

FIELD ENGINEERING BULLETIN

TITLE: RECORDING AND REPRODUCING SMPTE TIME CODE

I. APPLICABILITY

ATR-100 - All versions

II. PURPOSE

The ATR-100 will play back time code quite satisfactorily at normal speeds, with no modification to the normal equalization. If, however, it is desired to read code during fast wind modes then the audio channel chosen must be "wide-banded".

III. DISCUSSION

There are basically two levels of wide-banding possible.

1. The First Method:

The first method, which only involves re-setting equalizers, and a change to one component value, permits recording of motion direction invariant code, and reproduction of code at, up to 30 times real time speeds, for 15 in/s recordings, and approximately 20-25 times real time for 7.5 in/s recordings. 30 in/s recordings can be adequately reproduced up to full wind speeds.

This method does not permit using the sel sync mode for high speed code reading.

2. The Second Method:

The second method involves changing a number of components on the main audio board, and also re-adjustment of equalizers. The record section re-adjustments are the same as in #1 above. With this second method it becomes possible to read a 15 in/s recording, in either "repro" or "Sel sync" at up to 45 x real time. This is typically faster than the normal fastwind speeds on an ATR-100.

A 7.5 in/s recording may be run at up to 40 x real time but 35 x is recommended as an upper limit.

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III. DISCUSSION (CONTINUED)Method 1:

1. Select normal speed jumpering on Padnet.
2. Set S1 on the Padnet so that S1-3 and S1-6 are "on" and S1-1, S1-2 and S1-4, S1-5 "off".
3. Turn both high speed and low speed record equalizers fully CCW.
4. Put both high speed and low speed reproduce HF equalizers fully CCW.
5. Set both high speed and low speed reproduce LF equalizers fully CW.
6. On the main audio board, locate and remove C9. Replace with a 5 pF $\pm 1/2$ pF mica capacitor (Ampex Part No. 034-156).
7. If a flux loop is available connect it to a square wave generator set to 10KHZ, clip it to the reproduce head, and with the appropriate audio board assembly on an extender, adjust R34 on the main audio board to produce minimum ringing and overshoot. (This adjustment is also correct for normal usage.) If an Ampex flux loop equalizer amplifier is being used, set the HF transition to "0", LF transition to " ∞ " and the SGR to the position appropriate to the transport speed.
8. It is also recommended that the scrape flutter idler in the head assembly be either removed or backed out of contact with the tape; failure to do this may considerably shorten the life of the idler.

Method 2:

1. On the main audio board to be modified remove and/or replace the components noted below:
 - a. R35 was 100 ohm, Remove.
 - b. R36 was 15k ohm, Replace with 3k ohm 1/4W, 5% (Ampex Part No. 066-667).
 - c. R31 was 1k ohm, Replace with 3k ohm, 1/4W, 5% (Ampex Part No. 066-667).
 - d. R9 was 59k, Replace with 22k ohm, 1/4W, 5% (Ampex Part No. 066-712).

III. DISCUSSION (CONTINUED)

- e. L1 was 4700 uH, Replace with 2200 uH, 10%, (Ampex Part No. 540-068).
 - f. C3 was 270 pF, Replace with 1K ohm, 1/4W, 5% (Ampex Part No. 066-665).
 - g. C9 was 39 pF, Replace with 5 pF \pm 1/2 pF (Ampex Part No. 034-156).
 - h. R38 was 100 ohm, Remove.
 - i. C29 was 820 pF, Remove.
 - j. R33 was 27K ohm, Replace with 3K ohm, 1/4W, 5% (Ampex Part No. 066-667).
2. Perform steps 1 through 3 of Method 1 above, Then:
- a. Turn R34 fully CW.
 - b. Turn reproduce high speed and low speed LF Eq. fully CW.
 - c. Connect a flux loop to reproduce head and with 3KHz square wave drive adjust high speed frequency reproduce equalizer for "Flat Top" square wave system output.
 - d. Repeat for lower selected speed with low speed repro HF equalizer.
3. Finally, make a short test recording using a SMPTE code generator, rewind tape and then manually move the tape in both forward and reverse directions. The waveform of the reproduced signals should be essentially similar (i.e. a time reversed signal with no amplitude differences). If desired, the record equalizer may be used to improve the amplitude response for 7.5 in/s recordings, but care must be taken to ensure that no amplitude changes occur with motion reversal.
- IV. To minimize crosstalk into audio tracks from time code. The record and reproduce gains on the time code track can be adjusted to record the time code at 10-15 dB below normal operating level.