NAVTRA 41046
0502-205-2300

TRAINEE'S GUIDE

for

NAVAL SCHOOLS

TELETYPE MAINTENANCE

CLASS C

VOLUME 1

A-160-0023
A-160-0024

Naval Technical Training Command
June 1972

DEPARTMENT OF THE NAVY
CHIEF OF NAVAL TECHNICAL TRAINING
NAVAL AIR STATION
MILLINGTON, TENNESSEE 38054

IN REPLY REFER TO:

FOREWORD

1. NAVTRA 41046, Trainee's Guide for Naval Schools, Teletype Maintenance, Class C, Volume 1, is approved for use in the Teletype Maintenance courses A-160-0023 and A-160-0024.

2. This publication supersedes volume 1 of all previous trainee guides developed for the course.

3. Commands are invited to submit explicit comments and recommendations on the contents of this publication to the Chief of Naval Technical Training (N3).

L. D. MARSOLAIS
Captain, USN
Head, Individual Technical
Training Branch

DISTRIBUTION LIST:

COMMANDING OFFICER 350
FLEET TRAINING CENTER
NORFOLK, VIRGINIA 23511

COMMANDING OFFICER 350
SERVICE SCHOOL COMMAND
NAVAL TRAINING CENTER
SAN DIEGO, CALIFORNIA 92133

COMMANDER 1
NAVAL SHIP SYSTEMS COMMAND (06T)
NAVAL SHIP SYSTEMS COMMAND HQ
WASHINGTON, D.C. 20360

OFFICER IN CHARGE 1
NORFOLK DIVISION SEC 6600
NAVAL SHIP ENGINEERING CENTER
NAVAL STATION, BLDG AP-13
NORFOLK, VIRGINIA 23511

COMMANDING OFFICER 50
NAVAL PUBLICATIONS AND FORMS CENTER
5801 TABOR AVENUE
PHILADELPHIA, PENNSYLVANIA 19120

OFFICER IN CHARGE 2
NAVAL TRAINING PUBLICATIONS DETACHMENT
BLDG 220
WASHINGTON NAVY YARD
WASHINGTON, D.C. 20390

CHIEF OF NAVAL TECHNICAL TRAINING 1
NAVAL AIR STATION
MEMPHIS (75)
MILLINGTON, TENNESSEE 38054

COMMANDING OFFICER 1
NAVAL TRAINING SUPPORT COMMAND (Code 20)
BLDG 45
PENSACOLA, FLORIDA 32508

RECORD OF CHANGES

No.	Authority	Substance	Entered by	Date

CONTENTS PAGE

INTRODUCTION

The purpose of this guide is to: (1) provide you with the material required during the course to develop your technical knowledge and competence with respect to the use of maintenance tools, troubleshooting teletypewriter equipment, and the performance of maintenance routines, and (2) provide you with sufficient reference material so that when you return to your unit you will be able to use the technical manual effectively. This guide does not duplicate information contained in the technical manual.

This guide is designed specifically around the AN/UGC-6K Teletypewriter, but was developed to train personnel in maintenance of this and similar equipment in the Model 28 family of teletypewriters.

How to use the Guide

The information contained within this guide is organized in the same sequence as the course of instruction, and parallels the sections and topics presented by the instructor. This reduces to a minimum the need for elaborate note taking and provides more instructional time to cover and explain the subject matter of the course.

Vol. I contains information sheets developed in support of the technical manual and classroom instructions. The information sheets relate to a train of parts, their nomenclature, the sequence of movements, operation etc., and contain associated diagrams. They contain basic information with respect to the fundamentals of mechanical operations, and are of assistance to you in applying this information to the functional operation of the equipment.

Self test items (assignment sheets) are provided in Vol. II. They are used as a yard stick to tell you how well you are progressing whether you are getting the necessary information and whether you are maintaining a proper level in the course.

These test items will require study of the text (NAVSHIPS 0967-173-6010, NAVSHIPS 0967-173-6020 and NAVSHIPS 0967-173-6030) as well as this guide. Answer sheets will be provided for your answers and all items will be reviewed in class the first morning period following assignment.

Job Sheets are provided to assist you in performing maintenance routines and to provide for graded application. Adjustments as listed in the technical manual have been modified to provide accurate logically organized procedures for you to follow.

Pictorials are provided in Vol. III. They are used to help you follow the train of parts and to enable you to identify the various parts of the teletype machine.

This guide, when used in a conscientious manner, will be a valuable tool for you to use while in this school. We sincerely hope our efforts will benefit you and your command.

Safety

The use of this equipment involves voltages that are dangerous and may be fatal if contacted. Extreme caution should be exercised when working on this equipment. The attention of operating and maintenance personnel is directed to NAVSHIPS 0901-670-0002 or superseding instructions on the subject of electrical precautions to be observed.

The following rules must be strictly observed:

Keep away from live circuits as much as maintenance permits.
Never repair or adjust equipment alone.
Always ascertain that the UGC-6K teletypewriter and all test equipment in use is properly grounded.

The AN/UGC-6K teletypewriter is a precision machine using small mechanical parts that are easily damaged. Extreme care should be exercised when making adjustments. Avoid excessive pressure when tightening screws, nuts, etc., to prevent stripping. Do not use small parts as pry points. Ensure that the machine is not binding before energizing the motor circuit.

IMPROVEMENT OF STUDY HABITS

INTRODUCTION

You have just begun a course of instruction in Teletype Maintenance. The subject matter is highly technical and you will be required to put in many hours of study in order that you may complete the course of instruction satisfactorily. Many of you have been away from classroom work for a long time, so it is important that you be re-acquainted with proper study habits. The Teletype Maintenance School conducts a very effective night school which you can utilize to help you. There are times, however, when you may want to study on your own and this information sheet is designed to help you in this endeavor.

INFORMATION

General

A student in this school was heard to say, "I need to be motivated in order to study." This is true of many of us, so here is a little motivation for you. This course of instruction is one of the best the Navy has to offer. You are one of the fortunate few selected for this training. Upon satisfactory completion your job code will be changed. Please keep in mind that your chances of getting another opportunity to attend this school are practically nil.

Another important point is to seek help when you need it. When you are studying and get confused, ask a buddy in class to help. If this will not solve the problem, there is a duty TTM Instructor assigned each day. Seek him out; he will be glad to help you.

If you have a personal problem which is keeping you from giving your all to your studies, ask to see the Director. Every effort will be made to help you, and your personal business will be kept in the strictest confidence.

Preparation for Study

The term "STUDY," as used in this information sheet, means a concentrated effort on the part of the student to develop further understanding of the subject matter and to fix this information firmly in his mind. Here is a list of things to check to make sure you are ready to study.

1. Make sure the place you are going to study is good for the purpose. If it is too noisy, cold, hot, stuffy, etc., you are obviously not going to be able to concentrate. Be sure to pick a good place.

2. Be sure your physical condition is good. Don't try to study if you are suffering.

3. Free your mind from worry about other problems. Erase everything from your mind except your desire to improve.

4. Make sure you have everything you will need for study, i.e., pencils, paper, books, etc.

5. Keep in mind that the most important factor for you to consider is your attitude toward the subject matter.

Method of Study

For most students, the Orientation Phase of this course appears hard because of the large amount of material covered. Without a definite study method, time can be wasted with little learning accomplished. A good study method is required - one that is organized, is logical, and won't waste time and effort. A good study method can be devised, first, by noticing how the classroom instruction is organized, and second, by planning your study in accordance with this organization.

Here is how the classroom instruction is organized:

First, the instructor will identify the mechanical parts, show you their shape and their physical placement in relation to each other. He will use transparencies and actual equipment for this.

Second, with the aid of transparencies, he will demonstrate and explain the movements of the mechanical parts and how they act upon each other.

Third, he will demonstrate and explain with the aid of transparencies, the powers required to move the parts.

Fourth, with the aid of transparencies, he will summarize by explaining the movements and powers in logical sequence to present the overall mechanical operation.

Now it becomes apparent that there are three main areas of subject matter you must learn. Stated briefly they are:

1. Parts

2. Movements

3. Powers

After one day of classes, you will realize that a great deal of independent study will be necessary to understand and retain the subject matter presented. The most logical way to study the subject matter is in the same order it was presented in class. The following study method is based on this concept.

The trainee's guide is your most important source of material because it parallels the classroom instruction. There are four recommended steps for studying the material in this trainee's guide. They are as follows:

Step 1. Name and Identify the Parts

The purpose of this step is for you to be able to readily associate the name, shape and location of each part using a pictorial or the equipment.

The first time the name of a part appears in the text of an information sheet, it is place along the left hand margin. The parts are listed in proper operating sequence. Without reading the text of the information sheet, read the names of the parts that appear down the left hand margin and go to the pictorial and identify the part. Do this until you can associate the name with the shape and locate it on the pictorial with ease. Remember to identify and locate the parts in the order that they appear on the text of the information sheet. This will help you later on.

Step 2. Understand how the Parts move.

The purpose of this step is for you to be able to explain what moves each part and the direction of movement, using a pictorial.

Read the information sheet carefully. Read the operation of each part; then look at the pictorial and visualize its movement. If necessary, use your pencil and trace the movements and also read out loud if you can. These physical actions will help make a stronger impression. Go through the complete operation in this manner as many times as necessary to understand the operation of all parts.

Step 3. Understand the Source of Power to Move each part.

The purpose of this step is for you to be able to trace out and identify the power to move each part.

Go to the pictorial and trace through the operation in the same manner as step 2, but pay particular attention to the action of those parts that are considered powers as defined in the power law. (Power Laws will be explained during classroom instruction). Do not try to memorize verbatim what power moves each individual part. There are many more parts than powers. Instead, study with the intention of being able to pick out any part in the pictorial at random and trace back through the train of parts until you come to the power and then identify it.

Step 4. Self Evaluation

Go to the pictorial book and turn to the pictorial that corresponds to the lesson you have studied. Now trace through the operation, name the parts, state their movements and identify the powers and their action as you go along. Any weakness will become apparent, and you will know what must be restudied.

Use these four steps to study each lesson. Study lessons in the same order they were presented during classroom instruction. This will tie in all subject matter in proper order and eliminate many confusing factors.

This is only a recommended method of study; however, it has proved to be very effective for most students. Some students have their own methods that obtain the same satisfactory results. It is up to you to determine what is the best study method to use.

After the Orientation Phase will come the Adjustment and Troubleshooting Phase; at this time the actual AN/UGC-6K teletypewriter and the Technical Manual will be used. Classroom time will be used in working on the equipment, first making adjustments and then locating troubles placed on the machine. To assist you in your studies in these phases, some principles of learning are listed on the following page.

Learning

Learning does not come automatically from reading and listening, but is a science based on well defined principles and procedures. There are four well defined rules and principles to consider, that aid learning.

1. Motivation - you must have a desire to learn.

2. Concentration - Focus your full attention and full power of your mind on the subject matter you are attempting to learn.

3. Organization - Fit the subject matter together. First get the general pattern of what you are going to learn, then get the details in more concentrated study.

4. Repetition - Repeat your study of the subject matter as many times as necessary to ensure that you can readily recall the essential information, and that you understand the concepts.

Comprehension and mastery come through practice of the principles discussed.

Information Sheet 1-2-1I

Major Components of the AN/UGC-6K and Relationship with the Model 28 Family

TOPIC OBJECTIVE

When you complete this lesson, you will be able to:

1. EXPLAIN the relationship of the AN/UGC-6K to the Model 28 Family of teletype equipment. The explanation shall be the same as that given in the Trainee's Guide, NAVTRA 41046.

2. STATE that the reason for using the AN/UGC-6K as the prime training vehicle is that is incorporates all the major components used in Model 28 ASR sets.

3. DISASSEMBLE the AN/UGC-6K to the point required for removal of equipment for orientation, adjustments and troubleshooting. The disassembly will be performed as specified in the handouts given each student in the classroom.

4. LOCATE and IDENTIFY the eight major components of the AN/UGC-6K.

5. STATE the functions of the eight major components in the AN/UGC-6K. The statement will include the information given in Information Sheet 1-2-1I.

INTRODUCTION

This information sheet presents a general introduction to the AN/UGC-6K, disassembly, major components and their functions.

REFERENCES

NAVSHIPS 0967-173-6010, Technical Manual for Model 28 Automatic Send-Receive (ASR) Teletypewriter Sets, Vol. 1
NAVSHIPS 0967-173-6020, Technical Manual for Model 28 Automatic Send-Receive (ASR) Teletypewriter Sets, Vol. 2
NAVSHIPS 0967-173-6030, Technical Manual for Model 28 Automatic Send-Receive (ASR) Teletypewriter Sets, Vol. 3

INFORMATION

Relationship of the AN/UGC-6K to Model 28 Family is that it has the same basic operation in all models.

Reason for using the AN/UGC-6K as the prime training vehicle is that it incorporates all major components used in Model 28 ASR sets.

Disassembly of the AN/UGC-6K

1. Keyboard Control Knob - Pull Straight Out

2. Plate behind Keyboard Control Knob - Remove 2 screws and pull out

3. Front Panel

    a. Remove 2 screws to left of keyboard
    b. Loosen thumb screw on right inside of cabinet
    c. Slide panel to right
    d. Lift left side up and pull to left

4. Keyboard Cover

    a. Remove 2 screws left plexiglass cover
    b. Remove 2 screws right inside of cabinet
    c. Remove paper labels
    d. Remove 4 screws holding cover (2 left side and 2 right side)
    e. Remove 2 screws under cover on bottom edge (1 left and 1 right)
    f. Slide keyboard cover forward and remove
    g. Remove rubber gasket

5. Tape Holder

    a. Remove 4 screws on base of tape holder
    b. Lift tape holder straight up and out

6. Perforator Guard

    a. Remove screw on right
    b. Slide guard to right and remove

7. Transmitter distributor housing, plate and crossbar

    a. Pull housing straight out and remove (spring clip loaded)
    b. Remove set screw and mounting bolt on right side
    c. Crossbar removal - loosen 2 screws on left inside of cabinet, remove set screw and mounting bolt on right side, lift crossbar up and out.

8. Automatic Typer

    a. Remove "R" connector (squeeze clips on bottom to release connector)
    b. Remove 4 pilot screws from bottom of typer frame
    c. Lift typer up and out

9. Keyboard

    a. Remove "F" connector
    b. Remove 4 pilot bolts from 4 corners of keyboard base
    c. Loosen Hex head screws holding flexible connector on TD drive shaft
    d. Slide flexible connector to left and remove drive shaft
    e. Lift keyboard up and forward to remove

10. ESU

    a. Remove 2 pilot bolts from ESU

Major Components and their Functions

TYPING UNIT - Contains the mechanisms necessary for translating electrical input signals into printed, alphanumeric characters or functional control operations.

KEYBOARD - Contains the mechanisms for generating and transmitting a teletype signal. It also provides mounting facilities for the typing unit, tape punch units, motor units, and the necessary driving gears and cross shafts.

TAPE PUNCH UNIT (PERFORATOR) - Contains the mechanisms that traslate mechanical inputs into both perforations and printed characters. The tape prepared is partially perforated. (chadless)

AUXILIARY TYPING REPERFORATOR - Contains a selector mechanism to receive inputs electrically. Translates inputs into both perforations and printed characters. This is a completely independent set. (Independent of any other component)

TRANSMITTER-DISTRIBUTOR (T/D) - Contains the necessary mechanisms to advance the tape, read its perforations, and to convert these into teletype signals.

ELECTRICAL SERVICE UNIT (ESU) - Serves as the area of concentration for the wiring of the set, and provides mounting facilities for various electrical assemblies and components.

MOTOR UNITS - Provide Mechanical motion for the ASR set.

CABINET - Provides a place to mount all major components compactly, including space for an Auxiliary Typeing Reperforator Electrical Service Unit. (LESU)

Speed

The AN/UGC-6K operates at speeds up to 100 words per minute. In this school it is geared for 100 words per minute operation. The speed is changed by changing gear sets (or ratios) in the Keyboard base and the Transmitter Distributor Base. The reperforator has a 3 speed gear shift mechanism built into it.

The gear set data required to change operating speed can be located in the Technical Manual on the following pages:

Keyboard base - Volume 3, ISS 1, Section 573-118-800, page 27
TD base - Volume 3, ISS 2, Section 573-128-800, page 9
Reperf base - Volume 3, ISS 2, Section 573-121-800TC, page 19

Occasionally a machine is used on circuits employing the 7.0 transmission pattern vice 7.42. To change the speed of such equipment requires a more extensive gear change, and it is recommended that the cam sleeve assemblies be changed.

Electrical Requirements

The Model 28 Family of teletypewriters, requires 115 VAC 60 cycle single phase. The current requirements will vary with the different models.

The AN/UGC-6K motor (LMU-12) requires 12.25 AMPS starting current and 2.8 AMPS running current. The reperforator motor (LMU3) requires 9 AMPS starting current and 1.85 AMPS running current.

Information Sheet 1-3-1I

TECHNICAL MANUAL AND INSTRUCTION SHEETS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. UTILIZE effectively the NAVSHIPS Teletype Technical Manuals, Vols. 1, 2, and 3, so that you can operate, adjust, lubricate, and order parts for the Model 28 family of teletype equipments.

2. UTILIZE the Trainee Guides, NAVTRA 41046, 41047, and 41048, in conjunction with the technical manuals, when operating, adjusting, lubricating and ordering parts for the Model 28 family of teletype equipments.

INTRODUCTION

This information sheet describes the use of the Technical Manuals and instruction sheets.

REFERENCES

NAVTRA 41046
NAVTRA 41047
NAVTRA 41048

INFORMATION

Utilization of the NAVSHIPS Technical Manual on Teletypewriters, Volumes 1, 2 and 3.

Volume 1, NAVSHIPS 0967-173-6010 - provides cross reference materials, description and principles of operation, installation, operating tests, disassembly, reassembly and component wiring diagrams.

1. Major units found in various models in Model 28 Family differ.

    a. Cross Reference Chart indicates proper schematic or wiring diagram to use. (attachment to page 1)
    b. Theory of operation explained for all differences.

2. Table of Contents

    a. Indicates section each major unit is located in.
    b. Each section has independent "Table of Contents" for breakdown of each major unit.

Volume 2, NAVSHIPS 0967-173-6020, provides the specific requirements for adjustments, lubrication, disassembly and reassembly of the MOD 28 teletypewriter.

1. Introduction - Same in all technical manuals

2. Table of Contents

    a. Title column
    b. Contents column
    c. Section column
    d. Issue column
    e. Is used to find section of Technical Manual desired
    f. Section 573-117-700TC (located at top right hand corner)

3. Section 573-117-700TC - This section contains the specific requirements and adjustments for the 28 perforator-transmitter base.

    a. Contents (page 1 and 2) lists all adjustments in this section and page number.
    b. Locate desired adjustment (Signal Contact Clearance) page 7
    c. Under Signal Contact Clearance adjustment you will see how to meet your requirements, how to check these requirements and how to adjust to proper tolerances. Observe all caution points and read notes.
    d. ALL SECTIONS are used in same manner.

4. Section 573-115-702 - Describes the disassembly and reassembly proceedure for the Model 28 major units. Disassembly covers a procedure for removing the principle sub-assemblies which make up the unit.

    a. Contents (page 1) lists all sub-assemblies and page numbers.
    b. Look up page number for Main Shaft in Contents.
    c. Explain procedures for removing Main Shaft (para. 2.23) (read note at end of paragraph)

Volume 3, NAVSHIPS 0967-173-6030 - Provides a list of maintenance tools and parts ordering information.

1. Introduction - Same as Volume II

2. Table of Contents

    a. Title column
    b. Section column
    c. Issue column
    d. Is used to find section of technical manual desired
    e. Section 573-115-800TC, page 34 (located at top right hand corner)

Trainee's Guide - (Not intended as Technical Manual replacement)

1. Introduction to Trainee's Guide (pages vi and vii)

2. Appropriate section, page and figure number for appropriate pictorials listed at beginning of each section of Trainee's Guide.

3. Rely on technical manual as much as possible.

    a. Proper names of parts for test purposes taken from Trainee's Guide.
    b. Technical Manual utilizes abbreviations a repairman would understand but a trainee like yourself would not.

Use Technical Manuals as much as possible. Any conflict between the Trainee's Guide and the Technical Manuals, the Trainees Guide takes precedence over the technical manual.

Information Sheet 1-4-1I

SIGNALLING CODE

TOPIC OBJECTIVE

When you complete this lesson, you will be able to:

1. EXPLAIN the difference between the five level 7.42 and five level 7.00 unit codes. The explanation will be limited to the time duration and electrical values of the start, stop, and five intelligence impulses.

2. EXPLAIN the difference between polar and neutral keying as given in the Information Sheet 1-4-1I of NAVTRA 41046.

3. DETERMINE Baud Rate, using the formula:

   $$\text{BAUD} = \frac{\text{unit code x WPM}}{\text{10 (constant)}}$$

   The student will be given the unit code and WPM.

4. EXPLAIN the operation of a basic half duplex teletype circuit, using the electrical diagram given in Information Sheet 1-5-1I of NAVTRA 41046.

INTRODUCTION

This information sheet describes the Five level teletypewriter Code, the Baud, and the basic teletypewriter circuit (loop).

REFERENCES

NAVSHIPS 0967-173-6010, Section 573-115-100, pages 8 and 9, Vol. 1
NAVSHIPS 0967-225-0010, Teletypewriter, Principles of Telegraphy

INFORMATION

During the latter part of the nineteenth century, a French signal Officer, Jean M. Emile BAUDOT, envisioned a method of mechanically transmitting a signal that would activate a printing mechanism. The new method of printing telegraphy (teletypewriter) required modification of the basic Morse Code. The primary change was the control over the time interval of each transmitted pulse. Specified time intervals or pulse lengths were to replace the arbitrary dot-dash system of each operator.

In order to encompass the 26 letters of the alphabet and a number of purely mechanical functions required to operate the printing mechanism, Mr. BAUDOT determined that the basic conditions, (current-on-line, no current-on-line), would have to be expanded. He accomplished this by taking the two basic conditions and raising them to the fifth power, (2^5 = 2x2x2x2x2), for a total of 32 possible combinations. Therefore, each character is a combination of five impulses (pulses), with each impulse having two possible conditions. The five impulses comprising a character are known as intelligence impulses.

The two conditions referred to above shall be called by their more common names, current-on-line - MARKING, no current-on-line - SPACING, throughout the remainder of this guide.

Subsequent to the development of this basic code, a printer was developed with the addition of an upper case, referred to as FIGURES, thereby expanding the capabilities of the code to twice as many characters, or 64 possible characters. The ability to shift from lower case (LETTERS) to upper case (FIGURES), and vice versa, is a mechanical function, and the same basic code combinations are used for both LETTERS and FIGURES.

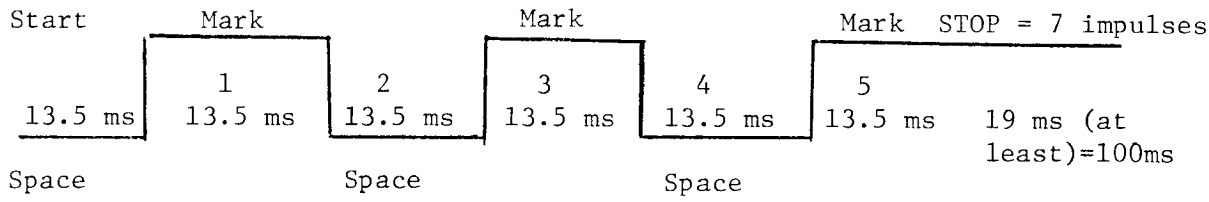
To maintain synchronism between the sending machine and the receiving machine(s), it is necessary to establish a starting point and a stopping point. Consequently, a START (Spacing) impulse and a STOP (Marking) impulse is added to the five intelligence impulses. The START and STOP impulses are not part of the intelligence impulses. The START impulse ensures that all machines start simultaneously, and the STOP impulse ensures that all machines stop within the allotted time.

The basis for our present day teletypewriter code is the mechanical control of the combinations of MARK and SPACE conditions associated with the individual characters. The length of time duration of the individual impulses used to make a character is determined by the speed of the unit, which through a gear train, operates the various cams and levers that ultimately open and close the signal line. We may say then, that as the mechanical operating speed of the unit increases, the time interval of the total character decreases.

Analyzing a Character

In breaking the individual character into its separate impulses, and determining their length, we have to consider the START and STOP impulses. In the majority of applications the START and five intelligence impulses are of equal length, with the STOP impulse being of a longer duration. The STOP impulse is usually 42% longer to ensure that all receiving units will have time to completely detect the last information impulse before the transmitter begins the next character. Therefore, it can be said that each character contains 7.42 units, and requires 100 milliseconds to transmit.

Each impulse is broken down as follows:



From the preceding information, it can be seen that each character requires 100 msec of time to transmit. This is true regardless of the typing speed of the operator. If only one character per minute is transmitted, 100 msec is required. The time that the machine is idle between characters is simply a continuation of the STOP impulse.

NOTE: All explanations are based on 100 wpm. Impulse time durations would be considerable longer for 60 and 75 wpm, i.e., for 60 wpm the START and each of the intelligence impulses would be 22 msec long, and the STOP impulse would be (at least) 31 msec for a total of 163 msec required to transmit one character.

Unit Code

Since each character is comprised of 7.42 units, it is known as 7.42 Unit Code. Some commercial companies, and the Navy, use 7.00 Unit Code. This has a STOP impulse of the same time duration as the other impulses.

Polar/Neutral Keying

Polar Keying has current all the time for marks and for spaces, negative for space, and positive for a mark. All MOD 28 contact boxes designed to accept this with minor modifications.

Neutral Keying is primarily used in Navy. Current flow for a mark and no current for a space.

Baud Rate

The word baud is derived from the name BAUDOT. The baud rate, sometimes called the bit rate, is simply an expression which combines both shaft speed (operations-per-second) and the particular unit code being used into one usable term or figure. It indicates the maximum usable number of pulses-per-second that a given piece of equipment can handle. The term "Baud Rate" is used internationally to denote compatibility of equipment(s).

If we have a transmitter and receiver with equal baud rates, we know that traffic can be passed between them. An unequal baud rate tells us that. without modification, we cannot transmit between the equipments in question.

One baud corresponds to the total number of impulses per second. Also referred to as the modulation rate.

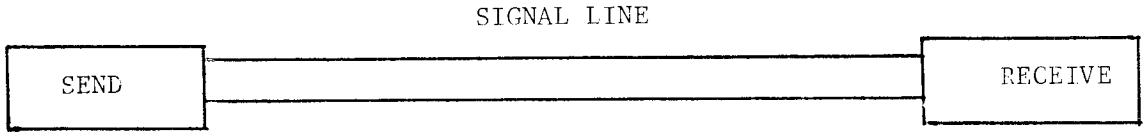
Formula: $$\text{BAUD} = \frac{\text{Unit code X wpm}}{\text{10 (constant)}}$$

Formula transposition for finding wpm:

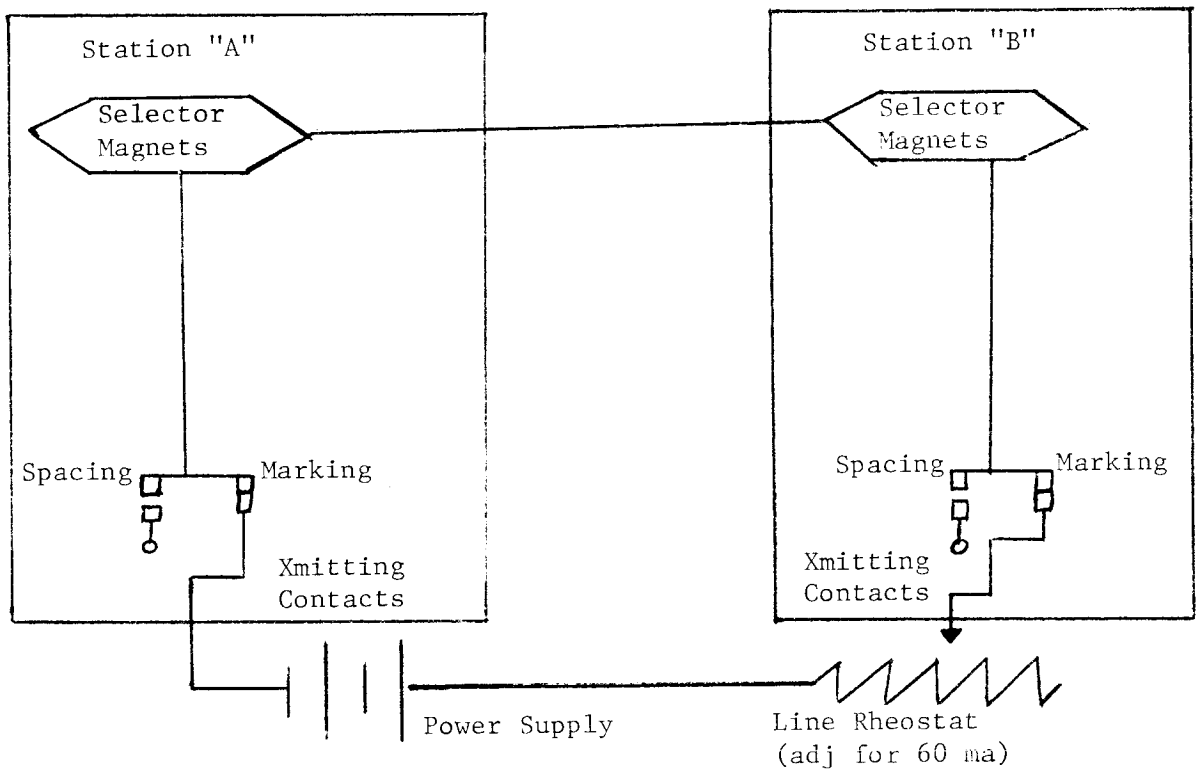
$$\text{WPM} = \frac{\text{10 (constant) X Baud Rate}}{\text{Unit Code}}$$

Basic Teletypewriter Circuits

The basic teletypewriter circuit consists of a sending machine, a receiving machine and two wires connected between the



Typical teletypewriter circuits have the ability to send and receive. The following illustration shows this capability with all related components.



Sending Unit

The sending unit transforms mechanical action of striking the keys into electrical impulses of the teletype code.

Receiving Unit

The receiving unit transforms electrical impulses back into mechanical motion to print a character.

Power Supply

The power supply furnishes 115 volts d-c to the Signal Line Circuit. The resistance in the line is adjusted by the line rheostat to allow 60 milliamps (ma) whenever the circuit is complete (a mark on the line).

Transmitting Contacts

The transmitting contacts make up the electrical part of the transmitter unit (Keyboard or Transmitter Distributor). There is only one pair of contacts (marking) used in the transmitting unit. These contacts will open and close according to the character or function selected.

Selector Magnets

The Selector Magnets (electromagnets) are the brain of the receiving unit. When current flows through them, they become a strong magnet. When no current is flowing through them, they immediately lose their magnetism. The Selector Magnets, through the medium of an armature, change electrical energy into mechanical motion.

Signal Line

The Signal Line consists of the cable connecting the two stations. The stations may also be connected by a radio teletype channel.

In the preceding diagram, Station B selector magnets, being in series with Station A selector magnets, will react to the signal in the same manner and at the same time as Station A. When Station A is sending, the transmitting unit of Station B will not be operating, since only one station can send at a time in this type of circuit (half-duplex). Other more complex types of circuits (systems) are also in use.

Operations per Minute

At the present time there are three basic shaft speeds in popular usage. They are 368 rpm, 460 rpm and 600 rpm of shaft speed. A conversion of these speeds into the more widely used term "words-per-minute" may be accomplished by dividing each figure by 6. (This assumes that the average word contains five characters and a space between it and the next word.) Thus, 368 rpm is known as 60 wpm, 460 rpm as 75 wpm and 600 rpm as 100 wpm. For maintenance, or other technical purposes, it is far more accurate to deal only with the actual shaft speed. If for every revolution of the transmitting shaft a complete character is transmitted, we may state that a complete operation has been performed. Therefore, our rpm's become operations-per-minute (OPM).

For further information, refer to Section 573-101-100TC, Page 9, Vol. 1, Technical Manual.

Information Sheet 1-5-1I

TERMINOLOGY AND POWER LAW

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. USE proper terminology when referring to names of parts and when explaining the uses of various mechanical parts. The terminology will be the same as that used in the Technical Manuals and Trainee's Guide, NAVTRA 41046.

2. EXPLAIN the special phrases used in this course that pertain to directions of movements, views of the machine, and operating conditions of the machine. The explanation shall be limited to the information given in Information Sheet, 1-5-1I, NAVTRA 41046.

3. NAME the sources of power that are used in the AN/UGC-6K, and EXPLAIN how these sources cause a part to move. The explanation will be the same as that given in the Information Sheet 1-5-1I of NAVTRA 41046.

4. EXPLAIN the term "Power Law" as used in this course. The student will explain that the term power law is applied as an aid in finding the power source that causes a part to move or be moved and as an aid in troubleshooting the AN/UGC-6K.

INTRODUCTION

This information sheet will acquaint you with the basic terminology used in this course. The understanding of this information will simplify communications between you and the instructor. The phrases in this sheet are standard for this course.

REFERENCES

NAVSHIPS 0967-173-6010, Vol. 1
NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3

INFORMATION

Proper terminology enables you to recognize basic mechanical parts and understand their usage. It also helps you to understand basic functions in order to make understanding of the teletype machine simpler.

Mechanical parts and their uses:

MACHINE

A mechanical device employing springs, cams, gears, levers and bails, etc. to accomplish work. Examples of machines are automobile engines, typewriters, adding machines, and of course the teletypewriter.

The following are various names of mechanical parts which are used in teletype machines. Each part is usually prefixed by a name which denotes its operation, what it moves or what moves it, as the examples will show.

MAJOR COMPONENT

The AN/UGC-6K is divided into eight major components. Each performs a separate distinct function.

TRAIN OF PARTS

A series of mechanical parts operating together to accomplish an ultimate end.

GEAR

A wheel with teeth on its outer rim, usually mounted on a shaft and meshing with other gears. Used to transmit motion. There are two types normally used in the AN/UGC-6K, they are:

1. Spur Gear - Teeth grooved in a horizontal direction.
2. Helical Gear - Teeth grooved in a diagonal direction.

ECCENTRIC

A precision cut piece of metal or fiber, perfectly round with its pivot point off center. Used to change rotary motion to back and forth or straight line motion.

CAM

A precision made piece of metal or fiber, basically round, but has one or more high and/or low surfaces on the outer rim. Used for exact precision timing of movements.

SPRINGS

Usually made of steel, has the ability to store energy. This energy, when released, can be used to accomplish work. There are four types of springs normally used in the AN/UGC-6K, and they are:

1. Coil - (most common)
2. Torsion
3. Compression
4. Leaf - Normally used in sets of contacts.

BAIL

Is moved by part, and when moved, releases or moves another part or parts.

BELL CRANK

Forms an angle and is used to change the direction of movement.

LEVER

Used for leverage or mechanical advantage.

BACK

A bar, straight or curved, with teeth on one or both sides which engage another rack or gear, used to change to a rotary movement.

SHOULDER SCREW

A screw having a built up portion near the head. Normally used as a pivot point.

ECCENTRIC SCREW

A screw having a built up portion, with its pivot point off center, normally used where an adjustable pivot point is required.

RATCHET WHEEL

A circular wheel having teeth. It differs from a gear in the manner or cut of the teeth, and how it is operated. A ratchet is usually pushed or pulled by a pawl operating back and forth.

PAWL

A pivoted tongue or sliding bolt adapted to fall into notches on a ratchet so as to permit motion in one direction.

DETENT

Used to hold a part or train of parts in a given position until acted upon or moved.

ECCENTRIC FOLLOWER

An arm normally encompassing an eccentric, used to change circular motion to up and down or back and forth motion.

SCREWS

Used to fasten parts together. There are four types of screws normally used in the AN/UGC-6K and they are:

1. Round Head - To be tightened or loosened by a screwdriver only.
2. Hexagon Head - To be tightened or loosened by a wrench if possible.
3. Pivot Screw - Has an extended portion unthreaded, to help guide it into position
4. Allen Screw - Normally used to connect shafts together, to prevent a screw head from sticking up.

LOCK WASHERS

Used to lock a screw or bolt in place. Two types normally used are:

1. Split type
2. Star type

RETAINER RING

A metal clamp shaped like the letter "C". Used to hold a part on a shaft. (Also referred to as a "C" clamp)

Special Phrases

1. Directions of movement

    a. Up and Down
    b. Right and Left
    c. Front and Rear
    d. Clockwise and Counterclockwise (CW and CCW)

2. Viewing of the machine

    a. Front and rear
    b. Right and left
    c. Top and bottom
    d. When no view is given, it is considered to be from the front.

3. Operating conditions of the Teletype Machine

    a. Normal - all machine operations are normal
    b. Running Open - no current at the selector magnets, the selector clutch will not disengage.
    c. Running Closed - current at the selector magnets continually, the selector clutch will not engage.
    d. Garbling - not printing the selected character.

Sources of Power

1. Power - A force of energy used to move a part or a train of parts.

2. Sources of power within the AN/UGC-6K

   a. CAMS - by use of highs and lows on cam surface
   b. GEARS - by use of teeth meshing with other gears
   c. ECCENTRICS - by rotating with pivot point off center
   d. SPRINGS - by expansion and compression
   e. TYPEBOX CLUTCH - by rotating and moving main rocker shaft

Power Law

1. Since many parts furnish power, major component is given its own power law.

2. The term "power law", as used in this course, simply means the power that causes a part or train of parts to move or be moved. This term is applied to five of the eight major components in the AN/UGC-6K. As these five components are discussed in detail later in the course, the meaning and use of this term will become more familiar to you.

3. In troubleshooting, the above meaning of the power law will be used extensively. When a part is not moving as it should be, the trouble is either one of two things:
   a. The part moving it is not moving it properly.
   b. The power that causes it to move is not doing its job properly.

Information Sheet 1-6-1I

Gear Power Train and Internal Expansion Clutch

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of the gear power train is to extend motion to the main shaft and keyboard signal generator shaft.

2. LOCATE and IDENTIFY the parts in the gear power train, using a pictorial and the actual equipment. The pictorial shall be provided in the Trainee's Guide, NAVTRA 41048.

3. EXPLAIN the overall operation of the gear power train, in terms of part names, movements and power, using a pictorial and/or the actual equipment.

4. STATE that the purpose of the internal expansion clutch is to control motion of cams, cam sleeve assemblies, eccentric gears, and other mechanical parts.

5. LOCATE and IDENTIFY the internal expansion clutch, using the actual equipment and the pictorial provided in the Trainee's Guide, NAVTRA 41048.

6. EXPLAIN the overall operation of the internal expansion clutch, in terms of part names, movements and powers, using a pictorial and/or the actual equipment.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1
NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3

INFORMATION

The purpose of the Gear Power Train is to extend motion to the main shaft of the automatic typer and the keyboard signal generator shaft.

When the
MOTOR is turned on, the
MOTOR SHAFT extends motion to the attached
INTERMEDIATE SHAFT HELICAL DRIVING GEAR, which meshes with and turns the
INTERMEDIATE SHAFT HELICAL DRIVEN GEAR, which is attached to and turns the
INTERMEDIATE SHAFT, which has attached to it, and extends motion to the
AUTOMATIC TYPER HELICAL DRIVING GEAR, which meshes with and extends motion to the
MAIN SHAFT HELICAL DRIVING GEAR, which is mounted on and extends motion to the

MAIN SHAFT of the automatic typer. Also mounted on the
MAIN SHAFT HELICAL DRIVING GEAR is the
KEYBOARD HELICAL DRIVING GEAR, which meshes with and extends motion to the
KEYBOARD HELICAL DRIVEN GEAR, which is part of the
SIGNAL GENERATOR SHAFT, extending motion to the signal generator shaft. As long as the machine is turned on, the Main Shaft of the Automatic Typer and the Signal Generator Shaft on the Keyboard will turn. The
MOTOR SHAFT also extends motion to the
PERFORATOR DRIVE GEAR and
T/D DRIVE GEAR.

General Information

To change speed of the automatic typer, the Intermediate Shaft Helical Driving Gear and the Intermediate Shaft Helical Driven Gear must be changed.

Internal Expansion Clutch

The purpose of Internal Expansion Clutch is to control motion of cams, eccentrics, cam sleeve assemblies, gears, and other mechanical parts.

Engaging

When the clutch shoe lever is released, the
CLUTCH SHOE LEVER SPRING rotates the
CLUTCH SHOE LEVER CCW, rotating the
PRIMARY SHOE CCW, into initial contact with the
CLUTCH DRUM. A mechanical reaction takes place, driving primary shoe into full engagement with clutch drum. The
CLUTCH DRUM rotates the
PRIMARY SHOE in contact with the
SECONDARY SHOE, moving it into contact with the
CLUTCH DRUM. A mechanical reaction takes place, driving secondary shoe into full engagement with clutch drum, and against the
ADJUSTING DISK, which prevents the
SECONDARY SHOE from moving away from the
CLUTCH DRUM, which rotates and extends motion to the
SECONDARY SHOE, which moves the
ADJUSTING DISK, which extends motion to the
CLUTCH ASSEMBLY, which rotates in unison with clutch drum.

Disengaging

A trip lever or stop arm will be placed into the path of the
CLUTCH SHOE LEVER, rotating it CW into the
STOP LUG.
As the
CLUTCH SHOE LEVER moves CW, it allows the
SHOE PRING to pull the
PRIMARY AND SECONDARY SHOES together, away from
CLUTCH DRUM, allowing the assembly it had driven to stop, momentum will cause the

CLUTCH CAM DISK to continue to turn a little more allowing a CLUTCH LATCH LEVER to drop into a notch on the CLUTCH CAM DISK, thereby holding the clutch positively disengaged, preventing the clutch from "chattering".

NOTE: The power to move all Latch Levers into notches on Cam Disks comes from the respective Latch Lever Springs.

General Information

When a clutch is engaged, it is rotating and doing work. This is a positive action, non-slip type clutch, which is fully engaged in less than 2 degrees rotation of shaft. Same type clutch utilized throughout Model 28 Family.

POWERS

Part	Direction	Power
Clutch Shoe Lever	CCW	Clutch Shoe Lever Spring
Primary and Secondary Shoes	Together	Shoe Spring

Information Sheet 2-1-1I

MAIN SHAFT OF THE AUTOMATIC TYPER

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the power law for the automatic typer, as given in the Trainee's Guide, NAVTRA 41046.

2. STATE that the purpose of the main shaft is to extend motion from the motor to the Automatic Typer and Keyboard.

3. LOCATE and IDENTIFY by name, each clutch assembly and gear on the automatic typer main shaft, using the actual equipment and the pictorial in the Trainee's Guide, NAVTRA 41048.

4. STATE the purpose of each clutch assembly and gear on the automatic typer main shaft. The statement is to be limited to the information given in Information Sheet 2-1-1I of NAVTRA 41046.

INTRODUCTION

The purpose of the Automatic Typer is to convert an electrical teletype signal into readable printed page copy. To meet this end and for operator convenience the following features have been incorporated into the Automatic Typer:

Signal Bell Function - used to attract an operator to the machine.

Keyboard Lock - Enables an operator to automatically lock all keyboards on a circuit.

Automatic Line Feed and Carriage Return - Safety feature, returns carriage in event a Carriage Return Signal is not received.

Automatic Line Feed on Carriage Return - Automatically gives a line feed upon receipt of a carriage return signal preventing overscoring of lines of text.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Power Law for Automatic Typer

The power for the automatic typer is derived from Cams, Gears, Eccentrics on the Main Shaft, the Type Box Clutch, and Springs throughout the Automatic Typer.

The purpose of the Main Shaft is to extend motion from the motor to the Automatic Typer and Keyboard.

MAIN SHAFT

The Main Shaft is mounted on each side frame, in ball bearings and extends the length of the automatic typer. The Main Shaft turns continuously when the motor is ON.

SELECTOR CLUTCH

The Selector Clutch is a one stop clutch and is the first clutch to engage upon receipt of the start inpulse. The Selector Clutch makes one revolution with each operation and controls the motion of the Cam sleeve assembly.

SELECTOR CAM SLEEVE ASSEMBLY

The Selector Cam Sleeve Assembly is driven by the Selector Clutch. Its Cams are machined onto a bearing. (Not adjustable) The order of the Cams, right to left: Stop Arm Bail Cam, 5, 4, 3, selector lever cams, spacing and marking lock lever cam, 2, 1 selector lever cams, push lever reset bail cam, and code bar clutch trip cam. All cams make one complete revolution for each operation of machine. Each cam will operate a train of parts and provide power.

CODE BAR CLUTCH

The Code Bar Clutch is a one stop clutch and is the second clutch to be engaged. It makes one revolution with each operation and controls motion to the Code Bar Clutch Eccentric and Code Bar Clutch Cam.

FUNCTION CLUTCH

The Function Clutch is a one stop clutch and is the third clutch to be engaged. It makes one revolution with each operation and extends motion to the Function Clutch Eccentric and Function Cam.

SPACING CLUTCH

The Spacing Clutch is a three stop clutch, and is engaged only when a space is required. It will make 1/3 revolution for each space desired and extends motion to the Spacing Clutch Restoring Cam and Spacing Shaft Helical Driving Gear.

MAIN SHAFT HELICAL DRIVING GEAR

The main Shaft Helical Driving Gear extends motion to Main Shaft and Keyboard Helical Driving Gear. It will continuously turn with the Main Shaft.

KEYBOARD HELICAL DRIVING GEAR

The Keyboard Helical Driving Gear turns continuously with the Main Shaft and is a major power for the Keyboard.

LINE FEED CLUTCH

The Line Feed Clutch is a three stop clutch and will be engaged only when a line feed is required. It will make 1/3 revolution for each line feed desired and extends motion to Line Feed Clutch Spur Gear and Line Feed Clutch Cam Disk.

TYPE BOX CLUTCH

The Type Box Clutch is a one stop clutch and is the last of the one stop clutches to be engaged. It makes one revolution with each operation and extends motion to the Type Box Clutch Drive Link. As you will see later on in the course, this is the reason the Type Box Clutch is the only Clutch that is a power.

Information Sheet 2-1-2I

ENGAGING AND DISENGAGING THE SELECTOR CLUTCH, RANGE FINDER AND DISTORTION

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY the selecting mechanism using the actual equipment and the pictorial provided in NAVTRA 41048.

2. STATE that the purpose of the selecting mechanism is to change electrical energy to mechnical motion.

3. LOCATE and IDENTIFY the parts used to engage and disengage the selector clutch, using the actual equipment and the pictorial provided in NAVTRA 41048.

4. EXPLAIN the overall operation of engaging and disengaging the selector clutch. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial provided in NAVTRA 41048 to aid in the explanation.

5. EXPLAIN distortion as associated with a teletype signal. The explanation will include the types of distortion, how distortion occurs, and how it affects the quality of the signal.

6. STATE that the purpose of the range finder is to orient the mechanical selector with electrical signal to obtain maximum selecting margins.

7. LOCATE and IDENTIFY the parts of the range finder, using the actual equipment and the pictorial provided in NAVTRA 41048.

8. EXPLAIN the overall operation of the range finder. The explanation will include the names of parts, the movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 to aid in the explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the selecting mechanism is to translate the signaling code combinations into corresponding mechanical arrangements which control the Code Bars.

Engaging the Selector Clutch (right view)

When the start impulse (no current) is received the
ARMATURE SPRING moves the
ARMATURE down, away from
POLE PIECES.
(Power: Armature Spring)
This allows the
START LEVER SPRING to rotate the
START LEVER CW, over riding the
ARMATURE EXTENSION. The
START LEVER moving CW, also moves the
STOP ARM BAIL CW into indent of
STOP ARM BAIL CAM, the
STOP ARM BAIL also moved the
STOP ARM CW, out of the path of
CLUTCH SHOE LEVER.
(Power: Start lever Spring)
The Clutch will now engage and extend motion to the
SELECTOR CAM SLEEVE ASSEMBLY, all
CAMS will rotate CCW.

Disengaging Selector Clutch (right view)

As the Selector Cam Sleeve Assembly turns, during the start impulse, the
STOP ARM BAIL CAM presents it high and moves the
STOP ARM BAIL CCW, moving the
START LEVER CCW, away from the armature where it will be held during the signaling time, the
STOP ARM BAIL also moves the
STOP ARM CCW, back into the path of the
SELECTOR CLUTCH SHOE LEVER, so when the Clutch completes its revolution it will be stopped; once stopped, momentum will cause the
(Power: Stop Arm Bail Cam)
CLUTCH CAM DISC to turn a little more allowing the spring tensioned
LATCH LEVER to drop into a notch on the
CLUTCH CAM DISC and hold the clutch positively disengaged.
(Power: Latch Lever Spring)

After the 5th intelligence impulse, the indent on the
STOP ARM BAIL CAM will present itself to the
STOP ARM BAIL. The stop impulse (mark) is received and the
ARMATURE moves up and blocks the
START LEVER. This prevents the
STOP ARM BAIL from dropping into the indent on its cam, and the
STOP ARM will be held in the path of the
SHOE LEVER until the next start impulse is received.

Signal Distortion

For purpose of illustration, Teletype pulses are shown as perfect rectangular waveshapes with sharp transitions and precise timing. This optimum condition is seldom, if ever, found in actual practice.

The modification of the original, rectangular waveshape is called DISTORTION. The total distortion to any signal is broken down into three categories for purposes of classification, but it is also important to note that any signal may contain all three components of distortion. The three components of distortion are:

1. Bias Distortion
2. Characteristic Distortion
3. Fortuitous Distortion

Bias and characteristic distortion are combined in the term Systematic Distortion, which is caused by detuned receivers, change of frequency of transmitter, etc., and consequently, either is roughly predictable. With the third element, Fortuitous Distortion, uncontrollable occurrences (hits on the line, loose ground connections, atmospheric disturbances, poor solder joints etc.), are accounted for. With the introduction of the selector magnet driver, distortion has been greatly reduced.

You will actually use an oscilloscope and observe a good and distorted teletype signal, later in the course.

Range Finder

The purpose of the Range Finder is to orient the mechanical selector with electrical signal to obtain maximum selecting margins. It also allows the operator to adjust the selector to pick off the best portion of the incoming signal.

When the
RANGE FINDER KNOB is pushed in and rotated, it moves the
RANGE FINDER SECTOR (which serves as a mounting bracket for the
STOP ARM PAIL, STOP ARM, and LATCH LEVER) either CW or CCW (right view)
around the
SELECTOR CAM CLUTCH. This changes the angular position at which the
SELECTOR CAM CLUTCH stops with respect to the selector levers. The low portions of the selector cams are placed either closer to or farther away from the selecting levers and permits the operator to select the optimum setting.

When the optimum setting is obtained, the
RANGE FINDER KNOB is released. Its inner teeth engage the teeth of the
INDEXING LOCK STUD to lock the
RANGE FINDER INDEX MECHANISM in position, the setting may be read on the
RANGE SCALE opposite the fixed
INDEX MARK.

Points of Range

To determine the points of range, the range finder is adjusted to the two extreme positions - at the lower and upper end of the range scale.

In each position, observations are made of the typed copy and a reading obtained from the range scale when one error is typed per line of copy. This means one error in 69 characters.

After the high and low limits are found, subtract the low limit from the high limit and this will give the points of range. 72 points of range are required as a minimum acceptable standard per the technical manual.

Optimum Setting

The best selection of the incoming signal is obtained near the center of the highest position of the marking impulse.

With the selection points midway between transition, there is the least chance of error. This is known as the optimum setting. To find the optimum setting add the high side and the low side of the usable range and divide by 2.

Information Sheet 3-1-1I

SELECTING AND TRANSFER MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to

1. LOCATE and IDENTIFY by name, the parts used to connect the teletype signal to mechanical motion using the actual equipment and the pictorial provided in NAVTRA 41048.

2. EXPLAIN the overall operation of the parts used to convert the teletype signal to mechanical motion. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment or the pictorial provided in NAVTRA 41048 for this explanation.

3. STATE that the purpose of the transfer mechanism is to transfer mechanical motion from the selector mechanism to the code bars.

4. LOCATE and IDENTIFY by name, the parts of the transfer mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

5. EXPLAIN the overall operation of the transfer mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment or the pictorial provided in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Selecting Mechanism Operation (right view)

With the code combination 1---- received, #1 impulse marking, providing current to the
SELECTOR MAGNETS, attracting the
ARMATURE which moves up, taking its attached
ARMATURE EXTENSION up which prevents the
SPACING LOCK LEVER from moving into the low of its cam.
The
MARKING LOCK LEVER SPRING moves the
MARKING LOCK LEVER to the rear under traveling the
ARMATURE EXTENSION, locking it up in a marking position. The
MARKING LOCK LEVER EXTENSIONS allow the
(Power: Marking Lock Lever Spring)
#1 SELECTING LEVER SPRING to move
#1 SELECTING LEVER to the rear into the low of

#1 SELECTOR LEVER CAM.
(Power: #1 Selecting Lever Spring)
The
#1 PUSH LEVER SPRING rotates the
#1 PUSH LEVER CW down in front of the
#1 SELECTING LEVER.
(Power: #1 Push Lever Spring)
With the
CAM SLEEVE ASSEMBLY rotating, the
#1 SELECTOR LEVER CAM moves the
#1 SELECTING LEVER slightly to the front, moving
#1 PUSH LEVER slightly to the front.
(Power: #1 Selector Lever Cam)
The
MARKING LOCK LEVER CAM moves the
MARKING LOCK LEVER and
MARKING LOCK LEVER EXTENSIONS back to the front, allowing the
ARMATURE and
ARMATURE EXTENSION to be positioned for #2 impulse.
(Power: Marking Lock Lever Cam)

With #2 impulse received, spacing, no current to the
SELECTOR MAGNETS, the
ARMATURE SPRING moves the
ARMATURE and its attached
ARMATURE EXTENSION down preventing the
MARKING LOCK LEVER from moving to the rear.
(Power: Armature Spring)
The
SPACING LOCK LEVER SPRING moves
SPACING LOCK LEVER to the rear over traveling the
ARMATURE EXTENSION, locking armature and extension down for a space.
(Power: Spacing Lock Lever Spring)
The
MARKING LOCK LEVER EXTENSIONS (remaining to the front) prevents
#2 SELECTING LEVER from going into low of
#2 SELECTOR LEVER CAM, therefore
#2 PUSH LEVER remains in top notch of
#2 SELECTING LEVER. The
SPACING LOCK LEVER CAM moves the
SPACING LOCK LEVER, back to the front, allowing the
ARMATURE and
ARMATURE EXTENSION to be positioned for #3 impulse.
(Power: Spacing Lock Lever Cam)

The #3, 4 and 5 impulses will work identical to the #2 impulse.

After all 5 intelligence impulses have been received, the high side of
each
SELECTOR LEVER CAM will force their respective
SELECTING LEVERS to the front, moving the marking
PUSH LEVERS to the front for a mark.
(Power: Selector Lever Cams)

TRANSFER MECHANISM OPERATION (right view)

The purpose of the transfer mechanism is to transfer mechanical motion from the selector mechanism to the code bars.

When the
#1 PUSH LEVER moved to the front for a mark, it moves the
#1 INTERMEDIATE ARM CCW, placing tension on dual purpose spring
#1 TRANSFER LEVER SPRING,
(Power: #1 Selector Lever Cam)
The
#1 TRANSFER LEVER SPRING rotates the
#1 TRANSFER LEVER CW, moving
#1 CODE BAR SHIFT BAR to the rear for a mark.
(Power: #1 Transfer Lever Spring)
The
#2 PUSH LEVER, remains to the rear (spacing position) the
#2 INTERMEDIATE ARM and
#2 TRANSFER LEVER remain unoperated. The
#2 CODE BAR SHIFT BAR remains to the front for a space.

There is one additional transfer lever called
COMMON TRANSFER LEVER, which has an extension that rides to the rear of #1 and #2 transfer levers. If either #1 or #2 transfer levers are moved to the rear for a mark, they will move the

COMMON TRANSFER LEVER CW which will move the
COMMON CODE BAR SHIFT BAR to the rear for a mark.
(Power: #1 and/or #2 Transfer Lever Springs)

If the #1 and #2 impulses are both spaces, the
COMMON TRANSFER LEVER SPRING will hold the
COMMON TRANSFER LEVER and the
COMMON CODE BAR SHIFT BAR to the front (unselected position).
(Power: Common Transfer Lever Spring)

Resetting (right view)

When the next character is received, the
PUSH LEVER RESET BAIL CAM will move the
PUSH LEVER RESET BAIL CCW, which rotates all
PUSH LEVERS CCW.
(Power: Push Lever Reset Bail Cam)

The
PUSH LEVER RESET BAIL SPRING will move the
PUSH LEVER RESET BAIL CW back to its normal stop position.
(Power: Push Lever Reset Bail Spring)
The
PUSH LEVER SPRINGS will return all previously marking
PUSH LEVERS to the rear (unselected position), releasing the
INTERMEDIATE ARMS.
(Power: Push Lever Springs)

The
INTERMEDIATE ARM SPRINGS collapse, moving
INTERMEDIATE ARMS CW which moves the
TRANSFER LEVERS CCW moving the
CODE BAR SHIFT BARS to the front (unselected position).
(Power: Intermediate Arm Springs)

If the
COMMON TRANSFER LEVER had been marking, when the #1 or #2 transfer lever returned to the front, they released the
COMMON TRANSFER LEVER, allowing the
COMMON TRANSFER LEVER SPRING to return the
COMMON TRANSFER LEVER top to the front, moving the
COMMON CODE BAR SHIFT BAR to the front (unselected position).
(Power: Common Transfer Lever Spring)

Information Sheet 2-1-4I

ENGAGING/DISENGAGING THE CODE BAR CLUTCH AND POSITIONING OF THE CODE BARS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts used to engage and disengage the code bar clutch using the actual equipment and the pictorial provided in NAVTRA 41048.

2. EXPLAIN the overall operation of engaging and disengaging the code bar clutch. The explanation will include the names of parts, the movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

3. STATE that the purpose of the code bar mechanism is to set the code bars in a position that will govern movements of other trains of parts that determine the printing and operation of functions.

4. LOCATE and IDENTIFY, by name, the parts of the code bar mechanism using the actual equipment and the pictorial provided in NAVTRA 41048.

5. EXPLAIN the overall operation of the code bar mechanism. The explanation will include the names of parts, the movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for the explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Engaging the Code Bar Clutch

Near the end of the 5th intelligence impulse the
CODE BAR CLUTCH TRIP CAM moves the
CODE BAR CLUTCH TRIP SHAFT LEVER CCW which rotates the
CODE BAR CLUTCH TRIP SHAFT CCW which moves the
CODE BAR CLUTCH TRIP LEVER CCW out of the path of the
CODE BAR CLUTCH SHOE LEVER.
(Power: Code Bar Clutch Trip Cam)
The
CODE BAR CLUTCH engages and extends motion to the
CODE BAR CLUTCH ECCENTRIC and
CODE BAR CLUTCH CAM.
(Power: Main Shaft Helical Driving Gear)

Disengaging the Code Bar Clutch

As the Selector Cam Sleeve Assembly continues to rotate, the
CODE BAR CLUTCH TRIP SHAFT LEVER SPRING rotates the
CODE BAR CLUTCH TRIP SHAFT LEVER CW into the low of the
CODE BAR CLUTCH TRIP CAM. The
CODE BAR CLUTCH TRIP SHAFT LEVER moving CW will move the
CODE BAR CLUTCH TRIP SHAFT CW which moves the
CODE BAR CLUTCH TRIP LEVER CW back into the path of the
CODE BAR CLUTCH SHOE LEVER, disengaging the clutch.
(Power: Code Bar Clutch Trip Shaft Lever Spring)

Momentum will cause the
CODE BAR CLUTCH CAM DISC to rotate a little further allowing the
CODE BAR CLUTCH LATCH LEVER SPRING to rotate the
CODE BAR CLUTCH LATCH LEVER CCW into the indent of the
CODE BAR CLUTCH CAM DISC and hold the clutch positively disengaged.
(Power: Code Bar Clutch Latch Lever Spring)

Positioning of the Code Bar (right view)

The purpose of positioning the code bars is to set them in a position that will govern the movements of other trains of parts which determine printing and operation of functions.

During 1st half revolution of the
CODE BAR CLUTCH, the
CODE BAR CLUTCH ECCENTRIC moves the
CODE BAR CLUTCH ECCENTRIC FOLLOWER ARM to the rear, which moves the
SHIFT LEVER DRIVE SHAFT EXTENSION CW which rotates the
SHIFT LEVER DRIVE SHAFT CW, rotating the
SHIFT LEVER DRIVE ARM CW, which moves the
SHIFT LEVER LINK up, taking the attached
SHIFT LEVER LINK ROLLERS up, which operate the
CODE BAR SHIFT LEVERS front to the right, rear to the left.

The
REAR CODE BAR SHIFT LEVER moves the
MARKING CODE BAR SHIFT BARS to the left, which moves the
MARKING CODE BARS to the left.

The
FRONT CODE BAR SHIFT LEVER moves the
SPACING CODE BAR SHIFT BARS (that had previously been marking) to the right, which move
SPACING CODE BARS to the right.
(Power: Code Bar Clutch Eccentric)

The
DETENT MECHANISM in the left side of the code bar bracket holds the
CODE BARS in position moved until forcibly moved again (next character).

Resetting

During the 2nd half revolution of the CODE BAR CLUTCH, the preceding train of parts is reset, under the power of the Code Bar Clutch Eccentric. The SHIFT LEVER LINK is brought down, causing the front and rear CODE BAR SHIFT LEVERS to open up, thereby allowing the CODE BAR SHIFT BARS to be re-positioned for the next character into the machine.

Information Sheet 2-1-5I

ADJUSTMENT PROCEDURES

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of adjustment procedures is to ensure the requirements for adjusting and lubricating the Model 28 as prescribed in the technical manuals are performed.

2. EXPLAIN the procedures for making mechanical adjustments, in terms of throw-outs, preliminaries, finals and postfinals as described in the Information Sheet 2-1-5I of NAVTRA 41046.

3. COMPLETE a NAVSUP Form 1250 to obtain parts and tools from the shop storeroom, using the parts information contained in the Technical Manuals.

4. EXPLAIN the safety precautions applicable to working on electrical equipment as prescribed in NAVSHIPS 0901-670-0002 and NAVSO P-2455.

REFERENCES

NAVSHIPS 0967-173-6010, Vol. 1
NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3
NAVSUP 1250
NAVSHIPS 0901-670-0002
NAVSO P-2455

INFORMATION

The purpose of adjustment procedures is to provide the trainee with specific requirements for adjusting and lubricating the Model 28 Teletypewriter as prescribed in the technical manuals and the school job sheets.

Procedures for making Adjustments

All teletype machines are checked out prior to a class convening.

Throw-out. An instructor will explain to a group of trainees the individual adjustment to be made. He will point out mounting screws, nuts, pry points, adjustment points and caution points. The instructor will then proceed to mal-adjust that particular adjustment.

Preliminary Check - Each trainee will make the preliminary adjustments to conform with the technical manual requirements and the school job sheets. For a preliminary adjustment, each adjustment will be set in the mid point range of the clearance required by either the technical manual or the job sheet. Maximum assistance will be given to any trainee requiring assistance. A preliminary check must be obtained prior to placing the machine under power.

Final Check - The instructor will check each adjustment using the guages assigned to that position. This is to ensure that the teletype machine is adjusted properly. For each mal-adjustment found, 1.28 points will be subtracted from an overall grade of 100. The trainee will be required to readjust that particular adjustment, and any other adjustments which that adjustment may effect. After remaking the necessary adjustments he will be ready for a post final.

Post Final Check - This is to recheck any mal-adjustments found on a final check. If the adjustment is still found to be mal-adjusted, the trainee will be assigned another mal-adjustment and another 1.28 points will be subtracted from his overall grade.

NAVSUP 1250 - Used by the trainee to draw replacement parts from the shop storeroom. Used by the school for more accurate parts stocking inventory and ordering information. To be filled out by the student as follows:

Block A - room number
Block B - position number
Block C - check "issue" box
Block 6 - teletype part number (obtained from Vol. 3)
Directly below block 6, fill out noun name of part as stated in technical manual.
Block 7 - unit of issue
Block 8 - quantity
Block 10 - equipment designation (either AN/UGC-6K or AN/UGC-20)
Block 11 - equipment serial number
Block 13 - date
Block 14 - component serial number
Block T - component serial number
Block U - Instructors signature
Block V - Students signature, signed only after receiving part from storeroom.
The completed form will be turned in to the shop storeroom supervisor.

Safety Precautions - to protect you and the equipment against hazards that can occur while working with teletype machines.

Use rubber mats. Place one mat on the deck to stand on and one mat on the desk to set your machine on

Aprons or smocks tied to the rear so ties cannot be caught on the motor or shafts while they are turning.

No handkerchiefs or neckties are to be worn while working around rotating machinery.

Shirt sleeves will be rolled down and buttoned, or rolled up above the elbows.

Always have a preliminary check prior to applying power. The instructor will check for broken parts or parts that may be binding to protect the teletype machine from serious damage that could occur under power.

Place components on workbench only in their authorized positions, otherwise they may fall over and break parts.

Use the proper tools for the proper job, it will be easier and safer to use them correctly.

All machines will be kept covered overnight, to protect from foreign matter falling into the machine.

Keep your area clean and free of scrap paper.

NEVER leave your position with your machine under power.

Information Sheet 2-2-1I

ENGAGING AND DISENGAGING THE FUNCTION AND TYPEBOX CLUTCHES

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts used to engage and disengage the function and typebox clutches, using the actual equipment and the pictorial provided in NAVTRA 41048.

REFERENCES

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Engaging and Disengaging the Function and Typebox Clutches (right view)

Upon receipt of the start impulse, the Selector Clutch engages and starts rotating. Near the end of the 5th intelligence impulse, the code bar clutch engages and rotates, at approximately 1/2 of a revolution of the code bar clutch
the
CODE BAR CLUTCH CAM presents it low to the
CODE BAR CLUTCH CAM FOLLOWER ARM ROLLER. The
CODE BAR CLUTCH CAM FOLLOWER ARM SPRING moves the
CODE BAR CLUTCH CAM FOLLOWER ARM, which moves its roller into the low of the
CODE BAR CLUTCH CAM, rotating the
CODE BAR CLUTCH CAM FOLLOWER ARM CCW which rotates the
CLUTCH TRIP LEVER SHAFT CCW which moves the attached
FUNCTION CLUTCH TRIP LEVER CCW out of the path of the
FUNCTION CLUTCH SHOE LEVER, allowing the function clutch to engage and start rotating, extending motion to the
FUNCTION CLUTCH ECCENTRIC and the
FUNCTION CAM.
(Power: Code Bar Clutch Cam Follower Arm Spring)
The
CLUTCH TRIP LEVER SHAFT continues its rotation and moves the
TYPE BOX CLUTCH TRIP ARM CCW, which moves the
TYPE BOX CLUTCH TRIP LEVER CCW, out of the path of the
TYPE BOX CLUTCH SHOE LEVER, allowing the
TYPE BOX CLUTCH to engage and start rotating, extending motion to the
TYPE BOX CLUTCH DRIVE LINK.
(Power: Code Bar Clutch Cam Follower Arm Spring)

Disengaging the Function and Type Box Clutches (right view)

When the high side of the
CODE BAR CLUTCH CAM presents itself to the
CODE BAR CLUTCH CAM FOLLOWER ARM ROLLER, it rides to the high of the cam and moves the

CODE BAR CLUTCH CAM FOLLOWER ARM CW, moving the attached
CLUTCH TRIP LEVER SHAFT CW, which moves the
FUNCTION CLUTCH TRIP LEVER back into the path of its shoe lever, disengaging the function clutch.
(Power: Code Bar Clutch Cam)

The
CLUTCH TRIP LEVER SHAFT continues its rotation, and moves the attached
TYPE BOX CLUTCH TRIP ARM CW, away from the
TYPE BOX CLUTCH TRIP LEVER.
(Power: Code Bar Clutch Cam)
The
TYPE BOX CLUTCH TRIP LEVER SPRING moves the
TYPE BOX CLUTCH TRIP LEVER CW, back into the path of its shoe lever, disengaging the type box clutch.
(Power: Type Box Clutch Trip Lever Spring)

Engagement of Clutches in relation to other clutches:

Clutch	When Clutch Engages
Selector Clutch	Upon receipt of start impulse
Code Bar Clutch	End of 5th intelligence impulse
Function Clutch	After 1/2 revolution of the Code Bar Clutch
Type Box Clutch	Approximately 2 degrees after Function Clutch

Information Sheet 2-2-2I

CONFIGURATION OF TYPE BOX AND VERTICAL POSITIONING

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. DESCRIBE the configuration of the type box. The description shall be limited to the information contained in Information Sheet 3-2-2I of NAVTRA 41046.

2. LOCATE and IDENTIFY, by name, the parts of the vertical positioning mechanism using the actual equipment and the pictorial provided in NAVTRA 41048.

3. EXPLAIN the overall operation of the vertical positioning mechanism. The explanation will include the names of parts, the movements of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial provided in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Configuration of the type box.

The type box is divided into two halves, the letters half, and the figures half. Each half contains four horizontal rows, numbered top, second, third and bottom.

Letters Half - contains all alphabet characters (referred to as lower case0. Divided into right and left sides. Each side contains four vertical rows. They are nunbered from the center to the left and to the right respectively as 1st row, 2nd row, 3rd row and 4th row.

Figures Half - contains all numbers and punctuation (referred to as upper case). Divided into right and left sides. Each side contains four vertical rows. They are numbered the same as the letters half of the type box.

Positioning of either half is identical, depending on whether we are in a letters or a figures position of our type box, which will be covered in a later lesson.

During vertical positioning and horizontal positioning, we will be referring to the LETTERS HALF OF THE TYPE BOX ONLY

Vertical Positioning

The #1 and #2 intelligence impulses determine which horizontal row of the type box printing will occur.

During the first half revolution of the
TYPE BOX CLUTCH, the
TYPE BOX CLUTCH DRIVE LINK moves the
MAIN ROCKER SHAFT DRIVE BRACKET CW, moving the (left view)
MAIN ROCKER SHAFT BRACKET CCW, moving the
MAIN SIDE LEVER DRIVE LINK up, rotating the
MAIN SIDE LEVERS CW. The front of the
MAIN SIDE LEVERS move the
VERTICAL POSITIONING LEVERS up, which move the
TYPE BOX CARRIAGE TRACK with the attached
TYPE BOX CARRIAGE and
TYPE BOX up. The
VERTICAL POSITIONING LEVERS are driven up until they are stopped by one of four spacing code bars. When stopped, the rear leg of the
VERTICAL POSITIONING LEVERS buckle, allowing the
MAIN SIDE LEVERS to continue moving CW away from the
MAIN SIDE LEVER FOLLOWER ARMS.
(Power: Type Box Clutch)

The
MAIN SIDE LEVER FOLLOWER ARM SPRING moves the
MAIN SIDE LEVER FOLLOWER ARMS CCW, which moves the
VERTICAL POSITIONING LOCK LEVERS CCW.
(Power: Main Side Lever Follower Arm Spring)
One of four notches on the vertical positioning lock levers will engage the projection on the rear of the vertical positioning levers, locking the train of parts in place for printing. How high the vertical positioning levers, the type box carriage track and type box are allowed to go is determined by which one of the four spacing code bars stops the upward movement of the vertical positioning levers.

How #1 and #2 intelligence impulses determine which horizontal row to print in.

#1 & #2 Intel Impulses	Position of Code Bars	Vert Posit Lever stopped by	Horizontal Row
1 sp 2 sp	1 & 2 & Common right	Common Code Bar	Top
1 mk 2 sp	1 & Common left 2 right	#2 Code Bar	Second

#1 & #2 Intel Impulses	Position of Code Bars	Vert Posit Lever stopped by	Horizontal Row
1 sp 2 mk	2 & Common left 1 right	#1 Code Bar	Third
1 mk 2 mk	1 & 2 & Common left	Suppression Code Bar	Bottom

Resetting

During the last half revolution of the
TYPE BOX CLUTCH the
TYPE BOX CLUTCH DIRVE LINK moves the
MAIN ROCKER SHAFT DRIVE BRACKET CCW, moving the (left view)
MAIN ROCKER SHAFT, CW, which moves the (right view)
MAIN ROCKER SHAFT BRACKET CW, moving the
MAIN SIDE LEVER DRIVE LINKS down, rotating the
MAIN SIDE LEVERS CCW, moving the
MAIN SIDE LEVER FOLLOWER ARMS CW, which move the
VERTICAL POSITIONING LOCK LEVERS CW, away from the
VERTICAL POSITIONING LEVERS. The
MAIN SIDE LEVERS still moving CCW, will also move the
VERTICAL POSITIONING LEVERS down, which will move the
TYPE BOX CARRIAGE TRACK with the attached
TYPE BOX CARRIAGE and
TYPE BOX down, to its normal stop position, with the print hammer slightly above the top row in the type box.
(Power: Type Box Clutch)

The
VERTICAL POSITIONING LEVER SPRINGS completely straighten the rear leg of the
VERTICAL POSITIONING LEVERS.
(Power: Vertical Positioning Lever Springs)

Information Sheet 2-3-1I

HORIZONTAL POSITIONING

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the horizontal positioning mechanism, using the actual equipment and the pictorial provided in NAVTRA 41048.

2. EXPLAIN the overall operation of the horizontal positioning mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Initial Positioning (prior to Type Box Clutch Engaging)

When the #3 CODE BAR is marking and is moved left, it rotates the REVERSING SLIDE SHIFT LEVER CCW, which moves the HORIZONTAL MOTION REVERSING SLIDE to the left. The DETENT MECHANISM will hold it to the left. The RIGHT REVERSING SLIDE BRACKET initially buckles the RIGHT SHIFT SLIDE DRIVE LINK.

(Power: Code Bar Clutch Eccentric)

The LEFT SHIFT SLIDE DRIVE LINK SPRING will straighten the LEFT SHIFT SLIDE DRIVE LINK.

(Power: Left Shift Slide Drive Link Spring)

When the #3 CODE BAR is spacing and is moved right, it rotates the REVERSING SLIDE SHIFT LEVER CW, which moves the HORIZONTAL MOTION REVERSING SLIDE to the right. The DETENT MECHANISM will hold it to the right. The LEFT REVERSING SLIDE BRACKET initially buckles the LEFT SHIFT SLIDE DRIVE LINK.

(Power: Code Bar Clutch Eccentric)

The RIGHT SHIFT SLIDE DRIVE LINK SPRING will straighten the RIGHT SHIFT SLIDE DRIVE LINK.

(Power: Right Shift Slide Drive Link Spring)

Final Positioning (All parts will move left or CCW for a Space, and move right or CW for a mark)

During the first half revolution of the
TYPE BOX CLUTCH the
MAIN BAIL will move down, moving the
SHIFT SLIDE DRIVE LINKS down. The
UNBUCKLED SHIFT SLIDE DRIVE LINK drives the
OSCILLATING RAIL SHIFT SLIDE (either left or right), which moves the
PLATE which moves the
HORIZONTAL POSITIONING LOCK LEVER ARM (CW or CCW).
The
OSCILLATING RAIL SHIFT SLIDE also moves the
OSCILLATING RAIL SHIFT LINKS, which move the
OSCILLATING RAIL, moving the
OSCILLATING RAIL GUIDE ARMS and attached
OSCILLATING RAIL GUIDE ARM ROLLERS which move the
UPPER DRAW WIRE ROPE with attached
OSCILLATING RAIL SLIDE which moves the
TYPE BOX CARRIAGE LINK moving the attached
TYPE BOX CARRIAGE which moves the
TYPE BOX.
(Power: Type Box Clutch)
The
UNBUCKLED SHIFT SLIDE DRIVE LINK also moves the
DECELERATING SLIDE into contact with one of three unselected
HORIZONTAL MOTION STOP SLIDES, causing the
DECELERATING SLIDE and
OSCILLATING SHIFT SLIDE DRIVE LINK to buckle.
(Power: Type Box Clutch)

As the
MAIN BAIL continues moving down, it places tension on the
HORIZONTAL POSITIONING LOCK LEVER SPRING, which moves the
HORIZONTAL POSITIONING LOCK LEVER down, locking the
HORIZONTAL POSITIONING LOCK LEVER ARM (in either the left or right position), which moves the
PLATE, which moves the
OSCILLATING RAIL SHIFT SLIDE into its final position and locking it there for printing.
(Power: Horizontal Lock Lever Spring)

Resetting

During the last half revolution of the
TYPE BOX CLUTCH, the
MAIN BAIL will move up, moving the
HORIZONTAL POSITIONING LOCK LEVER and the
SHIFT SLIDE DRIVE LINKS up.
The previously
UNBUCKLED SHIFT SLIDE DRIVE LINK straightens, pulling the
OSCILLATING RAIL SHIFT SLIDE, back to its normal stop position, which moves the

PLATE, which moves the
HORIZONTAL POSITIONING LOCK LEVER ARM back to its normal stop position.
The
OSCILLATING RAIL SHIFT SLIDE also moves the
OSCILLATING RAIL SHIFT LINKS, which move the
OSCILLATING RAIL, moving the
OSCILLATING RAIL GUIDE ARMS and attached
OSCILLATING RAIL GUIDE ARM ROLLERS, which move the
UPPER DRAW WIRE ROPE moving the attached
OSCILLATING RAIL SLIDE which moves the attached
TYPE BOX CARRIAGE LINK, moving the
TYPE BOX CARRIAGE which moves the
TYPE BOX back to its normal stop position.
(Power: Type Box Clutch)

Horizontal Motion Stop Slides

There are three horizontal motion stop slides, they are top to bottom,
#4 HORIZONTAL MOTION STOP SLIDE,
COMMON HORIZONTAL MOTION STOP SLIDE, and
#5 HORIZONTAL MOTION STOP SLIDE.

The Common Horizontal Motion Stop Slide has the widest stop slide and provides the first stop. It also has an additional stop on its shank (called Shank of Common), which is the shortest stop and provides the fourth stop. The COMMON HMSS has projections on it which stick up in front of #4 HMSS and down in front of #5 HMSS. COMMON HMSS has NO connection to the common code bar.

#4 Horizontal Motion Stop Slide is shorter in width than Common and provides the second stop.

#5 Horizontal Motion Stop Slide is shorter in width than #4 HMSS and provides the third stop.

Positioning of Horizontal Motion Stop Slides

For a mark (top view)

When either #4 or #5 is marking, their associated code bars will be moved left, which move their associated
CODE BAR BELL CRANKS CCW, moving their associated
HORIZONTAL MOTION STOP SLIDES to the front. Either #4 or #5 HMSS moving to the front will move the
COMMON HORIZONTAL MOTION STOP SLIDE to the front, out of the path of the DECELERATING SLIDES.
(Power: Code Bar Clutch Eccentric)

For a space (top view)

When #4 and #5 are spacing, their associated code bars will be moved right, which move their associated
CODE BAR BELL CRANKS CW away from their associated
HORIZONTAL MOTION STOP SLIDES.
(Power: Code Bar Clutch Eccentric)
The
HORIZONTAL MOTION STOP SLIDE SPRINGS will move the
HORIZONTAL MOTION STOP SLIDES to the rear.
(Power: Horizontal Motion Stop Slide Springs)

Printing in vertical rows is determined as follows:

Code Combination	Position of HMSS	Decelerating Slides Stopped by	Vertical Row
4 sp 5 sp	all to rear	Common HMSS	1st
4 sp 5 mk	#4 rear, #5 & Common to front	#4 HMSS	2nd
4 mk 5 sp	#5 rear, #4 & Common to front	#5 HMSS	3rd
4 mk 5 mk	all to front	Shank of Common	4th

Information Sheet 2-3-2I

RIBBON MECHANISM

TOPIC OBJECTIVE

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the ribbon mechanism, using the actual equipment and the pictorial provided in NAVTRA 41048.

2. EXPLAIN the overall operation of the ribbon mechanism. The explanation will include ribbon feed, ribbon oscillation and reverse, names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Ribbon Oscillation (left view) - to move the ribbon up for printing and down for viewing after printing.

During the first half revolution of the
TYPE BOX CLUTCH, the
MAIN SIDE LEVERS are rotated CCW, moving the
RIBBON DRIVE LINKS up, taking the
RIBBON SPOOL BRACKETS CCW, which move the
RIBBON SPOOLS and
RIBBON up, for printing.
(Power: Type Box Clutch)

During the last half revolution of the
TYPE BOX CLUTCH, the
MAIN SIDE LEVERS are rotated CW, mov ng the
RIBBON DRIVE LINKGS, down, rotating the
RIBBON SPOOL BRACKETS CW, which move the
RIBBON SPOOLS and
RIBBON down to normal stop position for viewing.
(Power: Type Box Clutch)

Ribbon Feed (left view) - to maintain constant tension on the ribbon and move it left or right presenting a fresh inked surface to the next character to be printed.

During the first half revolution of the
TYPE BOX CLUTCH, the
MAIN SIDE LEVERS are rotated CCW, moving the
RIBBON DRIVE LINKS up, taking the
RIBBON SPOOL BRACKETS and the
RATCHET DETENT LEVERS CCW.
(Power: Type Box Clutch)

The
RATCHET FEED LEVER SPRING rotates the
RATCHET FEED LEVER slightly CCW, undertraveling 1 tooth on the
RATCHET WHEEL.
(Power: Ratchet Feed Lever Spring)
The
RATCHET DETENT LEVER SPRING holds the
RATCHET DETENT LEVER into engagement with the
RATCHET WHEEL, preventing it from backing up.
(Power: Ratchet Detent Lever Spring)

During the last half revolution of the
TYPE BOX CLUTCH, the
MAIN SIDE LEVERS are rotated CW, moving the
RIBBON DRIVE LINKS down, rotating the
RIBBON SPOOL BRACKETS CW. The
RATCHET FEED LEVER engages and moves the
RATCHET WHEEL CW 1 unit of movement, (top view) also moving its attached
RIBBON SPOOL SHAFT CW, rotating the
RIBBON SPOOL CW, winding up the ribbon.
As the
RATCHET WHEEL moved CW, it overtraveled the
RATCHET DETENT LEVER.
(Power: Type Box Clutch)
The
RATCHET DETENT LEVER SPRING moves the
RATCHET DETENT LEVER CCW back into engagement with the
RATCHET WHEEL.
(Power: Ratchet Detent Lever Spring)

Ribbon Reverse - to change direction of ribbon movement before it becomes completely unwound on one side.

Assume the ribbon is being wound up on the right ribbon spool

During the last half revolution of the
TYPE BOX CLUTCH, the
LEFT RIBBON EYELET moves the
LEFT RIBBON LEVER CCW (top view).
(Power: Type Box Clutch)

During the first half revolution of the
TYPE BOX CLUTCH, the
MAIN SIDE LEVERS are rotated CCW which move the (left view)
RIBBON DRIVE LINKS up, moving the
RIBBON SPOOL BRACKETS CCW, taking the
LEFT RIBBON LEVER CCW, moving the
LEFT RIBBON REVERSING LEVER CCW, which moves the
LEFT RIBBON FEED REVERSE LEVER CCW.
(Power: Type Box Clutch)

The
LEFT RATCHET FEED LEVER SPRING moves the
LEFT RATCHET FEED LEVER up into engagement with the
RATCHET WHEEL.
(Power: Left Ratchet Feed Lever Spring)

The
LEFT RATCHET DETENT LEVER SPRING moves the
LEFT RATCHET DETENT LEVER up into engagement with the
RATCHET WHEEL.
(Power: Left Ratchet Detent Lever Spring)

When the
LEFT RIBBON REVERSING LEVER moved CCW, it moved the
LEFT RIBBON REVERSE SPUR GEAR CW, which moved the
RIBBON REVERSE SHAFT CW, which moved the attached
RIGHT RIBBON REVERSE SPUR GEAR CW, which moves the
RIGHT RIBBON REVERSING LEVER CW, which moves the
RIGHT RIBBON FEED REVERSE LEVER CW, which moves the
DETENT LEVER CW, out of engagement with the
RIGHT RATCHET WHEEL.
(Power: Type Box Clutch)

As the
RIBBON REVERSE SHAFT moves CW, it buckles the
TOGGLE LINK.
(Power: Type Box Clutch)

As the
TOGGLE LINK buckles, it allows the
RIBBON REVERSE DETENT LEVER SPRING to move the
RIBBON REVERSE DETENT LEVER to the front, holding the
RIBBON REVERSE SHAFT in its last operated position until the ribbon is
again reversed.
(Power: Ribbon Reverse Detent Lever Spring)

After ribbon reverse takes place, the
LEFT RIBBON EYELET moves away from the
LEFT RIBBON LEVER, which allows the
LEFT RIBBON LEVER SPRING to rotate the
LEFT RIBBON LEVER CW, back to its normal stop position.
(Power: Left Ribbon Lever Spring)

Information Sheet 2-3-3I

NORMAL SPACING AND SPACING CUT-OUT

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the normal spacing train of parts, using the actual equipment and the pictorial provided in NAVTRA 41048.

2. EXPLAIN the overall operation of the normal spacing train of parts. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial provided in NAVTRA 41048 for this explanation.

3. STATE that the purpose of spacing cut-out is to prevent the printing and type box carriages from going to far to the right in the event a normal carriage return is not received and the automatic carriage return fails to operate.

4. LOCATE and IDENTIFY, by name, the parts of the spacing cut-out train of parts, using the actual equipment and the pictorial provided in NAVTRA 41048.

5. EXPLAIN the overall operation of the spacing cut-out. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Normal Spacing

Initial Positioning (left view)

During the first half revolution of the
TYPE BOX CLUTCH, the
TYPE BOX CLUTCH DRIVE LINK rotates the
MAIN ROCKER SHAFT DRIVE BRACKET CW, which rotates the
MAIN ROCKER SHAFT CW, moving the attached
MAIN ROCKER SHAFT CAM PLATE CW, which moves the
SPACING TRIP LEVER BAIL CW, which moves the
SPACING TRIP LEVER up.
(Power: Type Box Clutch)

The
SPACING TRIP LEVER SPRING moves the
SPACING TRIP LEVER CCW or top to the rear, latching onto the
INTERMEDIATE BAIL.
(Power: Spacing Trip Lever Spring)

Final Positioning (left view)

During the last half revolution of the
TYPE BOX CLUTCH, the
TYPE BOX CLUTCH DRIVE LINK rotates the
MAIN ROCKER SHAFT DRIVE BRACKET CCW, which rotates the
MAIN ROCKER SHAFT CCW, which moves its attached
MAIN ROCKER SHAFT CAM PLATE CCW, away from the
SPACING TRIP LEVER BAIL.
(Power: Type Box Clutch)
The
SPACING TRIP LEVER BAIL SPRING moves the
SPACING TRIP LEVER BAIL CCW, which moves the
SPACING TRIP LEVER down, bringing the
INTERMEDIATE BAIL down in front (or CW), which moves the
SPACING CLUTCH TRIP LEVER CW, out of engagement with the clutch shoe lever,
allowing the
SPACING CLUTCH to engage.
(Power: Spacing Trip Lever Bail Spring)

As the
SPACING CLUTCH rotates, it extends motion to the
SPACING SHAFT RESTORING CAM and the
SPACING SHAFT HELICAL DRIVING GEAR, which meshes with and rotates the
SPACING SHAFT HELICAL DRIVEN GEAR CCW, which rotates the (front view)
SPACING SHAFT CCW, which rotates the attached
SPACING ECCENTRICS CCW, moving the (eccentrics are 180 degree offset)
SPACING DRUM FEED PAWLS, one up, one down, which moves the
SPACING DRUM CW, one unit of movement, it also moves the attached
STOP RING CW, which moves the
STOP ARM ROLLER CW, away from the
TRANSFER SLIDE.
(Power: Spacing Shaft Helical Driving Gear)
This allows the
TRANSFER SLIDE SPRING to pull the
TRANSFER SLIDE to the left.
(Power: Transfer Slide Spring)
As the
SPACING DRUM is moving CW, it also moves the
UPPER DRAW WIRE ROPE. The rear wire moves the
OSCILLATING RAIL SLIDE to the right, which moves the
TYPE BOX CARRIAGE LINK to the right, moving the attached
TYPE BOX CARRIAGE to the right, and the
TYPE BOX to the right.

The
UPPER DRAW WIRE ROPE front wire moving to the right, moves the
PRINTING CARRIAGE to the right, moving the attached
PRINT HAMMER to the right. The
UPPER DRAW WIRE ROPE also moves the
CARRIAGE RETURN SPRING DRUM CW, placing tension on the
CARRIAGE RETURN SPRING DRUM SPRING.

As the
CARRIAGE RETURN SPRING DRUM rotates CW, it also moves the attached
MARGIN INDICATOR CAM DISK CW, causing the
MARGIN INDICATOR SWITCH to close contacts, which light the
MARGIN INDICATOR LAMP. (only in KT or K position).

(Power: Spacing Shaft Helical Driving Gear)

As the
SPACING CLUTCH continues to rotate, it causes the
SPACING CLUTCH RESTORING CAM to present 1 of 3 high sides to, and move the
SPACING TRIP LEVER CW, or top to the front, releasing the
INTERMEDIATE BAIL.

(Power: Spacing Clutch Restoring Cam)

This allows the
INTERMEDIATE BAIL SPRING to move the
INTERMEDIATE BAIL CCW or front up, away from the
SPACING CLUTCH TRIP LEVER.

(Power: Intermediate Bail Spring)

This allows the
SPACING CLUTCH TRIP LEVER SPRING to move the
SPACING CLUTCH TRIP LEVER CCW, placing it back into the path of the shoe lever. Stopping the
SPACING CLUTCH after one third revolution. For every one third revolution of the spacing clutch, one space is received.

(Power: Spacing Clutch Trip Lever Spring)

Spacing Cut-Out

The purpose of spacing cut-out is to prevent the printing and type box carriages from going too far to the right in the event a normal carriage return is not received and the automatic carriage return fails to operate.

As the
SPACING DRUM reaches a predetermined point, it moves the (left view)
SPACING CUT-OUT LEVER into contact with, and rotates the
SPACING CUT-OUT TRANSFER BAIL CCW, which moves the
SPACING CUT-OUT BAIL CW or top to the front, moving the
SPACING SUPPRESSION SLIDE to the front, which moves the
SPACING TRIP LEVER top to the front, away from the
INTERMEDIATE BAIL.

(Power: Spacing Shaft Helical Driving Gear)
The spacing clutch cannot engage, and we prevent spacing from occuring.

Resetting

When a carriage return is received, it allows the
SPACING DRUM FEED PAWLS to be moved out of engagement with the
SPACING DRUM.
This allows the
CARRIAGE RETURN SPRING DRUM SPRING to rotate the
CARRIAGE RETURN SPRING DRUM CCW, moving the
UPPER DRAW WIRE ROPE to the left, pulling the
SPACING DRUM CCW, moving the attached
SPACING CUT-OUT LEVER CCW, away from the
SPACING CUT-OUT TRANSFER BAIL.
(Power: Carriage Return Spring Drum Spring)
This allows the
SPACING CUT-OUT TRANSFER BAIL SPRING to rotate the
SPACING CUT-OUT TRANSFER BAIL CW, moving the (left view)
SPACING CUT-OUT BAIL, top to the rear, away from the
SPACING SUPPRESSION SLIDE.
(Power: Spacing Cut-Out Transfer Bail Spring)
This allows the
SPACING TRIP LEVER SPRING to move the
SPACING TRIP LEVER CCW, or top to the rear, moving the
SPACING SUPPRESSION SLIDE to the rear, or normal stop position.
(Power: Spacing Trip Lever Spring)

In the event all of the above fail, there are teeth missing on the spacing drum so that the spacing drum can be rotated just so far and then it will stop. This is an additional safety feature to prevent damage to the teletype machine.

Information Sheet 2-4-1I

PRINTING A CHARACTER

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the printing mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the printing mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various part. The student will use the actual equipment and the pictorial in NAVTRA 41048.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Printing

During the first half revolution of the
TYPE BOX CLUTCH, the
TYPE BOX CLUTCH DRIVE LINK moves to the rear, moving the
MAIN ROCKER SHAFT DRIVE BRACKET CW, which rotates the (left view)
MAIN ROCKER SHAFT CW, moving the
MAIN BAIL DRIVE BRACKET down in front, which move the (front view)
MAIN BAIL LINKS down, moving the
MAIN BAIL down, which pulls the
PRINTING TRACK down, moving the attached
PRINTING ARM SLIDE down, moving the
PRINTING ARM CW, which moves the
SECONDARY PRINTING ARM to the right, away from the
PRINTING HAMMER OPERATING BAIL.
(Power: Type Box Clutch)
This allows the
PRINTING HAMMER OPERATING BAIL SPRING to move the
PRINTING HAMMER OPERATING BAIL slightly CCW, against the (top view)
PRINTING HAMMER OPERATING BAIL LATCH.
(Power: Printing Hammer Operating Bail Spring)
As the
PRINTING ARM continues to move to the right, it strikes and rotates the
PRINTING HAMMER OPERATING BAIL LATCH CCW, releasing the
PRINTING HAMMER OPERATING BAIL.
(Power: Type Box Clutch)

This allows the
PRINTING HAMMER OPERATING BAIL SPRING to rotate the
PRINTING HAMMER OPERATING BAIL CCW, moving the
PRINTING HAMMER BAIL CCW, which moves the
PRINTING HAMMER to the rear. As the
PRINTING HAMMER OPERATING BAIL moves CCW, it comes against the
PRINTING HAMMER OPERATING BAIL FORWARD STOP and stops. The
PRINTING HAMMER BAIL continues CCW, moving the
PRINTING HAMMER further to the rear, striking a
TYPE PALLET.
(Power: Printing Hammer Operating Bail Spring)
The
PRINTING HAMMER BAIL SPRING moves the
PRINTING HAMMER BAIL to the front, which moves the (front view)
PRINTING HAMMER to the front.
(Power: Printing Hammer Bail Spring)
The
TYPE PALLET SPRING moves the
TYPE PALLET to the front, placing it back in the
TYPE BOX in its normal place.
(Power: Type Pallet Spring)

Resetting

During the last half revolution of the
TYPE BOX CLUTCH, the
TYPE BOX CLUTCH DRIVE LINK moves to the front, moving the
MAIN ROCKER SHAFT DRIVE BRACKET CCW, which rotates the (left view)
MAIN ROCKER SHAFT CCW, moving the
MAIN BAIL DRIVE BRACKET up in front, moving the (front view)
MAIN BAIL LINKS up, which move the
MAIN BAIL up, which moves the
PRINTING TRACK up, taking the attached
PRINTING ARM SLIDE up, which moves the
PRINTING ARM CCW, moving the attached
SECONDARY PRINTING ARM to the left, which rotates the
PRINTING HAMMER OPERATING BAIL CW. (top view)
(Power: Type Box Clutch)
The
PRINTING HAMMER BAIL SPRING moves the
PRINTING HAMMER BAIL further to the front, or CW, which moves the
PRINTING HAMMER CW.
(Power: Printing Hammer Bail Spring)
The
PRINTING HAMMER OPERATING BAIL LATCH SPRING then rotates the
PRINTING HAMMER OPERATING BAIL LATCH CW back to its normal stop position.
(Power: Printing Hammer Operating Bail Latch Spring)

Information Sheet 2-4-2I

TYPICAL FUNCTIONS

TOPIC OBJECTIVE

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts associated with a typical function, using the actual equipment and the pictorial provided in NAVTRA 41048.

2. EXPLAIN the overall operation of the parts associated with a typical function. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial provided in NAVTRA 41048.

INFORMATION

The function box is constructed to accommodate 42 functions, however, all slots are not presently utilized. Every function will be selected and operated using a FUNCTION BAR, FUNCTION PAWL and a FUNCTION LEVER.

Initial Positioning (Right View)

During the first quarter revolution of the
FUNCTION CLUTCH, the
FUNCTION CAM presents its low to the
FOLLOWER ARM ROLLER.
The
ROCKER SHAFT SPRING collapses rotating the
ROCKER SHAFT CCW, moving the
FOLLOWER ARM to the rear, which moves the
FOLLOWER ARM ROLLER into the low of the function cam.
(Power: Rocket Shaft Springs)
The dual purpose springs, now called the
FUNCTION BAR RESET BAIL SPRINGS, move the
FUNCTION BAR RESET BAIL, which moves the
FUNCTION BAR RESET BAIL BLADE to the front, releasing all
FUNCTION BARS.
(Power: Function Bar Reset Bail Springs)

The
FUNCTION BAR RESET BAIL BLADE had previously been holding all
FUNCTION BARS to the rear of the machine. All
FUNCTION BARS move to the front of the machine. If the tines on the function bars line up with the
CODE BAR NOTCHES, the function bar will travel further forward than the other function bars and will enter the rear of the
CODE BARS, becoming selected.
(Power: Function Bar Springs)

When the selected
FUNCTION BAR moves forward, its associated
FUNCTION PAWL drops in the rear, onto the top rear portion of the
FUNCTION BAR, and the
FUNCTION PAWL is said to be selected.
(Power: Function Pawl Springs)

Final Positioning (Right View)

During the second quarter revolution of the
FUNCTION CLUTCH, the
FUNCTION CAM presents its high to and moves the
FOLLOWER ARM ROLLER, which moves its attached
FOLLOWER ARM to the front, rotating the
ROCKER SHAFT CW, which moves the
FUNCTION BAR RESET BAIL ROLLER, which moves its attached
FUNCTION BAR RESET BAIL CW, which moves the
FUNCTION BAR RESET BAIL BLADE, to the rear, which moves all
FUNCTION BARS to the rear. The selected
FUNCTION BAR will move its selected
FUNCTION PAWL to the rear, which will move the selected
FUNCTION LEVER top to the rear, and bottom to the front or CW.
(Power: Function Cam)
Either the top of the bottom of the selected (or operated)
FUNCTION LEVER will move a train of parts to operate the specific function
selected.

Resetting (Left Rear View)

During the first one half revolution of the
FUNCTION CLUTCH, the
FUNCTION CLUTCH ECCENTRIC operates the
FUNCTION CLUTCH ECCENTRIC FOLLOWER, which moves the
DRIVING LINK up, rotating the
DRIVING ARM CW, which rotates the
DRIVING CAM SHAFT CW, which moves the
DRIVING CAM CW, moving the
CAM ARMS CW, pulling the
STRIPPER BLADE down, from its normal stop position.
(Power: Function Clutch Eccentric)

During the last half revolution of the
FUNCTION CLUTCH, the
FUNCTION CLUTCH ECCENTRIC operates the
FUNCTION CLUTCH ECCENTRIC FOLLOWER, which moves the
DRIVING LINK down, rotating the
DRIVING ARM CCW, which rotates the
DRIVING CAM SHAFT CCW, which moves the
DRIVING CAMS CCW, which move the
CAM ARMS CCW, moving the

STRIPPER BLADE up, coming up under the selected
FUNCTION PAWLS, stripping them off their
FUNCTION BARS.
(Power: Function Clutch Eccentric)
The selected
FUNCTION PAWL SPRING returns the
FUNCTION PAWL to the front of the machine.
(Power: Function Pawl Spring)
The selected
FUNCTION LEVER SPRINGS return the
FUNCTION LEVERS top to the front, bottom to the rear, or to their normal stop position. Releasing the train of parts it operated for that function.
(Power: Function Lever Springs)

TYPICAL ASR FUNCTION (Stunt) BOX

Arrangement

FUNCTION	SLOT NUMBER	SIGNAL CODE	REMARKS
Unshift on Space	1	Space (--3--)	Function not used in USN, disabled.
Figures Shift	2	Figures (12-45)	
Letters Shift	3	Letters (12345)	
Automatic CR	4	Any	Selected when "0" code bar moved right.
Carriage Return	5	CR (---4-)	
Universal #1	12	Any	Becomes selected when Blocking Slide moved right, when operated it releases and allows Universal #2 to become selected.
Universal #2	13	Any	Becomes selected on first character after universal #1 is operated. When operated it strips off LF on CR Blocking Function Lever Latch.
LF on CR Blocking Function	14	CR (---4-)	When operated, moves Blocking Slide right.
Signal Bell	28	Upper Case "S" (1-3--)	Blocked by "S" code bar when the Letters Position.
Space Suppression on Single LF	34	LF (-2---)	Operates spacing suppression bail.
Blank Function	35	Blank (-----)	Prevents Keyboard Lock Function Bar from becoming selected on first blank signal.
Keyboard Lock	36	Blank (-----)	Selected on 2nd consecutive blank signal.
Automatic LF	38	Any	Selected when "0" code bar moves to right.
LF on CR Function	39	CR (---4-)	Operates LF slide arm when CR signal into machine and whenever Automatic LF function is operated.
LF	40	LF (-2---)	

Total number of slots available is 42. Function box may contain more functions, amount normally governed by operational requirements at installation site.

Information Sheet 2-4-3I

NORMAL AND LOCAL CARRIAGE RETURN

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the normal carriage return function, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the normal carriage return function. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

3. LOCATE and IDENTIFY, by name, the parts of the local carriage return train of parts, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of local carriage return. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Normal Carriage Return (left view)

When the carriage return function is selected and operated, the CARRIAGE RETURN FUNCTION LEVER moves top to the rear, bottom to the front, and is latched in this operated position by the CARRIAGE RETURN FUNCTION LEVER LATCH, which will ensure that the carriage return train of parts will be held operated long enough for the carriage to return to the left side of the automatic typer.

The bottom of the CARRIAGE RETURN FUNCTION LEVER moving to the front, moves the CARRIAGE RETURN SLIDE ARM to the front, which rotates the CARRIAGE RETURN BAIL CW, or top to the front, moving the SPACING DRUM FEED PAWL RELEASE LINK down, causing the upper arm of the SPACING DRUM FEED PAWL RELEASE LINK to pivot CCW, lifting both (front view) SPACING DRUM FEED PAWLS out of engagement with the SPACING DRUM.

(Power: Function Cam)

The CARRIAGE RETURN LATCH BAIL SPRING then rotates the CARRIAGE RETURN LATCH BAIL CCW, latching the CARRIAGE RETURN LEVER down in front. The

CARRIAGE RETURN LATCH BAIL also moves the
CARRIAGE RETURN LATCH BAIL PLATE CCW.
(Power: Carriage Return Latch Bail Spring)
When the
SPACING DRUM FEED PAWLS were moved out of engagement with the
SPACING DRUM, it allowed the
CARRIAGE RETURN SPRING DRUM SPRING to rotate the
CARRIAGE RETURN SPRING DRUM CCW, pulling the
UPPER DRAW WIRE ROPE to the left, which pulls the
OSCILLATING RAIL SLIDE to the left, which moves
TYPE BOX CARRIAGE and
PRINTING CARRIAGE to the left hand margin. The
UPPER DRAW WIRE ROPE also rotates the
SPACING DRUM CCW, which moves the attached
STOP RING CCW, which moves its attached
STOP ARM and
STOP ARM ROLLER CCW, which moves the
TRANSFER SLIDE with attached
DASHPOT PISTON, right, into the
DASHPOT CYLINDER. Air will escape through the hole in the right end. How fast air escapes is determined by the adjustment of the
BALL VALVE ASSEMBLY.
(Power: Carriage Return Spring Drum Spring)

The
STOP RING moving CCW, also moves the
STOP RING PROJECTION CCW, which strikes and moves the
CARRIAGE RETURN LATCH BAIL PLATE CW, moving the attached
CARRIAGE RETURN LATCH BAIL CW, releasing the
CARRIAGE RETURN LEVER.
(Power: Carriage Return Spring Drum Spring)

Resetting

Upon receipt of the next signal into the machine, the
STRIPPER BLADE will move down, and strike the
CARRIAGE RETURN FUNCTION LEVER LATCH, releasing the
CARRIAGE RETURN FUNCTION LEVER.
This allows the
CARRIAGE RETURN FUNCTION LEVER SPRING to move the
CARRIAGE RETURN FUNCTION LEVER top to the front, bottom to the rear, away from the
CARRIAGE RETURN SLIDE ARM.
(Power: Carriage Return Function Lever Spring)
This allows the
SPACING DRUM FEED PAWL RELEASE LINK SPRING to move the
SPACING DRUM FEED PAWL RELEASE LINK up, pivoting the upper arm CW, releasing the
SPACING DRUM FEED PAWLS.
(Power: Spacing Drum Feed Pawl Release Link Spring)

This allows the
SPACING DRUM FEED PAWL SPRINGS to rotate both
SPACING DRUM FEED PAWLS CW, reengaging the
SPACING DRUM.
(Power: Spacing Drum Feed Pawl Springs)
As the
SPACING DRUM FEED PAWL RELEASE LINK is moving up, it also moves the
CARRIAGE RETURN LEVER CCW, or up in front, which moves the (left view)
CARRIAGE RETURN BAIL CCW, or top to the rear, moving the
CARRIAGE RETURN SLIDE ARM to the rear, normal stop position.
(Power: Spacing Drum Feed Pawl Release Link Spring)

Local Carriage Return

By depressing the red
LOCAL CARRIAGE RETURN KEY, it moves the
LOCAL CARRIAGE RETURN KEYLEVER down, which moves the
LOCAL CARRIAGE RETURN FUNCTION LEVER down in front, up in the rear, moving the
LOCAL CARRIAGE RETURN BAIL CCW, which moves the (left view)
CARRIAGE RETURN LEVER (on the Auto Typer) down in front. A carriage return is effected in the same manner as described above for normal carriage return.
(Power: None)

As the red
LOCAL CARRIAGE RETURN KEY is released, it allows the
LOCAL CARRIAGE RETURN FUNCTION LEVER SPRING to rotate the
LOCAL CARRIAGE RETURN FUNCTION LEVER up in front, and down in the rear, away from the
LOCAL CARRIAGE RETURN BAIL. As the
LOCAL CARRIAGE RETURN FUNCTION LEVER moves up in front, it moves the
LOCAL CARRIAGE RETURN KEYLEVER up, which moves its attached
LOCAL CARRIAGE RETURN KEY up.
(Power: Local Carriage Return Function Lever Spring)
The
LOCAL CARRIAGE RETURN BAIL SPRING then moves the
LOCAL CARRIAGE RETURN BAIL CW, away from the (left view)
CARRIAGE RETURN LEVER.
(Power: Local Carriage Return Bail Spring)
This allows the
SPACING DRUM FEED PAWL RELEASE LINK SPRING to move the
SPACING DRUM FEED PAWL RELEASE LINK up, which moves the
CARRIAGE RETURN LEVER up, to its normal stop position.
(Power: Spacing Drum Feed Pawl Release Link Spring)

Information Sheet 2-4-4I

SPACING SUPPRESSION AND SIGNAL BELL

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of spacing suppression is to prevent a space when a non-printing function is operated.

2. LOCATE and IDENTIFY, by name, the parts of the spacing suppression train of parts, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of spacing suppression. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

4. LOCATE and IDENTIFY, by name, the parts of the signal bell function, using the actual equipment and the pictorial in NAVTRA 41048.

5. EXPLAIN the overall operation of the signal bell function. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Spacing Suppression - to prevent a space when a non-printing function is operated, such as blank, signal bell, letters, figures, carriage return and line feed.

During the operation of a non-printing function, the bottom of the operated
FUNCTION LEVER moves to the front, moving the
SPACING SUPPRESSION BAIL to the front, which moves the
SPACING SUPPRESSION SLIDE to the front, moving the top of the
SPACING TRIP LEVER to the front, away from the
INTERMEDIATE BAIL, which prevents the
SPACING CLUTCH from engaging, thereby preventing a space.
(Power: Function Cam)

Resetting

When the function is stripped or re-set, the
FUNCTION LEVER SPRING moves the
FUNCTION LEVER bottom to the rear, top to the front, away from the
SPACING SUPPRESSION BAIL.
(Power: Function Lever Spring)
This allows the
SPACING SUPPRESSION BAIL SPRINGS to return the
SPACING SUPPRESSION BAIL to the rear, away from the
SPACING SUPPRESSION SLIDE.
(Power: Spacing Suppression Bail Springs)
The
SPACING TRIP LEVER SPRING moves the
SPACING TRIP LEVER top to the rear, which moves the
SPACING SUPPRESSION SLIDE to the rear, to its normal stop position.
(Power: Spacing Trip Lever Spring)

Signal Bell

With the upper case "S" selected for a signal bell; during the second quarter revolution of the
FUNCTION CLUTCH, the
SIGNAL BELL FUNCTION BAR is moved to the rear, taking the
SIGNAL BELL FUNCTION PAWL to the rear, which moves the
SIGNAL BELL FUNCTION LEVER top to the rear, bottom to the front, moving out from under the
SIGNAL BELL CONTACT ARM.
(Power: Function Cam)
This allows the
SIGNAL BELL CONTACT SPRING to close the
SIGNAL BELL CONTACTS, completing an electrical circuit to the
SIGNAL BELL MAGNET.
(Power: Signal Bell Contact Spring)
The
SIGNAL BELL MAGNET energizes and attracts the
ARMATURE, causing the
SIGNAL BELL to ring one time.

During the last half revolution of the
FUNCTION CLUTCH, the
SIGNAL BELL FUNCTION PAWL is stripped by the
STRIPPER BLADE.
(Power: Function Clutch Eccentric)

This allows the
SIGNAL BELL FUNCTION LEVER SPRING to move the
SIGNAL BELL FUNCTION LEVER top to the front, bottom to the rear, coming up under the
SIGNAL BELL CONTACT ARM opening up the
SIGNAL BELL CONTACTS, and de-energizing the
SIGNAL BELL MAGNET.
(Power: Signal Bell Function Lever Spring)

When selecting the lower case "S", the signal bell function bar is prevented from going forward into the function box by the "S" Code Bar.

Information Sheet 2-4-5I

LETTERS FIGURES FUNCTIONS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of letters - figures, train of parts.

2. EXPLAIN the operation of the letters - figures shift. The explanation will include names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Figures Shift

With the figures code combination received, and during the first half revolution of the
TYPE BOX CLUTCH, the
MAIN BAIL moves down.
(Power: Type Box Clutch)
The
FIGURES FUNCTION BAR is selected and operated, moving the (top view)
FIGURES FUNCTION LEVER top to the rear, which moves the
FIGURES FUNCTION SLIDE to the rear, which cams the
LETTERS-FIGURES CODE BAR FORK CW, which moves the
BRACKET to the left, which moves the (front view)
LETTERS-FIGURES SHIFT CODE BAR (S Code Bar) to the left, moving the
LETTERS-FIGURES SHIFT SLIDE to the left, rotating the
LEFT And RIGHT SHIFT LINK BREAKER SLIDES CW, placing the right
SHIFT LINK BREAKER SLIDE straight up and down above the right
BREAKER SLIDE BAIL, and the left
SHIFT LINK BREAKER SLIDE away from the left
BREAKER SLIDE BAIL.
(Power: Function Cam)

During the second half revolution of the
TYPE BOX CLUTCH, the
MAIN BAIL moves up, moving the
BREAKER SLIDE BAILS up. The
RIGHT BREAKER SLIDE BAIL moving up, moves the
RIGHT SHIFT LINK BREAKER SLIDE up, initially buckling the

RIGHT OSCILLATING RAIL SHIFT LINK, which pulls the
OSCILLATING RAIL to the left, which starts to straighten the
LEFT OSCILLATING RAIL SHIFT LINK.
(Power: Type Box Clutch)
This allows the
LEFT OSCILLATING RAIL SHIFT LINK SPRING to completely straighten the
LEFT OSCILLATING RAIL SHIFT LINK, which now drives the
OSCILLATING RAIL to the left, which moves the
UPPER DRAW WIRE ROPE to the left, which moves the
OSCILLATING RAIL SLIDE to the left, which moves the
TYPE BOX CARRIAGE LINK to the left, moving the attached
TYPE BOX CARRIAGE to the left, which moves the
TYPE BOX further to the left, which will allow us to type in the figures half of the typebox.
(Power: Left Oscillating Rail Shift Link Spring)

The type box will remain in the figures position until letters is selected.

Also during the second half revolution of the
TYPE BOX CLUTCH, the
STRIPPER BLADE moves up, stripping off the
FIGURES FUNCTION PAWL.
(Power: Function Clutch Eccentric)
This allows the
FIGURES FUNCTION PAWL SPRING to move the
FIGURES FUNCTION PAWL to the front away from the
FIGURES FUNCTION LEVER.
(Power: Figures Function Pawl Spring)
Allowing the
FIGURES FUNCTION LEVER SPRING to move the (top view)
FIGURES FUNCTION LEVER top to front, which moves the
FIGURES FUNCTION SLIDE to the front, freeing the
LETTERS-FIGURES CODE BAR FORK.
(Power: Figures Function Lever Spring)

Letters Shift

With the letters code combination received, and during the first half revolution of the
TYPE BOX CLUTCH, the
MAIN BAIL moves down.
(Power: Type Box Clutch)
The
LETTERS FUNCTION BAR is selected and operated, moving the (top view)
LETTERS FUNCTION LEVER top to the rear, which moves the
LETTERS FUNCTION SLIDE to the rear, moving the
UNSHIFT-on-SPACE FUNCTION LEVER top to the rear.

As the
LETTERS FUNCTION SLIDE moves to the rear, it also cams the
LETTERS-FIGURES CODE BAR FORK CCW, which moves the
BRACKET to the right, which moves the (front view)
LETTERS-FIGURES SHIFT CODE BAR to the right, moving the
LETTERS-FIGURES SHIFT SLIDE to the right, rotating the
LEFT and RIGHT SHIFT LINK BREAKER SLIDES CCW, placing the left
SHIFT LINK BREAKER SLIDE straight up and down above the
LEFT BREAKER SLIDE BAIL, and the right
SHIFT LINK BREAKER SLIDE away from the
RIGHT BREAKER SLIDE BAIL.
(Power: Function Cam)

During the second half revolution of the
TYPE BOX CLUTCH, the
MAIN BAIL moves up, moving the
BREAKER SLIDE BAILS up. The
LEFT BREAKER SLIDE BAIL moves the
LEFT SHIFT LINK BREAKER SLIDE up, initially buckling the
LEFT OSCILLATING RAIL SHIFT LINK, which pulls the
OSCILLATING RAIL to the right, which starts to straighten the
RIGHT OSCILLATING RAIL SHIFT LINK.
(Power: Type Box Clutch)
This allows the
RIGHT OSCILLATING RAIL SHIFT LINK SPRING to completely straighten the
RIGHT OSCILLATING RAIL SHIFT LINK, which now drives the
OSCILLATING RAIL to the right, which moves the
UPPER DRAW WIRE ROPE to the right, which moves the
OSCILLATING RAIL SLIDE to the right, moving the
TYPE BOX CARRIAGE LINK to the right, moving the attached
TYPE BOX CARRIAGE to the right, which moves the
TYPE BOX further to the right, which will allow us to type in the letters
half of the type box.
(Power: Right Oscillating Rail Shift Link Spring)

The type box will remain the letters position until figures is selected.

Also during the second half revolution of the
TYPE BOX CLUTCH, the
STRIPPER BLADE moves up, stripping off the
LETTERS FUNCTION PAWL.
(Power: Function Clutch Eccentric)
Allowing the
LETTERS FUNCTION PAWL SPRING to move the
LETTERS FUNCTION PAWL to the front away from the
LETTERS FUNCTION LEVER.
(Power: Letters Function Pawl Spring)

This allows the
LETTERS FUNCTION LEVER SPRING to move the (front view)
LETTERS FUNCTION LEVER top to the front, away from the
LETTERS FUNCTION SLIDE.
(Power: Letters Function Lever Spring)
Allowing the
UNSHIFT-ON-SPACE FUNCTION LEVER SPRING to move the
UNSHIFT-ON-SPACE FUNCTION LEVER top to the front, moving the
LETTERS FUNCTION SLIDE to the front, freeing the
LETTERS-FIGURES CODE BAR FORK.
(Power: Unshift-On-Space Function Lever Spring)

Unshift-On-Space

The
UNSHIFT-ON-SPACE FUNCTION BAR is coded to become selected and operated when a space code combination is received. When selected, the
UNSHIFT-ON-SPACE FUNCTION LEVER is moved top to the rear, moving the
LETTERS FUNCTION SLIDE to the rear, which moves the
LETTERS-FIGURES CODE BAR FORK to the right, and normal letters shift takes place as described above.

The Unshift-On-Space function is disabled by raising the rear of the unshift-on-space function pawl with the disabling screw. The U. S. Navy does not normally utilize this function and it must be disabled on all teletype machines. Even though disabled, the unshift-on-space function lever and springs are utilized when a letters function is selected.

Information Sheet 2-4-6I

LINE FEED MECHANISMS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the line feed mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the line feed mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. ;

INFORMATION

Normal Line Feed (double line feed)

By moving the
SINGLE/DOUBLE LF LEVER to the #2 position, it moves the
OPERATING ARM CCW, which moves the (right view)
STRIPPER BAIL ARM CW, out of the slot in the (top view)
LF FUNCTION PAWL STRIPPER, disabling it.
(Power: None)
When the LF function is selected, and operated, the
LF FUNCTION LEVER move top to rear, bottom to the front, moving the (right view)
LF SLIDE ARM to the front, which moves the
LF CLUTCH TRIP ARM CCW, moving the
LF CLUTCH TRIP LEVER ADJUSTING SCREW to the rear, which moves the
LF CLUTCH TRIP LEVER CCW, out of the path of the
LF CLUTCH SHOE LEVER, allowing the
LF CLUTCH to engage, extending motion to the
LF CLUTCH SPUR GEAR.
(Power: Function Cam)
As the
STRIPPER BLADE is moving up, with the attached
LF FUNCTION PAWL STRIPPER, it will strip off the
LF FUNCTION PAWL.
(Power: Function Clutch Eccentric)
This allows the
LF FUNCTION LEVER SPRING to move the
LF FUNCTION LEVER top to front, bottom to rear, away from the
LF SLIDE ARM.
(Power: LF Function Lever Spring)

The
LF CLUTCH TRIP LEVER SPRING moves the
LF CLUTCH TRIP LEVER CW, back into the path of the
LF CLUTCH SHOE LEVER, allowing the
LF CLUTCH to disengage after 2/3 revolution.

The timing relationship between the stripper blade cycle and the main shaft is such that the function pawl is not stripped from the function bar, until after more than 1/3 revolution of the LF clutch has occured. Thus, the LF clutch trip lever will stop the LF clutch after 2/3 of a revolution, or when double line feed has taken place.

The
LF CLUTCH TRIP LEVER also moves the
LF CLUTCH TRIP LEVER ADJUSTING SCREW to the front, moving the
LF CLUTCH TRIP ARM CW, which moves the
LF SLIDE ARM to the rear.
(Power: LF Clutch Trip Lever Spring)
With the
LF CLUTCH engaged and extending motion to the
LF CLUTCH SPUR GEAR, which meshes and rotates the (right view)
LF ECCENTRIC SPUR GEAR, which rotates two 180 degree off-set
LF ECCENTRICS, which working in conjunction with the
LF BAR BELL CRANK extend stepping motion to the two
LF BARS.
(Power: LF Clutch Spur Gear)
The
LF BAR BELL CRANK SPRING holds the
LF BARS into engagement with the
LF SPUR GEAR.
(Power: LF Bar Bell Crank Spring)
As the
LF BARS continue their stepping motion, one idling to rear and moving up, other
LF BAR is engaged with and pulling down the
LF SPUR GEAR, which rotates the
PLATEN CW, advancing the paper one line for each 1/3 revolution of the
LF CLUTCH.
(Power: LF Clutch Spur Gear)
The
PLATEN DETENT BAIL SPRING holds the
PLATEN DETENT BAIL against the
LF SPUR GEAR to hold the
PLATEN in its last operated position.
(Power: Platen Detent Bail Spring)

Single Line Feed

By moving the
SINGLE/DOUBLE LF LEVER to the #1 position, it moves the
OPERATING ARM CW, away from the (right view)
STRIPPER BAIL ARM.
(Power: None)
This allows the
STRIPPER BAIL ARM SPRING to move the
STRIPPER BAIL ARM CCW, into the notch of the (top view)
LF FUNCTION PAWL STRIPPER, enabling it.
(Power: Stripper Bail Arm Spring)

When the LF function is selected and operated, the
LF FUNCTION LEVER moves top to rear, bottom to the front, moving the (right view)
LF SLIDE ARM to the front, which moves the
LF CLUTCH TRIP ARM CCW, which moves the
LF CLUTCH TRIP LEVER ADJUSTING SCREW to the rear moving the
LF CLUTCH TRIP LEVER CCW, out of the path of the
LF CLUTCH SHOE LEVER, which allows the
LF CLUTCH to engage, extending motion to the
LF CLUTCH CAM DISK, which rotates, immediately presenting one of three highs to the
STRIPPER BAIL, which moves CCW, moving the
STRIPPER BAIL ARM CCW, or up in the rear, moving the
LF FUNCTION PAWL STRIPPER up, stripping off the
LF FUNCTION PAWL.
(Power: LF Clutch Cam Disk)
This allows the
LF FUNCTION LEVER SPRING to move the
LF FUNCTION LEVER top to front, bottom to the rear, away from the
LF SLIDE ARM.
(Power: LF Function Lever Spring)
The
LF CLUTCH TRIP LEVER SPRING moves the
LF CLUTCH TRIP LEVER CW, back into the path of the
LF CLUTCH SHOE LEVER, allowing the
LF CLUTCH to disengage after 1/3 of a revolution.
The
LF CLUTCH TRIP LEVER also moves the
LF CLUTCH TRIP LEVER ADJUSTING SCREW to the front, moving the
LF CLUTCH TRIP ARM CW, which moves the
LF SLIDE ARM to the rear.
(Power: LF Clutch Trip Lever Spring)

Spacing Suppression on Signal Line Feed

During single line feed, the LF function mechanism is stripped off immediately, preventing it from being operated long enough to allow for normal spacing suppression. So an additional
LF FUNCTION BAR, PAWL, LEVER and SPRINGS were added in the function box in slot 34, away from the
LF FUNCTION PAWL STRIPPER, so that it cannot strip off this pawl. Whenever the LF signal is received, this function is also operated, and its only purpose is to operate the spacing suppression bail, thereby preventing a space on single line feed.

Local Line Feed (LLF)

By pushing the
LLF KEY down, it moves the
LLF KEYLEVER down, moving the
LLF FUNCTION LEVER down in front, up in the rear, which rotates the
LLF BAIL CCW, which moves the (left view)
LLF TRIP LINK to the rear, moving the
LF CLUTCH TRIP LEVER out of the path of the
LF CLUTCH SHOE LEVER, allowing the
LF CLUTCH to engage. It will rotate continuously until the
LLF KEY is released.
(Power: None)

When the
LLF KEY is released, the
LLF FUNCTION LEVER SPRING moves the
LLF FUNCTION LEVER up in front, moving the
LLF KEYLEVER up, which moves the
LLF KEY up.
The
LLF FUNCTION LEVER also moves down in the rear, away from the
LLF BAIL
(Power: LLF Function Lever Spring)
This allows the
LLF TRIP LINK SPRING to move the
LLF TRIP LINK to the front, moving the
LLF BAIL CW. (left view)
(Power: LLF Trip Link Spring)
Allowing the
LF CLUTCH TRIP LEVER SPRING to move the
LF CLUTCH TRIP LEVER back into the path of the
LF CLUTCH SHOE LEVER, allowing the
LF CLUTCH to disengage.
(Power: LF Clutch Trip Lever Spring)

Manual Line Feed (right view)

When the
PLATEN HAND WHEEL is moved either CW or CCW it will rotate the
PLATEN HAND WHEEL SHAFT which rotates the
LF LEVER either CW or CCW which strikes the top of the
LF BAR RELEASE LEVER, pushing it down, moving the
LF BAR BELL CRANK towards the rear of CW, moving both
LF BARS toward the rear, away from the
LF SPUR GEAR.

Any further rotation of the
PLATEN HAND WHEEL will rotate the
PLATEN HAND WHEEL SPUR GEAR, which will rotate the
PLATEN IDLER SPUR GEAR which rotates the
PLATEN SPUR GEAR which is attached to the
PLATEN.

(Power: None)

When the
PLATEN HAND WHEEL is released, the
LF BAR RELEASE LEVER SPRING moves the
LF BAR RELEASE LEVER up, away from the
LF BAR BELL CRANK. The
LF BAR RELEASE LEVER also strikes the
LF LEVER and moves it back to its normal stop position, which moves the
PLATEN HAND WHEEL SHAFT and attached
PLATEN HAND WHEEL back to its normal stop position.

(Power: LF Bar Release Lever Spring)

This allows the
LF BAR BELL CRANK SPRING to move the
LF BAR BELL CRANK to the front or CCW, which moves the
LF BARS towards the front, reengaging the
LF SPUR GEAR.

(Power: LF Bar Bell Crank Spring)

Information Sheet 2-4-7I

AUTOMATIC LINE FEED ON CARRIAGE RETURN

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the automatic line feed on carriage return train of parts, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the automatic line feed on carriage return train of parts. The explanation will include names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Automatic Line Feed on Carriage Return is to prevent the automatic typer from overlining. It also prevents a Line Feed from being operated for two characters after operating a carriage return.

Operation

Upon receipt of a CR signal into the teletype machine, the normal carriage return functions are selected and operated, and the carriage is returned. Also the
LF on CR FUNCTION is selected and operated. (Coded for CR) As the
LF on CR FUNCTION LEVER operates top to rear, bottom to front, it moves the
LF SLIDE ARM to the front, effecting a LF. The
LF on CR BLOCKING FUNCTION is also selected and operated. (Coded for CR) As the
LF on CR BLOCKING FUNCTION LEVER is moved top to the rear, bottom to the front, it is latched by the
LF on CR BLOCKING FUNCTION LEVER LATCH. The
LF on CR BLOCKING FUNCTION LEVER moves the
LF on CR BLOCKING FUNCTION LEVER SLIDE to the rear, which cams the
SHIFT PLATE ROLLER to the right, which moves the
SHIFT PLATE POST to the right, placing tension on the
BLOCKING SLIDE SPRING.
(Power: Function Cam)
The
BLOCKING SIDE SPRING moves the
BLOCKING SLIDE to the right, causing the attached

BLOCKING SLIDE PROJECTIONS to move in front of the
LF on CR FUNCTION BAR (slot 39) and the
LF FUNCTION BAR (slot 40), preventing both from becoming selected.
At the same time, the
BLOCKING SLIDE PROJECTIONS are moved from in front of the
UNIVERSAL #1 FUNCTION BAR (slot 12) and the
UNIVERSAL #2 FUNCTION BAR (slot 13). These function bars have no tines, and can now be selected regardless of the signal code to the machine.
(Power: Blocking Slide Spring)
Upon receipt of the first signal into the machine after the first CR, the
UNIVERSAL #1 FUNCTION BAR moves forward, and becomes selected.
(Power: Universal #1 Function Bar Spring)
UNIVERSAL #2 FUNCTION BAR although identical is prevented from becoming selected by the
UNIVERSAL #1 FUNCTION LEVER EXTENSION.
(Power: None)
As the
UNIVERSAL #1 FUNCTION LEVER is operated, it moves top to rear, bottom to the front.
(Power: Function Cam)
This allows the
UNIVERSAL #1 FUNCTION LEVER LATCH SPRING to rotate the
UNIVERSAL #1 FUNCTION LEVER LATCH CW, latching the (left view)
UNIVERSAL #2 FUNCTION BAR, which will allow it to be operated on the next character.
(Power: Function Cam)

Upon receipt of the second signal into the machine after the first CR, the
UNIVERSAL #2 FUNCTION BAR also moves forward and becomes selected.
(Power: Universal #2 Function Bar Spring)
As the
UNIVERSAL #2 FUNCTION LEVER moves top to the rear, bottom to the front, the bottom strikes the
LF on CR BLOCKING FUNCTION LEVER LATCH, which frees the
LF on CR BLOCKING FUNCTION LEVER.
(Power: Function Cam)
This allows the
LF on CR BLOCKING FUNCTION LEVER SPRING to move the
LF on CR BLOCKING FUNCTION LEVER top to the front, moving the
LF on CR BLOCKING FUNCTION SLIDE to the front, which frees the
SHIFT PLATE POST.
(Power: LF on CR Blocking Function Lever Spring)

Allowing the
SHIFT PLATE POST SPRING to move the
SHIFT PLATE POST to the left, moving the
BLOCKING SLIDE to the left, moving the attached
BLOCKING SLIDE PROJECTIONS. This places the projections back in front of slots 12 and 13, and moves them away from slots 39 and 40.
(Power: Shift Plate Post Spring)

All parts have been reset except the
UNIVERSAL #1 FUNCTION LEVER, which is still latched by the
UNIVERSAL #1 FUNCTION LEVER LATCH. It will remain latched until the next signal is received and the
STRIPPER BLADE moves down, stripping it off.

Information Sheet 2-4-8I

AUTOMATIC CARRIAGE RETURN AND LINE FEED

TOPIC OBJECTIVE

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the carriage return and line feed train of parts, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the automatic carriage return and line feed train of parts. The explanation will include the name of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Automatic Carriage Return and Line Feed (ACRLF)

The purpose of the automatic carriage return and line feed is to automatically operate the CR add LF train of parts when the printing and type box carriages reach a predetermined point.

Operation

As the
SPACING DRUM is rotating CW, at a predetermined point, the attached
ACR RING and PROJECTION will strike and rotate the
ACR BELL CRANK CW, which moves the
ACRLF CODE BAR (or O code bar) to the right.
(Power: Spacing Shaft Helical Driving Gear)
This allows the
ACR FUNCTION BAR and the
ALF FUNCTION BAR to become selected and operated. As the
ACR FUNCTION LEVER moves top to the rear, bottom to the front, it moves the
CR SLIDE ARM to the front, activating the normal CR train of parts. The
ALF FUNCTION PAWL moves to the rear, moving the
ALF FUNCTION PAWL EXTENSION to the rear, which moves the
ALF on CR FUNCTION LEVER top to the rear, bottom to the front, which moves the
LF SLIDE ARM to the front, activating the normal LF train of parts.
(Power: Function Cam)

Resetting

With the CR train of parts operated the SPACING DRUM is rotating CCW, which moves the attached ACR RING and PROJECTION CCW, away from the ACR BELL BRANK.
(Power: CR Spring Drum Spring)
This allows the ACR BELL CRANK SPRING to move the ACR BELL CRANK CCW, which moves the ACRLF CODE BAR to the left, which will prevent the ACR FUNCTION BAR and the ALF FUNCTION BAR from being selected.
(Power: ACR Bell Crank Spring)

Information Sheet 2-4-9I

REMOTE KEYBOARD LOCK MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the remote keyboard lock mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the remote keyboard lock mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the remote keyboard lock mechanism is to permit a station to lock the keyboards of other stations on the circuit by remote means.

Operation

Upon receipt of the first blank code combination to the machine, the BLANK FUNCTION BAR SPRING moves the BLANK FUNCTION BAR forward, and it becomes selected.
(Power: Blank Function Bar Spring)
The KEYBOARD LOCK FUNCTION BAR (coded for a blank) is prevented from going forward by the BLANK FUNCTION LEVER EXTENSION. As the BLANK FUNCTION LEVER moves top to the rear, it moves the BLANK FUNCTION LEVER EXTENSION out of engagement with the KEYBOARD LOCK FUNCTION BAR, but it is too late for it to become selected.
(Power: Function Cam)
The BLANK FUNCTION LEVER LATCH SPRING will rotate the BLANK FUNCTION LEVER LATCH CCW, latching the (right view) BLANK FUNCTION LEVER until the next signal into the machine, and the stripper blade moves down.
(Power: Blank Function Lever Latch Spring)
If the next signal into the machine is another blank, the KEYBOARD LOCK FUNCTION BAR is now allowed to move forward and become selected, and operated. The bottom of the KEYBOARD LOCK FUNCTION LEVER moves the KEYBOARD LOCK SLIDE ARM to the front, which moves the KEYBOARD LOCK LEVER down, striking the

KEYBOARD LOCK PLUNGER and moving it down.
(Power: Function Cam)
The
KEYBOARD LOCK PLUNGER moving down, compresses the
PLUNGER LOCK SPRING, which moves the
KEYBOARD LOCK BAIL CCW, which rotates the (left view)
KEYBOARD LOCK FUNCTION LEVER CW, which moves the
LOCKBAR LATCH CCW, out of engagement with the (front view)
LOCKBAR.
(Power: Plunger Lock Spring)
The
KEYBOARD LOCK SWITCH SPRINGS move the
SWITCH LEVER CW, which pulls the
LOCK BAR to the right or to the lock position. The
KEYBOARD LOCK SWITCH opens and closes contacts, shunting (by passing) the signal generator contacts.
(Power: Keyboard Lock Switch Springs)
As the
KEYBOARD LOCK FUNCTION LEVER moved CW, it also moved the
REC KEYLEVER down, which moved the
REC KEY down.
(Power: Plunger Lock Spring)

As the stripper blade moves down, it strips off the
BLANK FUNCTION LEVER LATCH. As the stripper blade moves up it strips off the
KEYBOARD LOCK FUNCTION PAWL, which allows the
KEYBOARD LOCK FUNCTION LEVER to return top to front, releasing the
KEYBOARD LOCK SLIDE ARM.
This allows the
KEYBOARD LOCK LEVER SPRING to move the
KEYBOARD LOCK LEVER up, which moves the
KEYBOARD LOCK SLIDE ARM to the rear.
(Power: Keyboard Lock Lever Spring)
The
PLUNGER SPRING moves the
KEYBOARD LOCK PLUNGER back up to its normal unoperated position, which moves the
KEYBOARD LOCK BAIL CW (left view).
(Power: Plunger Spring)
If the second signal received into the machine was other than a blank, then when the stripper blade stripped off the
BLANK FUNCTION LEVER LATCH, the
BLANK FUNCTION LEVER would have returned to its normal stop position, placing the
BLANK FUNCTION LEVER EXTENSION back into engagement with the
KEYBOARD LOCK FUNCTION BAR, preventing it from becoming selected and operated, and preventing the keyboard from being locked up.

Information Sheet 2-5-1I

CLEANING TANKS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. DESCRIBE the three types of cleaning tanks as listed in the Information Sheet 2-5-1I of NAVTRA 41046. The description will include the name of each, when they are used, the methods of their use and the various cleaning fluids used in them.

2. EXPLAIN all safety precautions applicable to handling equipment and cleaning fluids, as listed in Information Sheet 2-5-1I of NAVTRA 41046.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Types of Cleaning Tanks

Greymills clean-o-matic
Magnasol small parts cleaning tank
Ultrasonic cleaner

Various methods of use

All cleaners will utilize one of the following methods to clean the appropriate parts.

Forced spraying agitation. (Greymills or Magnasol) This is where cleaning fluid is pumped through a small pipe with various sized holes in it and the fluid drains down through the machine.

Forced air pressure. This is where the parts are setting in a tank full of fluid, and air is forced through a pipe with various sized holes in it, causing an agitating action, moving the fluid through the machine.

Rocking or oscillating. The parts are set on a platform, and the platform is moved through the fluid by forced air.

Ultrasonic Cleaner. In this unit, the teletype machine is placed in a cleaning fluid or freon or soap and water and cleaned by ultrasonic sound waves, which are produced by the cleaning unit.

Cleaning Fluids. The following types of cleaning fluids may be used, depending on the type of cleaning tank you have. Agitene, Super Agitene, Lix Office Machine Concentrate (must by cut), Varsol, Magnasol concentrate, Triclorethilene, Gunk Freon, or Teletype Corporation cleaning concentrate.

When to clean the teletype machine.

When operating at 60 WPM the teletype machine will be cleaned every PMS check A1R, which is annually or every 3000 hours of operation, whichever comes first. When operating at 100 WPM it will be cleaned every PMS check S1R, which is semiannually or every 1500 hours of operation, whichever comes first.

Safety Precautions

Ensure the main power switch is secured and tagged with the name of the man actually working on the equipment. Only that man is authorized to remove the tag.

Ensure the DC loop is disconnected.
After cleaning the teletype machine, lubricate all parts per the technical manual. Check all sealed bearings to ensure the lubricant is still intact.
Ensure that when working with cleaning fluids you have the proper ventilation, as most of the fumes from any cleaning agent are toxic.
Avoid blowing air directly into the cleaning agent to prevent blow back of the fluid into your eyes.
Read the instructions contained with or on the cleaning agent container, and follow these instructions as they are <u>for your own safety</u>.

Information Sheet 2-6-1I

TROUBLESHOOTING PROCEDURES

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. EXPLAIN how to fill out a trouble analysis chit properly. The explanation will be limited to the information provided in Information Sheet 2-6-1I of NAVTRA 41046.

2. EXPLAIN the scoring system used during troubleshooting. The explanation is limited to information provided in Information Sheet 2-6-1I of NAVTRA 41046.

3. EXPLAIN the logical troubleshooting procedures for the automatic typer: recognizing and diagnosing symptoms, isolating the fault to the area or train of parts, localizing the faulty or maladjusted part and analyzing the cause of the malfunction.

REFERENCES

NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3

INFORMATION

Trouble Analysis Chit

This is a locally prepared form to help you follow logical troubleshooting procedures, and it is used also by the instructors to compute your score for each individual trouble. It is filled in by each student following the format described below.

Block 1 - Sympton - explain in your own words the symptom of the teletype machine, such as running open, closed or garbling.

Block 2 - Major Component - list the major component that the malfunction is located in. (Automatic Typer, T/D or Keyboard)

Block 3 - Isolate - trace the malfunction down to the appropriate circuit as named on your schematic for electrical troubles, or to the appropriate train of parts for a mechanical trouble. The train of parts must be obtained from the technical manual at either the top of the page, or the bottom of the page that the adjustment is located on, or the page that the missing part is on.

Block 4 - Analysis - this is to point out the <u>exact</u> trouble as you have located it.

Maladjustment - you must state the section, page number and title of the adjustment you believe necessary to correct the trouble located.

Missing/Broken Part - list the part number and the manufacturers name. (Found in Vol. 3)

Circuit - This is used for electrical troubles only, and you must state circuit condition and test point; i.e...open C120 to C122, or short between AH1 and AH3.

Miscellaneous - state in your own words what the trouble is, only if it cannot be explained appropriately in blocks above. (Example: Spacing Clutch loose on main shaft...etc.)

Scoring System

Your grade will be determined by an instructor, using your filled in trouble analysis chit.

Time - 20 points, within first 5 minutes 20 points, every one minute thereafter, minus 1 point.
Symptom - 10 points
Component - 10 points
Circuit or Train of Parts - 20 points
Analysis - 40 points. If instructor guidance is needed to locate part in technical manual or to help locate the trouble 10 points will be deducted.

Logical Troubleshooting Procedures for the Automatic Typer

Plug in AC and DC
Turn on machine
If machine appears to run open, hold the selector armature up. If the automatic typer locks up, you most probably have an electrical problem. Call an instructor for assistance.
If machine continues to trip off, you most probably have a mechanical problem.
Unplug both AC and DC from machine, remove "R" plug, place automatic typer in number 3 position, and check the order of operation of the clutches on the main shaft, check to see if they are engaging/disengaging in proper order. If not, follow that particular train of parts until the malfunction or missing part is located.
Place Line Test Key in test position, move Keyboard Control Know to "K" position and type out test.
Observe all aspects of printing and function operations.
Quality of printing. (Ocean Motion)
Proper operation of functions.
Legibility (garbling)

If machine is garbling, determine which impulse is being gained or dropped. Start at the selector unit and trace that impulse train of parts until the malfunction or missing part is located. If random garbling is occuring, check the train of parts that would be common to all impulses.

Information Sheet 3-1-1I

LOCK BALL MECHANISM AND ENGAGING THE SIGNAL GENERATOR CLUTCH

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the power law for the keyboard as given in the Trainee's Guide, NAVTRA 41046.

2. STATE that the purpose of the lock ball mechanism is to prevent more than one key being depressed at the same time.

3. LOCATE and IDENTIFY, by name, the parts of the lock ball mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of the lock ball mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

5. LOCATE and IDENTIFY, by name, the parts used to engage the signal generator clutch, using the actual equipment and the pictorial in NAVTRA 41048.

6. EXPLAIN the overall operation of engaging the signal generator clutch. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The Power Law for Keyboard is "The Keyboard Helical Driving Gear, and springs throughout the Keyboard."

The purpose of the lock ball mechanism to to prevent more than one key being depressed at the same time. This applies to all keys except the red local function keys.

Lock Ball Mechanism Operation

By depressing any (except local function keys) KEY, it will move down, moving the KEYLEVER down, which moves the CODE LEVER down in front, up in the rear. Attached to it is the

WEDGELOCK, which moves down, separating the
LOCK BALLS, which move left and right in the
LOCK BALL CHANNEL, preventing any other
KEYLEVER from being operated. The
LOCK BALLS are kept in a straight line on the
LOCK BALL CHANNEL by the
LOCK BALL RETAINER.
(Power: None)
As the
KEY is released, the
CODE LVER SPRING moves the
CODE LEVER up in front, down in rear, moving the
WEDGELOCK up, away from the
LOCK BALLS. As the
CODE LEVER moved up in front, it also moved the
KEYLEVER up, which moves the
KEY up to its normal stop position.
(Power: Code Lever Spring)

Engaging the Signal Generator Clutch Operation

As a
KEY is pushed down, it moves the (right view)
KEYLEVER down, moving the
CODE LEVER down in front, up in rear, moving the
FRONT BAR CW which moves the
CODE LEVER UNIVERSAL BAIL CW, which moves its attached
CODE LEVER UNIVERSAL BAIL REAR EXTENSION CW, out from under the
UNIVERSAL BAIL LATCH LEVER.
(Power: None)
This allows the
UNIVERSAL BAIL LATCH LEVER SPRING to rotate the
UNIVERSAL BAIL LATCH LEVER CW, which strikes and rotates the
CODE BAR BAIL LATCH CW, releasing the (front view)
CODE BAR BAIL.
(Power: Universal Bail Latch Lever Spring)
Allowing the
CODE BAR BAIL SPRING to move the
CODE BAR BAIL CCW, releasing the
CODE BARS.
(Power: Code Bar Bail Spring)
This allows the
UNIVERSAL CODE BAR SPRING to pull the
UNIVERSAL CODE BAR to the right, away from the
CLUTCH TRIP MAGNET CONDITIONING CONTACTS.
(Power: Universal Code Bar Spring)
The
CLUTCH TRIP MAGNET CONDITIONING CONTACT SPRING closes the
CLUTCH TRIP MAGNET CONDITIONING CONTACTS, which completes a circuit to the
CLUTCH TRIP MAGNET. As it becomes energized, it attracts its
ARMATURE, which moves the
ARMATURE BAIL to the front, away from the
CLUTCH TRIP BAR.
(Power: Clutch Trip Magnet Conditioning Contact Spring)

ARMATURE, which moves the
ARMATURE BAIL to the front, away from the
CLUTCH TRIP BAR.
(Power: Clutch Trip Magnet Conditioning Contact Spring)

This allows the
CLUTCH TRIP BAR SPRING to move the
CLUTCH TRIP BAR to the right, rotating the
CLUTCH TRIP LEVER CCW, which moves the
CLUTCH STOP LEVER CCW, out of the path of the
CLUTCH SHOE LEVER. This allows the
SIGNAL GENERATOR CLUTCH to start rotating, extending motion to the
SIGNAL GENERATOR CAM SLEEVE ASSEMBLY.
(Power: Clutch Trip Bar Spring)

Information Sheet 3-1-2I

SIGNAL GENERATOR MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of the signal generator mechanism is to convert mechanical action to electrical impulses.

2. LOCATE and IDENTIFY, by name, the parts of the signal generator mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of the signal generator mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the signal generator mechanism is to convert mechanical action, (depressing a key), to electrical impulses for use by the automatic typer.

Cam Sleeve Assembly

Machined onto the cam sleeve assembly are the following cams, (rear to front) #1, 2, start, 3, 4, 5, stop and the locking bail cam. Mounted on the front of the assembly is an eccentric, which with its associated train of parts is used to reset the codebar bail.

Initial Positioning

As a KEY is depressed, it moves the KEYLEVER down, which moves the CODE LEVER down in front, up in rear, entering notches in the MARKING CODE BARS. The SPACING CODE BARS will be held to the left by the selected CODE LEVER.
(Power: None)

The MARKING CODE BAR SPRINGS move the MARKING CODE BARS to the right, moving their attached MARKING CODE BAR PROJECTIONS to the right, which strike and rotate the MARKING TRANSFER LEVERS top to the right or CW.
(Power: Marking Code Bar Springs)

The
SPACING TRANSFER LEVER SPRINGS will hold the
SPACING TRANSFER LEVERS to the left.
(Power: Spacing Transfer Lever Springs)
As the
SIGNAL GENERATOR CAM SLEEVE ASSEMBLY rotates; during the START impulse, the high of the
LOCKING BAIL CAM moves away from the
LOCKING BAIL.
(Power: Keyboard Helical Driving Gear)
This allows the
LOCKING BAIL SPRING to move the
LOCKING BAIL up, locking the tops of the
MARKING TRANSFER LEVERS in their initial position. This is to allow the code bars to reset for the next character while this character is in the process of being transmitted.
(Power: Locking Bail Spring)

Final Positioning

For a mark

With the
LOCKING BAIL holding the
MARKING TRANSFER LEVERS top to the right or CW, the
TRANSFER LEVER CAM moves the
TRANSFER LEVER down, which pulls on the left side of the
TRANSFER BAIL, moving it CCW, which moves the
DRIVE LINK to the left, moving the
CONTACT TOGGLE CW, closing the (top view)
MARKING CONTACT, which completes a circuit, allowing current to flow to the
SELECTOR MAGNETS
As the
TRANSFER BAIL moves CCW, it moves the (front view)
TRANSFER BAIL EXTENSION CCW.
(Power: Keyboard Helical Driving Gear)
This allows the
STABILIZER SPRING to pull the
SPACING TRANSFER BAIL DETENT LATCH CCW, which ensures the
TRANSFER BAIL is held in a marking condition.
(Power: Stabilizer Spring)

For a Space

As the
SPACING TRANSFER LEVERS are being held top to the left, the
TRANSFER LEVER CAM moves the
TRANSFER LEVER down, which pulls on the right side of the
TRANSFER BAIL, moving it CW, pulling the
DRIVE LINK SPRING to the right.
(Power: Keyboard Helical Driving Gear)

The
DRIVE LINK SPRING moving to the right, pulls the
DRIVE LINK to the right, which moves the
CONTACT TOGGLE CCW, closing the (top view)
SPACING CONTACT, which opens the circuit to the
SELECTOR MAGNETS.
(Power: Drive Link Spring)
As the
TRANSFER BAIL moves CW, it moves the attached
TRANSFER BAIL EXTENSION CW.
(Power: Keyboard Helical Driving Gear)
This allows the
STABILIZER SPRING to pull the
MARKING TRANSFER BAIL DETENT LATCH CW, ensuring that the
TRANSFER BAIL is held in a spacing condition.
(Power: Stabilizer Spring)

Resetting

As the high's on the
TRANSFER LEVER CAMS move away from the
TRANSFER LEVERS, the
TRANSFER LEVER SPRINGS will move the
TRANSFER LEVERS up.
(Power: Transfer Lever Springs)
After the 5th intelligence impulse is transmitted, the
LOCKING BAIL CAM presents its high to the
LOCKING BAIL, moving it down, releasing the tops of the
MARKING TRANSFER LEVERS.
(Power: Keyboard Helical Driving Gear)
When the tops of the
MARKING TRANSFER LEVERS are released, the
MARKING TRANSFER LEVER SPRINGS will move the
MARKING TRANSFER LFVERS top to left, or CCW, back to their normal stop position.
(Power: Marking Transfer Lever Springs)
The
SPACING TRANSFER LEVERS are still held top to the left, or CCW in their normal stop position by the
SPACING TRANSFER LEVER SPRINGS

Information Sheet 3-1-3I

RESETTING AND DISENGAGING THE SIGNAL GENERATOR CLUTCH AND CLUTCH TRIP DELAY

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts used to reset the keyboard, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of resetting the keyboard. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

3. LOCATE and IDENTIFY, by name, the parts used to disengage the signal generator clutch, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of disengaging the signal generator clutch. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

5. STATE the purpose of the clutch trip delay mechanism as given in Information Sheet 3-1-3I of NAVTRA 41046.

6. LOCATE and IDENTIFY, by name, the parts of the clutch trip lever delay mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

7. EXPLAIN the overall operation of the clutch trip lever delay mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Resetting the Keyboard

During the first half revolution of the SIGNAL GENERATOR CLUTCH, the high of the ECCENTRIC moves the ECCENTRIC FOLLOWER to the left, which moves the

ECCENTRIC STUD to the left, moving the attached
CODE BAR BAIL CW, which takes the
CODE BARS to the left, to their normal stop position

As the
CODE BAR BAIL moved CW, it also moved its attached
CODE BAR BAIL EXTENSION left, which moves the
NON-REPEAT LEVER to the left, which rotates the
NON-REPEAT LEVER CRANK CW, which moves the
UNIVERSAL BAIL LATCH LEVER up.
(Power: Keyboard Helical Driving Gear)
This allows the
CODE BAR BAIL LATCH SPRING to rotate the
CODE BAR BAIL LATCH CCW, which latches the
CODE BAR BAIL in a CW direction, or its normal stop position, holding all
CODE BARS to the left, or unselected position.
(Power: Code Bar Bail Latch Spring)
As the
UNIVERSAL BAIL LATCH LEVER moved up, it allows the
CODE LEVER UNIVERSAL BAIL SPRING to rotate the (right view)
CODE LEVER UNIVERSAL BAIL CCW, which moves it attached
CODE LEVER UNIVERSAL BAIL REAR EXTENSION CCW, placing it back under the
UNIVERSAL BAIL LATCH LEVER.
(Power: Code Lever Universal Bail Spring)
When the
CODE LEVER UNIVERSAL BAIL moved CCW, it also moved its attached
CODE LEVER UNIVERSAL BAIL FORWARD EXTENSION CCW, which strikes and rotates
the
NON-REPEAT LEVER CCW, unlatching it from the
CODE BAR BAIL EXTENSION.
(Power: Code Lever Universal Bail Spring)
This allows the
NON-REPEAT LEVER SPRING to move the
NON-REPEAT LEVER to the right, which rotates the
NON-REPEAT LEVER CRANK CCW, to its normal stop position.
(Power: Non-Repeat Lever Spring)
The
UNIVERSAL BAIL LATCH LEVER SPRING will now move the
UNIVERSAL BAIL LATCH LEVER down to its normal stop position, on top of the
CODE LEVER UNIVERSAL BAIL REAR EXTENSION.
(Power: Universal Bail Latch Lever Spring)
When the
CODE LATCH UNIVERSAL BAIL moved CCW, it also moved the
REAR BAR CCW, away from the
CODE LEVER.
(Power: Code Lever Universal Bail Spring)

During the second half revolution of the
SIGNAL GENERATOR CLUTCH, the high of the (front view)
ECCENTRIC moves the
ECCENTRIC FOLLOWER to the right, away from the
ECCENTRIC STUD. This allows the Code Bar Bail to rotate CCW upon selection
of the next character.
(Power: Keyboard Helical Driving Gear)

Disengaging the Signal Generator Clutch

During the first half revolution of the
SIGNAL GENERATOR CLUTCH, as the
CODE BAR BAIL moved CW, it moved the
UNIVERSAL CODE BAR to the left, and the
CLUTCH TRIP BAR to the left, releasing the
CLUTCH TRIP LEVER.
(Power: Keyboard Helical Driving Gear)
This allowed the
CLUTCH STOP LEVER SPRING to move the
CLUTCH STOP LEVER CW, back into the path of the
CLUTCH SHOE LEVER, disengaging the clutch, which stops the
CAM SLEEVE ASSEMBLY.

As the
CLUTCH STOP EEVER moved CW, it also moved the
CLUTCH TRIP LEVER CW.
(Power: Clutch Stop Lever Spring)
When the
UNIVERSAL CODE BAR moved to the left, it also moved the
CLUTCH TRIP MAGNET CONDITIONING CONTACTS, which now opens the circuit to
the
CLUTCH TRIP MAGNET causing it to become deenergized.
(Power: Keyboard Helical Driving Gear)
This allows the
ARMATURE BAIL SPRING to rotate the
ARMATURE BAIL CW, latching the (top view)
CLUTCH TRIP BAR in it.
(Power: Armature Bail Spring)

The purpose of the Clutch Trip Delay Mechanism is to delay tripping of the perforator until near the end of the signal generator clutch cycle, when operating in the "KT" position. This prevents perforation errors when two keys are operated in rapid succession.

Operation of the Clutch Trip Delay

During the first half revolution of the
SIGNAL GENERATOR CLUTCH as the
ECCENTRIC high moved left, moving the
ECCENTRIC FOLLOWER left, it moved away from the
BLOCKING LEVER BAIL.
(Power: Keyboard Helical Driving Gear)

This allows the
BLOCKING LEVER BAIL SPRING to pull the
BLOCKING LEVER BAIL CW, which moves the
BLOCKING LEVER CW, into the path of the
CODE BAR BAIL LATCH, preventing it from being tripped off again at this
time.
(Power: Blocking Lever Bail Spring)

During the last half revolution of the
SIGNAL GENERATOR CLUTCH, the
ECCENTRIC high moves right, moving the
ECCENTRIC FOLLOWER to the right, which moves the
BLOCKING LEVER BAIL CCW, which rotates the
BLOCKING LEVER CCW, out of the path of the
CODE BAR BAIL LATCH, so that it may be tripped off at this time for the next character.
(Power: Keyboard Helical Driving Gear)

Information Sheet 3-1-4I

REPEAT AND LINE BREAK MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the repeat mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the repeat mechanism. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

3. LOCATE and IDENTIFY, by name, the parts of the line break mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of the line break mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Repeat Mechanism

When the selected character or function and repeat key are depressed, the
REPEAT KEY moves down, moving the
REPEAT KEYLEVER down, which moves the
REPEAT FUNCTION LEVER down in front, up in rear, which moves the
NON-REPEAT LEVER CCW, which moves the left end down out of the path of the
CODE BAR BAIL EXTENSION, preventing the
NON-REPEAT LEVER CRANK from resetting the
UNIVERSAL BAIL LATCH LEVER
The selected
CODE LEVER remains held up in the rear by the
REAR BAR which is attached to the
CODE LEVER UNIVERSAL BAIL, and the character is repeated until the
REPEAT KEY is released.
(Power: None)

When the
REPEAT KEY is released, it allows the
REPEAT FUNCTION LEVER SPRING to move the
REPEAT FUNCTION LEVER up in front, and down in the rear, which moves the

REPEAT KEYLEVER up, moving the
REPEAT KEY up.
(Power: Repeat Function Lever Spring)

As the
REPEAT FUNCTION LEVER moved down in the rear, it allows the
NON-REPEAT LEVER SPRING to move the
NON-REPEAT LEVER CW into position to be reset through normal resetting operation of the keyboard.
(Power: Non-Repeat Lever Spring)

The purpose of the line break mechanism is to allow an operator to open the signal line (provided both machines are using the same signal line loop) to gain the attention of the other operator.

Line Break Mechanism Operation

When the
BREAK KEY is depressed, it moves the
BREAK KEYLEVER down, which moves the
BREAK FUNCTION LEVER down in front, and up in the rear, which moves the
BREAK LEVER up in front, down in the rear, depressing the
ACTUATOR PIN located in the
BREAK SWITHC, which opens the normally closed contacts in the signal line, thereby causing both machines to run open.
(Power: None)
When the
BREAK KEY is released, the
BREAK FUNCTION LEVER SPRING moves the
BREAK FUNCTION LEVER up in front, and down in the rear, which moves the
BREAK KEYLEVER up, which moves the
BREAK KEY up to its normal stop position.
(Power: Break Function Lever Spring)
As the
BREAK FUNCTION LEVER moved down in the rear, it allowed the
BREAK LEVER SPRING to move the
BREAK LEVER down in front, up in the rear, away from the
ACTUATOR PIN.
(Power: Break Lever Spring)
The
ACTUATOR PIN is moved up by spring action within the
BREAK SWITCH, closing the normally closed contacts, completing the signal line circuit, allowing the machine to run normal.

Information Sheet 3-1-5I

LOCAL KEYBOARD LOCK AND UNLOCK

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the local keyboard lock and unlock train of parts, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the local keyboard lock and unlock train of parts. The explanation will include the names of parts, movement of parts, and the the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Local Keyboard Lock

To lock your keyboard, depress the
RECEIVE KEY, which moves the
RECEIVE KEYLEVER down, which moves the (left view)
KEYBOARD LOCK FUNCTION LEVER down in front, and up in the rear, moving the
LOCKBAR LATCH CCW, out of engagement with the (front view)
LOCKBAR.
(Power: None)
This allows the
KEYBOARD LOCK SWITCH SPRINGS to rotate the
SWITCH LEVER CW, pulling the
LOCKBAR to the right, or to the lock position. The
KEYBOARD LOCK SWITCH opens and closes sets of contacts, shunting (by-passing) the signal generator contacts.
(Power: Keyboard Lock Switch Spring)

Leyboard Unlock

To unlock your keyboard, depress the
SEND KEY, which moves the
SEND KEYLEVER down, which moves the (left view)
KEYBOARD UNLOCK FUNCTION LEVER down in front, and up in the rear, engaging the
SAW TOOTH CAM SURFACE, camming the (front view)
LOCKBAR to the left, which pulls the
SWITCH LEVER CCW, which allows the
KEYBOARD LOCK SWITCH to open and close sets of contacts, placing the signal generator contacts back for normal operation.
(Power: None)

The
KEYBOARD LOCK FUNCTION LEVER SPRING pulls the
KEYBOARD LOCK FUNCTION LEVER down in the rear, up in the front, moving the
RECEIVE KEYLEVER up, which moves the
RECEIVE KEY up. Also when the
KEYBOARD LOCK FUNCTION LEVER moved down in the rear, it moved the
LOCKBAR LATCH CW, latching the
LOCKBAR in its unoperated position, or unlock position.
(Power: Keyboard Lock Function Lever Spring)
The
KEYBOARD UNLOCK FUNCTION LEVER SPRING pulls the
KEYBOARD UNLOCK FUNCTION LEVER down in the rear, up in the front, moving away from the
LOCKBAR and moving the
SEND KEYLEVER up, which moves the
SEND KEY up to its normal stop position.
(Power: Keyboard Unlock Function Lever Spring)

Information Sheet 3-1-6I

CHARACTER COUNTER

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the character counter, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the character counter. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Counting

With the
KEYBOARD CONTROL KNOB in either the KT or T position; a key depressed, the
COUNTER CODE BAR SPRING moves the
COUNTER CODE BAR to the right, which moves the
FEED BAIL CCW, which moves the
DRIVE LEVER to the left, over-riding a tooth on the
RATCHET.
(Power: Counter Code Bar Spring)
The
LATCH LEVER SPRING holds the
LATCH LEVER into engagement with the
RATCHET, preventing it from rotating CCW.
(Power: Latch Lever Spring)
The
LATCH LEVER SPRING holds the
LATCH LEVER into engagement with the
RATCHET, preventing it from rotating CCW.
(Power: Latch Lever Spring)
When the
CODE BAR BAIL resets the code bars, the
COUNTER CODE BAR moves to the left, moving the
FFED BAIL CW, which moves the
DRIVE LEVER to the right, rotating the
RATCHET CW, moving the attached
RATCHET DRUM CW, which moves the
INDICATOR CORD to the right, pulling the
INDICATOR to the right, along the

COUNTER SCALE, indicating the lapsed characters and stretching out on the RETURN SPRING.

As the INDICATOR counts the 66, 67th or 68th character, with the RATCHET DRUM moving CW, it also moves the attached high side of the SWITCH CAM into contact with the END OF LINE SWITCH, which closes its set of contacts and lights the END OF LINE LAMP.

(Power: Keyboard Helical Driving Gear)

The EOL Switch will light the EOL lamp only when in the "T" position. While operating in either the "K" or "KT" position, the same lamp (now called the Margin Indicator Lamp) will be activated by the Margin Indicator Cam Disk mounted on the Carriage Return Spring Drum.

Resetting Indicator

When a carraige return function is selected, the CARRIAGE RETURN CODE BAR SPRING moves the CARRIAGE RETURN CODE BAR (or COUNTER RESET CODE BAR) to the right, which moves the RESET BAIL CCW, moving the RESET LEVER CW. The right end moving down, will take the RESET LEVER EXTENSION down.

(Power: Carriage Return Code Bar Spring)

This will allow the RESET LEVER EXTENSION SPRING to pull the RESET LEVER EXTENSION CCW, into the notch in both the DRIVE LEVER and LATCH LEVER.

(Power: Reset Lever Extension Spring)

When the CODE BAR BAIL resets the code bars, the CARRAIGE RETURN CODE BAR moves left, moving the RESET BAIL CW, which moves the RESET LEVER CCW, taking the RESET LEVER EXTENSION up, which lifts both the DRIVE LEVER and LATCH LEVER up, disengaging them from the RATCHET.

(Power: Keyboard Helical Driving Gear)

This allows the RETURN SPRING to pull the INDICATOR to the left, which pulls the INDICATOR CORD to the left, which rotates the RATCHET CCW, back to starting position.

As the RATCHET moves CCW, it moves its attached RATCHET STOP CCW, coming into contact with the STOP LEVER, which transfers motion to the ANTI-BOUNCE LATCH, rotating it CW, catching the RATCHET STOP.

(Power: Return Spring)

When the energy is dissipated, the
ANTI-BOUNCE LATCH SPRING rotates the
ANTI-BOUNCE LATCH CCW, freeing the
RATCHET STOP and the
RATCHET.
(Power: Anti-Bounce Latch Spring)

Restarting

On the first character after a carriage return, the
COUNTER CODE BAR SPRING moves the
COUNTER CODE BAR to the right, which rotates the
FEED BAIL CCW, moving the
DRIVE LEVER to the left.
(Power: Counter Code Bar Spring)
This allows the
DRIVE LEVER SPRING to move the
DRIVE LEVER CW, back into engagement with the
RATCHET.
(Power: Drive Lever Spring)
When the
CODE BAR BAIL resets the code bars, the
COUNTER CODE BAR moves left, rotating the
FEED BAIL CW, which moves the
DRIVE LEVER to the right, which rotates the
RATCHET CW, one tooth. The
DRIVE LEVER also moves the
RESET LEVER EXTENSION CW, disengaging it from the
LATCH LEVER.
(Power: Keyboard Helical Driving Gear)
This allows the
LATCH LEVER SPRING to pull the
LATCH LEVER CW or down, into engagement with the
RATCHET.
(Power: Latch Lever Spring)

Information Sheet 3-2-1I

TROUBLESHOOTING PROCEDURES FOR THE KEYBOARD

TOPIC OBJECTIVES

When you complete this lesson, you should be able to:

1. EXPLAIN the logical troubleshooting procedures for the keyboard: recognizing and diagnosing symptoms, isolating the fault to the area or train of parts, localizing the faulty/maladjusted part, and analyzing the cause of the malfunction.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1
NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3

INFORMATION

Logical Troubleshooting Procedures for the Keyboard:

Plug in AC and DC
Turn machine on
Place LTK key in test position
Place KEYBOARD Control Knob in "K" position
Type out complete test, checking for garbles

If garbling - determine which impulse is being gained or dropped. Starting with the code bars, trace out that entire train of parts until the malfunction of missing part is located.

Operate all local function keys. If not operating normal, check out that train of parts.
Check tripping of signal generator clutch:

If tripping continuously - check the non-repeat train of parts until malfunction or missing part is located.

If not tripping off - check the clutch trip train of parts until malfunction or missing part is located.

Place Keyboard Control Knob in "T" position, check EOL light. (Should light on 66, 67 or 68th character) If not, check indicator light, and trace out train of parts until malfunction or missing part is located.

Information Sheet 4-1-1I

KEYBOARD CONTROL KNOB AND ENGAGING AND DISENGAGING THE PERFORATOR FUNCTION CLUTCH

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the power law for the perforator as given in Information Sheet 4-1-1I of NAVTRA 41046.

2. STATE that the purpose of the keyboard control knob is to allow an operator to select his mode of operation; either K, KT, or T.

3. LOCATE and IDENTIFY, by name, the parts of the keyboard control knob train of parts, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of the keyboard control knob. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

5. LOCATE and IDENTIFY, by name, the parts used to engage and disengage the perforator function clutch, using the actual equipment and the pictorial in NAVTRA 41048.

6. EXPLAIN the overall operation of engaging and disengaging the perforator function clutch. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The Power Law for the perforator is "Cams and eccentrics on the perforator main shaft and springs throughout the perforator."

The purpose of the keyboard control knob is to allow an operator to select his mode of operation; either K, KT, or T.

K position - Signals are generated by the keyboard and monitored by the automatic typer. (The perforator and T/D will not operate)

KT position - Signals generated by keyboard, monitored by automatic typer, and perforator cuts tape simultaneously. Signals can also be generated by the T/D and monitored by the automatic typer.

T position - Signals generated by T/D and monitored by automatic typer. Perforator cuts tape and resets the keyboard.

Keyboard Control Knob Operation

Changing from KT to K position

By rotating the
KEYBOARD CONTROL KNOB CCW, it rotates the
KEYBOARD CONTROL SHAFT CCW, which opens contacts in the attached
AUXILIARY SWITCH, which prevents the T/D clutch magnets from being energized.
As the
KEYBOARD CONTROL SHAFT rotates CCW, it also rotates its attached
CONTROL CAM CCW. The
FRONT LOBE (of the control cam) strikes and moves the
BLOCKING BAIL SLIDE ROLLER to the left, moving the
BLOCKING BAIL SLIDE to the left, which rotates the
BELL CRANK CW, moving the
LATCH CCW, out of engagement with the
CLUTCH TRIP BAR LINK. This prevents the perforator function clutch from being tripped off.
As the
BLOCKING BAIL SLIDE moved to the left, it also moved the
BLOCKING BAIL to the left, which moves its attached
BLOCKING BAIL EXTENSION to the left, which moves the
CODE BAR EXTENSIONS to the left, and holds them fast. No information can be transmitted from the code bars to the perforator.
As the
BLOCKING BAIL SLIDE moved to the left, it also moved the
BLOCKING BAIL LEVER to the left, which moves the
COUNTER CODE BAR and the
CARRIAGE RETURN CODE BAR to the left, and holds them fast. The character counter cannot operate now.
(Power: None)

Changing from K to KT position

By rotating the
KEYBOARD CONTROL KNOB CW, it rotates the
KEYBOARD CONTROL SHAFT CW, which closes contacts in the attached
AUXILIARY SWITCH, which will allow the T/D clutch magnets to be energized.
As the
KEYBOARD CONTROL SHAFT rotates CW, it also rotates its attached
CONTROL CAM CW. The
FRONT LOBE (of the control cam) moves CW, away from the
BLOCKING BAIL SLIDE ROLLER.
(Power: None)

This allows the
BLOCKING BAIL SPRING to pull the
BLOCKING BAIL to the right, which moves the
BLOCKING BAIL EXTENSION to the right, away from the
CODE BAR EXTENSIONS.
(Power: Blocking Bail Spring)
Allowing the
CODE BAR EXTENSIONS SPRINGS to pull their
CODE BAR EXTENSIONS to the right, against their
CODE BARS.
(Power: Code Bar Extension Springs)
As the
BLOCKING BAIL moved to the right, it also moved the
BLOCKING BAIL SLIDE to the right, which moves the attached
BLOCKING BAIL SLIDE ROLLER to the right, As the
BLOCKING BAIL SLIDE moved to the right, it moved away from the
BELL CRANK.
(Power: Blocking Bail Spring)

This allows the
COMPRESSION SPRING to expand, moving the
LATCH CW, back into engagement with the
CLUTCH TRIP BAR LINK.
As the
LATCH moves CW, it also moves the
BELL CRANK CCW.
(Power: Compression Springs)
When a
KEY is depressed, the (KT position)
CODE BAR BAIL allows the marking
CODE BAR SPINGS to move the marking
CODE BARS to the right, away from the
CODE BAR EXTENSIONS.
(Power: Marking Code Bar Springs)

This allows the associated marking
CODE BAR EXTENSIONS SPRINGS to move the marking
CODE BAR EXTENSIONS to the right.
(Power: Marking Code Bar Extensions Springs)
The
UNIVERSAL CODE BAR SPRING simultaneously moves the
UNIVERSAL CODE BAR to the right, which moves the
KEYBOARD CONTROL SELECTION LEVER to the right, and the
LATCH to the right, which is engaged with, and moves the
CLUTCH TRIP BAR LINK to the right, moving the
PERFORATOR TRIP LEVER LATCH to the right, which rotates the
PERFORATOR MAIN TRIP LEVER CCW, out from underneath of the
CLUTCH RELEASE.
(Power: Universal Code Bar Spring)
The
CLUTCH RELEASE SPRING will now rotate the
CLUTCH RELEASE CCW, which moves the

TRIP SHAFT CCW, which rotates the attached
PERFORATOR FUNCTION CLUTCH TRIP LEVER CCW, out of the path of the
PERFORATOR FUNCTION CLUTCH SHOE LEVER, allowing the
PERFORATOR FUNCTION CLUTCH to engage, and start rotating, extending motion to the perforator main shaft assembly.

As the
TRIP SHAFT rotated CCW, it also rotated the
RESET ARM CCW.

(Power: Clutch Release Spring)

As the
LATCH moved to the right, it strikes the
STOP, and rotates CCW, releasing the
CLUTCH TRIP BAR LINK.

(Power: Universal Code Bar Spring)

This allows the
COMPRESSION SPRING to expand and move the
CLUTCH TRIP BAR LINK to the left, which moves the
PERFORATOR TRIP LEVER LATCH to the left, away from the
PERFORATOR MAIN TRIP LEVER.

(Power: Compression Spring)

Allowing the
PERFORATOR MAIN TRIP LEVER SPRING to rotate the
PERFORATOR MAIN TRIP LEVER CW, coming to rest against the end of the
CLUTCH RELEASE.

(Power: Perforator Main Trip Lever Spring)

Near the end of the first half revolution of the
FUNCTION CLUTCH, the
RESET PIN, located on the
FORWARD FUNCTION CAM, strikes and moves the
RESET ARM CW, which rotates the attached
TRIP SHAFT CW, which moves the
CLUTCH TRIP LEVER CW, placing it back into the path of the
CLUTCH SHOE LEVER. The clutch will disengage after one revolution.

As the
TRIP SHAFT rotates CW, it also rotates the
CLUTCH RELEASE CW, placing left end above the
PERFORATOR MAIN TRIP LEVER.

(Power: Forward Function Cam)

This allows the
PERFORATOR MAIN TRIP LEVER SPRING to pull the
PERFORATOR MAIN TRIP LEVER further CW, back to its normal stop position.

(Power: Perforator Main Trip Lever Spring)

The code bars, code bar extensions, and universal code bar are moved to the left, and reset through normal resetting operation of the keyboard under the power of the Keyboard Helical Driving Gear.

As the
UNIVERSAL CODE BAR moves to the left, it moves the
LATCH to the left, away from the
STOP.
(Power: Keyboard Helical Driving Gear)
This allows the
COMPRESSION SPRING to further expand, moving the
LATCH CW, back into engagement with the
CLUTCH TRIP BAR LINK.
(Power: Compression Spring)

Changing from KT to T position

By rotating the
KEYBOARD CONTROL KNOB further CW, it rotates the
KEYBOARD CONTROL SHAFT CW, which opens contacts in the
AUXILIARY SWITCH, preventing the keyboard clutch trip magnets from energizing; preventing a signal from reaching the automatic typer.
As the
KEYBOARD CONTROL SHAFT moved CW, it rotates its attached
CONTROL CAM CW. The
REAR LOBE (of the control cam) moves CW, away from the
CONTROL CAM FOLLOWER ARM.
(Power: None)
This allows the
CONTROL CAM FOLLOWER ARM SPRING to rotate the
CONTROL CAM FOLLOWER ARM CCW, allowing the
KEYBOARD CONTROL SELECTION SWITCH upper contacts to close, completing a path for current to the EOL lamp.

As the
CONTROL CAM FOLLOWER ARM moves CCW, it also moves the
CONTROL CAM RESET LEVER CCW, which moves the
KEYBOARD CONTROL SELECTION LEVER CW, placing the stud on the left end up, in the path of the
FOLLOWER ARM RESET LEVER.
(Power: Control Cam Follower Arm Spring)

When a
KEY is depressed, the (T position)
CODE BAR BAIL allows the marking
CODE BAR SPRINGS to move the marking
CODE BARS to the right, away from the
CODE BAR EXTENSIONS.
(Power: Marking Code Bar Springs)
Which allows the associated marking
CODE BAR EXTENSIONS SPRINGS to move their marking
CODE BAR EXTENSIONS to the right.
(Power: Code Bar Extension Springs)

The
UNIVERSAL CODE BAR SPRING simultaneously moves the
UNIVERSAL CODE BAR to the right, which moves the
KEYBOARD CONTROL SELECTION LEVER to the right, and the
LATCH to the right.
(Power: Universal Code Bar Spring)

The perforator function clutch will be engaged/disengaged in the same manner as in the "KT" position. However, not utilizing the automatic typer in the "T" position, we must reset the keyboard through the operation of the perforator.

During the first half revolution of the
FUNCTION CLUTCH, the high of the
RESET CAM is presented to, and moves the
RESET CAM FOLLOWER ARM ROLLER to the right, which rotates the
RESET CAM FOLLOWER ARM CW, which moves the
FOLLOWER ARM RESET LEVER CW, into contact with, and moving the
KEYBOARD CONTROL SELECTION LEVER to the left, which moves the
UNIVERSAL CODE BAR to the left, moving the attached
CODE BAR BAIL CW, taking all
CODE BARS to the left, which move their respective
CODE BAR EXTENSIONS to the left, or normal stop position.
(Power: Reset Cam)
At the end of the last half revolution of the
FUNCTION CLUTCH, the
RESET CAM FOLLOWER ARM ROLLER. This allows the
RESET CAM FOLLOWER ARM SPRING to pull the
RESET CAM FOLLOWER ARM CCW, moving the
FOLLOWER ARM RESET LEVER CCW.
The
RESET CAM FOLLOWER ARM moving CCW, also moves the
RESET CAM FOLLOWER ARM ROLLER left, riding into the low of the
RESET CAM.
(Power: Reset Cam Follower Arm Spring)

Changing from T to KT position

By rotating the
KEYBOARD CONTROL KNOB CCW, it rotates the
KEYBOARD CONTROL SHAFT CCW, which closes contacts in the
AUXILIARY SWITCH completing a path for current to energize the clutch trip magnet.
As the
KEYBOARD CONTROL SHAFT rotates CCW, it moves the
CONTROL CAM CCW. The
REAR LOBE (of the control cam) moves CCW, moving the
CONTROL CAM FOLLOWER ARM CW, closing the lower contacts of the
KEYBOARD CONTROL SELECTION SWITCH, opening the path for current to the EOL lamp.

The
CONTROL CAM RESET LEVER SPRING now moves the
CONTROL CAM RESET LEVER CW, which moves the
KEYBOARD CONTROL SELECTION LEVER CCW, out of the path of the
FOLLOWER ARM RESET LEVER.

(Power: Control Cam Reset Lever Spring)
This will allow the keyboard to be reset through normal resetting operation of the keyboard under the power of the keyboard helical driving gear.)

In the "T" position, the keyboard control selection switch "upper contacts" are closed, and EOL lamp will work from the switch under the character counter. In the K and KT positions, the "lower contacts" are closed, and the same lamp, now called the Margin Indicator Lamp, will work from the switch under the carriage return spring drum.

Information Sheet 4-1-2I

PUNCH MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the punch mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the punch mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

In the "KT" or "T" position, when a KEY is depressed, the marking CODE BAR EXTENSIONS SPRINGS move the marking CODE BAR EXTENSIONS to the right, rotating their associated PUNCH SLIDE LATCHES CCW, out of the path of the PUNCH SLIDES.

(Power: Code Bar Extensions Springs)

At the same time, the PERFORATOR MAIN TRIP LEVER moved CCW, which moved the attached PUNCH SLIDE RESET BAIL TRIP LEVER CCW, which moved the PUNCH SLIDE RESET BAIL CW, releasing all of the PUNCH SLIDES.

(Power: Universal Code Bar Spring)

This allows the marking PUNCH SLIDE SPRINGS to move their associated PUNCH SLIDES to the left, into engagement with the SLIDE POST and under their associated PUNCH PINS.

(Power: Punch Slide Springs)

The spacing PUNCH SLIDES remain latched and held to the right by their respective PUNCH SLIDE LATCHES.

During the first half revolution of the PERFORATOR FUNCTION CLUTCH, the FORWARD FUNCTION CAM moves the ROCKER BAIL to the left, which moves the PERFORATOR DRIVE LINK to the left, which rotates the

ROCKER ARM CCW, rotating the
TOGGLE SHAFT CCW, which rotates the attached
TOGGLE BAIL CCW, which moves the
TOGGLE LINKS CW.

Through the holding action of the
DRAG LINK, the
TOGGLE LINK moving CW, moves the
SLIDE POST up, which moves the marking
PUNCH SLIDES left end up, which moves their associated
PUNCH PINS up, perforating the tape, and also moving the
RETRACTOR RAIL CW.

As the
TOGGLE LINK moved CW, it also moved the
PUNCH SLIDE RESET BAIL to the left.

(Power: Forward Function Cam)

After the
PUNCH SLIDE RESET BAIL moved to the left, the
PERFORATOR MAIN TRIP LEVER SPRING moved the
PERFORATOR MAIN TRIP LEVER CW, which moved the
PUNCH SLIDE RESET BAIL TRIP LEVER CW, which rotates the
PUNCH SLIDE RESET BAIL CCW, into notches of the
PUNCH SLIDES.

(Power: Perforator Main Trip Lever Spring)

While the punch mechanism is being operated, the
CODE BAR EXTENSIONS are reset to the left, away from the
PUNCH SLIDE LATCHES.

(Power: KT-Keyboard Helical Driving Gear: T-Reset Cam)

This allows the marking
PUNCH SLIDE LATCH SPRINGS to move the
PUNCH SLIDE LATCHES slightly CW, under the right end of the
PUNCH SLIDES.

(Power: Marking Punch Slide Latch Springs)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
REAR FUNCTION CAM moves the
ROCKER BAIL to the right, which moves the
PERFORATOR DRIVE LINK to the right, rotating the
ROCKER ARM CW, which moves the
TOGGLE SHAFT CW, rotating the
TOGGLE BAIL CW, moving the
TOGGLE LINKS CCW.

Through the holding action of the
DRAG LINK, the
TOGGLE LINK moving CCW, moves the
SLIDE POST down, which moves the
MARKING PUNCH SLIDES down.

(Power: Rear Function Cam)

The
RETRACTOR BAIL SPRINGS now move the
RETRACTOR BAIL CCW, which brings the
PUNCH PINS down to their normal stop position.

(Power: Retractor Bail Springs)

As the
TOGGLE LINK was moving CCW, it also moved the
PUNCH SLIDE RESET BAIL to the right, which moves and holds the
PUNCH SLIDES to the right.

(Power: Rear Function Cam)

This allows the marking
PUNCH SLIDE LATCH SPRINGS to rotate their associated
PUNCH SLIDE LATCHES further CW, back into the path of the
PUNCH SLIDES.

(Power: Marking Punch Slide Latch Springs)

Information Sheet 4-2-1I

TAPE FEED AND FEED HOLE SPACING

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the tape feed mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the tape feed mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

3. LOCATE and IDENTIFY, by name, the parts used in feed hole spacing, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of the feed hold spacing train of parts. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Tape Feed

During the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
FORWARD FUNCTION CAM moves the
ROCKER BAIL to the left, which moves the
PERFORATOR DRIVE LINK to the left, which rotates the
ROCKER ARM CCW, which moves the
ROCKER SHAFT CCW, which rotates the
TOGGLE BAIL CCW, which moves the
PERFORATOR FEED PAWL down, over-riding a tooth on the
RATCHET WHEEL.
(Power: Forward Function Cam)
The
PERFORATOR FEED PAWL SPRING causes the
PERFORATOR FEED PAWL to remain in engagement with the
RATCHET WHEEL during tape feed operation.
(Power: Perforator Feed Pawl Spring)

The
DETENT LEVER SPRING holds the
DETENT LEVER up, into engagement with the
RATCHET WHEEL, holding it fast.
(Power: Detent Lever Spring)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
REAR FUNCTION CAM moves the
ROCKER BAIL to the right, which moves the
PERFORATOR DRIVE LINK to the right, which rotates the
ROCKER ARM CW, which moves the
ROCKER SHAFT CW, which moves the
TOGGLE BAIL CW, which moves the
PERFORATOR FEED PAWL up, which rotates the
RATCHET WHEEL CCW, one tooth, rotating the
FEED WHEEL CCW, which advances the tape.
(Power: Rear Function Cam)

Feed Hole Spacing

During tape feed, the
FEED WHEEL is rotated CCW, which causes the
DIE WHEEL to rotate CW, which presses the tape on to the
FEED WHEEL.
(Power: Rear Function Cam)
The
TAPE SHOE TORSION SPRING holds the
TAPE SHOE, ensuring the tape remains on the
FEED WHEEL until it is stripped off by the
STRIPPER PLATE.
(Power: Tape Shoe Torsion Spring)
The tape is now fed into the
PUNCH BLOCK.
(Power: Rear Function Cam)
A
BIASING SPRING holds the tape against the
REFERENCE BLOCK. This ensures that the feed holes are maintained a constant distance from the edge of the tape.

A
TAPE GUIDE SPRING holds the tape against the back side of the
PUNCH BLOCK. This ensures that the code holes are maintained a constant distance from the edge of the tape.

Information Sheet 4-3-11

TRANSFER MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of the transfer mechanism is to set up a train of parts for the correct positioning of the typewheel.

2. LOCATE and IDENTIFY, by name, the parts of the transfer mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of the transfer mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the transfer mechanism is to set up a train of parts for the correct positioning of the typewheel.

During the first half revolution of the PERFORATOR FUNCTION CLUTCH, with all intelligence impulses marking, the PUNCH SLIDES move left, rotating their associated TRANSFER LEVERS CCW, which move the PULSE BEAMS front to the left, the rear to the right, away from their BELL CRANKS.

(Power: Punch Slide Springs)

This allows the BELL CRANK SPRINGS to rotate the BELL CRANKS CCW, which move the PUSH BARS up. The #1, 2, 3, and 4 PUSH BARS are moved up into the path of the OPERATING BLADE. The #5 PUSH BAR is moved up, out of the path of the OPERATING BLADE. (Due to different physical shape of #5 Push Bar)

(Power: Bell Crank Springs)

During the last half revolution of the PERFORATOR FUNCTION CLUTCH, the PUNCH SLIDE RESET BAIL will return the PUNCH SLIDES to the right, which move the TRANSFER LEVERS CW.
#1, 2, 3 and 4 TRANSFER LEVERS move their associated

PULSE BEAMS front to the right, the rear to the left, moving their BELL CRANKS CW, which move their associated PUSH BARS down, out of the path of the OPERATING BLADE. The #5 TRANSFER LEVER moves the right leg of the #5 PULSE BEAM to the right.
(Power: Rear Function Cam)

The right leg of the #5 PULSE BEAM pulls the #5 PULSE BEAM SPRING, which pulls the left leg of the #5 PULSE BEAM front to the right, the rear to the left, which moves the #5 BELL CRANK CW, which moves the #5 PUSH BAR down, into the path of the OPERATING BLADE.
(Power: #5 Pulse Beam Spring)

The #1, 2, 3 and 4 push bars will operate for a mark. The #5 push bar will operate for a space.

The order of the push bars from front to rear are #3, Figures, letters, #5, #4, #1 and #2.

The #5 pulse beam is different in construction from the other pulse beams by having two separate parts, which are joined by a spring.

Information Sheet 4-3-2I

CONFIGURATION OF THE TYPEWHEEL, AXIAL POSITIONING AND AXIAL CORRECTING

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. DESCRIBE the configuration of the typewheel. The description is limited to the information contained in Information Sheet 4-3-2I of NAVTRA 41046.

2. STATE that the purpose of axial positioning and correcting is to position the typewheel to the front of the machine to the selected axial row, and return it to its normal stop position.

3. LOCATE and IDENTIFY, by name, the parts used in axial positioning and axial correcting, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of the axial positioning and axial correcting. The explanation will include the names of parts, movement of parts and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Configuration of the Typewheel

The typewheel is basically a typebox wrapped around a drum. It contains four axial rows. They are numbered from front to rear as Ø, 1, 2, and 3 axial rows. It is divided into letters and figures halves. The letters half contains all alphabet, and it has eight rotary or longitudinal rows, they are numbers Ø, 1 CW, 2 CW, 3 CW, 1 CCW, 2 CCW, 3 CCW, or 4 CCW rotary rows. The figures half contains all numbers and punctuation. It contains eight rotary or longitudinal rows and are numbered the same as the letters half. The normal stop position of the typewheel is with the Ø axial row slightly to the rear of the tape and the print hammer.

The purpose of axial positioning is to position the typewheel to the front of the machine to the selected axial row, then return it to its normal stop position.

Axial Positioning

The #1 and #2 intelligence impulses control axial positioning, through the operation of the upper and lower eccentrics. Each eccentric, when operated will rotate 180 degrees, and the lower eccentric will give one unit of movement, the upper eccentric will give two units of movement, both eccentrics operated together will give three units of movement.

Operating Blade

During the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the left, moving the
MOUNTING BAIL to the left, which moves the
OPERATING BLADE to the left, moving all
PUSH BARS that are in its path, to the left.
(Power: Forward Function Cam)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the right, moving the
MOUNTING BAIL to the right, which moves the
OPERATING BLADE to the right, moving all
PUSH BARS to the right, back to their normal stop position.
(Power: Rear Function Cam)

Positioning to the Ø Axial Row (#1 and #2 spacing)

When the
ROCKER BAIL moves to the right, it moves the (rear view)
OSCILLATING DRIVE LINK to the right, which moves the
OSCILLATING DRIVE BAIL CW, which rotates the (top view)
TOGGLE LINK CCW, which moves the
AXIAL SECTOR CCW, which moves the
TYPEWHEEL SHAFT to the front, moving the attached
TYPEWHEEL to the front, one unit of movement; placing the Ø axial row directly above the
PRINT HAMMER.
(Power: Forward Function Cam)

When the
ROCKER BAIL moves left, it moves the (rear view)
OSCILLATING DRIVE LINK to the left, which moves the
OSCILLATING DRIVE BAIL CCW, which rotates the (top view)
TOGGLE LINK CW, which moves the
AXIAL SECTOR CW, which moves the
TYPEWHEEL SHAFT to the rear, moving the attached
TYPEWHEEL to the rear, one unit of movements; placing the Ø axial row to the rear of the tape, and to the rear of the
PRINT HAMMER.
(Power: Rear Function Cam)

Positioning to the Ø axial row takes place everytime the perforator function clutch is tripped off.

Positioning to #1 axial row (#1 marking, #2 spacing)

When the
OPERATING BLADE moves left, it moves the (left view)
#1 PUSH BAR to the left, which moves and operates the
LOWER ECCENTRIC CW, moving the
AXIAL CRANK PIN to the rear, which moves the
AXIAL OUTPUT RACK to the rear, which rotates the
AXIAL SECTOR CCW, moving the
TYPEWHEEL SHAFT to the front, which moves its attached
TYPEWHEEL to the front, 2 units of movement, placing the
PRINT HAMMER directly below the #1 axial row.
(Power: Forward Function Cam)
When the
OPERATING BLADE moves to the right, it moves the (left view)
#1 PUSH BAR to the right, which moves and operates the
LOWER ECCENTRIC CCW, moving the
AXIAL CRANK PIN to the front which moves the
AXIAL OUTPUT RACK to the front, rotating the
AXIAL SECTOR CW, moving the
TYPEWHEEL SHAFT to the rear, which moves its attached
TYPEWHEEL to the rear, 2 units of movement, back to the normal stop position.
(Power: Rear Function Cam)

Positioning to the #2 axial row (#1 spacing, #2 marking)

When the
OPERATING BLADE moves to the left, it moves the (left view)
#2 PUSH BAR to the left, which moves and operates the
UPPER ECCENTRIC CCW, moving the
AXIAL CRANK PIN to the rear, which moves the
AXIAL OUTPUT RACK to the rear, which moves the
AXIAL SECTOR CCW, moving the
TYPEWHEEL SHAFT to the front, which moves its attached
TYPEWHEEL to the front, 3 units of movement, placing the
PRINT HAMMER directly below the #2 axial row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, it moves the (left view)
#2 PUSH BAR to the right, which moves and operates the
UPPER ECCENTRIC CW, moving the
AXIAL CRANK PIN to the front, which moves the
AXIAL OUTPUT RACK to the front, rotating the

AXIAL SECTOR CW, moving the
TYPEWHEEL SHAFT to the rear, which moves its attached
TYPEWHEEL to the rear, 3 units of movement, back to the normal stop position.
(Power: Rear Function Cam)

Positioning to the #3 axial row (#1 marking, #2 marking)

When the
OPERATING BLADE moves to the left, it moves the (left view)
#1 PUSH BAR to the left, moving and operating the
LOWER ECCENTRIC CW, 1 unit of movement; and the
#2 PUSH BAR to the left, moving and operating the
UPPER ECCENTRIC CCW, 2 units of movement, now moving the
AXIAL CRANK PIN to the rear, which moves the
AXIAL OUTPUT RACK to the rear, which rotates the
AXIAL SECTOR CCW, moving the
TYPEWHEEL SHAFT to the front, which moves its attached
TYPEWHEEL to the front, 4 units of movement, placing the
PRINT HAMMER directly below the #3 axial row.
(Power: Forward Function Cam)
When the
OPERATING BLADE moves to the right, it moves the (left view)
#1 PUSH BAR to the right, moving and operating the
LOWER ECCENTRIC CCW, 1 unit of movement; and
#2 PUSH BAR to the right, moving and operating the
UPPER ECCENTRIC CW, 2 units of movement, now moving the
AXIAL CRANK PIN to the front, which moves the
AXIAL OUTPUT RACK to the front, rotating the
AXIAL SECTOR CW, moving the
TYPEWHEEL SHAFT to the rear, which moves its attached
TYPEWHEEL to the rear, 4 units of movement, back to the normal stop position.
(Power: Rear Function Cam)

The purpose of axial correcting is to move the typewheel into its final position and to lock it in that position during printing.

Axial Correcting

When the
ROCKER BAIL moves to the right, it moves the (rear view)
CORRECTING DRIVE LINK to the right, which stretches out the
AXIAL CORRECTING PLATE SPRING.
(Power: Forward Function Cam)
The
AXIAL CORRECTING PLATE SPRING now pulls the
AXIAL CORRECTING PLATE CCW, into contact with the (top view)
AXIAL SECTOR, locking it in place.
(Power: Axial Correcting Plate Spring)

When the
ROCKER BAIL moves to the left, it moves away from the
CORRECTING DRIVE LINK.
(Power: Rear Function Cam)

This allows the
CORRECTING DRIVE LINK SPRING to pull the
CORRECTING DRIVE LINK to the left, which moves the
AXIAL CORRECTING PLATE CW, away from the (top view)
AXIAL SECTOR.
(Power: Correcting Drive Link Spring)

Eccentric detents, hold the eccentrics and eccentric shafts in the last operated and/or unoperated position.

Information Sheet 4-3-3I

ROTARY POSITIONING AND ROTARY CORRECTING

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the purpose of rotary positioning and correcting as given in Information Sheet 4-3-3I of NAVTRA 41046.

2. LOCATE and IDENTIFY, by name, the parts used in rotary positioning and rotary correcting, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of rotary positioning and rotary correcting. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of rotary positioning is to position the typewheel either CW or CCW to the selected rotary row, then return it to the Ø rotary row, or the normal stop position.

Rotary Positioning

The #3, #4, and #5 intelligence impulses control rotary positioning, through operation of the right front eccentric, the left rear eccentric and the right rear eccentric respectively. Each eccentric when operated will rotate 180 degrees, when operated, the right front eccentric (#3) gives 4 CCW units of movement, the left rear eccentric (#4) gives 2 CW units of movement, and the right rear eccentric (#5) gives 1 CW unit of movement. The normal stop positions of the eccentrics are: #5 or right rear eccentric - high side down, the other two eccentrics - high side up.

Positioning to the #1 CW rotary row (#3, #4 and #5 spacing)

When the
OPERATING BLADE moves left, it moves the
#5 PUSH BAR to the left, which moves and operates the
RIGHT REAR ECCENTRIC CCW, which moves the

CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW, moving the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL SHAFT CW, moving its attached
TYPEWHEEL CW, one unit of movement, allowing the
PRINT HAMMER to type in the #1 CW rotary row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, it moves the
#5 PUSH BAR to the right, which moves and operates the
RIGHT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW, moving the
TYPEWHEEL RACK up, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CCW, which moves the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, 1 unit of movement, back to the Ø rotary row.
(Power: Rear Function Cam)

Positioning to the #2 CW rotary row (#3 spacing, #4 and #5 marking)

When the
OPERATING BLADE moves to the left, it moves the
#4 PUSH BAR to the left, which moves and operates the
LEFT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
LEFT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CCW, moving the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL SHAFT CW, moving its attached
TYPEWHEEL CW, 2 units of movement, allowing the
PRINT HAMMER to type in the #2 CW rotary row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, it moves the
#4 PUSH BAR to the right, which moves and operates the
LEFT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
LEFT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CW, moving the
TYPEWHEEL RACK up, which rotates the

TYPEWHEEL SHAFT SPUR GEAR CCW, which moves the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, 2 units of movement, back to the Ø rotary row.
(Power: Rear Function Cam)

Positioning to the #3 CW rotary row (#3 spacing, #4 marking, #5 spacing)

When the
OPERATING BLADE moves to the left, it moves the
#4 PUSH BAR to the left, which moves and operates the
LEFT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
LEFT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CCW.
The
OPERATING BLADE also moves the
#5 PUSH BAR to the left, which moves and operates the
RIGHT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK further CCW.
The
CROSS LINK moving CCW, will move the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL SHAFT CW, moving its attached
TYPEWHEEL CW 3 units of movement, allowing the
PRINT HAMMER to type in the #3 CW rotary row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, it moves the
#4 PUSH BAR to the right, which moves and operates the
LEFT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
LEFT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CW.
The
OPERATING BLADE also moves the
#5 PUSH BAR to the right, which moves and operates the
RIGHT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK further CW.
The
CROSS LINK moving CW, will move the
TYPEWHEEL RACK up, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CCW, which moves the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, 3 units of movement, back to the Ø rotary row.
(Power: Rear Function Cam)

Positioning to the #1 CCW rotary row (#3, #4 marking, #5 spacing)

When the
OPERATING BLADE moves left, it moves the
#3 PUSH BAR to the left, which moves and operates the
RIGHT FRONT ECCENTRIC CCW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW.
The
OPERATING BLADE also moves the
#4 PUSH BAR to the left, which moves and operates the
LEFT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
LEFT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CCW.
The
OPERATING BLADE also moves the
#5 PUSH BAR to the left, which moves and operates the
RIGHT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW.
The
CROSS LINK moving CW, will move the
TYPEWHEEL RACK up, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CCW, which moves the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, i unit of movement, allowing the
PRINT HAMMER to type in the #1 CCW rotary row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, it moves the
#3 PUSH BAR to the right, which moves and operates the
RIGHT FRONT ECCENTRIC CW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW.
The
OPERATING BLADE also moves the
#4 PUSH BAR to the right, which moves and operates the
LEFT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
LEFT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CW.
The
OPERATING BLADE also moves the
#5 PUSH BAR to the right, which moves and operates the
RIGHT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW.

The
CROSS LINK moving CCW, will move the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL SHAFT CW, moving its attached
TYPEWHEEL CW, 1 unit of movement, back to the Ø rotary row.
(Power: Rear Function Cam)

Positioning to the #2 CCW rotary row (#3, #4 amd #5 marking)

When the
OPERATING BLADE moves left, it moves the
#3 PUSH BAR to the left, which moves and operates the
RIGHT FRONT ECCENTRIC CCW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW.
The
OPERATING BLADE also moves the
#4 PUSH BAR to the left, which moves and operates the
LEFT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
LEFT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CCW.
The
CROSS LINK moving CW, will pull the
TYPEWHEEL RACK up, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CCW, which moves the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, two units of movement, allowing the
PRINT HAMMER to type in the #2 CCW rotary row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, it moves the
#3 PUSH BAR to the right, which moves and operates the
RIGHT FRONT ECCENTRIC CW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW.
The
OPERATING BLADE also moves the
#4 PUSH BAR to the right, which moves and operates the
LEFT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
LEFT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CW.
The
CROSS LINK moving CCW, will pull the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL SHAFT CW, moving its attached
TYPEWHEEL CW, 2 units of movement, back to the Ø rotary row.
(Power: Gear Function Cam)

Positioning to the #3 CCW rotary row (#3 marking, #4 and #5 spacing)

When the
OPERATING BLADE moves left, it moves the
#3 PUSH BAR to the left, which moves and operates the
RIGHT FRONT ECCENTRIC CCW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW.
The
OPERATING BLADE also moves the
#5 PUSH BAR to the left, which moves and operates the
RIGHT REAR ECCENTRIC CCW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW.
The
CROSS LINK moving CW, will pull the
TYPEWHEEL RACK up, which rotates the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, 3 units of movement, allowing the
PRINT HAMMER to type in the #3 CCW rotary row.
(Power: Forward Function Cam)
When the
OPERATING BLADE moves to the right, it moves the
#3 PUSH BAR to the right, which moves and operates the
RIGHT FRONT ECCENTRIC CW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW.

The
OPERATING BLADE also moves the
#5 PUSH BAR to the right, which moves and operates the
RIGHT REAR ECCENTRIC CW, which moves the
CRANK PIN down, moving the
RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW.
The
CROSS LINK moving CCW, will pull the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL CW, 3 units of movement, back to the Ø rotary row.
(Power: Rear Function Cam)

Positioning to the #4 rotary row (#3 marking, #4 spacing, #5 marking)

When the
OPERATING BLADE moves to the left, it moves the
#3 PUSH BAR to the left, which moves and operates the
RIGHT FRONT ECCENTRIC CCW, which moves the
CRANK PIN down, moving the

RIGHT OUTPUT CONNECTING ROD down, which rotates the
CROSS LINK CW, pulling the
TYPEWHEEL RACK up, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CCW, which moves the
TYPEWHEEL SHAFT CCW, moving its attached
TYPEWHEEL CCW, 4 units of movement, allowing the
PRINT HAMMER to type in the #4 CCW rotary row.
(Power: Forward Function Cam)

When the
OPERATING BLADE moves to the right, itmoves the
#3 PUSH BAR to the right, which moves and operates the
RIGHT FRONT ECCENTRIC CW, which moves the
CRANK PIN up, moving the
RIGHT OUTPUT CONNECTING ROD up, which rotates the
CROSS LINK CCW, pulling the
TYPEWHEEL RACK down, which rotates the
TYPEWHEEL SHAFT SPUR GEAR CW, which moves the
TYPEWHEEL SHAFT CW, moving its attached
TYPEWHEEL CW, 4 units of movement, back to the Ø rotary row.
(Power: Rear Function Cam)

Printing in the Ø rotary row (#3, #4 spacing, #5 marking)

When the
OPERATING BLADE moves left, there are no
PUSH BARS in its path, therefore we remain in, and will print in the Ø rotary row.

The purpose of rotary correcting is to move the typewheel into its final rotary position and to lock it in that position during printing.

Rotary Correcting

During the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the left, moving the
CORRECTING DRIVE LINK to the left, which moves the
CORRECTING CLAMP ARM CW, which rotates the
CORRECTING SHAFT CW, which moves its attached
ROTARY CORRECTING LEVER CW, into engagement with the
TYPEWHEEL RACK, locking it in place for printing.
(Power: Forward Function Cam)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the right away from the
CORRECTING DRIVE LINK.
(Power: Rear Function Cam)

This allows the
CORRECTING DRIVE LINK SPRING to pull the
CORRECTING DRIVE LINK to the right, which moves the
CORRECTING CLAMP ARM CCW, which rotates the
CORRECTING SHAFT CCW, which moves the
ROTARY CORRECTING LEVER CCW, out of engagement with the
TYPEWHEEL RACK, freeing it, allowing it to be moved back to its normal stop position.
(Power: Correcting Drive Link Spring)

The eccentric detents hold the eccentrics and eccentric shafts in their last operated and/or unoperated positions.

Information Sheet 4-3-4I

LETTERS-FIGURES SHIFT

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts used for letters-figures shift, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of letters-figures shift. The explanation will include the names of parts, movements of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The left front eccentric controls letters-figures shift, and when operated, will rotate 180 degrees and give us either 8 CW or CCW units of movement to the typewheel. The letters-figures eccentric is never operated by itself.

With each engagement of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves right, moving the (rear view)
RIGHT DWELL SURFACE from underneath of the
LIFTER ARM ROLLER.
(Power: Forward Function Cam)
This allows the
LIFTER SPRING to pull the
LIFTER down, which moves the attached
LIFTER ARM down, which moves the
LIFTER ARM ROLLER down, into the camming surface of the
ROCKER BAIL.
(Power: Lifter Spring)
The
LIFTERS downward movement, allows the
LETTERS and FIGURES FUNCTION BLADE SPRINGS to move their respective
LETTERS and FIGURES FUNCTION BLADES down, until stopped by a
BELL CRANK.
(Power: Letters and Figures Function Blade Springs)

As the
ROCKER BAIL moves to the right, it moves the
OSCILLATING DRIVE LINK to the right, moving the
TRIP POST to the right, away from the
LOCK LEVER RELEASE ARM.

As the
ROCKER BAIL continues moving to the right, its camming surface forces the
LIFTER ARM ROLLER up, which moves the
LIFTER ARM up, which moves the
LIFTER up, moving the
TOGGLE LINK up.
(Power: Forward Function Cam)

This allows the
TOGGLE LINK SPRING to rotate the
TOGGLE LINK CW, to the lock position, rotating the
LOCK LEVER CCW, which moves the
LOCK LEVER RELEASE ARM CCW.
(Power: Toggle Link Spring)
The
LIFTER's upward movement, moves and holds the
LETTERS and FIGURES FUNCTION BLADES up, out of engagement with all the
BELL CRANKS.
(Power: Forward Function Cam)

As the
ROCKER BAIL moves to the left, it moves the (rear view)
LEFT DWELL SURFACE from underneath of the
LIFTER ARM ROLLER.
(Power: Rear Function Cam)
The
TOGGLE LINK SPRING holds the
TOGGLE LINK in the lock position, which holds the
LIFTER up, holding the
LIFTER ARM up, preventing the
LIFTER ARM ROLLER from riding into the low of the camming surface of the
ROCKER BAIL.
(Power: Toggle Link Spring)
As the
ROCKER BAIL moves left, it also moves the
OSCILLATING DRIVE LINK to the left, which moves the
TRIP POST to the left, which strikes and rotates the
LOCK LEVER RELEASE ARM CW, rotating the
LOCK LEVER CW, which rotates the
TOGGLE LINK CCW.
(Power: Rear Function Cam)
This allows the
LIFTER SPRING to pull the
LIFTER down, which pulls the
LIFTER ARM down, moving the attached
LIFTER ARM ROLLER DOWN onto the
RIGHT DWELL SURFACE of the
ROCKER BAIL as it reaches its normal stop position.
(Power: Lifter Spring)

Shifting to Figures

With the figures code combination received (1 2 - 4 5), during the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
LETTERS and FIGURES FUNCTION BLADE SPRINGS pull the (rear view)
LETTERS and FIGURES FUNCTION BLADES down. The
LETTERS FUNCTION BLADE is stopped by the
#3 BELL CRANK. The
FIGURES FUNCTION BLADE moves down into notches of the
BELL CRANKS moving the
FIGURES ARM ASSEMBLY CCW, which rotates the
FIGURES YIELD ARM CCW, which moves the
FIGURES YIELD ARM EXTENSION CCW, which moves the
FIGURES EXTENSION ARM CCW, away from the
LETTERS-FIGURES BELL CRANK.
(Power: Figures Function Blade Spring)
As the
FIGURES ARM ASSEMBLY moved CCW, it allowed the
LETTERS ARM ASSEMBLY SPRING to rotate the
LETTERS ARM ASSEMBLY CCW, rotating the
LETTERS YIELD ARM CCW, which moves the
LETTERS YIELD ARM EXTENSION away from the
LETTERS EXTENSION ARM.
(Power: Letters Arm Assembly Spring)
The
LETTERS EXTENSION ARM SPRING will now move the
LETTERS EXTENSION ARM CCW, rotating the
LETTERS-FIGURES BELL CRANK CW, which moves the
LETTERS PUSH BAR up, out of the path of the
OPERATING BLADE.
The
LETTERS-FIGURES BELL CRANK while moving CW, also moved the
FIGURES PUSH BAR up, into the path of the
OPERATING BLADE after it moved to the left.
(Power: Letters Extension Arm Spring)
As the
OPERATING BLADE moved to the left, it caused the
LEFT REAR ECCENTRIC to be operated, moving the
TYPEWHEEL CW 2 units of movement to the #2 CW rotary row.
(Power: Forward Function Cam)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, as the
OPERATING BLADE moves to the right, it pulls the (front view)
FIGURES PUSH BAR to the right, rotating the
LETTERS-FIGURES ECCENTRIC CCW, which pulls the
LETTERS PUSH BAR to the left. When the
LETTERS-FIGURES ECCENTRIC was operated, it gives 8 CW units of movement,
but as the same time, the

LEFT REAR ECCENTRIC is resetting, taking away 2 CW units of movement, causing the
TYPEWHEEL to move an additional 6 CW units of movement, placing it in the Ø rotary row, figures half.
(Power: Rear Function Cam)

Shifting to Letters

With the letters code combination received (1 2 3 4 5), during the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
LETTERS and FIGURES FUNCTION BLADES SPRINGS pull the (rear view)
LETTERS and FIGURES FUNCTION BLADES down. The
FIGURES FUNCTION BLADE is stopped by the
#3 BELL CRANK, the
LETTERS FUNCTION BLADE moves down, into the notches of the
BELL CRANKS, moving the
LETTERS ARM ASSEMBLY CW, rotating the
LETTERS YIELD ARM CW, which rotates the
LETTERS YIELD ARM EXTENSION CW, which moves the
LETTERS EXTENSION ARM CW, away from the
LETTERS-FIGURES BELL CRANK.
(Power: Letters Function Blade Spring)
As the
LETTERS ARM ASSEMBLY moved CW, it allowed the
FIGURES ARM ASSEMBLY SPRING to rotate
FIGURES ARM ASSEMBLY CW, rotating the
FIGURES YIELD ARM CW, which moves the
FIGURES YIELD ARM EXTENSION away from the
FIGURES EXTENSION ARM.
(Power: Figures Arm Assembly Spring)
The
FIGURES EXTENSION ARM SPRING will now move the
FIGURES EXTENSION ARM CW, rotating the
LETTERS-FIGURES BELL CRANK CCW, which moves the
FIGURES PUSH BAR down, out of the path of the
OPERATING BLADE. The
LETTERS-FIGURES BELL CRANK also moves the
LETTERS PUSH BAR down, into the path of the
OPERATING BLADE after it moved to the left.
(Power: Figures Extension Arm Spring)
As the
OPERATING BLADE moved left, it caused the (front view)
LEFT REAR ECCENTRIC and the
RIGHT FRONT ECCENTRIC to operate, moving the
TYPEWHEEL CCW 2 units of movement to the #3 CCW rotary row.
(Power: Forward Function Cam)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
OPERATING BLADE moving to the right, pulls the (front view)
LETTERS PUSH BAR to the right, rotating the
LETTERS-FIGURES ECCENTRIC CW, which pulls the
FIGURES PUSH BAR to the left. When the
LETTERS-FIGURES ECCENTRIC was operated, it gives 8 CW units of movement,
but at the same time, the
LEFT REAR ECCENTRIC and the
RIGHT FRONT ECCENTRIC are resetting, taking away 2 CCW units of movement,
causing the
TYPEWHEEL to move an additional 6 CCW units of movement, placing it back
in the Ø rotary row, letters half.
(Power: Rear Function Cam)

Information Sheet 4-4-1I

PRINTING MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the printing mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the printing mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

During the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the right, moving the (left rear view)
PRINTING DRIVE LINK to the right, which rotates the
PIVOT ARM CW, which moves the
PRINTING TRIP LINK down, rotating the
PRINTING LATCH CW, releasing the
ACCELERATOR.
(Power: Forward Function Cam)
This allows the
ACCELERATOR SPRING to rotate the
ACCELERATOR CCW, moving the
PRINT HAMMER CCW, until the
ACCELERATOR is stopped by the
LATCH BRACKET PROJECTION. Then momentum will cause the
PRINT HAMMER to continue moving CCW, causing a character to be printed on the tape.
(Power: Accelerator Spring)
The
PRINT HAMMER SPRING will then move the
PRINT HAMMER CW, away from the
TYPEWHEEL, and back against the
ACCELERATOR.
(Power: Print Hammer Spring)

During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the left, moving the
PRINTING DRIVE LINK to the left, rotating the
PIVOT ARM CCW, which moves the
PRINTING TRIP LINK up, away from the
PRINTING LATCH.
(Power: Rear Function Cam)
The
PRINTING LATCH SPRING will now rotate the
PRINTING LATCH CCW.
(Power: Printing Latch Spring)

As the
PRINTING TRIP LINK moves up, it moves and holds the
ACCELERATOR CW, in its normal stop position.
(Power: Rear Function Cam)

This allows the
PRINT HAMMER SPRING to rotate the
PRINT HAMMER further CW, back to its normal stop position.
(Power: Print Hammer Spring)

Information Sheet 4-4-2I

RIBBON MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the ribbon mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the ribbon mechanism. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Ribbon Oscillation moves the ribbon out over the print hammer for printing and back for viewing.

During the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the left, moving the (top view)
OSCILLATING DRIVE LINK to the left, rotating the
OSCILLATING DRIVE BAIL CW, which rotates the
TOGGLE LINKS CCW, moving the
OSCILLATING BAIL CW, which moves the
RIBBON OSCILLATING LEVER CCW, taking the
RIBBON GUIDE to the front, taking the
RIBBON to the front for printing.
(Power: Forward Function Cam)

During the second half revolution of the
PERFORATOR FUNCTION CLUTCH, the
ROCKER BAIL moves to the right, moving the (top view)
OSCILLATING DRIVE LINK to the right, rotating the
OSCILLATING DRIVE BAIL CCW, which rotates the
TOGGLE LINKS CW, moving the
OSCILLATING BAIL CCW, which moves the
RIBBON OSCILLATING LEVER CW, pulling the
RIBBON GUIDE to the rear, taking the
RIBBON to the rear, for viewing
(Power: Rear Function Cam)

Ribbon Feed maintains a constant tension on the ribbon, and moves it left or right presenting a fresh inked surface for the next character to be printed.

During the first half revolution of the PERFORATOR FUNCTION CLUTCH, the ROCKER BAIL moves to the left, moving the attached ROLLER to the left, which moves the ADJUSTABLE EXTENSION ARM CW, which moves the DRIVE ARM CW, moving the FEED PAWL up, overtraveling a tooth on the RATCHET.

(Power: Forward Function Cam)

The RETAINING PAWL SPRING (a dual purpose spring) holds the RETAINING PAWL into engagement with the RATCHET, preventing it from backing up.

The FEED PAWL SPRING (a dual purpose spring) holds the FEED PAWL into engagement with the RATCHET.

(Power: Retaining/Feed Pawl Spring (same spring)

During the last half revolution of the PERFORATOR FUNCTION CLUTCH, the ROCKER BAIL moves to the right, moving the ROLLER to the right, away from the ADJUSTABLE EXTENSION ARM.

(Power: Rear Function Cam)

This allows the DRIVE ARM SPRING to pull the DRIVE ARM CCW, moving the FEED PAWL down, rotating the RATCHET CCW, which moves the RIBBON SPOOL CCW, winding the RIBBON up.

The DRIVE ARM moving CCW, also moves the ADJUSTABLE EXTENSION ARM CCW.

(Power: Drive Arm Spring)

Ribbon reverse changes the direction of movement of the ribbon before it becomes completely unwound on one side.

Assume the ribbon is being wound on the right ribbon spool.

As the RIBBON nears the end; the left RIBBON EYELET moves the RIBBON REVERSING ARM and EXTENSIONS CCW.

(Power: Drive Arm Spring)

During the first half revolution of the
PERFORATOR FUNCTION CLUTCH, the
FEED PAWL moves up.
(Power: Forward Function Cam)
This allows the
RIBBON REVERSE DETENT LEVER SPRING to move the
RIBBON REVERSE DETENT LEVER, which through its detenting action, moves the
RIBBON REVERSING ARM RIGHT EXTENSION further CCW, under the
FEED PAWL, holding the
RIBBON REVERSING ARM in last position shifted, until it is moved by the
RIBBON EYELET.
(Power: Ribbon Reverse Detent Lever Spring)
During the last half revolution of the
PERFORATOR FUNCTION CLUTCH, the
DRIVE ARM SPRING rotates the
DRIVE ARM CCW, which moves the
FEED PAWL down, striking the
RIBBON REVERSING ARM RIGHT EXTENSION, which rotates the
FEED PAWL CCW, out of engagement with the
RIGHT RATCHET, and into engagement with the
LEFT RATCHET. The bottom of the
FEED PAWL while moving CCW, moves the
RETAINING PAWL CW, into engagement with the
LEFT RATCHET.
(Power: Drive Arm Spring)
The
RETAINING PAWL SPRING (dual purpose) holds the
RETAINING PAWL into engagement with the
RATCHET, preventing it from backing up.
The
FEED PAWL SPRING (dual purpose) holds the
FEED PAWL into engagement with the
RATCHET.
(Power: Retaining/Feed Pawl Spring)

Information Sheet 4-4-3I

POWER DRIVE BACKSPACE

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of the power backspace is to allow an operator to automatically step the tape back through the punch block in order to delete perforated errors.

2. LOCATE and IDENTIFY, by name, the parts used for power backspace, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of the power backspace. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the power drive backspace is to allow an operator to automatically step the tape back through the punch block in order to delete perforated errors.

When the
TAPE BACKSPACE KEY is depressed, it moves down, moving the
KEYLEVER down, which moves the
BACKSPACE SWITCH PLUNGER down, causing the
BACKSPACE SWITCH to close, which energizes the
BACKSPACE MAGNET. The
ARMATURE is attracted, and moves the
ARMATURE BAIL and EXTENSION down, away from the
DRIVE LINK LATCH.

(Power: None)

This allows the
NON-REPEAT ARM SPRING to rotate the
NON-REPEAT ARM CCW, into the path of the
DRIVE LINK LATCH.

(Power: Non-Repeat Arm Spring)

The
DRIVE LINK LATCH SPRING rotates the
DRIVE LINK LATCH CW, into the path of the
ECCENTRIC ARM.

(Power: Drive Link Latch Spring)

As the
ECCENTRIC high moves to the right, it moves the
ECCENTRIC ARM to the right, which moves the
DRIVE LINK LATCH to the right, rotating the
DRIVE LINK CCW, which moves the
LINK down, moving the
BELL CRANK HANDLE down, disengaging the
PERFORATOR FEED PAWL from the
RATCHET WHEEL.
As the
BELL CRANK HANDLE moves down, it also moves the
BELL CRANK CW, pulling on the
SEGMENT GEAR SPRING
(Power: Eccentric)
The
SEGMENT GEAR SPRING moves the
SEGMENT GEAR to the right, rotating the
RAKE CCW, which moves the chads on the tape, down.
(Power: Segment Gear Spring)
As the
BELL CRANK rotated CW, it also moves the
RETURN LATCH to the right, away from the
RETURN LATCH ECCENTRIC.
(Power: Eccentric)
As the
BELL CRANK rotated CW, it also moves the
BACKSPACE FEED PAWL right, which engages and moves the
RATCHET WHEEL CW, backing the tape up one space.
As the
RATCHET WHEEL rotated CW, a tooth strikes and moves the
BACKSPACE FEED PAWL CCW, moving its lower extension from under the
RETURN LATCH.
(Power: Eccentric)
This allows the
RETURN LATCH SPRING to rotates the
RETURN LATCH CW, holding the
BACKSPACE FEED PAWL away from the
RATCHET WHEEL.
(Power: Return Latch Spring)

As the
ECCENTRIC high moves to the left, it moves the
ECCENTRIC ARM to the left, away from the
DRIVE LINK LATCH.
(Power: Eccentric)
This allows the
BELL CRANK SPRING to rotate the
BELL CRANK CCW, moving the
BELL CRANK HANDLE up, away from the
PERFORATOR FEED PAWL.
(Power: Bell Crank Spring)

Allowing the
PERFORATOR FEED PAWL SPRING to release the
PERFORATOR FEED PAWL.
(Power: Perforator Feed Pawl Spring)
As the
BELL CRANK HANDLE moves up, it also moves the
LINK up, moving the
DRIVE LINK CW, which moves the
DRIVE LINK LATCH to the left.
(Power: Bell Crank Spring)
As the
BELL CRANK moves CCW, it also moves the
SEGMENT GEAR and the
RAKE back to their normal stop positions.
With the
BELL CRANK moving further CCW, it also causes the
RETURN LATCH to move further to the left, striking the
RETURN LATCH ECCENTRIC, which rotates the
RETURN LATCH CCW, releasing the lower extension of the
BACKSPACE FEED PAWL.
(Power: Bell Crank Spring)
This allows the
BACKSPACE FEED PAWL SPRING to rotate the
BACKSPACE FEED PAWL CW, placing its lower extension under the
RETURN LATCH.
(Power: Backspace Feed Pawl Spring)

With the
TAPE BACKSPACE KEY depressed, the
ARMATURE BAIL and extension are down, out of the path of the
DRIVE LINK LATCH.
(Power: None)
The
NON-REPEAT ARM is up, in the path of the
DRIVE LINK LATCH.
(Power: Non-Repeat Arm Spring)
As the
DRIVE LINK LATCH moves further to the left, it hits the
NON-REPEAT ARM which rotates the
DRIVE LINK LATCH CCW, out of engagement with the
ECCENTRIC ARM, allowing only one backspace.
(Power: Bell Crank Spring)
With the
TAPE BACKSPACE KEY released, the
ARMATURE BAIL SPRING rotates the
ARMATURE BAIL and EXTENSION CCW into the path of the
DRIVE LINK LATCH.

The
ARMATURE BAIL also moves the
NON-REPEAT ARM CW, out of the path of the
DRIVE LINK LATCH.
(Power: Armature Bail Spring)
As the
DRIVE LINK LATCH moves further to the left, it hits the
ARMATURE BAIL EXTENSION, which causes the
DRIVE LINK LATCH to rotate CCW, out of engagement with the
ECCENTRIC ARM, allowing only one backspace.
(Power: Bell Crank Spring)

To receive continuous backspace, you must manually hold the armature bail extension and non-repeat arm down, out of the path of the drive link latch.

Information Sheet 4-5-1I

TYPING REPERFORATOR

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the power law for the reperforator, as given in the Trainee's Guide, NAVTRA 41046.

2. LOCATE and IDENTIFY, by name, the parts of the reperforator, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall basic operation of the reperforator. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The typing reperforator selector mechanism works the same as the selector mechanism in the automatic typer. The punching and printing mechanisms work the same as the puching and printing mechanisms in the perforator with three minor differences.

The power law for the reperforator is "Cams and eccentrics on the main shaft and springs throughout the reperforator."

Cams, gears and eccentrics on the main shaft from front to rear:

Eccentric
Selector clutch assembly
  Cams: #5 selector lever cam
        #4 selector lever cam
        #3 selector lever cam
        Marking and spacing lock lever cam
        #2 selector lever cam
        #1 selector lever cam
        Reset bail cam
        Function trip cam
Drive bail cam
Function clutch assembly
  Cams: Forward function cam
        Rear function cam
        Feed out cam
        Feed pawl eccentric

Punch Mechanism (2 differences)

As each intelligence impulse is selected, the marking PUSH LEVERS are moved to the left, which moves the PUNCH SLIDE LATCHES CCW, out of the path of the PUNCH SLIDES.

(Power: Associated Selector Lever Cams)

As the REPERFORATOR MAIN TRIP LEVER rotates CCW, it moves the PUNCH SLIDE RESET BAIL TRIP LEVER CCW, which places tension on the PUNCH SLIDE RESET BAIL SPRING.

(Power: Function Trip Cam)

The PUNCH SLIDE RESET BAIL SPRING pulls the PUNCH SLIDE RESET BAIL CW, releasing all the punch slides.

(Power: Punch Slide Reset Bail Spring)

Function Clutch Trip Mechanism (1 difference)

During the fifth intelligence impulse, the high of the FUNCTION TRIP CAM presents itself to and rotates the FOLLOWER LEVER CW, which places tension on the ADJUSTING ARM SPRING. The FOLLOWER LEVER also rotates the ADJUSTING ARM CW, which moves the REPERFORATOR MAIN TRIP LEVER CCW, out from under the CLUTCH RELEASE.

(Power: Function Trip Cam)

This allows the CLUTCH RELEASE SPRING to rotate the CLUTCH RELEASE CCW, which rotates the TRIP SHAFT CCW, rotating the FUNCTION CLUTCH TRIP LEVER CCW, out of the path of the FUNCTION CLUTCH SHOE LEVER, allowing the clutch to engage.

(Power: Clutch Release Spring)

When the low of the FUNCTION TRIP CAM presents itself to the FOLLOWER LEVER, it allows the ADJUSTING ARM SPRING to rotate the ADJUSTING ARM CCW away from the REPERFORATOR MAIN TRIP LEVER. The ADJUSTING ARM moving CCW also moves the FOLLOWER LEVER CCW down into the low of the FUNCTION TRIP CAM.

(Power: Adjusting Arm Spring)

Near the end of the first half revolution of the
REPERFORATOR FUNCTION CLUTCH, the
FORWARD FUNCTION CAM with its attached
RESET PIN rotates CCW, which strikes and rotates the
RESET ARM CW, which rotates the
TRIP SHAFT CW, moving the
CLUTCH RELEASE CW, and also moving the
FUNCTION CLUTCH TRIP LEVER CW, back into the path of the
FUNCTION CLUTCH SHOE LEVER, disengaging the clutch.
(Power: Forward Function Cam)

Information Sheet 4-6-1I

TROUBLESHOOTING PROCEDURES FOR THE TYPING PERFORATOR

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. EXPLAIN the logical troubleshooting procedures for the typing perforator: recognizing and diagnosing symptoms, isolating the fault to the area or train of parts, localizing the faulty or maladjusted part, and analyzing the cause of the malfunction.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1
NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3

INFORMATION

Logical troubleshooting procedures for the typing perforator.

Plug in AC and place typer on keyboard, rotate motor flywheel by hand.
Turn machine on, place LTK in TEST position and place keyboard control knob in K position, ensure perforator does not trip off.
Place keyboard control knob in KT position.
Check perforator clutch engagement. (The perforator should trip off on the first character selected), if not; check the clutch trip mechanism train of parts until malfunction or missing part is located.
Type out complete test
Check printing on tape for garbles: If garbling is observed, determine if only the printing is garbling, or if both printing and punching is garbled.
If only printing is garbled - check the printing mechanism starting with the push bars.
If both printing and punching is garbled - check the printing and punching mechanisms starting with the code bar extensions.
Check character counter operation, and margin indicator light. (Should light on the 66, 67 or 68th character)
Check power backspace to ensure that you are able to backspace the tape and letter out the desired characters.
Check the perforations in the tape to ensure the punching is correct. If the perforations are garbled, check out the punching train of parts starting with the punch slide latches.
Place keyboard control knob in T position.
Check EOL light. (shoud light on 66, 67 or 68th character)
Ensure the keyboard is being reset; if not; check out the resetting train of parts until the malfunction or missing part is located.

Information Sheet 5-1-1I

ENGAGING AND DISENGAGING THE T/D CLUTCH

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the power for the transmitter distributor is the Drive Arm Eccentric, Cams on the TD Main Shaft, and Springs throughout the TD.

2. LOCATE and IDENTIFY, by name, the parts used to engage and disengage the transmitter distributor clutch, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of engaging and disengaging the transmitter distributor clutch. The explanation will include the name of parts, the movement of parts, and the pwoer that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The power law for the T/D is "The Drive Arm Eccentric, Cams on the TD Main Shaft and Springs throughout the TD."

Eccentrics and cams on the TD cam shaft assembly front to rear are:

Drive arm eccentric
Locking bail cam
Spare
#5 Transfer lever cam
#4 Transfer lever cam
#4 Transfer lever cam
Start cam
#2 Transfer lever cam
#1 Transfer lever cam
Stop cam
Spare

Engaging the TD clutch

When the
TD CLUTCH MAGNETS energize, the
ARMATURE is attracted to the pole pieces, moving the
ARMATURE BAIL EXTENSION CW, which moves the (rear view)

MAIN BAIL LATCH LEVER CCW, away from the
MAIN BAIL.
(Power: None)
This allows the
MAIN BAIL SPRING to rotate the
MAIN BAIL CW, which moves the
TRIP LEVER BAIL ECCENTRIC POST, which moves the
CLUTCH TRIP LEVER BAIL CCW, moving the
CLUTCH TRIP LEVER CCW, away from the
CLUTCH SHOE LEVER, allowing the clutch to engage and extend motion to the
TD CAM SHAFT ASSEMBLY.
(Power: Main Bail Spring)
As the
TD CAM SHAFT ASSEMBLY rotates, it moves the attached
DRIVE ARM ECCENTRIC, which moves the
DRIVE ARM down, which pulls the
MAIN BAIL ECCENTRIC down, which rotates the
MAIN BAIL CCW.
(Power: Drive Arm Eccentric)

Disengaging the TD Clutch

As the
MAIN BAIL rotated CCW, the
TRIP LEVER BAIL ECCENTRIC POST moved the
CLUTCH TRIP LEVER BAIL CW, which moves the
CLUTCH TRIP LEVER SPRING.
(Power: Drive Arm Eccentric)
The
CLUTCH TRIP LEVER SPRING now moves the
CLUTCH TRIP LEVER CW, back into the path of the
CLUTCH SHOE LEVER, causing the TD clutch to disengage and stop motion of
TD CAM SHAFT ASSEMBLY.
(Power: Clutch Trip Lever Spring)
As the
TD CLUTCH MAGNETS deenergize, the
ARMATURE BAIL EXTENSION SPRING moves the
ARMATURE away from the pole pieces, moving the
ARMATURE BAIL EXTENSION CCW.
(Power: Armature Bail Extension Spring)
This allows the
MAIN BAIL LATCH LEVER SPRING to move the
MAIN BAIL LATCH LEVER CW, latching the
MAIN BAIL down in its normal stop position.
(Power: Main Bail Latch Lever Spring)

Information Sheet 5-1-2I

TAPE FEED AND TAPE SENSING

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts used in tape feeding, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of tape feed. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

3. STATE that the purpose of tape sensing is to convert tape perforations into electrical impulses.

4. LOCATE and IDENTIFY, by name, the parts used in tape sensing, using the actual equipment and the pictorial in NAVTRA 41048.

5. EXPLAIN the overall operation of tape sensing. The explanation will include the names of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

Tape Feeding (rear view)

As the
MAIN BAIL moves CW, it moves the
FEED PAWL up, over traveling a tooth on the
FEED WHEEL RATCHET.
(Power: Main Bail Spring)
The
FEED PAWL SPRING holds the
FEED PAWL into engagement with the
FEED WHEEL RATCHET.
(Power: Feed Pawl Spring)
The
RATCHET DETENT LEVER SPRING holds the
RATCHET DETENT LEVER into engagement with the
FEED WHEEL RATCHET, preventing it from backing up.
(Power: Ratchet Detent Lever Spring)

As the
MAIN BAIL moves CCW, it moves the
FEED PAWL down, which rotates the
FEED WHEEL RATCHET CW. which rotates the
FEED WHEEL CW, advancing the tape to the right
(Power: Drive Arm Eccentric)

The purpose of tape sensing is to convert tape perforations into electrical impulses.

Tape Sensing

As the
MAIN BAIL moves CCW, it moves the
MAIN BAIL SPACER POST CCW, away from all the
TAPE SENSING PINS.
(Power: Main Bail Spring)
This allows the
TAPE SENSING PIN SPRINGS to move all the
TAPE SENSING PINS up, until stopped by either the
TAPE (for spacing impulses - no perforations) or the
MAIN BAIL SPACER POST. (For marking impulses, perforations in tape)
(Power: Tape Sensing Pin Springs)
The
MARKING TAPE SENSING PINS move their associated
TRANSFER LEVERS CW.
(Power: Tape Sensing Pin Springs)
The
TRANSFER LEVER SPRINGS hold the
SPACING TRANSFER LEVERS CCW.
(Power: Transfer Lever Springs)

During the start impulse, as the
CAM SHAFT ASSEMBLY rotates, the high of the
LOCKING BAIL CAM moves up, allowing the
LOCKING BAIL SPRING to move the
LOCKING BAIL up, locking all the
TRANSFER LEVERS in position for either a mark or a space.
(Power: Locking Bail Spring)
As the
CAM SHAFT ASSEMBLY rotates, the
TRANSFER LEVER CAMS rotate, moving their associated
TRANSFER LEVERS down, rotating the
TRANSFER BAIL CCW, for a mark; or CW for a space.
(Power: Transfer Lever Cams)

As the
TRANSFER LEVER CAMS move away from their associated
TRANSFER LEVERS, their associated
TRANSFER LEVER SPRINGS pull the
TRANSFER LEVERS up.
(Power: Transfer Lever Springs)

Positioning for a Mark

As the
TRANSFER BAIL moves CCW for a mark, it moves the
TRANSFER BAIL EXTENSION to the left, pulling on the
STABILIZER SPRING.
(Power: Transfer Lever Cams)
The
STABILIZER SPRING rotates the
SPACING LATCH CCW, which now holds and detents the
TRANSFER BAIL EXTENSION to the left.
(Power: Stabilizer Spring)

As the
TRANSFER BAIL moved CCW, it also moved the
DRIVE LINK to the left, which rotates the
CONTACT TOGGLE CW, which closes the (top view)
MARKING CONTACTS. Current now flows for a mark.
(Power: Transfer Lever Cams)

Positioning for a Space

As the
TRANSFER BAIL moves CW, for a space, it moves the
TRANSFER BAIL EXTENSION to the right, pulling on the
STABILIZER SPRING.
(Power: Transfer Lever Cams)
The
STABILIZER SPRING rotates the
MARKING LATCH CW, which now holds and detents the
TRANSFER BAIL EXTENSION to the right.
(Power: Stabilizer Spring)
As the
TRANSFER BAIL moves CW, it also moves the
DRIVE LINK SPRING to the right.
(Power: Transfer Lever Cams)
The
DRIVE LINK SPRING pulls the
DRIVE LINK to the right, which rotates the
CONTACT TOGGLE CCW, which closes the (top view)
SPACING CONTACTS. Current does not flow.
(Power: Drive Link Spring)

Resetting

As the
MAIN BAIL moves CW, it moves the
MAIN BAIL SPACER POST CW, which moves all
TAPE SENSING PINS down, to their normal stop position.
(Power: Drive Arm Eccentric)

After the fifth intelligence impulse has been transmitted, the high of the
LOCKING BAIL CAM moves the
LOCKING BAIL down, releasing all of the
TRANSFER LEVERS.

(Power: Locking Bail Cam)

This allows the
MARKING TRANSFER LEVER SPRINGS to move the
MARKING TRANSFER LEVERS CCW, back to their normal stop position.

(Power: Transfer Lever Springs)

Information Sheet 5-1-3I

START-STOP, TIGHT OR TANGLED TAPE, AND TAPE OUT SENSING OPERATION

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the purpose of the start-stop, tight or tangled tape, and tape out sensing mechanisms, as given in the Information Sheet 5-1-3I of NAVTRA 41046.

2. LOCATE and IDENTIFY, by name, the parts of the start-stop, tight or tangled tape, and tape out sensing mechanisms, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of start-stop, tight or tangled tape, and the tape out sensing mechanisms. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the start-stop mechanism is to permit the T/D to be set up in either a run, stop or free wheeling position.

The purpose of the tape out sensing mechanism is to stop the TD when the tape runs out.

In the stop position, the tape sensing pins and tape out sensing pins are down below the tape guide plate, and the start-stop and tight tape contacts are open, de-energizing the T/D clutch magnet.

Changing from stop to Free Wheeling position:

By moving the
CONTROL LEVER CCW, it moves the
START-STOP BAIL CW, moving the
START-STOP BAIL EXTENSION CW, which moves the
DETENT LEVER and the
FEED PAWL away from the
FEED WHEEL RATCHET.
(Power: None)

The
FEED WHEEL is now free to rotate and the tape can be pulled through the
TAPE GUIDE freely.

As the
START-STOP BAIL EXTENSION moved CW, it also moved the
INTERMEDIATE BAIL EXTENSION ARM CW, which moves the
INTERMEDIATE BAIL CW, placing tension on the
INTERMEDIATE BAIL SPRING.

(Power: None)

Changing from Free Wheeling to Stop position:

By rotating the
CONTROL LEVER CW, it moves away from the
START-STOP BAIL.

(Power: None)

This allows the
INTERMEDIATE BAIL SPRING to rotate the
INTERMEDIATE BAIL CCW, which moves the
INTERMEDIATE BAIL EXTENSION ARM CCW, moving the
START-STOP BAIL EXTENSION CCW, which moves the
START-STOP BAIL CCW.

(Power: Interemdiate Bail Spring)

As the
START-STOP BAIL EXTENSION moved CCW, it allowed the
FEED PAWL SPRING and the
DETENT LEVER SPRING to move the
FEED PAWL and the
DETENT LEVER back, into engagement with the
FEED WHEEL RATCHET.

(Power: Feed Pawl Spring and Detent Lever Spring (2 separate springs)

Changing from Stop to Run Position

By rotating the
CONTROL LEVER fully CW, it moves further away from the
START-STOP BAIL.

(Power: None)

This allows the
INTERMEDIATE BAIL SPRING to rotate the
INTERMEDIATE BAIL CCW, which moves the
INTERMEDIATE BAIL EXTENSION ARM CCW, moving the
START-STOP BAIL EXTENSION CCW, moving the
START-STOP BAIL CCW, away from the
START-STOP and ITHGT TAPE CONTACTS.

(Power: Intermediate Bail Spring)

This allows the
START-STOP and TIGHT TAPE CONTACTS to close, energizing the
TD CLUTCH MAGNETS.

As the
INTERMEDIATE BAIL moved CCW, it also moves the
TAPE OUT PIN DEPRESSOR BAIL CCW, away from the
TAPE OUT SENSING PIN.
(Power: Intermediate Bail Spring)
Allowing the
TAPE OUT SENSING PIN SPRING to move the
TAPE OUT SENSING PIN up, against the tape. When the tape runs out, the
TAPE OUT SENSING PIN will move further up, opening the
TAPE OUT CONTACTS, which will open the TD clutch magnet circuit.
(Power: Tape Out Sensing Pin Spring)

Changing from Run to Stop Position

By rotating the
CONTROL LEVER CCW, it moves the
START-STOP BAIL CW, which moves the
START-STOP BAIL EXTENSION CW, moving the
INTERMEDIATE BAIL EXTENSION ARM CW, which moves the
INTERMEDIATE BAIL CW, away from the
TAPE OUT PIN DEPRESSOR BAIL.
(Power: None)
This allows the
TAPE OUT PIN DEPRESSOR BAIL SPRING to move the
TAPE OUTPIN DEPRESSOR BAIL CW, which moves the
TAPE OUT SENSING PIN down, away from the
TAPE OUT CONTACTS, allowing them to close. The
TAPE OUT SENSING PIN will move down flush or below the
TAPE GUIDE PLATE.
(Power: Tape Out Pin Depressor Bail Spring)
As the
START-STOP BAIL moved CW, it also moved and opened the
START-STOP and TIGHT TAPE CONTACTS, which opens the circuit to the
TD CLUTCH MAGNET.
(Power: None)

The purpose of the tight or tangled tape mechanism is to prevent tearing the tape during tape feed.

With the
CONTROL LEVER in the run position, and tape being fed; a tight or tangled
tape will rotate the
TIGHT or TANGLED TAPE BAIL CCW, which rotates the
TIGHT TAPE INTERMEDIATE ARM ASSEMBLY CW, opening the
START-STOP TIGHT TAPE CONTACTS, which opens the circuit to the
TD CLUTCH MAGNET.
(Power: Drive Arm Eccentric)

When the tight or tangled tape is cleared, the TIGHT TAPE INTERMEDIATE ARM ASSEMBLY SPRING rotates the TIGHT TAPE INTERMEDIATE ARM ASSEMBLY CCW, allowing the START-STOP and TIGHT TAPE CONTACTS to close, energizing the TD CLUTCH MAGNETS, allowing the TD to run again.

As the TIGHT TAPE INTERMEDIATE ARM ASSEMBLY rotated CCW, it moved the TIGHT or TANGLED TAPE BAIL CW, back to its unoperated position.

(Power: Tight Tape Intermediate Arm Assembly Spring)

Information Sheet 6-1-1I

BASIC ELECTRICITY

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. DEFINE current, voltage and resistance. The definition will be the same as that given in Information Sheet 6-1-1I of NAVTRA 41046.

2. EXPLAIN the relationship between current, voltage, and resistance, using Ohms Law and the information provided in Information Sheet 6-1-1I of NAVTRA 41046.

3. SOLVE for current, voltage, or resistance in a simple series and a simple parallel circuit using the formulas given in Information Sheet 6-1-1I of NAVTRA 41046.

4. WRITE the formulas expressing the three forms of Ohm's Law used to solve for unknown values of current, voltage, or resistance in simple circuits.

5. EXPLAIN the difference between AC and DC currents in terms of current flow. The explanation will be limited to the information provided in NAVTRA 41046.

6. IDENTIFY, from a pictorial, the schematic representation of resistors, capacitors, transformers, relays, magnets, switches, fuses, and lamps.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1
CNATT - P-4830 Elements of electrical physics - Ohm's Law.

INFORMATION

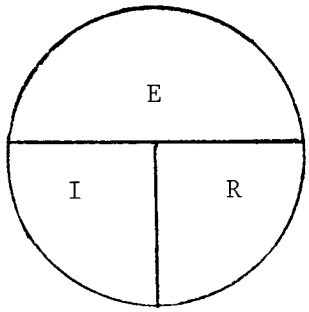
The three basic elements of any electrical circuit are voltage, curent and resistance.

Voltage is the force needed to move the flow of electrons, and it is measured in volts. The symbol representing voltage is E.

Current is the flow of electrons within a carriers, and it is measured in amperes. The symbol representing current is I.

Resistance is the opposition to the flow of electrons, and it is measured in ohms. The symbol representing resistance is R.

Ohm's Law



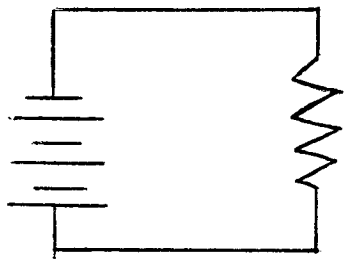
$E = IxR$

$I = \frac{E}{R}$

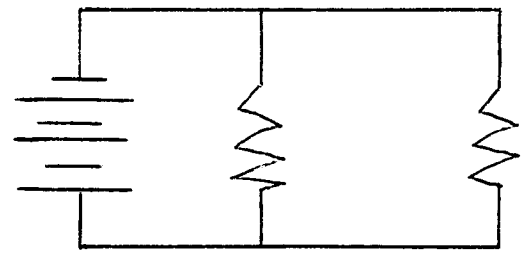
$R = \frac{E}{I}$

Simple Series Circuit:

A simple series circuit has only one path for current to flow, the current remains the same throughout the entire circuit, the voltage will be dropped proportionately throughout the circuit, and the total resistance will be equal to the sum of all resistances.



Series Circuit



Parallel Circuit

Simple Parallel Circuit:

A simple parallel circuit has more than one path for current to flow. The current will flow through each leg in accordance with the amount of resistance in that leg, the voltage will remain the same in each leg, and the total resistance will always be less than the smallest resistance.

Problem solving for a series circuit:

Total voltage = total current X total resistance
Total current = total voltage ÷ total resistance
Total resistance = total voltage ÷ total current

To find the total resistance in a series circuit, add the individual resistances: $R_T = R_1 + R_2 + R_3$

Problem solving for a parallel circuit:

Total voltage = total current X total resistance
Total current

Problem solving for a parallel circuit:

Total voltage = total current X total resistance
Total current = total voltage ÷ total resistance
Total resistance = total voltage ÷ total current

To find the total resistance in a parallel circuit, use the following formula:

$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

AC and DC Current in the AN/UGC-6K

AC current fluctuates from a positive reference point to a negative reference point. It is obtained from an external source and is used to run the motor, lights and signal bell.

DC current does not fluctuate, it remains either positive or negative in reference to a zero line. It is obtained either from an external source, or from a rectifier within the teletype machine. DC current is used for the signal line and for signalling purposes.

Electrical Components:

Fuse - a safety device to protect equipment from too much current.

Switch - used to open or close a circuit.

Transformer - used to step up or step down voltage for componenets requiring more or less voltage than is available.

Magnet - used to attract an armature, normally used to start a train of parts moving.

Relay - used to open or close contacts when energized or deenergized.

Rectifier - used to convert AC current to DC current.

Capacitor - used to block DC or to give a phase shift to AC.

Thermal Cutout - used to open the circuit to the motor in case of excessive current flow.

Electrical connections are shown on schematics within this school by a crossed line with a dot in the middle. If there is no dot in the middle, that means there is no electrical connection.

Information Sheet 6-2-1I

AC CIRCUITS IN THE AN/UGC-6K

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. TRACE and IDENTIFY, by name, all AC circuits in the AN/UGC-6K, using the circuit diagrams provided in the classroom.

2. SPECIFY the AC voltages present across all the electrical loads in the AC circuits, using the circuit diagrams and AC electrical mock-up provided in the classroom.

3. INTERPRET the voltage values across an open and a shorted component or circuit, while simulating the use of an ameter.

4. DETERMINE the defective AC circuit and/or components when given symptoms of simulated abnormal conditions, using AC circuit diagrams.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the AC circuits is to distribute AC to all required electrical components. There are terminal strips located throughout the AN/UGC-6K, these are located on each major component, in the ESU's and across the back of the cabinet. Each terminal strip is identified by a letter designation.
Located on each terminal strip, are terminal points, or screws where the wires are connected. Each terminal point is numbered.
Each major component is attached to the ESU by a plug. Each plug is identified by a letter designation; the "R" plug is for the automatic typer, the "F" plug is for the keyboard and the "U" plug is for the T/D. Each terminal strip or plug may carry both AC and DC.

AC Circuits

AC Common - supplies AC current to the entire AN/UGC-6K, all other components requiring AC, tap off this line. This circuit is protected by a 6¼ amp slo-blo fuse.

Motor Circuit - provides current to the start capacitor and start windings of the motor to ensure the motor builds up to speed immediately and starts running in the right direction. It also provides current to run the motor once it has started. The motor itself is an AC synchronus motor, operating on 60 cycle, 115V AC, with a starting current of 12.25 amps, and a running current of 2.8 amps. The running speed is 3600 RPM.

Backspace Circuit - supplies current to energize the power backspace magnet, through the normally open backspace switch.

Primary Lamp Transformer Circuit - supplies current to the primary windings of the lamp transformer, which steps down the 115V AC to 5.5V AC to light the lamps used throughout the AN/UGC-6K.

Copy and Perforator Lamp Circuit - provides power to light the copy and perforator lamps from the secondary windings of the primary lamp transformer circuit. These lights are normally on when the teltype machine is on.

Margin Indicator Lamp Circuit - supplies current to the margin indicator lamp when the keyboard control knob is in either the K or the KT position.

End of Line Indicator Lamp Circuit - supplies current to the EOL lamp with the keyboard control knob is in the T position. This circuit utilizes the same path for current as does the Margin Indicator Lamp Circuit, except for how it goes through the keyboard control selection switch.

Line Shunt Relay Magnet Circuit - which supplies current to activate the line shunt relay magnet. The magnet when energized (machine on) opens the line shunt contacts in the DC signal line, allowing the machine to operate normal. The magnet when de-energized (machine off) closes the line shunt contacts in the DC signal line, allowing other machines on the same line to run normal.

Signal Bell Circuit - supplies power to energize the signal bell magnet.

Rectifier Primary Circuit - supplies current to the primary windings of the rectifier transformer. The rectifier changes the AC to DC and has an output of 115 V DC, which is used within the teletype machine for DC current in the test position.

Selector Magnet Driver Rectifier Primary Circuit - supplies current to the primary windings of the SMD power supply. Steps down 115V AC to 80 V AC to supply power to the SMD. The SMD has an output of a negative 40 V DC.

Normal Voltage Readings (using a PSM-4 multimeter)

When reading between two points which are shorted, you will read Ø volts, as you are merely reading the voltage between two wires. But when reading between two points which have an open between them, you will read source voltage, as you are actually reading both sides of the line. The same applies to whenever you read across a load, you are actually reading both sides of the line and will read source voltage. If you short across a load, then you are actually taking all the resistance from that particular circuit, and this will cause a fuse to be blown.

Information Sheet 6-3-1I

DC CIRCUITS IN THE AN/UGC- K

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. TRACE and IDENTIFY, by name, all DC circuits in the AN/UGC-6K, using the circuit diagrams provided in the classroom.

2. SPECIFY the DC voltages present across all the electrical loads in the DC circuits, using the circuit diagrams and DC electrical mock-up provided in the classroom.

3. INTERPRET the voltage values across an open and a shorted component or cicuit, while simulating the use of a meter.

4. DETERMINE the defective DC circuit and/or components when given symptoms of simulated abnormal conditions, using DC circuit diagrams.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the DC circuits is to distribute DC to all required electrical components.

External Signal Line - supplies current to the SMD from an external source with the line test key in the LINE position. The total resistance of the signal line circuit is approximately 1885 ohms, 1800 ohms through an external source and approximately 85 ohms through the SMD. The total voltage is 115 V DC, but with a mark on the line, you will read approximately 3 VDC at terminal points C-5 and C-15, with a space on the line, you will read approximately 1 VDC at C-5 and C-15.

Internal Signal Line - supplies current to the SMD from the internal rectifier within the AN/UGC-6K, with the line test key in the TEST position. The 1800 ohm resistors in the teletype machine are now used in place of the 1800 ohm resistance we had from an external source when in the LINE position. The total resistance is still approximately 1885 ohms.

External Signal Line - with line test key in TEST position. This circuit is used to shunt the external line around the AN/UGC-6K when it is in the TEST position.

Selector Magnet Circuit - supplies current from the SMD to the selector magnets of the automatic typer. The total resistance of the selector magnets if approximately 66 ohms. The total current is 60 ma, and they utilize a voltage of 4 VDC for a mark and Ø VDC for a space.

Line Shunt Relay Contact Circuit - this circuit is used to shunt the signal line around the AN/UGC-7K when the teletype machine is turned off. These contacts are in the DC circuit, but are controlled by the Line Shunt Relay Magnet, which is in the AC portion of the teletype machine.

Clutch Trip Magnet Circuit - supplies path for current to the clutch trip magnet, to activate the mechanism to trip off the keyboard signal generator clutch.

T/D Clutch Magnet Circuit - supplies path for current to the T/D clutch magnet to activate mechanism for tripping off the T/D clutch. Three sets of contacts must be closed to energize the T/D clutch magnet, the Tape Out Contacts, the Start-Stop Tight or Tangled Tape Contacts, and the Lockbar Switch Contacts (keyboard lock), also the keyboard control knob must be in either the KT or T position.

Normal Voltage Readings - As far as reading across a shorted or an open circuit, the readings will be the same as in AC. The major difference is while taking readings of DC, you must observe the polarity, place the negative lead of your meter on the negative side of the line, and the positive lead on the positive side of the line.

Information Sheet 6-4-1I

AC AND DC IN THE TYPING REPERFORATOR

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. TRACE and IDENTIFY, by name, all AC and DC circuits in the typing reperforator, using the circuit diagrams.

2. SPECIFY the AC and DC voltages present across all the electrical leads in the AC and DC circuits.

3. INTERPRET the voltage values across an open and a shorted component or circuit, while simulating the use of a meter.

4. DETERMINE the defective AC and DC circuit and/or components when given symptoms of simulated abnormal conditions, using the AC and DC circuit diagrams.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

AC Circuits

AC Common - supplies a path for current to the various AC components throughout the typing reperforator. The line itself is protected by a 4 amp slo-blo fuse.

Motor Circuit - provides a path for current to the motor, through the start capacitor and start windings to start the motor immediately and to ensure it runs in the right direction. Then it furnishes a path for current to keep the motor running once it has started. The starting current for the motor is 9 amps, the running current is 1.85 amps. The motor is protected by a thermostatic cutout switch.

Line Shunt Relay Magnet Circuit - supplies a path for current to energize the Line Shunt Relay Magnet, and when energized, it controls a set of contacts in the DC circuit (line circuit) which will shunt the signal line around the machine or allow the machine to be activated by an external source.

Signal Bell Circuit - provides a path for current to energize the signal bell magnet when the signal bell function is operated.

Tape Out Circuit - provides a path for current to energize the signal bell magnet whenever the tape on the reel begins to get low. This bell will ring continuously to make the operator aware that his tape is about to run out.

Selector Magnet Driver Primary Circuit - provides a path for current to the primary windings of the SMD power supply transformer. The same type transformer that is used in the AN/UGC-6K is used herein.

DC Circuits

Signal Line Circuit - provides a path for current to activate the selector magnet driver from an external (signal line) source.

Line Shunt Relay Contact Circuit - provides a path for current to either be shunted around the typing reperforator when it is shut off, or for it to be used by the typing reperforator when it is turned on. This set of contacts is controlled by the Line Shunt Relay Magnet which is AC operated.

Selector Magnet Circuit - provides a path for current to the selector magnets from the output of the SMD. The selector magnets are the same as the selector magnets discussed earlier in the automatic typer.

Interfering Blank Tape Feed Out Circuit - provides a path for current to the blank tape feed out magnet through the tape feed out switch. It also shunts around the selector magnets at the same time.

Normal Voltage Readings - the same rules apply to reading the AC and DC voltages within the typing reperforator as apply to other readings within the AN/UGC-6K which were discussed earlier.

Information Sheet 6-5-1

SELECTOR MAGNET DRIVER

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the purpose of the selector magnet driver as given in Information Sheet 6-5-1I of NAVTRA 41046.

2. EXPLAIN the principles of operation of the selector magnet driver. The explanation will show the directions of current flow during the reception of a mark and a space.

REFERENCE

NAVSHIPS 0967-173-6010, Vol. 1

INFORMATION

The purpose of the selector magnet driver (SMD) is to supply a steady current of 60 ma DC to the selector magnets to cut down on the distortion, and to allow the teletype machine to operate efficiently with a fluctuating line current from 30 to 100 ma. It is a transistorized unit, with its power supply that provides a negative 40 VDC at 60 ma.

Current Flow for a Mark

When a mark is received on the line; Q-1 is turned on, Q-2 is turned off, Q-3 is turned on, the initial flow will be through Q-4 to the selector magnets, to Q-3 and back to the positive side of the power supply. The selector magnets will oppose the initial flow of current, causing a reflected voltage back to Q-4 and Q-5, which causes Q-4 to turn off and Q-5 to turn on. Q-5 will provide a large amount of current, and the current will immediately go to 60 ma, this increase will cause Q-5 to shut off, and Q-4 to turn on, and the current will flow from Q-4 to the selector magnets, to Q-3 and back to the positive side of the power supply.

Current Flow for a Space

When a space is received on the line; Q-1 is turned off, Q-2 is turned on, Q-3 is turned off. Current will flow through Q-4 to Q-2 and back to the positive side of the power supply. Q-2 will act as a shunt for current around the selector magnets.

Information Sheet 6-6-1I

TELETYPE PANELS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of teletype panels is to facilitate imterconnection and transfer of teletypewriters and various types of terminal equipment.

2. DESCRIBE the physical characteristics of a basic teletype panel. The description will be limited to the information contained in Information Sheet 6-6-1I of NAVTRA 41046.

3. EXPLAIN the proper patching procedures and safety precautions, when using a teletype panel. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

4. EXPLAIN the principles of operation of the SB-1210A/UGQ teletype panel, using a block diagram and single channel schematic, showing the directions of current flow.

REFERENCE

NAVSHIPS 95718 Technical Manual for Communication Patching Panels SB-1203A/UG and 1210A/UGQ.

NAVSHIPS 0901-670-0002, Bureau of Ships Technical Manual, Electronics.

INFORMATION

The purpose of the teletype patch panel is to facilitate interconnection and transfer of teletypewriters and various types of terminal equipment.

Physical Characteristics

Components of the panels are housed in an aluminim cabinet, with most of the electrical componenets mounted on the inside of the front panel. The front panel is hinged at the bottom, and is secured at the top by two screws.

The front panel provides for operation of six channels, each comprising a circuit of two looping (LPG) jacks, at least one set (SET) jack, and a rheostat for adjusting the line current. Line current is monitored by a milliammeter which can be switched to any one channel by a rotary selector switch. There are also six miscellaneous jacks to which any teletypewriter unit not regularly assigned a channel may be connected.

The jacks identified as LPG and MISC are identical and are the standard type phone jacks. They may be plugged into without interrupting the signal line. The jack labeled SET incorporates a double-throw-double-pole-switch, which allows the attached equipment to remain in that channel whether or not a plug is in the jack. To disconnect it from that channel, a dummy plug must be inseted into the set jack.

The communications patching panels SB-1203A/UG and SB-1210A/UGQ are identical in essentials of operation and functions, except for minor differences in some electrical components. The SB-1210A/UGQ is a modification of the SB-1203A/UG, that has been designed for patching requirements of secure teletypewriter channels.

Proper Patching Procedures and Safety Precautions

If the desired teletype equipment is not wired into the same looping channel as the terminal equipment to be used, insert a patch cord into the teletype (SET) jack, and the other end in either one of the two looping (LPG) jacks in the desired channel.

CAUTION. DO NOT plug into the looping jack first, as it will interrupt the circuit, and may place 110 VDC on the free end of the plug.

Principles of Operation

Radio adapters or crypto equipment are wired in at TB-101, the teletype equipment is wired in at TB-102, the miscellaneous jack is wired to TB-103, and an internal power supply is wired in at TB-104. TB-103 may be wired to any desired teletype or terminal equipment.

Local Loop being Supplies

Current flows from TB-104 to TB-101, through the radio adapter, to the SET jack, to TB-102, through the teletype equipment, back to the SET jack, to the LPG jacks, to R-107 (meter shunt resistor), to R-108 (rheostat for adjusting line current), to R-119 (which limits the current in any loop to a maximum of 190 milliamps), back to TB-104 the other side of the power supply.

External Loop being Supplies

Remove straps from TB-104 pin #1 going to TB-101 pin #1, and strap from TB-104 pin #2 going to R-119. Strap R-119 to pin #1 of TB-101.

Current flows from TB-101, to the SET jack, to TB-102, through the teletype equipment, back to the SET jack, to the LPG jacks, to R-107, R-108, T-119, back to TB-101, the other side of the loop.

Information Sheet 7-1-1I

DISTORTION AND TEST EQUIPMENT

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. EXPLAIN the various types of distortion associated with a teletype signal. The explanation will be limited to the information contained in NAVTRA 41046.

1. SET UP and USE the AN/UGM-8(V) telegraph test set to measure signal distortion handling limits on a teletypewriter, using the procedures listed in the technical manual.

3. SET UP and USE the AN/USM-105A oscilloscope to measure distortion present in a teletypwriter circuit, using the procedures listed in the technical manual.

4. SET UP and USE the AN/PSM-4C multimeter for in-circuit voltage readings, using the procedures listed in the technical manual.

5. EXPLAIN applicable safety precautions as prescribed in NAVSHIPS 0901-670-0002, Bureau of Ships Technical Manual, Electronics, as related to the use of test equipment.

REFERENCES

NAVSHIPS 92051 Technical Manual for Multimeter AN/PSM-4
NAVSHIPS 93658A Technical Manual for AN/USM-105A Oscilloscope
NAVSHIPS 0967-328-9010 Technical Manual for test set, Telegraph AN/UGM-8(V)

INFORMATION

Types of Distortion

Systematic Distortion is caused by broken, worn or improperly adjusted equipment, either on the sending or receiving end. It can be either marking or spacing bias distortion or both. Marking bias distortion is the lengthening of the marking impulse at the expense of the spacing impulse. Spacing bias distortion is the lengthening of the spacing impulse at the expense of the marking impulse. Bias distortion effects the displacement of the space-to-mark transition and will effect only the beginning of the impulse when changing from a space to a mark. Systematic distortion is considered to be controllable by locating the cause of distortion and correcting the malfunction.

Fortuitous distortion is the random displacement or breaking-up of the marking and spacing impulses. It can be caused by cross talk interference, atmospheric conditions, power line induction, etc. Fortuitous distortion is considered to be uncontrollable due to the condition causing the distortion is either uncontrollable or impossible to locate.

End distortion is man made for test purposes. Marking end distortion is the lengthening of the marking impulse at the expense of the spacing impulse, and spacing end distortion is the lengthening of the spacing impulse at the expense of the marking impulse. End distortion effects the displacement of the mark-to-space transition, and will affect only the end of the impulse.

AN/UGM-8(V) is a Telegraph Distortion Test Set, designed to insert distortion into a piece of teletype equipment so its handling limits may be established. Operating instructions are contained in NAVSHIPS 0967-328-9010.

AN/USM-105A is a high speed, precision instrument used to visually display electrical impulses and simple or complex recurrent waveforms. Operating instructions are contained in NAVSHIPS 93658A.

AN/PSM-4C is a complete portable volt-ohm-milliammeter, it can be used to take DC current, DC resistance, and DC, AC and output voltage measurements. Operating instructions are contained in NAVSHIPS 92501.

Information Sheet 7-2-1I

TROUBLESHOOTING PROCEDURES FOR THE AN/UGC-6K

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. EXPLAIN the logical troubleshooting procedures for the AN/UGC-6K, which consists of recognizing and diagnosing symptoms, isolating the fault to area or circuit, localizing the faulty/maladjusted part or component and analyzing the cause of the malfunction.

2. RECOGNIZE and DIAGNOSE symptoms of mechanical and electrical troubles for the AN/UGC-6K; ISOLATE the fault to the area or circuit; LOCALIZE the fault to the part or component level, and ANALYZE the cause of the malfunction, utilizing logical troubleshooting procedures, appropriate tools and equipment, observing all applicable safety precautions, and meet the prescribed time limits for each trouble.

REFERENCES

NAVSHIPS 0967-173-6020, Vol. 2
NAVSHIPS 0967-173-6030, Vol. 3

INFORMATION

Isolating to faulty major component

Automatic Typer

Rotate motor flywheel by hand, check all shafts for rotation
Check range finder index
Eyeball check of plugs, springs, etc.
Check R, F and U plug to ensure they are in correctly
Plug in both AC and DC connectors
Place on-off switch to on position, listen for audible click of line shunt relay contacts
If automatic typer rungs open, hold selector armature up against pole pieces; if it locks up, commence electrical troubleshooting procedures.
Place LTK in line position:
  Observe printed copy for correctness and ocean motion
  Observe correct operations of all functions
  Check margin indicator light

CONCLUSION: Automatic Typer operating normal except for ALF on CR and signal bell, which have not been checked as of yet.

Keyboard-Perforator

Place LTK in Test position.
Move KYBD CONTROL KNOB to "K" position.
Depress red send key, and type out test on keyboard.
  Observe printed copy for correctness.
  Check signal bell function.
  Check ALF on CR function. (Depress CR key; should receive a CR and a LF, and the next two characters should be suppressed)
  Check keyboard lock/unlock operation.

Check all local function controls. (Red Keys)
Ensure that perforator does not trip off.
Move KYBD CONTROL KNOB to "KT" position.
Type out test on keyboard, observing tape copy for proper printing and punching.
The perforator should trip off on the first character selected.
Character counter should count every character, and restart and count following a carriage return.
Check power backspace.
Move KYBD CONTROL KNOB to "T" position.
Check EOL Lamp. (should light on 66, 67 or 68th character)

CONCLUSION: Keyboard-Perforator Operation Normal

Transmitter Distributor

Place test tape cut previously in "KT" position on TD and start TD. (ensure Send Key is depressed)
The automatic typer should monitor without garbling.
Tape should stop using any of the following methods:
  Depressing red REC key. To restart; depress red SEND key
  Moving control lever to STOP position.
  Moving control lever to FREE position. (The tape should be free to move back and forth with no drag)
  Move control lever to RUN position; the TD should restart.
  Lift the tight-tangled tape bail upward, TD should stop; to restart, release bail.
  Move KYBD CONTROL KNOB to "K" position, to restart, move to "KT" or "T" position.
  Allow tape to run out of TD, tape out sensing mechanism should stop the TD.

CONCLUSION: TD operating normal.

Reperforator

Plug in DC connector
Place on-off switch to on position
Check printing and punching of tape for correctness
Check blank tape feed out operation

CONCLUSION: Reperforator operating normal.

Isolating to Electrical Circuits

WARNING: VOLTAGES DANGEROUS TO LIFE EXIST IN THE TELETYPEWRITER SET. USE EXTREME CAUTION WHEN SERVICING THIS EQUIPMENT. IF YOU ARE IN DOUBT ABOUT SAFETY PROCEDURES, DO NOT MAKE ELECTRICAL CHECKS WITHOUT SUPERVISION.

AC Circuit Troubleshooting

The external AC comes into the teletype machine at terminal C39 and C40. The 6¼ amp slo-blo fuse "P" is common to all AC components. Determine which AC components are operating normally, utilizing your AC schematic, and following a process of elimination, track the problem down to the fewest circuits possible. Then commence systematic voltage checks using the PSM-4 multimeter until the faulty component is located.

DC Circuit Troubleshooting

The external DC comes into the teletype machine at terminals C5 and C15.
The internal DC comes from the internal rectifier at terminals A8 and A9.

If the teletype machine runs open or closed, first determine if it runs open or closed in both the line and test position.

Both line and test - using the DC schematics and the PSM-4 commence systematic troubleshooting of the DC circuits only where the line and test circuits are common with each other.

Only line position - check DC at C5 and C15, and commence systematic troubleshooting of the DC circuits only where the line circuit is separate from the test circuit.

Only test position - check DC at A8 and A9, and commence systematic troubleshooting of the DC circuits only where the test circuit is separate from the line circuit.

After locating the faulty major component, troubleshoot that component following the recommended troubleshooting procedures you have already learned.

Information Sheet 8-1-1I

MAJOR COMPONENTS OF THE AN/UGC-20

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the major components on the AN/UGC-20, using the actual equipment and the information provided in Information Sheet 8-1-1I of NAVTRA 41046.

2. STATE the function of each major component of the AN/UGC-20 as given in the Information Sheet 8-1-1I of NAVTRA 41046.

3. EXPLAIN the relationship of the AN/UGC-20 to the Model 28 family. The explanation will be limited to the information provided in NAVTRA 41046.

4. DISASSEMBLE the AN/UGC-20 to the point required for removal of equipment for orientation, adjustments and troubleshooting.

REFERENCE

NAVSHIPS 0967-059-9010

INFORMATION

Major components and functions of each.

Keyboard Transmitter - is held secure to the keyboard base by four mounting bolts; it preselects the teletype character and initiates the release of the distributor clutch.

Keyboard Base - provides facilities for mounting of the keyboard transmitter, the automatic typer and the following mechanisms:

Distributor Mechanism - converts mechanical motion to electrical energy and shapes the teletype signal.

3 speed gear shift assembly - transfers rotational motion from the motor to the distributor mechanism and the automatic typer. Provides either 60, 67 or 100 WPM operation when the motor is operating on 60 CPS.

Motor - provides mechanical motion for the KSR set; it is an AC syncronous motor with 115 VAC input at 50 or 60 CPS and develops 1/20 HP. The starting current is 9 amps and the running current is 1.9 amps when operating at 60 CPS. The running speed is 3600 RPM at 60 CPS, and 3000 RPM at 50 CPS.

Automatic Typer - translates electrical input signals into printed alpha-numeric characters or functional control operations. It is a LP 111 - which is a modified TT-437 with the following modifications: side plates shortened, signal bell mounted on right side plate and different gears on the main shaft.

Relationship of AN/UGC-20 to Model 28 Family

The purpose of the AN/UGC-20 is to provide normal teletypewriter services in mobile and fixed stations where minimum equipment size is a prime factor. It follows the same basic operation as applies to other Model 28 teletypewriters.

Disassembly

Raise the dome, remove the six point connector to the cabinet, push the cover release latches (located under dome on both sides) to the rear and pull up on the cabinet. The automatic typer is secured to the keyboard base by four mounting bolts. The keyboard transmitter is secured to the keyboard base by four mounting bolts located directly underneath of the keyboard.

Information Sheet 8-2-1I

CODEBAR MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the power law for the keyboard transmitter as given in Information Sheet 8-2-1I of NAVTRA 41046.

2. STATE the purpose of the Codebar Mechanism as given in Information Sheet 8-2-1I of NAVTRA 41046.

3. LOCATE and IDENTIFY, by name, the parts of the codebar mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

4. EXPLAIN the overall operation of the codebar mechanism. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048.

REFERENCE

NAVSHIPS 0967-059-9010

INFORMATION

The power law for the keyboard transmitter is "Springs throughout the keyboard transmitter."

For each code level there is a corresponding codebar submechanism. This codebar submechanism consists of a front bar, rear bar, tie link, and two T levers. They are numbered one through five, rear to front, to correspond to the five level code.

Positioning for a Mark

With a
KEY or the
SPACE BAR depressed, it moves the
KEYLEVER down, which enters a slot in the
REAR BAR.
The
KEYLEVER, while moving down, moves the
FRONT BAR down, rotating the
LEFT and RIGHT T LEVERS CW, which move the
TIE LINK to the left.
The
RIGHT T LEVER will rotate away from the
CONTACT WIRE.
(Power: None)

With the
KEY released, its associated
LEAF SPRING will move the
KEYLEVER up, which moves the
KEY up, to its normal stop position.
(Power: Leaf Spring)
With the
SPACE BAR released, the
SPACE BAR KEYLEVER SPRING will move the
SPACE BAR KEYLEVER up, which moves the
SPACE BAR up, to its normal stop position.
(Power: Space Bar Keylever Spring)

Positioning for a space

With a
KEY depressed, it moves the
KEYLEVER down, entering a slot in the
FRONT BAR.
The
KEYLEVER, while moving down, moves the
REAR BAR down, rotating the
LEFT and RIGHT T LEVERS CCW, which move the
TIE LINK to the right.
The
RIGHT T LEVER WIll rotate into the path of the
CONTACT WIRE, ensuring it remains away from the
SIGNAL LINE. (DC terminal strip).
(Power: None)
With the
KEY released, its associated
LEAF SPRING will move the
KEYLEVER up, moving the
KEY up, to its normal stop position.
(Power: Leaf Spring)

The codebar submechanisms will remain in either the marking or spacing positions until physically moved by another keylever.

Information Sheet 8-2-2I

UNIVERSAL AND CONTACT MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of the universal mechanism is to lock the T-levers in the selected position during the transmission of a character and to allow the contact reset bail to be operated.

2. LOCATE and IDENTIFY, by name, the parts of the universal mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of the universal mechanism. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

4. STATE that the purpose of the contact mechanism is to control the selection of a character and to provide a path for energizing the distributor clutch magnet.

5. LOCATE and IDENTIFY, by name, the parts of the contact mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

6. EXPLAIN the overall operation of the contact mechanism. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-059-9010

INFORMATION

The purpose of the universal mechanism is to lock the T-levers in the selected position during the transmission of a character and to allow the contact reset bail to be operated.

With a
KEY depressed, it moves the
KEYLEVER down, which moves the
UNIVERSAL CODE BAR down, rotating the
UNIVERSAL T-LEVERS CW, which moves the
UNIVERSAL TIE LINK to the left, which moves the
UNIVERSAL TIE LINK EXTENSION to the left, moving the
NON-REPEAT LEVER TAB to the left, rotating the
NON-REPEAT LEVER CW.

As the
NON-REPEAT LEVER TAB moves to the left, it also moves the
LATCH LEVER CW, away from the top of the
UNIVERSAL LEVER.
(Power: None)
This allows the
UNIVERSAL LEVER SPRING to move the
UNIVERSAL LEVER up in front, ensuring that the
T-LEVERS remain in their selected position.
When the
UNIVERSAL LEVER moves up, it also moves the
NON-REPEAT LEVER up, which moves the
NON-REPEAT LEVER TAB up, away from the
UNIVERSAL TIE LINK EXTENSION.
(Power: Universal Lever Spring)
This allows the
NON-REPEAT LEVER SPRING to move the
NON-REPEAT LEVER CCW, moving the
NON-REPEAT LEVER TAB to the right, over the top of the
UNIVERSAL TIE LINK EXTENSION, and away from the
LATCH LEVER.
(Power: Non-Repeat Lever Spring)
This allows the
LATCH LEVER SPRING to move the
LATCH LEVER CCW, against the
UNIVERSAL LEVER.
(Power: Latch Lever Spring)

When the
KEY is released, the
LEAF SPRING moves the
KEYLEVER up, away from the
UNIVERSAL CODE BAR.
(Power: Leaf Spring)
This allows the
UNIVERSAL TIE LINK SPRING to move the
UNIVERSAL TIE LINK to the right, rotating the
UNIVERSAL T-LEVERS CCW, moving the
UNIVERSAL CODE BAR pp.
As the
UNIVERSAL TIE LINK moved to the right, it also moved the
UNIVERSAL TIE LINK EXTENSION to the right, out from under the
NON-REPEAT LEVER TAB, which is being held up by the
UNIVERSAL LEVER.
(Power: Universal Tie Link Spring)

The purpose of the contact mechanism is to control the selection of a character and to provide a path for energizing the distributor clutch magnet.

Operation of the contact mechanism

As the
UNIVERSAL LEVER is moved up in front, it moved away from the
CONTACT RESET BAIL.
(Power: Universal Lever Spring)
This allows the
CONTACT RESET BAIL SPRING to move the
CONTACT RESET BAIL CW, away from all the
CONTACT WIRES.
(Power: Contact Reset Bail Spring)

The spacing
CODE LEVEL CONTACT WIRES are held away from the
SIGNAL LINE (DC terminal strip) by the spacing
T-LEVERS.
(Power: None)
The marking
CODE LEVEL CONTACT WIRE SPRINGS move their respective
CODE LEVEL CONTACT WIRES to the left, up against the
SIGNAL LINE.
(Power: Marking Code Level Contact Wire Spring)
The
CLUTCH TRIP CONTACT WIRE SPRING moves the
CLUTCH TRIP CONTACT WIRE to the left, up against the
AC TERMINAL STRIP, providing a path for current to the
DISTRIBUTOR CLUTCH MAGNET.
(Power: Clutch Trip Contact Wire Spring)

The clutch trip contact wire is shorter than the code level contact wires, and has no T-lever. It will operate everytime the contact reset bail moves CW.

Information Sheet 8-2-3I

RESET, REPEAT, LINE BREAK, AND LOCAL FUNCTION MECHANISMS

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts used in reset, repeat, linebreak, and local functions, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the reset, repeat, linebreak, and local functions. The explanation will include the name of parts, movements of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-059-9010

INFORMATION

Reset Mechanism

During the 5th intelligence impulse, the
RESET SOLENOID becomes energized, attracting the
SOLENOID PLUNGER, which moves to the right, moving the
RESET SHAFT LEVER CW, which rotates the
RESET SHAFT CW, rotating the
RESET ARM CW, which moves the
UNIVERSAL LEVER down in front, moving the
CONTACT RESET BAIL CCW, which moves the
MARKING CODE LEVEL CONTACT WIRE and the
CLUTCH TRIP CONTACT WIRE to the right, to their unselected positions.
(Power: None)
As the
UNIVERSAL LEVER moves down, it allows the
LATCH LEVER SPRING to rotate the
LATCH LEVER CCW, over the top of the
UNIVERSAL LEVER.
(Power: Latch Lever Spring)
As the
UNIVERSAL LEVER moved down, it also moved away from the
NON-REPEAT LEVER, allowing the
NON-REPEAT LEVER SPRING to move the
NON-REPEAT LEVER down, moving the
NON-REPEAT LEVER TAB down.
(Power: Non-Repeat Lever Spring)

Repeat Mechanism

When the
REPEAT KEY is depressed, it moves the
REPEAT KEYLEVER down, compressing the
MINIATURE SWITCH.
(Power: None)

When the miniature switch is compressed; it places an open in the reset circuit, preventing the reset solenoid from energizing. It also places a short around the timing contacts, preventing the clutch magnet from de-energizing.

When the
REPEAT KEY is released, the
REPEAT KEYLEVER RETURN SPRING moves the
REPEAT KEYLEVER up, moving the
REPEAT KEY up, to its normal stop position.
(Power: Repeat Keylever Return Spring)
The
MINIATURE SWITCH resets by
SPRING CONTACTS located within the miniature switch.

Line Break

When the
LINE BREAK KEY is depressed, it moves the
LINE BREAK KEYLEVER down, which rotates the
LINE BREAK T-LEVER CCW, which moves the
LINE BREAK CONTACT WIRE to the right, away from the
DC TERMINAL STRIP, opening the signal line.
(Power: None)
When the
LINE BREAK KEY is released, the
LINE BREAK KEYLEVER RETURN SPRING moves the
LINE BREAK KEYLEVER up, which rotates the
LINE BREAK T-LEVER CW, away from the
LINE BREAK CONTACT WIRE.
(Power: Line Break Keylever Return Spring)

This allows the
LINE BREAK CONTACT WIRE SPRING to move the
LINE BREAK CONTACT WIRE to the left, against the
DC TERMINAL STRIP, completing the signal line current path.
(Power: Line Break Contact Wire Spring)

Local Line Feed (LLF)

When the
LLF KEY is depressed, it moves the
LLF KEYLEVER down, which rotates the
LLF BAIL CW, which rotates the (left view)
LLF LEVER CCW, which moves the
LLF TRIP LINK to the rear, which moves the
LF CLUTCH TRIP LEVER (on automatic typer) out of the path of the
LF CLUTCH SHOE LEVER.
(Power: None)

When the
LLF KEY is released, the
LLF KEYLEVER RETURN SPRING moves the
LLF KEYLEVER up, which moves the
LLF KEY up, to its normal stop position.
(Power: LLF Keylever Return Spring)
This allows the
LLF TRIP LINK SPRING to move the
LLF TRIP LINK to the front, rotating the
LLF LEVER CW, which moves the (left view)
LLF BAIL CCW, back to its normal stop position.
(Power: LLF Trip Link Spring)
This allows the
LF CLUTCH TRIP LEVER SPRING to move the
LF CLUTCH TRIP LEVER back into the path of the
LF CLUTCH SHOE LEVER.
(Power: LF Clutch Trip Lever Spring)

Local Carriage Return (LCR)

When the
LCR KEY is depressed, it moves the
LCR KEYLEVER down, which rotates the
LCR BAIL CW, which moves the (left view)
LCR TRIP LINK to the rear, which moves the
CR LEVER down in front, which activates the normal carriage return train of parts located in the automatic typer.
(Power: None)

When the
LCR KEY is released, the
LCR KEYLEVER RETURN SPRING moves the
LCR KEYLEVER up, away from the
LCR BAIL.
(Power: LCR Keylever Return Spring)

This allows the
LCR BAIL SPRING to move the
LCR BAIL CW, which moves the (left view)
LCR TRIP LINK to the front, away from the
CR LEVER.

(Power: LCR Bail Spring)

This allows the
SPACING DRUM FEED PAWL RELEASE LINK SPRING to move the
SPACING DRUM FEED PAWL RELEASE LINK up, moving the
CR LEVER up in front, to the normal unoperated position.

(Power: Spacing Drum Feed Pawl Release Link Spring)

Information Sheet 8-2-4I

DISTRIBUTOR MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE that the purpose of the distributor mechanism is to shape the teletype signal and control operation of the clutch trip magnet and solenoid circuits.

2. LOCATE and IDENTIFY, by name, the parts of the distributor mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

3. EXPLAIN the overall operation of the distributor mechanism. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-1059-9010

INFORMATION

The purpose of the distributor mechanism is to shape the teletype signal and control operation of the clutch trip magnet and solenoid circuits.

The Power Law for the Distributor is "Cams on the main shaft, the distributor main shaft drive gear, and spring throughout the distributor."

Distributor Cam Sleeve

Order of Cams (left to right)	Function of each cam
Reset cam	Does not operate a set of contacts, Used to reset the distributor clutch.
Blank Cam	Not used
#1 thru #5 Code Level Cams	Operates #1 thru #5 code level contacts to shape the teletype signal.
Stop Cam	Generates the start and stop impulse.
Timing Cam	Deenergizes the clutch trip magnet circuit.

Blank Cam	Not used
Solenoid Reset Cam	Energizes the reset solenoid. The last cam to do any work.

Distributor Block Contacts

Order of Operation	Normal Position	When Operated
Stop	Closed	Opens signal line for start impulse.
Timing	Closed	Opens, deenergizes clutch trip magnet.
#1 Code Level	Open	Closes, then opens signal line.
#2 Code Level	Open	Closes, then opens signal line.
#3 Code Level	Open	Closes, then opens signal line.
#4 Code Level	Open	Closes, then opens signal line.
#5 Code Level	Open	Closes signal line.
Solenoid Reset	Open	Closes, energizes reset circuit.
#5 Code Level	----	Opens signal line.
Stop	----	Closes, signal line for stop impulse.
Timing	----	Closes circuit to clutch trip magnet.
Solenoid Reset	----	Open, deenergizing reset circuit.

Engaging/Disengaging the Distributor Clutch

As the DISTRIBUTOR CLUTCH TRIP MAGNET is energized by an AC impulse from the CLUTCH TRIP CONTACT WIRE, the DISTRIBUTOR CLUTCH TRIP ARMATURE is moved down, releasing the (right view)

This allows the
CLUTCH TRIP LEVER SPRING to rotate the
CLUTCH TRIP LEVER CW, moving the
CLUTCH STOP LEVER CW, and the
RESET LEVER CW, into the low of the
RESET CAM.
(Power: Clutch Trip Lever Spring)

The
DISTRIBUTOR CLUTCH engages, and rotates the
DISTRIBUTOR CAM SLEEVE ASSEMBLY.
(Power: Distributor Main Shaft Drive Gear)

At the beginning of the revolution of the
DISTRIBUTOR CAM SLEEVE ASSEMBLY, the
RESET CAM presents its high to the
RESET LEVER, rotating it CCW, which moves the
CLUTCH STOP LEVER CCW, back into the path of the
CLUTCH SHOE LEVER.
The
RESET LEVER also moves the
CLUTCH TRIP LEVER CCW.
(Power: Reset Cam)

This allows the
CLUTCH TRIP ARMATURE SPRING to move the
CLUTCH TRIP ARMATURE up, after the
(Power: Clutch Trip Armature Spring)

TIMING CAM opens the
TIMING CONTACTS, deenergizing the
DISTRIBUTOR CLUTCH TRIP MAGNET.
(Power: Timing Cam)

At the end of the revolution of the
DISTRIBUTOR CAM SLEEVE ASSEMBLY, the
RESET CAM presents its low to the
RESET LEVER. This allows the
CLUTCH TRIP LEVER SPRING to rotate the
CLUTCH TRIP LEVER slightly CW, which moves the
CLUTCH STOP LEVER and the
RESET LEVER slightly CW, back to their normal stop position.
The
CLUTCH TRIP LEVER will come to rest against the end of the
CLUTCH TRIP ARMATURE.
(Power: Clutch Trip Lever Spring)

Distributor Block Operation

The high of a
CAM is presented to, and moves the (right view)
FOLLOWER LEVER CCW, which moves the
ROCKER LEVER CW, opening the respective
CONTACTS.
(Power: (Respective) Cams)

When the low of a
CAM is presented to the
FOLLOWER LEVER, the
FOLLOWER LEVER SPRING rotates the
FOLLOWER LEVER CW, away from the
ROCKER LEVER.
(Power: Follower Lever Spring)
This allows the
ROCKER LEVER COMPRESSION SPRING to rotate the
ROCKER LEVER CCW, closing the
CONTACTS.
(Power: Rocker Lever Compression Spring)

The Lever Guides and springs hold the rocker levers in place, and serve as a path for current from the terminal strips to the contacts. The bakelite on the follower levers acts as an insulator.

Information Sheet 8-2-5I

3 SPEED GEAR MECHANISM

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. LOCATE and IDENTIFY, by name, the parts of the 3 speed gear mechanism, using the actual equipment and the pictorial in NAVTRA 41048.

2. EXPLAIN the overall operation of the 3 speed gear mechanism. The explanation will include the name of parts, movement of parts, and the power that moves the various parts. The student will use the actual equipment and the pictorial in NAVTRA 41048 for this explanation.

REFERENCE

NAVSHIPS 0967-059-9010

INFORMATION

The purpose of the 3 speed gear mechanism is to transfer motion from the motor to the distributor mechanism (KSR only) and the typing unit for speeds of either 60, 67 or 100 WPM.

The
MOTOR rotates the
MOTOR SHAFT and attached
MOTOR PINION GEAR which meshes and rotates
DRIVEN GEAR which rotates
ASSEMBLY DRIVE SHAFT.

VARIABLE SIZED GEARS are mounted on the
ASSEMBLY DRIVE SHAFT, which rotates at a constant speed. These gears
mesh with and rotates the
VARIABLE SPEED GEARS, which are located on the
VARIABLE SPEED SHAFT.
A
SLIDING KEY is attached to the
COLLAR and rides in the
VARIABLE SPEED SHAFT slot, and connects one of the three
VARIABLE SPEED GEARS to the
VARIABLE SPEED SHAFT.
The
VARIABLE SPEED SHAFT GEAR meshes with the
DISTRIBUTOR SHAFT IDLER GEAR and rotates the
DISTRIBUTOR IDLER SHAFT.

The
DISTRIBUTOR IDLER SHAFT rotates the
DISTRIBUTOR DRIVE GEAR, which supplies motion to the
DISTRIBUTOR IDLER GEAR, which rotates the
DISTRIBUTOR MAIN SHAFT DRIVE GEAR.

The
TYPING UNIT DRIVE GEAR is also meshed with the
VARIABLE SPEED SHAFT GEAR and drives the
TYPING UNIT GEAR.

The
SPEED SELECTOR KNOB on the front left of the machine, moves the
SPEED SELECTOR SHAFT, which moves the
SHIFT LINK, which moves the
COLLAR, moving the
SLIDING KEY within the slot of the
VARIABLE SPEED SHAFT, engaging one of three
VARIABLE SPEED GEARS.

The speed of operation can be changed while the machine is running.

Information Sheet 8-3-1I

AC AND DC CIRCUITS IN THE AN/UGC-20

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. TRACE and IDENTIFY, by name, all AC and DC circuits in the AN/UGC-20, using the circuit diagrams.

2. SPECIFY the AC and DC voltages present across all the electrical loads in the AC and DC circuits, using circuit diagrams.

3. INTERPRET the voltage values across an open and a shorted circuit or component, while simulating the use of a meter.

4. DETERMINE the defective AC and DC circuit and/or component when given symptoms of simulated abnormal conditions, using AC and DC circuit diagrams.

REFERENCE

NAVSHIPS 0967-059-9010

INFORMATION

The purpose of the AC circuitry is to distribute AC voltages to the various electrical components as needed.

AC Common - supplies external AC voltage to the entire AN/UGC-20. All other AC components tap off this line.

Motor Circuit - provides current to the start capacitor, and start windings of the motor to ensure that it builds up speed immediately and starts running in the right direction. It also provides current to continue running the motor once it has started. The motor itself is an AC synchronus motor, operating on 50 or 60 cps, with a starting current of 9 amps, and a running current of 1.9 amps for 60 cps, and 2.4 amps at 50 cps. The operating speed is 3600 rpm.

Reset Circuit - supplies current to the reset solenoid to reset the keyboard transmitter.

Distributor Clutch Trip Circuit - supplies AC to the distributor clutch magnet to control the operation of the distributor cam sleeve assembly.

Repeat Circuit - supplies AC to the distributor clutch magnet during repeat operation.

Signal Bell Circuit - supplies current to the signal bell magnets to energize the signal bell.

Margin Indicator Light Circuit - supplies AC to light the margin indicator lights.

Copy Light Circuit - supplies current to light the copy lights.

The purpose of the DC circuitry is to distribute DC voltages to the various electrical components as needed.

Signal Line Circuit (normal stop position) - supplies current to the selector magnets of the automatic typer for a stop impulse.

Signal Line Circuit (for a mark) - supplies current to the selector magnets of the automatic typer for a mark impulse.

Signal Line Circuit (for a space) - supplies a spacing impulse to the selector magnets of the automatic typer for a spacing impulse.

The suppressor located across the code level contacts is to reduce arcing and electronic radiations.

Information Sheet 8-4-1I

TROUBLESHOOTING PROCEDURES FOR THE AN/UGC-20

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. EXPLAIN the logical troubleshooting procedures for the AN/UGC-20: recognizing and diagnosing symptoms; isolating the fault to the area or circuit; localizing the faulty/maladjusted part or component and analyzing the cause of the malfunction.

REFERENCES

NAVSHIPS 0967-059-9010, Vol. 1
NAVSHIPS 0967-059-9020, Vol. 2

INFORMATION

WARNING: VOLTAGES DANGEROUS TO LIFE EXIST IN THE TELETYPEWRITER SET. USE EXTREME CAUTION WHEN SERVICING THIS EQUIPMENT. IF YOU ARE IN DOUBT ABOUT SAFETY PROCEDURES. DO NOT MAKE ELECTRICAL CHECKS WITHOUT SUPERVISION.

Troubleshooting Procedures

Place automatic typer on keyboard base.

Rotate motor flywheel by hand to ensure typer is setting correctly on base. Check "R" plug to ensure it is seated in correctly.

Plug in both AC and DC power cords.

Turn on-off switch to the on position.
If motor does not run, check fuse F-1. If fuse if good; commence meter readings of the motor circuit using the PSM-4 and the AC schematic. Start at terminals S1 and S4.

If machine runs open, place armature clip on the selector magnets.

If machine locks up - there is most probably an electrical trouble on the machine, Visually check the following:

1. "R" plug
2. DC plug
3. Contact wires (keep hands off these wires)
4. DC terminal strip connector
5. Golf block contacts

After visually checking all the above, commence troubleshooting the incoming signal line at terminals P1 and P2.

If machine continues to run open, there is most probably a mechanical trouble on the machine. Commence checking the mechanical linkage of the appropriate train of parts.

Type out test on keyboard; observing the following:

Distributor clutch tripping off, if not; depress the repeat key and another key.

If repeat operation occurs - check timing contacts and the timing contact circuit.

If repeat operation does not occur - check mechanical linkage to clutch trip mechanism and using the PSM-4 with the AC schematic, commence meter readings of the clutch trip circuit.

Keyboard transmitter resetting properly.

Check by manually depressing the reset arm; if the clutch trips once and will not trip again, it is not resetting. Check the following:

1. Check fuse F-2
2. Check reset solenoid contacts
3. Visually check the mechanical linkage of the reset mechanism
4. Using the PSM-4 and the AC schematic, trace out the reset circuit.

Automatic Typer printing correctly. (garbling)

Determine which impulse is being gained or dropped. Visually check that contact wire, code level contact, and that particular train of parts in the keyboard transmitter.

Check the automatic typer train of parts for that impulse, commencing with the selector mechanism.

Ocean Motion - check the vertical positioning train of parts.

Partial printing - check the printing trains of parts.

Check the proper operation of all function, both local and remote functions.

When more than one symptom is obtained, find the common point for the symptoms noted.

If a machine is running open and improper meter readings are obtained across a mechanical adjustment, or mechanical train of parts, check for a mechanical problem giving electrical symptoms.

Information Sheet 8-4-2I

REASSEMBLY OF THE AN/UGC-20

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. REASSEMBLE the AN/UGC-20 in the inverse order of disassembly. Insure that equipment is in normal working conditions; all broken or missing parts replaced; and all nuts, screws, washers, and parts are installed properly, using the Trainee's Guide, NAVTRA 41046, and the technical manual.

REFERENCES

NAVSHIPS 0967-059-9010, Vol. 1
NAVSHIPS 0967-059-9020, Vol. 2

INFORMATION

Reassembly of the AN/UGC-20

Keyboard Base - ensure proper fuses are in the correct fuse holders. Check "F" and "Y" connectors to ensure they are seated properly in place.

Automatic Typer - place typer on base, and rotate motor flywheel by hand. Secure typer with four pilot screws, and replace "R" connector plug.

Cabinet - Replace cabinet CAREFULLY over typer and base, secure with the two latches to the base. Replace the "Z" connector plug.

Light off equipment and check out completely for normal operation.

Information Sheet 9-1-1I

SIMILARITIES AND DIFFERENCES OF TELETYPE EQUIPMENT

TOPIC OBJECTIVES

When you complete this lesson, you will be able to:

1. STATE the major similarities and differences of the Model 28 teletype family. The statement will cover the following equipment and be limited to the information given in NAVTRA 41046, pages 5, 6 and 7.

    1. AN/UGC-5
    2. AN/UGC-7
    3. AN/UGC-8
    4. AN/UGC-15/16
    5. AN/UGC-20
    6. AN/UGC-25
    7. AN/UGC-35
    8. TT-47A/4G & TT-48A/UG
    9. TT-171/UG
    10. TT-69A/UG & TT-70A/UG
    11. TT-176/UG
    12. TT-253/UG
    13. TT-192/UG
    14. TT-187/UG

2. STATE the major similarities and differences between the Model 28 and Models 32, 35 and Inkatronic Teletype Families. The statement will be limited to the information contained in NAVTRA 41046, page 7.

3. EXPLAIN the purpose of modifying the Model 28 teletype for low level keying, as given in Information Sheet 9-1-1I of NAVTRA 41046.

INTRODUCTION

This information sheet describes the similarities and differences of teletype equipment within the Model 28 family.

REFERENCES

NAVSHIPS 0967-183-6010, Vol. 1
NAVSHIPS 0967-273-2010

INFORMATION

Similarities and differences of the Model 28 Teletype Family:

The purpose here is to acquaint you with the various modifications, changes and different equipment you may run across in the field.

The following equipments are of the Model 28 family, and the changes/modifications or differences between those and the AN/UGC-6K, as taught in this school are:

1. AN/UGC-5 - Basically the same as the AN/UGC-6K

    a. No Reperforator
    b. When equipped with a series governed motor it is a 5X

2. AN/UGC-7 - Basically the same as the AN/UGC-5

   a. No reperforator
   b. Equipped with weather keyboard
   c. Type wheel and typebox has weather symbols

3. AN/UGC-8 - Same as AN/UGC-7 with the reperforator added.

4. AN/UGC-15/16 - Basically same an AN/UGC-5 and AN/UGC-6K, except it has a reperforator in lieu of a perforator.

5. AN/UGC-20

   a. Uses a modified Model 28 printer
   b. Has a smaller more compact electrical keyboard
   c. Cabinet size reduced to a minimum
   d. Has no electrical service unit

6. AN/UGC-25 - Similar to AN/UGC-20, but has no keyboard, it is a receive only teletype machine. (Receive Only) (RO)

7. AN/UGC-35 - Similar to AN/UGC-6K

   a. Same major components
   b. Two reperforators
   c. No perforator
   d. Cable of receiving 3 circuits

8. TT-47A/UG and TT-48A/UG

   a. No perforator, reperforator, TD
   b. Mounted in up-right, free standing cabinets
   c. TT-47 has synchronous motor
   d. TT-48 has series governed motor

9. TT-171/UG - Basically same as TT-47A/UG, except it has no keyboard

10. TT-69A/UG and TT-70A/UG - Basically the same as TT-47A/UG and TT/48A/UG

11. TT-176/UG - Similar to TT-69A/UG

12. TT-253/UG Send/Receive typing reperforator

   a. Model 28 typing reperforator with keyboard, own motor, and dust cover.
   b. May be connected to a line to receive/send operations.

13. TT-192/UG Typing Reperforator

   a. Model 28 chadless typing reperforator, with motor and dust cover.
   b. Equipped with ESU and power supply.
   c. Receive only machine (RO).

14. TT-187/UG Transmitter Distributor - Basically the same as the TD in the AN/UGC-6 with the following exceptions:

    a. Has its own mounting base and motor
    b. Connecting facilities for connecting to AC and external DC lines

Similarities and Differences between Model 28 and Models 32, 35 and Inkatronic Teletype Families.

1. Model 32 Teletypewriter Sets

    a. New modern design
    b. Normally used commercially but can be adapted to any communication link utilizing the standard Baudot Code
    c. Keyboard similar to AN/UGC-20
    d. Normally equipped with a telephone type selective calling device

2. Model 35 Automated Communications Set

    a. Designed for data collection, handling and transmission
    b. Used for commercial and specialized data collection applications
    c. Uses bascially a Model 28 printer modified to accomodate the eight level code
    d. Equipped with telephone type selective calling devices

3. Teletype Inkatronic 2101 Data Terminal, is a family of high-speed electronic data communications terminals.

    a. High Speed, 1200 WPM
    b. Non-impact printing (printing is accomplished by having a high potential charge on the platen that attracts a stream of ink from a nozzle to the paper. The ink stream is then broken into little droplets which are electrostatically guided to form the characters).
    c. Moving parts are kept to a minimum to reduce maintenance
    d. No mechanical carriage return
    e. Almost completely silent
    f. The only mechanical parts are the ink pump and paper feed mechanism.

Model 28 Teletype Modified for Low Level Keying

The purpose of Low Level Keying is to attenuate generation of RFI/EMI as close to the source as possible to minimize the possibility of intercepting information from the teletype machine.

Construction and contents of Modification Kit components:

1. Cables

    a. Multi-strand twisted pair
    b. Double shielded

2. Selector Unit - Magnetic field effect completely enclosed (shielded) and grounded.

3. Contact Boxes

    a. Double box construction; outer steel, inner brass
    b. Gold plated contacts
    c. Insulated bonding keeps radiated energy above chassis ground

4. Power Regulator Cards - There are two and they are interchangeable.

5. Clutch Magnet Driver Cards - There are two and they are interchangeable.

6. Polar Line Keyer Cards - There are two and they are interchangeable.

7. Selector Magnet Driver Cards - There are two and they are interchangeable.