MOBILE RADIO

INSTRUCTIONS

FOR

# TRANSMITTER CONTROL BOARD 19D429082G1

LBI30710 (DF4098)

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## DESCRIPTION

The 19D429082G1 Transmitter Control Board is used with the 19D416660 Transmitter Control Board for providing three or four-frequency transmit control functions in MASTR® II Tone Remote Control Base Stations. The 19D416660 Board provides two-frequency transmit control and the 19D429082 provides the third and fourth frequency control.

## CIRCUIT ANALYSIS

When a function tone frequency of 1350 Hertz is applied to the audio pair at the remote control console, the tone is applied to LIMITED AUDIO lead A10 on the board. An LC filter, composed of L1-C1 is tuned to the 1350 Hz function tone and the resulting output voltage turns off diode CR1 on the positive peaks and allows Q1 to turn on through R2. Conduction of Q1 applies a low to the input of gate U1-D, pin 13.

The grounded Secur-it DET lead D7 is connected to inverter U3-C, applying a high to the input of U1-A. The low output of U1-A is connected back to U1-D (pin 12), latching the flip-flop. The low output of U1-A is also inverted by U1-C and applied to NAND gate U1-B. The inverted high Secur-it DET lead is also connected to the input of U1-B. The resultant output of U1-B (pin 6) is inverted by U3-B and this high turns on Q3.

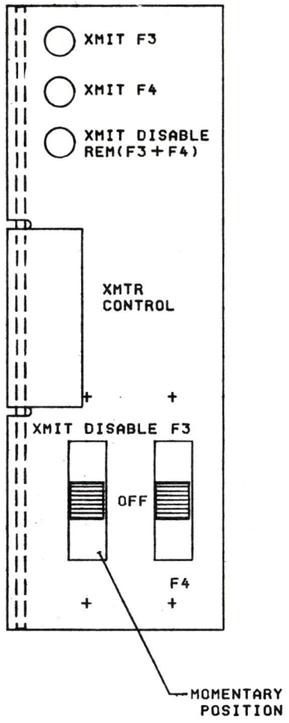
Conduction of Q3 grounds the PTT path to key the station transmitter. The high output of U1-C turns on Q13, grounding the LIMITED AUDIO path as long as the flip-flop remains latched. Unkeying the transmitter removes the ground from DET lead D7, applying a low to pin 2 of U1-A. This unlatches the flip-flop. Operating the XMIT DISABLE switch S2 to the DISABLE position opens the PTT path and applies ground to the XMIT DISABLE Indicator LED CR8, turning on the light.

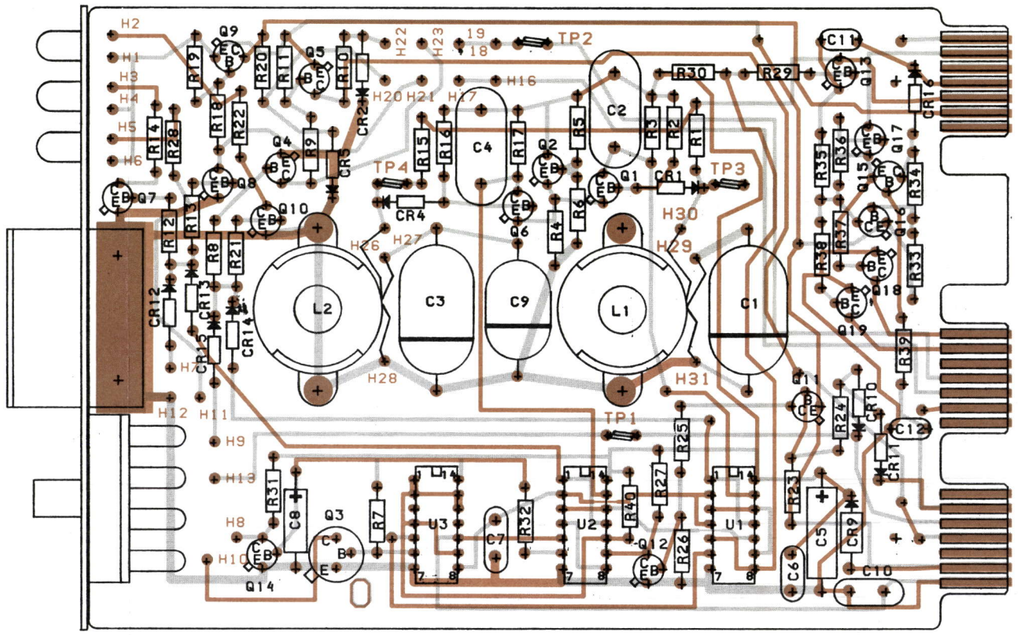
When TX F3 tone is detected, the high at pin 11 of U1-D is passed by CR14 to turn on Q4. Conduction of Q4 applies ground to the XMIT F3 lead C4 to select the F3 transmitter oscillator. The high from U1-D (pin 11) also operates Q10, turning on the XMIT F3 LED CR6.

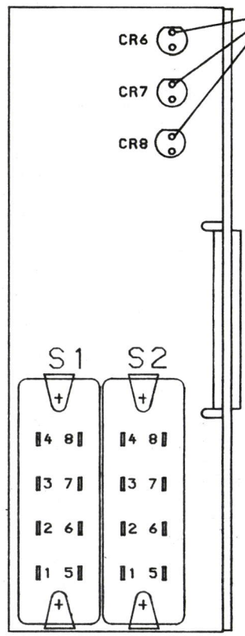
When Q4 conducts, the low from the collector is applied to the base of Q5, turning on the transistor. The resulting high at the collector of Q5 is connected to the TX F3 INTERCONNECT lead D4. The high on the AUDIO MUTE lead D2 (when the Secur-it tone DETECT function is active) turns on Q15 which, in turn, turns on Q16. Conduction of Q16 operates Q17, Q18 and Q19, muting the receiver 2, receiver 3 and receiver 4 audio.

When TX F4 tone (1250 Hz) is selected at the remote control console, the tone is detected at the F4 filter (L2-C3), reverse biasing CR4 and turning on Q6. This latches flip-flop U2-A, U2-D and applies a low to gate U1-C (pin 10). The transmitter is keyed as previously described. The high output of U2-D turns on Q8 which, in turn, grounds the XMIT F4 lead C5 to select the transmit F4 oscillator. Conduction of Q8, also operates Q9, applying a high to the TX F4 INTERCONNECT lead A9. When the TX F4 is selected, the high from the output of U2-D also turns on Q7, applying a low to XMT F4 Indicator LED CRT to turn on the light.

In local PTT operation, with no function tone present on the LIMITED AUDIO path, the Secur-it DET lead is high. Grounding the local PTT lead D13 using the local microphone PTT turns on Q11 and keys the transmitter. The low input to U2-C is inverted and applied to NAND gate U2-B. The Secur-it DET lead, which is high, is also connected to NAND gate U2-B. The resulting low output of U2-B turns Q14 off and allows the collector voltage to go high. This high forward biases either CR12 or CR15, depending on the position of S1. If F3 is selected by S1, CR15 is forward biased and turns on Q4 which grounds the F3 oscillator. If F4 is selected by S1, CR12 is forward biased and turns on Q8 which grounds the F4 oscillator. Switch S2 is used to disable remote PTT.



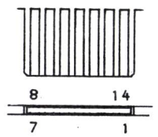




REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS

| FROM | TO |
|---|---|
| CR6-ANODE | H1 |
| CR6-CATHODE | H2 |
| CR7-ANODE | H4 |
| CR7-CATHODE | H3 |
| CR8-ANODE | H6 |
| CR8-CATHODE | H5 |
| S1-1 | H7 |
| S1-2 | H8 |
| S1-2 | S1-3 |
| S1-4 | H9 |
| S2-3 | H12 |
| S2-3 | S2-2 |
| S2-4 | H11 |
| S2-5 | H10 |
| S2-6 | H13 |
| S2-7 | S2-5 |
| H23 | H19 |
| H21 | H17 |
| L1-Y | H29 |
| L1-R OR GY | H30 |
| L1-BK | H31 |
| L2-Y | H26 |
| L2-R OR GY | H27 |
| L2-BK | H28 |

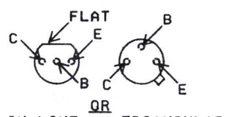
SECTION "B-B"




SOLDER SIDE
TYP. NUMBERING OF
CONTACT FINGERS.

DETAIL "A"

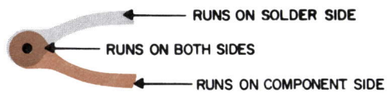
LEAD IDENTIFICATION
FOR Q1-Q18




TOP VIEW

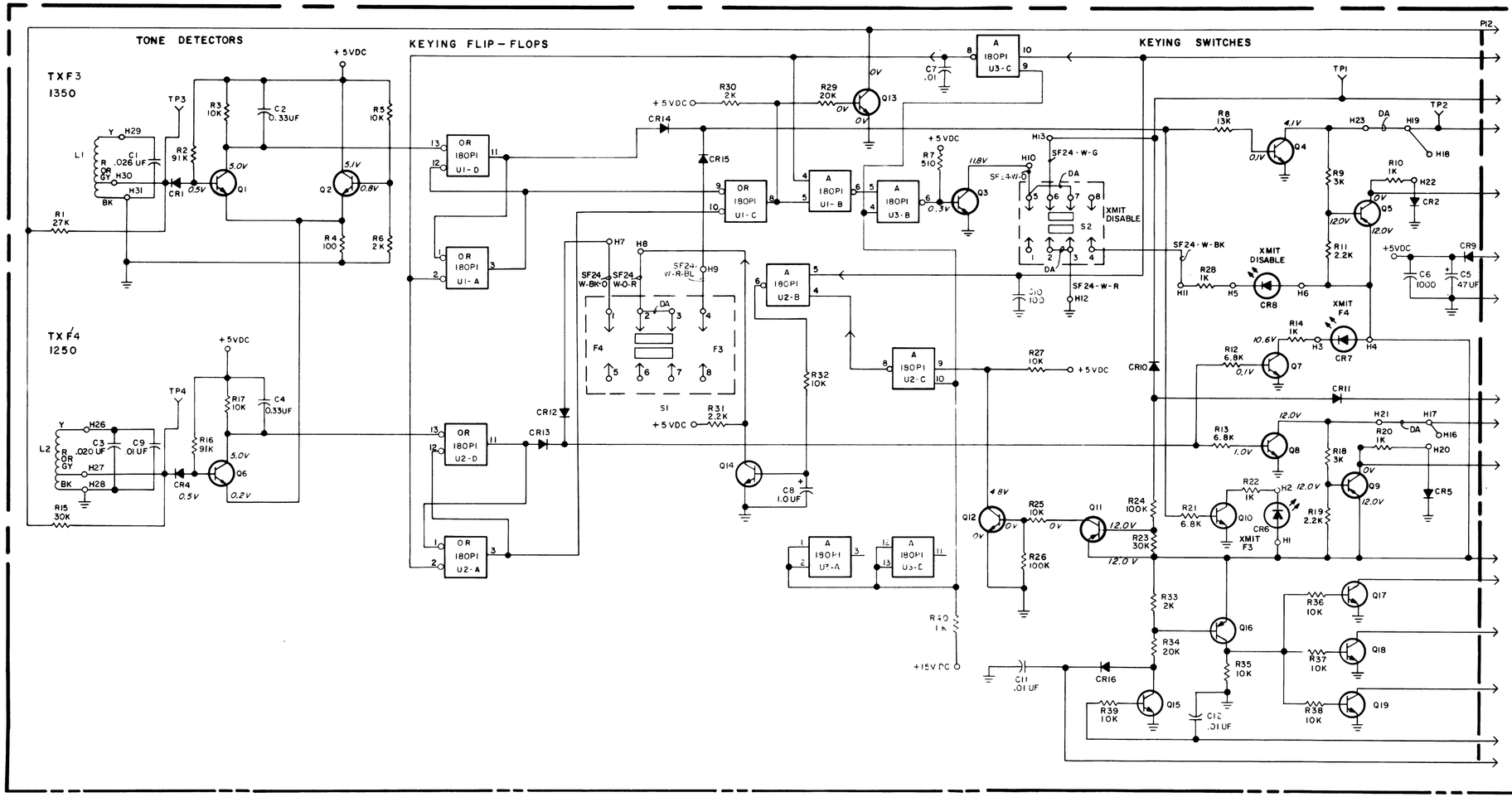
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(19D429084, Rev. 0)
(19B232316, Sh. 1, Rev. 0)
(19B232316, Sh. 2, Rev. 0)




# OUTLINE DIAGRAM

TRANSMITTER CONTROL BOARD
19D429082G1




NOTES:
1 PIN 7 OF ALL IC'S ARE CONNECTED TO GRD.
PIN 14 OF ALL IC'S ARE CONNECTED TO +5VDC.

2 ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS; CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

(19R622328, Rev. 0)

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

| MODEL NO | REV LETTER |
|---|---|
| 19D429082G1 | |

# SCHEMATIC DIAGRAM

## TRANSMITTER CONTROL BOARD 19D429082G1

Issue 1

## PARTS LIST

TRANSMITTER CONTROL BOARD
19D429082G1

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C1 | 19A116738P15 | Polystyrene: 1250 pf ±2.5%, 26K VDCW; sim to Mial Series 617. |
| C2 | 19A116080P10 | Polyester: 0.33 µf ±20%, 50 VDCW. |
| C3 | 19A116738P14 | Polystyrene: 0.020 µF ±2.5%, 33 VDCW. |
| C4 | 19A116080P10 | Polyester: 0.33 µF ±20%, 50 VDCW. |
| C5 | 5496267P2 | Tantalum: 47 µF ±20%, 6 VDCW, sim to Sprague Type 150D. |
| C6 | 5494481P111 | Ceramic disc: 150 pf, ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C7 | 7491827P102 | Ceramic disc: 0.005 µF ±80% - 20%, 50 VDCW; sim to Sprague Type 40C141. |
| C8 | 5496267P17 | Tantalum: 1.0 µF ±20%, 35 VDCW; sim to Sprague Type 150D. |
| C9 | 19A116738P3 | Polystyrene: 0.010 µF ±2.5%, 33 VDCW; sim to Mial Series 617. |
| C10 | 5490008P127 | Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C11 and C12 | 19A116080P1 | Polyester: 0.01 µF ±20%, 50 VDCW. |
| | | - - - - - - - - - - DIODES - - - - - - - - - - |
| CR1 and CR2 | 19A115250P1 | Silicon, fast recovery, 225 mA, 50 PIV. |
| CR4 and CR5 | 19A115250P1 | Silicon, fast recovery, 225 mA, 50 PIV. |
| CR6 thru CR8 | 19A134146P4 | Diode, optoelectronic: yellow; sim to Opcoa LSM-23L. |
| CR9 | 4037822P1 | Silicon, 1000 mA, 400 PIV. |
| CR10 thru CR16 | 19A115250P1 | Silicon, fast recovery, 225 mA, 50 PIV. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - - |
| L1 and L2 | 19B205254G6 | Coil. Includes: |
| | 19B209407P4 | Tunning slug. |
| | 19B209407P101 | Tunning slug. |
| | | - - - - - - - - - PRINTED BOARDS - - - - - - - - - |
| P12 | | Part of printed board 19D429083P1. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1 and Q2 | 19A115910P1 | Silicon, NPN; sim to Type 2N3904. |
| Q3 | 19A115300P4 | Silicon, NPN. |
| Q4 | 19A115910P1 | Silicon, NPN; sim to Type 2N3904. |
| Q5 | 19A115852P1 | Silicon, PNP; sim to Type 2N3906. |
| Q6 thru Q8 | 19A115910P1 | Silicon, NPN; sim to Type 2N3904. |
| Q9 | 19A115852P1 | Silicon, PNP; sim to Type 2N3906. |
| Q10 | 19A115910P1 | Silicon, NPN; sim to Type 2N3904. |
| Q11 | 19A115852P1 | Silicon, PNP; sim to Type 2N3906. |
| Q12 | 19A115910P1 | Silicon, NPN; sim to Type 3904. |
| Q13 | 19A116774P1 | Silicon, NPN; sim to Type 2N5210. |
| Q14 and Q15 | 19A115910P1 | Silicon, NPN; sim to Type 2N3904. |
| Q16 | 19A115852P1 | Silicon, PNP; sim to Type 2N3906. |
| Q17 thru Q19 | 19A115910P1 | Silicon, NPN; sim to Type 2N3094. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R1 | 3R152P273J | Composition: 27K ohms ±5%, 1/4 w. |
| R2 | 3R152P913J | Composition: 91K ohms ±5%, 1/4 w. |
| R3 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R4 | 3R152P101J | Composition: 100 ohms ±5%, 1/4 w. |
| R5 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R6 | 3R152P202J | Composition: 2K ohms ±5%, 1/4 w. |
| R7 | 3R152P511J | Composition: 510 ohms ±5%, 1/4 w. |
| R8 | 3R152P133J | Composition: 13K ohms ±5%, 1/4 w. |
| R9 | 3R152P302J | Composition: 3K ohms ±5%, 1/4 w. |
| R10 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R11 | 3R152P222J | Composition: 2.2K ohms ±5%, 1/4 w. |
| R12 and R13 | 3R152P682J | Composition: 6.8K ohms ±5%, 1/4 w. |
| R14 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R15 | 3R152P303J | Composition: 30K ohms ±5%, 1/4 w. |
| R16 | 3R152P913J | Composition: 91K ohms ±5%, 1/4 w. |
| R17 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R18 | 3R152P302J | Composition: 3K ohms ±5%, 1/4 w. |
| R19 | 3R152P222J | Composition: 2.2K ohms ±5%, 1/4 w. |
| R20 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R21 | 3R152P682J | Composition: 6.8K ohms ±5%, 1/4 w. |
| R22 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R23 | 3R152P303J | Composition: 30K ohms ±5%, 1/4 w. |
| R24 | 3R152P104J | Composition: 100K ohms ±5%, 1/4 w. |
| R25 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R26 | 3R152P104J | Composition: 100K ohms ±5%, 1/4 w. |
| R27 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R28 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R29 | 3R152P203J | Composition: 20K ohms ±5%, 1/4 w. |
| R30 | 3R152P202J | Composition: 2K ohms ±5%, 1/4 w. |
| R31 | 3R152P222J | Composition: 2.2K ohms ±5%, 1/4 w. |
| R32 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R33 | 3R152P202J | Composition: 2K ohms ±5%, 1/4 w. |
| R34 | 3R152P203J | Composition: 30K ohms ±5%, 1/4 w. |
| R35 thru R39 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R40 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| | | - - - - - - - - - - SWITCHES - - - - - - - - - - |
| S1 | 19B209261P26 | Slide: 2 poles, 3 positions, .5 amps VDC or 3 amp VAC at 125 v; sim to Switchcraft 46313LDH. |
| S2 | 19B209261P17 | Slide: 2 poles, 3 positions, .5 amp VDC or 3 amp VAC at 125 v; sim to Switchcraft 4613TDH. |
| | | - - - - - - - - - - TEST POINTS - - - - - - - - - - |
| TP1 thru TP4 | 19B211379P1 | Spring (Test Point). |
| | | - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - |
| U1 thru U3 | 19A116180P1 | Quad 2-Input Nand Gate. |
| | | - - - - - - - - - MISCELLANEOUS - - - - - - - - - |
| | 19B219702P4 | Face panel. |
| | 19B219690G1 | Handle assembly. |
| | 4036555P1 | Insulator, washer: nylon. (Used with Q3). |
| | 19B201074P204 | Tap screw, Phillips POZIDRIV®. No. 4-40 x 1/4. (Secures S1 and S2). |
| | 4032480P1 | Nut, sheet spring: sim to Electronic Co. No. 440. (Secures S1 and S2). |

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES