



Introduction

The following notes give guidance to the user on the selection of cassette recorders for use with GEM 80 systems.

Cassette recorders are used for storing GEM 80 programs and video format data when using the Portable Programmer type 8920. They may also be used with the 8922 System Programmer, but as this type of unit has a built-in digital cassette deck recording at a much higher speed, the user is only likely to need a cassette recorder for loading data originally developed using the 8920 Portable Programmer.

There are many types of cassette recorder available on the market, offering a variety of facilities at a variety of prices. Since new models are being introduced all the time, any recommendations would quickly become out of date. The notes below therefore highlight the factors which should be considered when selecting a cassette recorder.

Essential Features

1. Audio type

The recorder must be of a type intended for audio use, designed to accept standard audio cassettes.

With GEM 80 systems, although data is recorded as just two frequencies, 1200 Hz and 2400 Hz, the frequency response of the recorder should be flat up to frequencies higher than these to ensure good response on transitions from one frequency to the other.

2. Controls

The recorder must have the normal Record, Playback, Fast Forward and Fast Rewind controls.

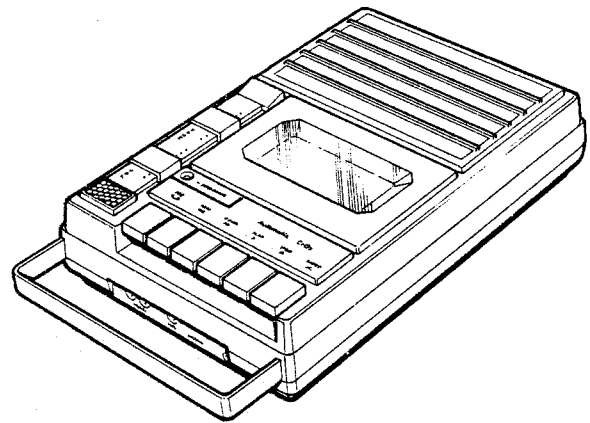
3. External Connections

The recorder must have sockets into which external lead or leads can be plugged for input and output. Some recorders are fitted with a single 3 or 5 pin 180 degree DIN socket for both input and output. Others are equipped for 3.5mm jack plugs typically labelled "MIC" for microphone input, and "EAR" for earphone output.

4. Signal levels

The external input must be suitable for accepting a signal from the GEM 80 system of 100mV peak-to-peak nominal. The external output must be capable of providing a signal of between 50mV and 1V peak-to-peak.

Cassette Recorders



Note....

With many of the cheaper cassette recorders, the manufacturer's instructions and specification are very brief, and may not define signal levels at all. Most available types of recorder will conform to the signal level requirements given above. If in doubt, the user should obtain a recorder on sale-or-return to verify that it is compatible with GEM 80 systems.

Desirable Features

1. Auto Recording Level Control

It is not recommended that the user should purchase a recorder unless it has automatic level control.

2. Auto Stop

Only a few types of recorder provide auto stop on Fast Forward/Rewind, and it is left to the user to press Stop when the end of the tape is reached. Some recorders "overcome" the problem by requiring that the operator holds the Fast Forward or Rewind keys down, instead of the Stop key being pressed, but this is obviously an annoying feature when rewinding a full tape.

3. Speaker Cut-out

When loading a tape into a GEM 80, or when playing a tape back to verify it, some recorders cut out the internal loudspeaker in the recorder when the external lead is plugged in. Other recorders do not, so that, unless the volume control is turned down, an annoying whistle is produced by the loudspeaker.

Note....

The user should try muffling the loudspeaker if the whistle is too annoying by covering it with a book or other makeshift acoustic cover.

4. Fixed/Variable Output

Some recorders provide the external output at a fixed level, whereas other recorders give their output via the same volume control as used for the internal speaker. With the latter type, the required volume control setting will have to be established by the user by cut-and-try methods, whereas with the fixed output type he doesn't need to experiment.

For a variable output recorder, winding the volume up to maximum may cause signal distortion (this would probably be evident on playing a music tape). Setting the volume too low, on the other hand, could give a signal too small for the GEM 80 to read without errors. The user should therefore try various levels to establish what setting is required for reliable operation.

See the section on "Diagnostics" below, and the use of the GEM 80 Programmer Test Mode, which indicates how tests can be carried out that signals from the programmer are being recorded and played back satisfactorily. Such testing can be carried out without needing a GEM 80 controller.

Note that, if the recorder does not have speaker cut-out, setting the volume for reliable operation must override any considerations of the annoyance caused by the whistle produced on the recorder's internal speaker.

5. A.C. Bias/D.C. Bias

The better quality recorders use a high frequency a.c. bias on recording, whereas cheaper recorders use a d.c. bias. The latter are more susceptible to tape head magnetisation, and they should have their heads de-magnetised from time to time.

Combined tape head cleaning and de-magnetising cassettes are commercially available. Consult your local audio store.

5. Gate Loading

The mechanical design of cassette recorders varies considerably. The better types have a gate such that, when the tape is to be removed, an Eject key must be pressed, and the cassette is pushed up in a tilting gate. The poorer types have just a trap-door type of cover for the cassette, which makes insertion and removal of a cassette more cumbersome.

Unnecessary Features

1. Chromic Oxide Tape Facility

Good quality low noise ferro cassettes should be used, so facilities for recording/playing chromic oxide tapes are not required.

2. Inverting Output

Some recorders produce a phase inversion between record and playback. This is immaterial for GEM 80.

Diagnostics

1. Recording Lead

On failure to record or playback, first check that the lead between the GEM 80 programmer and the recorder is correctly plugged in; some types of recorder which require leads with jack plugs need the jack plugs to be pushed in the correct distance, neither too little nor too far. If there are still problems, remove the lead at both ends and ring it through for continuity in case of a broken lead or plug termination.

2. Tape Head Cleanliness and Magnetisation

As mentioned earlier, problems can be encountered if the tape head becomes magnetised; this is more likely with d.c. biased recorders. The head itself should never be fingered, and can be cleaned using, e.g. Johnson's Cotton Buds, or with a cleaning cassette.

3. Tape Head Alignment

Tape head alignment is fairly critical, but is not something which can be adjusted by the user. If the tape head is not precisely vertical, or if the tape edge guides are not set to the correct height, problems may be encountered on playing tapes back, particularly those recorded on different recorders. If the recorder has this type of fault, it should be discarded or sent for repair and not used again until the alignment has been corrected.

4. Battery/Mains

Some recorders allow an undesirable amount of 50Hz or 60Hz mains ripple to get onto the tape when recording. If problems are encountered when running a recorder off mains, it is suggested that the user tries running off battery to see whether this makes an improvement.

5. Use of GEM 80 Programmer Test Mode

For checking that programs can be recorded and played back correctly, the user should make use of the Test Mode incorporated in the 8920 Programmer. This is described also in the User Information leaflet T420 for Version 4 software 8920 programmers. This is particularly useful where the correct volume control setting must be established on recorders giving variable output.

Pressing SHIFT T takes the programmer into Test Mode (after a few seconds delay) and the screen displays a screenful of characters. Pressing ESC twice gives a mode for testing the cassette recorder interface. The output to the recorder will consist of a string of alternate 0's and 1's. If this is recorded and played back to the programmer, a string of U characters will be displayed, as long as the data has been recorded and can be played back correctly, otherwise the U's will be replaced by a variety of symbols.

To get out of Test Mode, press ESC twice, then X for skip.

Leads

At the GEM80 end, a DIN 5-pin 180° connector is required. At the recorder end, the type of connector/s will depend on the particular recorder, and will normally be either another DIN 5-pin connector or else a couple of jack plugs (grey for "EAR", black for "MIC").

If a suitable lead cannot be obtained from the user's local audio store, they can be ordered from GEC to the following ordering codes:

5-pin DIN to 5-pin DIN	: 78801/213
5-pin DIN to 3.5mm jack plugs	: 78801/218

(Note: The latter may be supplied with a third jack plug, of smaller diameter (2.5mm) than the other jack plugs. If so, this third jack plug should be snipped off).

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T490 Issue1 184

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Printed in England

ID0065G/0004G

