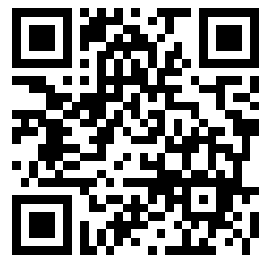

NavPers 93422

TRAINEE'S GUIDE for MAINTENANCE TRAINING on TT-299/UG TELETYPE EQUIPMENT

(2)
Bureau of Naval Personnel
Washington, D.C. 20370
October 1965

(1) NAVY.

FOREWORD

This Trainee's Guide was prepared for the Chief of Naval Personnel by the Training Publications Division, Naval Personnel Program Support Activity, Washington, D. C., with the technical assistance of the Teletype Maintenance, Class "C" school, Norfolk, Virginia. It is approved for use in schools using TT-299/UG Teletype Equipment. It supplements but does not replace material contained in the Technical Manual, NavShips 94522.

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RECORD OF CHANGES

No.	Authority	Substance	Entered By	Date

CONTENTS

INTRODUCTION

Safety

The use of this equipment involves votages which 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 Chapter 67 of the Bureau of Ships Technical Manual or superseding instructions on the subject of electrical precautions to be observed.

The following rules must be strictly observed:

Use extreme caution while servicing equipment when live circuits are exposed.

Never repair or adjust equipment alone.

Always ascertain that the TT-299/UT Teletypewriter and any test equipment in use is properly grounded.

The TT-299/UG Teletypewriter is a miniature 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 for pry points. Ensure machine is not binding before energizing motor circuit.

Purpose

This guide is not intended to duplicate information in the technical manual or other publications related to this equipment. It is to be used for the purposes of (1) providing you with information which will assist you in this course and (2) providing you with sufficient reference material that will enable you, upon return to your ship, to read and use the technical manual effectively.

This guide is designed specifically around the TT-299/UG Teletypewriter but has been developed to train personnel in maintenance of this and similar equipments such as the TT-264/AG and TT-298/UG Teletypewriters and the AN/TGC-14(V) Teleprinter.

How to Use This Guide

The information contained within this guide follows the same sequence as the course of instruction and is organized into three major areas:

Operation of the keyboard.

Operation of the printer.

Operation of the electrical components.

Each area contains a series of instruction sheets, each developed in support of the technical manual and classroom instruction. The information sheets are related to trains of parts of components, their nomenclature, the sequence moved or operated, etc., as well as the associated figure or diagram.

Self analysis sheets and problem sheets are provided for each area. These will help you detemine how well you are progressing.

Job sheets are provided to assist you in performing maintenance routines. The adjustments listed on the job sheets have been selected from those contained in the technical manual on the basis of difficulty and importance.

This guide, if used in a conscientious manner, will be a valuable tool for use when you leave this school. We hope our efforts here will be your gain at your command.

Information Sheet 1-1-1I

HOW TO STUDY

INTRODUCTION

The objective of this information sheet is to point out to you that there are methods of study that have been found very successful. These methods can be called tools. How well you use these tools is strictly up to you. If you use them you will find that you will learn more about TELETYPE equipment.

REFERENCE

Station, T.F., How To Study, McQuiddy Printing Co., 1954 Edition

INFORMATION

Oliver Wendell Holmes once said "I have five friends that I always have with me." With their help, he found he could solve almost anything. The five friends were:

1. - How

2. - Why

3. - What

4. - Where

5. - When

They are friends of yours also. Apply them to your subject during study periods and they will help you get the main ideas. As an example of the help they give, apply them to the subject "How to Study."

How

Study with a Definite Goal in mind. To finish the course with a 4.0 mark is fine, however you may be looking too far ahead. Pick a closer goal, such as finishing tonight's assignment and be sure you understand the assignment.

Study every day. Do not try to cram. Cramming may help you pass the test but the important thing to remember is that some place at some time the information that you will be taught will be important.

Make notes in your own words. After you have done this you will find that you will understand what has been taught much better.

Use as many senses as possible. This means -- read it (seeing), tell it to your study partner (talking), and then have him tell you (hearing). If you do not have a study partner, tell it to the wall. Touching the equipment in the lab may help.

Review - You will find that rereading your assignment will help to amplify the important material in the text. You will find some information that you missed the first time through and other areas will be clarified.

Why

Always study to make your future brighter and the Navy better. Both are excellent goals, but some people try to reach these goals by memorizing as much theory as possible. Theory is not the goal, you must know how to apply it.

What

Every night, you will have an assignment. This will be a reading and writing assignment. What is the goal of a reading assignment? Look for the key ideas in the reading assignment and make an extra effort to remember these ideas. Do not overlook GRAPHS, TABLES and SCHEMATICS, these contain important information that will help you understand much of the written word.

Where

A Quiet Place is best. Music, card games, noise and the like do not aid your study. Use the study rooms so assigned in the school. Besides - there will be an instructor there to assist you when you need assistance. If you find that you are unable to find the assistance you desire, make a note of the problem and ask your instructor the next morning.

When

When is your UNDERSTANDING THE HIGHEST? Most people like to study right after chow. Others start at midnight - which isn't a very good idea especially if you're coming from the beach. Still others put a call in the call book and get up early.

The "when" has a lot to do with REGULARITY. Whatever time you decide on, STICK TO IT. Don't forget time needed for liberty, washing clothes, shining shoes, writing home, and things like that. You are going to have to ADJUST YOUR ROUTINE not only to accommodate school but also for study time.

Summary

To sum up, we can say, "USE your FIVE FRIENDS" on each assignment to help get the idea. And, above all, use a great deal of good old COMMON SENSE in your study habits. If you have trouble - ask your instructor for help.

Information Sheet 2-1-1I

INTRODUCTION TO TT-299/UG

GENERAL

The TT-299/UG is a light-weight, miniature, alphanumeric-printing teletypewriter set for use under a wide range of operating conditions. The teletypewriter set is fully compatible with other teletypewriter equipment employing the standard Baudot code and can be intergrated into existing landline and radio link communications systems.

The TT-299/UG is basically the same as the AN/TGC-14(V) and the TT-264/AG. Graduates of the TT-299/UG maintenance course will be able to maintain these equipments.

The TT-299/UG Teletypewriter is manufactured by the MITE Corporation of New Haven, Connecticut.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

Speed

Speed change gears for the TT-299/UG are available in two groups and are color coded for identification.

The different speeds and color codes are listed in the Technical Manual, NavShips 94522, Section A2.

Power Requirements

The TT-299/UG requires a primary source of 115 VAC, 60CPS and has a power requirement of 70 watts without the heating element and 200 watts with the heating element.

Power requirements for the AN/TGC-14(V) and TT-264/AG will be discussed during the course of instruction.

Information Sheet 2-1-2I

COMPONENT PARTS OF THE TT-299/UG

INTRODUCTION

The TT-299/UG is composed of the following basic parts; the Teletypewriter, the Power Supply Kit, the Motor and the Case. This information sheet will give you a brief description of these parts.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

Teletypewriter

The teletypewriter includes the keyboard (TT-318/UG), printer (1-2-3-1041) and the electrical chassis (516).

The keyboard inserts into the electrical chassis under the printer and has three positions - stowage, operate and out. It transmits the teletype signal made up of selected characters or functions to the signal line.

The printer is supported by the electrical chassis. It consists of the magnetic selector, the main shaft with its gears and clutch assemblies, the function selector and their trains of parts necessary for printing selected characters and performing printer functions.

The electrical chassis supports the keyboard, printer, a standard roll of paper, line sensor and signal line power supply. The rear panel of the electrical chassis houses five fuse holders, seven option patching jacks and the service cable receptacle through which all power, signal line, and ground connections are made.

Power Supply Kit

The power supply kit includes the line sensor, signal line power supply heating element and service cable assembly.

Motor

The motor (PD-82/U) of the TT-299/UG is a hysteresis-synchronous type and mounted on the printer. It furnishes motive power to the main shaft of the TT-299/UG through the motor pinion (speed change), idler and third reduction gears. Its speed of 3600 RPM is reduced to 2160 RPM inside the motor housing. It requires 115 VAC 60 CPS and uses approximately 65 watts power. No wire is used in the nickel cobalt steel rotor.

Case

The case encloses all component parts of the TT-299/UG and is fitted with a dust proof cover with copy window and off-line function keys.

Information Sheet 2-2-11

FIVE LEVEL TELETYPE CODE

INTRODUCTION

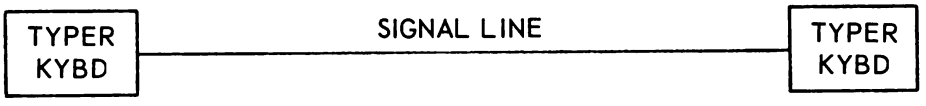
Basically the teletypewriter is a motor driven device designed for exchanging messages between stations. Each station must have a transmitting unit (keyboard) and a receiving unit (printer). This will be illustrated and explained in this information sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION



Transmitting Unit

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

Receiving Unit

This unit transforms these electrical impulses back into mechanical motion that causes printing.

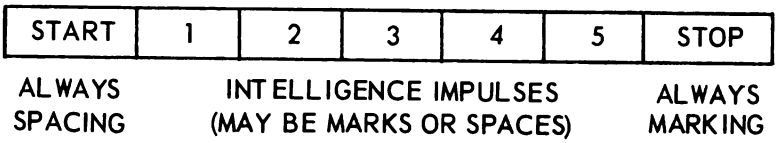
Signal Line

This line carries the teletype code from one station to another.

The teletype code is an electrical code of current and no current impulses. When there is current flowing in the signal line between stations a MARK impulse is on the signal line. When no current is

flowing there is a SPACE impulse on the signal line. A combination of these impulses make up the teletype code used to exchange messages.

Each teletype code character is made up of seven impulses. Only five of these impulses carry the intelligence. The other two impulses are used to maintain synchronization between sending and receiving teletype machines.



START IMPULSE: Causes all receiving stations to receive transmitted characters simultaneously. The start impulse is always a space.

FIVE INTELLIGENCE IMPULSES: A combination of mark and/or space impulses depending on the teletype character transmitted.

STOP IMPULSE: Follows the five intelligence impulses and is always a mark.

The start impulse causes all receiving stations to start receiving at the same time and the stop impulse ensures that all machines stop receiving until the next start impulse is on the signal line. Both are used to keep all machines in the teletype loop synchronized.

Based on 100 WPM, 7.42 unit operation, the length of time required to send each character of the teletype code is the same. Once any character is started, it will take exactly 100 milliseconds to complete. All machines are driven at the same speed by motors that are turning at the same speed.

The teletype machine operates at 100 WPM (words per minute).

The 100 WPM is derived as follows:

Each character or operation takes .100 seconds (100 m/s).
OPM (operations per minute) would equal 60 divided by .100;

$$\frac{600}{.1} = 600 \text{ (operations per minute)}$$

Each word is considered as 6 characters or operations.
Actual words per minute would be 600 OPM divided by 6.

$$\frac{600}{6} = 100 \text{ (words per minute)}$$

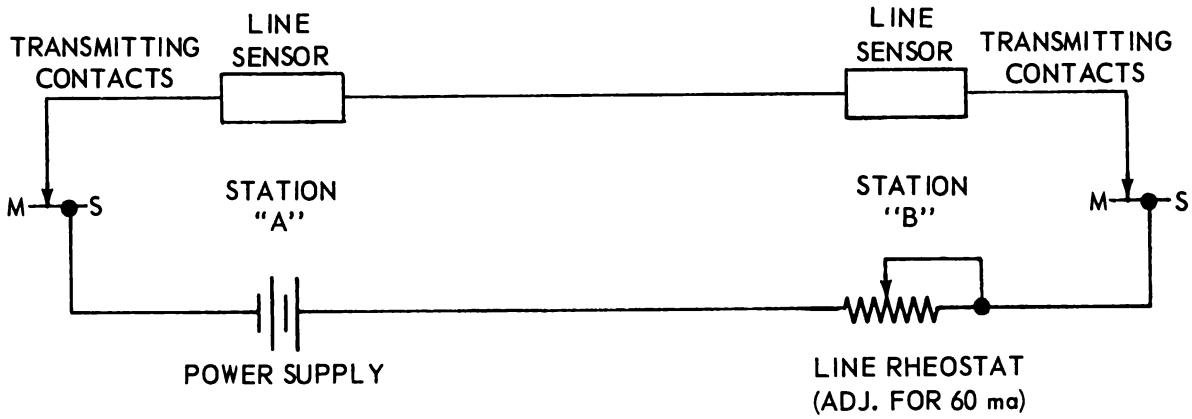
Considering only one character, the total transmitting time would be as follows: (using "Y" as an example)

START	1	2	3	4	5	STOP
13.5 m/s	13.5 m/s	13.5 m/s	13.5 m/s	13.5 m/s	13.5 m/s	19 m/s
SPACE	MARK	SPACE	MARK	SPACE	MARK	MARK

It will therefore require 100 m/s to send any one character, regardless of how fast the operator is typing. If he sends only one character per minute, that character will be sent out and received by the other stations in 100 m/s. The part of the minute that the machines are not working they remain in a marking condition (a continuation of the stop impulse beyond its 19 m/s). If the operator is typing 600 OPM each character still takes 100 m/s but there is no time lost between the operations. Immediately after the 19 m/s stop impulse, a start impulse is sent for the next character.

For machines operating at speeds of 60 and 75 WPM, the time for each character is increased.

The diagram on the following page illustrates the method of connecting two stations together. Notice that all parts are connected in series.



A discussion of the various units used for the generation and reception of the five level code follows:

Signal Line Power Supply

The power supply furnishes 26 volts DC 100 milli-amps to the circuit. The resistance in the line is adjusted for a current flow of 60 milli-amps (ma) whenever the circuit is in a closed condition (a mark on the line).

Transmitting Contacts

The transmitting contacts make up the electrical part of the transmitter unit (keyboard). These contacts will open and close according to the character or function selected.

Line Sensor

The line sensor is a transistorized switching device that converts the neutral (current and no-current) teletype signal to a polar (mark current and space current) teletype signal. It has an internal power supply (26V DC) that supplies current to the mark and space coils in the magnetic selector on the printer.

Signal Line

The signal line consists of the cable carrying the teletype signal connecting different stations. The stations may also be connected by a radio teletype channel.

The diagram on the preceding page, shows station B line sensor, being in series with station A line sensor, will react to the signal in the same manner and at the same time as station A. When station A is sending, the keyboard of station B will not be operating, since only one station can send at a time in this type of circuit. Other types of hookups are available.

Information Sheet 2-3-1I

ORIENTATION TERMS FOR THE TT-299/UG

INTRODUCTION

This information sheet has been developed to simplify communications between you and the instructor. The phrases in this sheet have been standardized for this course.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

Phrases Indicating a Direction of Movement or Type of Movement

Up and down
Right to left
Left to right
Front to rear
Rear to front
Clockwise (abbreviated CW)
Counterclockwise (abbreviated CCW)

Phrases Indicating the Side of the Machine Being Viewed

As viewed from the front
As viewed from the right (abbreviated (rt))
As viewed from the left (abbreviated (lt))
As viewed from the top
As viewed from the rear
As viewed from the bottom (abbreviated (bot))

NOTE: When the view is not specified, the view is always considered as being from the front.

Phrases Introducing Questions Which Ask for the Cause of Motion

What furnishes the power to move . . . . . ?

The answer to this question must be one of the following:

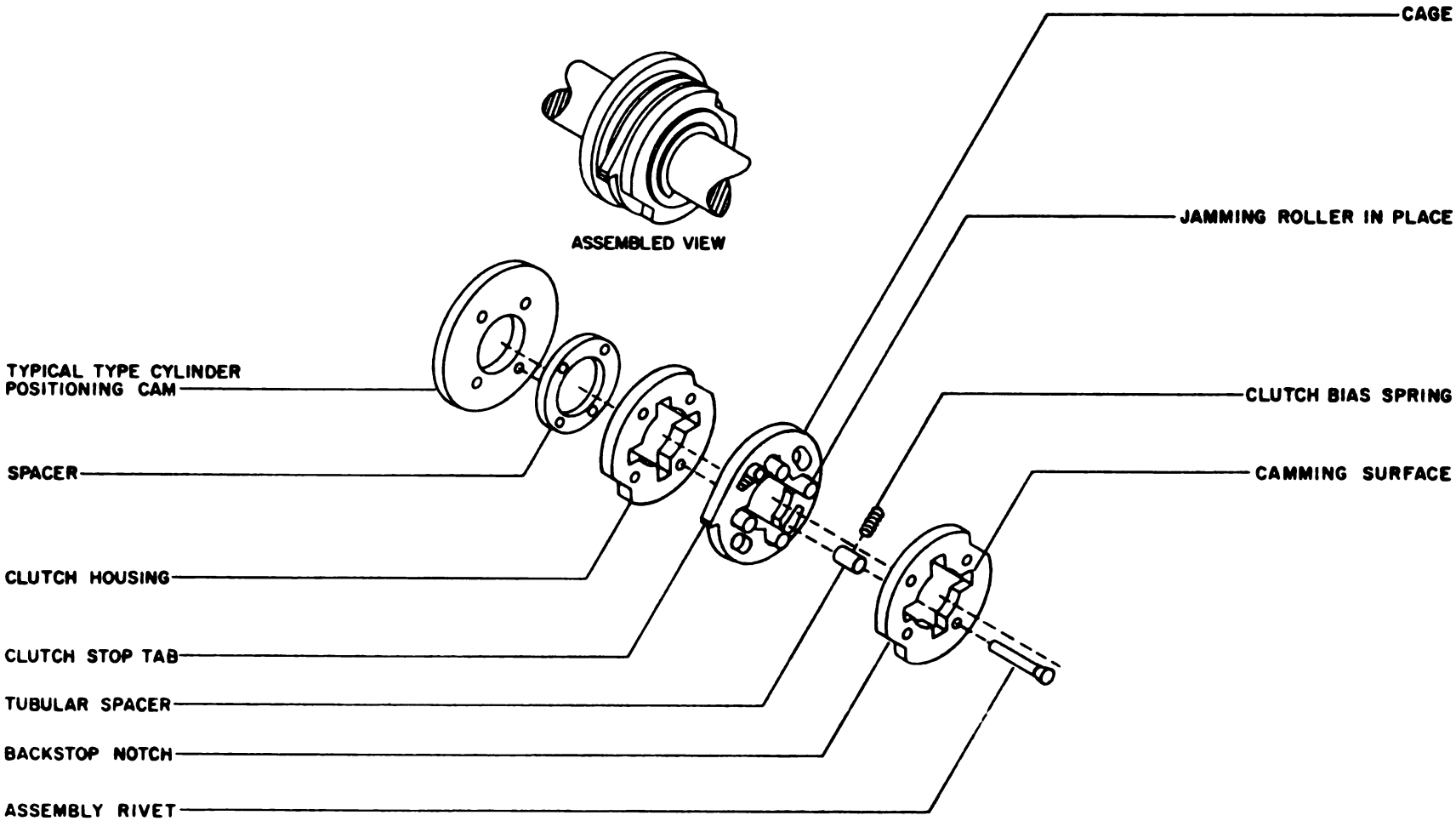
a cam on the printer main shaft
a gear on the printer main shaft
a spring which directly or indirectly maintains a tension on the part being moved.

What part moves . . . . . ?

The answer to this question must be the part which actually touches and moves another part.

Phrases Indicating the Operating Condition of the Machine

Running normal	- The machine is operating correctly in all respects.
Running open	- The machine is running but is not selecting or printing.
Running closed	- The machine cannot be keyed.
Garbling	- The machine is not printing the correct character, or the functions are inoperative, or a combination of both.



TYPICAL CLUTCH ASSEMBLY

Information Sheet 3-1-1I

OPERATION OF THE FRICTION-ROLLER TYPE CLUTCH

INTRODUCTION

The purpose of this information sheet is to describe and present the sequence of operation of the Friction-Roller Type Clutch

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The FRICTION-ROLLER TYPE CLUTCH consists of

two HOUSINGS,
a CAGE,
four ROLLERS and
two BIAS COMPRESSION SPRINGS.

The housings with the cage sandwiched between them are riveted together holding the housings rigid, but the cage, riveted through elongated holes, is free to rotate approximately 20^{o} in relation to the housings. The four rollers are aligned in four slots cut into the housings and cage. The bias compression springs bias the cage in the direction of shaft travel.

When the CLUTCH RELEASE is moved away from the CLUTCH STOP TAB on the cage the bias compression springs force the cage to move in the direction of shaft travel. The motion cams the rollers down out of their slots and wedges them against the shaft. This action will start the housings and cage rotating. As the rotation continues the rollers will be jammed firmly against the shaft and the clutch will rotate for 180^{o} until the clutch release is placed in the path of the clutch stop tab on the cage.

The impact against the cage will stop the clutch, and the rollers will move back into their original position in the slots. The bias compression springs will try to push the housings backward, thus reestablishing the camming effect.

To prevent the resulting clutch chatter the BACKSTOP will be pulled into a notch in the housing, holding the bias compression springs compressed and the clutch completely disengaged.

Assignment Sheet 3-1-1A

SELF-TEST ITEMS ON THE TT-299/UG

INFORMATION

Answer the following questions in the space provided below each item. Refer to the technical manual and trainee's guide as necessary. Your work will be reviewed in the classroom by the instructor.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

QUESTIONS

1. How often should the clutch rollers of the keyboard clutch on the TT-299/UG teletypewriter be lubricated?

2. What speed/s/ will the TT-299/UG operate with gears supplied with the equipment?

3. How many impulses are in the teletype code?

4. When operating at 100 WPM, what is the time duration of the start impulse?

5. What is the primary purpose of the start and stop impulses?

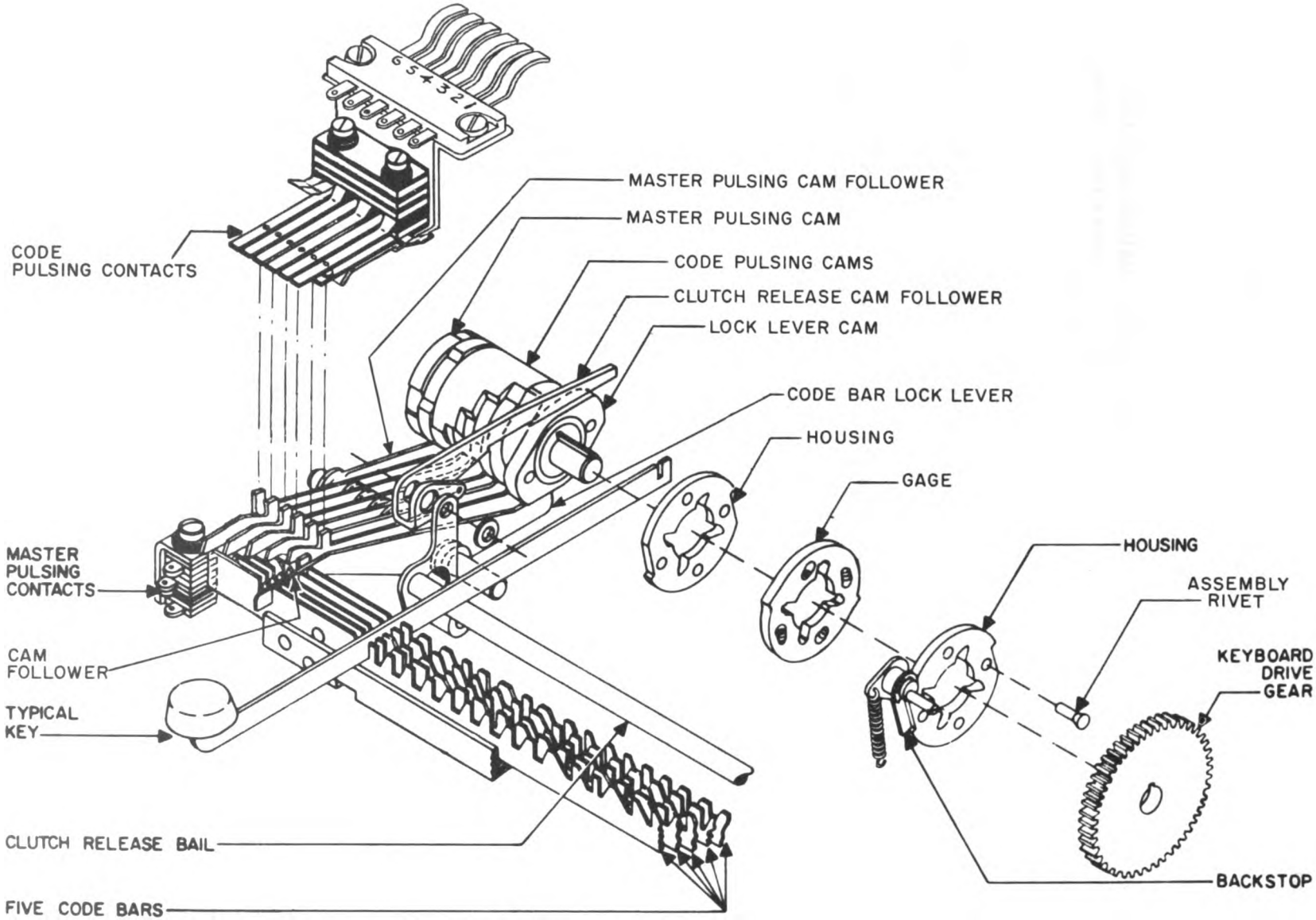
6. When asked "What furnishes the power to move a part in a certain way", from where must the power be derived?

7. What is the nomenclature of the keyboard unit of the TT-299/UG?

8. What is the electrical power requirement for the TT-299/UG?

9. What type clutch does the TT-299/UG use?

10. What is the nomenclature of the motor used in the TT-299/UG?



KEYBOARD, MECHANICAL DIAGRAM

Information Sheet 3-1-2I

POSITIONING THE CODE BARS

INTRODUCTION

The purpose of this information sheet is to assist you in learning the correct nomenclature and the sequence of operation of Code Bars. It is intended that you refer to the figure on the preceding page.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 94522, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When a KEY or the SPACE BAR is depressed it moves the front of the KEYLEVER down against the tension of the KEYLEVER LEAF SPRING. As the keylever moves down it strikes the slanted sides of notches cut into the CODE BARS and moves them. The code bars are moved to the right and out from under the related CODE PULSING CAM FOLLOWER for a mark. The code bars are moved to the left and under the related code pulsing cam follower for a space.

The LOCK LEVER under tension of its spring is pulled to the low part of its cam. The front of the lock lever will move down into slots cut into the code bars locking them in the selected positions (right or left).

There are five code bars numbered front to rear: #1, #2, #3, #4, and #5.

There are eight cam followers. Left to right they are designated as follows:

MASTER PULSING CAM FOLLOWER
START/STOP CAM FOLLOWER
#1 CODE PULSING CAM FOLLOWER
#2 CODE PULSING CAM FOLLOWER
#3 CODE PULSING CAM FOLLOWER
#4 CODE PULSING CAM FOLLOWER
#5 CODE PULSING CAM FOLLOWER
CLUTCH RELEASE CAM FOLLOWER

KEYBOARD INTERLOCK

Assignment Sheet 3-1-2A

KEYBOARD INTERLOCK

INTRODUCTION

Using the actual equipment and the figure on the preceding page identify the equipment parts listed below.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V). Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

1. SOLENOID AND BRACKET ASSEMBLY
2. RELEASE PIN
3. CLUTCH RELEASE
4. LOCK LEVER
5. CODE BARS
6. KEYBOARD CLUTCH AND CAM ASSEMBLY
7. CLUTCH RELEASE CAM FOLLOWER
8. ACTUATE LEVER
9. RELEASE LEVER LINK
10. RELEASE LEVER
11. LOCK LEVER TAB
12. REPEAT KEY STOP
13. SOLENOID STOP
14. RELEASE PIN SPRING
15. LOCK LEVER ECCENTRIC PIN
16. ECCENTRIC BUSHING
17. LEAF SPRING
18. SOLENOID PLUNGER ROD
19. SOLENOID STROKE ADJUSTMENT NUT
20. LEAF SPRING ADJUSTMENT NUT
21. CLUTCH RELEASE CAM FOLLOWER ECCENTRIC
22. REPEAT RELEASE ARM
23. KEY LEVER GUIDE

Information Sheet 3-1-3I

RELEASING THE KEYBOARD CLUTCH
(keyboard interlock system enabled)

INTRODUCTION

The purpose of this information sheet is to teach nomenclature and the sequence of operation of the releasing of the keyboard clutch.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

As the keylever moves down it rotates the CLUTCH RELEASE BAIL CCW (counter-clockwise) with the upper left extension going to the front. Connected to the extension and moving to the front is the CLUTCH RELEASE CAM FOLLOWER which engages the ACTUATE LEVER and rotates CCW (rt).

The RELEASE LEVER LINK is attached to the actuate lever and is moved to the front against the tension of the actuate lever spring. The release lever link is attached to the RELEASE LEVER and rotates CCW (rt) moving it away from the tab on the LOCK LEVER. This action allows the lock lever spring to pull the lock lever CCW (rt) with the rear part going to the low side of the lock lever cam. The LOCK LEVER ECCENTRIC PIN moves away from the CLUTCH RELEASE.

The clutch release is held in its unoperated position by the spring loaded RELEASE PIN of the INTERLOCK SOLENOID and will not move away from the clutch stop tab to release the keyboard clutch until a synchronous pulse is received from an external source. When the pulse is received, the interlock solenoid becomes energized and will retract the release pin. This action will allow the clutch release to pivot CCW (rt) under power of its spring, and move out of engagement with the CLUTCH STOP TAB, causing the KEYBOARD CLUTCH to be engaged to rotate with its cam next for 180°.

Information Sheet 3-1-4I

RELEASING THE KEYBOARD CLUTCH
(keyboard interlock system disabled)

INTRODUCTION

The purpose of this information sheet is to teach nomenclature and the sequence of operation of the releasing of the keyboard clutch with the keyboard interlock system disabled.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

As the keylever moves down it rotates the CLUTCH RELEASE BAIL CCW (rt), with the upper left extension going to the front of the machine. Connected to the extension and moving to the front is the CLUTCH RELEASE CAM FOLLOWER which engages and rotates the ACTUATE LEVER CCW (rt). The top of the actuate lever moves toward the front of the machine against the tension of its spring.

The RELEASE LEVER LINK is attached to the actuate lever and moves to the front of the machine. The release lever link is attached to the RELEASE LEVER and rotates it CCW (rt). When the release lever is rotated it clears the tab on the LOCK LEVER. This action allows the lock lever spring to pull the lock lever CCW (rt) (to the low part of its cam).

The LOCK LEVER ECCENTRIC PIN moves away from the CLUTCH RELEASE allowing it to pivot CCW (rt) under power of its spring and move out of engagement with the keyboard clutch stop tab. The KEYBOARD CLUTCH will engage and rotate with its CAM NEST for 180°.

The CAM NEST consists of nine cams. Left to right they are designated:

MASTER PULSING CAM
START/STOP CAM
#1 CODE PULSING CAM
#2 CODE PULSING CAM
#3 CODE PULSING CAM
#4 CODE PULSING CAM
#5 CODE PULSING CAM
LOCK LEVER CAM
CLUTCH RELEASE CAM

Information Sheet 3-1-5I

TRANSMITTING THE TELETYPE SIGNAL TO THE SIGNAL LINE

INTRODUCTION

The purpose of this information sheet is to teach terminology and the operational sequence used when transmitting the teletype signal to the signal line.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the lock lever is pulled to the low part of its cam, the front of the lock lever moves down into the notches of the CODE BARS locking them in their selected position.

As the CAM NEST rotates, the START/STOP CAM FOLLOWER rides to the high part of its cam and the front moves up, opening the start/stop pulsing contacts. The open contacts place a space (start impulse) on the signal line.

If the code bars are to the right (mark), CODE PULSING CAM FOLLOWERS #1 through #5 are pulled to the low part of their cams by their springs. The front moves down and allows the normally opened code pulsing contacts to close placing a mark on the signal line. The code pulsing cam followers will then ride to the high part of their cams opening their respective code pulsing contacts. If the code bars are to the left (space) they will block and prevent movement of the code pulsing cam followers. The code pulsing contacts will remain open.

The MASTER PULSING CAM FOLLOWER rides on the master pulsing cam which has 4 high surfaces and 3 low surfaces for each character cycle. When riding on the high parts of the cam the upper contacts close and control start, #2, #4 and stop impulses. When the cam follower is pulled to the low parts of the cam the lower contacts close and control #1, #3, and #5 impulses. The master pulsing contacts shape the teletype signal and keeps switching current off the code pulsing contacts.

The START/STOP CAM FOLLOWER rides to the low part of its cam, allowing the start/stop pulsing contacts to close, placing a mark (stop impulse) on the signal line.

Information Sheet 3-1-6I

RETURNING KEYBOARD CLUTCH TO NORMAL STOP POSITION

INTRODUCTION

The purpose of this information sheet is to teach terminology and the operational sequence used when returning the keyboard clutch to normal stop position. It is intended that you will use available drawings and actual equipment while using this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

After the cam nest has rotated approximately one-fourth revolution, the CLUTCH RELEASE CAM FOLLOWER will ride upon the high part of its cam and disengage from the ACTUATE LEVER.

As the cam nears the end of its character cycle (180°) the LOCK LEVER rides upon the high part of its cam taking the front portion up out of the notches and unlocks the CODE BARS. This creates a clearance between its tab and the RELEASE LEVER. The actuate lever spring returns the actuate lever, release lever link and release lever to their normal stop position.

As the rear portion of the lock lever moves down the LOCK LEVER ECCENTRIC PIN moves the clutch release CW (rt) with the upper portion going into the path of the stop tab on the keyboard clutch. The KEYBOARD CLUTCH will become disengaged.

The clutch release cam follower spring furnishes power to return the CLUTCH RELEASE CAM FOLLOWER and CLUTCH RELEASE BAIL to their normal stop position. The keylever leaf spring furnishes power to return the KEYLEVER and KEY to their normal stop position.

Information Sheet 3-1-7I

REPEATING A CHARACTER

INTRODUCTION

The purpose of this information sheet is to teach terminology and how the teletypewriter equipment repeats a character.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the REPEAT KEY is depressed the front of the REPEAT KEYLEVER moves down against tension of the repeat keylever spring, rotating the REPEAT KEYLEVER SHAFT CCW (rt).

Attached to the left end of the repeat keylever is the REPEAT RELEASE ARM which rotates CCW (rt). The top of the repeat release arm will engage the ACTUATE LEVER and move the top to the front of the machine which will operate the normal keyboard clutch release mechanism.

The last character selected on the code bars will be repeated until the repeat key is released.

The REPEAT KEYLEVER SPRING furnishes power to return the repeat key, repeat keylever, repeat keylever shaft, and repeat release arm to their normal stop position.

Information Sheet 3-1-8I

LINE BREAK

INTRODUCTION

The purpose of this information sheet is to teach terminology and to give a brief explanation of how a space is made on a line.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The signal line can be opened for signaling purposes, or to start the motor when turned off by automatic motor stop, by depressing the BREAK BUTTON on the front of the keyboard. This action opens the break switch in series with the signal line, placing a space on the line.

Information Sheet 3-1-9I

ELECTRICALLY SHORTING OUTPUT OF KEYBOARD

INTRODUCTION

The purpose of this information sheet is to teach terminology and to explain the function of the SEND-REC/REC SWITCH.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The SEND-REC/REC SWITCH located on the front of the keyboard is connected across the master pulsing contacts, code pulsing contacts and the break switch. When the switch is in the SEND-REC position the switch is open and the operator may send or receive. When it is in the REC position the switch is closed and the keyboard is electrically shorted preventing the signal line from being keyed or interrupted by the keyboard.

Assignment Sheet 3-1-3A

SELF-TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided below each item. You may refer to the technical manual, guide, and notes to answer these questions. Your work will be reviewed by the instructor.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

QUESTIONS

1. Name the cams on the keyboard nest from right to left.

2. What is the purpose of the master pulsing contacts?

3. What is the purpose of the code pulsing contacts?

4. What furnishes the power to move the front of the lock lever up?

5. What furnishes the power to rotate the repeat keylever shaft CW (rt)?

6. What furnishes the power to rotate the repeat release arm CW (rt)?

7. What is the purpose of the line break circuit?

8. Across what components in the keyboard circuit are the send-rec/rec switch connected?

9. What furnishes the power to return the keyboard clutch release to its normal stop position?

10. What furnishes the power to open the start/stop contacts?

Information Sheet 3-3-1I

ADJUSTMENT PROCEDURES

INTRODUCTION

To develop a skill in repairing the TT-299 teletype equipment you must have a thorough knowledge in reading directions, identifying parts and the use of special tools. The purpose of this information sheet is to provide background information for the adjustment phase of the TT-299 course.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

Each trainee will be provided with a set of job sheets for use during the adjustment phase.

The job sheets will be used in conjunction with the reference manuals.

Follow the steps as outlined in the job sheets.

Observe all safety precautions.

Have the instructor check your machine before applying power.

Ample time will be provided for making each adjustment.

Periodic breaks (10 min each hr.) will be allowed to relax and ease the tension sometimes caused by this type of work.

The reference manual often states the requirements for measuring clearances in fractions of an inch. (i.e. 1/16, 1/32, etc.). The following conversion table will aid you in selecting the proper gauge for making these measurements.

1/64 - .015 1/32 - .031 1/16 - .062

Information Sheet 3-3-2I

TT-299 TOOL INVENTORY

INTRODUCTION

The purpose of this information sheet is to provide a ready reference of tools used on the TT-299 equipment by federal stock number and part number.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V), and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

ITEM:	FED.STK.NR.	PART NR.
Crochet Needle	**	151959
Gauge, Margin adjust	**	**
".002"	N5815-412-7638	96358
".005"	1N5210-382-0047	93823
".010"	N5815-412-7620	96373
".012"	1N5210-184-9513	93828
".015"	1N5210-189-9534	96375
".020"	1N5210-189-9535	96377
".025"	1N5210-189-9512	93825
".030"	1N5815-369-9344	93811
".035"	1N5210-189-9536	96383
Screwdriver, 6"	1N5120-227-7356	**
Screwdriver, small	1N5120-227-7377	**
Spring-hook, Puller	N5815-448-3927	75765
Spring-hook, Pusher	1N5120-448-3924	75503
Tweezers	**	**
Wrench, Allex Hex:		
1/16"	1N5120-015-1297	5120-1
5/64"	-1303	5120-2
3/32"	-1304	5120-3
7/64"	-1313	5120-4
.050"	-1305	5120-5
.035"	-1306	5120-6

ITEM:	FED.STK.NR.	PART NR.
Hex key, Allen.	1N5120-015-1307.	5122-1
Hex key, Allen.	1N5120-015-1308.	5122-2
Handle, for hex key as indicated:		
1/16".	1N5120-015-1309.	5121-1
5/64".	1N5120-015-1298.	5121-2
3/32".	1N5120-618-3214.	5121-3
7/64".	1N5120-015-1300.	5121-4
.050".	1N5120-015-1301.	5121-5
.035".	1N5120-015-1302.	5121-6
Wrench, 3/16" special socket. . .	1N5120-015-1291.	4534
Wrench, 1/2" special.	1N5120-015-0811.	2241
Wrench, 1/4 x 3/16"	1N5120-596-4420.	**
Wrench, 3/8 x 5/16"	1N5120-596-4439.	**
Wrench, 1/16 x 6"	1N5120-015-1293.	4535
Handwheel	1N5120-015-1292.	4533

Job Sheet 3-4-1J

KEYBOARD ADJUSTMENT

INTRODUCTION

The purpose of this job sheet is to guide you in making adjustments to certain parts of the keyboard. Certain steps in this procedure will be graded. These steps will be marked by a GA (the abbreviation for graded application). You will be graded on accuracy on these particular steps. As you read the directions you will notice the phrase CHECK POINT followed by a blank line. This means that you are to contact your instructor before proceeding on to the next step. In some cases, he may grade the adjustment(s) which you have just completed. In other cases, he may simply check your work to ensure that you are "on the right path."

The above information concerning graded application applies to all job sheets in the Adjustment Phase of the course, and it will not be repeated.

EQUIPMENT

TT-299B/UG Teletypewriter Set
Tool Kit
AN/USM-24 (or equivalent), Oscilloscope

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

Information Sheet 3-1-3I, Releasing the Keyboard Clutch

JOB STEPS

1. Disable keyboard interlock adjustment

a. Position the solenoid stop against the shoulder on the release pin shaft so that it holds the release pin even with or slightly inside the left face of the eccentric bushing.

b. Tighten the adjustable stop clamping screw.

2. Release lever eccentric adjustment.

a. Rotate the keyboard clutch and cam assembly until the lock lever is on the high part of its cam.

GA b. Loosen the release lever clamp screw and adjust the release lever eccentric on the clutch release bail shaft until the release lever is positioned under the lock lever tab with some clearance, but not more than .002".

c. Tighten the release lever clamp screw.

3. Lock lever eccentric pin adjustment.

GA a. With the lock lever on the high part of its cam and the clutch release against the clutch cage, loosen the lock nut and adjust the eccentric pin until some, but not more than .005" clearance is established between the lock lever eccentric pin and the clutch release.

b. Tighten the lock nut.

4. Clutch release cam follower eccentric adjustment.

GA a. With the keyboard clutch in its stop position, loosen the locking nut and adjust the clutch release cam follower eccentric so a minimum amount of travel is required to pull the release lever out from under the lock lever tab when a key is depressed.

b. Check using Q, P, Blank and Figs keys.

c. Tighten eccentric lock nut.

5. Repeat release arm adjustment.

GA a. With the repeat key stop disabled, the repeat key held down and the clamp screw loosened, adjust the repeat release arm so it engages the actuate lever until the clutch release is operated.

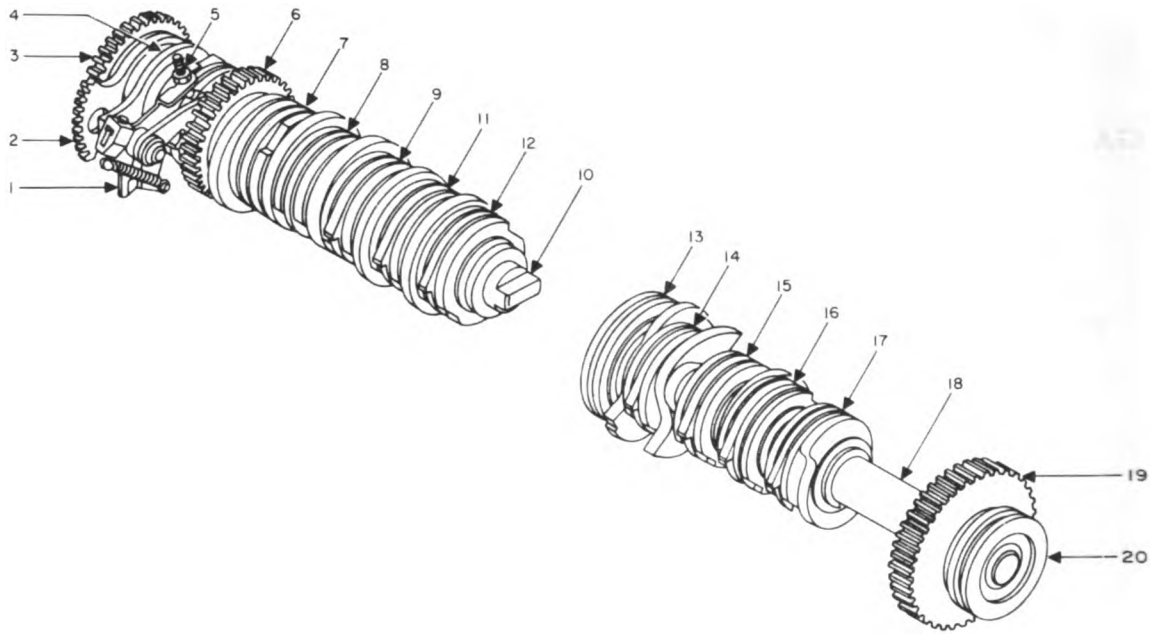
b. Tighten the clamp screw.

6. Lateral position and clearance of backstop adjustment. Page 6-91 Para (d).

GA

7. Code pulsing contact clearance adjustment. Page 6-92 Para (g).
Check only. Check point. INITIAL_____

8. Oscilloscope adjustment of keyboard TT-318/UG. Page 6-93 Para (2).
Check point INITIAL_____



1. Start Clutch Backstop
2. Range Gear Sector
3. Printer Gear
4. Bearing Retainer
5. Start Clutch Release Adjustment Screw
6. Start Gear
7. No. 3 Intelligence Clutch and B Cam
8. No. 4 Intelligence Clutch and C Cam
9. No. 5 Intelligence Clutch and D Cam
10. Selector Mainshaft Assembly
11. No. 2 Intelligence Clutch and E Cam
12. No. 1 Intelligence Clutch and F Cam
13. Bearing
14. Print-Function Clutch and G and H Cams
15. Line Feed Clutch and I Cam
16. Letters-Figures Clutch and J Cam
17. Carriage Return Clutch and K Cam
18. Function Mainshaft
19. Third Reduction Gear
20. Bearing

PRINTER, MAIN SHAFT ASSEMBLY

Information Sheet 3-5-1I

MAIN SHAFT OF PRINTER

INTRODUCTION

The purpose of this information sheet is to teach the terminology and location of the parts of the main shaft of the printer. Refer to the figure of the main shaft assembly while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

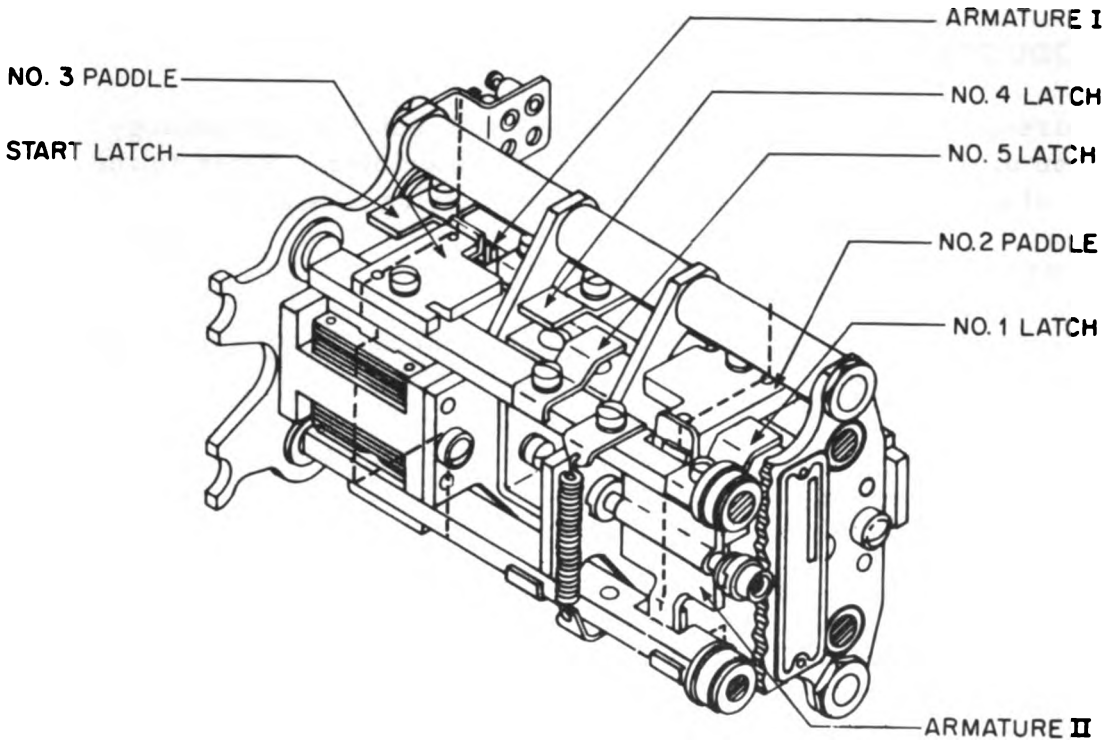
INFORMATION

The main shaft of the printer consists of the SELECTOR MAIN SHAFT with the following parts:

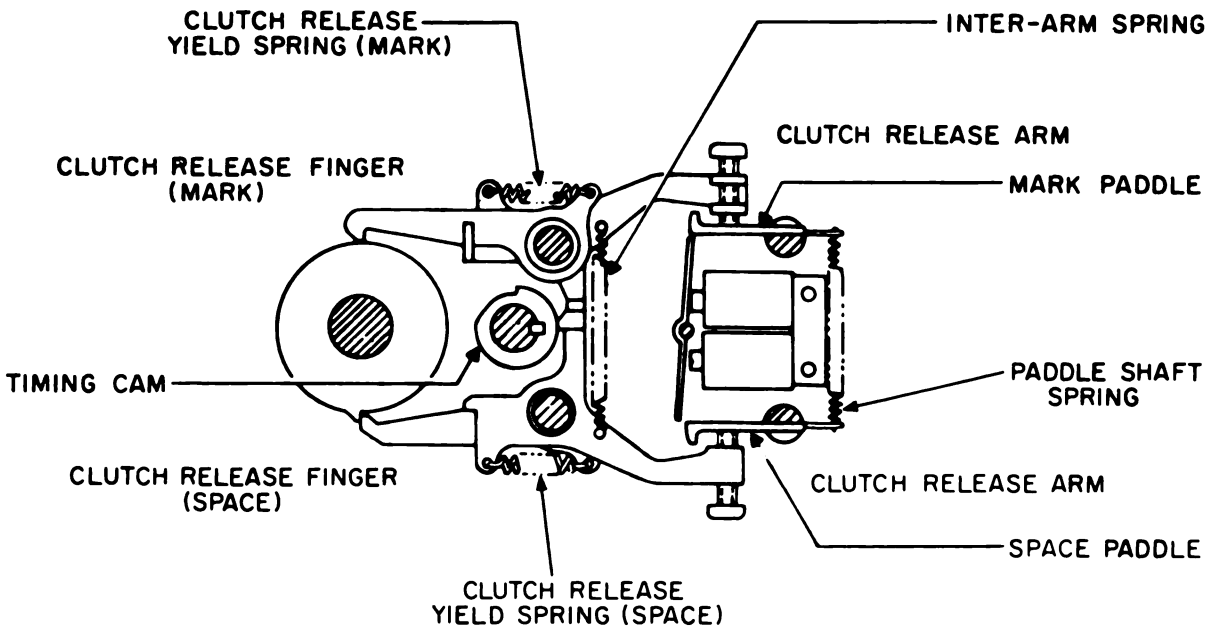
Printer gear
Range selector gear
Start clutch - "A" cam
#3 clutch - "B" cam
#4 clutch - "C" cam
#5 clutch - "D" cam
#2 clutch - "E" cam
#1 clutch - "F" cam

and the FUNCTION MAIN SHAFT with the following parts:

Print/function clutch - "G and "H" cams
Line feed clutch - "I" cam
Letters/figures clutch - "J" cam
Carriage return clutch - "K" cam
Third reduction gear



SELECTOR MECHANISM



THE SELECTOR CLUTCH RELEASE MECHANISM

Information Sheet 3-5-2I

MAGNETIC SELECTOR

INTRODUCTION

The purpose of this information sheet is to teach terminology and location of parts on the magnetic selector. Refer to the figures on the preceeding page while studying this material.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The purpose of the magnetic selector is to convert electrical impulses into mechanical motion. The TT-299 uses mechanical motion to control six clutch assemblies on the selector main shaft.

The magnetic selector consists of 2 ARMATURE SETS and 2 SOLENOID COIL SETS facing in opposite directions. Each solenoid coil set contains four solenoid coils (2 mark and 2 space).

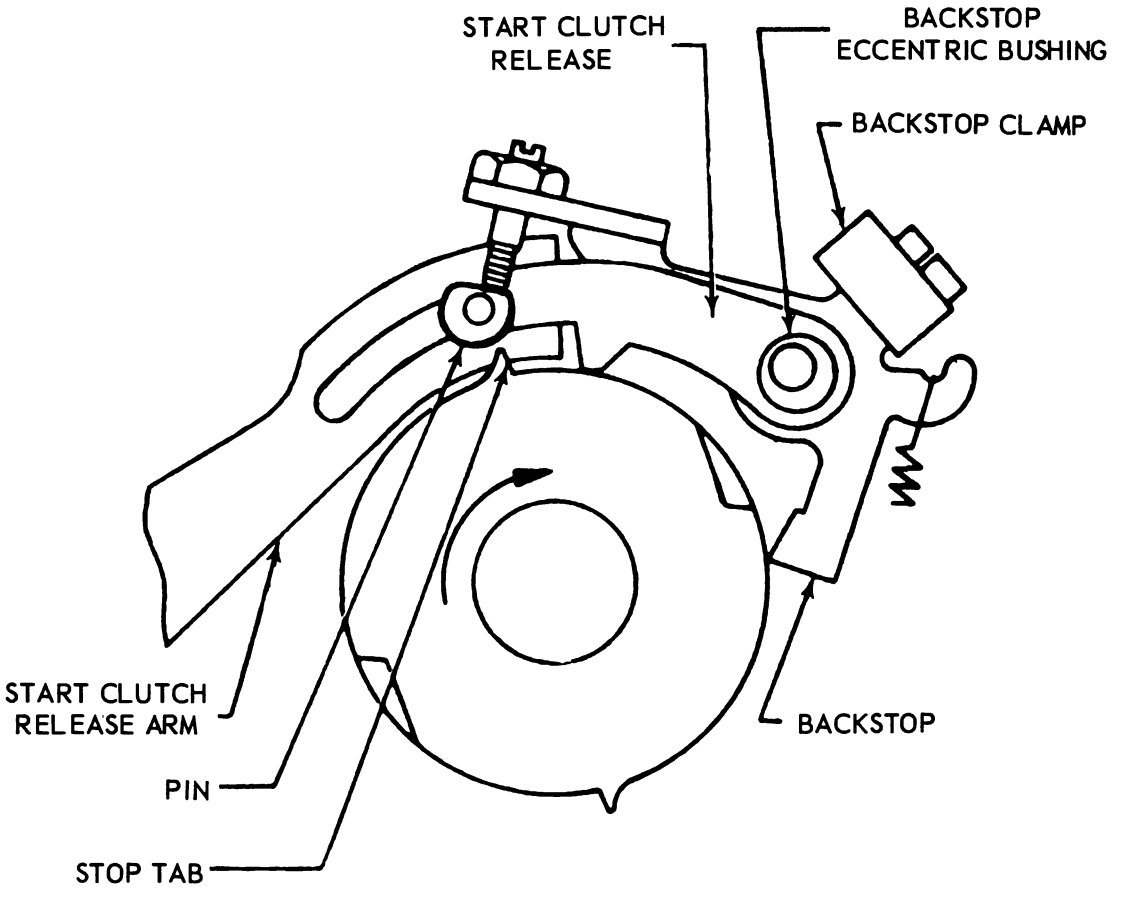
The magnetic selector has 4 PADDLE SHAFTS, 4 PADDLES, and 8 LATCHES.

Pulse information for the magnetic selector is obtained from the line sensor in the form of space current or mark current.

Armature set #1 controls #1, #3, and #5 intelligence clutches. Armature set #2 controls the start clutch, #2, and #4 intelligence clutches.

Energizing mark or space coils position the armatures to block a mark or space paddle. Movement of the unblocked paddles, or latches on the paddle shaft, allows the clutch release fingers to release their respective clutches.

Movement of the intelligence clutches release fingers at the correct time is controlled by the timing camshaft.



START CLUTCH ASSEMBLY

Information Sheet 3-5-3I

OPERATION OF THE START CLUTCH AND TIMING CAM SHAFT ASSEMBLY

INTRODUCTION

The objective of this information sheet is to teach the operating procedures and terminology of the Start Clutch and Timing Cam Shaft Assembly. Refer to the figure on the preceeding page while studying this material.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-298A/UG, and Teletypewriter TT-299A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

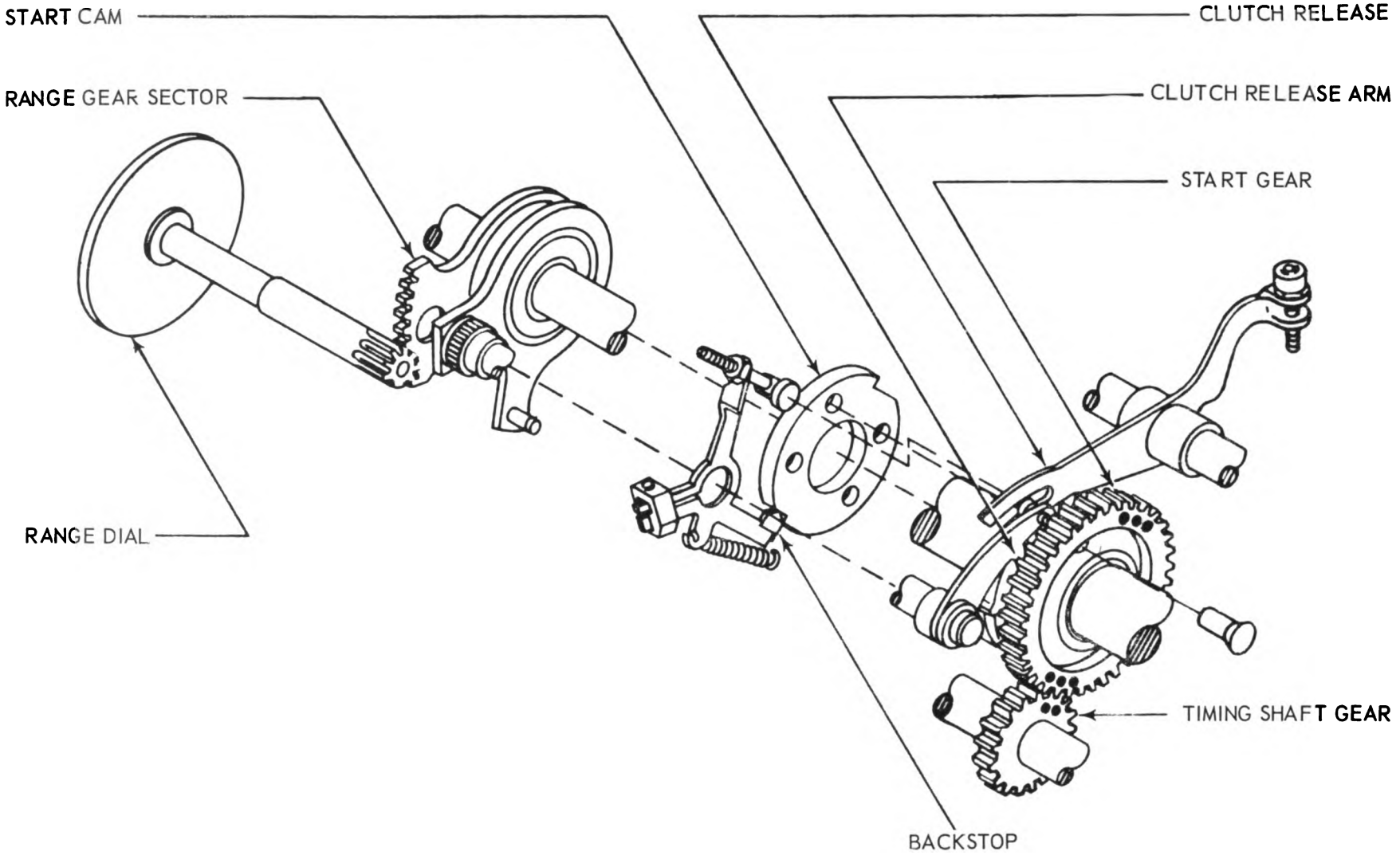
To start the START CLUTCH ASSEMBLY rotating a start impulse is received. This impulse energizes the bottom (space) coils of the selector assembly. The energized space coils pull the bottom of the pivoted armatures, blocking the movement of the bottom selector magnet paddles, but freeing the top paddles and latches to move down. The rear of the START CLUTCH RELEASE ARM is pulled down and the front is pulled up by the START CLUTCH RELEASE ARM SPRING.

The START CLUTCH RELEASE is engaged by the elongated slot of the start clutch release arm. The start clutch is then moved out of engagement with the START CLUTCH STOP TAB. The start clutch assembly will engage and rotate 180°.

Attached to the start clutch assembly is the START GEAR which also rotates and drives the TIMING CAM SHAFT GEAR. This rotation will drive the timing cam shaft one revolution for every one-half revolution of the start clutch.

There are six cams on the timing cam shaft. They are designated from left to right #3, #4, #5, #2, #1, and the print/function timing cams.

The cams will cause intelligence clutch release arms to be operated in the following order: #1, #2, #3, #4, and #5. The print/function clutch release arm will operate at the same time as #5 intelligence clutch release arm.



EXPLODED VIEW OF START CLUTCH RELEASE MECHANISM

Information Sheet 3-5-4I

STOPPING THE START CLUTCH ASSEMBLY

INTRODUCTION

The objective of this information sheet is to teach the operation of the stopping procedure of the start clutch assembly. Refer to the figure on page 44 while studying this material.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the start clutch assembly rotates the START (A) CAM also rotates. At the same time the BACKSTOP LEVER rides on the high part of "A" cam pivots (lt). As the adjusting screw of the backstop moves down it will move the start clutch release back into the path of the START CLUTCH STOP TAB. The impact of the start clutch release and the start clutch stop tab will stop the clutch after 180° rotation.

The START CLUTCH RELEASE ARM is positioned by action of the start clutch release. This action will cause the front part of the start clutch release arm to move down and the rear part to move up against the tension of the start clutch release arm spring. This movement will free the start latch and paddle shaft to move to their unoperated position. At the same time the backstop lever is pulled into an identification of the "A" cam and will hold the clutch completely disengaged.

When a stop impulse (mark coil current) is present the armatures are pulled to a mark condition so that the latch assemblies on the top paddle shafts are blocked and cannot move. The start latch prevents downward movement of the start clutch release arm, thus it can not release the start clutch until another start impulse is received.

Information Sheet 3-5-5I

ORIENTATION OF RANGE SECTOR

INTRODUCTION

The objective of this information sheet is to teach terminology and the orientation of the range sector.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the RANGE KNOB, RANGE DIAL, and RANGE SHAFT are rotated, the teeth on the shaft mesh with and rotate the RANGE SECTOR GEAR. Also connected to the range sector gear and moving with it are the start clutch release and the backstop lever, both have been previously studied. This permits adjustment of the timing cycle or the time relationship between the timing camshaft and the intelligence impulses.

Assignment Sheet 3-5-1A

SELF TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided below each item. Your work will be reviewed in the classroom by the instructor.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

QUESTIONS

1. Name the clutches on the printer main shaft from left to right.

2. When a space impulse is received by the magnetic selector, what prevents the bottom paddles and latches from operating?

3. What clutches does armature set #2 control?

4. What furnishes the power to move the rear of the start clutch release arm up?

5. What furnishes the power to move the start clutch release out of engagement with the start clutch stop tab?

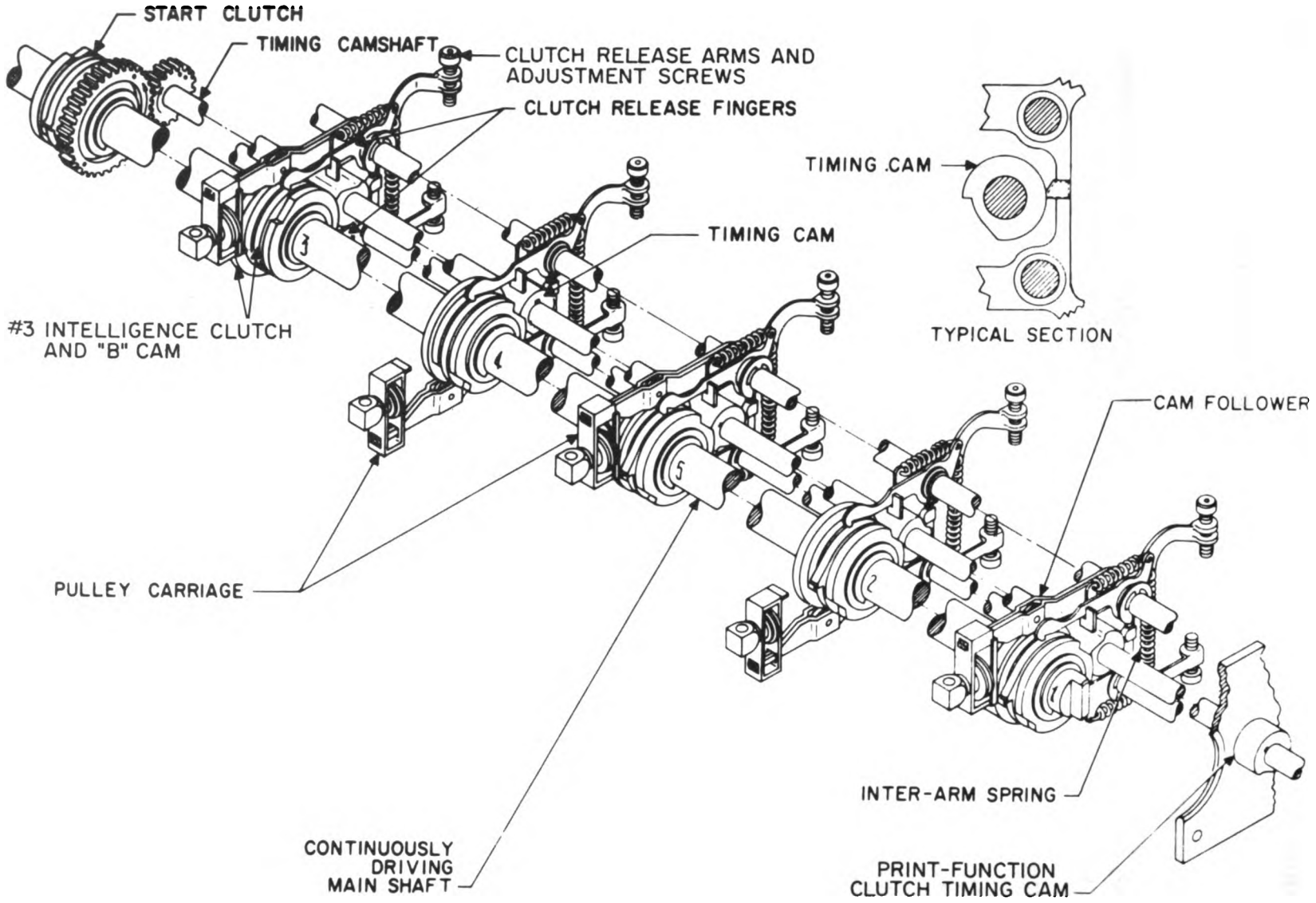
6. Name the cams on the timing cam shaft from left to right?

7. What furnishes the power to move the start clutch release into the path of the start clutch stop tab?

8. How many degress will the timing cam shaft rotate for each character cycle?

9. Name the part to which the start clutch backstop lever is connected.

10. When operating on a local loop, what is the minimum desired range?



PRINT CYLINDER POSITIONING CLUTCH RELEASE SYSTEM

Information Sheet 3-5-6I

OPERATION OF THE INTELLIGENCE CLUTCHES

INTRODUCTION

The objective of this information sheet is to teach the operation of the intelligence clutches.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

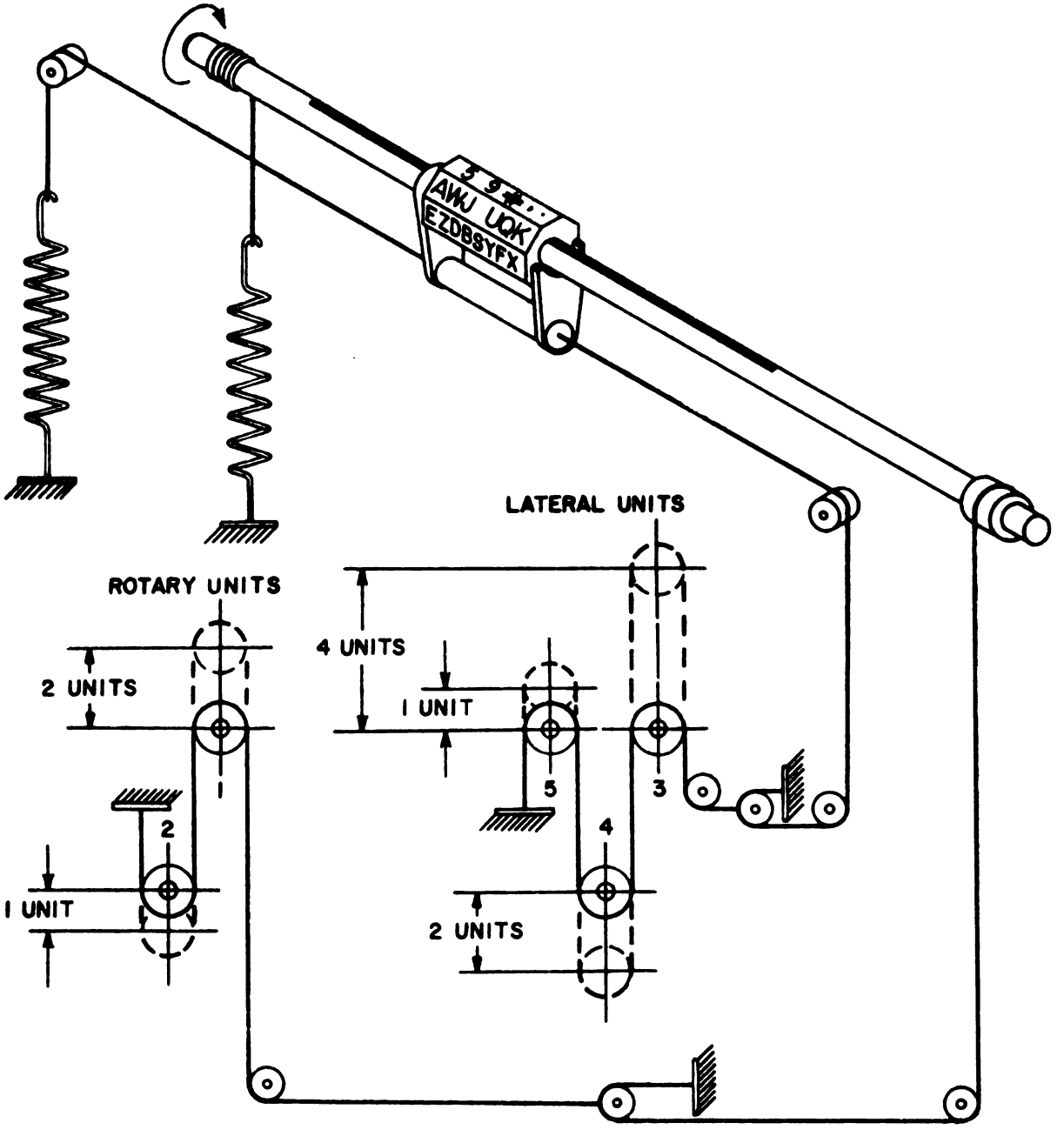
INFORMATION

The intelligence clutch is resting on a mark, and it is held by the top clutch release finger. When a space impulse is received, the bottom PADDLES and LATCHES are blocked by the armature, however the top paddles and latches are free to operate.

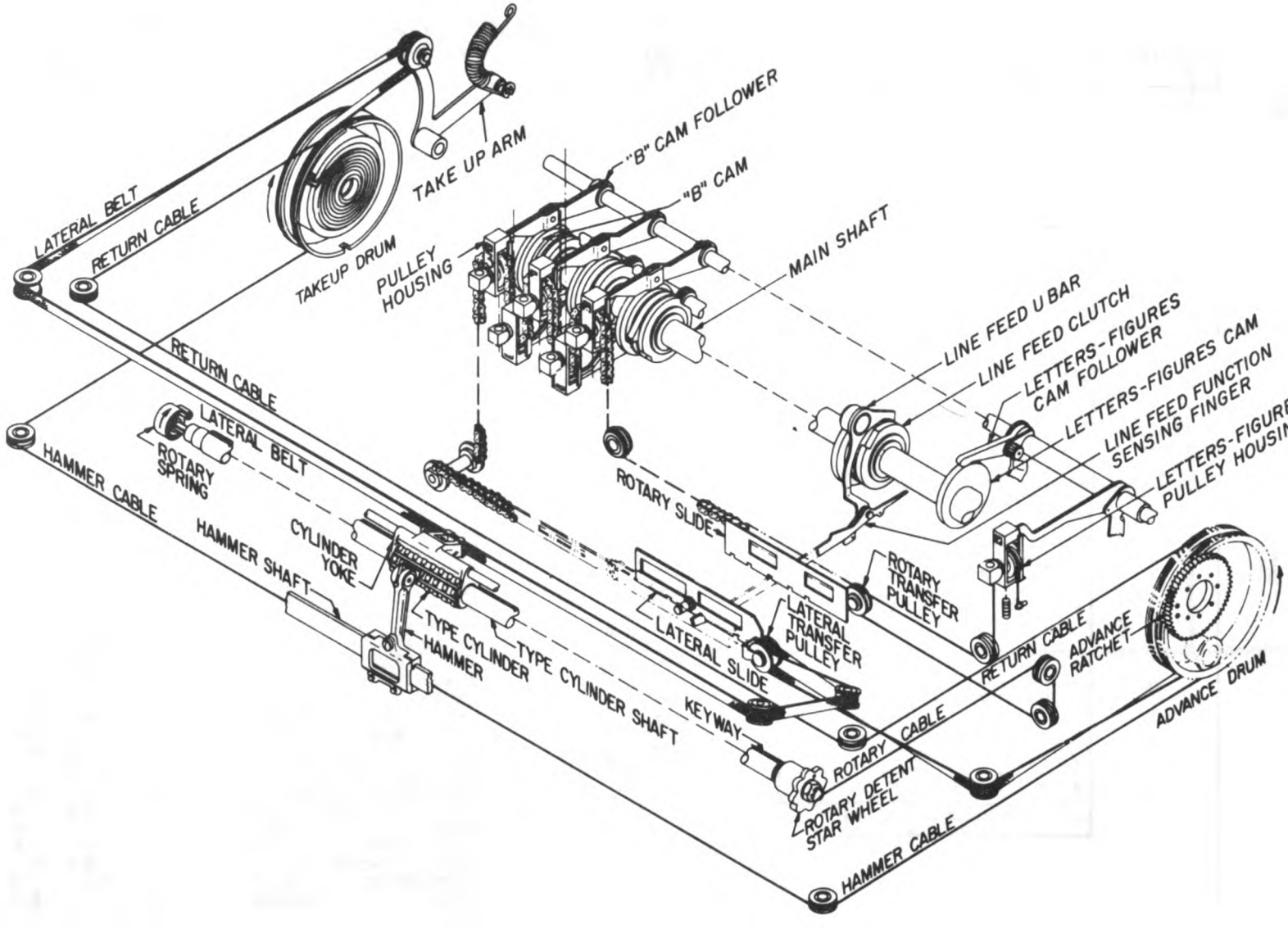
The rear of the top clutch release arm will then be pulled down by the INTER-ARM SPRING when the indent of the respective cam on the TIMING CAM SHAFT is presented to the clutch release arm. This action causes the top CLUTCH RELEASE FINGER to move away from the clutch to engage and rotate 180°. This action is stopped when the bottom clutch release finger engages the clutch stop tab.

The CLUTCH BACKSTOP will then be pulled into its notch to hold the clutch completely disengaged. If the clutch is resting on a mark and a mark impulse is received the top paddles and latches will be blocked by the armature, however the bottom paddles and latches will be free to operate. The rear of the bottom clutch release arm will be pulled up by the inter-arm spring when the indent of the cam on the TIMING CAM SHAFT is presented to the clutch release arm. At this time the bottom clutch release finger will move down, but since the clutch is being held by the top clutch release finger the clutch will not release.

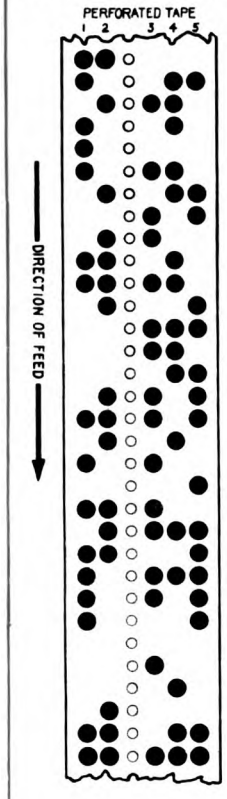
The clutch release arms will be positioned back to normal stop positions by their respective timing cams on the timing cam shaft and they will move the clutch release fingers back into the path of the stop tabs with the clutch springs. The power to move the clutch release arms and clutch release fingers to their normal stop position is furnished by the start gear.



ROTARY AND LATERAL UNITS

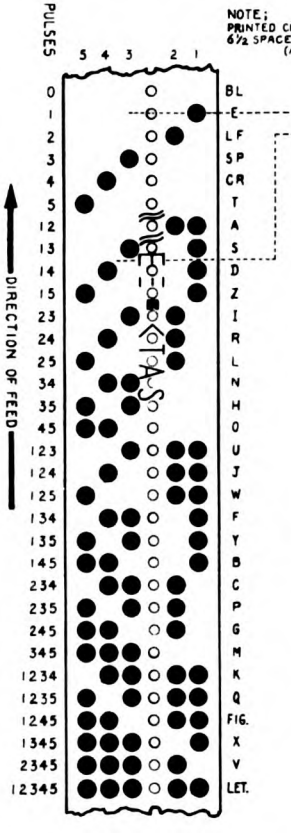


PRINT CYLINDER AND PRINT HAMMER POSITIONING SYSTEM



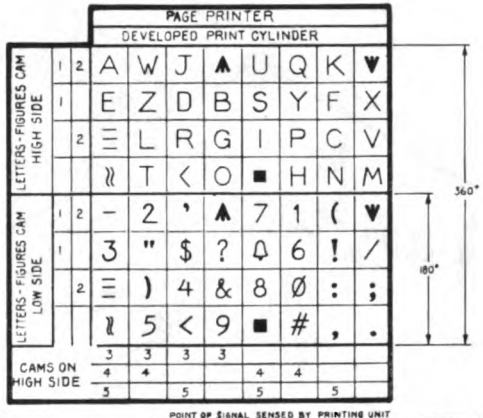
CHARACTERS		7.0 UNITS CODE SIGNALS						
LET.	FIG.	START	1	2	3	4	5	STOP
A	-		■	■				■
B	?		■			■	■	■
C	:			■	■	■		■
D	$		■			■		■
E	3		■					■
F	!		■		■	■	■	■
G	&			■		■	■	■
H	# ④				■			■
I	8			■	■			■
J	'		■	■		■		■
K	(		■	■	■	■	■	■
L	)			■		■	■	■
M	.				■	■		■
N	,				■	■	■	■
O	9					■		■
P	Ø			■	■	■		■
Q	1		■	■	■	■		■
R	4			■		■	■	■
S	A ①		■			■	■	■
T	5						■	■
U	7		■	■	■			■
V	;			■	■	■	■	■
W	2		■	■			■	■
X	/		■		■	■	■	■
Y	6		■		■		■	■
Z	"		■				■	■
≫	BLANK ①							
■	SPACE ②							
<	CAR. RET. ①					■		
≡	LINE FEED ①			■	■			
▲	FIGURES ①		■	■		■	■	■
▼	LETTERS ①		■	■	■	■	■	■

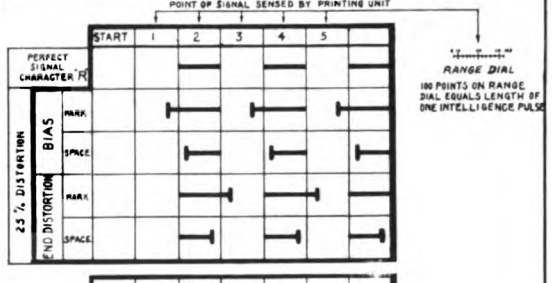
① NON PRINTING; NON ADVANCING
② NON PRINTING; ADVANCING
③ PRINTING; ADVANCING (MAY BE USED AS MOTOR STOP)

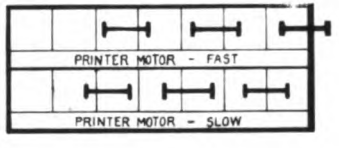


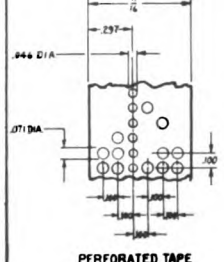
NOTE;
PRINTED CHARACTERS WILL APPEAR 6½ SPACES AFTER PUNCHED HOLES (AS SHOWN)

E ---------PUNCHED HOLE
---PRINTED CHARACTER







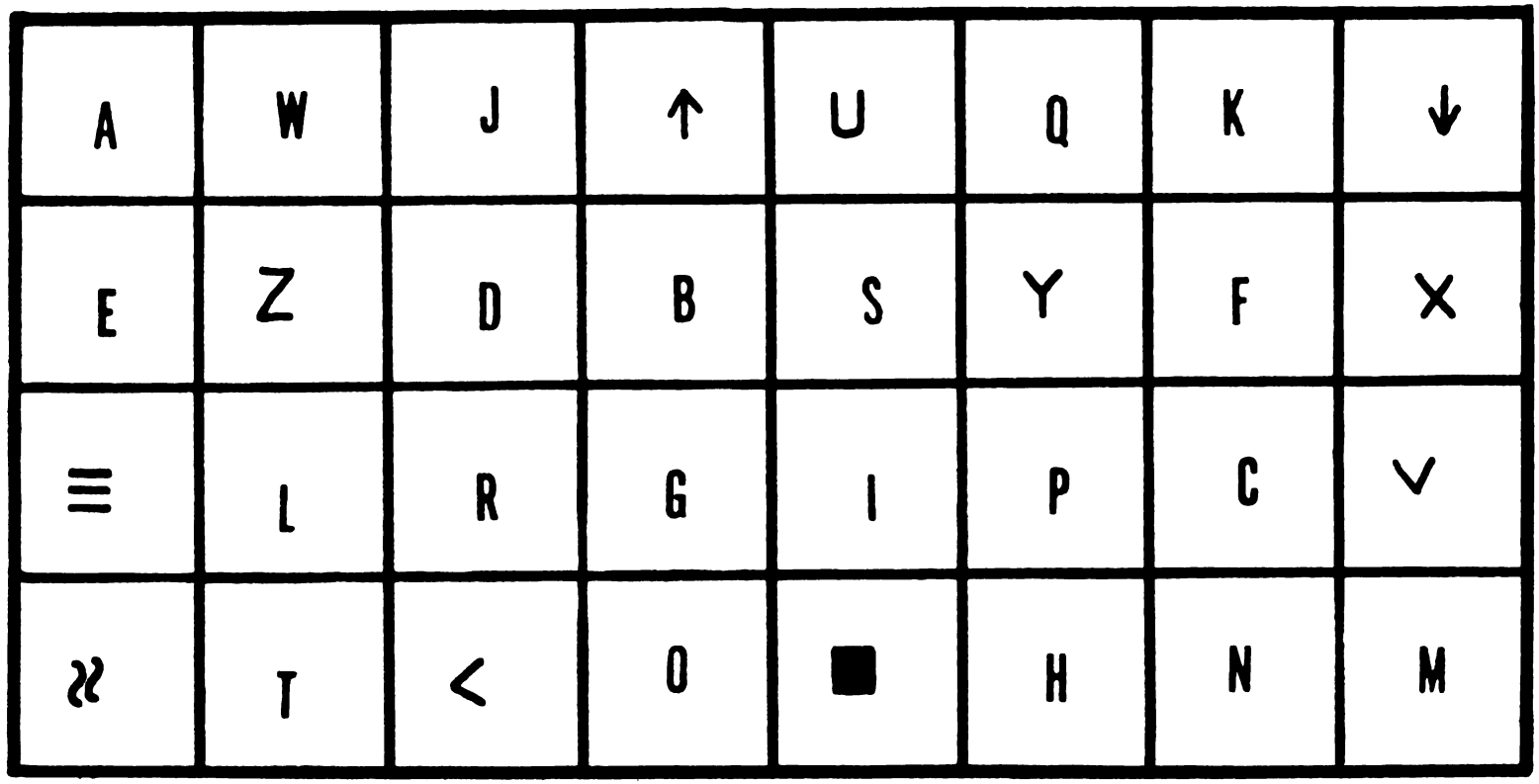


NOMINAL DATA				
BAUDS	OPERATIONS PER MIN.	WORDS PER MIN.	SIGNAL LENGTH IN MILLISECONDS CHARACTER LENGTH	BIT LENGTH
45.45	389.5	64.9	154	22
50	428.5	71.4	140	20
75	642	107.1	93.33	13.33

TARGET SPEED 2160 R.P.M. 6-DOT TARGET
TUNING FORK: 108 CYCLES/SEC.

5 Level 7.0 Unit Baudot Code Chart

NAME:	MODEL:		DWG. NO.:
TELETYPEWRITER CODE 5 LEVEL 7.0 UNIT BAUDOT	104	MITE CORPORATION ENGINEERING LABORATORY PARAMUS, NEW JERSEY FED MFR CODE 09083	FS-01A



TYPE CYLINDER (LETTER SIDE)

ROTARY POSITIONING

INTRODUCTION

The objective of this information sheet is to support the instruction on how the rotary system is positioned.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The #1 ("F") CAM and the #2 ("E") CAM control the positioning of the rotary system. These cams are postioned to the high side for a mark and to low side for a space. Each cam operates a CAM FOLLOWER. Each cam follower operates a PULLEY CARRIAGE.

When the pulley carriage is moved up or down the ROTARY CHAIN can be effectively lengthened or shortened. The rotary chain is connected to the ROTARY TRANSFER PULLEY thru the medium of a metal strip.

The ROTARY CABLE is threaded thru the rotary transfer pulley with one end terminated at the LETTERS/FIGURES downstroke adjustment plate and the other end around the ROTARY DETENT STAR WHEEL. The rotary detent star wheel is connected to the TYPE CYLINDER SHAFT.

The type cylinder rides on the type cylinder shaft. The type cylinder is biased CW (rt) by the ROTARY SPRING.

When the rotary chain is shorted the type cylinder will turn CCW (rt) and when it is lengthened the rotary spring will furnish power to turn the type cylinder CW (rt).

At the same time #1 cam will cause the type cylinder to operate two units of movement, and the #2 cam will cause the cylinder to operate one unit of movement.

CAM POSITION		ROTARY ROW POSITION
#1	#2	
SPACE	SPACE	4th
SPACE	MARK	3rd
MARK	SPACE	2nd
MARK	MARK	1st

Information Sheet 3-5-8I

LATERAL POSITIONING

INTRODUCTION

The objective of this information sheet is to support the instruction on how the lateral system is positioned. It is intended that the trainee be looking at the components of the lateral system while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The number 3 ("B"), number 4 ("C"), and number 5 ("D") CAM control the lateral positioning. These cams are positioned on the low side for a mark and on the high side for a space. Each cam operates a cam follower and each cam follower operates a pulley carriage. By moving the pulley carriage up or down we can effectively lengthen or shorten the LATERAL CHAIN.

The lateral chain is connected to the LATERAL TRANSFER PULLEY thru the medium of a metal link strap.

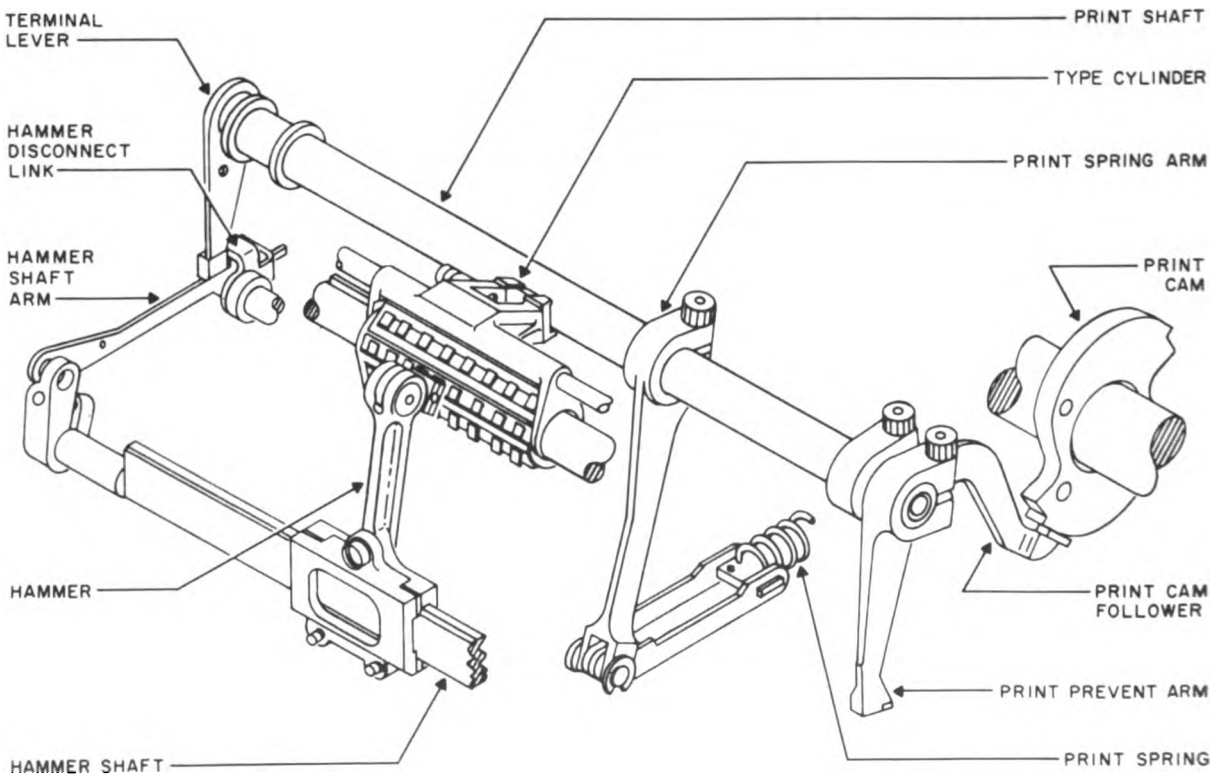
A LATERAL BELT is threaded through the lateral transfer pulley with one end terminated at the ADVANCE DRUM and the other end connected to the TAKEUP DRUM. The mid point of the lateral belt is connected to the CYLINDER YOKE which is fitted over and moves the TYPE CYLINDER. The lateral belt is biased to the left by the takeup arm spring.

When the lateral chain is shorted the type cylinder will be pulled to the right, and when it is lengthened the takeup arm spring will furnish the power to pull the type cylinder to the left.

At this time the:

#3 cam will cause the type cylinder to operate 4 units of movement
#4 cam will cause the type cylinder to operate 2 units of movement
#5 cam will cause the type cylinder to operate 1 unit of movement

CAM POSITION			LATERIAL ROW POSITION
#3	#4	#5	
MARK	MARK	MARK	8
MARK	MARK	SPACE	7
MARK	SPACE	MARK	6
MARK	SPACE	SPACE	5
SPACE	MARK	MARK	4
SPACE	MARK	SPACE	3
SPACE	SPACE	MARK	2
SPACE	SPACE	SPACE	1



FUNCTION SELECTOR, CHARACTER PRINTING LINKAGE

Information Sheet 3-5-91

ENGAGING THE PRINT/FUNCTION CLUTCH AND PRINTING A CHARACTER

INTRODUCTION

The objective of this information sheet is to teach terminology and the operating procedures of the function selector. It is intended that the trainee locate the components on the equipment while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the timing CAM SHAFT nears the end of its rotation (during the 5th intelligence impulse) the PRINT/FUNCTION CLUTCH RELEASE ARM is pulled into the indent of its timing cam on the timing cam shaft. This causes the PRINT/FUNCTION CLUTCH RELEASE FINGER to move away from the clutch stop tab. The print/function clutch is engaged to rotate 180°. The PRINT ("G") CAM rotates with the print/function clutch and the PRINT CAM FOLLOWER rides upon its high part. Then it is pulled to the low part of the cam under the power of the PRINT SPRING.

The print spring is attached to the print spring arm. The print cam follower and the print spring arm are attached to the PRINT SHAFT, which transmits its motion to the TERMINAL LEVER. As the bottom of the terminal lever moves to the rear it engages the HAMMER SHAFT ARM and takes it to the rear.

The hammer shaft arm is attached to the HAMMER SHAFT and rotates it CW (rt). The HAMMER rides on the hammer shaft and is driven toward the type cylinder. The HAMMER DISCONNECT LINK is moved with the terminal lever, forcing the hammer shaft arm away from the terminal lever before hammer impact. The inertia of the hammer completes the printing stroke.

The HAMMER SHAFT SPRING furnishes the power to return the hammer shaft and hammer to their normal stop position, and to return the hammer shaft arm to the front of the machine. The HAMMER SHAFT ARM SPRING furnishes the power to rotate the hammer shaft arm and disconnect link CW (lt) to their normal stop position.

The print cam furnishes power to return the remaining printing linkage to its normal stop position. At the same time the print cam follower starts to ride upon the high surface of its cam.

Assignment Sheet 3-5-2A

SELF TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided. You may refer to the technical manual, guide, and notes to answer these questions. Your work will be reviewed by the instructor.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

QUESTIONS

1. What furnishes the power to move the intelligence clutch release fingers back into the path of the clutch stop tabs?

2. What furnishes the power to rotate the type cylinder CW (rt)?

3. If "F" cam follower is on the high side of its cam and "E" cam follower is on the low side of its cam, which rotary row would be positioned for the print hammer?

4. In lateral positioning, what furnishes the power to move the type cylinder to the right?

5. What code combination would be required to type in the 2nd rotary row and the 4th lateral row of the type cylinder?

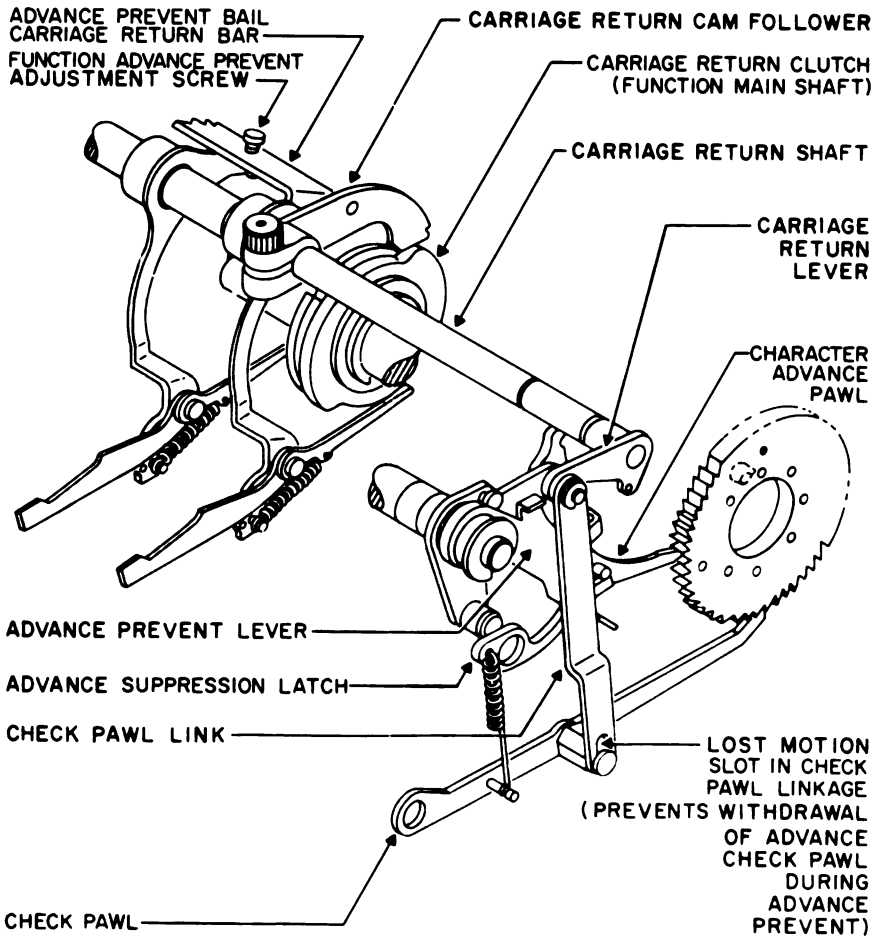
6. What code combination would be required to type in the 1st rotary row and the 1st lateral row of the type cylinder?

7. In relation to the intelligence clutches when is the print/function clutch engaged?

8. What furnishes the power to print a character?

9. What part moves the hammer shaft arm to the rear?

10. What part of the print cam does the print cam follower rest upon in its normal stop position?



FUNCTION SELECTOR, CHARACTER ADVANCE PREVENT LINKAGE

Information Sheet 3-5-10I

CHARACTER ADVANCE

INTRODUCTION

The objective of this information sheet is to teach the operation of the character advance. Refer to the equipment while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the print/function clutch is released the function cam follower rides upon the high part of its cam and rotates the function shaft CW (rt). The function shaft terminal lever is part of the function shaft and will rotate CW (rt). The ADVANCE FEED PAWL is connected to the rear extension of the function shaft terminal lever and will move down and engage a tooth on the ADVANCE DRUM RATCHET and cause the advance drum to advance one space CCW (rt). The advance drum will pull the PRINT HAMMER and TYPE CYLINDER one space to the right through the medium of the hammer cable and lateral belt.

When the FUNCTION CAM FOLLOWER drops to the low part of its cam under power of the function spring the FUNCTION SHAFT and FUNCTION SHAFT TERMINAL LEVER will rotate CCW (rt) pulling the advance feed pawl up allowing it to overtravel one tooth on the advance drum ratchet that will be held in place by the CHECK PAWL.

Information Sheet 3-5-11I

END OF LINE BELL

INTRODUCTION

The objective of this information sheet is teach the operation sequence necessary to ring the end of line bell.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the PRINT HAMMER has advanced to a predetermined character it will come into contact with and rotate the END OF LINE BELL LEVER CW (top). This moves the END OF LINE BELL CONNECTION ROD and END OF LINE BELL CLAPPER to the left. When the print hammer has cleared the end of line bell lever it is released and its spring will return the end of line bell lever and end of line bell connecting rod to their normal stop position. Then the END OF LINE BELL CLAPPER SPRING will return the clapper to the right and the clapper will strike the bell and the end of the line bell will ring.

Information Sheet 3-5-12I

OPERATION OF THE ROTARY DETENT

INTRODUCTION

The objective of this information sheet is to teach the operation of the rotary detent. Refer to the equipment while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

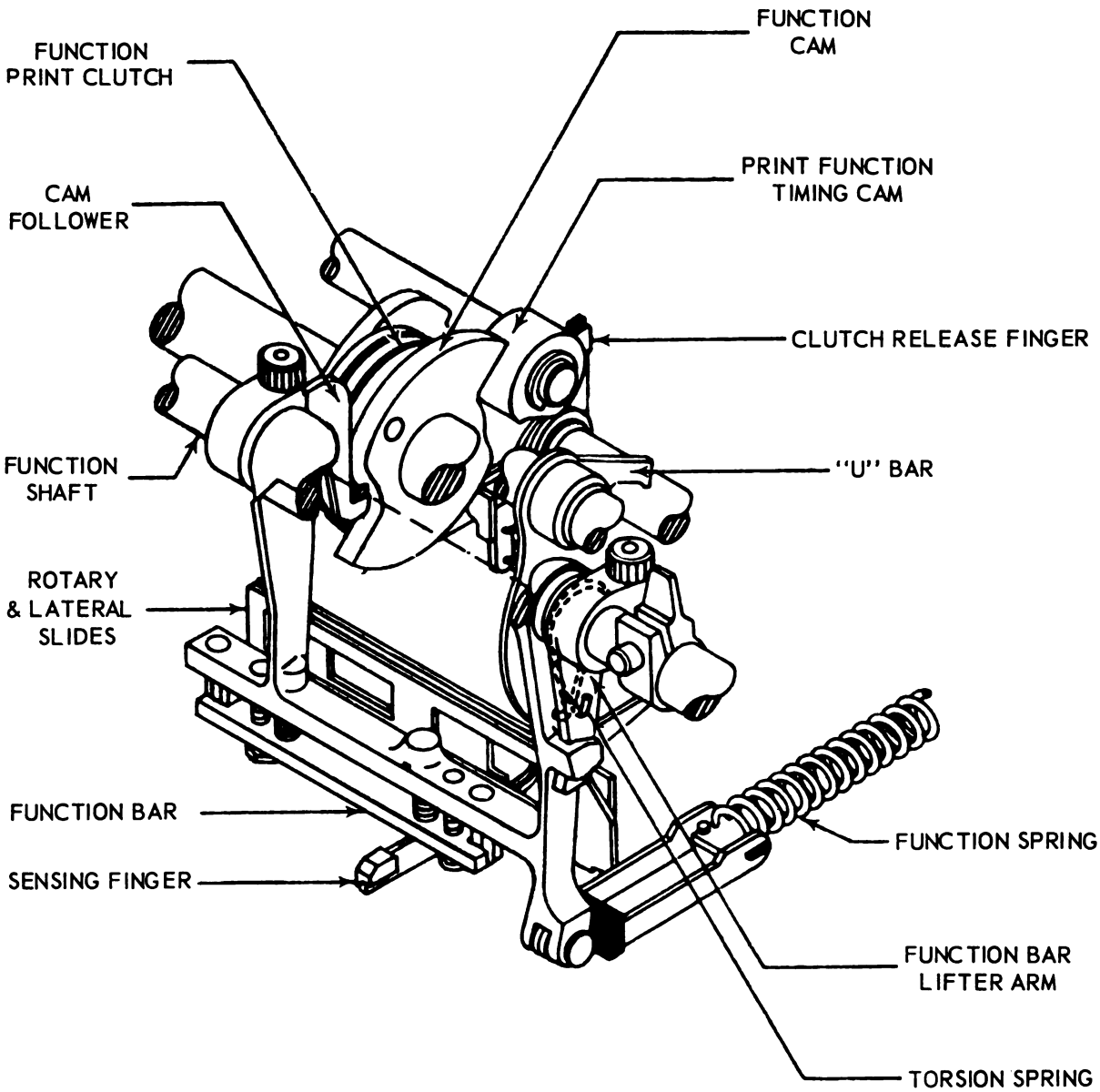
NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the PRINT/FUNCTION CLUTCH is released the FUNCTION CAM FOLLOWER rides upon the high part of its cam giving a CW (rt) rotation to the FUNCTION SHAFT and the FUNCTION SHAFT TERMINAL LEVER.

The DETENT ACTUATOR LINK is connected to the lower extension of the function shaft terminal lever and will move down. The detent actuator link moves the DETENT ACTUATOR CCW (rt), and into contact with the adjusting screw on the DETENT ARM. The detent arm will move CCW (rt) against the tension of its spring. The DETENT PIN will move out of engagement with the ROTARY DETENT STAR WHEEL. Rotary positioning can now be accomplished.

When the FUNCTION CAM FOLLOWER drops to the low part of its cam the FUNCTION SHAFT and FUNCTION SHAFT TERMINAL LEVER will rotate CCW (rt). The DETENT ACTUATOR LINK will move up and rotate the DETENT ACTUATOR CW (rt) away from the adjusting screw on the DETENT ARM. The detent arm spring will pull the detent arm up and the DETENT PIN into engagement with the ROTARY DETENT STAR WHEEL locking it in place prior to printing.



THE FUNCTION SELECTOR

Information Sheet 3-5-13I

FUNCTION SELECTOR

INTRODUCTION

The objective of this information sheet is to teach terminology and the operating procedure of the function selector. Refer to the figure on the preceding page and the equipment while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

Connected to the metal strips in rotary and lateral positioning and moving with them are the ROTARY FUNCTION SLIDE and the LATERAL FUNCTION SLIDE. Slots are cut in these slides and so arranged that when a particular code combination is selected the appropriate FUNCTION SENSING FINGER, which is spring biased toward the slides, will enter the aligned slots.

The function sensing fingers in the function selector are designated from left to right as follows:

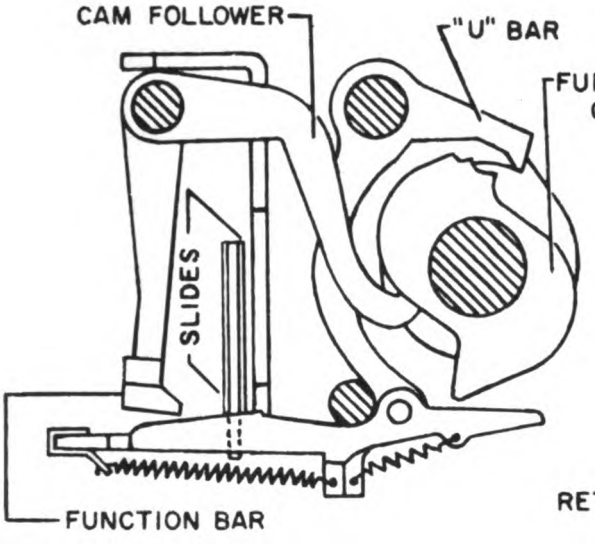
BLANK
SPACE
AUTOMATIC LINE FEED
LINE FEED
FIGURES
BELL
LETTERS
OFF LINE LETTERS
CARRIAGE RETURN
AUTOMATIC CARRIAGE RETURN

The FUNCTION ("H") CAM is part of the print/function clutch assembly and will rotate when the clutch is engaged.

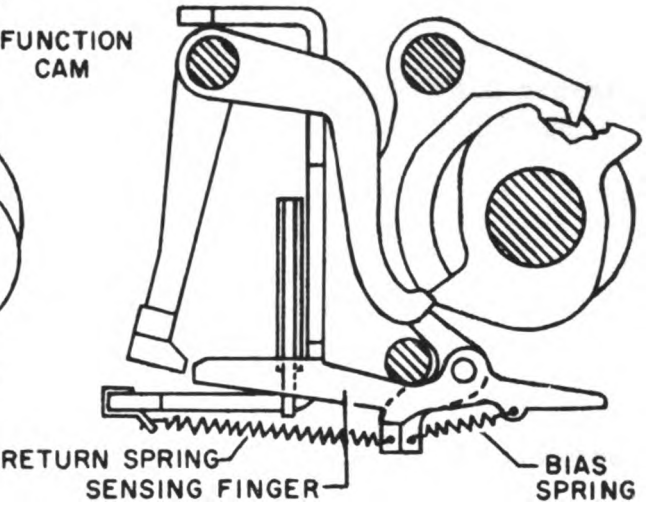
The FUNCTION CAM FOLLOWER rides to the high part of its cam then drops into the low part under power of the FUNCTION SPRING, which is attached to the bottom of the FUNCTION BAR. The function bar is fitted around but not attached to the FUNCTION SHAFT.

The function cam follower and the FUNCTION BAR LIFTER ARM are clamped to the function shaft. When the function spring collapses the bottom of the function bar will go to the rear. A notch on the function bar will engage the function bar lifter arm and move it. This will turn the function shaft CCW (rt). The function bar lifter will move the function bar to the front of the machine when the cam follower rides upon the high part of its cam.

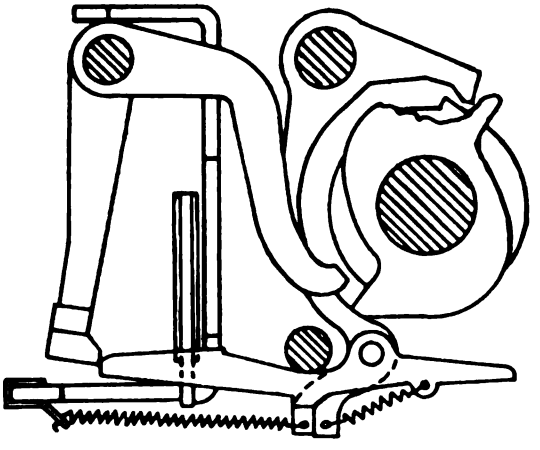
The camming and spring action will give a forward and backward motion to the function bar each time the print/function clutch is engaged.



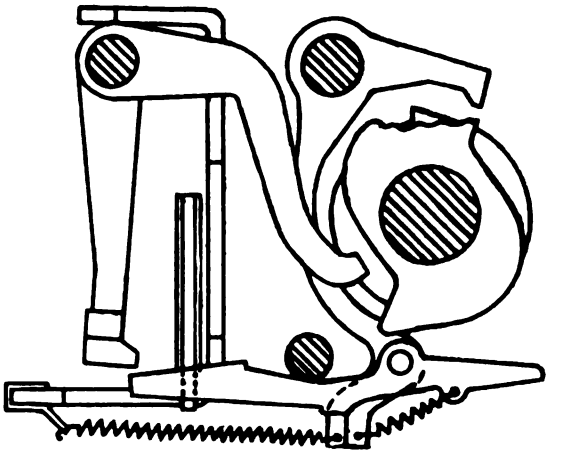
FUNCTION BAR HOLD OUT FINGERS WITH FUNCTION CAM AT REST



FUNCTION FINGERS FREE TO ENTER SLIDES WITH FUNCTION CAM FOLLOWER AT HIGH POINT

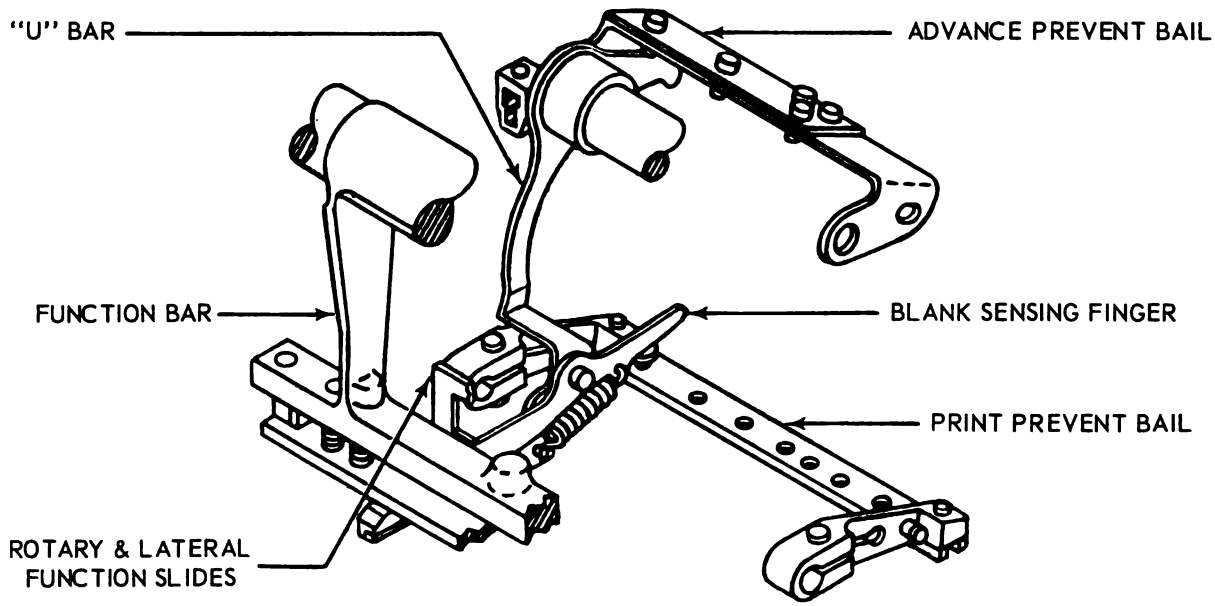


FUNCTION FINGER SELECTED BEING DRIVEN DOWN BY FUNCTION BAR AS CAM FOLLOWER DROPS ("U" BAR HAS RELEASED CLUTCH)



FUNCTION FINGER HAS BEEN CAMMED OUT FROM UNDER BAR AND IS RETURNING TO SENSING POSITION

"FUNCTION CAM FOLLOWER, FUNCTION BAR AND FUNCTION FINGER INTERACTION"



BLANK LINKAGE

Information Sheet 3-5-14I

BLANK FUNCTION LINKAGE

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the blank linkage. Refer to the equipment and the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

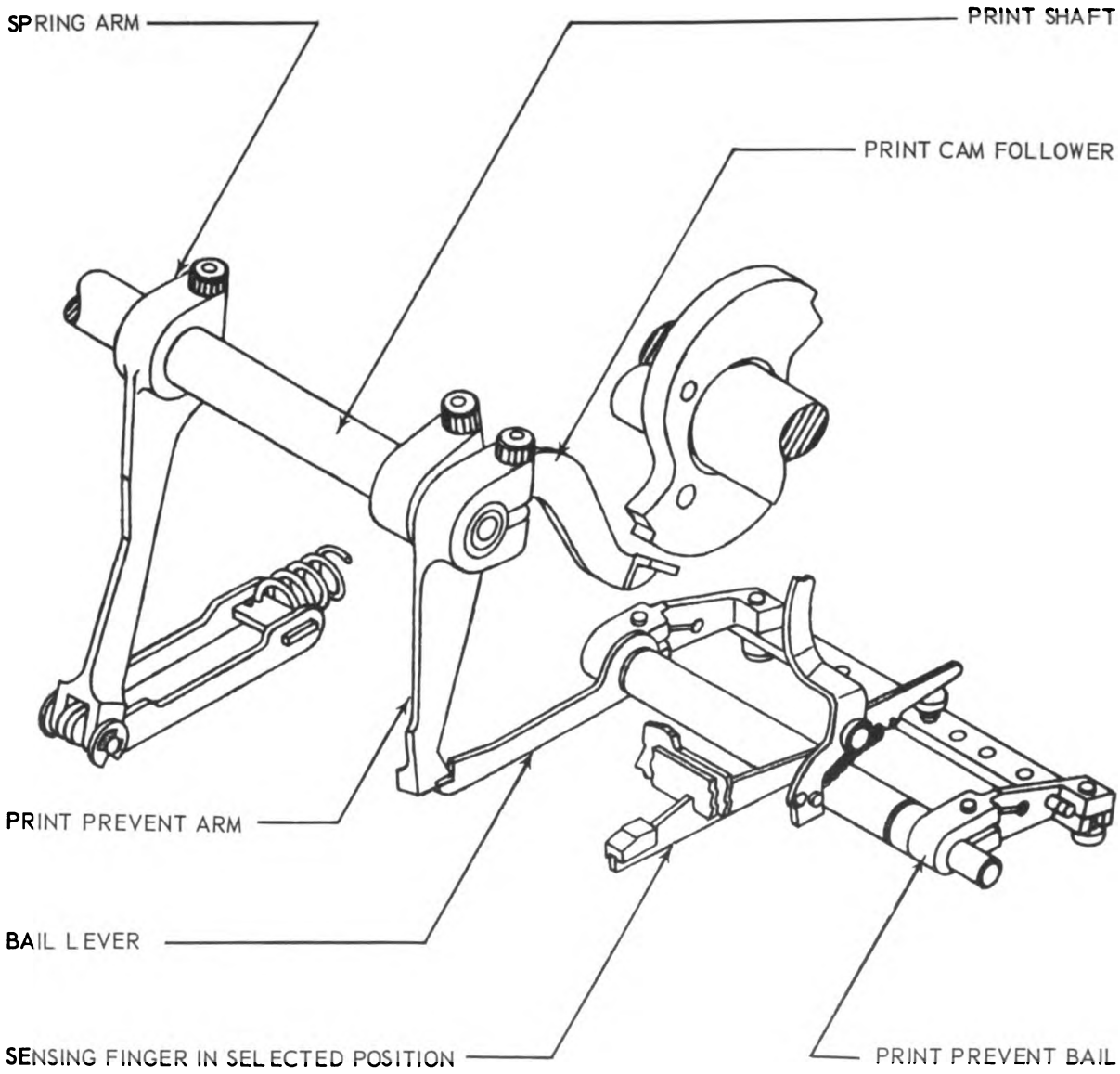
NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When blank function is selected the BLANK SENSING FINGER is pulled into the aligned slots of the LATERAL and ROTARY SLIDES under the power of its bias spring. The rear part of the blank function sensing finger strikes the PRINT PREVENT BAIL and moves it down against the tension of the print prevent bail spring. The front of the blank function sensing finger is raised up into the path of the FUNCTION BAR (which has been positioned to the front of the printer under power of the function cam). The function bar now starts to the rear under power of the function spring and strikes the blank function sensing finger and takes it to the rear. Attached to and moving with the sensing finger is the BLANK U BAR which pivots CCW (rt) against the tension of the blank bar return spring. The upper part of the blank U bar strikes the ADVANCE PREVENT BAIL moving it up against tension of the advance prevent bail spring. As the rearward motion continues, a camming surface on the blank function sensing finger strikes the shaft of the print prevent bail moving the blank function sensing finger down out of the rotary and lateral slides and out of engagement with the function bar.

The BLANK U BAR RETURN SPRING will then collapse and return the blank U bar and blank function sensing finger to their normal stop position.

The print prevent and advance prevent trains of parts will operate on blank function.



PRINT PREVENTION

Information Sheet 3-5-15I

PRINT PREVENTION

INTRODUCTION

The objective of this information sheet is to teach the operation of the print prevention function. Refer to the equipment and figure on the previous page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When a function sensing finger is operated, the sensing finger bias spring overcomes the print prevent bail spring and the rear of the SENSING FINGER will push the print prevent bail down.

Attached to the print prevent bail is the PRINT PREVENT BAIL LEVER which will be pivoted CW (rt) with the front part moving under the PRINT PREVENT ARM when the print cam follower is on the high part of its cam.

The print prevent arm and the print cam follower are both clamped to the PRINT SHAFT. When the cam follower drops into the step in the cam the print prevent bail lever will lock the print prevent arm. This locking action will not allow the PRINT CAM FOLLOWER to drop to the low part of its cam thus no printing action will occur during this operation.

When the sensing finger is stripped the rear will move up away from the PRINT PREVENT BAIL. As the cam follower rides to the high part of the cam during the next character cycle, the print prevent arm moves out of engagement with the print prevent bail lever allowing the print prevent bail spring to collapse and furnish power to return the print prevent bail and print prevent bail lever to their normal stop position.

Assignment Sheet 3-5-3A

SELF TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided. Refer to the technical manual and notes as necessary. Your work will be reviewed by the instructor.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

QUESTIONS

1. In relation to printing when does character advance occur?

2. What furnishes the power to move the advance feed pawl up?

3. What furnishes the power to ring the end-of-line bell?

4. What is the purpose of the rotary detent?

5. What furnishes the power to move the detent arm CCW (rt)?

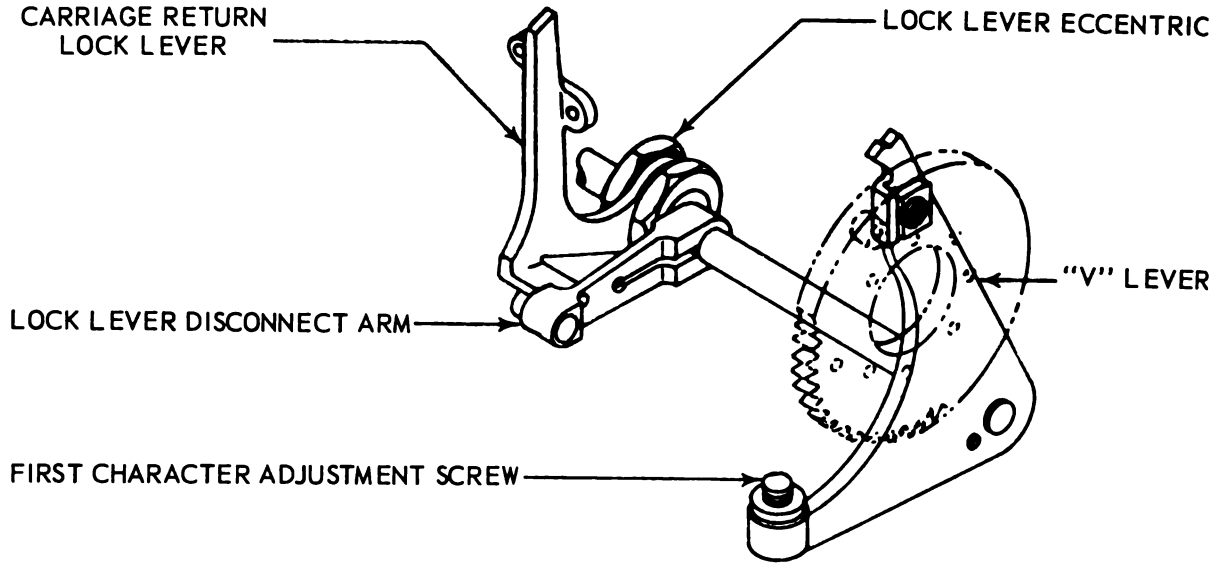
6. What part moves the detent actuator CW (rt)?

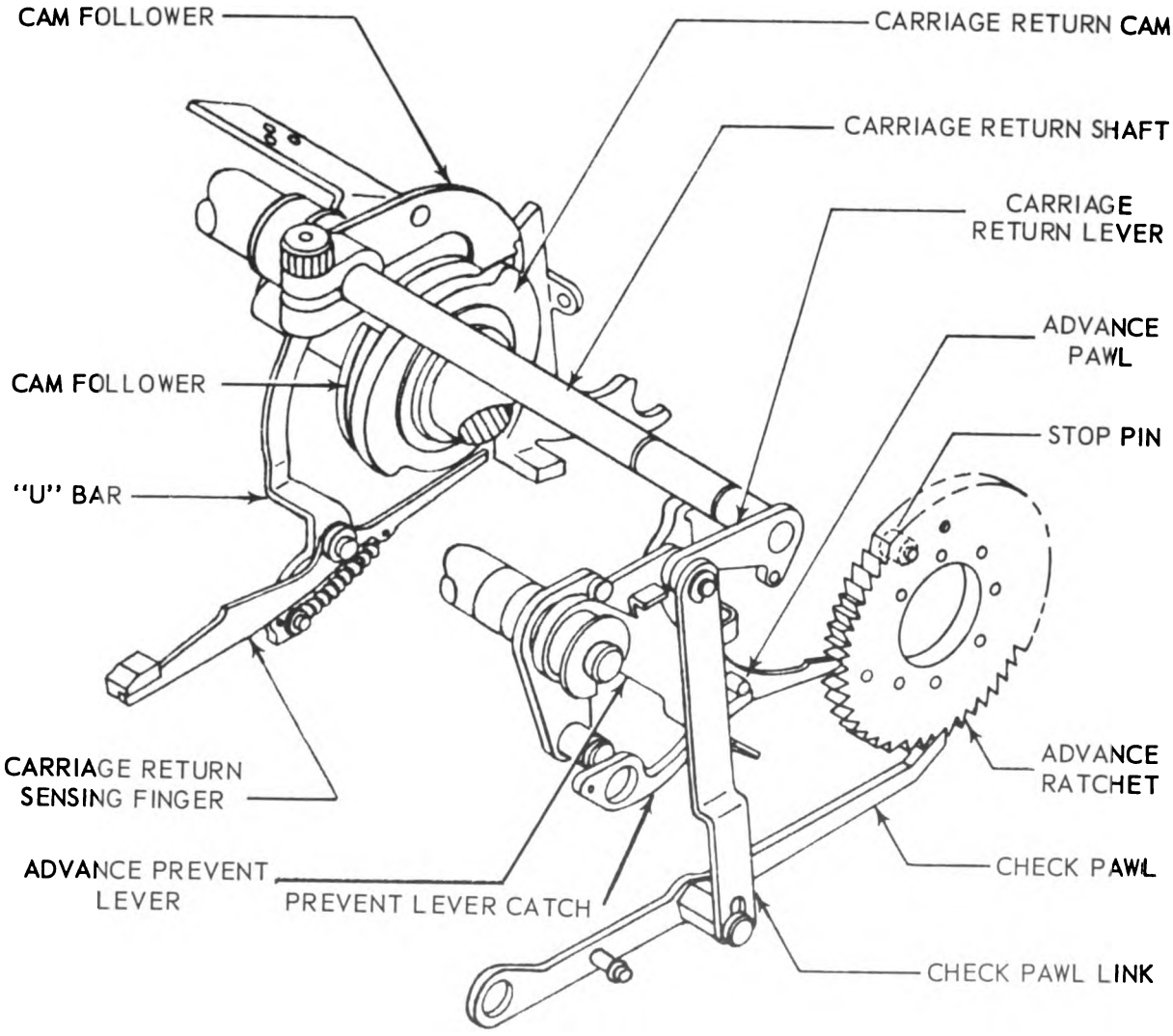
7. What part moves the function bar lifter arm CCW (rt)?

8. What furnishes the power to move the rear of the print prevent bail down?

9. In relation to the function cam and its follower, when does the print prevent bail lever engage the print prevent arm?

10. In relation to the print cam and its follower, when is the print prevent bail returned to its normal stop position?





CARRIAGE RETURN LINKAGE

Information Sheet 3-5-16I

ADVANCE PREVENTION

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the advance prevent component of the teletypewriter. Refer to the equipment and the figures on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-299A/UG

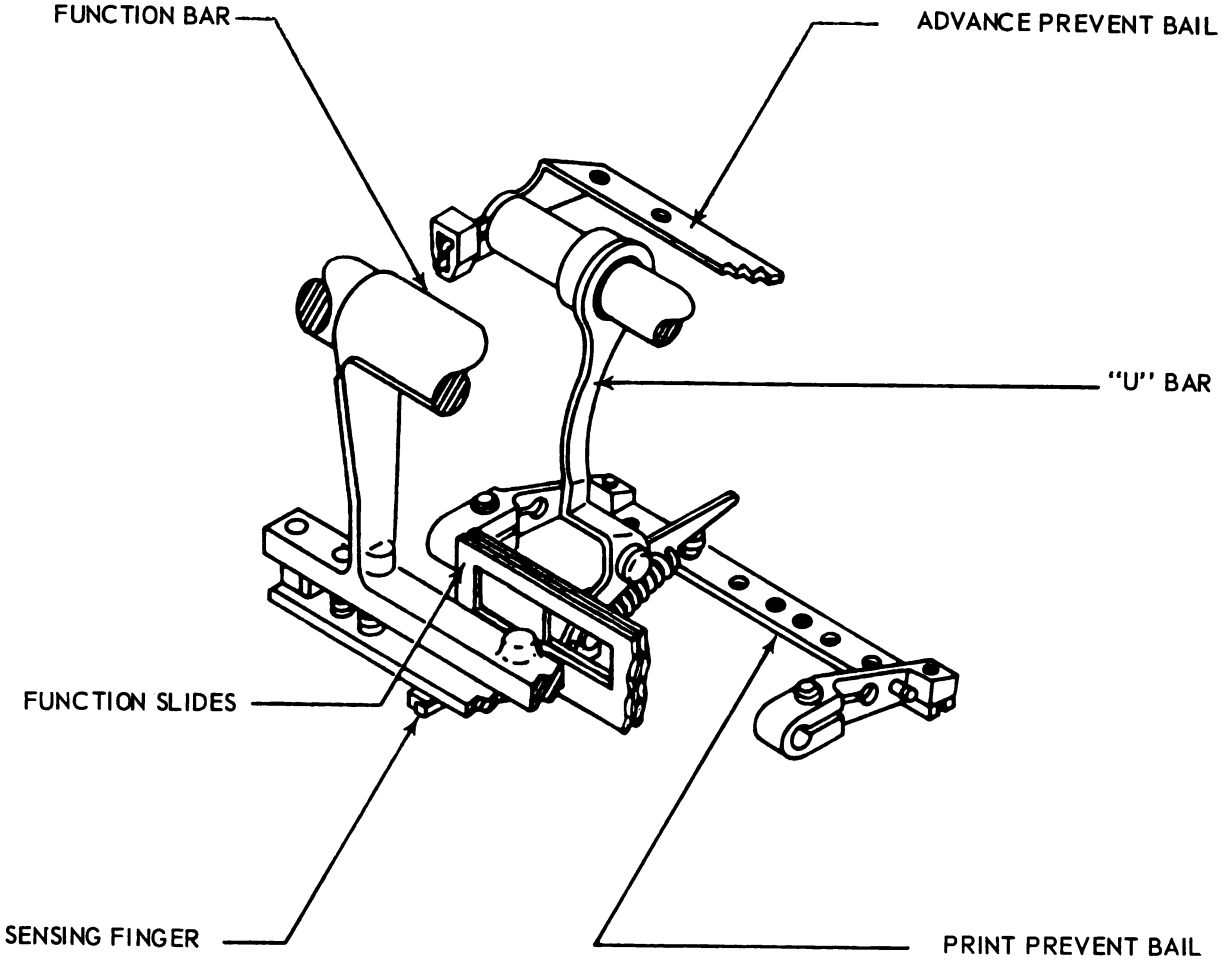
NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the U BAR moves the ADVANCE PREVENT BAIL up, the CARRIAGE RETURN CAM FOLLOWER (which is attached to the advance prevent bail) goes up about one-half the upward travel induced by the carriage return cam. This motion is transmitted through the CARRIAGE RETURN SHAFT to the CARRIAGE RETURN LEVER which will rotate CCW (rt) and move the ADVANCE PREVENT LEVER CW (rt). The advance prevent lever will move the ADVANCE FEED PAWL CW (rt) and out of engagement with the ADVANCE RATCHET. The ADVANCE PREVENT CATCH will latch the advance prevent lever. This action will cause the advance feed pawl to remain out of engagement with the advance ratchet during this character cycle.

During the next normal character advance cycle the advance feed pawl will move down and strip the advance prevent catch away from the advance prevent lever which will allow the advance feed pawl to again engage the advance ratchet.

The lost motion linkage (elongated slot) in the check pawl link permits the check pawl to remain engaged with the advance ratchet during advance prevent thus holding it and not allowing it to be turned CW (rt).



SPACE LINKAGE

Information Sheet 3-5-17I

SPACE FUNCTION LINKAGE

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the space function linkage. Refer to the equipment and figure on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG and Teletypewriter TT-298A/UG

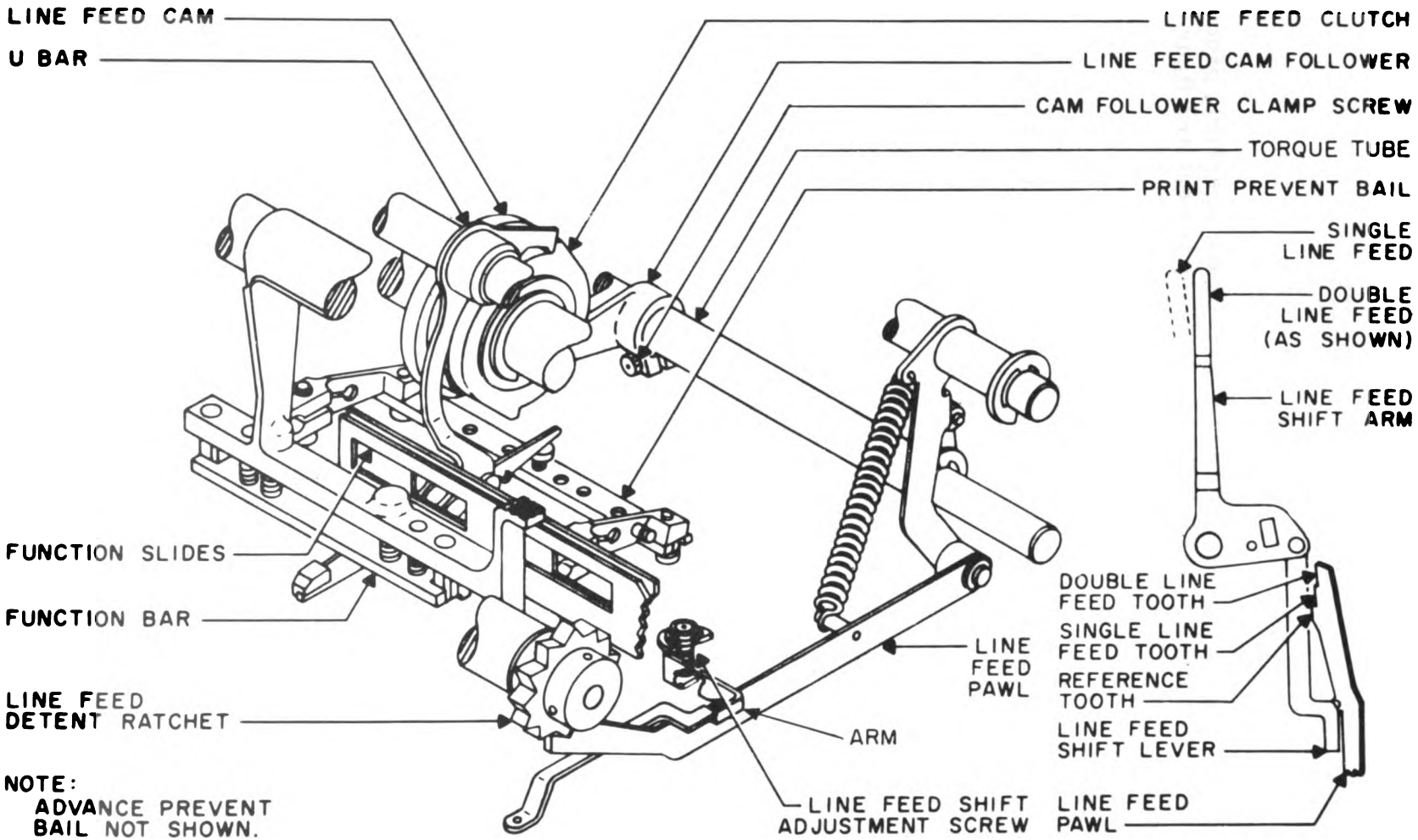
NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When space function is selected the SPACE FUNCTION SENSING FINGER, lateral and rotary slides, print prevent bail function bar and space U BAR operate the same as in blank function linkage except that the space U BAR does not have an upper part to operate the advance prevent bail.

The reset action is the same as blank function linkage.

No printing will occur on space, but the hammer and type cylinder will advance one space for each operation of the function linkage.



LINE FEED FUNCTION LINKAGE

Information Sheet 3-5-18I

LINE FEED FUNCTION LINKAGE

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the line feed function linkage. Refer to the equipment and the figure on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the line feed function is selected the line feed function sensing finger, lateral and rotary slides, print prevent bail, function bar, and line feed U bar operate the same as in blank function linkage except that in addition to the upper part of the line feed U bar pivoting up and striking the advance prevent bail it becomes a clutch release finger and releases the line feed clutch which rotates 180°.

Affixed to the line feed clutch is the line feed ("I") cam on which rides the line feed cam follower. The line feed cam follower transfers its motion to the TORQUE SHAFT which is fitted around the space selector shaft. This motion is then transferred to the ACTUATOR and its ROLLER which engages and moves the AMPLIFIER.

The amplifer pivots around the mark selector shaft. Its lower end attaches to and extends a backward and forward motion to the line feed pawl. This pawl moves the PAPER FEED ROLLER that feeds the paper.

The line feed cam follower, torque shaft, actuator, amplifier, and the line feed pawl are returned to their normal stop position by the LINE FEED PAWL SPRING.

The print prevent and advance prevent trains of parts will operate one feed function.

Information Sheet 3-5-19I

SINGLE/DOUBLE LINE FEED

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the single/double line feed. Refer to the equipment while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

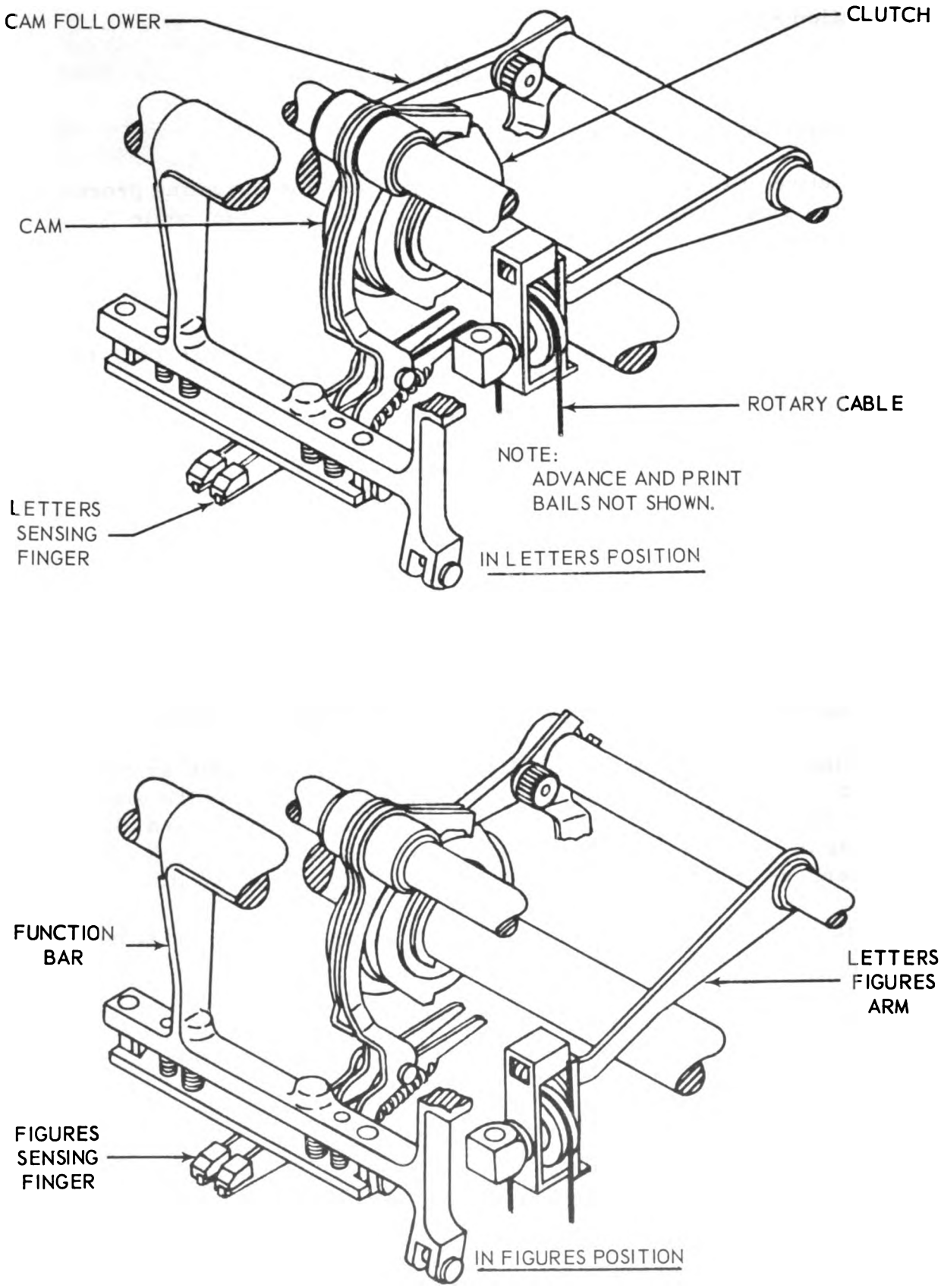
INFORMATION

A single line feed is accomplished by moving the line feed shift arm to the left. This moves the LINE FEED SHIFT LEVER to the front of the machine. The line feed shift lever moves the LINE FEED PAWL away from the LINE FEED RATCHET WHEEL so that only the second notch on the line feed pawl will engage and move the ratchet one tooth.

Double line feed is accomplished by moving the line feed shift arm to the right. This takes the line feed shift lever to the rear of the machine. The line feed shift lever moves away from the line feed pawl and allows its spring to pull it up. This causes the first notch on the line feed pawl to engage the LINE FEED RATCHET WHEEL and move it two teeth.

The third notch on the line feed pawl is the reference notch and it is used for adjustment purposes.

The line feed detent wheel is held in position by its detent.



LETTERS- FIGURES LINKAGE

Information Sheet 3-5-20I

LETTERS/FIGURES FUNCTION LINKAGE

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the letters/figures function linkage. Refer to the equipment and the figures on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When letters or figures/function is selected the letters/figures function sensing finger, lateral and rotary slides, print prevent bail, function bar and letters or figures U bar operate the same as in the blank function linkage except that in addition to the upper part of the U bar striking the ADVANCE PREVENT BAIL it becomes a clutch release and will release the LETTERS/FIGURES CLUTCH to rotate 180°.

The letters U bar holds the clutch in the figures position and the figures U bar holds the clutch in the letters position, thus when letters are selected the clutch will engage only if resting in figures position. The opposite is true for figures.

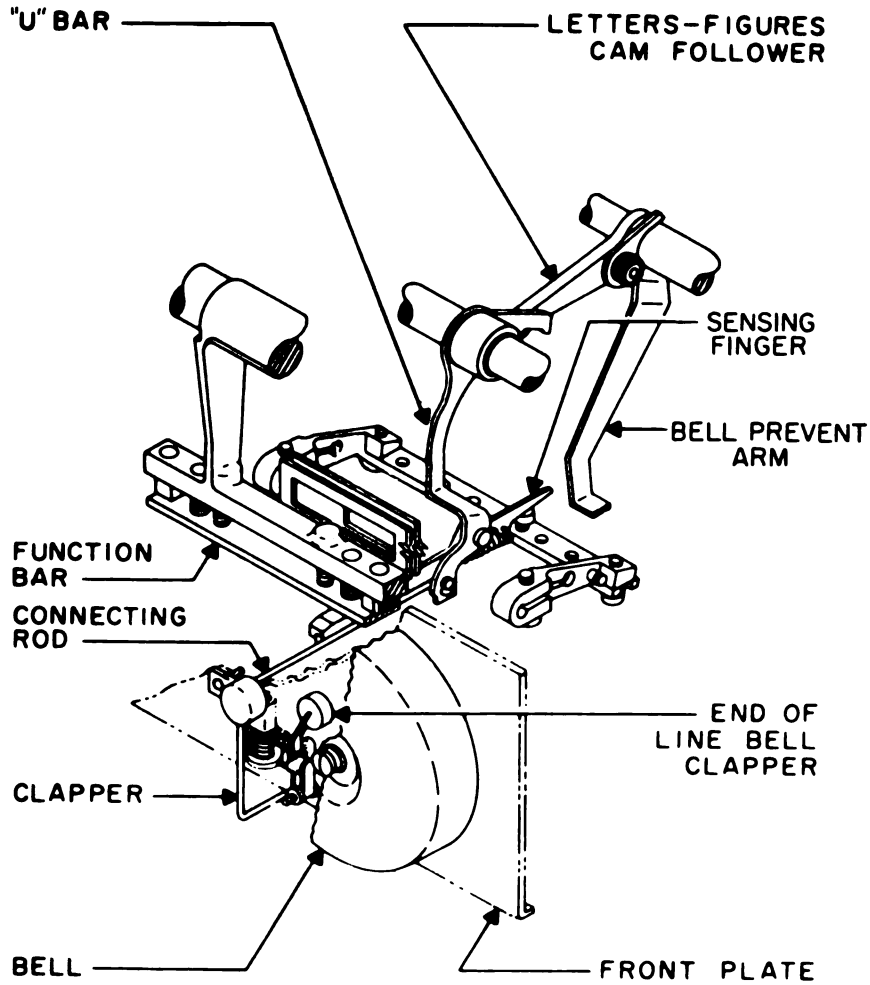
Affixed to the letters/figures clutch is the LETTERS/FIGURES ("J") CAM which positions its high side for letters and its low side for figures to the letters/figures cam follower. This transmits the motion thru the torque shaft (fitted around the mark selector shaft) to the letters/figures arm.

The letters/figures arm is fitted into a slot in the LETTERS/FIGURES PULLEY CARRIAGE ASSEMBLY which will be positioned up for letters and down for figures. This effectively shortens or lengthens the rotary cable.

The "J" cam furnishes power to rotate the STAR WHEEL, TYPE CYLINDER SHAFT and TYPE CYLINDER 180° to the letters side.

The rotary spring furnishes power to rotate the above back to the figures position.

The print prevent and advance trains of parts will operate on letters/figures function.



BELL FUNCTION LINKAGE

Information Sheet 3-5-21I

BELL FUNCTION LINKAGE

INTRODUCTION

The objective of this information sheet is to teach the operating procedure of the bell function linkage. Refer to the equipment and the figure on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the bell function is selected (figures position "s") the BELL FUNCTION SENSING FINGER, LATERAL and ROTARY SLIDES, PRINT PREVENT BAIL, FUNCTION BAR and BELL U BAR operate the same as in blank function linkage. The exception being, in addition to the top of the bell U bar striking the advance prevent bail the bottom of the U bar is connected to and moves the bell connecting rod to the rear against the tension of the bell U bar return spring.

The bell connecting rod is connected to the bell lever and moves it CW (top).

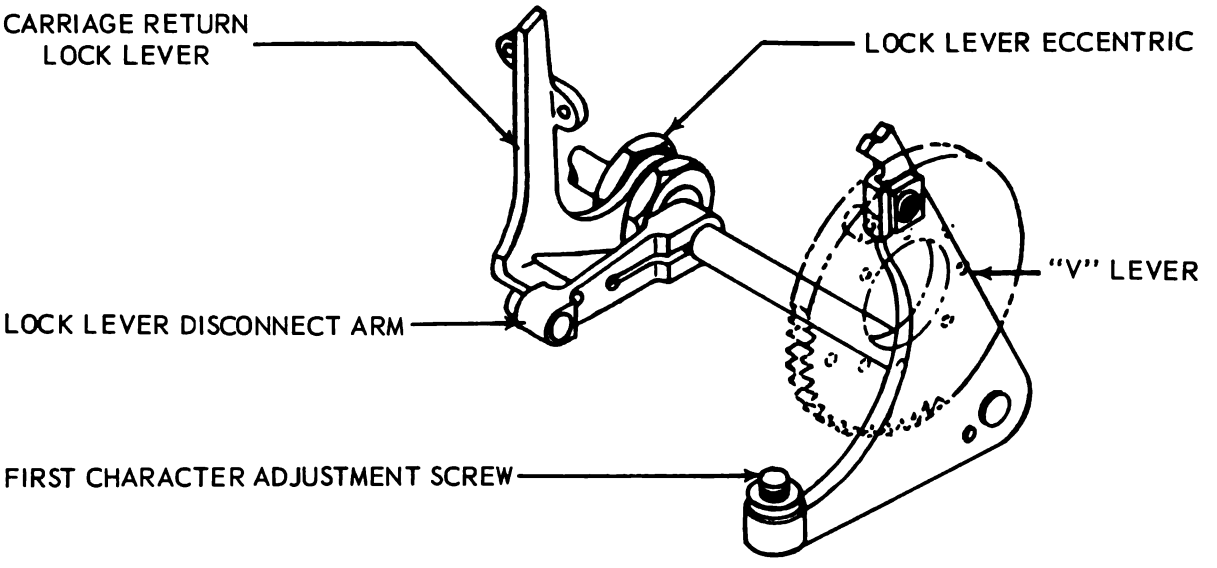
The CLAPPER is connected to the bell lever and moves away from the bel

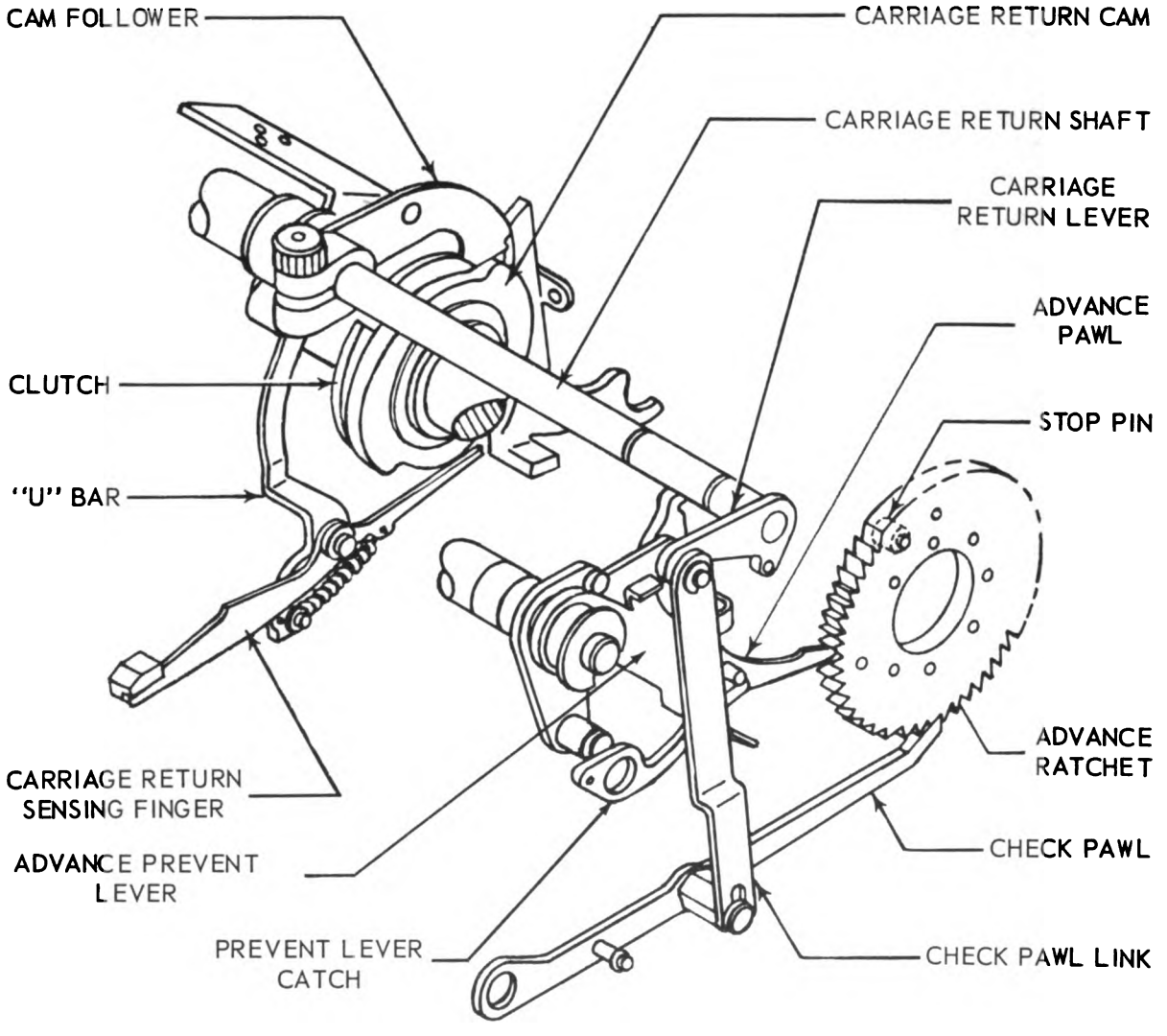
When the bell function sensing finger is camed out of engagement with the function bar, the bell U bar return spring furnishes power to return the bell function sensing finger, bell U bar, bell connecting rod, bell lever and clapper to their normal stop position. As a result of overtravel the clapper strikes and rings the bell.

The BELL PREVENT ARM is connected to the letters/figures cam follower and is positioned under the bell sensing finger in letters position and it prevents the sensing finger from entering the notches in the lateral and rotary slides.

The bell can be adjusted by rotating it around its eccentric mounting.

The print prevent and advance prevent train of parts will operate on bell function.





CARRIAGE RETURN LINKAGE

Information Sheet 3-5-22I

CARRIAGE RETURN FUNCTION LINKAGE

INTRODUCTION

The objective of this information sheet is to teach the operating procedures of the carriage return function linkage. Refer to the equipment and the figure on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

When the carriage return function is selected the carriage return function sensing finger, lateral and rotary slides, print prevent bail, function bar, and carriage return U bar operate the same as in blank function. The exception being that the top of the carriage return U bar does not operate the advance prevent bail but serves as a clutch release finger and releases the carriage return clutch to rotate 180°. Affixed to the carriage return clutch is the carriage return ("K") cam on which rides the carriage return cam follower. This follower is raised up as it rides on the high part of its cam. This motion will be transferred to the carriage return shaft which will rotate CCW (rt).

Attached to the right end of the carriage return shaft is the carriage return lever which rotates CCW (rt) and moves the check pawl down. The advance prevent lever will rotate CW (rt) and move the advance feed pawl out of engagement with the advance ratchet.

The check pawl link moves the check pawl out of engagement with the advance ratchet allowing the take up drum spring to furnish power to return the type cylinder and hammer to the left thru the medium of the hammer cable and lateral belt.

To ensure a complete carriage return the carriage return lock lever is pulled under the carriage return cam follower by its spring. The carriage return lock lever will hold the carriage return linkage in its operate position until the STOP PIN on the ADVANCE RATCHET strikes the V LEVER. This lever is rotated and it in turn rotates the V lever shaft CW (rt). This in turn rotates the LOCK LEVER DISCONNECT ARM CW (rt).

The lock lever disconnect arm moves the carriage return lock lever out from under the carriage return cam follower.

The advance prevent bail spring will furnish power to return the carriage return linkage to its normal stop position.

To ease the hammer and type cylinder to a stop and to prevent bouncing the stop pin on the advance ratchet. The advance ratchet comes into contact with the bounce prevent lever and raises it up against the tension of its spring. This spring slows the hammer and type cylinder motion near the end of the pawl. The bounce prevent lever then rides over the stop pin and drops in front of it preventing bounce.

The print prevent advance prevent trains of parts will operate on carriage return function.

Assignment Sheet 3-5-4A

SELF TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided. Refer to the technical manual and your notes as necessary. Your work will be reviewed by the instructor.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

QUESTIONS

1. What furnishes the power to move the advance prevent bail up?

2. In advance prevent, what furnishes the power to move the advance feed pawl CW (rt)?

3. What furnishes the power to move the advance prevent catch CW (rt)?

4. What furnishes the power to move the advance prevent bail down?

5. What part moves the actuator CCW (rt)?

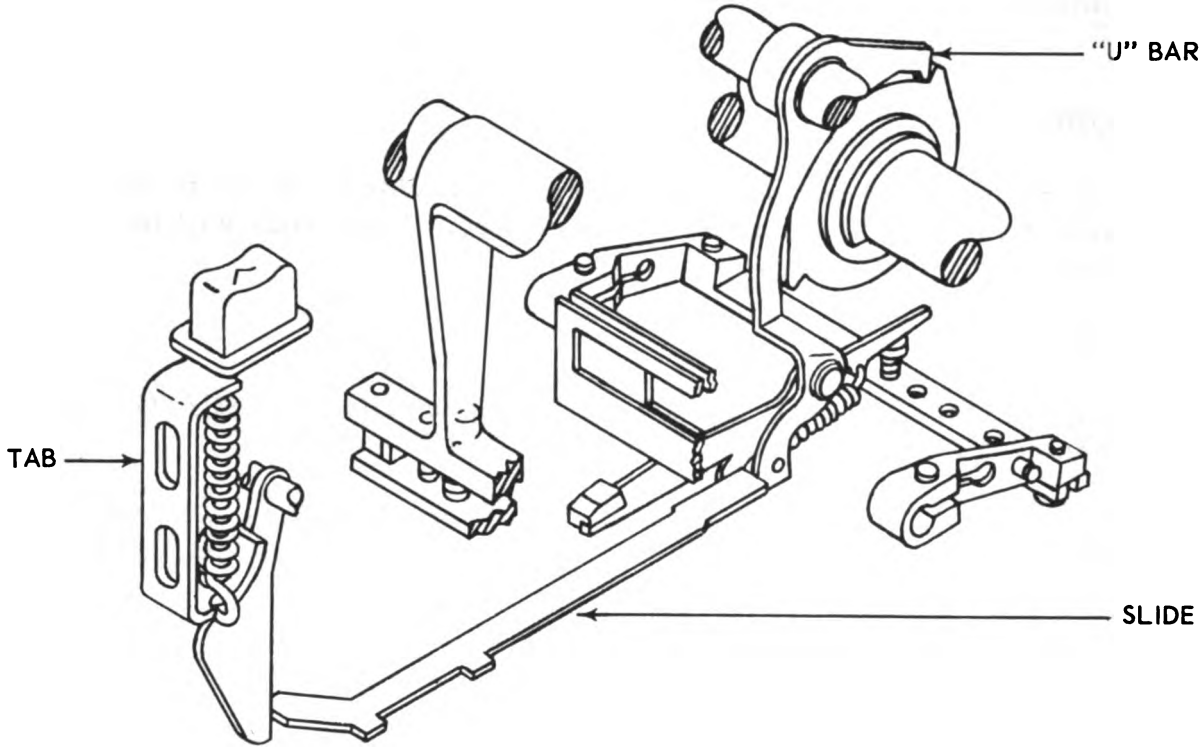
6. What furnishes the power to move the detent pin into engagement with the rotary detent star wheel?

7. What furnishes the power to rotate the advance ratchet CW (rt)? CCW (rt)?

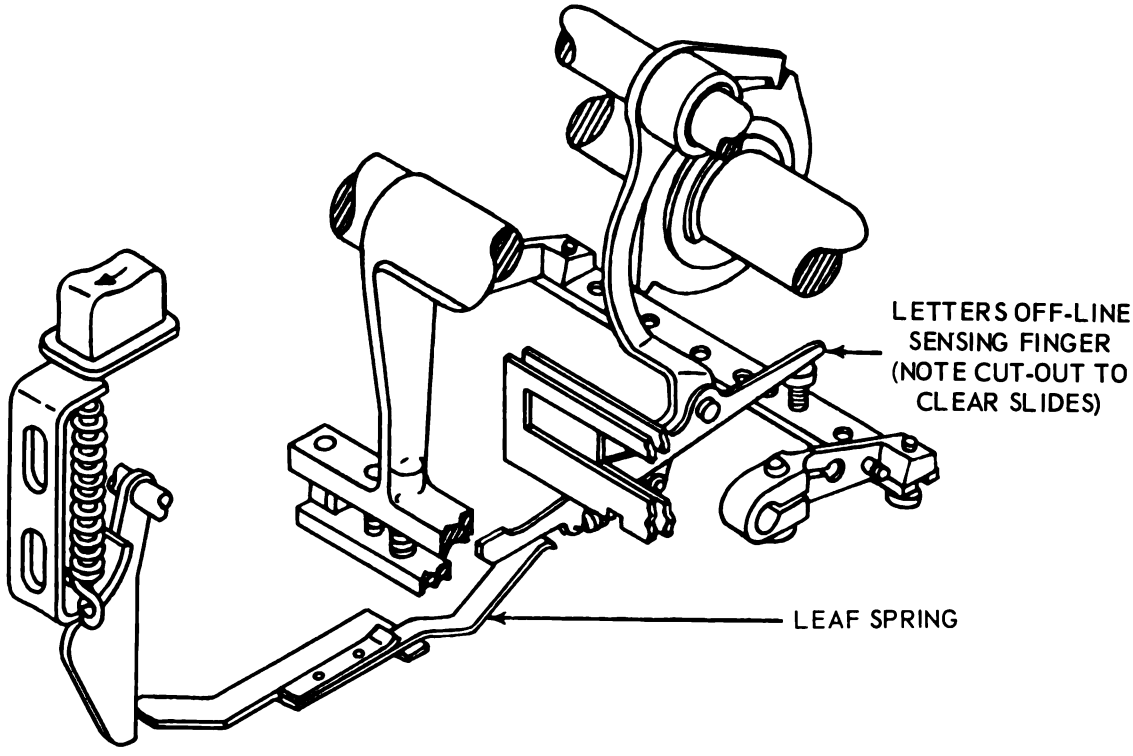
8. What part prevents the bell from ringing in the letters position?

9. What part moves the line feed pawl down when shifting from double to single line feed?

10. What furnishes the power to rotate the V lever shaft CW (rt)?



TYPICAL OFF-LINE
FUNCTION INTRODUCTION



LETTERS OFF-LINE
FUNCTION INTRODUCTION

Information Sheet 3-5-23I

OPERATION OF THE OFF LINE FUNCTIONS

INTRODUCTION

The objective of this information sheet is to teach the operation of the off line functions. Refer to the equipment and the figures on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

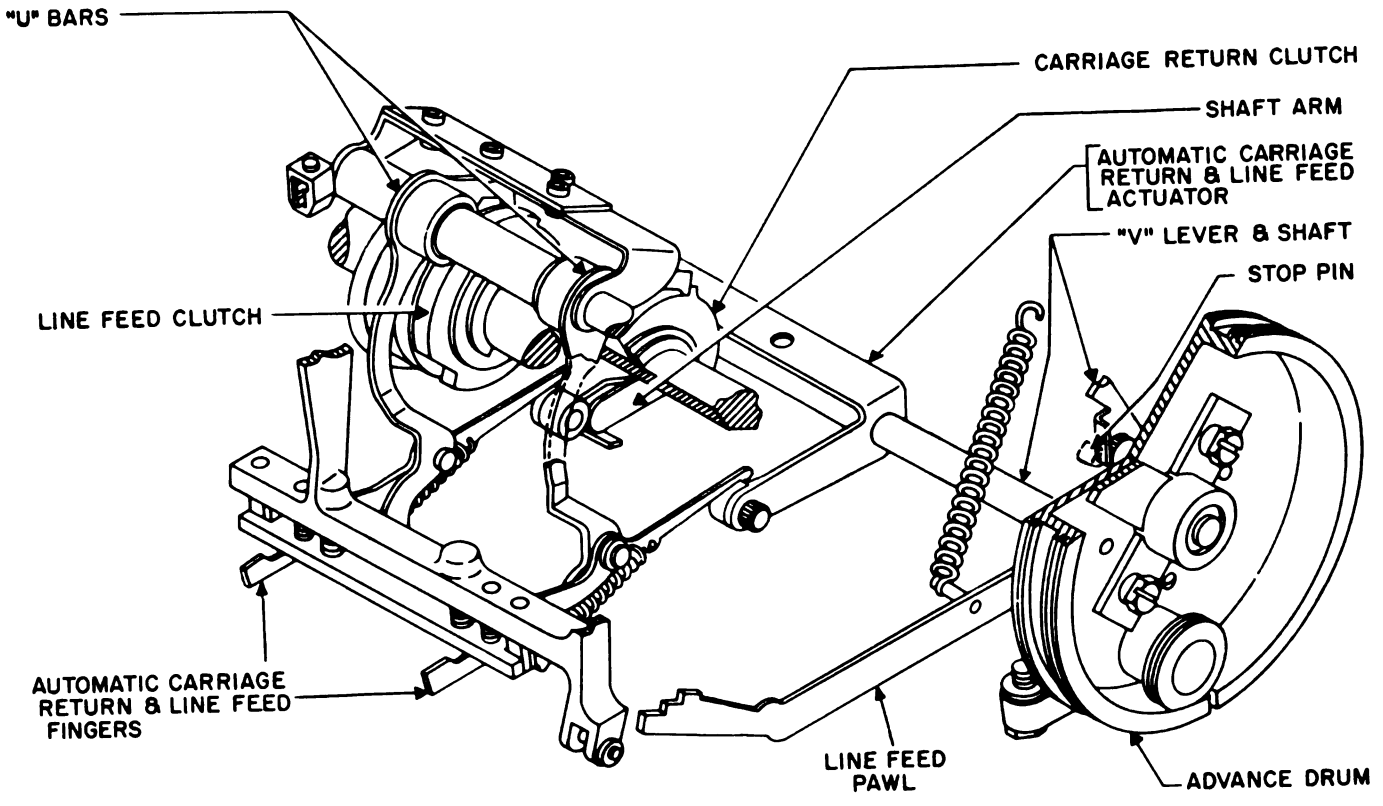
NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

Four off line functions are available for operation without keying the signal line. They are the off line functions of line feed, figures, letters, and carriage return into the printer. The off line -line feed, figures, and carriage return are operated by depressing the appropriate OFF LINE KEY (on the case cover). This action will cause the OFF LINE FUNCTION LEVER (on the electrical chassis) to operate with the bottom going to the rear. This moves the OFF LINE FUNCTION SLIDE (on the printer) to the rear. The off line function slide will operate its appropriate U BAR. The linkage for normal functions will operate.

Since there is a possibility that the release of the letters clutch will release at the wrong time and jam the machine, the off line letters control is operated by depressing the OFF LINE LETTERS KEY (on the cover). This action will cause the OFF LINE LETTERS FUNCTION LEVER (on the electrical chassis) to operate with the bottom going to the rear and moving the OFF LINE LETTERS FUNCTION SLIDE (on the printer) to the rear. The off line letters function slide moves the leaf spring up against its tension. The leaf spring moves the front of the OFF LINE LETTERS FUNCTION SENSING FINGER up into the path of the function bar. On the next character cycle the function bar will operate the off line letters function sensing finger. At the same time the linkage for letters function will operate.

All off line keys, off line function levers and off line function slides have their own springs that return them to the normal stop positions.



AUTOMATIC CARRIAGE RETURN AND LINE FEED

Information Sheet 3-5-24I

AUTOMATIC CARRIAGE RETURN AND LINE FEED

INTRODUCTION

The objective of this information sheet is to teach the operation of the automatic carriage return and line feed. Refer to the equipment and the figure on the preceding page while studying this sheet.

REFERENCES

NavShips 94522, Technical Manual for Teletypewriter Set AN/TGC-14(V), Teleprinter TT-299A/UG, and Teletypewriter TT-298A/UG

NavShips 95898, Technical Manual for Teletypewriter Sets AN/TGC-14(V) and 14A(V), Teleprinters TT-298A/UG and TT-298B/UG, and Teletypewriters TT-299A/UG and TT-299B/UG

INFORMATION

The automatic carriage return and line feed operate on the 72nd or 76th character. Their sensing fingers differ from the other sensing fingers in that they do not have to enter the notches on the lateral and rotary slides to move into the path of the function bar. Their bias springs are attempting to pull them into the path of the function bar. They are blocked by the automatic carriage return and line feed actuator.

On the 72nd or 76th character the STOP PIN on the ADVANCE DRUM comes into contact with the V LEVER rotating it and the V LEVER SHAFT CCW (rt).

The V LEVER SHAFT ARM rotates with the V lever shaft and engages the automatic carriage return and line feed actuator causing it to rotate CCW (rt) and move down. At this time the automatic carriage return and automatic line feed function sensing fingers will move into the path of the function bar.

The carriage return and line feed function linkage will operate normally.

Information Sheet 3-5-25I

AUTOMATIC LINE FEED ON CARRIAGE RETURN (enabled position)

INTRODUCTION

The objective of this information sheet is to teach the operation of the automatic line feed on carriage return for the enabled position. Follow the steps closely on the equipment.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

When the carriage return function train of parts is operated, the lower extension of the CARRIAGE RETURN U BAR engages the LINE FEED LEVER LATCH, and moves it to the rear.

The line feed lever latch is attached to the LINE FEED LEVER LINK and rotates it CCW (bot). The line feed lever link moves the line feed lever CW (bot). This engages the lower extension of the line feed U bar and moves it to the rear. The normal line feed linkage will operate normally.

The LINE FEED LEVER LINK SPRING furnishes the power to return the line feed lever link, line feed lever, and line feed lever latch to their normal stop position.

OFF LINE FUNCTION OPERATION

When the OFF LINE CARRIAGE RETURN FUNCTION SLIDE is operated, the BREAKER SLIDE comes into contact with the LINE FEED DISCONNECT LEVER and rotates it CCW (bot). Its rear extension engages and moves the LINE FEED LEVER LATCH CCW (bot) out of engagement with the lower extension of the carriage return U bar.

The off line carriage return function will operate independently of the line feed function.

Information Sheet 3-5-26I

AUTOMATIC LINE FEED ON CARRIAGE RETURN
(disabled position)

INTRODUCTION

The objective of this information sheet is to teach the operation of the automatic line feed on the carriage return in the disabled position. Follow the steps on the equipment while studying this sheet.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

When the line feed lever link spring is moved to the disabled position, the line feed disconnect lever is pulled CCW (bot). At the same time the line feed lever latch will be held CCW (bot) out of the path of the lower extension of the carriage return U bar. In this position there will be no automatic line feed on carriage return.

Information Sheet 3-5-27I

RIBBON FEED AND OSCILLATION

INTRODUCTION

The objective of this information sheet is to teach the operation of ribbon feed and oscillation.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Ribbon feeding is continuous with the motor running thru the medium of the printer gear on the main shaft, ribbon idler gear, ribbon feed drive gear, friction clutch, ribbon feed drive shaft, ribbon feed worm gear, ribbon feed spur gear, left and right intermediate drive gears, left and right ribbon spool gears, and the left and right ribbon spool gears backstops and springs.

The ribbon is fed through the ribbon vibrator links. One side of the link is attached to brackets on the front plate assembly forming a fixed pivot point. The other side is attached to the ribbon vibrator arms which forms a moving pivot point.

The ribbon vibrator arms are clamped to the hammer shaft so that when the hammer is rotated toward the type cylinder the ribbon is moved up and into its path. When the hammer is rotated away from the type cylinder the ribbon is moved down so the line of type is visable.

Information Sheet 3-5-28I

RIBBON REVERSAL

INTRODUCTION

The objective of this information sheet is to teach the sequence of operation when the ribbon is reversed.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Ribbon reversal is accomplished when the RIBBON EYELET engages the sensing arm and moves it outboard. The sensing arm pulls the CONNECTING LINK attached to the RIBBON REVERSE CLUTCH RELEASE ARM. At the same time the RIBBON REVERSE CLUTCH will engage and rotate with the ribbon reverse cam 180°. The ribbon reverse cam follower rides to the high part of the cam and causes the movable slide plate to shift from one side to the other.

The RIBBON SPOOL GEAR is mounted on the slide plate and it will disengage from its matching drive gear, and the gears on the opposite side will engage and feed the ribbon from that side.

Assignment Sheet 3-5-5A

SELF TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided. Refer to the technical manual and your notes as necessary. Your work will be reviewed by the instructor.

REFERENCES

NavShips 94522

NavShips 95898

QUESTIONS

1. What furnishes the power to move the off line function lever to the front of the machine?

2. When does automatic carriage return and automatic line feed occur?

3. Name the off line keys from left to right.

4. If the machine is resting in the figures position and the off line letter key is depressed, when will the machine shift to the letters position?

5. How many clutches are there in the TT-299/UG teletypewriter?

6. What furnishes the power to feed the ribbon?

7. In automatic line feed on carriage return, what furnishes the power to move the line feed U bar CW (rt)?

8. What part moves the ribbon spool gear away from its drive gear?

9. What furnishes the power to move the advance drum CW (rt)?

10. When does the automatic carriage return function sensing finger enter the notches in the rotary and lateral slides?

Job Sheet 3-5-1J

DISASSEMBLY OF 1-2-3-1041 PRINTER UNIT

INTRODUCTION

The purpose of this job sheet is to guide you in the disassembly of the printer unit into its main assemblies and their subassemblies.

EQUIPMENT

1-2-3-1041 Printer Unit
Tool Kit

REFERENCE

NavShips 94522

JOB STEPS

1. Disassembly of printer unit into three main subassemblies. Page 6-18 Para (e), as modified below.

a. Remove paper guide plate (2, fig. 6-32) by pulling up and back.

b. Remove ribbon from ribbon vibrator brackets (13 and 16, fig. 6-32) on the front of the printer.

c. Detach auxillary cam follower spring from cam follower post and line feed pawl spring cam from its post (13, fig. 6-29).

d. Remove ribbon spools then release two clamps on front of ribbon feed mechanism on clean surface.

e. Remove "E" ring (6, fig. 6-35) from clevis pin (5) and remove the pin from arm (7).

f. Remove "E" ring (52, fig. 6-36) from clevis pin (51) and remove the clevis pin from function bar (57).

g. Position printer on its backplate, loosen four clamp screws, (34, fig. 6-30) and two clamp screws (65, fig. 3-31); then disengage the clamps.

h. Ensuring that the main shaft remains in the rear half of the printer, carefully grasp front half of printer and lift it away from the rear half.

CAUTION: THE MAIN SHAFT CONSISTS OF TWO SEPARATE SECTIONS WITH NO POSITIVE LOCKING DEVICE. GRASP BOTH HALVES FIRMLY DURING HANDLING.

i. Remove springs (2 and 3, fig. A6-1) and loosen screw to pawl guide (5) and disengage advance pawl (1) and check pawl (4) from pawl guide.

2. Rear half disassembly. Page 6-21 Para (2).

a. Motor and shroud disassembly. Page 6-21 para (a). Steps 1 thru 7 only. Add to step 5 - remove 3 screws (1).

b. Selector removal and disassembly. Page 6-21 para (b). Steps 1 thru 3 only.

Check point INITIAL_____

3. Front half disassembly. Page 6-27 Para (3).

a. Takeup drum disassembly para (a). Steps 1 thru 4 only.

NOTE: DISENGAGE RANGE FINDER SHAFT LOCK.

b. Front plate removal and disassembly. Page 6-29 para (b). Steps 1 and 2 only.

c. Hammer shaft removal and disassembly. Page 6-30 para (c). Steps 1 thru 5 only.

CAUTION: ENSURE BEARINGS REMAIN WITH END OF SHAFT ON WHICH THEY ARE ORIGINALLY POSITIONED.

d. Yoke shaft removal and disassembly. Page 6-31 para (d). Steps 1 thru 4. Do not use excessive pressure when placing screw (4) back into yoke (7).

e. Type cylinder and shaft removal and disassembly. Page 6-31 para (e).

CAUTION: LOOSENING THE ROTARY SPRING (1) BELOW. IF SPRING IS NOT RELEASED SLOWLY, THE SPRING MAY BE DAMAGED.

(1) Hold the rotary spring housing (24, fig. 6-33) firmly and slowly remove screws (28) and lock-washers (29) from bearing retainer (26). When screws are loose, slowly release the spring tension by allowing the rotary spring housing to turn.

(2) Remove screw (16) and lock-washer (17) from bearing retainer (15).

(3) Loosen and remove nut (9) and spacer (10).

(4) Slide rotary star wheel (11) off shaft (30) observing caution with key (12).

(5) Lift cylinder shaft assembly (9 thru 30) from the frame as one unit. Place spacer (10) and nut (9) back on shaft assembly.

f. Paper feed removal and disassembly. Page 6-31 para (f). Steps 1 and 2 only. Remove two pins (17, fig. 6-31). On step 2, right screw (15) will remain in paper feed assembly after removing from frame.
Check point INITIAL_____

4. Disassembly of main shaft. Page 6-20 Fig. 6-22.

a. Separate the two halves of the main shaft at the center bearing.

b. Remove "C" ring (4) from function main shaft (34).

c. Slide washer (5) and print/function clutch (7) from shaft.

d. Remove the 56 needle rollers (6-9) from the print/function clutch.

e. Remove the 4 jamming rollers (8) from the print/function clutch.
Check point INITIAL_____

Job Sheet 3-5-2J

REASSEMBLY OF 1-2-3-1041 PRINTER UNIT

INTRODUCTION

The purpose of this job sheet is to guide you in the reassembly of the subassemblies and main assembly of the printer unit.

EQUIPMENT

1-2-3-1041 Printer Unit
Tool Kit

REFERENCE

NavShips 94522

JOB STEPS

1. Reassembly of the main shaft. Page 6-20 Fig. 6-22

GA a. Ensure print/function clutch is clean (7).

b. Pack the inside of the print/function clutch with Mil-G-3278A.

c. Insert the four jamming rollers (8) into the clutch.

d. Replace the 28 needle rollers (9) in the function cam by placing a light film of grease in the cam.

e. Slide washer (10) on function main shaft (34).

f. Slide the print/function clutch (7) onto the function shaft (34).

g. Replace the 28 needle rollers (6) in the print cam.

h. Slide washer (3) onto function main shaft.

i. Snap "C" ring (4) in place on function main shaft.

j. Place spacer (3), bearing (2) and bearing retainer (1) on function main shaft.

k. Place spacer (52, fig. 6-21) on selector main shaft (53).

2. Rear half reassembly. Page 6-59.

GA a. Motor assembly. Page 6-59 para (w). Steps 9 thru 13 only.

b. Magnetic selector installation. Para (x). Steps 35 thru 37 only. Ensure latches do not bind or catch on any of the clutch release fingers and cable is fed out top as shown in fig. 2-7. Plug in the time delay motor stop control leads.

c. Back plate installation. Page 6-60 para (y). Steps 1 thru 5. Place motor leads thru the slotted part of the backplate.

d. Main shaft installation. Page 6-62 para (3). Steps 1 thru 5. Insert time delay motor stop feed pawl and check pawl into the pawl guide and rehook the springs. (Fig. A6-1).

Check point INITIAL_____

3. Reassembly of front half and assembly of major assemblies.

GA a. Rotary cable replacement. Page 6-15 para (1). Step 6 only.

b. Frame and main shaft assembly. Page 6-66 para (af). Steps 1 thru 5.

(1) Observe caution points in step 3 and 4.

(2) Rehook springs to auxillary cam follower and line-feed pawl.

(3) Replace yokes (32, fig. 6-30) on print and function bar arms.

c. Place take-up drum bracket in place and secure with two screws (92, fig. 6-31) and two screws (16).

d. Preload takeup drum by turning CCW (lt) four complete turns. Insert a screw or some similar object in the hole in the takeup drum and the rear hole in the frame to prevent the drum from unwinding.

e. Cable and belt replacement. Page 6-15.

(1) Replacement procedures. Para (c).

(2) Return cable replacement. Page 6-16 para (2).

(3) Lateral belt replacement. Page 6-17 para (4).

f. Paper feed assembly installation. Page 6-68 para (aj). Steps 20 and 21 only.

g. Hammer cable replacement. Page 6-17 para (3).

h. Type cylinder shaft assembly installation. Page 6-69 para (ak).

i. Cylinder yoke shaft installation. Page 6-69 para (al). Steps 3 thru 5 only.

j. Hammer shaft assembly and installation. Page 6-69 para(am).

k. Front plate assembly and installation. Page 6-69 para (an).
Check point INITIAL_____

Job Sheet 3-6-1J

CLUTCH, CHAIN, AND CABLE ADJUSTMENTS

INTRODUCTION

The purpose of this job sheet is to guide you in making selected mechanical adjustments on the printer unit.

EQUIPMENT

1-2-3-1041 Printer Unit
Tool Kit

REFERENCE

NavShips 94522

JOB STEPS

1. Preliminary positioning of the range dial. Page 6-75 Para (4).

2. Clutch backstop adjustment. Page 6-74 Para (2).

GA a. Manually place the magnetic selector on a mark and rotate the main shaft until all clutches are in a stop condition.

b. Recheck all clutches after printer unit has been placed under power.

3. Start clutch release adjustment. Page 6-74 Para (3).

GA (Place range knob at mid scale.)

4. Rotary cable replacement. Page 6-15 Para 6-5C (1). Step 1-11

5. Lateral function slide alignment. Page 6-76 Para (a).

6. Rotary function slide alignment. Page 6-76 Para (b).

7. Rotary cable adjustment. Page 6-76 Para (d).

GA

8. Lateral belt adjustment. Page 6-77 Para (e).

GA a. Add to step 4. Remove pin from takeup drum and continue to pull green hammer cable until the cable on the takeup drum touches, but does not overlap, then tighten hammer cable clamp. (7, fig. 6-4)

b. In step 6 - Pull the red return cable snug, not tight.
Check point INITIAL_____

Job Sheet 3-6-2J

FUNCTION SECTION

INTRODUCTION

The purpose of this job sheet is to guide you in making selected adjustments to the function section of the printer.

EQUIPMENT

1-2-3-1041 Printer Unit
Tool Kit

REFERENCE

NavShips 94522

JOB STEPS

1. Function shaft adjustments. Page 6-77 Para (a). Delete step 18.

GA

2. Function bar adjustments. Page 6-78 Para (b).

   a. In step nine adjust the function bar so that it strikes the unselected sensing fingers at the mid-point of the sloping surface.

3. Character advance adjustment. Page 6-79 Para (c).

GA a. Change step 3 to read: Adjust advance prevention catch eccentric (16 fig. 6-4) to provide .030 to .050 inch clearance between the tip of the advance feed pawl and the advance ratchet.

4. Carriage return adjustments. Page 6-79 Para (d).

GA a. Remove advance prevention bail spring (14, fig. 6-30).

5. Carriage return lock lever adjustment. Page 6-80 Para (e).

GA

6. Automatic carriage return and line feed adjustment. Page 6-81 Para (f).

GA a. Replace advance prevention bail spring (14, fig. 6-30).

7. Bell sensing finger adjustment. Page 6-82 Para (g).

GA

8. Line feed adjustment. Page 6-83 Para (h).

GA

Check point INITIAL_____

Job Sheet 3-6-3J

PRINT SECTION ADJUSTMENTS

INTRODUCTION

The purpose of this job sheet is to guide you in selected adjustments to the print section of the printer.

EQUIPMENT

TT-299A/UG Teletypewriter Set
Tool Kit

REFERENCE

NavShips 94522

JOB STEPS

1. Cylinder clamp and hammer adjustment. Page 6-84 Para (a).

GA a. Modify step three to read one-half inch vice one-sixteenth inch.

2. Print disconnect adjustment. Page 6-84 Para (b).

a. After completing step eleven replace the ribbon feed front plate. (Fig. 6-32)

3. Print shaft adjustment. Page 6-85 Para (c).

GA

Check point INITIAL_____

4. Magnetic selector adjustment.

a. Place printer unit on electrical chassis. Plug in selector, but not the motor connection. Turn main power switch to on position.

b. Turn the range dial fully counter clockwise. Break the signal line. NOTE: Breaking the signal line may be accomplished by pressing the "BREAK" Button on the keyboard, or by pulling out the patching jack "Signal Line" and replacing the jack.

c. Manually rotate the main shaft until all clutches come to a stop.

d. Momentarily break the signal line to actuate the release latch and turn the range dial clockwise as far as it will go, then turn the range dial counter-clockwise approximately one-sixteenth inch to keep the release latch from bottoming in the fork.

e. Hold the start clutch release against the clutch by inserting the .031 shim between the backstop shaft and the start clutch release fork.

GA f. Adjust all clutch release fingers on the mark side, except the start clutch release, so that .008 to .012 inch clearance exists between the selector paddle and the tip of the adjusting screw when the paddle is held against the armature.

GA g. Open the signal line by removing patching jack "signal line" and adjust all clutch release fingers on the space side of the magnetic selector. (Leave the line open while making this adjustment.)

h. Remove the shim and place the range dial at its' mid-point.

i. Slowly turn the main shaft until the number 3 clutch release on the mark side is pressing against its paddle (paddle drops). Close the signal line by replacing the patching jack.

GA j. Check for the .008 to .012 inch clearance between the start clutch release arm adjustment screw and the selector paddle.
Check point INITIAL_____

5. Plug motor connection in and turn main power switch to on position.

GA a. Run machine for 20 minutes.

b. Recheck clearances on clutch release fingers, start clutch release arm and steps #2 and #3,job sheet 4. Observe machine for proper operation, i.e. carriage return, character advance, etc. Correct adjustments for proper operation, if necessary.
Check point INITIAL_____

Job Sheet 3-6-4J

TYPE POSITIONAL CAM FOLLOWER STROKE ADJUSTMENT

INTRODUCTION

The purpose of this job sheet is to guide you in making selected adjustments to the printer.

EQUIPMENT

TT-299A/UG Teletypewriter Set
Tool Kit

REFERENCE

NavShips 94522

JOB STEPS

1. Rotary motion of the cylinder. Page 6-86 Para (1).

GA

2. Lateral motion cam follower stroke adjustment. Page 6-86 Para (2).

GA

3. Advance prevention adjustment. Page 6-87 Para (f).

GA

4. Print prevention adjustment. Page 6-88 Para (g).

GA

5. First character adjustment. Page 6-88 Para (h).

GA a. Check for 72 characters in the line.

6. Bounce prevent adjustment. Page 6-98 Para (i).

GA

7. After running your machine for at least 30 minutes, have instructor check entire unit before proceeding with the next step.

INITIAL_____

8. Automatic lateral chain takeup adjustment. Page 6-98 Para (az).

9. Time delay motor stop adjustment. Page A6-1 (at the beginning of section six).

FINAL CHECK INITIAL_____

Information Sheet 4-1-1I

REVIEW OF BASIC ELECTRICITY

INTRODUCTION

The objective of this information sheet is to assist you to recall the basic principles of electricity.

INFORMATION

Ohms Law as Applied to Basic Electricity

Three components of Ohms Law

Voltage (E) - The force that causes the electrons to move in a conductor - measured in volts (V).

Current (I) - The flow of electrons in a conductor - measured in amperes (amps) or a thousandth of an ampere called a milliampere (ma).

Resistance (R) - The opposition offered to the flow of current in a circuit - measured in ohms (Ω).

Relationship of three components

$$E = I \times R$$

$$I = \frac{E}{R}$$

$$R = \frac{E}{I}$$

Series Circuits

Offers only one path for current flow.

An open in one part of the circuit will stop current flow in all parts of the circuit.

E, I, and R in a series circuit

The sum of the voltage drops equals the applied voltage.
The current is the same in all parts of a series circuit.
Resistance is added to find the total resistance.

Parallel Circuits

More than one path for current flow.

Current divides according to the resistance of each leg of the circuit.

Voltage is the same across each leg of a parallel circuit.

Assignment Sheet 4-1-1A

SERIES CIRCUIT PROBLEMS

INTRODUCTION

Work the following problems using the information from information sheet 4-1-1I.

PROBLEMS

1. 

R 2Ω
I 60 amps
E ?

2. 

R 2Ω
E 120 V
I ?

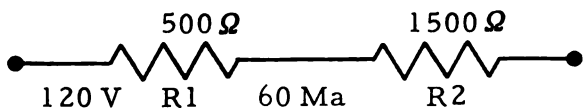
3. 

E 120 V
I 60 amps
R ?

4. 

120 V 60 Ma

Rt ?

5. 

ER 1 ?
ER 2 ?

Assignment Sheet 4-1-2A

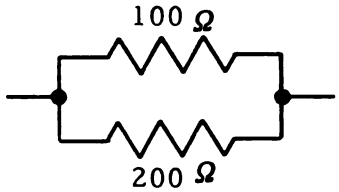
PARALLEL CIRCUIT PROBLEMS

INTRODUCTION

Work the following problems using the information from information sheet 4-1-1I.

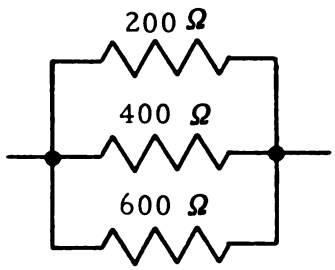
PROBLEMS

1.



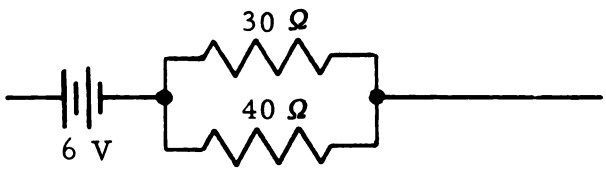
Rt = ?

2.



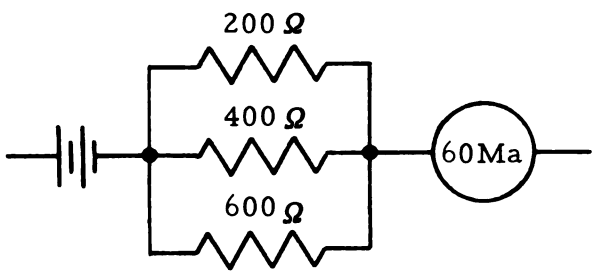
Rt = ?

3.



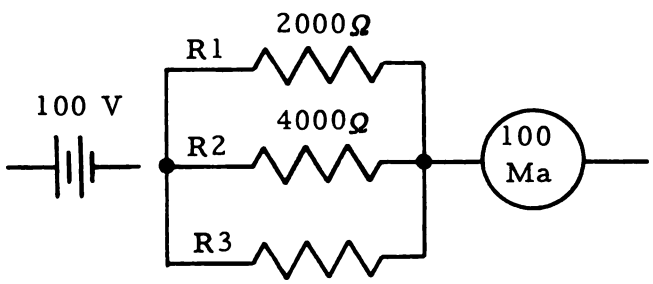
I = ?

4.



E = ?

5.



R3 = ?

Information Sheet 4-2-1I

OPERATION OF THE AN/PSM-4C MULTIMETER

INTRODUCTION

The AN/PSM-4C multimeter is a portable volt-ohm-milliameter used to measure DC current, resistance and all types of voltages.

The meter includes test probes, a telephone plug and a high voltage probe (not furnished at this school).

SAFETY PRECAUTIONS

The use of this equipment involves voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working on equipment employing high voltages.

Do not service or adjust equipment without the immediate presence or assistance of another person capable of rendering aid.

REFERENCE

NavShips 92051, Instruction Book for Multimeter AN/PSM-4A

INFORMATION

There are three controls located on the front panel. They are as follows:

Function switch - a ten position switch in the lower left corner used to select d-c volts, a-c volts, output volts, d-c ma or amps, and various ranges of resistance.

Range switch - an eight position switch located in the lower right corner used to select the proper range of current and voltage.

Zero ohms - a control located in the center of the panel used to adjust the meter pointer to zero ohms when the function switch is changed to a different range of resistance.

There are four scales on the meter. They are as follows:

The top scale (green) - used to measure ohms and indicated zero to infinity from right to left.

The second scale from the top (black) - used to measure DC volts and current. The scale is numbered 0 - 250, 0 - 50, and 0 - 10 from left to right.

The third scale from the top (blue) - used to measure AC volts. It is numbered 0 - 250, 0 - 50, and 0 - 10 from left to right.

The bottom scale (blue) - used to measure AC volts 2.5V and below. It is numbered 0 - 2.5 from left to right.

The meter is designed for the following electrical measurements:

DC current up to 10 amperes
Resistance up to 300 megohms
DC voltage up to 5000 volts
AC voltage up to 1000 volts
Output voltage up to 500 volts

OPERATION OF THE AN/PSM-4C MULTIMETER

Measuring Resistance

Rotate the function switch to the appropriate range.

0 to 100 ohms, set function switch to Rx1
0 to 1000 ohms, set function switch to Rx10
0 to 10000 ohms, set function switch to Rx100
0 to 100000 ohms, set function switch to Rx1000
0 to 300 megohms, set function switch to Rx10000

Caution - Ensure power is secured and circuit is isolated before proceeding further.

With the black test lead plugged into the COM jack and the red lead into the V-MA-O jack, short the test probs together and adjust the zero ohms knob until the pointer reads 0 on the top green scale.

After observing caution procedures above, place probs across the part of the circuit to be measured and observe the reading on the top (green) scale.

Measuring DC Voltage

Rotate the function switch to DCV direct, and the range switch to the appropriate scale. CAUTION: To protect the meter always use the scale of the highest voltage expected to be present.

With the black lead plugged into the COM jack and the red lead plugged into the V-MA-O jack and observing the correct polarity, place the probs across the part of the circuit to be measured. The correct reading will be under the pointer on the second from top (black) scale.

If a reverse deflection of the pointer is observed the function switch should be turned to DCV reverse for correct reading.

Measuring DC Amps or Milli-amps

Position the function switch to DC MA/AMPS position and the range switch to the appropriate scale. CAUTION: Always use the scale twice the highest current expected to be present.

With the black lead plugged into the Com jack and the red lead plugged into the V-MA-O jack and observing the correct polarity place the probs in series with the leg of the circuit to be measured. The correct reading will be under the pointer on the second from top (black) scale.

Measuring AC Voltage

Position the function switch to ACV and the range switch to the appropriate scale. CAUTION: Always use the scale twice the highest voltage expected to be present.

With the leads plugged into the Com jack and the V-MA-O jack, place the probs across the part of the circuit to be measured and observe the correct reading under the pointer on the third from top (blue) scale. Since AC is not polarized the red and black leads may be interchanged without causing the meter to read backwards.

If the AC voltage present is below 2.5V, position the range switch to the proper scale and observe the reading on the bottom scale.

Safety of Operation

Place multimeter in a safe operating position, avoiding the edge of workbench, desk, etc.

When in doubt of the value to be checked, start at the highest range when checking resistance, or the range giving a full scale reading of twice the expected value when checking voltage or current.

Double check position of switches before making measurements. Placing the test probs across circuit when the switches are positioned incorrectly may cause the multimeter to be damaged.

Assignment Sheet 4-2-1A

SELF TEST ITEMS ON THE TT-299/UG

INTRODUCTION

Answer the following questions in the space provided. Refer to the technical manual and your notes as necessary. Your work will be reviewed by the instructor.

REFERENCES

NavShips 94522

NavShips 95898

QUESTIONS

1. What electrical charge do electrons possess?

2. What are materials called that will not allow the flow of electrons?

3. In what directions does current flow?

4. What is a series circuit?

5. What is a parallel circuit?

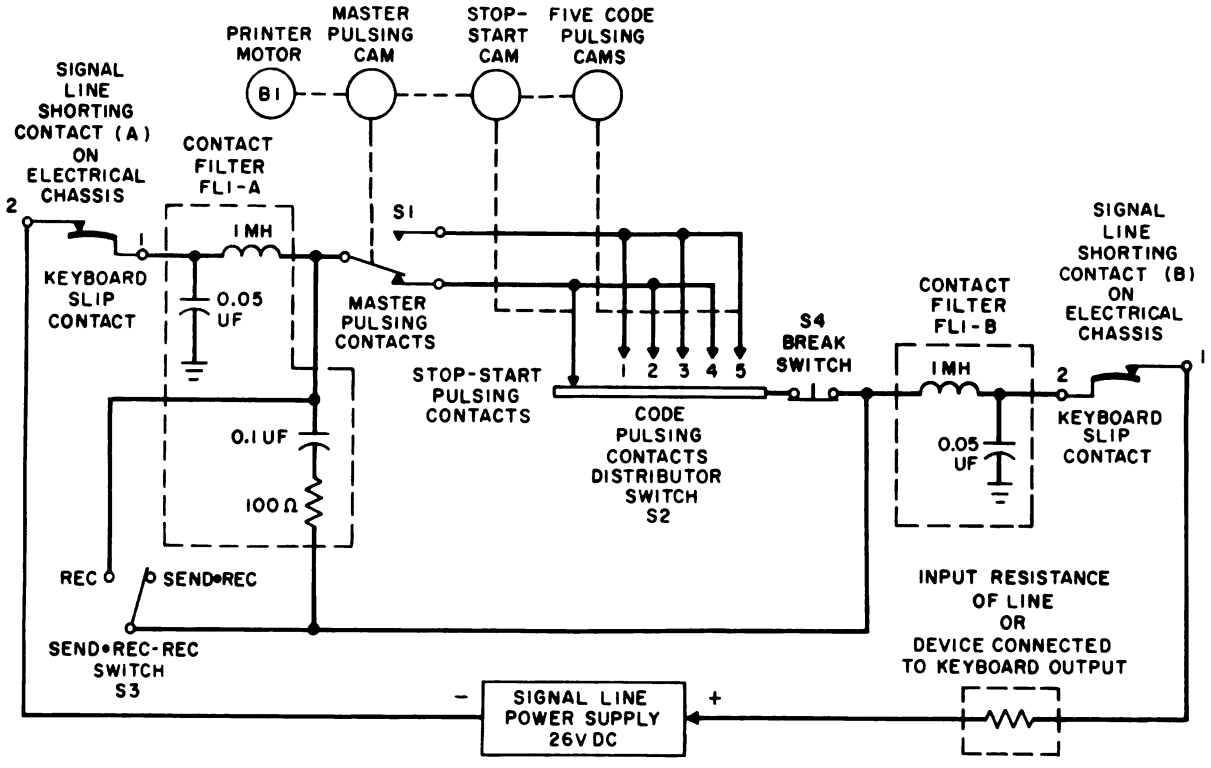
6. In a parallel circuit, what determines the amount of current to be found in each individual leg?

7. What is the total resistance of a series circuit containing resistors of 20, 80, and 100 ohms?

8. What is the total resistance in a parallel circuit containing 20, 80, and 100 ohms resistors?

9. When using the PSM4C multimeter to measure DC voltages, what color is the lead connected to the negative terminal?

10. What precautions should be observed when measuring resistance with the PSM-4C multimeter?



KEYBOARD TT-318/UG(1A9), SIMPLIFIED SCHEMATIC DIAGRAM

Information Sheet 4-3-1I

KEYBOARD CIRCUIT

INTRODUCTION

The objective of this information sheet is to teach terminology of the keyboard components and their functions and the operation of the keyboard circuit.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Electrical Components of the Keyboard and Their Function.

Keyboard contact filter - used to filter out unwanted variations in line current, to reduce distortion, and to minimize interference.

Transmitter (master pulsing contact assembly) - used to determine the duration of a pulse.

Distributor (code pulsing contact assembly) - used to sense the presence or absence of a pulse.

Automatic line shorting contact - used to complete the circuit when keyboard is out or stored in electrical chassis.

Break switch - used to open signal line to signal distance stations and for starting motor when motor stop circuit is energized.

Send/Receiving switch - used to short keyboard out of signal line.

Keyboard slip connects - used to complete the circuit when keyboard is in the operating position.

Operation of the Circuit

Current input is through the keyboard slip connectors.

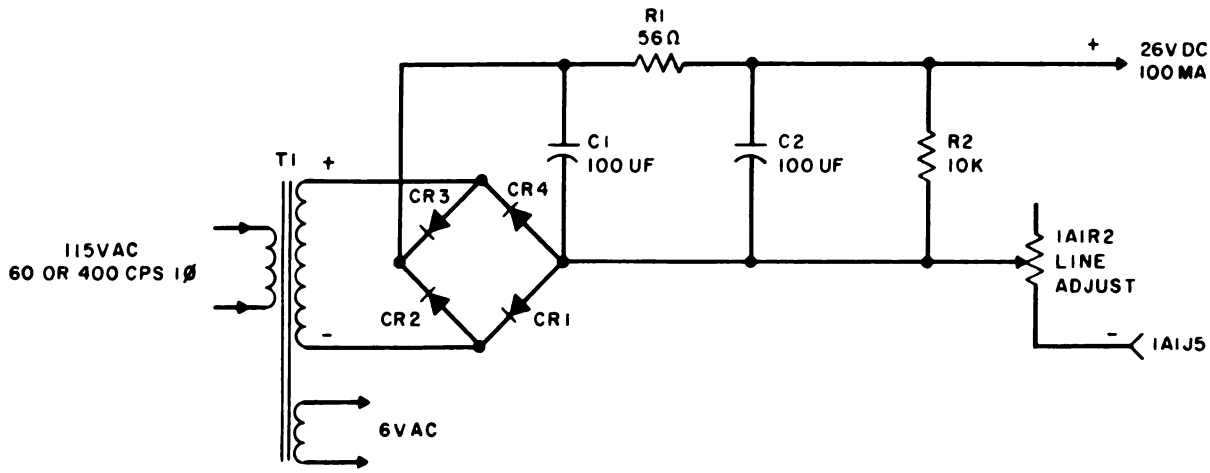
Current passes through the keyboard filter.

Current flows through S-1 to code pulsing contacts.

Current flows through line filter to keyboard slip contacts.

When send/rec switch is in rec position switch shorts out keyboard.

When keyboard is out or stored the line shorting contacts complete the circuit.



A-C SIGNAL LINE POWER SUPPLY 1A4
SIMPLIFIED SCHEMATIC DIAGRAM

Information Sheet 4-3-2I

SIGNAL LINE POWER SUPPLY

INTRODUCTION

The objective of this information sheet is to teach the components and their description of the signal line power supply.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Components of the Signal Line Power Supply

Power transformer T1 - A step-down type transformer from 115V AC 60 - 400 CPS single phase to 33V AC and 6V AC.

Rectifier - Formed by four diodes CR 1 - CR 4 connected as full wave bridge.

Filter - Resistance-capacitance network.

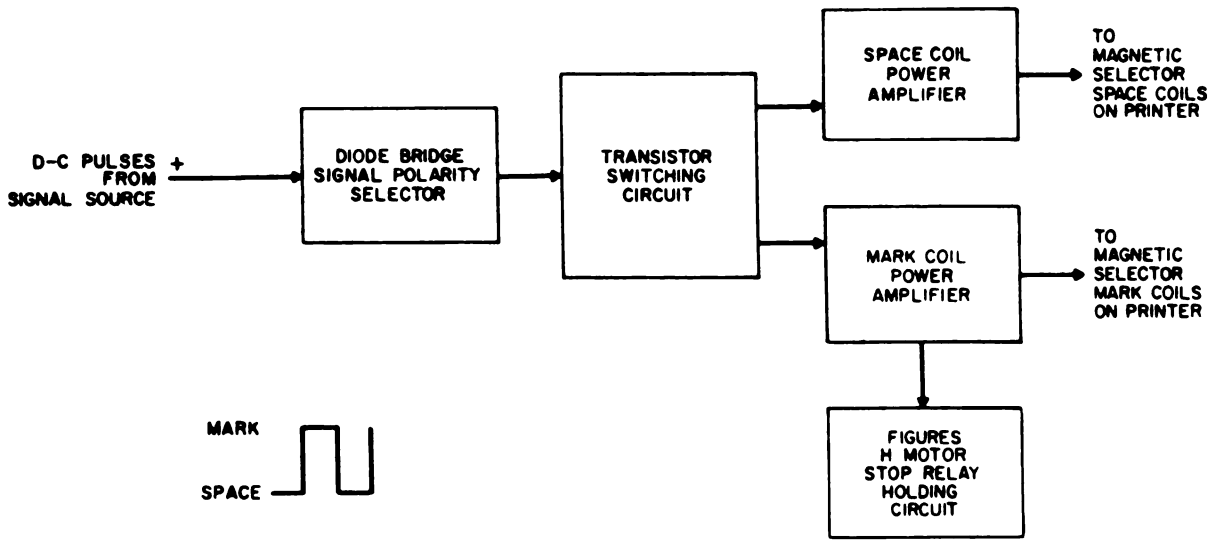
Line adjust control 11AIR2 - Used to adjust line current

Description

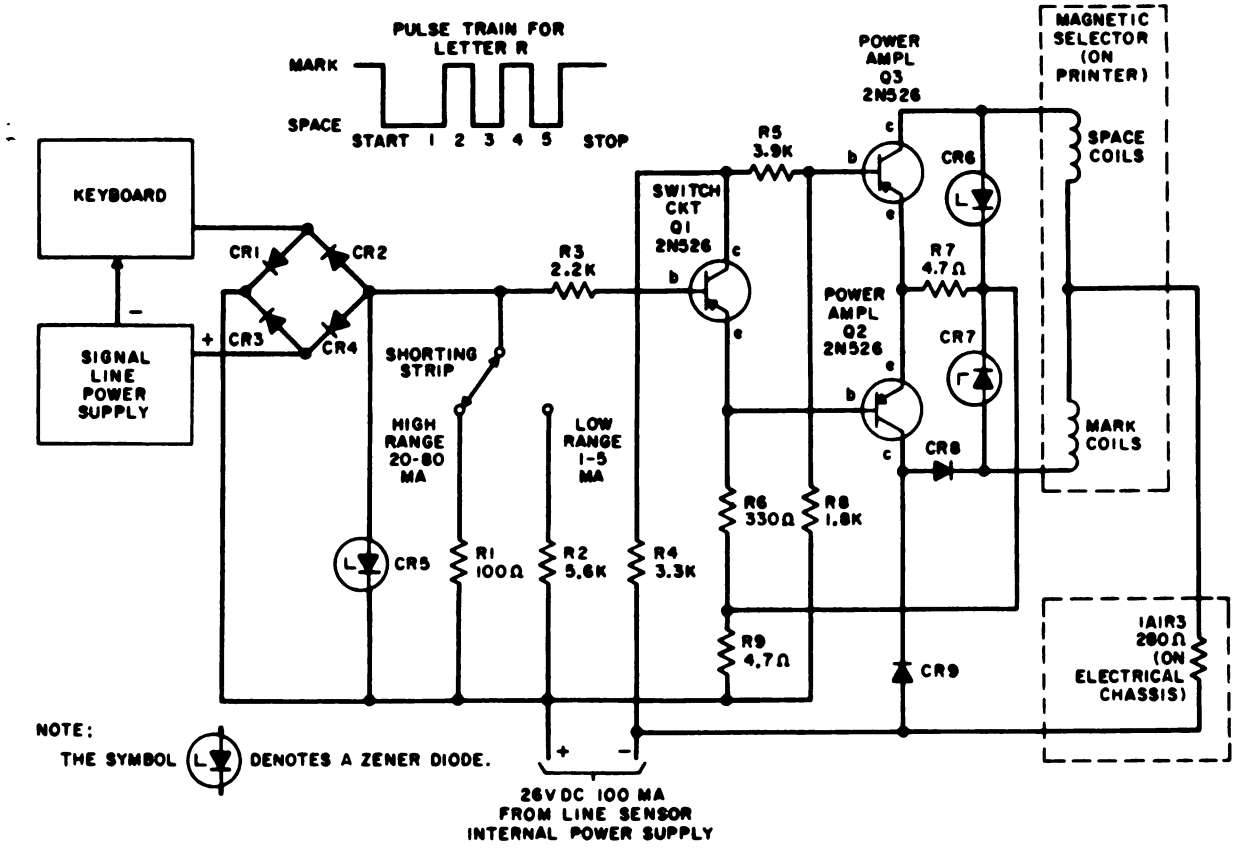
Output voltage 26V DC at 100 MA.

With the exception of the transformer T1, the components are mounted on a printed circuit board.

A similar power supply is incorporated in the line sensor furnishing DC voltages necessary for operation of the magnetic selector.



LINE SENSOR 1A3 AND 1A6, FUNCTIONAL BLOCK DIAGRAM



LINE SENSOR 1A3 AND 1A6, SIMPLIFIED SCHEMATIC DIAGRAM

Information Sheet 4-3-3I

FUNCTIONAL OPERATION OF THE LINE SENSOR

INTRODUCTION

The objective of this information sheet is to teach the types, purpose, parts, and operation of line sensors.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Types and Purpose of the Line Sensor

There are two types of line sensors. They are the 115V AC input (1A3) and the 26V DC input (1A6). Both line sensors are designed for dual range operation. When set for the high range the teletype machine will operate with a signal line current of 20 - 80 ma and when set for the low range it will operate with a signal line current of 1 - 5 ma.

The 1A3 line sensor is supplied with the TT-299/UG and TT-264/AG teletypewriters.

The 1A6 line sensor is supplied with the AN/TGC-14(V) teletypewriter.

The purpose of the line sensor is to complete the teletype signal line and to act as a switching device that places the output of the line sensor power supply across the mark or space coils of the magnetic selector.

Components Parts of the 1A3 Line Sensor

Full wave sensitive bridge using four silicon rectifiers

Transistor switching circuit

Three voltage limiting diodes

Two isolating diodes

Power supply providing 26V DC at 100 ma for the transistor switching circuit and the mark and space coils. A 6V AC winding is provided for the copy lamp circuit.

Operation of the 1A3 Line Sensor

CR 1, 2, 3, and 4 select proper polarity of incoming signal.

CR 5 acts as an overload relay. 12V will cause it to conduct protecting Q1 against high voltages.

R1, R2 and the shorting strips are used to develop signal voltages and to select proper current operating ranges.

Q1 operates as a switching device and will conduct for a mark and cutoff for a space. It will control the operation of Q2 and Q3.

Q2 will conduct for a mark, causing current to flow through the mark coils in the magnetic selector. Q2 will cutoff for a space.

Q3 will conduct for a space, causing current to flow through the space coils in the magnetic selector. Q3 will cutoff for a mark.

CR6 and 7 acts as overload relay and protects Q2 and Q3 against excessive voltages.

CR 8 and 9 are isolating diodes and prevents current from going in opposite direction reversing transmissions.

The line sensor power supply is identical to the signal line power supply.

Information Sheet 4-3-4I

AC PRINTER MOTORS

INTRODUCTION

The objective of this information sheet is to teach the types, requirements and operation of AC printer motors.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Types and Requirements of the AC Motor

There are two types of printer AC motors. They are the PD-82/u and the PD-83/u.

The PD-82/u is used on the TT-299/UG and requires 115V AC 60 CPS primary power. It has 60 poles and its 3600 RPM is reduced to 2160 RPM by the 2nd reduction gears on the motor frame.

The PD-83/u is used on the TT-264/AG and requires 115V AC 400 CPS primary power. It has 30 poles and its 12000 RPM is reduced to 3600 RPM by the 1st reduction gears then to 2160 RPM by the 2nd reduction gears on the motor frame.

The motor is a hysteresis-synchronous type motor. No wire is used in the rotor construction. It is made of nickel cobalt steel.

A capacitor, in series with a start winding to provide phase shift, is required to start the motor.

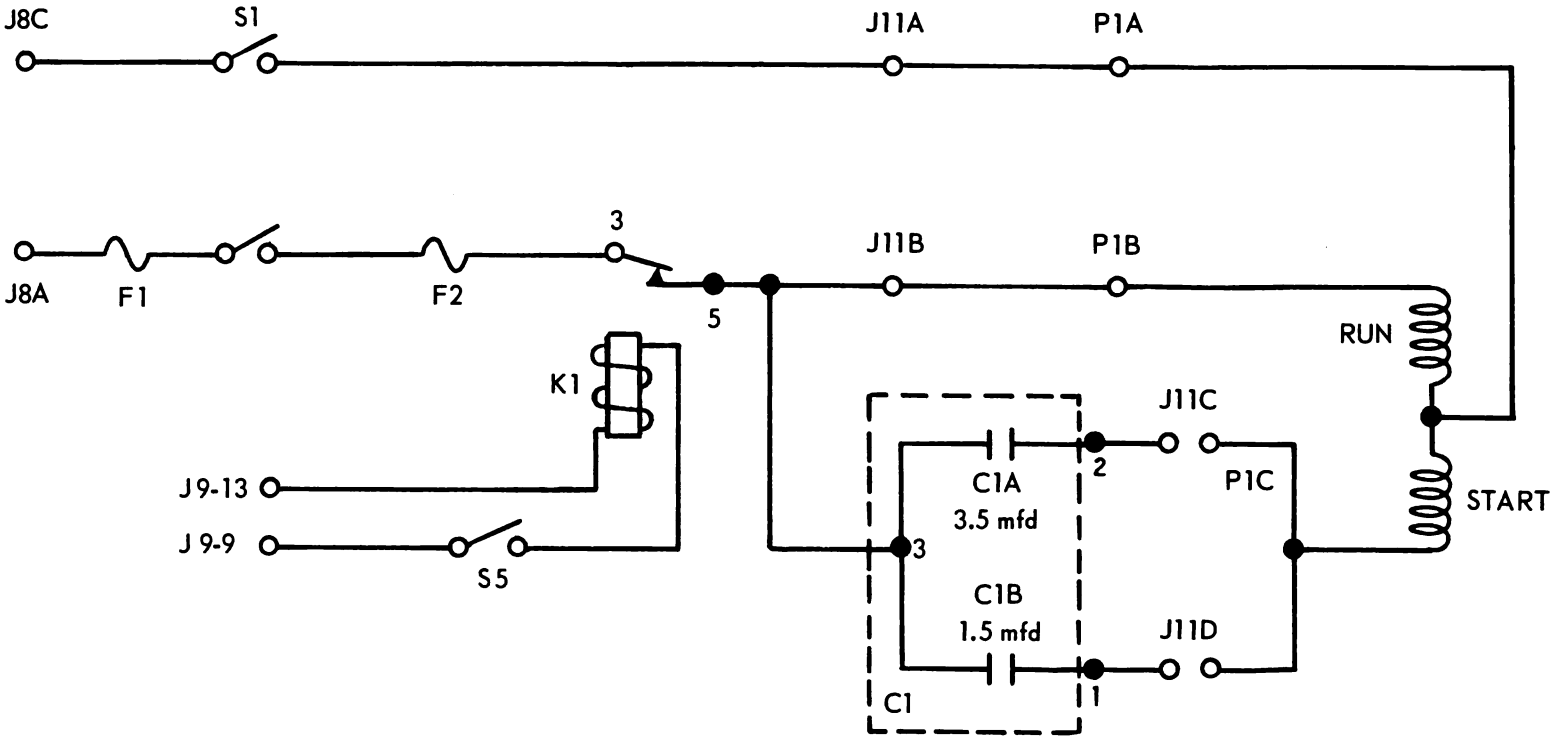
Operation of the Motor Circuits

The motor start circuit can be traced on the schematic diagram as follows:

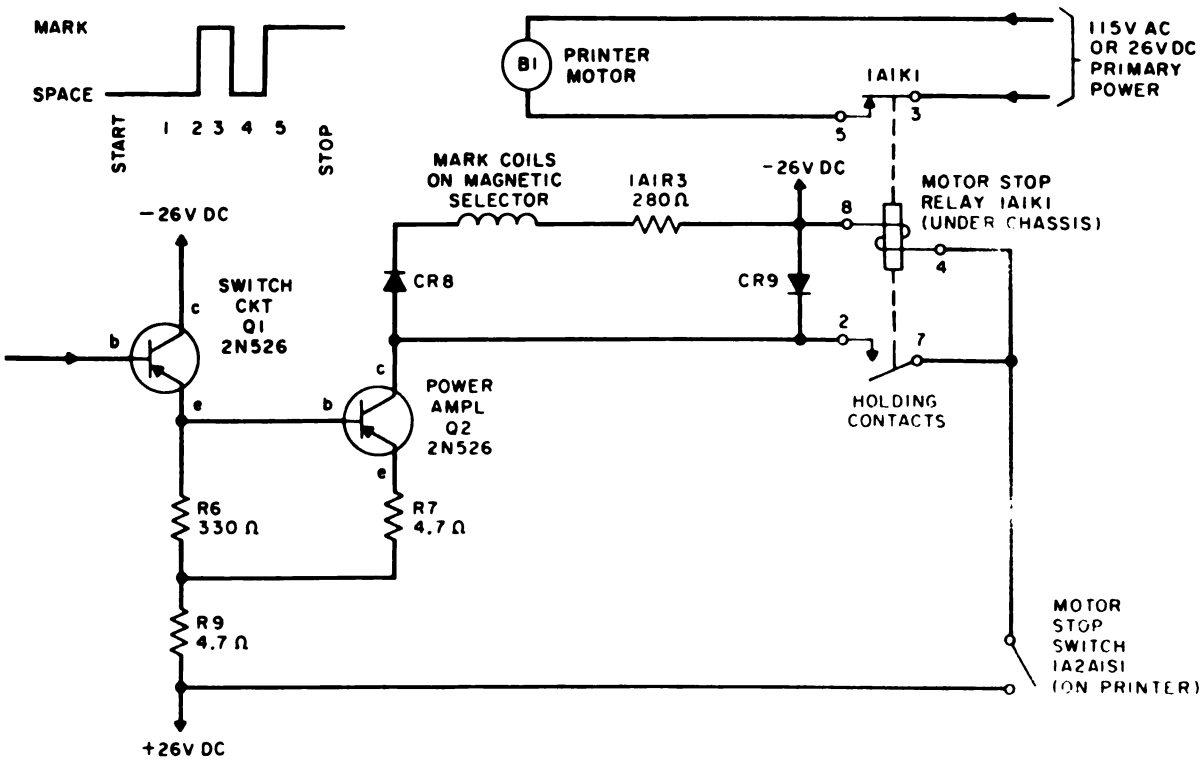
Pin A of J8
F1
S1
F2
Terminal 3 of K1
Terminal 5 of K1
Terminal 3 of C1 (C1B used for PD-83/u - both C1A and C1B used for PD-82/u)
Terminals 1 and 2 of C1
Pins C 7 D of J11 and P1 through the start winding of motor
Pin A of P1 and J11
S1
Pin C of J8

The motor run circuit can be traced on the schematic diagram as follows:

Pin A of J8
F1
S1
F2
Terminal 3 of K1
Terminal 5 of K1
Pin B of J11 and P1 through run winding of motor
Pin A of P1 and J11
S1
Pin C of J8



TT-299/UG SCHEMATIC DIAGRAM MOTOR CIRCUIT



LINE SENSOR 1A3 and 1A6, MOTOR STOP FUNCTION
SIMPLIFIED SCHEMATIC DIAGRAM

Information Sheet 4-3-5I

MOTOR STOP CIRCUIT

INTRODUCTION

The objective of this information sheet is to teach the components of the motor stop circuit and their function, the operation of the circuit to stop the motor,and the operation of the circuit to start the motor.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

Components of the Motor Stop Circuit and Their Function

Q2 - used to provide a holding circuit for motor stop relay.

CR 9 - used to prevent inductive voltage from damaging Q2 when the the field collapses.

Motor stop relay K1 - used to open the 115V AC primary power circuit to the printer motor.

Motor stop switch - used to energize K1 at first instant when motor stop train of parts causes it to close.

Operation of the Circuit to Stop the Motor

Motor stop switch S1 closes momentarily and energizes the motor stop relay K1.

Relay contacts 2 and 7 close to keep relay energized and contacts 3 and 5 open removing primary power to the motor.

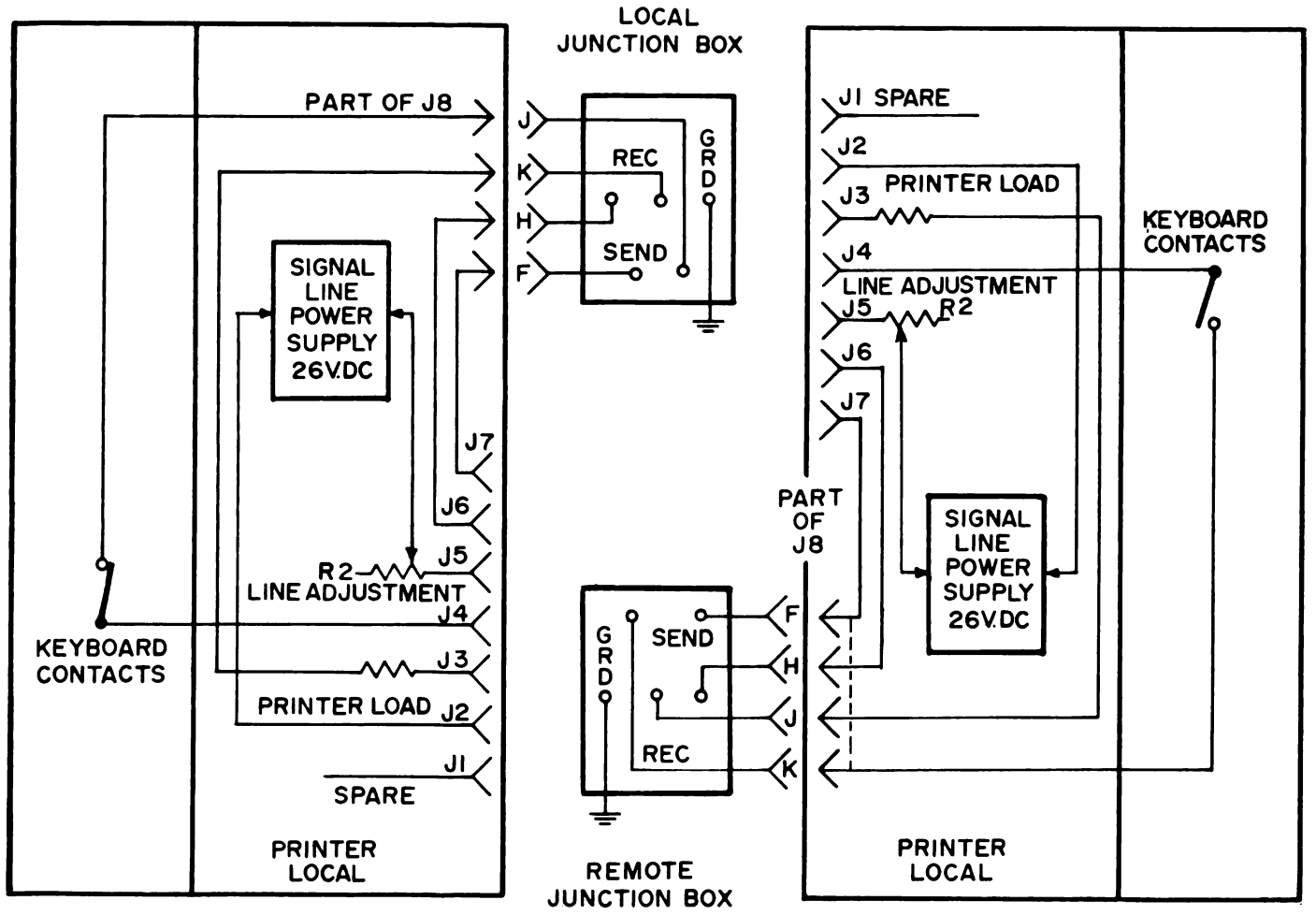
Current through Q2 (stop impulse) is used to keep K1 energized after S1 opens.

Operation of the Circuit to Start the Motor

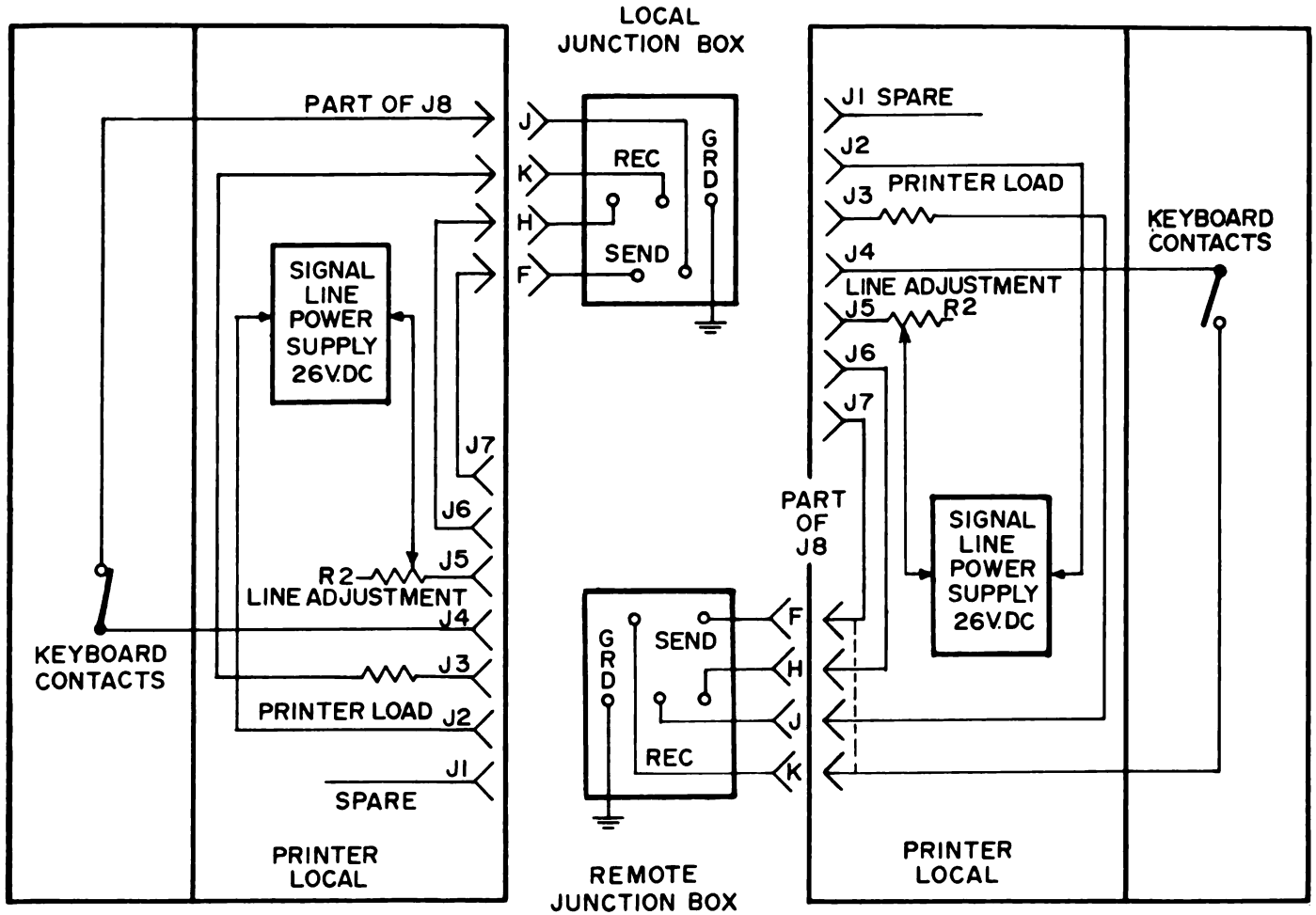
Depressing the break button or receiving a start impulse places a space (no current) on the signal line and causes Q2 to stop conducting.

No current through Q2 causes K1 to become deenergized.

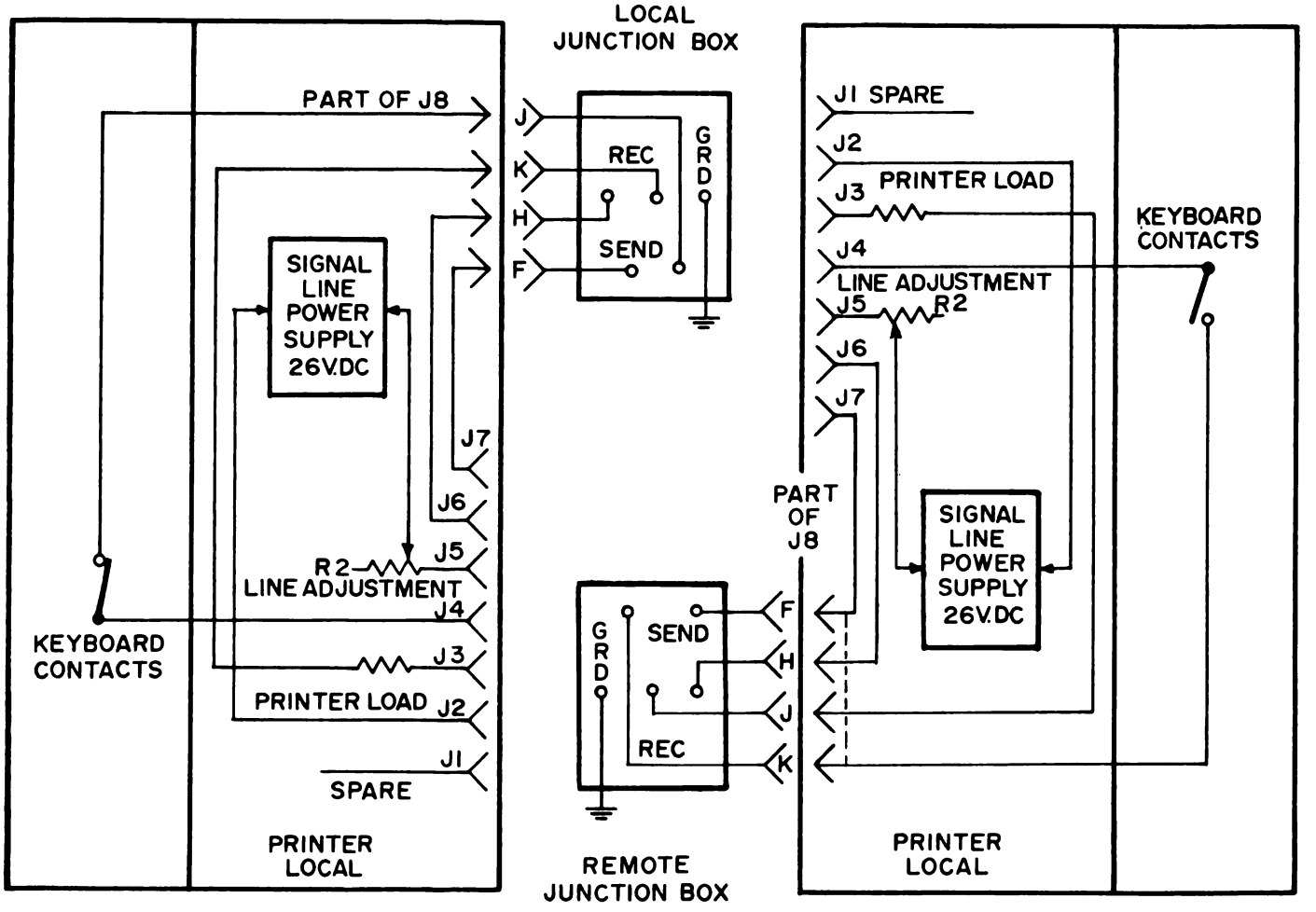
Relay contacts 2 and 7 open and contacts 3 and 5 close applying primary to the printer motor.



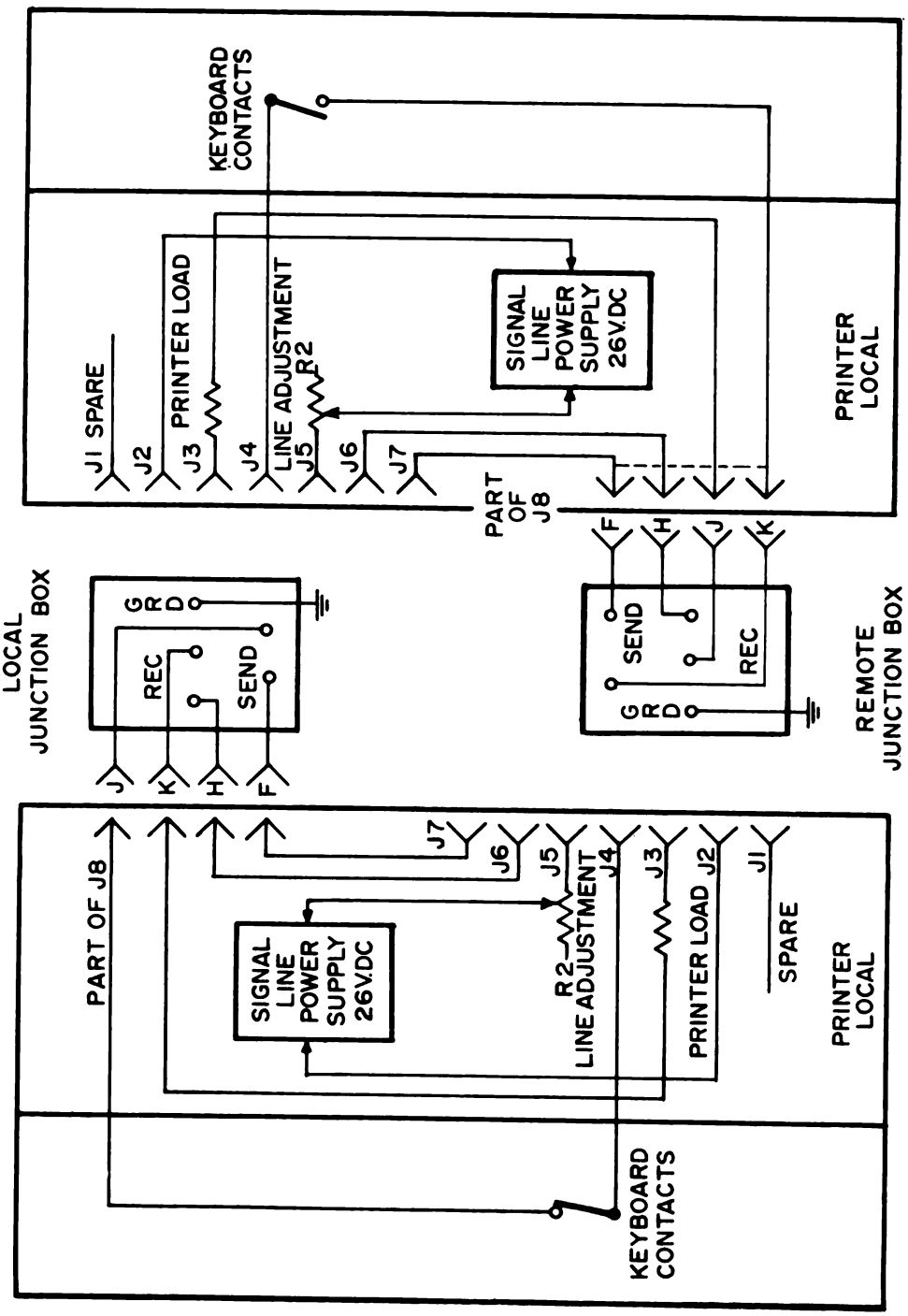
PATCHING OPTIONS
MODE-I



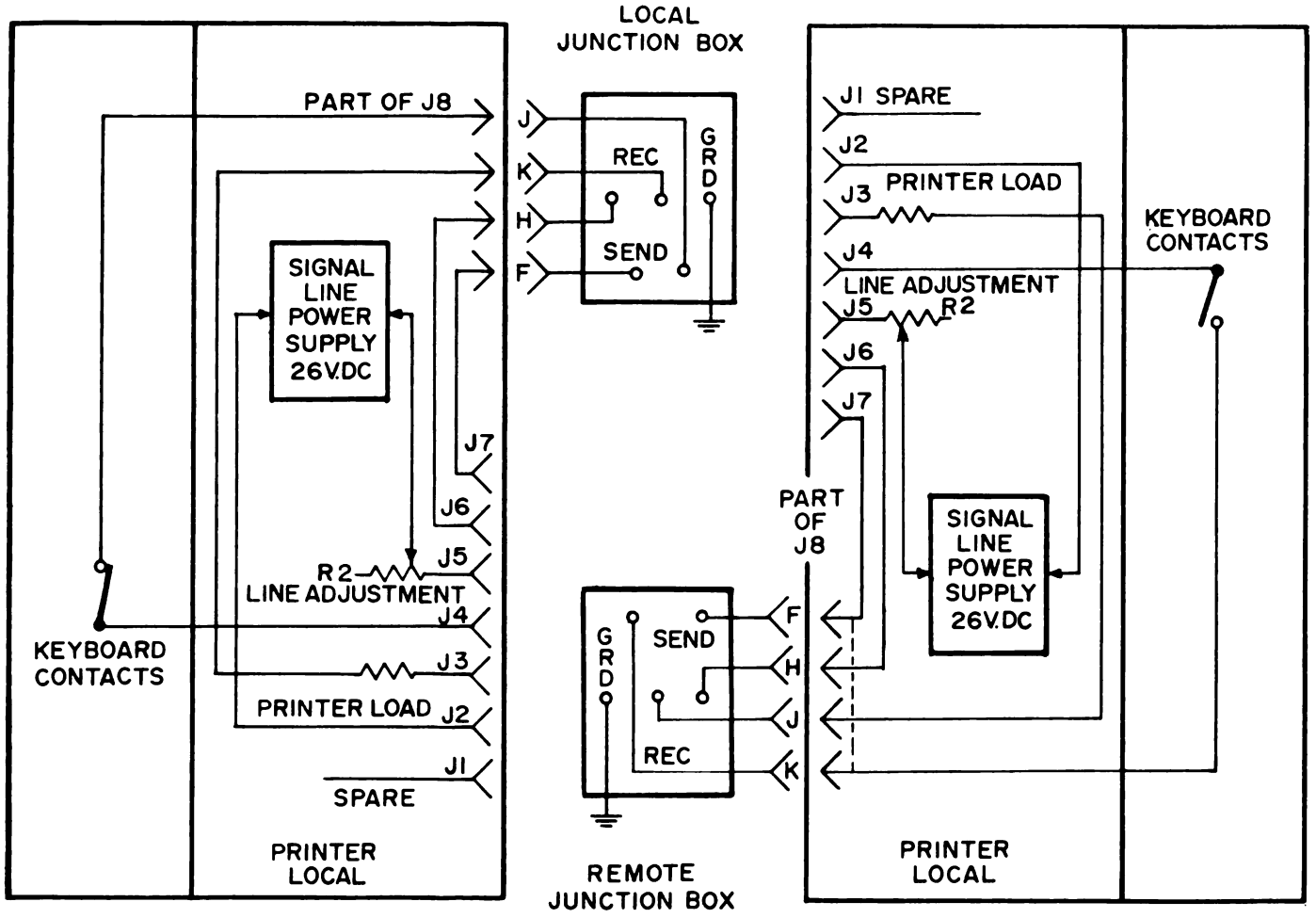
PATCHING OPTIONS
MODE-2



PATCHING OPTIONS
MODE-3



PATCHING OPTIONS
MODE-4



PATCHING OPTIONS
MODE-5

Information Sheet 4-3-6I

OPERATION MODES AND METHOD OF PATCHING

INTRODUCTION

The objective of this information sheet is to teach the operation modes and the method of patching for the various modes.

REFERENCES

NavShips 94522

NavShips 95898

INFORMATION

The TT-299A/UG is Capable of Operating in Any One of Three Modes

Off Line Local Mode - The signal line power supply, keyboard, and line sensor of the local machine are connected in series to form a closed signal loop.

Half Duplex Mode (Simplex) - The keyboard and line sensor of the local machine and the distance machine /s/ are connected in series with either local or distance machine furnishing the power supply for the signal loop. The machine can either send or receive but not both simultaneously.

Full Duplex Mode - The keyboard of the local station and the line sensor of the distance station are in series in one signal loop and the keyboard of the distance station and the line sensor of the local station are in series in another signal loop. Full duplex mode operation requires two separate signal loops with their individual power supplies and permits simultaneous sending and receiving.

Method of Patching for Various Modes of Operation for 60 MA Operations

Half Duplex Mode Operation (Simplex)

Mode 1. Line battery supplied by local machine. Patch jacks J2 to J3, J4 to J5, and J6 to J7 (use this mode for off-line local mode - short service cable, red to red, and black to black).

Mode 2. Line battery supplied externally. Patch jacks J1 to J2, J3 to J4, and J6 to J7.

Full Duplex Mode Operation

Mode 3. Line battery for remote keyboard and local printer supplied by local teletypewriter. Line battery for remote printer and local keyboard supplied by remote teletypewriter. Patch jacks J2 to J3, J5 to J6, and J4 to J7.

Mode 4. Line battery for both signal loops supplied externally. Patch jacks to J1 to J2, J3 to J6, and J4 to J7.

Mode 5. Line battery for local keyboard and remote printer supplied by local teletypewriter. Line battery for local printer and remote keyboard supplied by remote teletypewriter. Patch jacks J3 to J6, J2 to J4, and J5 to J7.

CAUTION: NEVER PATCH OPTION PATCHING JACK J2 to J5. THIS COMBINATION WILL PLACE A SHORT CIRCUIT ACROSS THE SIGNAL LINE POWER SUPPLY.

Always connect the teletypewriter set that is supplying signal line power to the SEND binding posts at the junction box. When two or more sets are supplying signal line power connect in series.

Information Sheet 5-1-1I

TROUBLESHOOTING INSTRUCTIONS

INTRODUCTION

The objective of this information sheet is to set forth some basic instructions for the troubleshooting problems that you will be required to perform.

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.

Purpose of Troubleshooting

The purpose of this phase is to help you develop the ability to diagnose trouble, then to repair it. The instruction you have received thus far will serve as a foundation for the troubleshooting phase.

As an efficient repairman you should be able to identify, locate, and quickly repair any type of trouble the equipment may develop. Knowledge of troubleshooting and isolation methods will help you become an efficient repairman.

Materials Required for Troubleshooting

The following materials are required for the troubleshooting phase:

One 6" screwdriver

One multimeter

Work books, schematic diagrams, class notes, and technical manuals as required

All tool drawers will remain closed except when correcting troubles.

Cautions to be Observed

Do not repair or correct troubles until instructed to do so.

Use only those tools prescribed above.

Place the multimeter in a safe position and observe proper operating procedures for it. A blown fuse will result in loss of time and points.

Pass to and from the lounge as quietly as possible. Do not smoke in the passageway.

SHOOT YOUR OWN MACHINE. Conversation is not allowed between students during the actual shooting of a trouble.

Procedure for Troubleshooting

Troubleshooting can be divided into four steps as follows:

SYMPTOM - Wherein a definite trouble shows itself such as no spacing, no printing, garbling, etc.

DIAGNOSIS - What could be causing the trouble.

ISOLATING - The area of the machine where the trouble is located.

LOCALIZING - The exact location or the name of the part causing the trouble.

When a trouble has been placed on your machine and you have been called back into the classroom assemble at your position and wait for the instructors signal before proceeding to locate the trouble.

When you have localized the trouble, write it down on a troubleshooting chit. Use correct names, then sign the chit before taking it to the instructor. If you are correct the instructor will send you to the students lounge. If you are incorrect the instructor will instruct you to continue troubleshooting. When you have been instructed to leave the classroom, do not return to your position.

A 20 minute period is allowed to localize a trouble. When the time limit is up, or when all students have localized the trouble the instructor will instruct you to repair your machine. After the trouble has been corrected and you are satisfied your machine is again operating normally, leave the classroom and go to the students lounge. Another trouble will be placed on the machine.

Recommended troubleshooting procedures for the electrical and the mechanical systems of the TT-299/UG teletypewriter are located in section 5 of the technical manual.

Job Sheet 6-1-1J

PREVENTIVE MAINTENANCE

INTRODUCTION

The objective of this job sheet is to guide you in the performance of the preventive maintenance check-off schedules, Tables 6-5, 6-6, and 6-7 of the Technical Manual NAVSHIPS 94522.

EQUIPMENT

TT-299/UG Teletypewriter Set

Tool Kit

REFERENCES

NavShips 94522

JOB STEPS

1. Ensure machine is operating as prescribed top page 6-3 of the Technical Manual NAVSHIPS 94522.

2. Proceed with action required in Tables 6-5, 6-6, and 6-7 of the Technical Manual NAVSHIPS 94522.

3. Delete steps that are not applicable to your teletypewriter set.

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REVISIONS			
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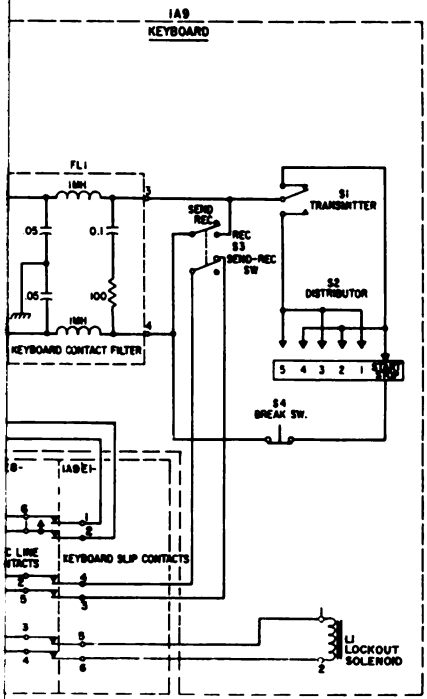

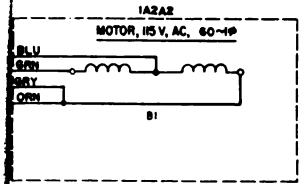

NOTES:

1. – ALL RESISTORS ARE 1/2 WATT ±5% AND VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
2. – ALL CAPACITORS ARE ±10% AND VALUES ARE IN MICROFARADS(μF) UNLESS OTHERWISE SPECIFIED.
3. – ALL DIODES ARE TYPE AFIN645 UNLESS OTHERWISE SPECIFIED.
4. – FOR WIRING DIAGRAMS: "CHASSIS 1A1" SEE DWG D-33364
   "KEYBOARD 1A9" SEE DWG D-30727
   "AC LINE SENSOR 1A3" SEE DWG D-7068
   "AC POWER SUPPLY 1A4" SEE DWG C-33690
   "SELECTOR 1A2A1" SEE DWG B-7067
   "MOTOR, 115 V AC, 60~1Φ 1A2A2" SEE DWG. B52-3416
5. – F4 IS NOT USED IN THIS EQUIPMENT
6. – FOR OTHER PATCHING OPTIONS SEE INSTRUCTION MANUAL.

SCHEMATIC DIAGRAM
TT-299B/UG