

Del Mar Engineering Laboratories

TO: President: Bruce Del Mar

NO.: ENG-26-72

FROM: Chief Engineer: C. Sanctuary

DATE: 6 March 1972

SUBJECT: Trip Report, 2/16/72 through 2/23/72

cc: R. Cherry, W. Parsons, D. Woods, W. Thornton

2/16/72 - Dr. Troyer, University Hospital, Madison, Wisconsin

Has no interest in S-T for long-term recordings, and feels that very few cardiologists will have. Possibly only advantage is for PRINZ METAL ANGINA where S-T does not depress under stress but at other times. Feels that S-T work is more directly applicable to stress testing except for above variant.

He feels PVC and PAC detection is very important and would like to see work done by us in this field.

Also, feels that an event marker is essential for marking the tape by the patient. This could be done even if it temporarily removes the second lead data, and would be valuable for timing as well as events. For example, the patient could mark the tape and log the time.

Feels that, in some cases, cassettes would be of value if a patient could change them himself to be able to record over longer periods than 24 hours. (24 hours is a big step.)

He is not in line for NIH analysis systems and wouldn't be too interested in it for his work. He is using a PDP-8 on line with patients trying to control their heart rate. The PDP-12 he uses with the input from the 450, and he has programs written to detect and totalize PVC's, PAC's, etc.; also histograms. But these are not too valuable over long periods as the basic heart rate changes and tends to mask the data. He is inputting data at 60 times real time, but is looking at rate, R-wave width, and R to R spacing to determine classifications. Sample of print-out attached.

2/17/72 - Dr. Feldman, Vita Comp, Inc., Sudbury, Massachusetts

Has COMPLETE COMPUTERIZED SYSTEM, at present inputting data at 30 times real time but converting it to 60 times. Now no longer needs the AVSEP or Arrhythmigraph. Used PDP-11 inputs all data and digitizes data. 200 samples per beat. Stores data on disc and computer analyses total data. All PVC's and PAC's runs, etc., specifically identified, times, accessible in analog print-out in real time. Feels system is too large and expensive for general use, but thinks he has a winner for his ECG service. He can feed our tapes in and get a complete analysis without using technicians. He would like to see our recorder price lower so he could get more in service. He is building up his service slowly.

His patient monitoring system on which this is based has been licensed to E for M and they are working for and with E for M. Will have system on show in Chicago. Bruce should look. All outputs on his real time monitoring are applicable to recorded data at high speed.

Dr. Feldman (Continued)

Re: Dr. P. Fromer - has poor opinion. Has provided several proposals in the past as unsolicited (requested) only to find that they were turned into specs for general bid. He objects to free engineering and feels NIH specializes in it. Thought that the NIH spec was definitely slanted towards us but wasn't sure. Also feels that BP is Dr. Fromer's pet subject.

2/18/72 - Dr. Hinkle, Cornell University Hospital, New York City

Dr. Hinkle considers any new equipment should have 3 leads to give 3 90° cuts across the heart. Also, a fourth track with accurate time is essential with capability of patient marking tape. He would also like it all telemetered, for example, portacase style, to eliminate bulk on the patient, and make it unobtrusive. AVSEP presentation very important, but would like all analysis to be automatic, with selectable print-outs. Tape could then be scanned while being fed into a computer, readouts and analysis data punched in and computer could then dump out what was required. Felt that large centers would buy these systems even at \$50 - 60K due to savings made on technicians. P.R., RR, PAC, PVC, all essential data, plus when occurring, times, runs, etc. Recorder should be FM with data to DC.

He likes our 24-hour portacase but wants antennas hidden. Would also like to consider one in a plastic lunch box or something, as some patients (i.e., janitors) can't logically be seen with a brief case. Psychological aspects important during 24-hour tapes.

Dr. Hinkle is doing some respiratory work in conjunction with heart problems as two are associated, so showed him and his associate gas analysis. Very excited at minute readout and its capabilities. Wants firm price in about 2 weeks, if possible, for his budget, and he will buy. Gave budgetary price of \$10 - 20K. States nothing similar available on market.

Very unhappy over 350 recorder motors; he got only 7 24-hour runs out of last one before breakdown, and repair cost was \$175.

2/19/72 - Dr. Moss, Strong Memorial Hospital, Rochester, New York

Dr. Moss working very closely with NIH and Peter Fromer. He stated last year's NIH bid was a toss-up between us and Rochester group before cancellation. He thought money the reason.

He is working in a different aspect of monitoring and feels it has a big future (with NIH approval). This is in the area of screening. He has shown that sudden death is always preceded by rhythmic changes, and these show up in 98% of all cases within 4 hours. He thinks that this market (screening) should be cassette recorders, direct input into computer and computer analysis. Important features to be VPB's, IVCD, PR variations and S-T variations. At present, he is working entirely with patients from Kodac who have had infarcts. They want eventually to get a 4-hour recording each 4 months on patients who have had heart attacks, and feels that with this data, and drug therapy, 85% of the sudden death casualties can be saved.

Dr. Moss (Continued)

Dr. Charles Frank, health program, New York City, is running 1-hour cassette tapes, and sending them to Dr. Lownes, Boston. This is a start of a screening program. Dr. Frank's patients are hip-break problems, but he is running the ECG tapes for Dr. Lownes.

With reference to screening, Dr. Moss thinks this is the way NIH wants to go with the sudden death program and thinks we are the only logical people to propose this work. Thinks we would get full NIH backing.

2/22/72 - Dr. Sam Fox, George Washington University Hospital, Washington, D.C.

Interested in the respiratory analysis system and would like more detailed data, i.e., back pressures, accuracies, etc. Apparently, Westinghouse is working on a system and he will be seeing that shortly. Will not be at Atlantic City, but would like to see the equipment and for us to give a talk on it at one of the regular seminars he holds at the hospital.

Regarding stress testing, he felt that the digital readout of S-T would satisfy some cardiologists, but for leaders in the field, more is needed, but thinks that from the marketing standpoint, we have a useful instrument as it is. He personally would like to see a storage display of the S-T segment, something like the AVSEP, with each complex superimposed on each other so he can see changes taking place. He feels that no computer can take the place of the human brain for this type of analysis.

Suggested that the discussions with Dr. Sheffield would be very valuable as they work very closely together.

2/23/72 - Dr. L. T. Sheffield, University Hospital, Birmingham, Alabama

Felt our approach to Holter was good for advanced system, but felt that we were too narrow on our approach. Would like to see a companion system using a computer wherein data went in at high speed and all normal data was discarded. As with others, thinks this is definitely the future and would save a lot of time. Also, felt that screening for shorter periods, i.e., 2-4 hours has a big future providing analysis is automatic.

Liked our 24-hour recorder and said he would like to buy a couple.

Discussed stress testing; he does a lot of it but not with our equipment. He plots the S-T - HR loop and finds it very valuable. Discussed respiratory analysis. Thinks this has a big future as at present no automatic system at all, and as he said, oxygen measurement is a painful measurement to take accurately with present systems.

CS
C. Sanctuary

CS:lm

Attachment: As noted.