OR DELAY DIAL, DP OR NO PULSING, SD1A237-02 OR -05

* BIT 23 DOES NOT EXIST IN THE TRANSLATION WORD FOR NO. 1 ESS. IT IS EQUAL TO 0 IN THE NO. 1A ESS.

Fig. 1—Expanded Trunk Class Code Translation Words for Non-CAMA 2-Wire Toll/Tandem Use (Sheet 4 of 6)

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LEGEND:
ACTO/TTO - ANNOUNCEMENT CUT-THROUGH TO OPERATOR OR TONE TIME-OUT. 1 IF INDICATED.
     AIC - OUTGOING TO AUTOMATIC INTERCEPT. 1 IF INDICATED.
     BAT - BATTERY ON TIP OR RING. 1 IF TIP, 0 IF RING.
    COFN - CHARGE ON FREE NUMBER. 1 IF INDICATED.
    COMP - COMPENSATING RESISTANCE - 0 FOR NONE OR NO DIAL PULSE.
                                     1 FOR 300 OHM
                                     2 FOR 600 OHM OR DIAL PULSE.
                                     3 FOR 900 OHM
    CONF - CONFERENCE RESTRICTED. 1 IF INDICATED.
     CPI - CIRCUIT PROGRAM INDEX.
      CR - CONTROLLED RING. 1 IF INDICATED.
      FA - FAST ANSWER. 1 IF INDICATED.
      FE - FLASH EXPECTED. 1 IF INDICATED.
      FR - FLASH REPEATING. 1 IF INDICATED.
      FT - FLASH TIMING. 1 IF INDICATED.
   HFNOC - HIGH FIVE NORMALIZED OFFICE CODES OR MF INPULSING FROM PANEL OFFICE.
     ICT - IDLE CIRCUIT TERMINAL. 1 IF INDICATED.
   INBND - INBAND SIGNALING. 1 IF INDICATED.
   INPUL - INPULSING - 0 FOR NONE
                       1 FOR MF
                       2 FOR DP
                       3 FOR RP
                       5 FOR TOUCH-TONE OR DP.
   NOCTN - NORMALIZED OFFICE CODE OR TABLE NUMBER.
      NT - NO TEST. 1 IF INDICATED.
     PAD - 1 DB SWITCHABLE PAD.
                           0 FOR SERVICE, TONE AND
                             ANNOUNCEMENT TRUNKS
                           1 ECHO SUPPRESSOR
                           3 FOR TRUNKS HAVING
                             SWITCHABLE 2 DB PAD
                           2 FOR ALL OTHER TRUNKS
     QDR - QUANTITY OF DIGITS RECEIVED.
 OGT-ESB - OUTGOING TRUNK TO EMERGENCY SERVICE
           BUREAU, 1 IF INDICATED.
      OP - OPERATING - 0 FOR NONE.
                       1 MF OR TRAFFIC SERVICE POSITION
                         OR SYSTEM.
                       2 DP
                       3 RP
                       4 PANEL CALL INDICATOR
                       5 TOUCH TONE
      OT - OPERATOR TRUNK, 1 IF INDICATED,
  RECCOM - RECORDING - COMPLETING
     RTG - ROUTING. 00 FOR NONE, 01 FOR LOCAL.
  SDSTIM - START DIAL SIGNAL TIMING, 1 FOR INTERTOLL AND
           OUTGOING DDD ACCESS TRUNKS, OTHERWISE 0.
     SDS - IN WORD ONE, START DIAL SIGNAL ON OUTGOING
           TRUNK, 1 IF INDICATED. IN WORD 3, START
           DIAL SIGNAL - 00 FOR NONE
                         01 FOR DELAY DIAL
                         10 FOR WINK
                         11 FOR DIAL TONE
  SG/FHP - STOP-GO FINAL HEAVY POSITIVE PULSE. 1 IF INDICATED.
    SUPV - SUPERVISION. 1 FOR REVERSE BATTERY, 3 FOR
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Fig. 1—Expanded Trunk Class Code Translation Words for Non-CAMA 2-Wire Toll/Tandem Use (Sheet 5 of 6)

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LEGEND (CONTINUED):
          E&M, OR 4 FOR HI-LO REVERSE BATTERY.
    TONE - TONE, 0 FOR NONE, 1 FOR STEADY, 2 FOR
          INTERRUPTED, 3 FOR ANNOUNCEMENT OR
          RECEIVER OFF-HOOK.
      TS - TOLL SWITCH. 1 IF INDICATED.
  TSP/XT - TRAFFIC SERVICE POSITION OR REVERTIVE PULSE
          TO CROSSBAR, 1 IF INDICATED.
     TTL - CIRCUIT MODIFIED FOR TANDEM TIE LINE. 1
          IF INDICATED.
      TU - TRUNK USAGE. 0 FOR OUTGOING, 1 FOR INCOMING OR
          SERVICE LINK NETWORK, 2 FOR 2-WAY, 3 FOR
          MISCELLANEOUS.
     WDD - WINK START DIAL VERSUS DELAY DIAL. 1 IF WINK
          START DIAL, 0 IF DELAY DIAL.
    WINK - WINK FOR INBAND SIGNALING. 1 IF INDICATED.
  WORD3 - WORD 3 IS APPLICABLE, 1 IF INDICATED.
```

Fig. 1—Expanded Trunk Class Code Translation Words for Non-CAMA 2-Wire Toll/Tandem Use (Sheet 6 of 6)

7. COST FACTORS

7.01 For details of cost factors for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

8. AVAILABILITY

8.01 Table A lists the availability of the various toll/tandem features.

CONSIDERATIONS FOR INCORPORATION OF FEATURE INTO SYSTEM

9. PLANNING

9.01 For detailed information on planning for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

10. HARDWARE

GENERAL

10.01 For details on hardware requirements for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

TRUNKS

10.02 See Table B for trunk circuits applicable to No. 1/1A ESS 2-wire toll/tandem operations, except CAMA trunks. For CAMA trunking information, see reference B(8) in Part 19. Table B is not intended to be all inclusive, but it is designed to show the types of trunks that are available for No. 1/1A ESS 2-wire toll/tandem operation. For details on trunks, see reference B(11) in Part 19.

11. DETERMINATION OF QUANTITIES

11.01 For details on determination of quantities for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

12. ASSIGNMENTS AND RECORDS

INPUT AND RECORD KEEPING

A. General

12.01 For details on input and record keeping for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

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TABLE A

AVAILABILITY OF TOLL/TANDEM FEATURES

FEATURE	AVAILABILITY	
	NO. 1 ESS	NO. 1A ESS
Operator Tandem	CTX-6 and later	all generic programs
Combined Operator Office Trunks	CTX-7 and later	all generic programs
Toll Operator Signaling and Compatibility with Residual TSPS Traffic	CTX-7 and later	all generic programs
No Line Link Network	CTX-7 and later	not offered
Through Balance Test Facilities	CTX-7 and later	all generic programs
2048 Junctor Trunk Link Network	CTX-7 and later	all generic programs
Fast Repeat of Answer Supervision	CTX-8, Issue 2 and later	1AE4 and later
Code 100 Test Line	CTX-4 and later	all generic programs
Code 101 Test Line	all active generic programs	all generic programs
Code 102 Test Line	all active generic programs	all generic programs
Code 103 Test Line	CTX-7 and later	all generic programs
Code 104 Test Line	CTX-7 and later	all generic programs
Code 105 Test Line	CTX-4 and later	all generic programs
Code 108 Test Line	CTX-7 and later	all generic programs
Automatic Selection of Transmission Test Tone Level	CTX-7 and later	all generic programs
CAMA	CTX-6 and later	all generic programs
Network Management	CTX-6 and later	all generic programs
Incoming Trunk Service Observing	1E5 and later	1AE5 and later

NON-CAMA TRUN

SD NUMBER		USE	SUPERVISION
REGULAR	REDUCED SIZE		
1A236-02	1A236-05	2-Way Intertoll or TSPS Operator 4-Wire, MF Signaling	E&M
1A237-02	1A237-05	2-Way Intertoll 4-Wire, DP Signaling	E&M
1A165-02	1A165-05	Outgoing Toll Connecting 2-Wire	RB
1A166-02	1A166-05	Incoming Toll Connecting 2-Wire	RB
1A163-02	1A163-05	2-Way Toll Connecting 2-Wire	E&M
1A220-01	1A220-05	Incoming Bylink Toll Connecting 2-Wire	RB
1A252-01	1A252-05	2-Way Toll Connecting 2-Wire	E&M
1A264-01	—	2-Way Toll Connecting 2-Wire	HI-LO OUT, RB IN
1A266-02	1A266-05	Incoming Toll Connecting 2-Wire	RB
1A203-01	1A203-05	Outgoing Toll Connecting 2-Wire to XBAR Tandem or TSPS No. 1	RB
1A321-01	1A321-05	Incoming TSPS Operator 2-Wire	RB

* Order Code 4907 is for combined operator-office service to a step-t trunk circuit. See reference B(3) in Part 19.

TABLE B

K CIRCUITS FOR 2-WIRE TOLL/TANDEM OPERATION

ORDER CODE(S)		J–SPEC. NUMBER		TRUNK FRAME		NUMBER OF CIRCUITS PER UNIT	POINTS PER CIRCUIT	
REGULAR	REDUCED SIZE	REGULAR	REDUCED SIZE	REGULAR	REDUCED SIZE		SCAN	SIGNAL DISTRIBUTION
021T5 021T6	021T7 021T8	1A033CB2	1A088CB	M	CMT	1	4	5
022T7 022T8	022T0 022T1	1A033CC3	1A088CC	M	CMT	1	4	5
00205	00206	1A032BB	1A084BB	U	MUT	2	2	3
00405	00406	1A032AB	1A084AB	U	MUT	2	2	3
04905 04907*	04909	1A033CA	1A088CA	M	CMT	1	5	5
0031C 0039C	00303 00304	1A033AB	J1A088AB	M	MUT	1	3	2
00700	00702	1A032CC	1A084CC	U	MUT	1	3	4
02400	—	1A033CG	—	M	—	1	2	4
05100	02500	1A032AE	1A084AE	U	MUT	1	2	3
01541	01503	1A032BF	1A084BF	U	MUT	1	3	4
03800	03801	1A033AE	1A088AE	M	MUT	1	2	3

y-step community dial office. There is no reduced size version of the combined office-operator version of this

B. Trunks

Translation Forms

12.02 The following translation forms, found in TG-1A, are used for toll/tandem trunks (non-CAMA):

(1) ESS 1200—Universal Trunk Frame Record: This form relates on a frame basis the universal trunk equipment location to the corresponding trunk network appearances and the universal trunks assigned to these equipment locations.

(2) ESS 1201A/B—Miscellaneous Trunk Frame Record: This form relates equipment location on a frame basis with the trunk network number trunk group, trunk number, trunk class code, CPD points, service link network, and Automatic Identified Outward Dialing (AIOD) index. It also records signal distributor points, scan points, common distributor points, and interrupter points.

(3) ESS 1219A1/2—Combined Miscellaneous Trunk Frame Record: This form is used to record the same information for miniaturized universal trunks as is recorded on the ESS 1201A/B form for regular universal trunks.

(4) ESS 1202—Trunk Group Record: This form is used to furnish trunk network number to trunk group and trunk member number translations for all trunks.

(5) ESS 1204—Trunk Class Code Record: This form associates the trunk class code with the trunk class code expansion.

(6) ESS 1204A—Trunk Class Code Inventory: This form is used as an inventory of the trunk class codes arranged for an ESS office.

(7) ESS 1204B—Trunk Class Code Sharing: With CTX-7 and later generic programs (No. 1 ESS) and all generic programs for No. 1A ESS, the use of multiple trunk order codes for a given trunk class code is permitted. The ability to mix trunk order codes allows miniaturized and nonminiaturized trunk circuits to be assigned to the same trunk group. Only one trunk class code can be assigned to a trunk group. This form is used to record this trunk order code sharing.

(8) ESS 1208A/B—Trunk Screening Group Record: This form provides for screening of trunks.

(9) ESS 1209A—Trunk Group Tandem Record: This form associates the trunk group number, chart column, and tandem table number for tandem trunk groups.

(10) ESS 1209B—Tandem Table Record: This form provides information for the tandem translator.

(11) ESS 1216A & B—Trunk Group Supplementary Record: This form provides information for a supplementary trunk group number translator primarily used for maintenance items.

12.03 For information about translation forms used for CAMA trunks, see reference B(8) in Part 19.

UNIFORM SERVICE ORDER CODES

12.04 Not applicable.

13. NEW INSTALLATION AND GROWTH

13.01 Figure 2 is a flow chart of the procedure for adding the 2-wire toll/tandem feature.

14. TESTING

A. General

14.01 For details on testing for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

B. Trunks

14.02 TTY input and output messages, found in IM-1A001 and OM-1A001 (No. 1 ESS) or in IM-6A001 and OM-6A001 (No. 1A ESS), can be used to verify trunk translations for the 2-wire toll/tandem feature. The procedure is as follows.

(a) Use the VFY-TKGN message to verify the trunk group number translations. System response is a TR10 message.

(b) Use the VFY-TNN message to verify the trunk network number translations. System response is a TR14 message.

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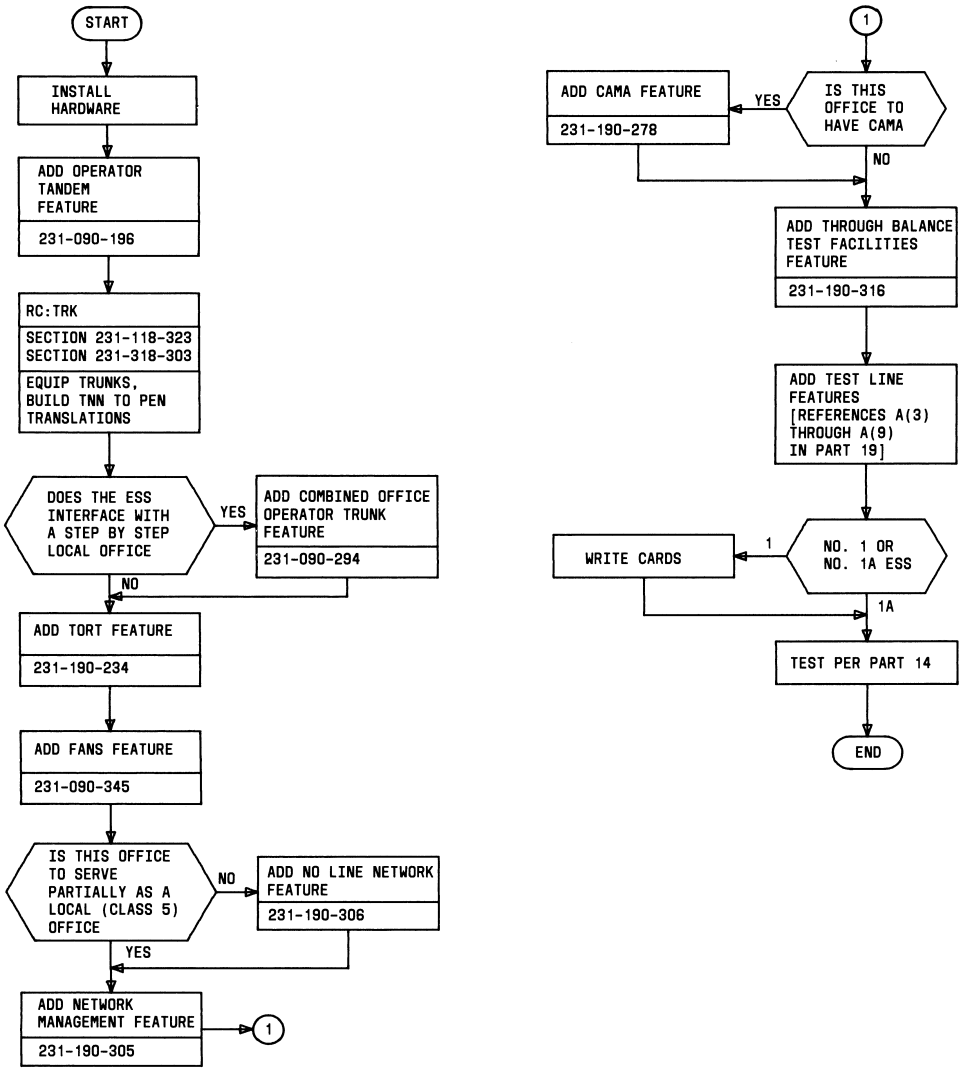

Fig. 2—Procedure for Adding the 2-Wire Toll/Tandem Feature

(c) Use the TAG-TNN-PEN message to verify the trunk network number to peripheral equipment number translations. System response is a TR21 message.

(d) Use the TAG-TNN-TCL message to verify the trunk class code expansion. System response is a TR21 message.

(e) Use the VFY-UTCN message to verify the trunk circuit number translations. System response is a TR11 message.

(f) Use the VFY-MSN message to verify the master scanner number translations. System response is a TR12 message.

(g) Use the VFY-OFFC message to verify 3-digit codes, 6-digit codes, or all office codes from 200 to 999. System response is a TR04 message.

(h) Use the VFY-EXP message to verify a route index translation. System response is a TR05 message.

(i) Use the V-TOLLRT message to verify toll routes. System response is a TR38 message.

15. MEASUREMENTS

A. General

15.01 For details on measurements for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

B. Toll/Tandem Trunk

15.02 Traffic measurements for non-CAMA toll/tandem trunk traffic are shown in Table C.

16. CHARGING

16.01 For details on charging for the various toll/tandem features, see references A(2) through A(10) and B(1) through B(9) in Part 19.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

17.01 Not applicable.

18. REASONS FOR REISSUE

18.01 Not applicable.

19. REFERENCES

A. Bell System Practices

(1) Section 231-030-010—Remreed Switching Network Description—No. 1 and No. 1A Electronic Switching Systems

(2) Section 231-090-196—Operator Tandem Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(3) Section 231-090-100—Feature Document—Code 101 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(4) Section 231-090-098—Feature Document—Code 100 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(5) Section 231-090-101—Feature Document—Code 102 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(6) Section 231-090-094—Feature Document—Code 103 Test Line and Synchronous Test Line Features—2-Wire No. 1 and No. 1A Electronic Switching Systems (when published)

(7) Section 231-090-342—Feature Document—Code 104 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems (when published)

(8) Section 231-090-099—Feature Document—Code 105 Test Line Feature—2-Wire No.1 and No. 1A Electronic Switching Systems

(9) Section 231-090-404—Feature Document—Code 108 Test Line Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

(10) Section 231-190-305—Feature Document—Network Management Feature—2-Wire No. 1 Electronic Switching System

(11) Section 231-318-303—Trunk Translation RC Procedures for TG, TGBVT, TRK, CFTRK, TGMEM, and CCIS (Through 1AE5 Generic

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TABLE C

TRAFFIC MEASUREMENTS FOR NON-CAMA TOLL/TANDEM TRUNK TRAFFIC

MEASUREMENT CODE	OFFICE COUNT	DESCRIPTION
05	034	Trunk-to-Trunk Path Memory Peg Count: counts the number of times a trunk-to-trunk path memory register is seized.
05	035	Trunk-to-Trunk Path Memory Overflow: counts the number of times the system attempts to seize a trunk-to-trunk path memory register but fails due to all registers being busy.
05	131	Tandem Call Attempts Peg Count: counts the total attempts to switch the following calls through the control group: — Calls over incoming trunk groups designated (in translations) to carry only tandem traffic and are routed out of the office via three six-digit translations. — With the CTX-6, G1, and later Generic Program, DDD access from a class 5 office and intertoll incoming calls, requiring outpulsing, will be included in this count. Excludes CTX, CCSA, CAMA, operator tandem and calls over trunks that have screening LENs. To score this register, the trunk groups must appear on the Tandem Table Record, ESS 1209B Form.
05	132	Tandem Call Attempts Overflow: counts the failures on tandem call attempts due to network, trunk, or service circuit blockage. For CTX-7, G1, and later Generic Programs, counts the final failures to find a network path to service circuits or trunks on tandem call attempts.
05	202	Tandem First Failure to Match (TFFM) Peg Count: counts the number of failures to reserve a talking path between the incoming tandem trunk and the initially selected outgoing trunk (or tone or announcement circuit in the event the desired outgoing trunk group is busy). Available with CTX-7, G1, and later Generic Programs.
05	208	Tandem Calls Failure Due to OGT Busy Peg Count: counts the tandem calls that block due to an all outgoing trunks busy condition. Available with CTX-7, G1, and later Generic Programs.
00	—	Trunk or Service Circuit Group Usage: measures usage on each trunk or service circuit group.
01	—	One-Way Outgoing, One-Way Incoming Trunks, or Service Circuit Groups Peg Count: counts the attempts to seize an outgoing trunk or service circuit, or the actual seizure of an incoming trunk. Includes OVFL scores.
02	—	Trunk or Service Circuit Group Overflow: scores when an attempt to seize a trunk or service circuit fails and is routed to another trunk or tone group.

TABLE C (Contd)

TRAFFIC MEASUREMENTS FOR NON-CAMA TOLL/TANDEM TRUNK TRAFFIC

MEASUREMENT CODE	OFFICE COUNT	DESCRIPTION
03	—	2-Way Trunk Group — Incoming Peg Count: counts the incoming seizures of a 2-way trunk group.
04	—	2-Way Trunk Group — Outgoing Peg Count: counts the attempts to seize a 2-way trunk group on an outgoing basis.
06	—	Trunk or Service Circuit Maintenance Usage: measures the maintenance usage of trunk or service circuit groups. Do not assign fast scan.
23	—	Tandem Trunk Group Peg Count: counts outgoing through-switched or incoming through-switched calls.

Program)—2-Wire and HILO 4-Wire No. 1A Electronic Switching System

(12) Section 231-118-323—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, and TGMEM (CTX-6 through 1E4 Generic Programs)—2-Wire and HILO 4-Wire No. 1 Electronic Switching System

(13) Section 231-130-120—Manual Trunk Test Circuit and Auxiliary Manual Test Circuit—General Description—2-Wire and HILO 4-Wire No. 1 Electronic Switching Systems

(14) Section 231-130-320—Manual Trunk Test Position and Auxiliary Manual Test Position—Method of Operation—2-Wire and HILO 4-Wire No. 1 Electronic Switching Systems.

B. Other References

(1) GL 75-12-090 (EL 5061)—Through Balance Test Facilities (TBTF) Feature—FD 231-190-316—2-Wire No. 1 Electronic Switching System

(2) GL 76-08-098 (EL 4837)—Fast Repeat of Answer Supervision Feature—FD 231-090-345—2-Wire Answer Supervision Feature—FD 231-090-305—2-Wire No. 1 and No. 1A Electronic Switching Systems

(3) GL 76-03-060—Combined Office Operator Trunk Feature—FD 231-090-294—2-Wire No. 1 and No. 1A Electronic Switching Systems

(4) GL 75-12-099—Toll Operator Signaling and Compatibility With TSPS Residual Traffic (TORT) Feature—FD 231-190-234—2-Wire No. 1 Electronic Switching System

(5) GL 74-03-012 (EL 3125)—2048 Junctor Trunk Link Network Feature (2048 TLN)—FD 231-190-237—2-Wire No. 1 Electronic Switching System

(6) GL 75-01-026 (EL 3755)—No Line Link Network Feature—FD 231-190-306—2-Wire No.1 Electronic Switching System

(7) GL 75-10-193—Receiver Attachment Delay Report (RADR) Feature—FD 231-190-309—2-Wire No.1 Electronic Switching System

(8) GL 75-01-013 (EL 3762)—Centralized Automatic Message Accounting (CAMA) Feature—FD 231-190-278—2-Wire No. 1 Electronic Switching System

(9) GL 74-03-062 (EL 3131)—Network Management Feature (Phase II)—FD 231-190-305, Issue 1A—2-Wire No. 1 Electronic Switching System

(10) GL 73-03-129 (EL 2461)—No. 1 ESS—2-Wire Toll Operation With Centrex 7 Generic Program; Engineering Information

(11) J1A063-1 Trunk and Service Circuit Engineering Specification

(12) FD 231-090-410—Incoming Trunk Service Observing Feature—2-Wire No. 1 and

No. 1A Electronic Switching Systems (when published)

(13) FD 231-090-409—Multifrequency signaling on Bylink Trunks (BYMF) Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems (when published)

(14) GL 77-12-019—HILO 4-Wire Switching Feature—FD 231-090-366—2-Wire No. 1 and No. 1A Electronic Switching Systems

(15) FD 231-090-416—Toll Common Channel Interoffice Signaling Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems (when published).

Trango VRX2550 2.4 GHz Video Receiver Experiments

Overview

This is quick hack to allow a Trango Systems VRX2550 EaglePLUS 2.4 GHz video receiver to receive slightly out−of−band frequencies.

The stock Trango VRX2550 is a high−quality analog video receiver (FM with NTSC/PAL video output) operating in the standard 2.4 GHz license−free Part 15 band. These analog wireless video systems are getting to be a bit dated, but there are still alot of consumer wireless security and surveillance video systems which utilize the 2.4 GHz band.

Several commercial Unmanned Aerial Vehicle (UAV), and other drone−type aircraft, even use the 2.4 GHz band for their streaming video downlinks. It's possible to intercept these video feeds to help keep an eye on the watchers.

The Trango VRX2550 uses a common 480 MHz Intermediate Frequency (IF) for the input to the FM video demodulating circuits. This IF signal is derived by mixing the incoming RF signal within a Mini−Circuits MBA−25L mixer along with a synthesized Local Oscillator (LO) signal. A Z−Comm SMV1960L Voltage Controlled Oscillator (VCO) is used for generating the local oscillator frequency, and is tuned 480 MHz *below* the received frequency.

The Trango VRX2550 has a PIC controlling a National LMX2325 PLL synthesizer to determine the local oscillator frequency for each of the four channels. It's possible to reprogram the LMX2325 for your own receive frequency or to even replace the voltage tune line with something manual.

Trango Systems VRX2550 EaglePLUS

Channel	Receive Frequency (GHz)	Local Oscillator Frequency (GHz)	VCO Vt (Volts)
1	2.413	1.933	2.529
2	2.432	1.952	2.691
3	2.451 (microwave ovens)	1.971	2.851
4	2.470	1.990	3.011

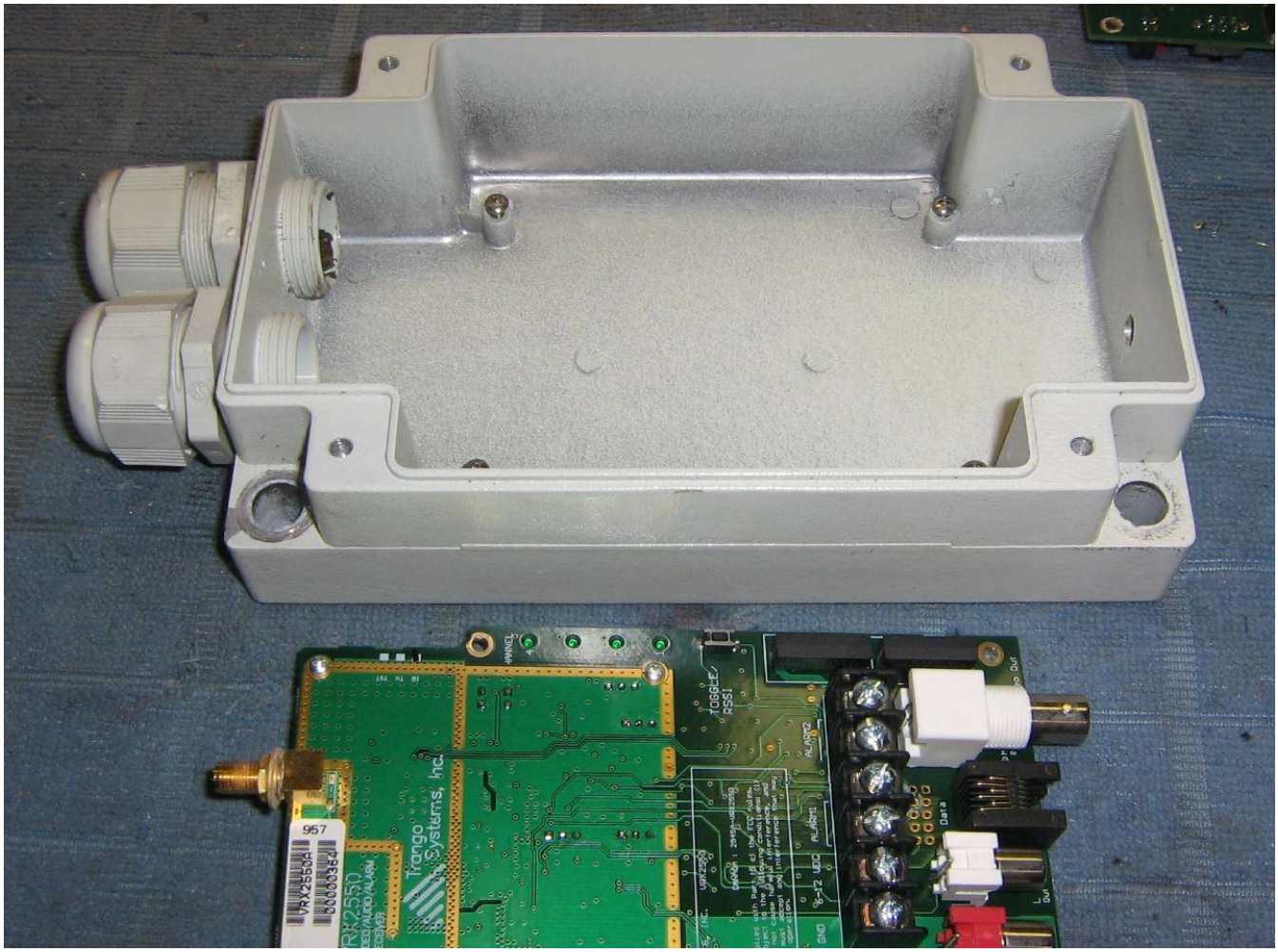
You can manually "tune" the Trango VRX2550's local oscillator frequency by replacing the LMX2325 synthesizer control line going to the VCO with a DC control voltage from an external potentiometer. By manually sweeping this voltage from 0 to around 4 volts, the Z−Comm SMV1960L will cover approximately 1.7 − 2.2 GHz.

The VRX2550 will then be able to receive anything between 2.1 − 2.6 GHz − *sorta...* There is, however, an input RF bandpass filter right after the VRX2550's antenna input, so any frequencies away from the filter's 2.45 GHz center frequency will be attenuated by 20 dB or more.

This on−board 2.45 GHz bandpass filter may be jumpered and external filtering used, along with any optional pre−amplification.

A horizontal video synchronization (15.75 kHz) detector and an automatic channel scanner will also be added to this unit. The video synchronization detector lights a LED when a possible video signal is detected, and the automatic channel scanner "hops" through the four channels about once ever two seconds so you don't have to manually toggle through them.

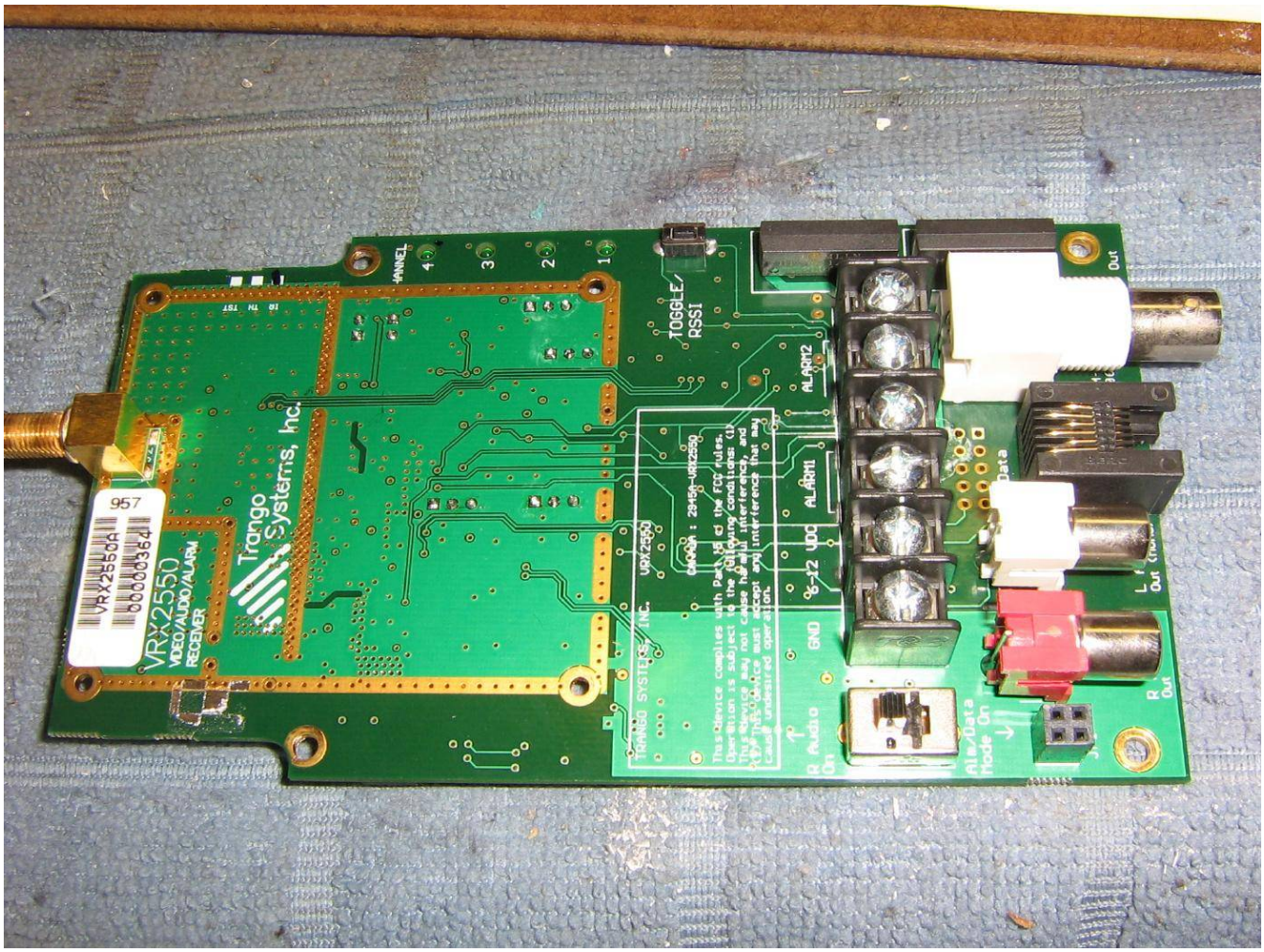
Pictures & Construction Notes



Internal overview of a stock Trango Systems VRX2550 EaglePLUS video receiver.

The audio/video/DC power connections come into the case via the weatherproof connections on the case's left.

The VRX2550 board can be powered from +6 to +12 VDC. The current draw is around 400 mA.



Overview of the Trango Systems VRX2550 EaglePLUS video receiver circuit board.

The antenna connection is via the right−angle SMA jack on the left.

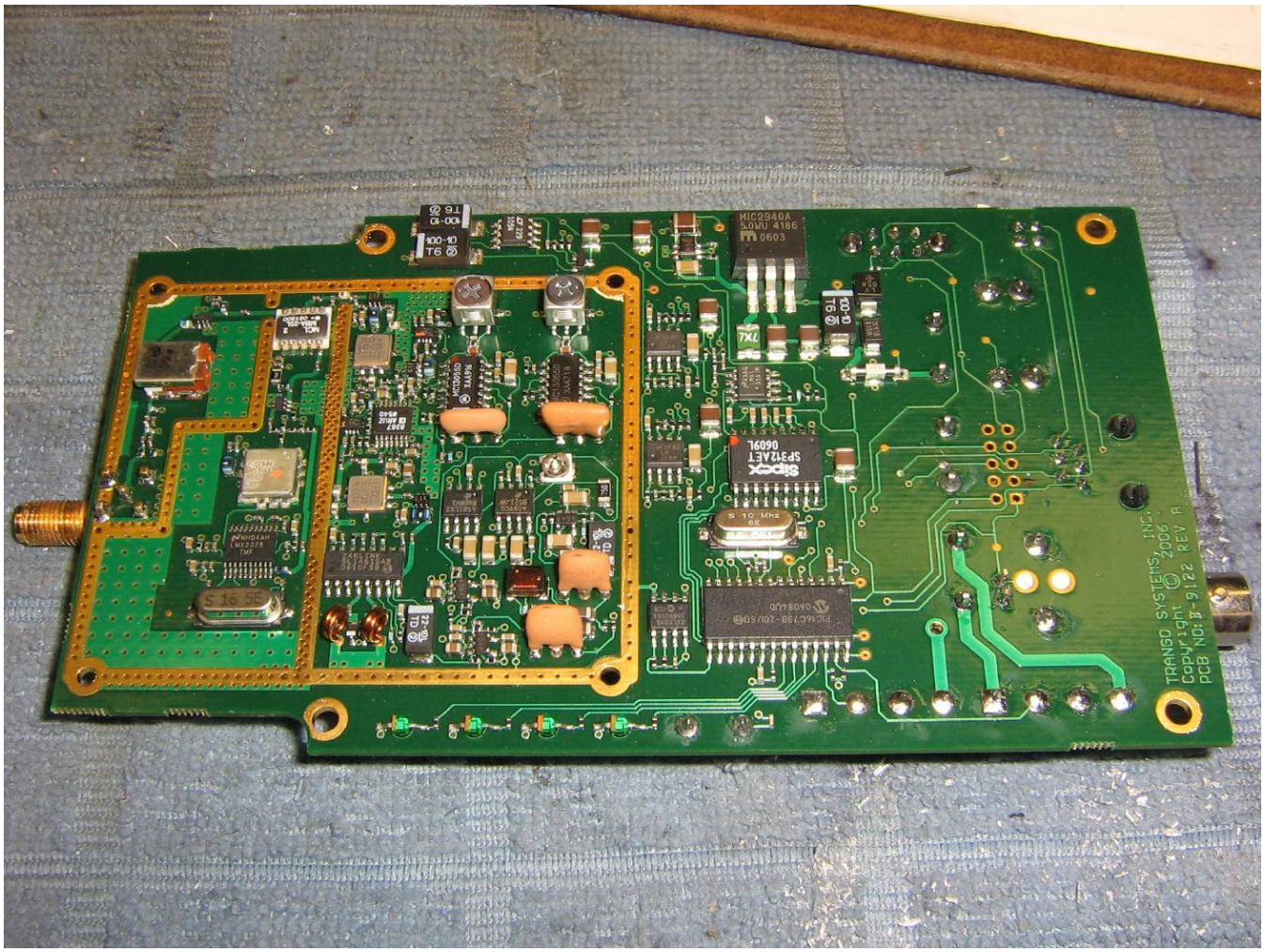
The BNC jack is for the **Video Output**.

The white RCA jack is for **Left Audio Output**. This connection also provides the audio output when operating in monaural (mono) mode.

The red RCA jack is for **Right Audio Output**.

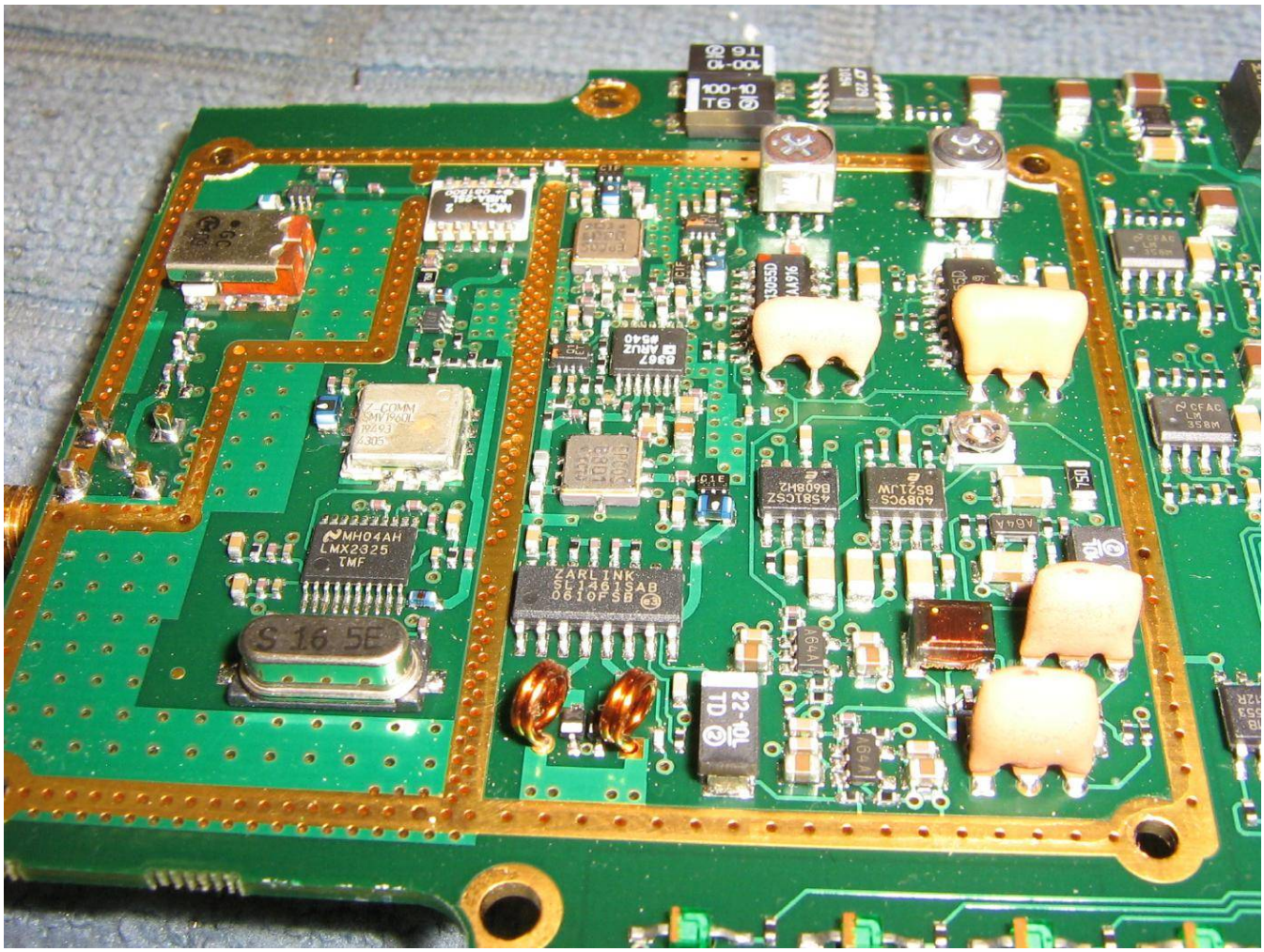
The **Toggle**/**RSSI** push button selects the receiver's channel. The four green LEDs indicate which channel (1−4) the receiver is tuned to.

The screw terminals are for the DC power and the alarm outputs. The alarm connections will not be used in this application.



Component overview of the stock Trango Systems VRX2550 EaglePLUS video receiver circuit board.

These units are very well designed and the receiver utilizes "proper" microwave receiver components.

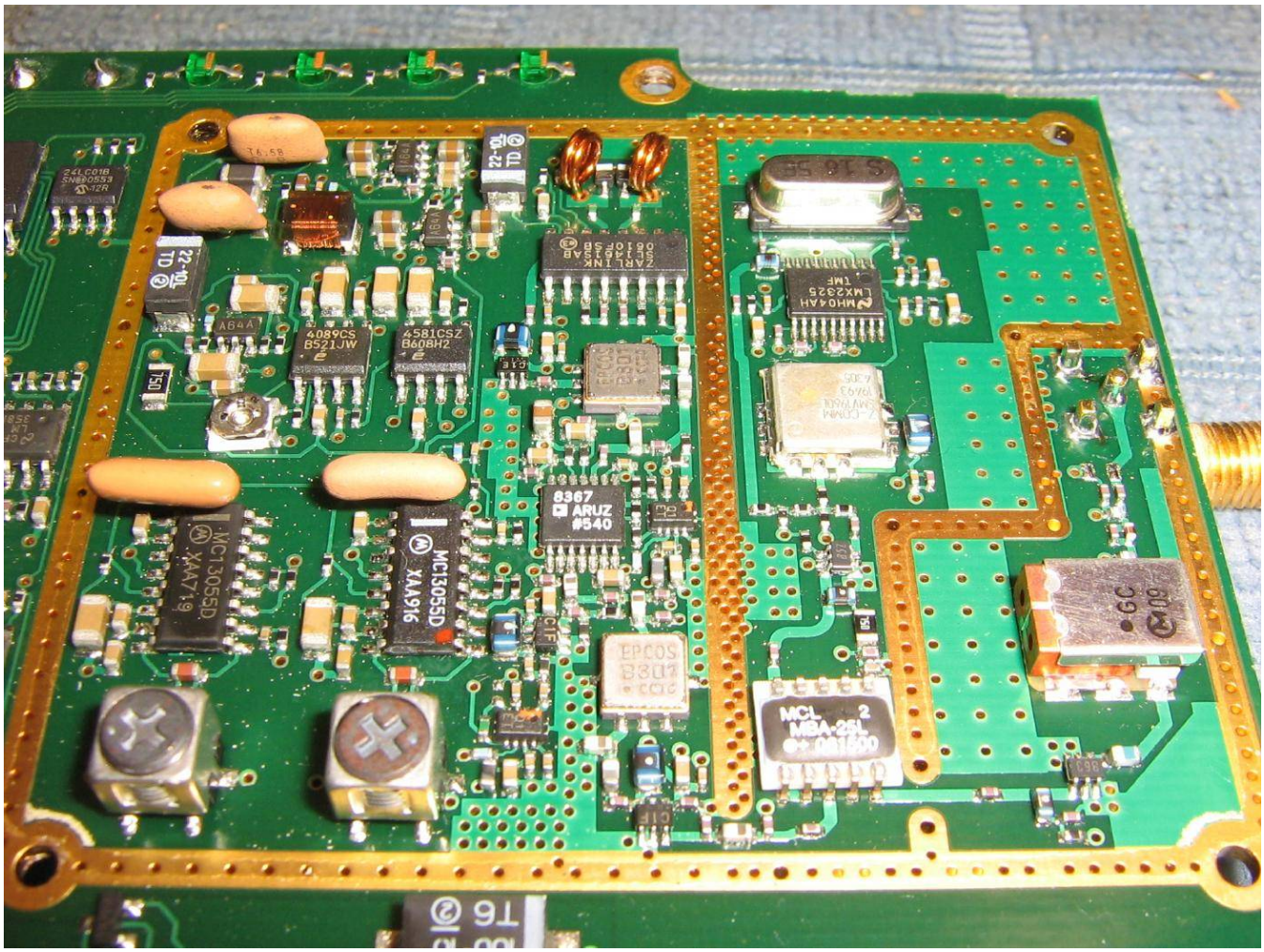


There is a 2−pole Murata 2.4 GHz bandpass filter after the antenna input and a low−noise receive amplifier, which I believe is a MGA−83563 (or equivalent).

The RF input feeds a Mini−Circuit MBA−25L mixer. The receiver's local oscillator is based around a Z−Comm SMV1960L VCO and is PLL synthesized with a National LMX2325. Using a PLL circuit prevents the receiver's frequency from drifting.

The mixer's 480 MHz IF ouptut is common for these types FM video receivers and the video demodulation is done by a Zarlink SL1461.

Two Motorola MC13055 FSK receivers handle the audio and alarm code demodulation.



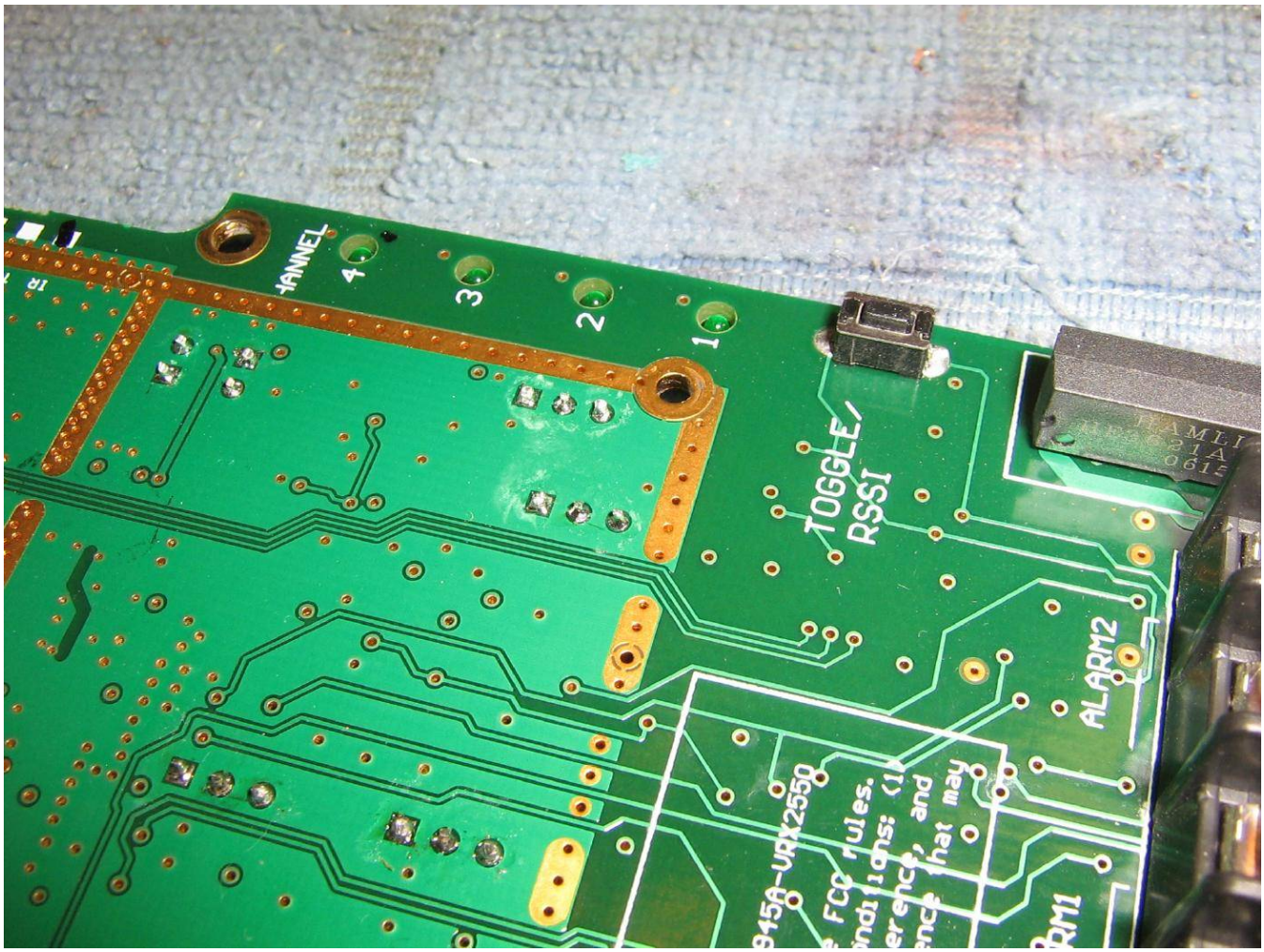
Alternate view.

Two EPCOS B801 480 MHz SAW filters clean up the IF output from the mixer.

This surface−mount SAW filters have a farily high insertion loss (20 dB or so) and replacing them with external filters could possibly increase the receiver's overall sensitivity.

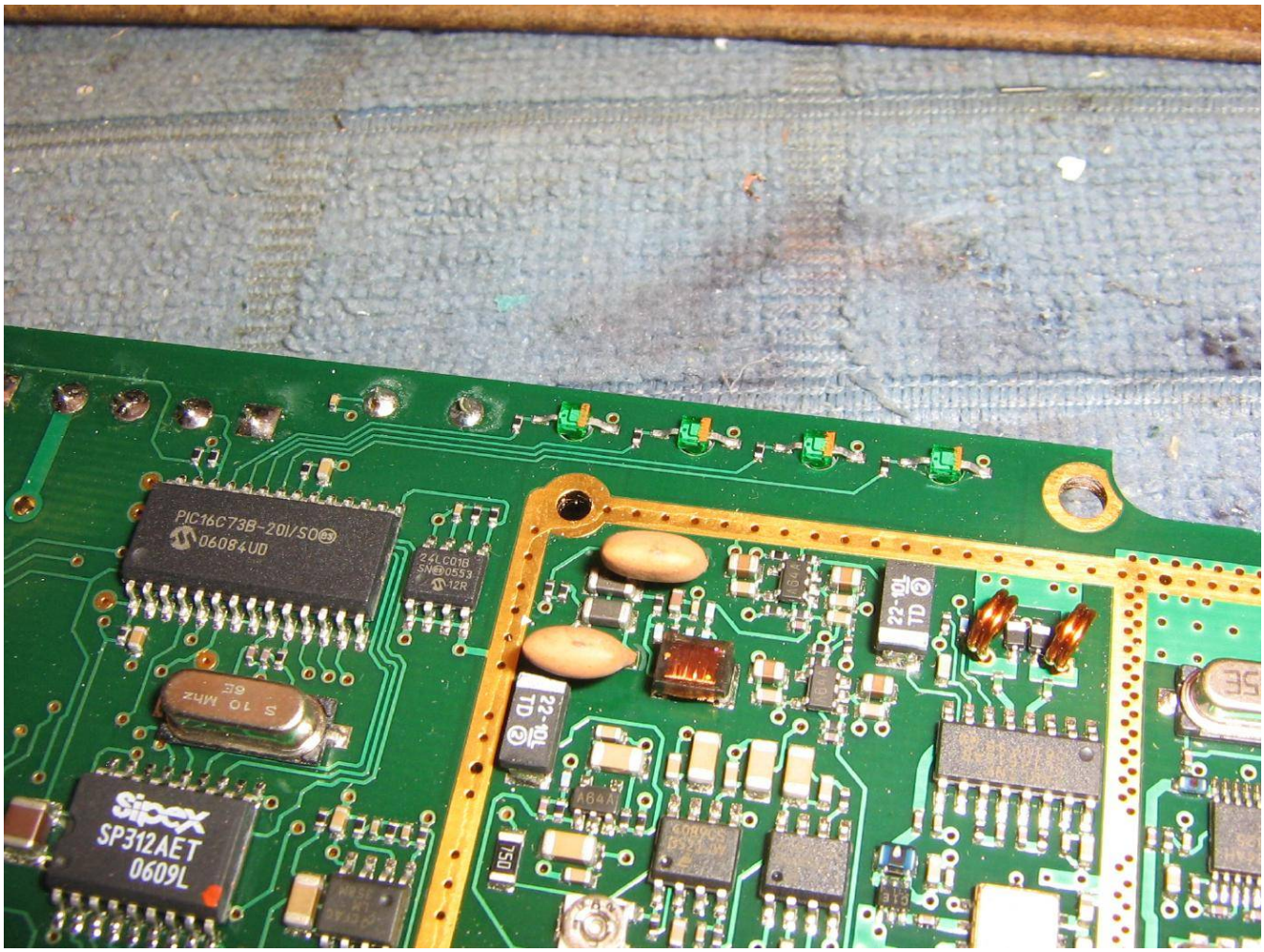
The right audio channel uses a 6.0 MHz audio carrier and the left/mono channel uses a 6.5 MHz carrier. The alarm data is also on the 6.0 MHz carrier.

An Analog Devices AD8367 provides the Received Signal Strength Indicator (RSSI).



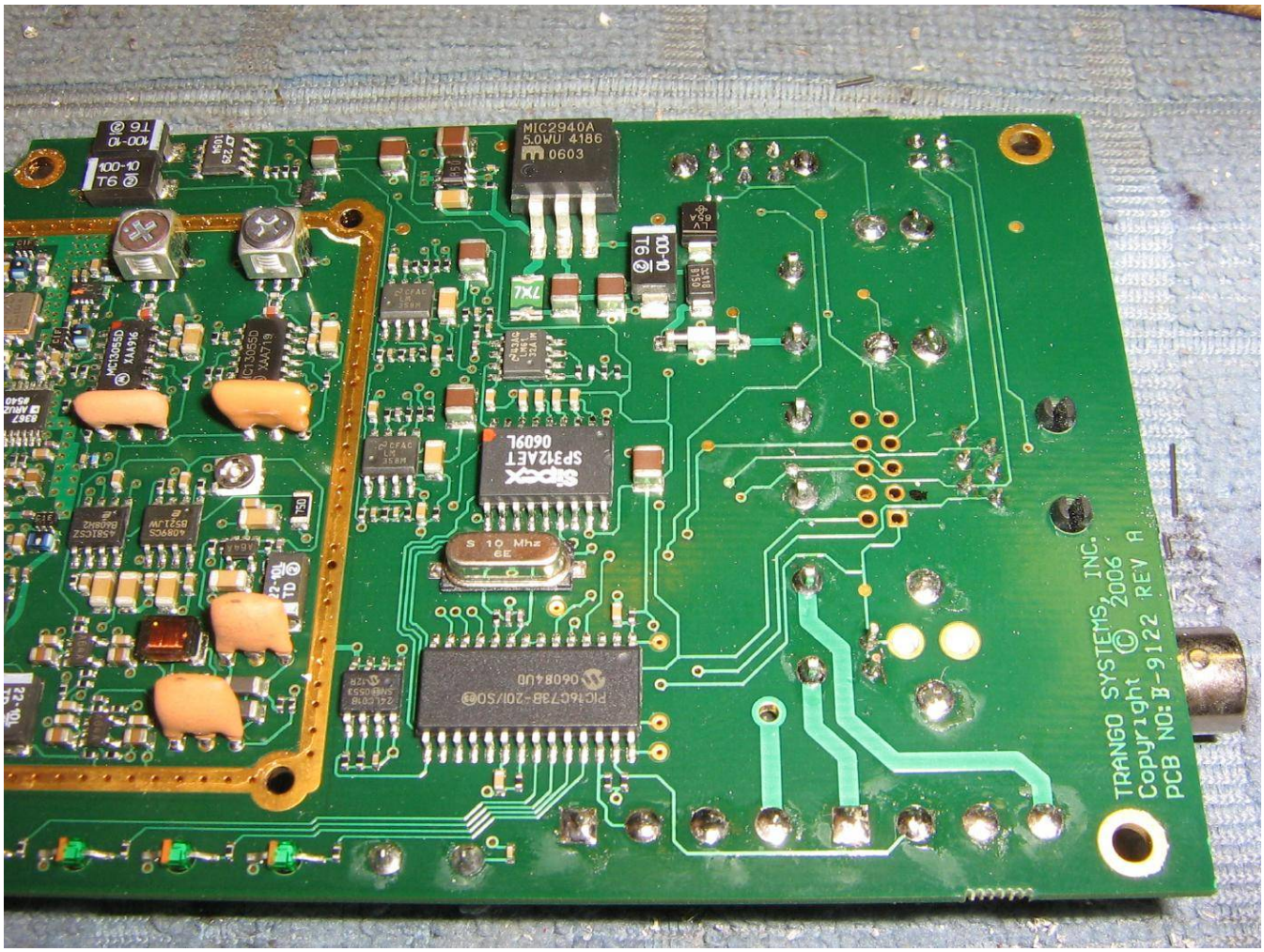
Overview of the four channel indicating LEDs and the **Toggle**/**RSSI** push button.

These will be removed and panel−mounted for convenience.



Solder−side view of the LEDs. The have tiny 220 ohm resistors for current−limiting, but you may want to remove these so you have a bigger pad to solder to.

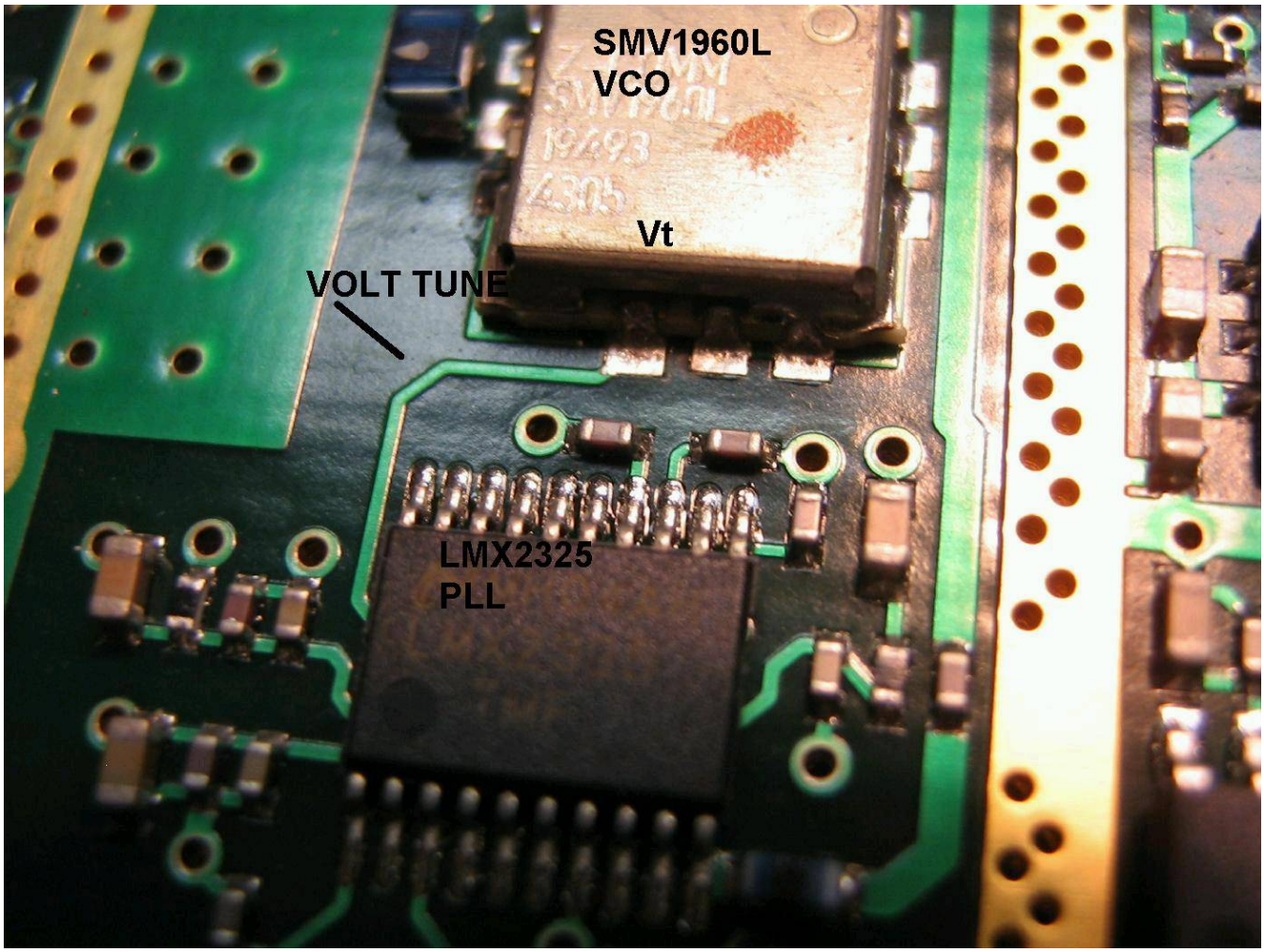
New 220 ohm resistors will added externally.



Overview of the voltage regulator components and PIC microcontroller.

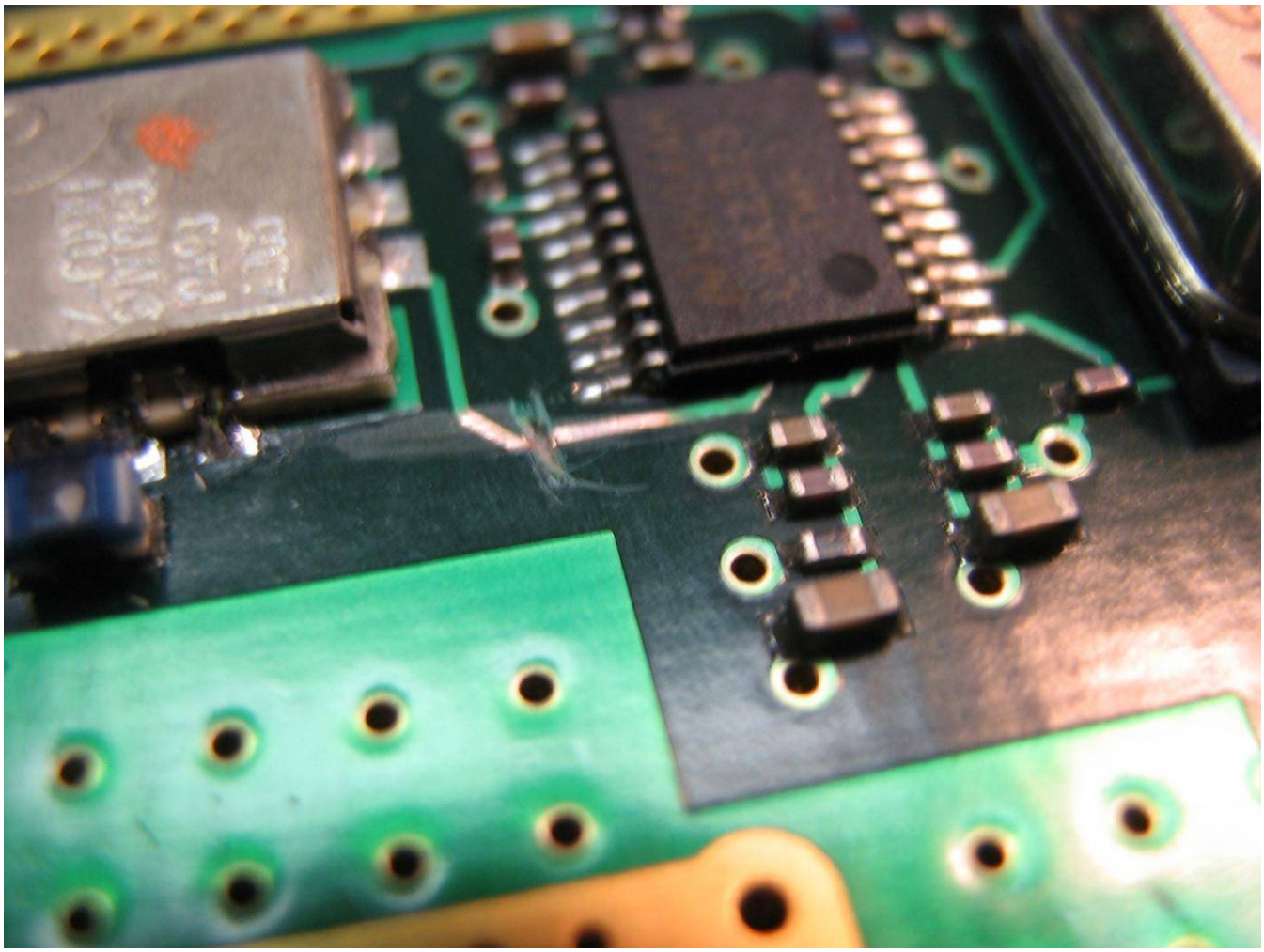
The ten test pads can be used for tapping the board's +5 VDC, ground, video output, and left/right audio outputs.

Pin them out with an ohm meter. The square pad should be the video output.



Overview of the voltage tune line on a stock Trango Systems VRX2550 EaglePLUS video receiver circuit board.

This line controls the tuning voltage to the Z–Comm SMV1960L VCO. Switching in a potentiometer to vary this tuning voltage from approximately 0 – 4 volts allows you to manually tune the receiver over a (slightly) wider frequency range.

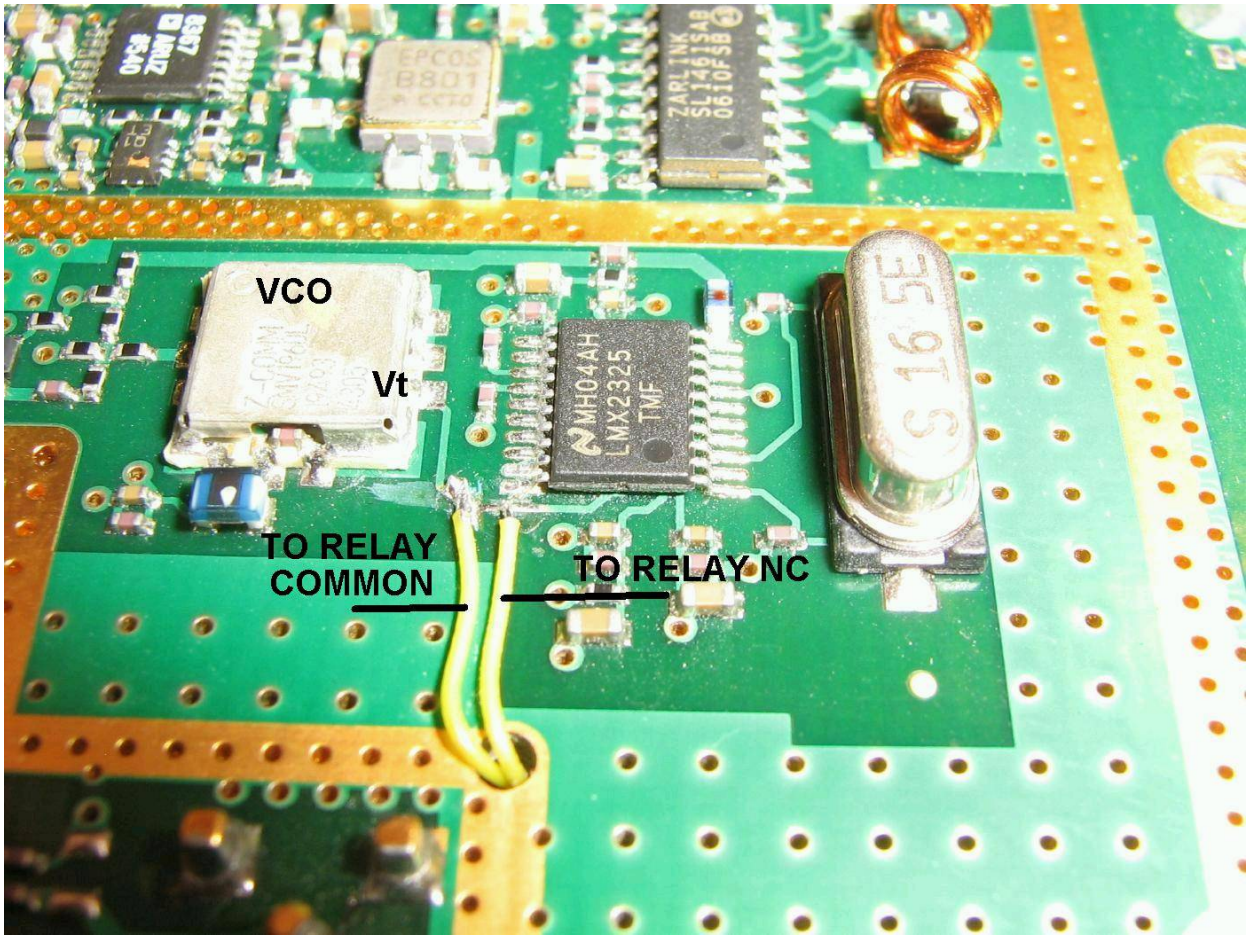


Scrap off the solder resist with an X−ACTO knife and cut the trace as shown.

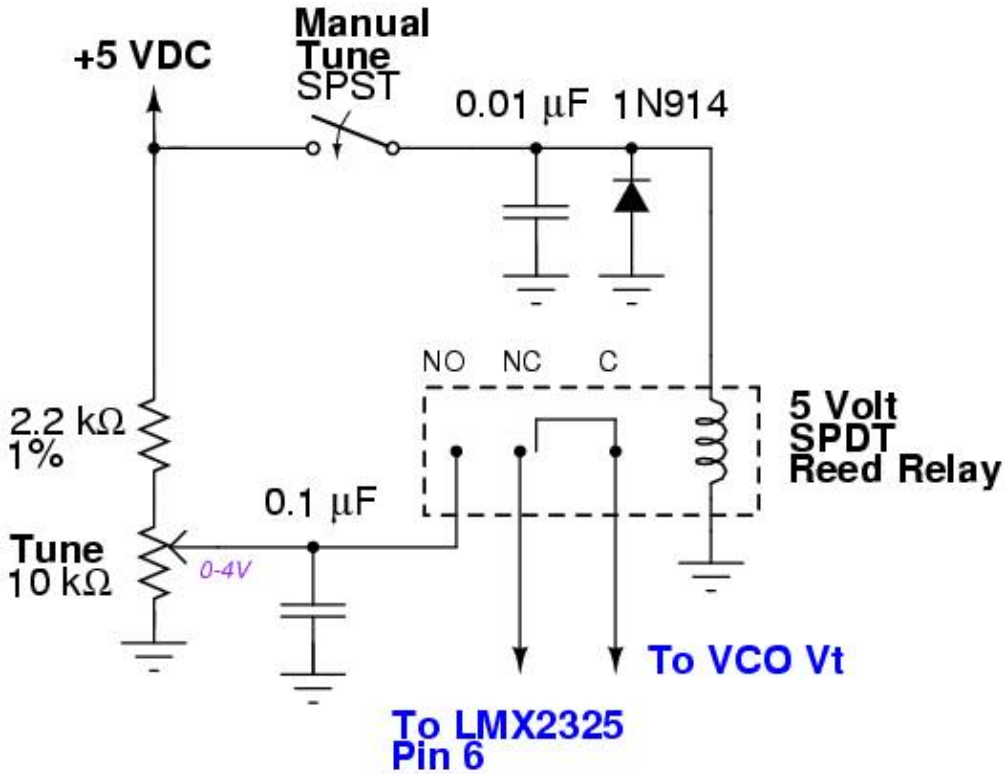
The exposed trace going to the right is connected to pin 6 of the LMX2325 PLL.

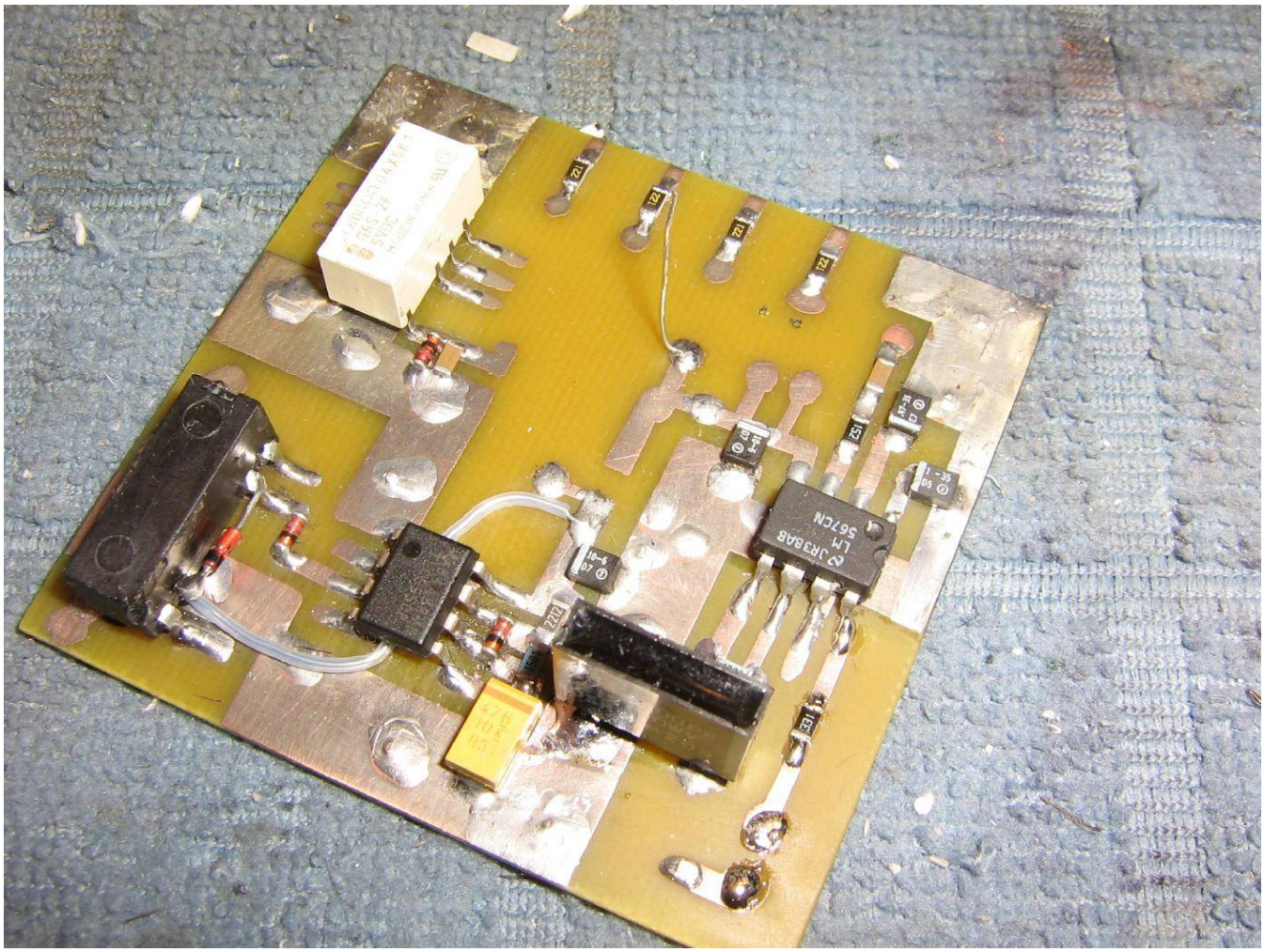
The exposed trace going to the left is the voltage tune line for the SMV1960L VCO.

A relay will be used to switch between PLL and manual tuning for the SMV1960L VCO.



Drill a small hole in the PC board and route two #30 wires as shown.





Overview of the circuit board for the automatic channel scanner and the 15.75 kHz horizontal synchronization frequency detector.

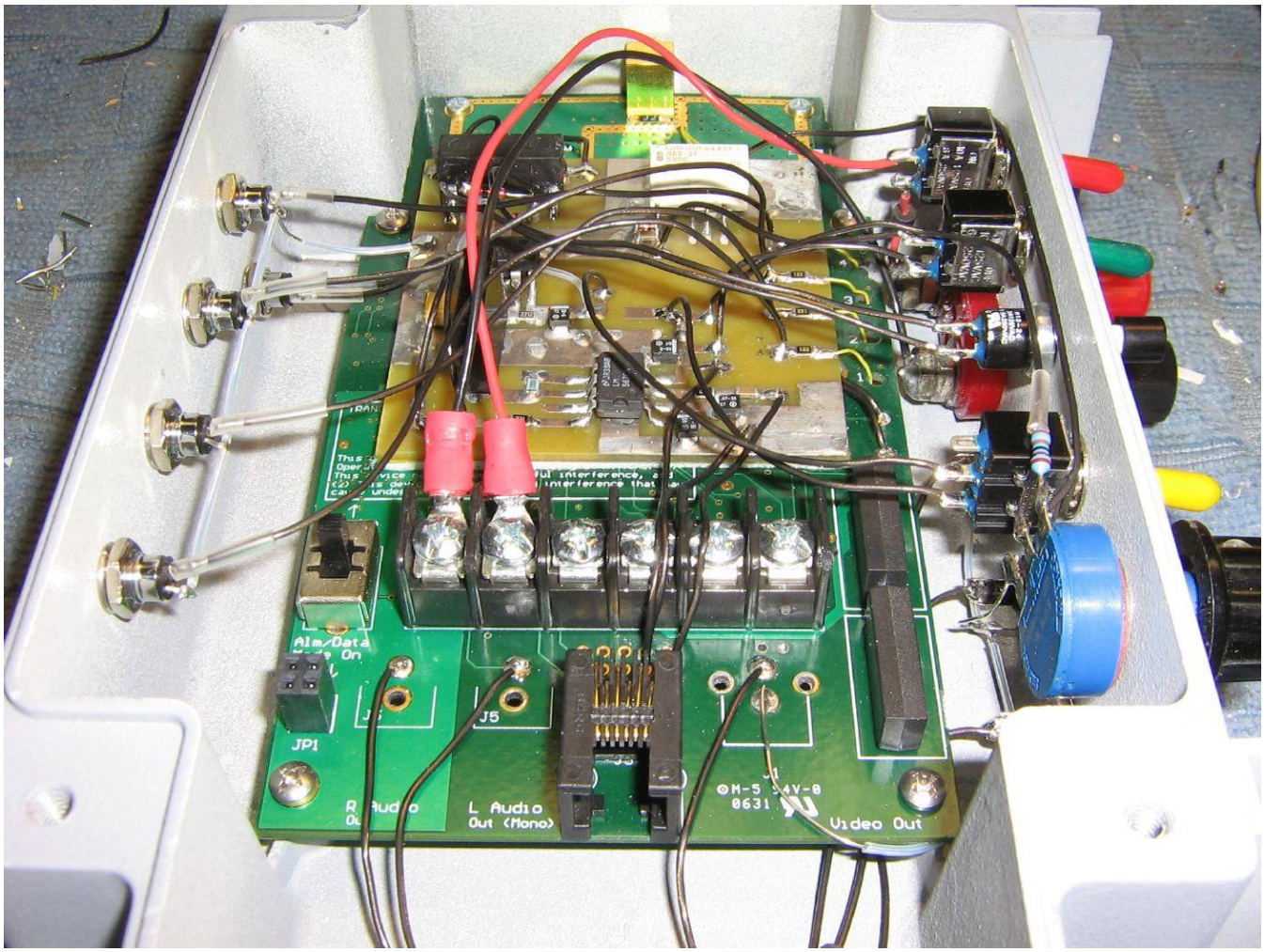
For the automatic channel scanner, a TLC555 timer is configured in an astable operation with about a 2 Hz pulse rate. This then controls a relay in parallel with the **Toggle**/**RSSI** pads on the receiver's main board. This simulates pressing the **Toggle**/**RSSI** about once every two seconds.

Avoid faster channel scan rates, as it can take a moment for your video monitor to detect a valid video signal.

For the sync detector, a LM567 tone decoder is configured to detect a signal at 15.75 kHz. The center detection frequency is set by a high−tolerance 10 kohm resistor and 6800 pF capacitor. You may have to slightly tweak the value of the resistor to get the center frequency near 15.75 kHz. You can verify the LM567's detection frequency by monitoring the LM567's pin 5 with a high−impedance frequency counter. The detection bandwidth is just under 1 kHz.

The white relay is used to switch between PLL and manual tuning. The use of a relay is to avoid additional capacitance which could prevent the PLL from locking.

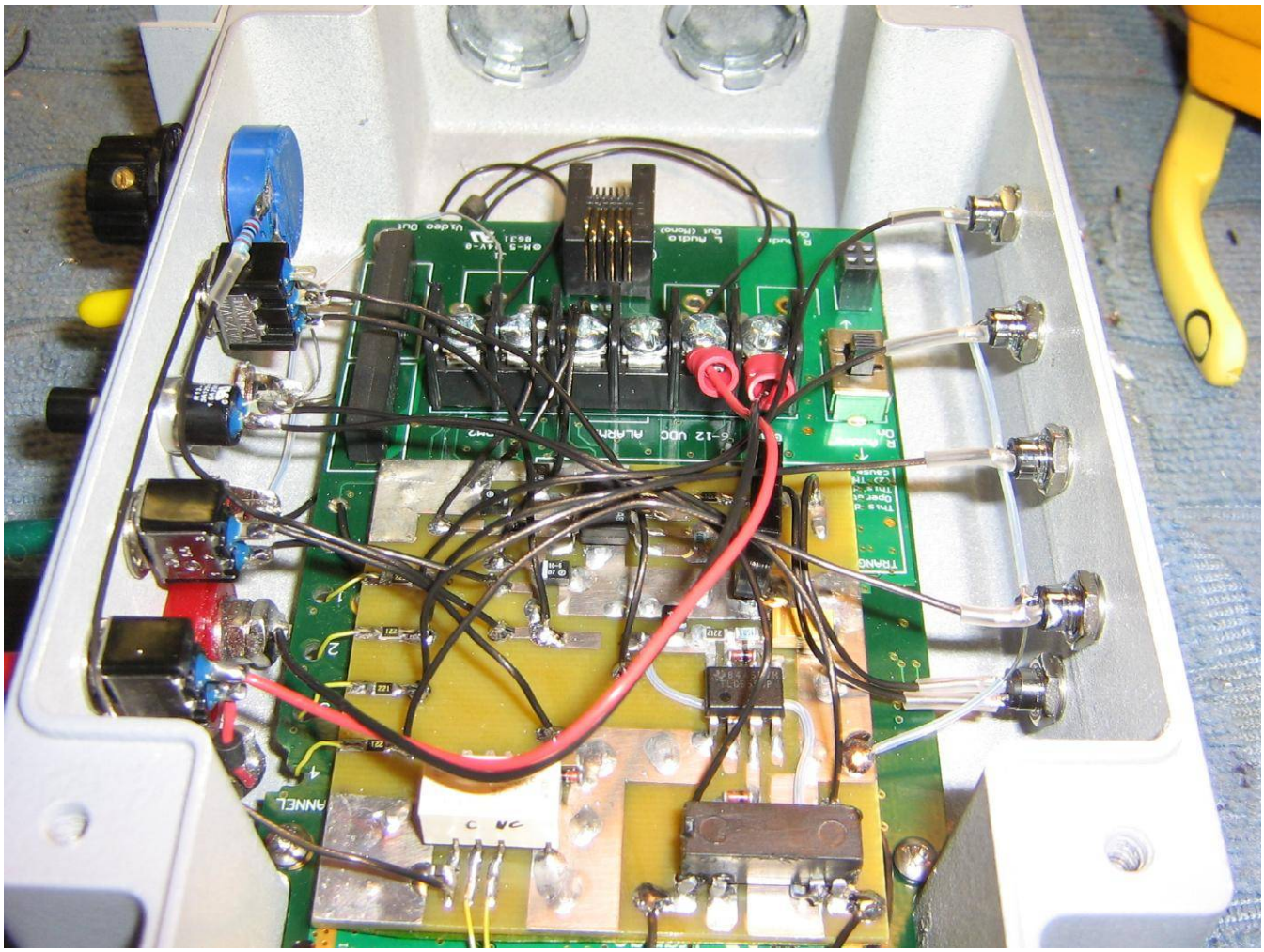
The 220 ohm resistors are for the new panel−mounted channel indicating LEDs.



Completed internal overview.

Try to keep the manual tuning wires as short as possible. You can use a multi−turn potentiometer for better frequency resolution in manual tuning mode, but you'll probably soon find it to be tedious. Slowly tuning a single−turn pot seems to be the least finicky.

The stock audio RCA jacks and video BNC jack where removed. New jacks were panel−mounted to the side of the case.



Alternate overview.

Completed overview with a matching Trango Systems AD2500−10 2.4 GHz patch antenna mounted on top.

Overview of the panel–mounted controls.

The banana jacks provide the DC power.

The RCA jacks are for the audio and video outputs. These outputs are at the standard "line levels." The impedance of the audio outputs is 600 ohms (unbalanced) and the video output is 75 ohms (unbalanced).

The manual tune 10 kohm potentiometer is on the left.

The red switch is for DC power.

The yellow switch enables the automatic channel scanner relay.

The green switch enables the manual tune relay.

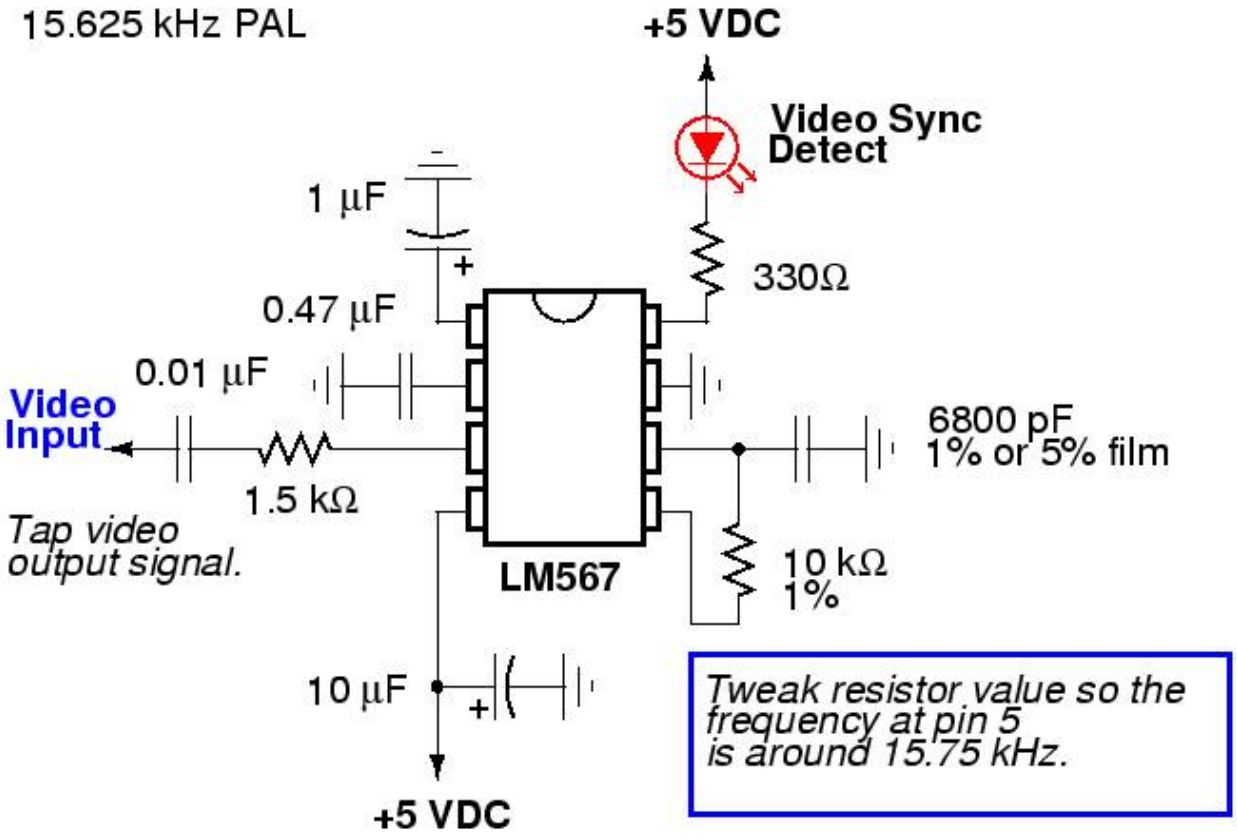
The black push button is in parallel with the stock **Toggle**/**RSSI** switch on the receiver board.

Overview of the panel–mounted LEDs.

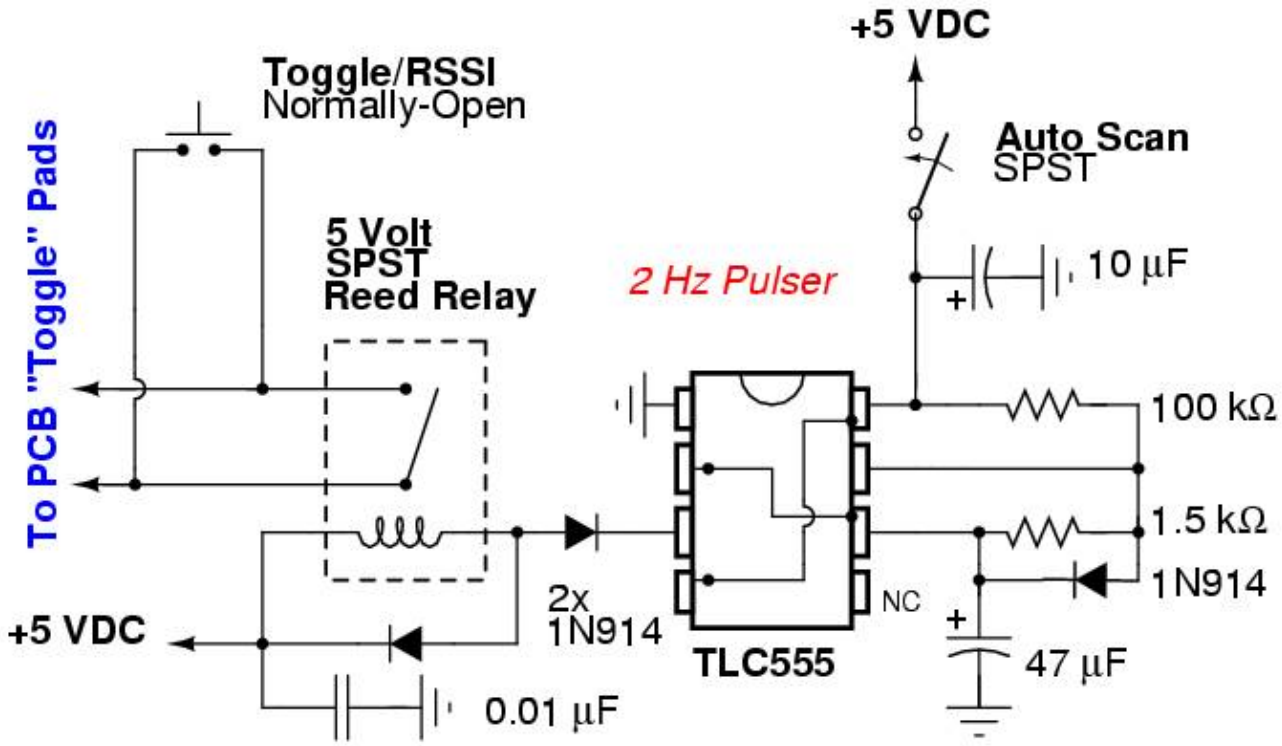
The four green LEDs indicate the receive channel and the red LED is for the video sync detector.

Horizontal Video Synchronization Frequency Detector

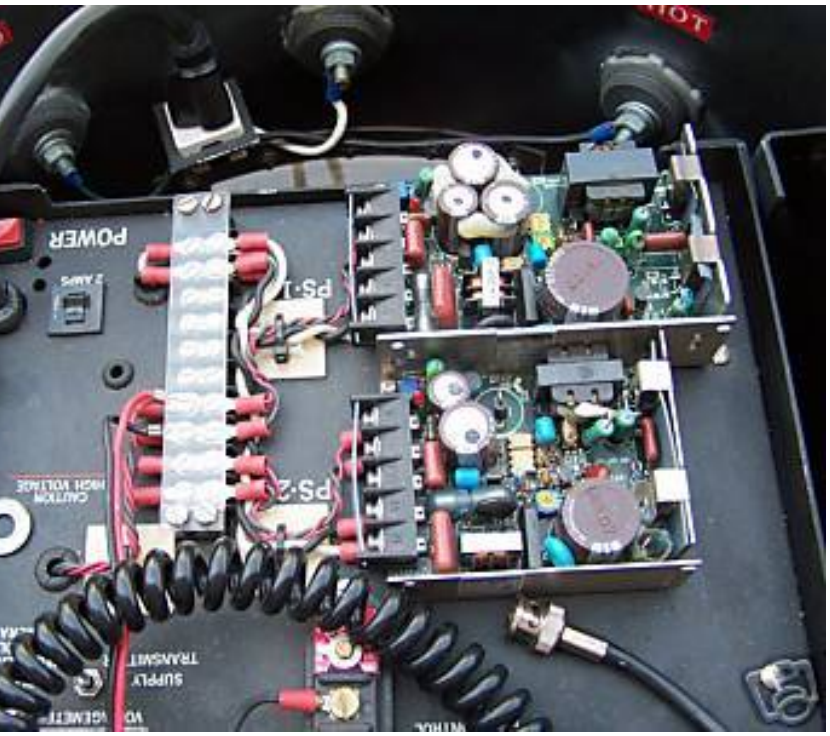
15.734 kHz NTSC
15.625 kHz PAL

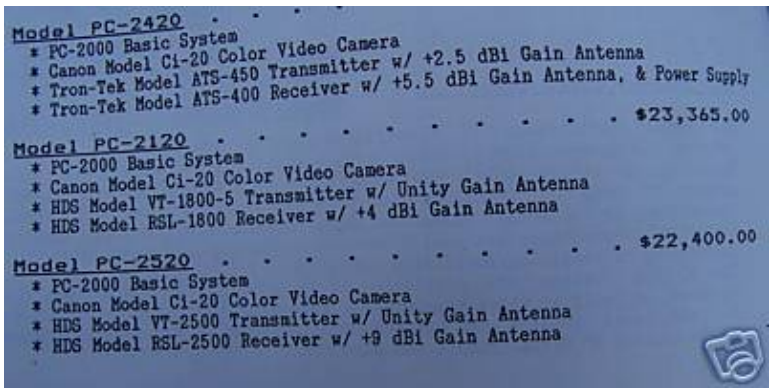


Automatic Channel Scanner



Household Data Systems (HDS) professional–level wireless video surveillance system. Complete with a fake pole–pig transformer housing and a $22,000 dollar price tag. The "1800" and "2500" in the model numbers most likely refers to the frequency bands they operated at. The Motorola HT most likely handled the camera pan/tilt/zoom controls.





Model PC-2420 . . . . . .
* PC-2000 Basic System
* Canon Model Ci-20 Color Video Camera
* Tron-Tek Model ATS-450 Transmitter w/ +2.5 dBi Gain Antenna
* Tron-Tek Model ATS-400 Receiver w/ +5.5 dBi Gain Antenna, & Power Supply
. . . . . $23,365.00

Model PC-2120 . . . . . .
* PC-2000 Basic System
* Canon Model Ci-20 Color Video Camera
* HDS Model VT-1800-5 Transmitter w/ Unity Gain Antenna
* HDS Model RSL-1800 Receiver w/ +4 dBi Gain Antenna
. . . . . $22,400.00

Model PC-2520 . . . . . .
* PC-2000 Basic System
* Canon Model Ci-20 Color Video Camera
* HDS Model VT-2500 Transmitter w/ Unity Gain Antenna
* HDS Model RSL-2500 Receiver w/ +9 dBi Gain Antenna

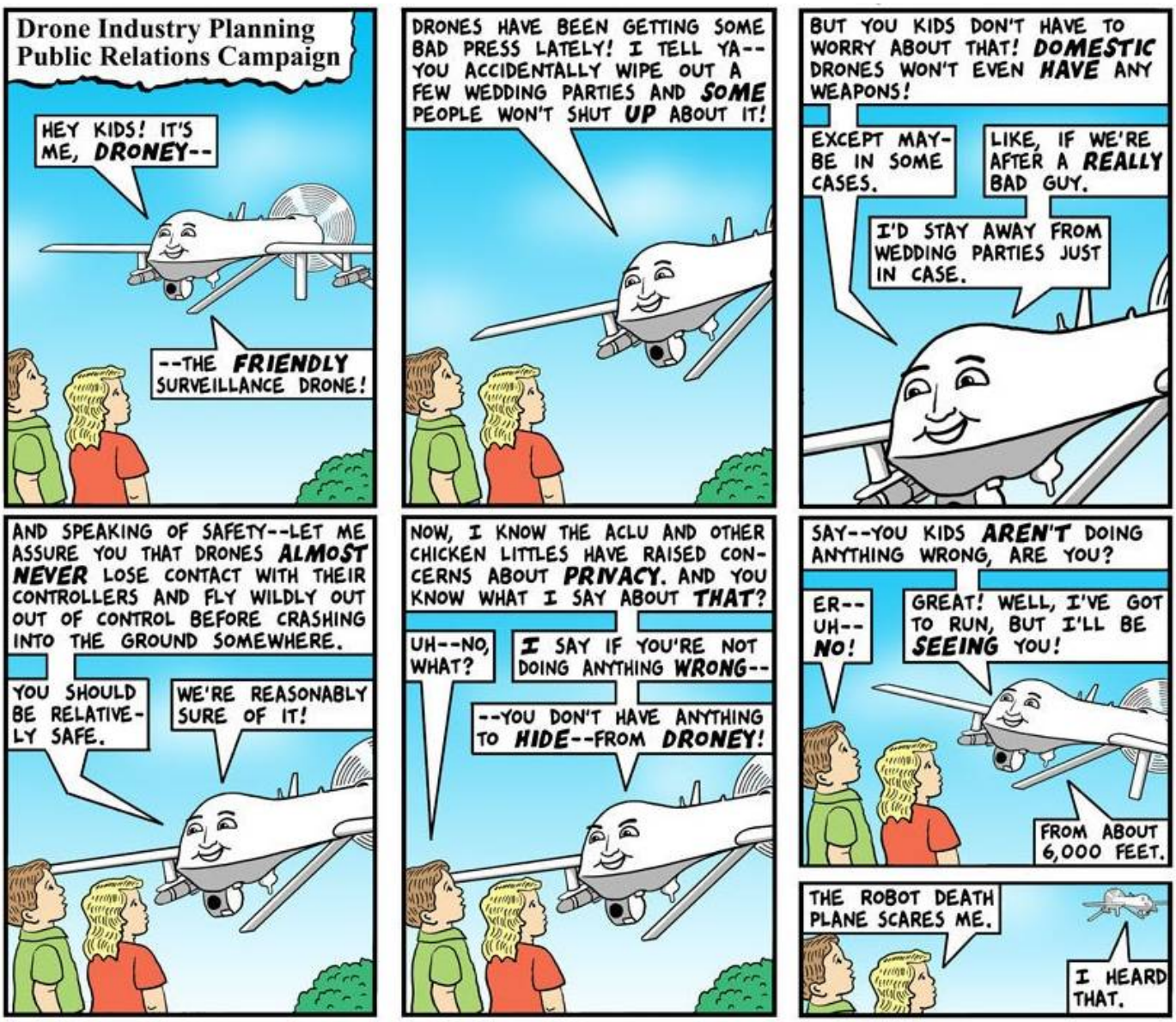
TRON–Tek (tron–tek.com) still exists today. The "400" and "450" may refer to the 400 MHz UHF band.

Commmon wireless video carrier frequencies:

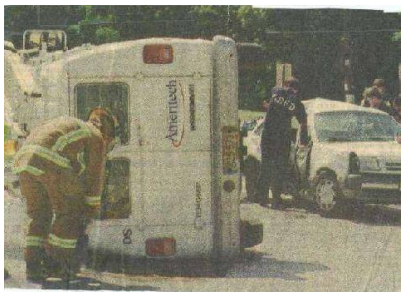
```
1710 - 1850 MHz
1990 - 2110 MHz    (Part 74/Broadcast)
2200 - 2300 MHz
2402 - 2483 MHz
2450 - 2499 MHz    (Part 74/Broadcast)
4400 - 5000 MHz
5250 - 5850 MHz
6875 - 7125 MHz    (Part 74/Broadcast)
```

The audio subcarriers can be at 4.83, 5.8, 6.0, 6.2, 6.5, 6.8, or 7.5 MHz.

Bonus


Drone Industry Planning Public Relations Campaign
HEY KIDS! IT'S ME, DRONEY--
--THE FRIENDLY SURVEILLANCE DRONE!
DRONES HAVE BEEN GETTING SOME BAD PRESS LATELY! I TELL YA--YOU ACCIDENTALLY WIPE OUT A FEW WEDDING PARTIES AND SOME PEOPLE WON'T SHUT UP ABOUT IT!
BUT YOU KIDS DON'T HAVE TO WORRY ABOUT THAT! DOMESTIC DRONES WON'T EVEN HAVE ANY WEAPONS!
EXCEPT MAYBE IN SOME CASES.
LIKE, IF WE'RE AFTER A REALLY BAD GUY.
I'D STAY AWAY FROM WEDDING PARTIES JUST IN CASE.
AND SPEAKING OF SAFETY--LET ME ASSURE YOU THAT DRONES ALMOST NEVER LOSE CONTACT WITH THEIR CONTROLLERS AND FLY WILDLY OUT OUT OF CONTROL BEFORE CRASHING INTO THE GROUND SOMEWHERE.
YOU SHOULD BE RELATIVELY SAFE.
WE'RE REASONABLY SURE OF IT!
NOW, I KNOW THE ACLU AND OTHER CHICKEN LITTLES HAVE RAISED CONCERNS ABOUT PRIVACY. AND YOU KNOW WHAT I SAY ABOUT THAT?
UH--NO, WHAT?
I SAY IF YOU'RE NOT DOING ANYTHING WRONG--
--YOU DON'T HAVE ANYTHING TO HIDE--FROM DRONEY!
SAY--YOU KIDS AREN'T DOING ANYTHING WRONG, ARE YOU?
ER--UH--NO!
GREAT! WELL, I'VE GOT TO RUN, BUT I'LL BE SEEING YOU!
FROM ABOUT 6,000 FEET.
THE ROBOT DEATH PLANE SCARES ME.
I HEARD THAT.

End of Issue #107

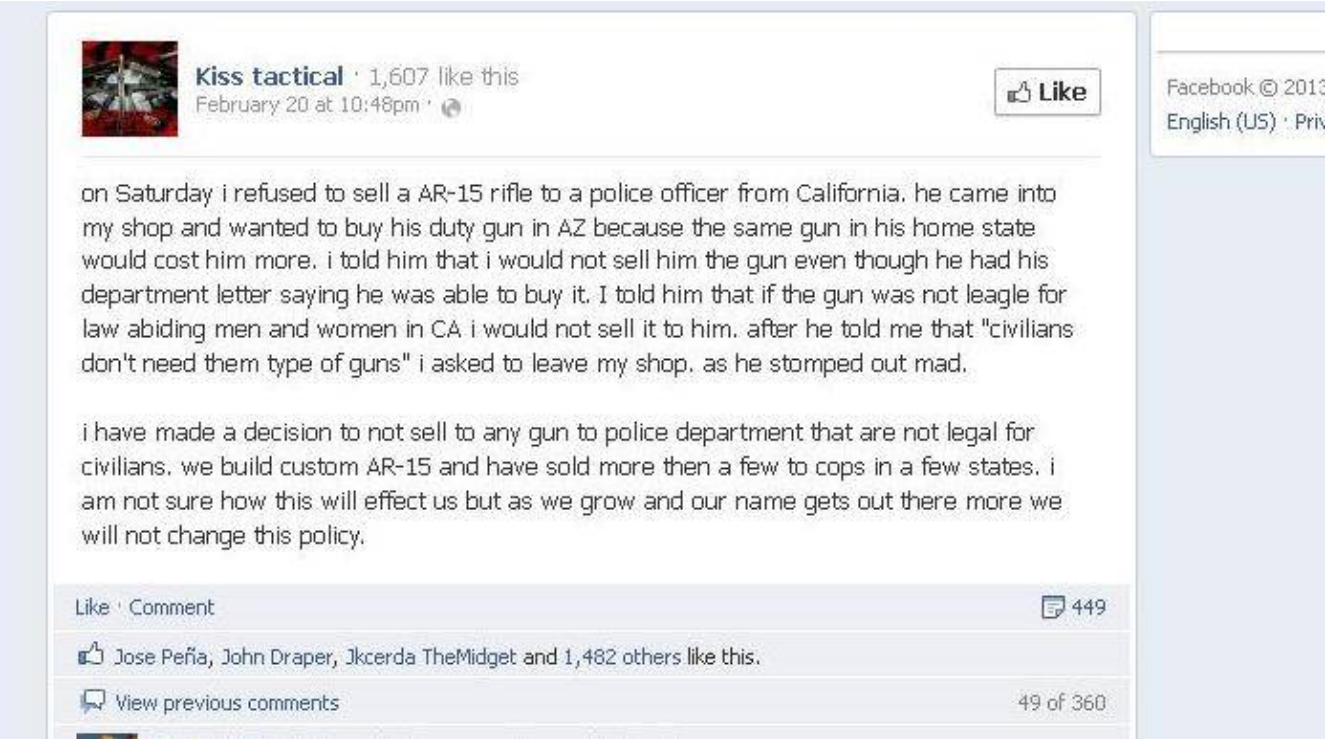


Any Questions?

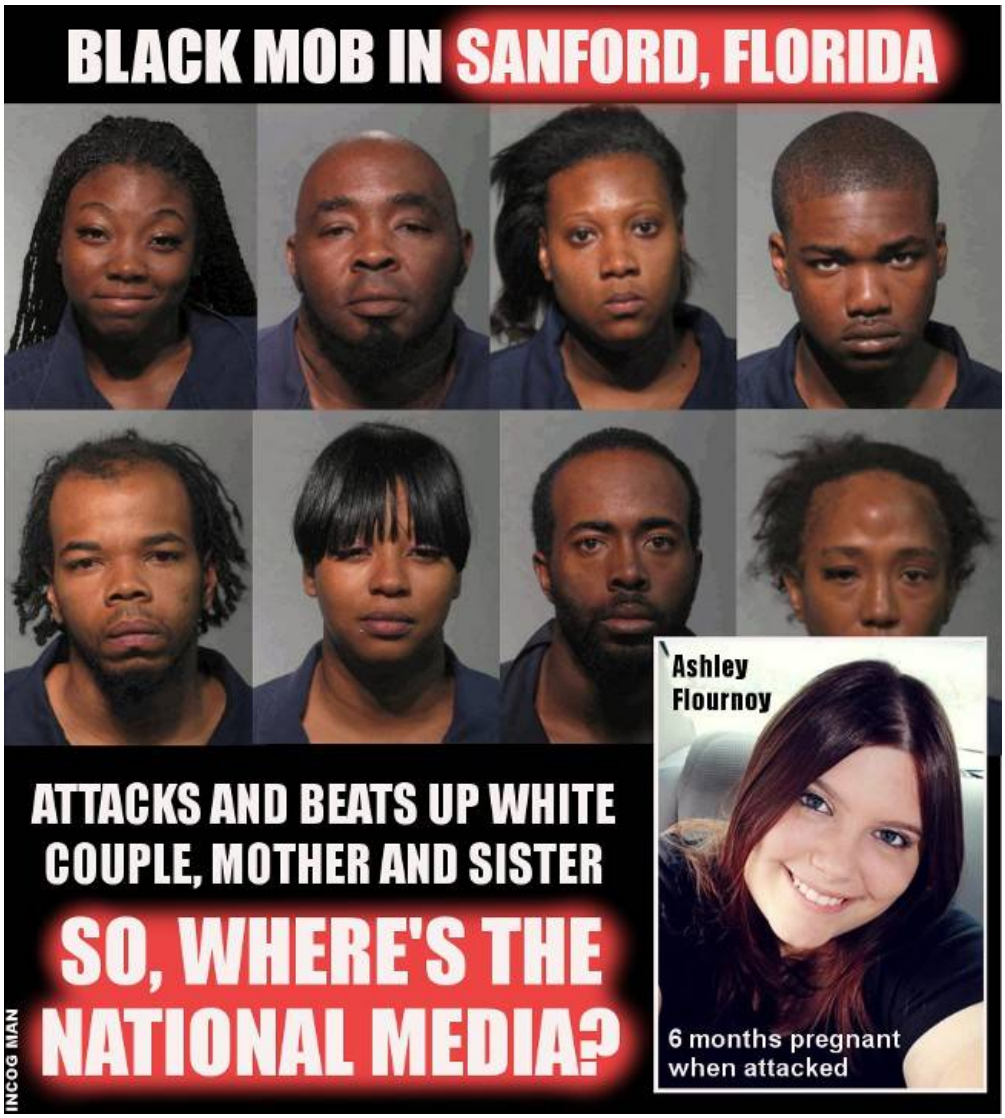
Editorial and Rants

"Comrades! Turn in your weapons."

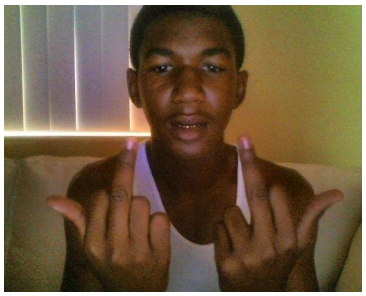
Anti–gun poster from the 1918 Jewish Bolshevik "revolution" in Russia. This resulted in millions of innocent gentiles being killed so a handful of unelected oligarchs could control Russia's natural (and political) resources.



Glad to see there are still honest businesses and people out there...



Does Sanford, Florida sound familar? Yep, that's where Trayvon Martin went to the giant watermelon patch in the sky!



Obama's Son

Recently, in that same city, six negroes attacked a pregnant White woman and, *well...*, there won't be any protests or outrage in the media. Change!

Contact your local Congress and Senate representatives and demand they pass "Nigger and Jew Control" laws at once!

(http://incogman.net/2013/02/jew-controlled-media-continues-the-white-hating-bs)

Actual targets being purchased by the Department of Homeland Security (DHS). They are being sold by Law Enforcement Targets, Inc. as part of their "No More Hesitation" product line. *Really...*

Remember, the DHS was the essentially the brainchild of Israeli dual–citizen Michael Chertoff. His company, The Chertoff Group, gets all those expensive government contracts for providing "security consulting." Cronyism at its finest...

See the Jew: Michael Chertoff

More Marxist thought crimes... Hope these "teachers" don't realize Crayons kinda look like bullets! You're pretty much insane if you send your kids to public schools at this point...

Student Suspended for Shaping Pop–Tart Into Gun

March 3, 2013 – *From: ktnv.com*

by Krista Hostetler

Baltimore, MD (KTNV) –– A student in Baltimore was suspended over breakfast.

7–year–old Josh Welch was eating a Pop–Tart at school. A teacher saw the pastry and said she thought it looked like it was being shaped into a gun.

The teacher also said she heard Welch say, "Bang Bang" while he was holding it.

That was enough to get him suspended.

Welch said his teacher got it completely wrong, "It was already a rectangle and I just kept on biting it and tore off the top, and it kind of looked like a gun but it wasn't."

Welch said he was trying to shape the Pop–Tart into a mountain.

The school sent out a letter late in the day to parents explaining what happened and why they thought it was a threat saying, "A student used food to make an inappropriate gesture."

Welch was suspended for two days.

Celebrating Purim in Israel

Seven–year–old twins Ilay and Nehaoray in their "Twin Towers" costumes. Remember, the 9/11 terrorist attacks where the result of supporting Israel in the first place! Wake up *goyim...*

(shalomlife.com/culture/18828/kids–purim–costume–idea–the–burning–twin–towers–photo)