CONTENTS

dRs INTERMITTENT DRIVE

Prediction Follow-up Mounting Plate, page 694

NOTE:
The *dRs* intermittent drive can be removed without removing the follow-up mounting plate if the *Co* receiver is removed.
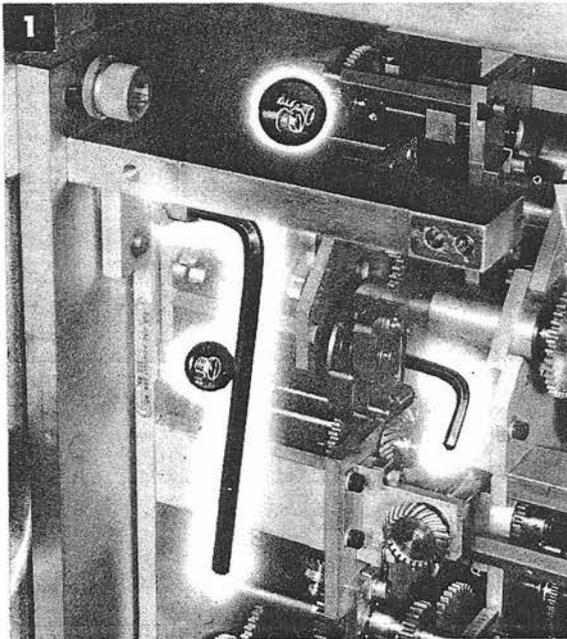
1   Remove the large screw securing the intermittent drive plate.

Back out the two screw dowels and remove the three screws securing the intermittent drive.

2 Tilt the intermittent drive to clear the surrounding gearing and remove it.
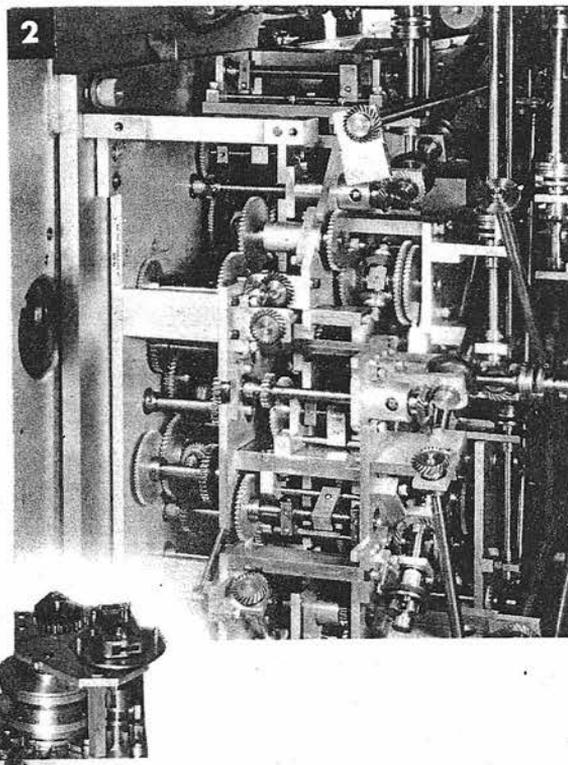
To reinstall the *dRs* intermittent drive, reverse the removal procedure.

Reinstall the *Co* receiver.

Readjust clamps **A-181** and **A-179**.

Run tests.

If the prediction follow-up mounting plate has been removed, reinstall it.

Readjust clamp **A-181**. Make readjustments listed in the reinstallation of the plate, page 695.

BEARING FILTER ASSEMBLY
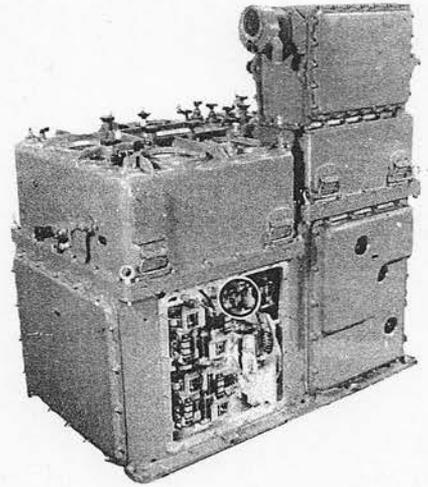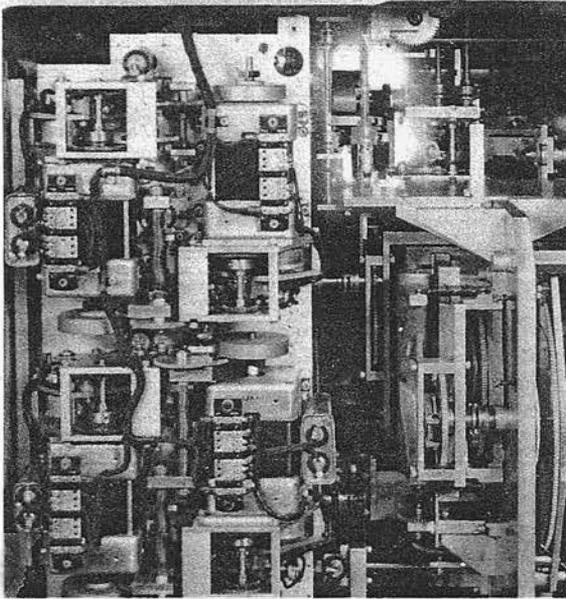
Co Receiver, page 666
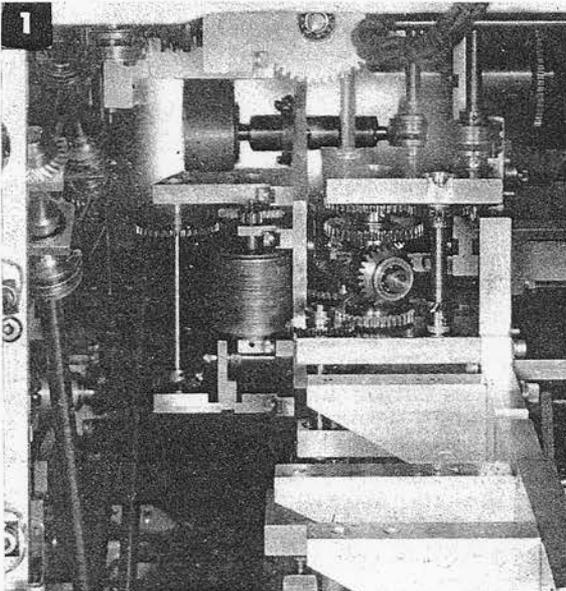
1 Loosen clamp A-209.
Remove the two screws securing the adapter for the large damper shaft.
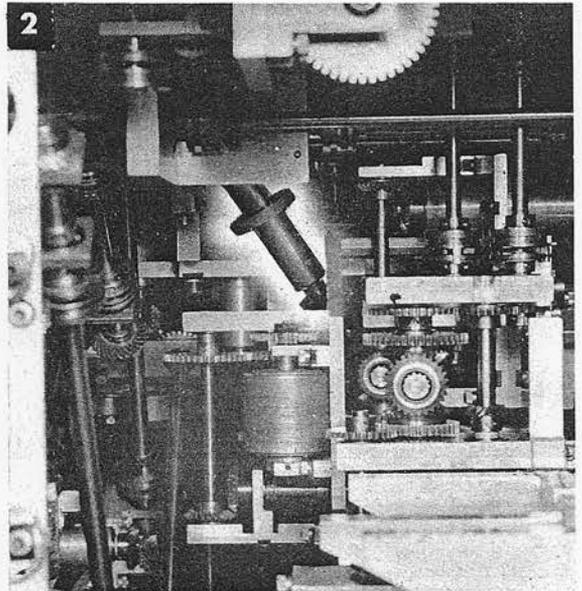
2 Tilt the assembly.
Remove the damper and then the shaft.

3 From the opposite side of the computer, remove clamp A-225 and the gear on which it is mounted.

Remove the two screws securing the adapter above the gear just removed. Turn the flat side of the adapter toward the bearing filter.

Working from both sides of the computer, remove the screws securing the bearing filter to its mounting brackets.

Slide the entire assembly forward to clear the end of the shaft from which clamp A-225 was removed.
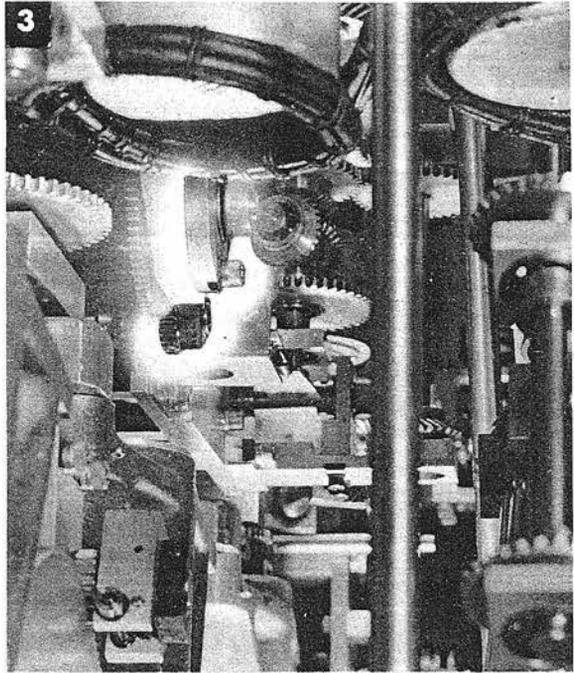
4 Remove the assembly from the Co side of the instrument.
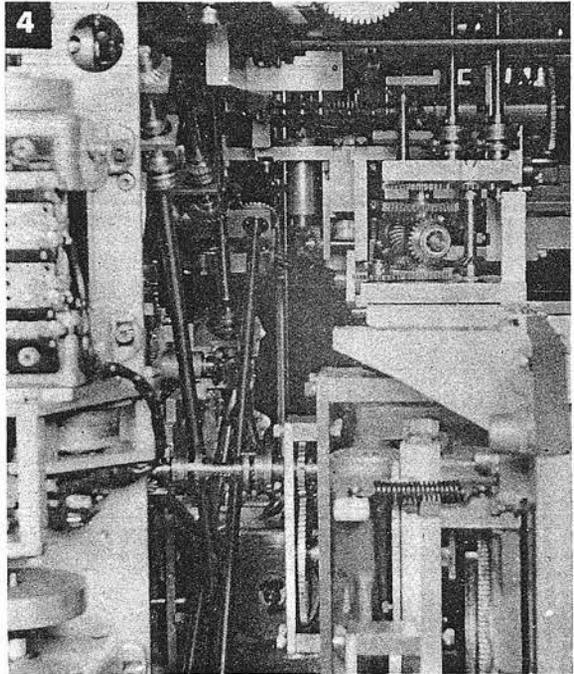
To reinstall the bearing filter assembly, reverse the removal procedure.

Reinstall the Co receiver.

Tighten clamps A-225 and A-209.

Readjust clamp A-179.

$\triangle cB'r$ and $\triangle cEb$
INDICATING TRANSMITTERS
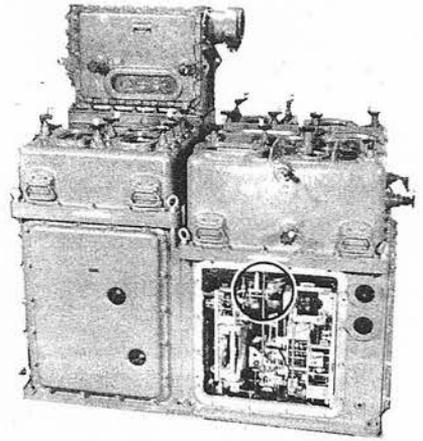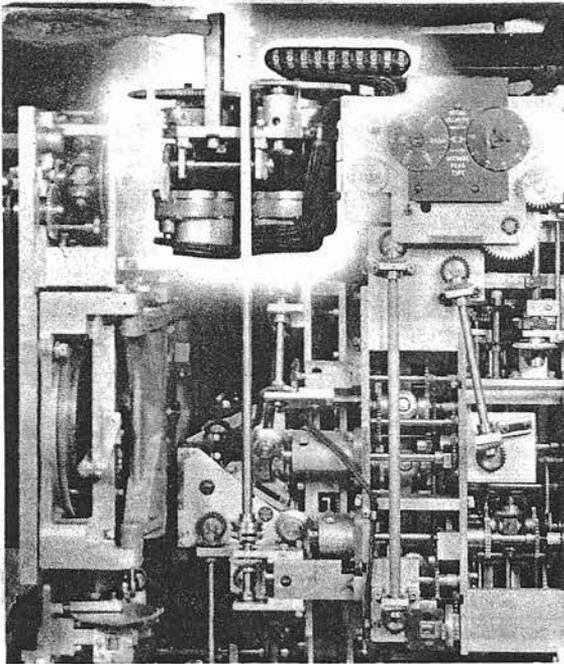
1 Remove the locking springs on the Xo coupling shaft, and on the shorter $\triangle cEb$ coupling shaft above the transmitter plate. Remove both shafts.

2 Remove the three screws securing the small gearing group to the upper corner of the integrator mounting plate.
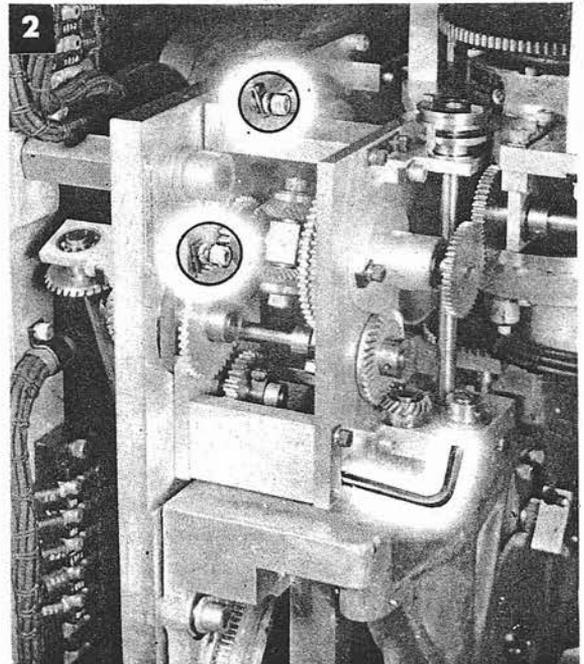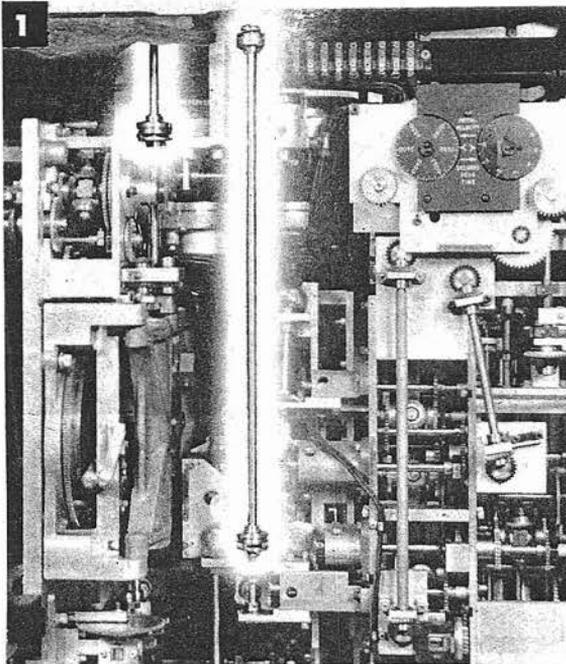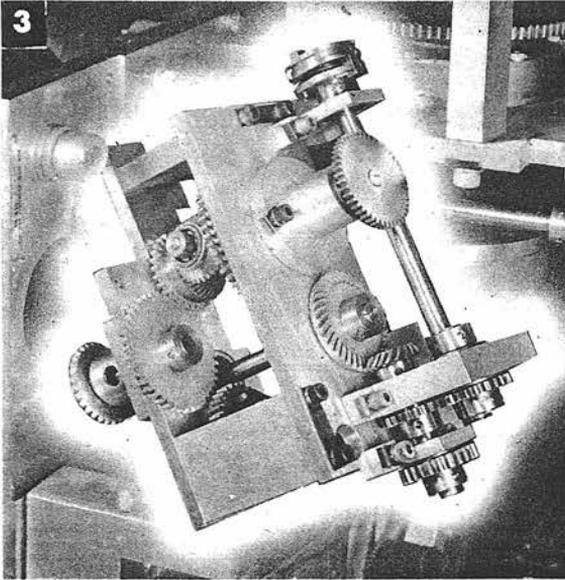
3 Tilt the gearing group to clear the adjacent mechanisms.
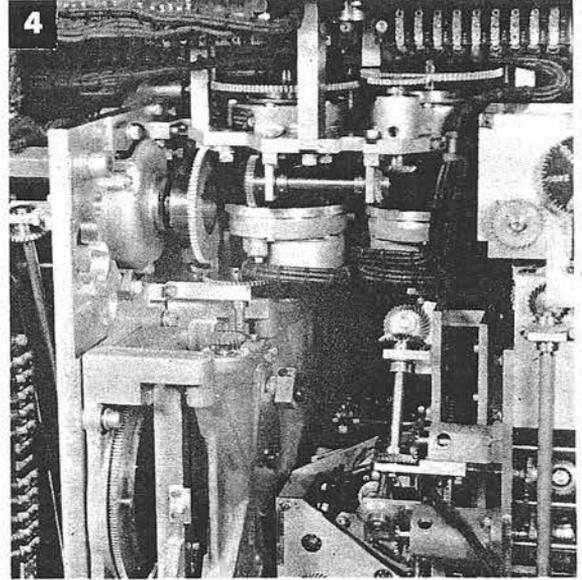
4 Remove the gearing group.

5 Using an offset fillister screw driver, loosen the locking nut on the rotor gear of the $\triangle cEb$ automatic transmitter. Remove the nut and the gear. Remove all the screws connecting the transmitter cable leads to the terminal block.
Remove the two screws securing the terminal block.
Remove the four screws securing the front mounting bracket.
Remove the bracket.
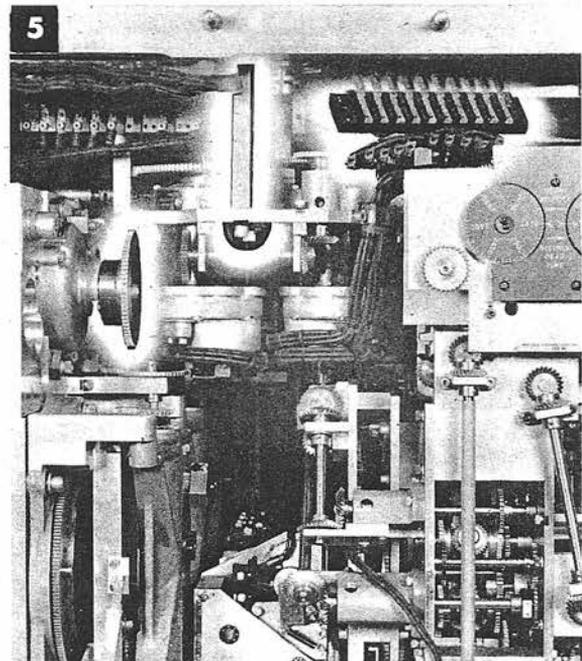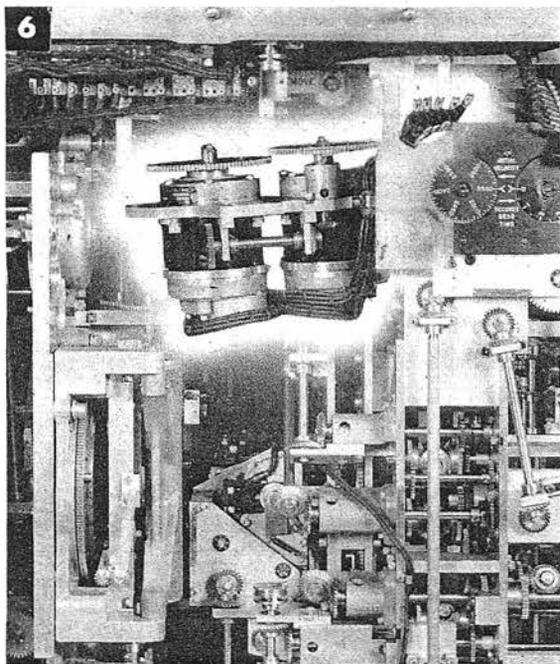
6 Remove the screws securing the transmitter mounting plate to brackets on the other three sides of the mechanism. Support the mechanism while removing the last screw.
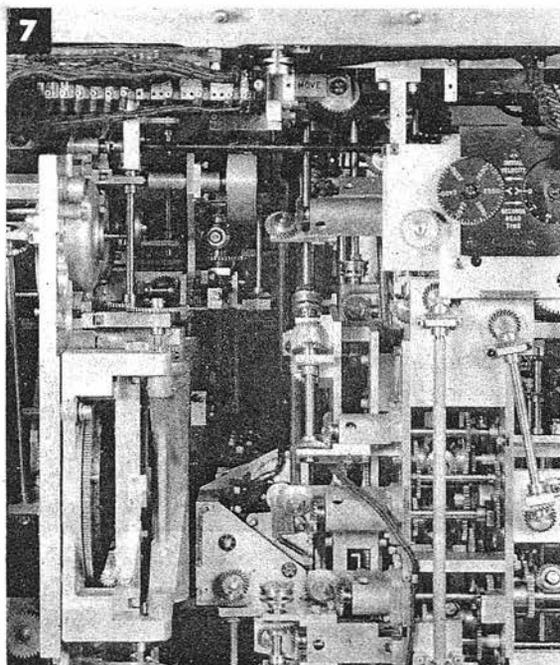
7 Turn the mechanism to clear the gearing and remove it.

To reinstall the transmitter mechanism, reverse the removal procedure.

When reinstalling the Xo shaft, turn the couplings to establish the proper relationship between the two connections, or readjust clamp A-131.

Run tests.

Co Receiver and Mounting Plate, page 666

△cB′r AUTOMATIC TRANSMITTER

△cB′r and △cEb
AUTOMATIC TRANSMITTERS
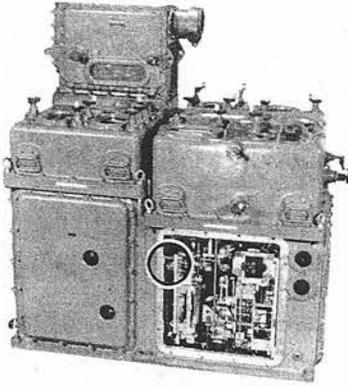
1 The $\triangle cB'r$ transmitter, seen from the Co side.
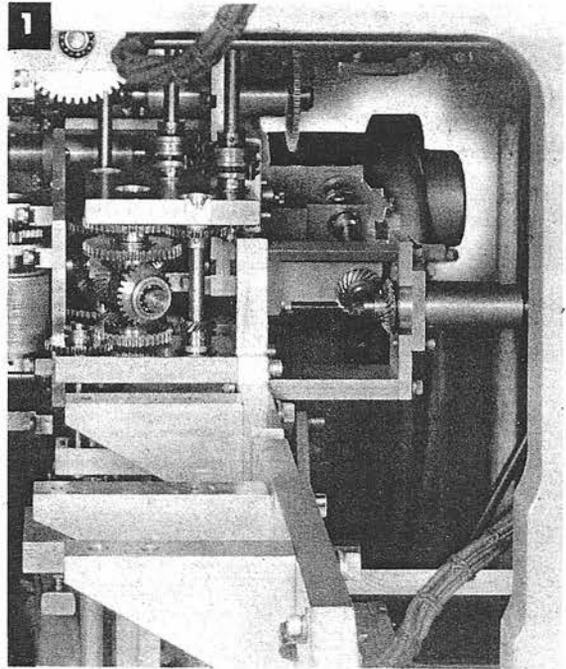
2 Remove the five screws connecting the transmitter cable leads to the terminal block on the floor of the instrument. Pull the cable behind the integrator mounting plate to the Co side.
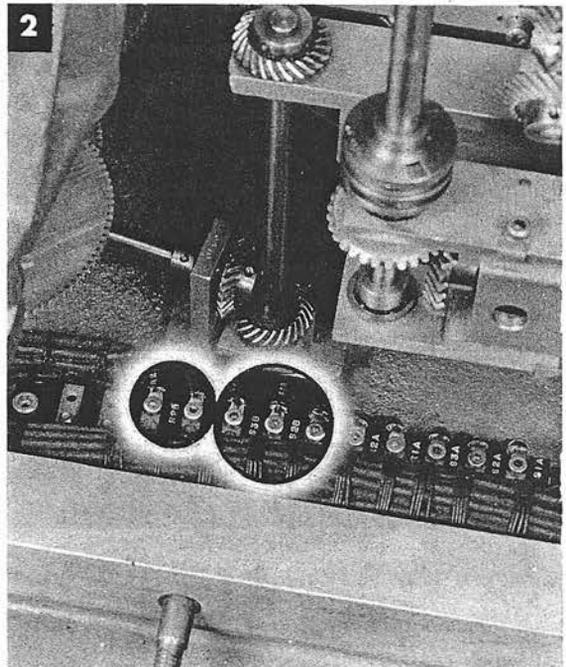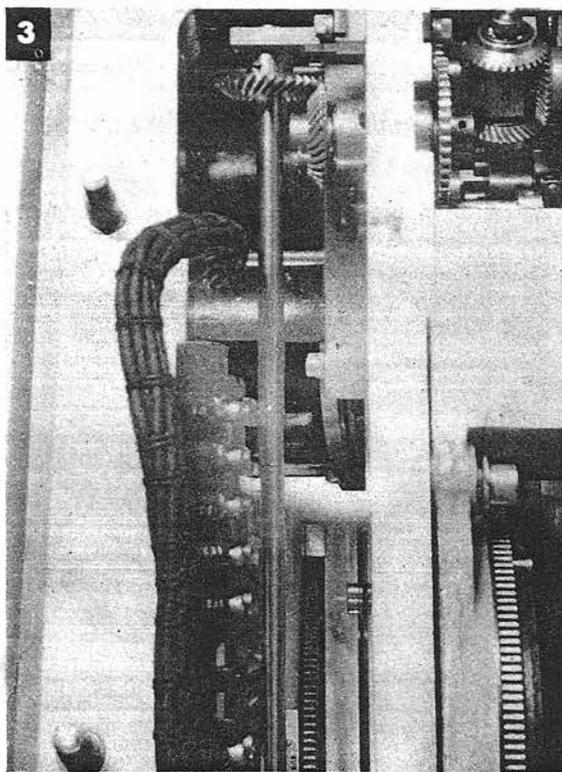
3 Remove the four screws securing the transmitter frame to the back of the integrator mounting plate. Work from both sides of the instrument to reach these screws.

Remove the two screws securing the terminal block to the computer case.
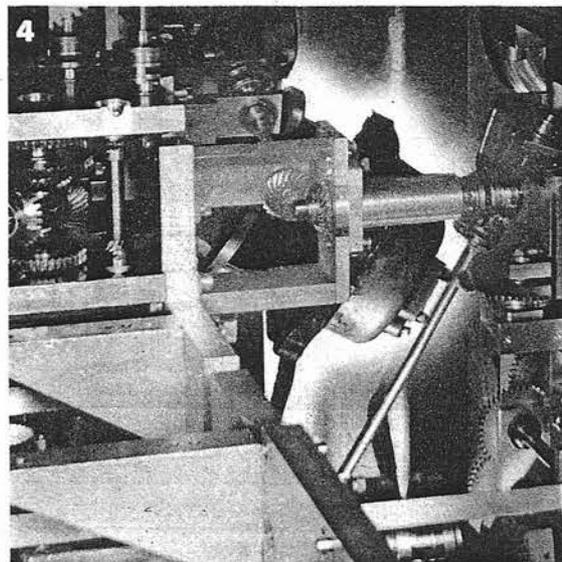
4 Partially remove the transmitter in its frame. A helper should stand by on the other side of the computer to assist.

5 The transmitter will not clear the gearing behind the integrator mounting plate without being removed from the frame.

Two split-ring locking segments fit between the transmitter and the frame. The frame and the locking segments should be removed by the person on the other side of the computer. Although the frame is doweled, it should be marked in relation to the mounting plate before removal.

These pictures illustrate this special type of transmitter mounting.

6 Remove the transmitter through the Co aperture.
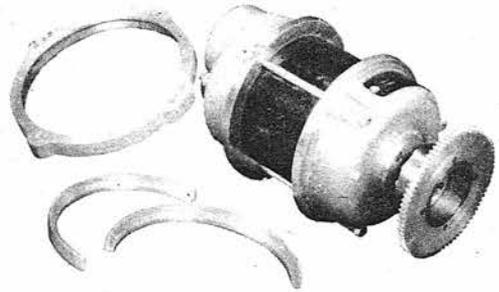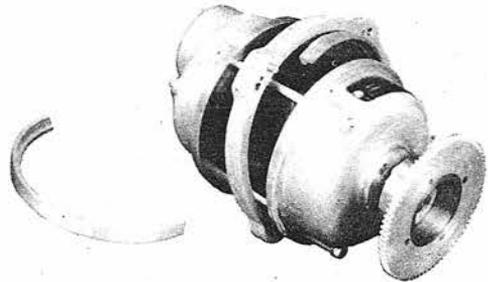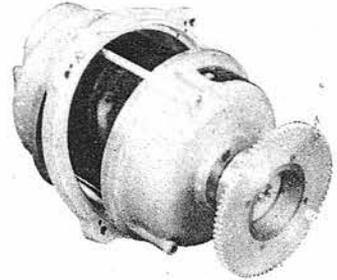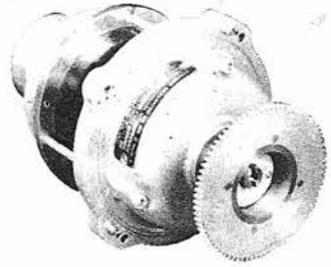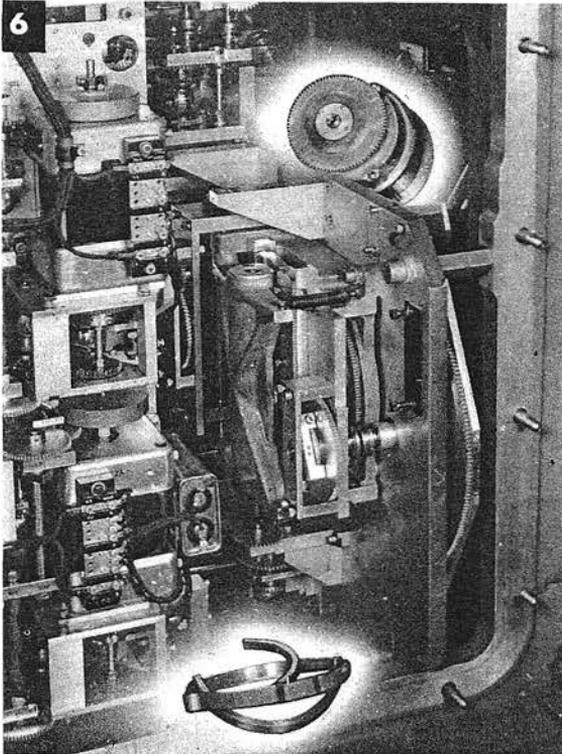
To reinstall the $\triangle cB'r$ transmitter, reverse the removal procedure.

Reinstall the Co mounting plate and the Co receiver.

Readjust clamp A-179.

Establish the proper relationship between the cR dials and the cR intermittent drive during installation of the cR coupling shaft.
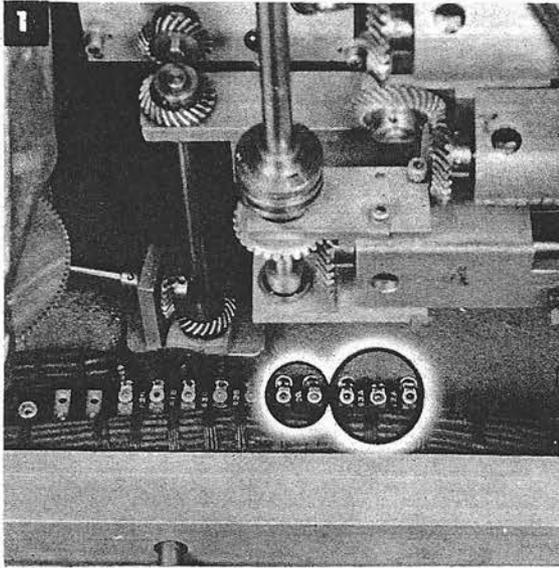
△cE AUTOMATIC TRANSMITTER

Co Receiver and Mounting Plate,
page 666
△*cB'r* Automatic Transmitter, page 705

1   Remove the five screws, connecting
the transmitter cable leads to the
terminal block. Pull the cable be-
hind the integrator mounting plate
to the *Co* side.
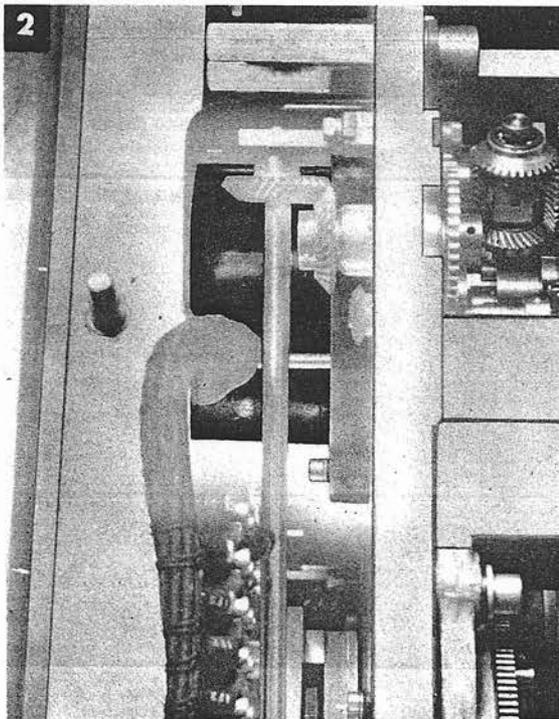
2   Remove the four screws securing the
transmitter frame to the back of the
integrator mounting plate.
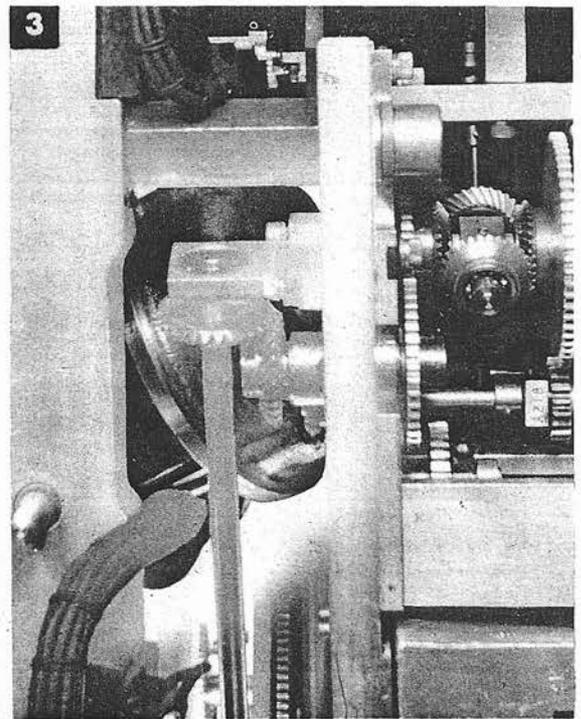
3   Remove the frame and the split-ring
locking segments as explained in the
removal of the △*cB'r* automatic
transmitter, page 707
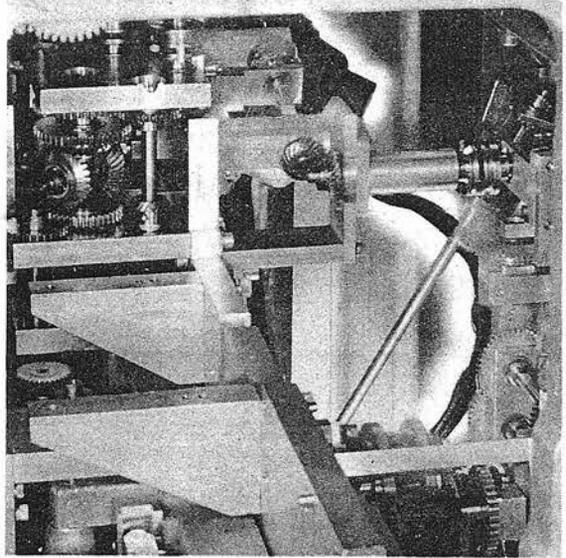
5 Remove the transmitter through the Co aperture as in the removal of the $\triangle cB'r$ transmitter, page 707
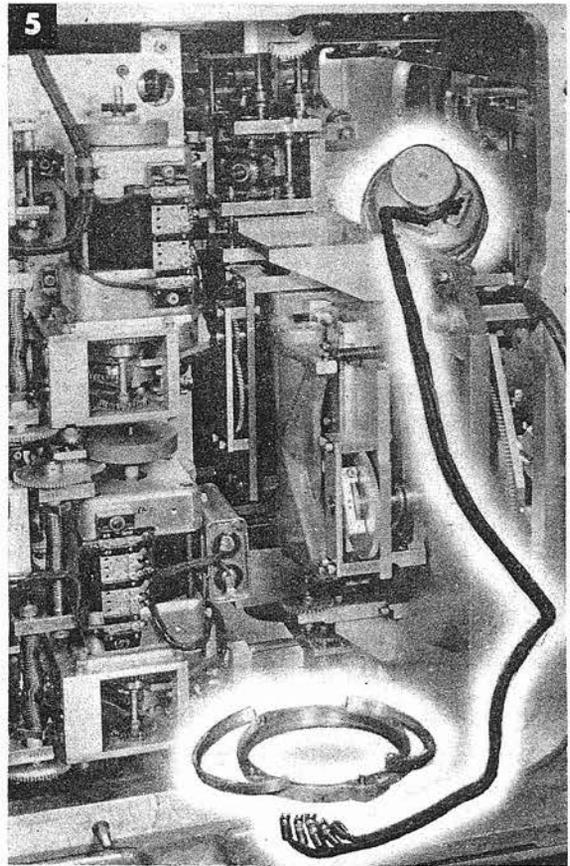
To reinstall the $\triangle cE$ automatic transmitter, reverse the removal procedure.

Reinstall the $\triangle cB'r$ transmitter, the Co mounting plate, and the Co receiver.

During the replacement of the cR coupling shaft, establish the proper relationship between the cR dials and the cR intermittent drive.

Readjust clamp A-179.

COMPLEMENTARY ERROR CORRECTOR
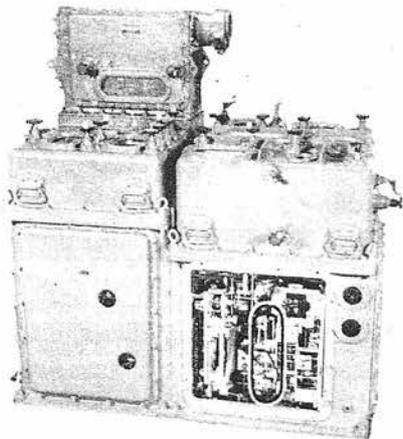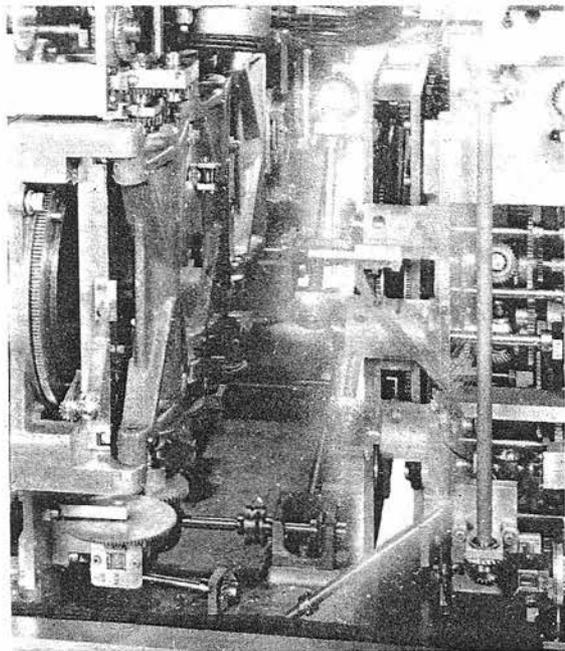
$WrD + KRdBs$ Follow-up, page 684

NOTE:

The complementary error corrector may be removed by either of two methods: The method shown here is more difficult, although it involves removal of fewer parts; the alternate method is shown in the preliminary procedure for the removal of the horizontal wind component solver, page 684
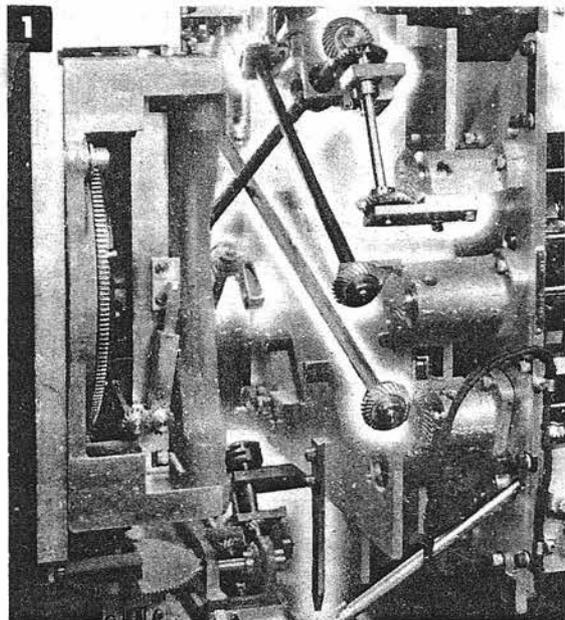
1 It is necessary to remove all the shafts crossing the corrector.
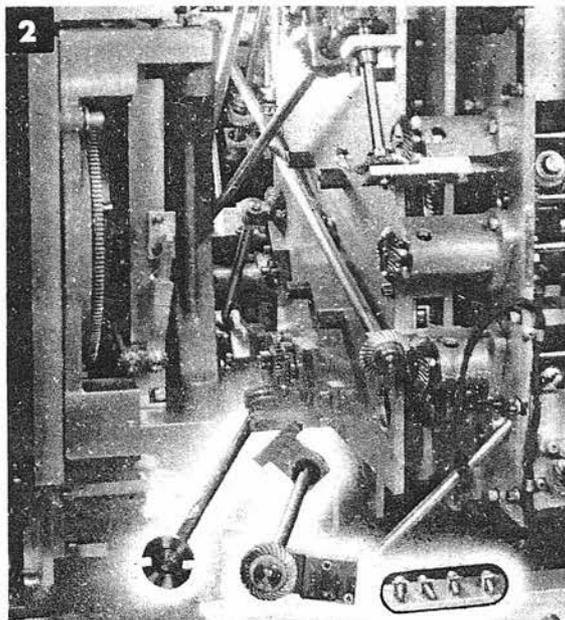
2 Remove the locking spring from the long coupling shaft. Remove the shaft.

Remove the screws from the short shaft assembly which connects with the middle bevel gear at the edge of the mechanism.

Remove the assembly.

3 Remove the screws securing the short shaft assembly which connects with the top bevel gear. Remove the assembly.

Remove the screws from the long shaft assembly that connects with the assembly just removed. Remove the assembly.

Remove the short coupling shaft near the center at the top of the mechanism.
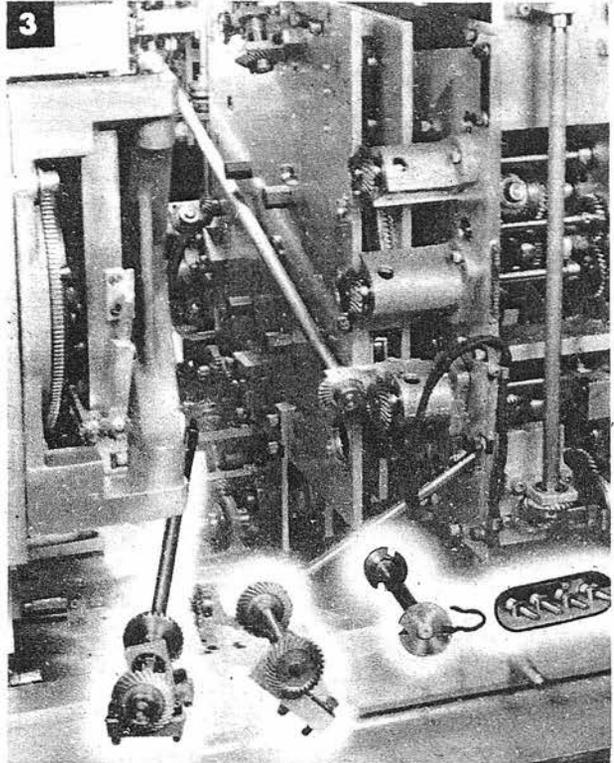
4 Remove the screws from the lowest bevel-gear adapter.

Remove the two screws from the hanger attached to the flat side of the adapter.

Remove the two screws from the other end of the shaft assembly. Remove the assembly.

Remove the screws from the short bevel-gear shaft assembly at the back of the mechanism. Remove this assembly.
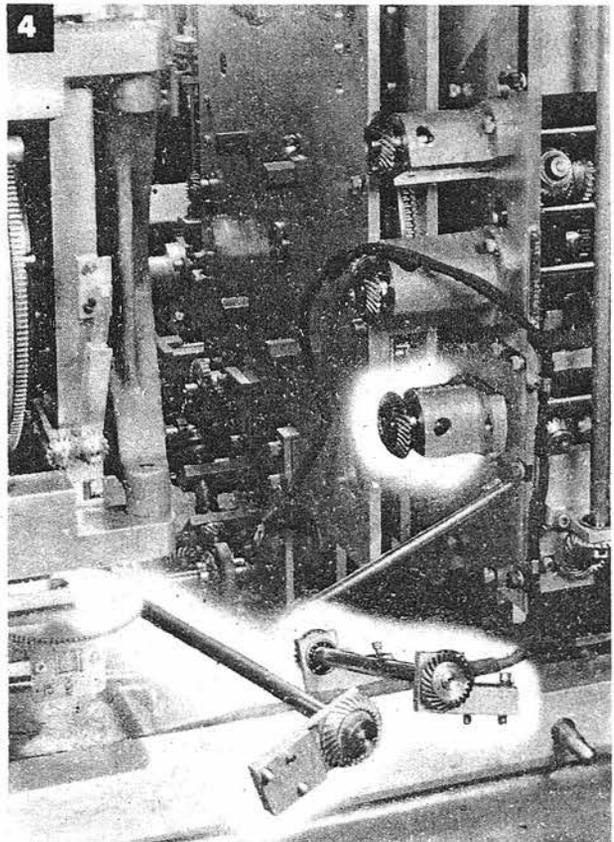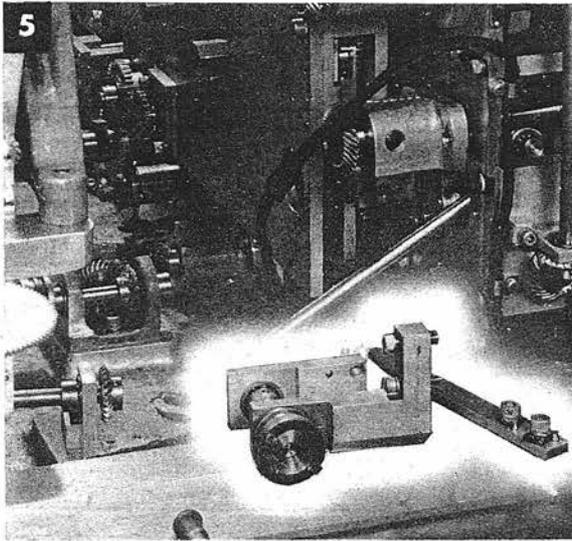
5 Remove the screws from the hangers of the short coupling shaft below the complementary error corrector. Remove the shaft assembly.

Remove the screws from the supporting leg at the bottom center of the unit. Remove the leg.
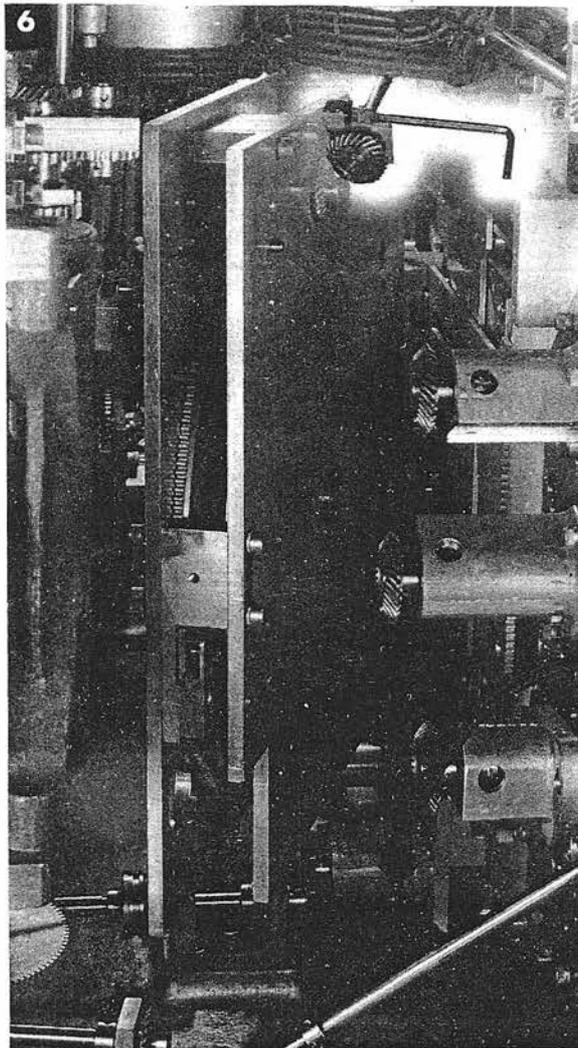
6 From the opposite side of the computer, remove the two screws from the *Ds* shaft assembly on which clamp A-110 is mounted.

Remove the screws securing the complementary error corrector. Move the mechanism away from the bevel-gear adapters.

Remove the two screws from the short shaft assembly attached to the rear plate. Remove the shaft assembly.

7 Remove the complementary error corrector.
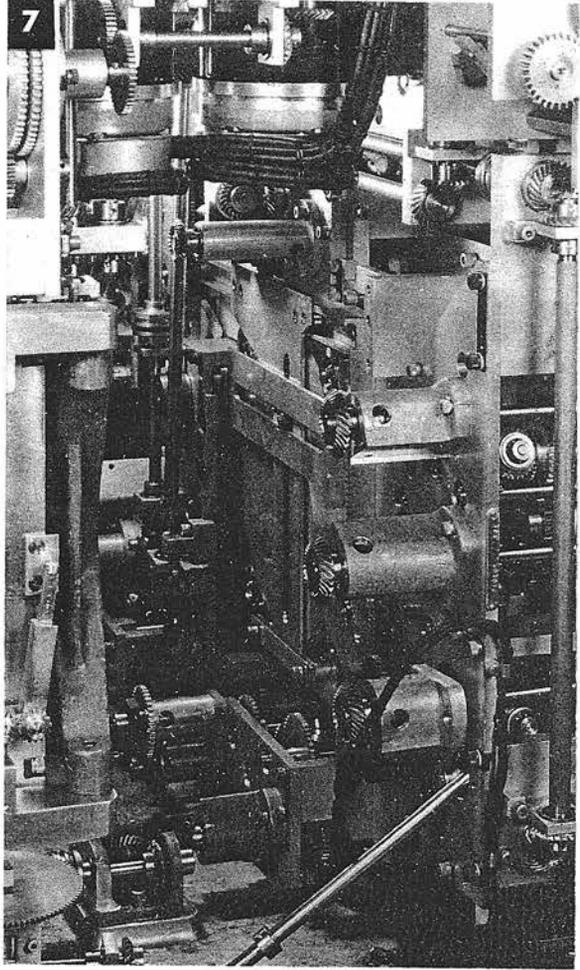
To reinstall the complementary error corrector, reverse the removal procedure. Reinstall the other mechanisms removed.

NOTE:

When reinstalling the Rj, Vj, and Dj coupling shafts, adjust the counters to the limit stop by proper mating of the couplings or gears, or readjust clamps A-234, A-235, A-88, A-501, A-87, A-500, and A-86.

Readjust clamps A-108, A-157, A-100, A-135, A-134, A-131, A-110, A-107, A-229 and A-230.

Check clamps A-104, A-103, A-102, A-106, A-109 and A-105.

Run tests.

I. V., Tg DIAL GROUP
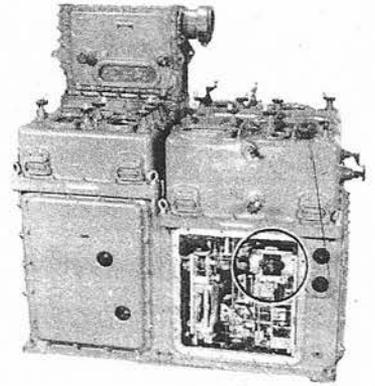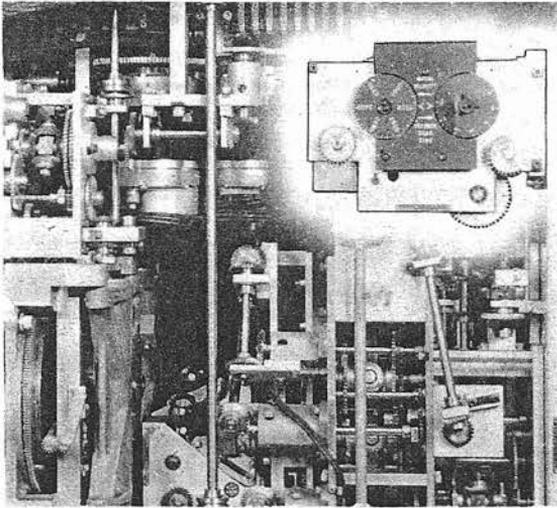
1 Remove the four screws securing the mechanism. One is reached through the hole just below the *I.V.* dial.

2 The other three screws are in the large mounting plate at the front.

3 Remove the mechanism.
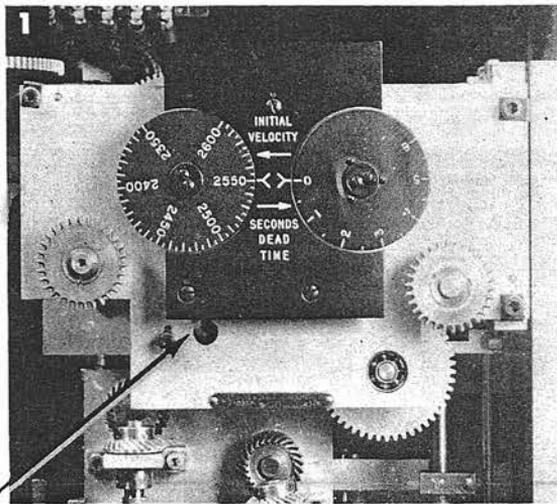
To reinstall the dial group, reverse the removal procedure.

Readjust clamps A-535; A-536 and A-188.

Check clamps A-181, A-135 and A-81.
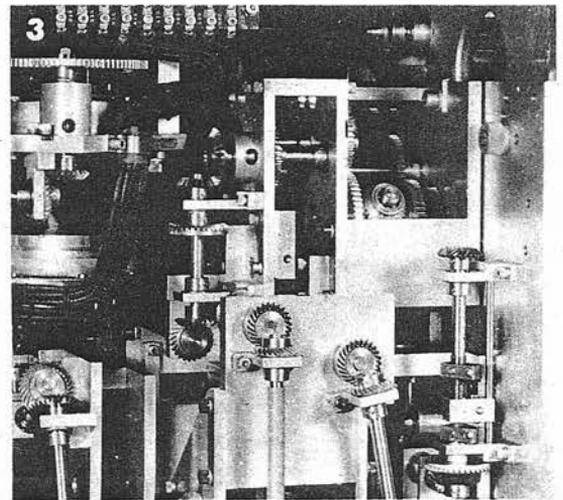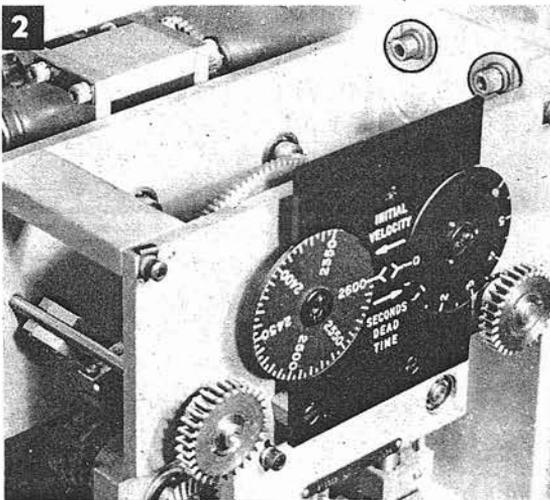
PREDICTION MULTIPLIERS INPUT GEARING
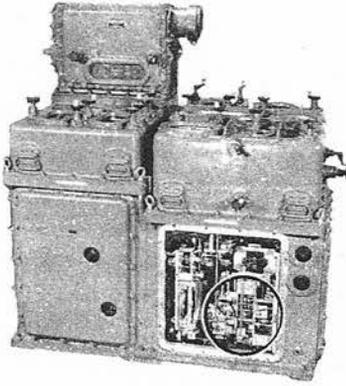
I.V., *Tg* Dial Group, page 714
WrD + *KRdBs* Follow-up, page 684
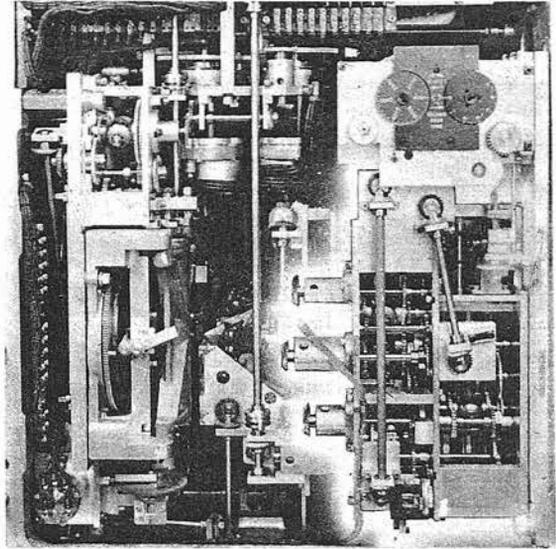
1 Remove the four screws securing the hangers for the *Tg* limit stop, L-14. Remove the limit stop.

Remove the four screws from the shaft assembly connecting with the bevel gear at the upper left of the mechanism. Remove the assembly.

Remove the large screw securing the lower corner of the large mounting plate.

Loosen the two screws securing the cable clamps.

Free the cable.
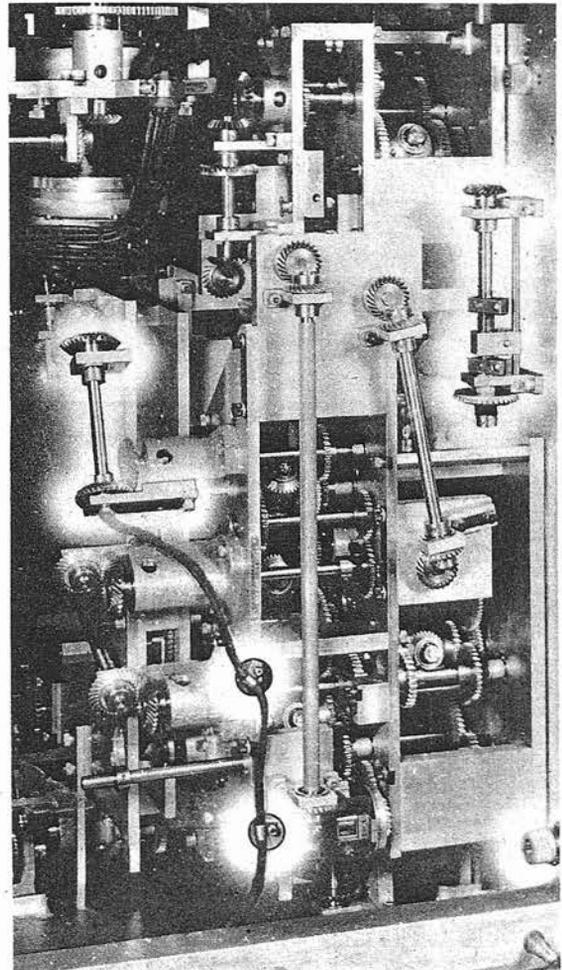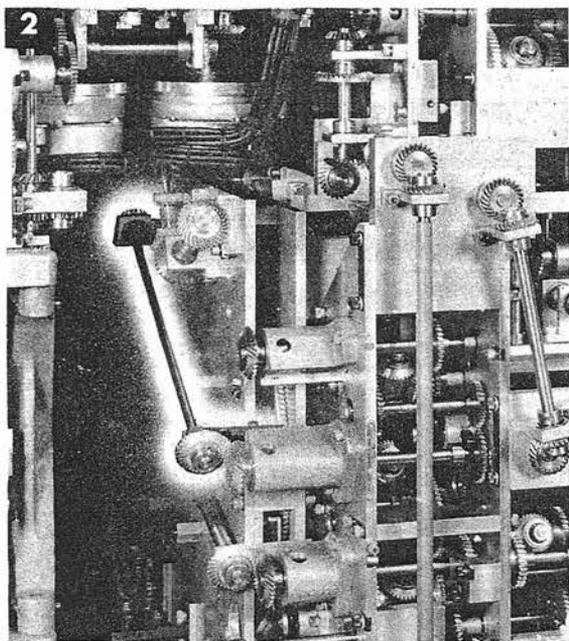
2   Remove the four screws from the shaft assembly connecting with the middle bevel-gear adapter.
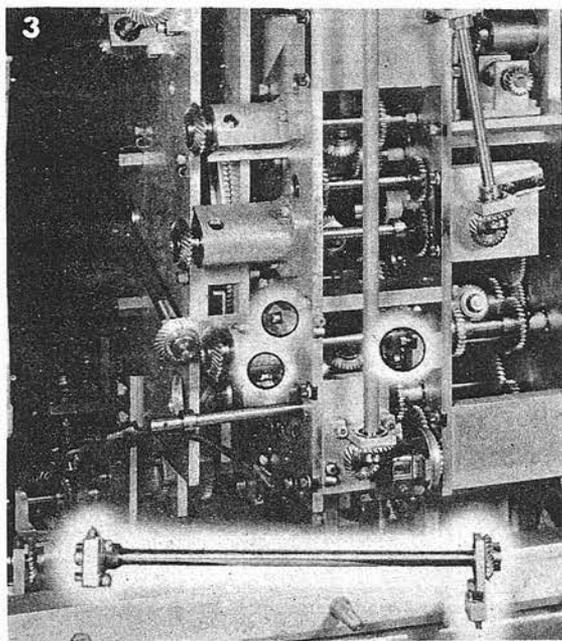
3   Remove the shaft assembly. Remove the two screws from the lowest bevel-gear adapter. Remove the two screws from the other end of the shaft assembly connecting with the lowest bevel gear.
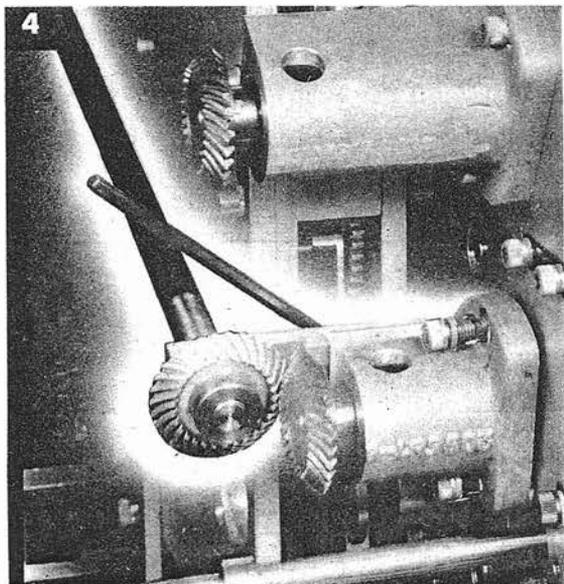
4   Remove the two screws from the hanger attached to the back of the lowest adapter.
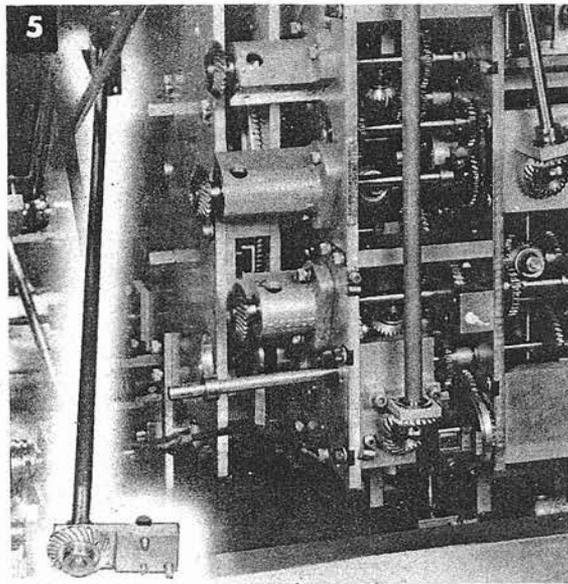
5   Move the shaft assembly out of the way.
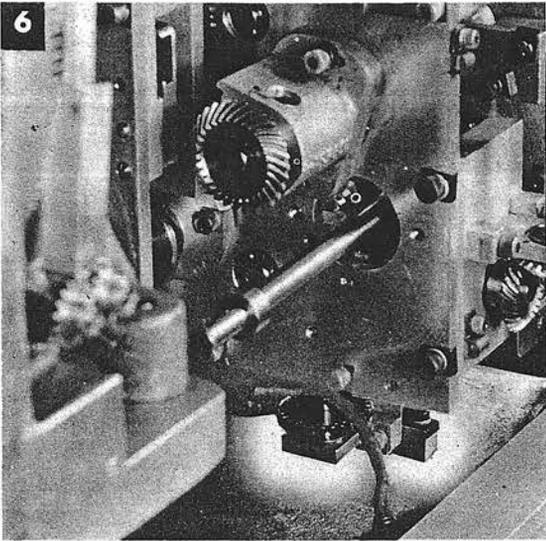
6 Remove the two screws from the hanger at the prediction-unit end of the shaft assembly connecting the ballistic and prediction units. To reach these screws it may be necessary to remove the four screws from the shaft assembly mounted on this hanger.
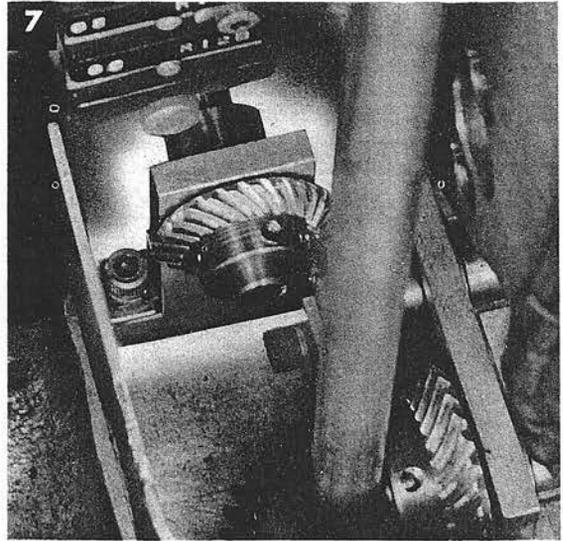
7 Remove the two screws from the hanger at the ballistic-unit end of the assembly.
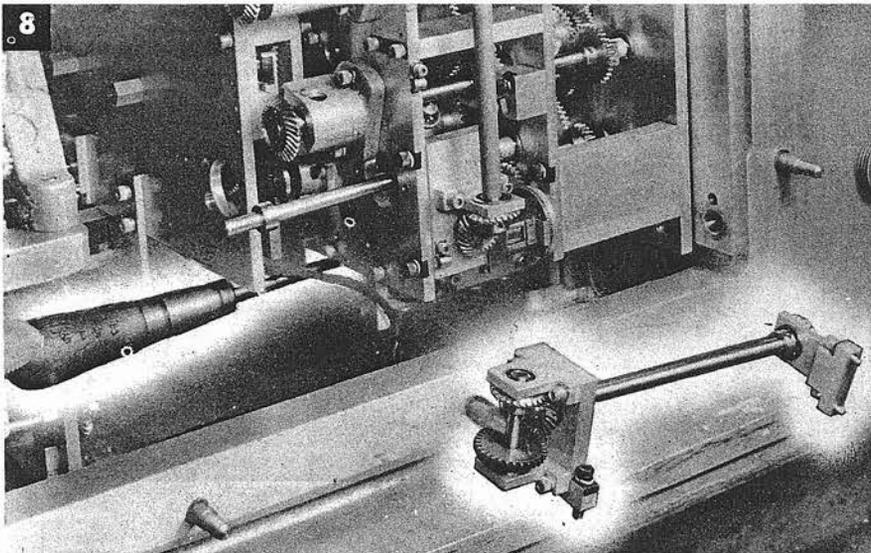
8 Remove the shaft assembly through the prediction side of the mechanism.

Remove the screw securing the prediction multipliers input gearing.
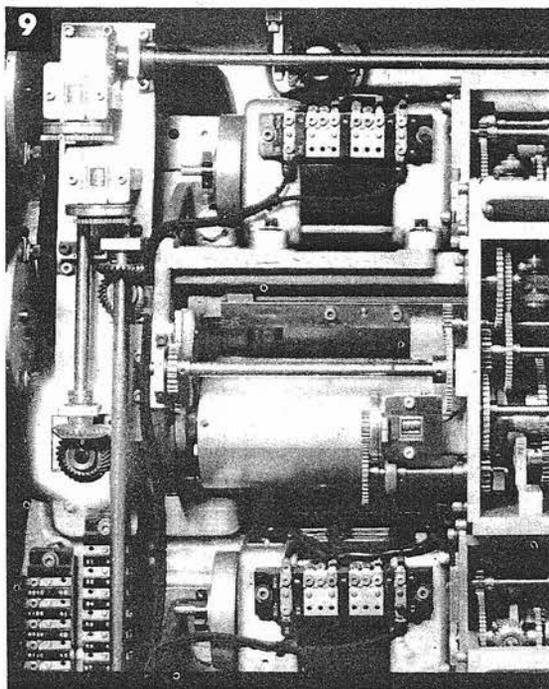
9   Remove the two screws securing the hanger to the left of the *Tf/R2* ballistic computer.
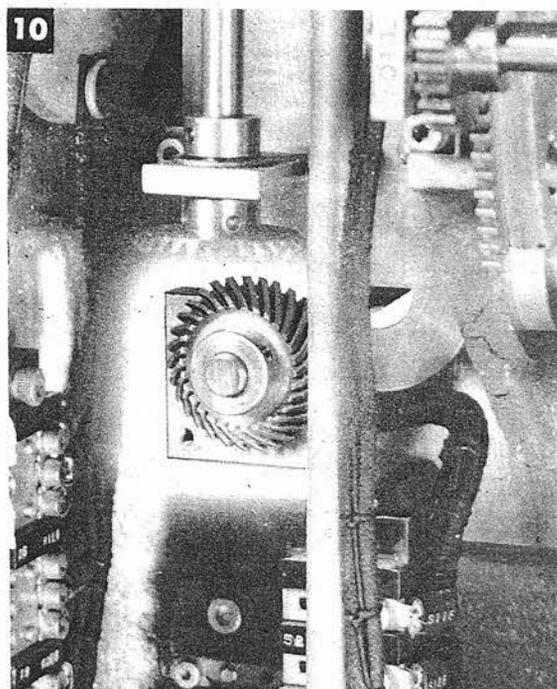
10 Remove the two screws securing the adapter directly behind this hanger.
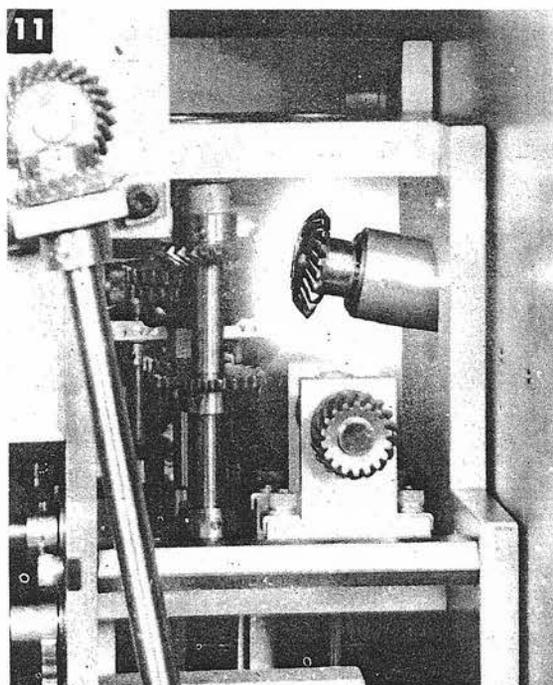
11 Slide the adapter and shaft assembly as far as it will go toward the ballistic-unit side.
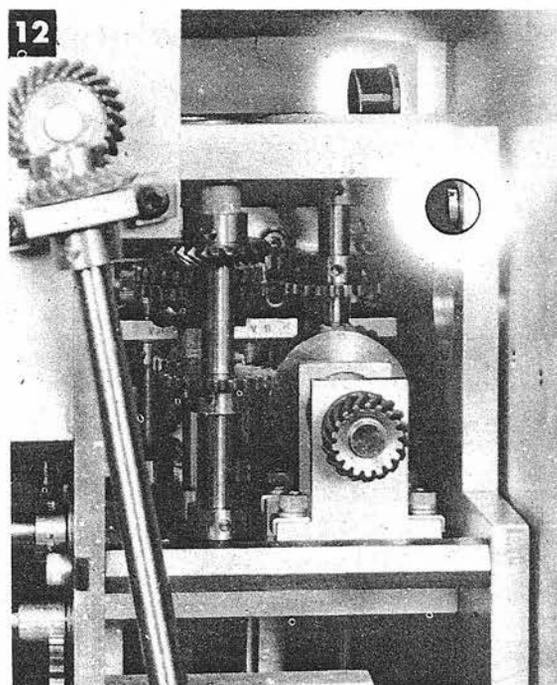
12 Back out the screw dowel. Remove the upper screw.
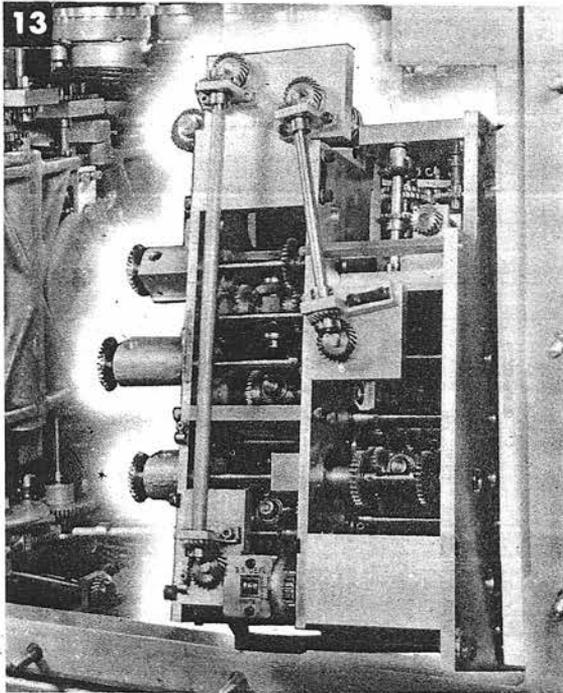
13 Back out the two screw dowels. Remove the remaining screw. Support the gearing unit while removing this screw. Tilt the mechanism to clear the instrument.
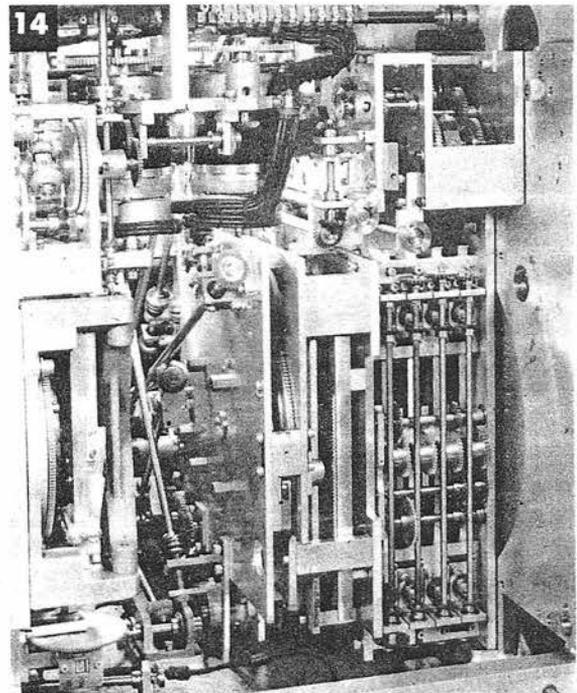
14 Remove the prediction multipliers input gearing.

To reinstall the prediction multipliers input gearing, reverse the removal procedure.

Reinstall all mechanisms removed.

Readjust clamps A-108, A-81, A-135, A-80.

Check clamp A-104.

Readjust clamps A-79, A-134, A-535, A-536, A-188, A-181, and A-132.

Check clamp A-203.

Readjust clamps A-133, A-131, and A-78.

Check clamps A-102, A-110, A-107, and A-103.

Readjust clamps A-229 and A-230.

Run tests.

HORIZONTAL WIND COMPONENT SOLVER
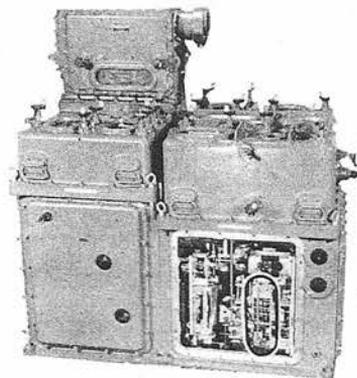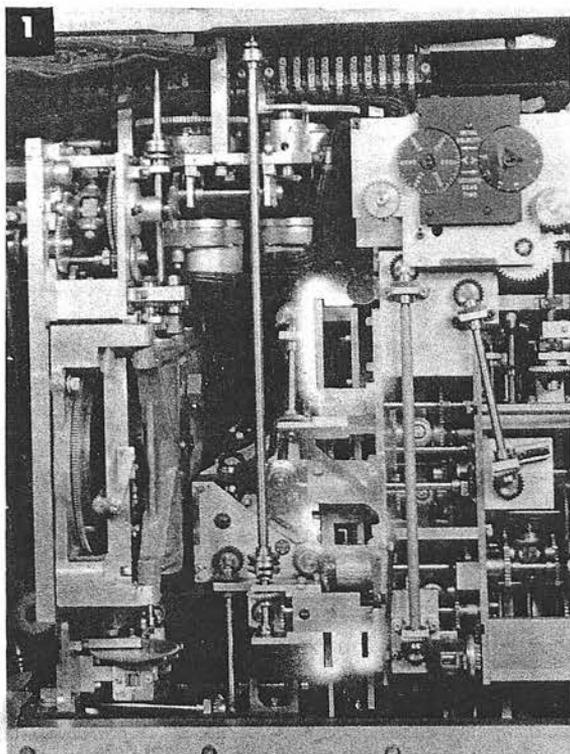
$WrD + KRdBs$ Follow-up, page 684
I.V., Tǵ Dial Group, page 714
Prediction Multipliers Input Gearing,
page 715

1 The first step in the removal of the
wind component solver is the re-
moval of the complementary error
corrector. The procedure outlined
here may be used instead of the
method given on page 710
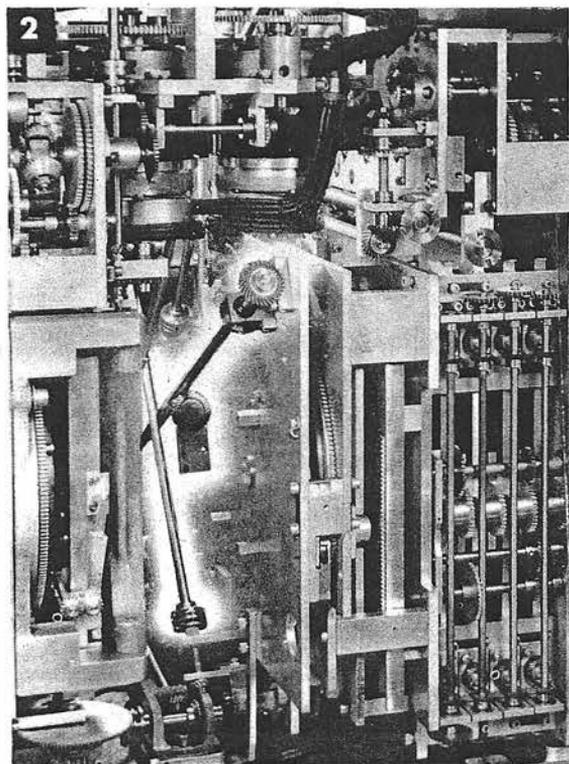
2 Remove the locking springs from
the long coupling shaft. Remove the
shaft.
Remove the screws from the long
shaft assembly mounted diagonally,
with its upper hanger on the com-
plementary error corrector.

3 Remove the third long shaft assembly, one end of which was previously loosened.
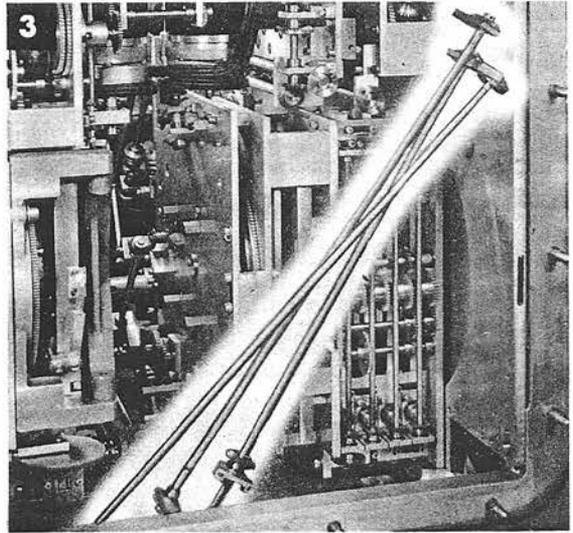
4 Remove the locking springs from the coupling shaft connecting with the short shaft at the top of the complementary error corrector. Remove the shaft.

Remove the two screws securing the supporting leg at the bottom of the mechanism. Remove the leg.

Remove the screws securing the short coupling shaft near the bottom of the mechanism. Remove the shaft.

Remove the screws securing the short shaft assembly which is mounted diagonally between the inner edge of the complementary error corrector and the floor of the computer. Remove the shaft.
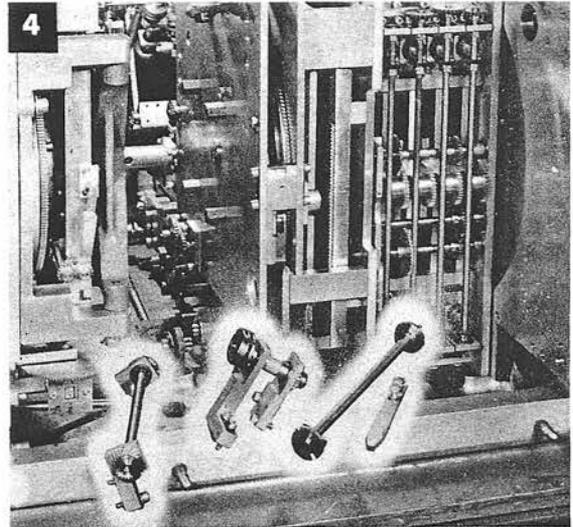
**5** From the other side of the computer, remove two screws from the *Ds* shaft assembly where clamp A-110 is mounted.

Remove the screws securing the complementary error corrector. Remove the mechanism.
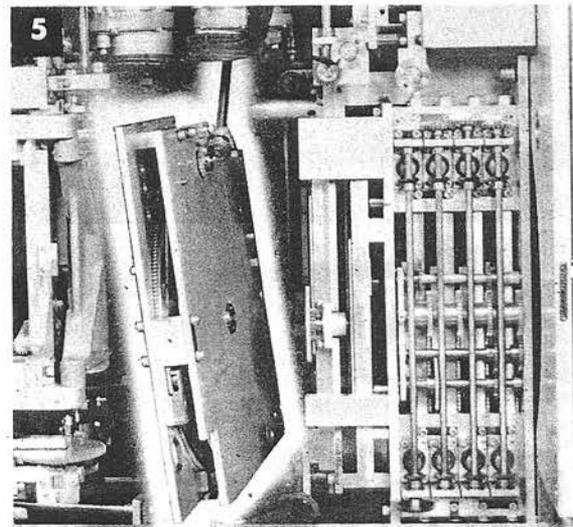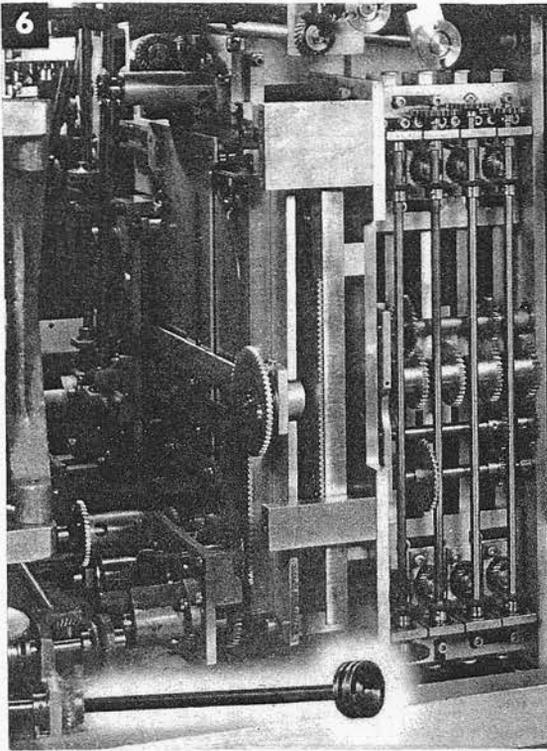
6 Remove the locking spring from the *Sw* coupling shaft directly above the horizontal wind component solver. Remove the shaft.
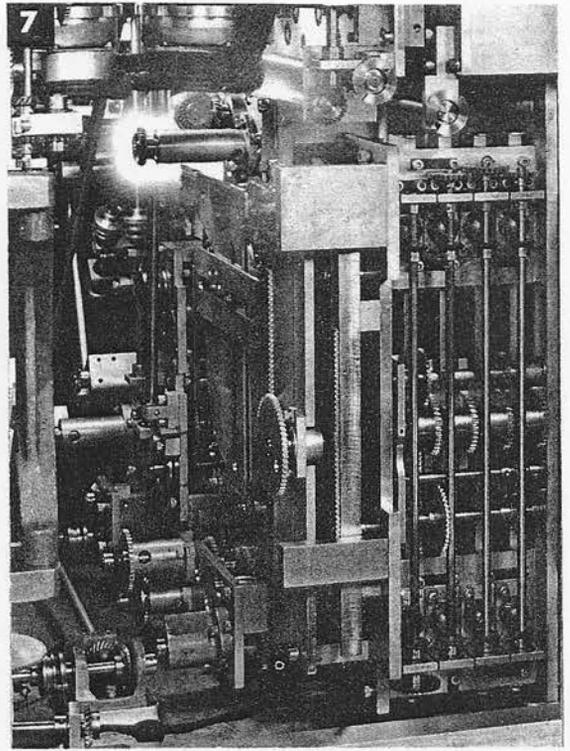
7 Remove the screws securing the plate of the small gearing unit above the solver.
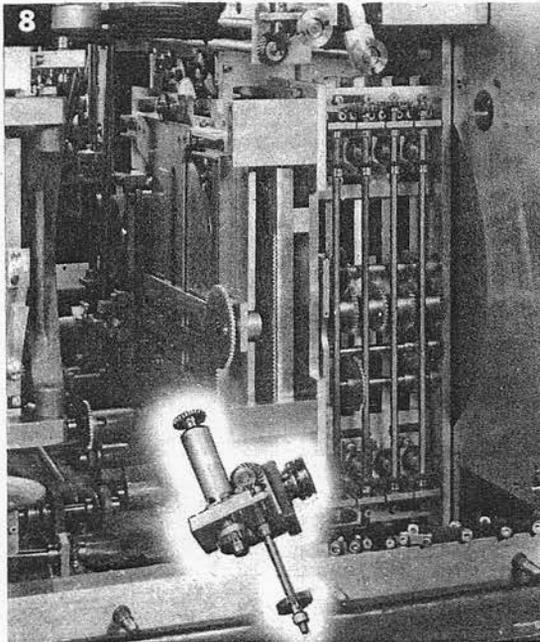
8 Remove the plate with the adapter and one shaft.
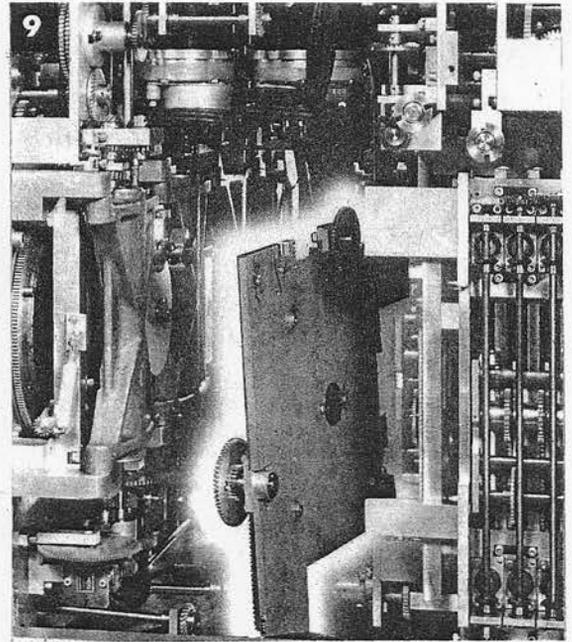
9 Remove the eight screws securing the horizontal wind component solver.
Remove the mechanism.

To reinstall the horizontal wind component solver, reverse the removal procedure.

Reinstall the other mechanisms removed.

The following adjustment procedure applies to the reinstallation of:

> Horizontal wind component solver
> Elevation wind component solver
> Wind component solvers output gearing
> Range rate corrector
> Prediction multipliers
> Prediction multipliers output gearing

Readjust the following clamps in the order given:

A-500	A-157	A-75
A-501	A-181	A-76
A-234	A-101	A-203
A-235	A-72	A-104
A-86	A-106	A-220
A-87	A-100	A-184
A-88	A-79	A-180
A-233	A-134	A-110
A-108	A-81	A-103
A-109	A-135	A-221
A-154	A-535	A-107
A-155	A-188	A-133
A-139	A-132	A-131
A-82	A-84	A-102
A-536	A-183	A-217
A-198	A-80	A-78
A-105	A-74	A-229
		A-230

NOTE:
If the Dj, and Vj, and Rj dials can be rematched to their limit stops through mating couplings or gear meshes, it will not be necessary to readjust clamps A-500, A-501, A-234, A-235, A-86, A-87 and A-88.

Run all tests.

ELEVATION WIND COMPONENT SOLVER
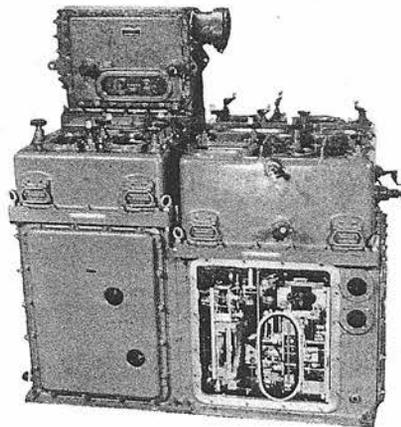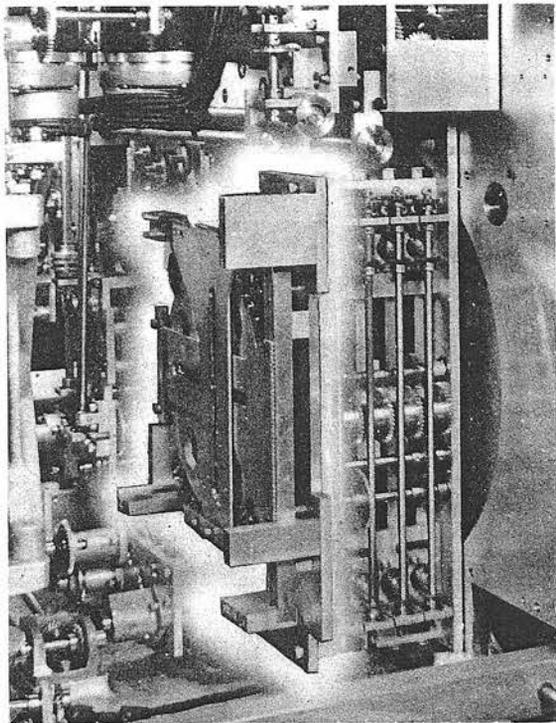
I.V., T g Dial Group, page 714
WrD + KRdBs Follow-up, page 684
Prediction Multipliers Input Gearing,
page 715
Complementary Error Corrector,
page 710
Horizontal Wind Component Solver,
page 720
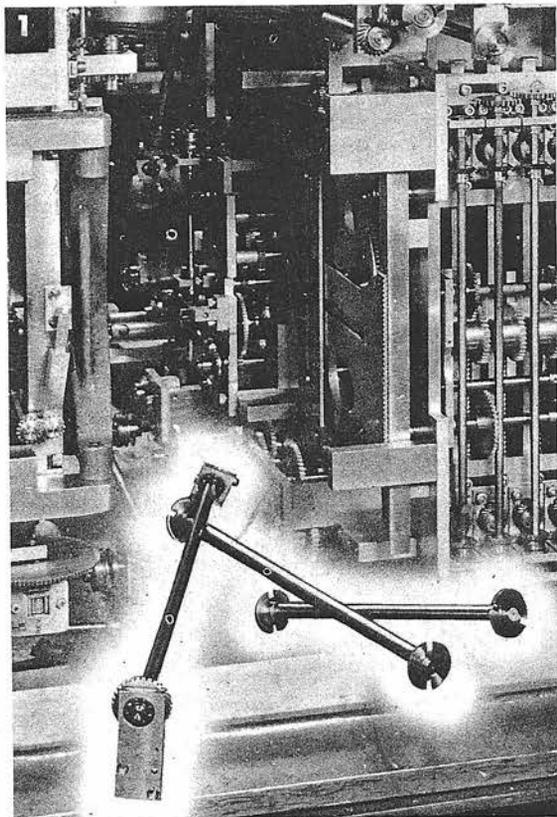
1   Remove the locking springs from the
    Bw and *Rj* coupling shafts above the
    elevation wind component solver.
    Remove the shafts.

    Remove the screws from the *Ds*
    shaft assembly, one end of which is
    mounted on the elevation wind
    solver, and the other almost directly
    above it. Remove this assembly.

2 Remove the two small brackets that supported the horizontal wind component solver.

Remove the screws from the short *E* shaft assembly near and parallel to the floor of the computer. Remove this assembly.

Remove the shafts from the small gearing unit, the top plate of which was removed with the horizontal wind solver. These shafts are above the elevation wind solver. (In the picture these shafts have been put back into the plate bearings.)
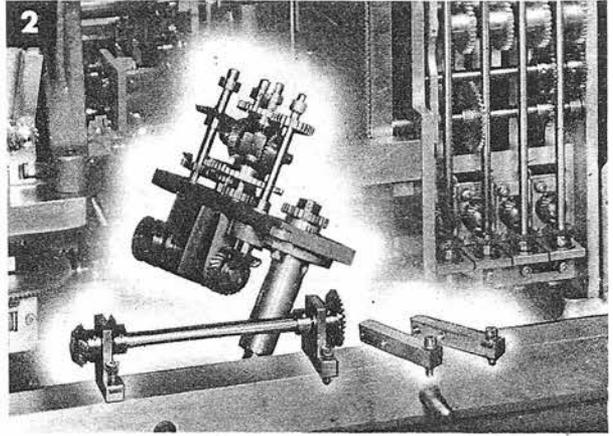
3 Remove the screws securing the elevation wind component solver.
Free the dowels from the mounting and tilt the mechanism.
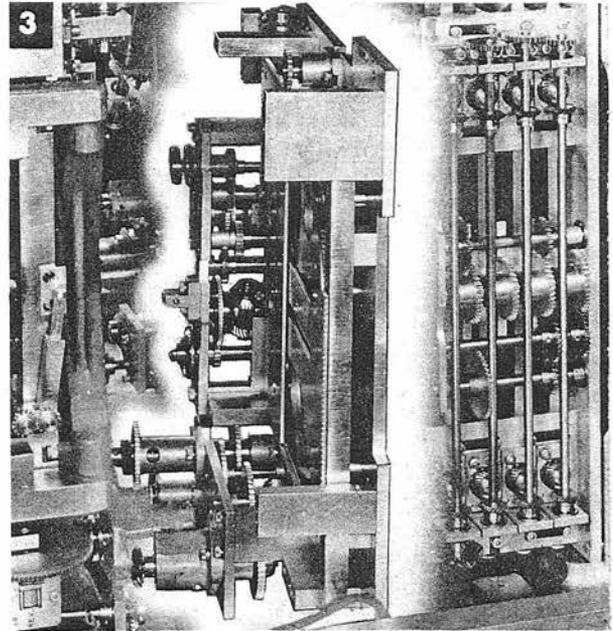
4 Remove the elevation wind component solver.
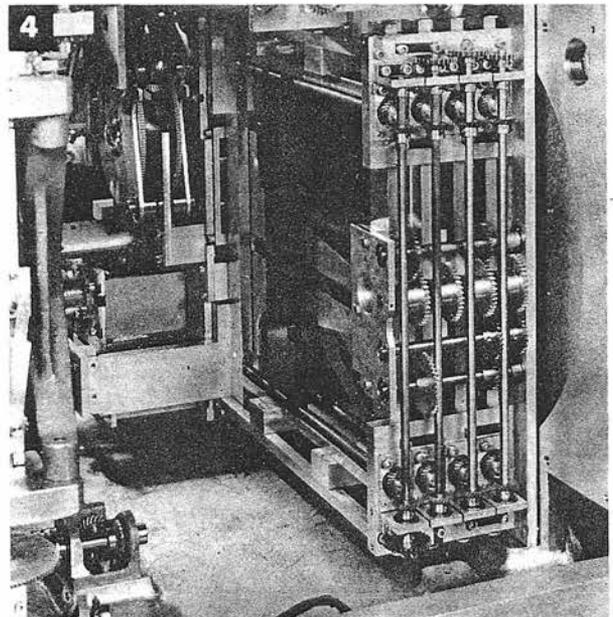
To reinstall the mechanism, reverse the removal procedure.

Reinstall all the units removed.

Readjust according to the instructions for reinstalling the horizontal wind component solver, page 723

WIND COMPONENT SOLVERS OUTPUT GEARING
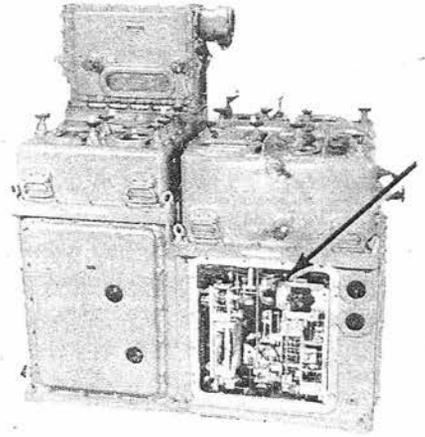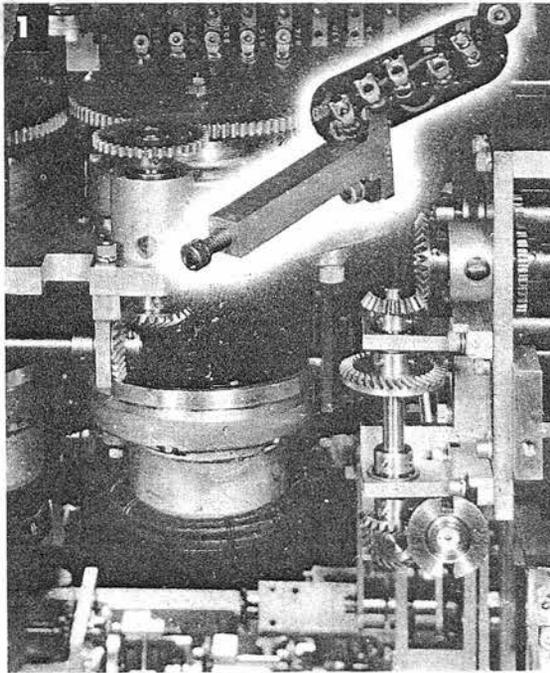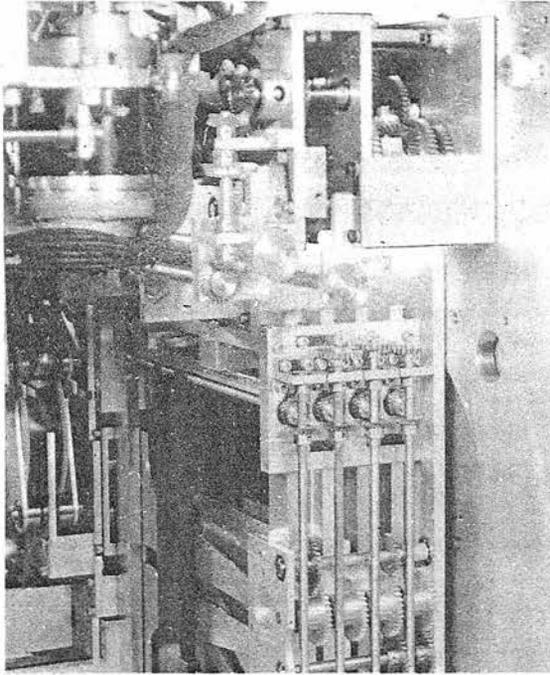
$I.V., Tg$ Dial Group, page 714
$WrD + KRdBs$ Follow-up, page 684
Prediction Multipliers Input Gearing,
page 715
Complementary Error Corrector,
page 710
Horizontal Wind Component Solver,
page 720
Elevation Wind Component Solver,
page 724
Time of Flight (Tf) Ballistic Computer,
page 663

1 Remove the five screws connecting
the $\triangle cE$ indicating transmitter cable
leads to the terminal block.
Remove the three screws securing
the supporting post to the front edge
of the transmitter mounting plate.
Remove the post.
Remove the two screws securing the
terminal block and push it to one
side.

2 Loosen the three screws securing the transmitter to the mounting plate. Turn the eccentric blocks so that the transmitter will clear. Lower the transmitter until the rotor gear rests on the mounting plate.
Remove the nut from the rotor gear. Remove the transmitter, the gear, the nut, and the washer.
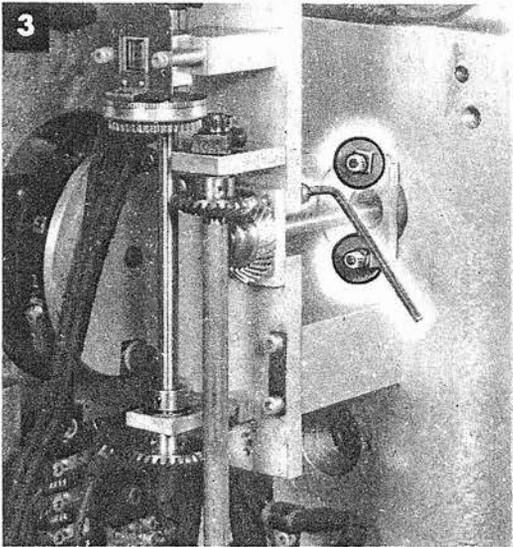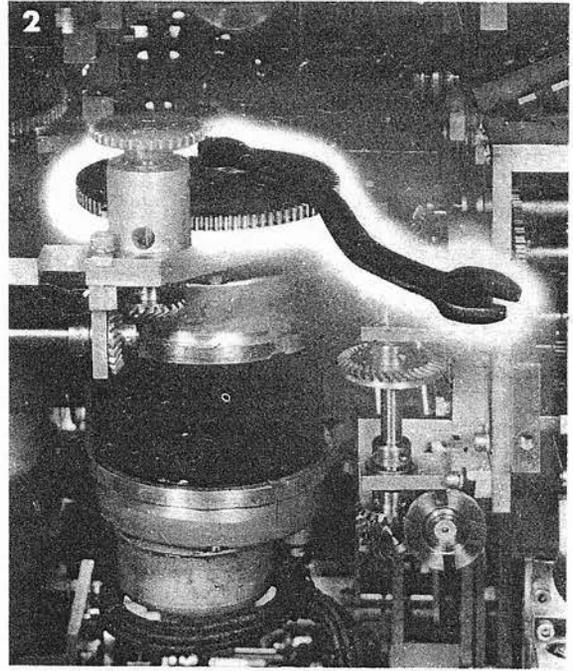
3 Remove the four screws securing the hanger and adapter just below the $Vf + Pe$ master counter.
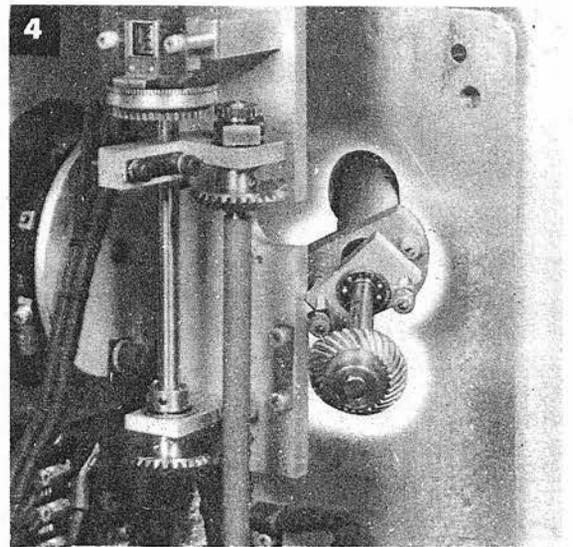
4 Pull the adapter and the shaft toward the ballistic side of the computer to clear the gearing unit to be removed.
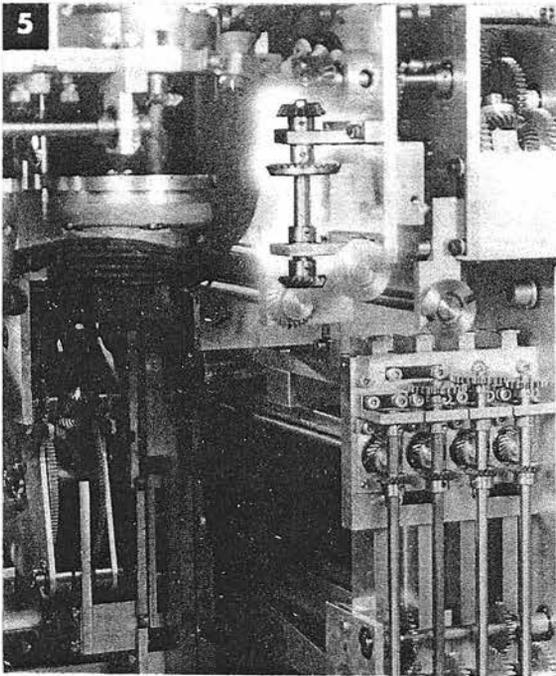
5 Remove the four screws securing the vertical shaft assembly to the mechanism to be removed.
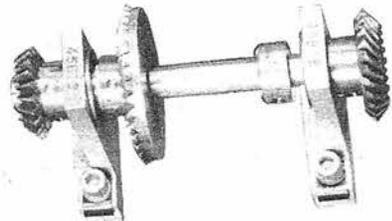
Remove the shaft assembly.

Remove the screws securing the hanger of the shaft that runs diagonally up to the mid-section of the wind component solvers output gearing.
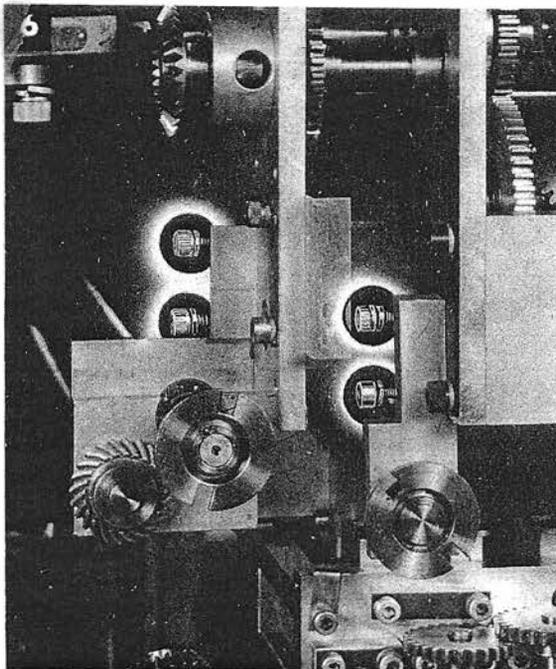
6 Remove the four screws securing the two long horizontal shaft assemblies. Back out the two screw dowels and remove the three screws. Support the gearing mechanism while removing the last screw. While the wind component solvers output gearing is being removed be careful not to bend the two long horizontal shaft assemblies.
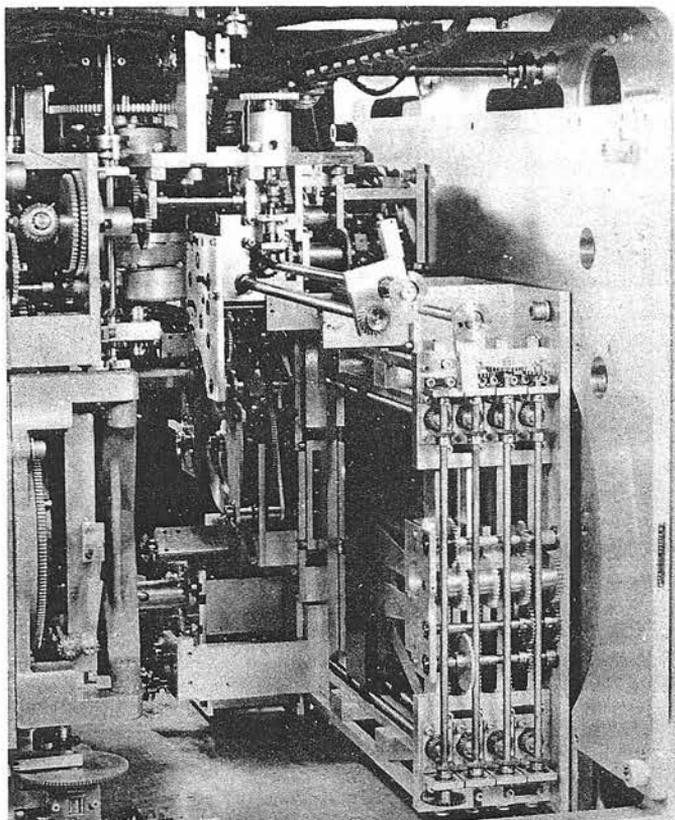
7 Remove the wind component solvers output gearing.

To reinstall the wind component solvers output **gearing, reverse the** removal procedure.

Reinstall the other mechanisms removed.

Readjust according to the instructions for reinstalling the horizontal wind component solver, page 723.

Run tests.

RANGE RATE CORRECTOR AND PREDICTION MULTIPLIERS
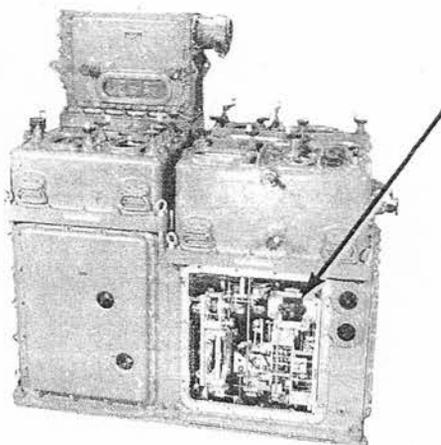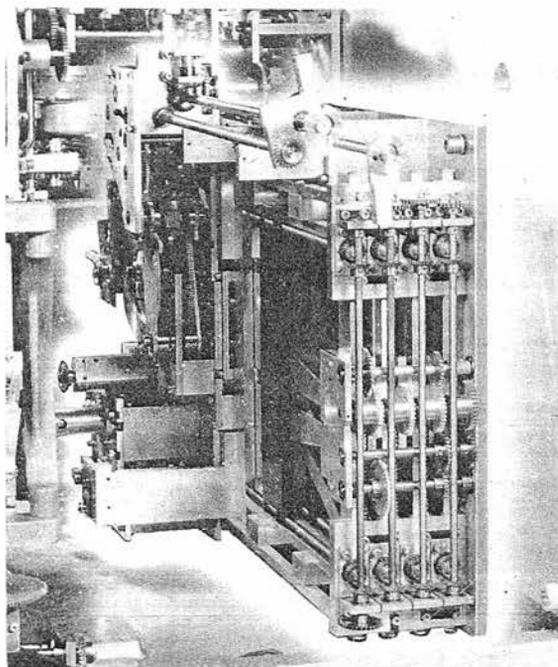
NOTE:

It is not practical to remove either of these mechanisms independently.

I.V., Tg Dial Group, page 714
WrD + KRdBs Follow-up, page 684
Prediction Multipliers Input Gearing, page 715
Horizontal Wind Component Solver, page 720
Elevation Wind Component Solver, page 724
Wind Component Solvers Output Gearing, page 726
Prediction Follow-up Mounting Plate, page 694
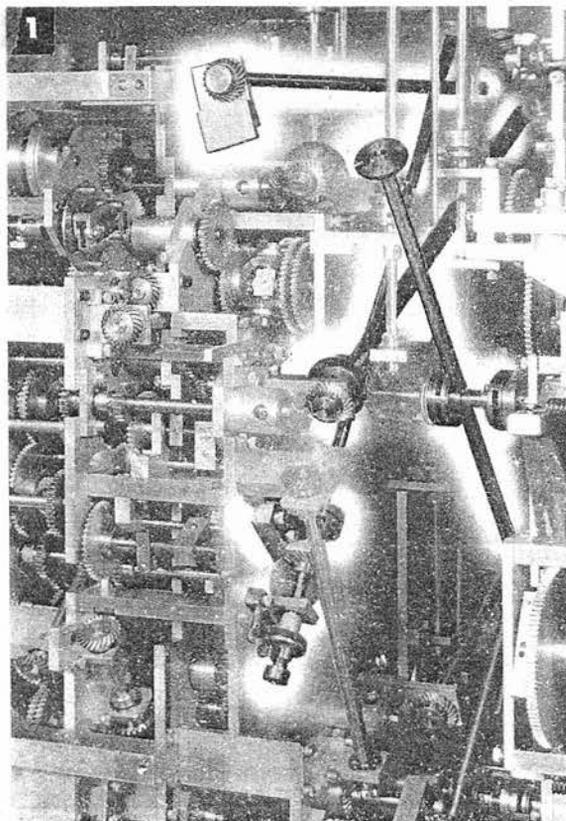
1   Remove the two screws securing the *Ds* shaft assembly. The other end of this assembly has been loosened in the removal of the prediction follow-up mounting plate.

Remove the locking springs from the short *RdBs* coupling shaft. Remove the shaft.

Remove the four screws securing the *Dj* friction shaft assembly. Remove the assembly.

Remove the four screws securing the *Vj* friction shaft assembly. Remove the assembly.

Remove the locking springs from the *Vj* coupling shaft. Remove the shaft.
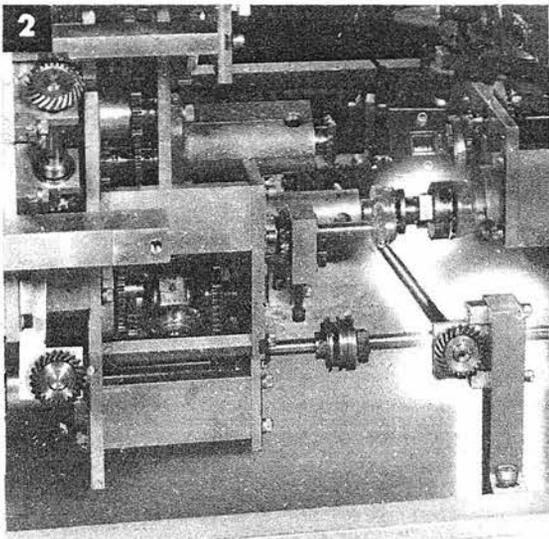
2 Remove the locking springs from the short E coupling shaft where clamp A-180 is mounted.
Remove the shaft.
Remove the four screws securing the long shaft assembly close to the bottom of the computer.
Remove the assembly.
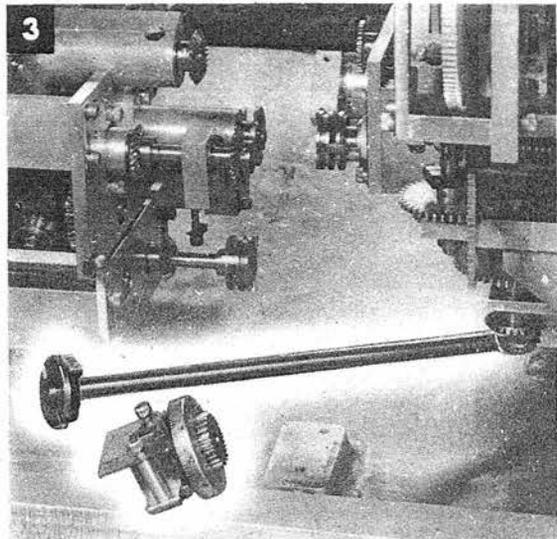
3 Remove the locking springs from the long coupling shaft where clamp A-183 is mounted.
Remove the shaft.
Remove the two screws securing the E check counter to its bracket. Remove the counter.

4 Remove the locking springs from the $RdBs$ coupling shaft on which A-109 is mounted. Remove the shaft.
Remove the four screws securing the shaft assembly which connects with the coupling just below the one removed. Remove the shaft.
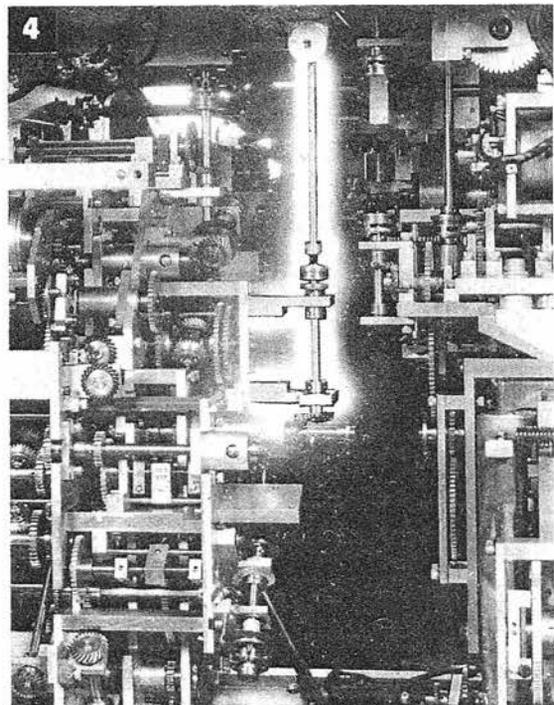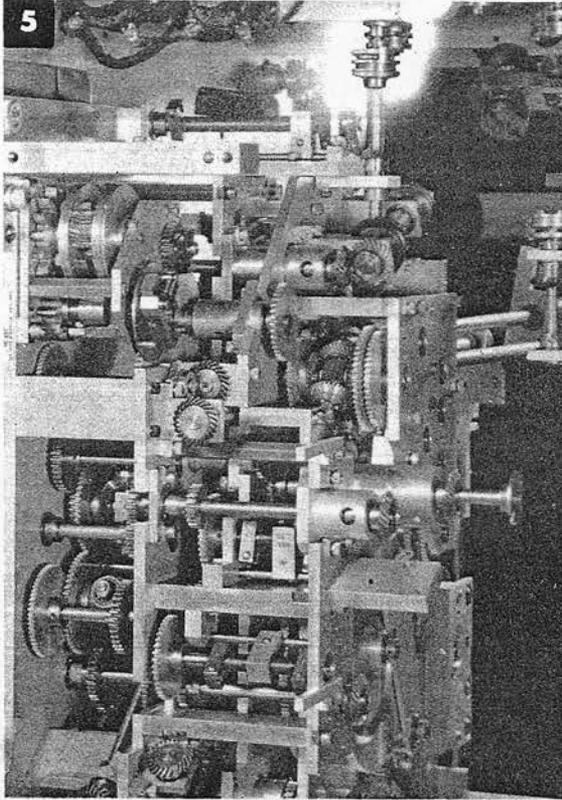
5 Remove the locking springs in the short *cR* coupling shaft next to the *cR* limit stop (L-10). Remove the shaft.
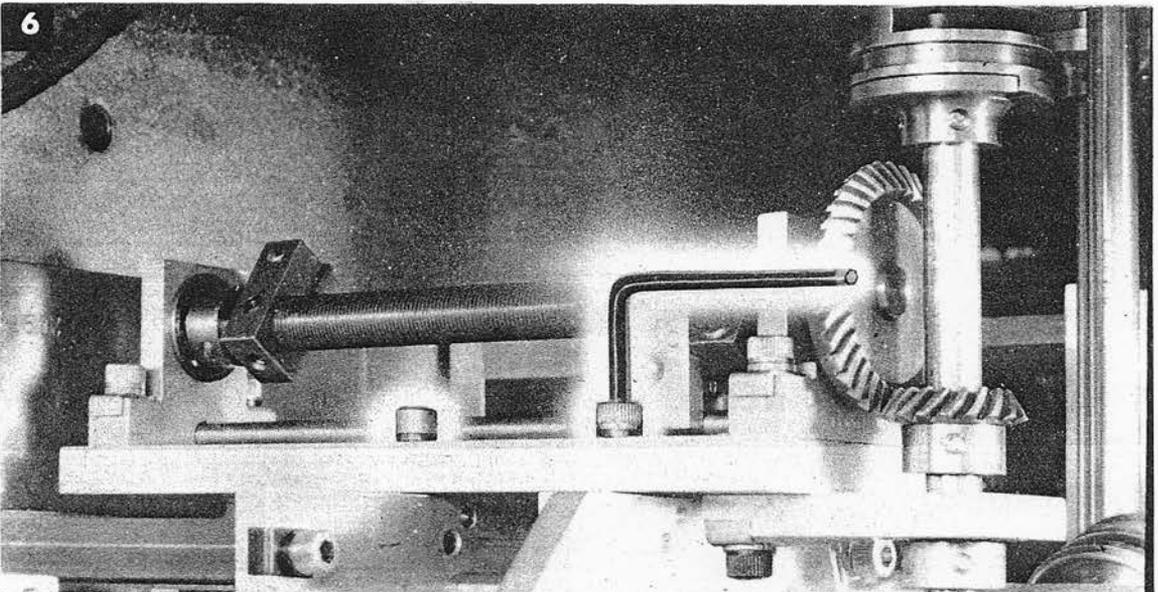
6 Remove the six screws securing the *cR* limit stop (L-10) mounting plate to the computer. Remove the limit stop and plate.
Remove the screws securing the hanger at the ballistic end of the *E2* coupling shaft.

7 To remove either the range rate corrector or the prediction multiplier, both must be partially removed before either can be taken out.

Remove the screws securing the mounting plate for the range rate corrector. Work the dowels loose. Ease the mechanism out just far enough to gain access to the two screws securing the hanger for the long horizontal shaft behind it.
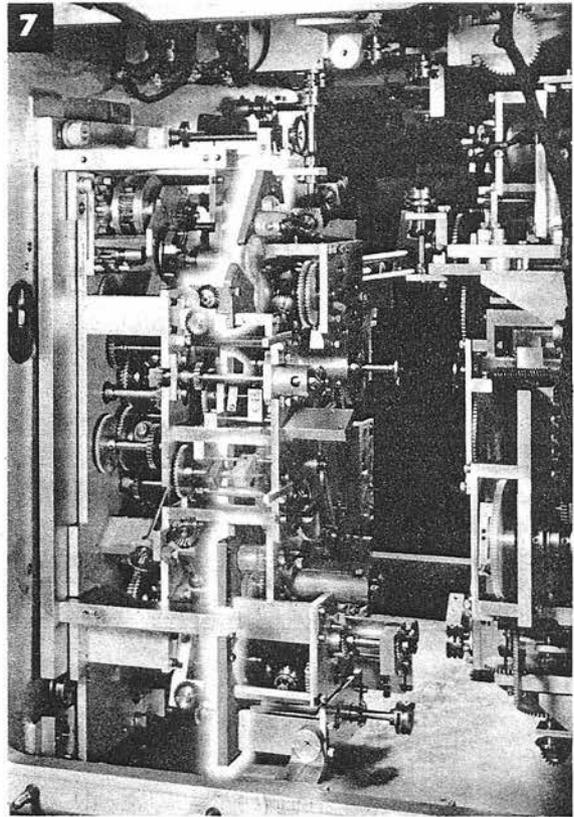
8 Remove the two screws securing this hanger.
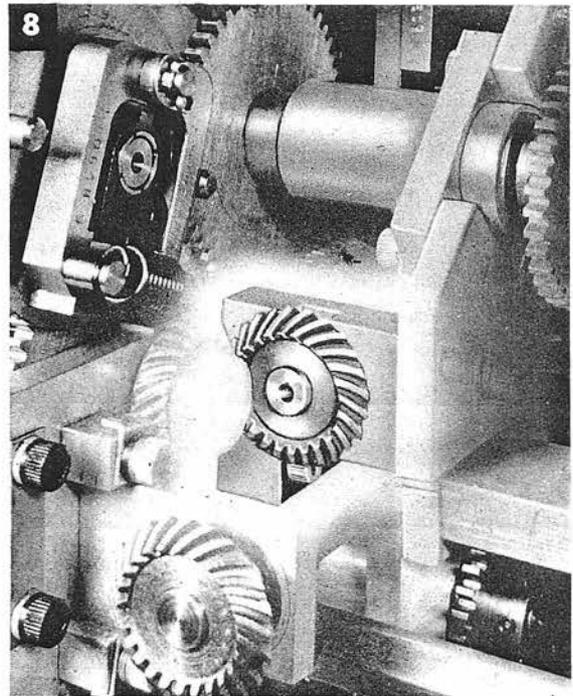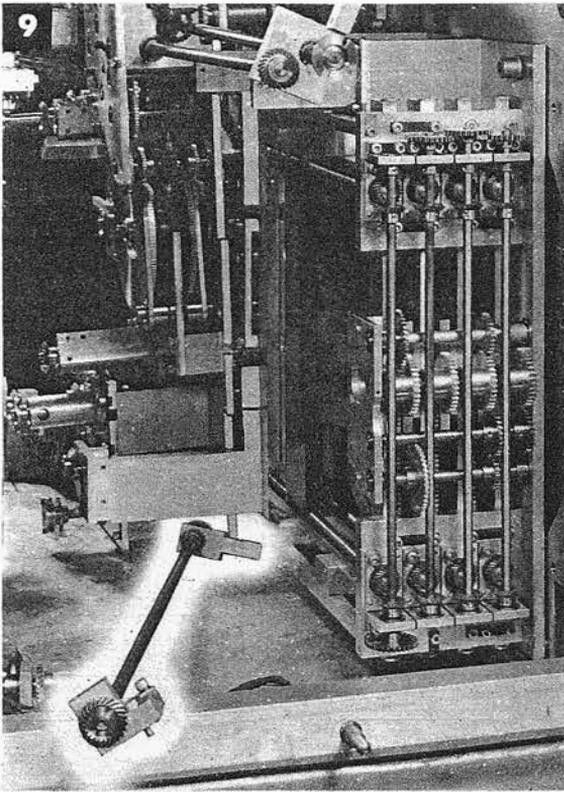
9   Remove the shaft from the left side of the computer.
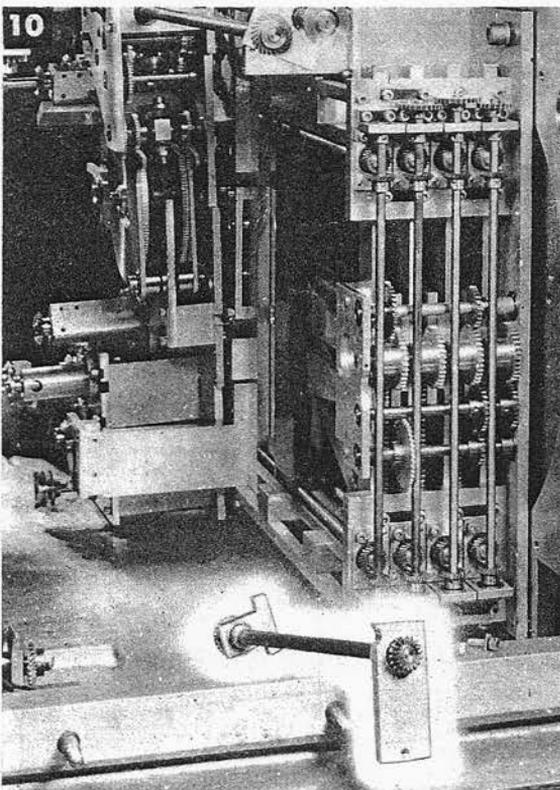
10   Remove the screws from the short shaft assembly which connects the prediction multilier unit to the prediction output gearing. Remove the shaft assembly.

11 Back out the two screw dowels. Remove the screws securing the prediction multiplier unit.

Move the range rate corrector unit toward the back of the computer to allow removal of the prediction multiplier unit.
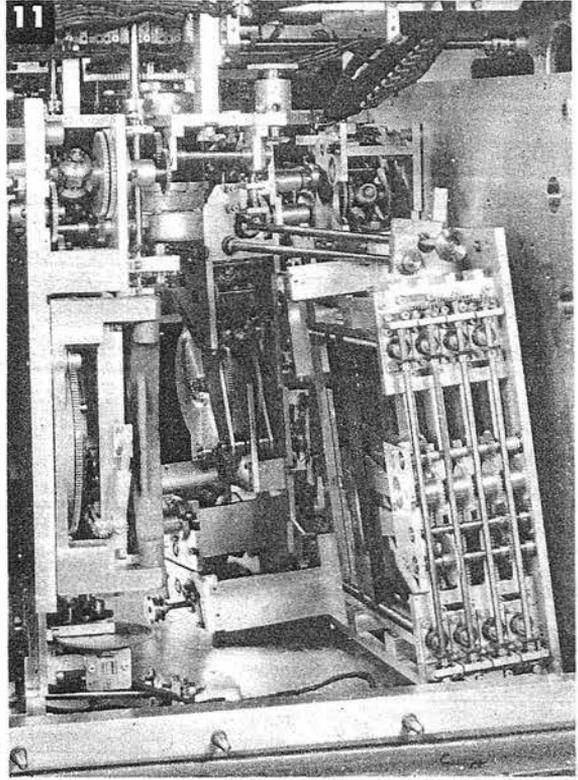
12 Remove both units from the left side of the computer.

To reinstall the range rate corrector and prediction multipliers, reverse the removal procedure.

Reinstall the other mechanism removed.

Readjust according to the instructions for reinstalling the horizontal wind component solver, page 723.

Run all tests.

COMPUTER MARK 1: MAINTENANCE

OP 1064A
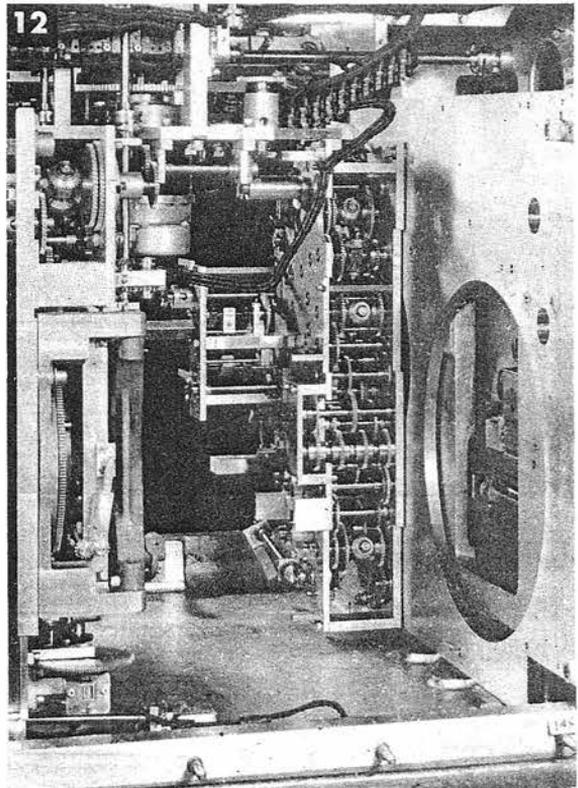
PREDICTION MULTIPLIERS OUTPUT GEARING

I.V., Tg Dial Group, page 714
WrD + KRdBs Follow-up, page 684
Prediction Multipliers Input Gearing, page 715
Horizontal Wind Component Solver, page 720
Elevation Wind Component Solver, page 724
Wind Component Solvers Output Gearing, page 726
Prediction Follow-up Mounting Plate, page 694
E2 Intermittent Drive, page 696
Range Rate Corrector and Prediction Multipliers, page 730
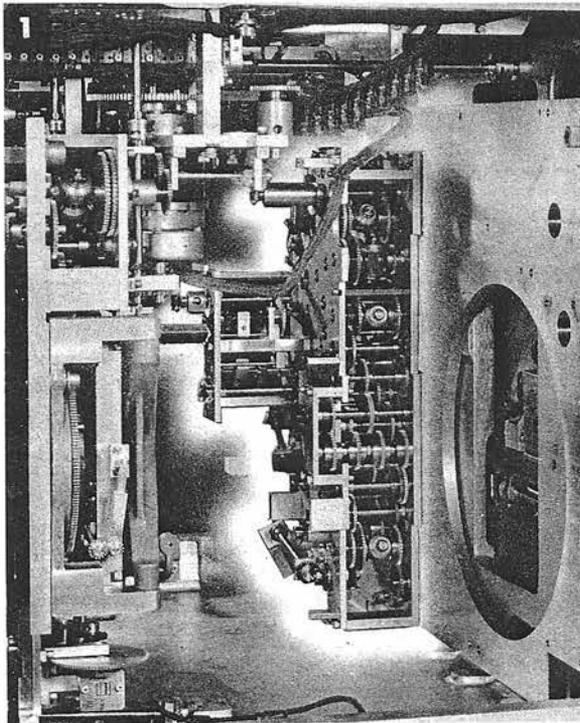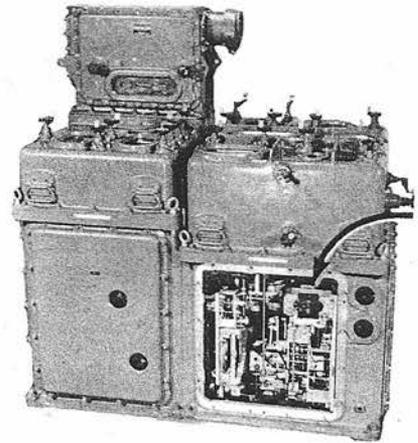
1 Remove the three screws securing the mechanism.

736

RESTRICTED
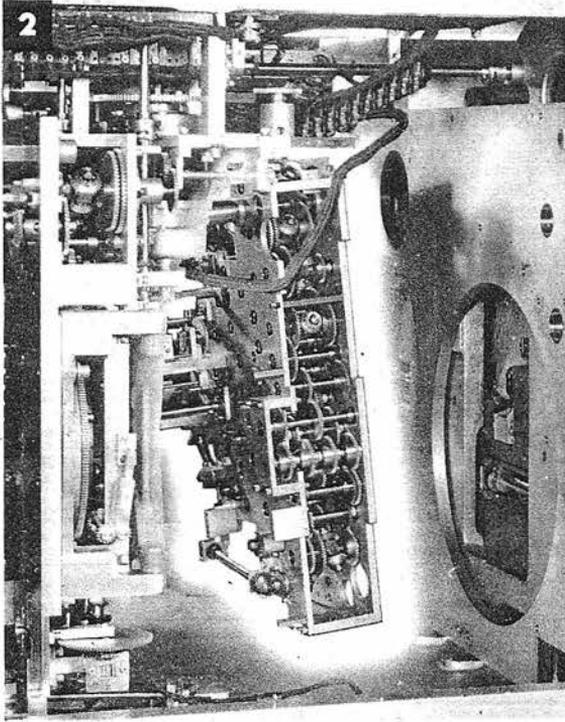
2 Tilt the mechanism to clear the surrounding gearing.
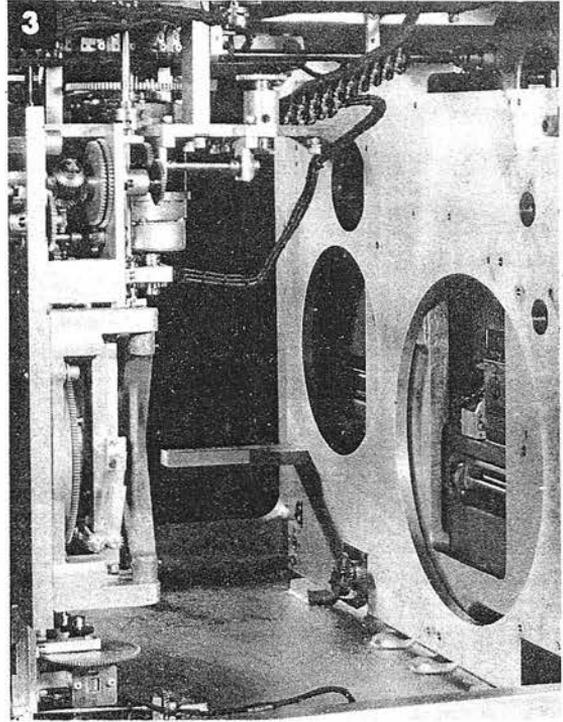
3 Remove the mechanism from the left side of the computer.

To reinstall the gearing unit, reverse the removal procedure.

Reinstall the other mechanisms removed.

Readjust according to the instructions for reinstalling the horizontal wind component solver, page 723

Run all tests.

So RECEIVER

Star Shell Computer, page 804
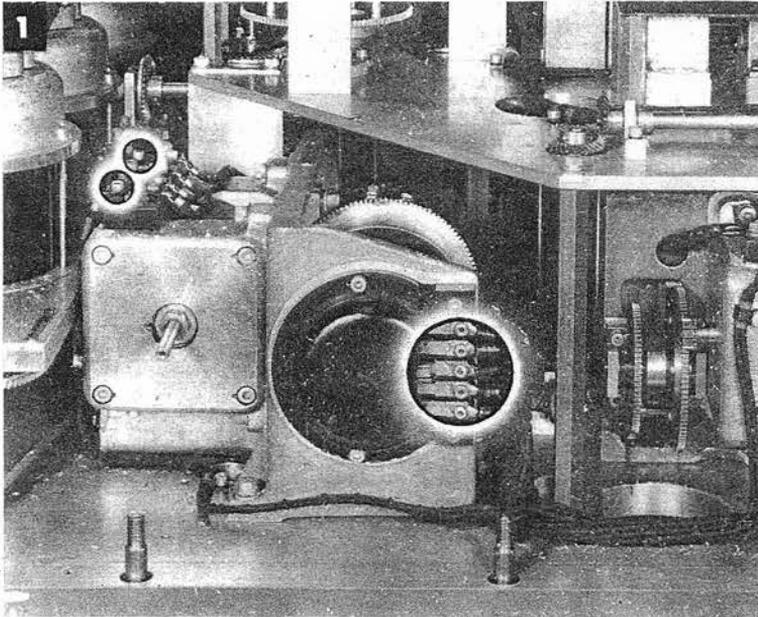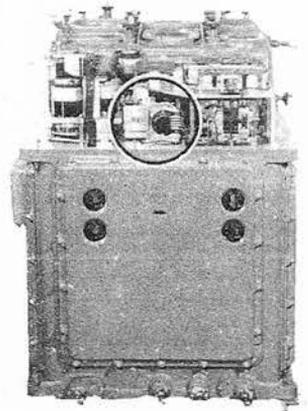
1 Remove the two screws connecting cable leads Y and YY to the servo terminal block.

Remove the five screws connecting the cable leads to the synchro terminal block.
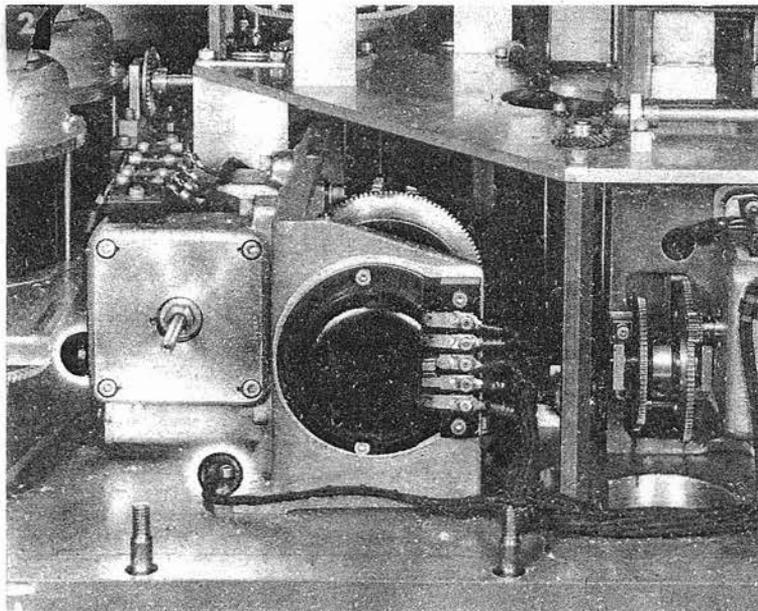
2 Remove the two screws securing the cable clamps near the servo motor.

3 Remove the three screws securing the receiver. Remove the rear screw through the access hole in the upper plate.
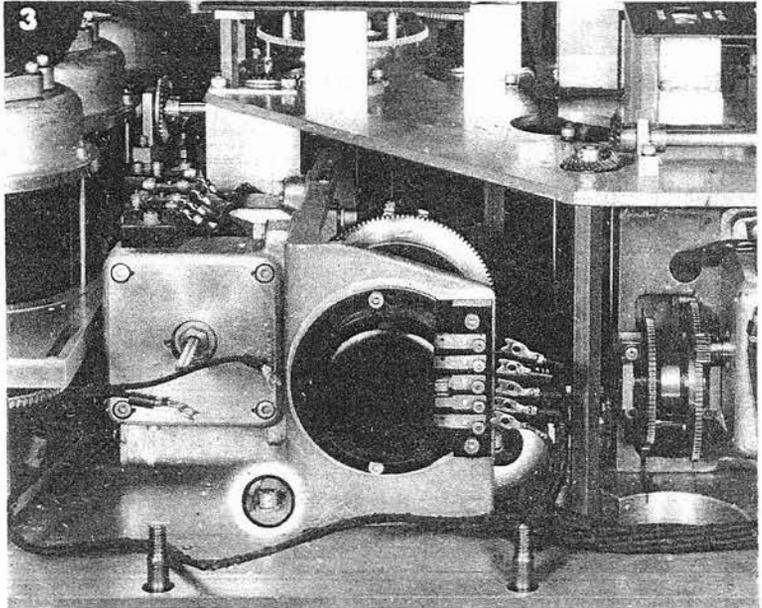
4 Remove the receiver.
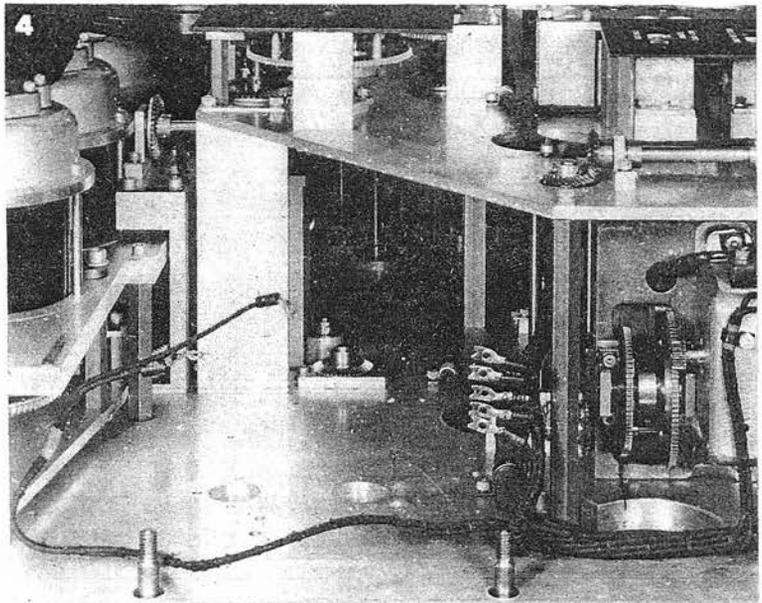
To reinstall the *So* receiver, reverse the removal procedure.

Readjust A-212.

Run transmission tests.

Reinstall the star shell computer, and test.

Rj RECEIVER

Star Shell Computer, page 804
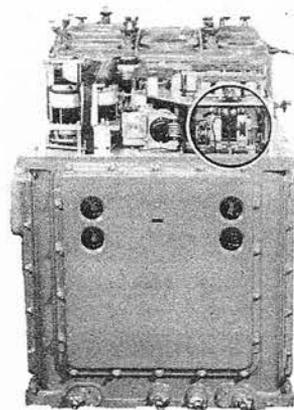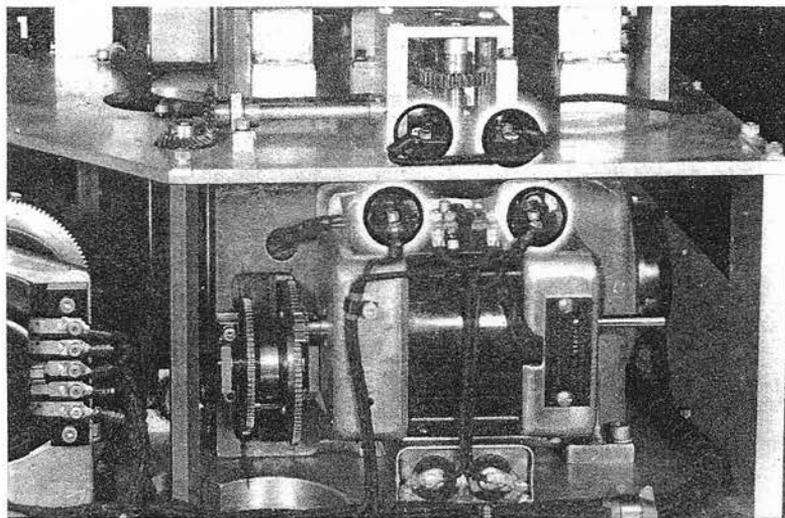
1 Remove the two screws connecting cable leads **X** and **XX** to the servo terminal block.

Remove the two screws securing the push switch above the servo motor.
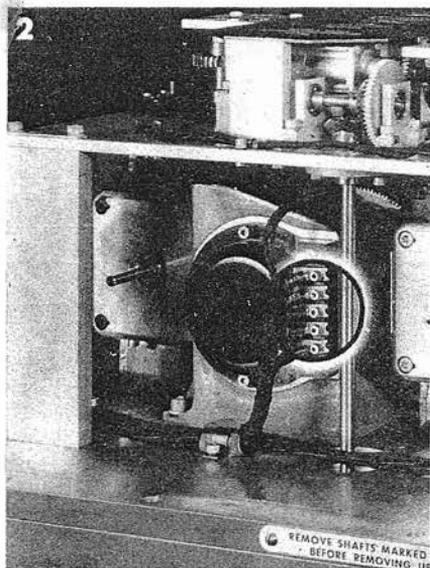
2 Remove the five screws connecting the cable leads to the synchro terminal block.
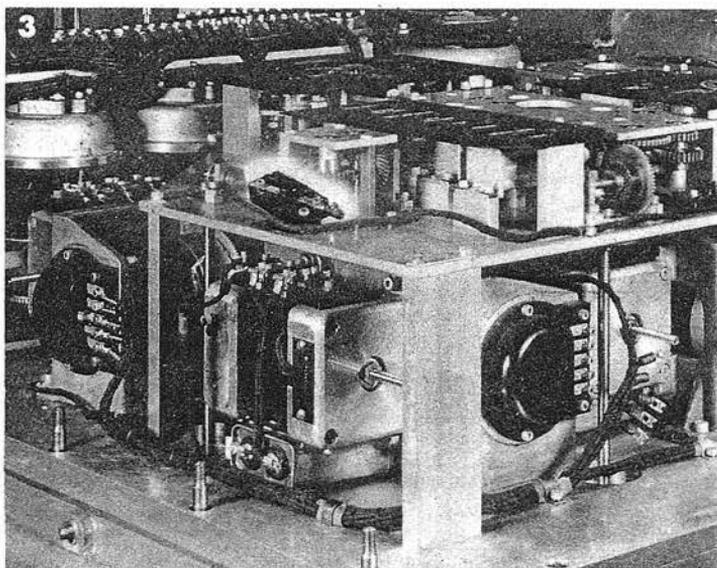
3 Push the switch up through the plate.

4 To reach the access holes for the rear screws, remove the mask over the counters above the receiver.
Remove the three screws securing the receiver.
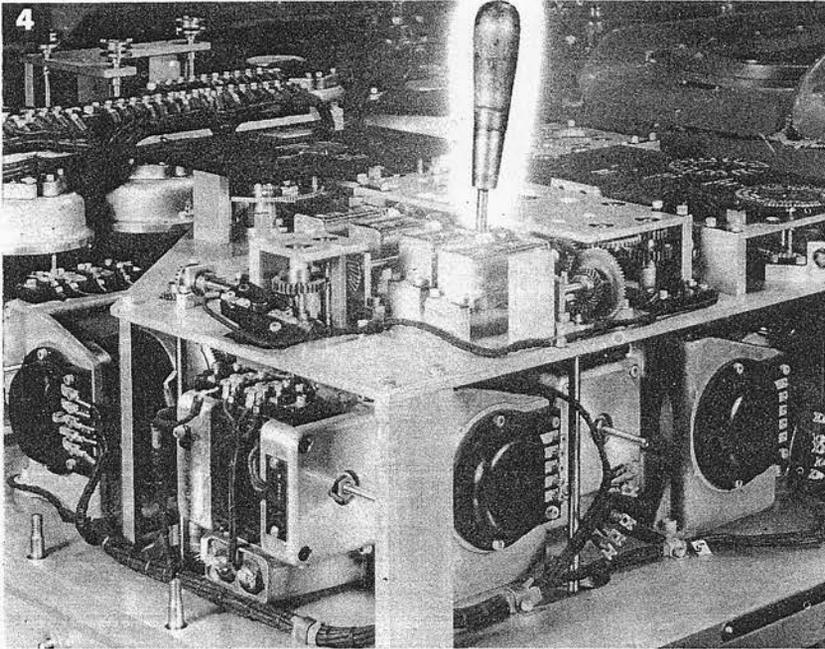
5 Remove the receiver by tilting it to clear the stud at the rear edge of the mounting plate.
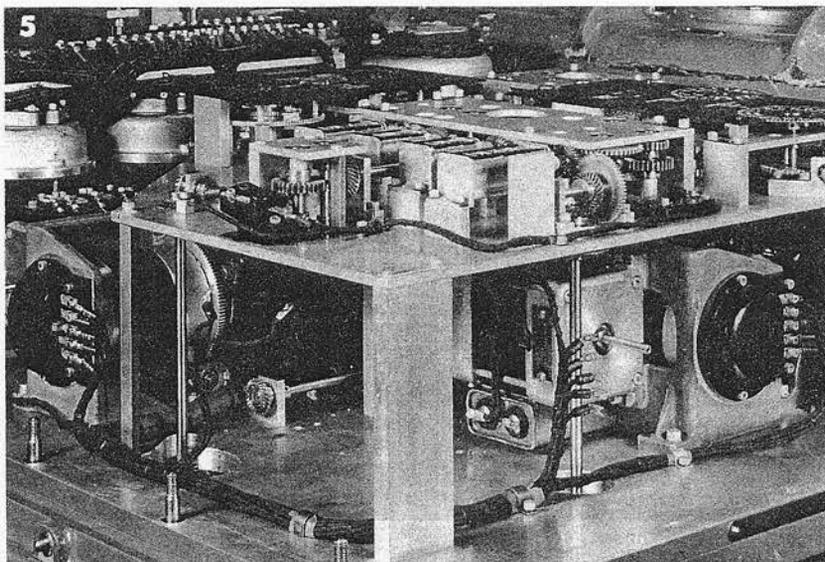
To reinstall the Rj receiver, reverse the removal procedure.

Readjust clamp A-88.

Run transmission tests.

Reinstall the star shell computer, and readjust it to the instrument.

Vj RECEIVER

Star Shell Computer, page 804
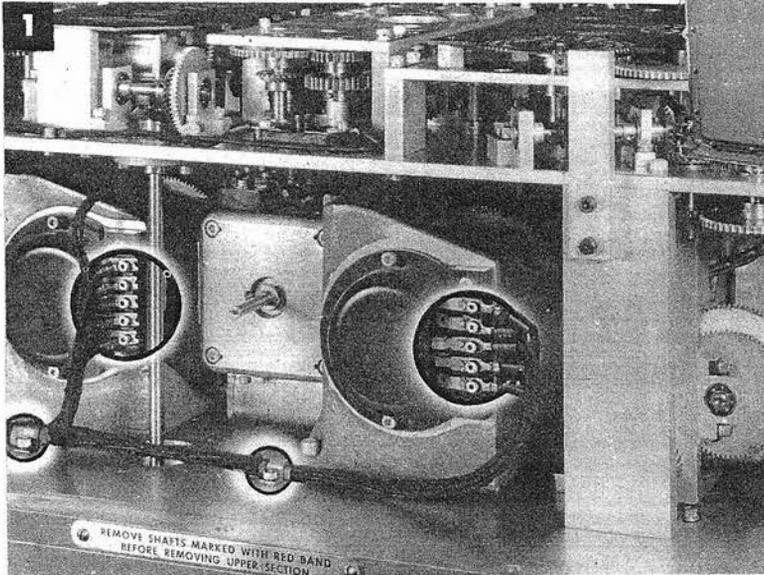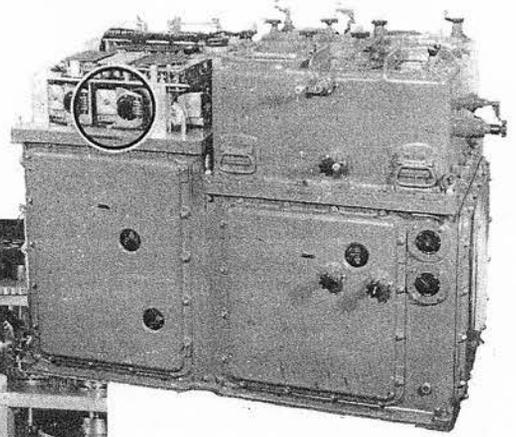
1 Remove the ten screws connecting the cable leads to the synchro terminal blocks of the Rj and the Vj receivers.

Remove the two screws securing the two cable clamps near the receivers.
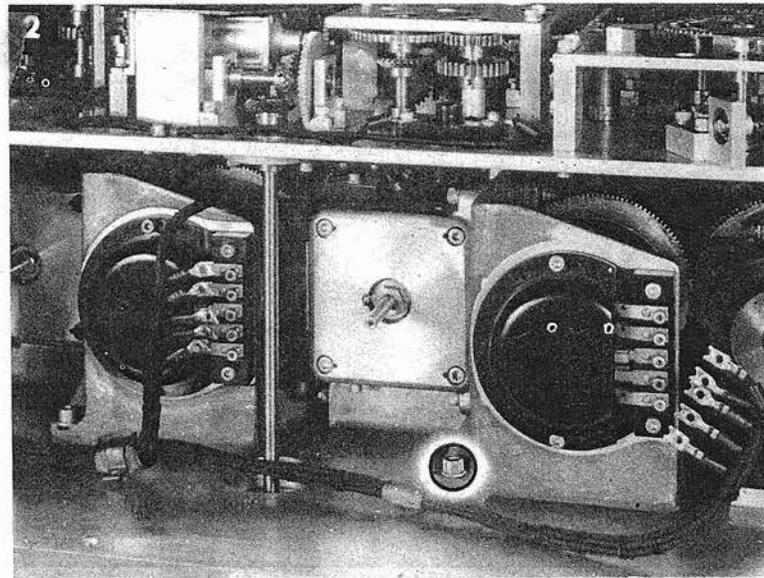
2 Remove the three screws securing the receiver. Reach through the access hole in the upper plate to remove the rear screw.

3 Slide the receiver out to reach the two screws connecting cable leads W and WW to the servo terminal block. Remove the two screws.
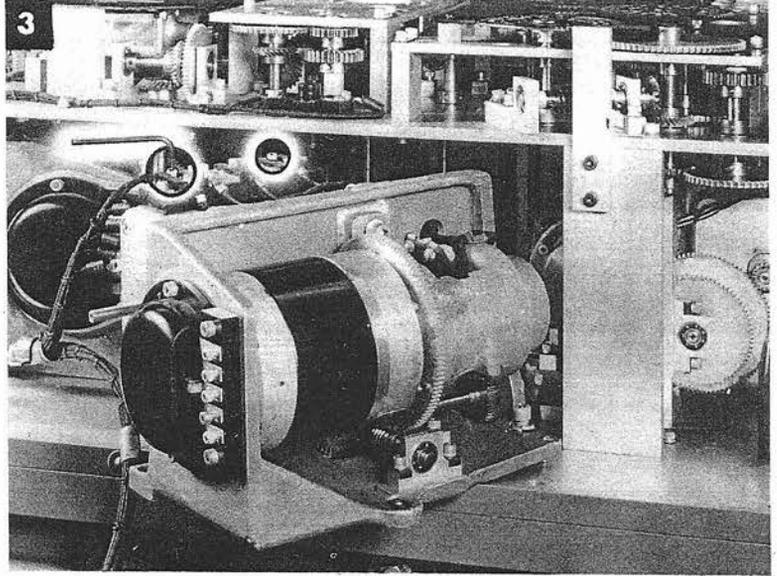
4 Remove the receiver.
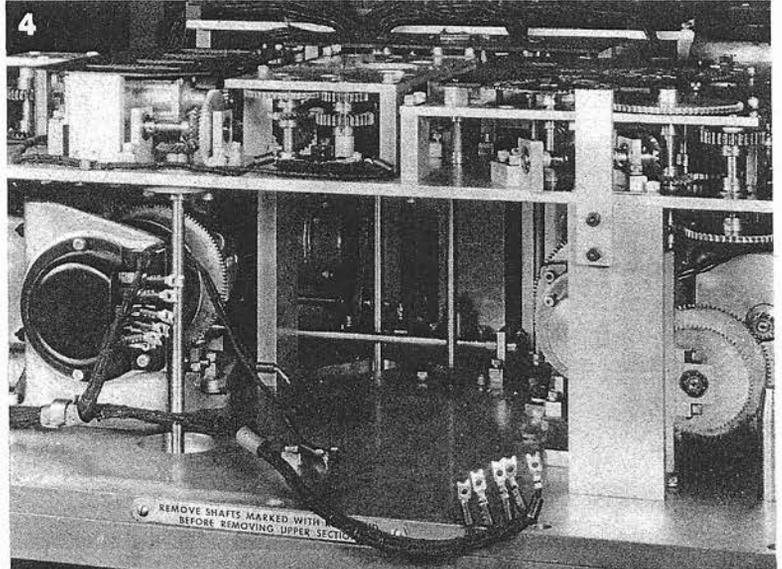
To reinstall the Vj receiver, reverse the removal procedure.

Readjust clamp A-87.

Run transmission tests.

Reinstall the star shell computer, and readjust it to the instrument.

Dj RECEIVER

Star Shell Computer, page 804
V j Receiver, page 742
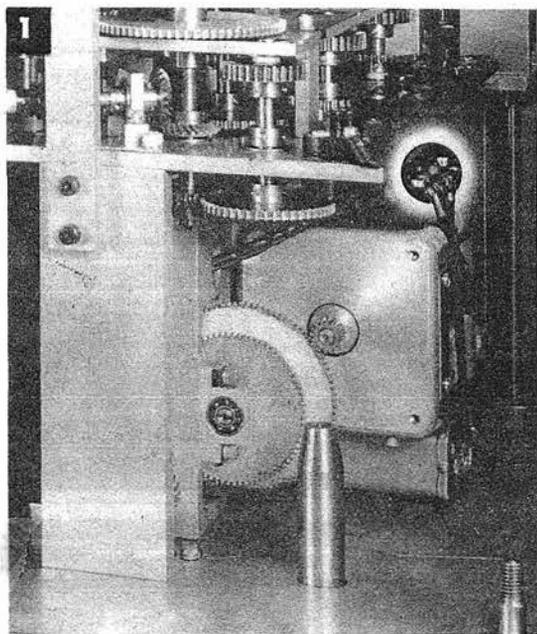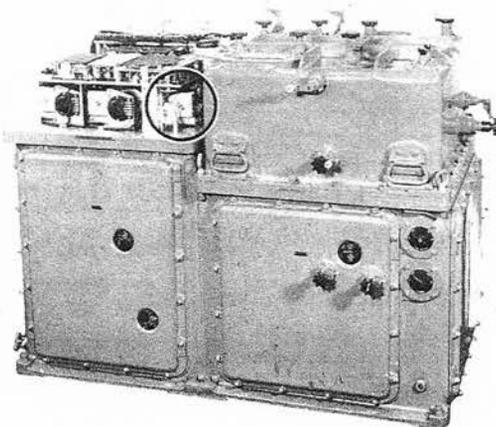
1 Remove the two screws connecting cable leads V and VV to the servo terminal block.

Loosen the screw securing the cable clamp to the servo motor.
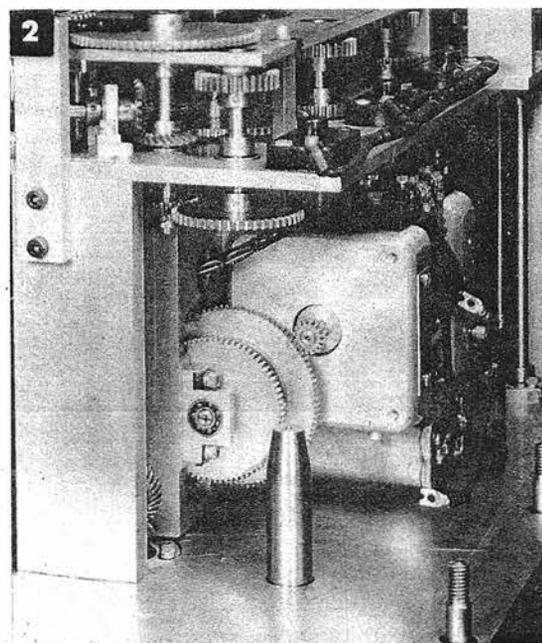
Free the cable.

2 Remove the three screws securing the receiver. Reach through the access hole in the plate above to remove the rear screw.

Loosen the screw securing the cable clamp behind the receiver.

Free the cable.

3 Turn the receiver to reach the screws connecting the cable leads to the synchro terminal block. Remove the five screws.
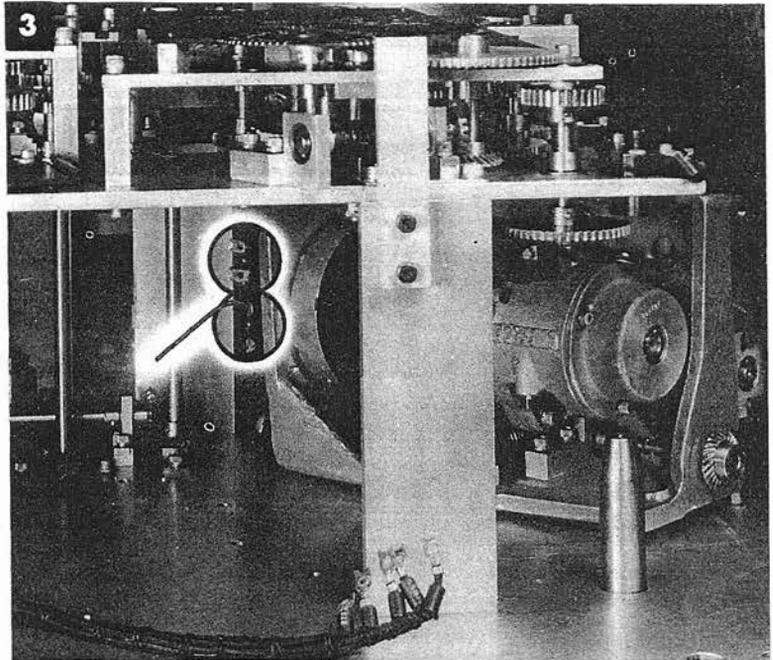
4 Remove the Dj receiver through the opening made by the removal of the Vj receiver.
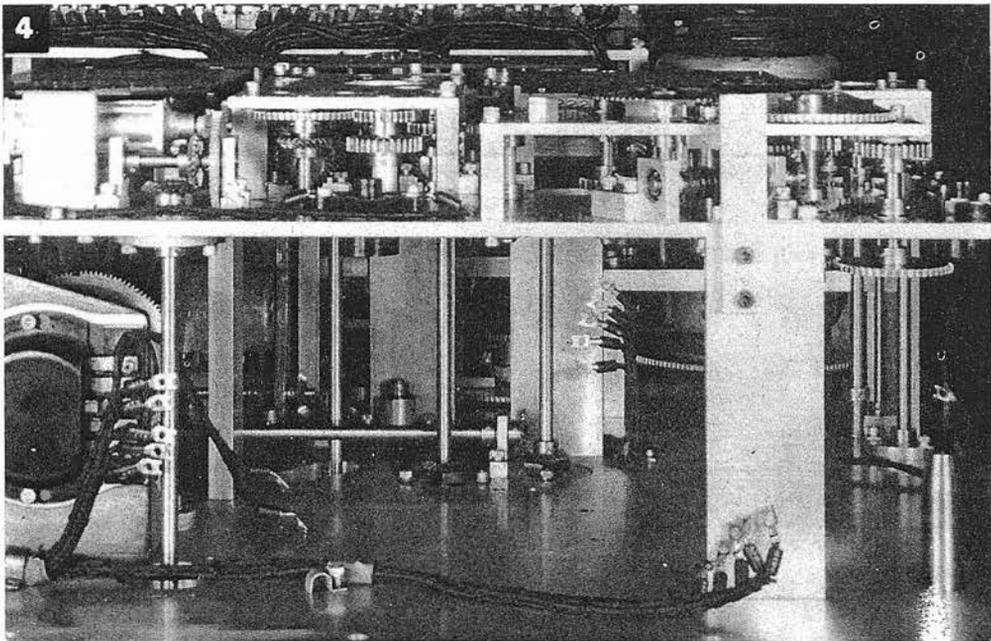
To reinstall the Dj receiver, reverse the removal procedure.

Reinstall the Vj receiver.

Readjust clamps A-86 and A-87.

Run transmission tests.

Reinstall the star shell computer, and readjust it to the instrument.

FUZE AND Ds TRANSMITTER GROUP

Star Shell Computer, page 804
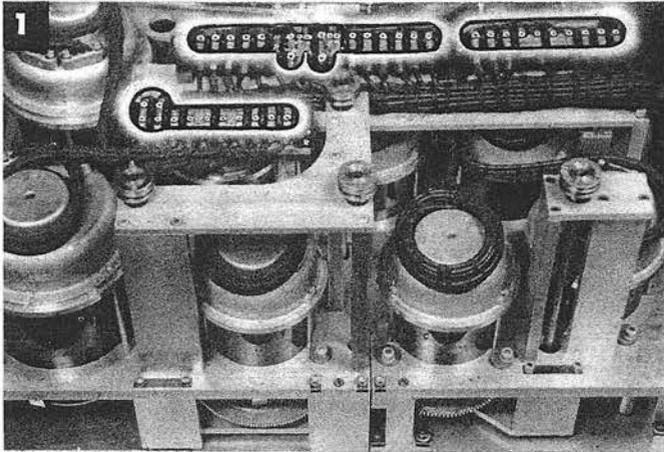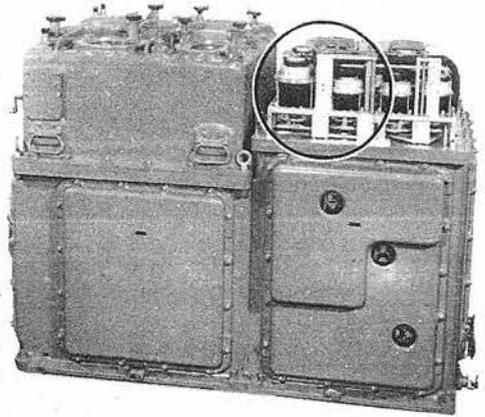
1 Remove the screws connecting all transmitter cable leads to the terminal blocks above the transmitters. Free the cable.
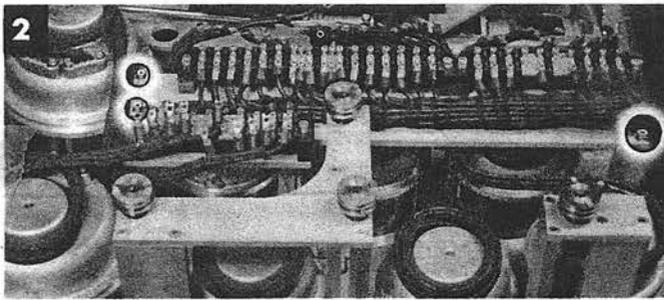
2 Remove the four screws securing the mounting plate for the terminal blocks.
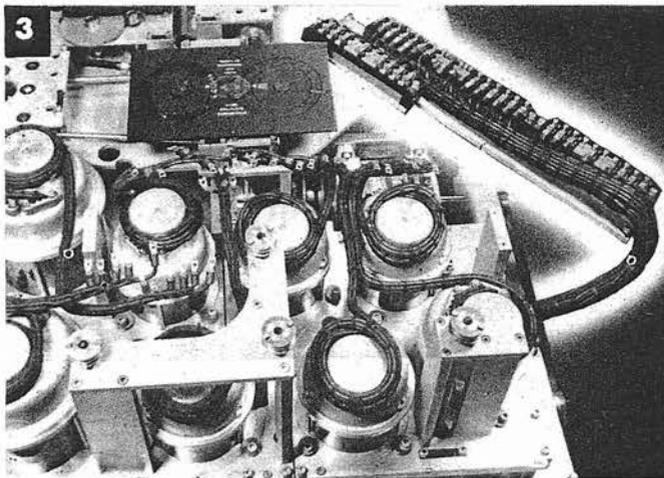
3 Push the terminal block and the mounting plate aside.

4 Back out the two screw dowels and all the screws securing the transmitter group mounting plate.
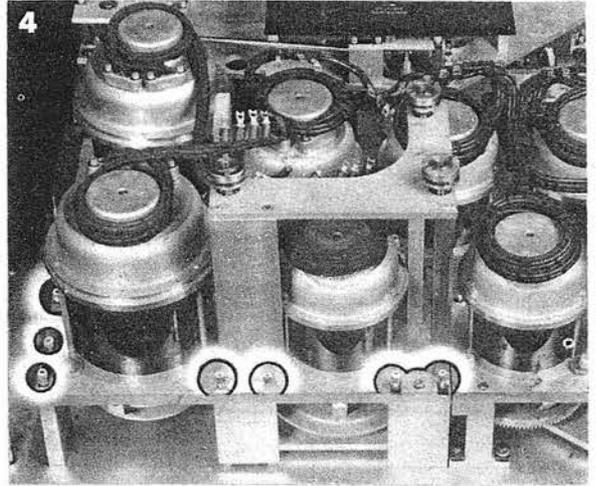
5 Lift the transmitter group straight up and remove it.
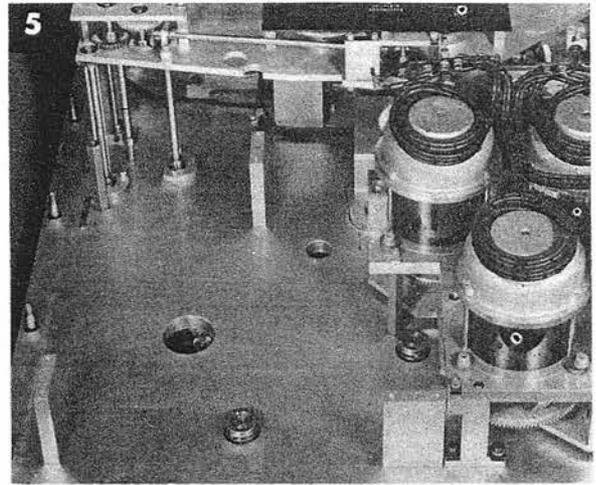
To reinstall the transmitter group, reverse the removal procedure.

Check clamp A-213.

Readjust clamps A-94, A-89, and A-96.

Check clamps A-66 and A-67.

Readjust clamps A-93 and A-77.

Run transmission tests.

Reinstall the star shell computer, and readjust it to the instrument.

CAUTION
If any one of the synchros has been removed, it is necessary to make the following adjustment to the reinstalled synchro before reinstalling the complete group: Set the rotor of the reinstalled synchro on electrical zero. Loosen the three screws holding the engraved plate on the rotor gear. Slip the plate to match the fixed index of the unit. Tighten the screws.

Vs, Ds TRANSMITTER GROUP

Fuze and *Ds* Transmitter Group, page 746
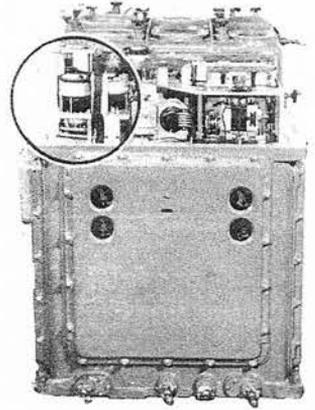
1 Remove the two screws in the base of the supporting hanger next to the cable.
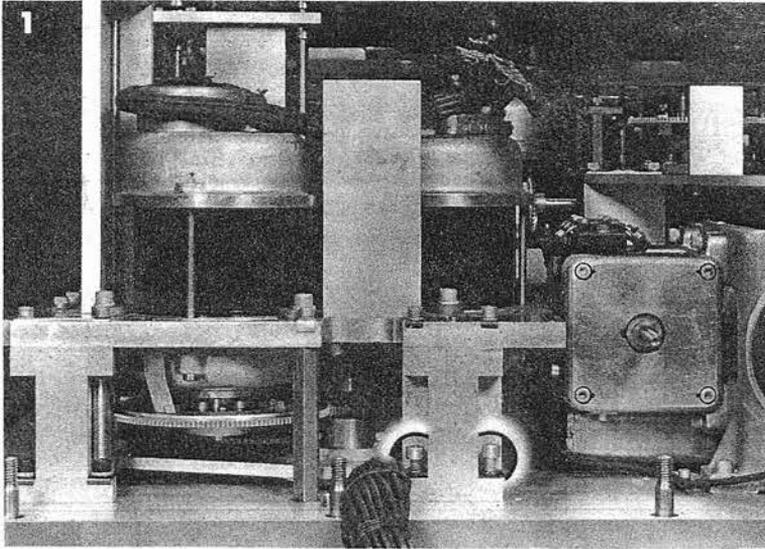
2 Remove all the screws securing the transmitter group mounting plate. Back out the two screw dowels.
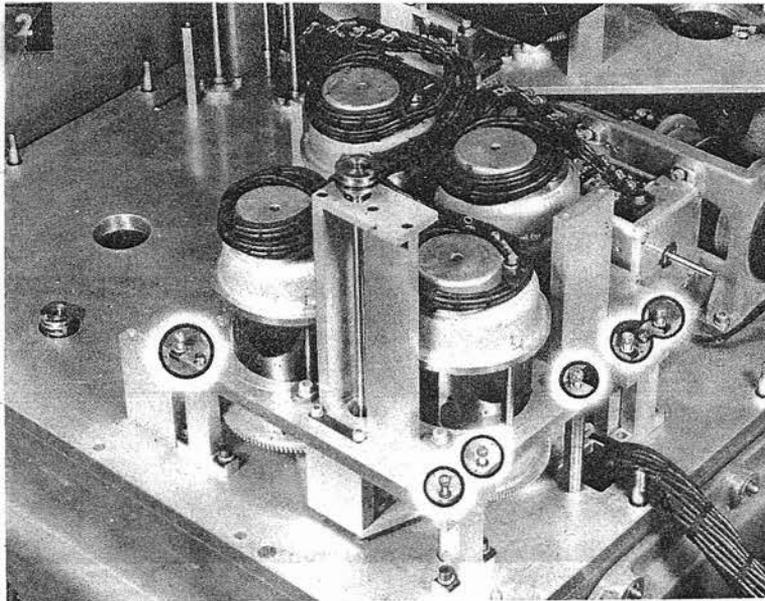
3 Lift the plate slightly and remove the supporting hanger next to the cable. Unscrew the hexagonal post.
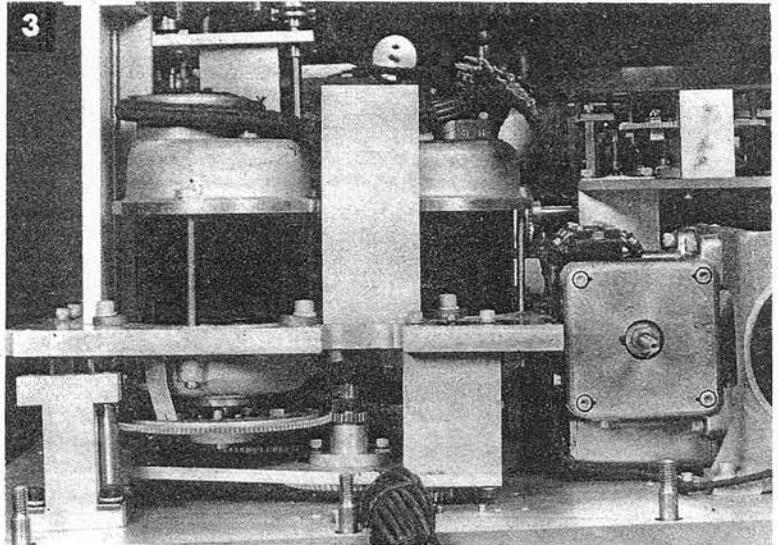
4 Lift the transmitter group toward the left rear corner of the computer to clear all interference. Remove the transmitter group.
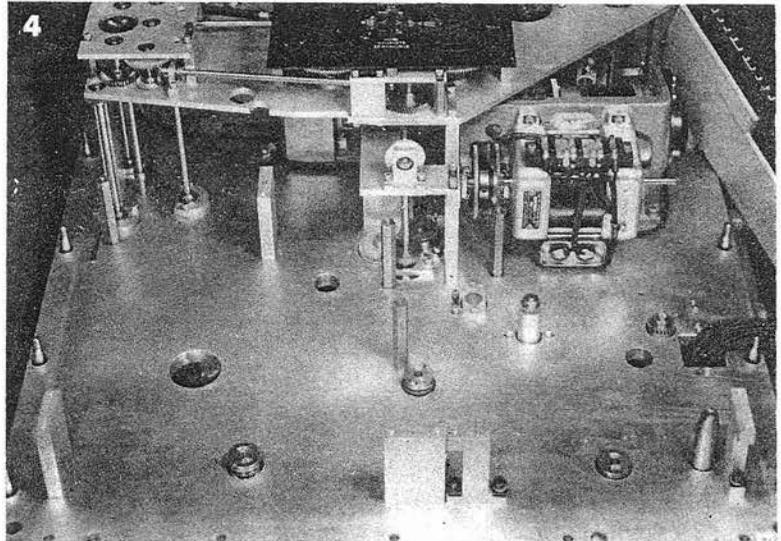
To reinstall the transmitter group, reverse the removal procedure.

Follow the readjustment procedure in the instructions for the reinstallation of the Fuze and *Ds* transmitter group. The caution at the end of that procedure also applies here.

Check clamp A-214.

Readjust clamps A-95, A-55, A-97, A-69, and A-96.

Check clamp A-66.

Rj COUNTER ASSEMBLY

Star Shell Computer, page 8 04
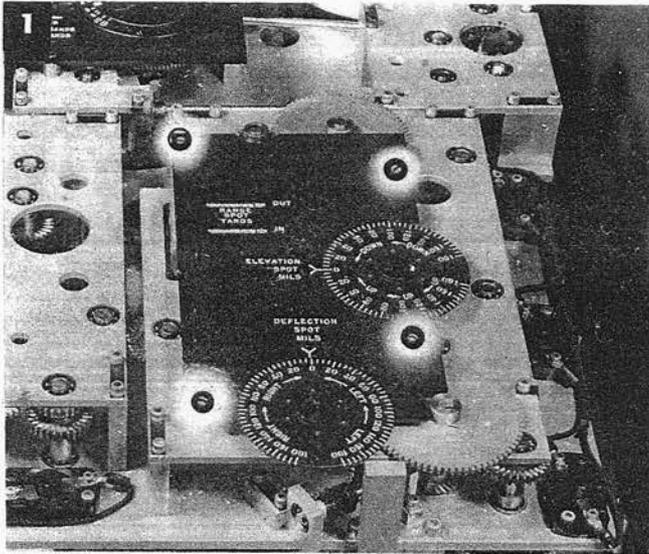
1 Remove the four screws secur-
ing the mask over the counter
assembly.
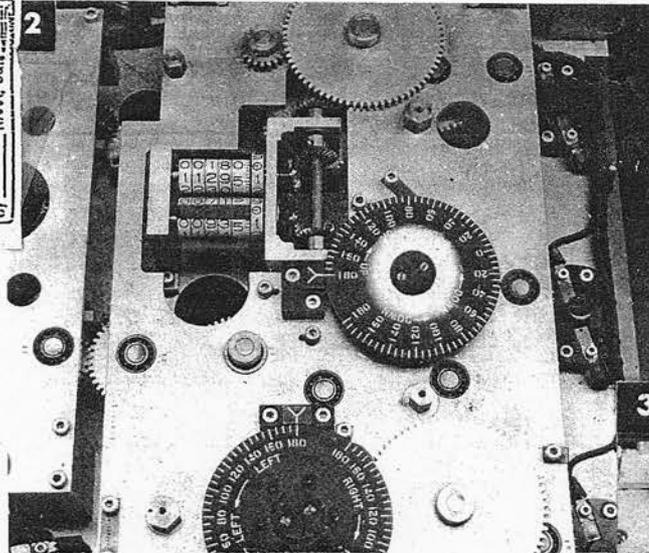
2 Remove the *Vj* dial clamp. Re-
move the dial.
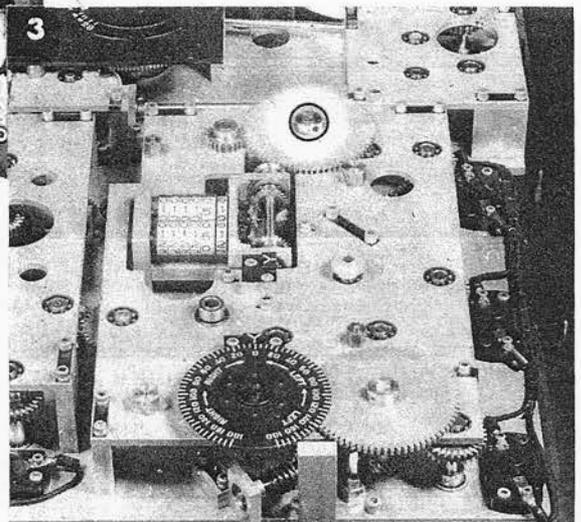
3 Unpin the large gear next to
the counter assembly.

4 Remove the gear from the shaft.

Remove the five screws securing the counter assembly casting.
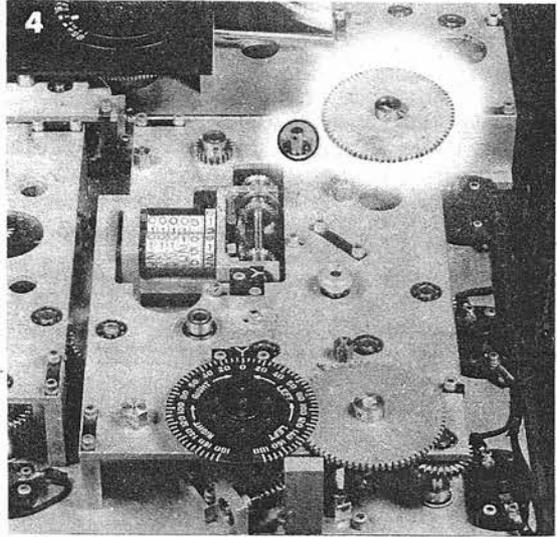
5 Tilt the assembly to clear the plate and surrounding gearing.
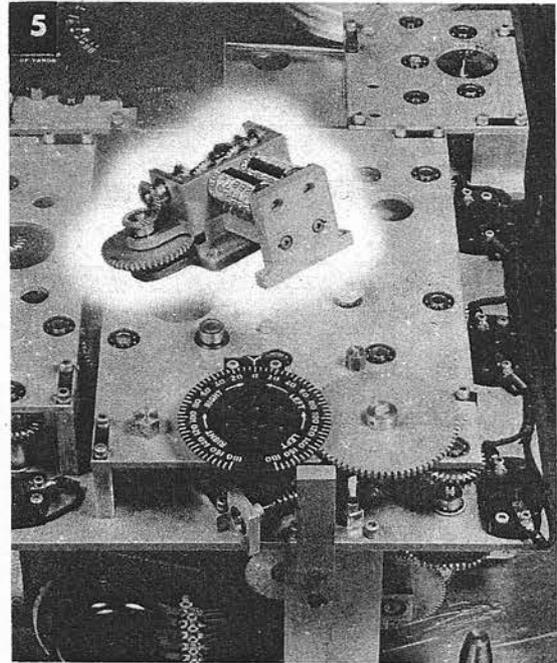
6 Remove the counter assembly.

To reinstall the *Rj* counter assembly, reverse the removal procedure.
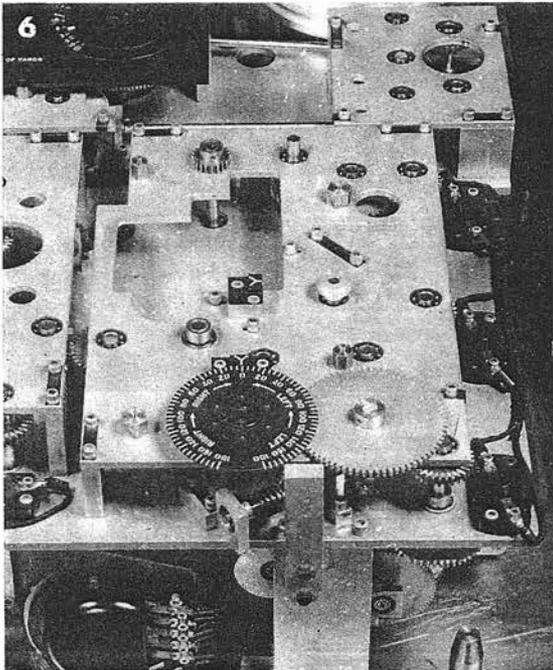
Readjust clamps A-234 and A-235.

Check clamp A-88.

Readjust clamp A-501.

Check clamp A-87.

Ds, Vs, FUZE, AND R2 COUNTERS

Star Shell Computer, page 804
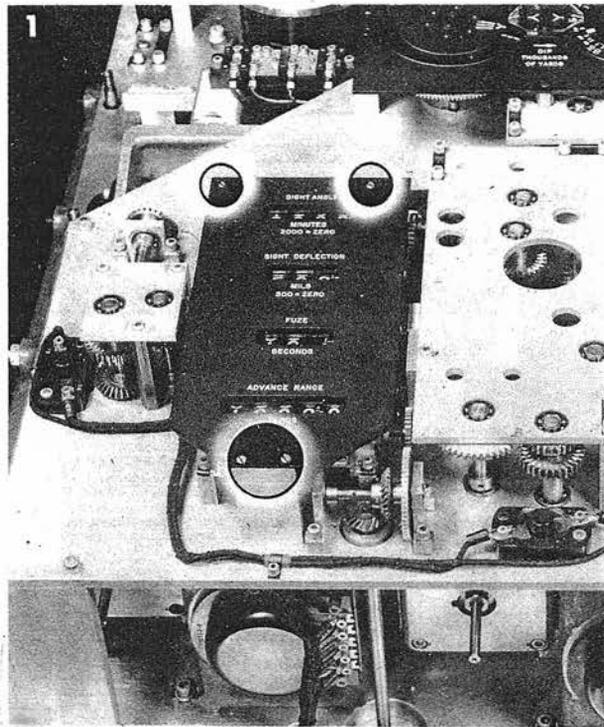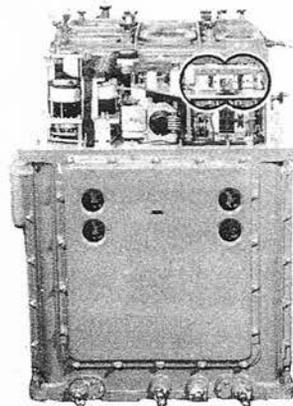
1 Remove the four screws securing mask. Remove the mask.
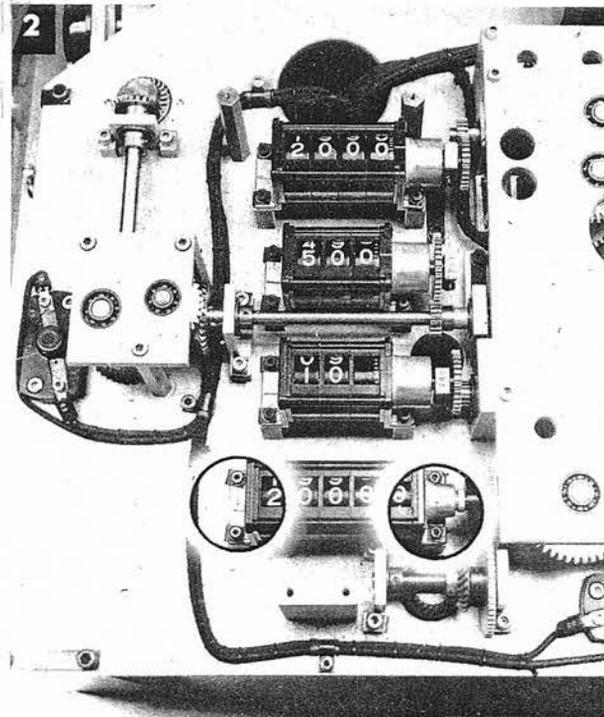
2 Remove the four screws securing a counter.

3 Remove the counter.
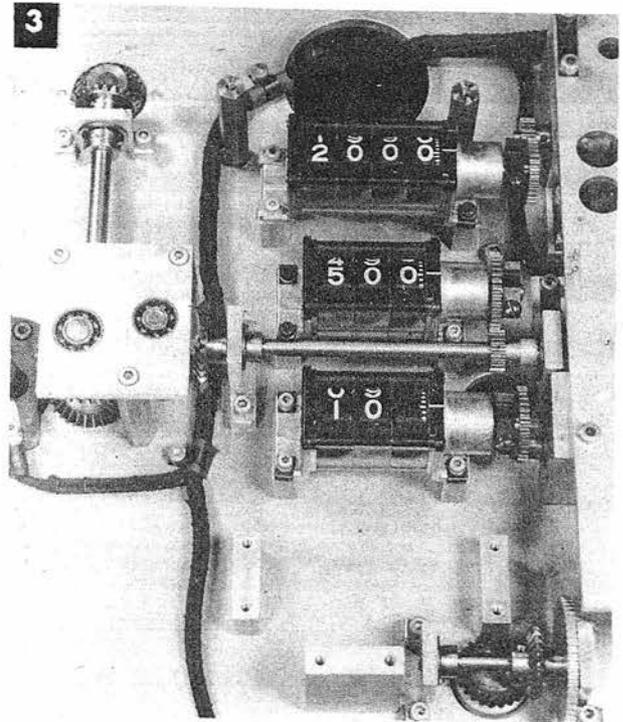
To reinstall a counter, reverse the removal procedure.

There is a different readjustment procedure for each counter, as follows:

Ds counter: Readjust clamp A-94 in accordance with the instructions for readjusting clamp A-89. Use A-94 to match the *Ds* indicating counter to the *Ds* master counter.

Check clamp A-96.

Vs counter: Readjust clamp A-95 in accordance with the instructions for readjusting clamp A-184. Use A-95 to match the *Vs* indicating counter to the *Vs* master counter.

Check clamp A-97.

R2 counter: Readjust clamps A-92 and A-18 in the star shell computer.

Fuze counter: Readjust clamp A-93 in accordance with the instructions for readjusting clamp A-77. Use A-93 to match the fuze indicating counter to the fuze master counter in the ballistic section.

Check fuze transmission.

Corrector Unit

This unit includes the trunnion tilt section, the deck tilt section, and the parallax section, as well as the Eb and $B'r$ receivers, the $E'g$ and $B'gr$ transmitters, and the $B'r$ local control follow-up.

Eb RECEIVER
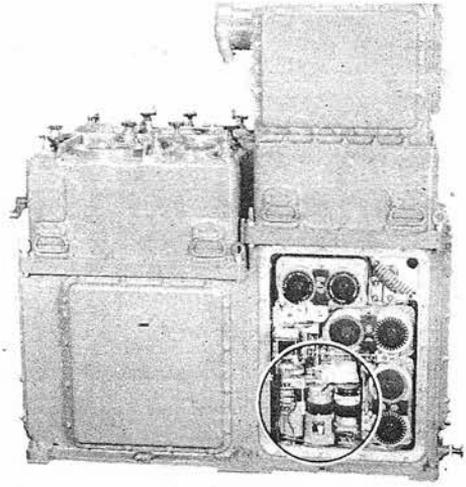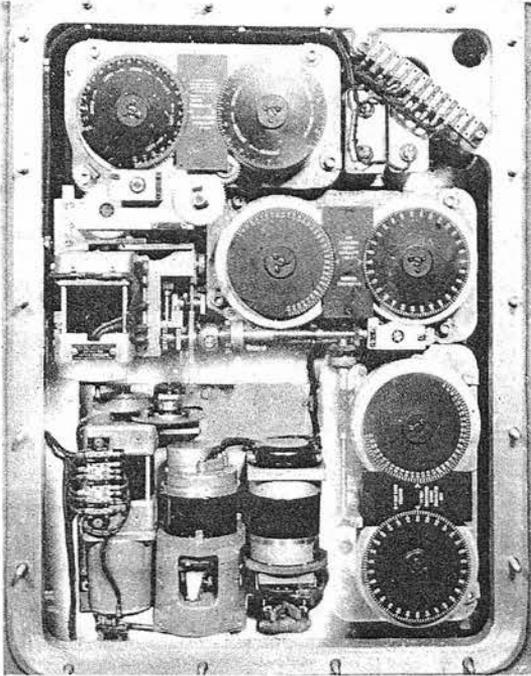
1 Remove the ten screws connecting the cable leads to the terminal block under the rear cover.
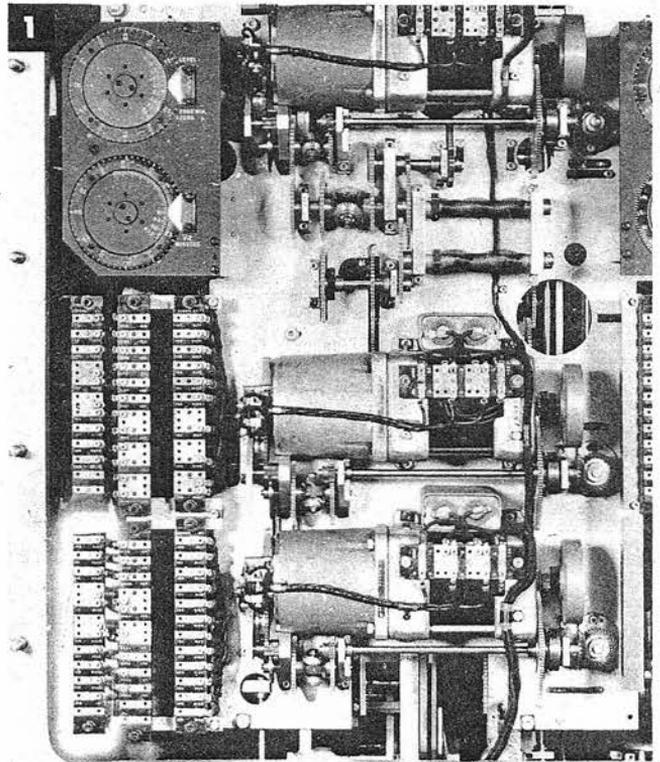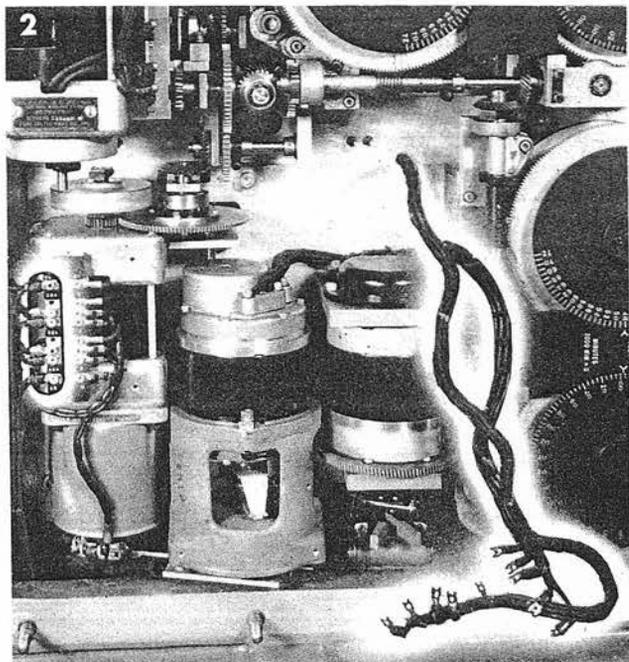
2 Pull the cable through to the receiver side of the instrument. Remove the screws connecting the external leads to the terminal block on the servo motor.
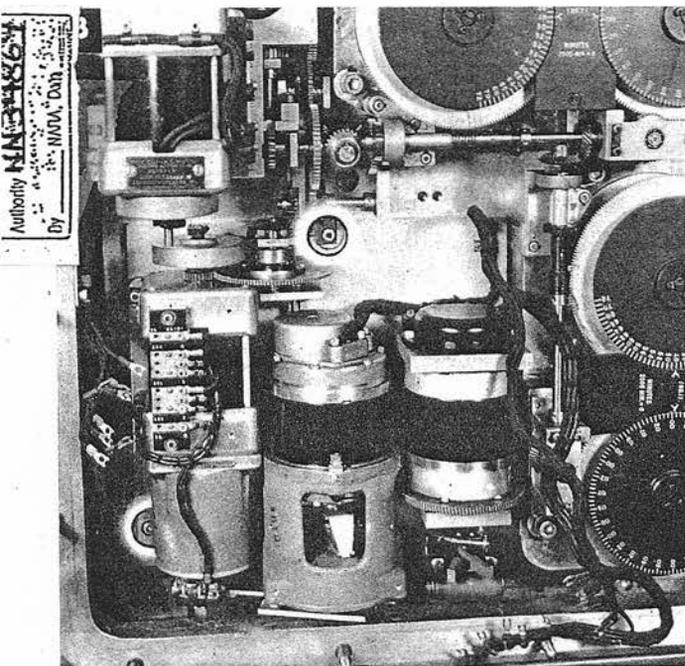
3 Remove the three screws securing the mechanism.
Carefully free the dowels.
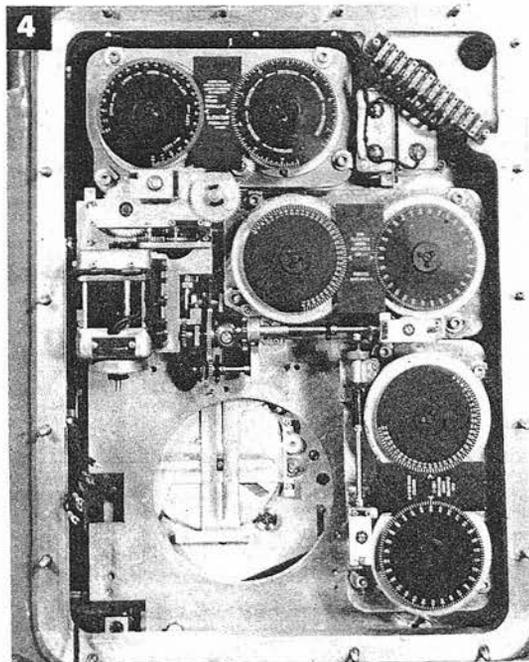
4 Remove the receiver.

To reinstall the *Eb* receiver, reverse the removal procedure.

Readjust clamp A-50.

Run tests.

E'g INDICATING TRANSMITTERS
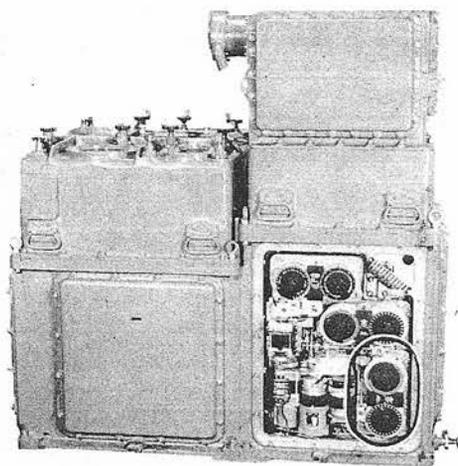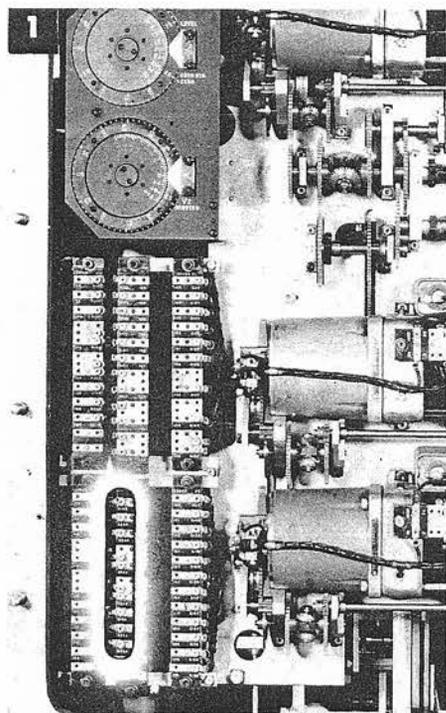
1 Remove the ten screws connecting the transmitter cable leads to the terminal block under the rear cover.
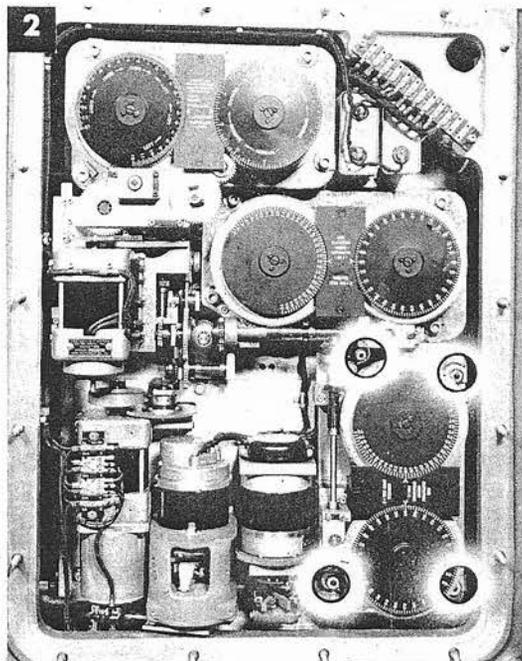
2 Remove the four screws securing the transmitters.
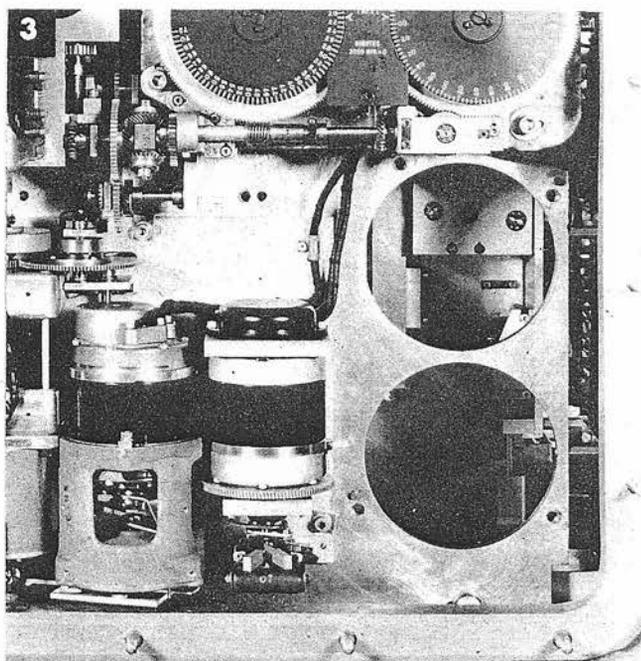
3 Remove the transmitters.

To reinstall the *E'g* indicating transmitters, reverse the removal procedure.
Readjust clamp A-5.
Run transmission tests.

E'g AUTOMATIC TRANSMITTERS

E'g Indicating Transmitters,
page 757
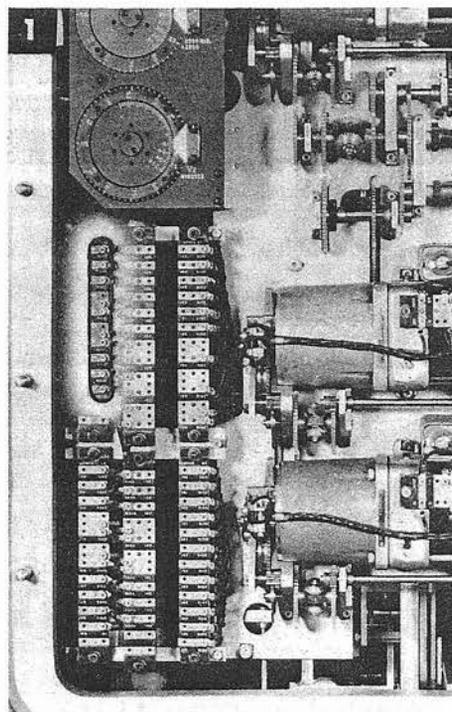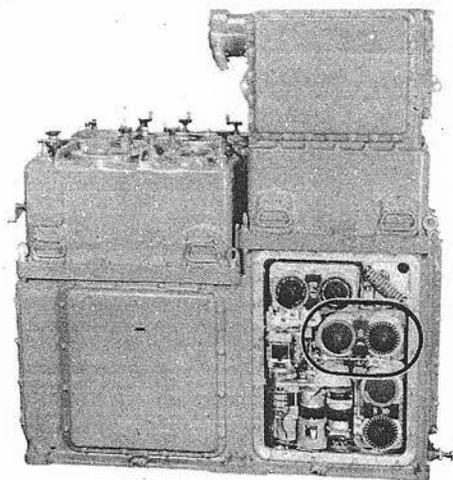
1 Remove the ten screws connecting the transmitter cable leads to the terminal block under the rear cover.
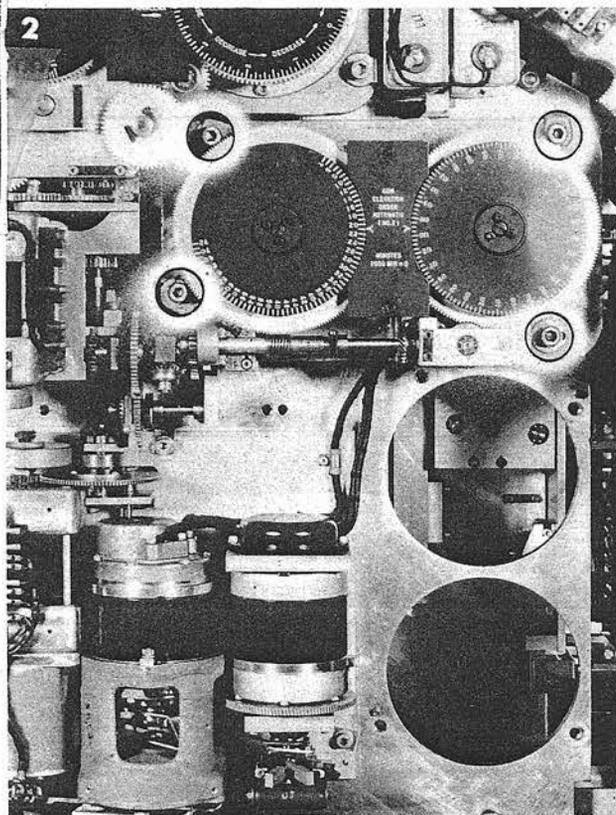
2 Remove the four screws securing the transmitters.
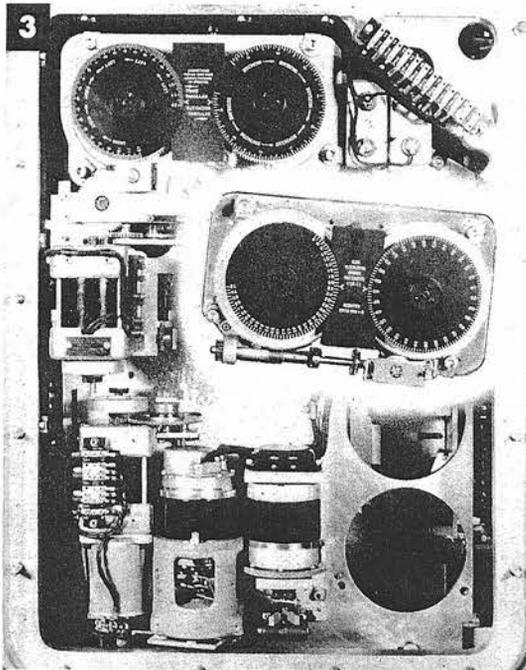
3 Work the dowels loose. Lift the transmitters to disengage the gear meshes.
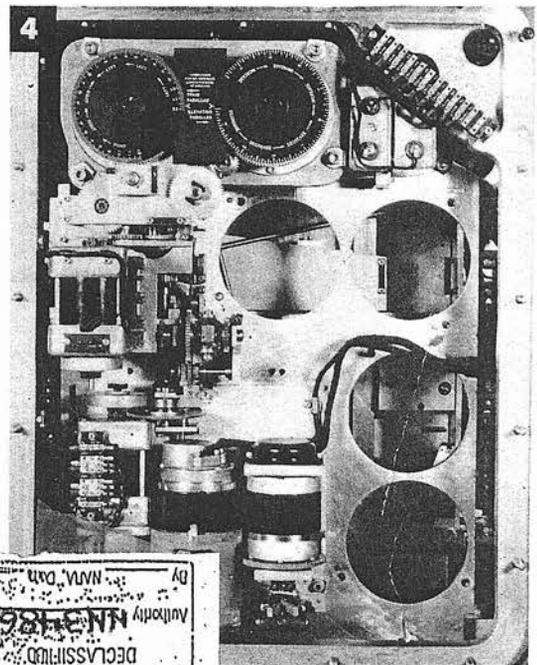
4 Remove the transmitters.

To reinstall the $E'g$ automatic transmitters, reverse the removal procedure.

Reinstall the $E'g$ indicating transmitters.

Readjust clamps A-5 and A-51.

Run tests.

PARALLAX TRANSMITTERS

1 Remove the ten screws connecting the cable leads to the terminal block. Unpin the collar over clamp A-228. Remove the collar, the gear and clamp, and the spacer.
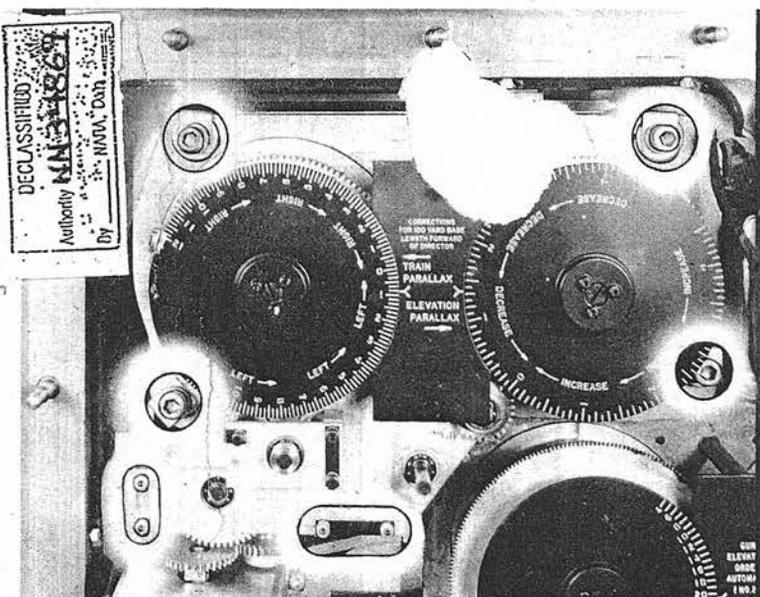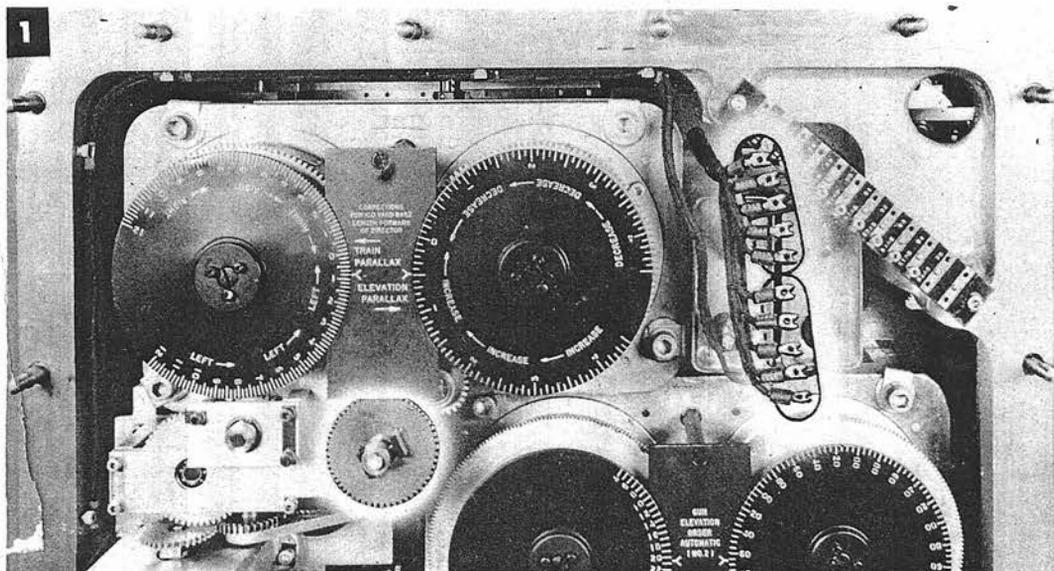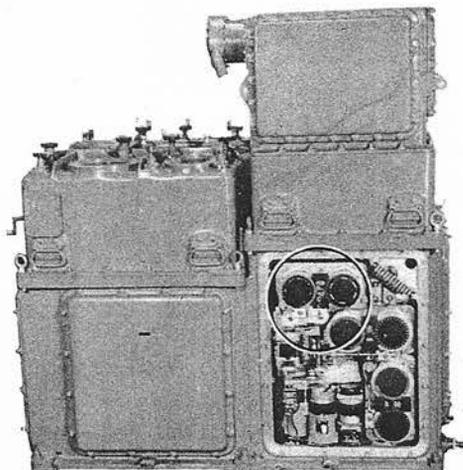
2 Remove the four small screws securing the plate below the transmitters. Remove the four large screws securing the transmitters.
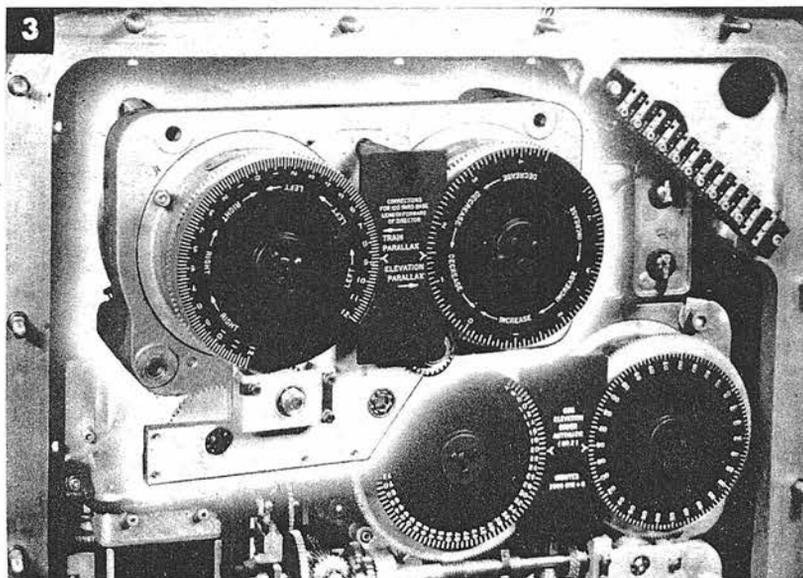
3 Pull the transmitters out to reach the two screws securing the cable clamps behind the upper edge of the transmitter casting. Remove the two screws and free the cable.
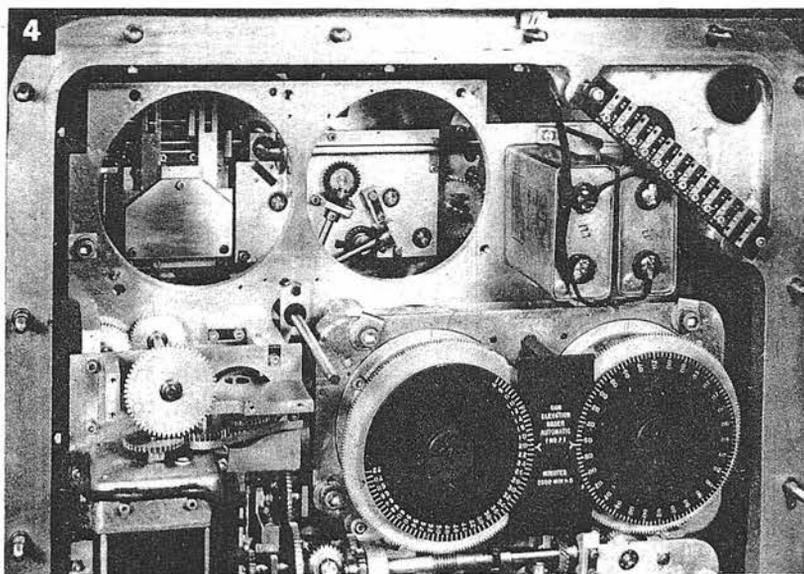
4 Slide the transmitters straight out to clear the shaft from which clamp A-228 was removed.

To reinstall the parallax transmitters, reverse the removal procedure.

Check clamps A-517 and A-548 either before or after reinstallation.

Readjust clamps A-52 and A-228.

Run tests.

Eb, E'g MOUNTING PLATE

Eb Receiver, page 755
E'g Indicating Transmitters, page 757
E'g Automatic Transmitters, page 758
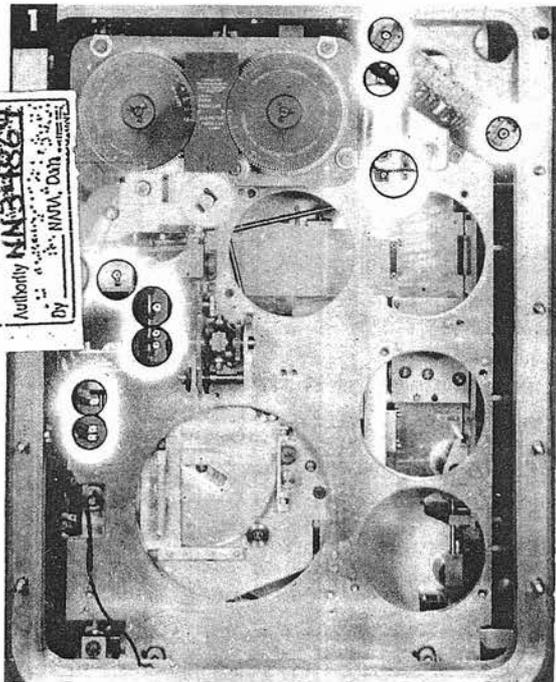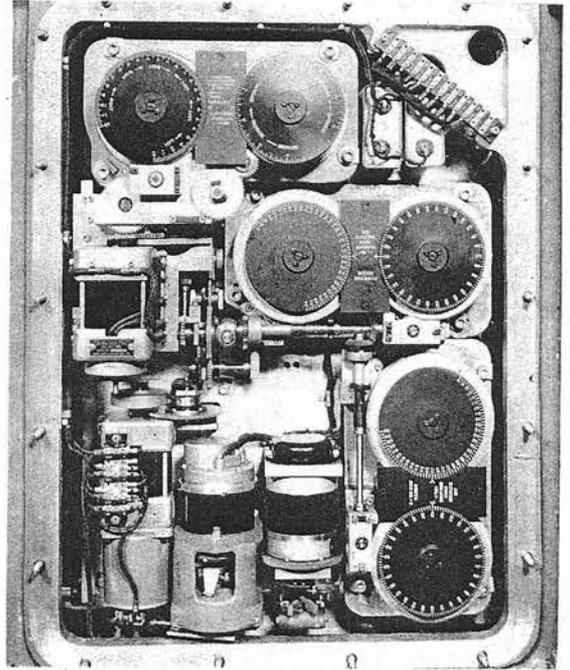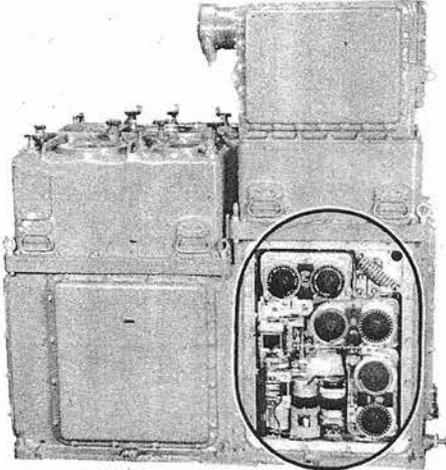
1   Remove the two screws securing the terminal block to the computer case.

Remove the four screws from the capacitor hangers.

Disconnect the cable leads from the servo motor.

Loosen the three screws securing the cable clamps to the servo motor.
Free the cable.
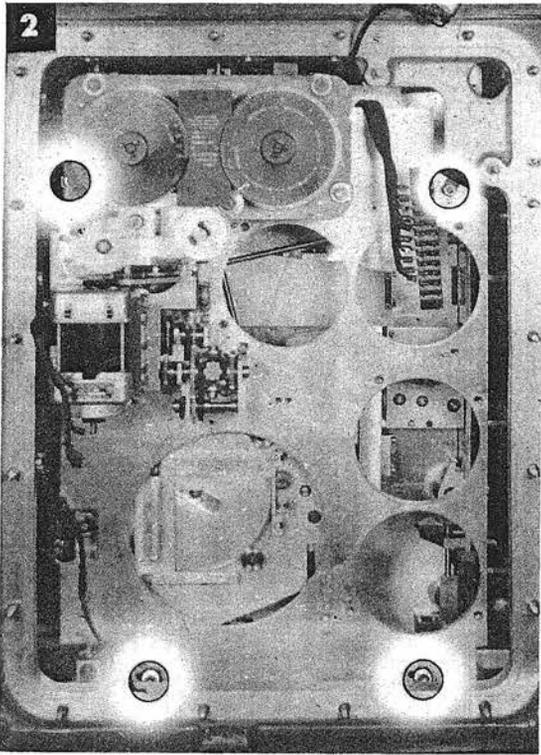
2 Push the capacitors and the terminal block aside.
Remove the four screws securing the plate.

3 Work the plate dowels loose from the mounting brackets. Remove the plate.
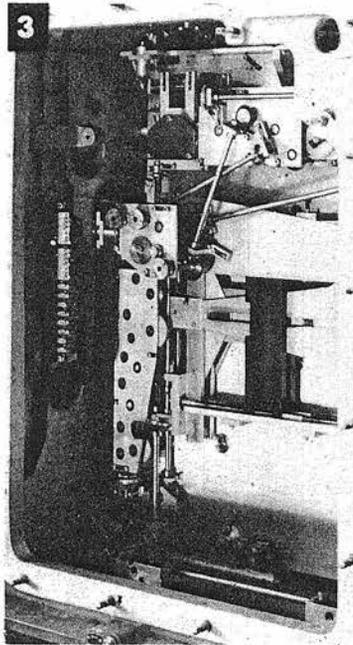
4 Rear view of removed plate.
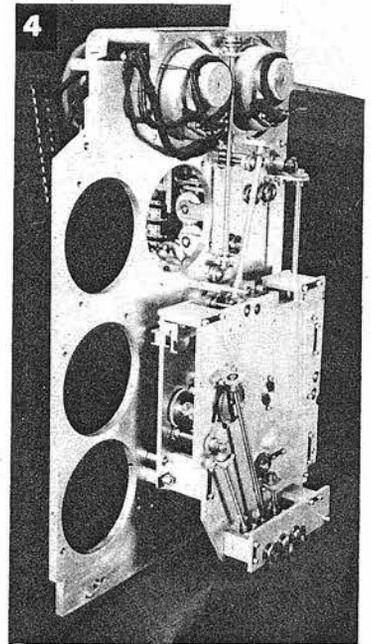
To reinstall the *Eb, E'g* mounting plate, reverse the removal procedure.

Readjust clamps A-243, A-49, A-52, A-226, A-227, A-228, A-156, A-3, A-51, A-50, A-5, and A-231.

Check clamps A-513, A-514, A-515, A-516, A-517, A-548, A-4, and A-6, either before or after reinstallation.

Run tests.

L • L sin 2B'r AND Zd (L — L cos 2B'r) MULTIPLIERS

1 Work can be done on any part of the $L \cdot L$ sin $2B'r$ and $Zd (L - L$ cos $2B'r)$ multipliers and associated gearing without removing them from the instrument.
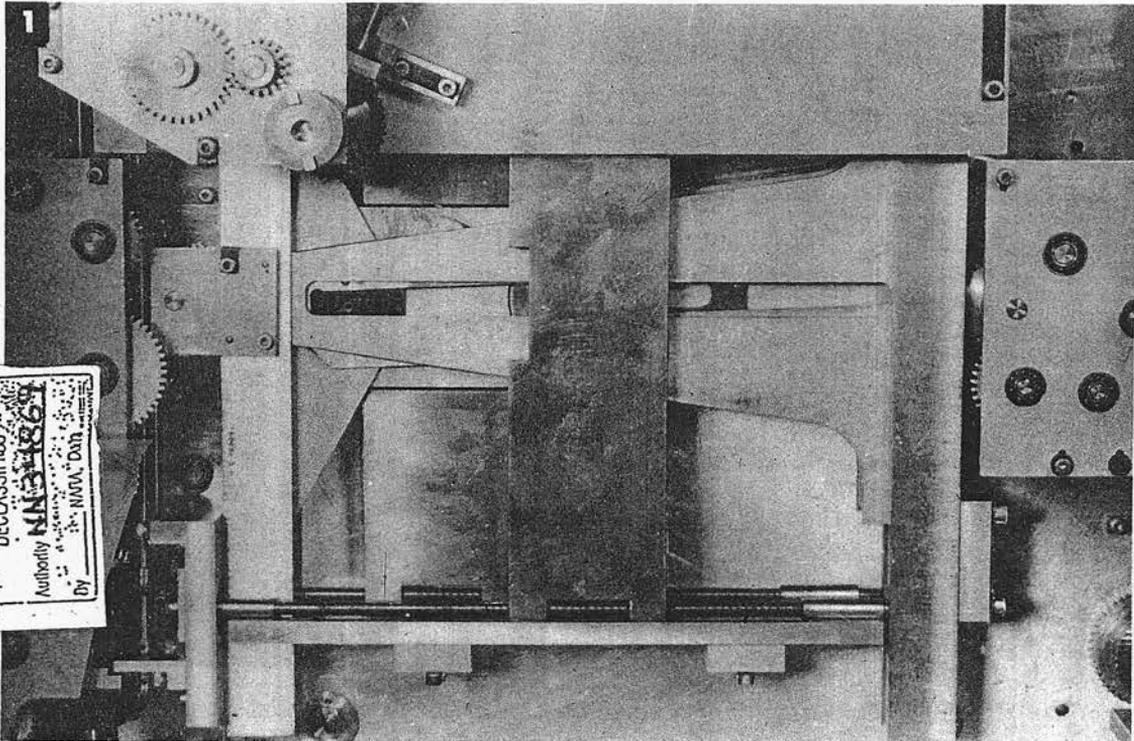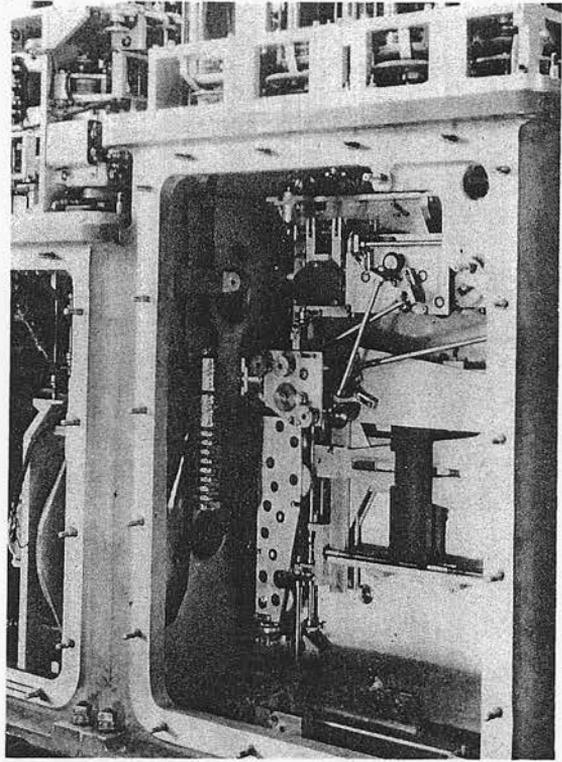
Reinstall the mechanisms removed.

Readjust clamps A-505, A-112, A-99, A-28, A-58, A-111, A-64, A-65, A-57, A-199, A-62, A-517, A-548, A-242, A-243, A-49, A-52, A-226, A-228, A-227, A-156, A-3, A-513, A-514, A-515, A-516, A-4, A-6, A-5, A-51, A-50, and A-231.
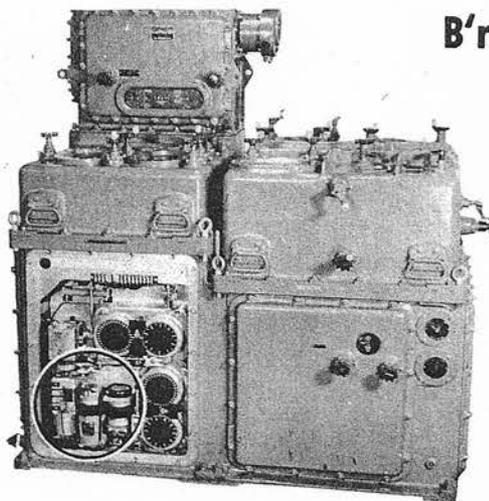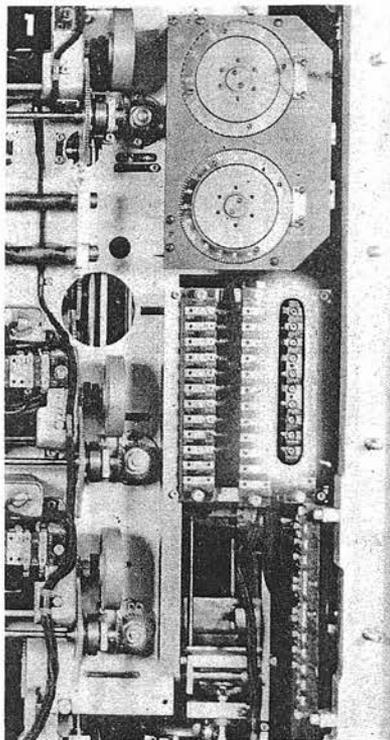
B'r RECEIVER

1 Remove the ten screws connecting the *B'r* receiver cable leads to the terminal block under the rear cover.
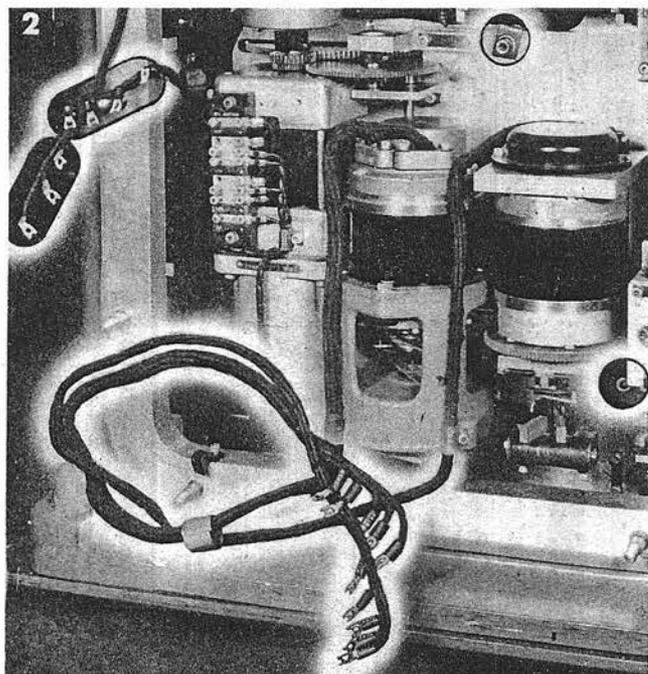
2 Pull the cables through to the receiver side of the computer.
Remove the screws connecting the external cable leads to the servo terminal block.
Remove the two screws securing the cable clamps near the receiver.
Remove the four screws securing the receiver.
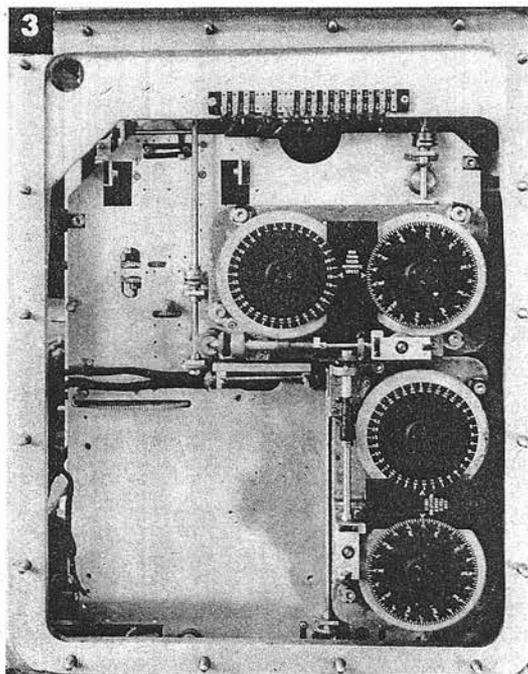
3 Remove the receiver.

To reinstall the receiver, reverse the removal procedure.

Readjust clamp A-98.

Run tests.

B'gr INDICATING TRANSMITTERS
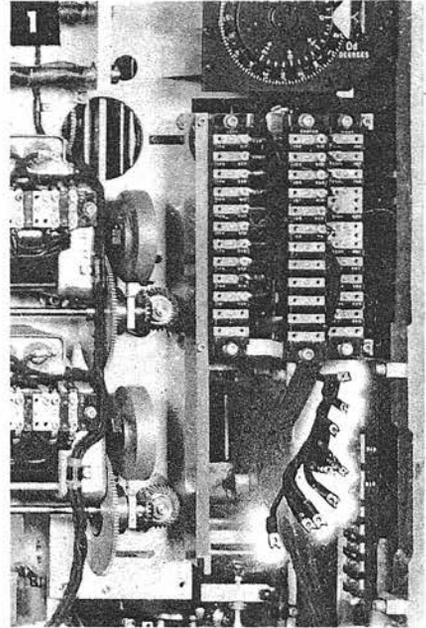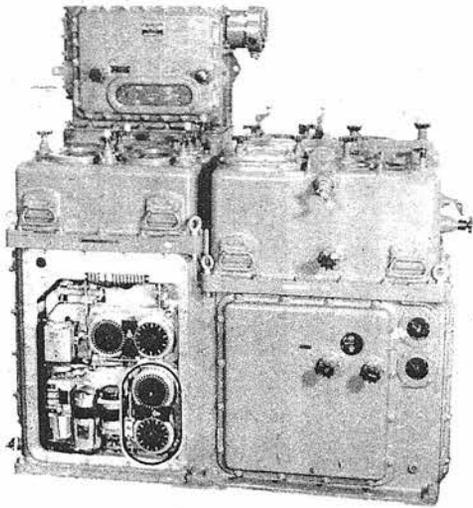
1 Remove the ten screws connecting the transmitter cable leads to the terminal block under the rear cover.

2 Pull the cable through to the transmitter side of the instrument.
Remove the two screws securing the cable clamps above the *B'r* receiver.
Free the cable.
Remove the four screws securing the transmitters.
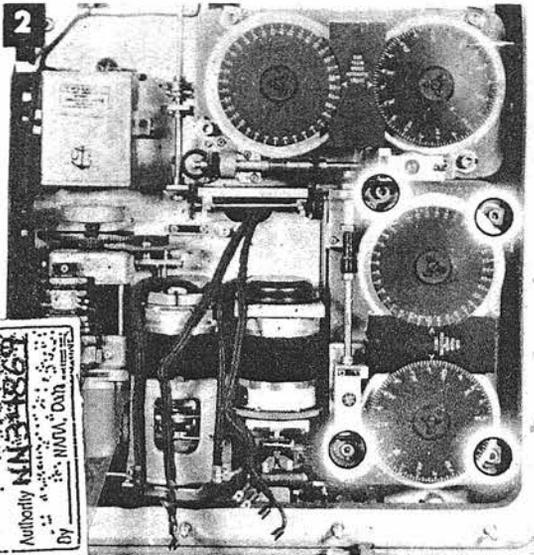
3 Remove the mechanism, easing the cable through behind it.

To reinstall the *B'gr* indicating transmitters, reverse the removal procedure.

Readjust clamp A-8.

Run tests.
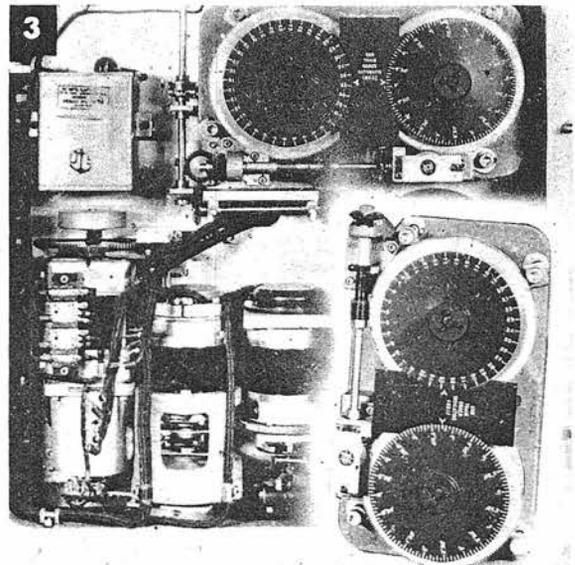
B'gr AUTOMATIC TRANSMITTERS

B'gr Indicating Transmitters, page 766
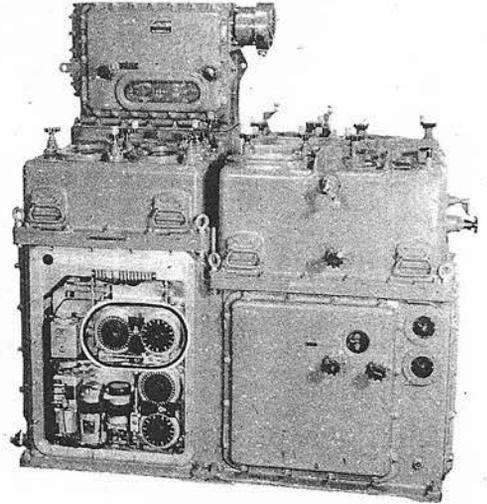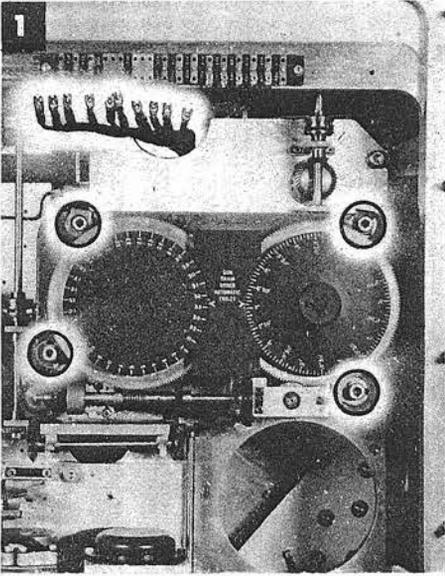
1 Remove the ten screws connecting the transmitter cable leads to the terminal block directly above the transmitters. Remove the four screws securing the transmitters.
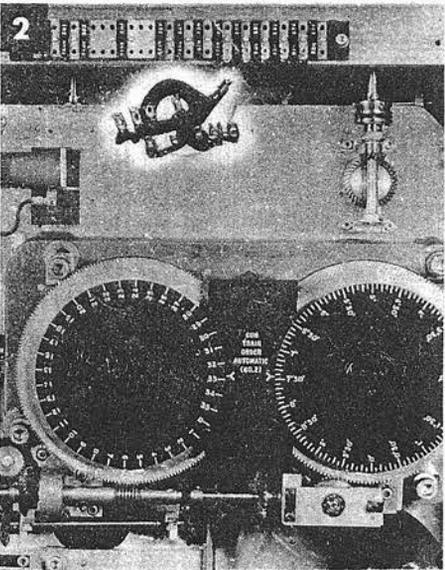
2 Ease the cable over the top of the mounting plate.

3 Remove the transmitters.
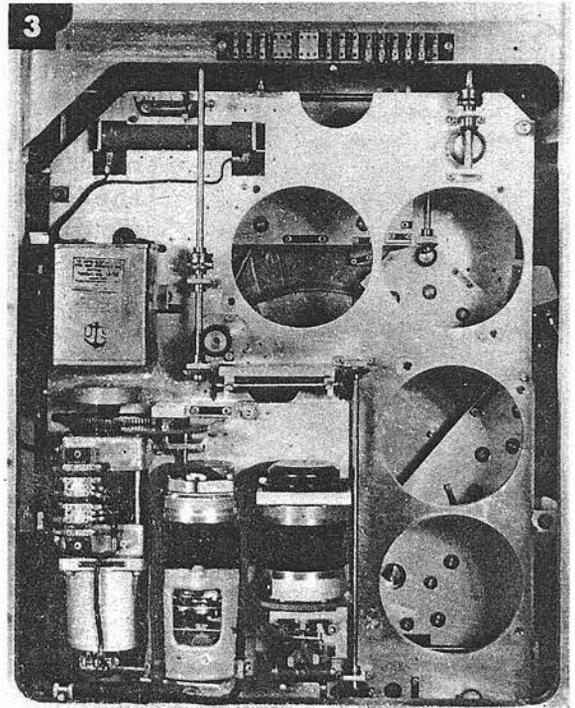
To reinstall the *B'gr* automatic transmitters, reverse the removal procedure.

Loosen assembly clamp A-68.

Readjust clamp A-8.

Set *Dd*, *Br*, *L*, and *Zd* on zero. Turn the transmitters to electrical zero and tighten A-68.

Run tests.

B'r, B'gr MOUNTING PLATE

B'r Receiver, page 765
B'gr Indicating Transmitters,
page 766
B'gr Automatic Transmitters,
page 767
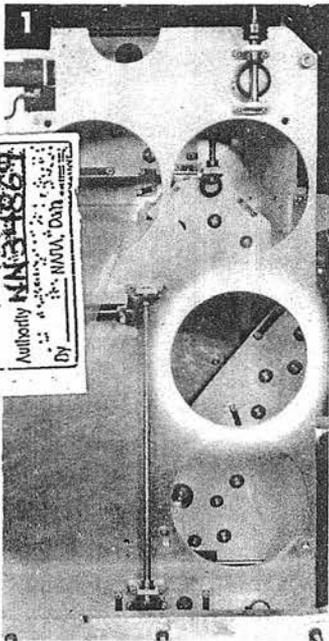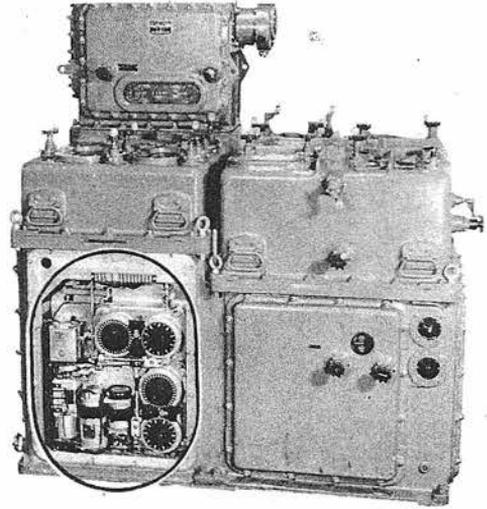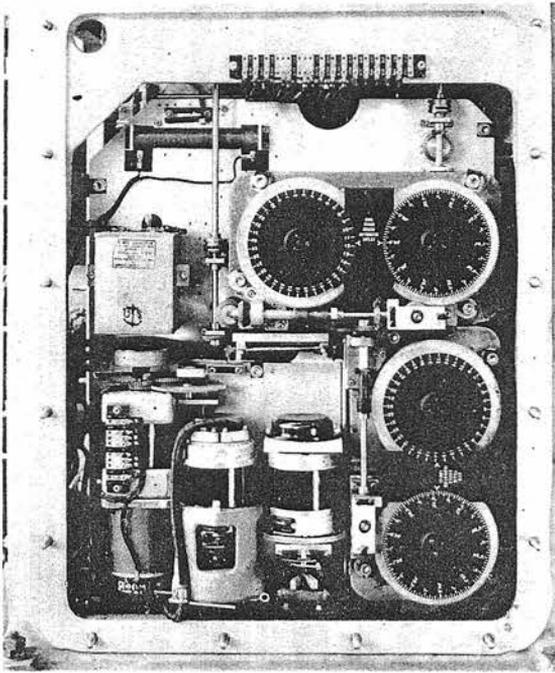
1 Through the opening made by removal of the *B'gr* transmitters, disconnect the cable leads from the local control servo motor.

2 Loosen the two screws securing the cable clamps to the rear edge of the mounting plate. Free the cable.

4 Remove the plate.

5 Rear view of the plate.
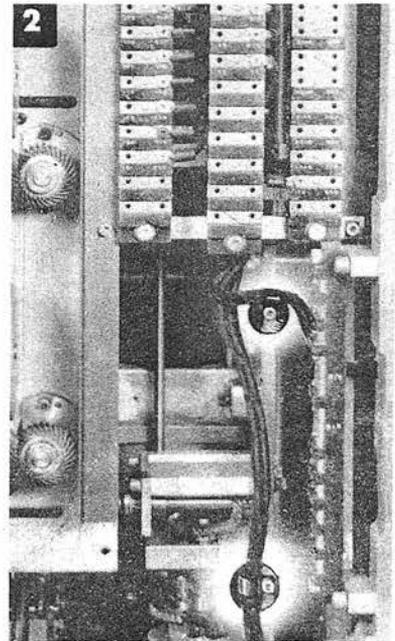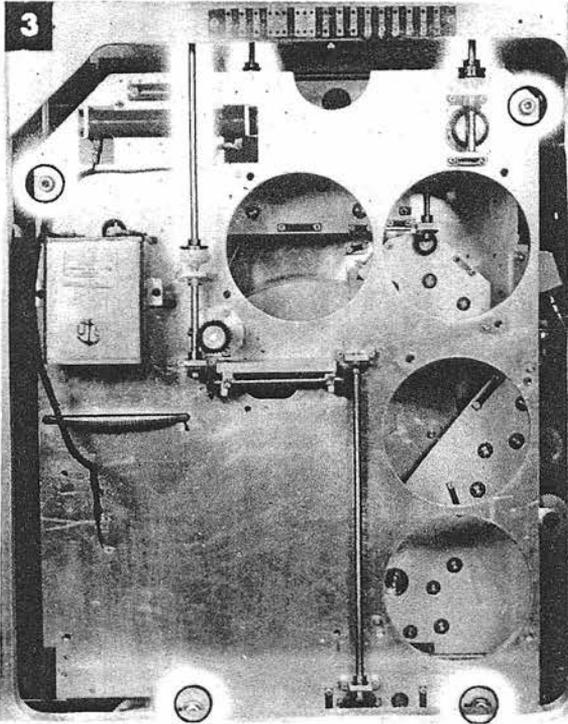
3 Remove the locking springs from the three vertical coupling shafts at the top of the plate. Remove the shafts.
Remove the four screws securing the plate. Work the dowels free.

To reinstall the mounting plate, reverse the removal procedure

Reinstall the other mechanisms removed.

Check clamps A-509, A-510, A-511, A-512, A-7, and A-9 either before or after reinstallation.

If the *Dj* dial cannot be set to the limit stop by proper mating of the coupling and gears, remove the star shell computer and indicator-unit cover and readjust clamps A-500, A-86, A-243, A-99, A-70, A-8, A-156, and A-98.

If the star shell computer is removed, readjust A-17, A-230, and A-231.

Run tests.

B'r LOCAL CONTROL FOLLOW-UP

1   The *B'r* local control follow-up is on the back of the *B'r, B'gr* mounting plate.
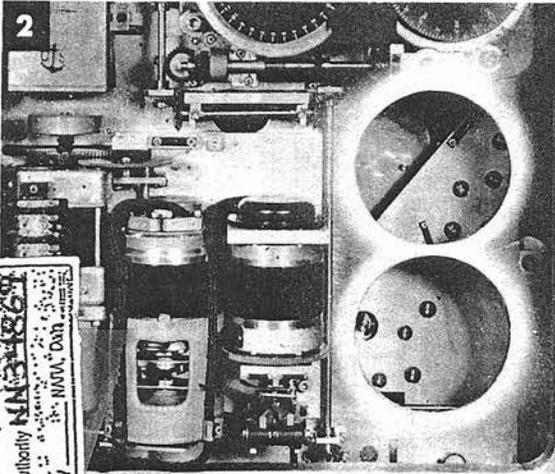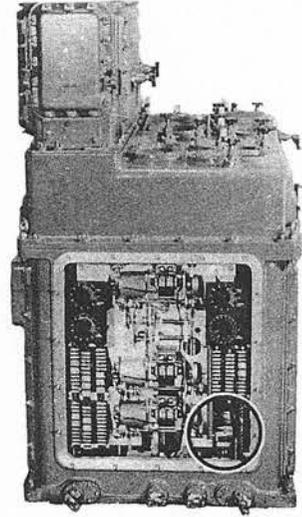
2   This follow-up can also be reached through the access cleared by removal of the *B'gr* indicating transmitters.
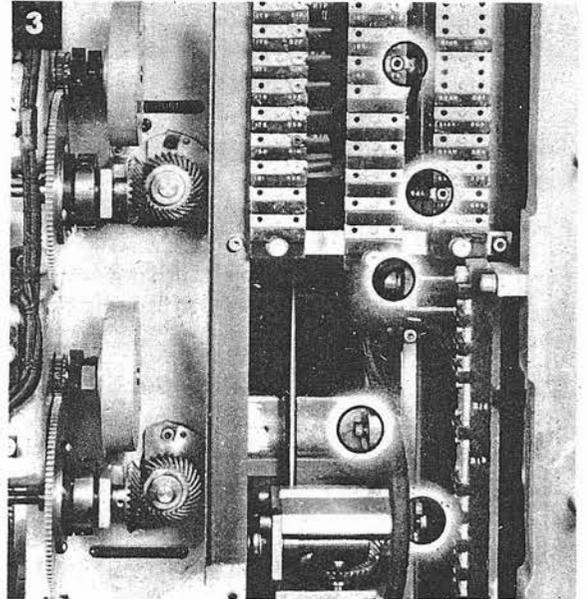
3   Working from the rear of the computer through the *B'gr* transmitter holes, remove the screws connecting the external cable leads to the servo motor terminal block. Remove the four screws securing the follow-up and remove it.

To reinstall the follow-up, reverse the removal procedure.

Reinstall the *B'gr* indicating transmitters.

Readjust clamps A-70 and A-8.

Run tests.

Vs INTERMITTENT DRIVE

Parallax Transmitters, page 760
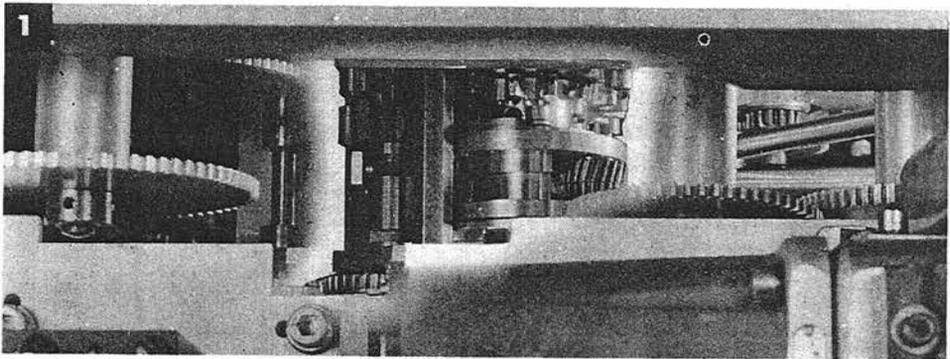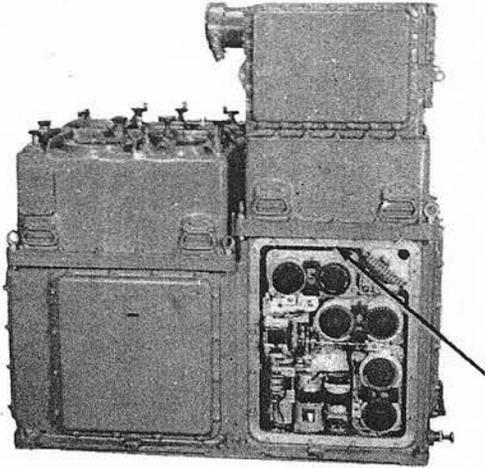
1   The *Vs* intermittent drive is removed from the right rear of the computer, but it can be seen from the rear if the *Ds* intermittent drive has been removed.
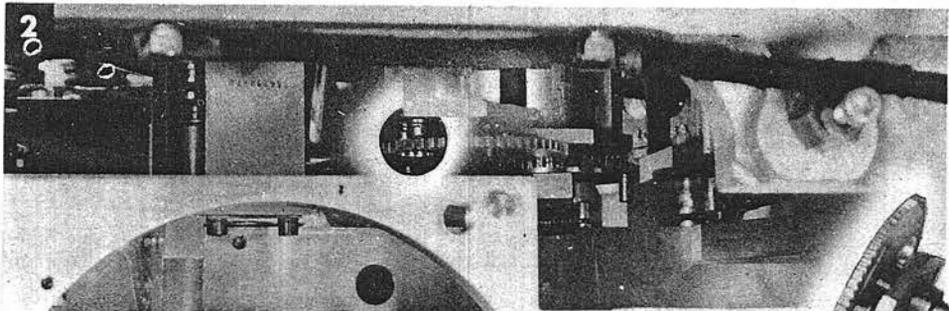
2   From the right rear of the computer, remove the three screws securing the small plate and shaft assembly. A hole in the gear allows access to the screws.
Remove the plate and shaft assembly.
Remove the hexagonal post that supports a corner of the plate.
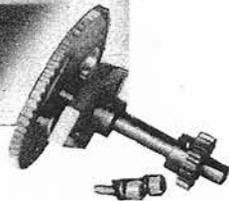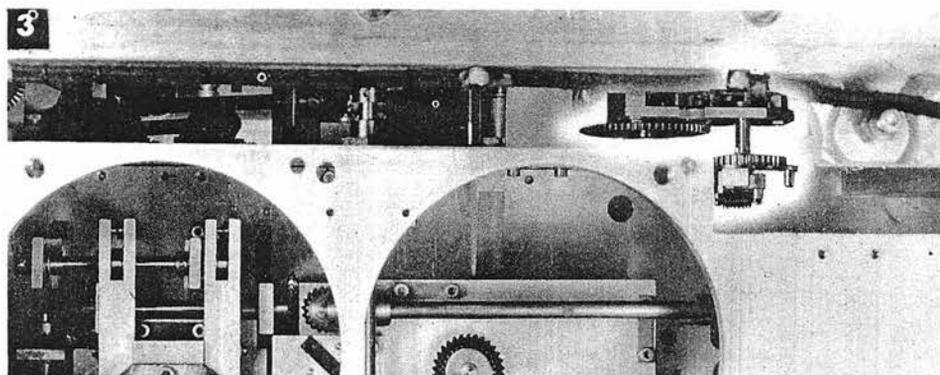
3 Remove the three screws securing the intermittent drive to the upper plate. Two of the screws can be reached from the right rear; the third, from the back of the computer. Loosen clamp A-114 if necessary.
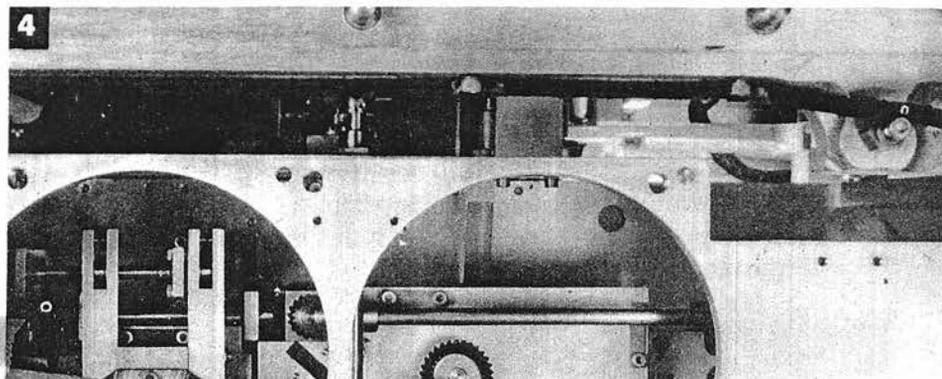
4 Remove the intermittent drive.

To reinstall the intermittent drive, reverse the removal procedure.

Reinstall the parallax transmitters.

Tighten clamp A-114.

Readjust clamps A-97, A-69, A-517, A-548, A-52, and A-228.

Ds INTERMITTENT DRIVE
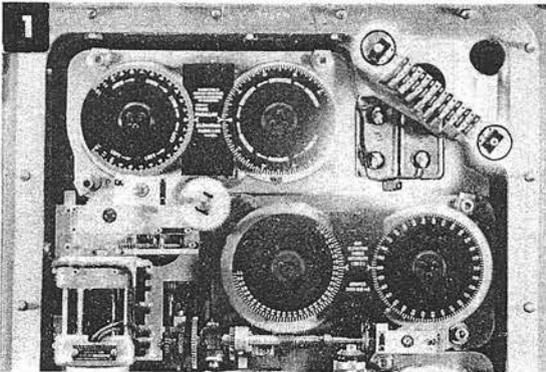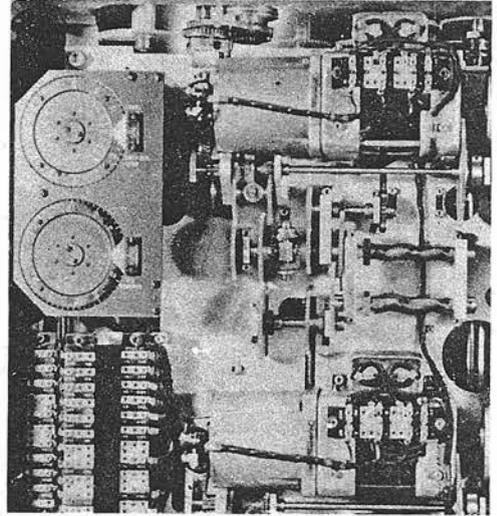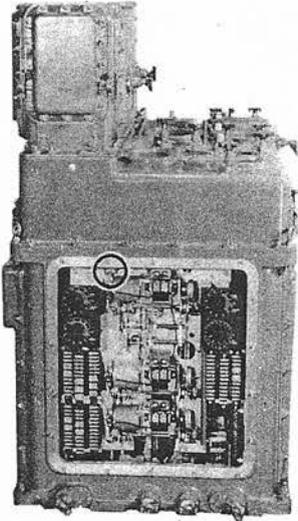
1. Remove the two screws securing the terminal block.
   Remove the four screws securing the capacitors above the $E'g$ automatic transmitters.
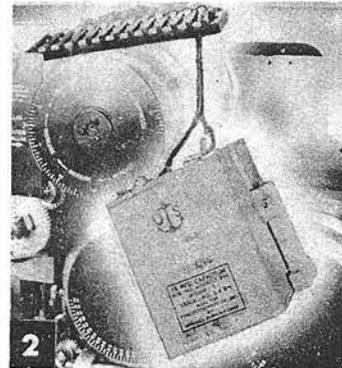
2. Move the terminal block and the capacitors out of the way.
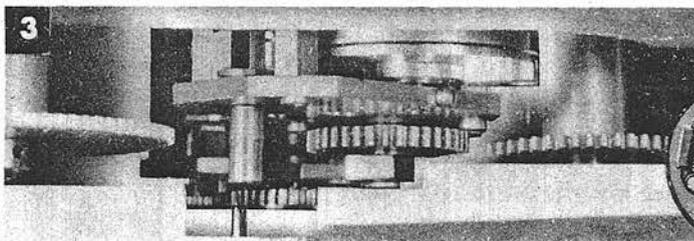
3. Loosen the shock absorber assembly clamp A-114.
   Remove the assembly from the intermittent drive.
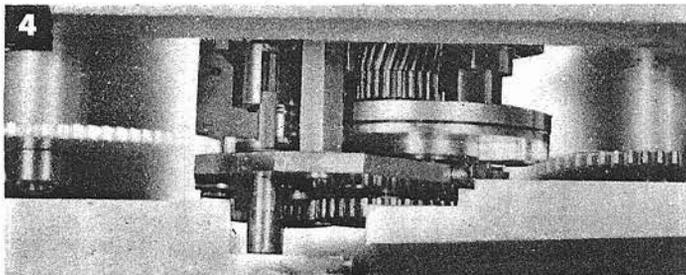
4 Through the access allowed by removal of the capacitors, move the intermittent drive toward the front of the computer.
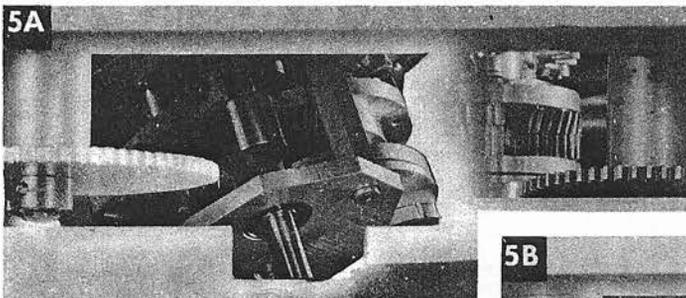
5 Turn the intermittent drive to clear the plate below it.
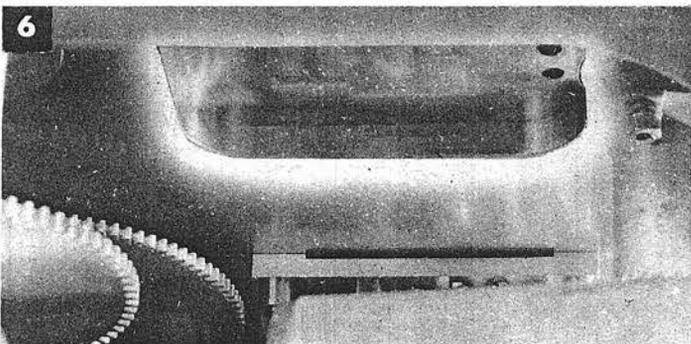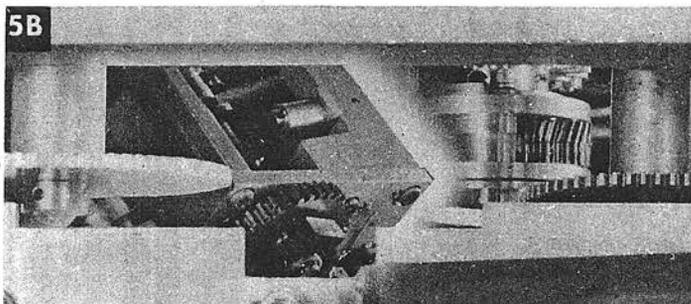
move the intermittent
ive through the access
the right rear.

To reinstall the *Ds* intermittent drive, reverse the removal procedure.

Tighten clamp A-114.

Readjust clamps A-96 and A-66.

Dd FOLLOW-UP
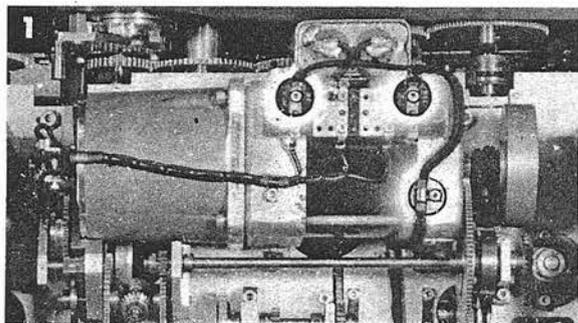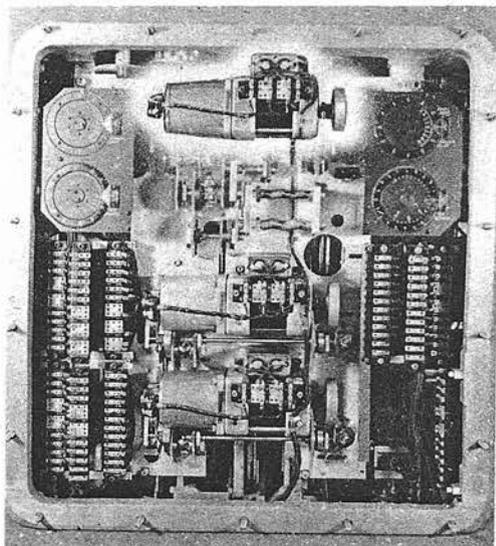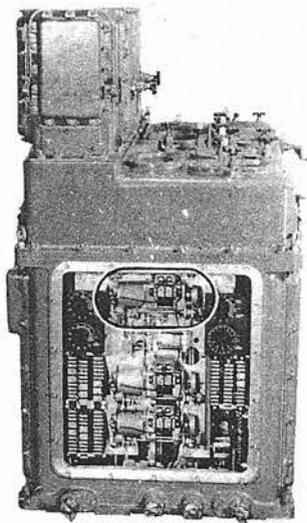
1 Remove the two screws connecting cable leads 1B and 1BB to the servo motor terminal block.

Remove the screw securing the cable clamp to the servo motor case. Free the cable.
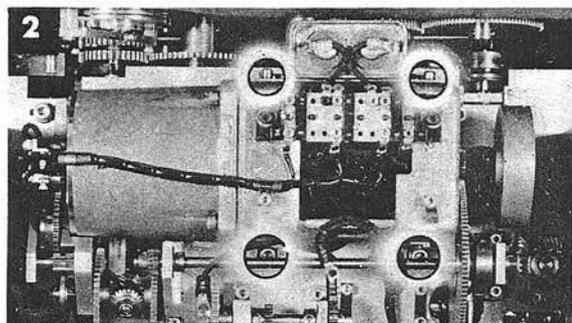
2 Remove the four screws securing the follow-up to the mounting plate. Support the follow-up while removing the last screw.
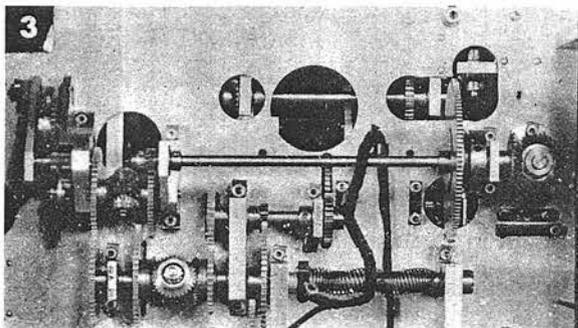
3 Remove the follow-up.

To reinstall the *Dd* follow-up, reverse the removal procedure.

Readjust clamp A-33.

Run tests.
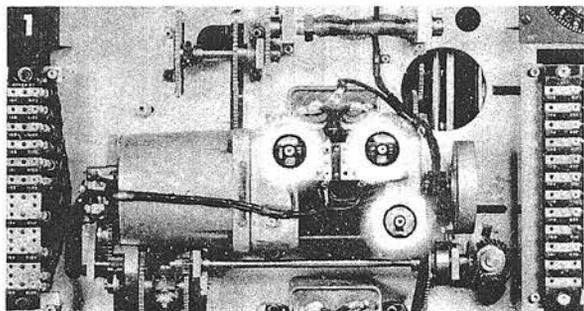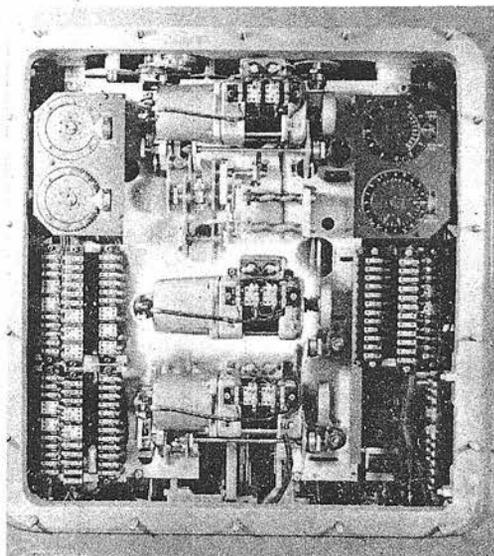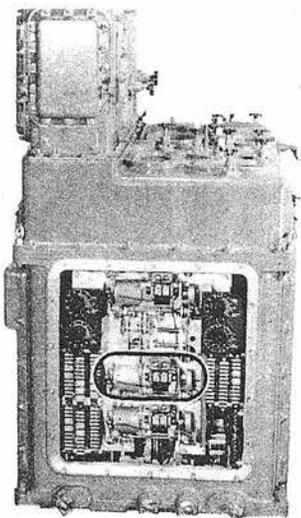
¡B'r FOLLOW-UP

1 Remove the two screws connecting cable leads 1C and 1CC to the servo terminal block.

Remove the screw securing the cable clamp to the servo motor. Free the cable.
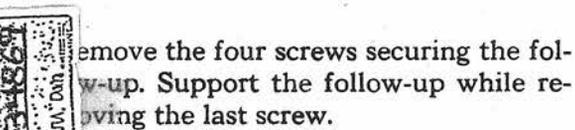
emove the four screws securing the follow-up. Support the follow-up while removing the last screw.
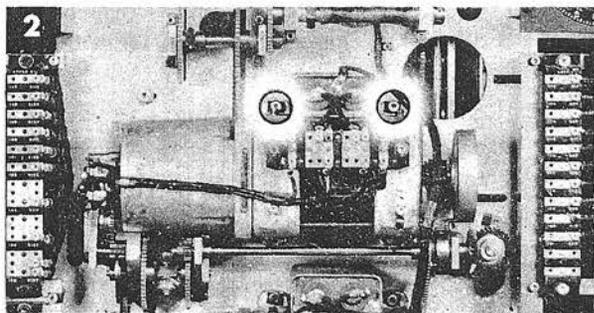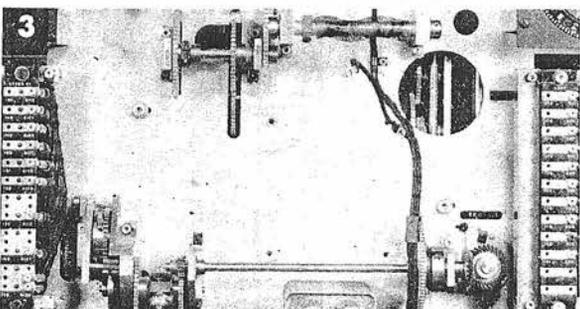
move the follow-up.

To reinstall the *jB'r* follow-up, reverse the removal procedure.

Readjust clamp A-62.

Run tests.

Vz FOLLOW-UP
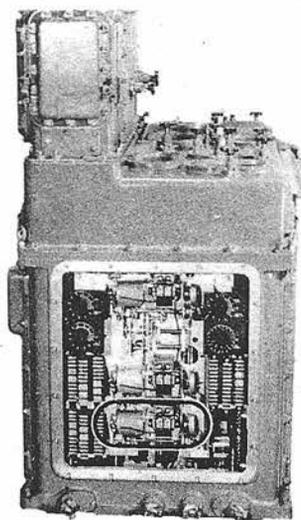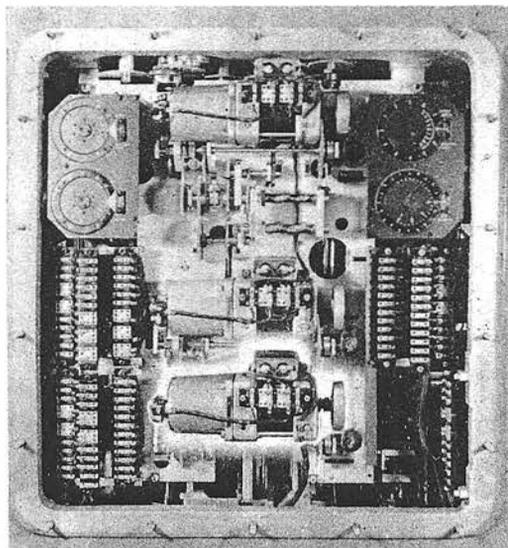
1 Remove the two screws connecting cable leads 1D and 1DD to the servo motor terminal block.

Remove the screw securing the cable clamp to the servo motor. Free the cable.
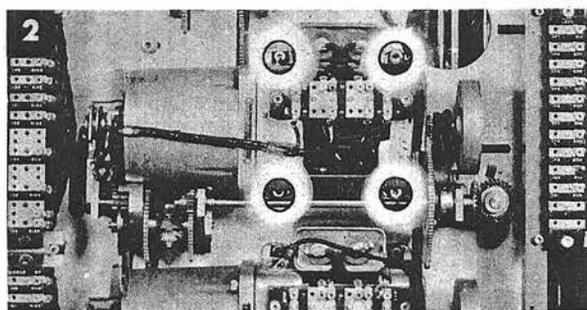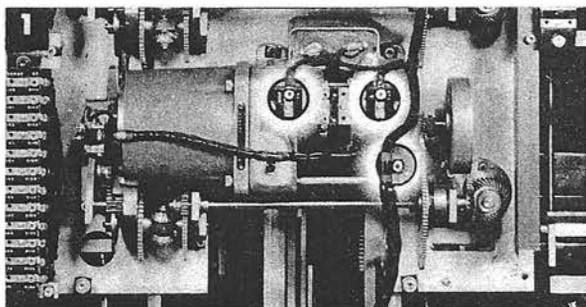
2 Remove the four screws securing the follow-up. Support the follow-up while removing the last screw.

3 Remove the follow-up.

To reinstall the *Vz* follow-up, reverse the removal procedure.

Readjust clamp A-63.

Run tests.
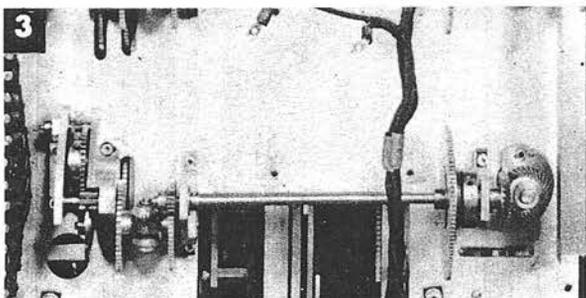
Dd, jB'r, Vz FOLLOW-UP MOUNTING PLATE

Dd, jB'r, and *Vz* Follow-ups, pages 775, 776, 777.
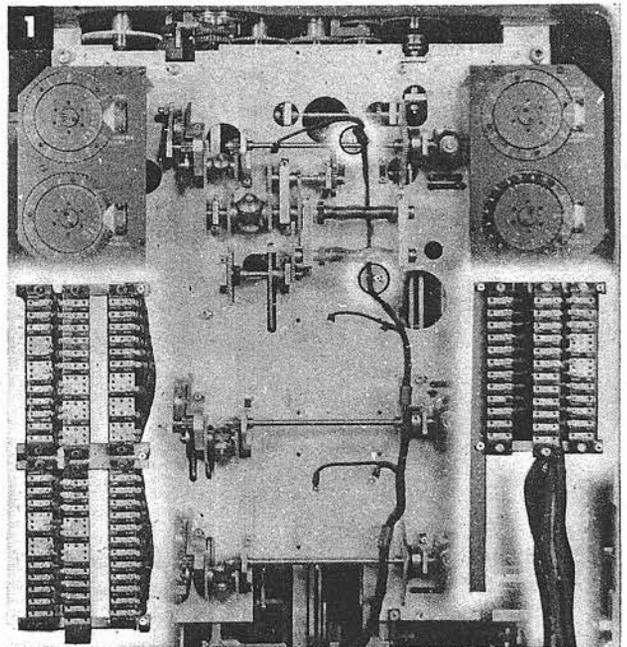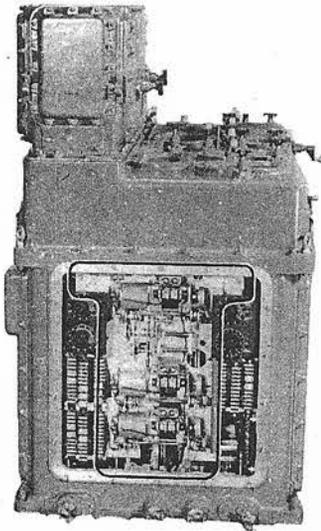
1   Remove the screws securing the frames
    of the terminal blocks.
    Remove the screws securing the cable
    clamps to the plate. Free the cable.
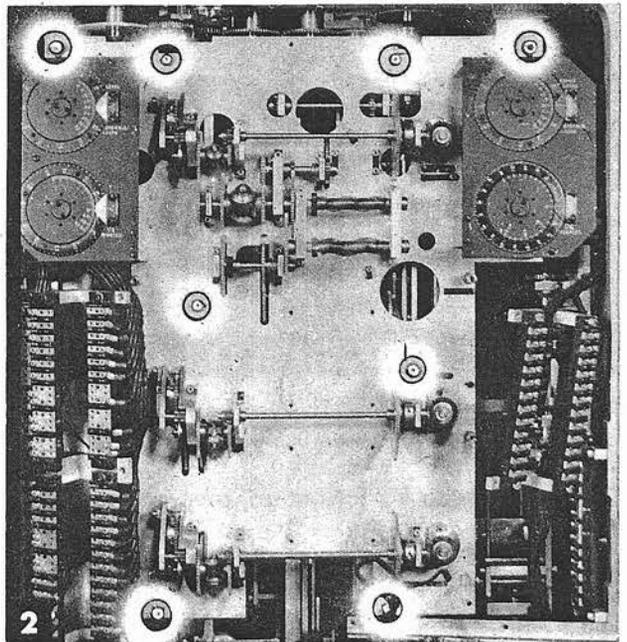
    emove the eight screws securing the
    ounting plate.

3 Push the terminal blocks aside. Work the dowels free. Remove the plate.
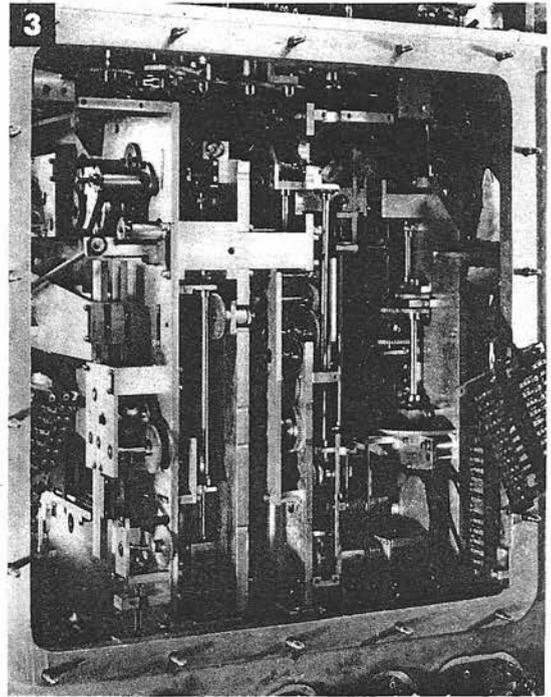
4 Rear view of the plate.

To reinstall the mounting plate, reverse the removal procedure.

Reinstall the three follow-ups.

Readjust clamps A-507, A-30, A-505, A-506, A-29, A-508, A-31, A-99, A-28, A-58, A-35, A-112, A-208, A-113, A-63, A-36, A-215, A-33, A-216, A-34, A-61, A-32, A-111, A-64, A-65, A-57, A-199, A-62, and A-51.

Check A-243, A-98, A-601, A-602, and A-603.

Run tests.

¡Dd AND Dz COMPUTERS

1 Remove the locking springs from the coupling shaft in the
$Wrd + KRdBs$ gearing line between the computer and cor-
rector units. Remove the shaft.
Remove the four screws securing the mounting blocks to
the floor of the computer. Remove the blocks.
Remove the eight screws from the three shaft assemblies
at the base of the computer. Remove the assemblies.
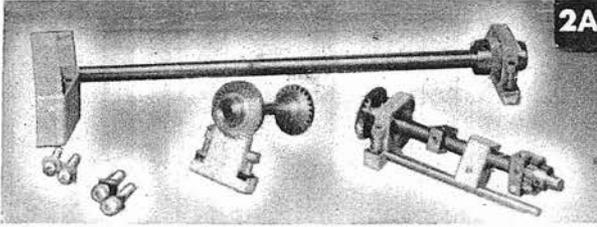
2 Remove the two screws securing the hanger of limit stop L-17. Remove the limit stop.

Remove the four screws securing the shaft assembly which connects with the *Zd* input. Remove the assembly.

Remove the two screws securing the outside hanger for the short shaft assembly which connects with the two couplings on the computer floor. Remove the assembly.

3 Remove the four screws securing the two brackets to the computer case. Remove the brackets.

Remove the two screws securing the bracket to the *Dz* mounting plate. Remove the bracket.
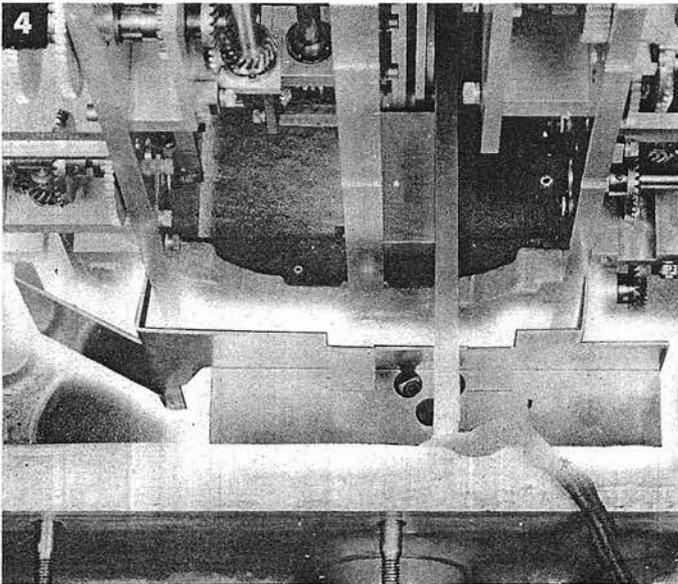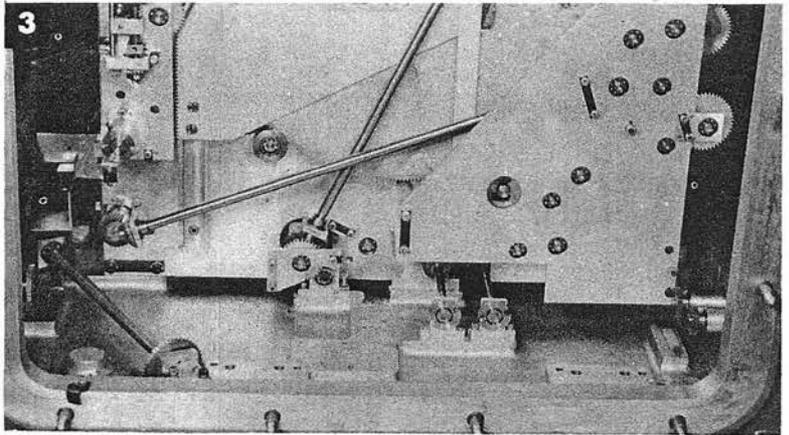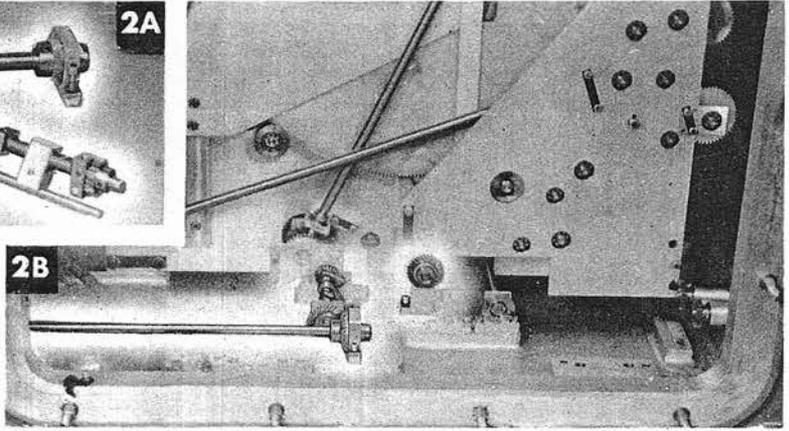
4 Remove the five screws securing the metal guard at the rear base of the computer.
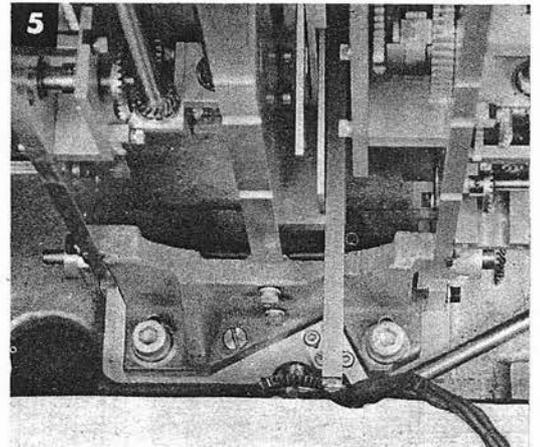
5 Remove the guard.
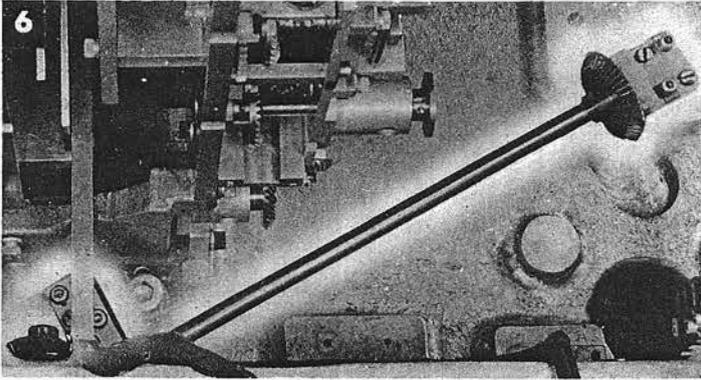
6 Remove the four screws securing the $B'r$ shaft assembly which meshes with the $B'r$ output shaft. Back out the four screw dowels. Remove the shaft assembly.

7 Unpin the spur gear near the Dz plate at the computer floor.
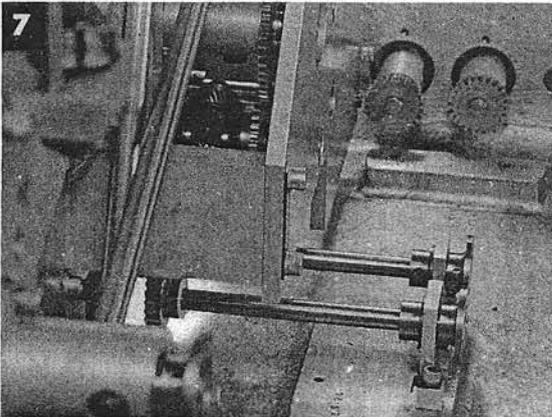
8 Slide the gear out on the shaft.
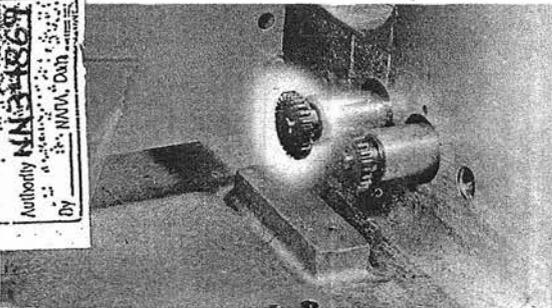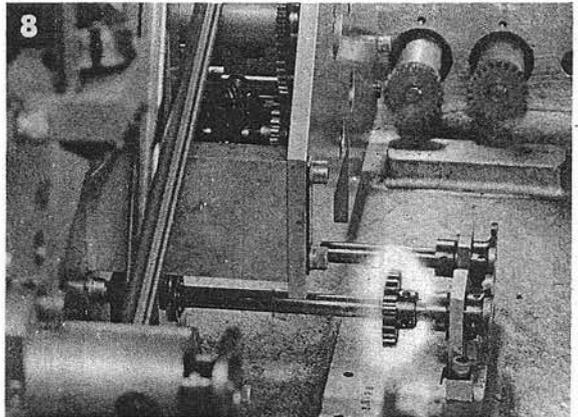
9 Unpin the inner spur gear extending from the adapter near the center division of the two units.
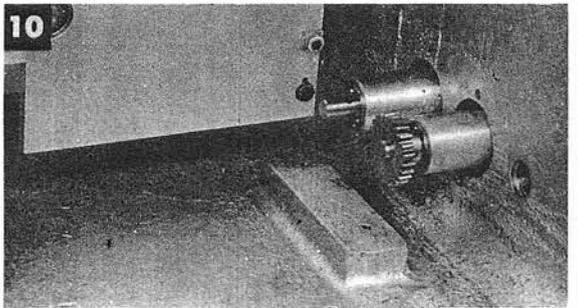
10 Remove the gear.

11 Remove the four screws securing the horizontal shaft assembly at the top of the *Dz, jDd* mounting plate.
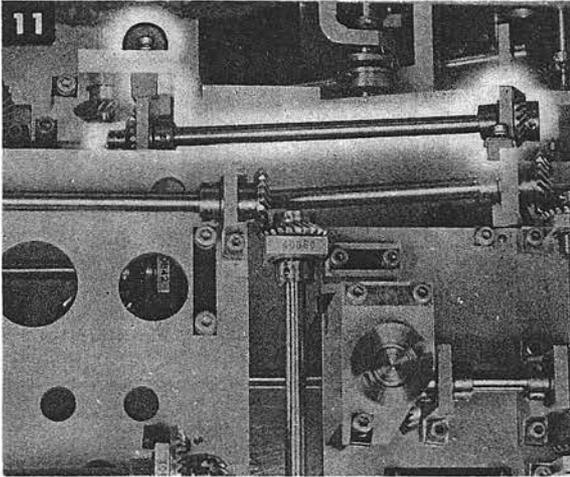
12 Remove the shaft assembly.
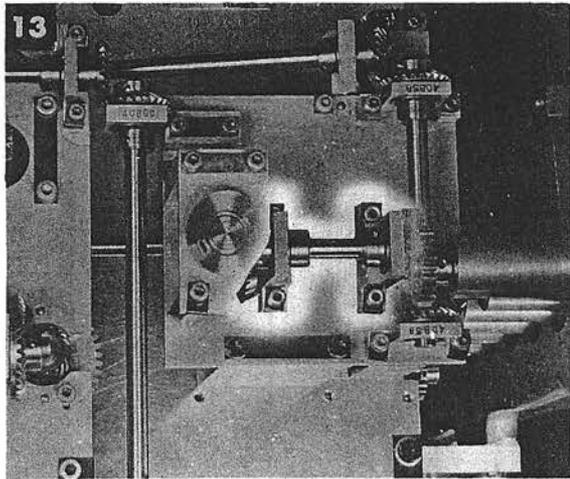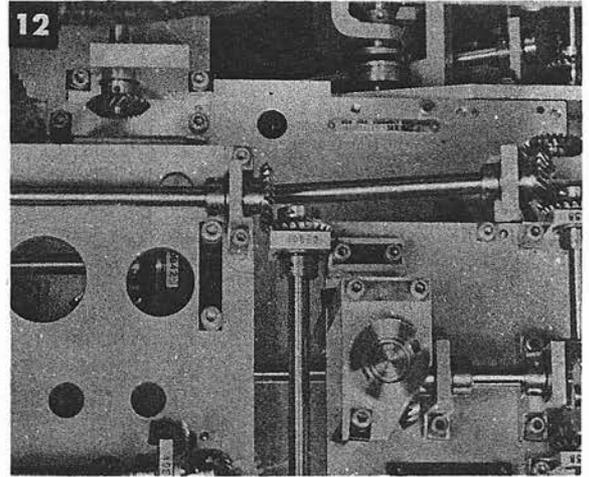
13 Remove the four screws securing the small shaft assembly in front of the *Dz* component solver.
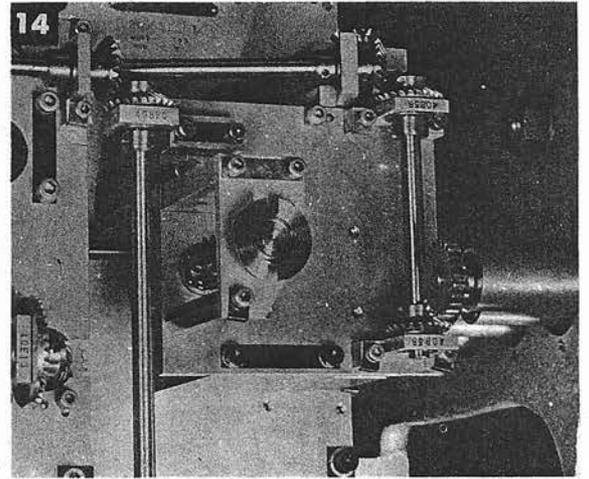
14 Tilt the shaft assembly to clear the gears and remove it.

15   Remove the four screws securing the vertical shaft assembly in front of the *Dz* component solver.
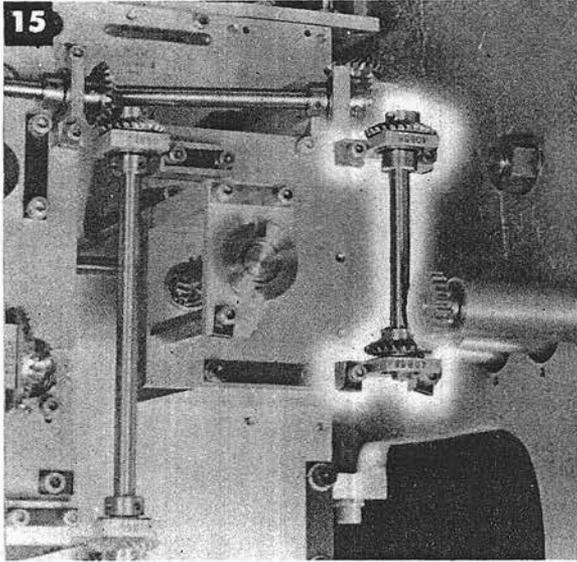
16   Remove the shaft assembly.
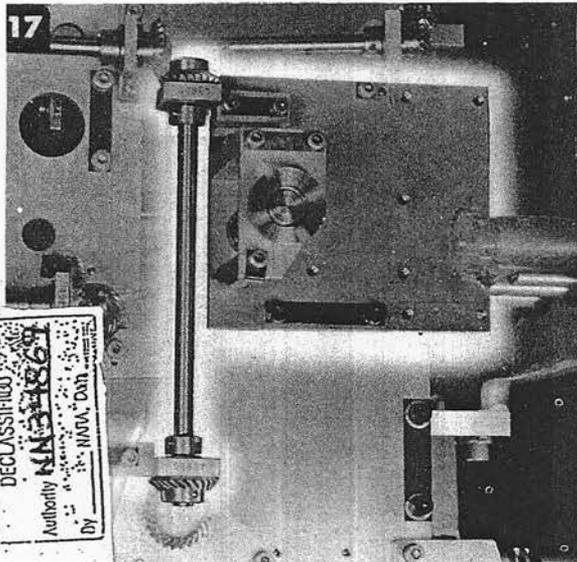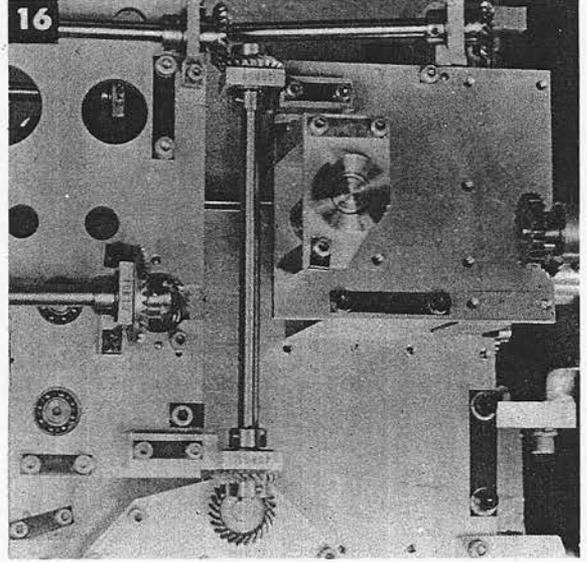
17   Remove the six screws from the plate and shaft assembly in front of the *Dz* component solver.
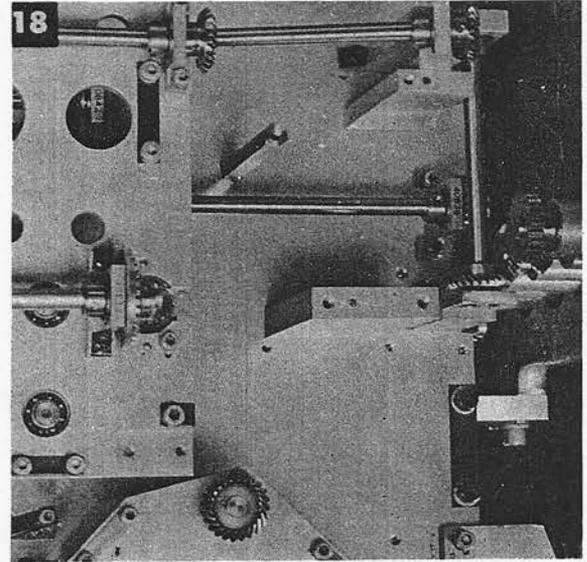
18   Work the dowels loose and remove the plate and shaft assembly.

19 Remove the four screws securing the vertical shaft assembly in front of the *Dz* component solver.
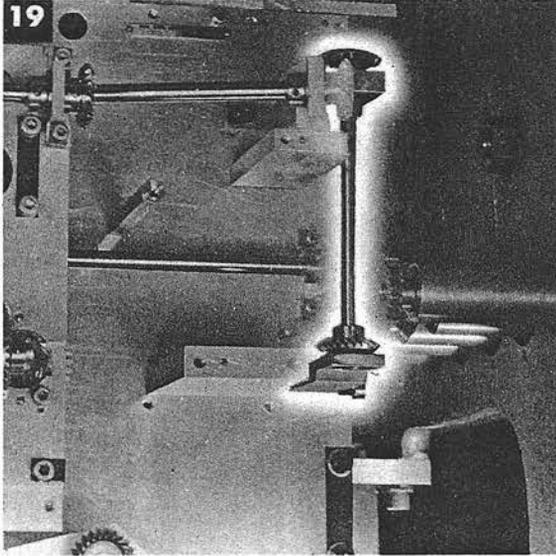
20 Remove the shaft assembly.
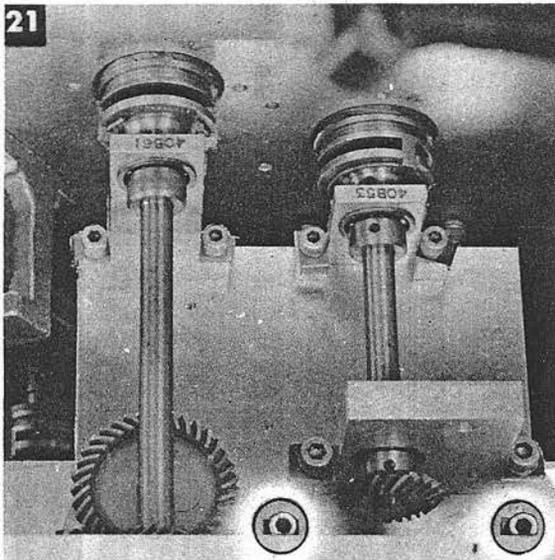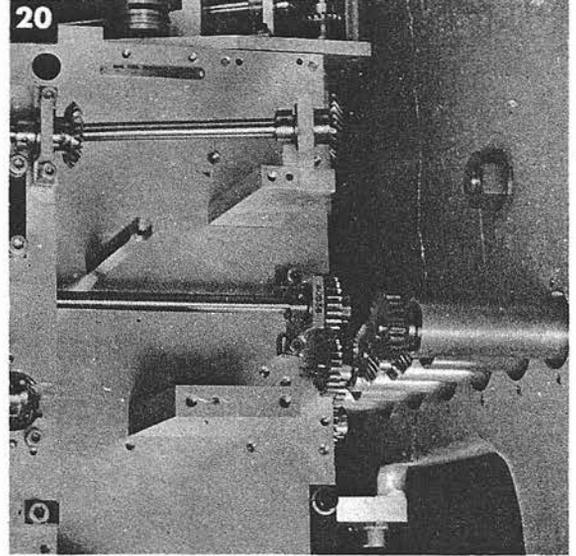
21 Remove the two screws from the small plate above the mounting plate.
Remove the two screws from the lower hanger of the longer of the shaft assemblies.
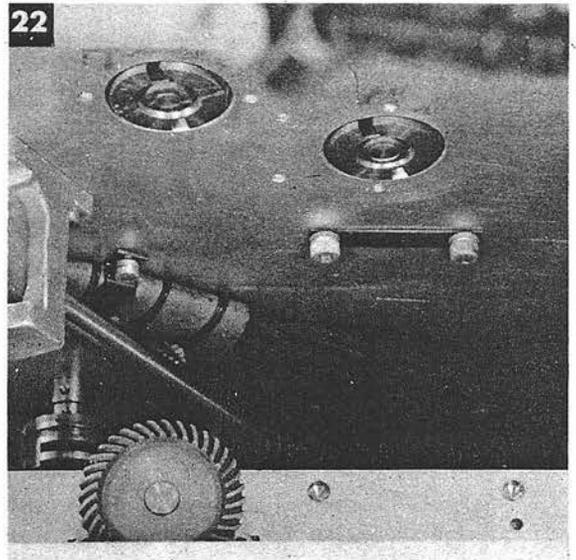
22 Work the two dowels loose. Disengage the two couplings.
Remove the plate.

23   Remove the six screws from the shaft assembly at the top section of the *Dz, jDd* mounting plate.
Remove the locking springs from the coupling end of the assembly.
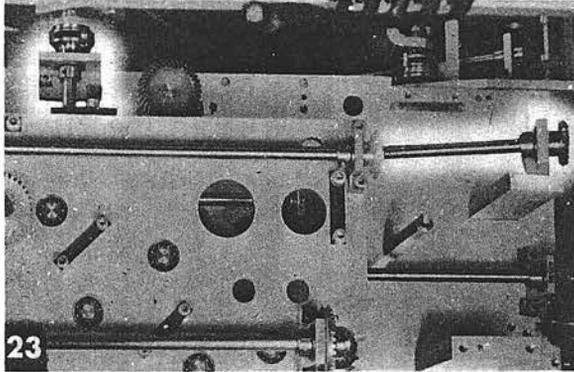
24   Remove the assembly.
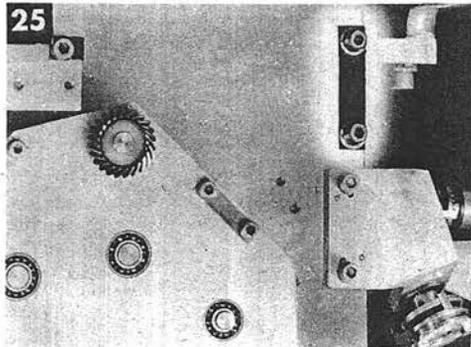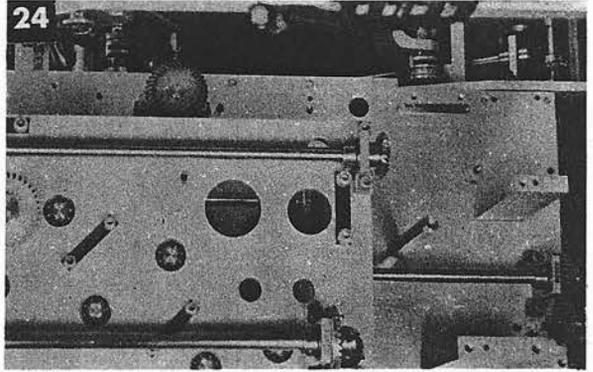
25   Remove the two screws securing the mid-section of the *Dz, jDd* mounting plate.
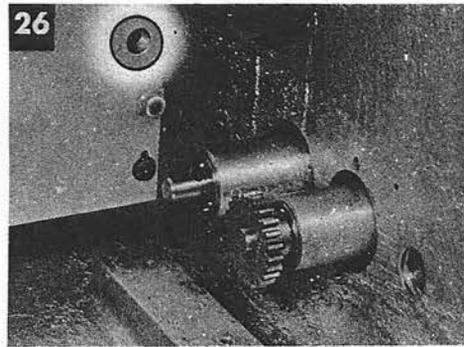
26   Remove the three screws securing the lower section of the mounting plate. One screw can be reached through the access hole in the plate.
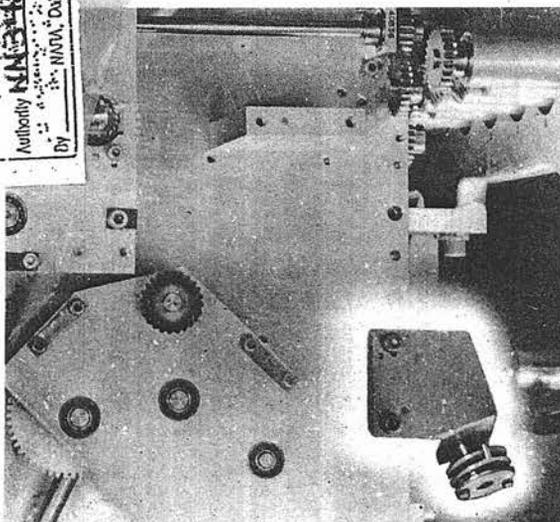
27   Remove the two screws securing the bracket of the $WrD + KRdBs$ coupling.

28 Work the bracket dowels loose. Remove the bracket.
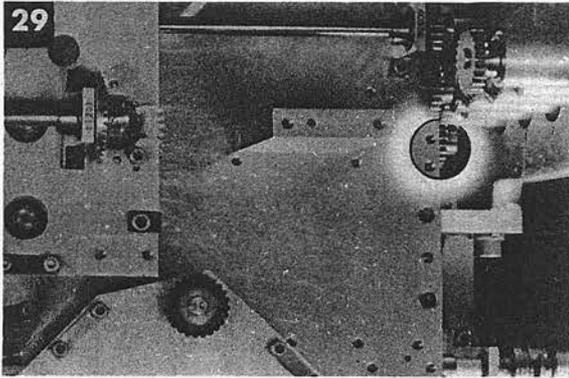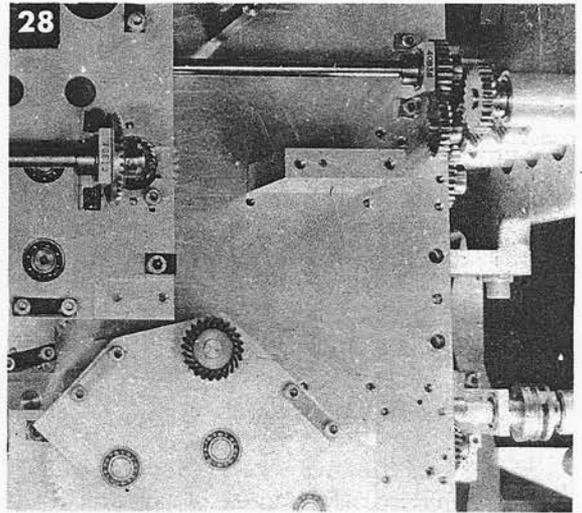
29 Unpin the spur gear at the center front of the *Dz, jDd* mounting plate.
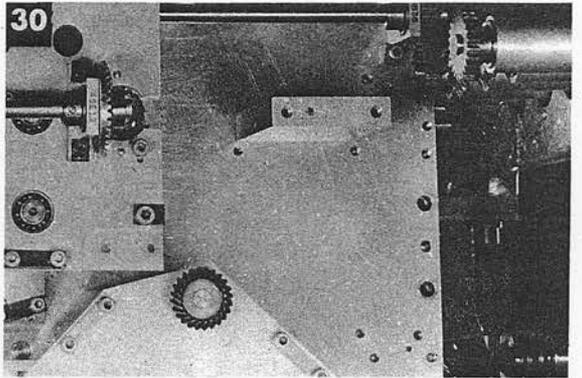
30 Remove the gear.
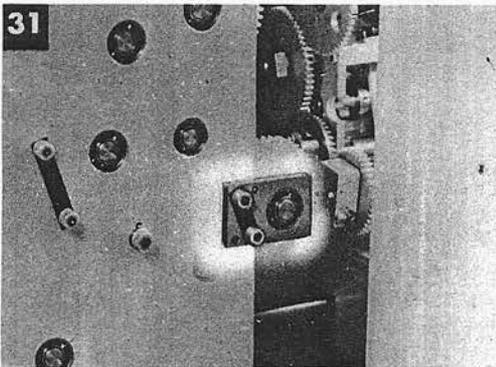
31 Remove the two screws securing the hanger of the horizontal shaft assembly with the large spur gear.
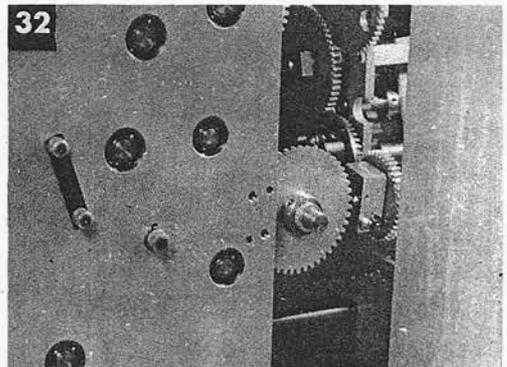
32 Work the dowels loose. Remove the hanger.
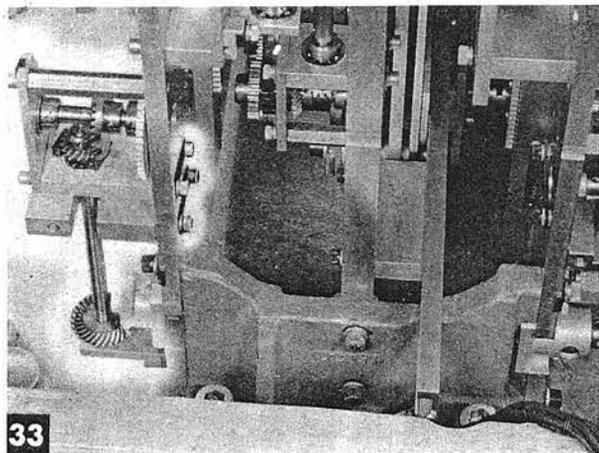
33 Remove the seven screws from the shaft assembly to the right of the deck tilt mounting plate.
Remove the shaft assembly.
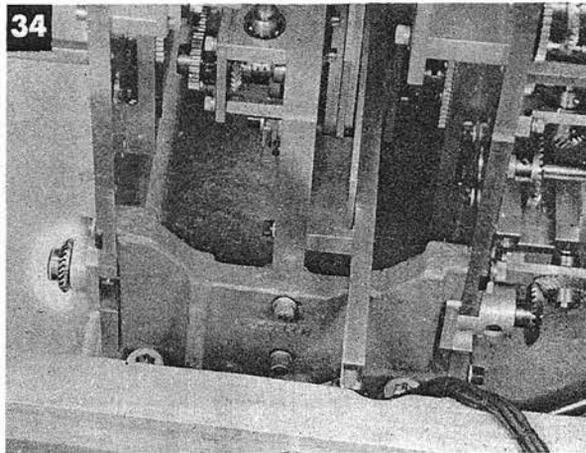
34 Unpin the bevel gear.
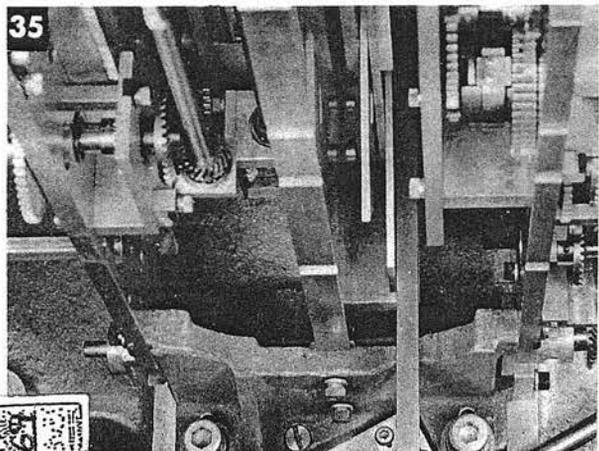
...emove the gear.
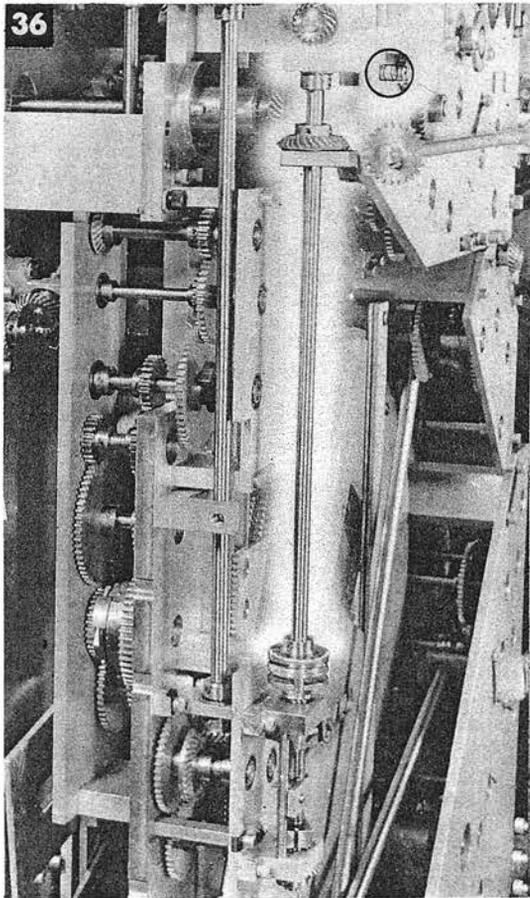
...emove the four screws securing the vertical coupling shaft near the upper rear edge of the *Dz, jDd* mounting plate. Remove the locking spring from the coupling end of the assembly.
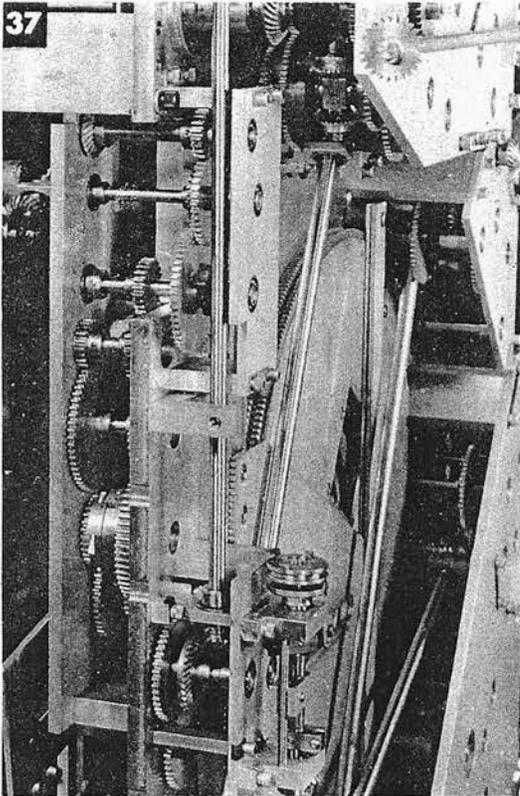
37   Remove the shaft assembly.

38   Remove the two screws securing the adapter for the shaft assembly above the *Dz* computer.
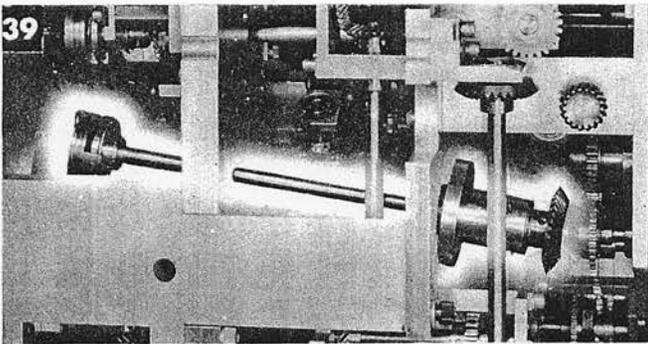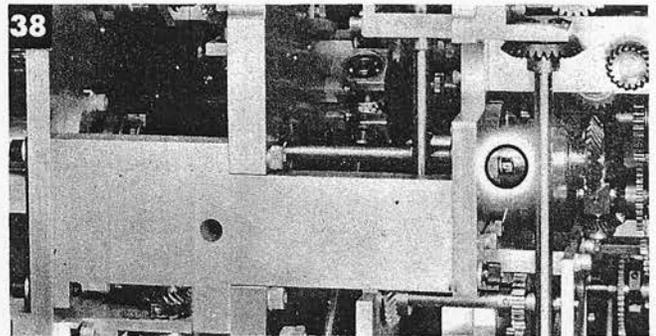
39   Slide the shaft assembly to the right as far as clearance will permit.

40   Remove the five screws securing the *Dz, jDd* mounting plate to the brackets.
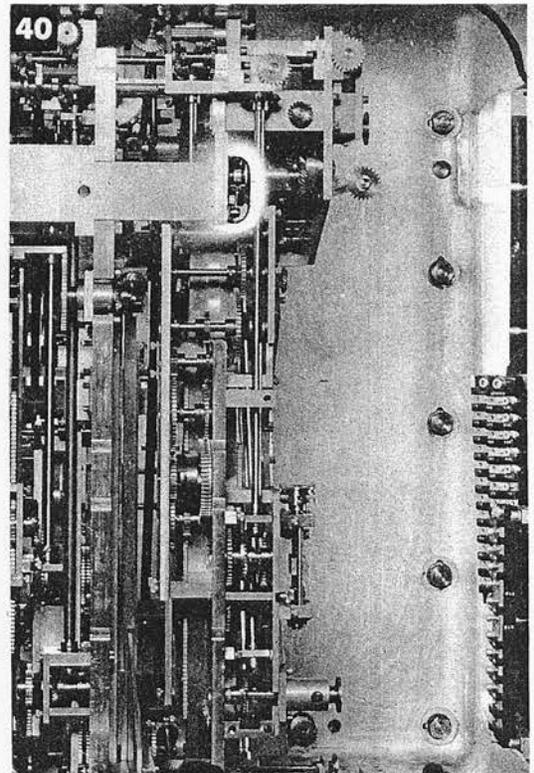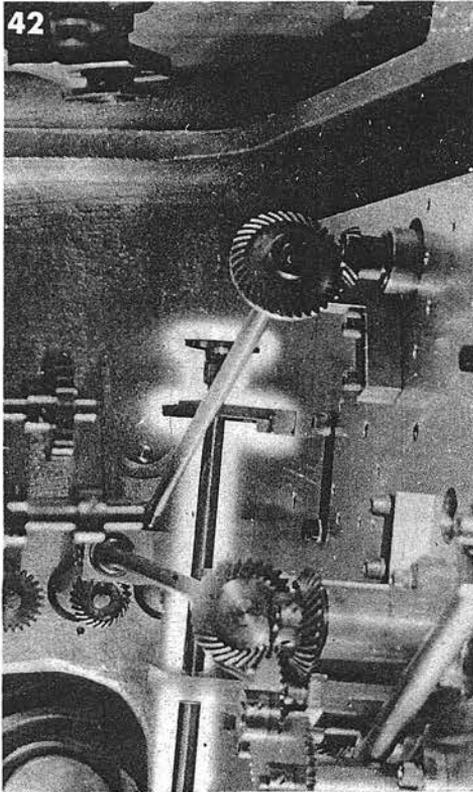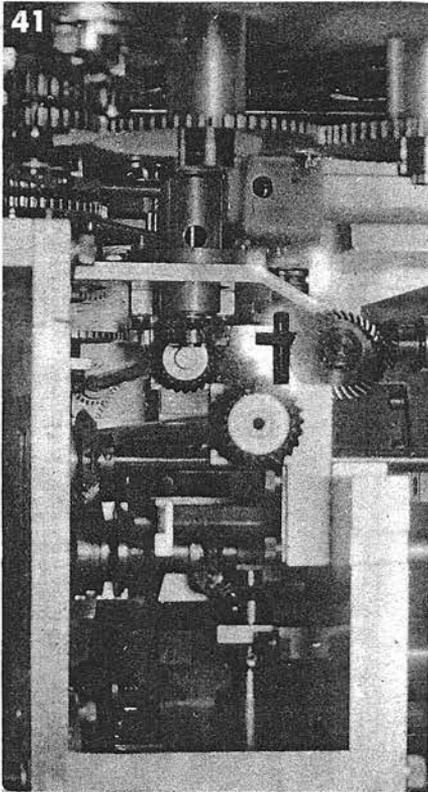
41 Work the dowels free from the brackets. Move the plate to gain access to the two screws securing the coupling shaft assembly at the inner edge of the plate. Remove these two screws.

42 Slide the shaft assembly downward to clear the hole in the upper plate. Move the *Dz, jDd* mounting plate out still farther.
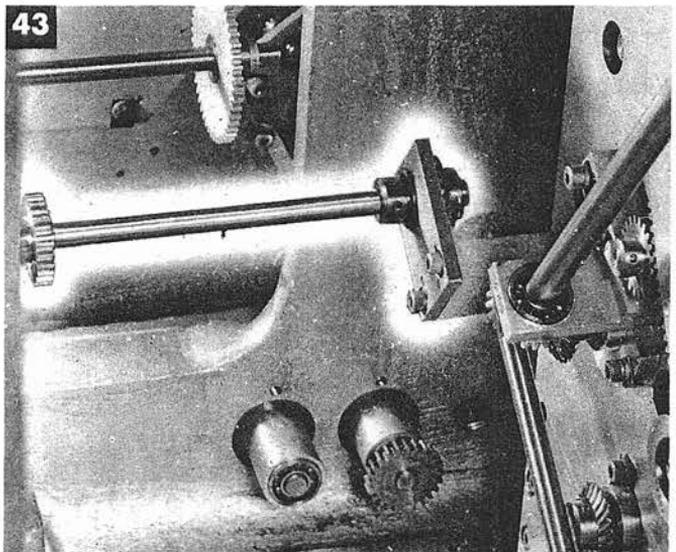
43 Remove the two screws securing the horizontal shaft assembly at the lower inner edge of the mechanism.
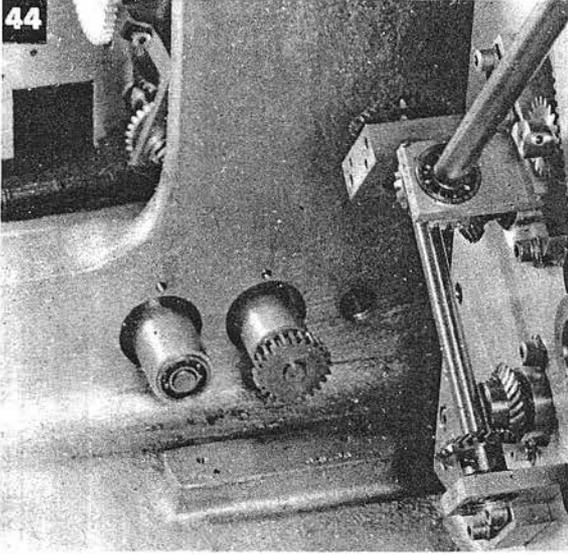
44 Remove the shaft assembly.

45 Move the *Dz, jDd* mounting plate to the outer edge of the computer case to gain access to the inner mechanism. It is not practical to remove the plate from the instrument.
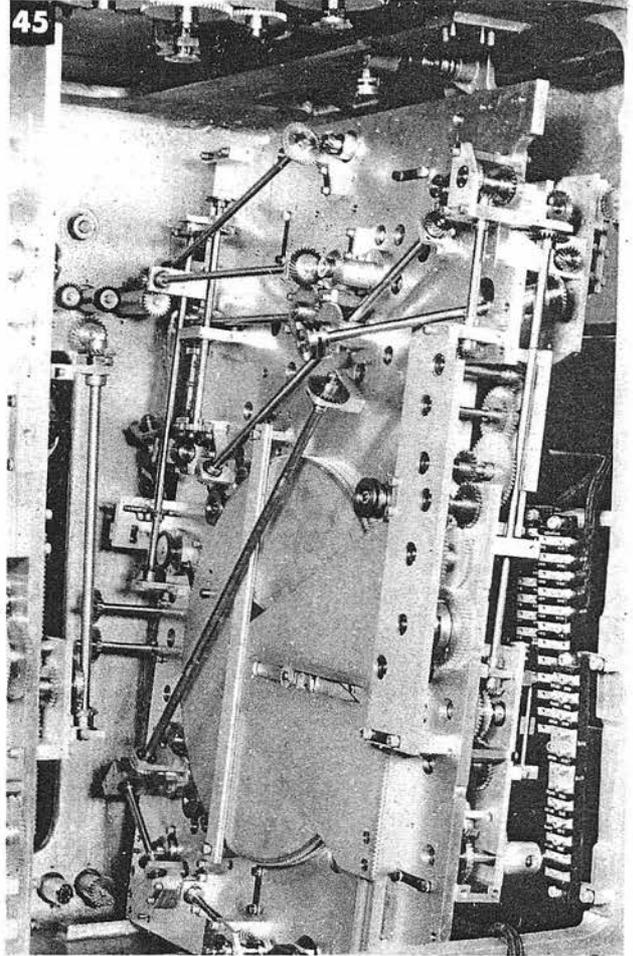
Disconnect the power leads from the *Dd, jB'r,* and *Vz* follow-ups.

Loosen the following adjustment clamps: A-116, A-198, A-184, A-500, A-501, A-234, A-235, A-86, A-87, A-88, A-212, A-89, A-96, A-55, A-77, A-260, A-250, A-210, A-146, A-145, A-147, A-183, A-180, A-30, A-29, A-31, A-8, A-99, A-28, A-58, A-243, A-49, A-52, A-156, A-3, A-226, A-227, A-228, A-90, A-91, A-12, A-259, A-60, A-35, A-216, A-112, A-208, A-113, A-63, A-36, A-215, A-33, A-34, A-61, A-32, A-111, A-64, A-65, A-57, A-199, A-62, A-92, A-5, A-51, A-98, A-70, A-50, A-179, A-230, and A-17 (star shell computer).

Readjust the clamps in the order given above.

Run all tests.

Zd² tan (Eb + Vs) AND Zd•Ds MULTIPLIERS
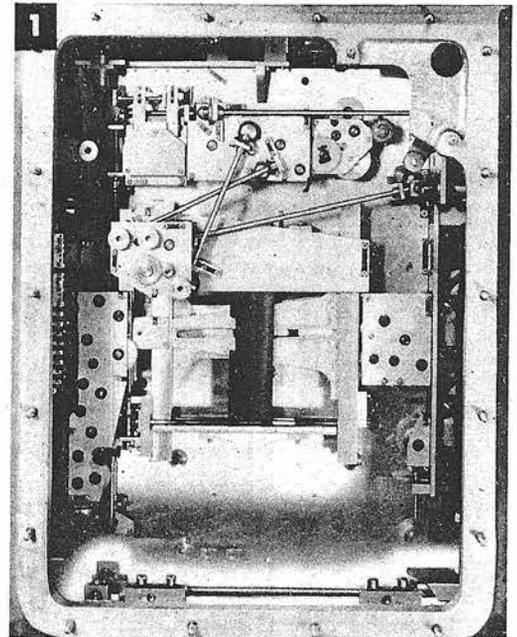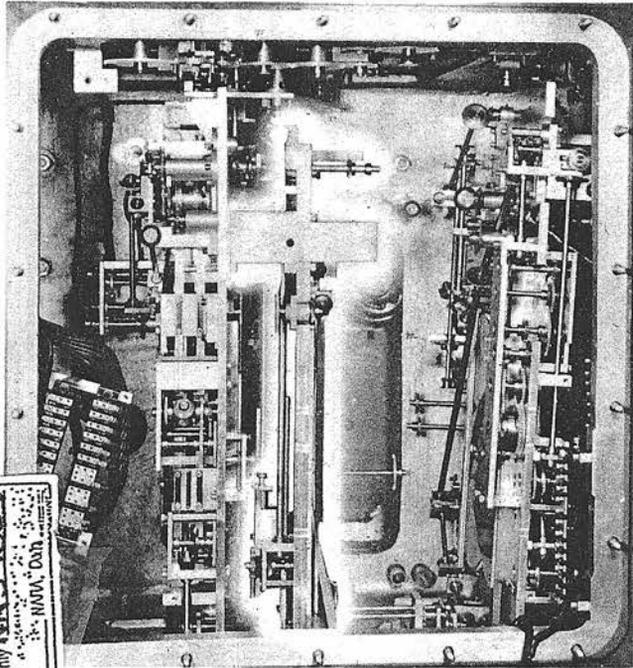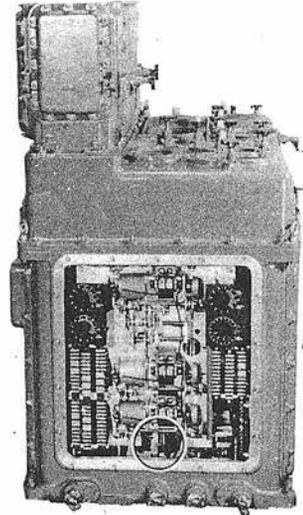
1 Remove the four screws securing the two mounting blocks to the floor of the computer. Remove the blocks.

Remove the six screws securing the long shaft assembly on which clamp A-58 and limit stop L-16 are mounted. Remove the assembly.

Remove the four screws securing the shaft assembly which connects with the long shaft just removed. Remove the assembly.
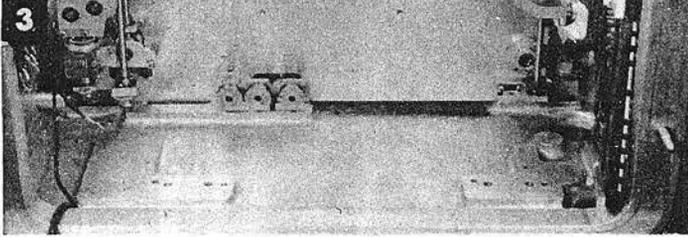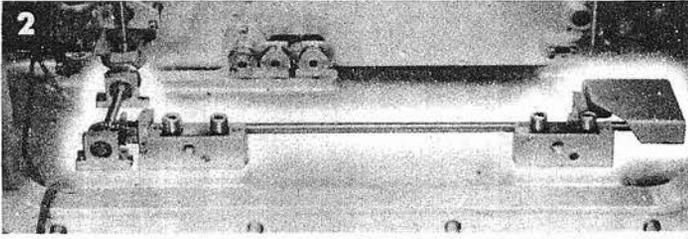
4 Remove the locking spring from the coupling end of the shaft assembly between the two halves of the computer. Remove the two screws securing the adapter.
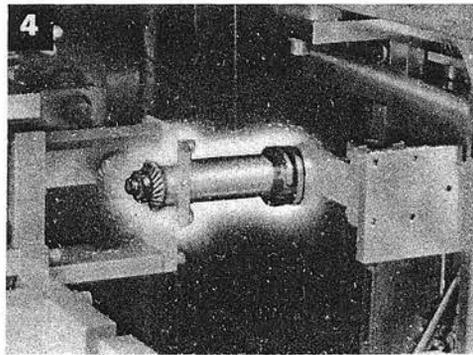
5 Remove the assembly.
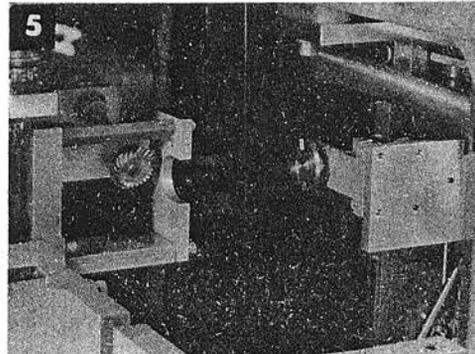
6 Remove the four screws from the angle bracket securing the $Zd^2 \tan (Eb + Vs)$ and $Zd \cdot Ds$ multipliers mounting plate above the shaft assembly just removed.
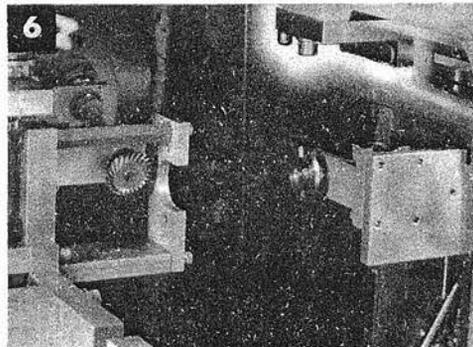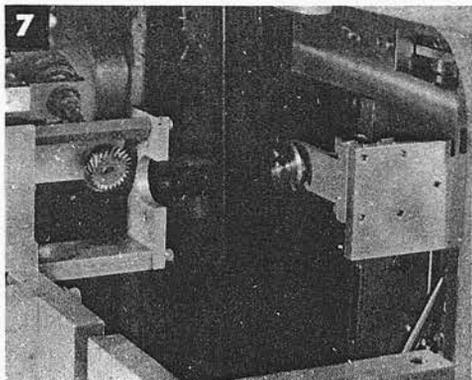
7 Work the dowels free. Remove the bracket.
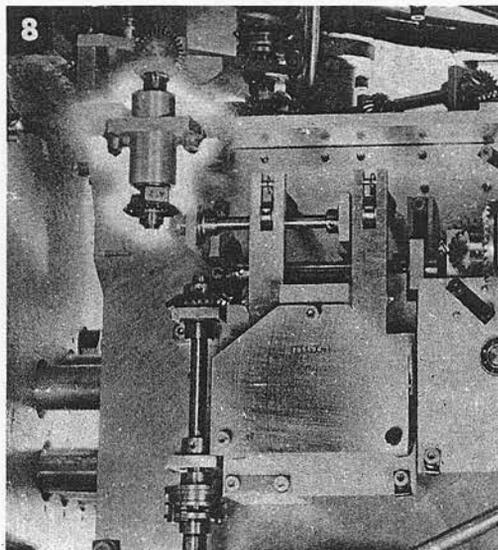
8 Remove the two screws securing the adapter of the shaft assembly on which clamp A-12 is mounted.
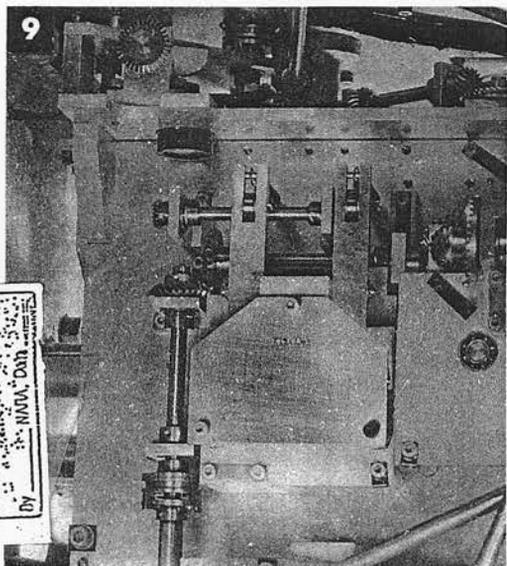
9 Remove the assembly.
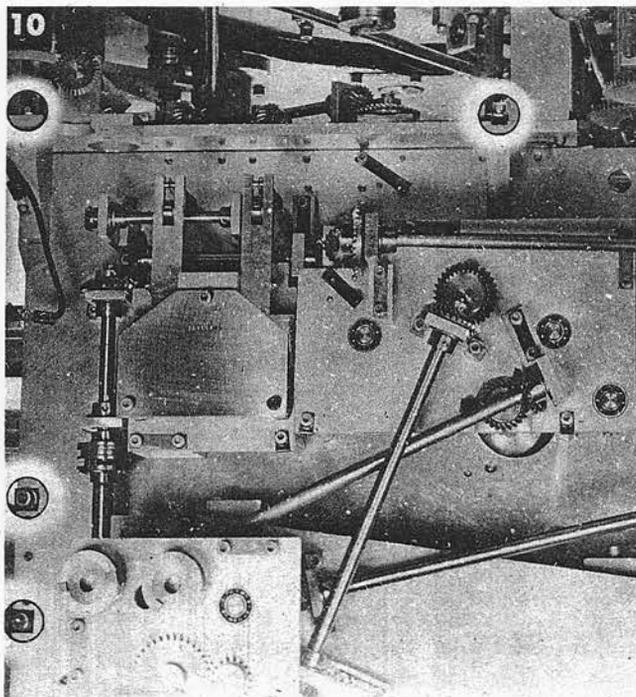
10 Remove the two screws securing the top plate. Remove the two screws securing the middle of the deck tilt mounting plate.
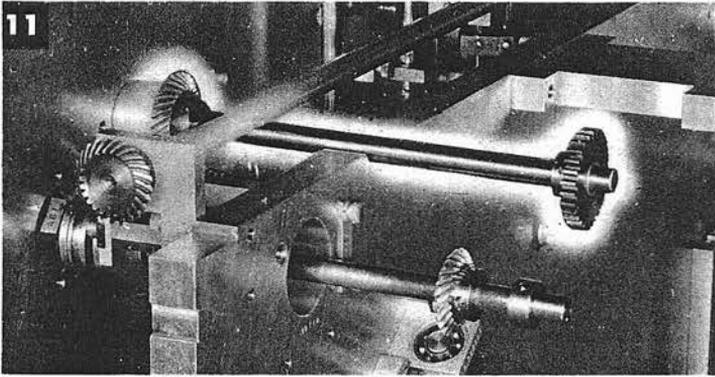
11 Remove the two screws securing the adapter of the shaft assembly over the $Zd^2 \tan (Eb + Vs)$ and $Zd \cdot Ds$ multiplier mounting plate.
The screws are on the deck tilt mounting plate.
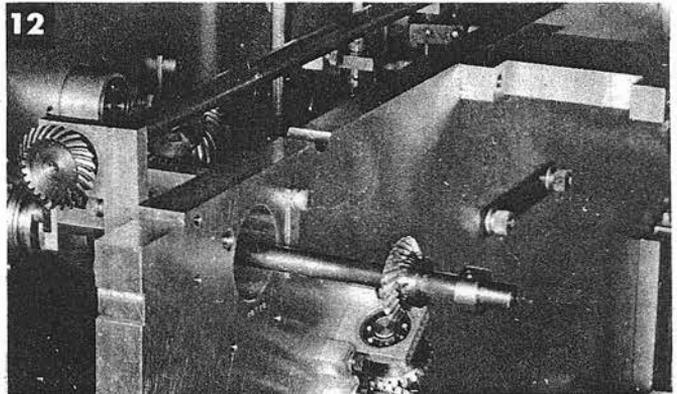
12 Remove the shaft assembly.
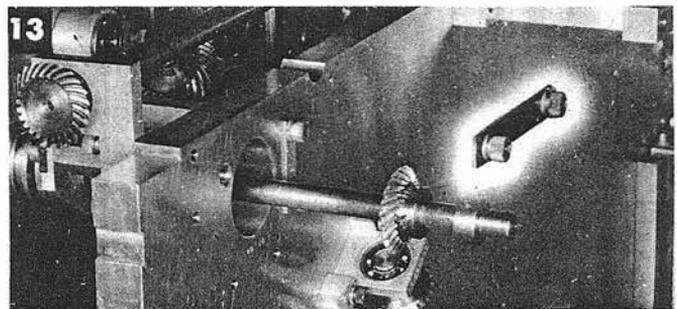
13 Remove the two screws securing the $Zd^2 \tan (Eb + Vs)$ and $Zd \cdot Ds$ multiplier mounting plate.
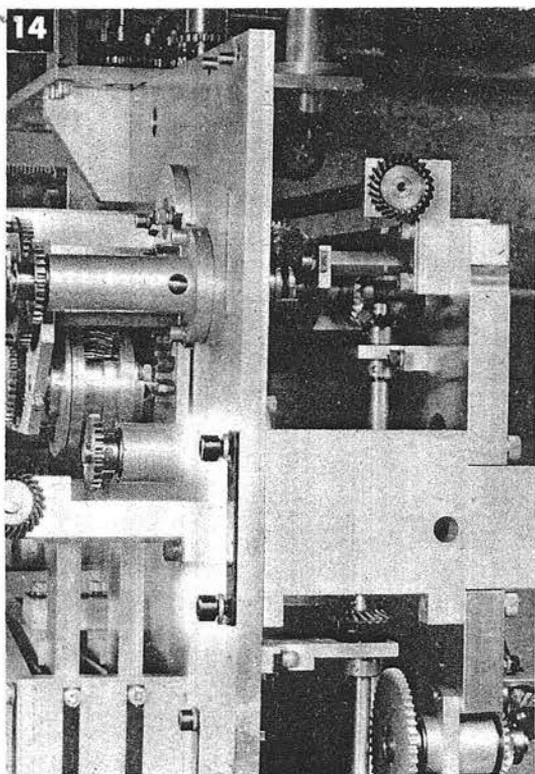
14 Remove the two screws securing the deck tilt mounting plate to a support at the top rear. The support remains on the $Zd^2 \tan (Eb + Vs)$ and $Zd \cdot Ds$ plate.

15 Remove the two screws securing the $E2$ counter.
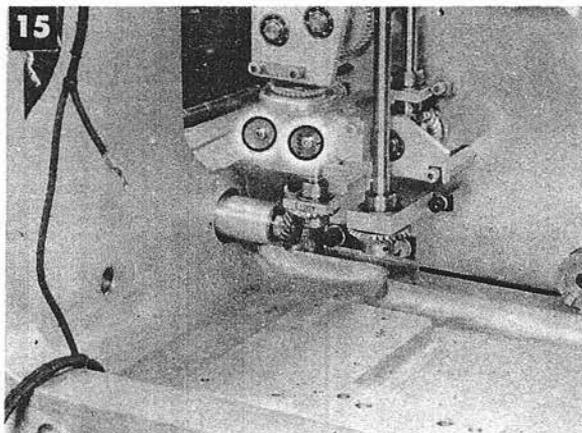
16 Remove the counter. Remove the two screws securing the supporting bracket. Remove the bracket.
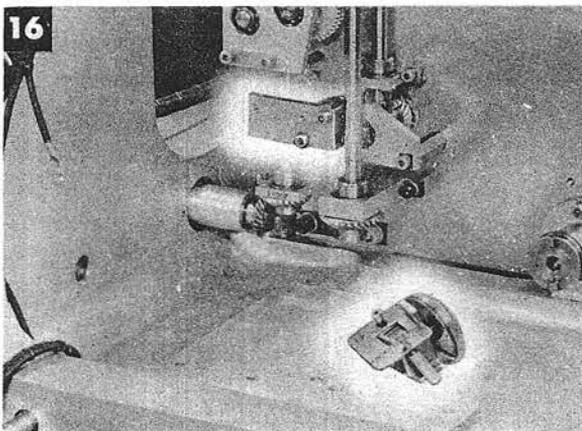
17 Remove the screw dowel and the two screws securing the front bracket to the floor of the computer.

Remove the two screws securing the deck tilt mounting plate to the bracket.
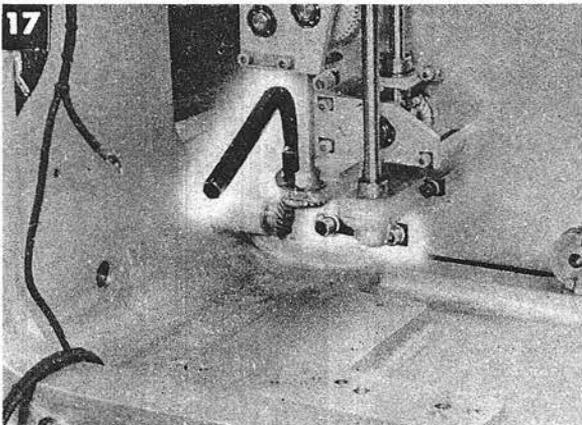
18 Loosen the screw dowel. Remove the two large screws securing the front bracket of the Zd^2 tan $(Eb + Vs)$ and $Zd \cdot Ds$ multiplier mounting plate to the floor of the computer.
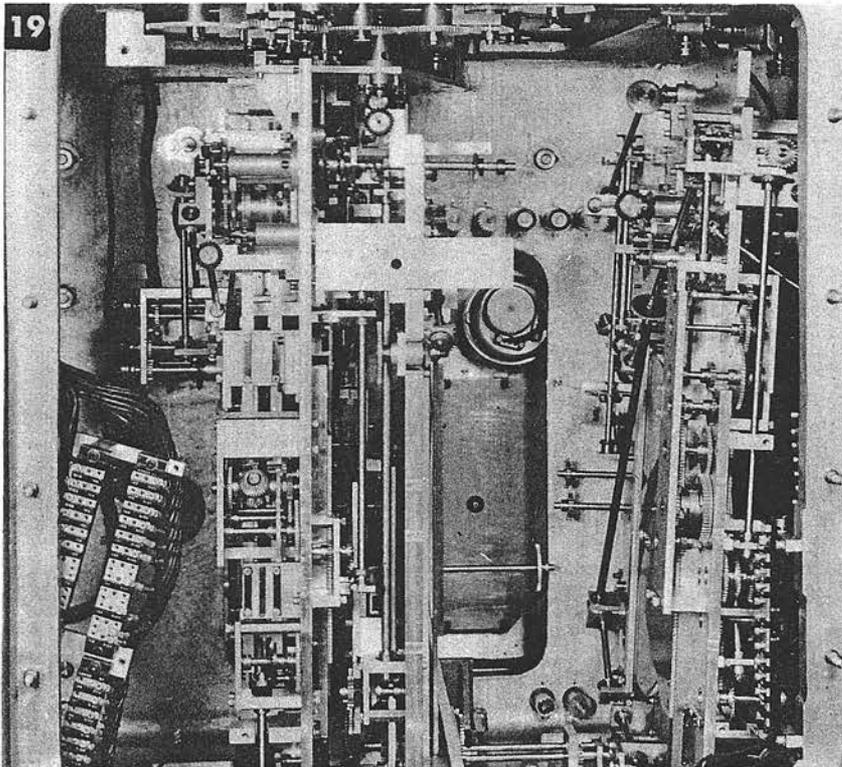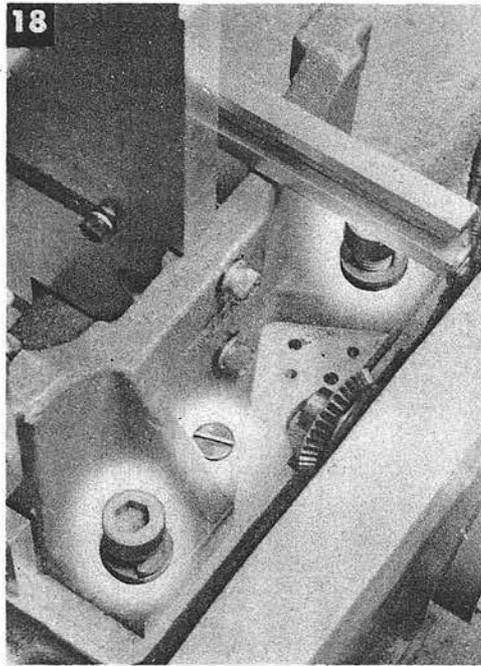
19 Move the Zd^2 tan $(Eb + Vs)$ and $Zd \cdot Ds$ multiplier mounting plate a few inches.
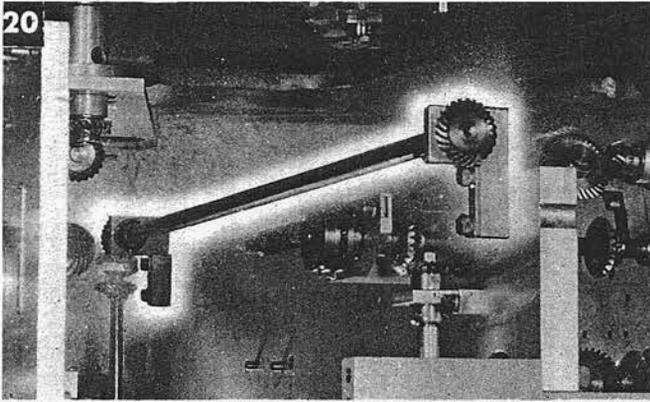
20   Remove the four screws securing the long shaft assembly at the top of the $Zd^2 \tan (Eb + Vs)$ and the $Zd \cdot Ds$ multiplier mounting plate.
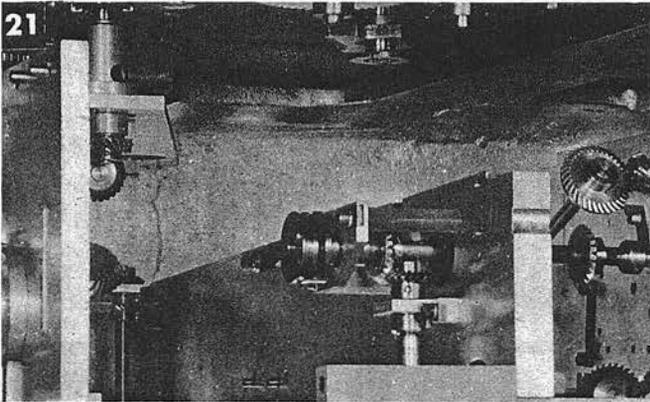
21   Remove the shaft assembly.
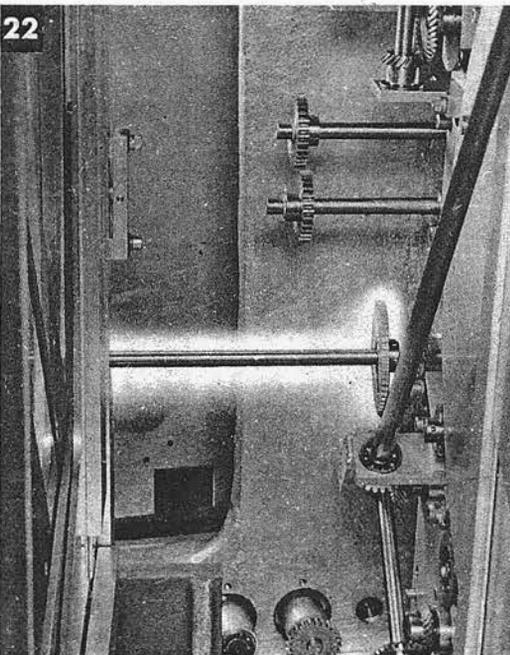
22   Remove the two screws from the hanger supporting the shaft assembly at the inner edge of the $Zd^2 \tan (Eb + Vs)$ and $Zd \cdot Ds$ multiplier mounting plate.
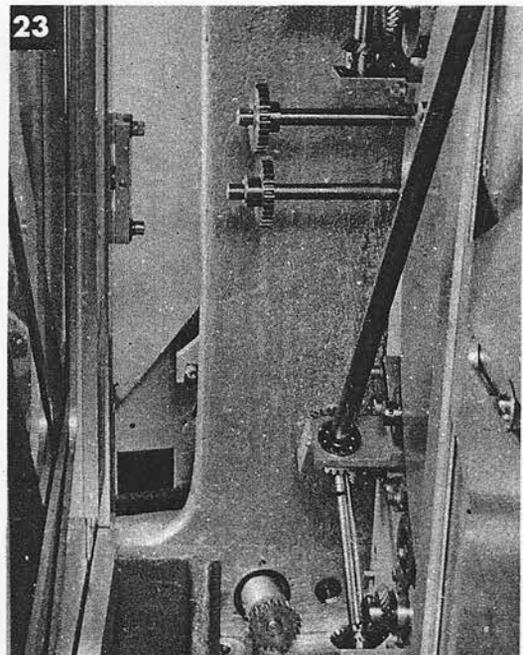
23   Remove the shaft assembly.

24 Move the $Zd^2 \tan (Eb + Vs)$ and $Zd \cdot Ds$ multiplier mounting plate to the right.
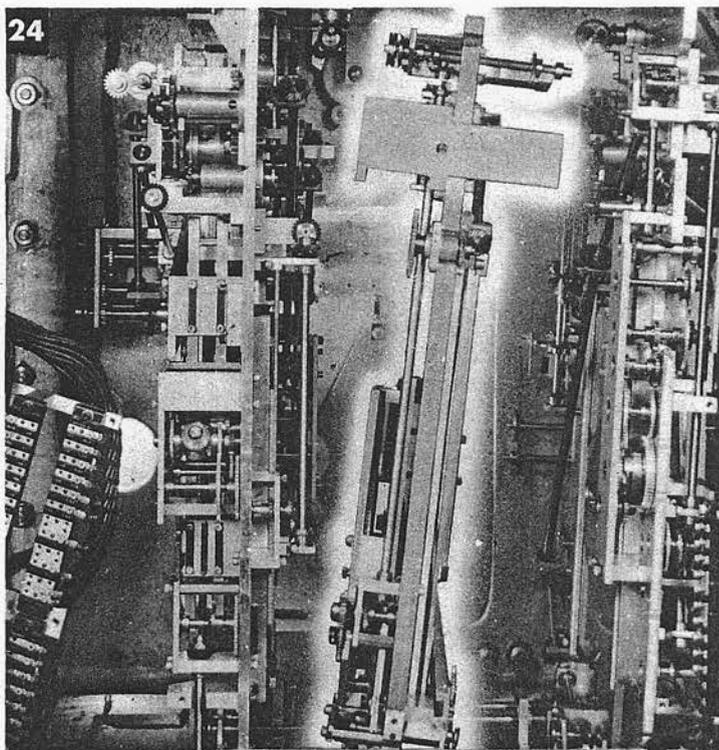
25 Remove the plate.
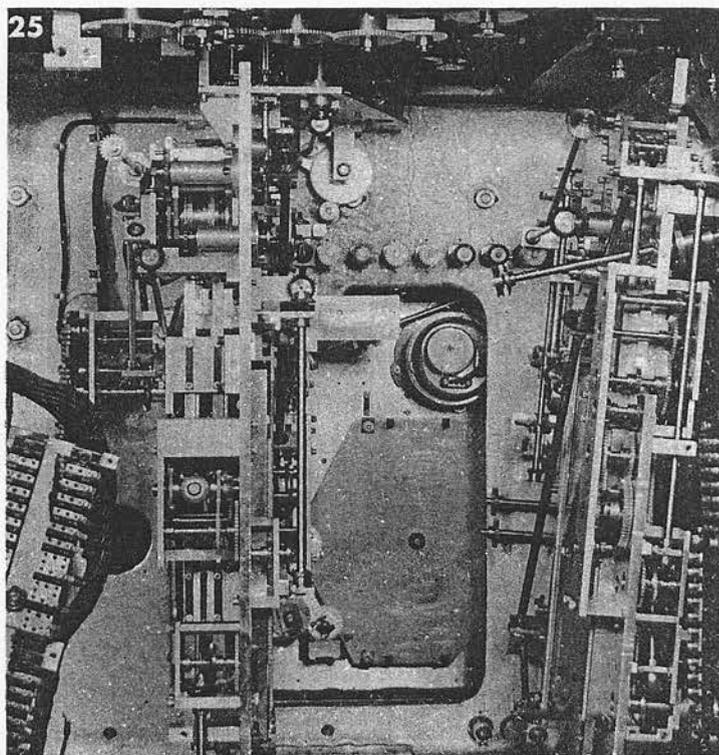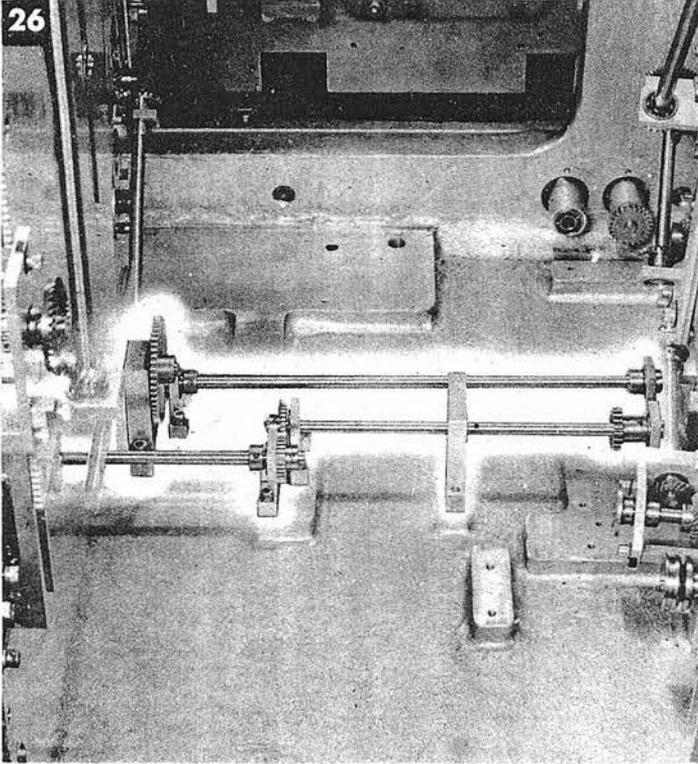
26 To provide additional clearance for working on the deck tilt component solver, remove the gearing at the floor of the computer.
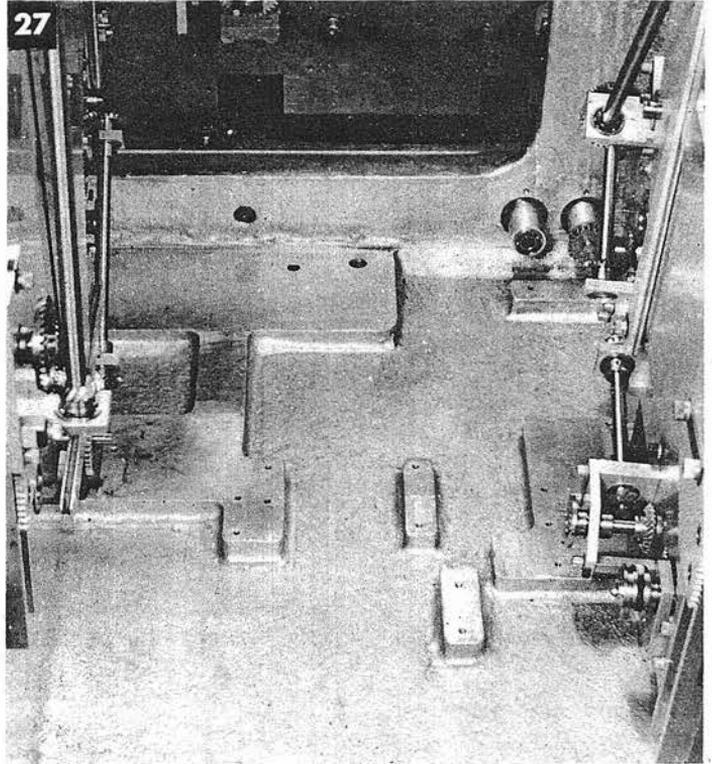
28 The $Zd \cdot Ds$ multiplier in position for repair.
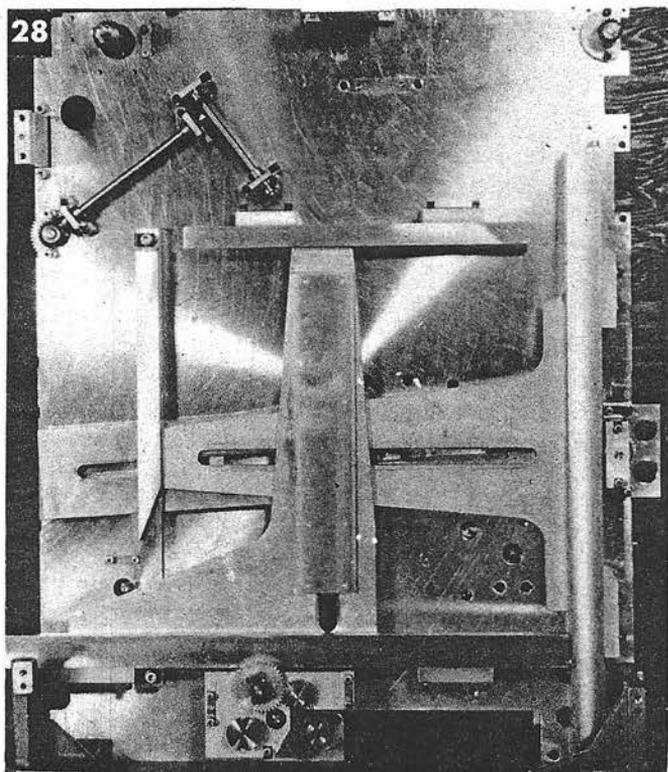
29 The $Zd^2 \tan (Eb + Vs)$ multiplier in position for repair.

To reinstall these mechanisms, reverse the removal procedure.

Reinstall the other mechanisms removed.

DECK TILT COMPONENT SOLVER, LIMIT STOP L-12

1 Work can be done on the deck tilt component solver, limit stop L-12, and the associated gearing without removing them from the instrument.

For the readjustment procedure, follow the directions given on page 791.
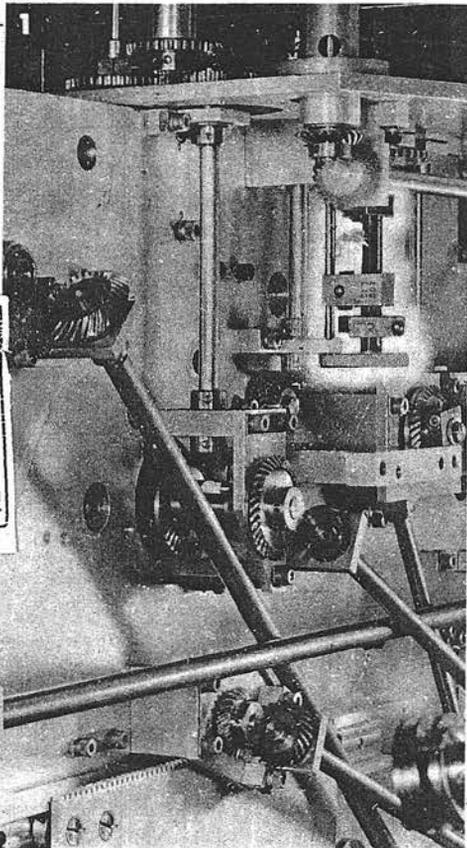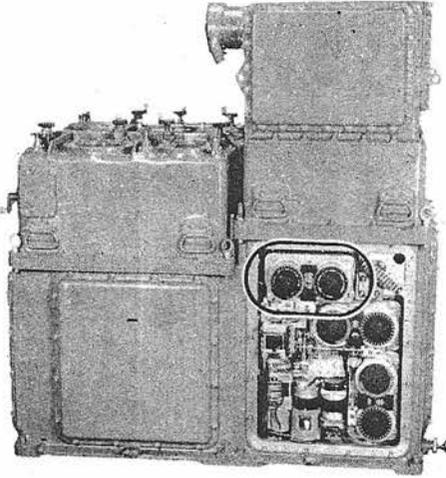
$Eb + Vs$ INTERMITTENT DRIVE SYNC E BRAKES

Parallax Transmitters, page 760
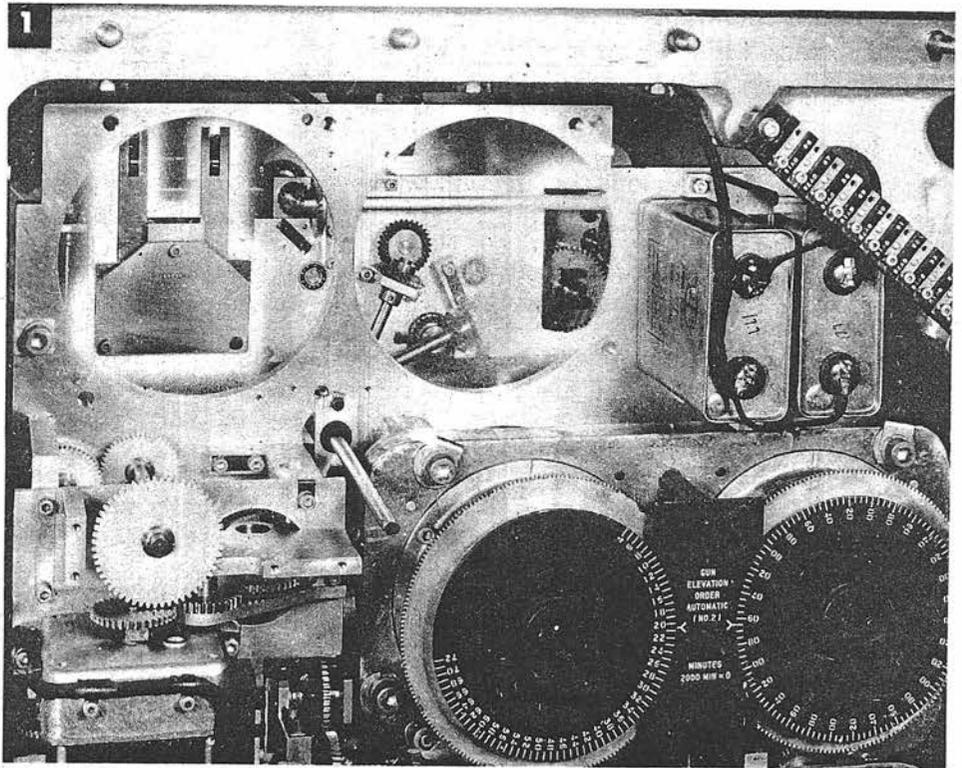
1 The $Eb + Vs$ intermittent drive and the sync E brakes are on the same side of the deck tilt mounting plate as the $L \cdot L$ sin $2B'r$ and Zd $(L - L$ cos $2B'r)$ multipliers.
The $Eb + Vs$ intermittent drive and the sync E brakes can be reached for repairs through the access allowed by the removal of the parallax transmitters.

After work has been completed on the $Eb + Vs$ intermittent drive, reinstall the parallax transmitters.

Readjust clamps A-60, A-61, A-32, A-52, and A-228.

Star Shell Computer

This chapter applies to the Star Shell Computer Mark 1 Mod O. It contains instructions for removing the *Ct* indicator, the star shell range spot receiver, the star shell multiplier section, and the star shell gun order transmitters. All of these assemblies can be removed from the star shell computer case while it is in place on Computer Mark 1.

If it is necessary to remove the entire star shell computer as a unit, either for bench overhaul or to allow removal of cover 2 from the Computer Mark 1, proceed as follows:

1   Remove the *Ct* indicator. Refer to page 805.

2   Remove the junction box cover. Disconnect all of the ship's wiring from the star shell computer terminal blocks.

3   Remove the two screws securing the cable elbow tube. Withdraw the cable from the junction box.

4   Remove the acorn nuts, lock washers, and cover washers from the fifteen studs securing the star shell computer to cover 2.

5   Insert a screw driver into each undercut in its base and pry the star shell computer loose gradually until it is free on the studs.

6   Put two 3/4-inch-diameter by 5-foot-long steel rods through the holes in the lifting brackets at the ends of the star shell computer, and use them to lift it from cover 2. It is advisable to use four men for the lifting job.

While it is on the bench, the star shell computer should be supported on blocks at either end in order to avoid damage to the dowels or mechanism on the bottom of the unit.

To reinstall the unit, reverse the removal procedure. Before tightening the securing nuts, check that the four couplings below the unit are properly aligned for engagement. After the nuts are tight, check that the couplings are engaged, and drive properly.

Readjust A-17, A-18, A-230, and A-231.

Ct INDICATOR
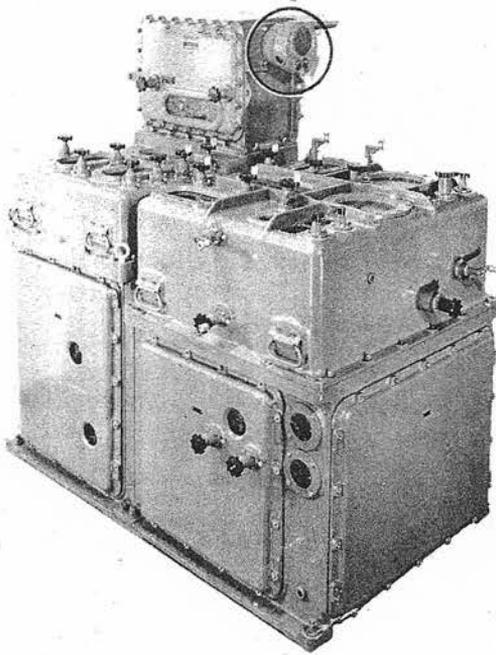
1 Loosen the four screws securing the *Ct* indicator.
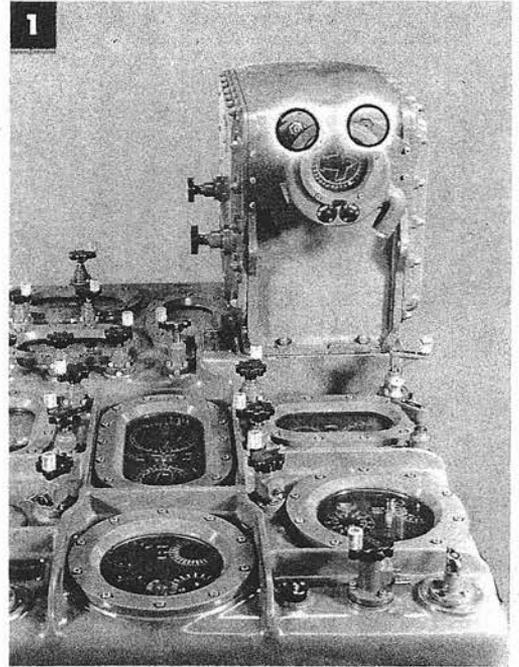
2 Remove the indicator.
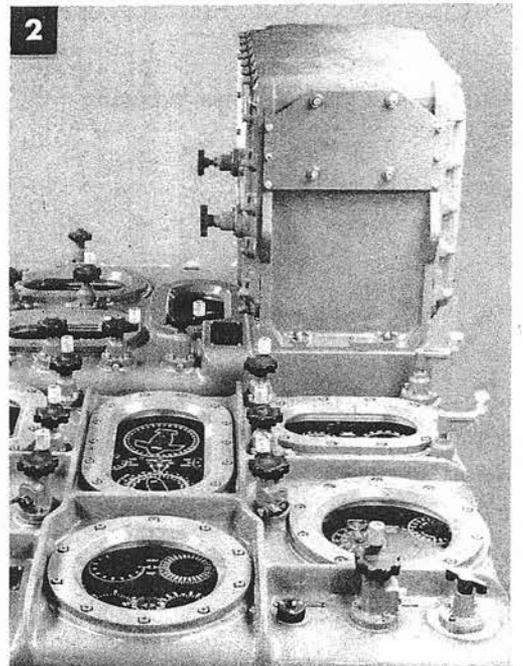
To reinstall the *Ct* indicator, reverse the removal procedure.

Rjn RECEIVER MOTOR
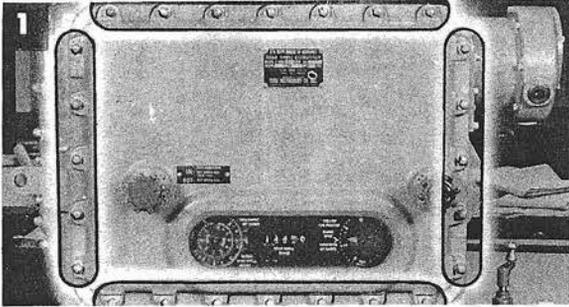
1 Remove the twenty-four acorn nuts securing the computer cover. Remove the cover.
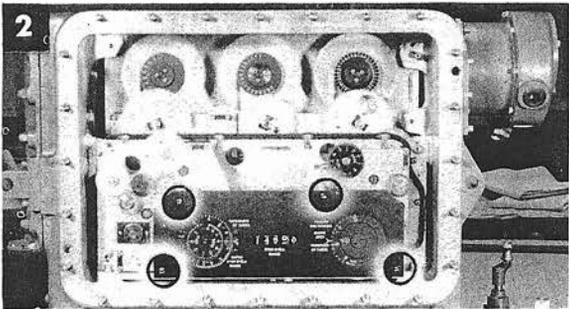
2 Remove the four screws securing the mask.
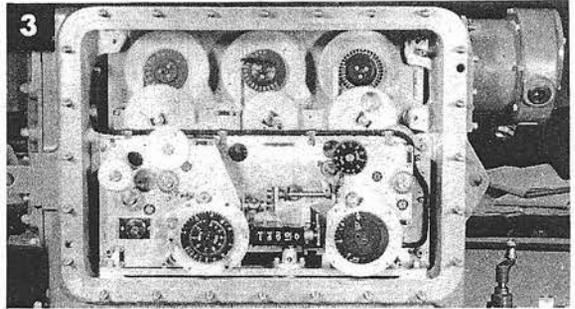
3 Remove the mask.
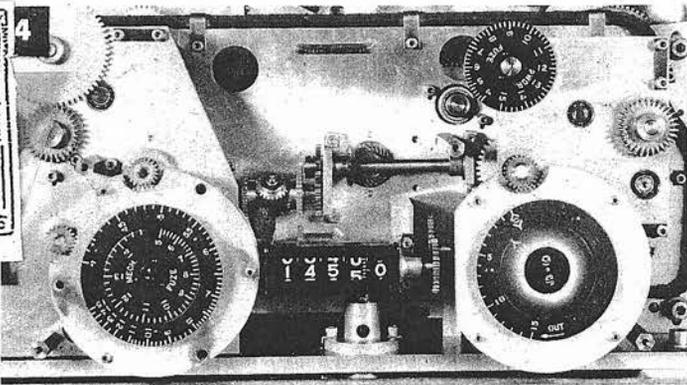
4 Remove the two screws from the dial clamp plate.
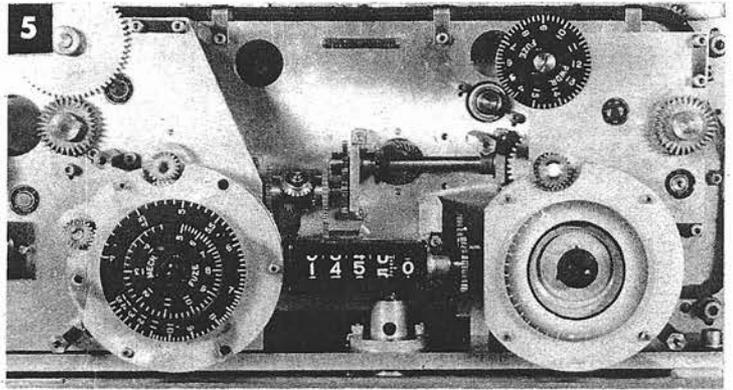
5 Remove the inner dial.
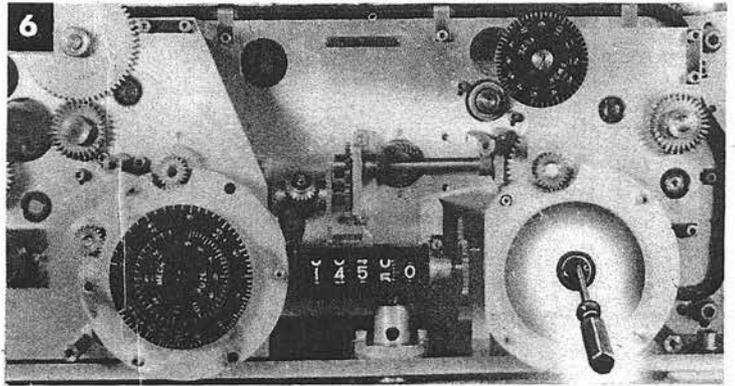
6 Using a screw driver, loosen the nut securing the dial hub to the motor shaft.
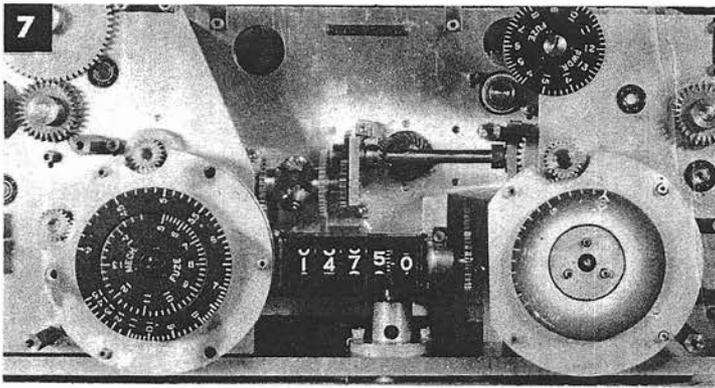
7 Remove the nut and the hub.
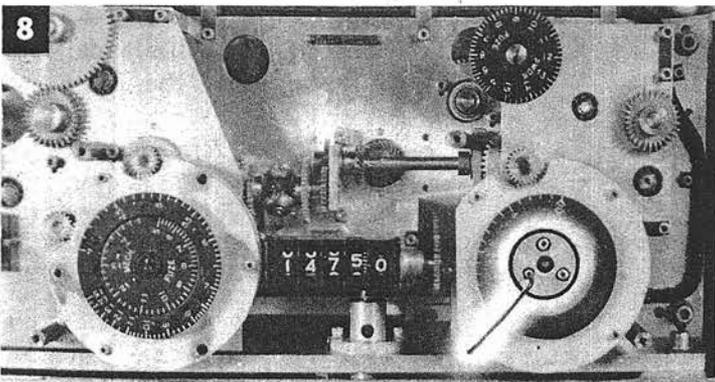
8 Remove the three screws securing the dial assembly.
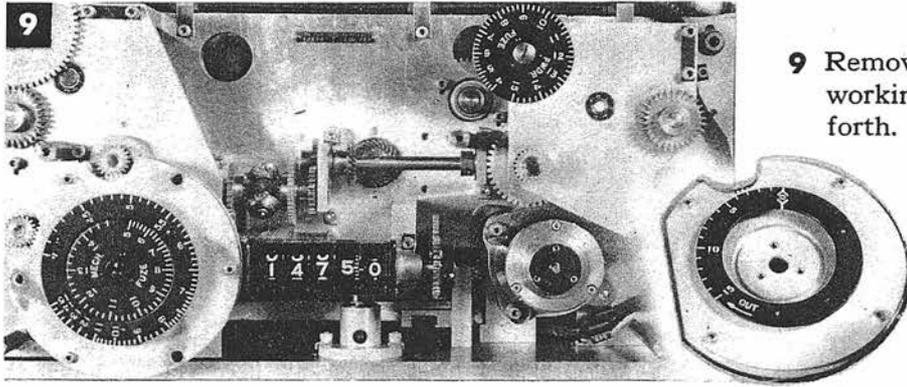
9 Remove dial assembly by working it back and forth.

10 Loosen, but do not remove, the three screws securing the *Rjn* motor to the frame.
Remove the three screws securing the *Rjn* motor cable clamps.
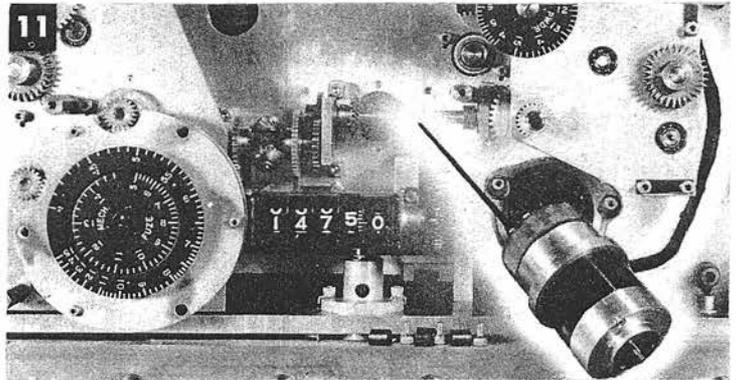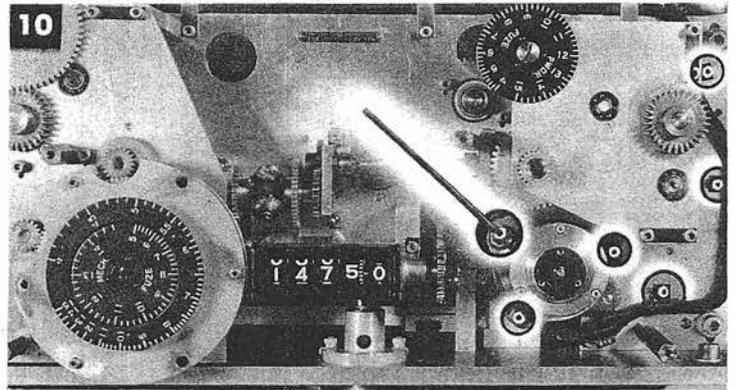
11 Partially remove the *Rjn* motor.
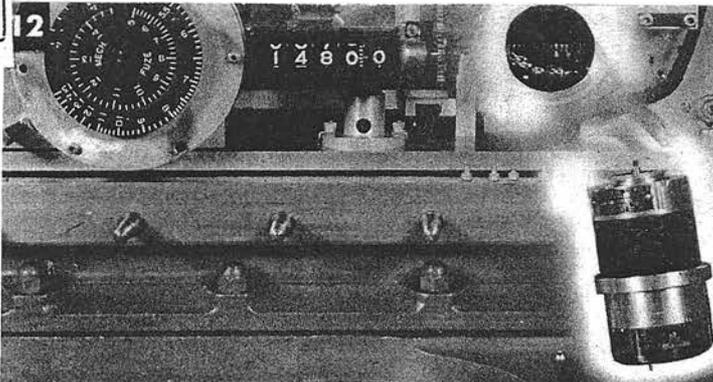
12 Remove the five screws connecting the cable leads to the base of the *Rjn* motor.
Remove the *Rjn* motor.

To reinstall the *Rjn* receiver motor, reverse the removal procedure.

Readjust clamps A-56, A-2, A-3, A-4, A-10, and A-18.

MULTIPLIER GEARING
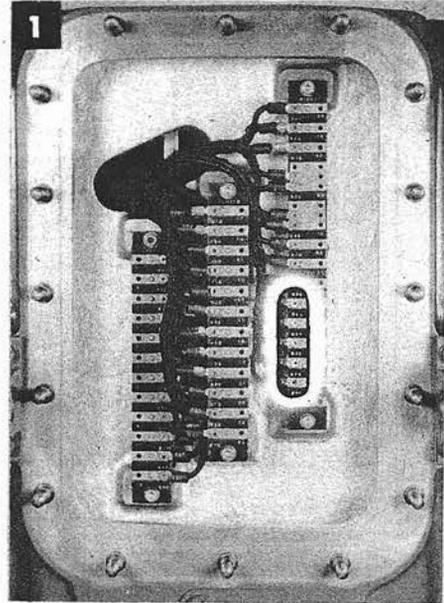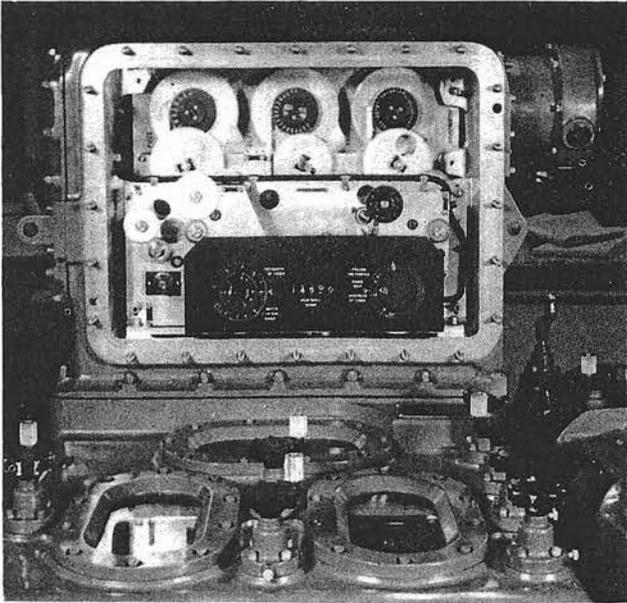
1 Remove the five screws connecting the *Rjn* motor cable leads to the terminal block in the junction box.
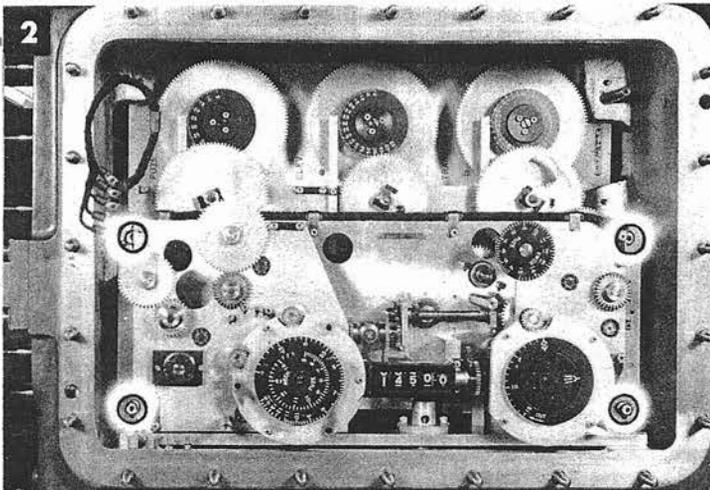
2 Remove the two screws securing the cable clamps to the wall of the computer. Ease the cable through the opening in the junction box. Remove the four screws securing the multiplier gearing.
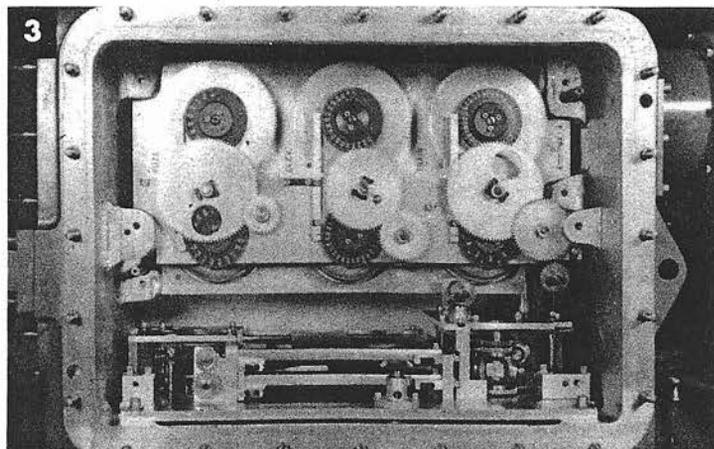
3 Work the two dowels loose. Remove the multiplier gearing.
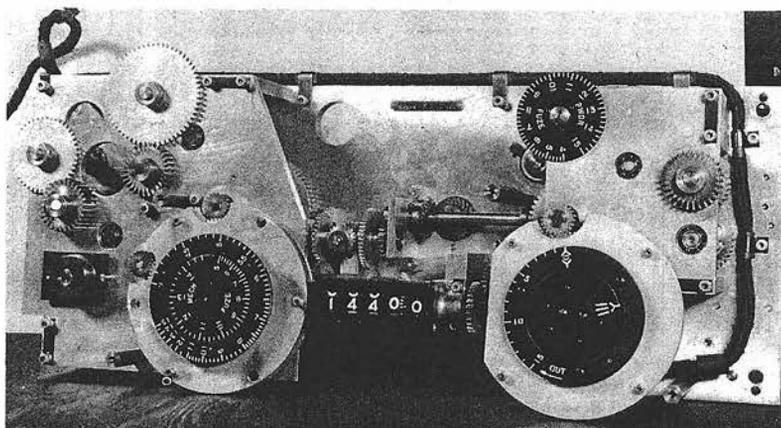
To reinstall the multiplier gearing, reverse the removal procedure.

Readjust clamps A-16, A-57, A-10, A-9, and A-11.

Set the Star Shell Computer Mark 1 to Computer Mark 1 through clamps A-18, A-17, A-230, and A-231.

TRANSMITTER MOUNTING PLATE: FUZE, ELEVATION, AND TRAIN
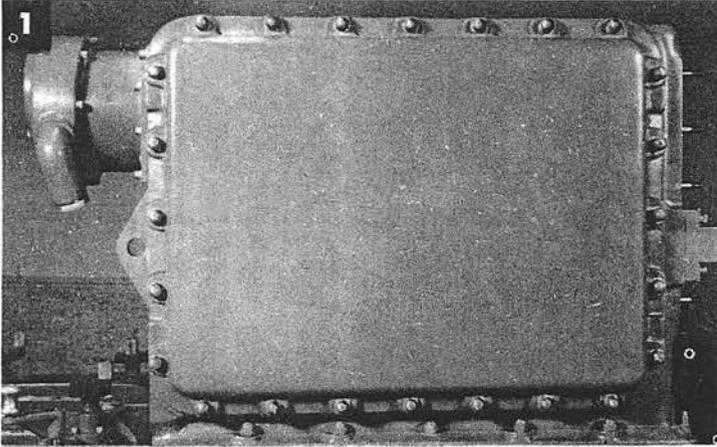
1 Remove the twenty-four acorn nuts securing the back cover.
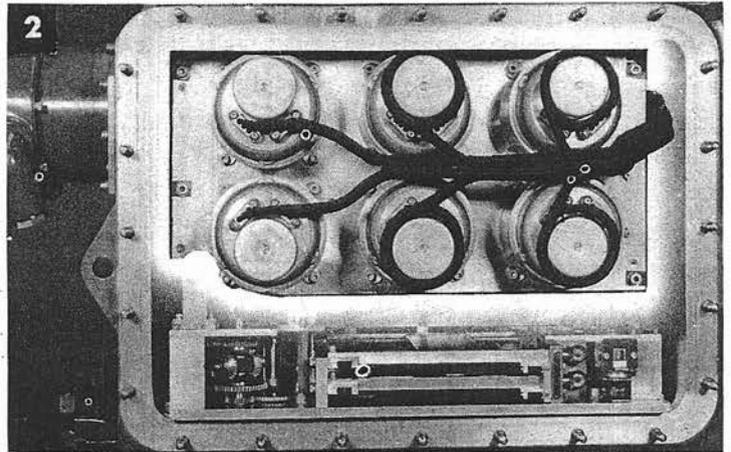
2 Remove the cover.
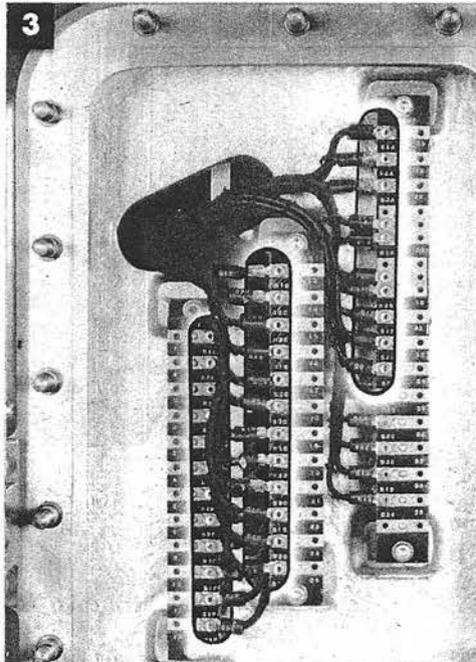
3 Remove the screws connecting the transmitter cable leads to the terminal blocks in the junction box. Ease the transmitter cables through the opening in the junction box.
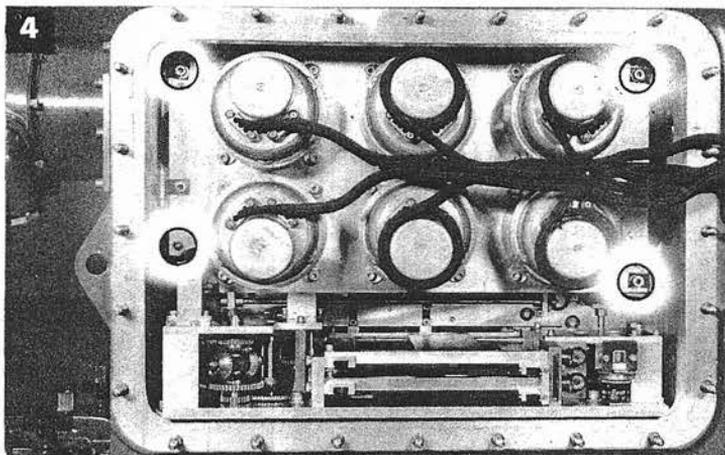
4 Remove the four screws securing the transmitter mounting plate to the frame.
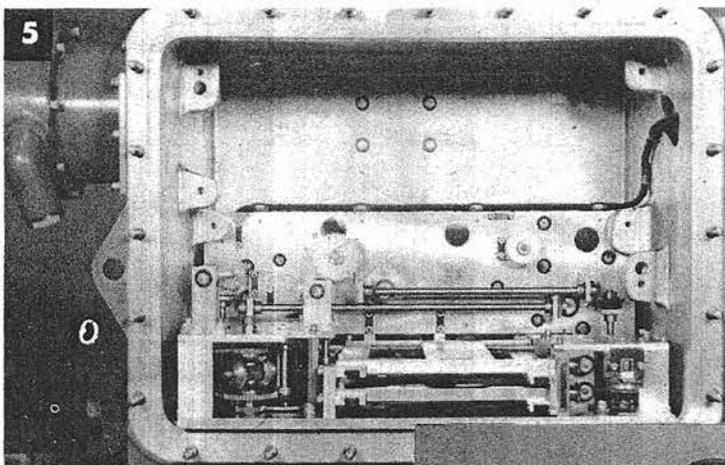
5 Remove the transmitter mounting plate.
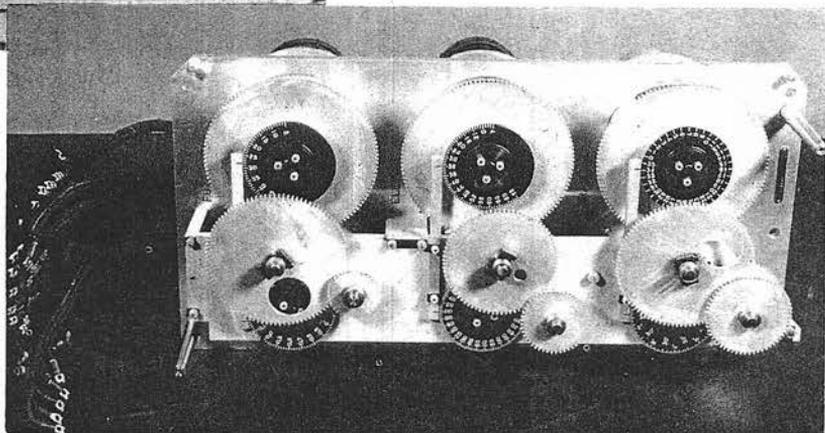
To reinstall the transmitter mounting plate, reverse the removal procedure.

Readjust clamps A-50, A-51, A-13, A-52, A-53, A-14, A-54, A-55, A-16, A-57, A-10, and A-9.

ELEVATION AND DEFLECTION MULTIPLIERS

Transmitter Mounting Plate,
page 809
Multiplier Gearing, page 811
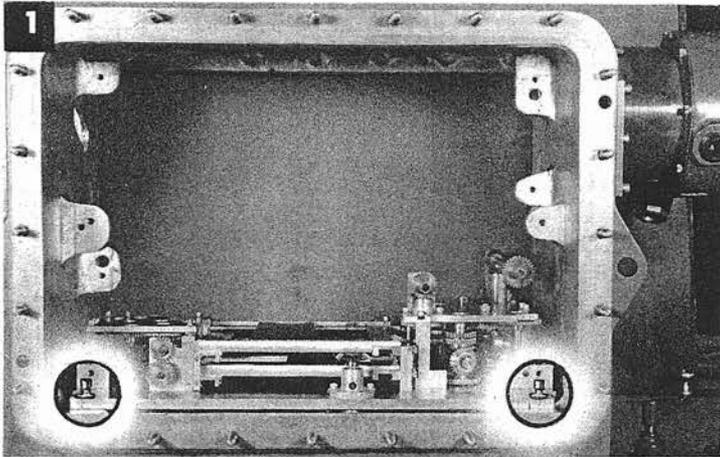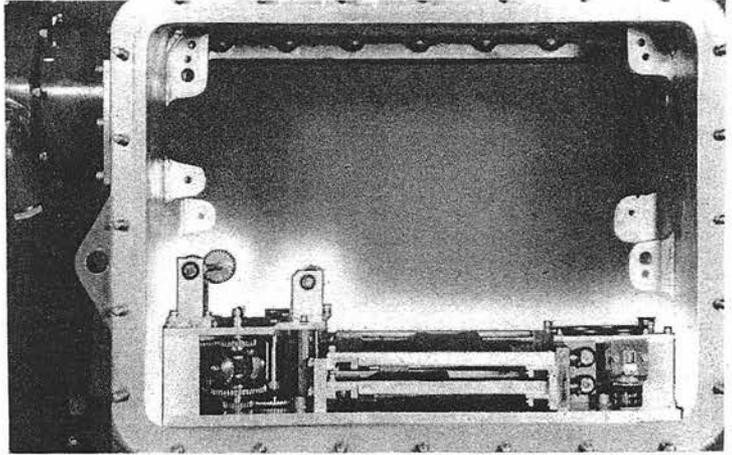
1 Remove the four screws se-
curing the multiplier
mounting plate.

2 Move the multiplier mount-
ing plate to free the dowels.
Tilt the plate to clear the
gearing at the bottom.
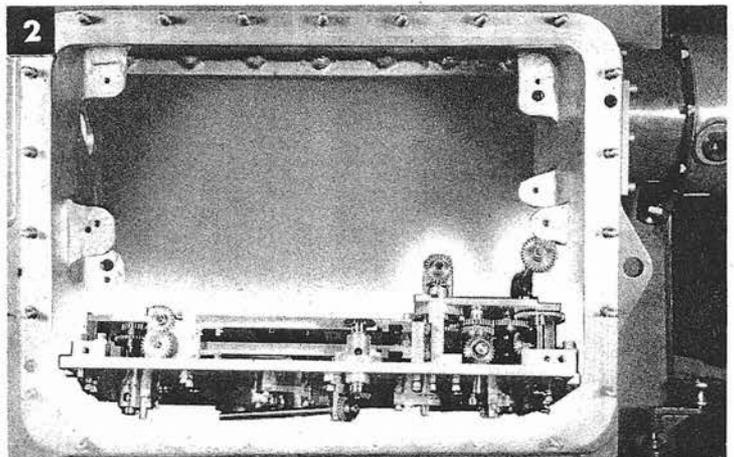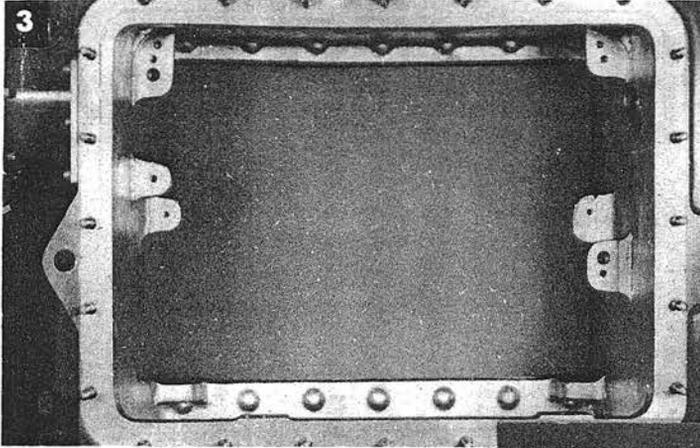
3 Remove the multipliers.
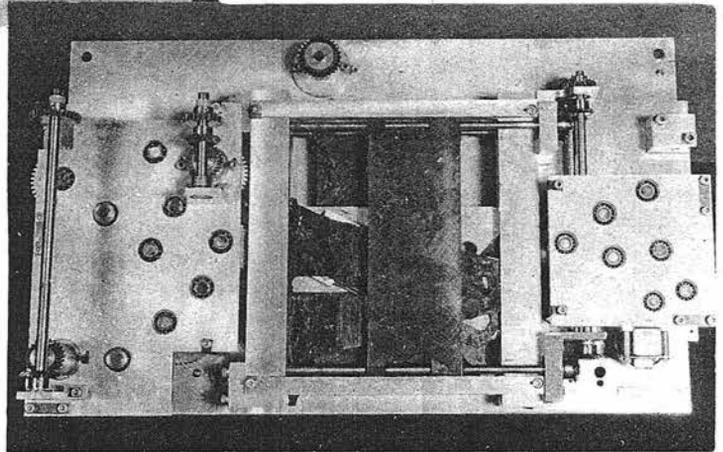
To reinstall the elevation and deflection multipliers, reverse the removal procedure.

Readjust clamps A-50, A-51, A-13, A-52, A-53, A-14, A-54, A-55, A-15, A-56, A-2, A-3, A-4, A-6, A-16, A-5, A-7, A-8, A-1, A-57, A-10, A-9, A-12, and A-11.

Set the Star Shell Computer Mark 1 to Computer Mark 1 through clamps A-18, A-17, A-230, and A-231.
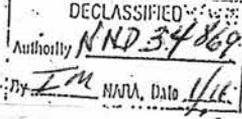
Part eight

FACTORY ADJUSTMENT PROCEDURE

Introduction

This section contains the basic reference data required for complete adjustment of the Computer Mark 1 and the Star Shell Computer Mark 1. This adjustment procedure should be followed whenever the entire instrument, or a major unit of the instrument, has been disassembled and reassembled. It is assumed that the maintenance personnel using this adjustment procedure will be experienced in the various operations and well acquainted with the instrument. If any further information on a particular adjustment is required, reference should be made to the *Readjustment Procedure*. For example, locations of the adjustment points have been omitted here. For the exact location of any adjustment, refer to the photos and locational description given in the *Readjustment Procedure*.

The sequence of adjustments has been carefully developed from methods used in the manufacturer's test department. The basic assumption is that all adjustment clamps are loose at the beginning. As the adjustment progresses, each step assumes that all previous adjustments have been properly made and permanently tightened. Therefore, if only part of the adjustment procedure is to be used, it is important to make sure that all previous adjustments are correct. The method of determining this depends upon the job, and the discretion of the maintenance man. In general, however, the checks given in the *Readjustment Procedure* may be used for this purpose.

In order to simplify presentation, and also to cover the majority of instruments, the procedure given here applies only to Computer Mk 1, Mods 7 and 13, Ser. Nos. 216 and higher, and to Star Shell Computer Mk 1, Mods 0 and 1.

When the instrument is to be completely adjusted, the star shell computer and all of the covers should be removed. To provide easier access to some adjustments, it is usually desirable to remove the Co and Eb receivers and both indicating and automatic $E'g$ transmitters. They should be reinstalled when adjustments requiring their presence are reached in the adjustment sequence.

The electrical zero adjustment of the Ds, Vs, and F transmitters *must* be made with the units out of the instrument. This adjustment consists of positioning each synchro at electrical zero, then adjusting the synchro ring dial index mark to match the fixed index. The coarse and fine synchros of the double-speed transmitters may then be adjusted to each other. After reinstallation of these units, the index marks may be used for future reference to electrical zero.

In order to facilitate adjustment and test of the ballistic computers, it is desirable to remove all four units from the instrument. While each unit is on the bench, a 115-volt 60-cycle power supply may be connected temporarily to it, in order to energize the follow-up and run the test.

For making some of the adjustments, directions are given with respect to the front, rear, left, or right. In all of these cases, the directions refer to the corresponding side of the computer itself. They should not be confused with the apparent front, rear, left, or right of a unit as viewed through an access. The reference directions are explained and illustrated in the chapter on *Covers*.

Whenever an adjustment is made which involves energizing a follow-up, certain precautions should be taken before the leads are connected, in order to avoid damage to other units. First, the servo motor should be turned gently by hand to both limits of the protecting limit stop. Observe the limit stop itself to be certain that it is actually the stop that is hitting and not some more fragile element in an integrator, component solver, or multiplier. Secondly, in order to avoid runaway action, the follow-up should be synchronized at the desired point and the adjustment clamp made slip-tight before power is applied.

A follow-up may often be used to measure the accuracy of an adjustment before it has been finally synchronized in the normal sequence of adjustment. In such a case, it may be synchronized at a suitable position and energized temporarily. The precautions outlined above should be observed; and all inputs to the follow-up, except the one being measured, should be kept motionless.

GENERAL PLAN

The following procedure is for use when the computer is to be completely adjusted and brought into proper operating condition.

1 Refer to the list of assembly clamps, page 818, and tighten all of the assembly clamps in each unit, making sure that the parts are properly positioned.

2 Disconnect and tape the following power leads:

Designations	Follow-up	Designations	Follow-up
P, PP	dRh	F, FF	$Yw\dot{g}r$
M, MM	$RdBs$	G, GG	$Dtwj$
E, EE	dR	H, HH	V
S, SS	RdE	J, JJ	$R2$
1G, 1GG	$WrD+KRdBs$	1B, 1BB	Dd
A, AA	Tf	1C, 1CC	$jB'r$
B, BB	$Tf/R2$	1D, 1DD	Vz
C1, CC	$Vf+Pe$	U, UU	Co receiver
D, DD	F	1A, 1AA	Eb receiver

Also, V and V1 on Dj knob switch

W and W1 on Vj knob switch

X and X1 on Rj handcrank switch

KRR1 on Sh handcrank switch

Make sure that all other leads are connected. (Reconnect each follow-up, or switch, as required to energize the associated circuit.)

3 Connect a 115-volt 60-cycle power supply to terminals PS and PPS.

4 Adjust and test each ballistic computer unit. If the units were adjusted on the bench, reinstall them in the computer.

5 Keep the following switches in the indicated position unless otherwise specified:

Power switch—ON

Time motor switch—OFF

Control switch—SEMI-AUTO

Range rate control switch—MANUAL

6 Make all adjustments in the control unit, the preliminary adjustments in the computer unit, and all adjustments in the indicator unit.

7 Replace control unit cover (No. 1) and indicator unit cover (No. 2). Make adjustments on all handcranks and knobs, as indicated.

8 Make all adjustments in computer unit, and in corrector unit up to A-513. If the $E'\dot{g}$ transmitters, Eb receiver, and Co receiver were removed, reinstall them and complete the adjustment of the instrument.

9 Adjust the star shell computer, mount it on cover 2, and adjust it to Computer Mark 1.

10 Run tests in the following order:

Test of operating limits

T/cR and (T/cR) sec E integrator check tests

Range B test

Elevation B test

Bearing B test

C test

A test

Star shell A test

Rate control test

Time motor regulator test

Transmission test

ASSEMBLY CLAMPS

The following counters must be adjusted to their drums at assembly. Use the clamp on the counter drum hub for this purpose.

$E2$ master counter (computer unit)

Tf master counter (computer unit)

$Vf + Pe$ master counter (computer unit)

$Tf/R2$ master counter (computer unit)

T/cR counter (integrator group)

(T/cR) sec E counter (integrator group)

$WrD + KRdBs$ counter (computer unit)

E counter (computer unit, Ser. Nos. 435 and higher)

E counter (corrector unit, Ser. Nos. 435 and higher)

$E2$ matching counter (corrector unit)

Vs master counter (corrector unit)

Ds master counter (corrector unit)

The following assembly clamps in each unit must be tightened before any adjustments are made.

Control Unit

A-166   Spur gear on roller of jRc integrator

A-167   Spur gear on roller of range integrator

A-168   Spur gear on output shaft of jdR motor

A-190   Spur gear driving fine E dial

A-207   Spur gear on jBr clutch

A-209   Dampers on jBr, jE, jdR, dR, dRh, RdE, $RdBs$, Sh, and Ct motors (9)

A-261   Shaft S1 in Ct follow-up

A-43   Single contact arm in jBr, jE, dR, dRh, RdE, $RdBs$, Sh, and Ct follow-ups (8)

A-232   Worm on 43-S41 to be out of mesh with Ct transmitter gear (Ser. Nos. 420 and lower, only)

Computer Unit

A-83   Spur gear driving $Vf + Pe$ master counter

A-114   Shock absorbers on dRs, $E2$, and cR intermittent drives

A-182   Spur gear on input, $E2$ intermittent drive

818

A-142
A-178 } Coupling on roller of $1/cR$ integrator

A-143
A-176 } Coupling on roller of sec E integrator

A-175   Spur gear on roller of elevation integrator

A-177   Spur gear on roller of bearing integrator

A-141   Spur gear driving T/cR counter. (On instruments with sliding gear, tighten out of mesh except when running tests.)

A-160   Spur gear driving T/cR sec E counter. (On instruments with sliding gear, tighten out of mesh except when running tests.)

A-146   Vernier adjustment of E to sec E cam (assembly clamp on Ser. Nos. 389 and lower, only)

A-211   Spur gear on 44-S6 (RdE)

A-218   Spur gear on 44-S1 (ΔcE)

A-219
A-225 } Spur gears on 44-S21 ($\Delta cB'r$)

A-238   Spur gear on magnetic drag in mesh with D-87 (bearing filter)

A-209   Damper on 44-A1 ($\Delta cB'r$)

A-209   Dampers on Co, $Dtwj$, $Ywgr$, V, $R2$, and $WrD + KRdBs$ motors (6)

A-230   Coupling between 45-A32 and 49-S34 (assembly clamp only if instrument is not equipped with star shell computer)

A-251   Shock absorber on E intermittent drive (Ser. Nos. 390 and higher, only)

A-43   Single contact arm on $Dtwj$, $Ywgr$, V, $R2$, and $WrD+KRdBs$ follow-ups, and Co receiver (6)

A-239   Spur gear on magnetic drag geared to fine synchro in Co receiver

Unnumbered   Arms on input and output shafts of differential in Co receiver (2)

Indicator Unit

A-114   Shock absorbers on Ds and Vs intermittent drives

A-43   Single contact arm on Rj, Vj, Dj, and So receivers (4)

Corrector Unit

A-56
A-59   Bevel gears on D-12 (E)

A-68   Bevel gear on $B'gr$ auto transmitter

A-114   Shock absorber on output of $(Eb + Vs)$ intermittent drive

A-209   Dampers on $B'r$, Eb, Dd, $jB'r$, and Vz motors (7)

A-231   Coupling between 14-B21 and 14-B25 ($E'g$) (assembly clamp only if instrument is not equipped with star shell computer)

A-53   Spur gear on output of $cB'r$ motor

A-54   Spur gear on output of $B'r$ motor

A-39   Spur gear on output of Eb motors (2)

A-43   Single contact arm on Dd, $jB'r$, Vz, and $cB'r$ follow-ups and $B'r$ and Eb receiver motors (6)

Unnumbered   Arms on input and output shafts of differentials in $B'r$ and Eb receivers (4)

A-11   Output gear on Dd, $jB'r$, and Vz motors (3)

BALLISTIC COMPUTERS

Before adjusting a ballistic computer, adjust the counter drums to the counters. Use the adjustment clamp on the counter drum hub for this purpose. Check for clearance between the drum and the fixed index. Tighten the following assembly clamps in each ballistic computer:

A-209   Damper on servo motor
A-43   Single contact arm of follow-up control

To insert the 3/16-inch diameter setting rod, move the cam follower to the end of travel under the magnetic damper. Loosen A-209 temporarily and move the damper to the end of the motor shaft. Looking from the damper position toward the cam, two holes will be seen, a clearance hole in the frame and the setting hole in the follower. Rotate the cam to locate its corresponding setting hole.

The standard values given for counter readings while the setting rod is in place may be amended slightly in order to bring the test within the allowable limits. The amended values determined at the time of manufacture are recorded on the legend plate of the unit. They normally are the best initial values to use when readjusting. If a unit has been overhauled and repaired, however, the legend plate values may no longer be the most desirable ones. In such a case, the initial adjustment should be made with the given standard values.

Vf + Pe Ballistic Computer

Adj. No.	Quantity	Connection	Procedure
15	E2	E2 counter to cam	Insert setting rod through follower and hole in cam. Set E2 at 90° and R2 at 17,000 yards. Remove setting rod and reposition motor damper.
17	R2	R2 counter to cam	
16	R2	R2 counter to L-23	Adjust so that stop acts at 300 and 18,200 yards on counter.
14	Vf + Pe	Vf + Pe counter to L-22	Adjust so that stop acts at 0 and 2500 min. on counter.
13	Vf + Pe	Cam output to Vf + Pe counter	Set R2 at 11,000 yards and E2 at 0°. Synchronize Vf + Pe follow-up so that Vf + Pe = 746.8 min. on counter.

Make test of unit according to NIO acceptance test sheet. Improve readings as necessary by refining A-15 and A-17. When the readings are satisfactory, check the adjustment of L-23 and, if necessary, readjust A-16. Check that E2 can be varied from 0 to 90°. Disconnect the follow-up power leads.

Tf/R2 Ballistic Computer

Adj. No.	Quantity	Connection	Procedure
40	E2	E2 counter to cam	Insert setting rod through follower and hole in cam. Set E2 at 90° and R2 (or R2m) at 14,000 yards. Remove setting rod and reposition motor damper.
42	R2 (or R2m)	R2 (or R2m) counter to cam	
607	jR2m (I.V.)	I.V. dial to L-39	Adjust dial so that stop acts at 2350 and 2600 f.s. (On Ser. Nos. 811 and higher only.)
264	jR2m (I.V.)	Holding friction	Adjust holding friction so that other quantities will not back out I.V. line. (On Ser. Nos. 811 and higher only.)
41	R2 (or R2m)	R2 (or R2m) counter to L-21	Adjust so that stop acts at 300 and 18,200 yards on counter. (On Ser. Nos. 811 and higher, maintain I.V. at 2550 f.s.)
38	Tf/R2	Tf/R2 counter to L-20	Adjust so that stop acts at 0.00122 and 0.00336 on counter.
37	Tf/R2	Cam output to Tf/R2 counter	Set R2 (or R2m) at 14,000 yards and E2 at 0°. Synchronize Tf/R2 follow-up so that Tf/R2 = 0.002611 on counter.

Make test of unit according to NIO acceptance test sheet. Improve readings as necessary by refining A-40 and A-42. When the readings are satisfactory, check the adjustment of L-21 and, if necessary, readjust A-41. Check that $E2$ can be varied from 0 to 90°. On Ser. Nos. 811 and higher, check that, with $R2$ wedged, an increase of 50 f.s. $I.V.$ causes a decrease of 225 yards $R2m$. Disconnect the follow-up power leads.

Tf Ballistic Computer

Adj. No.	Quantity	Connection	Procedure
20	$E2$	$E2$ counter to cam .	Insert setting rod through follower and hole in cam. Set $E2$ at 90° and $R2$ at 17,400 yards. Remove setting rod and reposition motor damper.
22	$R2$	$R2$ counter to cam	
21	$R2$	$R2$ counter to L-25	Adjust so that stop acts at 300 and 18,200 yards on counter.
19	Tf	Tf counter to L-24	Adjust so that stop acts at 0.6 and 60.6 sec. on counter.
18	Tf	Cam output to Tf counter	Set $R2$ at 11,000 yards, and $E2$ at 0°. Synchronize Tf follow-up so that $Tf = 24.67$ sec.

Make test of unit according to NIO acceptance test sheet. Improve readings as necessary by refining A-20 and A-22. When the readings are satisfactory, check the adjustment of L-25 and, if necessary, readjust A-21. Check that $E2$ can be varied from 0 to 90°. Disconnect the follow-up power leads.

Mechanical Fuze Ballistic Computer (Ser. Nos. 780 and lower)

Adj. No.	Quantity	Connection	Procedure
46	$E2$	$E2$ counter to cam	Insert setting rod through follower and hole in cam. Set $E2$ at 90° and $R3$ at 17,400 yards. Remove setting rod and reposition motor damper.
48	$R3$	$R3$ counter to cam	
47	$R3$	$R3$ counter to L-36	Adjust so that stop acts at -1250 yards (counter reading 98750) and $+19,750$ yards.
45	F	F counter to L-35	Adjust so that stop acts at 0.6 and 55 sec. on counter.
44	F	Cam output to F counter	Set $R3$ at 11,000 yards and $E2$ at 0°. Synchronize F follow-up so that $F = 24.67$ sec.

Make test of unit according to NIO acceptance test sheet. Improve readings as necessary by refining A-46 and A-48. When the readings are satisfactory, check the adjustment of L-36 and, if necessary, readjust A-47. Check that $E2$ can be varied from 0 to 90°. Disconnect the follow-up power leads.

Mechanical Fuze Ballistic Computer (Ser. Nos. 781 and higher)

Adj. No.	Quantity	Connection	Procedure
45	F	F counter to L-35	Adjust counter so that stop acts at 0.6 and 55.0 sec.
46	$E2$	$E2$ counter to cam	Insert setting rod through follower and hole in cam. Set $E2$ at 90° and F at 54 sec. Remove setting rod and reposition motor damper.
47	F	F counter to cam	
48	$R3$	$R3$ counter to L-36	Adjust counter so that stop acts at −13,150 yards (counter reading 86850) and +31,650 yards.
44	F	Cam output to F counter	Set $R3$ at 10,000 yards, and $E2$ at 0°. Synchronize F follow-up so that $F = 21.22$ sec.

Make test of unit according to NIO acceptance test sheet. Improve readings as necessary by refining A-46 and A-47. When the readings are satisfactory, check that $E2$ can be varied from 0 to 90°. Disconnect the follow-up power leads.

CONTROL UNIT

Adj. No.	Quantity	Connection	Procedure
527	So	Dial to L-1	Adjust dial so that stop acts at 0 and 45 knots.
197	Br	Coarse to fine ring dial	Adjust ring dials to agree.
531	Br	Ship dial to Br dials	Adjust inner dial of ship dial group to agree with Br dials.
194	Br	Ship component solver to Br dials	Set Br at 0°. Position vector gear with slot toward rear. Movement of So cam should cause no movement of Xo rack. Motion of Xo rack may be measured on $RdBs$ follow-up.

Adj. No.	Quantity	Connection	Procedure
127	So	Ship component solver to So dial	Set So at 0 knots. Position cam so that movement of vector gear through $360°$ causes no movement of output racks. Motion of Xo rack may be measured on $RdBs$ follow-up.
193	Sh	Counter to L-2	Adjust counter so that stop acts at 0 and 400 knots.
532	A	Target component solver to A dial	Position vector gear with slot toward front. Adjust A dial to read $0°$. Movement of Sh cam should cause no movement of Xt rack. Motion of Xt rack may be measured on $RdBs$ follow-up.
192	Sh	Target component solver to Sh counter	Set Sh at 0 knots. Position cam so that movement of vector gear through $360°$ causes no movement of output racks. Motion of Xt rack may be measured on $RdBs$ follow-up.
528	Sw	Dial to L-3	Adjust dial so that stop acts at 0 and 60 knots.
524	Ss	Dial to L-8	Adjust dial so that stop acts at ±450 knots. (One revolution of dial $= 900$ knots.)
202	dH	Friction drive	Adjust friction to slip when L-4 is against either limit.
525	dH	Dial to L-4	Adjust dial so that stop acts at $+150$ and -250 knots.
119	dRh	Ship and target component solvers to L-5	Set So at 40 knots, Sh at 400 knots, Br at $180°$, and A at $180°$. Position stop at upper limit (toward front) and synchronize dRh follow-up. Check that, with A at $0°$ and Br at $0°$, stop is at lower limit.
189	E	Coarse to fine ring dial	Adjust ring dials to agree.
123	E	dH component solver to E dials	Set E at $0°$. Position vector gear with gear end of lead screw toward front. Movement of dH lead screw should cause no movement of $dH \sin E$ rack. Motion of $dH \sin E$ rack may be measured on dR follow-up.
126	dH	dH component solver to dH dial	Set dH at 0 knots. Position lead screw so that movement of vector gear between limits of E causes no movement of output racks. Motion of $dH \sin E$ rack may be measured with a dial indicator.

Adj. No.	Quantity	Connection	Procedure
128	E	dRh component solver to E dials	Set E at $90°$. Position vector gear with gear end of lead screw toward front. Movement of dRh lead screw should cause no movement of $dRh \cos E$ rack. Motion of $dRh \cos E$ rack may be measured on dR follow-up.
125	dRh	dRh component solver to dRh follow-up	Set So and Sh at 0 knots, and keep dRh follow-up energized. Position lead screw so that movement of vector gear between limits of E causes no movement of output racks. Motion of $dRh \cos E$ rack may be measured with a dial indicator.
163	dR	Component solvers to Ss dial	Set So, Sh, and dH at 0 knots, and keep dRh follow-up energized. Synchronize dR follow-up so that Ss dial reads 0.
170 171	dR	Range integrator to dR follow-up	Set So, Sh, and dH at 0 knots and keep dRh and dR follow-ups energized. Position integrator carriage in center of plate so that rotation of plate causes no movement of output roller.
118	RdE	Component solvers to L-7	Set So and dH at 0 knots, Sh at 400 knots, E at $90°$, A at $0°$, and keep dRh follow-up energized. Position stop at upper limit (toward rear) and synchronize RdE follow-up. Check that with A at $180°$, stop is at lower limit.
121	$RdBs$	Component solvers to L-6	Set So at 0 knots, Sh at 400 knots, and A at $90°$. Position stop at upper limit (toward left) and synchronize $RdBs$ follow-up. Check that, with A at $270°$, stop is at lower limit.
204	jE	Holding friction	Adjust holding friction to prevent back drive of ΔcE, or jE motor.
529	cE	Fine cE dial to E dials	Set E at $0°$. Turn control switch to AUTO. With jE motor synchronized, adjust one of the lines on fine cE dial to index. Split the dead space due to the widely spaced contacts.
201	jBr	Holding friction	Adjust holding friction to prevent back drive of ΔcBr, or jBr motor.
533	cBr	Fine cBr dial to Br dials	Set Br at $0°$. Turn control switch to AUTO. With jBr motor synchronized, adjust one of the lines on fine cBr dial to index. Split the dead space due to the widely spaced contacts.

Adj. No.	Quantity	Connection	Procedure
136	A	Vector solver to A dial	*Adjust with power OFF.* Set A at $0°$ and wedge dial drive shaft 42-S93 at bevel gear end. Set true bearing (B) at $0°$, and wedge. Use the A handcrank input gear to position the vector gear so that its rails are aligned fore and aft in instrument and so that the N-S rack can be pushed manually from its center position (position at which N-S input gear is in center of rack) to the *front* end of the rail. Refine so that moving N-S rack (and, therefore, speed pin carriage) between center and front causes no movement of E-W rack. Motion of E-W rack may be measured by depth gauge placed in E-W rail. Tighten A-136.
137	Sh	Vector solver to Sh counter	*Adjust with power OFF.* Set Sh at 0 knots, A at $90°$, and true bearing (B) at $0°$. Position E-W rack at zero point (depth gauge measurement established in adjusting A-136). Tighten A-137. Check that there is no motion of racks for rotation of Ct vector gear through $360°$.
115	E	Elevation component integrators to E dials	Set E at $0°$. Position jdR integrator angle gear so that jdR input shaft is vertical, with bevel gear at top. jdR input should cause no movement of jHc output, and increasing jEc should increase dH. Check that jEc input causes no motion of $jdRh$ output.
117	B	Bearing component integrators to B dial	Set B at $0°$. Position jBc integrator angle gear so that jBc input shaft is horizontal, with bevel gear toward right. jBc input should cause no movement of N-S output, and increasing jBc should cause E-W friction drive gear to rotate clockwise as viewed from above. Check that $jdRh$ input causes no motion of E-W output.
222 223	jEc jBc	Holding frictions	Adjust holding frictions to maintain settings of jEc and jBc.
130	jHc	Friction drive	Adjust friction drive to slip when dH is introduced with handcrank.

Adj. No.	Quantity	Connection	Procedure
205	N-S change	Friction drive	Adjust friction drive to slip when Ct or Sh is introduced by handcrank. Usual adjustment is $3\frac{1}{2}$ turns from point where clamp just touches washer.
206	E-W change	Friction drive	Adjust friction drive to slip when Ct or Sh is introduced by handcrank. Usual adjustment is $3\frac{1}{2}$ turns from point where clamp just touches washer.
191	Time	Friction drive	Adjust friction drive to slip when time crank is turned in its IN position.
161	Time	Friction drive	Adjust friction drive to slip when regulator input gear is turned backwards.
172 173	Rrr	Range correction integrator to L-13	Remove block from stop arm. With stop against lower limit, position integrator carriage in center of plate so that rotation of plate causes no movement of output roller. Replace block on stop arm.
187	jR	Holding friction	Adjust friction to hold jR setting for both positions of jR handcrank.
546	cR	Coarse ring dial to coarse follow-up control on range receiver	Remove fine synchro dial. Turn range rate control switch to AUTO. Position range correction integrator carriage at maximum radius. Put power on jdR motor by energizing range finder signal circuit. Put index on coarse synchro dial near Y index on coarse ring dial in order to locate position where jdR motor does not drive. Rotate synchro dial slightly in opposite direction and note positions, measured against ring dial, where jdR motor starts to drive. Adjust ring dial so that these two positions lie equal distances on opposite sides of the Y index on ring dial.
545	cR	Fine ring dial to fine follow-up control on range receiver	Replace fine synchro dial. Tighten A-196 enough to drive fine ring dial, making sure that L-10 is not hitting either limit. Manually hold index of coarse synchro dial opposite index of coarse ring dial (this will energize fine follow-up). Fine follow-up will then drive to synchronism. Adjust fine ring dial so that its index matches the index on the fine synchro dial.

Adj. No.	Quantity	Connection	Procedure
195	cR	Coarse to fine ring dial	Adjust ring dials to agree. (Y index on fine ring dial indicates *even* thousands of yards.)
196	cR	Dials to L-10	Adjust so that stop acts at 0 and 35,000 yards.
520	R	Dial to coarse synchro motor	Turn power OFF. Set cR ring dials at 10,000 yards. Put coarse range synchro on electrical zero. Adjust pointer of synchro dial to match index on ring dial.
521	R	Dial to fine synchro motor	Put fine range synchro on electrical zero. Adjust pointer of synchro dial to match fixed index.
240 164	jdR jdR	Holding frictions	Adjust frictions to obtain smooth operation of range receiver and synchronizing time within prescribed limits. A-240 should prevent E or jEc from backing out jdR line with jdR clutch open. A-164 should prevent jR or ΔcR from backing out through range correction integrator.
124	E	Height computer to E dials	Set E at $0°$. Position vector gear with slot to front. Movement of cR cam should cause no movement of output rack. Motion of rack may be observed on H dials.
158	H	Spring to height dial drive	Set E at $-25°$. Position cR cam follower at end of slot on outer radius. Wind spring fully. Recheck A-124.
522	H	Coarse H dial to H computer	Set E at $0°$. Adjust coarse H dial to 0.
523	H	Fine H dial to H computer	Set E at $0°$. Adjust fine H dial to 0.
138	cR	Height computer to cR dials	Set E at $90°$ and cR at 8,000 yards. Position cR cam so that H dials read 24,000 feet.
116	E	E dials to L-12	Adjust so that stop acts at $-25°$ and $+85°$ on E dials (Ser. Nos. 390 and higher) or $-5°$ and $+85°$ (Ser. Nos. 389 and lower).
122	So	Holding friction	Adjust holding friction so that changing Br will not disturb So setting. Friction must not be so tight as to overload So receiver servo motor.

Adj. No.	Quantity	Connection	Procedure
200	Bw	Holding friction	Adjust holding friction so that changing B will not disturb Bw setting.
258	Ct	Transmitter to dials	Set A at $0°$ and B at $180°$. Position Ct transmitter on electrical zero.

PRELIMINARY ADJUSTMENTS IN COMPUTER UNIT

Adj. No.	Quantity	Connection	Procedure
536	$I.V.$	$I.V.$ dial to L-15	Adjust dial so that stop acts at 2350 and 2600 f.s.
120	Vfm	Holding friction	Adjust holding friction so that other quantities will not back out $I.V.$ line.
82	$Vf + Pe$	Master counter to ballistic computer	Adjust so that $Vf + Pe$ master counter agrees with $Vf + Pe$ counter in ballistic computer.
198	Ds	Counter to L-28	Set $Vf + Pe$ at 100 min. and $I.V.$ at 2550 f.s. Adjust so that $Dtwj$ stop acts at 1018 (+518) and 9982 (−518) mils on Ds master counter in corrector unit.
184	Vs	Counter to L-37	Set $Vf + Pe$ at 0 min. and $I.V.$ at 2550 f.s. Adjust so that V stop acts at 200 and 3800 min. on Vs master counter in corrector unit.

INDICATOR UNIT

Adj. No.	Quantity	Connection	Procedure
500	Dj	Dial to L-30	Adjust dial so that stop acts at RIGHT 180 and LEFT 180 mils.
501	Vj	Dial to L-31	Adjust dial so that stop acts at UP 180 and DOWN 180 mils.
234 235	Rj	Counters to L-29	Adjust counters so that stop acts at IN 12,000 and OUT 1800 yards.
185 186 174	Dj Vj Rj	Holding frictions	Adjust holding frictions so that other quantities will not back out lines on which they are located. Frictions should not overload receiver servo motors.

Adj. No.	Quantity	Connection	Procedure
86	Dj	Dial to receiver	Hold receivers on electrical zero, with
87	Vj	Dial to receiver	follow-ups energized. Adjust so that corresponding dials read zero.
88	Rj	Counters to receiver	Hold receiver on electrical zero, with follow-up energized. Adjust so that Rj counters read zero.
212	So	Dial to receiver	Hold receiver on electrical zero, with follow-up energized. Adjust so that So dial reads zero.
213	Ds	Coarse to fine synchro (double-speed transmitter)	Hold fine Ds synchro on electrical zero. Adjust so that coarse Ds synchro is on electrical zero.
94	Ds	Counter to double-speed transmitter	Hold Ds double-speed transmitter on electrical zero. Adjust Ds indicating counter to read 500 mils.
89	Ds	Indicating counter to master counter	Adjust so that Ds indicating counter agrees with Ds master counter in corrector unit.
96	Ds	Intermittent drive to counter	Adjust so that intermittent drive cuts out at 320 and 680 mils on Ds counter.
66	Ds	Single-speed transmitter to counter	Set Ds at 500 mils. Adjust so that Ds single-speed transmitter is on electrical zero.
214	Vs	Coarse to fine synchro (double-speed transmitter)	Hold fine Vs synchro on electrical zero. Adjust so that coarse Vs synchro is on electrical zero.
95	Vs	Counter to double-speed transmitter	Hold Vs double-speed transmitter on electrical zero. Adjust Vs indicating counter to read 2000 min.
55	Vs	Indicating counter to master counter	Adjust so that Vs indicating counter agrees with Vs master counter in corrector unit.
97	Vs	Intermittent drive to counter	Adjust so that intermittent drive cuts out at 2000 and 3800 min. on Vs counter.
69	Vs	Single-speed transmitter to counter	Set Vs at 2000 min. Adjust so that Vs single-speed transmitter is on electrical zero.
67	F	Coarse to fine synchro (F transmitter)	Hold fine F synchro on electrical zero. Adjust so that coarse F synchro is on electrical zero.

RESTRICTED

Adj. No.	Quantity	Connection	Procedure
93	F	Counter to transmitter	Hold F transmitter on electrical zero. Adjust F indicating counter to read 10.00 sec.
77	F	Indicating counter to ballistic computer	Adjust so that F indicating counter agrees with F counter in ballistic computer.

HANDCRANKS

The following table indicates which handcranks have friction relief drives and holding frictions, and which ones operate switches.

Adjust each friction relief drive so as to drive the line normally without slipping when the handcrank is turned, but to slip without straining the line when the limit is reached.

Adjust each holding friction so that the quantity will not back out in normal operation.

Adjust each switch-actuating screw so that when the handcrank is put in the IN position, the switch will open before the gears mesh. Make sure that the screw does not extend so far as to damage the switch when the handcrank is put in the IN position. Check that the switch is closed when the handcrank is in the OUT position.

Handcrank	Friction drive	Holding friction	Operates switch
Deflection Spot (Dj)	X	X	X
Elevation Spot (Vj)	X	X	X
Range Spot (Rj)	X	X	X
Fuze (F)	X	X	X
Sight Angle (Vs)	X	X	X
Sight Deflection (Ds)	X	X	X
Synchronize Elevation (sync E)	X	Note A	Note B
Wind Speed (Sw)	X		
Ship Speed (So)	X	X	X

NOTE A: Holding friction to be such that handcrank in IN position rotates when either limit of L-12 is reached.
NOTE B: Switch to be open in OUT position, and closed in CENTER and IN positions.

Handcrank	Friction drive	Holding friction	Operates switch
Target Speed (Sh)	X	X	X
Rate of Climb (dH)	Fixed		
Target Angle (A)		X	X
Ship Course (Co)		X	X
Wind Direction (Bw)	No Adjustments		
Range Rate (dR)	X	X	X
Time (T)	X		
Generated Range (jR)	X		
Generated Bearing (jBr)	No Adjustments		
Generated Elevation (jE)	X		
Range Rate Ratio (Rrr)		X	
Dead Time ($T\dot{g}$)	X		
Initial Velocity ($I.V.$) (both front and left knobs on Ser. Nos. 811 and higher)	X		

COMPUTER UNIT

Adj. No.	Quantity	Connection	Procedure
233	cR	Intermittent drive to dials	Adjust so that intermittent drive cuts out at 750 and 22,500 yards on cR dials.
151 152	cR	$1/cR$ cam to cR dials	Set cR at 1500 yards. Turn $1/cR$ cam so that $1/cR$ integrator carriage moves upward. Position cam at beginning of outer constant radius, where further rotation of cam causes no further upward movement of integrator carriage.
149	$1/cR$	$1/cR$ integrator to $1/cR$ cam	Set cR at 2790 yards. Position integrator carriage in center of plate so that rotation of plate causes no movement of output roller.
260	E	E counter in computer unit to E dials	Adjust so that E counter agrees with E dials. (In Ser. Nos 435 and higher only.)
250	E	Intermittent drive to dials	Adjust so that intermittent drive cuts out at $-2°$ and $+85°$ on E dials. (In Ser. Nos. 390 and higher only.)

Adj. No.	Quantity	Connection	Procedure
210 145	E	Sec E cam to E dials (Ser. Nos. 389 and lower)	Set E at $71°12'$. Turn sec E cam so that sec E integrator carriage moves upward. Position cam at beginning of outer constant radius, where further rotation of cam causes no further upward movement of integrator carriage.
145 146	E	Sec E cam to E dials (Ser. Nos. 390 and higher)	
147	Sec E	Sec E integrator to sec E cam	Set E at $60°49'$. Position integrator carriage in center of plate so that rotation of plate causes no movement of output roller.
108	RdE	Range rate corrector to RdE follow-up	Set So, Sh, and dH at 0 knots, and E at $0°$. Keep RdE and $RdBs$ follow-ups energized. Turn range rate corrector cams until 1/16-inch diameter setting rod can be inserted through both cams, both follower rollers, and the mounting plate. The rod should go in approximately 2 inches. Tighten A-108 and A-109 and REMOVE SETTING ROD.
109	$RdBs$	Range rate corrector to $RdBs$ follow-up	
154 155	RdE	Elevation integrator to RdE follow-up	Set dH at 0 knots, and E at $0°$. Keep RdE follow-up energized. Position integrator carriage in center of plate so that rotation of plate causes no movement of output roller.
139 140	$RdBs$	Bearing integrator to $RdBs$ follow-up	Set So and Sh at 0 knots, and Br and A at $0°$. Keep $RdBs$ follow-up energized. Position integrator carriage in center of plate so that rotation of plate causes no movement of output roller.
105	Bws	Horizontal wind component solver to Bws dial	Set Bws at $0°$ and Ds at 500 mils. Position vector gear with slot toward left. Movement of Sw cam should cause no movement of Xwg rack.
157	Sw	Horizontal wind component solver to Sw dial	Set Sw at 0 knots. Position cam so that movement of vector gear through $360°$ causes no movement of output racks.
129	Sw	Holding friction	Adjust friction so that changing Bwg will not disturb Sw setting.

Adj. No.	Quantity	Connection	Procedure
181	dRs	dRs intermittent drive to Ss *dial*	Set So, Sh, and dH at 0 knots, E at $0°$, and $I.V.$ at 2550 f.s. Keep $RdBs$ and RdE follow-ups energized. Adjust so that intermittent drive cuts out at $+450$ knots and -450 knots on Ss dial. To check the adjustment, set Ss at -450 knots, increase $I.V.$ through 2550, and observe cut-out point on $I.V.$ dial. Cut-out should occur as $I.V.$ passes through 2550. Set Ss at $+450$ knots and check the opposite cut-out point by decreasing $I.V.$ through 2550. Balance the errors in the $I.V.$ dial readings. Cut-out point may be observed on dRs shaft 45-A25 located just below $I.V.$ dial.
101	$Ywgr$	Component solvers to L-9	Set So at 40 knots, Sw at 60 knots, Ds at 500 mils, Br and Bws at $0°$. Position stop at upper limit (toward rear) and synchronize $Ywgr$ follow-up. Check that, with Br and Bws at $180°$, stop is at lower limit.
72	$E2$	$E2$ counter to intermittent drive	Adjust counter so that intermittent drive cuts out at $0°$ and $90°$.
106	$E2$	Elevation wind component solver to $E2$ counter	Set $E2$ at $78.95°$. Position vector gear with lead screw horizontal and gear end toward right. Movement of lead screw should cause no movement of WrR rack.
100	$Ywgr$	Elevation wind component solver to $Ywgr$ follow-up	Set So and Sw at 0 knots, Br and Bws at $90°$ and Ds at 500 mils. Keep $Ywgr$ follow-up energized. Position lead screw so that movement of vector gear between limits of $E2$ causes no movement of output racks.
79	$Tf/R2$	Elevation prediction multiplier to $Tf/R2$ master counter	Set $Tf/R2$ at 0.00115. Position input screw so that movement of input rack causes no movement of output rack. Motion of output rack may be measured on V follow-up. (For approximate adjustment, position nut at lower limit and set $Tf/R2$ at 0.001094.)

Adj. No.	Quantity	Connection	Procedure
134	WrE	Elevation prediction multiplier to component solvers	Set So, Sh, Sw, and dH at 0 knots, and E and $E2$ at $0°$. Keep dRh, RdE, and $Ywgr$ follow-ups energized. Position input rack so that rotation of input screw causes no movement of output rack. Motion of output rack may be measured on V follow-up.
81	Tf	Range prediction multiplier to Tf master counter	Set Tf at 5.00 seconds. Position input screw so that movement of input rack causes no movement of output rack. Motion of output rack may be measured on $R2$ follow-up. (For approximate adjustment, position nut at lower limit and set Tf at -0.95 sec.) (99.05 on counter.)
135	dRs	Range prediction multiplier to component solvers	Set So, Sh, Sw, and dH at 0 knots, E at $0°$, $I.V.$ at 2550 f.s. Keep dRh, dR, RdE, $RdBs$, and $Ywgr$ follow-ups energized. Position input rack so that rotation of input screw causes no movement of output rack. Motion of output rack may be measured on $R2$ follow-up.
535 (Ser. Nos. 780 and lower)	Tg	Dial to L-14	Adjust dial so that stop acts at 0 and 6 sec.
535 (Ser. Nos. 781 and higher)	Tg	Dial to L-38	Adjust dial so that stop acts at 0 and 6 sec.
262 (Ser. Nos. 781 and higher)	$Tg + F - Tf$	$Tg + F - Tf$ to L-14	Set Tg at 0 sec. and F at 51 sec. Adjust so that stop acts at 1 and 51 sec. on Tf counter.
263 (Ser. Nos. 781 and higher)	Tg	Holding friction	Adjust holding friction so that F and Tf cannot back out Tg line when at either end of L-14.
188 (Ser. Nos. 780 and lower)	Tg	Dead time prediction multiplier to Tg dial	Set Tg at 0 seconds. Position input screw so that movement of input rack causes no movement of output rack. Motion of output rack may be measured on $R3$ counter. (For approximate adjustment, position screw 1.5 turns from lower limit of nut travel.)

Adj. No.	Quantity	Connection	Procedure
188 (Ser. Nos. 781 and higher)	$Tg + F - Tf$	Dead time prediction multiplier to $Tg + F - Tf$	Set Tg at 0 seconds, F and Tf at 10 seconds. Position input screw so that movement of input rack causes no movement of output rack. Motion of output rack may be measured on $R3$ counter. (For approximate adjustment, position screw 1.5 turns from lower limit of nut travel.)
132 (Ser. Nos. 780 and lower)	dR	Dead time prediction multiplier to dR follow-up	Set So, Sh, and dH at 0 knots. Keep dRh and dR follow-ups energized. Position input rack so that rotation of input screw causes no movement of output rack. Motion of output rack may be measured on $R3$ counter.
132 (Ser. Nos. 781 and higher)	$dRs - dRm$	Dead time prediction multiplier to $dRs - dRm$	Set So, Sh, and dH at 0 knots and $I.V.$ at 2550 f.s. Keep dRh, dR, RdE, and $RdBs$ follow-ups energized. Position input rack so that rotation of input screw causes no movement of output rack. Motion of output rack may be measured on $R3$ counter.
71	$E2$	Counter in $Tf/R2$ unit to $E2$ master counter	Adjust so that $E2$ counter in each ballistic computer unit agrees with $E2$ master counter.
73	$E2$	Counter in F unit to $E2$ master counter	
84	$E2$	Counter in Tf unit to $E2$ master counter	
85	$E2$	Counter in $Vf + Pe$ unit to $E2$ master counter	
183	$E2$	Counter in corrector unit to $E2$ master counter	Adjust so that $E2$ counters agree.
80	Tf	Counter in Tf unit to Tf master counter	Adjust so that Tf counters agree.
74	$R2$	$R2$ counter in Tf unit to L-19	Adjust so that stop acts at 500 and 18,000 yards on counter.

Adj. No.	Quantity	Connection	Procedure
75	$R2$	Counter in $Vf + Pe$ unit to counter in Tf unit	Adjust so that $R2$ counters agree.
76	$R2$	Counter in $Tf/R2$ unit to counter in Tf unit	In Ser. Nos. 810 and lower, adjust so that $R2$ counters agree. In Ser. Nos. 811 and higher, set front I.V. at 2550 f.s. and adjust so that $R2m$ counter agrees with $R2$ counter.
203	$R3$	$R3$ counter to dead time prediction multiplier and $R2$ counters	Set Tg at 0 seconds. In instruments with Ser. Nos. 781 and higher, also set F equal to Tf. Adjust so that $R3$ counter in F ballistic computer agrees with $R2$ counters. Reconnect F motor.
104	$R2$	$R2$ counters to multiplier output gearing	Set So, Sh, Sw, and dH at 0 knots, Tf at 5.00 sec., Rj at 0 yards, I.V. at 2550 f.s. and cR at 2000 yards. Keep dRh, dR, RdE, $RdBs$, and $Ywgr$ follow-ups energized. Wind take-up spring 3 turns. Synchronize $R2$ follow-up so that $R2$ counters read 2000 yards. Reconnect Tf motor.
220		Spring to line	
180	E	$E2$ counters to E dials	Set E at $1°$, $Vf + Pe$ at 0 min., Vs at 2000 min., and I.V. at 2550 f.s. Adjust so that $E2$ counters read $1°$.
110	Ds	Complementary error corrector to Ds counter	Set Ds at 500 mils. Position $(Ds)^2$ cam so that follower is fully toward right. Tighten A-110. To refine: Set So, Sh, Sw, and dH at 0 knots, and $Vf + Pe$ at 0 min. Keep dRh, RdE and $Ywgr$ follow-ups energized. Synchronize V follow-up temporarily with A-103, so that Vs is approximately equal to 2000 min. Position $f(E2)$ cam so that follower is nearest center. Adjust $(Ds)^2$ cam so that Vs decreases to the same reading when Ds is moved to 100 or 900 mils.
103	V	Vs counter to multiplier output gearing	Set So, Sh, Sw, and dH at 0 knots, Vj at 0 mils, Ds at 500 mils, $Vf + Pe$ at 0 min., I.V. at 2550 f.s., and $Tf/R2$ at 0.001150. Keep dRh, RdE, and $Ywgr$ follow-ups energized. Wind take-up spring 3 turns. Synchronize V follow-up so that Vs counter reads 2000 min.
221		Spring to line	

Adj. No.	Quantity	Connection	Procedure
107	$E2$	Complementary error corrector to $E2$ counter	Set So, Sh, Sw, and dH at 0 knots, Vj at 0 mils, Ds at 500 mils, and $E2$ at $65°$. Keep dRh, RdE, $Ywgr$, and V follow-ups energized. Read E dials. Set Ds at 100 mils and turn E with sync E handcrank at CENTER until E dials read $11°07'$ higher than before. Position $f(E2)$ cam so that $E2$ reads $65°$.
133	$Tf/R2$	Deflection prediction multiplier to $Tf/R2$ master counter	Set $Tf/R2$ at 0.00125. Position input screw so that movement of input rack causes no movement of output rack. Motion of output rack may be measured on $Dtwj$ follow-up. (For approximate adjustment, position nut at lower limit and set $Tf/R2$ at 0.001196.)
131	$RdBs$	Deflection prediction multiplier to component solvers	Set So, Sh, and Sw at 0 knots. Keep $RdBs$ follow-up energized. Position input rack so that rotation of input screw causes no movement of output rack. Motion of output rack may be measured on $Dtwj$ follow-up.
102	$Dtwj$	Ds counter to multiplier output gearing	Set So, Sh, and Sw at 0 knots, Dj at 0 mils, $I.V.$ at 2550 f.s., $Tf/R2$ at 0.00125 and $Vf + Pe$ at 100 min. Keep $RdBs$ follow-up energized. Wind take-up spring 3 turns. Synchronize $Dtwj$ follow-up so that Ds counter reads 500 mils. Reconnect $Vf + Pe$ motor.
217		Spring to line	
78	$Tf/R2$	Counter in $Tf/R2$ unit to $Tf/R2$ master counter	Adjust so that $Tf/R2$ counters agree. Reconnect $Tf/R2$ motor.
229	$WrD + KRdBs$	Counter to component solvers	Set So, Sh, and Sw at 0 knots. Keep $RdBs$ follow-up energized. Adjust S.S. deflection counter to read zero.
153	$L + Zd/30$	Locking gear to $L + Zd/30$	Position locking gear out of mesh with gear on 44-S55 and tighten clamp.

CORRECTOR UNIT

Adj. No.	Quantity	Connection	Procedure
507	Zd	Coarse to fine dial	Adjust dials to agree.
30	Zd	Dials to L-17	Adjust so that stop acts at 480 and 3520 min. on Zd dials.
505	L	Coarse to fine dial	Adjust dials to agree.
506	Vz	Coarse to fine dial	Adjust dials to agree.
29	Vz	Dials to L-34	Adjust so that stop acts at $+1860$ and -2940 min. on Vz dials.
508	Dd	Coarse to fine dial	Adjust dials to agree.
31	Dd	Dials to L-32	Adjust so that stop acts at $\pm 120°$ on Dd dials.
509	$B'gr$	Dial to coarse synchro (automatic transmitter)	Hold synchros on electrical zero. Adjust dials to read zero.
510	$B'gr$	Dial to fine synchro (automatic transmitter)	
7	$B'gr$	Coarse to fine synchro (automatic transmitter)	Adjust so that coarse and fine synchros are on electrical zero together (dials to agree).
511	$B'gr$	Dial to coarse synchro (indicating transmitter)	Hold synchros on electrical zero. Adjust dials to read zero.
512	$B'gr$	Dial to fine synchro (indicating transmitter)	
9	$B'gr$	Coarse to fine synchro (indicating transmitter)	Adjust so that coarse and fine synchros are on electrical zero together (dials to agree).
8	$B'gr$	Indicating to automatic transmitter	Adjust so that transmitter dials agree.

Adj. No.	Quantity	Connection	Procedure
99	$B'r$	Deck tilt component solver to dials	Set $B'gr$ at $45°$, and Dd at $0°$. Position vector gear with slot toward rear. Movement of L cam should cause no movement of vertical ($L \cos 2B'r$) rack. Motion of rack may be measured with a dial indicator.
28	L	Deck tilt component solver to L dials	Position cam so that rotation of vector gear through $360°$ causes no motion of output racks. Adjust L dials to read 2000 min. Motion of vertical rack may be measured with a dial indicator.
58	L	Dials to L–16	Adjust so that stop acts at 480 and 3520 min. on L dials.
242	$B'gr$ or $B'r$	Drive to parallax component solver	In instruments for BB's, CA's, CB's, CVB's, and CL's, push double slide gear down into mesh with bevel gear on 14-A22 ($B'r$ line) and tighten in place. In instruments for CV's, and all one-director ships, push double slide gear up into mesh with bevel gear on 14-A11 ($B'gr$ line) and tighten in place.
243	$B'gr$ or $B'r$	Parallax component solver to dials	Set Dd and $B'gr$ at $0°$. Position vector gear with slot toward front. Movement of $1/R2$ cam should cause no movement of vertical rack.
49	$(\sin B'gr$ or $B'r)/R2$	Ph computer to parallax component solver	Set Dd and $B'gr$ at $0°$. Position input rack so that movement of sec $(E2 + L)$ cam causes no movement of Ph output rack. Motion of output may be measured on Ph dials.
517	Ph	Dial to synchro	Hold synchro on electrical zero. Adjust Ph dial to read zero.
52	Ph	Transmitter to computer	Set Dd and $B'gr$ at $0°$. Adjust so that Ph dial reads zero.
156	$R2$	$1/R2$ cam to $R2$ counters	Set Dd at $0°$, $B'gr$ at $90°$, and $R2$ at 1560 yards. Turn sec $(E2 + L)$ cam of Ph computer until cam follower is at outer constant radius, and hold cam. Position $1/R2$ cam of parallax component solver so that Ph dial reads RIGHT $10°59'$.

Adj. No.	Quantity	Connection	Procedure
3	$E2 + L$	Ph computer to $E2 + L$	Set Dd at $0°$, $B'gr$ at $90°$, L at 2000 min., $E2$ at $60°$, and $R2$ at 1560 yards. Position sec $(E2 + L)$ cam of Ph computer so that Ph dial reads RIGHT $7°20'$.
226	$(\cos B'gr$ or $B'r)/R2$	Pv computer to parallax component solver	Set Dd at $0°$, and $B'gr$ at $90°$. Position input rack so that movement of $\sin (E2 + L)$ cam causes no movement of Pv output rack. Motion of output may be measured on Pv dial.
227	$E2 + L$	Pv computer to $E2 + L$	Set $E2$ at $0°$, and L at 2000 min. Position $\sin (E2 + L)$ cam of Pv computer so that movement of input rack causes no movement of Pv output rack. To move input rack, set Dd and $B'gr$ at $0°$, and move $R2$. Motion of output rack may be measured on Pv dial.
548	Pv	Dial to synchro	Hold synchro on electrical zero. Adjust Pv dial to read zero.
228	Pv	Transmitter to computer	Set Dd and $E2$ at $0°$, $B'gr$ at $90°$, and L at 2000 min. Adjust so that Pv dial reads zero.
504	Sync E	Coarse to fine dial	Adjust dials to agree at index.
503	DIP	Coarse to fine dial	Adjust dials to agree so that infinity sign on fine dial and counterclockwise edge of white block on coarse dial are together at index.
90	Sync E	Sync E dials to Eb stop $(L-11)$ and E dials	Set E at $-5°$, and L at 800 min. Position Eb stop at lower limit (toward left). Adjust sync E dials to match fixed index. Set E at $85°$ and L at 3500 min. Turn Eb to upper limit and check that sync E dials are again matched at fixed index.
91	DIP	DIP dials to E, L, and sync E dials	Set E at $0°$, L at 2000 min. and match sync E dials at index. Adjust DIP dials to read infinity.

Adj. No.	Quantity	Connection	Procedure
12		Brakes to sync E handcrank	Adjust brakes so that when the sync E handcrank is in the IN position the brake on the sync E line is applied, and when it is in the CENTER or OUT positions, the brake on the E line is applied. A brake is applied when its cam is clear of its roller.
			Proceed as follows: Put the sync E handcrank in the OUT position. Turn the cam shaft until the round side of the E brake cam (rear cam) is toward the bottom and the flat is about 1/8 inch clear of the brake arm roller. Tighten A-12 and put the handcrank in the CENTER position. The E brake cam should be positioned so that the round part is toward the top and the other flat is clear of the roller by about 1/8 inch or by an amount equal to that previously established for the OUT position.
259	E	Counter in corrector unit to E dials	Adjust counter to agree with E dials.
60	$Eb + Vs$	Intermittent drive to Vs counter	Set L at 2000 min., E at 80°, and match sync E dials at index. Adjust so that upper cut-out point of intermittent drive occurs at 2360 min. on Vs counter. Check that with E at 0°, lower cut-out point occurs at 1640 min. on Vs counter.
35	Zd	Dz computer to Zd dials	Set Zd at 2000 min. Position vector gear with slot horizontal. Movement of $f(Eb + Vs)$ cam should cause no movement of output rack. Motion of rack may be measured on Dd follow-up.
216	Dz	Spring to Dz line	Set Zd at 2000 min. and wind spring 3 turns.

Adj. No.	Quantity	Connection	Procedure
112	Zd	$(Zd)^2$ cam to Zd dials	Set Zd at 2000 min. For approximate adjustment, position $(Zd)^2$ cam so that $(Zd)^2$ rack is at extreme front position. To refine the adjustment, make sure that A-113 is loose and that there is no output from $Zd \cdot Ds$ multiplier when Zd line is moved. Rotate tan $(Eb + Vs)$ cam until cam follower is on inner constant radius. Synchronize Vz follow-up temporarily, at zero on Vz dials, by means of A-63. Move Zd to 1400 min. and note reading of Vz dials. Move Zd to 2600 min. and again read Vz. The two readings should be equal. If they are not, refine A-112. Repeat the check with Zd at 800 min. and 3200 min., and further refine A-112 if necessary.
208	Ds	$Zd \cdot Ds$ multiplier to Ds counter	Set Ds at 500 mils. Position Ds input rack so that movement of Zd rack causes no movement of output rack. Motion of output may be measured on Vz follow-up.
113	Zd	$Zd \cdot Ds$ multiplier to Zd dials	Set Zd at 2000 min. Position Zd input rack so that movement of Ds rack causes no movement of output rack. Motion of output may be measured on Vz follow-up.
63	Vz	Vz dials to multipliers	Set Zd at 2000 min., and Ds at 500 mils. Position tan $(Eb + Vs)$ cam with follower on outer constant radius. Synchronize Vz follow-up so that Vz dials read zero.
36	Ds	jDd computer to Ds counter	Set Ds at 500 mils. Position input rack so that movement of cos $[E2 + L - K(Zd)^2]$ cam produces no movement of vector gear output. Motion of output may be measured on Dd follow-up.
215	jDd	Spring to jDd line	Set Ds at 500 mils, and wind spring $3\frac{1}{2}$ turns.
33	jDd	Dd dials to Dz and jDd computers	Set Ds at 500 mils and Zd at 2000 min. Position $f(Eb + Vs)$ cam follower on inner radius and cos $[E2 + L - K(Zd)^2]$ cam follower on outer radius. Synchronize Dd follow-up so that Dd dials read zero.

Adj. No.	Quantity	Connection	Procedure
236	Dd	Holding friction	Adjust friction to prevent $B'r$ from backing out Dd, but not so tight as to overload Dd servo motor. Usual adjustment is to tighten spring fully, but not solidly, leaving minimum space between coils.
34	$E2 + L - K(Zd)^2$	jDd computer to $E2 + L - K(Zd)^2$	Set L and Zd at 2000 min., $E2$ at $60°$ and Ds at 700 mils. Keep Dd follow-up energized. Position $\cos[E2 + L - K(Zd)^2]$ cam so that Dd dials read $23°35'$. Tighten A-34 and set Ds at 300 mils. Dd should then read $-23°35'$. If it does not, refine by adjusting both the plus and the minus reading until errors are of equal magnitude and like sign.
61	$Eb + Vs$	Dz computer to $Eb + Vs$	Set Ds at 500 mils, Vs and L at 2000 min., E at $60°$, sync E dials at index, and Zd at 3200 min. Keep Dd follow-up energized. Position $f(Eb + Vs)$ cam so that Dd dials read $30°34'$. Tighten A-61 and set Zd at 800 min. Dd should then read $-30°34'$. If it does not, balance plus and minus readings as for A-34.
32	$Eb + Vs$	$(Zd)^2 \tan (Eb + Vs)$ multiplier to $(Eb + Vs)$	Set Ds at 500 mils, Vs and L at 2000 min., E at $60°$, sync E dials at index, and Zd at 3200 min. Keep Vz follow-up energized. Position $\tan (Eb + Vs)$ cam so that Vz dials read 316 min. Set Zd at 800 min. and check that Vz dials again read 316 min.
			Before making further adjustments, run the unit check test of the trunnion tilt computer, page 222. Refine adjustments as necessary.
111	Zd	$Zd(L - L\cos 2B'r)$ multiplier to Zd dials	Set Zd at 2000 min. Position input screw so that movement of input rack causes no movement of output rack. Motion of output may be measured on $jB'r$ follow-up.
64	$L \cos 2B'r$	$Zd(L - L\cos 2B'r)$ multiplier to $L\cos 2B'r$	Set L at 2000 min. Position input rack so that movement of input screw causes no movement of output rack. Motion of output may be measured on $jB'r$ follow-up.

Adj. No.	Quantity	Connection	Procedure
65	L	$L(L \sin 2B'r)$ multiplier to L dials	Set L at 2000 min. Position input screw so that movement of input rack causes no movement of output rack. Motion of output may be measured on $jB'r$ follow-up.
57	$L \sin 2B'r$	$L(L \sin 2B'r$ multiplier to $L \sin 2B'r$	Set $B'gr$ and Dd at $0°$. Position input rack so that movement of input screw causes no movement of output rack. To measure motion of output rack, set Zd at 2000 min. and observe motion on $jB'r$ follow-up.
199	Br	Br dials to L-18	Set $B'gr$ and Dd at $0°$. Adjust so that $jB'r$ stop acts at $348°20'$ $(-11°40')$ and $+11°40'$ on Br dials.
62	$L(L \sin 2B'r)$	Br dials to deck tilt corrector	Set L and Zd at 2000 min., $B'gr$ and Dd at $0°$. Synchronize $jB'r$ follow-up so that Br dials read $0°$.

Run test of deck tilt computer. The necessary test sheets are contained in the log book, NAVORD Form 1229. If the test errors are excessive, make the unit check test of the deck tilt computer, page 220, to locate incorrectly positioned elements. Refine the adjustments as necessary.

92	$R2$	Indicating counter to $R2$ line	Adjust $R2$ indicating counter to agree with $R2$ counters in ballistic computers.
513	$E'g$	Dial to coarse synchro (automatic transmitter)	Hold synchro on electrical zero. Adjust dial to read 20.
514	$E'g$	Dial to fine synchro (automatic transmitter)	Hold synchro on electrical zero. Adjust dial to read 00.
4	$E'g$	Coarse to fine synchro (automatic transmitter)	Adjust so that coarse and fine synchros are on electrical zero together. (Dials to agree.)
515	$E'g$	Dial to coarse synchro (indicating transmitter)	Hold synchro on electrical zero. Adjust dial to read 20.
516	$E'g$	Dial to fine synchro (indicating transmitter)	Hold synchro on electrical zero. Adjust dial to read 00.

Adj. No.	Quantity	Connection	Procedure
6	$E'g$	Coarse to fine synchro (indicating transmitter)	Adjust so that coarse and fine synchros are on electrical zero together. (Dials to agree.)
5	$E'g$	Indicating to automatic transmitter	Adjust so that transmitter dials agree.
51	$Vs - Vz$	$E'g$ transmitters to $Vs - Vz$ line	Set Vs and L at 2000 min., Vz at 0 min., and DIP at infinity. Adjust so that $E'g$ transmitter dials read 2000 min.
10	$B'r$	Coarse to fine synchro ($B'r$ receiver)	Transmit electrical zero to fine and coarse synchros. Slip-tighten A-10. Turn servo motor by hand until coarse center contact is aligned with center interrupter contact. Hold worm to maintain this alignment and turn servo further until fine center contact is midway between outer contacts. Tighten A-10.
98	$B'r$	Dials to $B'r$ receiver	Transmit electrical zero to $B'r$ receiver synchros, and energize receiver. Set Dd at 0°. Adjust so that $B'gr$ dials read 0°.
70	$cB'r$	Bearing dials to $B'r$ local control	Energize $B'r$ receiver at electrical zero. Set L and Zd at 2000 min. Turn control switch to AUTO. After cBr dial is at rest, turn control switch to SEMI-AUTO. Turn jBr to set nearest graduation on cBr dial to 0° on Br. Turn control switch to LOCAL. Adjust A-70 so that Br dials read 0°.
1	Eb	Coarse to fine synchro (Eb receiver)	Transmit electrical zero to fine and coarse synchros. Slip-tighten A-1. Turn servo motor by hand until coarse center contact is aligned with center interrupter contact. Hold worm to maintain this alignment and turn servo further until fine center contact is midway between outer contacts. Tighten A-1.
50	Eb	$E'g$ dials to Eb receiver	Transmit electrical zero to Eb receiver synchros, and energize receiver. Set Vz at 0 min., and Vs at 2000 min. Adjust so that $E'g$ dials read 2000 min.

Adj. No.	Quantity	Connection	Procedure
2	Co	Coarse to fine synchro (Co receiver)	Transmit electrical zero to fine and coarse synchros. Slip-tighten A-2. Turn servo motor by hand until coarse center contact is aligned with center interrupter contact. Hold worm to maintain this alignment and turn servo further until fine center contact is midway between outer contacts. Tighten A-2.
179	Co	Dials to Co receiver	Transmit electrical zero to Co receiver synchros, and energize receiver. Set Br at $0°$. Adjust so that B dial reads zero.

STAR SHELL COMPUTER MK 1 MOD 0

Adj. No.	Quantity	Connection	Procedure
50	Fn	Dial to coarse synchro (Fn transmitter)	Hold coarse synchro on electrical zero. Adjust dial to read 10 sec.
51	Fn	Dial to fine synchro (Fn transmitter)	Hold fine synchro on electrical zero. Adjust dial to read 0.0 sec.
13	Fn	Coarse to fine synchro (Fn transmitter)	Adjust so that coarse and fine synchro are on electrical zero together.
52	$E'gn$	Dial to coarse synchro ($E'gn$ transmitter)	Hold coarse synchro on electrical zero. Adjust dial to read 20.
53	$E'gn$	Dial to fine synchro ($E'gn$ transmitter)	Hold fine synchro on electrical zero. Adjust dial to read 00.
14	$E'gn$	Coarse to fine synchro ($E'gn$ transmitter)	Adjust so that coarse and fine synchros are on electrical zero together.
54	$B'grn$	Dial to coarse synchro ($B'grn$ transmitter)	Hold coarse synchro on electrical zero. Adjust dial to read 0.
55	$B'grn$	Dial to fine synchro ($B'grn$ transmitter)	Hold fine synchro on electrical zero. Adjust dial to read 0.

Adj. No.	Quantity	Connection	Procedure
15	$B'grn$	Coarse to fine synchro ($B'grn$ transmitter)	Adjust so that coarse and fine synchro are on electrical zero together.
56	Rjn	Dial to synchro (Rjn receiver)	Set Rjn ring dial at zero. Hold synchro on electrical zero. Adjust inner dial so that pointer matches zero index of ring dial.
2	Rjn	Ring dial to L-2	Adjust so that stop acts at IN 1500 yards and OUT 1500 yards on ring dial.
3	Rjn	Coarse detent to Rjn dial	Set Rjn ring dial at zero. Position each detent in notch.
4	Rjn	Fine detent to Rjn dial	
—	$WrD + KRdBs$	Drum to counter	Adjust counter drum to agree with counter.
6	$WrD + KRdBs$	Counter to L-1	Adjust so that stop acts at +60 knots (060) and −60 knots (940) on counter.
16	Fn	Transmitter dials to L-3	Adjust so that stop acts at 8.20 and 41.55 sec. on Fn dials.
8	Fn	Holding friction	Adjust friction to hold Fn setting.
57	Fn	Fuze range dial to Fn dials	For powder fuze, set Fn dials at 10.60 sec. Adjust powder fuze range dial to read 5000 yards. For mechanical fuze, set Fn dials at 14.50 sec. Adjust mechanical fuze range dial to read 7600 yards.
5	$jDwn$	Ring dial to L-4	Adjust so that stop acts at 4000 and 15,000 yards on range ring dial.
7	$jDwn$	Holding friction	Adjust friction to hold $jDwn$ setting.
1	$R2n$	Assembly clamp	Tighten clamp.
10	Rjn	Elevation multiplier to Rjn ring dial	For initial adjustment, set Rjn at IN 200 yards. Position multiplier input rack 2½ inches from rear end of rack guide rail, and tighten A-10. Check the adjustment as follows: Wedge $E'g$ input shaft (41-S15) and $jDwn$ in-

Adj. No.	Quantity	Connection	Procedure
10 (Continued)			put gear. Temporarily tighten A-9. Set Rjn at OUT 1000 yards. Check that increasing Fn 20 secs. causes an increase of 309.6 min. on $E'gn$ dials. If necessary, refine A-10 until the change in $E'gn$ is correct.
9	Fn	Elevation multiplier to Fn dials	For initial adjustment, set Fn at 20.85 sec. Position multiplier slide block $2\frac{1}{2}$ inches from end of its guide rail. (Measure from input end to nearest edge of slide block.) Tighten A-9. Check the adjustment as follows: Wedge $E'g$ input shaft (41-S15) and $jDwn$ input gear. Set Fn at 35 sec. Check that changing Rjn from IN 1400 to OUT 1400 yards causes an increase of 393.4 min. on $E'gn$ dials. If necessary, refine A-9 until the change in $E'gn$ is correct.
12	$WrD +$ $KRdBs$	Deflection multiplier to counter	Set $WrD + KRdBs$ at 0 knots. Position input rack so that rotation of input screw causes no movement of output rack. To measure output motion, wedge $B'gr$ input shaft (41-S13), tighten A-17 temporarily, and observe motion on $B'grn$ dials.
11	$jDwn$	Deflection multiplier to range ring dial	For initial adjustment, set range ring dial at 8000 yards. Position multiplier slide block $2\frac{1}{2}$ inches from end of its guide rail. (Measure from input end to nearest edge of slide block.) Tighten A-11. Check the adjustment as follows: Wedge $B'gr$ input shaft (41-S13). Tighten A-17 temporarily. Set range ring dial at 5000 yards. Check that increasing $WrD + KRdBs$ from 0 to 50 knots causes an increase of $9°41'$ on $B'grn$ dials. If necessary, refine A-11 until the change in $B'grn$ is correct.
—	Range spot	Friction relief drives on knobs	Adjust each friction to drive line normally without slipping, but to slip without straining the line when the limit stop is reached.
—	Range		

Adjusting Star Shell Computer Mk 1 Mod 0 to Computer Mk 1

Adj. No.	Quantity	Connection	Procedure
18	$R2n$	$R2n$ counter to $R2$ counter	Set Rjn at 0 yards. Adjust so that $R2n$ reading is equal to $R2$ reading plus 1000 yards.
17	$Dtown$	$B'grn$ dials to $B'gr$ dials	Set $WrD + KRdBs$ at 0 knots. Adjust so that $B'grn$ reading is equal to $B'gr$ reading.
230	$WrD + KRdBs$	Counter in star shell computer to counter in computer unit	Synchronize $WrD + KRdBs$ follow-up so that counters agree.
231	$E'g$	$E'gn$ dials to $E'g$ dials	Set fuze range dial and range ring dial at 8000 yards, and Rjn at 0 yards. Adjust so that: For powder fuze, $E'gn$ reading equals $E'g$ reading plus 383 min. For mechanical fuze, $E'gn$ reading equals $E'g$ reading plus 373 min.

STAR SHELL COMPUTER MK I MOD 1

Adj. No.	Quantity	Connection	Procedure
50	Fn	Dial to coarse synchro (Fn transmitter)	Hold each synchro on electrical zero. Adjust each dial so that its index mark is at fixed index.
51	Fn	Dial to fine synchro (Fn transmitter)	
13	Fn	Coarse to fine synchro (Fn transmitter)	Adjust so that coarse and fine synchros are on electrical zero together.
52	$E'gjn$	Dial to coarse synchro ($E'gjn$ transmitter)	Hold each synchro on electrical zero. Adjust each dial so that its index mark is at fixed index.
53	$E'gjn$	Dial to fine synchro ($E'gjn$ transmitter)	

Adj. No.	Quantity	Connection	Procedure
14	$E'gjn$	Coarse to fine synchro ($E'gjn$ transmitter)	Adjust so that coarse and fine synchros are on electrical zero together.
54	$B'grjn$	Dial to coarse synchro ($B'grjn$ transmitter)	Hold each synchro on electrical zero. Adjust each dial so that its index mark is at fixed index.
55	$B'grjn$	Dial to fine synchro ($B'grjn$ transmitter)	
15	$B'grjn$	Coarse to fine synchro ($B'grjn$ transmitter)	Adjust so that coarse and fine synchros are on electrical zero together.
56	Rjn	Dial to synchro (Rjn receiver)	Set Rjn ring dial at zero. Hold synchro on electrical zero. Adjust inner dial so that pointer matches zero index of ring dial.
2	Rjn	Ring dial to L-2	Adjust so that stop acts at OUT 1500 yards and IN 2857 yards (red dot beyond IN 1500 calibration).
4	Rjn	Detent to ring dial	Set Rjn ring dial at zero. Position detent in notch.
—	$WrD + KRdBs$	Drum to counter	Adjust counter drum to agree with counter.
6	$WrD + KRdBs$	Counter to L-1	Adjust so that stop acts at +60 knots (060) and −60 knots (940) on counter.
26	Fn	Assembly clamp	Tighten clamp.
19	Fn	Counter to L-3	Adjust so that stop acts at 8.20 and 41.55 sec. on Fn counter.
8	Fn	Holding friction	Adjust friction to hold Fn setting.
57	Fn	Fuze range dial to Fn counter	For powder fuze, set Fn counter at 10.60 sec. Adjust powder fuze range dial to read 5000 yards. For mechanical fuze, set Fn counter at 14.50 sec. Adjust mechanical fuze range dial to read 7600 yards.
5	$jDwn$	Ring dial to L-4	Adjust so that stop acts at 4000 and 15,000 yards on range ring dial.

Adj. No.	Quantity	Connection	Procedure
7	$jDwn$	Holding friction	Adjust friction to hold $jDwn$ setting.
1	$R2n$	Assembly clamp	Tighten clamp.
58	$E'gjn$	Fine to coarse dial	Set ring dial at 20. Adjust inner dial to read 00.
22	$E'gjn$	Assembly clamp	Tighten clamp.
59	$E'jn$	Coarse to fine dial	Set ring dial at zero. Adjust inner dial so that center graduation is at index.
60	$B'jn$	Coarse to fine dial	Set ring dial at zero. Adjust inner dial so that center graduation is at index.
61	$B'grjn$	Fine to coarse dial	Set ring dial at zero. Adjust inner dial to read zero.
23	$B'grjn$	Assembly clamp	Tighten clamp.
10	Rjn	Elevation multiplier to Rjn ring dial	For initial adjustment, set Rjn at IN 200 yards. Position multiplier input rack $2\frac{1}{2}$ inches from rear end of rack guide rail, and tighten A-10. Check the adjustment as follows: Wedge $E'g$ input shaft (41-S15), $E'jn$ input gear, and $jDwn$ input gear. Temporarily tighten A-9. Set Rjn at OUT 1000 yards. Check that increasing Fn 20 sec. causes an increase of 309.6 min. on $E'gjn$ dials. If necessary, refine A-10 until the change in $E'gjn$ is correct.
9	Fn	Elevation multiplier to Fn counter	For initial adjustment, set Fn at 20.85 sec. Position multiplier slide block $2\frac{1}{2}$ inches from end of its guide rail (measure from input end to nearest edge of slide block). Tighten A-9. Check the adjustment as follows: Wedge $E'g$ input shaft (41-S15), $E'jn$ input gear, and $jDwn$ input gear. Set Fn at 35 sec. Check that changing Rjn from IN 1400 to OUT 1400 yards causes an increase of 393.4 min. on $E'gjn$ dials. If necessary, refine A-9 until the change in $E'gjn$ is correct.

Adj. No.	Quantity	Connection	Procedure
12	$WrD +$ $KRdBs$	Deflection multiplier to counter	Set $WrD + KRdBs$ at 0 knots. Position input rack so that rotation of input screw causes no movement of output rack. To measure output motion, wedge $B'\acute{g}r$ input shaft (41-S13) and $B'jn$ input gear, tighten A-17 temporarily, and observe motion on $B'\acute{g}rjn$ dials.
11	$jDwn$	Deflection multiplier to range ring dial	For initial adjustment, set range ring dial at 8000 yards. Position multiplier slide block $2\frac{1}{2}$ inches from end of its guide rail. (Measure from input end to nearest edge of slide block.) Check the adjustment as follows: Wedge $B'\acute{g}r$ input shaft (41-S13), and $B'jn$ input gear. Tighten A-17 temporarily. Set range ring dial at 5000 yards. Check that increasing $WrD + KRdBs$ from 0 to 50 knots causes an increase of $9°41'$ on $B'\acute{g}rjn$ dials. If necessary, refine A-11 until the change in $B'\acute{g}rjn$ is correct.
16	Fn	Transmitter to counter	Set Fn at 10 sec. Adjust so that index marks on transmitter dials are at indexes.
24	$E'\acute{g}jn$	Transmitter to dials	Set $E'\acute{g}jn$ at 2000 min. Adjust so that index marks on transmitter dials are at indexes.
25	$B'\acute{g}rjn$	Transmitter to dials	Set $B'\acute{g}rjn$ at $0°00'$. Adjust so that index marks on transmitter dials are at indexes.
—	Range spot	Friction relief drives on knobs and hand-cranks	Adjust each friction to drive line normally without slipping, but to slip without straining the line when the limit is reached.
—	Range		
—	Deflection		
—	Elevation		
—	Deflection	Holding friction in hand-crank	Adjust each friction to hold setting for both positions of handcrank.
—	Elevation		

Adjusting Star Shell Computer Mk 1 Mod 1 to Computer Mk 1

Adj. No.	Quantity	Connection	Procedure
18	$R2n$	$R2n$ counter to $R2$ counter	Set Rjn at 0 yards. Adjust so that $R2n$ reading is equal to $R2$ reading plus 1000 yards.
17	$Dtown$	$B'grjn$ dials to $B'gr$ dials	Set $WrD + KRdBs$ at 0 knots, and $B'jn$ at 0 mils. Adjust so that $B'grjn$ reading is equal to $B'gr$ reading.
230	$WrD + KRdBs$	Counter in star shell computer to counter in computer unit	Synchronize $WrD + KRdBs$ follow-up so that counters agree.
231	$E'g$	$E'gjn$ dials to $E'g$ dials	Set fuze range dial and range ring dial at 8000 yards, Rjn at 0 yards, and $E'jn$ at 0 mils. Adjust so that: For powder fuze, $E'gjn$ reading equals $E'g$ reading plus 383 min. For mechanical fuze, $E'gjn$ reading equals $E'g$ reading plus 373 min.

Part nine

SKETCH LISTS

Introduction

Whenever a part of the computer has been disassembled for repair or overhaul, it is always advisable to have at hand the drawings of the affected units. For the repair of some units, especially when new parts are to be installed, reference to the drawings is essential in order to meet established tolerances and to secure proper alignment of the unit.

This section contains lists of assembly drawing numbers for all of the units in the Computer Mark 1, Mods 0 to 16, and the Star Shell Computer Mark 1, Mods 0 to 2. When a particular drawing is required for reference, its number may be obtained from the list if the unit name and the modification and serial numbers of the computer have been ascertained. A complete list of drawings for all parts of the instrument would be so lengthy as to require a volume in itself. Therefore, only the assembly drawing numbers are listed. The drawing numbers of all *parts* are listed on the assembly drawings themselves. For some of the more complex units, several assembly drawings are required. In order to keep the sketch lists brief, only the "key" drawing number is listed for each of these units. On a "key" drawing, the complete list of assembly drawings pertaining to a unit may be found.

This section also serves as an index to certain drawings of a general nature which are frequently required for maintenance purposes. These drawings include the schematic, the wiring, and the gearing diagrams for the Computer Mark 1 and the Star Shell Computer Mark 1.

GENERAL
SCHEMATIC DIAGRAM

	MOD 0	MOD 1 & 9	MOD 2	MOD 3 & 10
	209301	209901 209311	209951 SER. NO. 99 AND LOWER 210540 SER. NO. 101 AND HIGHER	210394 SER. NO. 99 AND LOWER 210541 (MOD 10)

WIRING   DIAGRAM

	209302	209902	209952 SER. NO. 99 AND LOWER 209953 SER. NO. 101 AND HIGHER	210254

DESTROYER LEADERS, DD356 TYPE
CV'S
LIGHT DESTROYERS, DD409 AND DD453 TYPE
BB'S, CA'S, CL'S, AND CB'S
2100-TON DESTROYERS, DD445 TYPE, AND AUXILIARIES
SPARES
2200-TON DESTROYERS, DD692 TYPE

RING DIAGRAMS

OL AND COMPUTER UNITS

	209303	209903	209903 SER. NO. 99 AND LOWER 210464 SER. NO. 101 AND HIGHER	210098 (SER. NO. 100) 210465 SER. NO. 101 AND HIGHER

INDICATOR AND CORRECTOR UNITS

	209304	209904	209914	210100

MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 11	MOD 13	MOD 14 & 16	MOD 15
210395 SER NO. 99 AND LOWER 210542 SER. NO. 101 AND HIGHER	210397 SER. NO. 99 AND LOWER 210543 SER. NO. 101 AND HIGHER	210398 SER. NO. 215 AND LOWER 210608 SER. NO. 216 TO 389 INC. 210850 SER. NO. 390 TO 518 INC. 210709 SER. NO. 519 AND HIGHER	210730 210731	210710	210711 SER. NO. 780 AND LOWER 2001 TO 2050 210805 SER. NO. 781 TO 810 INC. 222941 SER. NO. 811 AND HIGHER	222921	222918
210256	210262 SER. NO. 99 AND LOWER 210258 SER. NO. 101 AND HIGHER		210732			222894	222928
		210677 210260 210582 210583 210584 210628 210630		210260 210628	210677 210260 210582 210583 210584 210628 210630		
210392 SER. NO. 99 AND LOWER 210466 SER. NO. 101 AND HIGHER	210099 SER. NO. 99 AND LOWER 210467 SER. NO. 101 AND HIGHER	210467 SER. NO. 215 AND LOWER 210466 SER. NO. 216 TO 389 INC. 210851 SER. NO. 390 TO 518 INC. 210694 SER. NO. 519 AND HIGHER	210735	210695	210096 SER. NO. 780 AND LOWER 2001 TO 2050 210086 SER. NO. 781 TO 810 INC. 222942 SER. NO. 811 AND HIGHER	222919	222916
210101	210103	210104 SER. NO. 215 AND LOWER 210607 SER. NO. 216 AND HIGHER	210736	210607	210607	222920	222917

GENERAL (CONTINUED)

CASE AND COVERS

	MOD 0	MOD 1 & 9	MOD 2	MOD 3 & 10
ALL UNITS	209650	210919	210072 SER. NO. 99 AND LOWER 210074 SER. NO. 101 AND HIGHER	210073
CONTROL AND COMPUTER UNITS				
INDICATOR AND CORRECTOR UNITS				

HANDCRANKS

	MOD 0	MOD 1 & 9	MOD 2	MOD 3 & 10
	REFER TO B.M.55503	209458 TO 209464 INC. 209646-5 209765-3 209871-4	195062-9 210353-1 210478-1 195066-5	210353 TO 210356-1

CONTROL UNIT

	MOD 0	MOD 1 & 9	MOD 2	MOD 3 & 10
RANGE RATE INTEGRATOR	209354	209354	210268	210268
RANGE INTEGRATOR	209355	209355	194077-1	194077-1
SHIP COMPONENT SOLVER	209358	209358	210269	210269
TARGET COMPONENT AND HEIGHT SOLVERS	209360	209360	210271	210271
dH AND dRh COMPONENT SOLVERS	209364	209364	210274	210274
VECTOR SOLVER	209366	209366	210276	210276
1/50 HP A-C MOTOR	207920-1	207920-1	207920-1	207920-1
1/20 HP A-C MOTOR, TIME	146191	146191	146191	146191
4-MFD. CAPACITOR	207920-2	207920-2	207920-2	207920-2
2-MFD. CAPACITOR	207924-1	207924-1	207924-1	207924-1
6-MFD. CAPACITOR	NONE	NONE	NONE	NONE
FOLLOW-UPS, dRh, RdE, dR	209329	209329	209329	209329
FOLLOW-UPS, jE, jBr	209330-1	209330-1	210295	210295
FOLLOW-UPS, Sh, Ct	209698-1	209698-1	210316	210316
FOLLOW-UP, RdBs	209933	209333	210331	210331

MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 11	MOD 13	MOD 14 & 16	MOD 15
210448 SER. NO. 99 AND LOWER 210073 SER. NO. 101 AND HIGHER	210071 SER. NO. 99 AND LOWER 210073 SER. NO. 101 AND HIGHER	210073 SER. NO. 360 AND LOWER			210616 SER. NOS. UP TO 750 INC.		
		210616 SER. NO. 361 TO 581 INC.	210714 210616	210616	210714	210714 210616	210714 222932
		210617 SER. NO. 361 TO 581 INC.	210617 222927	210617 210645	210617 210645	210617 222927	210617 222988
195062-9 210353-1 210356-1 210478-1	210353-1 210354-1 210355-2 210356-1	195062-9 195066-5 210353-1 210354-1 210355-1	195062-9 195066-5 210353-1 210354-1 210355-1	195062-9 195066-5 210353-1 210354-1 210355-1	195062-9 195066-5 210353-1 210354-1 210355-2	195062-9 195066-5 210353-1 210354-1 210355-2	195062-9 195066-5 210353-1 210354-1 210355-2

MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
210268 194077-1	210268 194077-1	210268 194077-1	210268 194077-1	210268 194077-1	210268 194077-1	210268 194077-1
210269 210271 210274 210276	210269 210271 210274 210276	210269 210271 210274 210276	210269 210271 210274 210276	210269 210271 210274 210276	210269 210271 210274 210276	210269 210271 210274 210276
207927 146191	207927 146191	207927 146191	207927 146191	207927 146191	207927 146191	207927 146191
207920-2 207924-1 207925-3	207920-2 207924-1 207925-3	207920-2 207924-1 207925-3	207920-2 207924-1 NONE	207920-2 207924-1 NONE	207920-2 207924-1 NONE	207920-2 207924-1 NONE
209329 210295 210316 210331	209329 210295 210316 210331	209329 210295 210316 210331	209329 210295 210316 210331	209329 210295 210316 210331	209329 210295 210316 210331	209329 210295 210316 210331

CONTROL UNIT (CONTINUED)

	MOD 0	MOD 1 & 9	MOD 2
RANGE RECEIVER	209336	209336	209336
RADAR RANGE RECEIVER	NONE	NONE	210438
ΔcB'r AND ΔcEb INDICATING TRANSMITTERS	NONE	209930	209930
TIME MOTOR REGULATOR	207004	207004	207004
BATTLE AND SHELL ORDER ANNUNCIATOR	209350	209350	209350
RANGE FINDER'S, POINTER'S, AND TRAINER'S SIGNAL SOLENOIDS	209351-1	209351-1	209892-1
SOLENOID CLUTCH	209352-1	209352-1	210289-1
SOLENOID LOCK	209348-1	209348-1	210290-1
REMOTE CONTROL RELAYS	NONE	NONE	NONE
TWO-UNIT COMPONENT INTEGRATORS	209353	209353	210291
FRAME 66 DAMPER	207916-1	207916-1	207926
MAGNETIC DRAG	NONE	NONE	195049-1
SYNCHRO MOTOR 5F MK 4 MOD 3 (RANGE RECEIVER)	173005	173005	173005
SYNCHRO GENERATOR 1F MK 8 MOD 3 (RADAR RANGE REC.)	NONE	NONE	173150
SYNCHRO GENERATOR 5G MK 1 MOD 3	173105	173105	173105
INDICATOR GENERATOR—RANGE AND BEARING SOLUTION	NONE	NONE	173170
SWITCHES	55527	55527	195051 210335-1
TOP PLATE OF CONTROL UNIT	209825	209856	210472
CONTROL UNIT GEARING	209800	209800	209800

COMPUTER UNIT

	MOD 0	MOD 1 & 9	MOD 2
INTEGRATORS, RdE, RdBs, 1/cR, Sec E	209355	209355	194077
ELEVATION WIND COMPONENT SOLVER	209359	209359	210270
HORIZ. WIND COMPONENT SOLVER	209368	209368	210278
Vf+Pe BALL. COMPUTER	209314	209314	209399
1/cR COMPUTER	209318	209318	210279
Sec E COMPUTER	209319	209319	210280

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
210314	210314	210314	210314	210692	210692	210692	210692
210438	210438	210438	210438	NONE	NONE	NONE	NONE
209930	209930	209930	209930	209930	209930	209930	209930
195022	195022	195022	195022	195022	195022	195022	195022
NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
209892–1	209892–1	209892–1	209892–1	209892–1	209892–1	209892–1	209892–1
210289–1	209289–1	209289–1	209289–1	209289–1	209289–1	209289–1	209289–1
210290–1	210290–1	210290–1	210290–1	210290–1	210290–1	210290–1	210290–1
NONE	210220	210220	210220	210220	210220	210220	210220
210291	210291	210291	210291	210291	210291	210291	210291
207926	207926	207926	207926	207926	207926	207926	207926
195049–1	195049–1	195049–1	195049–1	195049–1	195049–1	195049–1	195049–1
173005	173005	173005	173005	173005	173005	173005	173005
173150	173150	173150	173150	NONE	NONE	NONE	NONE
173105	173105	173105	173105	173105	173105	173105	173105
173170	173170	173170	173170	NONE	NONE	NONE	NONE
195051	195051	195051	195051	195051	195051	195051	195051
210335–1	210335–1	210335–1	210335–1	210335–1	210335–1	210335–1	210335–1
210473	210474	210474	210474	210474	210474	210474	210474
210476	210477	210477	210477 SER. NO. 518 AND LOWER	210720	210720	210720	210720
			210719 SER. NO. 519 TO 780				

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
194077	194077	194077	194077	194077	194077	194077	194077
210270	210270	210270	210270	210270	210270	210270	210270
210278	210278	210278	210278	210278	210278	210278	210278
210437	210437	210437	210437	210750 (MOD 8) 210759 (MOD 12)	210437	287534 (MOD 14) 287535 (MOD 16)	287486
210413	210413	210413	210413	210413	210413	210413	210413
210280	210280	210280	210280	210280	210280	210280	210280

COMPUTER UNIT (CONTINUED)

	MOD 0	MOD 1 & 9	MOD 2
RANGE RATE CORRECTOR AND GEARING	209666	209666	210281
Tf BALL. COMPUTER	209315-1	209315-1	210328-1
Fp BALL. COMPUTER	209315-2	209315-2	210328-2
Tf/R2 BALL. COMPUTER	209315-4	209315-4	210328-4
Fm BALL. COMPUTER	209315-3	209315-3	210328-3
PREDICTION MULTIPLIERS	209316	209316	210375
COMPLEMENTARY ERROR CORRECTOR	209326	209326	210085
FOLLOW-UPS, V, Ywgr, R2, Vf+Pe, Tf/R2, F, WrD+KRdBs	209329	209329	210329
FOLLOW-UP, Dtwj	209933	209933	210331
FOLLOW-UP, Tf	209062	209062	195029
INTERMITTENT DRIVES, E, E2, cR, dRs	194017	209069	210320
Co RECEIVER	209337	209337	210454
INTEGRATOR GEARING	209691	209911	210145
PREDICTION MULTIPLIER INPUT GEARING	209669	209669	210105
WIND COMPONENT SOLVERS—OUTPUT GEARING	209671	209671	210300
HORIZ. WIND COMPONENT SOLVER OUTPUT GEARING	209673	209921	210299
I.V., AND Tg DIAL ASSEMBLY	209674	209674	210302

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
210430	210430	210430	210430	210776	210430 SER. NO. 780 AND LOWER 210811 SER. NO. 781 AND HIGHER	210573	287465
209665-1 209665-2 209665-4	209665-1 209665-2 209665-4	209665-1 209665-2 209665-4	209665-1 209665-2 209665-4	210751-1 NONE 210751-2	209665-1 NONE 209665-4 SER. NO. 810 AND LOWER 222899 SER. NO. 811 AND HIGHER	287540 NONE 287547	287489 NONE 287496
209665-3	209665-3	209665-3	209665-3	210755	209665-3 SER. NO. 780 AND LOWER 222874 SER. NO. 781 AND HIGHER	287550	287497
209893	209893	209893	209893	210779	209893 SER. NO. 780 AND LOWER 210813 SER. NO. 781 AND HIGHER	287575	287500
210090 210329 210331 195029 210320 210532 210155	210090 210329 210331 195029 210320 210532 210158	210090 210329 210331 195029 210320 210532 210158	210090 210329 210331 195029 210320 210532 210158 SER. NO. 215 AND LOWER 210602 SER. NO. 216 TO 518 INC. 210718 SER. NO. 519 AND HIGHER	210090 210329 210331 195029 210320 210532 210718	210090 210329 210331 195029 210320 210532 210718	210090 210329 210331 195029 210320 210532 210718	210090 210329 210331 195029 210320 210532 210718
210106	210107	210107	210107	210781	210107 SER. NO. 780 AND LOWER 210815 SER. NO. 781 AND HIGHER	287567	287474
210300	210300	210300	210300	210768	210300 SER. NO. 780 AND LOWER 222861 SER. NO. 781 AND HIGHER	287579	287477
210299 210302	210299 210302	210299 210302	210299 210302	210299 210772	210299 210302 SER. NO. 780 AND LOWER 210809 SER. NO. 781 AND HIGHER	210299 287577	210299 287577

COMPUTER UNIT (CONTINUED)

	MOD 0	MOD 1 & 9	MOD 2
PREDICTION MULTIPLIER OUTPUT GEARING	209676	209676	210303
PREDICTION FOLLOW-UP MOUNTING	209679	209679	210308
WIND COMPONENT SOLVERS—INPUT GEARING	209682	209682	210311
BALL. COMPUTER MOUNTING AND GEARING	209383	209383	210066
PREDICTION MULTIPLIER MOUNTING AND GEARING	209822	209931	210110
CHANGE OF BEARING FILTER	NONE	NONE	210436
Co RECEIVER (COARSE) SYNCHRO MOTOR 5B MK 5 MOD 3	172905	172905	172905
Co RECEIVER (FINE) SYNCHRO MOTOR 5F MK 4 MOD 3	173005	173005	173005
ELEVATION SOLUTION TRANSMITTER	NONE	NONE	NONE
$\Delta cB'r$ (AUTO) AND ΔcEb (AUTO) TRANSMITTER	185004	185004	185004
1/50 HP A-C MOTOR	207927	207927	207927
4-MFD. CAPACITOR	207920–2	207920–2	207920–2
2-MFD. CAPACITOR	207924–1	207924–1	207924–1
6-MFD. CAPACITOR	NONE	NONE	NONE
FRAME 66 DAMPER	207926	207926	207926
SIZE 11 MAGNETIC DAMPER	207929	207929	207929
MAGNETIC DRAG	195049–1, 3	195049–1, 3	195049–1, 3
SWITCHES	210335–1	210335–1	210335–1

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
210434	210434	210435	210434	210785	210434 SER. NO. 780 AND LOWER / 222863 SER. NO. 781 AND HIGHER	287583	287470
210308	210308	210308	210308	210789	210308 SER. NO. 780 AND LOWER / 222865 SER. NO. 781 AND HIGHER	287571	210789
210311	210311	210311	210311	210792	210311	287581	210311
210066	210066	210066	210066	210794	210066 SER. NO. 780 AND LOWER / 222867 SER. NO. 781 TO 810 INC. / 222935 SER. NO. 811 AND HIGHER	287564	287504
210110	210111	210111	210111	210801	210111 SER. NO. 780 AND LOWER / 222871 SER. NO. 781 AND HIGHER	287587	287506
210436	210436	210436	210436	210436	210436	210436	210436
172905	172905	172905	172905	172905	172905	172905	172905
173005	173005	173005	173005	173005	173005	173005	173005
NONE	173170	173170	173170	NONE	NONE	NONE	NONE
185004	185004	185004	185004	185004	185004	185004	185004
207927	207927	207927	207927	207927	207927	207927	207927
207920-2	207920-2	207920-2	207920-2	207920-2	207920-2	207920-2	207920-2
207924-1	207924-1	207924-1	207924-1	207924-1	207924-1	207924-1	207924-1
NONE	207925-3	207925-3	207925-3 SER. NO. 518 AND LOWER	NONE	NONE	NONE	NONE
207926	207926	207926	207926	207926	207926	207926	207926
207929	207929	207929	207929	207929	207929	207929	207929
195049-1, 3	195049-1, 3	195049-1, 3	195049-1, 3	195049-1, 3	195049-1, 3	195049-1, 3	195049-1, 3
210335-1	210335-1	210335-1	210335-1	210335-1	210335-1	210335-1	210335-1

INDICATOR UNIT

	MOD 0	MOD 1 & 9	MOD 2
1/50 HP A-C MOTOR	207920-1	207920-1	207927
4-MFD. CAPACITOR	207920-2	207920-2	207920-2
SINGLE-SPEED SYNCHRO RECEIVERS, So, Rj, Dj, Vj	209333-1	209333-1	210371
F AND Ds TRANSMITTERS	209342	209844	209342
Vs TRANSMITTER	209347	209843	210352
INTERMITTENT DRIVES, Ds AND Vs	194017	209069	210320
SYNCHRO MOTOR 5B MK 3 MOD 3, So, Rj, Dj, Vj	45005	172905	172905
SYNCHRO GENERATOR 6G MK 2 MOD 3, Vs, Ds, F	46604	185004	185004
SYNCHRO GENERATOR 7G MK 3 MOD 3	47604	173204	173204
MAGNETIC DRAG	NONE	NONE	195049-2
SWITCHES	55527	209431-9	195051
INDICATOR UNIT—DIALS AND GEARING	209686	209920	209920

CORRECTOR UNIT

	MOD 0	MOD 1 & 9	MOD 2
Dz AND jDd COMPUTERS	209362	209362	210272
DECK TILT COMPONENT SOLVER	209363	209363	210273
PARALLAX COMPONENT SOLVER	209367	209367	210277
DECK TILT MULTIPLIERS	209322	209322	209912
Zd · Ds MULTIPLIER	209323	209323	210332
Zd² TAN (Eb+Vs) MULTIPLIER	209325	209325	210293
PARALLAX MULTIPLIER (TRAIN)	209327	209327	210286
PARALLAX MULTIPLIER (ELEVATION)	NONE	NONE	NONE
FOLLOW-UPS, Dd, jB'r, Vz	209332	209332	210287
FOLLOW-UP (B'r LOCAL CONTROL)	209357	209357	210330
COMPENSATORS, Vz, Dd, Eb, B'r, jB'r	NONE	NONE	209926
B'r RECEIVER	209334	209334	210120
Eb RECEIVER	209335	209335	210115
B'gr TRANSMITTERS (AUTO. AND IND.)	209338	209338	209998
E'g (AUTO. AND IND.) AND PARALLAX TRANSMITTERS	209340	209340	210034
INTERMITTENT DRIVE (Eb+Vs)	194017	209069	210320
1/50 HP A-C MOTOR	207920-1	207920-1	207927
4-MFD. CAPACITOR	207920-2	207920-2	207920-2
16-MFD. CAPACITOR	207925-1	207925-1	207925-1

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
207927	207927	207927	207927	207927	207927	207927	207927
207920-2	207920-2	207920-2	207920-2	207920-2	207920-2	207920-2	207920-2
210371	210371	210371	210371	210371	210371	210371	210371
210359	210360	210125	210570	210760	210570	210760	287451
210352	210181	210119	210550	210762	210550	210762	287450
210320	210320	210320	210320	210320	210320	210320	210320
172905	172905	172905	172905	172905	172905	172905	172905
185004	185004	185004	185004	185004	185004	185004	185004
173204	173204	173204	173204	173204	173204	173204	173204
195049-2	195049-2	195049-2	195049-2	195049-2	195049-2	195049-2	195049-2
195051	195051	195051	195051	195051	195051	195051	195051
210363	210364	210130	210575 SER. NO. 215 AND LOWER 210600 SER. NO. 216 AND HIGHER	210763	210600	210763	287456

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
210272	210272	210272	210272	210272	210272	210272	210272
210273	210273	210273	210273	210273	210273	210273	210273
210277	210277	210277	209975	209975	209975	209975	222961
209912	209912	209912	209912	209912	209912	209912	209912
210332	210332	210332	210332	210332	210332	210332	210332
210293	210293	210293	210293	210293	210293	210293	210293
210286	210286	210286	209977	209977	209977	209977	222963
NONE	NONE	NONE	209978	209978	209978	209978	222962
210287	210287	210287	210287	210287	210287	210287	210287
210330	210330	210330	210330	210330	210330	210330	210330
209926	209926	209926	209926	209926	209926	209926	209926
210120	210120	210120	210120	210120	210120	210120	210120
210115	210115	210115	210115	210115	210115	210115	210115
210431	210432	210433	210593	210593	210593	222967	287453
210039	210044	210044	210049	210742	210049	210742	222974
210320	210320	210320	210320	210320	210320	210320	210320
207927	207927	207927	207927	207927	207927	207927	207927
207920-2	207920-2	207920-2	207920-2	207920-2	207920-2	207920-2	207920-2
207925-1	207925-1	207925-1	207925-1	207925-1	207925-1	207925-1	207925-1

CORRECTOR UNIT (CONTINUED)

	MOD 0	MOD 1 & 9	MOD 2
FRAME 66 DAMPER	207916–1	207916–1	207926
FRAME 50 DAMPER	207914–1	207914–1	210321
SWITCHES	55527	209431–9	195051
SYNCHRO MOTOR 5B MK 5 MOD 3	45605	172905	172905
SYNCHRO MOTOR 5F MK 4 MOD 3	45405	173005	173005
SYNCHRO GENERATOR 7G MK 3 MOD 3	47604	173204	173204
PARALLAX CORRECTOR	209349	209349	210370
¡Dd AND Dz COMPUTER MOUNTING	209377	209377	210028
Zd · Ds AND Zd^2 TAN (Eb+Vs) MOUNTING	209384	209384	210338
DECK TILT COMPUTER MOUNTING	209386	209386	210342
DECK AND TRUNNION TILT CORRECTOR MOUNTING	209369	209905	210004
CORRECTOR FOLLOW-UP GEARING	209373	209374	210056

MOD 3 & 10	MOD 4	MOD 6	MOD 7	MOD 8 & 12	MOD 13	MOD 14 & 16	MOD 15
207926	207926	207926	207926	207926	207926	207926	207926
210321	210321	210321	210321	210321	210321	210321	210321
195051	195051	195051	195051	195051	195051	195051	195051
172905	172905	172905	172905	172905	172905	172905	172905
173005	173005	173005	173005	173005	173005	173005	173005
173204	173204	173204	173204	173204	173204	173204	173204
210370	210370	210370	209981	222880	209981	222879	222964
210028	210031	210031	210031	210031	210031	210031	210028
210338	210338	210338	210338	210338	210338	210338	210338
210342	210342	210342	210342	210737	210342	210737	210737
210006	210006	210006	210568	210568	210568	210568	210568
209990	210439	209991	209992 SER. NO. 215 AND LOWER 210610 SER. NO. 216 AND HIGHER	210610	210610	210610	210610

STAR SHELL COMPUTER

	MOD 0	MOD 1	MOD 2
GEARING DIAGRAM	191715	222143	193702
SCHEMATIC DIAGRAM	191702	222142	193701
WIRING DIAGRAM	191703	191794	193717

ASSEMBLIES

	MOD 0	MOD 1	MOD 2
COMPLETE ASSEMBLY	191701	222145	193704
	191710	222146	193705
	191711	222147	193706
	191712		
DIALS AND GEARING	191707	222152	193710
	191709	222185	222154
MULTIPLIER	191708	191708	193707
TRANSMITTER MOUNTING	191713	222149	193708
	191714	222150	193709
SYNCHRO MOTOR 1F MK 8 MOD 3	173150		
SYNCHRO GENERATOR 6G MK 2 MOD 3	185004	185004	185004
SYNCHRO DIFF. GEN. 6DG MK 5 MOD 3	185105	185105	185105
SYNCHRO CAPACITOR TYPE 9C MK 3 MOD 3	210511	210511	210511
HANDCRANKS		222148-2	222148-2
		222165-1	222165-1
MULTIPLIER GEARING	191704	191705	195705
	191705	222157	193715
	191706	222158	193716
SYNCHRO MOTOR 1F MK 8 MOD 3A		173130	173130

DISTRIBUTION

Requests for additional copies of OP 1064A should be submitted on NavGen 47, Stock Forms and Publications Requisition, through the District Publications and Printing Office by which addressee is serviced. Mailing addresses may be obtained from list 10.VV of the Standard Navy Distribution.

Standard Navy Distribution List No. 48 (Part 1) and
    Edition No. 5 (Part 2) to Catalog of Activities of
    the Navy
2 copies unless otherwise indicated.

1.A,B,C,D,E,G,H,I,K,L,M; 2.C,D,E,F,G,I,S; 3.(5 copies), B,M; 3.H*,U,V,X,Z,TT,VV,ZZ,LLL,OOO,WWW,EEEE,FFFF; 6.A; 7.(6 copies),D; 7.(18 copies),V; 7.(5 copies),K,M,N,P; 7.FFF,HHH; 8.K*,S,CC; 8.(5 copies),T 35,T60; 10.(25 copies),VV — 500 to West Coast; 11.(CNO,ComdtMarCorps, BuOrd*); 12. BuOrd Special List 12.A; 13.(5 copies),N.

*Applicable Addressees