MAINTENANCE MANUAL
REMOTE INTERFACE BOARD
19D902931G1

TABLE OF CONTENTS

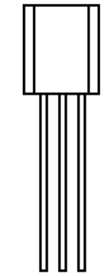
SPECIFICATIONS*

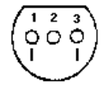
Power Input	13.8 Vdc ±10%
Current	
No PA Load	100 mA
3 Watts at 4 ohms	560 mA, typical
Output Voltage	9.9 Vdc, typical
Audio Output, 4 ohm load	3.46 Vrms (3 watts) 4.0 Vrms (4 watts)
Audio Distortion (3 watts)	5%, maximum

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

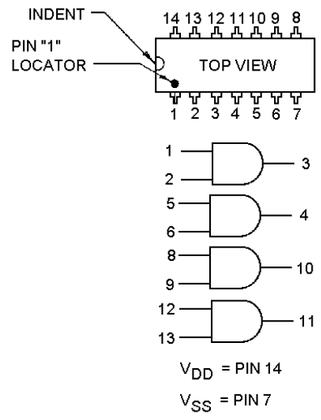
ERICSSON

VOLTAGE REGULATOR
19A701999P4 (U308)

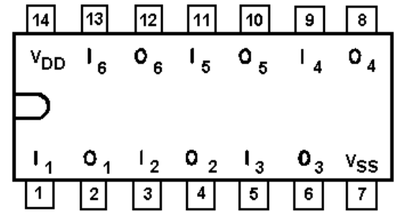




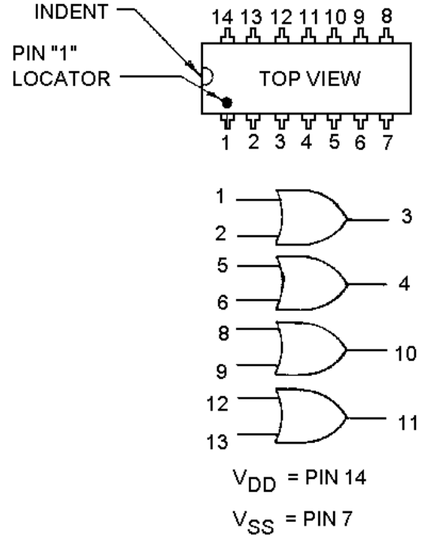
QUAD 2-INPUT AND GATE
19A700029P47 (U310)



HEX BUFFER
19A700176P2 (U309)



QUAD 2-INPUT AND GATE
19A700029P46 (U311)



REMOTE INTERFACE BOARD
19D902928G1

Ericsson Inc.
Private Radio Systems
Mountain View Road
Lynchburg, Virginia 24502
1-800-592-7711 (Outside USA, 804-592-7711)

Printed in U.S.A.

DESCRIPTION

The Remote Interface Board 19D902931G1 is used to interface the radio with the 19A704686 DC and Tone Remote-Boards.

The DC and tone remote boards allow use of the RCN-1000 Remote Control Consoles with the desk top station. There is a choice of 2-wire or 4-wire interface to the consoles for transmit, receive and intercom audio.

CIRCUIT ANALYSIS

The remote interface board provides the electrical interface between the radio and the remote boards. SW DESK MIC HI is routed through bilateral switches for control to the remote board and MIC HI in the mobile. VOL/SQ HI audio or SW SPKR HI audio is selectable by jumpers on the board. The selected receive audio is routed to the remote board. Mic audio from the remote is routed to MIC HI and SW SPKR HI by this board.

Conversely, remote console mic audio from the phone line is buffered by the remote board and sent to the remote interface board, which then gates the audio to the radio transmitter or to the station speaker.

AUDIO PATH FROM DESK MIC TO REMOTE BOARD

Audio from the desk microphone enters the remote interface board at P204-1 as SW DESK MIC HI. and to intercom mic level potentiometer R323. R323 adjusts the level of the intercom microphone signal to bilateral switch U304.1

Bilateral switch, U304.1, controls the connection of the SW DESK MIC HI to pre-emphasis amplifier U302.1. The logic on the interface board applies 0 Vdc to control pin 13 to keep the gate normally muted, but switches this control voltage to +10 Vdc to unmute the gate for the following conditions:

- DESK MIC PTT keyed and remote switch ON
- Intercom switch ON, DESK MIC PTT keyed and remote switch OFF
- Intercom switch ON, DESK MIC PTT keyed and receiver muted

When the SW DESK MIC HI signal is gated through switch U304-1, it goes through amplifier U302-1 and output through J302-9 as RX AUDIO where connection is made to the remote board. Since the audio circuitry on the remote board has built in de-emphasis, amplifier U302-1 includes audio pre-emphasis. The switching logic for this path is shown in Figure 1.

AUDIO PATH FROM DESK MICROPHONE TO RADIO TRANSMITTER

Audio from the desk microphone enters the remote interface board at P204-1 as SW DESK MIC HI. Bilateral switch U304-2 controls the passage of the SW DESK MIC HI line from the interconnect board to MIC HI at P204-2. Normally, the logic on the interface board grounds U304-2 pin 5 to keep the switch open, preventing desk mic audio from passing. It also switches to +10 Vdc, closing the switch and passing the switch and passing the audio when the desk mic is keyed and the intercom switch is OFF.

Combining amplifier, U305-2, amplifies the audio and passes it, as MIC HI, to the interconnect board through P204-2.

The microphone audio from the phone line is controlled by the volume control on the desk top station and summed by audio PA U303. For mobile receive audio, plug J303 jumper P303 across pins 2 & 3. This routes the signal to combining amplifier U305-1 where it is amplified and sent through J301-4 VOLUME HI to VOLUME potentiometer R1 on the desk top control panel. This potentiometer provides level control for both the remote console microphone audio and audio from the radio PA. The signal is then returned to the remote interface board at J301-5 VOLUME WIPER and amplified by desk top station 3 Watt Audio PA U303.

The output of audio amplifier, U303 -4, exits the interface board through P204-8 as STATION SPKR HI. There is no switching control logic for this path.

MOBILE RECEIVE AUDIO PATH FROM THE RADIO PA TO THE REMOTE BOARD

The audio signal from the radio PA enters the remote interface board at P204-7. For the mobile receive audio path, jumper P303 is connected across J303 pins 2 & 3. This routes the receive audio signal to FET switch Q302. The gate is controlled by logic on the remote interface board. Q302 is normally OFF with 0 Vdc applied, but is switched ON by +5 Vdc to pass the receive audio when the receiver is active and the REMOTE switch on the control panel is ON.

The receive audio is switched through Q302 to amplifier U302-1. The amplified output of U302.1 is output to J302-9 as RX AUDIO to the remote board. Since the audio circuitry in the remote board has built in de-emphasis, amplifier U302-1 includes audio pre-emphasis.

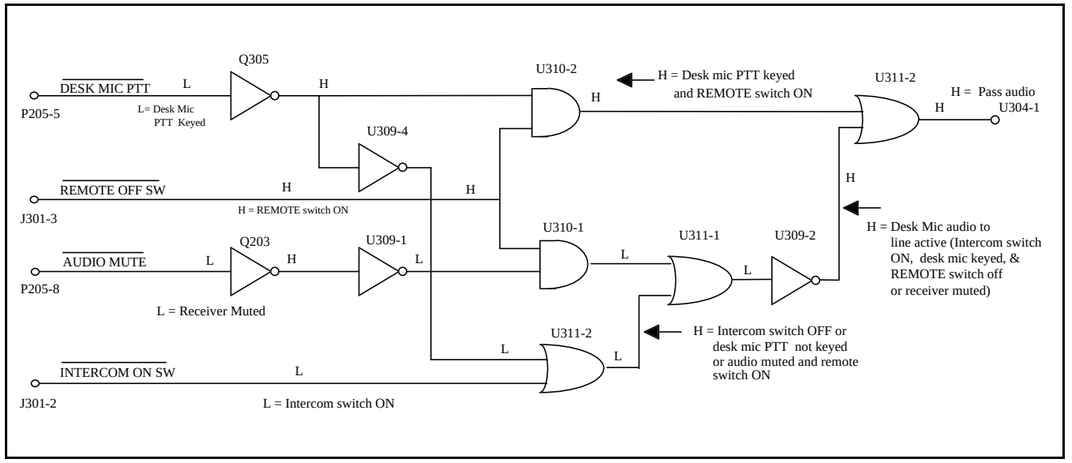


Figure 1 - Logic For Desk Mic to Remote Speaker Path

The audio path from the radio to the remote console speaker is set up with the REMOTE switch ON and is completed only when the radio is unsquelched.

Audio gating for radio transmission is controlled by the DESK MIC PTT unless the INTERCOM switch is ON. In the intercom mode the transmitter is not keyed. The switching control logic for this path is shown in Figure 2.

AUDIO PATH FROM REMOTE BOARD TO RADIO TRANSMITTER

The remote console microphone audio signal from the phone line comes through the remote board to J302-1, MIC AUDIO, on the remote interface board. The audio is gated by bilateral switch U304.3 which is controlled by logic on the interface board. The control signal is applied to U304.3 pin 6. The gate is normally muted with 0 Vdc. This control voltage is switched to

+10 Vdc to unmute the gate when the remote mic PTT is keyed, the desk top mic PTT is unkeyed, and the REMOTE switch is ON.

The output of the switch is applied to combining amplifier U305-2. The amplified output of the combiner is passed, as MIC HI, to the interconnect board through P204-2. Gating for MIC HI is controlled by the REMOTE switch. The REMOTE switch must be ON. The desk microphone has priority over the remotemicrophone for radio transmission. The switching control logic for this path is shown in Figure 3.

AUDIO PATH FROM REMOTE BOARD TO STATION SPEAKER

The remote console microphone audio from the phone line enters the remote interface board through J302-1 as MIC AUDIO. The signal level can be independently adjusted by the INTERCOM LEVEL FROM REMOTE potentiometer R325.

Audio is gated by bilateral switch U304.4, and controlled by logic on the interface board. The gate is normally ON with +10 Vdc applied. Control is through U304.4 pin 12. This control voltage is switched to 0 Vdc to mute the gate when:

- the receiver is active or
- the desk mic audio to remote line is active.

The second condition is a restatement of the gating conditions for the desk top mic to remote speaker path previously listed.

The audio signal is amplified by combining amplifier U305-1 and passed through J301-4 VOLUME HI to VOLUME potentiometer R1 on the desk top control panel. R1 controls the level for both the remote microphone audio and audio from the radio PA when jumper P304 is connected for mobile receive audio. Audio returns to the remote interface board at J301-5, VOLUME WIPER, and is amplified by desk top station 3-watt audio PA U303. STATION SPKR HI audio from U303 is leaves the interface board through P204-8.

The audio path is normally unmuted when connecting the remote console microphone to the station speaker, except when the receiver is active or the "desk mic to line path" is active. Without muting, undesirable feedback between the desk mic and speaker is possible. The switching control logic for this path is shown in Figure 4.

PATH FOR NON-PROCESSED AUDIO FROM THE RADIO VOL SQ HI LINE TO REMOTE BOARD FOR VOL SQ HI

Unprocessed audio from the radio is received by the remote interface board as VOL SQ HI at P205-9. The VOL SQ HI signal is then passed to FET switch Q301. The gate of Q301 is controlled by logic on the Remote Interface Board. This gate is normally OFF (open) with 0 Vdc applied, but is switched ON (+5 Vdc) when the receiver is active and the REMOTE switch is ON.

The VOL SQ HI audio signal is applied to amplifier U301.1 where it is processed with de-emphasis in the U301-1 amplifier stage and 300 Hz high-pass filtering in Channel Guard filter U301-2. For unprocessed "mobile receive audio" jumper P303 is connected across pins 1 & 2 of J303.

A second FET switch (Q302) in the path is in the same state as Q301 and similarly controlled, with the same conditions for switching. It controls the "Radio PA to Station Speaker Path".

When the audio signal is passed through FET switch Q302 it is applied to amplifier U302-1 and output as RX AUDIO at J302-9. J302-9 provides a connection to the remote board and to the remote console speaker. Since the audio circuitry in the remote interface board contained de-emphasis, amplifier U302-1 includes audio pre emphasis. The path from the radio to the remote speaker is set up with the REMOTE switch ON and is completed only when the radio receiver is unsquelched. The switching control logic for this path is shown in Figure 5.

PROCESSED AUDIO FROM THE RADIO AUDIO TO THE STATION SPEAKER

The audio signal from the radio enters the remote interface board at P204-7 as SW SPKR HI. For VOL SQ HI radios, jumper P304 is connected across pins 1 & 2 of J304. This routes the receiver audio to audio PA U303. The radio volume control buttons adjust the receiver volume. The switching logic for this path is shown in Figure 6.

RUS PATH

The receiver unsquelch (RUS) signal is generated on the remote interface board and output to the remote board through J302-12 as a HI (logical 1). A RUS signal is passed to the remote board when either the "Rx Audio to Line" path or the "Station Mic to Line" path is active.

These conditions are met for:

- Remote Switch ON or
- Intercom Switch ON

RUS is generated by Q308 when a low from either the radio VOL SQ HI line or the radio audio PA line is applied to its base. This turns Q308 off, causing a HI to be routed to the remote board through J302-12 to the remote console speaker. The logic is shown in Figure 7.

CHANNEL GUARD DISABLE PATH

The Channel Guard Disable (CGD) signal enters the remote interface board at J302-11 as a logical low. When Channel Guard is disabled in the radio, all audio transmissions on the receive frequency are heard.

Jumpers P305 must be connected across J305 pins 1 & 2 when the CGD signal is used. In EDACS tone remote applications. the CGD signal is not used. Reposition jumper P305 across J305 pins 2 & 3.

The low CGD signal received at J302-11 is inverted by Q309. This signal is now under control of the Remote Switch, allowing it to be overridden. With the REMOTE switch OFF diode D308 pulls the signal low at the base of inverter Q304. Q304 provides a HI signal to P205-10, enabling Channel Guard. Depending on its input, Q304 enables or disables the CGD signal.

PTT PATH

The PTT signal enters the remote interface board at J302-4 as a low to key the radio transmitter. After two inversions in transistors Q307 and Q306, the PTT signal is output to the interconnect board through P204-6, as a logical low to key the radio.

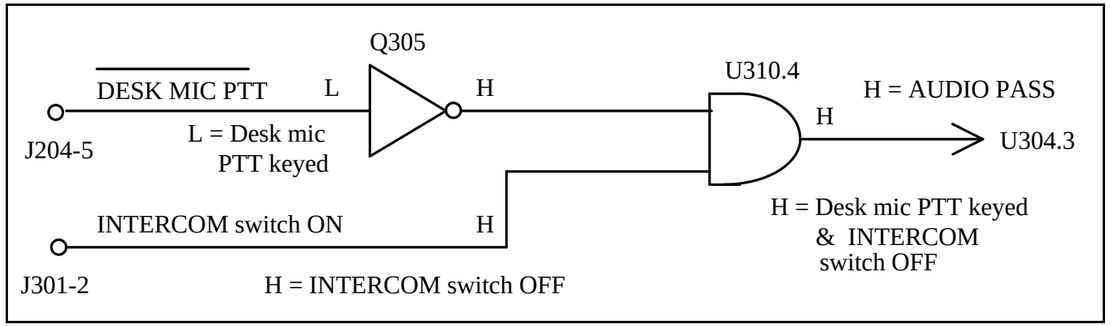


Figure 2 - Logic For Audio From The Radio To Remote Board

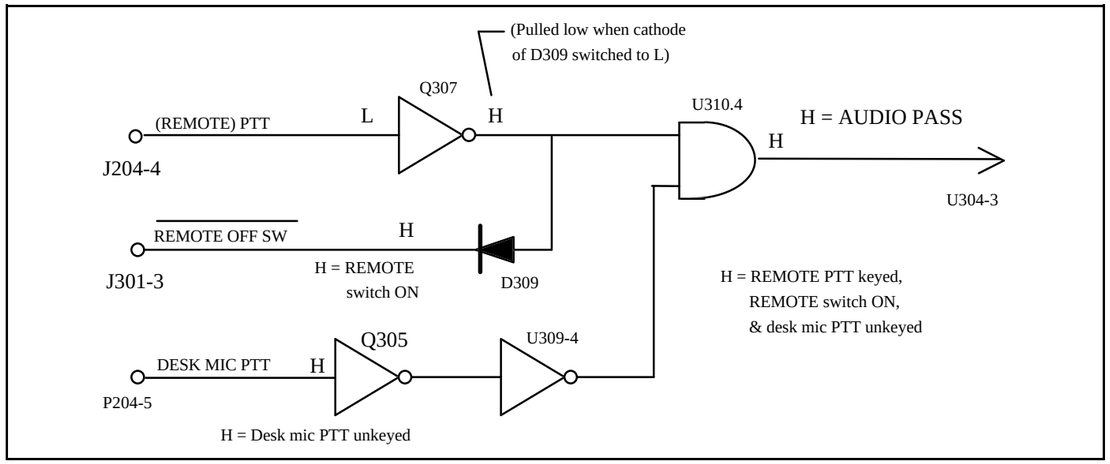


Figure 3 - Logic For Remote Mic To Radio Transmitter Path

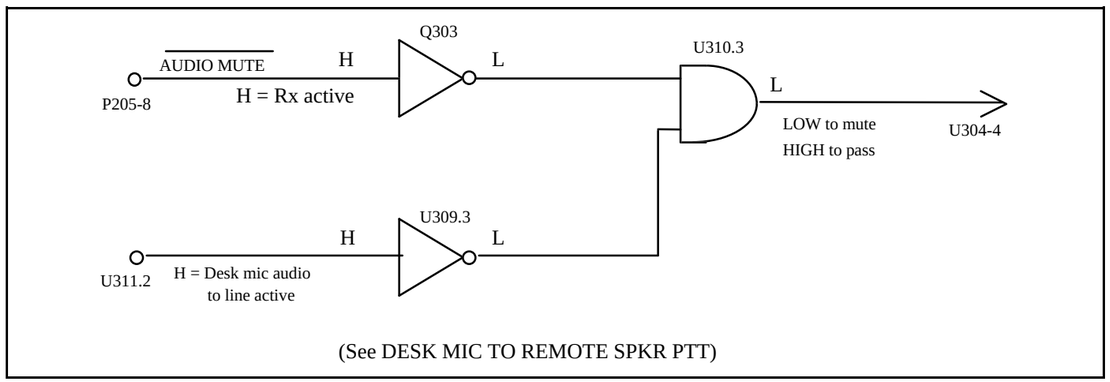


Figure 4 - Logic For Remote Mic To Station Speaker Path

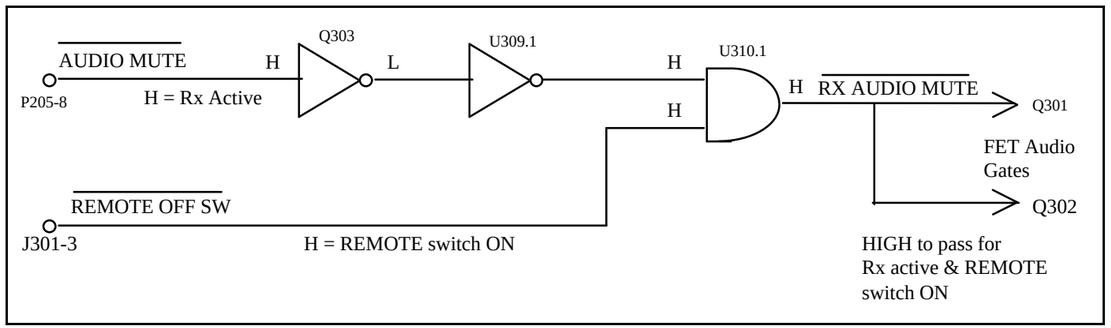


Figure 5 - Logic For Radio VOL SQ HI To Remote Speaker Path

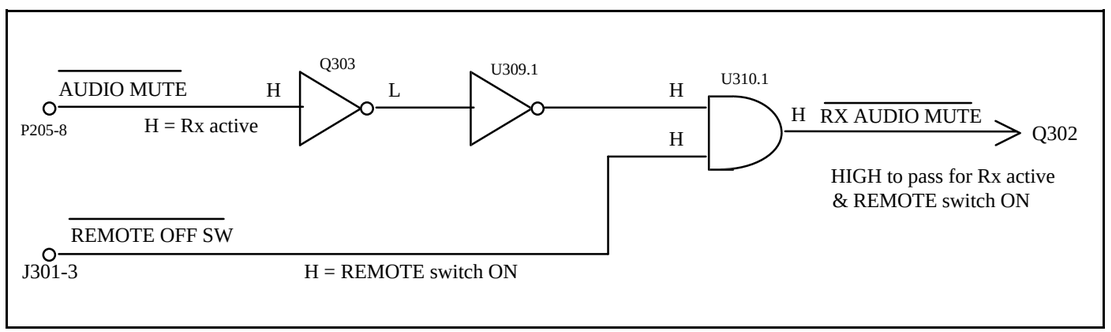


Figure 6 - Logic For Radio PA To Remote Speaker Path

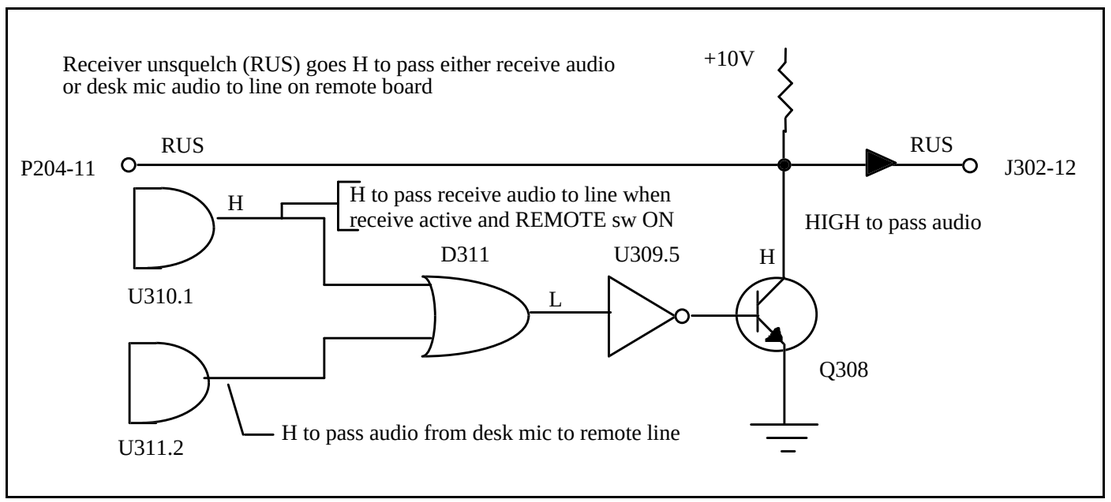
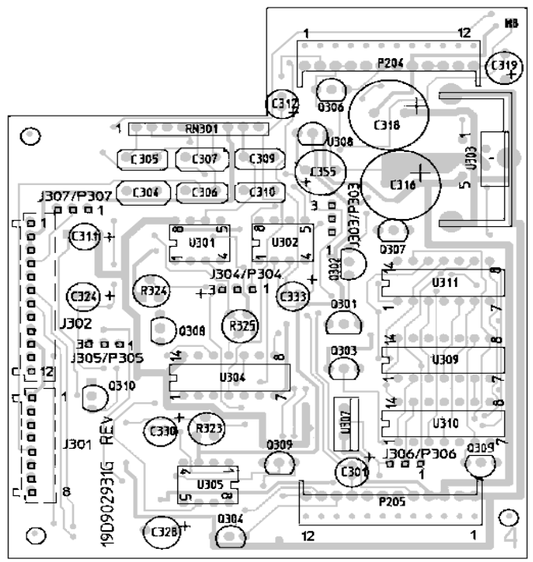


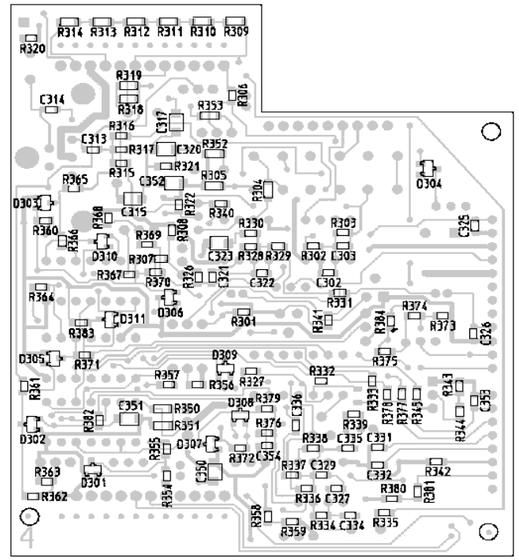
Figure 7 - Logic For Generation Of The RUS Signal

COMPONENT SIDE



FRONTSIDE VIEW

SOLDER SIDE

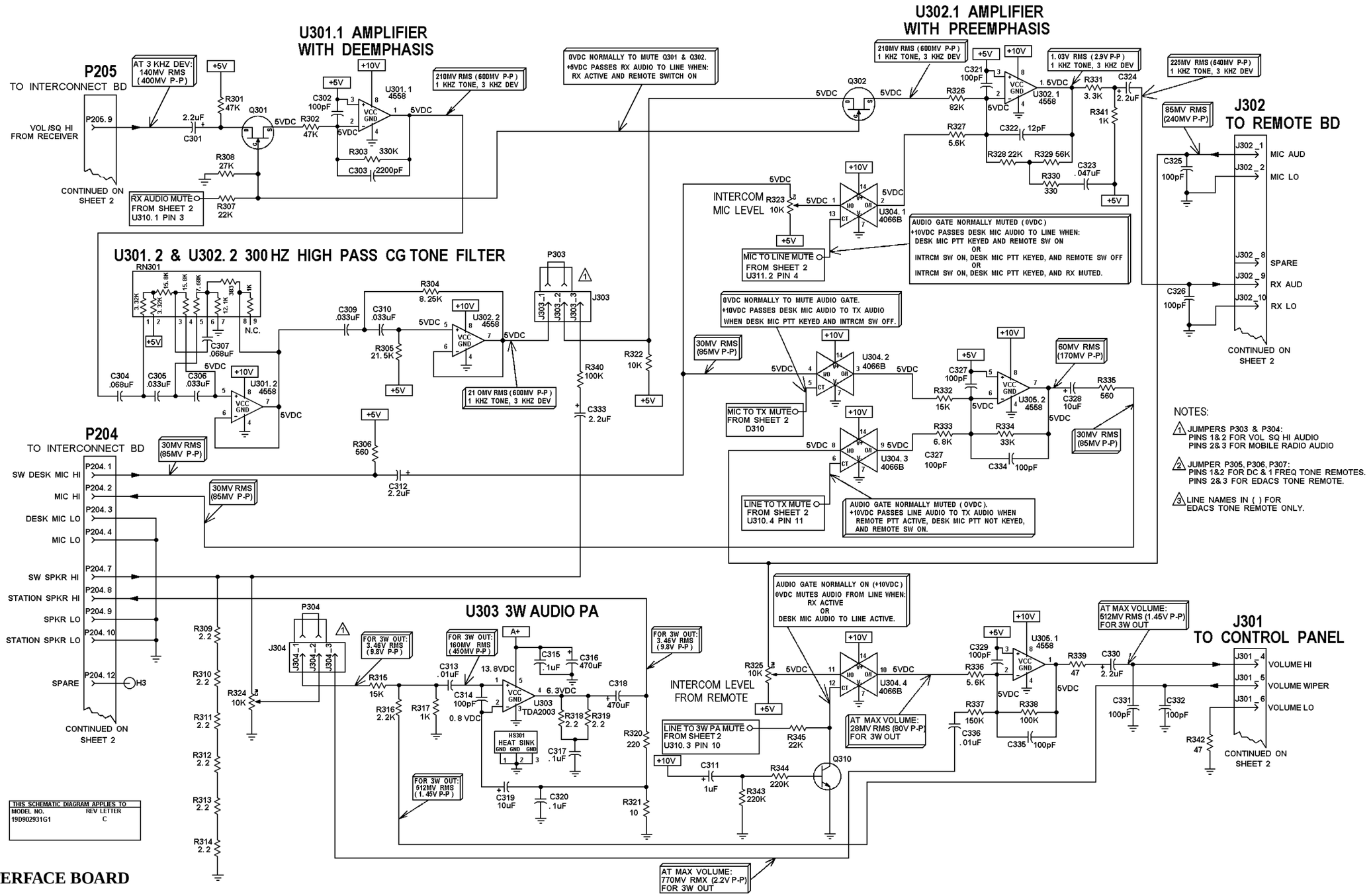


BACKSIDE VIEW

REMOTE INTERFACE BOARD
19D902931G1

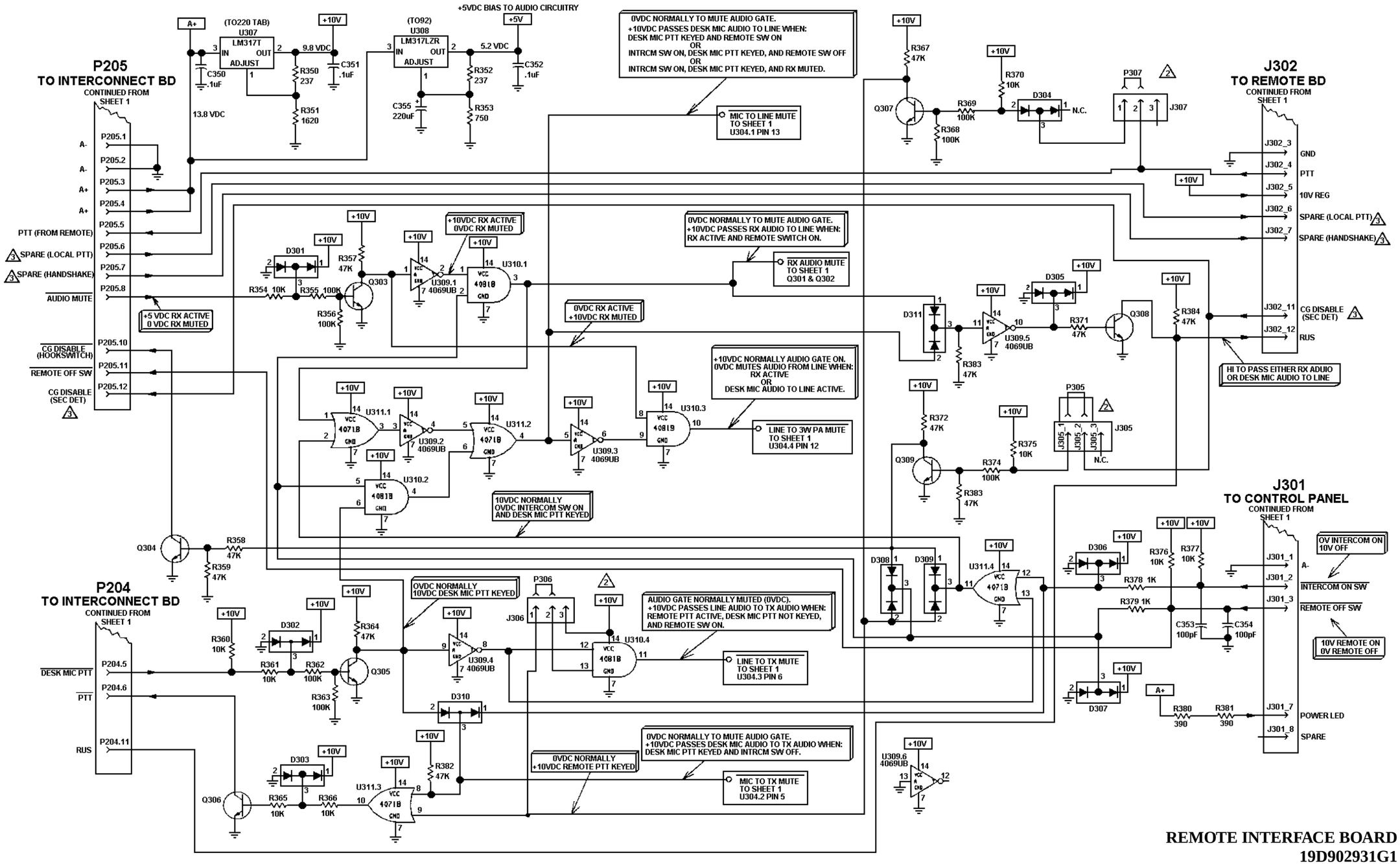
(19D902931, Rev. 4)

(19D902932, Rev. 5)



REMOTE INTERFACE BOARD 19D902931G1

(19D902933 Sh. 1 Rev. 9)



REMOTE INTERFACE BOARD
19D902931G1

(19D902933 Sh. 2 Rev. 4)

REMOTE INTERFACE BOARD 19D902931G1 Issue 3

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C301	19A704879P8	Capacitor, Electrolytic: 2.2uF ±20%, 50 VDCW.
C302	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C303	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C304	T644ACP368J	Polyester: .068 uF ±5%, 50 VDCW.
C305 and C306	T644ACP333J	Polyester: .033 uF ±5%, 50 VDCW.
C307	T644ACP368J	Polyester: .068 uF ±5%, 50 VDCW.
C309 and C310	T644ACP333J	Polyester: .033 uF ±5%, 50 VDCW.
C311	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C312	19A704879P8	Capacitor, Electrolytic: 2.2uF ±20%, 50 VDCW.
C313	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C314	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ± 30 PPM.
C315	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C316	19A701225P11	Electrolytic: 470 uF -10% to +75%, 16 VDCW.
C317	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C318	19A701225P11	Electrolytic: 470 uF -10% to +75%, 16 VDCW.
C319	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C320	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C321	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C322	19A702061P17	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C323	19A702052P122	Ceramic: 0.047 uF ±5%, 50 VDCW.
C324	19A704879P8	Capacitor, Electrolytic: 2.2uF ±20%, 50 VDCW.
C325 thru C327	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C328	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C329	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C330	19A704879P8	Capacitor, Electrolytic: 2.2uF ±20%, 50 VDCW.
C331 and C332	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C333	19A704879P8	Capacitor, Electrolytic: 2.2uF ±20%, 50 VDCW.
C334 and C335	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C336	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C350 thru C352	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C353 and C354	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C355	19A703314P2	Tantalum: 220 uF, -10 +50%, 10 VDCW.

▲ COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		---------- DIODES ----------
D301 thru D307	19A700053P2	Silicon: 2 Diodes in Series; sim to BAV99.
D308 and D309	19A700053P3	Silicon: 2 Diodes in Series, Common Cathode; sim to MBAV70L.
D310	19A703561P2	Silicon, fast recovery (2 diodes in series).
D311	19A700053P3	Silicon: 2 Diodes in Series, Common Cathode; sim to MBAV70L.
		---------- HEAT SINK ----------
HS301	19A702917P7	Heat Sink, Transistor: Sim to Thermalloy Cat 6030B-TT.
		---------- JACKS ----------
J301 thru J307	19A703248P11	Post: Gold Plated, 10 mm length.
		---------- PLUGS ----------
P304 and P305	19A704779P11	Connector; sim to Molex 22-17-2122.
P306 thru P307	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
		---------- TRANSISTORS ----------
Q301 and Q302	19A134137P7	N-type, field effect.
Q303 thru Q310	19A700023P2	Silicon, NPN: sim to 2N3904.
		---------- RESISTORS ----------
R301 and R302	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R303	19B801251P334	Metal film: 330K ohms ±5%, 1/10 w.
R304	19A702931P289	Metal film: 8250 ohms ±1%, 200 VDCW, 1/8 w.
R305	19A702931P333	Metal film: 21.5K ohms ±1%, 200 VDCW, 1/8 w.
R306	19B801251P561	Metal film: 560 ohms ±5%, 1/10 w.
R307	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R308	19B801251P273	Metal film: 27K ohms ±5%, 1/10 w.
R309 thru R314	19B800607P2R2	Metal film: 2.2 ohms ±5%, 1/8 w.
R315	19B801251P153	Metal film: 15K ohms ±5%, 1/10 w.
R316	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R317	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R318 and R319	19B800607P2R2	Metal film: 2.2 ohms ±5%, 1/8 w.
R320	19B801251P221	Metal film: 220 ohms ±5%, 1/10 w.
R321	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R322	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R323 thru R325	19B800779P10	Variable: 10K ohms 25%, 100 VDCW, .3 watt.
R326	19B801251P823	Metal film: 82K ohms ±5%, 1/10 w.
R327	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R328	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R329	19B801251P563	Metal film: 56K ohms ±5%, 1/10 w.
R330	19B801251P331	Metal film: 330 ohms ±5%, 1/10 w.

SYMBOL	PART NO.	DESCRIPTION
R331	19B801251P332	Metal film: 3.3K ohms ±5%, 1/10 w.
R332	19B801251P153	Metal film: 15K ohms ±5%, 1/10 w.
R333	19B801251P682	Metal film: 6.8K ohms ±5%, 1/10 w.
R334	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R335	19B801251P561	Metal film: 560 ohms ±5%, 1/10 w.
R336	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R337	19B801251P154	Metal film: 150K ohms ±5%, 1/10 w.
R338	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R339	19B801251P470	Metal film: 47 ohms ±5%, 1/10 w.
R340	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R341	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R342	19B801251P470	Metal film: 47 ohms ±5%, 1/10 w.
R343 and R344	19B801251P224	Metal film: 220K ohms ±5%, 1/10 w.
R345	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R350	19A702931P137	Metal film: 237 ohms ±1%, 200 VDCW, 1/8 w.
R351	19A702931P221	Metal film: 1620 ohms ±1%, 200 VDCW, 1/8 w.
R352	19A702931P137	Metal film: 237 ohms ±1%, 200 VDCW, 1/8 w.
R353	19A702931P185	Metal film: 750 ohms ±1%, 200 VDCW, 1/8 w.
R354	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R355 and R356	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R357 thru R359	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R360 and R361	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R362 and R363	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R364	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R365 and R366	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R367	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R368 and R369	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R370	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R371 and R372	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.
R373 and R374	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R375 thru R377	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R378 and R379	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R380 and R381	19B801251P391	Metal film: 390 ohms ±5%, 1/10 w.
R382 thru R384	19B801251P473	Metal film: 47K ohms ±5%, 1/10 w.

SYMBOL	PART NO.	DESCRIPTION
		------- RESISTOR NETWORK -------
RN301	19A704885P8	Resistor Network, Custom: 9 pins, .125 W.
		------ INTEGRATED CIRCUITS ------
U301 and U302	19A700086P4	Linear: Dual Op Amp; sim to 4558.
U303	19A701830P1	Linear, Audio AMPLIFIER; sim to TDA 2003.
U304	19A700029P44	Digital: BILATERAL SWITCH.
U305	19A700086P4	Linear: Dual Op Amp; sim to 4558.
U307	19A701999P1	Linear: Voltage Regulator; sim to LM317T.
U308	19A701999P4	Linear, (Positive Voltage Regulator): sim to LM317LZ.
U309	10A700176P2	Digital: Hex Buffer; sim to 4069UB.
U310	19A700029P47	Digital: Quad 2-Input AND Gate; sim to 4081B.
U311	19A700029P46	Digital: QUAD 2-INPUT OR GATE.
		------- MISCELLANEOUS -------
2	19D902932P1	BD PW
3	19D902931G7	CPNT BD REM
4	19A702564P308	Machine screw, TORZ Drive: No. M3-0.5 x 8.
5	19A701312P4	Flatwasher: 3.2 ID.
6	19A700034P4	Nut, hex: No. M3 x 0.5MM.
9	19A700033P5	Lock washer, external tooth: No. 3.

PRODUCTION CHANGES

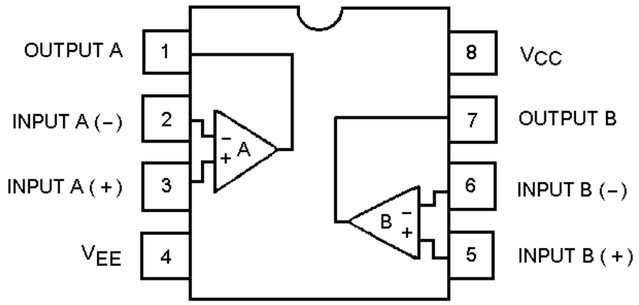
Changes in the equipment to improve or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - REMOTE INTERFACE BOARD 19D902931G1
To change volume control range, add time delay and add jumpers to accomodate the keypad option. Added capacitor C311, Jacks J306 and J307, plugs P306 and P307, transistor Q310, and resistors R324 and R342 through R345.

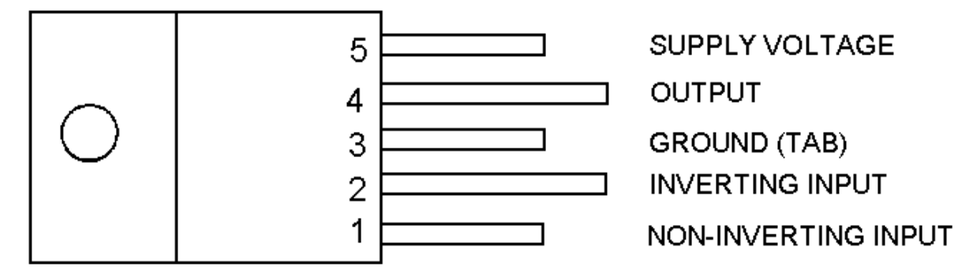
REV. B - REMOTE INTERFACE BOARD 19D902931G1
To equalize transmit audio between desk mike and the remote unit. R333 was 47K ohms (19B801251P473).

REV. C - REMOTE INTERFACE BOARD 19D902931G1
Parts no longer available. Q301 and Q302 were 19A700060P4.

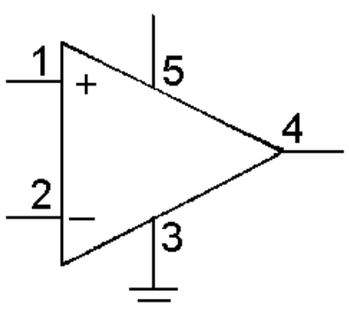
DUAL OPERATIONAL AMPLIFIER
19A700086P4 (U301, U302 & U305)



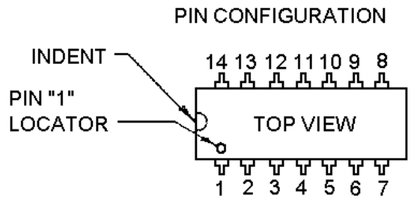
AUDIO AMPLIFIER
19A701830P1 (U303)

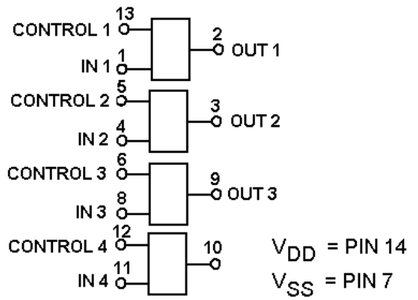


PIN IDENTIFICATION

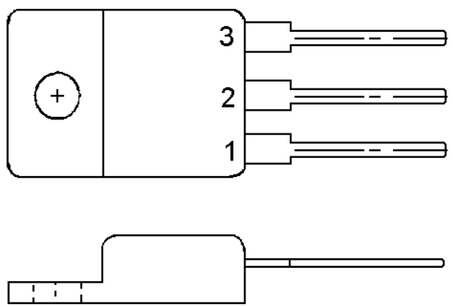


BILATERAL SWITCH
19A700029P44 (U304)





VOLTAGE REGULATOR
19A701999P1 (U307)



PIN 1 ADJUST PIN
PIN 2 OUTPUT
PIN 3 INPUT

REMOTE INTERFACE BOARD
19D902928G1