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MEMORANDUM FOR THE RECORD

TO: MPRO-3

SUBJECT: Diagnostic Library 7950 Data Processing System (HARVEST)

There will be seen be completed a library of test programs for the 7950 system. Due to the size and speed of the 7950 system, this library represents the largest integrated group of system test programs as yet produced in the computer industry. More important, it represents the work of a programming group that averaged 14 skilled diagnostic programmers. This group has been steadily engaged in this task for two years, so the accumulation of skilled manhours to build this library is very large. The resultant library will be approximately 500 programs.

The existence within MPRO-3 of a Diagnostic Programming group suggests an interest in that organization in building a Diagnostic Library. It seems to me that the incorporation of the 7950 Library into the MPRO-3 effort could considerably broaden the knowledge and consequent capability of this group.

Listed below are suggestions as to how the 7950 Library might be integrated into the MPRO-3 effort.

1. Temporary assignment of one or more Engineer Programmers to the study of the 7950 tests. (Preferably someone with 7950 Programming Training.)
2. Extracting from these tests the techniques of testing. Thus the methods developed by the manufacturer for rapid testing of advanced design adders, complementers, Mag. Tape systems, floating point operations, indexing operations, memories, etc., would become immediately available for adaptation and use on other Agency equipments. (This could result in considerable savings in programming effort and machine research time.)
3. Temporary assignment of Engineers, where eventual assignment in servicing of the HARVEST System, to the Diagnostics group would serve a double purpose in that they could assist in the integration of the large amount of information in the 7950 library into the Diagnostic group effort and at the same time familiarize themselves with the content of these tests which they will some day be using. (NOTE: In the proposed 7950 training contract, very little time is allowed for training the subject group in the details of the system diagnostics.)
4. The newer equipments purchased by the Agency are all organized on a system basis. It would seem logical therefore to pursue a systems analysis approach in the Diagnostics effort. The test programs for the SIGMA (Central computer) section of the 7950 system are assembled in such a way as to provide both unitary and system testing capability both under a maintenance mode of operation and under programming control in the operating mode. While it is true that 7950 incorporates more maintenance aids than are usually found in computing

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equipment (approximately 25% of the total circuitry) many of the methods used for system analysis can be adapted to other systems. This is particularly true in the utilization of the Interrupt concept which is found in most modern machines. Using the available interrupt register capacity under programming control should be primary technique for Diagnostics because it utilizes all the system capacity for self analysis. The methods developed for the SIGMA tests utilizing this idea could be an addition to the diagnostic work in MPRO.

Finally, it should be noted that the Purchase Description for the 7950 system requires that the manufacturer demonstrate the effectiveness of those test programs and make the test library subject to Agency approval. Depending on the size of the effort MPRO-3 is able to support in the examination of the test library all deficiencies in coverage or short comings in techniques of testing of the system could be noted and suggestions made to the manufacturer to correct these. The result could be a more comprehensive and efficient library for the ultimate use of MPRO-3 when the maintenance of the 7950 system becomes their responsibility. If these suggestions could be made known to the manufacturer before acceptance of the system takes place then his group of programmers and machine processing capability could be utilized to great advantage by NSA, and a considerable saving in money and man hours result.

This Memo is written to acquaint MPRO-3 of the facts of the situation and in the hope that they may be able to supplement the effort on this project.

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MPRO-35