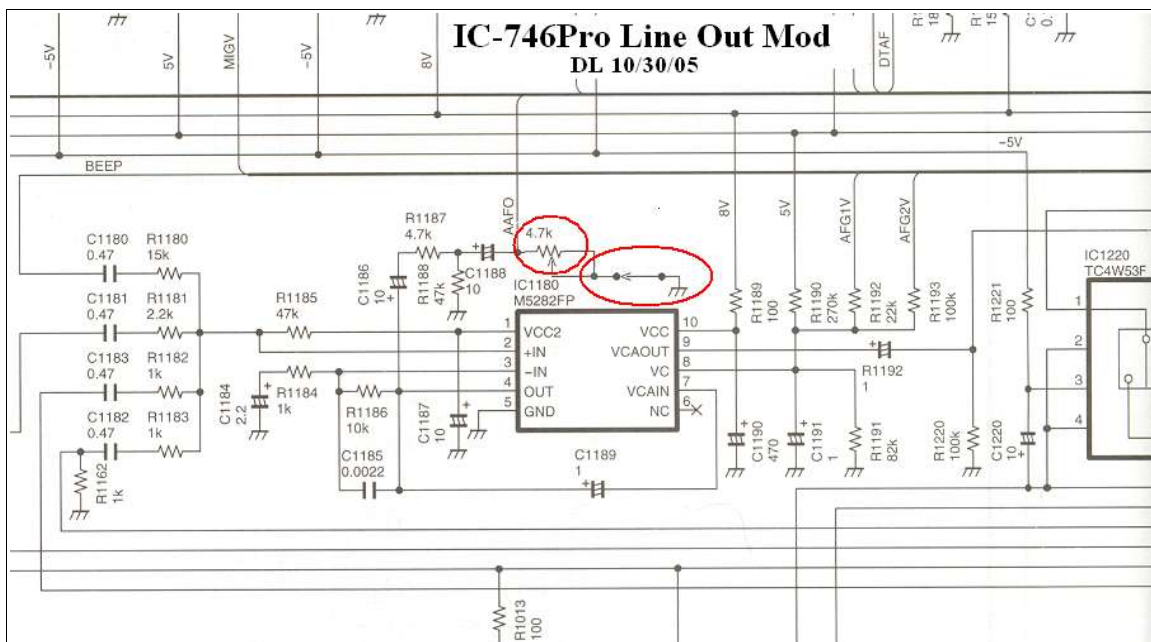


IC-746Pro Line Out Mod

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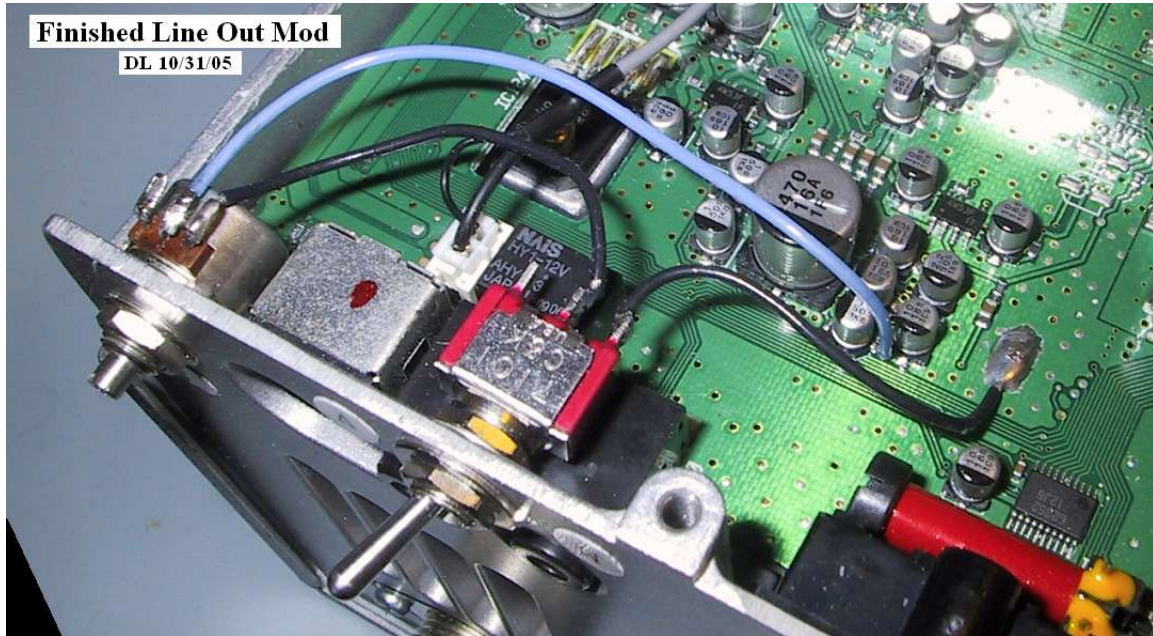
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Some recorders, like the iAudio M3, do not have AGC. They may and do overload when recording. For a correctly designed receiver this would not be a problem because the line out would have an output level control. However, the IC-746Pro (746P) does not. Here we describe a mod which adds switchable line out level control. The mod uses one C & K miniature toggle switch and one Allen Bradley 5K ohm miniature slot adjust pot. The AB 5K is a high quality pot which has been out of production for many years. A 5K pot Honeywell RV6LAYSA502A-P, available from Allied Electronics, part no. 753-3502, www.alliedelec.com, might be a suitable substitute; it is rated at 50,000 rotations and comes with a shaft lock nut.



The line out for a 746P is called AAFO by ICOM, which is available at pin 5 of the "Accessory 1" socket (an 8 pin DIN socket) and also pin 5 of the "Data" socket, both on the rear panel. The line out is rated by ICOM as 4.7K ohms source impedance, 100 - 300 mV rms nominal. The Measured output impedance of my 746P line out is about 5000 ohms at 400 Hz. I use a Sony MZ-N510 Type S Walkman (minidisc recorder) which has AGC in record mode, and so it does not need such a mod as described here. For the record, its input impedance is about 30,000 ohms nominally at 400 Hz. On the other hand, the iAudio M3 does not have AGC in record mode, and it does overload when used with a 746P. I do not know the iAudio M3 input impedance; presumably it is high, like the Sony. Modifying a 746P is not easy because of all the microscopic 603 SMD's; I

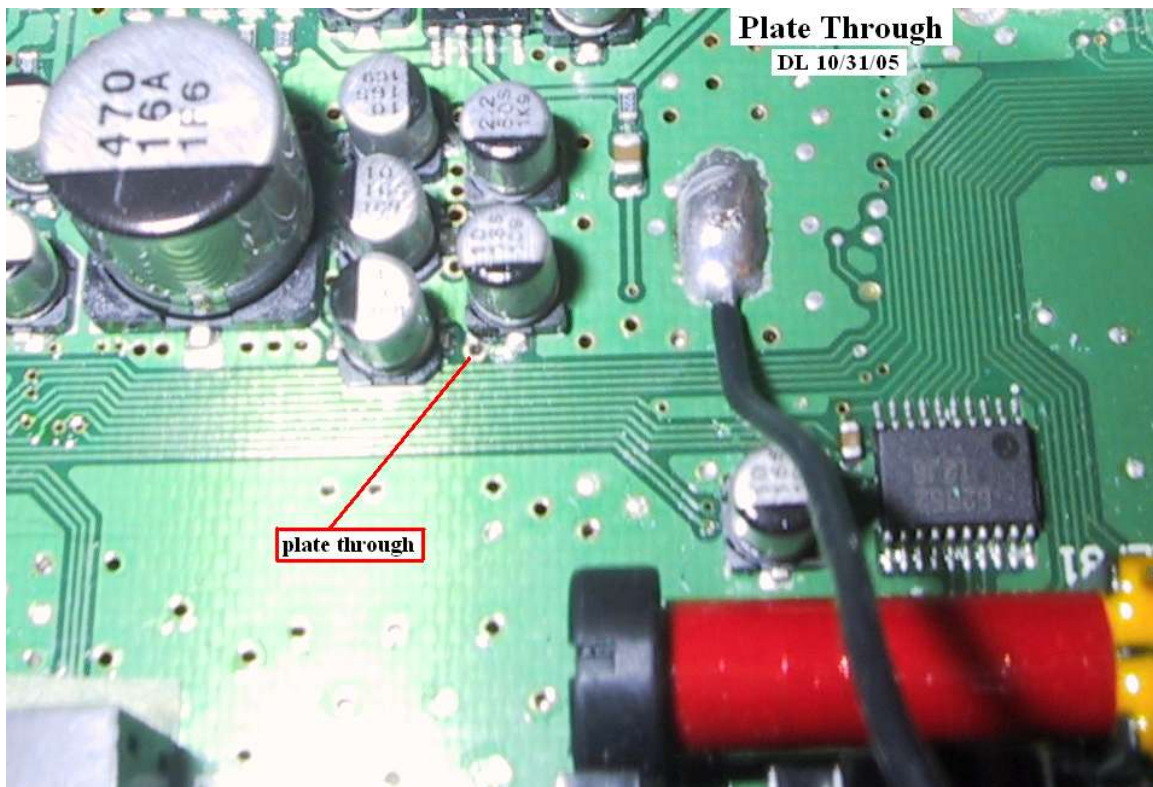
wanted to avoid tampering with them. After studying the appropriate parts of the schematic (see above) and the "Main 1" PC board layout, I found what seemed like a reasonable mod. I placed a 4.7K (actually 5K) ohm pot from the "Accessory 1" audio output (AAFO) line to ground. This allows one to reduce the line out level when using a non-AGC recorder. I made the pot switchable to accommodate AGC minidisc recorders. When switched in, at its maximum (5K) setting, the pot reduces the line out by about 6 dB when using a high input impedance minidisc recorder; the line out can be further reduced as much as needed by adjusting the pot.



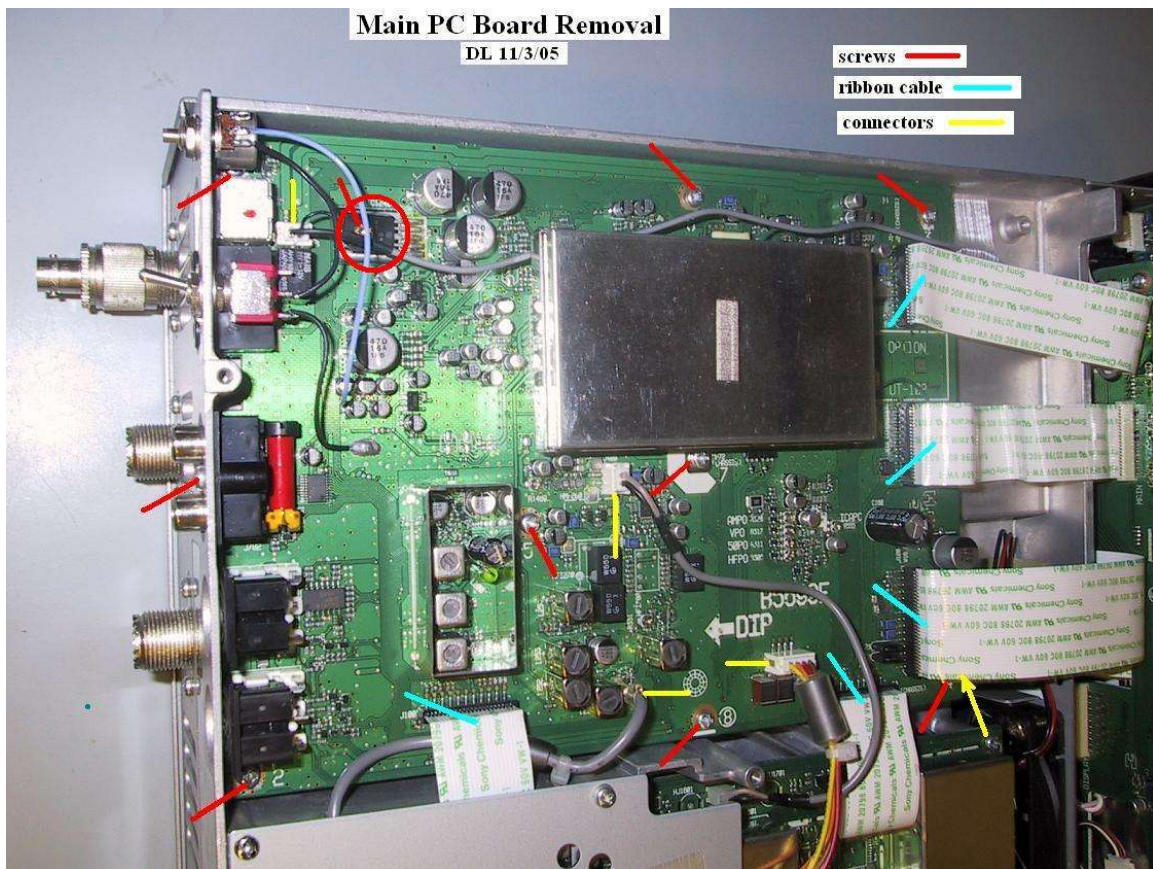
Above are photos of parts of the "Main 1" PC board and rear panel which show the mod. The toggle switch can be set for M = maximum (original 746P) or V = variable (the pot is switched in and is adjustable). There is not much room for error with regard to mounting

the pot and toggle switch; a miniature pot and miniature toggle switch must be used. I relied on one of my usual "tricks" for drilling the holes. I started with the smallest standard drill bits (1/16"), after using a center punch, and "slant drilled" through larger sizes to "move" the hole as necessary (using a round file if needed to move the hole further than a bit would move it) until reaching the desired 1/4" hole for the pot and toggle bushings. "Lock tab" holes were also drilled (carefully). Almost all drilling was done from the outside of the rear panel, with the 746P in upright position so that the metal "chips" and debris fell downward, away from the inside of the 746P. The exception was the "lock tab" hole for the pot, which was inside the 746P. In this case I used another "trick," a small piece of clear packing tape, stuck to the rear panel just below the drill site, with adhesive facing up in order to catch the metal chips and debris on the adhesive surface. Then additional tape was used to fix the debris so that it could be removed as the tape was removed, and thereby kept away from the inside of the 746P.

The wiring is routine, except for connecting the 4.7K ohm pot to the line out PC board trace, and grounding the toggle switch. For the switch ground, a small part of the green solder mask was scraped away (to bare bright copper) with a small pen knife and an oval shaped solder blob was created with a 45 watt soldering iron (a dab of solder flux paste is helpful here). While the iron is still applied to the blob the stripped end of black Teflon insulated stranded copper wire (#22 or #24) is inserted into the blob, the iron is removed, and the wire is held in place until the solder blob solidifies. Additional insulation around the wire will help keep fingers from being burned while the solder blob solidifies.



The pot is connected to the PC board trace via a plate through near the surface mount electrolytic capacitor C1188; see the photographs above. You must remove the "Main" PC board for the following procedures so that you can access both sides of the PC board; see the photograph below. When the mod is completed, as shown in the photo below, the pot and toggle switch must be removed in order to remove the Main PC board. The photo below also shows (with color coded lines) which screws, ribbon cables, and connectors must be removed in order to remove the Main PC board. The yellow arrow head denotes a connector which is under a ribbon cable. The ribbon cables are removed by pulling them out of the black receptacles soldered to the PC board. Pay close attention while disconnecting the ribbon cables from their receptacles so that you will recall how to reconnect them. The connectors are removed by pulling them up from the PC board. The screw which holds the audio output IC to the chassis (circled in red) is a machine screw (the other screws are sheet metal screws). One of the sheet metal screws is on the chassis rear; it holds the two RCA plugs in place. The screw at the edge of the metal box, the DSP circuits, holds a spring loaded metal strap which grounds the metal box. The DSP box is plug-in, and will probably have to be removed so that the ground strap can be repositioned correctly when reinstalling the Main PC board.



Although the photographs above shows the ground connection already made, the ground connection should be soldered to the PC board only after the the plate through solder work has been completed and the PC board has been reinstalled. The plate through is connected to the negative terminal of C1188 by a short PC board trace. I used #24 tinned solid copper wire, insulated with blue Teflon insulation, to connect the plate through to the 5K ohm pot. To make a good solder joint it may be helpful to first flow solder into the plate through, and then remove most or all of the solder with desoldering braid before inserting the # 24 solid wire. Even if solder remains in the plate through, the #24 solid wire, sans Teflon insulation, can still be inserted through the plate through by heating the wire near its end with the soldering iron as the wire is positioned at the entrance to the plate through. Do not heat the plate through and its pad directly with the soldering iron; excesssive heat can cause the plate through or its pad or both to disintegrate. When the solid wire has been passed through the plate through, solder both sides at the plate through pads, as if it were a regular PC board solder connection. Remove excess solder with desoldering braid. A loupe or other magnifier, 8x recommended, should be used to inspect (and correct, if necessary) all solder work. Use a diagonal cutter to cut off excess solid wire on the bottom side of the PC board. Put an appropriate length of Teflon insulation onto the solid wire and solder it to the 5K ohm pot.