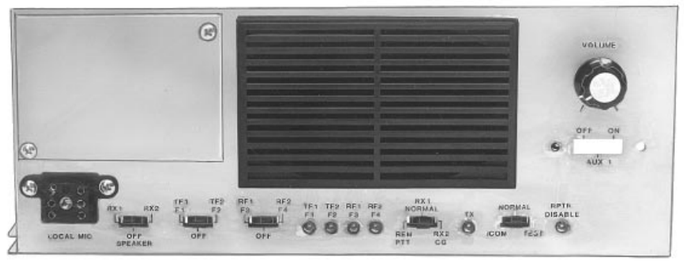
Mobile Communications



MASTR® II

REPEATER CONTROL PANEL

19B234871P1

Maintenance Manual

Ericsson GE Mobile Communications Inc.
Mountain View Road • Lynchburg, Virginia 24502

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PARTS LIST

SQUELCH OPERATED RELAY
AND
BATTERY ALARM
19B234871P105
REV. D

ISSUE 3

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	J19 / 362 - 0001	Monolithic: .1 uF, 50 v.
C2	J19 / 362 - 0001	Monolithic: .1 uF, 50 v.
C3	J19 / 390 - 0010	Tantalum: 10 uF, 16 v.
C4	J19 / 362 - 0003	Monolithic: .1 uF, 50 v.
C5 and C6	J19 / 360 - 0025	Electrolytic: 47 uF, 16 v.
C7	J19 / 390 - 0012	Tantalum: 1 uF, 25 v.
C8	J19 / 362 - 0001	Monolithic: .1 uF, 50 v.
C9	J19 / 390 - 0010	Tantalum: 10 uF, 16 v.
C10	J19 / 362 - 0006	Monolithic: .001 uF, 50 v.
C11	J19 / 362 - 0008	Monolithic: .0047 uF, 50 v.
C12 thru C15	J19 / 362 - 0003	Monolithic: .1 uF, 50 v.
		- - - - - - - - - - DIODES - - - - - - - - - -
D1	J19 / 110 - 0002	Silicon: sim to 1N4003.
D2	J19 / 112 - 0001	Light Emitting Diode: Red, sim to XC526R.
D3	J19 / 110 - 0001	Silicon: sim to 1N914.
D4 *	J19 / 110 - 0001	Silicon: sim to 1N914.
		- - - - - - - - CONNECTORS AND PLUGS - - - - - - - -
J2	J19 / 233 - 0035	Receptacle: 5 Position .1" centers.
J1216 - 7	J19 / 231 - 0025	Receptacle: 1 Position.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	J19 / 700 - 0001	4PDT: sim to HAS124.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	J19 / 180 - 0017	Silicon, NPN: sim to 2N3053.
Q2 and Q3	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q5	J19 / 180 - 0005	Silicon, PNP: sim to 2N5226.
Q6 and Q7	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q8	J19 / 180 - 0002	FET P - Channel: 2N3820.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	J19 / 313 - 1821	820 ohms ±5%, 1/2 w.
R2	J19 / 312 - 0014	33K ohms ±5%, 1/4 w.
R3	J19 / 312 - 0034	1.2K ohms ±5%, 1/4 w.
R4 *	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R5	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R6	J19 / 312 - 0014	33K ohms ±5%, 1/4 w.
R7	J19 / 312 - 0040	4.7K ohms ±5%, 1/4 w.
R8 thru R10	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R11 *	J19 / 312 - 0053	2.7K ohms ±5%, 1/4 w.
R12	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R13	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R14	J19 / 312 - 0021	12K ohms ±5%, 1/4 w.
R15	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R16	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R17	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R18	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R19	J19 / 352 - 0003	Variable: 1M ohms, 22 Turn.
R20 and R21	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R22	J19 / 351 - 0010	Variable: 50K ohms, 1 Turn Mini.
R23	J19 / 351 - 1103	Variable: 10K ohms, 1 Turn Mini.
R24	J19 / 311 - 6042	60.4K ohms ±1%, 1/4 w.
R25	J19 / 312 - 2552	25.5K ohms ±1%, 1/4 w.
R26	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R27	J19 / 312 - 1334	330K ohms ±5%, 1/4 w.
R28	J19 / 312 - 0019	
R29 and R30	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R31	J19 / 312 - 0058	68K ohms ±5%, 1/4 w.
R32	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R33	J19 / 312 - 0058	68K ohms ±5%, 1/4 w.
R34	J19 / 265 - 0004	Jumper.
R35	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R36 *	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - -
U1 and U2	J19 / 130 - 0010	Linear: Timer; LN555 (TI Only).
U3	J19 / 130 - 0120	Linear: Dual Op Amp; sim to TL062CP.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	J19 / 220 - 0003	IC Socket: 8 Pin DIP.
	J19 / 222 - 0020	Wire: 10" 22 AWG Brown. (J2 Pin 1).
	J19 / 222 - 0014	Wire: 10" 22 AWG Red. (J2 Pin 2).
	J19 / 222 - 0023	Wire: 10" 22 AWG Orange. (J2 Pin 3).
	J19 / 222 - 0018	Wire: 10" 22 AWG Yellow. (J2 Pin 4).
	J19 / 222 - 0016	Wire: 10" 22 AWG Green. (J2 Pin 5).
	J19 / 200 - 0026	Standoff: #6 - 32 x 1.25".
	J19 / 199 - 3070	Screw: #6 - 32 x .25" Phillips.
	J19 / 222 - 0021	Wire: 36" 22 AWG Black.
	J19 / 233 - 0041	Pin, Male.
	J19 / 200 - 0014	Spade: 42783 - 2.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the description of parts affected by these revisions.

REV. A - SQUELCH OPERATED RELAY 19B234871P102
BATTERY ALARM 19B234871P103
SOR / BATTERY ALARM 19B234871P105

To improve bias on RUS line, changed R4 from 3.6K to 1K ohms. Resistor R4 was 312 - 0029, 3.6K ohms.

REV. B - BATTERY ALARM 19B234871P103
SOR / BATTERY ALARM 19B234071P105

To improve unnecessary loading of audio line, changed 555 enable circuit as follows: Removed R11 (312 - 0011 10K ohms), connected U1 pin 4 to pin 8 and connected collector of Q7 to C5.

REV. C - BATTERY ALARM 19B234871P103
SOR / BATTERY ALARM 19B234871P105

To improve Q6 bias, added R36 from collector of Q5 to base of Q6. Resistor R36 is located on the underside of the board.

REV. D - BATTERY ALARM 19B234871P103
SOR / BATTERY ALARM 19B234871P105

To improve operation of alarm tone, added D4 and R11 (312 - 0053, 2.7M ohms) between U1 pins 2 and 6. Also moved Q3 and Q7 collectors to U1 pin 2. Changed R34 to a jumper. Diode D4 and resistor R11 are located on the bottom of the board.

PARTS LIST

STATION REPEATER CONTROL PANEL
19B234871P1
MECHANICAL PARTS

ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CONNECTORS - - - - - - - - - -
J1 and J2	J19 / 233 - 0024	Receptacle: AMP 640433 - 2.
J3	J19 / 233 - 0036	Receptacle: 4 - pin, .156" centers.
J1216	J19 / 234 - 0064	Connector. (MIC Connector).
	J19 / 234 - 0067	Pins. (Used with J19 / 234 - 0064).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R75	J19 / 340 - 0001	Potentiometer: 250 ohms. (Volume Control).
		- - - - - - - - - - SWITCHES - - - - - - - - - -
SW1	J19 / 611 - 0035	DPTT Locking.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	J19 / 200 - 0087	Rivet: .187". (Used with SW1).
	J19 / 199 - 0031	Nut, Pem: S - 632 - 2 - Cl.
	J19 / 199 - 0035	Pem, #6 - 32 Thread - Thru.
	N80P13004B6	Screw: #6 - 32 x 1/4".
	N210P13B	Nut: #6 - 32.
	J19 / 199 - 3094	Screw, Nylon: #6 - 32 x 3/8".
	J19 / 200 - 0010	Clip, Push On: C19275 - 011.
	J19 / 200 - 0038	Stand - off: #6 - 32 x .312".
	J19 / 202 - 0001	Knob, Volume. (Used with R75).
	J19 / 900 - 0050	Grill, Speaker: 3" x 5".
	J19 / 900 - 5100S	Cabinet, Screened.
	J19 / 900 - 5101A	Blank Meter Cover, Anodized.
	J19 / 901 - 0001A	Speaker: 8 ohms, 3" x 5".
	J19 / 901 - 0016	Cloth, Speaker: Black.

PRODUCTION CHANGES

Changes in the equipment to improve or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the descriptions of parts affected by these revisions.

REV. A - STATION REPEATER CONTROL PANEL 19B234871P1
Original release.

REV. B - STATION REPEATER CONTROL PANEL 19B234871P1
This revision incorporated changes to permit the use of the GE - MARC V interface. Added R88 (100K ohms) to bottom of board. (Board Rev. H).

REV. C - STATION REPEATER CONTROL PANEL 19B234871P1
To improve voltage regulator operation by permitting operation to - 20% of rated input voltage, made the following changes: Changed U3 and U4 regulators and deleted U1. Also deleted C1, C2, C12, C25, R2, R3, R8, R9 R34 and R35 near the regulators and changed R1. This revision also improved operation by isolating transmit audio combinder / output amplifier grounds near U2. H29 and H30 where added and jumpered. Also Local PTT switch SW2, and H31 were added. (Board Rev. J).
Note: H29 - H30 is removed on all units S / N 8496837 and after.

REV. D - STATION REPEATER CONTROL PANEL 19B234871P1
New style metal cabinet.

REV. E - STATION REPEATER CONTROL PANEL 19B234871P1
To update synthesizer lockinq circuitry and increase TX audio output, made the followinq chanqes: Added C12, D20, P4 P5 and H32 - H33. Changed the following components: Capacitor C8 changed from 82 pF to 18 pF, R8 changed from 4.7K to 3.9K ohms, R17 changed from 43K to 39K ohms, R19 changed from 100K to 750K ohms and R88 changed from 100K to 10K ohms. (Board Rev. K and L.).

REV. F - STATION REPEATER CONTROL PANEL 19B234871P1
To improve operation on GE - MARC V stations, reversed P4 - 1 and P5 - 2 connections. This change corrects audio paths for busy tone notch filter (BUSY FILTER OUT) and the phone bandpass filter (FILTERED AUDIO IN).

REV. - - STATION REPEATER CONTROL PANEL 19B234871P1
9GE - MARC Repeaters Only)
To improve acquisition tone access time, removed C35.

REV. G - STATION REPEATER CONTROL PANEL 19B234871P1
To improve noise margin of AND gate, also to provide noise only squelch for audio path the following changes were made:
R30 from 10K to 22K, R31 from 22K to 10K and R29 from 68K to 22K.. Added into circuits used is J1204-6 and V6B.

PARTS LIST

SQUELCH OPERATED RELAY
19B234871P102
REV. D

ISSUE 3

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	J19 / 362 - 0001	Monolithic: .1 uF, 50 v.
		- - - - - - - - - - DIODES - - - - - - - - - -
D1	J19 / 110 - 0002	Silicon: sim to 1N4003.
D2	J19 / 112 - 0001	Light Emitting Diode: Red; sim to XC526R.
D3	J19 / 110 - 0001	Silicon: sim to 1N914.
		- - - - - - - - - - CONNECTORS AND PLUGS - - - - - - - - - -
J2	J19 / 233 - 0035	Receptacle: 5 Position .1" centers.
J1214	J19 / 231 - 3109	Connector: 12 Position; sim to Molex 09 - 18 - 5121.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	J19 / 700 - 0001	4PDT: sim to HAS124.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	J19 / 180 - 0017	Silicon, NPN: sim to 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	J19 / 313 - 1821	820 ohms ±5%, 1/2 w.
R2	J19 / 312 - 0014	33K ohms ±5%, 1/4 w.
R3	J19 / 312 - 0034	1.2K ohms ±5%, 1/4 w.
R4 *	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	J19 / 222 - 0020	Wire: 10" 22 AWG Brown. (J2 pin 1).
	J19 / 222 - 0014	Wire: 10" 22 AWG Red. (J2 pin 2).
	J19 / 222 - 0023	Wire: 10" 22 AWG Orange. (J2 pin 3).
	J19 / 222 - 0018	Wire: 10" 22 AWG Yellow. (J2 pin 4).
	J19 / 222 - 0016	Wire: 10" 22 AWG Green. (J2 pin 5).
	J19 / 200 - 0026	Standoff: #6 - 32 x 1.25".
	J19 / 199 - 3070	Screw: #6 - 32 x .25", Phillips.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

BATTERY ALARM
19B234871P103
REV. D

ISSUE 3

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	J19 / 362 - 0001	Monolithic: .1 uF, 50 v.
C3	J19 / 390 - 0010	Tantalum: 10 uF, 16 v.
C4	J19 / 362 - 0003	Monolithic: .01 uF, 50 v.
C5 and C6	J19 / 360 - 0025	Electrolytic: 47 uF, 16 v.
C7	J19 / 390 - 0012	Tantalum: 1 uF, 25 v.
C8	J19 / 362 - 0001	Monolithic: .1 uF, 50 v.
C9	J19 / 390 - 0010	Tantalum: 10 uF, 16 v.
C10	J19 / 362 - 0006	Monolithic: .001 uF, 50 v.
C11	J19 / 362 - 0008	Monolithic: .0047 uF, 50 v.
C12 thru C15	J19 / 362 - 0003	Monolithic: .01 uF, 50 v.
		- - - - - - - - - - DIODES - - - - - - - - - -
D3	J19 / 110 - 0001	Silicon: sim to 1N914.
D4 *	J19 / 110 - 0001	Silicon: sim to 1N914.
		- - - - - - - - - - CONNECTORS AND PLUGS - - - - - - - - - -
J2	J19 / 233 - 0035	Receptacle: 5 Position .1" centers.
J1216 - 7	J19 / 231 - 0025	Receptacle: 1 Position.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2 and Q3	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q5	J19 / 480 - 0005	Silicon, PNP: sim to 2N5226.
Q6 and Q7	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q8	J19 / 180 - 0002	FET P - Channel: 2N3820.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R4 *	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R5	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R6	J19 / 312 - 0014	33K ohms ±5%, 1/4 w.
R7	J19 / 312 - 0040	4.7K ohms ±5%, 1/4 w.
R8 thru R10	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R11 *	J19 / 312 - 0053	2.7K ohms ±5%, 1/4 w.
R12	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R13	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R14	J19 / 312 - 0021	12K ohms ±5%, 1/4 w.
R15	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R16	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R17	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R18	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R19	J19 / 312 - 0003	Variable: 1M ohms, 22 Turn.
R20 and R21	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R22	J19 / 351 - 0010	Variable: 50K ohms, 1 Turn Mini.
R23	J19 / 351 - 1103	Variable: 10K ohms, 1 Turn Mini.
R24	J19 / 311 - 6042	60.4K ohms +1%, 1/4 w.
R25	J19 / 311 - 2552	25.5K ohms +1%, 1/4 w.
R26	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R27	J19 / 312 - 1334	330K ohms ±5%, 1/4 w.
R28	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R29 and R30	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R31	J19 / 312 - 0058	68K ohms ±5%, 1/4 w.
R32	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R33	J19 / 312 - 0058	68K ohms ±5%, 1/4 w.
R34	J19 / 265 - 0004	Jumper.
R35	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R36 *	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
		- - - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - - -
U1 and U2	J19 / 130 - 0010	Linear: Timer; LM555 (T1 Only).
U3	J19 / 130 - 0120	Linear: Dual Op Amp; sim to TL062CP.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	J19 / 220 - 0003	IC Socket: 8 Pin DIP.
	J19 / 222 - 0020	Wire: 10" 22 AWG Brown. (J2 Pin 1).
	J19 / 222 - 0014	Wire: 10" 22 AWG Red. (J2 Pin 2).
	J19 / 222 - 0023	Wire: 10" 22 AWG Orange. (J2 Pin 3).
	J19 / 222 - 0018	Wire: 10" 22 AWG Yellow. (J2 Pin 4).
	J19 / 222 - 0016	Wire: 10" 22 AWG Green. (J Pin 5).
	J19 / 200 - 0026	Standoff: #6 - 32 x 1.25".
	J19 / 199 - 3070	Screw: #6 - 32 x .25" Phillips.
	J19 / 222 - 0021	Wire: 36" 22 AWG Black.
	J19 / 233 - 0041	Pin, Male.
	J19 / 200 - 0014	Spade: 42783 - 2.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

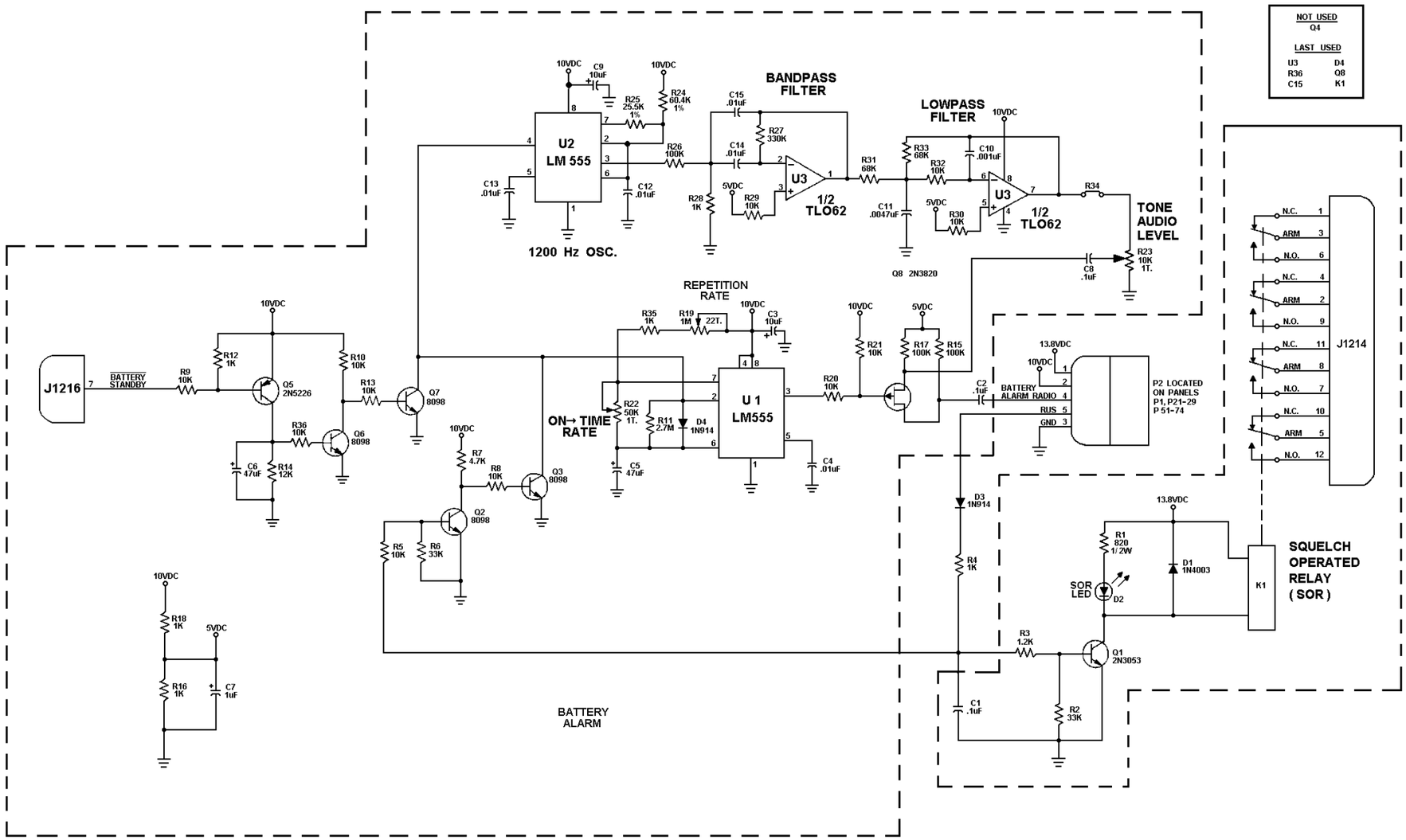
PARTS LIST

STATION REPEATER CONTROL BOARD
FOR 19B234871P1 PANEL
(J19/101 - 0162 , REV. G)

ISSUE 6

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C3	J19 / 360 - 0005	Electrolytic : 100 uF , 16 v.
C4	J19 / 360 - 0007	Electrolytic : 220 uF , 16 v.
C5 thru C7	J19 / 362 - 0001	Monolithic : .1 uF.
C8 *	J19 / 362 - 0007	Monolithic : 18 pF.
C9	J19 / 360 - 0007	Electrolytic : 220 uF , 16 v.
C10 and C11	J19 / 362 - 0011A	Monolithic : .022 uF ±2%.
C12 *	J19/390 - 0012	Tantalum : 1 uF , 25 v.
C13	J19 / 362 - 0001	Monolithic : .1 uF.
C14	J19 / 362 - 0011A	Monolithic : .022 uF ±2%.
C15	J19 / 362 - 5224	Monolithic : .22 uF, 50 v.
C16	J19 / 362 - 0011A	Monolithic : .022 uF ±2%.
C17 and C18	J19 / 362 - 0001	Monolithic : .1 uF.
C19	J19 / 390 - 0012	Tantalum : 1 uF , 25 v.
C20	J19 / 360 - 0007	Electrolytic : 220 uF , 16 v.
C21	J19 / 362 - 0011A	Monolithic : .022 uF ±2%.
C22 thru C24	J19 / 362 - 0006	Monolithic : .001 uF.
C26	J19 / 362 - 0006	Monolithic : .001 uF.
C27 and C28	J19 / 362 - 5473A	Monolithic : .047 uF ±2%.
C29	J19 / 362 - 0001A	Monolithic : .1 uF ±2%.
C30 and C31	J19 / 362 - 0001	Monolithic : .1 uF.
C32	J19 / 362 - 0006	Monolithic : .001 uF.
C33	J19 / 390 - 0007A	Tantalum : 10 uF , 25 v.
C34 thru C36	J19 / 390 - 0012	Tantalum : 1 uF , 25 v.
C37 thru C39	J19 / 362 - 0006	Monolithic : .001 uF.
C40 and C41	J19 / 362 - 0001	Monolithic : .1 uF.
C42	J19 / 362 - 0001A	Monolithic : .1 uF ±2%.
C43 thru C45	J19 / 362 - 0001	Monolithic : .1 uF.
C46	J19 / 390 - 0010A	Tantalum : 10 uF ±2%, 16 v.
C47	J19 / 362 - 5224A	Monolithic : .22 uF ±2%, 50 v.
C48	J19 / 390 - 007A	Tantalum : 10 uF , 25 v.
C49	J19 / 362 - 0011A	Monolithic : .022 uF ±2%.
C50	J19 / 362 - 0001	Monolithic : .1 uF.
C51	J19 / 362 - 0006	Monolithic : .001 uF.
		---------- DIODES ----------
D1 and D2	J19 / 110 - 0001H	Silicon : sim to 1N914.
D3	J19 / 110 - 0002	Silicon : sim to 1N4003.
D4 thru D6	J19 / 110 - 0001H	Silicon : sim to 1N914.
D7	J19 / 110 - 0002	Silicon : sim to 1N4003.
D8	J19 / 110 - 0001H	Silicon : sim to 1N914.
D9	J19 / 110 - 0002	Silicon : sim to 1N4003.
D10 thru D12	J19 / 110 - 0001H	Silicon : sim to 1N914.
D14 and D15	J19 / 110 - 0001H	Silicon : sim to 1N914.
D16 and D17	J19 / 110 - 0001	Light Emitting Diode: Red; sim to XC5569R / 526R.
D18 thru * D22	J19 / 110 - 0001H	Silicon : sim to 1N914.
		---------- CONNECTORS AND PLUGS ----------
H1 thru H4	J19 / 231 - 1002	Connector: 2 pins: sim to Molex 22 - 03 - 2021.
H5 thru H10	J19 / 231 - 1003	Connector: 3 pins: sim to Molex 22 - 03 - 2031.
H12 thru H23	J19 / 231 - 1002	Connector: 2 pins: sim to Molex 22 - 03 - 2021.
H24 thru H26	J19 / 231 - 1003	Connector: 3 pins: sim to Molex 22 - 03 - 2031.
H27 thru H30 *	J19 / 231 - 1002	Connector: 2 pins: sim to Molex 22 - 03 - 2021.
H31 *	J19 / 200 - 0015	Post: 85931 - 4
H32 * and H33 *	J19 / 231 - 1002	Connector: 2 pins: sim to Molex 22 - 03 - 2021.
	J19 / 234 - 0046	Plug, Shorting: 925250 - R. (Used with above Molex 22 - 03 - 2021 / 2031 Connectors).
		---------- JACKS ----------
J1200	J19 / 231 - 1071	Connector: 26 pins; Dual Row, .1" centers.
J1201	J19 / 231 - 3109	Connector: 12 pins; sim to Molex 09 - 18 - 5121.
J1202	J19 / 231 - 3110	Connector: 12 pins; sim to Molex 09 - 18 - 5927.
J1203	J19 / 231 - 3109	Connector: 12 pins; sim to Molex 09 - 18 - 5121.
J1204	J19 / 231 - 3110	Connector: 12 pins; sim to Molex 09 - 18 - 5927.
		---------- INDUCTORS ----------
L1	J19 / 306 - 0003	Filter Choke: 1 mH; sim to IHA - 105.
		---------- PLUGS ----------
P1	J19 / 231 - 1067	Connector: 2 pins, .156 centers.
P2	J19 / 233 - 0034	Connector: 5 pins, .100 centers.
P3	J19 / 231 - 1072	Connector: 4 pins, .156 centers.
P4 * and P5 *	J19 / 231 - 1043	Connector: 3 pins; sim to Molex 09 - 75 - 1031.
		---------- TRANSISTORS ----------
Q1	J19 / 180 - 0017	Silicon, NPN: sim to 2N3053.
Q2 and Q3	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q4	J19 / 180 - 0005	Silicon, PNP: sim to 2N5226.
Q5 thru Q7	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q8	J19 / 180 - 0005	Silicon, PNP: sim to 2N5226.
Q9	J19 / 180 - 0009	Silicon, NPN: sim to MPS8098.
Q10	J19 / 180 - 0005	Silicon, PNP: sim to 2N5226.
		---------- RESISTORS ----------
R1 * and R4	J19 / 312 - 0019	1K ohms ±5%, 1/4.
R5	J19 / 312 - 0058	68K ohms ±5%, 1/4.
R6 and R7	J19 / 311 - 4642	46.4K ohms ±1%, 1/4.
R8 *	J19 / 312 - 0070	3.9K ohms ±5% , 1/4 w.
R10	J19 / 311 - 1822	18.2K ohms ±1% , 1/4 w.
R11	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R12	J19 / 312 - 0024	5.1K ohms ±5% , 1/4 w.
R13	J19 / 311 - 1692	16.9K ohms ±1% , 1/4 w.
R14	J19 / 311 - 6982	69.8K ohms ±1% , 1/4 w.
R15	J19 / 311 - 1822	18.2K ohms ±1% , 1/4 w.
R16	J19 / 311 - 0004	23.2K ohms ±1% , 1/4 w.
R17 *	J19 / 312 - 0059	3.9K ohms ±5% , 1/4 w.
R18	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R19 *	J19 / 311 - 7503	750K ohms ±1% , 1/4 w.
R20	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R21	J19 / 311 - 3650	365 ohms ±1% , 1/4 w.
R22	J19 / 311 - 1210	121 ohms ±1% , 1/4 w.
R23	J19 / 311 - 8251	8.25K ohms ±1% , 1/4 w.
R24	J19 / 311 - 1542	15.4K ohms ±1% , 1/4 w.
R25	J19 / 311 - 5232	52.3K ohms ±1% , 1/4 w.
R26	J19 / 312 - 0019	1K ohms ±5% , 1/4 w.
R27	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R28	J19 / 312 - 0019	1K ohms ±5% , 1/4 w.
R29	J19 / 312 - 0015	22K ohms ±5% , 1/4 w.
R30	J19 / 312 - 0015	22K ohms ±5% , 1/4 w.
R31	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R32	J19 / 312 - 0019	1K ohms ±5% , 1/4 w.
R33	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R36	J19 / 311 - 5232	52.3K ohms ±1% , 1/4 w.
R37	J19 / 311 - 3482	34.8K ohms ±1% , 1/4 w.
R38	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R39	J19 / 312 - 0046	470K ohms ±5% , 1/4 w.
R40	J19 / 311 - 7872	78.7K ohms ±1% , 1/4 w.
R41	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R42	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R43	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R44	J19 / 312 - 0015	22K ohms ±5% , 1/4 w.
R45 and R46	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R47	J19 / 312 - 0019	1K ohms ±5% , 1/4 w.
R48	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R49	J19 / 312 - 0009	15K ohms ±5% , 1/4 w.
R50	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R51	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R52	J19 / 312 - 0019	1K ohms ±5% , 1/4 w.
R53	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R54	J19 / 312 - 0015	22K ohms ±5% , 1/4 w.
R55	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R56	J19 / 312 - 0015	22K ohms ±5% , 1/4 w.
R57	J19 / 311 - 2492	24.9K ohms ±1% , 1/4 w.
R58	J19 / 311 - 4992	49.9K ohms ±1% , 1/4 w.
R59	J19 / 312 - 0015	22K ohms ±5% , 1/4 w.
R60	J19 / 352 - 0005	Variable: 100K ohms, 1 Turn.
R61	J19 / 312 - 0011	10K ohms ±5% , 1/4 w.
R62	J19 / 312 - 0019	1K ohms ±5% , 1/4 w.
R62	J19 / 312 - 0045	620 ohms ±5% , 1/4 w.
R64	J19 / 312 - 0003	100K ohms ±5% , 1/4 w.
R65	J19 / 311 - 1004	1M ohms ±1% , 1/4 w.
R66	J19 / 311 - 1503	150K ohms ±1% , 1/4 w.
R67	J19 / 311 - 4323	432K ohms ±1% , 1/4 w.
R68	J19 / 312 - 0038	10 ohms ±5% , 1/4 w.
R69 and R70	J19 / 313 - 0046	620 ohms ±5%, 1/2 w.
R71	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R72 and R73	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R74	J19 / 312 - 0003	100K ohms ±5%, 1/4 w.
R76	J19 / 311 - 1782	17.8K ohms ±1%, 1/4 w.
R77	J19 / 311 - 1182	11.8K ohms ±1%, 1/4 w.
R78	J19 / 311 - 1782	17.8K ohms ±1%, 1/4 w.
R79	J19 / 311 - 8871	8.87 ohms ±1%, 1/4 w.
R80	J19 / 315 - 1180	18 ohms ±1%, 5 w.
R81	J19 / 311 - 1503	150K ohms ±1%, 1/4 w.
R82 and R83	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R84	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
R85	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R86	J19 / 351 - 1202	Variable: 2K ohms, 1 Turn.
R87 and R88 *	J19 / 312 - 0011	10K ohms ±5%, 1/4 w.
R89	J19 / 312 - 0019	1K ohms ±5%, 1/4 w.
		---------- SWITCHES ----------
SW1	J19 / 611 - 0026	Slide: 3P3T Right Angle Slide.
SW2 *	J19 /	Momentary.
		---------- INTEGRATED CIRCUITS ----------
U2	J19 / 130 - 0120	Linear: Dual Op Amp; sim to TL062CP.
U3 * and U4 *	J19 / 130 - 0277	Linear: +10 Volt Regulator; sim to LM2940.
U5	J19 / 130 - 0120	Linear: Dual Op Amp; sim to TL062CP.
U6	J19 / 130 - 0067	Digital: Quad Bilateral Switch; sim to 4066.
U7	J19 / 130 - 0238	Digital: Hex Inverter; sim to CD74C14.
U8	J19 / 130 - 0239	Digital: Programmable Timer; sim to MC14541B.
U9	J19 / 130 - 0094	Digital: Dual Monostable Multivibrator; sim to CD4538BCN.
U10	J19 / 130 - 0011	Digital: Quad 2 - Input NOR Gate; sim to CD4001.
U11	J19 / 130 - 0120	Linear: Dual Op Amp; sim to TL062CP.
U12	J19 / 130 - 0236	Linear: Voltage Regulator; sim to LM317LZ.
		---------- MISCELLANEOUS ----------
	J19 / 220 - 0003	Socket, IC: 8 Pin DIP. (Used with U2, U5 and U11).
	J19 / 220 - 0002	Socket, IC: 14 Pin DIP. (Used with U6, U7 U8 and U10).
	J19 / 220 - 0001	Socket, IC: 14 Pin DIP. (Used with U9).
	J19 / 113 - 0101	Guide, LED. (Used with D16 and D17).
	J19 / 210 - 0102	Insulator. (Used with Q1).
	J19 / 210 - 0009	Heat Sink: (Used with U3 and U4).
	J19 / 210 - 0103	Insulator: (Used with U3 and U4).
	J19 / 199 - 2002	Washer, Star: #6. (Used with U3 and U4).
	J19 / 199 - 0020	Nut, Hex: #6 - 32. (Used with U3 and U4).
	J19 / 199 - 3070	Screw: #6 - 32 x .25". (Used with U3 and U4).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



(4152-S-00, Sh. 1, Rev. 0)

SQUELCH OPERATED RELAY 19B234871P102
BATTERY STANDBY ALARM TONE 19B234871P103
SOR/BATTERY STANDBY ALARM TONE 19B234871P105

	REPEATER TIMER			
	1 MIN	3 MIN	10 MIN	TEST 22 1/2 SEC
H5 TO H6	X			X
H6 TO H7		X	X	
H8 TO H9	X			X
H9 TO H10		X	X	
H16 TO H17	X		X	

	REPEATER DROPOUT TIMER		
	1 SEC	3 SEC	10 SEC
H18 TO H19	X		
H20 TO H21	X	X	

NOTE: H14 TO H15 REMOVED FOR REPEATER TIMER DISABLE.
H22 TO H23 REMOVED FOR TONE SWITCH ENABLE.
X - JUMPER INSTALLED.

BACK TO BACK REPEATERS:

REMOVE H24 TO H25 AND INSTALL H24 TO H26. REMOVE H27 TO H28 WHEN USING THE MARC V FILTER BOARD.

NOTE: REMOVE H29 TO H30 TO ISOLATE TX AUDIO LOW FROM BOARD GROUND REMOVE H32 TO H33 FOR GE MARC V WITH SYNTHESIZED TRANSMITTER.

VOLTAGE MEASUREMENT CONDITIONS AND SYMBOLS		
FUNCTION LINE	ACTIVE	INACTIVE
TX OSC CONTROL	■	□
LOCAL PTT	◆	◇
RPTR PTT	●	○
TONE SWITCH	▲	△
RUS	▼	▽
ALL VOLTAGES LISTED IN VOLTS DC		
UNLESS NOTED:	SOLID JUMPERS IN DOTTED JUMPERS OUT	

	CHANNEL GUARD	
	WITH	WITHOUT
H1 TO H2		X
H1 TO H3	X	
H2 TO H4	X	X
H12 TO H13	X	

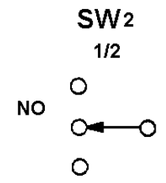
NOTE: H2 TO H4 REMOVED FOR CHANNEL GUARD REPEATER USING DECODE ONLY.

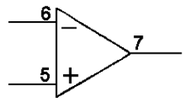
LAST REFERENCE DESIGNATORS USED:

U12	C51	D22
R91	Q10	H33
P5		

NOT USED:

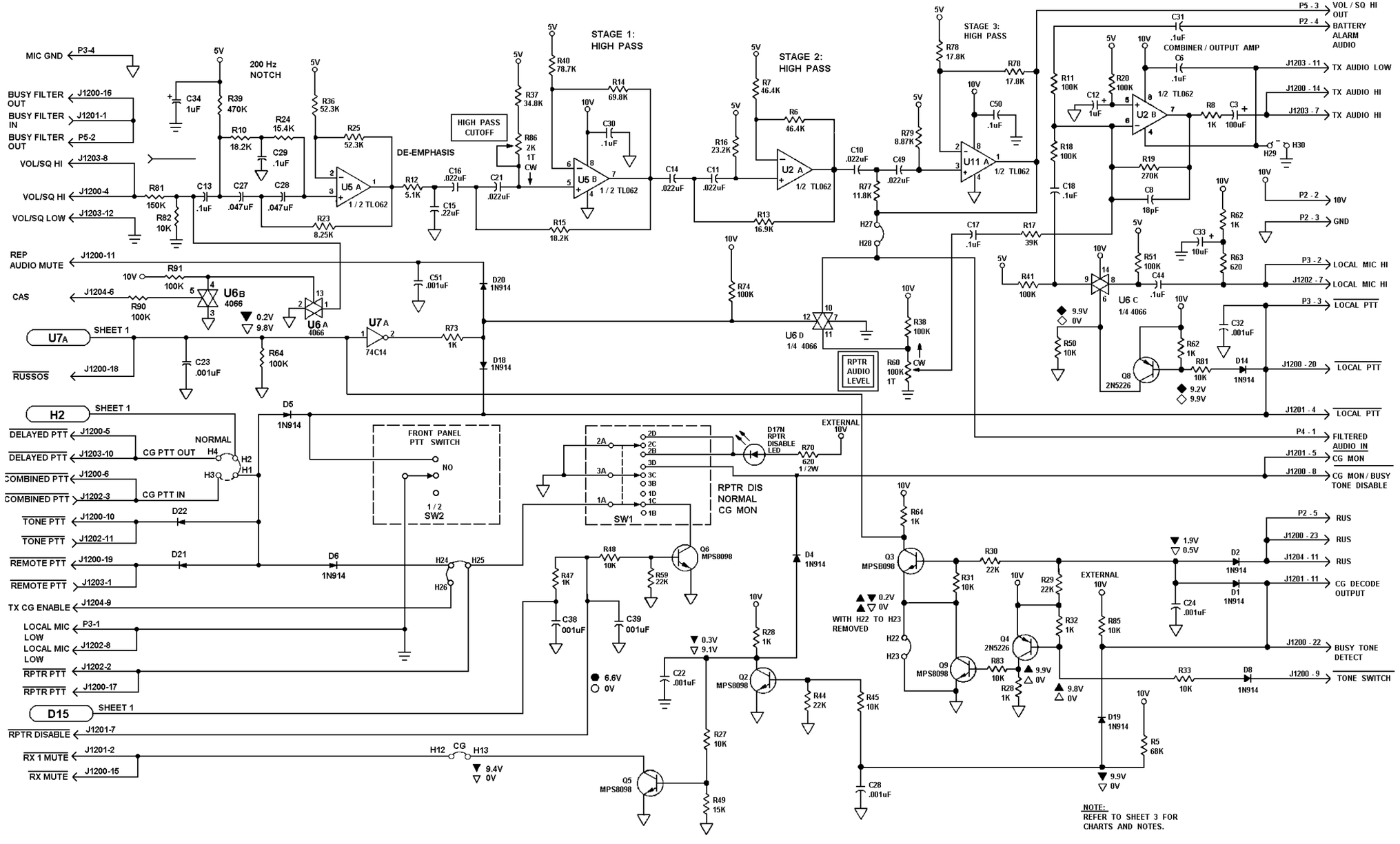
J1200 - 12, 24, 25, 26, 27, 28
J1201 - 6, 8, 9, 10, 12
J1202 - 4, 5, 6, 9, 10, 12
J1204 - 3, 7, 8, 12
P5 - 1
D13
H11
U1
R2, R3, R9, R34, R35
C1, C2, C25





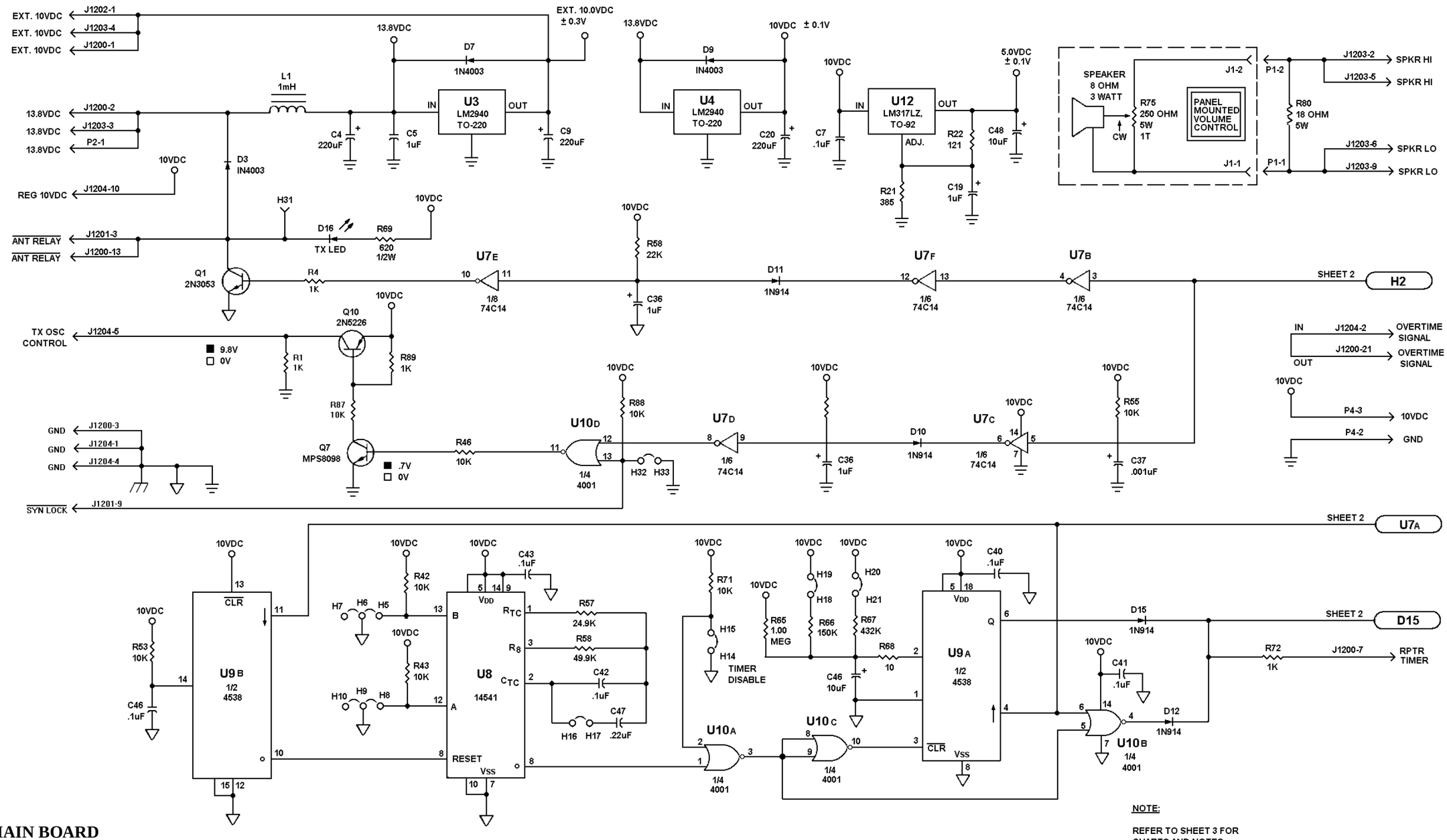
MAIN BOARD
Legend Information
Sheet 3 of 3

(4152-S-04, Rev. G)



MAIN BOARD
Audio and Switching
Sheet 2 of 3

(4152-S-03 Rev. G)

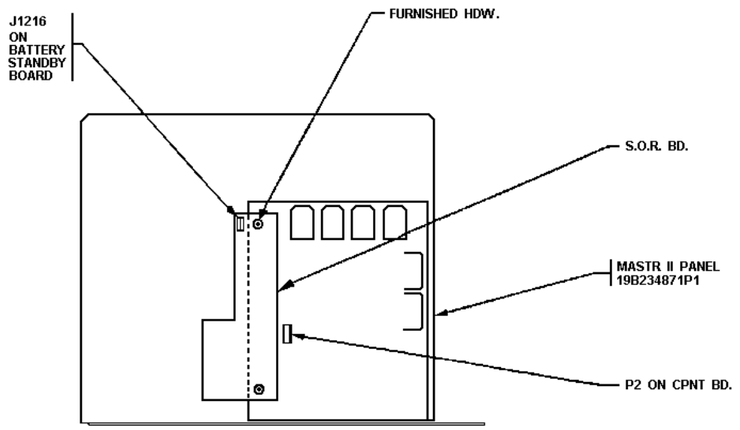


MAIN BOARD
Regulators and Timers
Sheet 1 of 3

(4152-S-02, Rev. G)

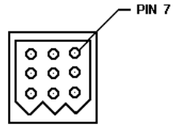
② THIS INSTRUCTION COVERS A SQUELCH OPERATED RELAY BOARD. (S.O.R. BD) 19B234871P102 MOUNTING TO THE MASTR II PANEL.

MOUNT S. O. R. BD. TO MASTR II PANEL AS SHOWN BELOW USING HARDWARE FURNISHED. PLUG CABLE ONTO P2 ON COMPONENT BD. ON PANEL AS SHOWN.



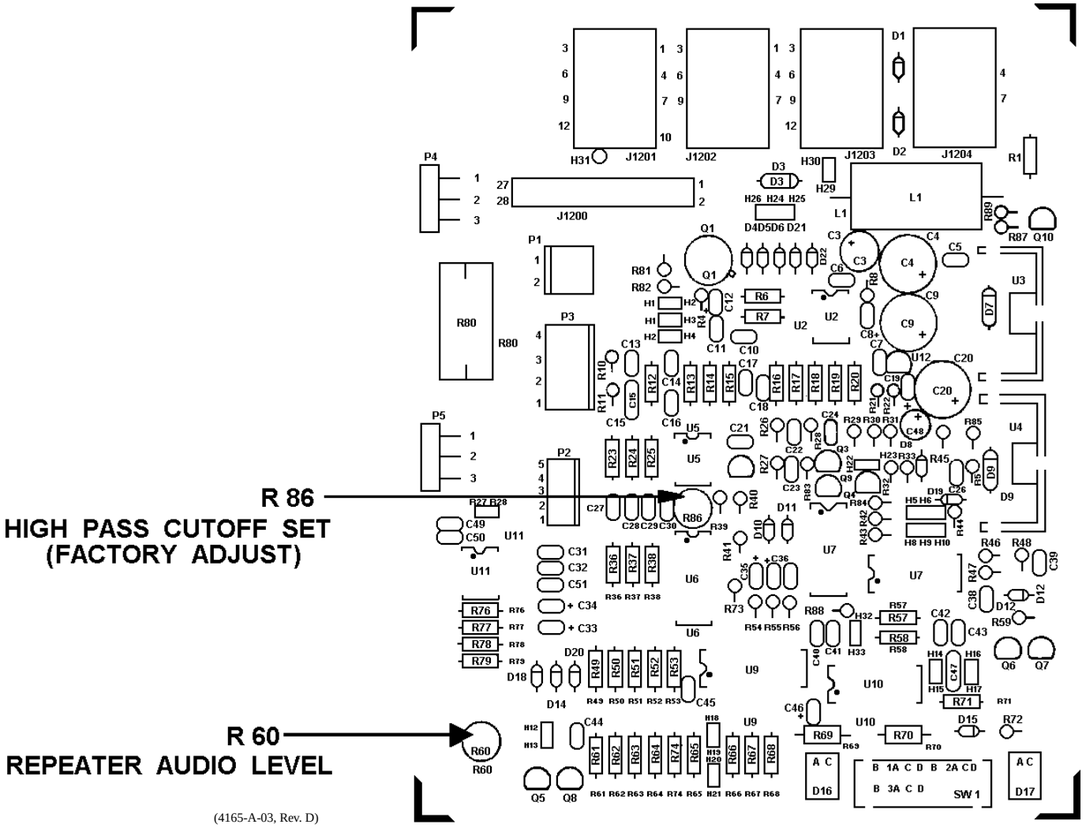
③ THIS INSTRUCTION COVERS THE INSTALLATION OF BATTERY STANDBY, OR BATTTERY STANDBY/SQUELCH OPERATED RELAY BOARD.

1. MOUNT THE BATTERY STANDBY BOARD PER INSTRUCTIONS OUTLINED IN PT 2.
2. INSTALL WIRE SUPPLIED BY CONNECTING ONE END TO J1216 ON BATTERY STANDBY BD. ROUTING ALONG SIDE EXSISTING HARNESS AND PLUGGING OTHER END ONTO PIN 7 OF P9 ON STATION POWER SUPPLY. (SEE FIG 1).

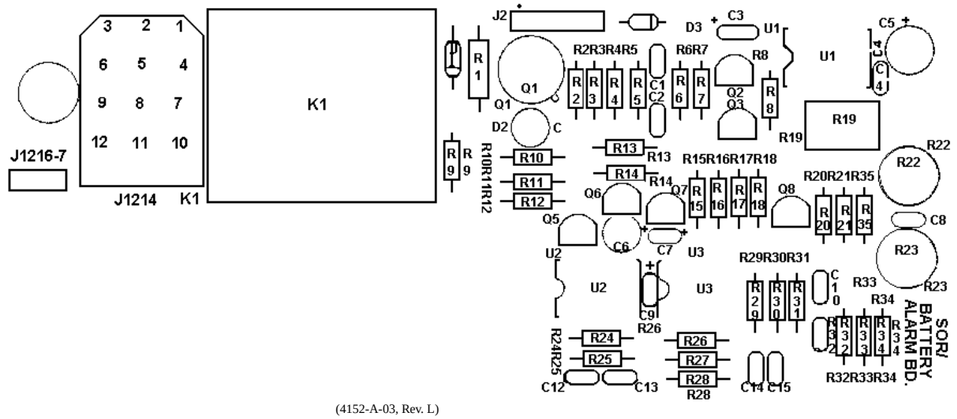


P 9
ON STATION
POWER SUPPLY
FIG. 1

(19D417576, Rev. 5)



(4165-A-03, Rev. D)



(4152-A-03, Rev. L)

MAIN BOARD
SOR/BATTERY STANDBY ALARM TONE

PROBLEM	PROCEDURE
The "ANT RELAY" on J1201-3 will not pull in the transmitter relay.	1. If the TX LED, D16, is illuminated then the output line between the panel and transmitter is bad or the relay is bad (Refer to the operators manual for transmitter). 2. The output from U7E pin 10 should go high (at least 6 Vdc) when the PTT is activated. This will happen at the same time that the PTT circuits pull the input on U7B pin 3 low. When the PTT is released the output on pin 10 will be delayed 20 milliseconds. 3. Check the position of jumpers H1, H2, H3 and H4.
MASTER TIMER will not function properly.	1. Check the repeater disable jumper H14 to H15. 2. The input trigger to U9B from RUSOS causes a reset to be applied to the input of the master timer U8. The output from pin 8 should go high (10 Vdc) at this time and remain high for the entire cycle time. this time is controlled by the jumpers on H5-H10 and H16 to H17 (refer to schematic for listing). 3. Check U10A and U10B. The input on pin 1 should go high and the output on pin 3 should go low. This in turn causes the output on pin 4 to be high which turns on transistor Q6. When the selector switch SW1 is in the normal position then the diode D6 is forward biased and the PTT sequence begins.
DROUPOUT TIMER will not function properly.	1. Check the jumpers H18-H21 for the proper connection. 2. On the rising edge of RUSOS the timer U9A will trigger and the output on pin 6 will go high if the clear is high on pin 3. The clear is controlled by the master timer. The output is summed by diode D15 to the drive transistor Q6. This transistor will start the PTT function when switch SW1 is in the normal operating position.
"RX MUTE" on J1201-2 doesn't work properly.	1. Jumper H12 to H13 installed for CG equipped radios. 2. Transistor Q2 is normally on in the non CG Decode state thus its collector is low (less than 0.3 Vdc) and this keeps transistor Q5 off. 3. When the "CG DECODE OUTPUT" on J1201-11 goes low (less than 0.8 Vdc) transistor Q2 turns off and its collector goes high. This turns on transistor Q5 which causes the receiver in the radio to mute.

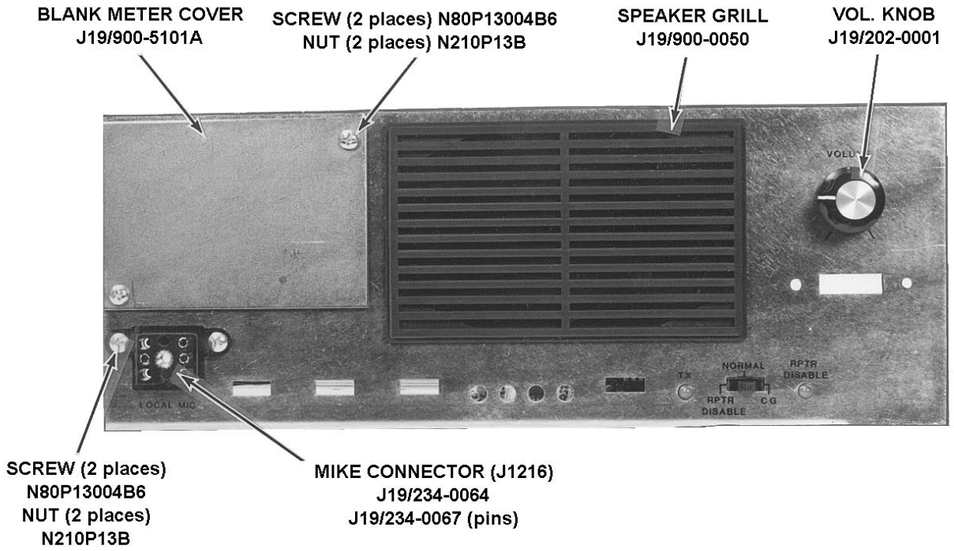


FIGURE 3 - REPEATER CONTROL PANEL

BATTERY STANDBY ALARM TONE OPTION BC02

The Battery Standby Alarm Tone option board (19B234871P103) plugs on to the main board via J2/P2. If AC power is interrupted to the station and it is being operated on a DC source, J1216 pin 7 goes low. This low enables the 1200 Hz Oscillator U2 and the Repetition Rate Oscillator UI via transistors QS Q7 and associated circuitry. Bandpass filter U3 provides filtering for the 1200 Hz signal and the output is applied to TONE AUDIO LEVEL adjustment R23. Integrated circuit UI drives JFET transistor Q8 at the repetition cycle. The rate and duty cycle of Ul are set by R19 and R22 respectively. The tone output appears at J2 pin 4 and is routed to the transmitter (by phone lines in remote control panels). This option is available for the Repeater, DC and Tone Control Panels.

SOR/BATTERY STANDBY ALARM OPTION 5U02

The SOR/Battery Standby Alarm Tone option board (19B234871P105) plugs on to the main board via J2/P2. This board combines the features of the SOR and the Battery Standby Alarm Tone options. This option is available for the Repeater, DC and Tone Control Panels.

MAINTENANCE

This repeater station panel is designed for minimal maintenance and requires no special fixtures or test equipment in the event that it must be serviced. To gain access to the panel simply pull on the outside edges of the cabinet and slide the unit out of the repeater cabinet card cage. A ground strap/retainer is mechanically fastened to the rear of the cabinet to keep the unit from being removed completely from the enclosure. In the event that the panel must be removed from the repeater cabinet for servicing, remove the four connectors on the rear of the assembly then simply remove the fastener that holds the ground strap on the back of the panel. If power is to be applied to the panel be sure that you refer to the schematic diagram for the proper terminals (J1203-3 is the 13.8 Vdc input and J1204-l is the System Ground). In the event that the printed circuit board is to be removed from the mounting plate, disconnect the harnesses that are connected to the faceplate and remove the four screws. Refer to the Troubleshooting Procedure if maintenance becomes necessary.

FRONT PANEL SPEAKER

The front panel mounted speaker and volume control potentiometer R75 allow the operator to set the proper listening level for servicing. R80 provides the terminating impedance required by the speaker drive circuits within the repeater.

NOTE

When the speaker is not being used turn the volume control all the way counter-clockwise to reduce the amount of audio that will be at large repeater sites installations. Also be sure the selector switch SW1 is in the normal mode of operation prior to leaving the site.

ADJUSTMENT

Potentiometer R60 which is labeled RPTR AUDIO LEVEL, sets the audio level to the repeater TX AUDIO HI port on connector J1203 Pin 7.

The repeater drop-out timer, repeater limit timer and Channel Guard function may be altered using jumpers according to the charts supplied on the schematic diagram. The repeater drop-out timer may be set at 1, 3 or 10 seconds. The repeater limit timer may be set at l, 3, or 10 minutes.

In addition to the above potentiometer, factory adjusted potentiometer R68 sets the cutoff frequency of the high pass filter on the input, VOL/SQ HI, port on J1203-8.

NOTE

This potentiometer will NOT require adjustment in the field and is sealed to prevent accidental movement.

BATTERY ALARM TONE ADJUSTMENTS

There are three adjustments on the Battery Alarm Tone Board. Potentiometer Rl9 sets the repetition rate of the 1200 Hz tone. Potentiometer R22 sets the ontime of the tone and R23 adjusts the output level.

TROUBLESHOOTING PROCEDURE

PROBLEM	PROCEDURE
No repeat audio from "VOL/SQ HI" J1203-8 to "TX AUDIO HI" J1203-7.	1. Check the setting of R60 which may be misadjusted (the setting is too low). 2. Check U6D. Pin 12 should be at 10 Vdc when the "RUS" port on J1204-11 is in unsquelched mode. Pins 10 and 11 should be 5 Vdc with the presence of repeater audio on both of them. 3. The "REP AUDIO MUTE" port on J1200-11 should be between 9 and l0 Vdc. 4. The "LOCAL PTT" port on J1201-4 should be between 9 and 10 Vdc. 5. The audio filtering amplifiers consisting of U5A (205 Hz Notch), U5B (Stage 1 High Pass) (Stage 2 High Pass), and U11A (Stage 3 High Pass) should have their respective outputs on either pin 1 or 7 at 5 Cdc with the presence of repeater audio. 6. On units that use the "TONE SWITCH" port on J1200-9 this should be 0.8 Vdc or less.
No audio on "LOCAL MIC HI" on P3-2 to J1203-7.	1. Check U6C. Pin 6 should be at 10 Vdc when the "LOCAL PTT" port on P3-2 is low (0.3 Vdc or less). Pins 8 and 9 should be 5 Vdc with the local audio riding on them. 2 The top of capacitor C33 should be 10 Vdc without the presence of audio from the local mic and drop to no less than 5 Vdc with audio from the "LOCAL MIC HI" port. 3. The summing amplifier, U2B should have its output on pin 7 at 5 Vdc with the local audio riding on it.
No 10 Vdc on the "External 10 Vdc" ports J1202-1 or J1203-4.	1. Check the input power source from the repeater on J1203-3 for +13.8 Vdc. 2. Check the input to the voltage regulator, U3 for at least +12 Vdc.
No 10 Vdc for the internal requirements and on J1204-10.	1. Check the input power source from the repeater on J1203-3 for +13.8 Vdc. 2. Check the input to the voltage regulator, U4 for at least +12 Vdc. 3. Check the output from the regulator for +10 Vdc.
No 5 Vdc for the internal reference source.	1. Check the input to U12 for +10 Vdc. 2. Check the output from the regulator for +5 Vdc.
Not the proper voltage on the "TX OSC CNTRL" at J1204-5.	1. Schmitt trigger delay circuit comprised of U7C and U7D is not functioning properly. The input on pin 5 goes low when the CG circuits decode a PTT; this causes the output on pin 8 of U7D to go low 20 milliseconds later. 2. Check U10D pin 11. It should go high 20 ms after a PTT function is enabled. 3. Check Q7's collector. It should go low 20 ms after a PTT function is enabled. 4. J1204-5 should go high (at least 9 Vdc). Suspect Q10 or a short in the TX oscillator circuit.

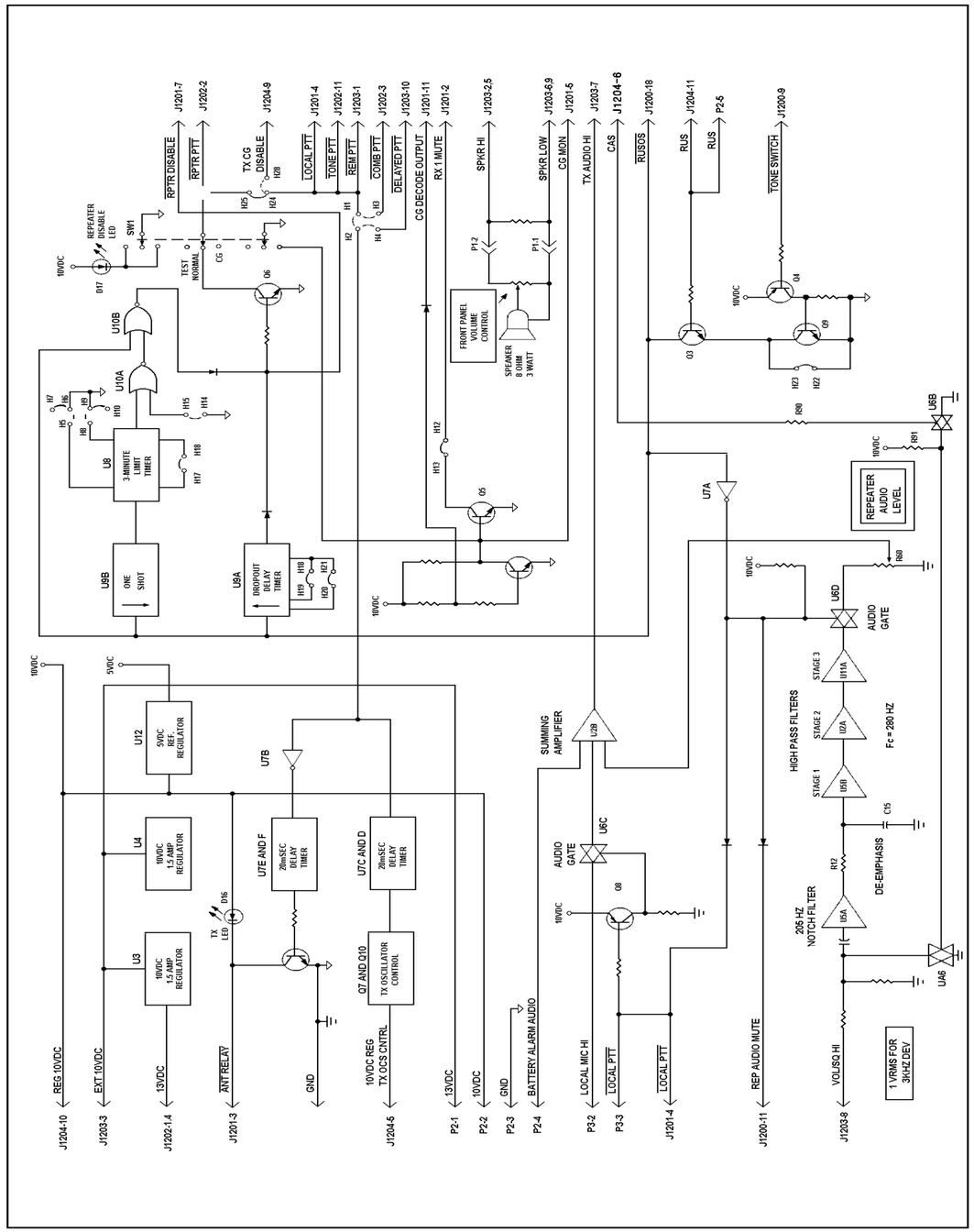


FIGURE 1 - BLOCK DIAGRAM

TIMER CIRCUITRY

The inverted RUS input also starts the master call length timer U8. On the negative edge of the inverted RUS function, one shot IC U9B sends a positive pulse from its Q output on pin 10 to the reset input on pin 6 of U8. This pulse resets the internal counters within U8 and causes the Q output on pin 8 to go high. The output will remain high until the internal counters have exceeded the number of clock cycles that have been programmed into it by the control line on pins 13 and 12. The internal clock frequency is set by resistors R57 and R58, and capacitors C42 and C47. Refer to the schematic (See Table of Contents) for the chart regarding the repeater timer jumpers.

Also when inverted RUS returns to its normally high state, drop-out timer U9A is triggered on the rising edge. This one-shot sets its Q output on pin 6 high for the period of time that is controlled by resistors; R65, R66 and R67 and capacitor C46. Refer to the schematic for the chart on the repeater drop-out timer jumpers. The clear input on pin 3 is controlled by NOR gate U10C, which sends timer U9A a positive pulse on power up. U10A OR's the output from the master timer into the drop-out timer which only allows the dropout timer to operate if it has not been disabled by the removal of the jumper from H14 to H15. Diodes Dl2 and DIS OR the outputs from the timers and feed them to output transistor Q6. This transistor can be disabled by bringing the REPEATER DISABLE pin J1201-7 low (less than 0.3 VDC). The timer output is available to the outside on RPTR TIMER port J1200-7.

Selector switch SW1, located on the front panel, allows the operator to place the panel into the RPTR DISABLE MODE which disconnects the collector of transistor Q6 from summing diode D6. This causes the repeater to enter a standby mode. SW1 also can ground the CG MON port on Jl20l-5 by moving the selector to the position where terminals 3A and 3D make contact. RPTR DISABLE LED D17 is energized in either the RPTR DISABLE mode or the CG MON mode.

ANTENNA RELAY AND TRANSMIT OSCILLATOR CONTROL

Upon detection of a PTT function on the input to the antenna relay sequence timer, U7B pin 3, the output on pin 4 goes high and is inverted by U7F. This is fed to forward biased diode D11 thus causing the input to U7E to go low which results in its output going high. This high on the output of U7E drives transistor Q1 into saturation and pulls the ANT RELAY port on J1201-3 low (less than 0.8 Vdc). This causes the relay within the repeater to be energized putting it into a transmit condition.

When the PTT function is released the input to U7B pin 3 will go high and the output on pin 4 will go low. The low on the input to U7F on pin 13 causes the output to go high and reverse biases diode, D11. During this time capacitor C36 is charging thru resistor, R56 and forms a delay of 20 milliseconds that is required in order to shut down the transmit oscillator before the antenna relay is opened thus reducing arcing across the contacts.

The PTT function also feeds another delay timer comprised of inverters U7C and U7D. These inverters, and associated components, provide a second 20 millisecond delay circuit (when the PTT goes low). This circuit also reduces relay contact arcing by allowing antenna relay contact closure before the TX oscillator is enabled. When a PTT function goes low (LOCAL PTT, RPTR PTT, REMOTE PTT, etc.) TX OSC CONTROL on J1204 pin 5 goes high (10 Vdc) 20 ms after the relay is energized. This high energizes the repeater transmit oscillator.

RECEIVER MUTE FUNCTION

When the CG DECODE OUTPUT pin on J1201-l1 goes low (less than 0.3 Vdc) diode D19 is forward biased. This causes transistor Q2 to turn off and transistor Q5 to turn on. This grounds the output port, RX l MUTE, on J1201-2 if jumper H12 to H13 is installed. If selector switch SWI is placed in the CG Monitor mode, then diode D4 is forward biased and transistor QS will always be turned off.

When used in a GE-MARK System the Repeater Control Board must be in the enable position and the IDA Repeater Control switch must be in the disable position. In addition D1 must be removed from the IDA Control Panel.

NOTE

Use in a GE-MARK System requires specific switch positions. Be sure positioning is correct

SQUELCH OPERATED RELAY OPTION 5U01

The Squelch Operated Relay (SOR) option board (19B234871P102) plugs on to the main board via J2/P2. When a signal unsquelches the receiver the RUS line at J2 pin 5 goes positive. Diode D3 is forward biased and Q1 saturates energizing relay Kl. Diode Dl suppresses spikes from the relay at turn off and LED D2 provides an indication of the relays state. This option is available for the Repeater, DC and Tone Control Panels.

NOTE

In receivers equipped with Channel Guard, the SOR will operate only when an "on frequency" signal with the correct CG tone applied to the receiver.

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WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

High level RF energy in the transmitter Power Amplifier assembly can cause RF burns. KEEP AWAY FROM THESE CIRCUITS WHEN THE TRANSMITTER IS ENERGIZED!

SPECIFICATIONS *

Power Input	13.8 Vdc at 100 mA
Frequency Response	+1, -3 dB from 300 to 3000 Hz
Temperature Range	-30° to +60°C (-22°F to +140°F)
Distortion	Less than 3%
Repeater Timer	Jumper selectable, 1,3 or 10 minutes
DropOut Timer	Jumper selectable, 1,3 or 10 seconds
Size	4.2 x 11.2 x 9.8 inches (h x w x d)

These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

DESCRIPTION

The 19B234871P1 Repeater Control Panel is a self contained unit that contains the audio, regulated power supplies and timing control circuits required to operate the repeater. The station panel is located within the 7-rack unit radio panel and is accessed by opening the receiver exciter door on the front of the repeater cabinet. Figure 1 provides a Block Diagram of the panel assembly.

CIRCUIT ANALYSIS

The Repeater Control Panel assembly is completely solid state and uses a combination of discrete components and integrated circuits (IC's) to achieve maximum reliability.

VOLTAGE REGULATORS

The input supply voltage for the panel is provided by the repeater power supply and is applied to the "13.8 Vdc" input terminal on J1203-3. This port feeds the output regulators comprised of U3 and U4. Regulator U3 provides all of the external 10 Vdc requirements for the repeater on J1202-1, J1203-4 and J1200-1. The voltage on any of these pins is specified at 10.0 Vdc with the maximum combined current for the above ports not to exceed 1.5 Amps. Regulator U4 provides all of the on board power requirements for the panel and REG l0 Vdc on J 1204-10. The voltage on this pin is specified at 10.0 Vdc with the maximum current draw at 0.5 Amps. Regulator U12 provides the +5 Vdc reference voltage for the audio amplifiers.

LOCAL MIKE IN/OUT

The "LOCAL MIC HI" port on P32 couples audio from the mic element to the analog gate U6C. The DC bias and 600 ohm terminating impedance required by the mic is provided by the RC network comprised of R52, R63 and C33. The analog gate U6C is controlled by transistor Q8 which interfaces the LOCAL PTT line on P33 to the gate lead of U6C. When the PTT button is not depressed Q8 is off and the voltage on the top of resistor R50 is low. Upon activation of the PTT switch, the voltage on R50 will be high (greater than 9.5 Vdc), and the audio from the LOCAL MIC HI line is coupled to the Combiner/Output Amp U2B via capacitor CI8.

CG FILTER, DEEMPHASIS AND HIGH PASS FILTER AMPLIFIERS

Audio from the repeater receiver section is applied to the panel on the "VOL/SQ HI" lead on J1203-8. Amplifier U5A is a notch filter that is centered at 205 Hz and has 25 dB of attenuation. Resistor R12 and capacitor CIS form the deemphasis filtering that causes the audio to roll off at 6 dB per octave in the frequency range from 300-3000 Hz. Amplifiers U5B, U2A and U11A form a third order high pass filter which is factory adjusted by potentiometer R86 to have a cutoff of 280 Hz. The combination of all the supporting components and amplifiers in this section provide the frequency envelope shaping requirements of the graph in Figure 2.

Analog gate U6D controls the audio from the VOL/ SQ HI input to the Combiner/Output Amp U2B. Upon detection of a high on the RUS input on J1204-11; transistor Q3 will turn on causing the voltage on the collector to go low (less than 0.3 Vdc). This level is inverted by U7A and controls the gate pin of U6D which then couples the audio to the top of potentiometer R60. This potentiometer is used to set the deviation on the transmitter to 3 KHz in the presence of a 1 Vrms signal on the VOL/SQ HI port. If during the time that the RUS port is high, a LOCAL PTT is depressed, then diode D18 is forward biased and disables U6D from conducting and disables the VOL/SQ HI audio path to the TX AUDIO HI port on J1203-7. In addition, if a low is applied to REP AUDIO MUTE port on J1200-11 then diode D20 is forward biased and this also will terminate the audio path from VOL/SQ HI to TX AUDIO HI by pulling the gate of U6D low.

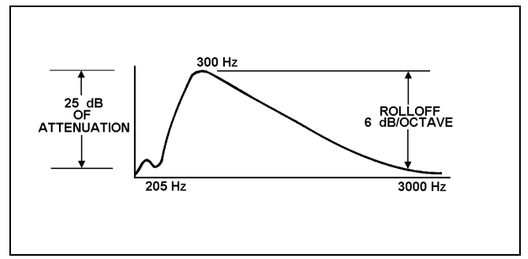

FIGURE 2 - FREQUENCY RESPONSE

RUS AND TONE SWITCH CONTROL

The RUS port on J1204-11 controls the VOL/SQ HI port as described. This port in itself is controlled by another port; TONE SWITCH on J1200-9. When the TONE SWITCH is pulled low (less than 3.0 Vdc); transistor Q4 will energize causing transistor Q9 to turn on thus enabling RUS transistor Q3 to operate as described above. This sequence is normally what occurs when the repeater is equipped with a tone option board and it receives the valid tone from the mobile. If for some reason the tone option board does not decode the proper tones, then the TONE SWITCH port will never go low thus removing the ground from the emitter of Q3 and in effect disabling the RUS function. When the TONE SWITCH port is used, then the jumper between H22 and H23 is removed. It is installed in all other cases.