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MASTER

A UNIQUE SAMPLING AND TRANSFER SYSTEM FOR THE FLUORINEL DISSOLUTION AND STORAGE FACILITY

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Liquid sampling, sample transfer and analytical systems for the Fluorinel Dissolution and Storage Facility (FAST) are required for monitoring feed and process solutions on a constant basis during fuel dissolution. This head end system includes three dissolvers that are operated in a sequential batch dissolution process. Due to this sequential type operation, sampling becomes very important in monitoring and tracking the dissolution phase of each dissolver. Liquid samples are taken quite frequently during certain phases of the decladding step and again during the dissolution of the fuel. It is very important in this process that the liquid samplers (Figure 1) function well, are reliable and designed so that the samples can be taken remotely. Samples must be transferred to an analytical cell for analysis. Analytical results are continually returned to operating personnel so that required feed adjustments can be initiated. Liquid samples are also taken from other process vessels in the system. Results of samples taken will then allow complete monitoring of the process.

The sampling cell also contains a pneumatic transfer system sender/receiver (Figure 2) designed for rapid and reliable sample transfer. This transfer system will be operated and maintained remotely so simplicity and reliability has again been emphasized.

To fullfill the process requirements, sample stations are designed to provide representative samples of all process streams and of adequate quantity for analytical needs. Also the samplers must be designed so that they can be

easily maintained remotely and operated in a manner that will minimize the spread of contamination and radiation exposure to operating personnel.

The sampling cell is a shielded facility located in the FAST building and adjacent to the dissolver cell. This sampling cell contains 10 liquid samplers, a pneumatic sample transfer sender/receiver, a decontamination service station, plastic transfer capsule capper/decapper and a sample bottle evacuation chamber. This cell will be remotely operated and maintained using two shielding windows, three Model "G" master-slave manipulators and small hand tools. The hand tools have been modified for handling with manipulators. An airlock type entrance with an interlock shielding door has been located at one end to allow access into and out of the cell. This airlock has been sized adequately to allow transfer of all sampling equipment located inside the cell.

A mockup of the sampling cell has been installed for equipment checkout and personnel training in the Remote Maintenance Test Facility (RMTF). This mockup is full scale in cross section and two thirds of the actual sampling cell length. The mockup is equipped with two Model "G" master-slave manipulators, a window simulating the size and viewing angles of an actual window, a shielding door and the utilities required to demonstrate sampling techniques. Equipment installed inside the cell is full scale and consists of a sample station, plastic transfer capsule, capper/decapper, sender/receiver station, sample bottle evacuation chamber and a decontamination service station. This mockup was used extensively for testing and checkout during the early stages of the facility design. Testing and checkout consisted of checking space requirements, viewing capabilities, and remote handling requirements for operation and maintenance. Mockup design also allowed testing of the samplers in three different locations. These locations simulated all of the locations that will be required in the actual facility. Time studies were incorporated into the testing program to assure that sampling, capsule capping, loading capsules into the sender receiver, bottle evacuation, and maintenance could be accomplished readily, reliably and expiditiously using remote techniques.

This sampling system is quite unique in design and remote maintenance has been greatly simplified. Sampling and transfer of the samples will reduce radiation exposure to operating personnel and reduce spreading of contamination. Full scale mockup and testing of these systems show them to be reliable, functional and workable. Simplicity in operation and remotability make this system very attractive for use in radioactive liquid handling facilities.

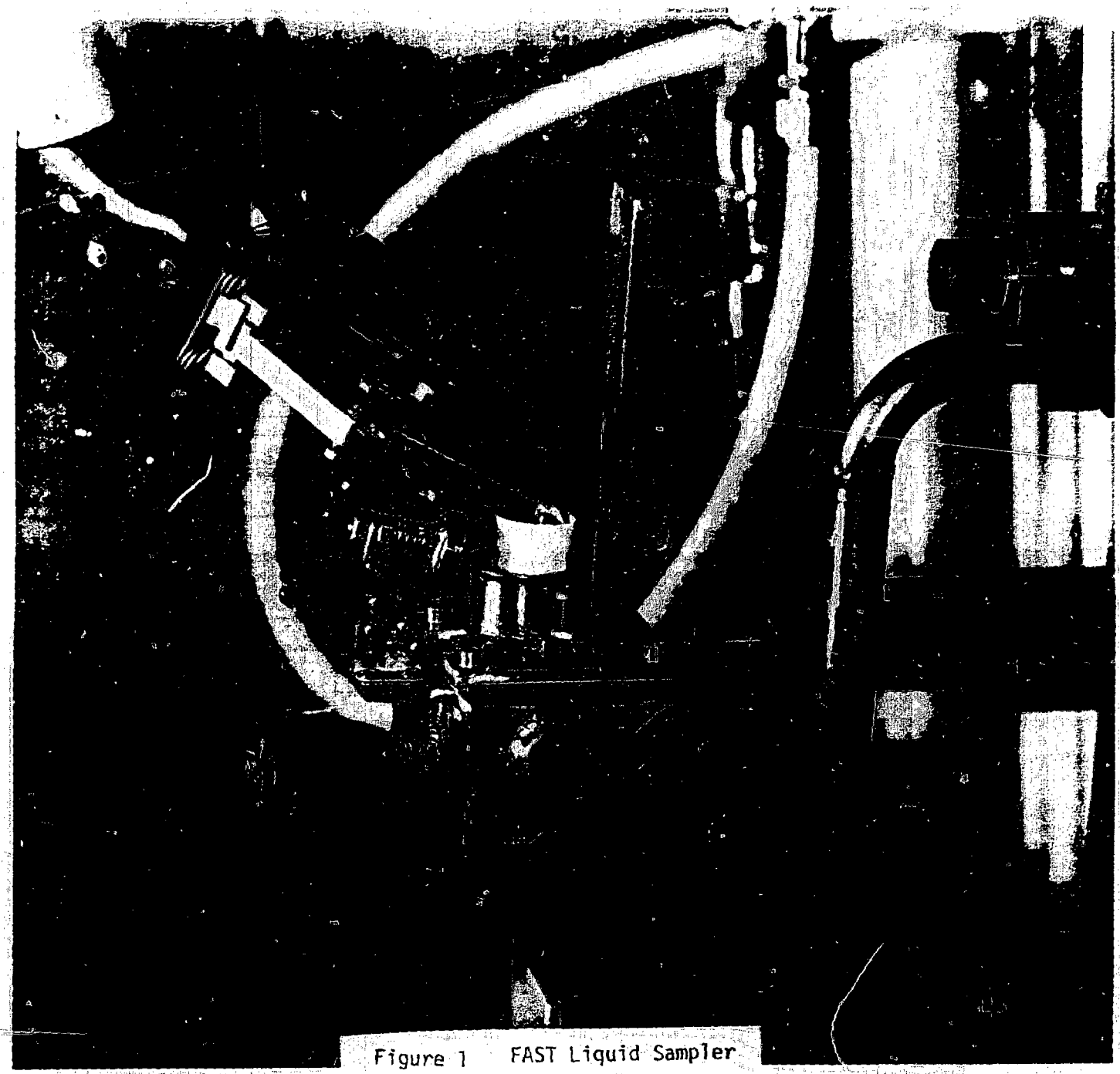

Figure 1 FAST Liquid Sampler

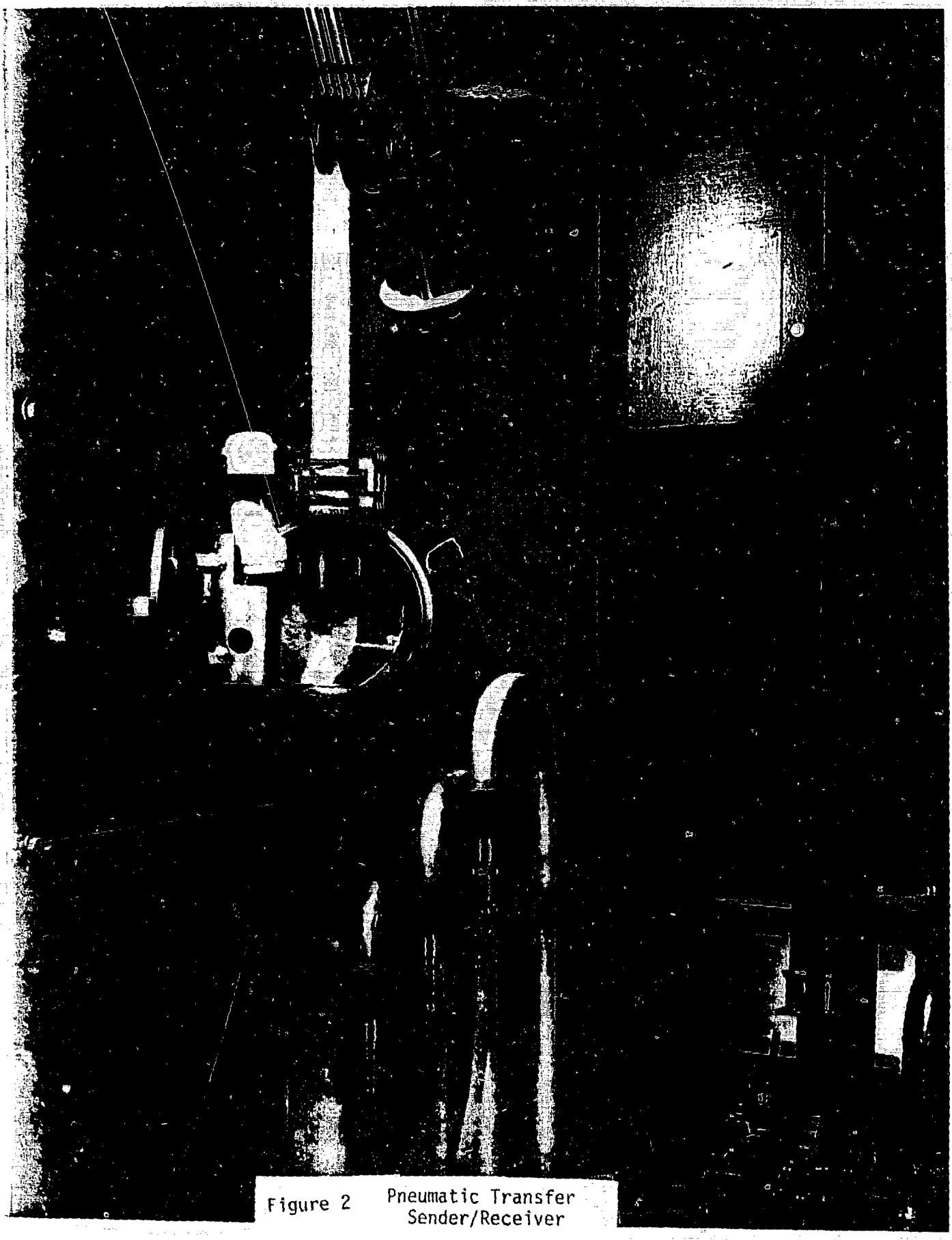

Figure 2 Pneumatic Transfer Sender/Receiver