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RS 2444/261

SCDR-67-412

PRELIMINARY TEST PROPOSAL

ON

QEST FOR XW67 (U)

F. A. Ross - 2444

William C. Kraft - 2440

May 1967

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TABLE OF CONTENTS

	PAGE
Introduction	3
Design Requirements	3
Design Intent	3
Description	3
Cost Estimate	6

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Introduction

In response to the first XW67 Quality Assurance Program Planning Committee meeting held May 4, 1967, the following preliminary proposal outlines the basic approach for the design of an XW67 QEST. The basic approach covers testing with an actual adaption kit or an adaption kit simulator thereby affording considerable flexibility in test planning, and will also allow a decision for whatever degree of test realism is desired.

Design Requirements

Because only general design requirements exist at this time, the proposal presented in this document is quite broad, and, as such, will be presented to a QAPPC meeting May 23, 1967. Following this meeting, specific test criteria will be formulated.

Design Intent

In this design proposal, it is the intent to provide a tester that will perform a realistic systems test, obtain as much component information as possible, make the least number of compromises to the system under test, and to limit the cost of the tester to a realistic figure.

Description

The QEST will be designed so that an AK and the Sandia package (S.P.) of the warhead can be tested or that either an AK or Sandia package can be tested utilizing a simulator for the other component. If an AK and S.P. are to be tested, the S.P. and AK will be removed from the nuclear part of the warhead during pre-QEST. The only system compromise would be the simulation of the ZERO G switch. Also during pre-QEST, the gas bottle will be removed and placed with the nuclear parts.

The QEST will be designed to provide a greater flexibility of testing. The QEST will be controlled by a small general purpose computer, such as the Digital Equipment Corporation Type PDP-8. This computer will allow the QEST to sense the conditions of the S.P. or the AK and to provide necessary stimuli for worse case conditions for more realistic testing. The computer also will allow a greater flexibility in programming for diagnostic testing of the weapon. It would also provide the capability of analyzing test results as they occur and preclude further testing if required.

In order to utilize the full capability of this small general purpose computer and the Universal Data Acquisition and Processing System, all data, wherever possible, will be generated in a digital form for direct digital entry into these machines.

As part of the test sequence, the G switches of the AK and S.P. must be subjected to a G-second environment that simulates the flight profile of the vehicle. (Figure 1.)

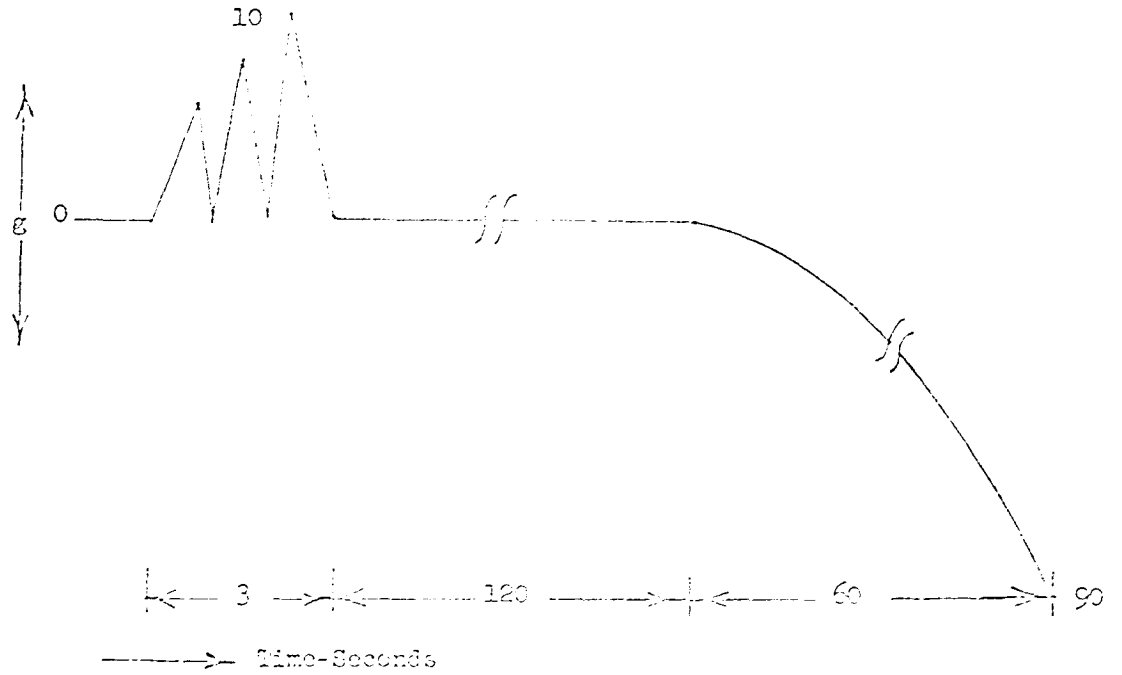

FIGURE 1

Since the ESD's are an integral part of the systems, it is impossible to remove these components and test them separately on existing equipment. As the S.P. is of an explosive nature, the unit should not be handled subsequent to latching of the Sandia ESD's for reasons of safety. This requires that the systems be placed on the proposed 50,000 g-pound large centrifuge presently being studied. This centrifuge will have capability of generating the flight profile required. During this profile, the AK and S.P. would be tested.

The QEST system control computer would provide a command signal to the computer control center of the centrifuge which would generate the acceleration profile and stop. While the centrifuge is at rest, the QEST control will generate command signals to a turntable located on the centrifuge arm. The turntable will reverse the orientation of the S.P. for the deceleration profile.

During the deceleration profile, the QEST control system will generate the necessary stimuli to exercise the S.P. or AK. A neutron monitoring system

will also be located on board the centrifuge, and the turntable will position the S.P. in the proper position for monitoring the neutron output of the zippers. Also, a simulator for the S.P. and AK will be provided for tester checkout prior to actual testing of the War Reserve units.

The following is a partial listing of monitored functions of the S.P:

1. A1, Pre-Arm)
2. B1, Pre-Arm)
3. A2, Arm) Input side of the ESD's (XMC2306's)
4. B2, Arm)
5. A3, Fire)
6. B3, Fire)

7. A1, Pre-Arm)
8. B1, Pre-Arm)
9. A2, Arm) Output side of the ESD's (XMC2306's)
10. B2, Arm)
11. A3, Fire)
12. B3, Fire)

13. Transverter A
14. Transverter B
15. Transverter A and B
16. Fire Set Current
17. Zipper Output
18. Zipper Fire Signal 1
19. Zipper Fire Signal 2

The Universal Data Acquisition and Processing System will be utilized for data recording. Provision to connect an oscillograph recorder to the QEST will be available for calibration and checkout. The QEST will basically consist of the computer programmer, test signal junction box, a control signal junction box, static interlock, system indicator, power distribution, D.C. power supplies, and oscilloscope. The units would be contained in standard QEST equipment cabinet.

The above proposal provides for testing of the S.P. Additional capabilities, such as required fixturing, power supplies, space load, and environmental stimuli will be added to the QEST for testing an A.K. The flexibility of the QEST computer programmer will provide the QEST with the capability of exercising the AK as necessary. Provisions would be made by cable connections to provide monitoring of all inputs and outputs of the AK.

The difference in the weight of the fixturing and the AK placed on the centrifuge is of no consequence since the centrifuge is computer controlled. The computer will generate the flight profile limited only by the weight restriction of the centrifuge.

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Cost Estimate

Inasmuch as this is a preliminary proposal, a firm cost cannot be given. It is estimated that the cost of the proposed system would be between $75,000 and $100,000.

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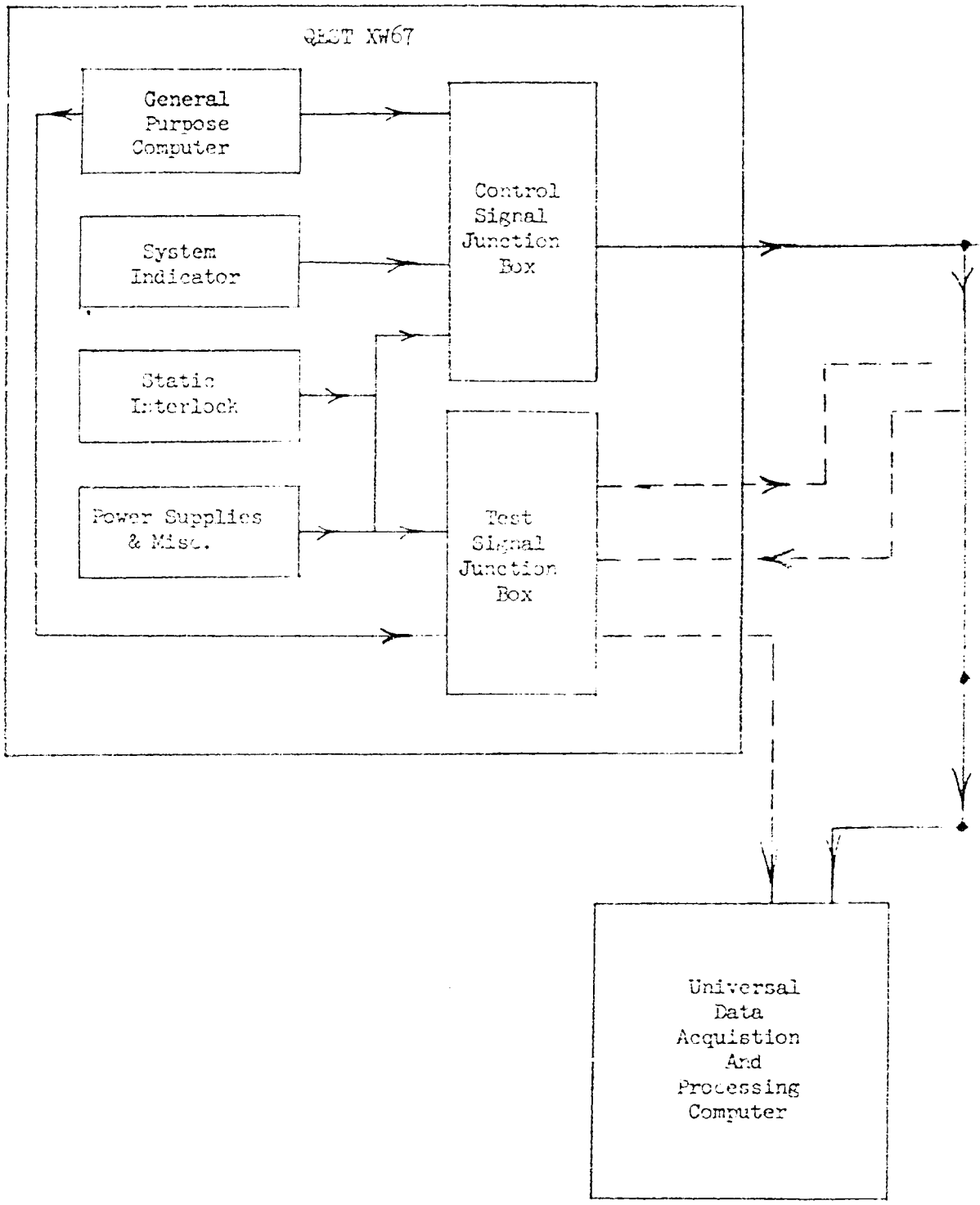
QEST XW67
General Purpose Computer
System Indicator
Static Interlock
Power Supplies & Misc.
Control Signal Junction Box
Test Signal Junction Box
Universal Data Acquistion And Processing Computer

FIGURE

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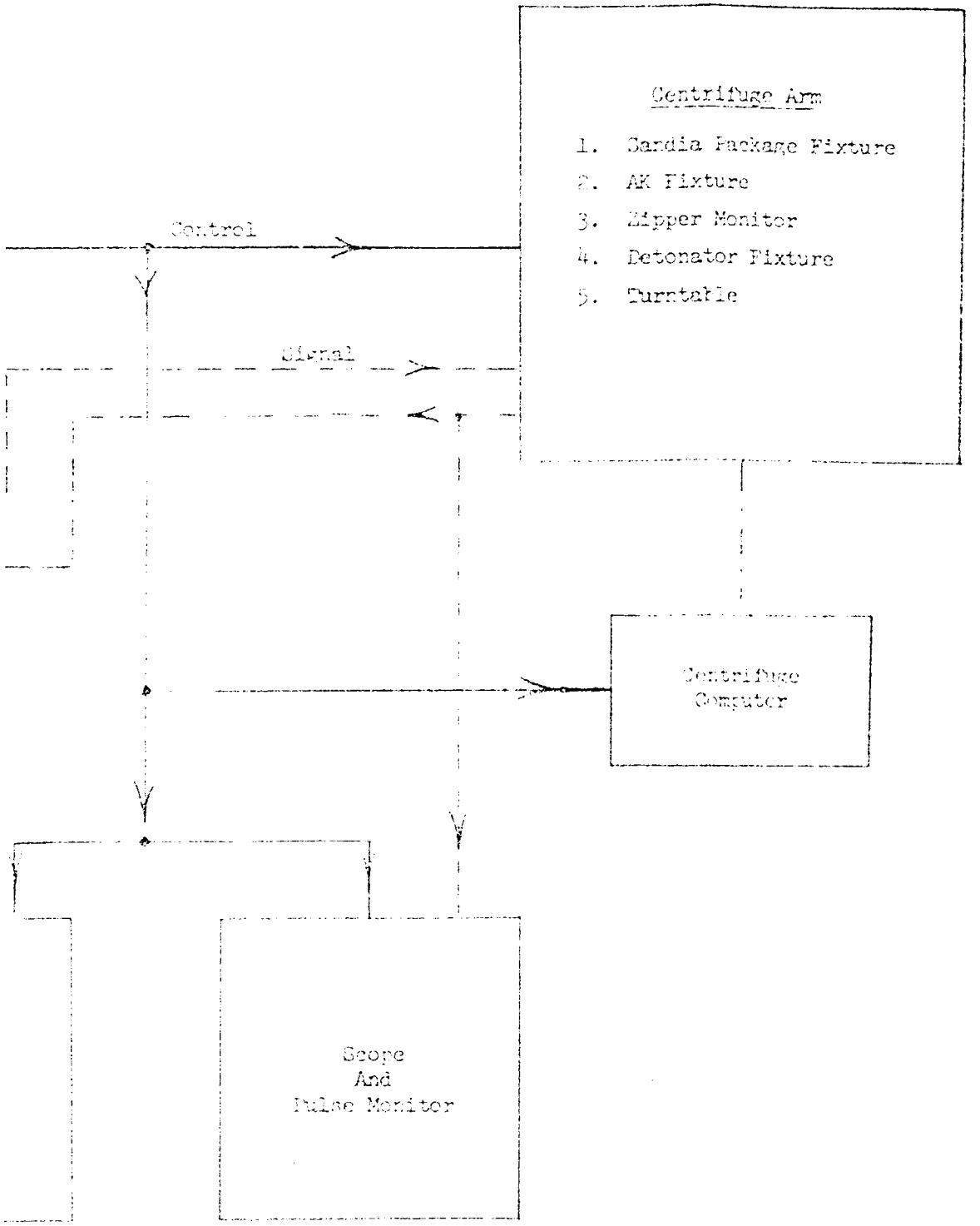

FIGURE 2

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