

## Replacing TO-3 output devices in older amplifiers

It is a problem replacing TO-3 devices as many are no longer available. However, electrically equal or superior devices are available in plastic “tab” packages like the TO-218. The large format plastic package of devices such as the 2SC1302 are meant to mount in locations where TO-3 devices were formerly used.

In order to replace TO-3 devices with a large format tab device you need:

- A suitable TO-218 or similar device. In the case of the RH D1500, this device needs to have a  $V_{ceo}$  of 200V or better and an  $I_c$  of 15A or better
- An insulator washer for that replacement device. The old TO-3 one will not be suitable.
- In the case of a transistor where the mounting hole is not in a bare metal tab but is surrounded by plastic, you may need a solder lug where the mounting hole area is round and flat, not toothed.

To mount the replacement device you must:

- Bend the base and emitter leads (the two outer leads) 90° down exactly where the lead steps down in width so that the distance between the center of the mounting hole to the lead is 0.665” or 17mm
- Replace the TO-3 insulating washer with the new one. The alignment is such that the large hole in the washer will be around the TO-3 mounting hole furthest from the emitter and base leads.
- Insert the transistor. Note that at this time, the collector, or center lead will still be attached to the transistor and will not be bent. Be careful inserting the emitter and base leads as they are square or rectangular and the old leads were round. If a socket was used for the TO-3 device, you may have to force it a little and you may have to solder the pins in place to get a reliable connection.
- If the replacement device has **an exposed metal tab**, use the mounting screw you used for the TO-3 device to make the electrical connection for the collector. Then you can snip off the collector lead from the transistor. Please note that in some cases, the TO-3 device may have been connected to the other mounting hole. If this was the case, you may have to solder a short piece of insulated wire between the two mounting points of the TO-3 device.
- If the replacement device **does NOT have an exposed metal tab** and the mounting hold is surrounded by plastic, you may need a longer mounting screw. You will need to solder a flat solder lug to the collector lead and bend it over the top of the case so that the hole in the lug lines up with the mounting hole so that when you put in the mounting screw, the collector connection may be made. Please note that in some cases, the TO-3 device may have been connected to the other mounting hole. If this was the case, you may have to solder a short piece of insulated wire between the two mounting points of the TO-3 device.

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