



**MAINTENANCE MANUAL
DESKTOP STATION
INTERCONNECT BOARD
19D904448G1**

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DESCRIPTION

Interconnect board 19D904448G1 for the MDX radio interconnects the radio in the Desk Top Station with the power supply, station speaker, control panel, station fan, external options terminal board, and the optional Keypad/Frequency Select board, Tone Remote Interface board, and Clock VU Meter board. When the radio and options are connected, the following functions are available.

- Audio Switching
- Local and Remote Keying
- Channel Guard Monitor
- Volume Adjustment
- Frequency Selection
- Intercom
- Remote ON/OFF Control

The interconnect board is supplied with jacks for connecting to:

- Radio (J202)
- Desk Microphone (J201)
- Power Supply, or Standby Power Transfer
- Option (J206)
- Data Options (J209)
- Station Speaker/Power LED (J211)
- Station Fan (J212)
- Station Fan Test J213)
- External Options (J200)
- Keypad/Freq. Select board, Option (J207, J208)
- Remote Interface Option (J204, J205)
- Clock/VU Module, Optional (J203)
- VU Meter Enable (J214)

CIRCUIT DESCRIPTION

TRANSMIT AUDIO PATH

The desk microphone is used to modulate the radio transmitter. The audio is received as DESK MIC HIGH on J201-2. It is then routed to External Option Connector J200-2 and returned on J200-3 as SW DESK MIC HIGH. See Figure 1. This allows an external device to break the mic path. Zero ohm resistor R207 is used to tie DESK MIC HI to SW DESK MIC HI when an external device is not used to break the mic path.

SW DESK MIC HI is then routed to the Remote Interface Board through connector J204-1. It is received from the Remote Interface Board as MIC HI via connector J204-2. If a Remote Interface board is present (optional), the transmit audio from the remote board will be summed into the mic path here. DESK MIC HI is connected to MIC HI by jumper P104-1 & 2.

MIC HI is also routed to the Keypad/Frequency Select board connector on J208-12 and to the Data Device connector on J209-6. It is returned from the Data Device connector on J209-5. This allows a data device to break the mic path. Zero ohm resistor R210 is used short J209-5 & 6 when a data device is not used or when a data device does not break the mic path.

MIC HI from the Data Device is routed to the radio through J202-4 and to the Clock/VU Meter through J203-3.

The desk mic supplied with the equipment requires a dc bias voltage. This voltage is generated inside the radio. External devices breaking the mic path must provide either dc continuity between the radio connector (J202-4) and the deskmic connector (J201-2) when not active or an equivalent mic bias circuit to the deskmic connector. Note, there are no active devices or frequency response shaping components in the mic lines of the Interconnect board. The return for the mic lines, MIC LO, is not switched. It is common to all connectors that have a mic input.

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PTT PATH

The ground closure PTT from the desk mic is routed to the Interconnect board as DESK MIC PTT through J201-7 and then to the External Option connector at J200-6, the Keypad/Frequency Select board connector at J207-9, the Remote Interface board connector at J204-5, and to the VU PTT jumper field at J214-6. The radio may be keyed by an external device by grounding J200-6. However, it can not break the PTT line. The Keypad/Frequency Select board uses the DESK MIC PTT signal to recognize when a local transmission is in progress. Connecting the VU PTT line to DESK MIC PTT on the J214 jumper field will only enable the VU meter on local transmissions.

The PTT path is then routed to the Remote Interface Board connector as DESK MIC PTT on J204-5 and received back from the Remote Interface Board connector as PTT on J204-6. Remote PTT will be summed into the PTT path if there is a remote option. If there is no remote option, DESK MIC PTT is connected to PTT by jumper P104-5 & 6. The PTT signal is also brought to Keypad/Frequency Select Board at J207-9. The PTT signal is then routed to the Data Option connector at J209-4. It is returned from the Data Option connector at J209-

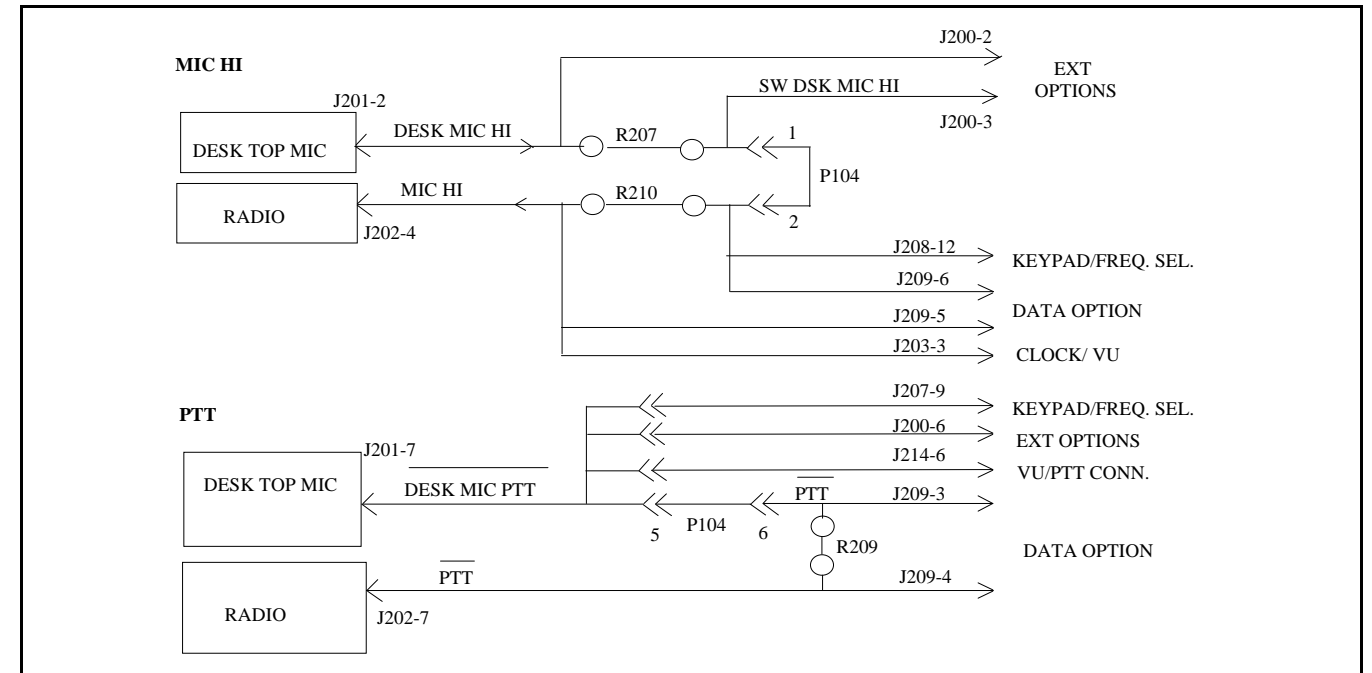


Figure 1 MIC HI And PTT Routing

3. This allows a data device to break the PTT path. If a data option is not used or if a data option does not break the PTT path, then zero ohm resistor R209 is used to connect J209-3 & 4 together to complete the PTT path to the radio.

The radio is keyed by its PTT line through J202-7. It will transmit when this line is low. The line is also routed to the VU PTT via jumper J214-4 & 5. When selected, the VU meter is enabled on all transmissions. The radio also contains a five-volt pull-up resistor. External devices keying the radio should do so with an open collector transistor or by a mechanical closure to ground.

RECEIVE AUDIO PATH

Speaker audio is passed from the radio to the Interconnect board over three lines: SPKR LO, SPKR HI, and SW SPKR HI. All three lines have dc blocking capacitors to allow external devices greater versatility when using the radio's balanced outputs. Refer to Figure 2.

SPKR HI from the radio is routed to the Interconnect Board through connector J202-3 and applied to the Desk Mic Connector at J201-9. Its purpose is to drive a low power handset or headset speaker. Note it will be referenced to A-. The complementary SPKR LO line is not brought to the Mic Connector.

SPKR LO from the radio is routed to the Interconnect Board through J202-2 and then to the Remote Interface Board through J204-9. It is returned from the Remote Interface Board through J204-10 as STATION SPKR LO. If there is no remote option, then SPKR LO is tied to STATION SPKR LO by jumper P104-9 & 10. This makes STATION SPKR LO the floating complementary output of SW SPKR HI. When a Remote Interface Board is present, SPKR LO and STATION SPKR LO are connected to A-. From the Remote Interface Board, STATION SPKR LO is routed to the External Option connector on J200-8 and to the desktop's Speaker/Power Led connector on J211-4.

SW SPKR HI from the radio is received by the Interconnect board at J202-9 and routed to the Remote Interface Board connector at J204-7. It is returned to the Remote Interface Board as STATION SPKR HI on J204-8. If a Remote Interface Board is not present, then SW SPKR HI and STATION SPKR HI are connected by jumper P104-7 & 8. STATION SPKR HI is the radio's SW SPKR HI. Speaker volume is controlled by the radio volume control. If a remote option is present, the radio's SW SPKR HI is routed to the desktop's front panel volume control and STATION SPKR HI is the output of the Remote Interface Board's audio amp. The audio amp is used to sum audio from a remote into the speaker path. With this option, the speaker level out of the radio is fixed and the volume control on the radio is not used. Volume is controlled from the front panel control of the desktop station.

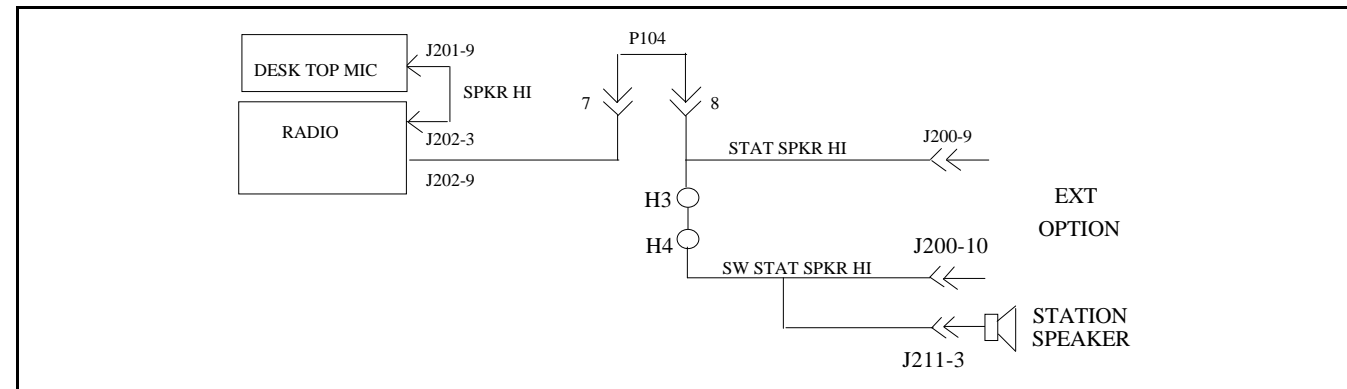


Figure 2 Station Speaker

STATION SPKR HI from the Remote Interface Board connector is then routed to the External Device through connector J200-9 and returned from the External Device as SW STATION SPKR HI on J200-10. This allows an external device to break the speaker path. A wire run on the PC Interconnect board between H3 and H4 connect STATION SPKR HI to SW STATION SPKR HI. If an external device is to break the speaker path, this run must be cut. SW STATION SPKR HI is applied to the desktop speaker at the Station Spkr/Power Led connector on J211-4.

primarily through the collector which is at ground potential.) This voltage differential now appearing across the fan's terminals starts the fan, pulling air through the station. Turning Q203 on also moves hysteresis resistor R214 to the lower leg of the thermistor voltage divider.

The airflow will cool down the station, thereby increasing the resistance of the thermistor. Because R214 is now in parallel with the thermistor, the temperature must drop below the fan's turn on point before the voltage is sufficient to turn Q202. With Q202 on Q203 is turned off, thus turning off the fan. Turning Q203 off also moves R214 to the upper leg of the divider, resetting the fan's turn on temperature. This hysteresis action keeps the fan from "chattering" on and off.

Fan Test

The fan can be tested by grounding pin J213-1. This will turn the fan on regardless of temperature. For more demanding applications it may be desirable to run the fan continuously. This can easily be done by placing a shorting plug across J213-1 & 2. In more extreme temperature situations it may be desirable to run the fan continuously at the full A+ voltage. This can be done by shorting pins two and three of Q201. This will greatly increase airflow and also fan noise.

STATION FAN CONTROL

The Interconnect Board contains circuitry to thermostatically control the fan. The positive side of the 12-volt dc fan is connected to A+ at J212-1. The negative side of the fan is connected to the emitter of PNP transistor Q201 at J212-2. When the station is "cool", the resistance of thermistor R212 is high. This relates to a higher voltage at the voltage divider formed by R211, R214, and thermistor R212. This holds Q202 on which keeps Q203 turned off, removing ground from the bottom of the voltage divider formed by R201, R202, R203, and R204. This also keeps Q201 turned off which allows its emitter voltage to rise to A+. The lack of voltage difference across the fan terminals keeps the fan off. This state also has hysteresis resistor R214 in the upper leg of the thermistor voltage divider.

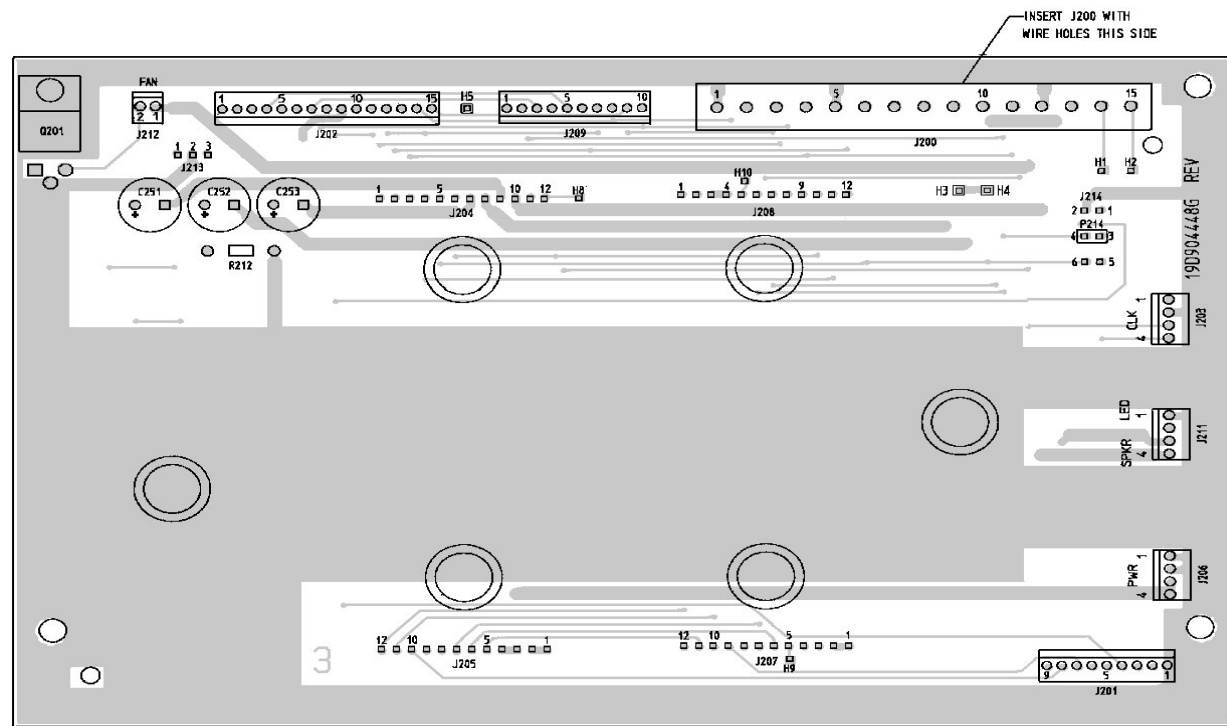
Increasing temperatures cause the resistance of the thermistor to decrease, thereby causing the voltage at the base of Q202 to decrease. Q202 turns off when the station "overheats". This turns on Q203 which grounds the lower side of the voltage divider at the base of Q201. Current now flows through these resistors. The resistors in this divider are paralleled to increase the power handling capabilities to allow adequate base drive using chip resistors. The base of Q201 is set to six volts. This will pull the emitter down toward seven volts. (The remaining voltage is dissipated by the transistor,

**Interconnect Board
19D904448G1**

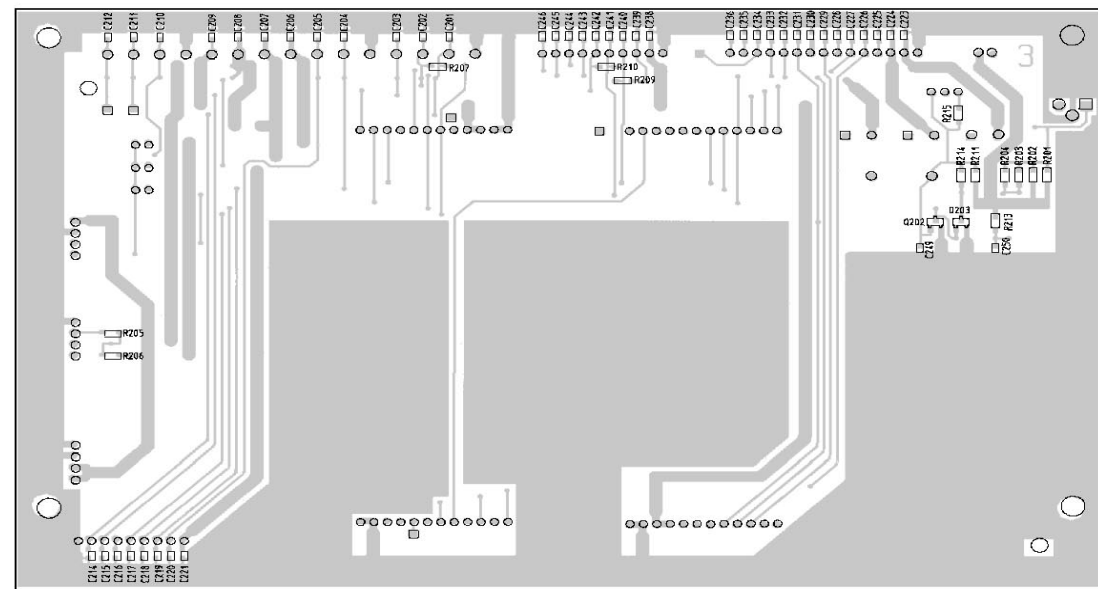
SYMBOL	PART NUMBER	DESCRIPTION
----- CAPACITORS -----		
C201 thru C212	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C214 thru C221	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C223 thru C236	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C238 thru C246	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C249 and C250	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C251 thru C253	344A4194P471160	Capacitor, Electrolytic. 470 µF ±20%, 16DCWV; sim to United Chemicon SME.
----- JACKS -----		
J200	344A3197P1	Terminal Board., 15 positions; sim to Electrovert 25.106.1553
J201	19A704852P35	Connector, 9 circuits, PWB
J202	19A704852P41	Connector, 15 circuits, PWB
J203	19A704852P30	Printed wire: 4 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2041.
J204 and J205	19A703248P18	Post: Gold Plated, 18 mm length.
J206	19A704852P30	Printed wire: 4 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2041.
J207 and J208	19A703248P18	Post: Gold Plated, 18 mm length.
J209	19A704852P36	Printed wire, two part: 10 contacts, sim to Molex 22-29-2101.
J211	19A704852P30	Printed wire: 4 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2041.
J212	19A700072P28	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex 22-27-2021.
J213 and J214	19A703248P11	Post: Gold Plated, 10 mm length.
----- PLUGS -----		
P214	19A702104P2	Connector: Shorting Jumper, Gold Plated. (Housing Color: White).
----- TRANSISTORS -----		
Q201	19A116942P1	Silicon, PNP.
Q202 and Q203	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
----- RESISTORS -----		
R201 and R202	19B800607P821	Metal film: 820 ohms ±5%, 1/8 w.
R203 and R204	19B800607P681	Metal film: 680 ohms ±5%, 1/8 w.
R205 and R206	19B800607P391	Metal film: 390 ohms ±5%, 1/8 w.
R207	19B800607P1	Metal film: Jumper.
R209 and R210	19B800607P1	Metal film: Jumper.
R211	19B800607P154	Metal film: 150K ohms ±5%, 1/8 w.

SYMBOL	PART NUMBER	DESCRIPTION
R212	19A701864P4	Thermal 10K ohms (NTC) ±10%, sim to Midwest Components 2H-103.
R213	19B800607P223	Metal film: 22K ohms ±5%, 1/8 w.
R214	19B800607P334	Metal film: 330K ohms ±5%, 1/8 w.
R215	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
----- MISCELLANEOUS -----		
	19A701502P3	Bumper, plastic.

COMPONENT SIDE



SOLDER SIDE

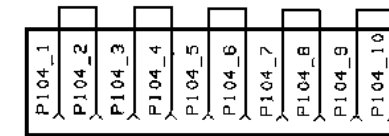


LEAD IDENTIFICATION FOR Q202 AND Q203 (SOT) TRANSISTORS (TOP VIEW)

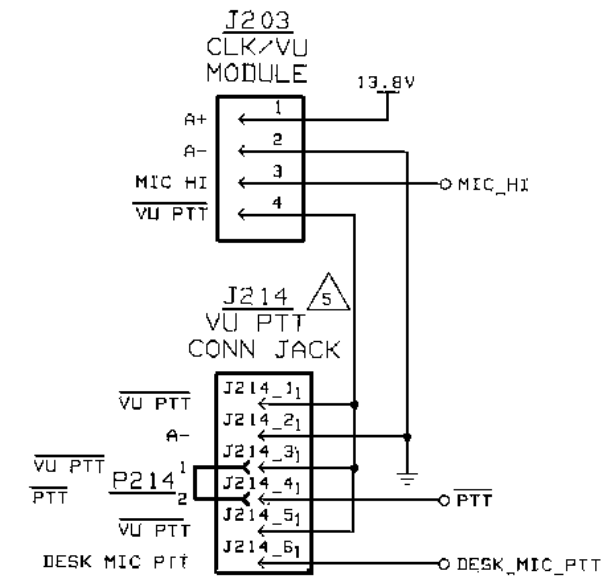


DESKTOP STATION Interconnect Board

(19904448 Sh. 1 Rev. 5)



P104
(SHOWN FOR REFERENCE ONLY)
FOR STANDARD DESKTOP STATION,
INSTALL P104 JUMPER PLUG ON
J204.
P104 JUMPER PLUG ON J204.
P104 JUMPER NOT USED WHEN DC/TONE
REMOTE OPTION INSTALLED.



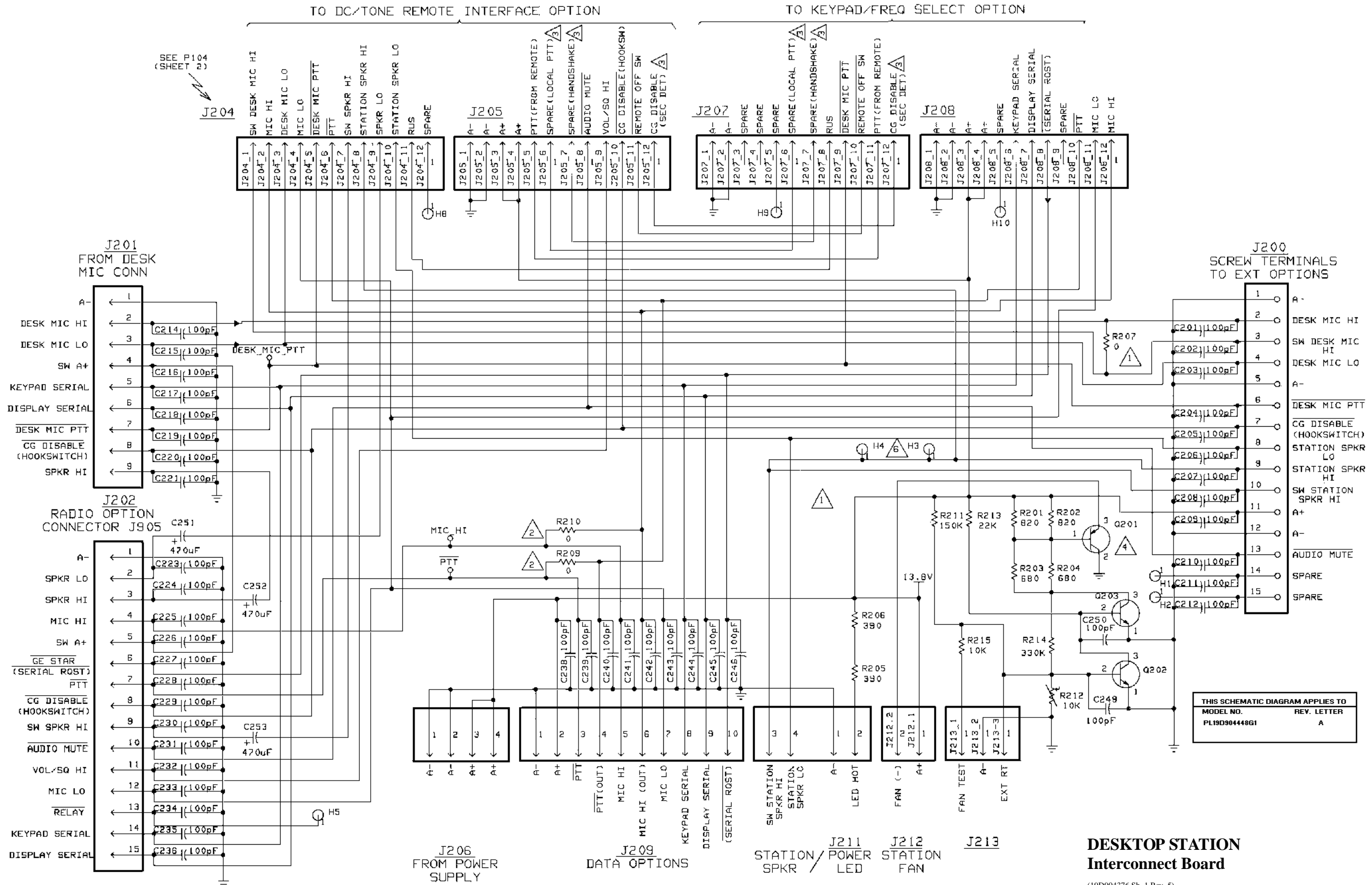
NOTES:

- 1 REMOVE 0 OHM RESISTORS:
R207 TO SWITCH DESK MIC AUDIO
- 2 REMOVE 0 OHM RESISTORS:
R209 AND R210 FOR DATA OPTIONS.
- 3 LINE NAMES IN () FOR EDACS TONE
REMOTE ONLY.
- 4 Q201 IS MOUNTED TO BOARD USING MOUNTING
STANDOFF FOR HEAT SINK.
- 5 VU METER ACTIVATION SELECTION CHART:
- 6 CUT RUN BETWEEN HOLE 3 AND HOLE 4
TO SWITCH STATION SPEAKER AUDIO.

FROM	TO	USING	EXPLANATION
J214-1	J214-2	P214	VU METER IS ALWAYS ACTIVE
J214-3	J214-4	P214	VU METER IS ACTIVE WHEN THE RADIO PTT IS LOW
J214-5	J214-6	P214	VU METER IS ACTIVE WHEN THE DESK MIC PTT IS LOW

DESKTOP STATION Interconnect Board

(19D904376 Sh. 2 Rev. 4)



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