

MOTOROLA EXTERNAL (AMPLIFIED) SPEAKER MODS

Accumulated over time by: Tom Hammond, NØSS

Rev. 04 July 2009

Corrections are ***encouraged***, please send to: **nØss@arrl.net**
(note: In the link above, the 'Ø' is the numeral ZERO, not an 'oh')

MOTOROLA Inc.
EXTERNAL SPEAKER INSTALLATION
Models: TLN2660A (Standard) SSN2005B (V.S.P II)
TLN2661 B (V.S.P.) SSN2008A (V.S.P)

An external speaker is required for some models or when V.S.P. or V.S.P. II hands-free operation is implemented. The speaker should be mounted under the dash, on the transmission hump, or other suitable location using the mounting bracket supplied with the speaker assembly. Figure 1 shows a typical external speaker and its mounting hardware.

CAUTION

Do not install the speaker unsupported to prevent shifting of the speaker which could interfere with the proper operation of the vehicle. If available, always use the supplied mounting hardware.

NOTE

The speaker housing is electrically insulated from the mounting bracket by insulating washers. Take precautions to prevent the speaker housing from contacting any metal in the vehicle, such as the dashboard or firewall. The speaker housing is internally connected to ground, and contacting any external metal will cause a ground loop which may introduce alternator whine or other undesirable interference.

- Step 1. Loosen the two wing nuts (one on each side) several turns and remove the mounting bracket from the speaker.
- Step 2. Temporarily position the speaker and mounting bracket to verify the desired mounting location. Make sure that the speaker will not interfere with the operation of the vehicle (preferable placement is on the passenger side of the vehicle) and that the speaker front is not blocked by sound absorptive material. Using the mounting bracket as a guide, mark two holes on the transmission hump or other selected location. The two mounting tabs on the bracket are somewhat flexible to conform to a curved surface as necessary.
- Step 3. Using an awl or similar device, open two holes in the carpet at marked locations. This must be done prior to drilling to avoid running the carpet.
- Step 4. Using a 4mm (5/32") bit, drill the two mounting holes and secure the bracket using the two 10-16 x 5/8 tapping screws (3-136756) provided.
- Step 5. Mount the speaker to the mounting bracket. Ensure that at each mounting position the self-adhering insulating washer is on one side of the bracket and the insulating shoulder Washer is on the other side of the bracket (as shown in Figure 1). Securely tighten the two wing nuts.

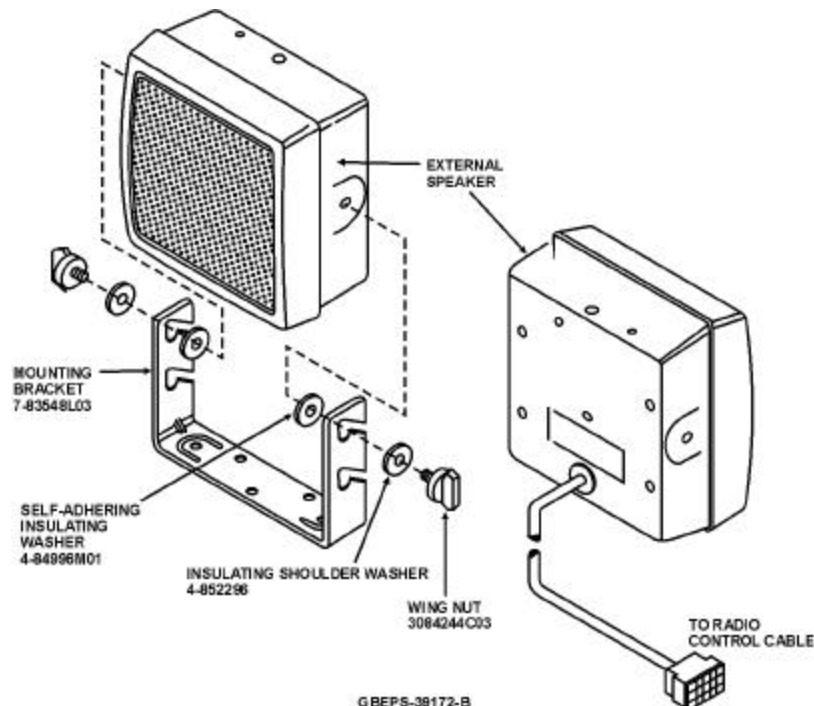


Figure 1 - External Speaker Installation Detail

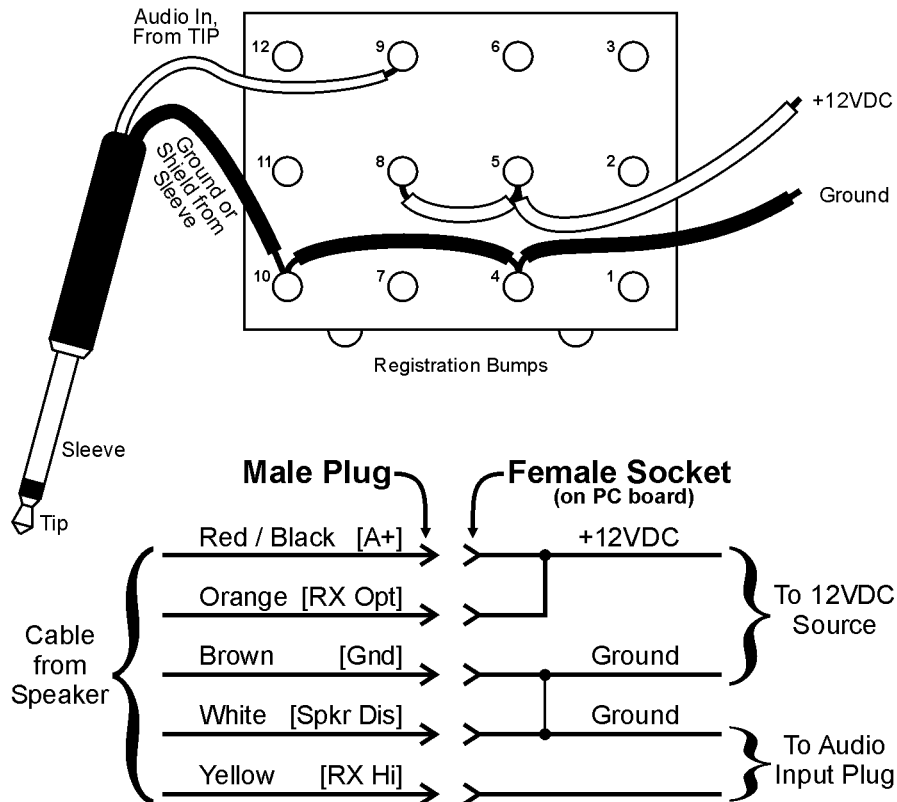
MOLEX CONNECTOR ASSEMBLY DIAGRAM

Motorola External (Amplified) Speaker

Models: TLN2660A (Standard) SSN2008A (VSP)
 TLN2661B (VIP) SSN2005B (VSP II)

1. Carefully strip the outer insulation off of the bare end of the cigarette lighter plug cable and audio cable, back 1-1/2'. Then strip the insulation off each individual wire back 1/4", unbraid 1-1/2" of the shield of the audio cable and twist into a single conductor if the audio cable needs this step.
2. Place the stripped ends of both the dc and audio cables side by side and slide both the 1/4" and 3/8" shrink tubing down over both until 2_3" of the cables protrude.
3. Follow the pictorial diagram for wire and jumper placement.
4. Twist the wire with the indicated jumper and crimp to the female socket. If you choose to solder, lay the twisted wire jumper in the "U" portion of the female socket. Fold the both sets of "ears" down on your twisted wires using needle nose pliers, then carefully solder only in the folded "ear" area.
5. Following the pictorial diagram, locate the correct hole location and insert the sockets into the rear (numbered end) of the connector. A miniature screwdriver is helpful to push the sockets into the connector. The rear of the socket will be recessed into it's hole about 1/16" when properly seated.
6. Slide the 1/4" shrink tubing up the cables, with the jumpers inside the tubing, until it is about 3/8" from the back of the connector. Heat the shrink tubing uniformly until it shrinks down on the cables and jumpers. Now slide the 3/8" shrink tubing up over the 1/4" tubing and heat until it shrinks down. Now slide the 3/4" shrink tubing over the connector, allowing one half of the connector length to protrude from the tubing. Heat uniformly on all four sides of the connector and down over the 3/8" tubing. Allow to cool.
7. Mount the speaker using the provided two page installation guide.
8. Plug the connectors together until they are fully seated.
9. You are now ready to plug in the DC plug to 12VDC and the audio plug to your speaker output jack of your radio, and enjoy great fidelity!!!

Note: This plug is as viewed from the numbered (back) side of the plug
 Insert pins from the back side of the plug.



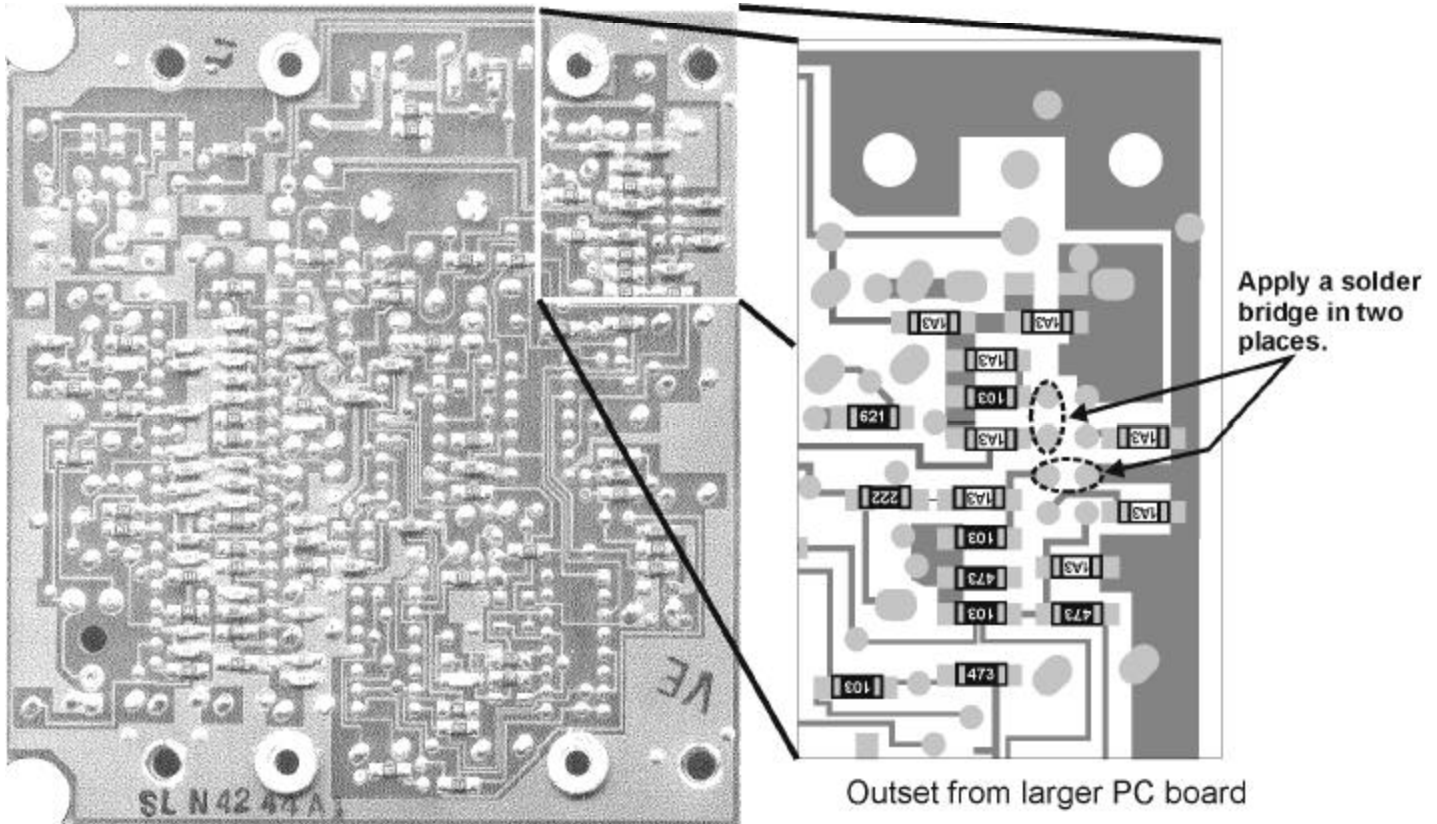
A 'CLEANER' RE-WIRING METHOD

(Not necessarily easier, but cleaner)

Motorola External (Amplified) Speaker

Models: TLN2660A (Standard) SSN2008A (VSP)
TLN2661B (VIP) SSN2005B (VSP II)

AF AMPLIFIER PC BOARD (SLN4244A)



Note: Foil patterns for this PC board vary slightly between PC board versions (e.g. A & B versions) but component locations do not vary significantly from version to version.

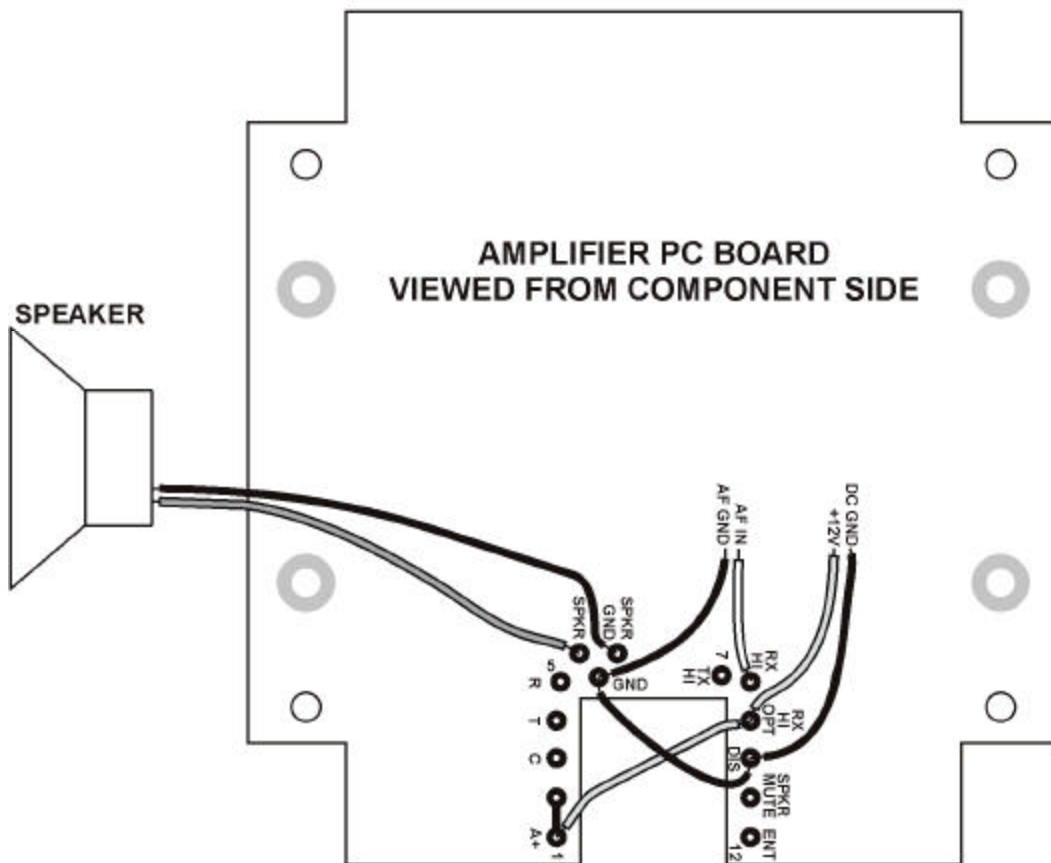
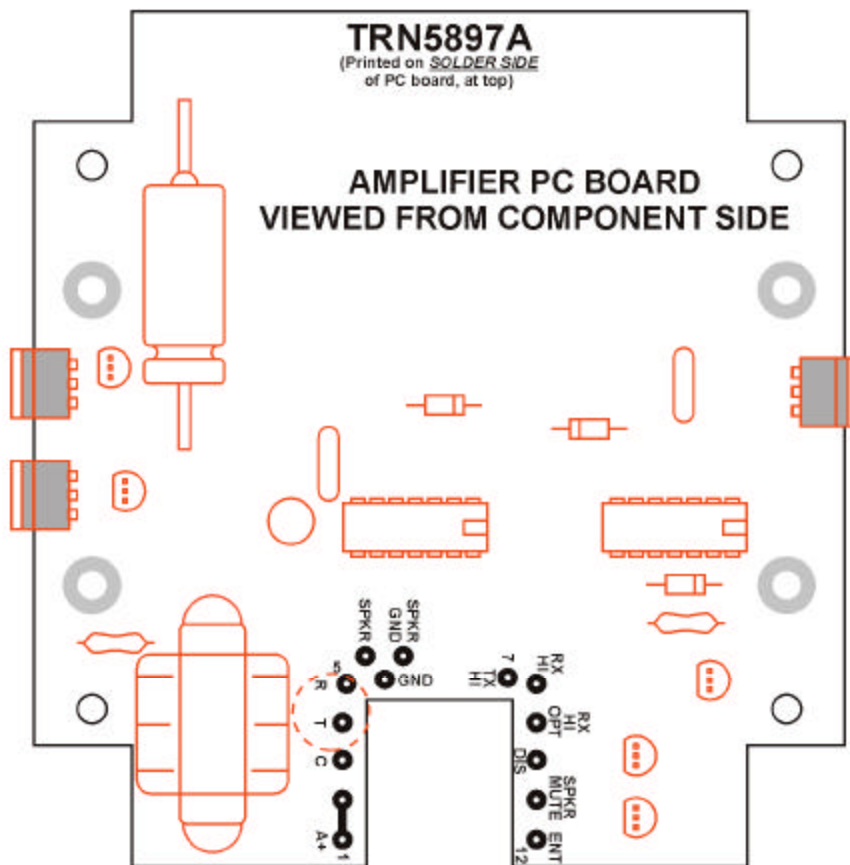
- 1) Remove the speaker case and remove the screws holding the PC board to the internal frame.
- 2) Unplug the 8-pin plug from the PC board and clip any wires which are installed in the holes marked with an "X" in the illustration to the right. DO NOT CLIP the following wires connected to the four center pins of the connector:

RED-BLK	>	+12VDC	YEL	>	AF INPUT
BRN	>	DC GND	WHT	>	AF GND
- 3) Install two (solder-bridge) SHORT jumpers as shown in the outset, above.
- 4) Cut the four remaining wires from the 8-Pin plug to a length of about 2" and strip 1/8" of insulation from each wire.
- 5) Install and insulate new DC power leads, connecting them to the two wires indicated in step 2.
- 6) Install and insulate a new shielded AF input lead (RG-174 works nicely), connecting to the two wires indicated in step 2.
- 7) Reconnect the plug to the socket on the PC board.
- 8) Re-route the DC and AF leads out of the case, reinstall the PC board to the mounting frame, and reinstall the case.
- 9) Install DC and AF In connectors as appropriate. DONE!

Motorola External (Amplified) Speaker

Models: TLN2660A (printed on Speaker Case)

TRN5897A (printed on AF Amp PC Board)



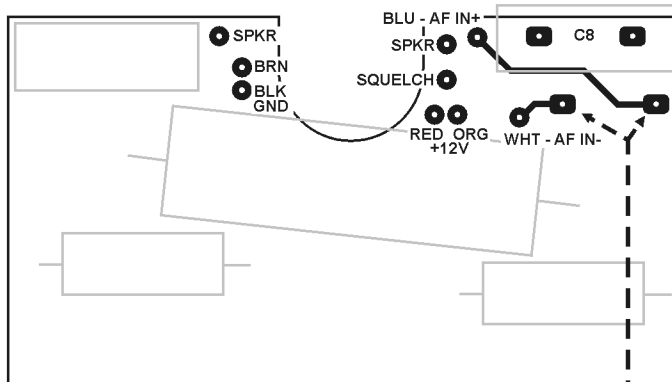
Models TRN5898B1S (printed on AF Amp PC Board)

(Printed on SOLDER SIDE
of PC board, at top)

Motorola External (Amplified) Speaker

Models: NSN6054A Speaker Case
8405326T.xx AF Amp PC Board
(this is a 12W amplifier)

PC board as viewed from the TOP (component) side, with
a few components shown just to assist in identification.



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NOTE: This amplified speaker utilizes a balanced audio input... neither of the input lines are grounded. As a result, you have two options for connecting the AF input:

1) Connect directly to the input wires (BLU & WHT) with no attempt at input isolation. This method will work, but you may run the risk of a possible ground loop and subsequent hum on the audio output. Or,

2) Install a small audio isolation transformer in the AF In line. An 8-Ohm to 300-Ohm isolation transformer works very well. Remove the BLU & WHT wires from the PC board. Connect the AF Input from the radio (BLU & WHT wires) to the transformer's 8-Ohm secondary and connect the primary to the BLU & WHT pads on the PC board. This method will also produce more audio output than method #1. There are two rectangular pads associated with the BLU and WHT pads on the PC board. If you remove the solder from these two rectangular pads, the empty holes make a nice attachment point for the secondary wires from the isolation transformer. I used a transformer from Mouser Electronics, part #42TM010 (Xicon 350 Ohm CT : 8 Ohm CT). I folded back the center tap wires, wrapped the transformer in plastic electrical tape, and then soldered the transformer directly to the under side of the PC board allowing it to hang by the primary winding leads. I then soldered the BLU & WHT wires back to the 8-Ohm secondary leads and insulated them with heat shrink. I'm told that the Radio Shack 273-1374 (1:1 ratio) transformer works as well.

You may find it helpful to temporarily remove the blue capacitor at C8 to facilitate installation of the isolation transformer. Just DON'T FORGET to replace C8 when you

PC Board/Cable connections:

+12VDC
DC GND

RED & ORG
BLK & BRN

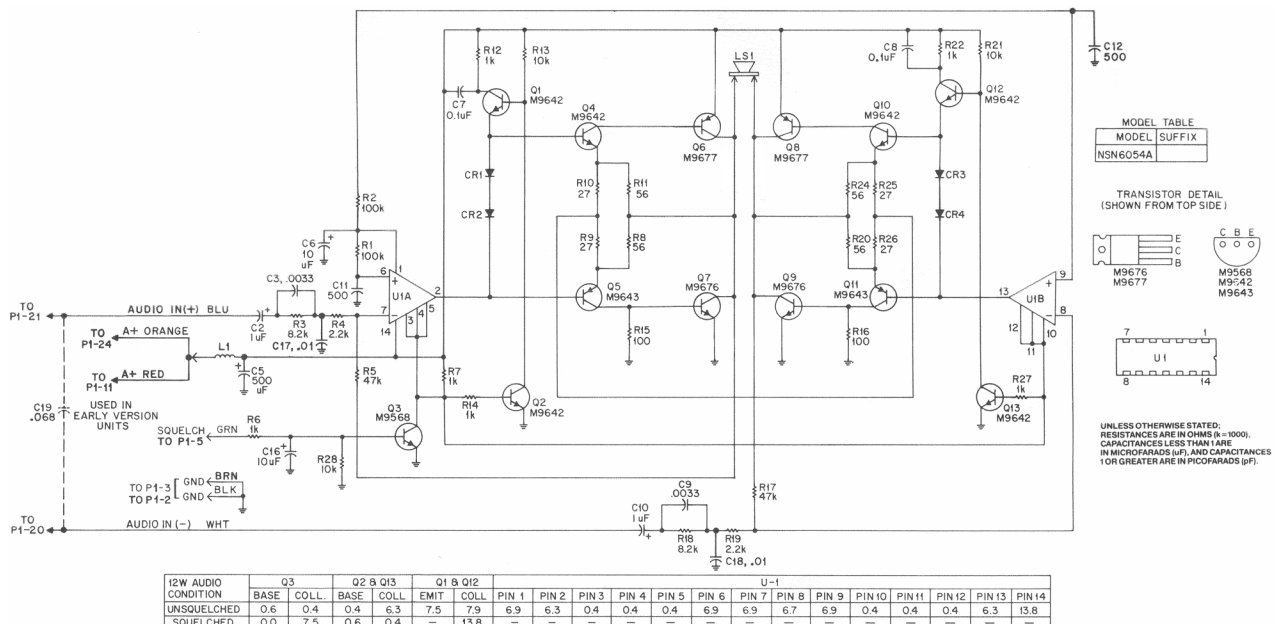
AF In+
AF In-
See NOTE at right

BLU
WHT

SQUELCH GRN (see NOTE)
Squelch **must** be connected to +12VDC
in order to enable the output amplifier.

Nomenclature on back (solder) side of PC board

8405326T.xx

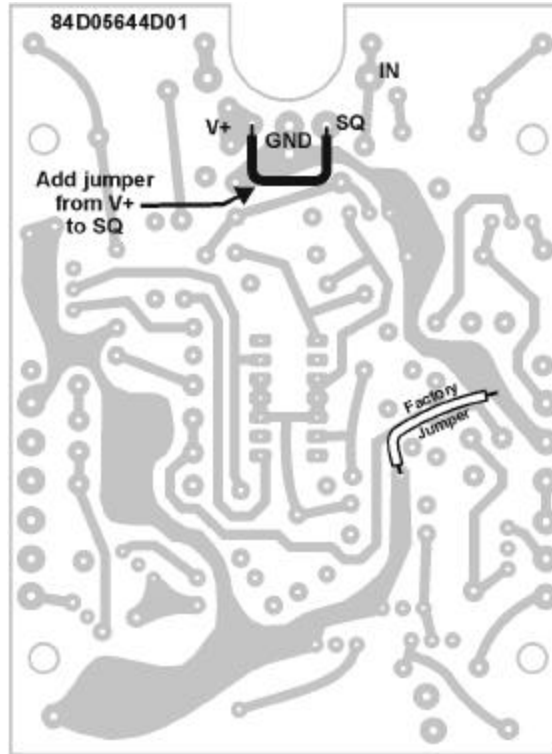


Motorola External (Amplified) Speaker

Model: NSN6048A (printed on case)
84D05644D01 (printed on AF Amp PCB)

PC Board Connections

+12VDC to [V+]
DC Gnd to [GND]
AF Input to [IN]
AF Gnd to [GND]
And, add a jumper between [V+] and [SQ]



Modification Steps

NOTE: This amplified speaker (NSN0648A) uses a PC board with the ID# 84D05644D01 etched into the copper. This model does **NOT** utilize external output transistors which are physically attached to the PCB mounting frame. If your PC board HAS this ID number but DOES HAVE external output transistors, refer to the pages of this document which reference model NSN6027A and PC board ID #84D05644D01.

- 1) Remove the speaker case and remove the screws holding the PC board to the internal frame.
- 2) NOTE that all control cable wires are installed in a semi-circle around a cutout in the PC board. Also note that, on the COMPONENT side of the PC board, several of the holes are labeled, for easy identification later. This will be important in future steps. CONFIRM that the component-side labels MATCH those labels which have been added to the PC board drawing shown above.
- 3) With the exception of the speaker wires, CAREFULLY desolder and remove ALL wires from the remaining PC board holes.
- 4) Install new +12VDC DC power leads, connecting [GND] and [V+].
- 5) Install a shielded AF input lead (RG-174 works nicely), connecting to holes [GND] and [IN].
- 6) Re-route the DC and AF leads out of the case, reinstall the PC board to the mounting frame, and reinstall the case.
- 7) Install DC and AF In connectors as appropriate. DONE!

Motorola External (Amplified) Speaker

Model: NSN6027A (printed on case)

84D05644D01 (printed on AF Amp PCB)

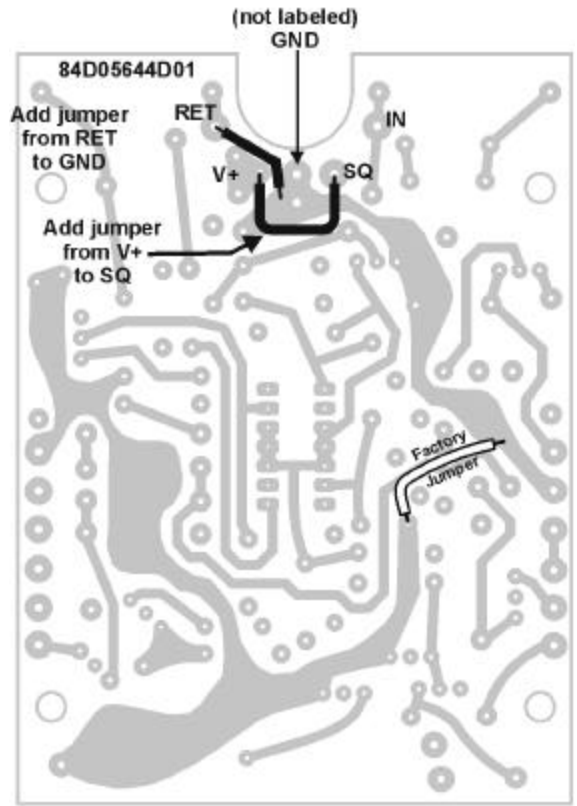
PC Board Connections

+12VDC to [V+] AF Input to [IN]
DC Gnd to [GND] AF Gnd to [GND]
And, add a jumper between [V+] and [SQ]

Modification Steps:

NOTE: This is what I call the 'clean' mod. The quick 'n dirty mod is on the following page. This mod is probably most applicable if the cable on your speaker has been cut short.

NOTE: This amplified speaker (NSN6027A) uses a PC board with the ID# 84D05644D01 etched into the copper. This model utilizes external output transistors which are physically attached to the PCB mounting frame. If your PC board HAS this ID number but DOES NOT HAVE external output transistors, refer to the page of this document which references model NSN0648A and PC board ID #84D05644D01.

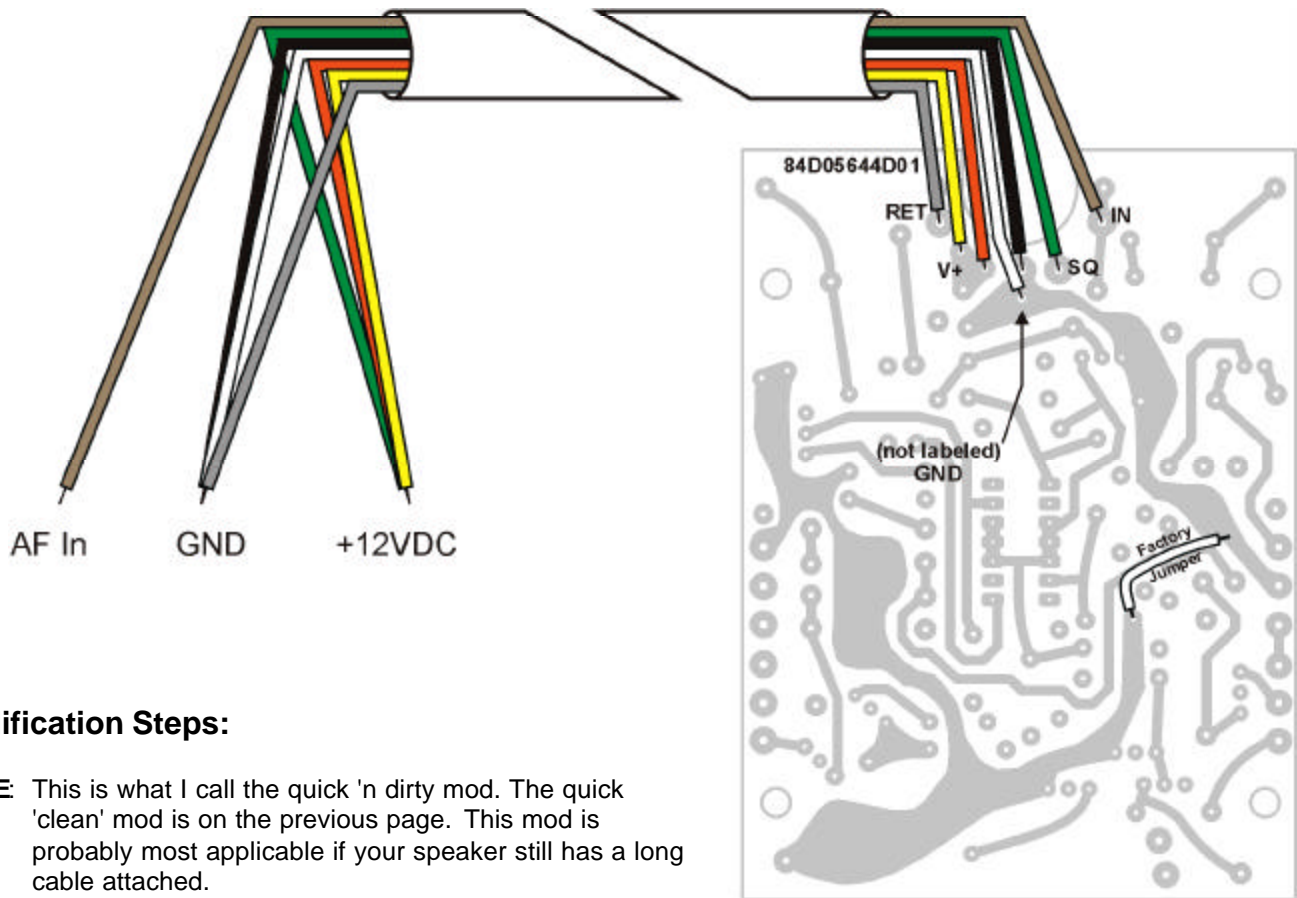


- 1) Remove the speaker case and remove the screws holding the PC board to the internal frame.
- 2) All control cable wires are installed in a semi-circle around a cutout in the PC board. Also note that, on the COMPONENT side of the PC board, several of the holes are labeled, for easy identification later. This will be important in future steps. CONFIRM that the component-side labels MATCH those labels which have been added to the PC board drawing shown above. NOTE that although the pad at the bottom of the semi-circle is NOT labeled, it is actually the ground (GND) pad for the circuit.
- 3) CAREFULLY desolder and remove ALL (7) wires from the pads around the semi-circular cut-out on the PC board.
- 4) On the component side of the PC board, install new +12VDC DC power leads, connecting to holes [GND] and [V+].
- 5) On the component side of the PC board, install a shielded AF input lead (RG-174 works nicely), connecting shield to [GND] and center conductor to [IN].
- 6) On the non-component side of the PC board, install an insulated jumper between [RET] and [GND]. There may be NO HOLE available for attaching the GND side of this jumper. Just solder to the available foil.
- 7) On the non-component side of the PC board, install an insulated jumper between [SQ] and [V+].
- 8) Re-route the DC and AF leads out of the case, reinstall the PC board to the mounting frame, and reinstall the case.
- 9) Install DC and AF In connectors as appropriate. DONE!

Motorola External (Amplified) Speaker

Model: NSN6027A (printed on case)

84D05644D01 (printed on AF Amp PCB)



Modification Steps:

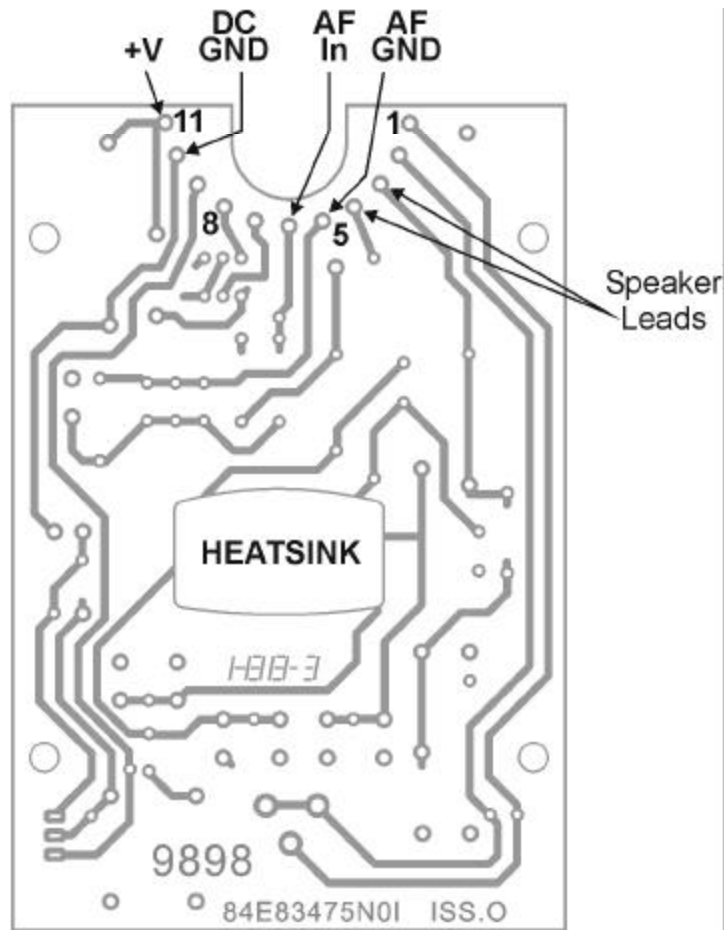
NOTE: This is what I call the quick 'n dirty mod. The quick 'clean' mod is on the previous page. This mod is probably most applicable if your speaker still has a long cable attached.

NOTE: This amplified speaker (NSN6027A) uses a PC board with the ID# 84D05644D01 etched into the copper. This model utilizes external output transistors which are physically attached to the PCB mounting frame. If your PC board HAS this ID number but DOES NOT HAVE external output transistors, refer to the page of this document which references model NSN0648A and PC board ID #84D05644D01.

- 1) Remove the speaker case and remove the screws holding the PC board to the internal frame.
- 2) All control cable wires are installed in a semi-circle around a cutout in the PC board. Also note that, on the COMPONENT side of the PC board, several of the holes are labeled, for easy identification later. This will be important in future steps. CONFIRM that the component-side labels MATCH those labels which have been added to the PC board drawing shown above. If the numbers on do not match, then this may NOT be the appropriate set of modification instructions.
- 3) Write down the wire colors for the following PC board points (standard colors are shown in parentheses): IN (Brn), SQ (Grn), GND (Blk & Wht), +V (Red & Yel), and RET (shield).
- 4) Reassemble the speaker cabinet and make the following connections at the far end of the speaker cable:
Connect the two (2) GND wires and one (1) RET wire together. They are now "GND".
Connect the two (2) +V wires and one (1) SQ wire together. They are now "+V".
AF Input - Connect to IN wire and to GND
+12VDC - Connect "+" to +V, connect "-" the GND
- 5) Done..!

Motorola External (Amplified) Speaker

Model: TLN2435A (printed on case)
TRN5276A (printed on AF Amp PCB)



Modification Steps:

- 1) Remove the speaker case and remove the screws holding the PC board to the internal frame.
- 2) In the middle of this PC board is a spring-type heatsink which should be covered with heatsink thermal compound. Either use care to not remove any of the compound from the heatsink, or wipe it off completely and re-apply it during reassembly of the speaker.
- 3) NOTE that all control cable wires are installed in a semi-circle around a cutout in the PC board. Also note that several of the holes (1, 5, 8 & 11) are numbered (on the COMPONENT side of the PC board), for easy identification later. This will be important in future steps.
- 4) With the exception of the speaker wires, connected to holes 3 & 4, CAREFULLY desolder and remove ALL wires from the remaining PC board holes.
- 5) Install new DC power leads, connecting them to holes 10 (GND) and 11 (+12VDC).
- 6) Install a new shielded AF input lead (RG-174 works nicely), connecting to holes 5 (AF GND) and 6 (AF IN).
- 7) Re-route the DC and AF leads out of the case, and reinstall the PC board to the mounting frame. If you removed the heatsink compound in step 2, re-apply it now. Reinstall the case.
- 8) Install DC and AF In connectors as appropriate. DONE!

Generic wiring instructions for (possibly) other versions of the Motorola Amplified Speaker

(Sorry, I cannot tell you which model they are for, OR how accurate they are.)

Your mileage may vary - Caveat Emptor!!!

Red, yellow, and green wires connect to +13.8v.

Black and white wires connect to ground.

Brown is audio signal + and the shield is audio signal - (ground).

Power and signal grounds should be connected together at the end of the cable opposite the speaker.

The green wire operates the MUTE circuit, which mutes the amp when this line is switched to ground and turns the amp on when it is supplied with any voltage greater than a few volts. Connecting the green wire to +13.8VDC keeps the speaker on whenever power is applied.

WARNING

DO NOT BE MISLED BY SOME MOTOROLA SPEAKERS..!

Not all Motorola speakers are 'AMPLIFIED' speakers, especially those which are completely contained within PLASTIC enclosures with enclosure backs which appear to be 'form-fitted' around the back of the speaker.

The NSN6026A is one example. While this is a VERY NICE 3.2 Ohm (possibly 4 Ohm) speaker, it is NOT an amplified design and requires NO modifications.

If you are looking for a Motorola AMPLIFIED speaker, be certain that is what you are purchasing, BEFORE you complete the transaction. If there is only a 2-wire connection coming out of the back of the speaker enclosure, there is a 95% chance that the speaker is not of the amplified design.

Also note that many, if not most, radios designed for MOBILE operation, or those designed to be powered directly from 12VDC, are designed to drive low-impedance (3.2 Ohm to 4 Ohm) speaker loads MUCH better than the more commonly available 8-Ohm speakers. So if you wish to find a nice speaker for your 12VDC-powered radio, you will generally be happier with a 3.2 to 4-Ohm speaker than with an 8-Ohm device.