CP-X

OWNER'S MANUAL

CAUTION

To prevent electrical shock, do not disassemble. No user-serviceable parts inside; refer servicing to qualified service personnel. Serviceman must disconnect line cord before disassembling.

INTRODUCTION

First of all, let us, the folks at TAPCO, extend a hand and thank you for buying a truly great electronic crossover: the CP-X. The CP-X Electronic Crossover is a product that was designed and crafted to bring you the best possible sound from an affordable piece of gear. The CP-X is affordable, you know that. But it's also a crossover that doesn't compromise specifications: a high slew rate, low distortion and noise...even relay protected outputs and a stable power supply, and it doesn't end there. The CP-X uses the very best filter system that offers great sound and maximum protection for high frequency compression drivers with 18dB/octave Butterworth filters(that are really flat response!)

The list could be endless...but believe that you bought the very best sound investment for the dollar. The CP-X brings together a unique blend of great electronic design and puts real control into the operation of a sophisticated, biamplified or triamplified PA system. The type of PA systems used everywhere; from smaller clubs to the large concert hall stage: the CP-X is really that flexible, and really sounds that good.

In order to take advantage of the good sound you and your new CP-X are going to make together, take a few minutes out and read through this manual. It may inform you about some of the different features the CP-X has that were here-to-fore unheard of in a low level,electronic crossover.

If you've just shoved the old, full-range PA speakers that "got you by" and have unboxed your new hi frequency horns and bass bins,(or if you're one of the folks that has TAPCO's FR 3000 Loudspeaker systems: they can be biamped too, even though they're in one box!) READ THIS, PLEASE!!

Learn what goes in where,and what comes out where before fiddling around and maybe blowing something up...ruining a PA speaker system. The shreaded cones and diaphragms fall like wind blown snow...

DON'T LET THAT HAPPEN TO YOU! READ THIS OWNER'S MANUAL FOR PROPER EXPLANATIONS OF CONTROLS FUNCTIONS. WE SUGGEST THAT YOU READ FIRST, SO YOU DON'T READ LATER WHAT WENT WRONG.

FRONT PANEL CONTROLS

POWER ON/OFF SWITCH AND POWER ON LED

Simply, the power switch on the front panel of the CP-X turns it on, or off. The green LED indicator to the right of the switch glows when the power is on.

DO NOT ATTEMPT ANY CONNECTIONS TO OR FROM THE CP-X WITH THE POWER ON!! MAKE SURE UNIT IS SWITCHED OFF AND/OR UNPLUGGED.

However, switching the power on and off on the CP-X brings one of its unique features to surface, so to speak. The CP-X has relay protected outputs that disconnect the actual unit outputs when power is switched on or shut off. The outputs don't "see" the turn on/off transients that can be generated. If the transient is passed along to the amps(if they are on while turning on the CP-X, they shouldn't be!), a transient could blow up the delicate, high end compression drivers...that's no fun, and it's expensive. More about this later.

GAIN

Each of the two channels on the CP-X have an input gain control that adjust the levels of the signals processed by the crossover. These are active, AutoPad® controls that not only increase or decrease gain, but help fight distortion and noise. How? Easy!

TAPCO-pioneered AutoPad® is a circuitry system that allows you to control distortion by simply turning the gain control down a bit...until distortion disappears. In a sense, with the CP-X, the "distortion" may not be too audible. The Peak Sensor LEDs, to the right of the channel Gain controls, may flash briefly. It could also be a situation where the distortion may be very loud and long...indicated by ear and LEDs. Whatever the case, it simply means turning the Gain down til it's gone.

The center position on the Gain control is marked "cal" or unity gain. This is a goesinta-and-comesouta-the-same position. This is the general function of gain controls on crossovers: unity gain. Best of all, on the CP-X you don't have to use a tool or gain internal access to change the input gain level. But if you've got to boost signal levels coming into the CP-X, and it's not possible at the mixer or preamp, you have plenty of gain available.

PEAK SENSOR LEDS

When the red Peak Sensor LEDs are lit, even for a brief flash, they indicate a clipping (read distortion) situation in progress. These LEDs, located to the right of the Gain controls on each channel, monitor four critical points in the circuit for an overload/clipping condition. This can occur at a point just past the very input, at the Gain control or two other points farther down the signal chain.

It can be said that most conditions of overload and clipping are "curable" by simply turning the input Gain control down some. If you continue to have an overload indicated by the LEDs, you may have to make some other minor adjustment(turn down the output of the mixer/preamp, etc.)

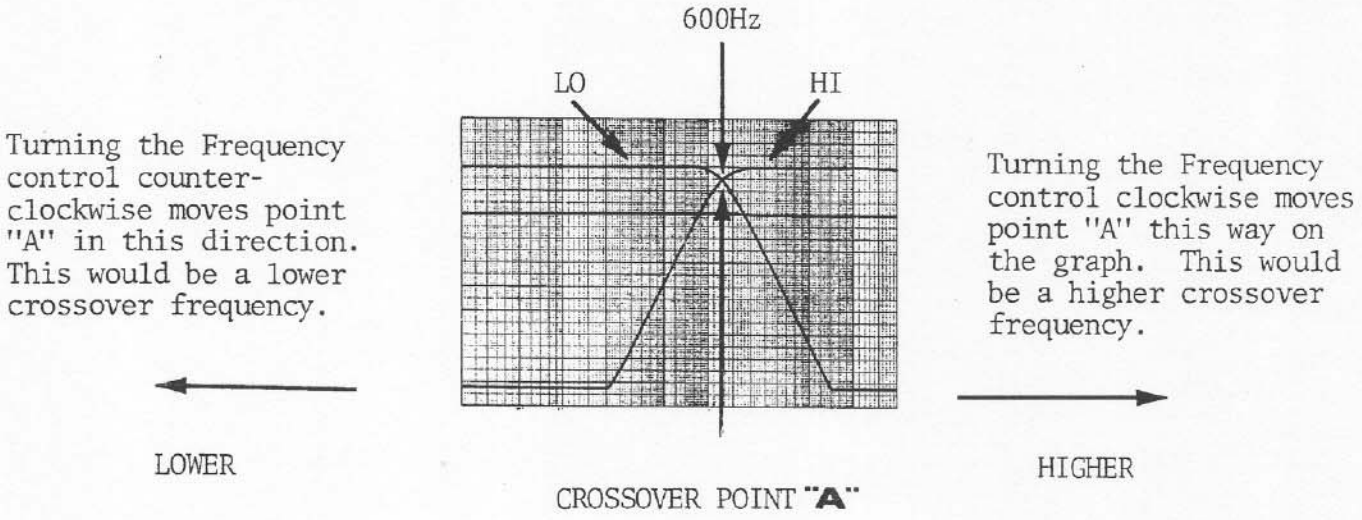
FREQUENCY

The recessed knob below the input Gain control is the Frequency adjust. This control sets the crossover frequency of both the high and low frequencies at the same time.

The CP-X uses a type of filter called a "3-pole state-variable" filter. This filter type permits the CP-X to control with one knob what other crossovers control with two or three separate controls. As far as response goes, the CP-X's 18dB/octave Butterworth filters are really flat.

As to ease of use, the Frquency control makes setting crossover frequencies a snap instead of a risky, tricky business. Other crossovers can have errors induced at the crossover frequency point by simple "operator's mistake" the low frequency rolls off and crosses over at -3dB at 600Hz while the high frequency crosses over 3dB down at 750Hz. "Hear" what we mean? This type of problem is eliminated fy the CP-X. Worse yet, a situation could develop where low frequency program material is reaching the high end drivers...they could be damaged...again, that won't happen with the CP-X unless the operator chooses the wrong frequency point for their loudspeaker system.

To set the crossover frequency, set the Frequency control to the recommended crossover frequency for your loudspeaker. The illustration below shows the 3dB down crossover frequency adjusted to 600Hz.



The representation of the Frequency adjustment on the example should be kept in mind while setting crossover frequencies on the CP-X: turning the control clockwise sets a higher crossover frequency, counterclockwise a lower crossover frequency.

Try an resist the temptation to hook-up the CP-X to your PA and fiddle around with the crossover frequencies in a wierd manner. The drivers you save will be your own. If you set the crossover frequency lower than the recommended frequency for your high end drivers, watch out ! Low frequency program material will cause havoc with the diaphrams. Carefully consult the information that comes with your loudspeakers for the best, and safest crossover frequencies.

After determining that point, adjust the Frequency control to that point on the scale that is around the control itself. The calibrated marks on the scale are:

These frequencies are in the X1 mode (see next section).

X10 SWITCH

The push-to-lock switch to the right of the Frequency control sets the operating frequencies of the CP-X from 90Hz to 1.6KHz (switch "out"). When the switch is depressed, the normal crossover frequencies are multiplied X10: 90Hz becomes 900Hz, 1.6KHz beomces 16KHz. Of course, frequencies in between are effected the same way. This is useful for extreme high ends of triamplified systems.

Crossover Frequencies: NORMAL (SWITCH OUT) 90Hz to 1.6KHz

X10 (SWITCH IN) 900Hz to 16KHz

The crossover frequencies themselves are set no differently in the X10 mode than they are in the normal mode. Observe same precautions in setting crossover frequencies as mentioned in the last section, for the same reasons.

HI FREQUENCY PHASE

The switch to the right of the X10 Switch is the Hi Frequency Phase switch. Its purpose is to reverse the polarity of the input waveform(when switch is pushed in.) Normally, with the switch in the "out" position, the phase relationship of the input material and that of the high frequency output will be the same(0). When the switch is pushed in this relationship changes: the high frequency material now has the opposite waveform polarity from the input waveform.

This feature uses the same ¼" phone jack or AGLC/XLR connector on the rear panel in either mode: there aren't any seperate outputs for inverted signals the switching is done internally, controlled from the front panel. Applications of this feature can include the solving of "time alignment" troubles, or solve a simple out-of-phase wiring job on the high end drivers, without climbing speaker stacks(it will solve, sorta, the same out-of phase wiring of a bass bin, but remember that all speakers should be in-phase.)

HI AND LO LEVEL

The two controls to the right of an input channel on the CP-X control the respective output levels from the Hi and Lo sections of the "divided" signal.

Unlike many crossovers that don't provide these functions, the only solution to "too much" signal going to the high and low frequency amps was to turn the input attenuators on the amp down. There are some problems with that, like reducing the overall headroom in the amp, etc.

The CP-X solution is to provide independent Hi and Lo output level controls: adjustments of levels going to the amps can be lowered. The amps can operate to provide the best performance the amp can put out. If you are among the fortunate folks that own TAPCO'S CP 120 or CP 500/500M, skillful use of PowerLock™ will probably eliminate the need to turn the level controls down.

The Hi and Lo Level controls overall range is "off" to unity gain with the rest of the crossover's signal levels set by the Gain control. If the amplifier you're using to drive either Hi or Lo ends tends to put out too many watts for the elements to handle, back off the levels going to the amps with the Level controls.

REAR PANEL CONNECTORS AND CONNECTIONS

AC POWER

The AC power cord is terminated in a 3-prong, grounded plug. Power requirement for the CP-X are 120V, 60Hz 15watts.

DO NOT ATTEMPT ANY CONNECTIONS TO OR FROM THE CP-X WITH THE POWER "ON"! MAKE SURE THE UNIT IS SWITCHED OFF AND/OR UNPLUGGED BEFORE CONNECTING TO SYSTEM. AVOID SHOCK AND EQUIPMENT DAMAGE HAZARDS.

UNBALANCED CONNECTORS AND CONNECTIONS

INPUT - The unbalanced input connectors(¼" phone jack), one for each channel, are designed to accept signals from the usual preamplified source or mixer. The signal that goes in at this point will be processed by the CP-X, outputs derived hi and lo. The unbalanced input will accept a maximum input level of +20dBV.

OUTPUT - The unbalanced outputs consist of a Hi and Lo output(¼"phone jacks) on the rear panel. One set of jacks per channel. The outputs from the Hi and Lo jacks feed the appropriate amplifiers. Level control is availible on the front panel.

UNBALANCED CONNECTORS ARE WIRED: TIP: HOT(+)
RING: GROUND(-)

Maximum Output +20dBm into 600 ohms or greater.

FOR BEST RESULTS, SIGNALS TO THE CP-X SHOULD BE "LINE" OR "HIGH" LEVEL.

BALANCED INPUTS AND AGLC™ OUTPUTS

The Balanced Inputs and AGLC™ Outputs are designed to be used with a wide variety of professional equipment with balanced circuitry. This includes mixers and power amps and certain types of installation requiring a cross-over system like the CP-X in monitor applications.

Whatever the equipment, all connections should be made to line level inputs or from line level outputs.

BALANCED INPUT - The balanced input connects to a balanced source wired as follows: PIN 1: ground, PIN 2: lo, PIN 3: Hi. The balanced input on each channel of the CP-X will accept a maximum of 20dBV input.

AGLC OUTPUTS - The AGLC™ Outputs are TAPCO's answer to many problems faced in using balanced equipment: improper terminations...ground loops(caused by other things, too.) AGLC or Automatic Ground Loop Compensation is a circuit design that offers the very best performance from differential circuitry, with some great features of transformer balanced circuitry...with few draw backs. The end result of this is the ability of the CP-X to reject up to 30dB of ground potential(Hummmmmmm)difference: a signal is referenced to the signal ground of the next piece of equipment. In this case, the amps. Ground loops can also be caused by improper terminations of balanced lines in unbalanced connectors, improper power grounding, etc.

If the ground loop is too much for the AGLC circuitry to handle, another solution to the above mentioned problems will have to be found. Perhaps common point powering of all PA components(desirable, but not always possible), or properly terminating the line. At least AGLC prevents any possible damage to the outputs of the CP-X(unless you do something stupid...like plug the output of an amp into the CP-X!)

Another CP-X plus is the power-drive capability of the outputs. The CP-X was designed for a wide range of uses that include location of the crossover "at the board" as well as on-stage with the amps. The power drivers have enough output to drive extremely long runs of snake cable and still meet spec.

The AGLC Outputs(Hi and Lo) are wired: PIN 1: ground, PIN 2: LO, PIN 3: HI

The AGLC Outputs put out a maximum of +20dBm into a load of 50 ohms or greater.

CP-X SPECIFICATIONS

Frequency response (sum of outputs)	20 Hz to 20 kHz, ± ½ dB
Signal to Noise ratio (20 kHz NBW)	90 dB (1 volt output) 110 dB (max. output)
T.H.D. (1 kHz, max. output, +18 dBm)	<.05%
SMPTE IM Distortion (+18 dBm)	<.05%
CCIF IM Distortion (19 and 20 kHz mixed 1:1, +18 dBm)	<.05%
Maximum input level	+20 dBu
Maximum output level (into 600 Ohms)	+20 dBm
Slew rate	greater than 13V *per microsecond*

Input impedance	22 k Ohms unbalanced 23 k Ohms bridging balanced
Output impedance	51 Ohms all outputs
CMRR	greater than 40 dB
AGLC™ attenuation	greater than 30 dB
Gain	Overall: off to + 12 dB Low and High frequency levels: off to unity
Filters	Butterworth 18 dB/octave (Maximally flat, state variable, 3-pole)
Crossover range	X1: 90 to 1600 Hz (four octaves) X10: 900 to 16,000 kHz (four octaves)
Size (W-H-D)	19″ X 3½″ X 8″
Weight	10 lbs.
Power requirements	120 volts, 60 Hz, 15 watts

All product specifications subject to change without notice.

CAUTION

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