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Metallurgical Laboratory

March 31, 1944

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Enclosed are Parts I and II of the Contract Negotiation forms which are being submitted along with this request for an extension of the contract with the Department of Engineering Research, University of Michigan, which expires April 10th.

The present status of the work which has been performed there may be outlined as follows:

1. It has been demonstrated that a supersonic apparatus which consists of a transmitter which transmits ultrasound through a W slug and a receiver which receives the sound will detect and locate flaws between jacket and slug of a size which will interfere with the proper functioning of the slug in the water cooled unit at H.E.W.

2. The appropriate electronic circuits for this work have been purchased. A scanning mechanism which will handle a slug in the inspection process has been designed and is under construction in the shops of the Metallurgical Laboratory.

3. A supersonic reflectoscope, which is in the laboratories of Professor Firestone, has been used to show that flaws within a metal slug may be detected, that slugs cut from extruded metal bar possess a large number of flaws which interferes with the sound transmission, that slugs cut from rolled bar transmit sound well and hence do not possess flaws, and that the thermal and mechanical history of the metal does not interfere with the testing for flaws.

4. A supersonic reflectoscope for use at the Metallurgical Laboratory has been rented from the General Motors Research Laboratory and is being conditioned for use on laboratory problems at the University of Michigan. Professor Firestone is in the process of hiring an electrical engineer to be trained in the use and service of this instrument. At the end of his training period, the man and the instrument will be moved to Chicago to perform testing work.

In the original contract, it was thought that a supersonic reflectoscope would be used for detecting flaws between can and slug. It was on this basis that the money for the contract was allotted and the time set at three months. During the first few weeks of work, it was established that another apparatus, using transmission rather than reflection of the sound, would be more suitable. This apparatus was designed and found to be simpler and cheaper than the reflectoscope. However, its development and construction have taken longer than the three months planned. During the past three months, it has developed that a method for determining flaws within slugs is desirable, and it has been shown that a reflectoscope is a suitable instrument for the detection of these

flaws in a nondestructive way. This development has renewed the interest in the reflectoscope and required the training of a man in its use. Thus, an additional reason is provided for extending the contract.

It is expected that the additional work on the apparatus for testing bonds and the training of a man in the use of the reflectoscope can be accomplished within the next three months. The only possible change that can be foreseen at the moment is that it may turn out to be necessary to have Professor Firestone build a reflectoscope for permanent use by the Project after the six months' rental period of General Motors' instrument expires. It is hoped that this question can be settled within the next month.

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