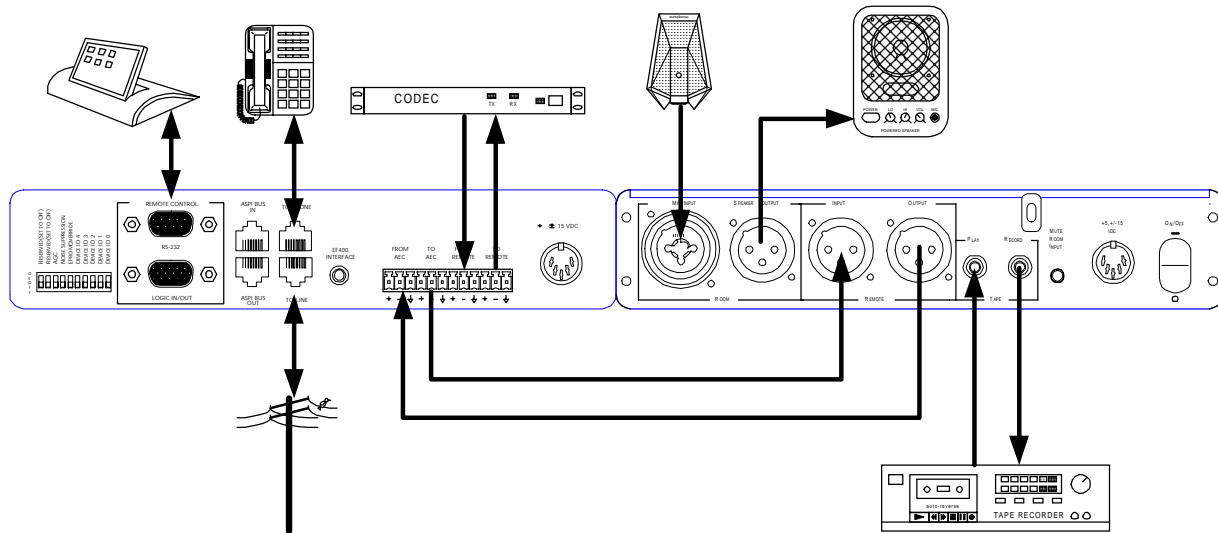


## INTRODUCTION

Frequently, conferencing or distance learning systems that need acoustic echo cancellation also need to be able to connect to a two-wire telephone line. Even systems that normally connect through four-wire video codecs may also need the capability of bringing callers into the system over the telephone. Since the EF400 Acoustic Echo Canceller has a four-wire interface, the EF200 Phone Add is needed for connecting to a telephone line. This application note explains how to connect the EF200 to the EF400 in systems, along with a codec or other four-wire device, and recording equipment. For more information about installing and using the products, refer to the manuals for the EF200 and EF400.

## CONNECTING THE SYSTEM

In Figure 1 you can see an example system using an EF200 and EF400 (the EF200 is on the left). You might think of it as inserting an EF200 between an EF400 and the CODEC.



*Figure 1:* Typical connections for a system using an EF200 and an EF400.

### Connecting the Speaker and Microphone

Connect the powered speaker or audio amplifier to the SPEAKER OUTPUT of the EF400. Connect the microphone or mixer to the MICROPHONE INPUT of the EF400. These are the normal microphone and speaker connections for the EF400.

### Connecting the EF200 to the EF400

Connect the REMOTE INPUT of the EF400 to the TO AEC jack of the EF200, and connect the REMOTE OUTPUT of the EF400 to the FROM AEC jack of the EF200.

## Connecting the EF200 to a CODEC

Connect the TO REMOTE jack of the EF200 to the input of the CODEC or other four-wire device. Connect the FROM REMOTE jack of the EF200 to the output of the CODEC.

## Connecting Recording Equipment to the EF400

Connect the input of a tape recorder or VCR to the RECORD jack of the EF400. Connect the output of the tape recorder or VCR to the PLAY jack of the EF400.

## Signal Paths

When the system is connected as described here, the CODEC will receive the signals from the local microphones and the telephone, as well as the tape recorder. The EF400 will receive signals from the telephone, CODEC, and tape recorder. The telephone caller will receive signals from the CODEC, the local microphones, and the tape recorder. The tape recorder will receive signals from the CODEC, the local microphones, and the telephone.

## CALIBRATING THE SYSTEM

Calibrate the microphone and speaker levels of the EF400 normally, as outlined in the EF400 User Manual. The remote input and remote output levels of the EF400 (set using the R24 and R25 trim pots) should both be set to the -20 dBu levels to match the TO AEC and FROM AEC levels of the EF200. The EF200 TO AEC and FROM AEC do not need to be calibrated (they are designed to work with the -20 dBu levels). The EF200 TO REMOTE and FROM REMOTE levels can be adjusted using the trim pots on the front panel, as outlined in the EF200 User Manual. This allows the EF200 to work with CODECs with a wide range of signal levels.

**NOTE** If you purchase the EF200 and EF400 at the same time, they will be mounted side by side in a single space rack shelf. The EF400 will be calibrated for the EF200 at the factory. This means you will only have to calibrate the microphone and speaker levels of the EF400, and the TO REMOTE and FROM REMOTE levels of the EF200.

## TROUBLESHOOTING

### Echo heard on the local end.

Make sure the echo is not coming from the remote end (such as acoustic echo from the room on the remote end). If that is the case, the problem should be remedied on that end. In some cases, the echo be due to improper levels going into the EF200, causing a lack of hybrid echo cancellation. Check the speech levels on the TO PHONE level indicator on the EF200 to make sure they are near the first yellow LED most of the time. The EF400 has nothing to do with this kind of echo.

### Echo heard on the remote end.

If the echo is heard on the remote end, it may be caused by improper levels leading to the EF400. Make sure the speech levels shown on the REMOTE level indicator are near the first yellow LED most of the time. Adjust levels if necessary. Also, check for excessive acoustic gain (microphone levels that are louder than remote levels), or distortion in the audio path.