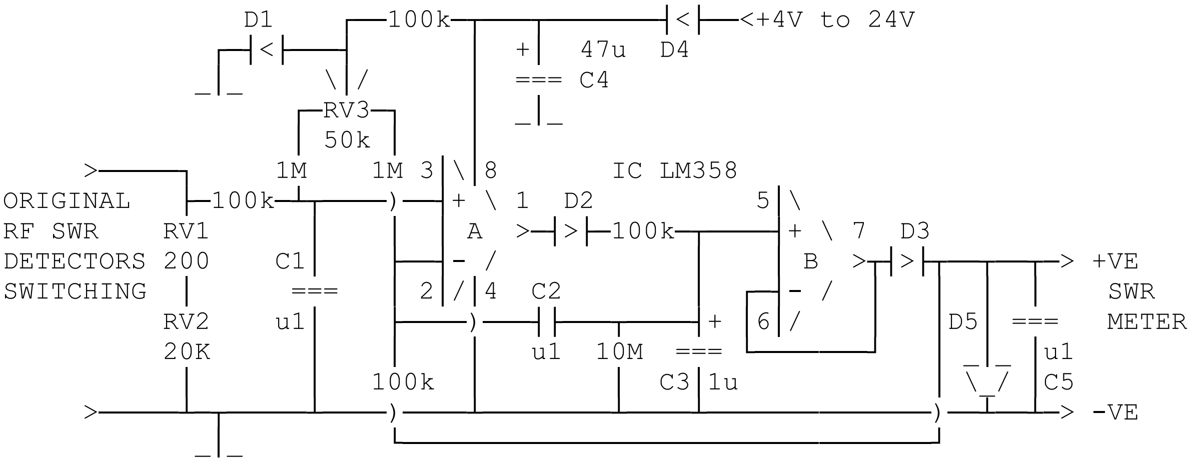
PEP Meter modification

By G8MNY (Rewrite Aug 07)

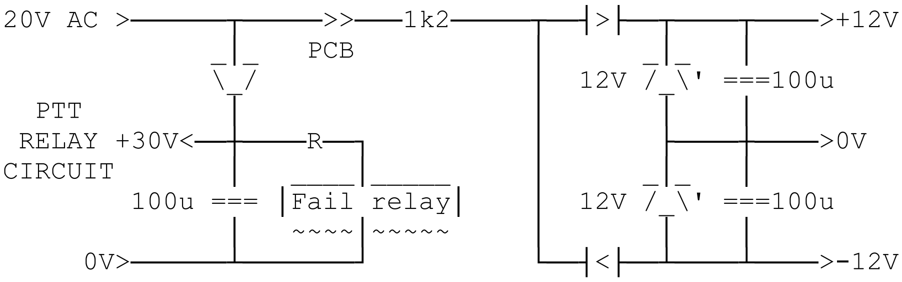
I have implemented a PEP Power meter in a large HF Valve PA, so that full carrier tuning is not required (used /P on generator). The circuit is loosely based on an old Radcom article (Jan 1986 page 46) that describes the principle of a conversion without much modification, & best of all maintaining the original calibration.

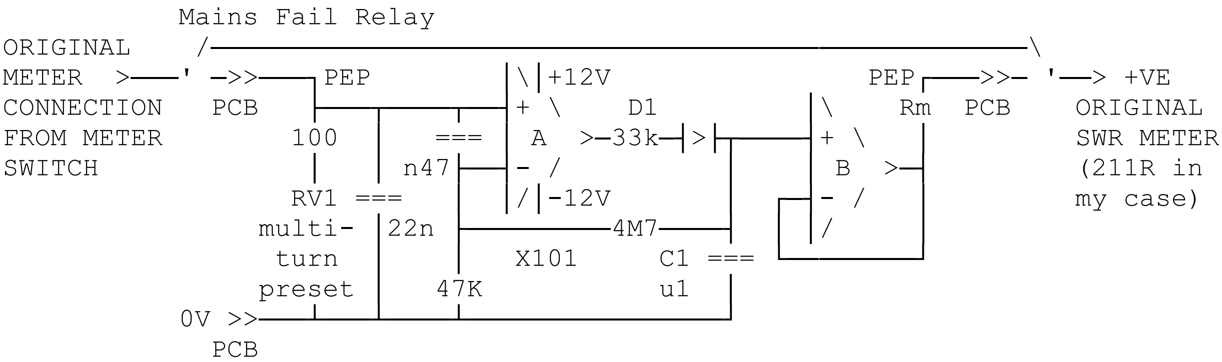
THE ORIGINAL CIRCUIT



MY IMPLEMENTATION

As I did not have this specific 0V input IC, but plenty of normal dual FET ones (more RF immune than bipolar types) & I had an AC supply on the PA, I decided to use a simple straight forward ± power rail design...





MAIN DIFFERENCES
The meter was used for 3 RF power functions as well as DC metering in this PA circuit, so the modification had to be faithful to all meter uses.

As there was HT metering, I found it was a SAFETY hazard when the PA is switch off, indicating no HT, so I added a small double pole relay (fed from the +30V via an R to get the right relay voltage) to revert the metering back to normal on no power. (useful for calibration by shorting the relay power)

In a valve PA there is a lot of RF around & finding a low RF field location for this circuit is important to correct operation. With the simple power supply on the same strip board as the opamps, the number of RF carrying wires to the circuit is kept to a minimum of 4 reducing RFI problems. So only the input opamp has RF protection with 22n across the dummy meter resistor & a n47 across the opamp input pins. I tested that this was enough by putting a series 10n in the meter input lead to bring in all the RF & see if the meter moved at all, it did not. I also tested it with an AF osc via a high value resistor to the input to mimic peak signals & checked it gave a flat peak reading response to > 2kHz. (the 22n & n47 affect this).

A major difference to the original design was to add gain of 101x on the 1st opamp & then attenuate by 101 with a series resistor (Rm=100x the meter value) to the meter. This then masks any small offset voltages, opamp leakage, or RF pickup in the system. Otherwise the opamps are comparing tiny meter level signals & with ±12V supply there is plenty of amp headroom even with 101x gain. An accurate DMM is needed to test the 4M7, 47k, Meter, RV1+100 & Rm values. (see my "Odd Resistance Finder" bull for making up Rm)

HOW IT WORKS
The input load of the Multiturn Preset RV1 + 100R is set to be exactly the same resistance as the meter, in practice this can be finely tweaked later on the calibration tests.

Silicon signal diode D1 allows the opamp only to charge up C1 (@ 5mA max peak current, hence C1 is a small value to charge nearly instantly via the 1k) to the peak +ve voltage the original meter x 101, would see from the detector etc.

Opamp B then accurately follows the C1 voltage & applies it to the meter via the 100x Rm resistor (1/101) maintaining the calibration.

Fine Calibration of RV1 is just to switch between normal & PEP (short relay supply) on a steady hum less carrier & adjust for the identical power reading. Check this at different power levels & bands.

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73 de John G8MNY @ GB7CIP