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RDT&E PROJECT NO. 1M643324D58806

USATECOM PROJECT NO. 7-3-0244-03

USAAESW BOARD PROJECT NO. CE 1864

SERVICE TEST OF  
IDEOGRAPHIC COMPOSING MACHINE

FINAL REPORT

BY

WALTER N. MOTT, MAJOR

MARCH 1968

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DEPARTMENT OF THE ARMY  
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND  
ABERDEEN PROVING GROUND, MARYLAND 21005

AMSTE-GE

27 MAR 1968

SUBJECT: Final Reports of Engineering and Service Tests of Ideographic Composing Machines, USATECOM Project No 7-3-0244-02 and -03

Commanding General  
U. S. Army Materiel Command  
ATTN: AMCRD-JI  
Washington, D.C. 20315

1. Inclosed are the separate final reports of the engineering and service tests of the Ideographic Composing Machine.
2. The Ideographic Composing Machine was developed from military characteristics approved in 1962 with subsequent revisions and waivers as reflected in the inclosed reports, which have been recorded in AMCTC Item 5786, Meeting No 1-68. These changes have resulted in an item not "militarized" for the normal field environment and which will require contract maintenance. Since only a few items are to be procured for Army use, it is questioned whether it should be formally type classified for issue.
3. This headquarters concludes that:
  - a. The Ideographic Composing Machines tested are not suitable for Army use.
  - b. The Ideographic Composing Machines may be suitable for Army use when the deficiencies listed below are corrected and as many as feasible of the shortcomings listed in appendix III of the inclosed reports:
    - (1) The Ideographic Composing Machine was unreliable due to the requirement for frequent repairs and adjustments during the test.
    - (2) The Ideographic Composing Machine was highly temperature sensitive.
    - (3) The test item was susceptible to failure of electrical components caused by power line surges and/or transients or brief power failures.

27 MAR 1968

AMSTE-GM

SUBJECT: Final Reports of Engineering and Service Tests of Ideographic Composing Machines, USATECOM Project No 7-3-0244-02 and -03

(4) Approximately 1 percent of the ideographs could not be reproduced from the vocabulary.

(5) Proper adjustment of the video read level control was not possible during automatic tape operation.

(6) The test item did not operate 180 hours without maintenance. The MTBI was 79.5 hours.

(7) It was not possible to determine if the film was correctly threaded in the camera due to positioning of the sprocket wheels behind the pressure roller assembly.

(8) Switches not used by the operator during operation were not protected to preclude inadvertent activation.

c. When deficiencies and shortcomings are corrected, the test items will provide a significant improvement in psychological warfare operations.

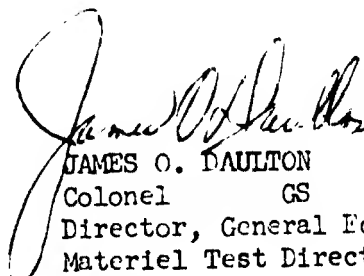
d. The test items are safe for their intended use.

4. This headquarters recommends that the requirement for the Ideographic Composing Machine be reviewed and, if still valid, the deficiencies and as many of the shortcomings as feasible, listed in appendix III of the reports, be corrected. When corrected, as determined by the developer, the Ideographic Composing Machines be issued as a nontype classified item with maintenance to be provided on a contract basis.

FOR THE COMMANDER:

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as (5 cy ea)

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JAMES O. DAULTON  
Colonel GS  
Director, General Equipment  
Materiel Test Directorate

27 MAR 1968

AMSTE-GE

SUBJECT: Final Reports of Engineering and Service Tests of Ideographic  
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RDT&E PROJECT NO. 1M643324D58806

USATECOM PROJECT NO. 7-3-0244-03

USAAESW BOARD PROJECT NO. CE 1864

SERVICE TEST OF  
IDEOGRAPHIC COMPOSING MACHINE

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BY

WALTER N. MOTT, MAJOR

MARCH 1968

U. S. ARMY AIRBORNE, ELECTRONICS AND SPECIAL WARFARE BOARD  
Fort Bragg, North Carolina 28307

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## ABSTRACT

Testing was conducted to determine to what degree the Ideographic Composing Machine, the test item, meets the military characteristics as modified, and its suitability for Army use in psychological warfare operations. Testing was conducted at Fort Bragg, North Carolina during the period July 1967 - February 1968.

The Ideographic Composing Machine had the vocabulary to meet the current demands of psychological warfare; however, it failed to meet some of the stated requirements. The following deficiencies were noted: electrical components were susceptible to failure caused by power line surges and/or transients or brief power failures; approximately 1 percent of the ideographs could not be reproduced from the vocabulary; proper adjustment of the video read level control was not possible; it did not operate 180 hours without maintenance; it was not possible to determine if the film was correctly threaded in the camera; and switches not used by the operator during operation were not protected to preclude inadvertent activation. Several shortcomings were noted, principally in the areas of operational characteristics and human factors.

It is concluded that the Ideographic Composing Machine in its present state is not suitable for Army use. It may be suitable for Army use when deficiencies and shortcomings are corrected. When the deficiencies and shortcomings are corrected, the test item will provide a significant improvement in psychological warfare operations. The test item is safe for its intended use.

It is recommended that deficiencies and shortcomings be corrected and the Ideographic Composing Machine be subjected to check tes..

## FOREWORD

U. S. Army Airborne, Electronics and Special Warfare Board was responsible for preparing the test plan, test execution, and preparing the test report.

Personnel support provided by Headquarters, Third United States Army, Fort McPherson, Georgia, and 2d Psychological Operations Group, Fort Bragg, North Carolina is acknowledged.

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## SECTION 1. INTRODUCTION

### 1.1 BACKGROUND

a. In 1962 Military Characteristics (MC) for Ideographic Composing Machine (ICM) were approved (ref 1, app V), revised at a Technical Review Meeting on 31 July 1963 (ref 2, app V), and further changed as recommended by U. S. Army Combat Developments Command (ref 3, app V). U. S. Army Quartermaster Research and Engineering Field Evaluation Agency (now General Equipment Test Activity) has completed Engineer Design testing (ref 4, app V) and is responsible for conducting the Engineering Test.

b. Ideographic Composing Machine, Serial No. 12, was received by the U. S. Army Airborne, Electronics and Special Warfare Board (USAAESWBD) in March 1967. Service testing was delayed pending results of a scheduled In-Process Review (IPR) which was conducted on 2 March 1967 (ref 5, app V). It was recommended that specific requirements of the MC be waived at that time due to the present technological state-of-the-art and that development be continued. These waivers were included in the revised approved plan of test (ref 6, app V). Testing was initiated on the test item, Serial No. 12, in July 1967. Due to a failure in the optic system, testing was suspended in August 1967. A second test item, Serial No. 11, was received in October 1967 and service tested during the period October 1967 - February 1968.

### 1.2 DESCRIPTION OF MATERIEL

The Ideographic Composing Machine (ICM), the test item, is a single electronic unit containing all equipment necessary for the rapid photo-composition of Chinese characters in a form suitable for reproduction. The test item has an electric keyboard input for 21 basic strokes, 28 keyboard entities, and 11 punctuation marks. Each character is spelled out on the keyboard in the normal stroking sequence of the Chinese language at a rate of up to 550 strokes per minute. Each stroke generates an 8-bit code which is fed into the logic circuits. A magnetic drum memory stores up to 10,000 characters. When a character has been selected by the keyboard input, it is compared with the information stored on the magnetic drum. The position of the information on the magnetic drum determines which character is illuminated from an ideographic character matrix. The selected character is displayed on a verification kinescope and projected into a camera unit. If the viewed character is incomplete, additional strokes are put into the machine using the keyboard. When the correct character appears on the verification kinescope, it is photographed. Additional inputs include punched tape and a photographic insert of characters not stored in the machine.

The test item can be mounted in a shelter or structure having suitable environmental controls.

### 1.3 TEST OBJECTIVES

Determine:

- a. The degree to which the Ideographic Composing Machine meets the military characteristics as modified.
- b. Suitability for Army use in psychological warfare operations.

### 1.4 SUMMARY OF RESULTS

The Ideographic Composing Machine has the vocabulary to meet the current demands of psychological warfare. However, it failed to meet some of the stated requirements. The following deficiencies and shortcomings were noted:

#### a. Deficiencies.

- (1) The test item was susceptible to failure of electrical components caused by power line surges and/or transients or brief power failures (Test No. 3).
- (2) Approximately 1 percent of the ideographs could not be reproduced from the vocabulary (Test No. 3).
- (3) Proper adjustment of the video read level control was not possible during automatic tape operation (Test No. 3).
- (4) The test item did not operate 180 hours without maintenance. The MTBF was 75.5 hours (Test No. 4).
- (5) It was not possible to determine if the film was correctly threaded in the camera due to positioning of the sprocket wheels behind the pressure roller assembly (Test No. 5).
- (6) Switches not used by the operator during operation were not protected to preclude inadvertent activation (Test No. 5).

#### b. Shortcomings.

- (1) Width of the test item exceeded requirement by 15/16 inch (Test No. 1).

(2) The shipping container required modification in order to secure the test item (Test No. 1).

(3) A format for preparation of coded copy to be used by a nonlinguist was not available (Test No. 2).

(4) Frequent adjustments of the video read level control were required (Test No. 3).

(5) The test item operated at only 485 operations (strokes) per minute while ideographs were being photographed (Test No. 3).

(6) Approximately 2 percent of the ideographs examined were disfigured due to a pin-cushioning effect in the optic system (Test No. 3).

(7) The alignment of ideographs in rows was not of good quality (Test No. 3).

(8) The commercial film required extra precautions during the development process (Test No. 3).

(9) A simple go-no-go automatic check-out equipment was not provided (impact not evaluated) (Test No. 4).

(10) Voltage and current indicators used during operation were not marked to indicate operating range (Test No. 5).

(11) The copy holder, when tilted, had no means for holding material (Test No. 5).

(12) Air filter on the front of the test item was not required for operation (Test No. 6).

(13) The shipping container did not have markings identifying curb weight, center of gravity, and attitude (Test No. 7).

#### 1.5 CONCLUSIONS

a. The Ideographic Composing Machine in its present state is not suitable for Army use.

b. The Ideographic Composing Machine may be suitable for Army use when deficiencies and shortcomings are corrected.

c. When deficiencies and shortcomings are corrected, the test item will provide a significant improvement in psychological warfare operations.

d. The test item is safe for its intended use.

#### 1.6 RECOMMENDATIONS

a. That deficiencies and shortcomings be corrected.

b. That the Ideographic Composing Machine be subjected to check test after the deficiencies and shortcomings are corrected.

## SECTION 2. DETAILS OF TEST

### 2.1 INTRODUCTION

a. Service test of the Ideographic Composing Machine (ICM), the test item, was conducted during the period July 1967 - February 1968 at Fort Bragg, North Carolina by personnel of the U. S. Army Airborne, Electronics and Special Warfare Board assisted by personnel from units at Fort Bragg and Fort McPherson, Georgia.

b. Criteria for this test were derived from Military Characteristics for Ideographic Composing Machine as approved in 1962 (ref 1, app V) with revisions (ref 2, 3, 5, app V) and other known requirements as approved in the coordinated plan of service test (ref 6, app V).

c. A complete maintainability evaluation was not conducted as the requirement for a formal maintenance package was waived and a contract was negotiated with the manufacturer to provide maintenance support as required during conduct of the service test (ref 2 and 5, app V). Maintenance beyond that listed in the operator's manual was performed by the manufacturer's serviceman.

d. The shipping container was fabricated by U. S. Army Natick Laboratories and shipped to this Board in January 1968.

### 2.2 TEST NO. 1 - PHYSICAL CHARACTERISTICS

#### 2.2.1 Objective

Determine the physical characteristics of the test item.

##### 2.2.1.1 Test Criteria

a. (Required) The composing machine utilizing the most recent advancements shall be of minimum size and weight consistent with performance required. Weight of the equipment complete with power supplies but not including power source shall not exceed 2,400 pounds (para 1, app II).

b. (Required) Dimensions shall not be greater than 78 inches in width, 29 inches in depth, and 60 inches in height (para 2, app II).

c. (Required) A shipping container shall be provided to shelter the equipment during transport (para 3, app II).



**2.2.2 Method**

a. The test item was inspected, weighed, measured, and photographed.

b. The shipping container for the test item and each accessory kit was inspected and weighed.

**2.2.3 Results**

a. Weights and dimensions of the test item and supporting bases were as follows:

| ITEM                             | SIZE (inches) |        |        | WEIGHT (pounds) |
|----------------------------------|---------------|--------|--------|-----------------|
|                                  | width         | depth  | height |                 |
| ICM                              | 78 15/16      | 29     | 59 1/4 | 2,288           |
| Platform dolly                   | 84            | 36     | 13 5/8 | 206             |
| Shipping container base platform | 91            | 41 1/4 | 10     | 157             |

b. Weights of accessory kits were as follows:

ICM shipping container - 642 pounds

Spare parts kits - 72 pounds

Engineering schematic kit - 45 1/2 pounds

c. Outside dimensions of the test item shipping container were 41 1/4 inches wide, 91 inches long, and 75 1/2 inches high. No rigid shipping container was provided for either the spare parts kit or the engineering schematic kit.

d. Total weight of the test item packed in its shipping container with desiccant was 2,946 pounds (less platform dolly, spare parts kit, and engineering schematic kit).

e. Photographs of the complete test item and shipping container are shown in figures 1 and 2, appendix I.

f. The base of the shipping container required modification in order to secure the test item for transport (fig 3, app I).

#### 2.2.4 Analysis

Met requirements except that:

a. Width of the test item exceeded requirement by 15/16 inch (shortcoming).

b. The shipping container required modification in order to secure the test item for transport (shortcoming).

#### 2.3 TEST NO. 2 - OPERATOR TRAINING

##### 2.3.1 Objective

Determine:

a. Adequacy of the operator training presented by the contractor.

b. Ability of military personnel who have received training to train other military personnel to operate the test item.

c. Training required by a linguist to encode a message, utilizing the key provided, so that a nonlinguist can print-out correct copy.

##### 2.3.1.1 Test Criteria

a. Operation by an individual not skilled in the art of writing Chinese will be possible through the use of simple coded copy prepared by a trained linguist (para 4, app II).

b. With training and suitable coded copy a nonlinguist shall be capable of operating the machine (para 5, app II).

##### 2.3.2 Method

a. A trained linguist (MOS 96C) was given a three-week course of instruction by the contractor in the operation of the test item. The instruction included general theory, on/off procedures and emergency shutdown procedures, and the use of input writer, camera unit, and insertion vidicon.

b. The contractor-trained linguist trained one linguist and two nonlinguist soldiers in the operation of the test item utilizing the literature provided (Chart 3, app IV). Instruction for the non-linguists covered four days and consisted of an introduction to Chinese

character forms as well as operational characteristics of the ICM. The linguist received two hours of instruction on the characteristics and operation of the test item including a demonstration. All personnel received copies of the literature provided for self-study and operated the test item a minimum of four hours under the direct supervision of the contractor-trained linguist.

c. The two linguists prepared tapes and coded copy of Chinese text with appropriate instructions which were used by nonlinguists.

### 2.3.3 Results

a. After being trained as in method a, preceding, the contractor-trained linguist (MOS 96C) was capable of operating the test item and performing operator maintenance. An additional period of approximately 25 hours of on-the-job training was required before the linguist became proficient and gained confidence in his ability to operate the test item.

b. After being trained as in method b, preceding, the linguist (MOS 96C) and the nonlinguists (MOS 9305 and 05C20) were capable of operating the test item and performing operator maintenance. An additional period of approximately 72 hours of on-the-job training was required before the trainees became proficient and gained confidence in their ability to operate the test item.

c. Since no format instructions for the preparation of copy were provided, the linguists experienced considerable difficulty initially in preparing suitable tapes and coded copy for use by the nonlinguists. It was necessary to provide a detailed key for use by nonlinguists to indicate indentations, spacing, change of type size, and insertion of nonmachine and predrawn vocabulary characters. Considerable experimentation on the part of the linguists was required before a suitable format was established.

d. No special training aids were required.

### 2.3.4 Analysis

Met requirements except that a format for preparation of coded copy to be used by a nonlinguist was not available (shortcoming).

## 2.4 TEST NO. 3 - OPERATIONAL CHARACTERISTICS

### 2.4.1 Objective

Determine the operational characteristics of the test item.

#### 2.4.1.1 Test Criteria

- a. With training and suitable coded copy, a nonlinguist shall be capable of operating the machine. The machine shall be capable of operation by one person (para 5, app II).
- b. (Required) The machine shall operate from a 120-volt, 60-cycle, single-phase power source (para 6, app II).
- c. The equipment shall be designed for operation in semi-permanent or permanent type buildings under controlled environmental conditions (para 7, app II).
- d. (Required) The composing machine shall be capable of making approximately 6,000 Chinese characters most used in newspaper and leaflet composition (para 8, app II).
- e. (Required) The operator shall be capable of controlling all functions required for composition from the operating position. Periodic adjustments or interruptions to composition shall be the minimum practicable (para 9, app II).
- f. (Required) The machine shall be capable of accepting at least 550 operations (strokes) per minute (para 10, app II).
- g. (Required) The equipment shall be capable of photographing or reproducing images of the ideographic characters selected for use in printing (para 11, app II).
- h. (Required) The selected ideograph shall be displayed for operator inspection before the photographic process is actuated (para 12, app II).
- i. (Required) The machine shall be capable of operation by the use of standard teletypewriter punched paper tape using nonstandard teletypewriter code (para 13, app II).
- j. (Required) Ideographs shall be reproduced in 12, 18, 24, and 30 point sizes, suitable for newspaper and leaflet composition. Change in size shall be simple and rapid (para 14, app II).
- k. (Required) Composition shall be in vertical rows from top to bottom and right to left and in horizontal rows from left to right and top to bottom (para 15, app II).
- l. (Required) Provisions shall be made to permit the use of additional ideographs not included in the machine vocabulary during composition (para 16, app II).

m. (Required) The film magazine or reproduction material shall be easily placed in and removed from the machine under conditions of ambient lighting. Sections of exposed film shall be easily removable for processing without removing the main film magazine (para 17, app II).

n. (Required) Operation shall be possible in a controlled environment of 40°F to 90°F, relative humidity not over 70 percent (para 18, app II).

o. (Required) The machine shall use commercial 5-inch roll film, sensitive to the blue of a cathode tube, not to exceed 50 feet in length (para 19, app II).

p. (Required) A device shall be provided to indicate the amount of unexposed film remaining in the magazine (para 20, app II).

q. It is desirable that an ancillary mechanism, which can be affixed to the keyboard so that a nonlinguist can operate the machine from coded copy, be furnished (para 21, app II).

r. It will be necessary for the composing machine to operate in conjunction with the Mobile Printing Set and other film processing and printing equipment authorized Psychological Warfare units (para 22, app II).

#### 2.4.2 Method

a. The test item was operated under controlled environmental conditions using a 60-cycle, single-phase, 120-volt power source.

b. The test item was operated by two nonlinguists (MOS 9305 and 05C20) using coded copy prepared by a linguist. The ability of the linguist to prepare coded copy and the ability of one operator to prepare printed matter suitable for reproduction were evaluated. The test item was operated using standard teletypewriter paper tape, the input writer, and the insert vidicon camera.

c. A sample of 1,600 of the characters stored on the magnetic drum were photographed and processed. The ideograph form and character stroke order of the reproduced characters were compared to material contained in textbooks used in the 47-week Chinese-Mandarin course conducted by Defense Language Institute, West Coast Branch. Two psychological warfare operations personnel (MOS 9305 and 96C) evaluated the adequacy of the test item's vocabulary for leaflet composition.

d. The test item was operated by a linguist using noncoded copy to prepare taped and filmed output. An evaluation was made of all operator functions, to include composition, speed, verification, and necessary adjustments.

e. The ability of the operator to compose text in different styles and point sizes was evaluated.

f. An evaluation was made of the operator's ability to load and unload the camera and to determine the amount of unexposed film left in the feed magazine.

g. One segment of exposed film was processed and reproduced in leaflet form using equipment organic to a psychological operations battalion.

### 2.4.3 Results

a. The test item operated satisfactorily from either a commercial power source or a standard 5-kw generator. However, periodic erratic operation and two failures of electrical components of the test item were attributed to surges and/or voltage transients on the power line.

b. On one occasion, a brief power failure occurred. When the power returned, an electrical failure was experienced in the test item since normal start procedures had not been exercised. The test item circuit breaker did not operate to protect the equipment. To preclude further damage of this type, the operators were instructed to immediately deactivate the test item in event of loss of power. However, the on/off switch (circuit breaker type) was located on one end of the test item, near its top, and could not be quickly reached by the operator. Also, if the operator should be across the room or temporarily out of the room during a loss of power, the equipment would be damaged if power was restored before the test item was turned off.

c. Each nonlinguist (MOS 9305 and 05C20) was able to produce a punched paper tape and simultaneously expose film for processing with no difficulty.

d. Examination of the three character masks disclosed space for a vocabulary of 10,000 Chinese characters, of which 9,783 ideographs were present. Approximately 5,500 different characters were reproduced during the test.

e. The operator controlled all functions required for photo composition from his position, but was required to make frequent adjustments of the video read level control.

- f. The test item operated at 500 operations (strokes) per minute when ideographs were not being photographed. When ideographs were being photographed the test item operated at 485 operations (strokes) per minute.
- g. The test item did not reproduce approximately 1 percent of the 1,600 Chinese characters analyzed because the input writer locked before completion of the stroking sequence. Cause could not be determined.
- h. The selected ideograph was displayed for easy verification by the operator prior to being photographed.
- i. The test item operated from standard teletypewriter paper tape. However, the exposed film was unsuitable for leaflet production since proper adjustment of the video read level control was not possible during automatic operation (fig 4, app I).
- j. The test item reproduced ideographs in 12, 18, 24, and 30 point sizes. Approximately 2 percent of the ideographs examined were disfigured due to a pin-cushioning effect in the optic system; however, the finished product could be read by a Chinese linguist.
- k. The test item reproduced ideographs in vertical rows from top to bottom and right to left and in horizontal rows from left to right and top to bottom. The alignment of ideographs in rows was not of good quality (fig 5, app I); however, the finished product could be read by a Chinese linguist.
- l. The test item was capable of reproducing ideographs not in its vocabulary by use of the insertion vidicon.
- m. The film magazines were easily placed in and removed from the test item under normal lighting conditions. The take-up magazine was removable for film processing without removing the feed magazines.
- n. The test item operated satisfactorily in a controlled environment maintained between 55°F and 85°F and between 70 and 30 percent humidity.
- o. The camera of the test item operated using commercial 5-inch roll film in 50-foot lengths. The film was sensitive to blue light produced by the cathode tube. A roller type counter on the test item indicated the amount of unexposed film in the feed magazine.
- p. Although an ancillary mechanism was not provided, a non-linguist using the code imprinted on the input writer keys successfully operated the test item.

q. A psychological warfare battalion using organic processing and printing equipment processed exposed film with no difficulty except that the commercial film required extra precautions against overdevelopment and light exposure during the developing process.

#### 2.4.4 Analysis

Met requirements except that:

- a. The test item was susceptible to failure of electrical components caused by power line surges and/or transients or brief power failures (deficiency).
- b. Frequent adjustments of the video read level control were required (shortcoming).
- c. The test item operated at only 485 operations (strokes) per minute while ideographs were being photographed (shortcoming).
- d. Approximately 1 percent of the ideographs could not be reproduced from the vocabulary (deficiency).
- e. Proper adjustment of the video read level control was not possible during automatic tape operation (deficiency).
- f. Approximately 2 percent of the ideographs examined were disfigured due to a pin-cushioning effect in the optic system (shortcoming).
- g. The alignment of ideographs in rows was not of good quality (shortcoming).
- h. The commercial film required extra precautions during the development process (shortcoming).

#### 2.5. TEST NO. 4 - MAINTENANCE

##### 2.5.1 Objective

Determine:

- a. Whether the test item meets maintenance and maintainability requirements as defined by established criteria.
- b. Reliability of the test item under normal operations in terms of mean time between failures.



c. Whether appropriate common and special tools and test equipment are suitable for their intended purpose and maintenance level.

d. Whether maintenance manuals and other appropriate maintenance literature are adequate for the intended maintenance level.

#### 2.5.1.1 Test Criteria

a. (Required) The equipment shall be capable of at least 180 hours of operation without major maintenance or overhaul (para 23, app II).

b. (Required) The equipment shall be designed to facilitate operator, organizational and direct support maintenance by organizational personnel. Components shall be constructed on the modular concept where practicable to permit rapid removal and replacement of defective parts. Simple go-no-go automatic check-out equipment shall be furnished (para 24, app II).

c. (Required) Other tools and test equipment, if required, shall be furnished with the machine (para 25, app II).

d. Maintenance repair and replacement parts shall be provided by the contractor under separate maintenance support contract (para 26, app II).

#### 2.5.2 Method

##### a. Maintainability.

(1) All maintenance operations performed throughout the service test were observed, recorded, and evaluated to determine degree of compliance with the military characteristics.

(2) All operator/organizational maintenance functions listed in the maintenance manuals were performed on the test item by operator personnel using only the tools, test equipment, and literature expected to be available to the operators.

b. Instruction. The operator (MOS 96C) received three weeks of factory training provided by the contractor. Three days of this period was devoted to instruction and on-the-job training for operator/organizational maintenance. Suitability and adequacy of this training were evaluated.

##### c. Reliability.

(1) All scheduled and unscheduled maintenance performed was recorded.

(2) Mean time between failures (MTBF) and mean time to repair (MTTR) were computed for the test item.

(3) A record was maintained of all spare parts/replacement modules used throughout the test period.

d. Technical manuals. Throughout the test period, technical manuals were evaluated in the following areas: general adequacy; simplicity and clarity; errors or omissions.

### 2.5.3 Results

#### a. Maintainability.

(1) All maintenance operations are recorded in Chart 1, appendix IV.

(2) Electronic components were mounted on plug-in type circuit boards except the power supplies and insertion vidicon camera, which are installed as separate units.

(3) Maintenance repairs above organizational level were accomplished by contract with the manufacturer.

(4) A go-no-go test set was not furnished. Impact of lack of test set could not be determined because of the factory maintenance contract.

(5) All operator/organization maintenance functions listed in the operator's manual were performed by a Radio Teletypewriter Operator (MOS 05C) without difficulty. Maintenance, as listed, was limited to the input writer only.

b. Instruction. The training provided by the contractor was adequate for operator/organizational maintenance. It should be noted that this maintenance was limited to the input writer (electric typewriter).

#### c. Reliability.

(1) All spare parts/replacement modules used during the test are recorded in Chart 2, appendix IV.

(2) Six failures of the test item (Serial No. 11) occurred requiring direct or general support maintenance during 452.7 hours of operation. This resulted in an MTBF of 75.5 hours.

(3) The six failures were repaired in 16.1 hours for an MTR of 2.7 hours.

d. Tools and test equipment. Since the maintenance concept calls for a factory maintenance contract throughout the life of the equipment, suitability of tools and test equipment was not evaluated.

e. Technical manuals.

(1) Technical manuals furnished with the test item are listed in Chart 3, appendix IV.

(2) The operator's manual was suitable for operator/organizational maintenance as described in subparagraph a(5), preceding.

(3) Suitability of the maintenance manual was not evaluated.

#### 2.5.4 Analysis

Did not meet requirements in that:

a. The test item did not operate for 180 hours without maintenance (deficiency). The MTBF was 75.5 hours.

b. A simple go-no-go automatic check-out equipment was not provided (shortcoming); impact not evaluated.

### 2.6 TEST NO. 5 - HUMAN FACTORS EVALUATION

#### 2.6.1 Objective

Determine whether the test item conforms to the principles of human factors engineering.

##### 2.6.1.1 Test Criteria

a. (Required) Controls and adjustments shall be the minimum required for proper operation. Controls and display devices shall be so located as to produce least operator fatigue during extended periods of operation (para 27, app II).

b. Operating and maintenance personnel shall be adequately protected from high voltage, radiation sources, noxious fumes, and irritating chemicals, if such are utilized (para 28, app II).

c. Human factors engineering will be taken into consideration during all phases of development (para 29, app II).

d. The equipment will be safe for its intended use (para 30, app II).

#### 2.6.2 Method

The test item was operated and maintained under controlled environmental conditions. Details requiring human attention were evaluated. This evaluation included, but was not limited to:

- a. Indices, markings, and other indicators.
- b. Operation of vidicon camera from the operator's position along with all fasteners, connectors, and other items requiring manual operation.
- c. Arrangement of components.
- d. Operations which were unduly time-consuming, fatiguing, or inconvenient.
- e. Audible mechanical noise.
- f. Safety hazards. Data pertaining to the safety confirmation required by USATECOM Regulation No. 385-7 was collected.

#### 2.6.3 Results

a. The camera was difficult to thread correctly even though instructions contained in the literature provided were carefully followed. Incorrect threading, which could only be determined after developing the film, and noting the position of the ideographs, occurred approximately 80 percent of the time. It was not possible to determine if the film was correctly threaded in the camera due to positioning of the sprocket wheels behind the pressure roller assembly.

b. Switches not used by the operator during operation were not protected to preclude inadvertent activation. Voltage and current indicators used during operation were not marked to indicate normal operating range.

c. Operating personnel were adequately protected from high voltage. No radiation sources, noxious fumes, or irritating chemicals were present or utilized with the test item.

d. When the copy holder which attaches to the test item was tilted to a near vertical position, material from which the operator was copying slid off the copy holder. The copy holder, when tilted, had no means for holding material.

e. No unsafe or hazardous conditions were noted.

#### 2.6.4 Anaylsis

Met requirements except that:

a. It was not possible to determine if the film was correctly threaded in the camera due to positioning of the sprocket wheels behind the pressure roller assembly (deficiency).

b. Switches not used by the operator during operation were not protected to preclude inadvertent activation (deficiency).

c. Voltage and current indicators used during operation were not marked to indicate operating range (shortcoming).

d. The copy holder, when tilted, had no means for holding material (shortcoming).

### 2.7 TEST NO. 6 - VALUE ANALYSIS

#### 2.7.1 Objective

Determine whether the test item has any unessential features or accessories.

2.7.1.1 Test Criteria. The equipment shall have no features or accessories that can be eliminated without adversely affecting essential performance requirements (para 31, app II).

#### 2.7.2 Method

Throughout the test period, data was collected on features, accessories, or other items that could be eliminated without sacrificing performance, maintainability, reliability, quality, or mission accomplishment.

#### 2.7.3 Results

The test item was equipped with a nonessential air filter and grill which can be eliminated without adversely affecting the cooling system. The filter is located on the front of the test item directly

below the input writer (fig 6, app I). There was no air vent behind the filter.

#### 2.7.4 Analysis

Met requirement except that air filter on the front of the test item was not required for operation (shortcoming).

### 2.8 TEST NO. 7 - INTERNAL AIR PORTABILITY

#### 2.8.1 Objective

- a. Determine suitability of the test item in its shipping container for internal air portability in Phase III of airborne operations.
- b. Determine suitable air portability procedures.

##### 2.8.1.1 Test Criteria

- a. (Required) The equipment shall be capable of air transport in Phase III of an airborne operation (para 32, app II).
- b. Materiel developed for air portability must meet the requirements imposed by the characteristics and capabilities of the aircraft to be employed (para 33, app II).
- c. Disassembly and assembly must be within the capability of using units, with organizational tools and equipment air portable in the same phase as the sectionalized item (para 34, app II).
- d. Sectionalization must not impair the capability of an item to perform its fundamental mission (para 35, app II).
- e. Materiel will be plainly marked as a guide to disassembly and assembly procedures (para 36, app II).
- f. Curb weight and the location of the center of gravity will be marked on each component and end item (para 37, app II).
- g. Tie-down provisions shall be designed and located to permit immediate identification and proper, effective use (para 38, app II).
- h. The length-height relationship of the item must be such as to preclude the load striking the top of the cargo compartment during loading and unloading (para 39, app II).

i. The outside dimensions of equipment item must be such as to permit loading and unloading with 6-inch vertical clearance after loading and 5-inch lateral clearance on each side during and after loading (para 40, app II).

j. All load configurations, when rigged in the airplane for air transport, must permit access to the rear of the aircraft during flight by the aircraft crew (para 41, app II).

k. Materiel and equipment developed for air portability shall be capable of withstanding take-off, flight conditions, and landings in appropriate aircraft without sustaining damage which would prevent proper functioning (para 42, app II).

### 2.8.2 Method

a. Physical characteristics of the test item in its shipping container were compared with cargo compartment and cargo loading aperture dimensions, floor loading limitations, load carrying capabilities, and restraint requirements of Phase III aircraft.

b. The test item in its shipping container was inspected and studied with respect to its adaptability for air portability. Center of gravity was determined. The following were studied and evaluated:

- (1) Requirements for disassembly.
- (2) Adequacy and accessibility of tie-down provisions.
- (3) Adequacy of markings.

c. The test item in its shipping container was given a preflight operational check and loaded into a U. S. Air Force C-130 aircraft in the manner specified by the appropriate loading handbook, restrained in accordance with specified criteria, flown, subjected to landing, unloaded, and given a postflight operational check.

### 2.8.3 Results

a. The physical characteristics of the test item in its shipping container and photographs are contained in appendix I.

b. Disassembly and assembly were not required.

c. The test item in its shipping container was adaptable for internal air portability in Phase III U. S. Air Force aircraft (C-124, C-133, and C-141) and in U. S. Air Force C-130 aircraft.

d. Sectionalization was not required.

e. Tie-down provisions were not required. It was restrained as bulk cargo (fig 7, app I).

f. The shipping container did not have markings identifying curb weight, center of gravity, and attitude.

g. The test item in its shipping container was successfully transported in a U. S. Air Force C-130 aircraft.

h. Time and personnel utilized for preparation for loading, restraining, and unloading are contained in Table 2, appendix I.

i. Procedures for internal air portability of the test item in its shipping container in a U. S. Air Force C-130 aircraft were developed and are on file at this Board.

j. No safety hazards were noted.

#### 2.8.4 Analysis

Met requirements except that the shipping container did not have markings identifying curb weight, center of gravity, and attitude (short-coming).



APPENDIX I. TEST DATA

INTERNAL AIR PORTABILITY (TEST NO. 8)

Table 1. Physical Characteristics of  
Ideographic Composing Machine in Shipping Container

|                                  |                                  |
|----------------------------------|----------------------------------|
| Length -----                     | 91 inches                        |
| Width -----                      | 41 1/4 inches                    |
| Height -----                     | 75 1/2 inches                    |
| Weight -----                     | 2,946 pounds                     |
| Center of Gravity Location ----- | 45 1/2 inches<br>from either end |

Table 2. Loading, Restraining, and Unloading Operations

USAF C-130 Aircraft

| <u>Operation</u>  | <u>Personnel</u> | <u>Time Required</u> |
|---|------------------|----------------------|
| Preparation for loading<br>(to include placing<br>machine into shipping<br>container)   | 3                | 2 1/2 hours          |
| Loading   | 3                | 15 minutes           |
| Restraining   | 3                | 15 minutes           |
| Unloading   | 3                | 10 minutes           |
| Placing into operation<br>(to include taking<br>machine out of ship-<br>ping container) | 3                | 1 1/2 hours          |

**SECTION 3. APPENDICES**

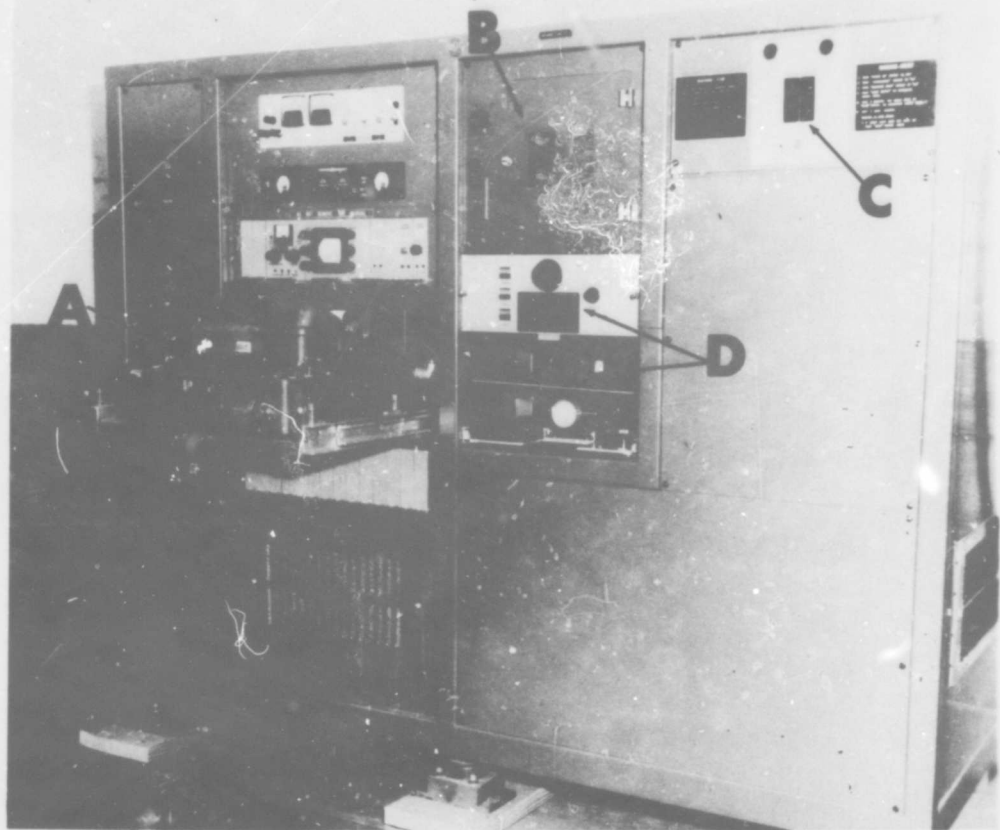


FIGURE 1

APPENDIX I

PROJECT NO:

USATECOM 7-3-0244-03

USAAESWED CE 1864

NEGATIVE NO. USAAESWBD-278-6/

USATECOM-68

SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE

COMPONENTS

- A - INPUT WRITER
- B - CAMERA UNIT
- C - MAIN POWER SWITCH (CIRCUIT BREAKER TYPE)
- D - INSERTION VIDICON

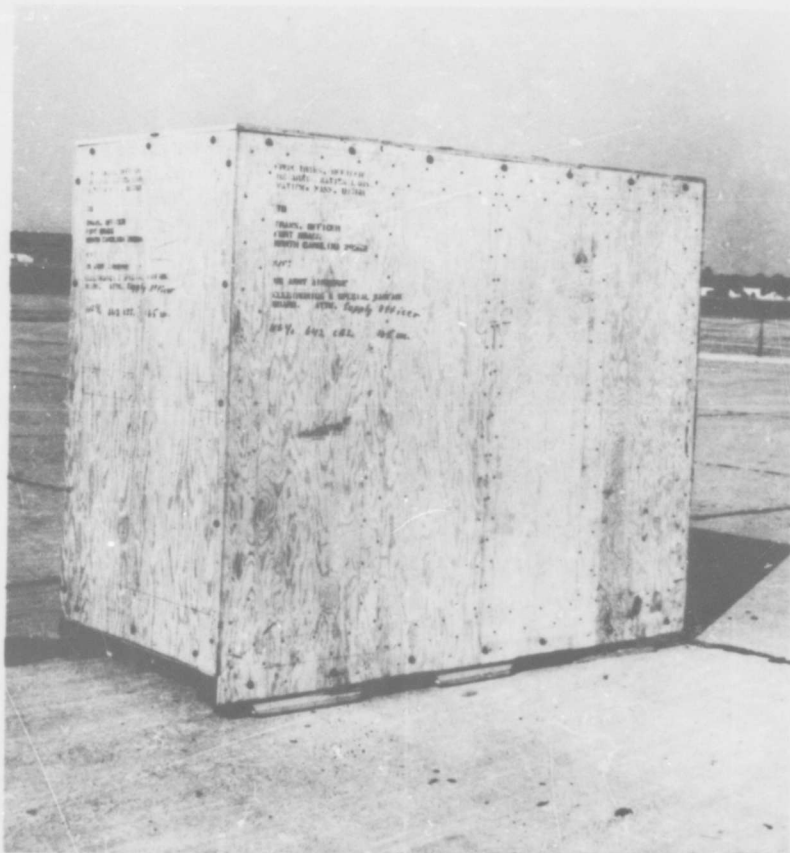


FIGURE 2

APPENDIX I

PROJECT NO:

USATECOM 7-3-0244-03

USAAESWBD CE 1864

NEGATIVE NO. USAAESWBD-278-2/

USATECOM-68

SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE

SHIPPING CONTAINER USED FOR TRANSPORT  
OF IDEOGRAPHIC COMPOSING MACHINE

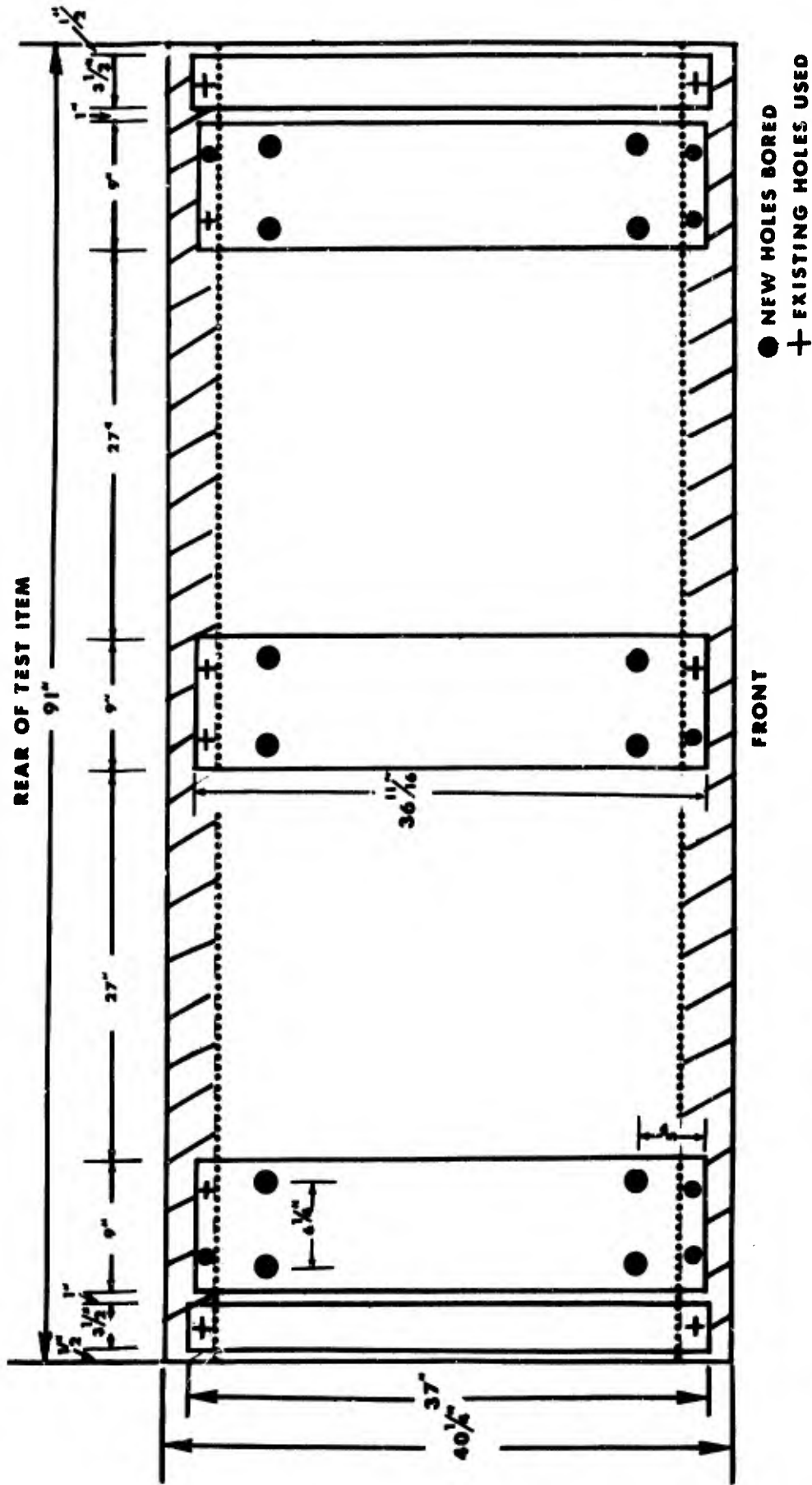


FIGURE 3 SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE  
 APPENDIX I  
 DIAGRAM SHOWING LOCATION OF NEW BOLT HOLES IN BRACES  
 AND BASE OF SHIPPING CONTAINER

PROJECT NO: \_\_\_\_\_  
 USATROOP 7-3-0244-03  
 USALESNO CE 1864  
 SERIAL NO. \_\_\_\_\_

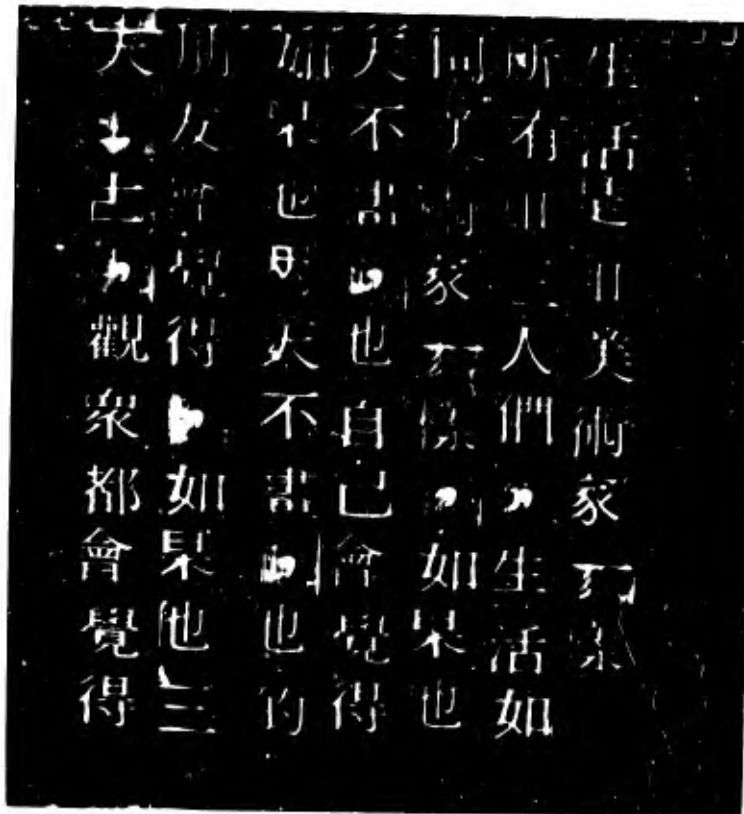


FIGURE 4

APPENDIX I

PROJECT NO:

USATECOM 7-3-0211-03

USAAESWD CE 1864

NEGATIVE NO. USAAESWD-278-10/  
USATECOM-68

SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE

ELECTRICAL NOISE REPRODUCED ON FILM WITH IDEOGRAPHS (VIDEO READ LEVEL CONTROL COULD NOT BE ADJUSTED PROPERLY DURING AUTOMATIC TAPE OPERATION)

猩猩看電視：  
四隻小  
猩猩離開家鄉剛果，被  
運送到紐約白朗克斯動物  
園。牠們在籠子裏面  
不斷地吵鬧，弄得鄰居  
們也不能休息。管理員  
戴維斯叔叔想出個妙計  
：放一個電視機在籠子  
前面，整天開着。四個  
小傢伙看得津津有味，  
忘記了吵鬧。

FIGURE 5

APPENDIX I

PROJECT NO:

USATECOM 7-3-02111-03

USAAESWBD CE 1864

NEGATIVE NO. USAAESWBD-278-9/  
USATECOM-68

SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE

IDEOGRAPH ALIGNMENT, BOTH  
VERTICAL AND HORIZONTAL

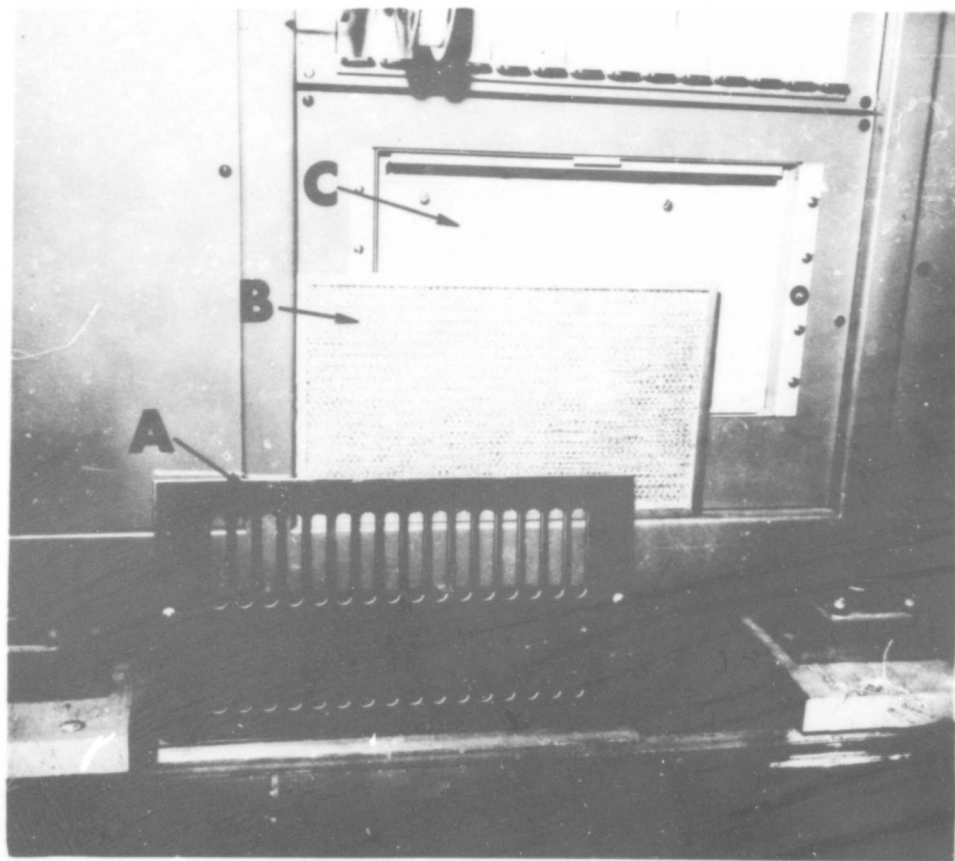


FIGURE 6

APPENDIX I

PROJECT NO:

USATECOM 7-3-0244-03

USAAESWBD CE 1864

NEGATIVE NO. USAAESWBD-278-8/  
USATECOM-68

SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE

AIR FILTER LOCATED ON FRONT OF  
TEST ITEM BELOW INPUT WRITER

- A - GRILL
- B - FILTER
- C - MAGNETIC MEMORY DRUM CASE



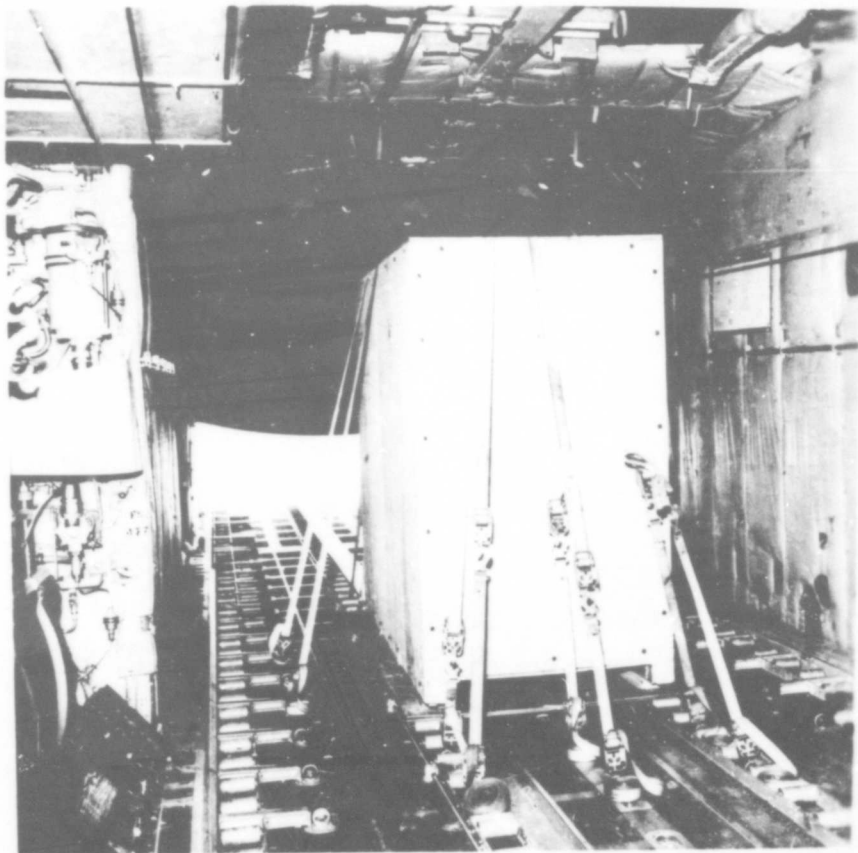


FIGURE 7

APPENDIX I

PROJECT NO:

USATECOM 7-3-02141-03

USAAESWD CE 1864

NEGATIVE NO. USAAESWD-278-4/  
USATECOM-68

SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE

SHIPPING CONTAINER WITH TEST ITEM INSIDE  
SECURED FOR INTERNAL AIR PORTABILITY

## APPENDIX II. FINDINGS

| REQUIREMENT   | SOURCE   | DEGREE OF COMPLIANCE  |
|---|--|---|
| 1. (Required) The composing machine utilizing the most recent advancements shall be of minimum size and weight consistent with the performance required. Weight of the equipment complete with power supplies but not including power source shall not exceed 2,400 pounds.   | MC para 2a,<br>Sec II;<br>para 7b,<br>ref 5, app V | Met requirement (Test No. 1).   |
| 2. (Required) Dimensions shall not be greater than 78 inches in width, 29 inches in depth, and 60 inches in height.   | MC para 2c,<br>Sec II;<br>para 5g,<br>ref 2, app V | Met requirement except width was exceeded by 15/16 inch (Test No. 1). |
| 3. (Required) A shipping container shall be provided to shelter the equipment during transport.   | MC para 2d,<br>Sec II;<br>para 8a,<br>ref 5, app V | Met requirement with exception (Test No. 1).                          |
| 4. Two operators, skilled in the art of writing Chinese, will be required. Operation by an individual not skilled in the art of writing Chinese will be possible through the use of simple coded copy. A trained linguist will be required to prepare this coded copy in much the same manner as currently practiced in preparing text matter in other foreign languages. | MC para 2e,<br>Sec IV                              | Met requirement (Test No. 2).   |
| 5. Initially a trained linguist will be required to translate the copy, prepare coded copy, and operate the composing machine. With training and suitable coded   | MC para 7a,<br>Sec I                               | Met requirement (Test No. 3).   |

| REQUIREMENT  | SOURCE   | DEGREE OF COMPLIANCE                         |
|--|--|--|
| copy, a non-linguist should be capable of operating the machine. The machine shall be capable of operation by one person.  |  |  |
| 6. (Required) The machine shall operate from a 120-volt, 60-cycle, single-phase power source.  | MC para 11,<br>Sec II                              | Met requirement with exception (Test No. 3). |
| 7. The equipment shall be designed for operation in semipermanent or permanent type buildings under controlled environmental conditions.   | MC para 2d,<br>Sec II;<br>para 8a,<br>ref 5, app V | Met requirement (Test No. 3).                |
| 8. (Required) The composing machine shall be capable of making approximately 6,000 Chinese characters most used in newspaper and leaflet composition.  | MC para 1a,<br>Sec II                              | Met requirement (Test No. 3).                |
| 9. (Required) The operator shall be capable of controlling all functions required for composition from the operating position. Periodic interruptions to composition shall be the minimum practicable. | MC para 1b,<br>Sec II                              | Met requirement with exception (Test No. 3). |
| 10. (Required) The machine shall be capable of accepting at least 550 operations (strokes) per minute.   | MC para 1c,<br>Sec II;<br>para 7a,<br>ref 5, app V | Met requirement with exception (Test No. 3). |
| 11. (Required) The equipment shall be capable of photographing or reproducing images of the ideographic characters selected, for use in printing.  | MC para 1d,<br>Sec II                              | Met requirement (Test No. 3).                |

| REQUIREMENT   | SOURCE   | DEGREE OF COMPLIANCE                          |
|---|--|---|
| 12. (Required) The selected ideograph shall be displayed for operator inspection before the photographic process is actuated. The displayed ideograph shall be sufficiently enlarged to permit easy observation from the operating position under normal lighting conditions. | MC para 1f,<br>Sec II  | Met requirement (Test Nos. 3 and 6).          |
| 13. (Required) The machine shall be capable of operation by the use of standard teletypewriter punched paper tape using nonstandard teletypewriter code.  | MC para 1g<br>Sec II;<br>para 5a,<br>ref 2, app V;<br>para 6a,<br>ref 5, app V | Met requirement (Test No. 3).                 |
| 14. (Required) Ideographs shall be reproduced in 12, 18, 24, and 30 point sizes, suitable for newspaper and leaflet composition. Change in size shall be simple and rapid.  | MC para 1h<br>Sec II;<br>para 5b,<br>ref 2, app V;<br>para 6b,<br>ref 5, app V | Met requirement (Test No. 3).                 |
| 15. (Required) Composition shall be in vertical rows from top to bottom and right to left, and in horizontal rows from left to right and top to bottom.   | MC para 1i,<br>Sec II  | Met requirement (Test No. 3).                 |
| 16. (Required) Provisions shall be made to permit the use of additional ideographs not included in the machine vocabulary during composition.   | MC para 1j,<br>Sec II  | Met requirement (Test No. 3).                 |
| 17. (Required) The film magazine or reproduction material shall be easily placed in and removed from the machine under conditions of ambient lighting. Sections of exposed film shall   | MC para 1k,<br>Sec II  | Did not meet requirement (Test Nos. 3 and 6). |

| REQUIREMENT   | SOURCE   | DEGREE OF COMPLIANCE                   |
|---|--|--|
| be easily removable for processing without removing the main film magazine.   |  |  |
| 18. (Required) The equipment shall be capable of sustained operation in a controlled environment of between 40°F to 90°F with the relative humidity not over 70 percent.  | MC para 1n, Sec II; para 5e, ref 2, app V; para 8a, ref 5, app V | Met requirement (Test Nos. 3 and 5).   |
| 19. (Required) The machine shall use commercial five-inch roll film, sensitive to the blue of a cathode tube, not to exceed 50 feet in length.  | MC para 2j(1), Sec II; para 6e, ref 6, app V                     | Met requirement (Test No. 3).          |
| 20. (Required) A device shall be provided to indicate the amount of unexposed film remaining in the magazine.   | MC para 2j(2), Sec II  | Met requirement (Test No. 3).          |
| 21. Related item - It is desirable that an ancillary mechanism which can be affixed to the keyboard so that a non-linguist can operate the machine from coded copy be furnished.  | MC para 1, Sec III   | Met requirement (Test No. 3).          |
| 22. Items or systems affected by the required material. - This is a new development. It will be necessary for the composing machine to operate in conjunction with the Mobile Printing Set and other film processing and printing equipment authorized Psychological Warfare units. | MC para 5, Sec III   | Met requirement (Test No. 3).          |
| 23. (Required) The equipment shall be capable of at least 180 hours of operation  | MC para 2i, Sec II; ref 3, app V                                 | Did not meet requirement (Test No. 4). |

| REQUIREMENT  | SOURCE   | DEGREE OF COMPLIANCE   |
|--|--|--|
| without major maintenance or overhaul.   |  |  |
| 24. (Required) The equipment shall be designed to facilitate first, second, and third echelon maintenance by organizational personnel. Components shall be constructed on the modular concept where practicable to permit rapid removal and replacement of defective parts. Simple go-no-go automatic check out equipment shall be furnished. (Desired) The equipment shall be designed to require no maintenance beyond the capability of organizational personnel. | MC para 3a,<br>Sec II                              | Met requirement with exception [maintenance beyond that listed in operator's manual was not evaluated, contractor supported] (Test No. 4). |
| 25. (Required) Other tools and test equipment if required shall be furnished with the machine.   | MC para 3c,<br>Sec II                              | Not evaluated, contractor supported (Test No. 4).  |
| 26. (Required) Maintenance repair and replacement parts shall be provided by the contractor via separate maintenance support contract.   | MC para 3d,<br>Sec II;<br>para 8c,<br>ref 5, app V | Met requirement (Test No. 4).  |
| 27. (Required)<br><br>(1) Controls and adjustments shall be the minimum required for proper operation.   | MC para 21,<br>Sec II                              | Met requirement (Test No. 5).  |
| (2) Controls and display devices shall be so located as to produce least operator fatigue during extended periods of operation.  |  |  |

| REQUIREMENT  | SOURCE                        | DEGREE OF COMPLIANCE                         |
|--|-------------------------------|--|
| (3) Human factors engineering is required.   |                               |  |
| 28. Appropriate safety criteria. - Operating and maintenance personnel shall be adequately protected from high voltages, radiation sources, noxious fumes, and irritating chemicals, if such are utilized. | MC para 2,<br>Sec III         | Met requirement (Test No. 5).                |
| 29. Human factors engineering will be taken into consideration during all phases of development.   | MC para 2a,<br>Sec IV         | Met requirement with exception (Test No. 5). |
| 30. The equipment will be safe for its intended use.   | USATECOM<br>Reg. No.<br>385-7 | Met requirement (Test No. 5).                |
| 31. The equipment shall have no features or accessories that can be eliminated without adversely affecting performance requirements, reliability, quality, or safety.                                      | USATECOM<br>Reg. No.<br>700-1 | Met requirement with exception (Test No. 6). |
| 32. (Required) The equipment shall be capable of air transport in Phase III of an airborne operation.  | MC para 2e,<br>Sec II         | Met requirement (Test No. 7).                |
| 33. Materiel developed for air portability must meet the requirements imposed by the characteristics and capabilities of the aircraft to be employed.  | AR 705-35<br>para 11c         | Met requirement (Test No. 7).                |
| 34. Disassembly and assembly must be within the capability of using units, with organizational tools and equipment   | AR 705-35<br>para 10d         | Not applicable (Test No. 7).                 |

| REQUIREMENT   | SOURCE                        | DEGREE OF COMPLIANCE                   |
|---|-------------------------------|--|
| air portable in the same phase as the sectionalized item.   |                               |  |
| 35. Sectionalization must not impair the capability of an item to perform its fundamental mission. Items must be capable of being reassembled and placed in operation within the time limits stated in paragraph 6. In addition, if an item is required in Phase I, the entire item, together with tools, equipment, and crew required for assembly in the objective area, must be capable of being loaded in one aircraft. All mobile materiel requiring sectionalization will be designed to permit the basic element to be moved on its own wheeled or tracked system. | AR 705-35<br>para 10d         | Not applicable (Test No. 7).           |
| 36. Materiel will be plainly marked as a guide to disassembly and assembly procedures.  | AR 705-35<br>para 10d         | Not applicable (Test No. 7).           |
| 37. Curb weight and the location of the center of gravity will be marked on each component and end item.  | AR 705-35<br>para 10d         | Did not meet requirement (Test No. 7). |
| 38. Tie-down provisions shall be designed and located to permit immediate identification and proper, effective use.   | AR 705-35<br>para 2,<br>app A | Not applicable (Test No. 7).           |
| 39. The length-height relationship of the item must be such as to preclude the load   | AR 705-35<br>para 2,<br>app A | Met requirement (Test No. 7).          |



| REQUIREMENT   | SOURCE                        | DEGREE OF COMPLIANCE          |
|---|-------------------------------|-------------------------------|
| striking the top of the cargo compartment during loading and unloading.   |                               |                               |
| 40. The outside dimension of equipment item must be such as to permit loading and unloading with 6-inch vertical clearance after loading and 5-inch lateral clearance on each side during and after loading.                  | AR 705-35<br>para 2,<br>app A | Met requirement (Test No. 7). |
| 41. All load configurations, when rigged in the airplane for air transport, must permit access to the rear of the aircraft during flight by the aircraft crew.  | AR 705-35<br>para 2,<br>app A | Met requirement (Test No. 7). |
| 42. Materiel and equipment developed for air portability shall be capable of withstanding take-off, flight conditions, and landings in appropriate aircraft without sustaining damage which would prevent proper functioning. | AR 705-35<br>para 2 and 8     | Met requirement (Test No. 7). |

APPENDIX III. DEFICIENCIES AND SHORTCOMINGS

1. DEFICIENCIES

| <u>Deficiency</u>   | <u>Suggested Corrective Action</u>  | <u>Remarks</u> |
|---|-------------------------------------|----------------|
| 1.1 The test item was susceptible to failure of electrical components caused by power line surges and/or transients or brief power failures (Test No. 3).                         | Unknown.                            |                |
| 1.2 Approximately 1 percent of the ideographs could not be reproduced from the vocabulary (Test No. 3).   | Unknown.                            |                |
| 1.3 Proper adjustment of the video read level control was not possible during automatic tape operation (Test No. 3).  | Unknown.                            |                |
| 1.4 The test item did not operate 180 hours without maintenance. The MTBF was 75.5 hours (Test No. 4).  | Unknown.                            |                |
| 1.5 It was not possible to determine if the film was correctly threaded in the camera due to positioning of the sprocket wheels behind the pressure roller assembly (Test No. 5). | Unknown.                            |                |
| 1.6 Switches not used by the operator during  | Provide caution markings or covers. |                |

| <u>Deficiency</u>   | <u>Suggested Corrective Action</u> | <u>Remarks</u> |
|---|------------------------------------|----------------|
| operation were not protected to preclude inadvertent activation (Test No. 5). |                                    |                |

## 2. SHORTCOMINGS

| <u>Shortcoming</u>  | <u>Suggested Corrective Action</u>                    | <u>Remarks</u>     |
|---|---|--------------------|
| 2.1 Width of the test item exceeded requirement by 15/16 inch (Test No. 1).   |   | Waive requirement. |
| 2.2 The shipping container required modification in order to secure the test item (Test No. 1).   | Provide shipping container compatible with test item. |                    |
| 2.3 A format for preparation of coded copy to be used by a nonlinguist was not available (Test No. 2).                                  | Develop standard format.                              |                    |
| 2.4 Frequent adjustments of the video read level control were required (Test No. 3).  | Unknown.  |                    |
| 2.5 The test item operated at only 485 operations (strokes) per minute while ideographs were being photographed (Test No. 3).           | Unknown.  | Waive requirement. |
| 2.6 Approximately 2 percent of the ideographs examined were disfigured due to a pin-cushioning effect in the optic system (Test No. 3). | Unknown.  |                    |

| <u>Deficiency</u>  | <u>Suggested Corrective Action</u> | <u>Remarks</u>        |
|--|------------------------------------|-----------------------|
| 2.7 The alignment of ideographs in rows was not of good quality (Test No. 3).  | Unknown.                           |                       |
| 2.8 The commercial film required extra precautions during the development process (Test No. 3).                          | Unknown.                           |                       |
| 2.9 A simple go-no-go automatic check-out equipment was not provided (Test No. 4).                                       |                                    | Impact not evaluated. |
| 2.10 Voltage and current indicators used during operation were not marked to indicate operating range (Test No. 5).      | Provide markings.                  |                       |
| 2.11 The copy holder, when tilted, had no means for holding material (Test No. 5).                                       | Provide a lip.                     |                       |
| 2.12 Air filter on the front of the test item was not required for operation (Test No. 6).                               | Eliminate air filter.              |                       |
| 2.13 The shipping container did not have markings identifying curb weight, center of gravity, and attitude (Test No. 7). | Provide markings.                  |                       |

APPENDIX IV. MAINTENANCE EVALUATION

CHART 1 - MAINTENANCE AND RELIABILITY ANALYSIS

| GROUP NO. | COMPONENT & RELATED OPERATIONS     | C - Op/Crew<br>O - Org<br>F - Direct<br>H - General |             |           |             | TH INSTRUCTIONS |         | ACTIVE MAINT TIME | LIFE<br>M - Miles<br>H - Hours<br>R - Rounds | REASON PERFORMED | REMARKS |
|-----------|------------------------------------|---|-------------|-----------|-------------|-----------------|---------|-------------------|--|------------------|---------|
|           |                                    | Pre-scribed   | Recommended | Ade-quate | Inade-quate | 1598            | 1598    |                   |  |                  |         |
| 1         | 2                                  | 3   | 4           | 5         | 6           | 7               | 8       | 9                 | 10   |                  |         |
| None      | Repaired carriage return           | None  | O           |           |             | .2 H            | 80 H    | Unsched           | EPR KA-3                                     |                  |         |
| *None     | Replaced blower motor              | None  | F           |           |             | 2.1 H           | 213 H   | Unsched           | EPR KA-4                                     |                  |         |
| *None     | Aligned character mask head        | None  | H           |           |             | 3 H             | 220 H   | Unsched           | EPR KA-5                                     |                  |         |
| *None     | Replaced power supply              | None  | F           |           |             | 4.5 H           | 224 H   | Unsched           | EPR KA-6                                     |                  |         |
| *None     | Repaired video pre-amplifier       | None  | H           |           |             | 1.5 H           | 283 H   | Unsched           | EPR KA-7                                     |                  |         |
| *None     | Replaced power supply              | None  | F           |           |             | 3.5 H           | 348.5 H | Unsched           | EPR KA-8                                     |                  |         |
| *None     | Replaced high voltage power supply | None  | F           |           |             | 1.5 H           | 341 H   | Unsched           | EPR KA-9                                     |                  |         |

\*Used to compute MTBF.

## INSTRUCTION SHEET

### Chart 1

#### COLUMN

#### DESCRIPTION

1. Group number as indicated in the Maintenance Allocation Chart.
2. Component and related operations as indicated in the Maintenance Allocation Chart. Operations indicated as in Depot Category are not shown.
3. Maintenance Level, Prescribed. Category prescribed by the Maintenance Allocation Chart is indicated by utilizing the letters C, O, F, or H. C - Operator or Crew; O - Organizational; F - Direct Support; H - General Support.
4. Maintenance Level, Recommended. Letters C, O, F, or H indicate the category recommended by the test agency.
5. TM Instructions, Adequate. An X in this column indicates the TM instructions are considered adequate.
6. TM Instructions, Inadequate. The test agency reference number used on DA Forms 1598 is indicated in this column, if the instructions are considered inadequate.
7. Active Maintenance Time. Man hours used to the closest tenth. If the operation was not actually performed but was reviewed, the estimated active maintenance time is indicated by using the prefix E. Average active maintenance time is used if the operation was performed more than once.
8. Life. Number of hours, miles, or rounds accumulated before or since this operation was performed. An entry is made each time this operation is performed, followed by the appropriate life units; i.e., M, H, or R. An "S" will be placed in this column if the operation was performed on a sampling basis and not because of actual failure.
9. Reason Performed. The symbol "Unsched" will be shown in this column if the operation was performed as a result of unscheduled maintenance. If the operation was performed as a result of scheduled maintenance, it is indicated by the symbol "Sched" in this column. If the operation was performed only to verify procedures and tools, not as a result of breakdown, it is indicated by the symbol "Sim" in this column.
10. Remarks. If the operation is related to any other sub-test covered in the body of the test report, the paragraph number is inserted for cross reference. If the operation was not performed as a result of using the sampling technique authorized by AR 750-6, one of the following remarks is entered as appropriate.
  - a. Reviewed - not performed.
  - b. Neither reviewed nor performed due to (No TMs) or (insufficient service test time).
  - c. Other, as appropriate.If an EPR is related to a maintenance operation, the EPR number will be inserted.

CHART 2 - PARTS ANALYSIS

| FEDERAL STOCK NUMBER  | NOUN NOMENCLATURE         | MAINTENANCE LEVEL |              | LIFE<br>M - Miles<br>H - Hours<br>R - Rounds | REASON USED | GP NO. CROSS REF | REMARKS  |
|-----------------------|---------------------------|-------------------|--------------|--|-------------|------------------|----------|
|                       |                           | Pre-scribed       | Recom-mended |  |             |                  |          |
| 1                     | 2                         | 3                 | 4            | 5  | 6           | 7                | 8        |
| Model AO-46839        | Blower Motor              | None              | F            | 213 H  | Unsched     | None             | EPR KA-4 |
| Trygon Model MS15-20A | Power Supply              | None              | F            | 224 H  | Unsched     | None             | EPR KA-6 |
| None                  | Capacitor 40 MFD 75 V     | None              | H            | 283 H  | Unsched     | None             | EPR KA-7 |
| None                  | Transistor 2N270          | None              | H            | 283 H  | Unsched     | None             | EPR KA-7 |
| None                  | High Voltage Power Supply | None              | F            | 341 H  | Unsched     | None             | EPR KA-9 |
| Trygon Model M-36-30A | Power Supply              | None              | F            | 348.5 H                                      | Unsched     | None             | EPR KA-8 |

## INSTRUCTION SHEET

### Chart 2

**GENERAL:** Parts will be assembled on this chart by functional groups and in numerical order within groups.

#### COLUMN

#### DESCRIPTION

1. Record one of the following: Federal Stock Number, Technical Service Part Number, Manufacturer's Part Number, or Drawing Number in this order of preference.
2. Noun Nomenclature. Self-explanatory.
3. Maintenance Level, Prescribed. Maintenance level as prescribed by the parts list under review: C - Operator/Crew; O - Organizational; F - Direct Support; H - General Support.
4. Maintenance Level, Recommended. C, O, F, or H indicate maintenance level recommended by the test agency.
5. Life. The number of hours, miles, or rounds accumulated before or since this part was replaced. An entry in this column is made for each part used followed by the appropriate life unit; i.e., M, H, or R.
6. Reason Used. The symbol "Unsched" will be shown in this column if the part was used as a result of unscheduled maintenance. If the part used was the result of scheduled maintenance, the symbol "Sched" will be used. If the part was consumed to verify procedures or tools, not as a result of breakdown, the symbol "Sim" will be used.
7. Group Number, Cross Reference. Parts usage by maintenance operation is indicated by cross referencing to the group number from Column 1 of the Maintenance and Reliability Analysis Chart.
8. Remarks. If the part usage is related to any other sub-test covered in the body of the test report, the paragraph number for cross reference is indicated. If an EPR is related to the part used, the EPR will be inserted in this column.



CHART 3 - MAINTENANCE PACKAGE LITERATURE

| MANUSCRIPT |       | DATE RECEIVED  |           | EVALUATION |      | FORM 1598 | REMARKS |  |
|------------|-------|--|-----------|------------|------|-----------|---------|--|
| NUMBER     | QTY   | TITLE  | LIT       | MATERIEL   | ADOT | INADOT    |         | DATE FWD'D   |
| 1          | 2     | 3  | 4         | 5          | 6    | 7         | 8       | 9  |
| None       | 2     | *Engineering Notes: Maintenance of the Chinese Ideographic Composing Machine | 13 Oct 67 | 13 Oct 67  |      |           | None    | Not evaluated  |
| None       | 1 Set | Schematic Diagrams   | 13 Oct 67 | 13 Oct 67  |      |           | None    | Not evaluated  |
| None       | 2     | *Engineering Notes: Operation of the Chinese Ideographic Composing Machine   | 13 Oct 67 | 13 Oct 67  | X    |           | None    |  |
|            |       |  |           |            |      |           |         | *Although titled Engineering Notes, they are in manual format. |

## INSTRUCTION SHEET

### Chart 3

#### COLUMN

#### DESCRIPTION

1. Give Army or manufacturer's publication or draft manual number.
2. Number of copies received. Insert "0" if none were supplied. Use Para 1111, Chapter 9, of AR 310-3 as a guide to determine those manuscripts and publications that should accompany the test item. Manuscripts and publications contained in the maintenance package should cover operations and functions through general support maintenance and should specify the categories involved.
3. Complete title.
4. Fill in date manuscripts (MMS) or publications received.
5. Fill in date test item or materiel was received.
- 6, 7. Insert "X" in appropriate block. Minor errors in 1598 forms are not in themselves sufficient reason to term a manuscript inadequate. Evaluation may be omitted if fewer than 25% of the specified maintenance operations were performed.
8. Insert date 1598 form was forwarded.
9. In addition to appropriate remarks, explain if manuscript was not evaluated.

## APPENDIX V. REFERENCES

1. Letter, ATDEV-5 400.114, HQ, USCONARC, 5 January 1962, subject: USCONARC-Approved Military Characteristics for Ideographic Composing Machine, with one inclosure, and two indorsements thereto.
2. Minutes of Technical Review Meeting on Ideographic Composing Machine (ANL-114), 31 July 1963.
3. 2d Indorsement, CRD-L (4 Feb 66), OCRD, DA, 2 March 1966, subject: Proposed Change to Department of Army Approved Materiel Requirement (QMR) for a Composing Machine, Ideographic.
4. Final Report of Engineer Design Test of Ideographic Composing Machine (ANL-114), USATECOM Project No. 7-3-0244-01K, USAGETA, October 1964.
5. Minutes, Formal In-Process Review, Ideographic Composing Machine, held on 2 March 1967.
6. Approved Revised Service Plan of Test for Ideographic Composing Machine, RDT&E Project No. 1-M-6-43324-D-588-06, USATECOM Project No. 7-3-0244-02, USAAESWBD, July 1967.

**DOCUMENT CONTROL DATA - R & D**

*(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)*

|   |  |  |                             |
|---|--|--|-----------------------------|
| <b>1. ORIGINATING ACTIVITY (Corporate number)</b><br>U. S. Army Airborne, Electronics and Special Warfare Board<br>Fort Bragg, North Carolina 28307   |  | <b>6a. REPORT SECURITY CLASSIFICATION</b><br>Unclassified  |                             |
| <b>2. REPORT TITLE</b><br>SERVICE TEST OF IDEOGRAPHIC COMPOSING MACHINE   |  |  |                             |
| <b>3. DESCRIPTIVE NOTES (Type of report and inclusive dates)</b><br>Final Report Jul 67 - Feb 68  |  |  |                             |
| <b>4. AUTHOR(S) (First name, middle initial, last name)</b><br>Walter N. Mott, Major, Chemical Corps  |  |  |                             |
| <b>6. REPORT DATE</b><br>Mar 68   |  | <b>7a. TOTAL NO. OF PAGES</b><br>49  | <b>7b. NO. OF REFS</b><br>6 |
| <b>8a. CONTRACT OR GRANT NO.</b>  |  | <b>8b. ORIGINATOR'S REPORT NUMBER(S)</b>   |                             |
| <b>a. PROJECT NO.</b> RDT&E 1M643324D58806  |  | USATECOM 7-3-0244-03   |                             |
| <b>c.</b>   |  | <b>8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</b>                       |                             |
| <b>d.</b>   |  | USAAESW Board CE 1864  |                             |
| <b>10. DISTRIBUTION STATEMENT</b><br>This document may be further distributed by any holder ONLY with specific prior approval of U. S. Army Natick Laboratories.  |  |  |                             |
| <b>11. SUPPLEMENTARY NOTES</b>  |  | <b>12. SPONSORING MILITARY ACTIVITY</b><br>U. S. Army Natick Laboratories<br>Natick, Massachusetts 01762 |                             |
| <b>13. ABSTRACT</b><br><p>This report covers service test of Ideographic Composing Machine. The Ideographic Composing Machine had the vocabulary to meet the current demands of psychological warfare; however, it failed to meet some of the stated requirements. The following deficiencies were noted: electrical components were susceptible to failure caused by power line surges and/or transients or brief power failures; approximately 1 percent of the ideographs could not be reproduced from the vocabulary; proper adjustment of the video read level control was not possible; it did not operate 180 hours without maintenance; it was not possible to determine if the film was correctly threaded in the camera; and switches not used by the operator during operation were not protected to preclude inadvertent activation. Several shortcomings were noted, principally in the areas of operational characteristics and human factors.</p> <p>This report concludes that the Ideographic Composing Machine in its present state is not suitable for Army use; that it may be suitable when deficiencies and shortcomings are corrected; and the test item is safe for its intended use.</p> |  |  |                             |

| 14<br>KEY WORDS                   | LINK A |    | LINK B |    | LINK C |    |
|-----------------------------------|--------|----|--------|----|--------|----|
|                                   | ROLE   | WT | ROLE   | WT | ROLE   | WT |
| Ideograph                         |        |    |        |    |        |    |
| Photocomposition                  |        |    |        |    |        |    |
| Chinese language                  |        |    |        |    |        |    |
| Psychological warfare operations  |        |    |        |    |        |    |
| Newspaper and leaflet composition |        |    |        |    |        |    |