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*HANDBOOK OF INSTRUCTIONS
WITH PARTS CATALOG*

FOR

AIRCRAFT SEXTANT

TYPE A-10A

(FAIRCHILD)

Published under joint authority of the Commanding General, Army Air Forces, the Chief of the Bureau of Aeronautics, and the Air Council of the United Kingdom.

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TABLE OF CONTENTS

Section	Page
I Introduction	1
II Description	1
1. General	1
2. Detailed	1
III Preparation for Use.....	4
IV Operation	5
1. Principles of Operation.....	5
2. Operation Instructions	6
V Service Inspection, Maintenance, and Lubrication.....	7
1. Service Tools Required.....	7
2. Service Inspection.....	7
3. Maintenance	8
4. Lubrication	11
5. Service Troubles and Remedies.....	11
VI Disassembly, Inspection, Repair, and Reassembly.....	12
1. Overhaul Tools Required.....	12
2. Disassembly	12
3. Cleaning, Inspection, Testing, and Repair.....	15
4. Reassembly	15
VII Test Procedure	20

PARTS CATALOG

VIII Introduction	21
IX Group Assembly Parts List.....	23
X Numerical Parts List.....	40
XI Standard Parts List.....	42

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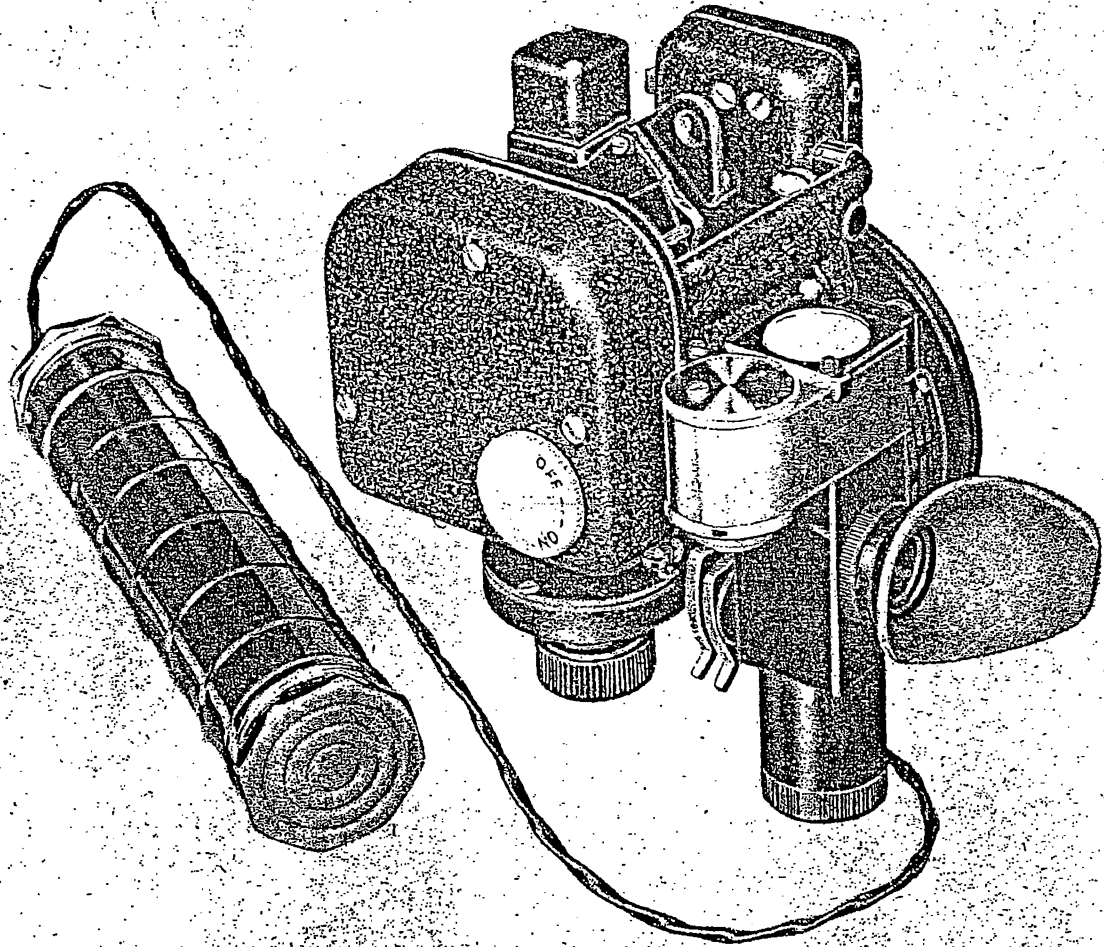


Figure 1—Type A-10A Aircraft Sextant

SECTION I INTRODUCTION

1. This Handbook of Instructions with Parts Catalog is issued as the general basic instructions for the equipment involved.
2. This Handbook contains descriptive data on, and

instructions for, the operation, maintenance and overhaul of the Type A-10A Aircraft Sextant, manufactured by the Fairchild Camera and Instrument Corporation, Jamaica, New York.

SECTION II DESCRIPTION

1. GENERAL.

(See figure 2.)

a. The type A-10A aircraft sextant is a precision instrument designed for aerial navigation, by means of which the angular altitude of a heavenly body can be measured and recorded with reference to a bubble artificial horizon.

b. The instrument is sighted by manual operation, and readings are registered automatically in one-second intervals on a marking disc (3), enabling an average observation to be selected readily, upon completion of the observations. A counter (2), instantly indicates the

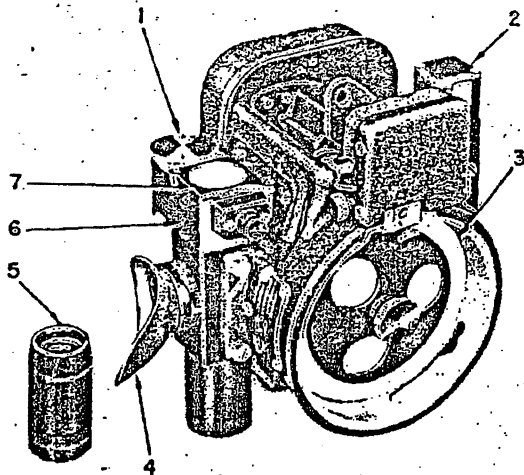


Figure 2—Right Side View

KEY TO FIGURE 2

- | | |
|-------------------------|---------------------------|
| 1 Bubble adjusting knob | 5 Telescope assembly |
| 2 Counter | 6 Bubble chamber assembly |
| 3 Marking disc | 7 Sunshade assembly |
| 4 Eyeguard assembly | |

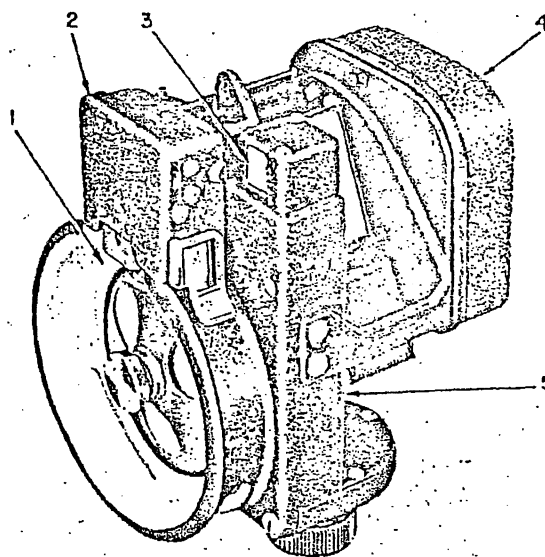


Figure 3—Front View

KEY TO FIGURE 3

- | | |
|-------------------|------------------|
| 1 Marking disc | 4 Timer assembly |
| 2 Marker assembly | 5 Frame assembly |
| 3 Counter | |

angle, when the mark of an observation is indexed against the marker.

c. A battery case assembly provides the power source for day and night use.

d. A detachable telescope (5) is provided for magnification.

2. DETAILED.

a. GENERAL.—The type A-10A aircraft sextant coordinates the functions of a mechanical, an optical and an electrical system.

Section II
Paragraph 2

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b. MECHANICAL SYSTEM.—The mechanical system of the sextant coordinates the movement of the field prism in relation to the counter and marking disc by means of the manually operated drive, worm, sector, gear, and recording disc assemblies.

c. OPTICAL SYSTEM. (See figure 9.)—The movable field prism (1) receives the rays of light from the celestial body that is being observed and transmits the rays to the fixed prism (7), which in turn transmits them to the eyepiece for observation. By looking past the open edge of the fixed prism (7), the natural horizon and the field may be viewed at one and the same time if the instrument is not tilted from the vertical. The field prism (1), which is mounted on the sector, revolves through an arc of 45 degrees, deflecting the line of sight 90 degrees, the deflection being shown by the counter. The objective lens (5) and the reflector (4) in the glass chamber housing function jointly to superimpose the image of the bubble in the center of the field of view, thereby creating the artificial horizon.

d. ELECTRICAL SYSTEM. (See figure 3.)—The electrical system consists of a power source comprising a pocket battery case which connects by a cable to the sextant. An electrically powered timer mechanism operates contacts which close the circuit to a relay located in the timer assembly (4); which in turn closes the circuit to a solenoid which operates the automatic marker assembly (2). The bubble light rheostat controls the illumination of the bubble cell, and the toggle switch controls the illumination of the marking disc (1) and counter (3).

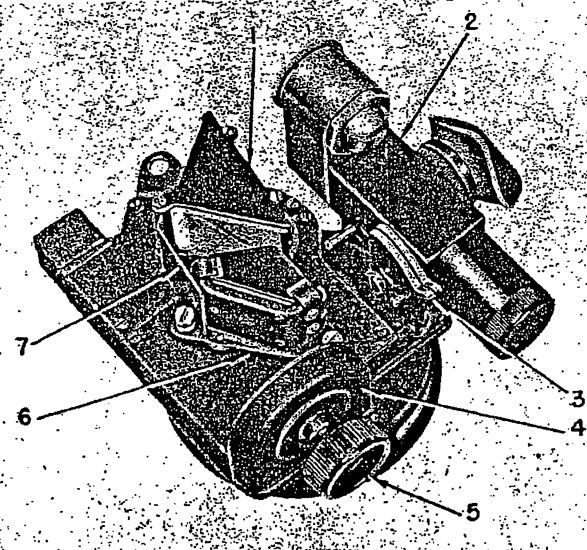


Figure 4—Prisms

KEY TO FIGURE 4

- | | |
|----------------------------------|------------------------|
| 1 Field prism assembly | 4 Drive assembly |
| 2 Glass chamber housing assembly | 5 Control knob |
| 3 Filter assembly | 6 Fixed prism assembly |
| | 7 Shade |

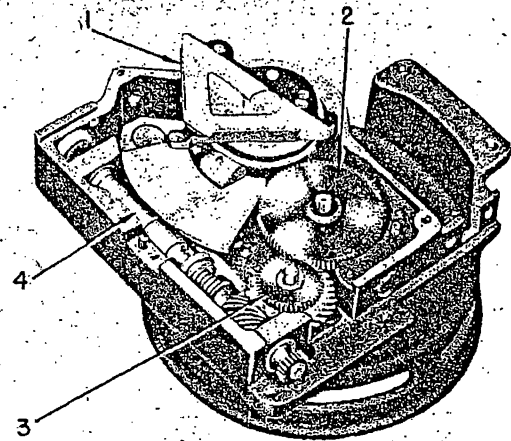


Figure 5—Interior View

KEY TO FIGURE 5

- | | |
|---------------------------|-----------------|
| 1 Sector assembly | 3 Gear assembly |
| 2 Recording disc assembly | 4 Worm assembly |

e. FRAME ASSEMBLY.—The frame assembly (5, figure 3) is a permanent-mold, aluminum-alloy casting to which are attached the major assemblies of the sextant.

f. DRIVE ASSEMBLY.—The drive assembly (4, figure 4) contains the manual control knob (5), the rotation of which operates the synchronized mechanisms. A stopping feature is incorporated in the drive assembly which limits the rotation of the control knob to the number of turns necessary to cover the range of the instrument.

g. WORM ASSEMBLY.—The worm assembly (4, figure 5) is driven by the drive assembly and, in turn, operates the gear assembly, moves the sector assembly, and turns the counter assembly.

h. GEAR ASSEMBLY.—The gear assembly (3, figure 5) is driven by the worm assembly and drives the recording disc assembly.

i. SECTOR ASSEMBLY.—The sector assembly (1, figure 5) is driven by the worm assembly, and supports and rotates the field prism assembly.

j. COUNTER ASSEMBLY.—The counter assembly (3, figure 3) is driven by the worm assembly and indicates on its dial angular positions in degrees and minutes.

k. RECORDING DISC ASSEMBLY.—The recording disc assembly (2, figure 5) is driven by the gear assembly and supports the marking disc.

l. FIELD PRISM ASSEMBLY.—The field prism assembly (1, figure 4) is supported by the sector assembly and revolves through an arc of 45 degrees, deflecting the line of sight 90 degrees. It receives the rays of light from the celestial body and transmits them to the fixed prism.

m. SHADE.—A shade (7, figure 4) is loosely mounted on one of the prism mounting screws, so that it may easily travel with the field prism. The shade covers the area between the field prism and the fixed prism (6) to eliminate the possibility of ghost images.

n. FIXED PRISM ASSEMBLY.—The fixed prism assembly (6, figure 4) supports the fixed prism which receives the rays of light from the field prism, and transmits them to the glass chamber housing assembly. The position of the fixed prism in the fixed prism assembly is adjustable for collimation purposes.

o. GLASS CHAMBER HOUSING ASSEMBLY.—The glass chamber housing assembly (2, figure 4) supports the bubble chamber assembly, the filter assemblies, the reflector, the objective lens assembly, and the eyeguard assembly. The image of the bubble is projected into the line of sight by the reflection of the bubble onto the reflector through the silvered glass chamber lens of the objective lens assembly.

p. FILTER ASSEMBLIES.—The filter assemblies (3, figure 4) which are attached to the glass chamber housing (2), comprise two filters of different intensities which are brought into position between the fixed prism and glass chamber housing when making day observations.

q. BUBBLE CHAMBER ASSEMBLY.—The bubble chamber assembly (6, figure 2) is mounted on the glass chamber housing assembly. It is filled with alcohol and comprises the mechanism for forming an air bubble which floats in the fluid in the bubble cell. The top of the bubble cell consists of a dome lens (2, figure 9) and the bottom is glass (3) which enables the image of the bubble to be projected into the optical system. The bubble chamber assembly consists of a diaphragm cell from which fluid passes to a bubble cell, which in turn is connected to a reservoir cell by means of a capillary tube. Tilting as indicated on the bubble chamber and turning the bubble adjusting knob (1, figure 2) clockwise compresses the diaphragm, creating pressure which moves the fluid through the system from the diaphragm cell, through the bubble cell, expelling the air into the reservoir cell and reducing the bubble. Tilting as indicated, and turning the bubble adjusting knob (1) counterclockwise, decompresses the diaphragm, relieving the pressure, which reverses the flow, drawing air from the reservoir cell and enlarging the bubble.

r. SUNSHADE ASSEMBLY.—A sunshade assembly (7, figure 2) which is attached to top of the bubble chamber assembly serves as a light diffusing medium to define more clearly the image of the bubble in the optical system. It can be swung out of position to observe directly the bubble through the dome lens of the bubble chamber assembly.

s. EYEGUARD ASSEMBLY.—The eyeguard assembly (4, figure 2) consists of a rubber eyeguard which is attached to the glass chamber housing by an adapter.

t. TIMER.—The timer consists of a self-contained

electric clock mechanism located in the timer assembly, (4, figure 3) which rotates a star wheel, the points of which, upon touching a contact, close the circuit to the relay assembly. The mechanism is regulated to transmit impulses at the rate of one per second.

u. RELAY ASSEMBLY.—The relay assembly located in the timer assembly, (4, figure 3) receives the impulses from the timer and closes the circuit to the marker assembly.

v. MARKER ASSEMBLY.—The marker assembly (2, figure 3) consists of the solenoid assembly and marking mechanism which makes a pencil mark on the marking disc, each time the impulse is transmitted from the relay assembly.

w. TELESCOPE ASSEMBLY.—The telescope assembly (5, figure 2) is interchangeable with the eyeguard assembly at the glass chamber housing. The use of the telescope gives a two-power magnification and reduces the field approximately one-half.

x. BATTERY CASE ASSEMBLY.—The battery case assembly (4, figure 6) consists of a three-cell battery case with a four-foot cable and connector plug. It will accommodate three standard 1.5-volt dry cells, size D,

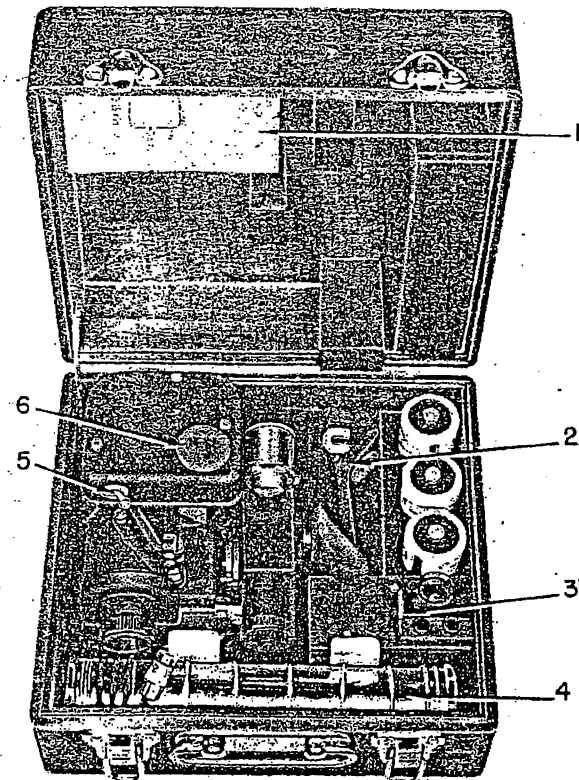


Figure 6—Carrying Case

KEY TO FIGURE 6

- | | |
|---------------------|---------------------------|
| 1 Plastic disc kit | 4 Battery case assembly |
| 2 Sextant bracket | 5 Toggle switch |
| 3 Allen-head wrench | 6 Rheostat adjusting knob |

which are 1-5/16 inches in diameter and 2-5/16 inches in length. These battery cells will not be supplied with the sextant but will be issued separately.

y. PLASTIC DISC KIT.—The plastic disc kit (1, figure 6) consists of three marking discs and thirty marker lead: enclosed in an envelope in the carrying case.

z. CARRYING CASE. (See figure 6.)—A carrying case is provided with each instrument. The case is designed with compartments to store the sextant, telescope, battery case (4), plastic disc kit (1), sextant bracket (2), Allen-head wrench (3) for No. 6-32 Allen headless set screws, 2 spare bulbs and three dry cells.

SECTION III PREPARATION FOR USE

CAUTION

When removing the type A-10A aircraft sextant from its carrying case, care should be taken in picking it up, so that prisms are not smudged with fingerprints or that it is accidentally jarred, as it is a precision instrument and rough handling may result in its being damaged or injured to the point of making it inaccurate. It must always be picked up and laid down carefully and gently.

1. The pencil marks on the marking disc can be easily erased. In the absence of an eraser, it is possible to wipe off the pencil marks with the tip of a finger that has been made slightly oily by rubbing it against the side of one's nose or ear lobe.
2. The marking disc is washable with soap and cold water and can be used on both sides. It is easily removable by unscrewing the clamping disc and tilting the instrument so that it will fall free.

CAUTION

When inserting a new marker lead, check to make sure it is put correctly into the holder, so that it does not extend too far or recede too far to cause breaking or jamming. The point should be set approximately 1/32 inch off the surface of the disc, and the mark obtained should be approximately 1/8 inch in length. Test marks can be made by pressing the side of the marker lightly with a finger to check its operation.

3. The telescope is attached by unscrewing the eyeguard and screwing the telescope into its place. The eyeguard is then replaced. The telescope is used in observing second magnitude stars or when weather conditions are such that the stars are dim.
4. Rotate the eyeguard to accommodate either the right or left eye.
5. Adjust the size of the bubble to approximately 5/64 inch or two sun diameters.

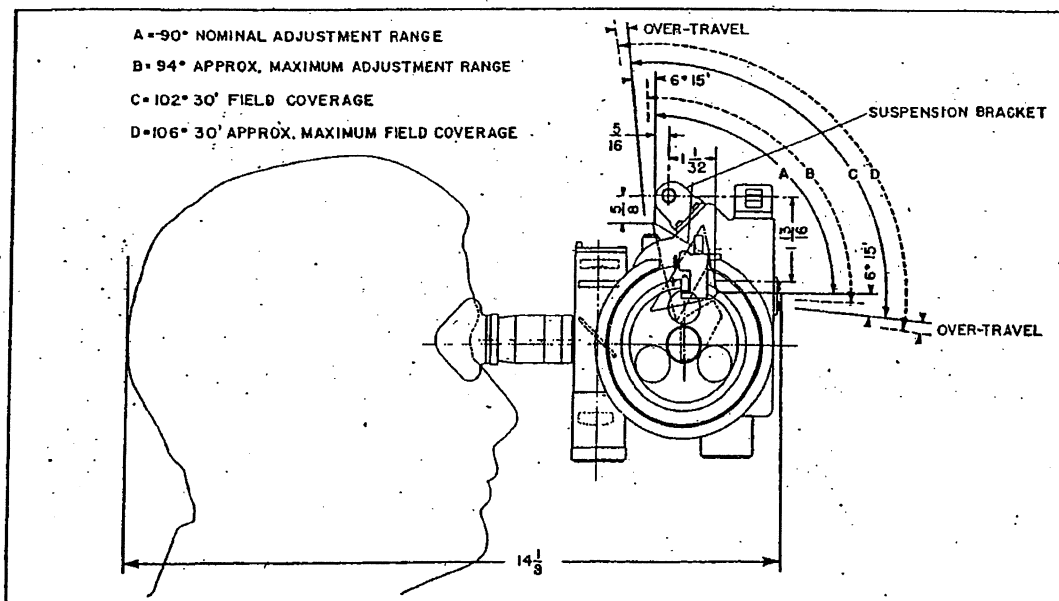


Figure 7—Vertical Displacement

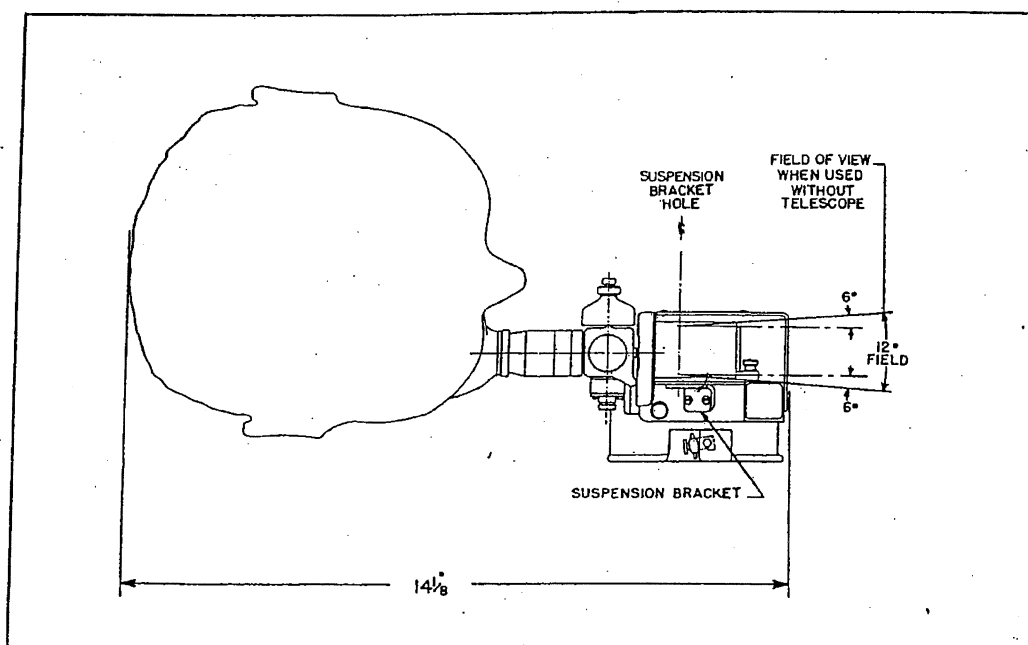


Figure 8—Horizontal Displacement

6. To reduce the bubble, hold the sextant so that the glass chamber housing is in a horizontal position with the bubble adjusting knob uppermost. This will enable the instructions, "HOLD UP TO REDUCE", engraved on the side of the bubble chamber to be read properly. Rotate the bubble adjusting knob BACK AND FORTH until the bubble is reduced to the desired size. Often sextants which have been stored for a long period of time will have all of the liquid in the air chamber of the bubble assembly which will make it appear that the liquid has leaked out. In such cases it will be necessary to perform the above cyclic action a great many times to satisfactorily reduce the bubble. The adjusting nut should be slowly rotated back and forth being careful to pause approximately 2 seconds when the stop is reached in each direction prior to reversing the direction of rotation.

7. To enlarge or form the bubble hold sextant so that the glass chamber housing is in a horizontal position with the bubble adjusting knob lowermost. This will enable the instructions, "HOLD UP TO ENLARGE", engraved on the side of the bubble chamber to be read properly.

Rotate the bubble adjusting knob BACK AND FORTH until the bubble is enlarged to the desired size.

8. Attach the battery cable and tilt instrument forward and backward carefully to start the electric timer.

9. Test bubble chamber light by turning rheostat adjusting knob clockwise to the desired intensity.

10. Test marker light by snapping on the toggle switch.

11. Test automatic marker by pressing trigger. If lights are dim and timer does not operate, battery may be run-down. Replace with new cells, size D, 1.5 volts, heavy duty.

12. Disconnect battery cable until ready to use the sextant to preserve the battery.

13. A hack watch is worn strapped across the palm of the right hand with the dial facing the navigator, to enable him to see the time by the marker light, when making night observations.

14. The carrying case holds spare bulbs, marker discs, dry cells, pencil leads and astral dome bracket.

SECTION IV OPERATION

1. PRINCIPLES OF OPERATION.

(See figure 9.)

a. The type A-10A aircraft sextant provides a marking disc upon which is recorded a mark, correlated to

the position of the movable field prism (1). The movable field prism, being synchronized through the mechanism with the counter and marking disc, permits the instantaneous determination of the angle of observation, by reading the counter.

b. The principle of operation presumes that the reading which equals the geometric middle mark of a pattern of marks, representing a series of readings, is equivalent to the average.

c. When sighting through the optical system of the sextant, by turning the control knob, the image of the heavenly body is focused so that it is superimposed upon the image of the bubble artificial horizon which should be held centered in the field of view. Depressing a trigger closes the circuit to the electric timing mechanism which operates the automatic marker in one-second impulses.

d. This produces a series of marks on the marking disc, the pattern and density of which are interpreted to determine the geometric middle mark.

e. The angular altitude reading in degrees and minutes is then obtained from the counter by indexing the selected average mark on the marking disc against the marker.

2. OPERATION INSTRUCTIONS.

a. DAY OBSERVATIONS. (See figure 10.)

(1) The instrument is held by the frame in the palm and fingers of the right hand with the control knob down.

(2) Insert battery case into a convenient pocket and attach the battery cable to the instrument.

(3) Check that bubble chamber light and marker light are off, to preserve batteries.

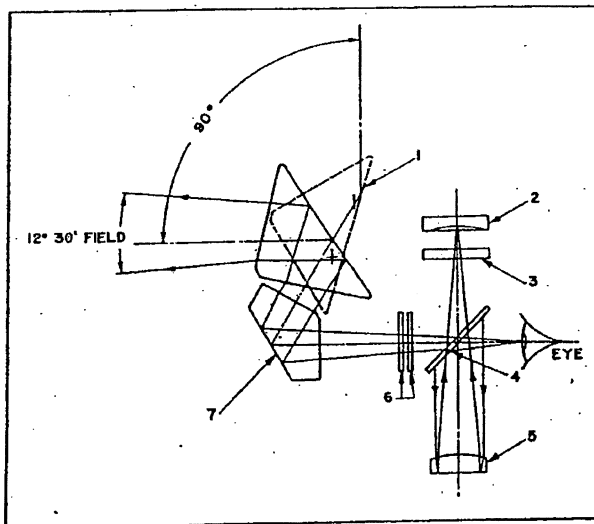


Figure 9—Optical Diagram

KEY TO FIGURE 9

- | | |
|----------------------------|------------------|
| 1 Field prism | 5 Objective lens |
| 2 Bubble chamber dome lens | 6 Filters |
| 3 Bubble chamber glass | 7 Fixed prism |
| 4 Reflector | |

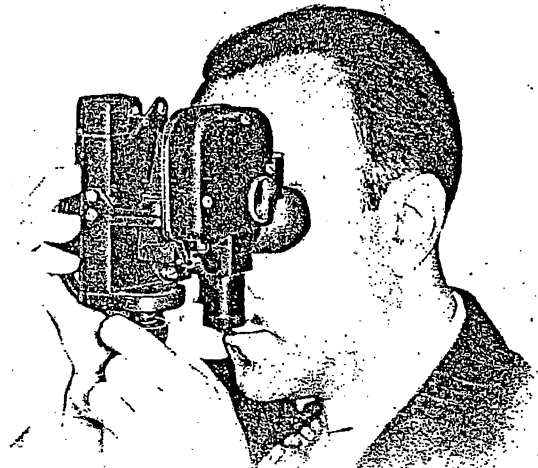


Figure 10—Operating Position

(4) Tilt instrument forward and backward to start timer, if necessary.

(5) In some cases the astral dome is provided with a hook for hanging the sextant while making observations.

(6) Adjust bubble size if necessary to about 5/64 inch or approximately two sun diameters. (Refer to section III, paragraphs 8 and 9.)

(7) The filters are brought into position between the fixed prism and the glass chamber, and the sunshade is pivoted across the top of the bubble chamber.

(8) The left hand is used for operating the control knob which elevates the field prism. The right middle finger depresses the trigger which operates the marker automatically.

CAUTION

Spinning the control knob rapidly, especially by striking it with the palm of the hand, must be avoided; this action exerts a sudden force through the mechanism which may cause damage to the counter mechanism.

(9) The average duration of a cycle of readings ranges between sixty and ninety seconds. Depending upon flight conditions, a minimum of 21 shots up to a maximum of 120 shots are taken. The average number of shots taken usually ranges between 60 and 90, and they are coordinated in conjunction with time readings which are taken from a hack watch.

(10) The marker can also be operated manually by pressing the flat side of the marker with the right index finger.

(11) Collimation is made between the bubble and the celestial body by rotating the control knob until the

SECTION V
SERVICE INSPECTION, MAINTENANCE, AND LUBRICATION

1. SERVICE TOOLS REQUIRED.

(See figure 11.)

NOMENCLATURE	APPLICATION
Lock ring wrench	Objective lens collimation
Adapter seat wrench	Objective lens collimation
Spherical nut wrench	Objective lens collimation

The lock ring, adapter nut and spherical nut wrenches are required to disassemble, reassemble and collimate the objective lens assembly in the glass chamber housing assembly. All of the necessary dimensions required for their manufacture can be found in the drawings illustrated. An Allen-head standard No. 6 wrench for No. 6-32 Allen headless set screws, is used to collimate the fixed prism assembly.

2. SERVICE INSPECTION.

The type A-10A aircraft sextant is a precision instrument but rugged enough to withstand normal careful usage. The instrument should always be set down gently, preferably flat, on the circular side of the frame. After severe or excessive use, the sextant should be thoroughly inspected for damage, alignment or adjustment. Before storing the instrument, or before making obser-

ations, it is recommended that the inspection procedure given below be followed.

Examine all moving parts.

Check the condition of the drive assembly to make sure that the differential stop gear limits the rotation of the control knob so that the field prism is limited to revolve through its complete deflection of 90 degrees, plus a two degree overrun at both ends of the cycle.

Examine the telescope.

See that the glass chamber lens, and reflector are free of smears.

See that the prisms are free of smears, fingerprints or any other markings that would impair their functions.

Test automatic marker.

Inspect filters and battery case.

Make certain that extra marker leads and extra marking discs are available.

Examine bubble; see that it is visible.

Check that bubble chamber and marking disc lamps light. Replace, if necessary with Kollsman Instrument Lamp, Type 71A, knurled end 5/16 by 32 thread, dull black finish, for 3-volt d-c operation.

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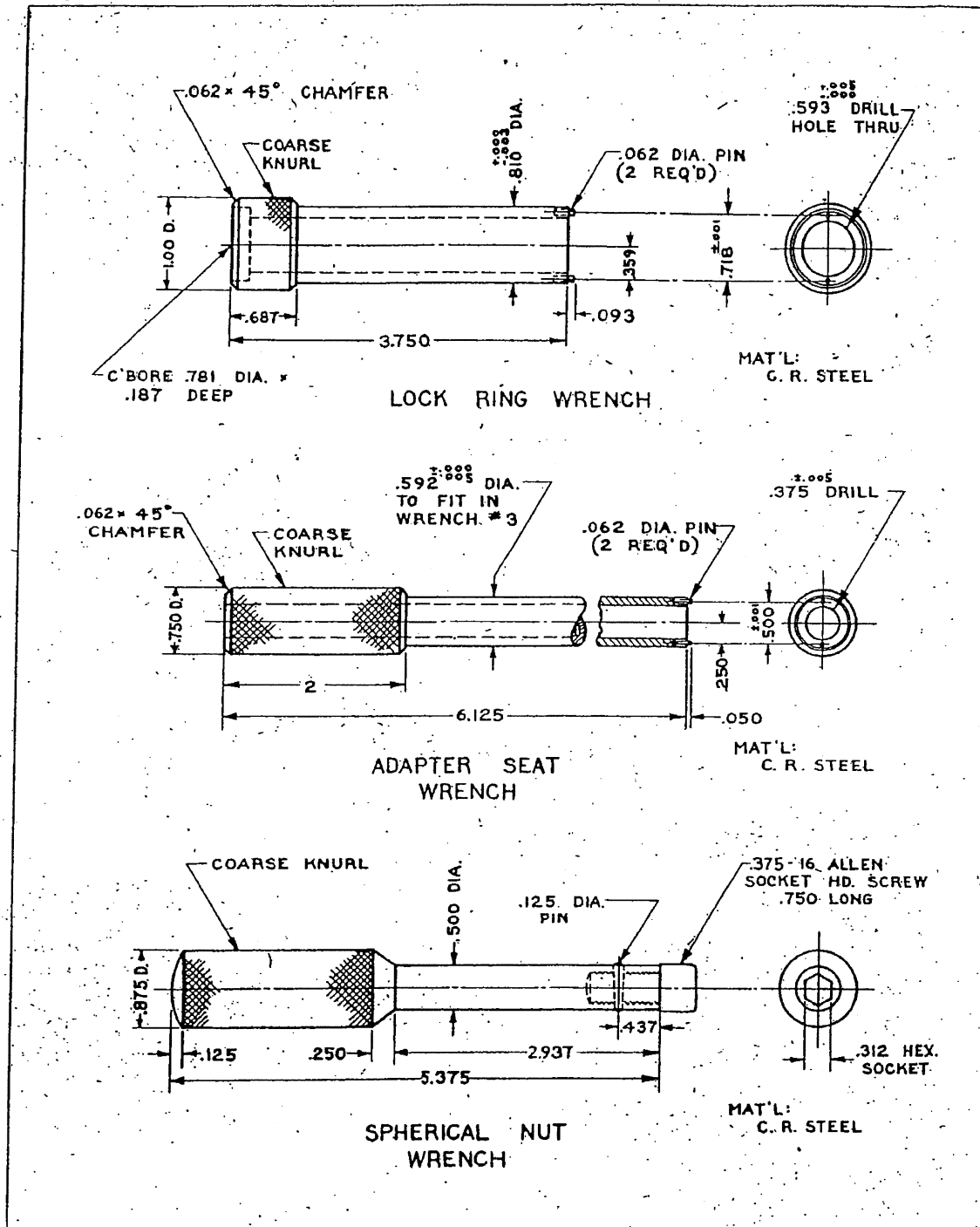


Figure 11—Service Tools

3. MAINTENANCE.

a. GENERAL.—It will be necessary to collimate the instrument if any of the following operations are performed:

- (1) Replacement of the bubble chamber assembly.
- (2) Replacement of the fixed prism assembly.

- (3) Replacement of the field prism assembly.
- (4) Replacement of the objective lens assembly.
- (5) Replacement of the reflector.
- (6) Replacement of the glass chamber housing assembly.
- (7) Replacement of the filters.

(8) Replacement of the sector, or the disassembly of the instrument to the stage that would necessitate its removal.

b. COLLIMATION.—Collimation consists of aligning the instrument so that the bubble is in focus on the reflector and also is in the exact center of the field of view when the instrument is held in a level position. The natural horizon, the field horizon and the bubble artificial horizon must be in exact alignment when the counter on the instrument reads 00 degrees, 0 minutes.

(1) ALIGNMENT OF THE FIELD HORIZON WITH NATURAL HORIZON.—Should the drive assembly or counter assembly have been disassembled, they can be reassembled and aligned in conjunction with this operation. Sight past the fixed prism, and at the same time turn the pinion of the worm bracket assembly until the views are in line. When this has been accomplished, the field horizon and the natural horizon are aligned.

(2) ATTACHING THE COUNTER ASSEMBLY.—Attach counter assembly to frame so that it reads exactly 00 degrees, 0 minutes. To accomplish this, it may be necessary to loosen the Allen headless set screw in the coupling with a No. 4 Allen wrench and turn the coupling independently of the shaft, while holding the shaft by its slotted end with a screw driver. Tighten set screw again and attach counter with the two counter mounting screws.

(3) ATTACHING THE DRIVE ASSEMBLY.—Turn the control knob of the drive assembly in a clockwise direction until it reaches its stop. Then turn the pinion of the worm bracket assembly counterclockwise until the counter reads 98 degrees 0 minutes (a movement of only 2 degrees), and then attach the drive assembly. The counter assembly should, on the first approximation over-travel 2 degrees 0 minutes at each end of the complete cycle, the range of which is from 00 degrees 0 minutes to 90 degrees 0 minutes. In other words, the complete movement from stop to stop should start at 98 degrees 0 minutes (which represents 2 degrees over-travel from 00 degrees 0 minutes) and proceed through one complete cycle to 90 degrees 0 minutes, and then continue on to 92 degrees 0 minutes, at which point the stop should be reached. If this does not occur, the timing procedure must be repeated.

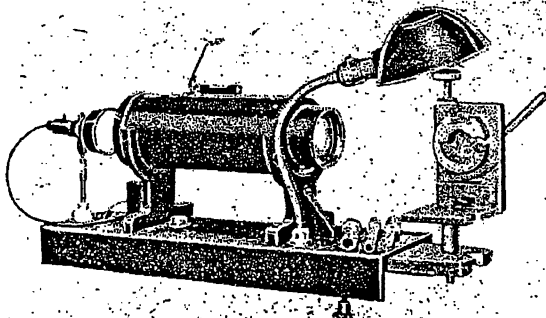


Figure 12—Collimation Fixture—Lens Adjustment

(4) ALIGNMENT OF THE OBJECTIVE LENS ASSEMBLY. (See figures 12 and 13.)—Before performing the following adjustments, it is assumed that the alignment of the field horizon with the natural horizon has been accomplished according to the preceding instructions.

(a) Remove the fixed prism assembly.

(b) Remove the housing cover by unscrewing it all the way.

(c) Remove the eye guard assembly and in its place substitute the telescope.

(d) Adjust the bubble until it is approximately 5/64 inch in diameter.

(e) Mount the sextant in the mounting fixture, making certain that the center of the exit pupil (telescope) is lined up with the center of the target in the collimating tube, and that the sextant is in a level position.

(f) Loosen the lock ring located in the glass chamber housing assembly, using the special lock ring wrench.

(g) Using the special adapter seat wrench, turn the adapter seat, which is located above the lock ring, in either a clockwise or counterclockwise direction, causing the objective lens assembly to be either raised or lowered. Raise or lower the lens until the bubble is in sharp focus. Move the eye up and down a small distance and if there is no parallax, i.e., no relative motion between the target and the bubble, the instrument is properly focused. Tighten the lock ring. If parallax is still present, the sextant must be readjusted to eliminate it.

(h) Loosen the spherical nut, located on the stud of the objective lens assembly, by means of the special spherical nut wrench. Pivot the lens assembly until the bubble is centered in relation to the lines on the target in the collimating tube.

(i) Tighten the spherical nut.

(j) Recheck bubble for location and parallax, to verify accuracy of foregoing adjustments.

(k) Remove the sextant from the mounting fixture.

(l) Add the fixed prism assembly.

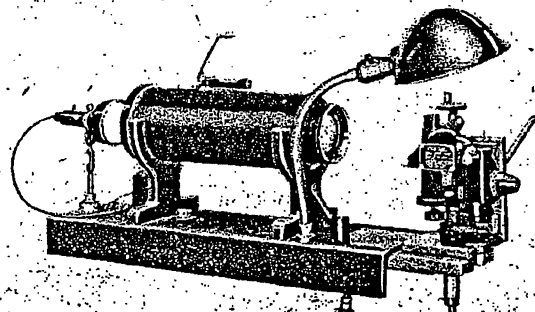


Figure 13—Prism Adjustment

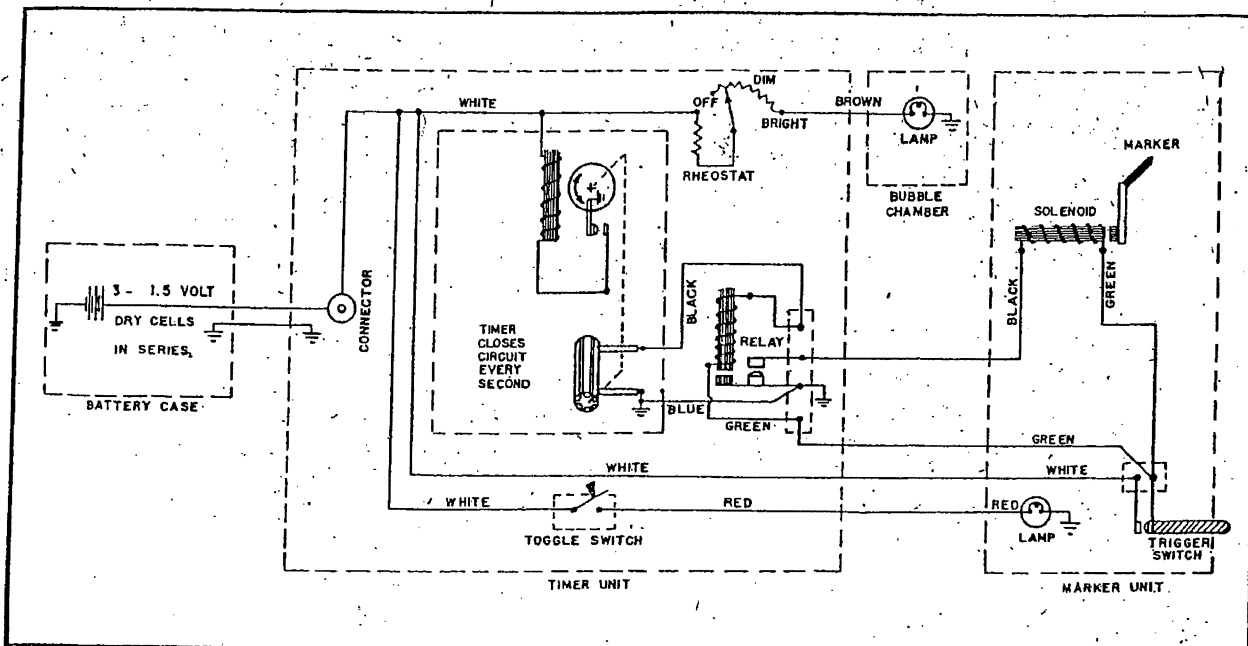


Figure 14—Wiring Diagram

(m) Set the counter to 00 degrees 0 minutes by turning the control knob.

(n) Lower the mounting fixture in such a manner that with the sextant attached, the field prism is in line with the collimating tube.

(o) Center the bubble in relation to target in the collimating tube, by adjusting the fixed prism with the three set screws located on the under side of it, using the special No. 6 Allen wrench provided.

c. INDEX CORRECTION.

(1) GENERAL.—If the bubble chamber is removed or replaced without optical calibration, there is a possibility of a change in index error which may amount to from 15 to 25 minutes. Pending complete adjustment at a maintenance depot, the new index correction should be obtained as soon as possible. If no natural horizon, such as exists on the sea, is available for reference, the following methods of obtaining this correction are suggested.

(2) DAY OBSERVATIONS.—Make at least twenty observations of the altitude of the sun, and note the time of each observation. Plot the observed altitudes against time, and on the same sheet plot the computed altitudes of the sun for that same period of time. Then draw smooth curves through the two series of points; the vertical distance between the curves is the index correction.

(3) NIGHT OBSERVATIONS.—Observe the altitude of a number of different stars of various altitudes and compare these values with the computed values obtained from the navigation tables. Average the differences between the two sets of readings; this average is the index correction.

d. ELECTRICAL SYSTEM. (See figure 14.)—The wiring of the electrical system can be checked by referring to the wiring diagram.

e. CLEANING.

(1) PRISMS.—Turn the control knob until the counter reads 00 degrees and carefully snap off the shade by pushing up on it while slowly rocking it from side to side. Then turn the control knob to 90 degrees and clean the field prism and the fixed prism with light tissue or a well-washed, clean pocket handkerchief. When replacing the shade, insert it between the fixed

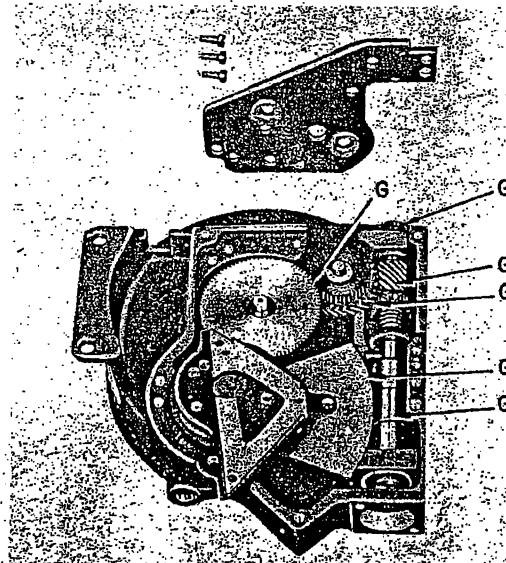


Figure 15—Lubrication

prism and the head of the mounting screw before snapping it on.

CAUTION

Spinning the control knob rapidly, especially by striking it with the palm of the hand, must be avoided; this action exerts a sudden force through the mechanism which may cause damage to the counter mechanism.

(2) REFLECTOR.—The reflector, being enclosed in the glass chamber housing assembly, may be cleaned by removing the eye guard and brushing with a soft brush. The filters may be moved down, to reach the other side of the reflector.

(3) GLASS CHAMBER LENS.—To clean the glass chamber lens in the objective lens assembly, unscrew and lower the housing cover. Through the aperture which is exposed, clean the lens with a soft brush or with lens tissue.

4. LUBRICATION.

(See figure 15.)

a. A very thin film of grease should be applied at the points indicated by "G" on the illustration or where otherwise stipulated. The grease specified is "Grease, Lubricating, Low Temperature, Specification No. AN-G-3a, Special for Camera Use." (Stock No. 7500-242700)

b. The sextant is thoroughly lubricated at the time of assembly and should not require any periodic lubrication. But, if the instrument is disassembled for repair, the following lubrication instructions should be observed:

(1) Apply a thin film of grease to the tapered shaft of the sector assembly.

(2) Apply a very thin film of grease to the teeth of the sector and to the worm.

(3) Apply a thin film of grease to all gear teeth

5. SERVICE TROUBLES AND REMEDIES.

TROUBLE	PROBABLE CAUSE	REMEDY
SECTOR ASSEMBLY BINDS	Taper shaft of sector assembly binding in bushing.	Clean and lubricate thoroughly the taper shaft and bushing.
PRISMS NOT IN ALIGNMENT WITH ZERO READING OF COUNTER	Counter coupling loose. Fixed prism jarred out of place.	Reset and tighten headless set screw with No. 4 Allen Wrench. Refer to section V, paragraphs 3. b. and 3. b. (2).
MECHANISM JAMMED	Counter drum broken by spinning control knob at too great a speed.	Replace counter. Refer to section V, paragraph 3. b.
FIXED PRISM INTERFERES WITH FIELD PRISM	Incorrect setting of drive assembly.	Detach the drive assembly and reattach. Refer to section V, paragraphs 3. b. and 3. b. (3).
DRIVE ASSEMBLY BINDING	Drive gears meshed too close with pinion of worm assembly.	Loosen the binding head and flat head screws, then reset drive assembly and tighten screws.
COUNTER NOT READING THE SAME AS THE PREDETERMINED ANGLE OF OBJECT SIGHTED	Spherical nut loose. Replacement of bubble chamber, without collimation.	Realign the objective lens assembly and tighten. Refer to section V, paragraphs 3. b. and 3. b. (4).
BUBBLE MOVING AROUND FIELD	Adapter nut and lock ring loose.	Realign the objective lens assembly and tighten. Refer to section V, paragraphs 3. b. and 3. b. (4).
BUBBLE CHAMBER LIGHT FAILS	Weak battery. Bulb burned out. Rheostat connection loose.	Replace battery. Replace bulb. Mechanically anchor and resolder.
MARKER LIGHT FAILS	Weak battery. Bulb burned out.	Replace battery. Replace bulb.
AUTOMATIC MARKER FAILS TO OPERATE	Weak battery. Poor connection of plug and socket. Break in wiring. Trigger switch not closing circuit. Marker solenoid not operating. Relay not operating. Electric timer out of order.	Replace battery. Clean socket and plug and insert plug correctly. Check wiring according to wiring diagram. (See figure 14.) Resolder all loose connections. Clean and adjust contact points. Clean and adjust contact points on relay. Check electric timer. Replace electric timer.

SECTION VI

DISASSEMBLY, INSPECTION, REPAIR, AND REASSEMBLY

1. OVERHAUL TOOLS REQUIRED.

No overhaul tools are required other than the regulation kit.

2. DISASSEMBLY.

a. GENERAL.

(1) When disassembling various units for inspection and repair, care should be taken in noting the specific order in which the various assemblies and sub-assemblies are taken apart with respect to their details.

(2) Throughout disassembly of the sextant, all assemblies, subassemblies, and details should be carefully handled. The unmeshing of gears should be given special attention.

(3) The structural systems of assemblies and related subassemblies, and the positions and the engagements of components are the factors that determine the order of methodical disassembly.

b. TIMER ASSEMBLY AND MARKER ASSEMBLY REMOVAL. (See figure 16.)—Remove from the frame assembly, two fillister-head screws (22), contact spring (21) and socket (20). Remove from the bubble chamber assembly (14), two fillister-head screws, sunshade bracket assembly (13), mount, and bubble light socket. Remove the three binding head screws and housing cover assembly from the marker housing assembly (4) and then unscrew the round-head screw, and lock washer. Remove from the frame assembly (1), fillister-head screw (5), lock washer (6), conduit clamp and marker housing assembly (4). Remove from the frame assembly (1), four binding head screws (17).

c. DRIVE ASSEMBLY REMOVAL. (See figure 16.)—Remove clamping disc, marking disc, two disc mounting screws and recording disc. Then remove flathead screw (24) and binding head screw (25).

d. COUNTER ASSEMBLY REMOVAL. (See figure 16.)—Remove two counter mounting screws (2) and counter (3).

e. GLASS CHAMBER HOUSING ASSEMBLY AND BUBBLE CHAMBER ASSEMBLY REMOVAL. (See figure 16.)—Remove two glass chamber mounting screws (7) and two lock washers, and glass chamber housing.

f. FIELD PRISM ASSEMBLY REMOVAL. (See figure 16.)—Snap off shade, and remove three prism mounting screws (9). Then remove field prism plate (12), prism cushion (11), field prism (8) with two corks and field prism shield (10) attached.

g. FIXED PRISM ASSEMBLY REMOVAL. (See figure 16.)—Remove two fixed prism mounting screws (18), and fixed prism assembly (19).

b. FRAME ASSEMBLY. (See figure 17.)—Remove seven fillister-head screws (6), lower main frame cover (8) and upper main frame cover (5).

i. SECTOR ASSEMBLY. (See figure 17.)—Rotate worm assembly (14) to position sector assembly (7) in upper half of frame assembly (18) to facilitate its removal. Remove flathead screw (2), washer (3) and dowel pin (1), then very carefully lift up sector assembly and when it is clear, rotate it counterclockwise one revolution to relieve the tension of the sector spring (15) and facilitate its removal. Sector spring (15) underneath may impede this operation and great care should be exercised to prevent damage to sector and spring in the removal.

j. DIAL SHAFT ASSEMBLY. (See figure 17.)—To remove the dial shaft assembly, it is first necessary to remove the plug screw (17). Rotate the worm assembly (14) to bring the narrow end of the taper pin (4) in the idler gear (12) into position and drive it out. Then remove the three mounting screws (10) and take off the outboard plate (9).

CAUTION

Do not take off the outboard plate before driving the taper pin out of the idler gear, as this would result in bending the dial shaft due to its being supported on one side only.

Remove the idler gear (12) and slip out the dial shaft (20) through the opposite side of the frame assembly (18).

k. GEAR ASSEMBLY. (See figure 17.)—Before removing the gear assembly (13) it is necessary to remove the dial shaft assembly. Then lift out the gear assembly (20). The gear assembly includes a spiral gear shim (16) on the spiral gear end of the shaft and an idler gear shim (11) on the idler gear end of the shaft.

l. WORM ASSEMBLY. (See figure 17.)—Remove three mounting screws (19) and detach worm assembly (14).

m. DRIVE ASSEMBLY. (See figure 18.)—Remove three flathead screws (9) and lift off cover assembly (1). Lift off drive gear stop (2). Drive out taper pins to further disassemble the drive shaft assembly.

n. FIXED PRISM ASSEMBLY. (See figure 22.)—Remove three binding head screws (6) which will free the upper (4) and lower fixed prism clamps (5), which in turn will release the fixed prism (7) and fixed prism adjusting plate (8).

o. BUBBLE CHAMBER ASSEMBLY. (See figure 21.)—Remove four fillister-head screws (2) and detach the bubble chamber assembly (4) from glass chamber housing assembly (8). The bubble chamber assembly is a sealed unit and must not be disassembled. If in need of repair it must be replaced as a unit.

p. SUNSHADE BRACKET ASSEMBLY. (See figure 21.)—Upon removing the "S" pin (26), the sunshade bracket assembly (29) can be completely disassembled.

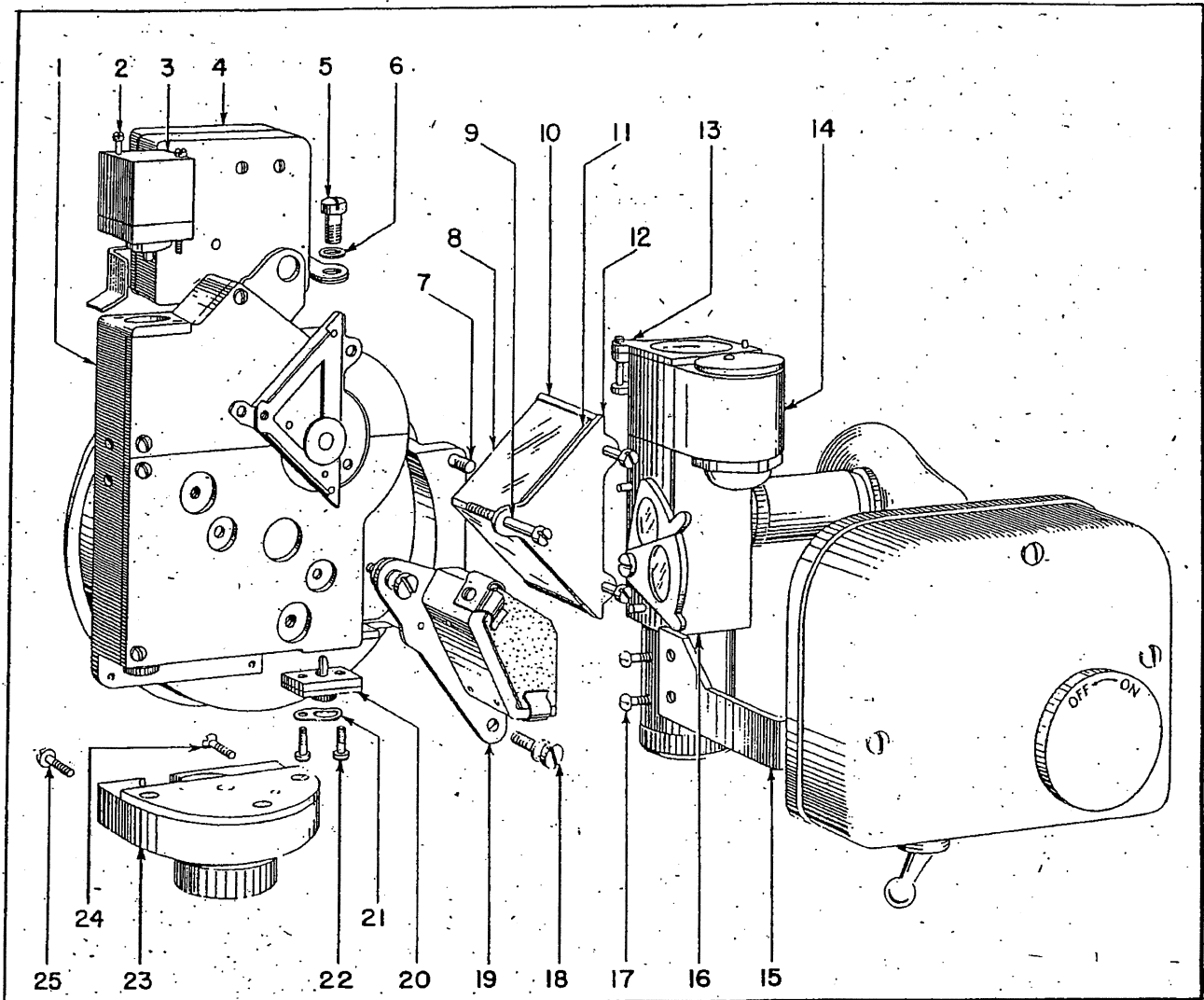


Figure 16—Major Assemblies

KEY TO FIGURE 16

- | | | | |
|--------------------------------|------------------------------|----------------------------------|-------------------------|
| 1 Frame assembly. | 8 Field prism | 14 Bubble chamber assembly | 20 Socket |
| 2 Counter mounting screw | 9 Field prism mounting screw | 15 Timer mounting plate assembly | 21 Contact spring |
| 3 Counter | 10 Field prism shield | 16 Glass chamber housing | 22 Fillister-head screw |
| 4 Market housing assembly | 11 Prism cushion | 17 Binding head screw | 23 Drive assembly |
| 5 Fillister-head screw | 12 Field prism plate. | 18 Fixed prism mounting screw | 24 Flathead screw |
| 6 Lock washer | 13 Sunshade bracket assembly | 19 Fixed prism assembly. | 25 Binding head screw |
| 7 Glass chamber mounting screw | | | |

g. GLASS CHAMBER HOUSING ASSEMBLY. (See figure 21.)

(1) Remove the two filter stop studs (23) by unscrewing them.

(2) To remove the filter, unscrew filter mounting stud (21) which will free the filters and washers.

(3) To remove the objective lens assembly unscrew housing cover (14), and using lock ring wrench un-

screw the lock ring (15). Then using adapter nut wrench, remove the objective lens assembly (11). By unscrewing the spherical nut (13) the assembly can be further disassembled.

(4) Using a spanner wrench unscrew the retainer nut (25). Pull out the upper reflector stop (5), and then remove the reflector (6). Next punch out dowel pin (10) and the lower reflector stop (7) can be taken out.

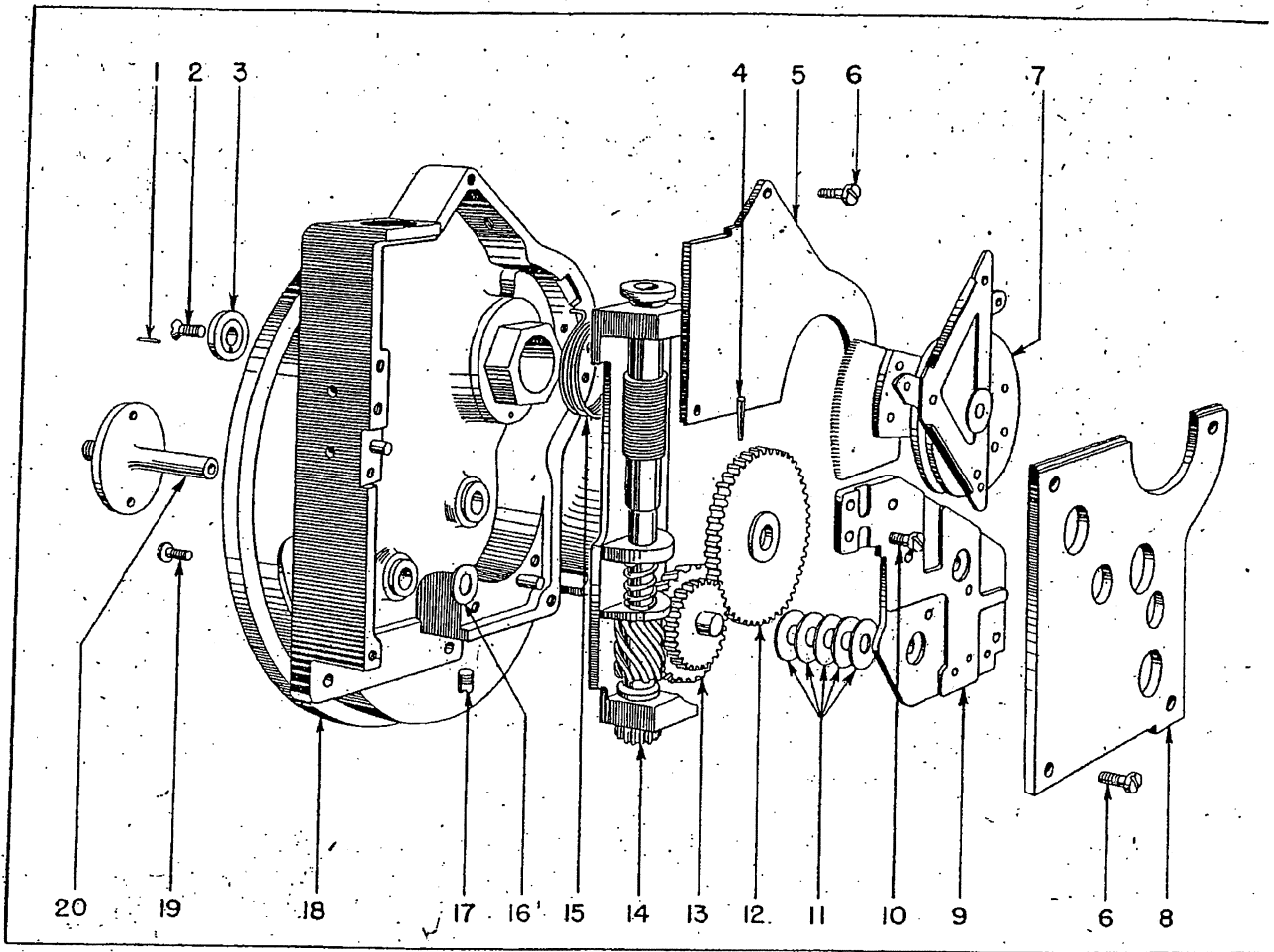


Figure 17—Frame Assembly

KEY TO FIGURE 17

- | | | |
|--------------------------|--------------------------|----------------------|
| 1 Dowel pin | 8 Lower main frame cover | 15 Sector spring |
| 2 Flathead screw | 9 Outboard plate | 16 Spiral gear, shim |
| 3 Washer | 10 Mounting screws | 17 Plug screw |
| 4 Taper pin | 11 Idler gear shim | 18 Frame assembly |
| 5 Upper main frame cover | 12 Idler gear | 19 Mounting screw |
| 6 Fillister-head screw | 13 Gear assembly | 20 Dial shaft |
| 7 Sector assembly | 14 Worm assembly | |

r. **TIMER ASSEMBLY.** (See figure 20.)—Remove three binding head screws (9) and take off the timer cover assembly (8). Then remove two fillister-head screws (14) and lock washers (15) to release the rheostat and switch assembly. The toggle switch (19) is removed from the switch mounting bracket by taking off the dust seal washer (18) and unscrewing the retaining nuts (17). The rheostat (20) is removed by unscrewing its retaining nut. The timer (7) is removed by unscrewing the two fillister-head screws (11) and lock washers (12). Then relay assembly (6) is removed by unscrewing the two fillister-head screws (1) and lock washers (2) and relay spacers (5). Unsolder wiring as required.

s. **MARKER HOUSING ASSEMBLY.** (See figure 19.)—Remove housing cover assembly (2) by unscrewing three binding head screws (1). Trigger (3) remains riveted to housing cover assembly (2). Remove two round-head screws (6) to release the combination armature hinge bracket (7), armature (5), and marking mechanism. From side of housing, remove two binding head screws (13) supporting the switch assembly. From the rear of the housing, remove two flat-head screws (14), supporting the solenoid (8). Remove two round head screws (9) and lock washers (10) which will free the light guide (11). Unsolder wiring as required.

3. CLEANING, INSPECTION, TESTING, AND REPAIR.

a. **CLEANING.**—For cleaning procedure refer to section V,3.e.

b. **INSPECTION.**

(1) If upon disassembly, inspection reveals that a part is in need of replacement which is a piece of a taper-pinned assembly or subassembly, the components of which are timed or located precisely with reference to angular or dimensional relationships, the whole assembly or subassembly should be replaced, even though only a single detail part of the taper-pinned assembly may be in need of replacement.

(2) This procedure is necessary due to the fact that in taper-pinned assemblies, only the dimensional and angular relationships of individual detail parts are held on shafts, etc., in exact correlation, and not the taper pins themselves; therefore, only complete assemblies are interchangeable.

(3) Individual detail parts are not interchangeable from one assembly or subassembly to another of the same kind if they are a definite part of a taper-pinned assembly or subassembly, because of the fact that in regulation-manufacturing practice, fixtures and jigs control the exact dimensional and angular positions of parts of assemblies for taper pinning. The locations of the taper pins themselves are not held in close enough control to allow them or separate details containing them to be interchanged without re-establishing correct correlation, which is only done with manufacturing jigs or fixtures or by other definite, regulation means of determination, in keeping with very close-tolerance machine-shop practice.

(4) Screws and their threads and taps, nuts, rivets, and washers should be carefully examined for wear; and if burred, should be replaced.

(5) Gears, shafts, and bearings should be inspected for wear and looseness.

(6) Prisms and mirrors and reflectors must be checked against damage, especially scratches or permanent smudges or smears.

(7) The counter assembly must be examined to ascertain that it functions properly.

c. **TESTING.**

(1) In testing the following assemblies, any showing signs of wear should be replaced. This is necessary to maintain the accuracy of the instrument.

(2) Test the bubble chamber assembly to see that it is in working order. Enlarge and reduce bubble to check its action.

(3) Test the drive assembly for wear and check the stopping feature.

(4) Test worm assembly for excessive play and examine profiles of worm teeth.

(5) Test sector assembly for wear and examine profiles of sector teeth.

(6) Test counter assembly for wear and check to see that it operates smoothly.

(7) Test operation and regulation of timer.

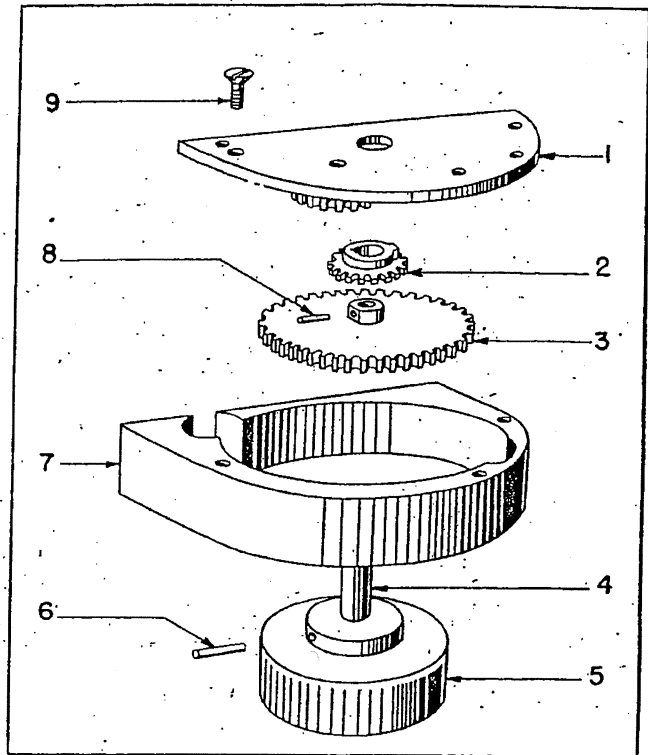


Figure 18—Drive Assembly

KEY TO FIGURE 18

- | | |
|-------------------|------------------|
| 1 Cover assembly | 6 Taper pin |
| 2 Drive gear stop | 7 Gear housing |
| 3 Drive gear | 8 Taper pin |
| 4 Drive shaft | 9 Flathead screw |
| 5 Control knob | |

(8) Test relay and check to see that it operates smoothly.

(9) Test solenoid for wear and check to see that it operates smoothly.

d. **REPAIR.**

(1) The assemblies indicated as complete replacements in the parts list should be replaced as such.

(2) Screws that have been treated with shellac (Shellac, Orange, Federal Specifications No. TF-S-271) before inserting in their recesses.

(3) Chipped mirrors or lenses cannot be satisfactorily repaired; they should be replaced with new ones.

(4) If the sector spring should be broken or if it should lose its tension, no attempt should be made to shorten the spring or unwind it. The result will not be satisfactory; rather, a new spring should be used.

4. REASSEMBLY.

a. **MARKER HOUSING ASSEMBLY.** (See figure 19.)—To the marker housing (12) attach the light guide (11) with two round-head screws (9) and lock washers (10). Then by inserting two flat-head screws (14) through the rear of the marker housing (12), at-

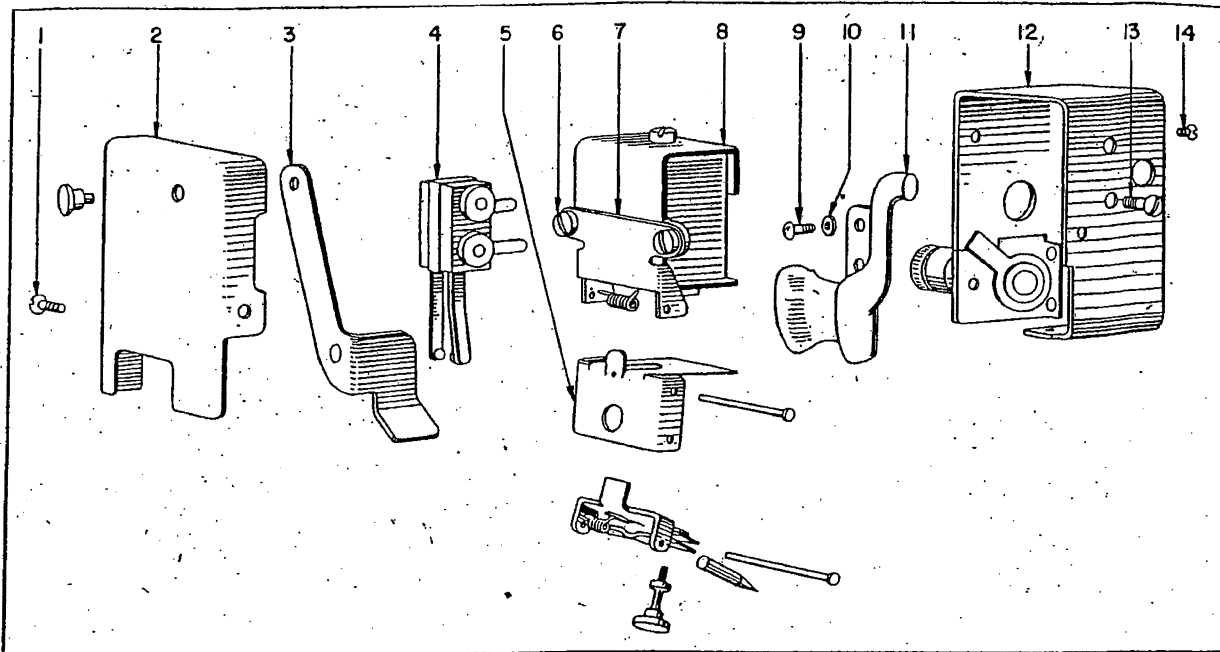


Figure 19—Marker Assembly

KEY TO FIGURE 19

- | | | |
|--------------------------|--------------------------|-----------------------|
| 1 Binding head screw | 6 Round-head screw | 11 Light guide |
| 2 Housing cover assembly | 7 Armature hinge bracket | 12 Marker housing |
| 3 Trigger | 8 Solenoid | 13 Binding head screw |
| 4 Switch assembly | 9 Round-head screw | 14 Flathead screw |
| 5 Armature | 10 Lock washer | |

attach the solenoid (8). By inserting two binding head screws (13) through the side of the marker housing (12), fasten the switch assembly (4). Next, with the two round-head screws (6), attach the armature hinge bracket (7), which supports the armature (5) and marking mechanism. (Refer to section VII for solenoid adjustment.) When attaching the housing cover assembly (2), the trigger (3) must be held to the extreme right, to enable the switch actuating pin to be inserted between the switch assembly (4) and the side wall of the marker housing (12). Fasten the housing cover assembly with three binding head screws (1).

b. TIMER ASSEMBLY. (See figure 20.)—Through the back of the timer mounting plate (3) insert the two fillister-head screws (1) with lock washers (2); add the two relay spacers (5) and attach the relay assembly (6). Attach the timer (7) with two fillister-head screws (11) and two lock washers (12). To the switch mounting bracket (16) attach the rheostat (20) with its retaining nut (13). Also attach the toggle switch (19) to the switch mounting bracket (16) with its retaining nuts (17) and add dust seal washer (18). Then fasten the switch mounting bracket (16) to the timer mounting plate (3) with two fillister-head screws (14) and two lock washers (15). Resolder wiring according to wiring diagram. (See figure 14.) When replacing the timer

cover assembly (8, figure 20) rotate the rheostat adjusting knob (10) until it seats in the slot in the rheostat shaft (4) before replacing the binding head screws (9) and tightening them.

c. GLASS CHAMBER HOUSING ASSEMBLY. (See figure 21.)

(1) Into the top of the glass chamber housing (8) insert lower reflector stop (7) until it reaches the seat and add dowel pin (10). Insert reflector (6) until it seats, add upper reflector stop (5) and retainer nut (25) using a spanner wrench.

(2) Into the bottom of the glass chamber housing (8) add the objective lens assembly (11) which is supported by the adapter nut (16) in conjunction with the auxiliary spacer (12) and spherical nut (13). Add lock ring (15) and housing cover (14).

(3) To the filter mounting stud (21) add steel washer (19), filter (dark) (22), two blued spring steel washers (20) back to back, filter (light) (24), steel washer (19), black aluminum washer (18) and lock washer (17) and screw the combination into the glass chamber housing (8). Then screw in the two filter stop studs (23).

d. SUNSHADE BRACKET ASSEMBLY. (See figure 21.)—To the bracket shaft (1) attach spring washer (28), sunshade assembly (3), washer (27), bracket (29)

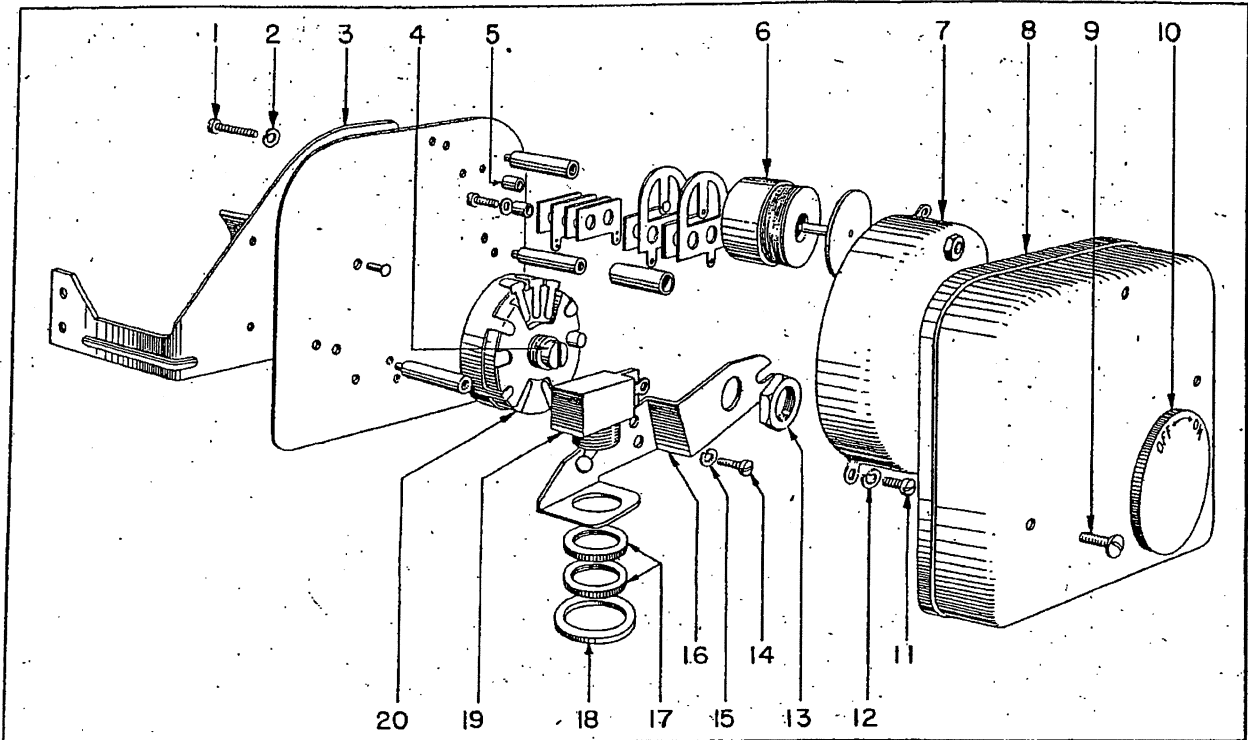


Figure 20—Timer Assembly

KEY TO FIGURE 20

- 1 Fillister-head screw
- 2 Lock washer
- 3 Timer mounting plate
- 4 Rheostat shaft
- 5 Relay spacer
- 6 Relay assembly
- 7 Timer

- 8 Timer cover assembly
- 9 Binding head screw
- 10 Rheostat adjusting knob
- 11 Fillister-head screw
- 12 Lock washer
- 13 Retaining nut
- 14 Fillister-head screw

- 15 Lock washer
- 16 Switch mounting bracket
- 17 Retaining nut
- 18 Dust seal washer
- 19 Toggle switch
- 20 Rheostat

spring washer (28), washer (27) and hold them together with "S" pin (26) inserted through hole in end of bracket shaft (1).

e. BUBBLE CHAMBER ASSEMBLY. (See figure 21.)—Attach the bubble chamber assembly to the glass chamber housing assembly with four fillister-head screws (2).

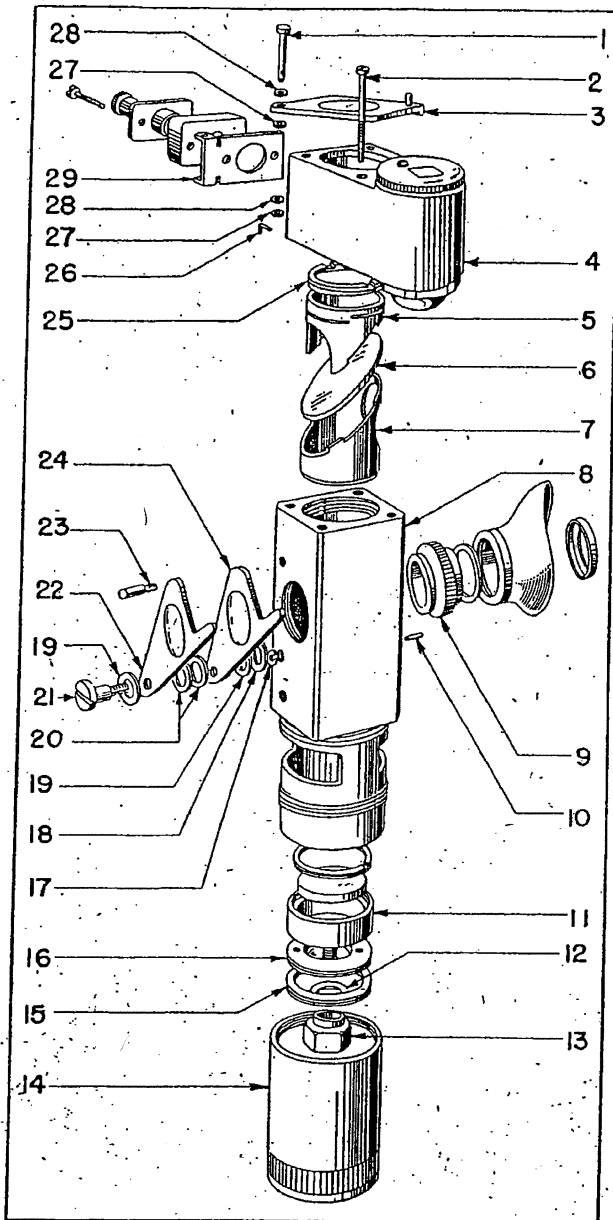
f. FIXED PRISM ASSEMBLY. (See figure 22.)—To the fixed prism holder (1) add the cork packing (2), adjusting plate (8) and two pieces of fish paper packing, fixed prism, lower clamp (5) and upper clamp (4), securing them with three binding head screws (6).

g. DRIVE ASSEMBLY. (See figure 18.)—To the drive shaft (4) add control knob (5), fasten with taper pin (6) and insert into gear housing (7), add drive gear (3) and fasten with taper pin (8). Over the hub of the drive gear (3) add drive gear stop (2) so that the teeth of same rest against the drive gear (3). Add cover assembly (1) and fasten with three flat-head screws (9).

b. WORM ASSEMBLY. (See figure 17.)—Attach the worm assembly (14) to the frame assembly (18) with three mounting screws (19).

i. GEAR ASSEMBLY. (See figure 17.)—When re-assembling the gear assembly (13), insert the .010-inch thick brass spiral gear shim (16) on the shaft next to the spiral gear. On the opposite end of the shaft, insert the proper combination of idler gear shims (11) of various thicknesses to allow only .002 inch end play when the outboard plate (9) is fastened down tight with its mounting screws (10).

j. DIAL SHAFT ASSEMBLY. (See figure 17.)—Insert the dial shaft (20) into its bearing, so that the large opening of the taper hole in the shaft faces the plug screw (17) hole. Add the idler gear (12) so that the large opening of the taper hole in the hub of the gear also faces the plug screw hole. Before proceeding to the next operation, a special tool is necessary. It can be made from a 5-inch length of brass tubing having an outside diameter of .125 inch and an inside diameter of approximately .079 inch and a 6-inch length of .062-inch diameter drill rod. Place the large end of the taper pin (4) in the brass tubing; then pass it through the plug screw hole in the casting and into the tapered hole in the gear and shaft. Using the drill rod, press the taper pin (4) into position. Then using a 5-inch



KEY TO FIGURE 21

- 1 Bracket shaft
- 2 Fillister-head screw
- 3 Sunshade assembly
- 4 Bubble chamber assembly
- 5 Upper reflector stop
- 6 Reflector
- 7 Lower reflector stop
- 8 Glass chamber housing assembly
- 9 Eyeguard assembly
- 10 Dowel pin
- 11 Objective lens assembly
- 12 Auxiliary spacer
- 13 Spherical nut
- 14 Housing cover
- 15 Lock ring
- 16 Adapter nut
- 17 Lock washer
- 18 Black aluminum washer
- 19 Steel washer
- 20 Steel washers
- 21 Filter mounting stud
- 22 Filter (dark)
- 23 Filter stop stud
- 24 Filter (light)
- 25 Retainer nut
- 26 "S" pin
- 27 Washer
- 28 Spring washer
- 29 Sunshade bracket

Figure 21—Glass Chamber Housing and Related Assemblies

length of 5/32-inch diameter brass rod, gently tap the taper pin (4) in as far as possible.

CAUTION

Do not drive tight at this point or the dial shaft (20) will bend because it is being supported on only one side. Position the outboard plate (9) on the frame assembly by means of the dowel pins and make certain that the two bearings in it will fit snugly around their respective shafts. Secure with the three

mounting screws (10). After this has been done, drive the taper pin (4) in tight. Add the plug screw (17).

k. SECTOR ASSEMBLY. (See figure 17.)

(1) Before installing the sector assembly remove the outboard plate (9) for convenience.

(2) Check the tips of the sector spring for burrs and remove by filing. Test the depth of the holes into which the spring is to seat, by inserting the spring individually, and make sure the spring ends are exactly at right angles to the coils to insure proper seating.

(3) Obtain a piece of thin string approximately twelve inches long which will be used to hold the tensioned sector spring in position in the assembly procedure. Fold the string in half and thread the loop through the binding head screw hole directly next to the spring seating hole in the frame.

(4) Insert the long end of the sector spring into the seating hole in the frame.

(5) Wind the spring one complete revolution and hold it in the wound position by encircling the free end with the loop of the string and holding the string taut.

(6) Check to make sure that the coils of the sector spring are parallel and that the top coil does not protrude over the face of the bushing, which would prevent the tapered shaft from seating completely.

(7) Insert the sector assembly carefully, positioning it to receive the free end of the sector spring into the hole in the sector.

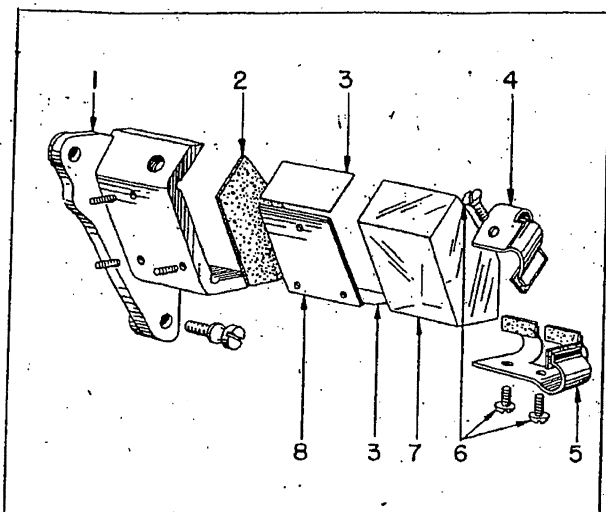


Figure 22—Fixed Prism Assembly

KEY TO FIGURE 22

- 1 Fixed prism holder
- 2 Cork packing
- 3 Packing
- 4 Upper fixed prism clamp
- 5 Lower fixed prism clamp
- 6 Binding head screw
- 7 Fixed prism
- 8 Fixed prism adjusting plate

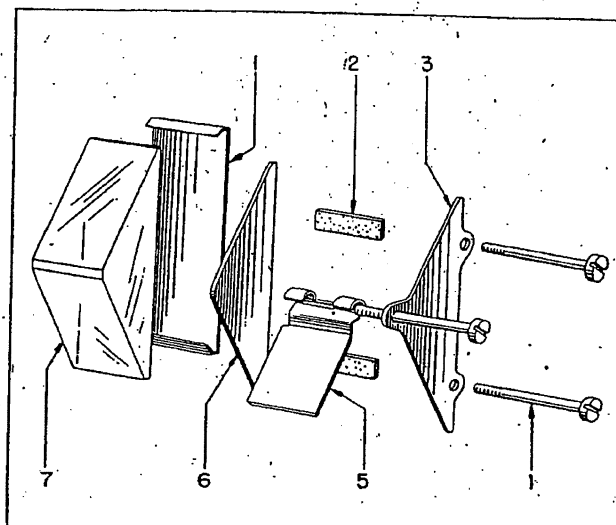


Figure 23—Field Prism Assembly

KEY TO FIGURE 23

- 1 Shield
- 2 Cork
- 3 Field prism plate
- 4 Prism mounting screw
- 5 Shade
- 6 Cushion
- 7 Field prism

(8) When the sector is seated, remove the string by slipping it out. Rotate the worm assembly counter-clockwise to check the reassembly. Examine the coils of the spring to make sure they are parallel, and if necessary use a small screw driver to push up the sector end of the spring so that it seats completely in the hole.

(9) Add the washer (3), dowel pin (1), and flat-head screw (2) to the tapered shaft.

(10) Replace the outboard plate.

l. FRAME ASSEMBLY. (See figure 17.)—Attach the lower main frame cover (8) and the upper main frame cover (5) with seven fillister-head screws (6).

m. FIXED PRISM ASSEMBLY INSTALLATION. (See figure 16.)—Attach fixed prism assembly with two mounting screws (18).

n. FIELD PRISM ASSEMBLY INSTALLATION. (See figure 23.)—Position field prism with two corks (2) and shield (1) attached, on sector assembly. Add prism cushion (6), field prism plate (3) and fasten with three prism mounting screws (4). Insert shade (5) between fixed prism and upper fixed prism mounting screw and attach it to the center field prism mounting screw (4).

o. GLASS CHAMBER HOUSING ASSEMBLY AND BUBBLE CHAMBER ASSEMBLY INSTALLATION. (See figure 16.)—Attach this assembly to the frame assembly with two glass chamber mounting screws (7) and two lock washers.

p. COUNTER ASSEMBLY INSTALLATION. (See figure 16.)—Attach counter assembly with two mounting screws (2). Refer to section V,3,b.

q. DRIVE ASSEMBLY INSTALLATION. (See figure 16.)—Attach drive assembly (23) with flathead screw (24) and binding head screw (25). (Refer to section V,3,b.) Then attach recording disc to dial shaft using two disc mounting screws. Add marking disc and clamping disc.

r. TIMER ASSEMBLY AND MARKER ASSEMBLY INSTALLATION. (See figure 16.)—Position the timer mounting plate assembly (15) and fasten with four binding head screws and marker housing cover assembly and position marker housing assembly (4) and fasten with binding head screw and lock washer and fillister-head screw (5) and lock washer (6) which is also used to hold down the conduit clamp. Next attach socket (20) and contact spring (21) with two fillister-head screws (22). Then, to the side of the bubble chamber assembly, position sunshade bracket assembly (13), mount and bubble light socket and fasten with two fillister-head screws. When attaching the marker housing cover assembly the trigger must be held to the extreme right, to enable the switch actuating pin to be inserted between the switch assembly and the side wall of the marker housing assembly (4). Fasten the marker housing cover assembly with three binding head screws.

SECTION VII TEST PROCEDURE

1. After overhaul, the instrument should be tested to check that the electrical mechanisms operate and the lamps light. The instrument should operate on a minimum voltage of 3.5 volts, and to establish this fact, a 3.5-volt source of power should be established and the instrument tested. This test will assure maximum performance from the regular battery case comprising three 1.5-volt dry cells, totaling 4.5 volts, when fresh dry cell batteries are employed.

2. Should the instrument fail to operate electrically after overhaul, test the seating of the two binding head screws which fasten the cover and mounting plate assembly to the frame assembly for proper electrical grounding, by cleaning the seating surfaces. If the

marker light fails, check the grounding of the large fillister-head clamp screw.

3. Test the solenoid and marker mechanism for proper operation. For most effective operation the solenoid armature should be adjusted to a clearance of .040 in. when measured at the center of the core when energized. When the armature is held exactly parallel with the core, the air gap should be .010 inch. The latter adjustment is made by loosening, adjusting the clearance and tightening the armature hinge bracket screws. By removing the two flat head screws from the rear of the marker housing the entire solenoid and marker mechanism can be withdrawn for adjustment.

4. Test the instrument for alignment by collimation. (Refer to section V, 3.b.)

PARTS CATALOG
SECTION VIII
INTRODUCTION

1. This parts catalog lists and describes the parts for the type A-10A Aircraft Sextant, manufactured by the Fairchild Camera and Instrument Corporation, Jamaica, New York.
2. The Group Assembly Parts List, Section IX, consists of a breakdown of the complete instrument in subassemblies and detailed parts. Each assembly listed is directly followed by its component parts properly indented to show their relationship to the assembly. The quantities specified are those used at the location shown and not necessarily the total number used per instrument. Refer to the Numerical Parts List, Section X, for the total quantities.
3. The Numerical Parts List, Section X, consists of part numbers in numerical order, exclusive of standard part numbers which are shown in Section XI. The column headed "Group List Page No." refers to pages of the Group Assembly Parts List. The column headed "Total Quantity" indicates total number used per instrument.
4. The Standard Parts List, Section XI, consists of Fairchild, Army Air Forces, and AN standard part numbers in numerical order and total quantities used per instrument.
5. The asterisks (*) denote parts which are not procurable separately. When replacements of parts, indicated by asterisks are found necessary, it is recommended that assemblies of which they are components, should be ordered rather than the individual parts. This is due to the fact that these individual parts can only be fabricated properly, with regard to their relationship to the other parts of the assembly, at the time of manufacture.

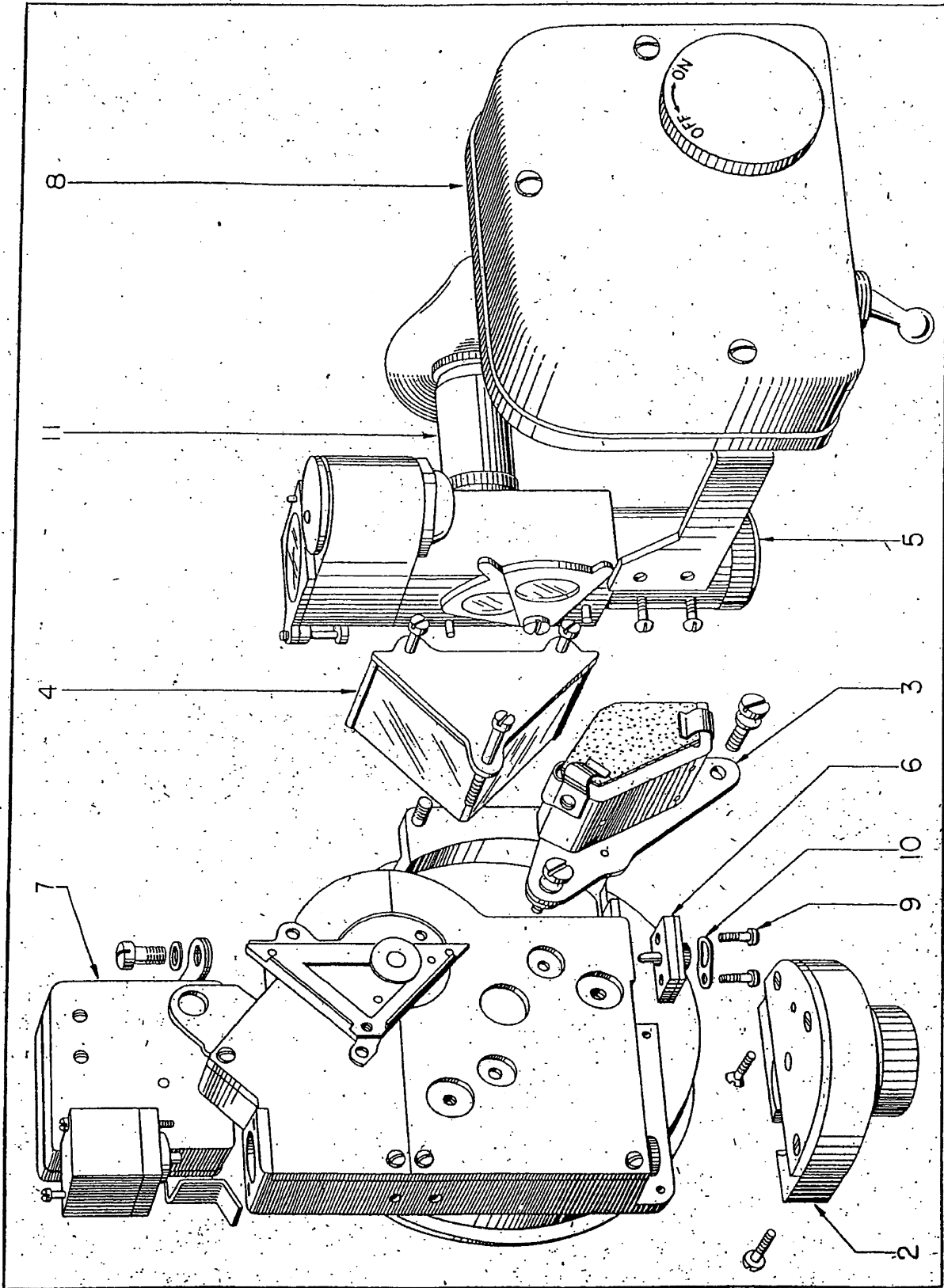


Figure 24—Complete Sextant Assembly