In five years of co-operative work there have been developed within the Departments of Medical Informatics and Clinical Neurophysiology of the Hannover Medical School a wide variety of projects that are in various stages of implementation, the spectrum covering the documentation and analysis of Electroencephalograhms, Nerve Conduction Velocity- and Electro-Myographic observations, along with epileptic seizure documentation and trend analysis. Using examples from the routine projects we comment on the experience gained and draw conclusions as to criteria to be fulfilled by information systems intended for routine clinical usage.

E.E.G. DOCUMENTATION AND ANALYSIS

A pre-requisite for the development of a program for automatic EEG analysis is the presence of enough documented and analyzed EEGs that are both clearly documented with regard to their relationship to a variety of EEG characteristics, while also containing no effects that could lead to a falsification of statistical values, these conditions having a decisive influence on the characteristics selected as suitable for automatic analysis.

In 1968, HELMCHEN et al. remarked on the desirability of EDP support in the documentation of electro-encephalograhic data [4] and accordingly designed a data acquisition form using Optical Mark Recognition (OMR) techniques.

A slightly modified version of this form was introduced for EEG documentation within the Department of Clinical Neurophysiology of the Hannover Medical School in 1971. The initial processing
routines contained no formal check routines for the medical consistency of the data recorded and a retrospective study carried out in 1972 [11] analyzing 6434 EEGs showed an error rate of up to 70% for those items recorded by the clinicians requesting that an EEG be carried out, with an error rate of between 5 and 15% for the recording of the visual EEG interpretation, for which the doctors carrying out the data acquisition were highly motivated and trained in the use of OMR forms. The introduction of the general optical mark reader form processing program AMAP [6], the system design of which includes an obligatory consistency and completeness check routine for each medical application incorporated, resulted in the creation of an extensive error check routine taking into account the results of this previous analysis. By this means logical inconsistencies were detected upon initial processing of the form, so that failures in documentation could be corrected soon afterwards. The error rate was reduced by half upon introduction of this checking routine but we noted that, after this initial improvement, we were not able to achieve any marked further improvement. We noted also to our disappointment, that the corrections were made in order to pass through the check routine, without referring to the original EEG tracing, since this was, in most cases, already in the archive for recording on microfilm. As a consequence of the above we decided that the most satisfactory method of documentation would be by means of an interactive data acquisition system, the data being recorded directly while the original EEG tracing is at hand.

Accordingly, an interactive system was developed within the medical information system DIES (Data Interpretation and Evaluation System [8]) for the EEG documentation. The dialogue consists of a fixed set of frames for the recording of the background activity, followed by selected frames depending on pathological findings in the EEG (e.g. see Fig. 1a). Plausibility checks are provided for both intra-frame and inter-frame recordings so that only complete and logically consistent data are archived. The program generates a report containing a summary of the input, supplemented with the doctors observations that are noted in free-text format in the final frame.

Due to the development of both batch (OMR) and on-line (interactive display) systems (see Figs. 1a,1b), we are in a position to ensure