EVALUATION OF AMPLITUDE AND FREQUENCY RESPONSE CHARACTERISTICS OF THE TEAC MODEL MR-30 TAPE RECORDER

by

J. A. Jendrzejczyk and R. K. Smith

Materials and Components Technology Division

1.0 OBJECTIVE

Verify operation of the Teac model MR-30 tape recorder at tape speeds and conditions representative of those associated with the collection of ground motion and building vibration data.

2.0 TEST PROCEDURE

The basic test setup is shown in Fig. 1. All seven record amplifier inputs are connected in parallel with a random noise generator that supplies the input test voltage. Outputs, which are generated in the playback mode, are compared to a reference from the random noise generator and a transfer function is calculated via a HP model 5451C Fast Fourier Transform (FFT) analyzer. The 5451C-FFT operating program used to calculate four transfer functions simultaneously is shown in Fig. 2 with program verification shown in Fig. 3.

Three speeds, 15/32, 15/16, and 1-7/8 inches per second, were tested using a random noise input signal; a noise level test with all inputs terminated in a common 600 ohm resistor was also performed at 15/32 inches per second.

3.0 TEST RESULTS

Transfer functions at a tape speed of 15/32 in./sec are shown in Fig. 4 along with the reference input. For all tests, the circled numbers correspond to the tape recorder channel numbers. All transfer functions are approximately equal with about a -1 Db attenuation, corresponding to a 12% amplitude reduction. Frequency response is greater than the manufacturer's specified range of 0-313 Hz.

Figure 5 shows the transfer function response at a tape speed of 15/16 in./sec. Results are similar to those above, but at this speed attenuation is about 40%. Frequency response is within the manufacturer's specified range of 0-625 Hz.

At a tape speed of 1-7/8 in./sec (Fig. 6) attenuation is also approximately 40%. Furthermore, the frequency response is greater than the manufacturer's specified range of 0-1250 Hz.

Noise level, as shown in Fig. 7, is within specifications with a large "electrical" response peak at 180 Hz can be identified. This peak is caused by operation of the tape recorder with DC power supplied from the AC power line.

4.0 DISCUSSION

Amplitude response for the above tests does not correspond to a desired 1:1 ratio but can be made to conform with a simple gain control adjustment. Frequency response, which is a function of internal reproduce amplifier filters, exceeds manufacturer's specifications and is acceptable without any adjustments or modifications. In the field tests, before recording a signal on tape, it is advisable to first record on a small length of tape a calibrate signal of known amplitude. This can subsequently be used to adjust the reproduce amplifier gains to the proper level.

1/27/87 JD

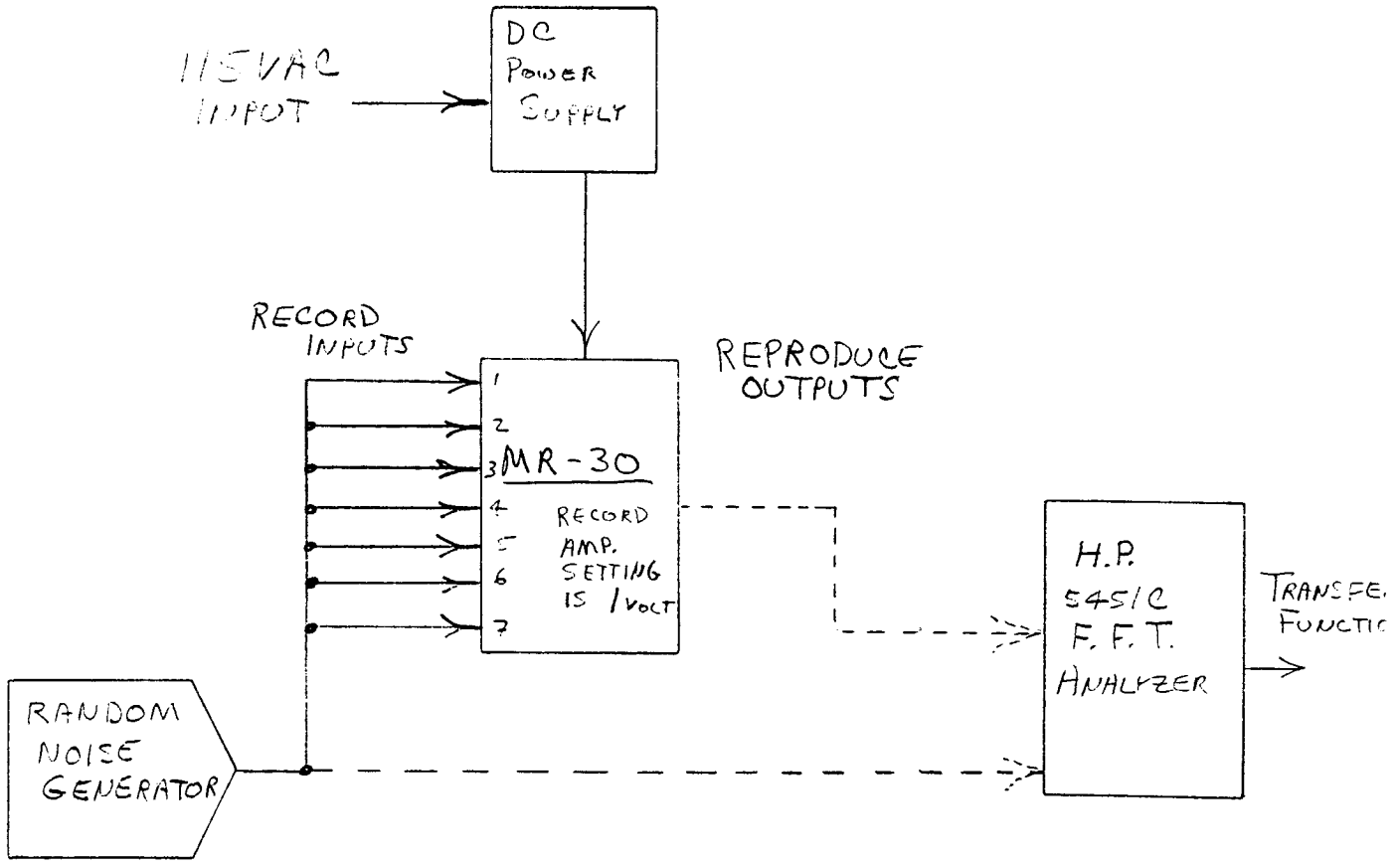
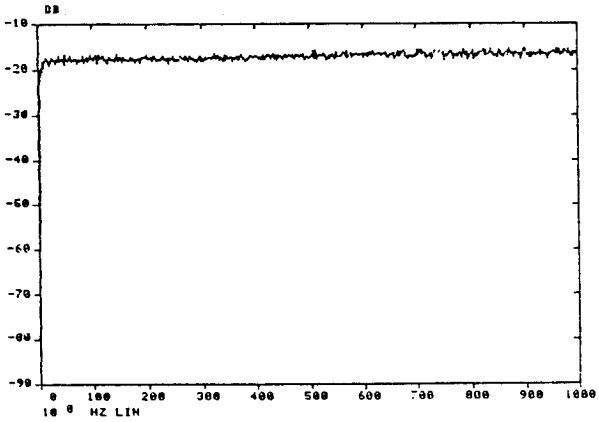


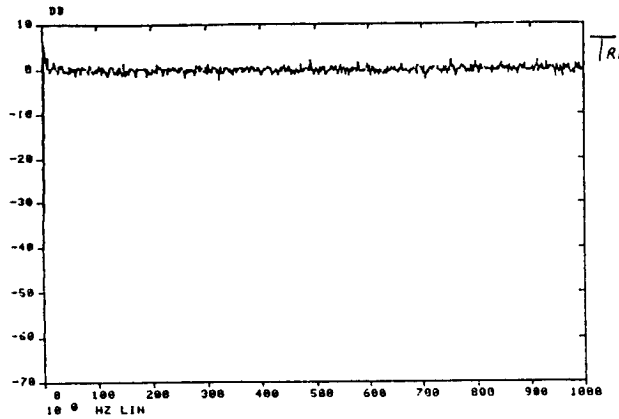
Fig. 1. Test Configuration

```
/L
     1 L        0
     5 CL       4
     9 CL       5
    13 CL       6
    17 CL       7
    21 L        1
    25 RA
    28 F        0
    32 F        1
    36 F        2
    40 F        3
    44 CL       0       0
    49 CL       1       0
    54 CL       2       0
    59 CL       3       0
    64 *-
    67 A+       4
    71 X>       4
    75 X<       1
    79 *-
    82 A+       5
    86 X>       5
    90 X<       2
    94 *-
    97 A+       6
   101 X>       6
   105 X<       3



   109 *-
   112 A+       7
   116 X>       7
   120 #        1      60       0
   126 X<       4
   130 :       10
   134 X>       4
   138 X<       5
   142 :       10
   146 X>       5
   150 X<       6
   154 :       10
   158 X>       6
   162 X<       7
   166 :       10
   170 X>       7
   174 MS
   177 MS      21       4
   182 MS
   185 MS      21       5
   190 MS
   193 MS      21       6
   198 MS
   201 MS      21       7
   206 .
```

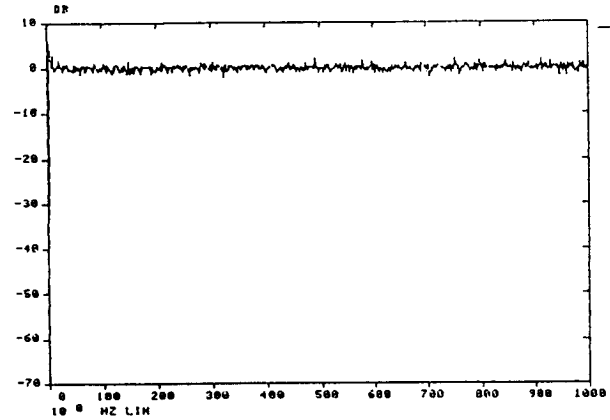
Fig. 2. 5451C Operating Program



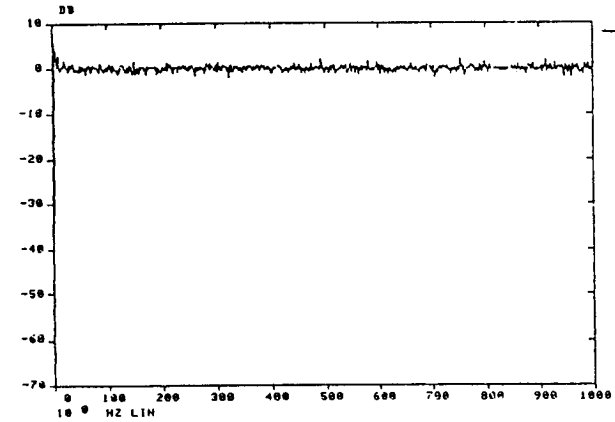
INPUT



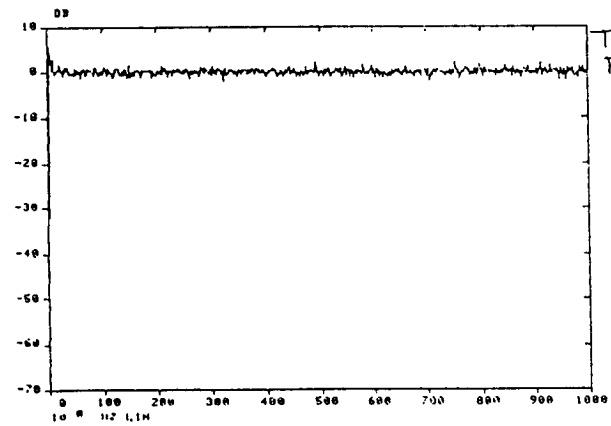
TRANSFER FUNCTION #1



TRANSFER FUNCTION #2



TRANSFER FUNCTION #3



TRANSFER FUNCTION #4

Fig. 3. Program Verification

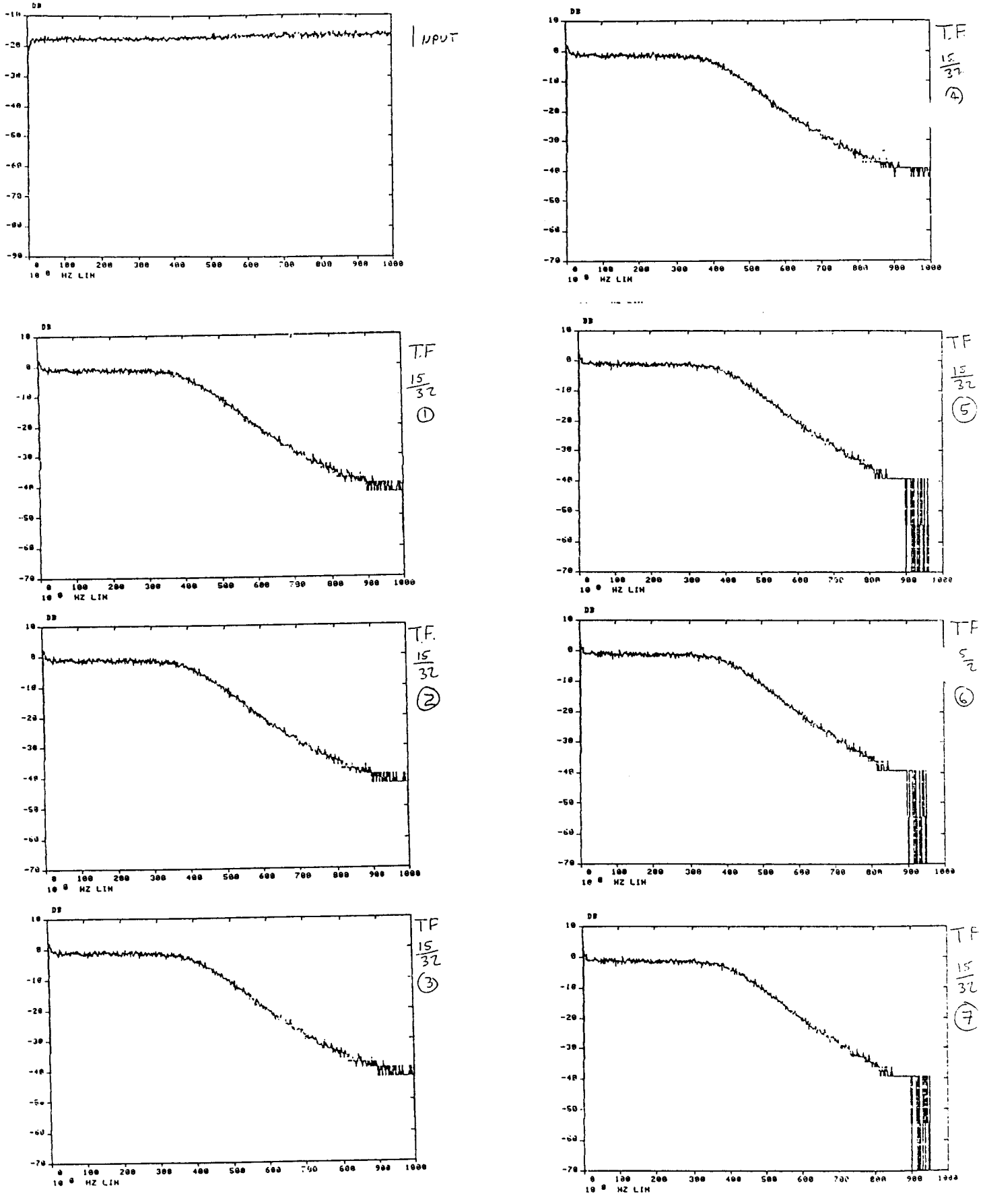
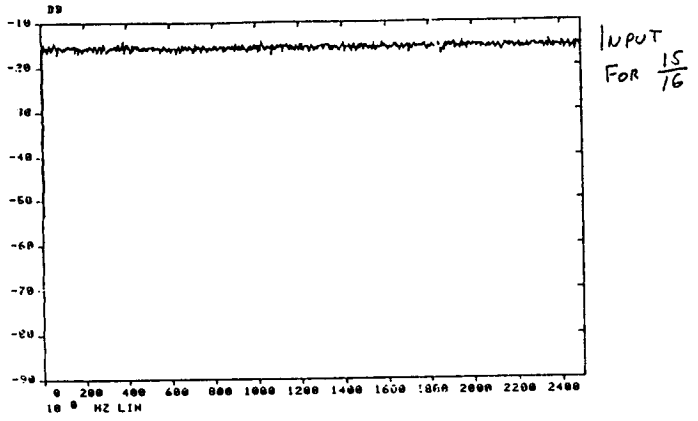
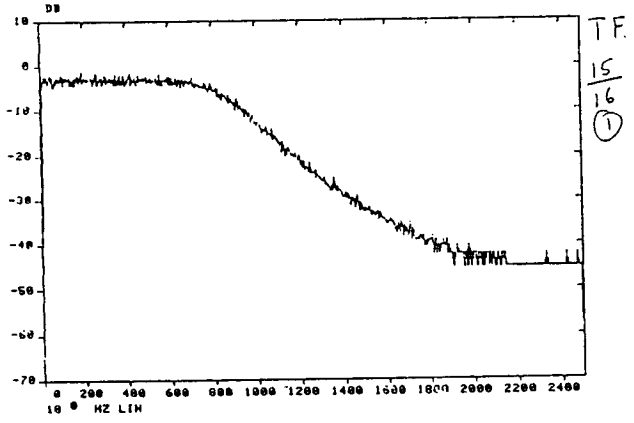
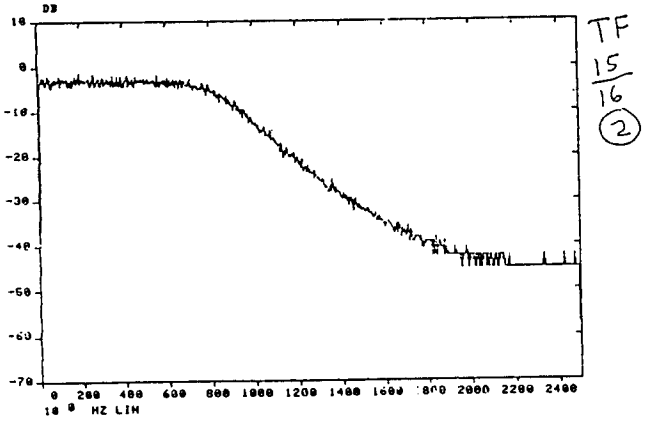
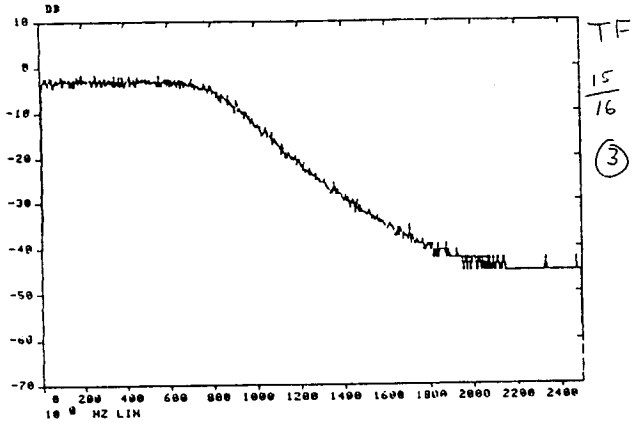


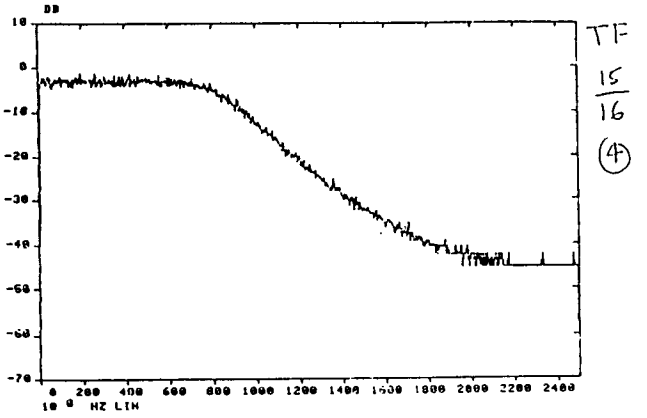
Fig. 4. Transfer Functions at 15/32 in. per sec

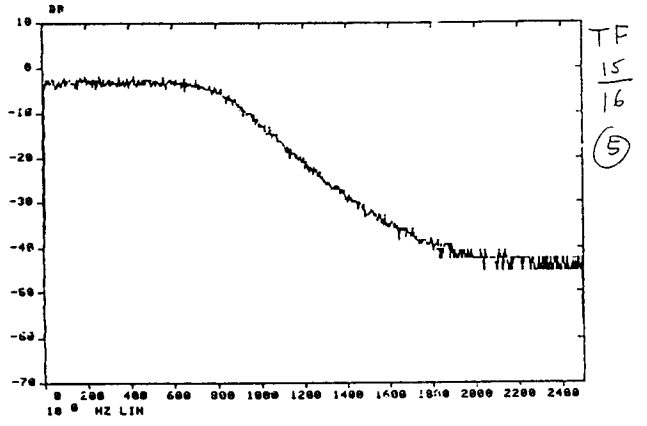


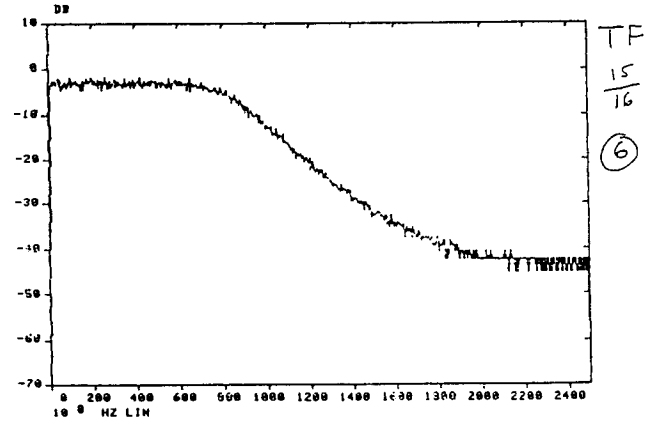












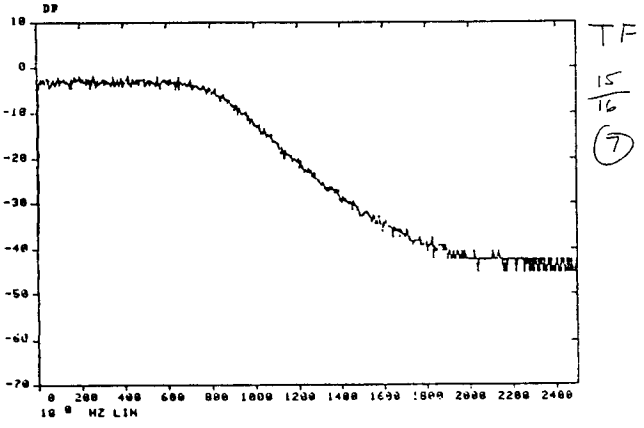


Fig. 5. Transfer Functions at 15/16 in. per sec

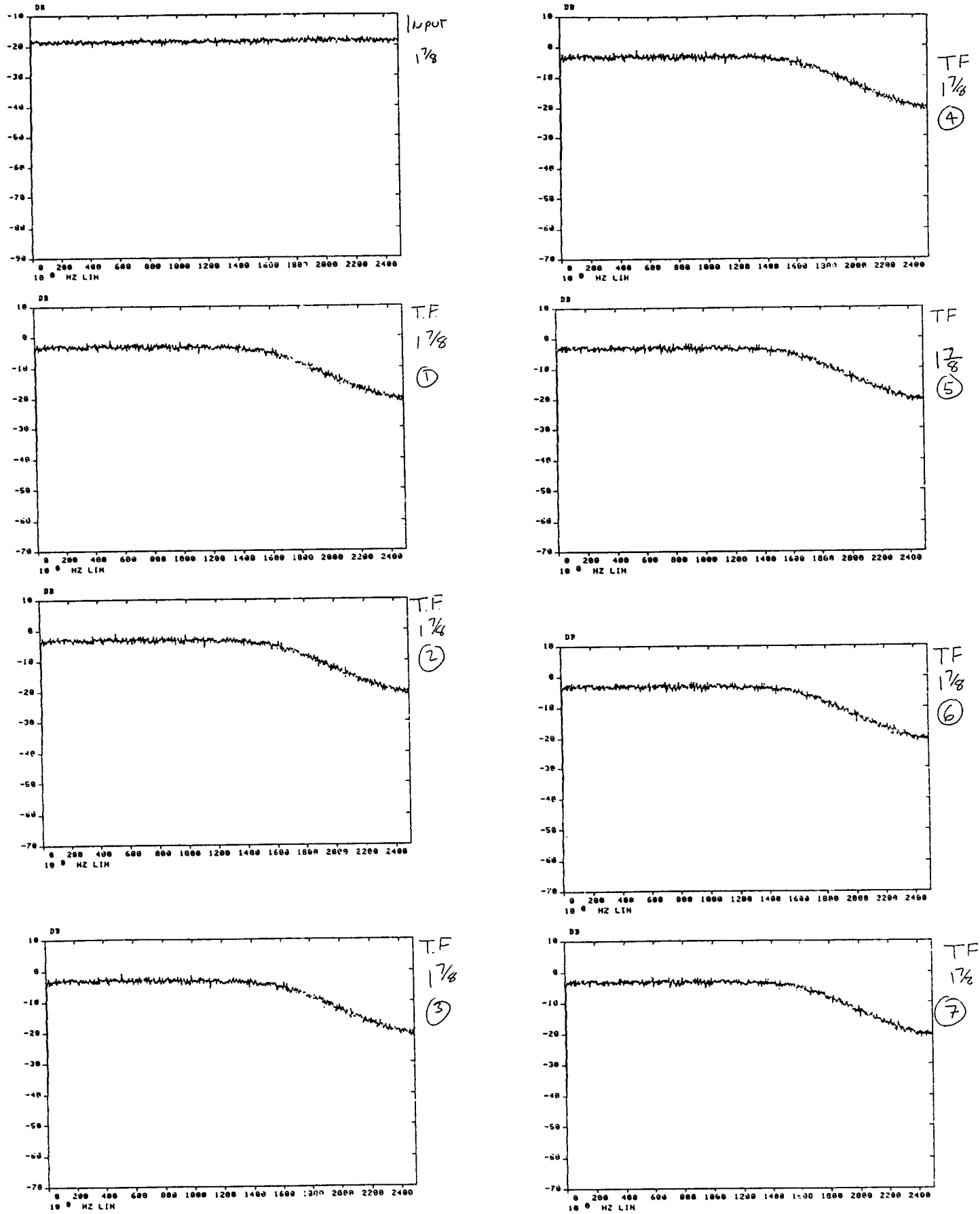
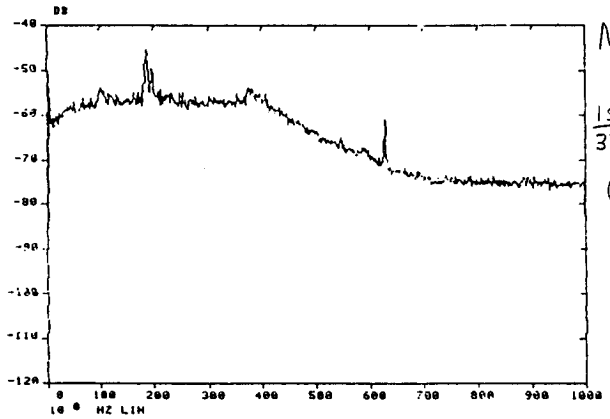
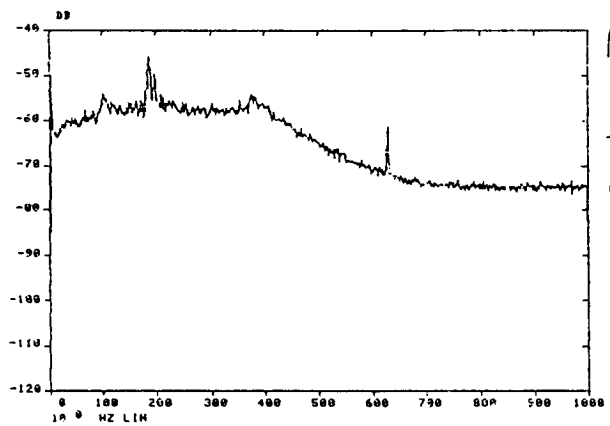


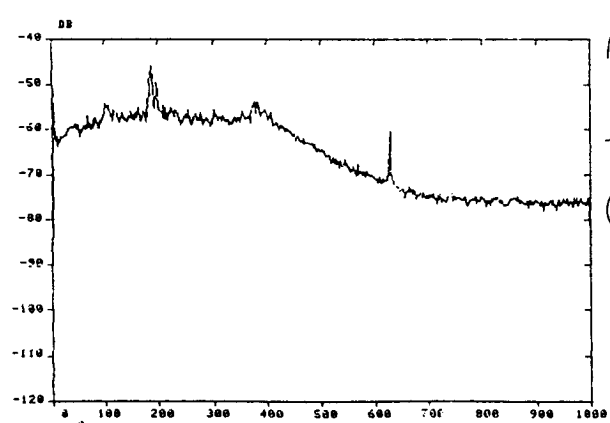
Fig. 6. Transfer Functions at 1-7/8 in. per sec



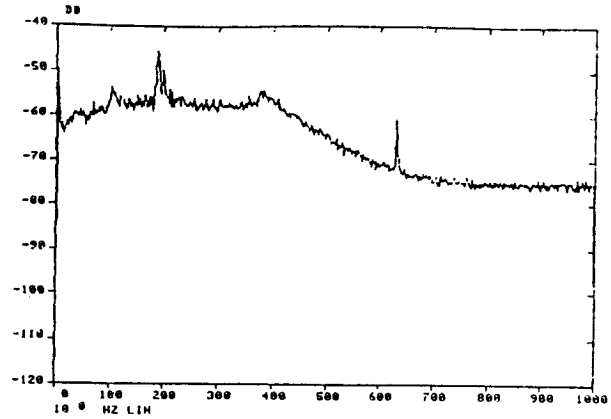
Noise Level 15/32 (1)



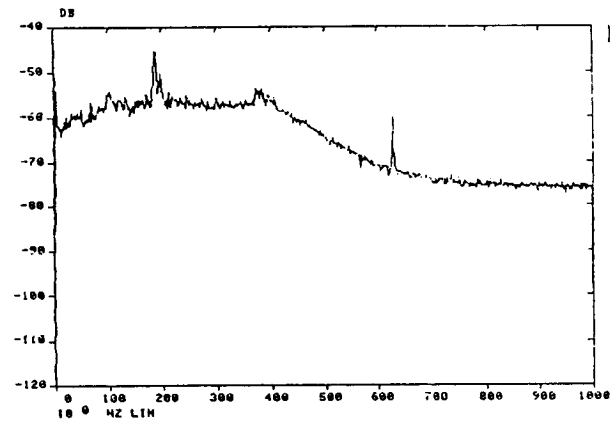
Noise Level 15/32 (2)



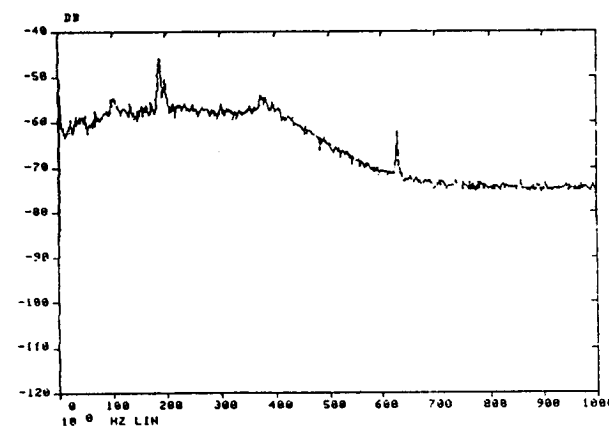
Noise Level 15/32 (3)



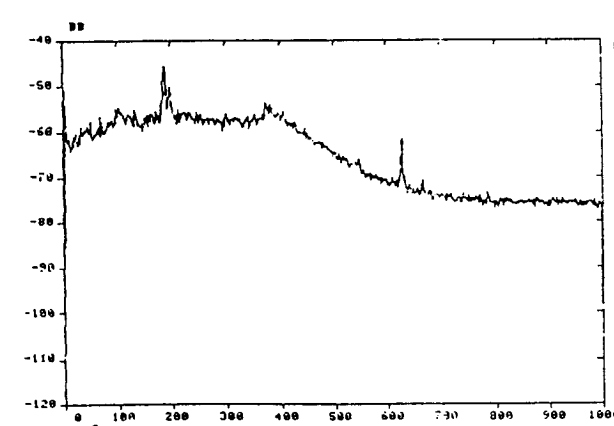
Noise Level 15/32 (4)



Noise Level 15/32 (5)



Noise Level 15/32 (6)



Noise Level 15/32 (7)

Fig. 7. Noise Levels at 15/32 in. per sec