

MixMinus PlusTM

DIFFERENTIAL SUMMING AMPLIFIER

HENRY ENGINEERING

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DESCRIPTION

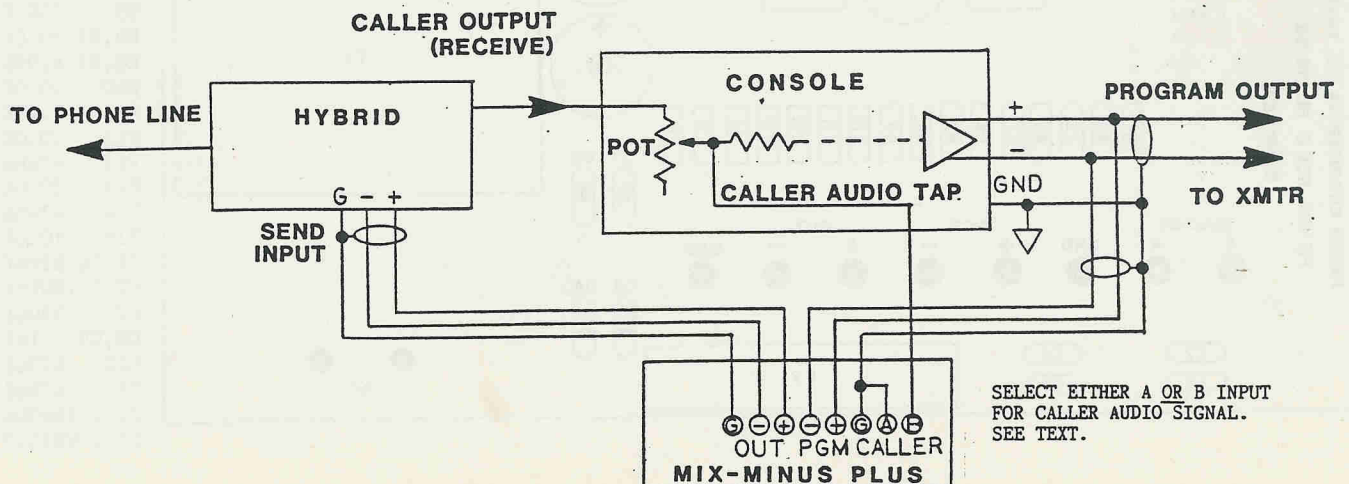
MixMinus Plus is a differential summing amplifier designed to add a "Mix Minus" output to a broadcast audio console that lacks this facility. A Mix Minus output is usually used to feed the "Send" input of a telephone hybrid device, so that the caller is able to hear the main Program mix, minus himself. MixMinus Plus generates this signal by electrically subtracting the hybrid Receive ("caller") audio from the Program output of the console. The MixMinus Plus must be used with a telephone hybrid when used to interface with TELCO audio lines. MixMinus Plus can also be used to remove satellite audio feeds from a Program mix, to eliminate "talent-echo" on back-haul satellite return audio mixes.

INSTALLATION

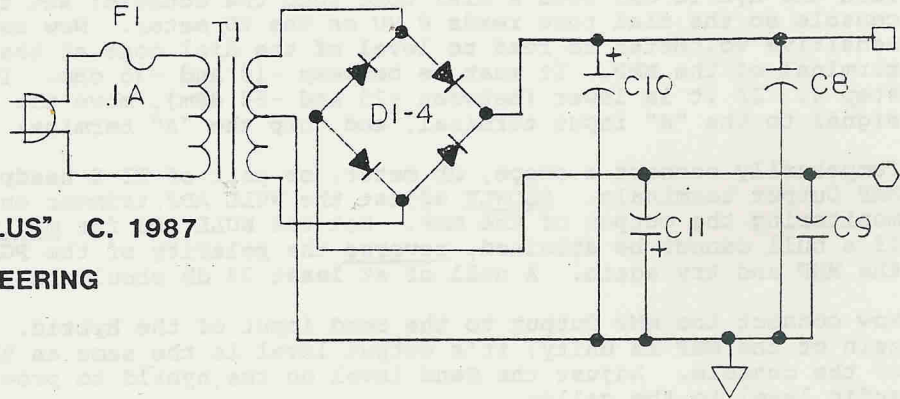
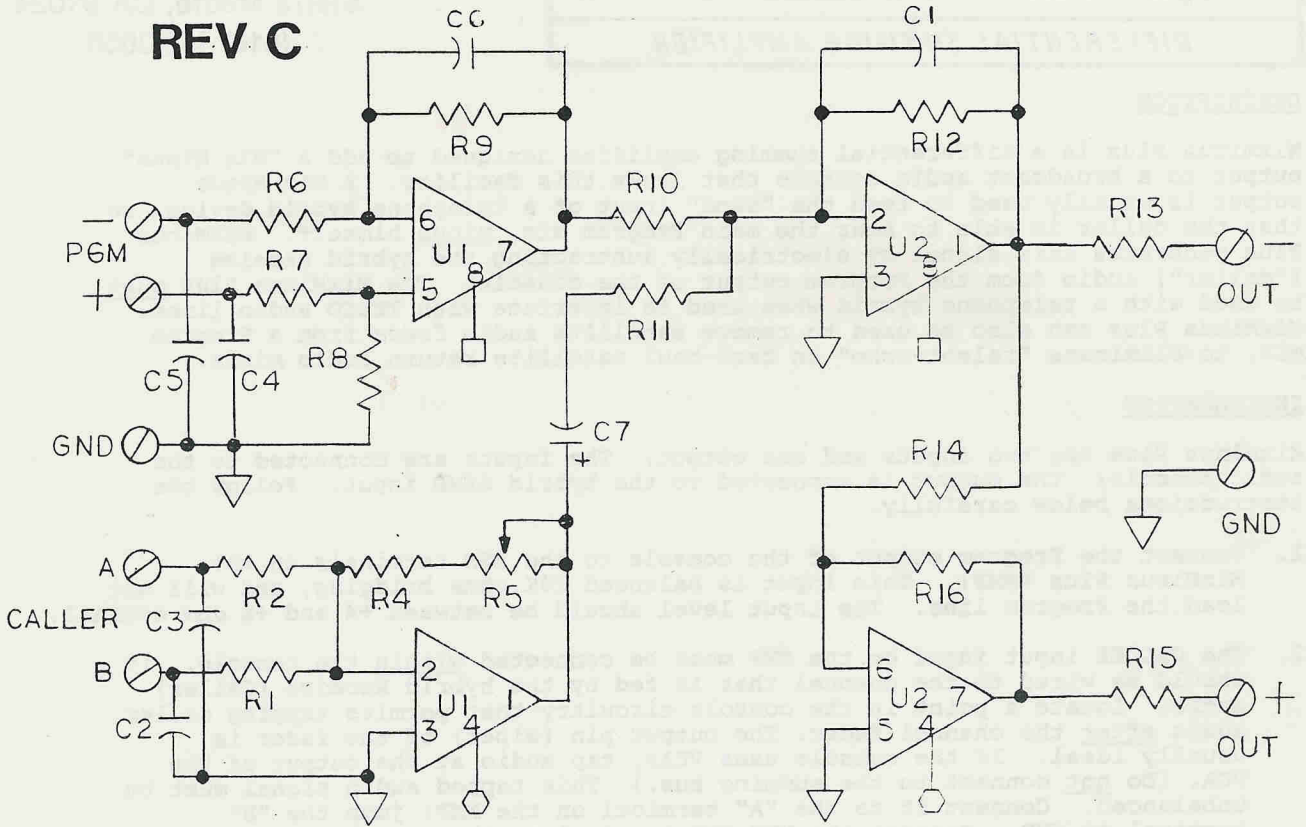
MixMinus Plus has two inputs and one output. The inputs are connected to the audio console; the output is connected to the hybrid SEND input. Follow the instructions below carefully.

1. Connect the Program output of the console to the PGM terminals on the MixMinus Plus (MMP). This input is balanced 20K ohms bridging, and will not load the Program line. The input level should be between +4 and +8 dBm nominal.
2. The CALLER input input on the MMP must be connected within the console. It should be wired to the channel that is fed by the hybrid Receive (Caller) audio. Locate a point in the console circuitry that permits tapping caller audio after the channel fader. The output pin (wiper) of the fader is usually ideal. If the console uses VCAs, tap audio at the output of the VCA. (Do not connect to the summing bus.) This tapped audio signal must be unbalanced. Connect it to the "A" terminal on the MMP; jump the "B" terminal to GND. Connect the MMP GND terminal to the console ground.
3. Turn the hybrid ON. Feed a dial tone into the console; set the fader on the console so the dial tone reads 0 VU on the VU meter. Now use a db meter or sensitive voltmeter to read to level of the dial tone at the CALLER (A) terminal of the MMP. It must be between -10 and -35 dBm. If it is, go to step 4. If it is lower (between -25 and -50 dBm), move the CALLER input signal to the "B" input terminal, and jump the "A" terminal to GND.
4. Temporarily connect a scope, db meter, or pair of HI-Z headphones to the MMP Output terminals. SLOWLY adjust the NULL ADJ trimmer on the MMP while monitoring the output of the MMP. Set the NULL ADJ for minimum dial tone. If a null cannot be attained, reverse the polarity of the PGM connections to the MMP and try again. A null of at least 25 db should be possible.
5. Now connect the MMP Output to the Send input of the hybrid. The overall gain of the MMP is unity; it's output level is the same as the output level of the console. Adjust the Send level on the hybrid to provide adequate audio level to the caller.

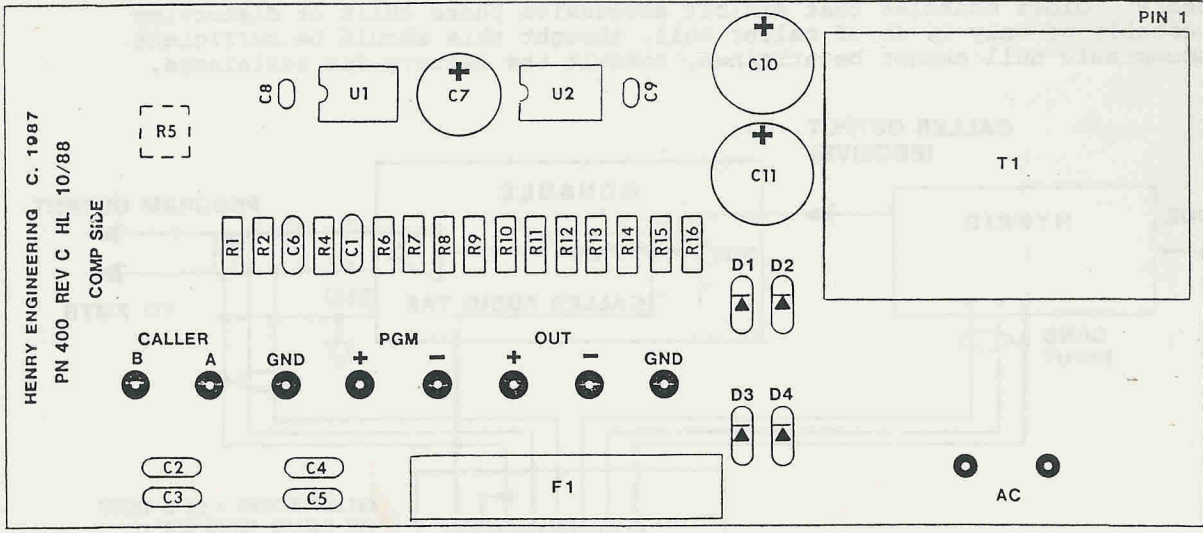
NOTE: The null performance of the MMP is dependent upon the phase shift through the console. Older consoles that exhibit excesssive phase shift or distortion may be capable of only 20 db of caller null, thought this should be sufficient. If an acceptable null cannot be attained, consult the factory for assistance.



REV C



"MIX MINUS PLUS" C. 1987
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PARTS LIST:

R1	2.49K
R2,R4	15.8K
R5	250 K
R6,R7	10.0K
R8,R9	4.99K
R10	10.0K
R11	2.49K
R12	10.0K
R13	47ohm
R14	10.0K
R14	47ohm
R16	10.0K
C1,C6	620pf
C2-5	.001uf
C7	330uf
C8,C9	.1uf
C10	470uf
C11	470uf
D1-4	1N4004
U1,2	NE5532

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PN 400 REV C HL 10/88

COMP SIDE

PIN 1