



TECH NOTES

Fender Musical Instruments Corp.
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TECH NOTE # TN 98-4

ISSUE DATE: May, 1998

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PAGE: 1 of 2

PRODUCT(S) AFFECTED:

ALL WITH GE (grounded emitter) / FLYING RAIL POWER AMPLIFIERS (such as Stage 112SE guitar amp, and some SR6300/8300 box-top mixers)

GENERAL THEORY OF OPERATION DISCUSSION

CONDITION:

Confusion sometimes occurs when, in servicing a flying rail amplifier, the technician refers to the schematic diagram and notices that where he normally sees the speaker connected, these amplifiers connect to ground. Then after finding the speaker on the diagram, he sees it connected to "C.T."

GENERAL EXPLANATION:

In most complimentary solid-state amps, the output could be defined as the common point between the emitter resistors. In a "normal" amp, the DC potential of this point is near-ground - separated only by the speaker (or output) load. If this point were to be grounded by removing the speaker and connecting the point to ground through a load resistor, it would electrically operate the same way, but no sound would be heard.

In the "flying rail" amplifier this is exactly the case; and explains why it is sometimes referred to as a "grounded emitter" amplifier. The "flying rail" name comes from the fact that with the emitters grounded and the amp driven, the rails will swing in concert with the driving signal.

To take advantage of this characteristic, a power supply exclusive to the power amp is used. The positive and negative rails are derived from each end, respectively, of a transformer secondary winding which has a center tap. All current drawn by the supply

(for the positive and negative rails) flows through the center tap. If we now remove the load resistor, insert the speaker in series with the center tap (positive lead connected to the center tap, and negative lead connected to ground), we have accomplished two things:

1. The load (speaker) has been moved from the power amp to the power supply, and will now produce sound (driven by the current the power amp is drawing.)
2. The power supply center tap is electrically (DC) near-ground.

Note: This is the reason that the speaker (or an appropriate load) must be connected when servicing these amps.

The schematics of "grounded-emitter/flying rail" amps refer to "C.T." This stands for "Center Tap". This is the same point as the positive terminal of the speaker.

When servicing this type of amplifier, it is important to find out whether the speaker jack(s) is(are) isolated from the chassis, and ensure the unit being serviced is correct in that area. At the time of this writing (May, 1998), all Fender amplifiers of this design have isolated speaker jacks.

Typical hardware stackup of the jack is (from inside to outside) as follows:

1. Jack
2. Toothed washer
3. Fiber washer
4. Chassis
5. Shoulder washer
6. Finish washer
7. Nut