

T r o u b l e s h o o t i n g

Current Draw

(Circuit breakers and fuses blow. Burning smell or smoke)

Symptoms:

- Excessive current without signal present
- Fast current draw
- Medium current draw
- Slow current draw
- Runaway current draw

Possible Causes:

- **EXCESSIVE CURRENT WITHOUT SIGNAL PRESENT** (Above 2A and less than 4A)
 1. The amplifier draws high current when the AC supply voltage is first applied. This symptom may mean that there is a short in the power stages of the circuit.
 2. This could also be a misadjusted bias setting. See calibration procedures in this manual for setting bias. Check for VR511, VR611 (MPC300/T, MPC 600/T), R512, VR612 (MPC 200/T) or open diodes D505, D506, D605, D606 (MPC300/T, MPC 600/T), D504, D505, D604, D605 (MPC 200/T).
- **FAST CURRENT DRAW** (increases rapidly at only a few volts AC):
 1. Reversed or shorted main bridge rectifier BR501, BR601 (MPC 200/T, MPC300/T), BR501, BR502, BR601, BR602 (MPC 600/T). Check the bridge rectifier by setting DMV to diode mode. To verify a good bridge rectifier, connect the negative lead to BR+ (BR = bridge rectifier) and check for 0.4 to 0.6v at both AC terminals. Connect positive lead to BR and check for 0.4 to 0.6v at both AC terminal.
 2. Both supply clamping diodes shorted or reversed D512, D513, D612, D613 (MPC300/T, MPC 600/T), D510, D512 (MPC 200/T).
 3. Shorted or reversed C509, C510, C511, C512, C609, C610, C611, C612 (MPC 600/T), C511, C512, C611, C612 (MPC300/T), C511, C512, C513, C514, C611, C612, C613, C614 (MPC 200/T).
- **MEDIUM CURRENT DRAW** (increases slowly, can go to 30 VAC before current becomes excessive.):
 1. Single polarity driver or output short.
 2. Open or missing bias diodes D505, D506 (MPC300/T, MPC 600/T), D504, D505 (MPC 200/T).
- **SLOW CURRENT DRAW** (above 60 volts AC before current begins to increase, amp may pass signal):
 1. Severely misadjusted bias circuit or defective D505506 (MPC300/T, MPC 600/T), R512, R612, D504, D505 (MPC 200/T).
 2. Severe oscillation causing current drain. Check all feedback components and high frequency snubber circuit
- **RUNAWAY CURRENT DRAW** (3040V AC before current begins to increase or runaway):
 1. A reversed filter capacitor: caution, may vent explosively.

Protection, Standby, and Power Up.

(The amplifier locks up or does not startup and shut off correctly)

Model MPC 200/200T

Symptoms:

- Amplifier does not come out of protect
- Amplifier will not thermally protect
- Muting delay
- Pilot LED not working
- Fan doesn't work

Model MPC 300/300T & MPC 600/600T

Symptoms:

- Amplifier does not come out of protect
- Relay won't turn on with normal operating amplifier
- No RED "PROTECT" LED
- No muting delay
- No thermal shutdown
- No DC protect
- Shut off under signal
- DC faults without current draw
- Fan doesn't work

MPC 200/200T Possible Causes:

- AMPLIFIER DOES NOT COME OUT OF PROTECT
 1. Q50 or Q51 shorted basecollector junction or collectoremitter junction.
 2. Voltage on Z5 should be 14v 15v. If this voltage is low, check for leaky C51, C52, defective D51, or open R51/R54.
 3. Check for open LD50 and PTCs R56, R57.
- AMPLIFIER WILL NOT THERMALLY PROTECT (If "Muting" circuit is OK)
 1. Check for shorted LD50 and PTCs R56, R57, incorrect R55, R53, or open R50.
- MUTING DELAY
 1. Excess muting delay (rest works OK): Check timing capacitor C51 voltage. If it rises normally but circuit is slow to turn on, check D51.
 2. No muting delay (rest works OK): R51/R51 low (fast charge C51). Missing R53 or high.
- PILOT LED NOT WORKING
 1. Check for shorted or open pilot LD2 (CH1) or LD4 (CH2). Check R531/R631.
- FAN DOESN'T WORK
 1. Always operate at high speed: check open PTC R50, defective U50, shorted Q52.
 2. Always operate at low speed: check shorted PTC R50, defective U50, Q52 shorted base.emitter junction.
 3. Doesn't operate: missing R63 or high. Check voltage across fan terminal, should be 10V at cold and 24V at hot. If voltage is OK, replace defective fan.

MPC300/300T & MPC 600/600T Possible Causes:

- **AMPLIFIER DOES NOT COME OUT OF PROTECT**
 1. Check speaker bus for DC; if over 3VDC present, the protection circuit is operating normally to hold of operation. See DC FAULT WITHOUT CURRENT DRAW section to fix this DC fault.
- **RELAY WON'T TURN ON WITH NORMAL OPERATING AMPLIFIER:**
 1. Check Relay power voltage. With relay off, voltage at C516 should measure about 47VDC. With relay on, C516 should measure about 27V. If not check D516, R531, C516, D515.
 2. If relay power voltage OK; check voltage on the timing capacitor C515. Should rise to 1215VDC, in three seconds, which triggers Q513. If not check R528, R530, C515 polarity.
 3. Timing voltage OK; check relay transistor Q512. If good, RN501BC resistors from base to speaker bus should activate relay.
 4. Relay driver Q512 OK, check driver Q513 and LD101.
- **NO RED "PROTECT" LED**
 1. Check LED voltage. If over 2V, LED is defective. If 0V with relay off (no negative voltage to LED), there is no "protect" power (open or missing R534), which defeats shutdown circuits. Be sure to correct before proceeding.
- **NO MUTING DELAY (be sure "protect" LED works)**

ALSO WITHOUT THERMAL OR DC PROTECT: relay or circuit is "stuck on".

1. Relay Q512 shorted or wrongly mounted. Check by jumping base to emitter, should turn it off.
2. Relay Q513 shorted or wrongly mounted. Check by jumping base to emitter, should turn it off.

NO MUTING DELAY ONLY (all else OK):

1. D518 reversed (charges timing capacitor C515 immediately)
2. R528 low (fast C515 charge)
3. R29 low (low voltage on E7 turns Q513 on too soon), missing or high R30 (no off current).

EXCESS MUTING DELAY:

1. Check timing capacitor E515 voltage. If it rises normally but circuit is slow to turn on, check D517 (lift temporarily), LD501 bad or intermittent, RN501D too low.
2. Timing capacitor voltage wrong; determine cause (R528, R530, reversed C515, reversed or wrong Q511).

- **NO THERMAL SHUTOFF**

Short the amplifier load with full signal to raise heatsink temperature and put voltmeter across PTC R516 & R616, (yellow or gray sensor on the output transistor), looking for voltage to rise from 0.7V cold to 5.5V at shut down.

 1. No Red "Protect", may have no R531, which defeats whole thermal circuit (no voltage across PTC). Also check D517 high/missing, or relay drive circuit stuck on.
- **NO DC PROTECT:**
 1. R532 missing or very high.
 2. BR502 defective/wrongly stuffed
 3. Q511 defective/wrong
 4. D518 reversed (also no muting delay)

5. Replace LD501 if voltage is less than 1.5V

- SHUTS OFF UNDER SIGNAL

1. C517 missing, defective, or much too small

- DC FAULT WITHOUT CURRENT DRAW

In most cases, shorts in the output circuit will cause current draw, but certain shorts will only cause DC offset in the output. In both cases, measure all the voltages, and look for abnormal values to help trace the fault, which can be a solder or component short (zero volts), reversed zener or diode (0.6V), reversed electrolytic (several volts), or wrong value parts (abnormal voltage). Look at the following points in the circuit.

1. Shorted IC rails.
2. Blown D521, D522 give zero volts on the IC rail.
3. VR502, VR503 turned all the way off or way too low in value.
4. Collectorbase short on the driver (rare without further damage)
5. Sometimes IC forces the rest of the circuit into DC due to shorts in the feedback network, etc. To check this remove IC, check for +15V, and see if adjusting current limit trimmer VR502, VR503 will produce a zero volt output (there will be no signal, of course). If so, output stage is probably OK, look for problems in the IC, or its associated parts.
6. Defective/reversed IC (pull and check voltage)

- FAN DOESN'T WORK:

1. Always operate at high speed: check shorted fan thermal switch. (on the heatsink under the main PCB).
2. Always operate at low speed: check defective fan thermal switch.
3. Doesn't operate: check open R902 on the AC PCB and intermittent fan cable connectors.

Faults with Signal Present

(The amplifier passes a signal but is not running correctly)

Symptoms:

- Output power "breaking up"
- 'Ringing' sound with no input to amplifier
- Output collapses into a 8, 4, or 2 ohm load
- Voltage rails ok without signal
- Amplifier gets too hot without load
- One channel clips prematurely
- Gain wrong
- Poor Frequency Response
- Step Circuit Problems

Possible Causes:

- OUTPUT POWER "BREAKING UP" (*Output distorted*)
 1. R523, 524, 526, 527 open (MPC 200/T) R520.
 2. C513, C514 open. (MPC 200/T) C515.
 3. Check for continuity between speaker ground, input ground and ac ground.
 4. R501, R502, R543 open. (MPC 200/T) R516, R517.
 5. Current limits out of adjustment.

6. Defective gain control.

- "RINGING" SOUND WITH NO INPUT TO AMPLIFIER
 1. C518, C519, C523 open or wrong value. (MPC 200/T) C505, C516.
 2. R541, R542, R538, R547 open or wrong value. (MPC 200/T) R523, R524, R502.
 3. Defective op amp U503. (MPC 200/T) U501
 4. Unstable driver transistors (Q501, Q502), or output transistors (Q505 Q510). (MPC 200/T) drivers Q503, Q504, and outputs Q500Q502 & Q505Q507.

- OUTPUT COLLAPSES INTO A LOAD
 1. D519, D520, R548 wrong value or open. (MPC 200/T) D509, D511, R518.
 2. Misadjusted current limits (VR502, VR503). (MPC 200/T) R513, R514.
 3. Defective op amp U503. (MPC 200/T) U501.
 4. R501, R502 wrong value. (MPC 200/T) R516, R517.

- VOLTAGE RAILS OK WITHOUT SIGNAL (*Collapses with a signal*)
 1. C525, C526 leaky or not holding a charge. (MPC 200/T) C506, C507.
 2. Check for capacitance value of C520.

- AMPLIFIER GETS TOO HOT WITHOUT LOAD
 1. Bias trimpot (VR501) misadjusted, opened or burned. (MPC 200/T) R512.
 2. Incorrect bias diodes (D505, 506 should be 1N4934). (MPC 200/T) D505, D506.
 3. R517, R518 open or has drifted in value. (MPC 200/T) R504, R527.
 4. Defective op amp U503. (MPC 200/T) U501.

- ONE CHANNEL CLIPS PREMATURELY
 1. R517 or R518 may be open or drifted in value. (MPC 200/T) R504, R528.
 2. Misadjusted current limits (VR502, VR503). (MPC 200/T) R514, R515.
 3. Defective zener D511, D514. (MPC 200/T) D503, D506.
 4. Check for open R512, R522, R539, R546. (MPC 200/T) R513, R525, R503, R526.
 5. 680 ohm chargeback resistor R548 may be open. (MPC 200/T) R518.

- GAIN WRONG
 1. Too high: Missing one of the two feedback resistors from output, R538 or R542, (MPC 200/T) R524; or input RN902, (MPC 200/T) RN500 is wrong value. (Faulty input resistors will cause the amplifier to fail the Common Mode test.)
 2. Too low: Above feedback values wrong or shunt resistor R541/C520, (MPC 200/T) R523 wrong or open (open causes very low gain with instability. Check circuit trace).

- POOR FREQUENCY RESPONSE (Be sure to correct any gain problem first)
 1. High frequency, determined by feedback capacitor C519, (MPC 200/T) C516 (wrong value also causes instability)
 2. Low frequency, determined by DC feedback rolloff C520, and "butterworth" feedback compensation network C518/R542. (MPC 200/T) C502 low frequency rolloff.

- STEP CIRCUIT (MPC 600/T only)

Check step circuit components U501, U502, Q503, Q504 carefully, note exact output voltage where step cuts in (are both matched to 1V). Step turning on too late (too high) will hang up at 2 ohms. Check referent 15V zener voltages D509 and D510. After inspecting all parts, see below:

 1. Step distortion: check step filter components R508/C505, R504/C501, and C528.

2. No step: check Q503, Q504, U501, U502 burned to open. R505, R506, R510 open.

Instability

(Gain problems, spurious noises, and oscillations)

All Models

- General Output Distortion
- Excessive or unbalanced crossover
- Output waveform appears "fuzzy"

Possible Causes:

First, distinguish between instability (fuzziness), "ringing" which is momentary instability after a transition, "step" distortion, crossover distortion (both often show ringing), or general distortion.

- GENERAL OUTPUT DISTORTION

SEVERE:

All loads, often with current draw: often associated with feed back components (U503, C532, C520, C519, C518, C523). (MPC 200/T) U501, C516, C505. Check resistor values on R540, R541, R542, R568, R538, R547. (MPC 200/T) R502, R523, R524.

MEDIUM:

Check feedback capacitor C519. (MPC 200/T) C516.

LOW GAIN:

Suspect open circuit in feedback shunt R541 and C520. (MPC 200/T) R523. Check for broken circuit trace. Substitute IC and check IC socket for contamination.

- EXCESSIVE OR UNBALANCED CROSSOVER (*Excess notch or ringing at zero crossing*)

1. Severe: shorted bias diode D505, D506. (MPC 200/T) D504, D505.
2. Moderate: Outofspec bias diodes.
3. Defective bias trimmer components VR501, R511. (MPC 200/T) R512, R532.
4. Check for open base resistors R517, 518 on output devices. (MPC 200/T) R504, R527.

- OUTPUT WAVEFORM APPEARS "FUZZY"

1. Check main heatsink ground continuity with chassis ground.
2. High frequency snubbers defective (C513, C514, R525, R526, R523, R527). (MPC 200/T) R520, C515.
3. Check capacitors on speaker output board.
4. Check/adjust driver emitter capacitors C519 and C523. (MPC 200/T) C516, C505.

Power Supply and Voltage Rail Balancing

(Uneven rails and power supply problems)

Symptoms:

- Current limiting wrong
- Current limiting too high into a short
- IC rail too high into a short
- Current limiting too low into a short
- Uneven voltage rails

Possible Causes:

- **CURRENT LIMITING WRONG**
Current limits should remain high down to 2 ohms, and collapse to a lower value for short circuits. This is caused by the IC rails going from normal 14 15 volts to about 56 volts. Current limit trimmers TR502 & TR503 permits adjustment of each channel to a specified range. See Test & Calibration Procedures for correct adjustment of the current limiting.
- **CURRENT LIMITING TOO HIGH INTO SHORT** *(IC rails check normal 56 volts)*
 1. Reversed or shorted 4.7V zeners D511, D514. (MPC 200/T) D503, D506.
 2. Shorted bias diode D505, D506 (also shows severe crossover). (MPC 200/T) D504, D505.
- **IC RAIL TOO HIGH INTO SHORT**
 1. Check op amp (weak output current).
 2. Clip LED LD103 open, clip circuit parts R544 high or missing. (MPC 200/T) LD1, LD3, R511.
 3. D101/D102/D103/D104 open. (MPC 200/T) BR500.
- **CURRENT LIMITING TOO LOW INTO SHORT AND 2 OHM LOAD**
 1. Bias resistor R512, R522 high.
 2. Very low gain driver transistors.
 3. Missing connection or open emitter resistors in some of the paralleled output transistors.
- **CURRENT LIMITING TOO LOW INTO SHORT ONLY** *(OK into normal loads)*
 1. 3.9 or 4.7V zeners high (7.5V or 15V).
 2. Clip LED LD103 shorted, clip circuit parts R544 low. (MPC 200/T) LD1, LD3, R511.
 3. D101/D102/D103/D104 shorted. (MPC 200/T) BR500.
- **OK INTO SHORT BUT LOW INTO 2 OHMS:** *(Usually on one side only)*
 1. IC RAIL LOW: Check replenishing resistor R548 and diodes D519, D520. (MPC 200/T) D509, D511, R518.
 2. IC RAIL OK: (until clipping starts) usually indicates low output section gain caused by weak driver, open output devices, or open emitter resistors. Also check value of driver emitter resistors R501, R502. (MPC 200/T) R516, R517.
- **UNBALANCED RAIL VOLTAGES:**
 1. Shorted Q503, Q504.
 2. Defective U501, U502.
 3. Open R506, R505.
 4. Open D514, D511. (MPC 200/T) D503, D506.