



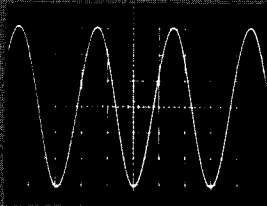
COMDEL

CSP 11

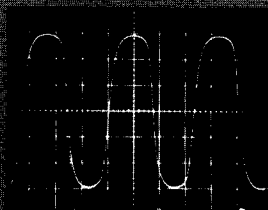
DISTORTION FREE SPEECH PROCESSOR

The Comdel CSP 11 is a communication aid designed for any system using a microphone for voice transmission. Its prominent feature is the achievement of peak limiting without the distortion which is the very undesirable by-product of conventional clippers. Therefore the average or talk-power gain obtained is more effective. In addition, the CSP 11 frequency response is tailored for maximum intelligibility of voice transmissions.

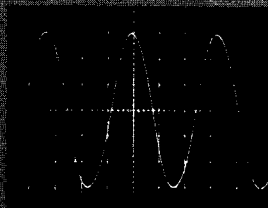
- Instantaneous limiting action
- No appreciable distortion
- Talk power gain greater than 10db
- Completely compatible with SSB
- Optimum frequency response for voice
- Installs in microphone lead
- All solid state circuitry



Input Test Signal
700 cps.
Pure Sine Wave



Output from Conventional
Clipping Clipper, 700 cps.
15 db of clipping
Note flattening of peaks



Output from Comdel CSP 11
700 cps, 15 db of clipping
Closely resembles input
wave form

SPEECH CLIPPING

Most voice communication systems carry a maximum peak power rating which must not be exceeded. The human voice has a notoriously low "mean-to-peak" signal ratio, hence the average signal, which determines the "loudness" at the receiving end, is only a small fraction of the available peak power output.

The conventional peak clipper is effective for increasing the "mean-to-peak" power ratio, at the expense of severe and often objectionable harmonic distortion. This distortion limits the usefulness of these devices. In Single Sideband Systems further difficulties are encountered when the input intelligence is in the form of clipped audio, as can be shown mathematically. The Comdel CSP 11 limits instantaneously without distorting the wave-shape as shown in the reproduced photographs. While the insertion of the Comdel CSP 11 may modify the tonal balance of the speech signal, the objectionable harmonic distortion is absent and the intelligibility is enhanced.

SINGLE SIDE BAND

When an audio wave is clipped, strong harmonics are generated which have a definite phase relationship to the fundamental frequency wave. This phase relation is completely destroyed when a clipped audio wave is used to generate Single Sideband by any of the usual methods. The various components will combine in a more or less random manner resulting in a peak amplitude which could be as high as that obtained without the use of the clipper. The Comdel CSP 11 eliminates this problem. This unit is currently believed to be the only instantaneous acting device which is entirely compatible with SSB systems. The increase in average output power will exceed 10 db without violating the original peak output power limitations of the system. It is to be noted that this increase in output power is also accompanied by a somewhat lesser increase in input power resulting in greater system efficiency.

CSP 11 SPEECH PROCESSOR

In the Comdel CSP 11 the original audio frequency spectrum, centered around 1.5kc for the human voice, is translated to a much higher center frequency. At this frequency the speech band occupies less than an octave. Peak-limiting the translated signal produces the usual harmonics, which are immediately filtered out, since they are considerably removed in frequency. The amplitude limited spectrum is then translated back to its original position resulting in peak-limited audio signals free of harmonic distortion. In effect, the CSP 11 comprises an SSB generator, limiter and demodulator in a compact package. (see block diagram on back page)

The unit is completely transistorized and requires 9 vdc at 18 ma., with the negative side grounded. Provision is made for six 1.5 volt "D" internal batteries connected in series. Power may be supplied from an external source and the use of a dropping resistor from a higher voltage supply is permissible. In the interest of power economy terminals are provided for "send-receive" or "push-to-talk" switches. The CSP 11 unit may be powered from 12 volt automobile systems without the use of external components.

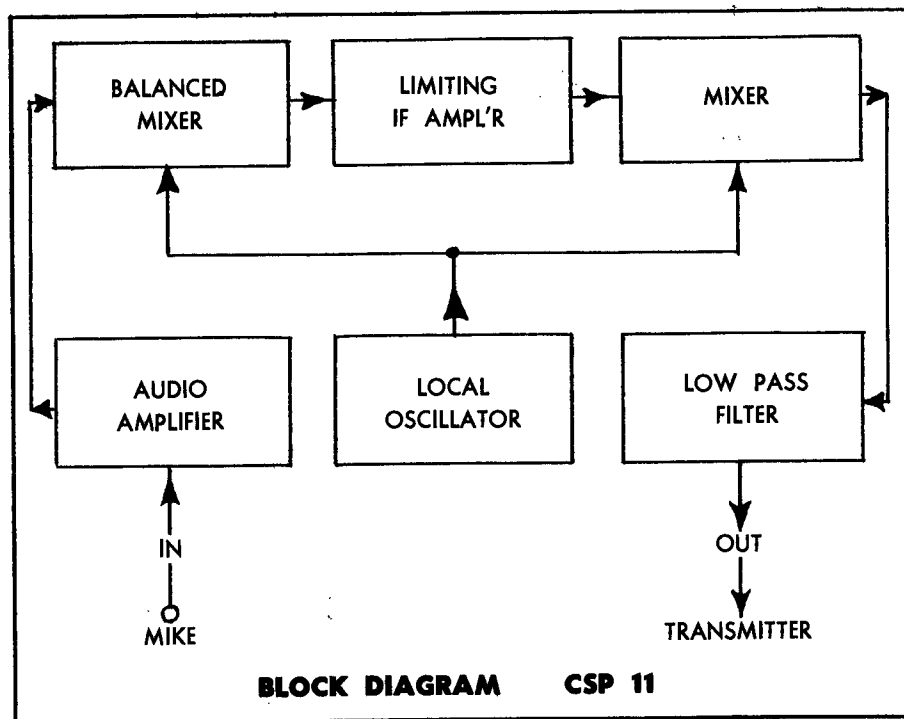
The speech device is designed to be used with fairly insensitive high impedance microphones having a peak output of at least 25 mv. on voice peaks. Most communication type microphones give considerably more output, necessitating a reduction of the front panel level control.

An "IN-OUT" switch on the front panel connects the microphone straight through to the main equipment when desired. The volume control on the main equipment becomes a "set peak level" adjustment, when the device is switched "IN."

SPECIFICATIONS¹

Input level at limiting point ²	10 mv peak
Output level at limiting point ²	40 mv peak
Input impedance	0.5 Megohm
Output load	Not less than 600 ohm
Typical frequency response	-3db @ 500c/s & 2500c/s
Power requirements	9Vdc, 18 ma.
(external source or internal batteries)	
Battery life ³	300 to 500 hours
Weight: less batteries	28 oz
Size:	5½" wide - 3¼" high x 7½" deep appr.
Price (Comdel Inc., Hamilton, Mass.)	\$120.00 (less batteries)

Notes: — (1) Comdel Inc. reserves the right to change data without notice.
(2) Limiting point is defined as the input required to cause an output 3db below the maximum attainable.
(3) Terminals are provided for "push to talk" or "send-receive" contacts, to double battery life.



COMDEL

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Hamilton, Mass.
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INSTALLATION AND OPERATION

COMDEL SPEECH PROCESSOR MODEL CSP 11

DESCRIPTION:

The Comdel Model CSP 11 is a speech processing device which provides instantaneous limiting without the distortion found in ordinary speech clippers. It is installed in microphone lead lines and does not require any modifications to the main equipment. When employed with public address systems and most radio transmitters, the CSP 11 will give greater average power output for any given peak level than conventional clippers due to the absence of distortion. With SSB systems, where conventional clippers are marginal in performance, the CSP 11 will give good quality output with an average power (talk power) gain of 10db or more, relative to the peak power output.

INSTALLATION:

The CSP 11 may be powered from internal batteries which are six 1.5 volt "D" cells, or from an external supply.

(1) Operation with Internal Batteries

To install batteries, remove the four screws affixing the feet. Slide the unit out through the rear of the case. Instructions will be found on the bottom (metal) plate. In installations such as transmitters, portable public-address or hailer systems, where "SEND-RECEIVE" or "PUSH - TO - TALK" (PTT) features are incorporated, spare switch or relay contacts may be wired to the rear terminal strip of the CSP 11. This will double the life of the internal batteries.

Terminal Arrangements: (a)

No PTT interconnections
Link terminals 4 and 5
Link terminals 1 and 2

(b)

With PTT (or Send-Receive)
Link terminals 4 and 5
Connect external relay contacts or switch wires to terminals 1 and 2. If one of these wires is grounded, it MUST go to terminal 1.

*Connect battery 1-2 to 4-5
be (ground) by PTT switch
PTT switch is closed*

Battery Check: Apply voltmeter to terminals 5 (+) and 2 (-) with unit operating. Voltage should be above 8.0. If less, replace all cells.

(2) Operation from External Supply

In installations where sufficient power is available from the main equipment, internal batteries need not be used. Inter-wiring of PTT or "Send-Receive" contacts is not possible. These features may, of course, be provided externally by interrupting the positive lead.

(a) Operation from 9⁺ 1.5 VDC

The supply must be capable of providing 18 ma, and should be "floating" or have its negative side grounded.

Connect positive side to terminal 4.

Connect negative side to terminal 3.

Link terminals 1 and 2.

(b) Operation from 12 VDC (Automotive) Supply

The supply must be capable of providing 18 ma, and should be "floating" or have its negative side grounded. Supplies with positive grounds cannot be used.

Connect positive line to terminal 4.

Connect negative line to terminal 3.

Link terminals 1 and 2.

(c) Operation from High Voltage D.C. Supplies

The supply must be capable of providing 18 ma, and should be "floating" or have its negative side grounded. An external voltage dropping resistor or line chord must be employed in the positive lead. The value of this resistor is given by $(V-9) \times 55$ ohms, where V is the voltage of the external supply. The minimum power rating of the resistor is $(V-9) \div 55$ watts. For example, if 150 vdc is available, then the resistance value is $(150-9) \times 55 = 7800$ ohms. If "preferred" values have to be used, the nearest value would be 8200 ohms. The power rating is $(150-9) \div 55 = 2.6$ watts. Always use a resistance value within 10% or closer of the calculated value. It is good practice to make the power rating at least 50% higher than the calculated value.

Connect the positive lead from the supply (the one containing the dropping resistor) to terminal 4.

Connect the negative lead to terminal 3.

Link terminals 1 and 2.

(3) Microphone Connection

The microphone connector is a Switchcraft type 297 or equivalent. This connector has provisions for three conductors which are utilized as follows:

TIP - PTT wire, if none leave blank
RING - "Live" Audio
Sleeve - Ground

(4) Microphone Considerations

The CSP 11 is designed for use with fairly insensitive high impedance microphones and close talking. The peak output on voice peaks should be at least 25 mv. Most communication type microphones give a considerably greater output, necessitating a reduction of the front panel gain control. Low impedance units may be used provided the 25 mv. peak output level is obtained when working into the high input impedance (0.5 Megohm) of the CSP 11.

(5) Output Connections

Output from the CSP 11 appears on the rear panel terminal strip.

Terminal 7. PTT wire; if none leave blank
Terminal 8. "Live" audio
Terminal 9. Ground

On later models these terminals are not numbered. Instead, each is marked with the appropriate legend.

OPERATION

After selecting the desired power supply conditions and appropriately connecting the rear panel terminals, the unit is ready for operation. Plug microphone into CSP 11 front panel jack, and CSP 11 audio output into the audio input terminals of the main equipment by means of a shielded lead.

Switch on main equipment. Switch in the CSP 11 and turn its level control to maximum (fully clockwise). While whistling into the microphone, adjust the volume control on the main equipment for its correct peak (single tone) operating condition. Address the microphone normally, and if necessary, reduce the CSP 11 gain control until satisfactory speech quality is obtained.

If an audio tone generator is available, it may be substituted for the microphone for setting up the main equipment control. Use a frequency near 1 Kc and a level of about 50 mv.

When the CSP is switched in, the main equipment audio control becomes a peak level adjustment. Once properly set, in accordance with the preceding instructions, it requires no further adjustment.

With peak microphone outputs between 25 and 50 mv., the CSP 11 level control will be at or near maximum (clockwise). If your microphone has a peak output in excess of 50 mv., the level control on the Speech Processor has to be turned down until satisfactory speech quality is obtained. When switching the device out of circuit the volume control on the main equipment will have to be reduced to the position used prior to the installation of the CSP 11.

A good example of a high level microphone is the popular Astatic D104. With close loud talking a peak output as high as 1/4 volt (250 mv.) can be obtained. With this and similar high level microphones, the CSP 11 control has to be reduced to somewhere between 1/4 and 1/2 setting.

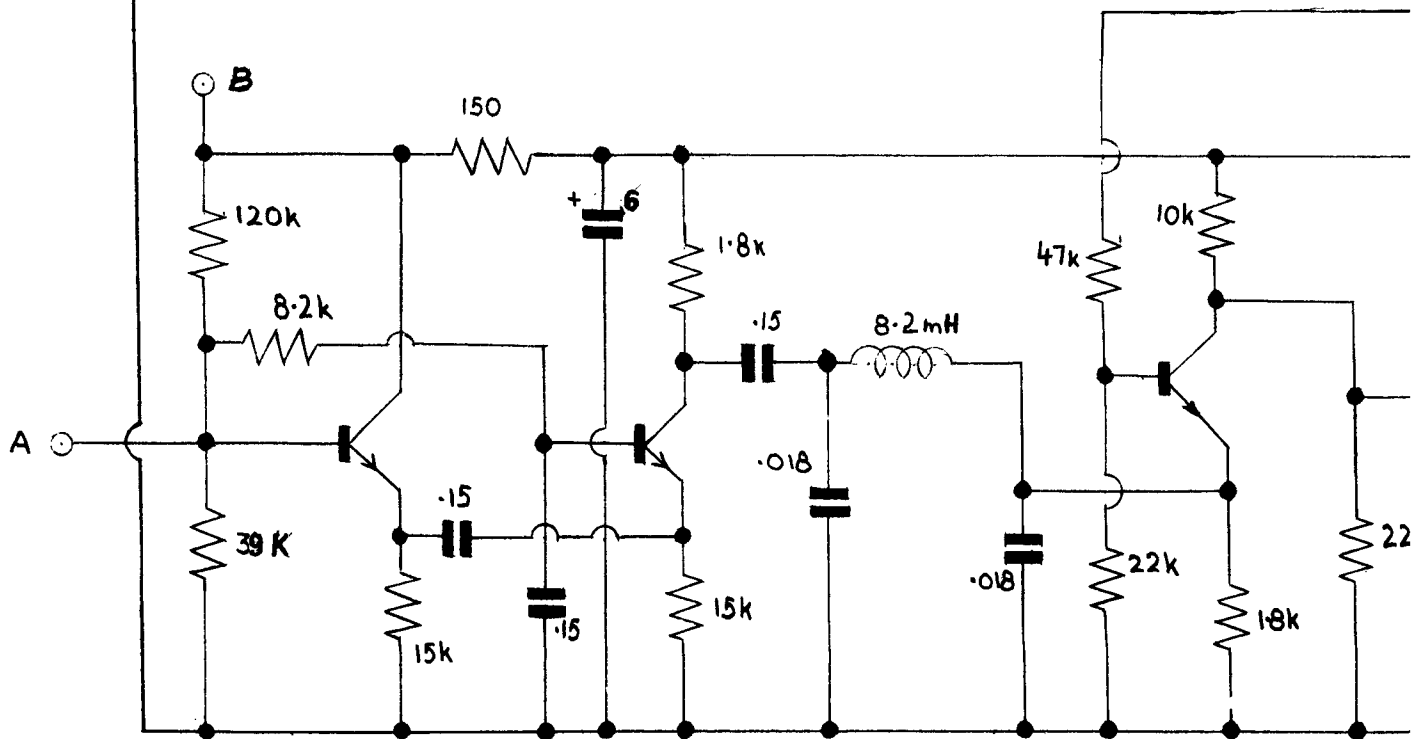
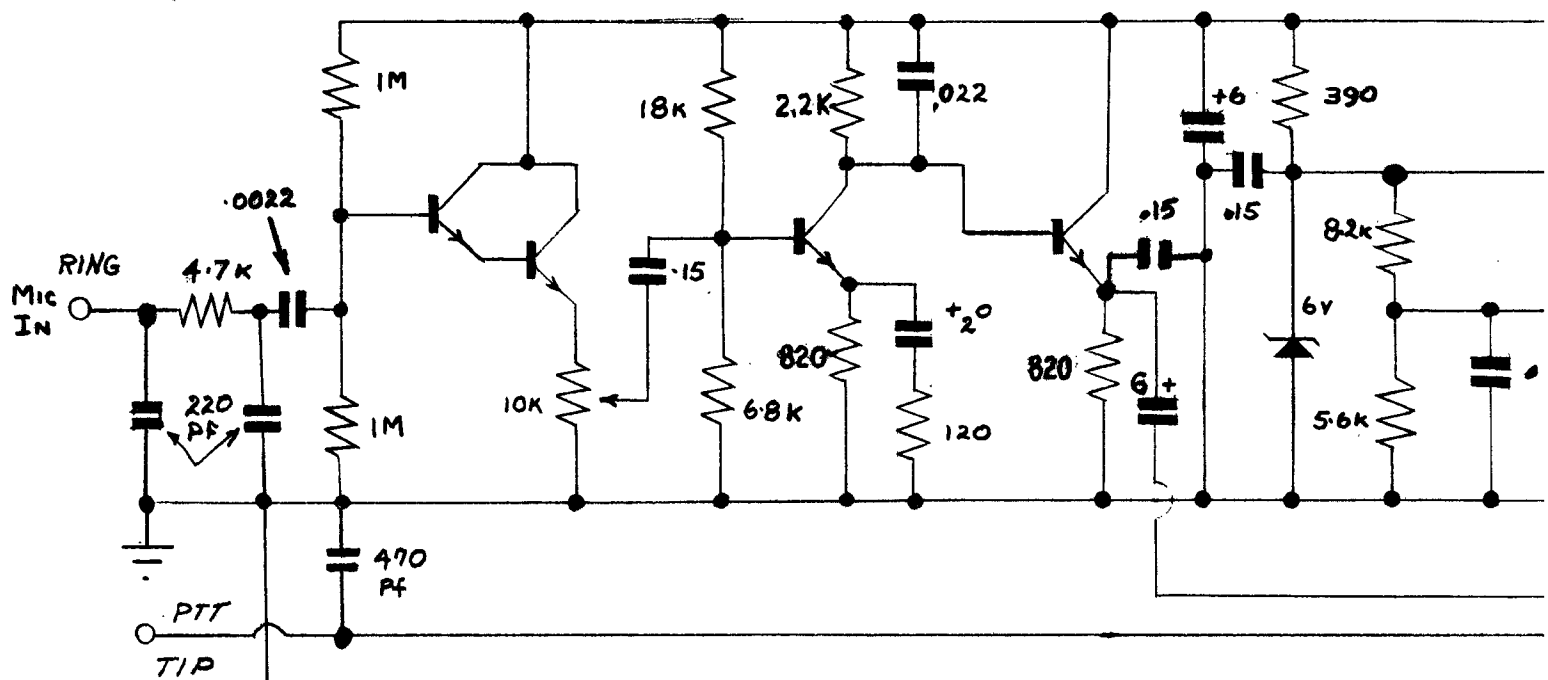
A final word of caution. The system to which the Speech Processor is to be connected must be free from RF and acoustic feedback effects. If this difficulty exists, the cause must be corrected prior to the installation of the CSP 11. The model CSP 11 Speech Processor incorporates sufficient filtering to prevent pick-up of radio frequency energy.

WARRANTY

THE COMDEL CSP 11 SPEECH PROCESSOR IS GUARANTEED FOR ONE YEAR FROM DATE OF PURCHASE AGAINST ALL FAILURES ATTRIBUTABLE, IN THE OPINION OF COMDEL, INC., TO MATERIALS AND WORKMANSHIP. FAILURES AND MALFUNCTIONS DUE TO OTHER CAUSES WILL BE MADE GOOD AT COST.

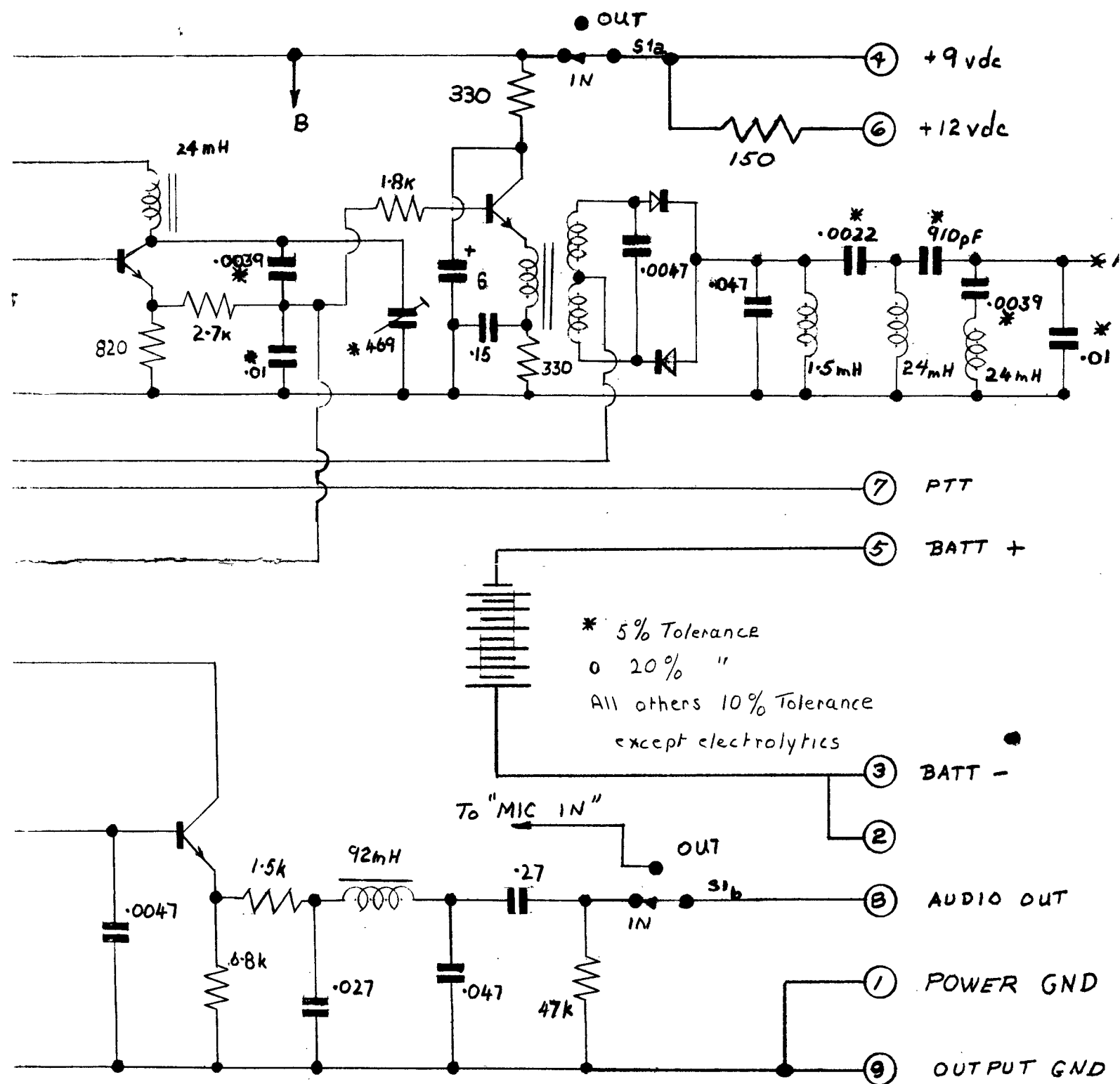
BEFORE RETURNING FAULTY UNITS, PLEASE REMOVE BATTERIES AND PACK SECURELY.

AUDIO AMPLIFIER LOCAL C



LIMITING AMPLIFIER LO PASS FILT PROD. DET

OSCILLATOR ————— BALANCED MIXER ————— U.S.B. FILTER



COMDEL INC.
BEVERLY MASS.
MODEL CSP II