FIELD SERVICE BULLETIN

Navion

NORTH AMERICAN

NO. 26
*REVISED APRIL 1, 1947

SECTIONS I AND II ARE MANDATORY - Must be accomplished by 9/1/47

CONTROLLED HYDRAULIC POWER SYSTEM INSTALLATION

*Section I of this bulletin directs the installation of a new controlled hydraulic power system consisting of a manually controlled relief valve with position indicator switch. Section II directs the clamping of the flap cylinder hydraulic lines and compliance with Field Service Bulletin No. 19. For airplanes equipped with cabin heaters or gyro instrument panels, read Paragraph D and E of Section II. Section III contains instructions for installation of a modified hydraulic pump. The Operation Instructions are contained in Section IV.

Kit Drawing 145-89032 lists the new parts required. Kit 145-89032-10 is required for those airplanes delivered from the factory without the hydraulic pump and flexible lines.

AIRPLANES AFFECTED

NAV-4-2 through NAV-4-947.

This change will be accomplished at the factory on Airplanes NAV-4-2-948 and subsequent.

SECTION I

INSTALLATION OF CONTROLLED HYDRAULIC RELIEF VALVE

A. Disassembly of Existing Power System.

1. Close hydraulic shut-off valve, and disconnect flexible control at the valve.
2. Disconnect all hydraulic lines to flow regulator, relief valve, and filter (if installed).

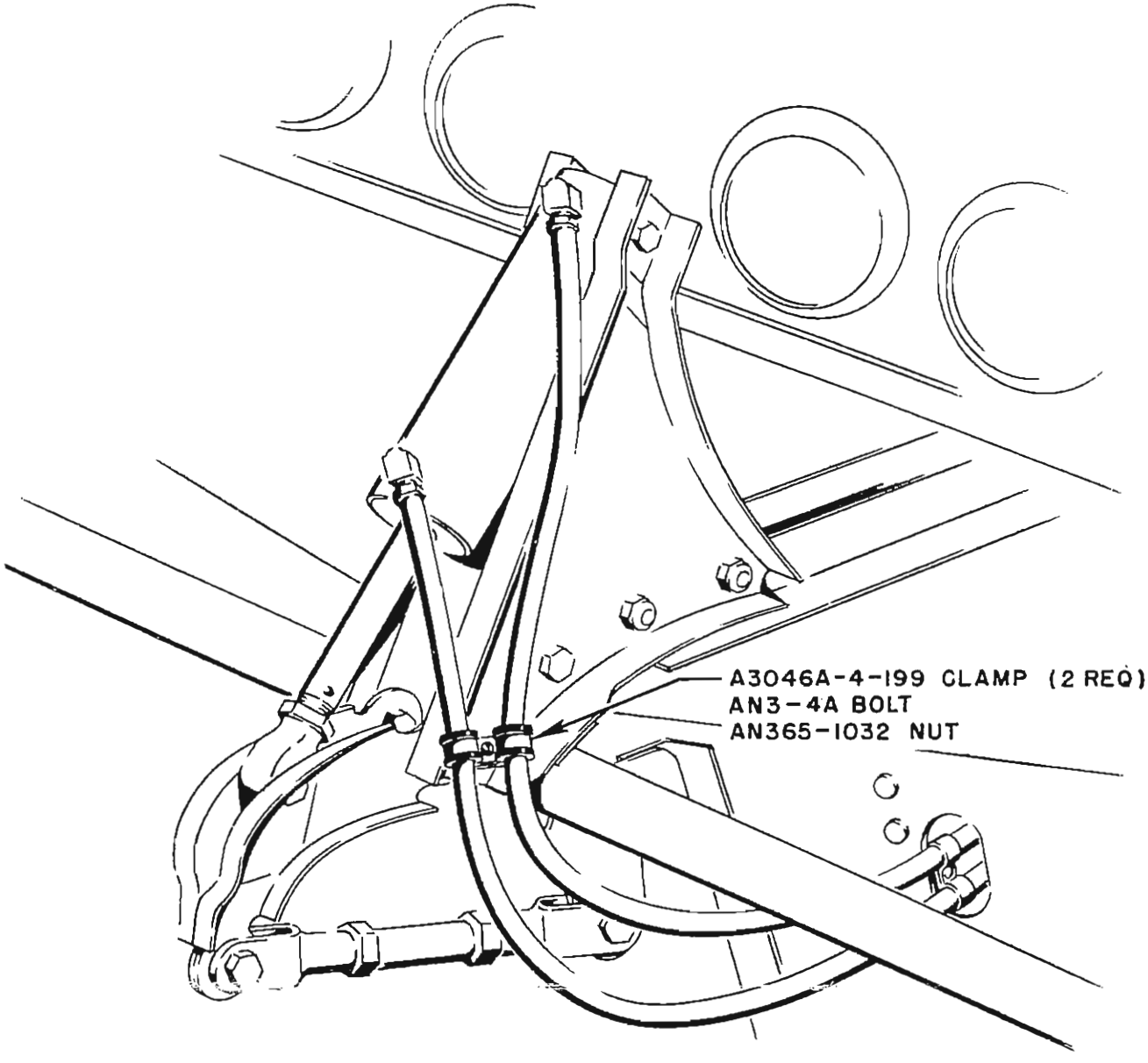

Figure 3 - Flap Hydraulic Line (Clamps)

SECTION III

INSTALLATION OF MODIFIED ENGINE-DRIVEN HYDRAULIC PUMP

A. Installation of Engine-driven Hydraulic Pump.

1. Remove old engine-driven hydraulic pump from right-hand side of the engine accessory section.
2. Install the new 145-58020 modified hydraulic pump, using 145-58189 drive adapter, new AN4045-1 gasket, and removed washers, nuts, and palnuts.

NOTE: Modified pump is identified by a green dot on the attaching flange.

SECTION IV

CHECK-OUT AND OPERATION OF SYSTEM

A. Check-out of System.

1. Fill hydraulic reservoir with clean (red) hydraulic fluid.
2. Relief valve lever should have full throw against both stops.
3. Jack airplane, and operate flaps and gear several cycles by hand-pump. Check hydraulic power light with dimmer switch on "BRIGHT".

NOTE: Shift 145-58303 striker on 145-58302 link rod to operate position light switch in both directions. Tabs on striker may be bent for additional adjustment.

4. Remove jacks, and with engine running, operate flaps several cycles.
5. Check hydraulic system for line connection leaks, and re-fill hydraulic reservoir if necessary.

B. Operation of Controlled Relief Valve Hydraulic System.

1. General

a. Take-off - Pull hydraulic power control "ON" just before starting take-off run; push control off after gear is raised.

b. Landing - Before lowering gear, pull power control "ON," and leave ON" until flaps are raised after landing is completed.

2. Normal Operation of Landing Gear.

a. Pull hydraulic power control "ON". Check light on.
b. Move gear control to desired position. (Release gear control down-lock when moving the control to UP).
c. When gear is in desired position (check gear position lights), push hydraulic power control off. Check power light off. If gear is being lowered for landing, leave power control "ON" until flaps are raised before starting to taxi.

3. Emergency Operation of Landing Gear.

a. If gear fails to extend normally, leave hydraulic power control "ON" and landing gear control at "DOWN".
b. Push landing gear emergency handle.
c. If necessary, operate hand-pump and then yaw airplane to lock gear down. Check gear position lights and warning horn.

4. Normal Operation of Flaps.

a. Pull hydraulic power control "ON". Check power light on.
b. Move flap control to "DOWN".
c. Leave hydraulic power control "ON" for landing.
d. When landing is completed, move flap control to "UP" and push hydraulic power control off. Check power light off.

5. Emergency Operation of Flaps.

a. If flaps fail to operate normally, leave hydraulic power control "ON" and flap control in desired position.
b. Supply hydraulic pressure by operating hand-pump.

COMPLETE FOLLOWING RECORDS

Enter notice of compliance with this Bulletin in the Airplane Log Book.

Insert "Log of Revisions" page immediately following title page and replace pages 4 and 5 in C.A.A. APPROVED AIRPLANE OPERATING LIMITATIONS with new revised pages.

Standard Repair and Alteration Form ACA-337 should be completed, and noted to indicate that Item No. 106 on Equipment List is ON airplane.

Insert Special Revision Number 1, dated March 26, 1947, Modification of Hydraulic System, in black-covered NAVION OPERATION MANUAL.

Remove and destroy Pilot's Check List 145-53094F, and install new Pilot's Check List 145-53094G.

Standard Time Allowance for this modification will be 5.3 hours. Warranty adjustments will be based on above standard.

Only the following parts are to be returned with Application for Warranty Adjustment Form (see Factory Dealer Bulletin No. 79):

Item	Description	Mfr. Ref. No.
382-300	Relief Valve	145-58022
344-100	Regulator	145-58019
6086	Filter	145-58023
330	Pump	145-58020

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NOTE: If you have sold your NAvion, please return this kit to the factory with name and address of the new owner.

3. Cap or plug all open lines.
4. With a hacksaw, cut through pipe nipple connecting flow regulator to bottom of shut-off valve, and remove flow regulator, relief valve, and filter from airplane. Remove remaining portion of nipple from shut-off valve.

NOTE: Saw through nipple so hex portion will remain in shut-off valve to provide a wrench grip for removal of fitting from shut-off valve.

5. Drill out three rivets which mount flow regulator bracket to firewall. Remove bracket, enlarge holes in firewall to No. 12 (.189), and plug with three AN3-4A bolts, AN960-D10 washers, and AN365-1032 nuts.
6. Remove flexible hydraulic shut-off control from airplane.

NOTE: Removed clamps and flexible control will be re-used.

B. Layout and drilling of the firewall and dash panel.

See Figure 1 for layout dimensions.

NOTE: The following paragraph numbers correspond to the numbered steps on Figure 1. Hole locations should be marked and checked to be certain they match the brackets to be installed.

1. Drill one 5/16-inch hole through firewall for hydraulic shut-off valve flexible control.
2. Drill one No. 10 (.193) hole through firewall angle for the mounting of the shut-off valve control bracket. Enlarge one existing hole in firewall angle to No. 10 (.193).
3. Drill four No. 10 (.193) holes for mounting of 145-58291 relief valve bellcrank bracket and position switch bracket. The third hole for mounting of the 145-58291 bracket is presently used to secure the electrical wiring to the firewall angle, and must be enlarged to No. 10 (.193).
4. Drill one 7/16-inch hole through firewall for 145-58294 relief valve control rod.
5. Drill four No. 18 (.169) holes through firewall for mounting of 145-58292 relief valve bracket.

NOTE: The above four holes are existing on Airplanes NAV-4-751 and subsequent.

6. Drill one letter "V" (.377) hole in the left-hand dash panel for relocation of hydraulic shut-off control.
7. Drill one 11/16-inch hole in upper left dash panel for position indicating light.

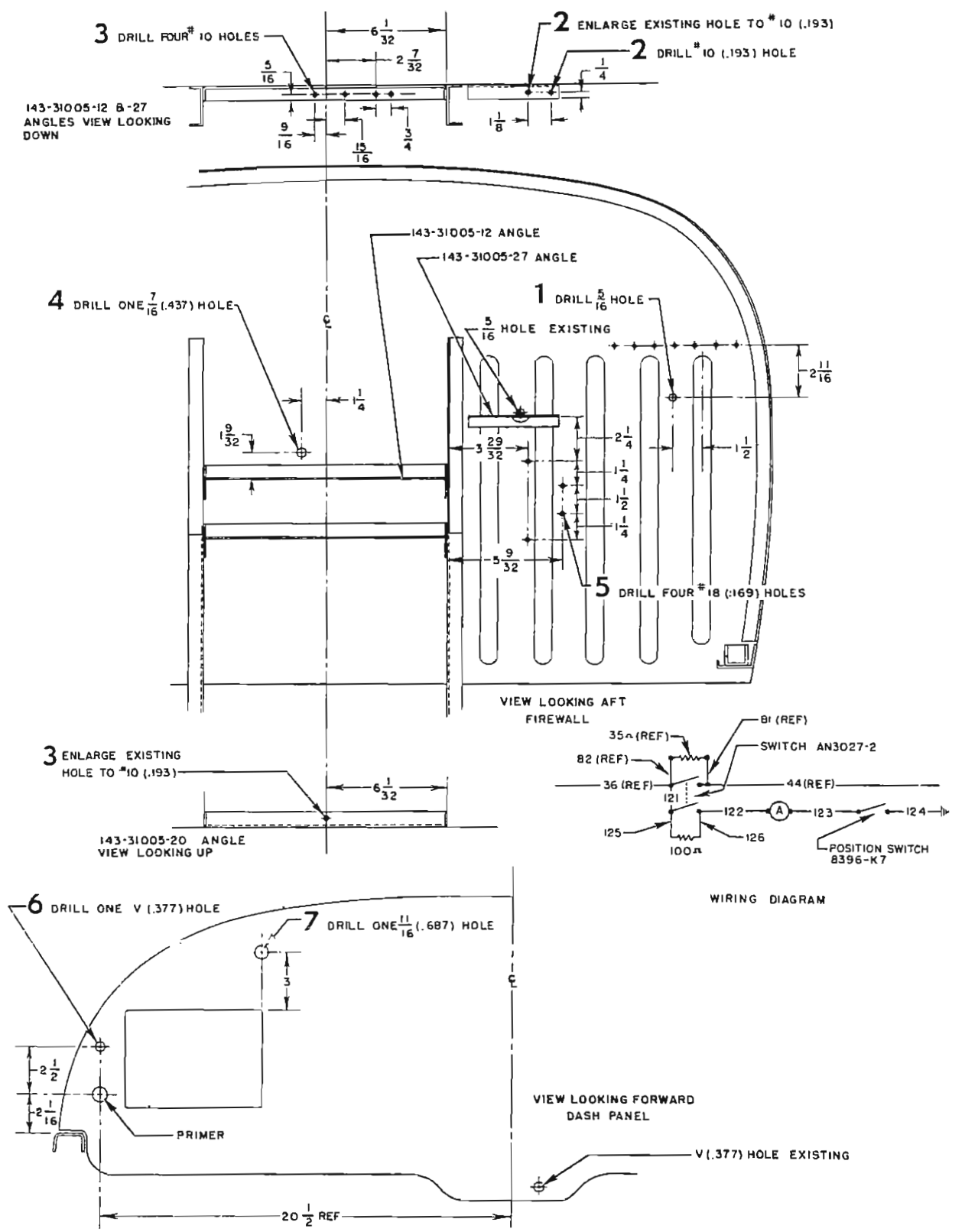

Figure 1 - Firewall Layout

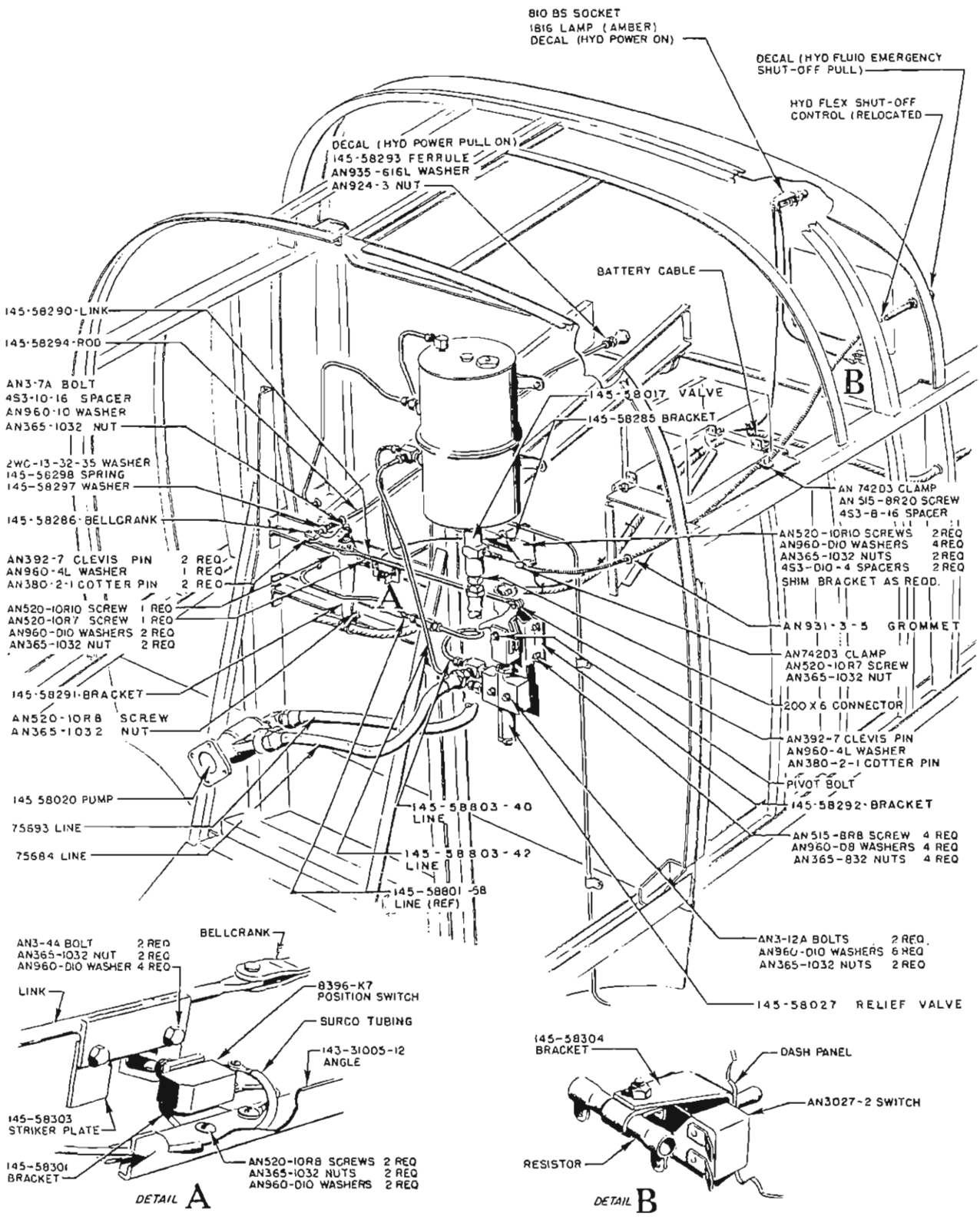

Figure 2 - Hydraulic Power Installation

C. Installation of New Hydraulic Power System.

See Figure 2.

1. Rotate the 145-58017 shut-off valve in the base of the hydraulic reservoir, tightening the threads, so the slide valve control operates from the left side, as viewed from the cockpit.
2. Remove 200 X 6 connector from the bottom of the removed flow regulator. Install connector in bottom of the 145-58017 shut-off valve. (200 X 6 connectors are furnished in 145-89032-10 kits.)
3. Mount 145-58291 bellcrank bracket on firewall with one AN520-10R10 screw, one AN520-10R7 screw, two AN960-D10 washers, and AN365-1032 nuts.

NOTE: Install AN520-10R10 screw in right-hand upper bracket mounting hole, and attach left-hand fuel pump hose at this point with new AN742-12C clamp.

Lower hole in bracket picks up existing hole for electrical wire clamp in firewall angle. Turn electrical wire Adel clamp over, and install on bottom of angle with AN520-10R10 screw and AN365-1032 nut through bellcrank bracket, firewall angle, and wire clamp.

4. Install pair of 145-58286 bellcranks on 145-58291 bracket with one AN3-7A bolt, 4S3-10-16 spacer, AN960-10 washer, and AN365-1032 nut.
5. Mount 145-58027 relief valve on 145-58292 relief valve bracket with two AN3-12A bolts through lower holes, six AN960-D10 washers, and two AN365-1032 nuts. Two washers are placed on each bolt between valve and bracket. One washer is placed under each nut. Attach relief valve to upper hole in bracket, using existing pivot bolt, washers, and nut at top of relief valve.

NOTE: Lifter on top of relief valve must be in the plunger depressed position before the pivot bolt is tightened to the bracket. It is imperative that this procedure be followed to eliminate backlash in the lifter pivot bolt and bushings, and allow the proper clearance between the lifter roller and valve plunger after the valve is installed. The valve is adjusted at the factory and should not be disturbed. If adjustment has been tampered with, readjust as follows:

Loosen small jam nut at base of lifter housing, and screw housing in or out on relief valve body until a clearance of .025 to .035 inch is obtained between roller and valve plunger with plunger in up position. All play must be taken up in pivot bolt bushing and holes when checking this clearance. After clearance is obtained, tighten jam nut previously loosened.

Loosen large jam nut next to relief valve body, and rotate lifter assembly until it is positioned in correct relationship to relief valve. With plunger depressed the top of the lifter at which operating link rod connects should be pointing away from the side of relief valve to which hydraulic lines attach. After lifter assembly is properly positioned, tighten the large jam nut and safety. This last adjustment is for indexing the lifter with the relief valve, and does not affect the previously adjusted clearance.

6. Install 145-58292 relief valve bracket on firewall, with four AN515-8R8 screws. AN960-D8 washers, and AN365-832 nuts.

NOTE: 145-54054 starter pedal reinforcement bracket mounts on aft side of firewall with these same screws. Field Service Bulletin No. 27 directs the installation.

7. Install 145-58293 ferrule on dash panel with AN935-616L lock washer and AN924-3 nut.

8 Place 2W1C-13-32-35 fairlead washer on 145-58294 control rod. Slide control rod through 7/16-inch hole in firewall and ferrule previously installed in dash panel. Install AN315-3R jam nut and 145-51061-3 control knob on dash panel end of control rod.

NOTE: The 145-58294 rod, with fairlead washer, must be installed from forward side of firewall The rod must be positioned near the starter motor before it can be inserted through the firewall. To ascertain this position insert the rod without the fairlead washer, from the aft side of firewall. Pull rod through firewall past starter motor, install fairlead washer on rod, and then push rod back through firewall so rod lies between the control column and right hand aileron cable.

9. Place 145-58298 spring over rod end, and install 145-58297 slotted washer on flattened portion of 145-58294 control rod Attach control rod to bellcranks with AN392-7 clevis pin, one AN960-4L washer, and one AN380-2-1 cotter pin. Bellcrank will retain 145-58297 washer on rod.

NOTE: 2W1C-13-32-25 washer serves as a seal on the firewall and is held in contact with the firewall by compression of spring thrusting against 145-58297 washer.

10. Connect 145-58290 link from bellcrank to relief valve, using two AN392-7 clevis pins, AN960-4L washers, and AN380 2-1 cotter pins

NOTE: Rods are installed between arms of bellcranks and actuating levers at all joints.

11. Install removed hydraulic flexible control through left side of dash panel above engine primer. (Remove primer, or use crowfoot wrench to tighten jam nut on control housing at forward side of dash panel.)
12. Route flexible hydraulic shut-off control forward through 5/16-inch hole in firewall using AN931-3-5 grommet. Attach control to radio power pack shelf, at rear outboard pack mounting screw hole, using previously removed AN742D-3 clamp, new AN515-8R20 screw, 4S3-8-16 spacer, and existing lock washer and nut.

NOTE: All screws attaching power pack to shelf should be installed with the heads upwards.

13. Mount 145-58285 bracket for hydraulic shut-off flexible control to firewall angle with two AN520-10R10 screws, 4S3-D10-4 spacers, four AN960-D10 washers, and two AN365-1032 nuts. Arrange spacers and washers to align bracket with the shut-off flexible control.
14. Secure shut-off flexible control housing to 145-58285 bracket with previously removed AN742D3 clamp, screw, nut and washer.
15. Connect shut-off control to shut-off valve, with control knob approximately 1/16 inch from dash panel (to provide spring-back), and the valve plunger in the closed position.
16. Connect 75693 flexible suction hose from hydraulic pump to 200 X 6 connector in bottom of hydraulic shut-off valve.
17. Connect 75684 flexible pressure hose from hydraulic pump to forward side of tee in relief valve.
18. Connect 145-58803-40 S-shaped line to tee on relief valve and to union on existing 145-58801-58 pressure line.

NOTE: 145-58801-58 line runs through firewall to master control valve on dash panel.

19. Connect 145-58803-42 return line to 200 X 4 connector on lower inboard side of relief valve and to 572 X 4 tee on inboard side of reservoir.

D. Airplanes equipped with Gyro Instrument Panels.

A special 145-89008-10 Kit furnishes the required parts to modify airplanes equipped with the gyro instrument panel.

1. Remove hose between oil separator and vacuum pump.

NOTE: Clamps on left-hand firewall angle and to left fuel pump hose will be used again.

2. Remove two screws, nuts, and spacers attaching oil separator to firewall.

3. Relocate separator 1-5/8 inches outboard of present location. Drill two No. 18 (.169) holes in firewall and attach oil separator, using removed screws, nuts, and spacers. Plug old holes with two AN515-8R6 screws and AN365-832 nuts.

NOTE: On early airplanes, the generator regulator condenser must be moved outboard to provide clearance for oil separator.

4. Route new 1/2 X 40 hose from vacuum pump, above new hydraulic installation, to oil separator. Secure hose to left-hand firewall angle at previous position with removed clamp.

NOTE: Rotate elbow in vacuum pump in clockwise direction to secure proper alignment with hose.

5. Clamp 1/2 X 40 hose 5 or 6 inches from top of right-hand diagonal angle on firewall with clamp, screw, and nut previously used to attach old vacuum hose to left-hand fuel pump hose.
6. Remove 1/2 X 19-1/2 hose from oil separator to engine oil sump. Cut to length of 18 inches and reinstall

E. Airplanes Equipped with Cabin Heaters.

1. Remove clamp attaching heater fuel line to firewall.
2. Clamp heater fuel line to left-hand fuel pump hose near aft left-hand end of left magneto, using new AN742-12C clamp, AN515-8R8 screw, AN365-832 nut, and removed heater line clamp.

F. Electrical Installation.

See Figure 2.

1 Install 810 BS pressure light socket and 1816 ember bulb in upper left side of dash panel.
2. Install new AN3027-2 switch and wiring assembly in dash panel in place of existing landing gear light dimmer switch which will be used again as the position switch.
3. Installed previously removed 8396-K7 dimmer switch in 145-58301 bracket.
4. Install old dimmer switch and bracket on firewall angle with two AN520-10R8 screws, AN960-D10 washers, and AN365-1032 nuts.

See Figure 1.

5. Connect wires in accordance with electrical diagram.

NOTE: The 35-ohm resistor is existing and must be connected to lower terminals of new AN3027-2 dimmer switch.

6. Route wire 123 along the battery lead from amber light to position switch mounted on firewall. The wire passes through the firewall grommet formerly used for the hydraulic shut-off valve flexible control. Secure wire 123 to battery lead in six places with waxed cord.
7. Ground wire 124 with screw attaching position switch bracket to firewall.

G. Placarding of Controls.

1. Remove existing stencil "HYDRAULIC SYSTEM PULL OFF" and install new decal "HYDRAULIC POWER PULL ON".
2. Install new "HYDRAULIC FLUID EMERGENCY SHUT-OFF PULL" decal above hydraulic shut-off valve control on left side of dash panel.
3. Install new decal "HYDRAULIC POWER ON" above amber pressure light.

SECTION II

INSPECTION OF NOSE GEAR CYLINDER AND CLAMPING OF FLAP LINES

A. Clamping of Flap Cylinder Hydraulic Lines.

This rework accomplished at factory on Airplanes NAV-4-948 and subsequent.

See Figure 3.

1. Remove flap operating mechanism inspection cover, from right-hand wing-to-fuselage fillet
2. Install two A3046A-4-199 clamps on 145-58801-46 and -48 hydraulic flap operating cylinder lines, using AN3-4A bolt and AN365-1032 nut. The clamps should be located approximately 8 inches below the upper line fitting in the cylinder.

NOTE: If the flap lines are not routed near one another so they can easily be clamped together, it may be necessary to turn the upper fitting slightly.

B. Inspection of Nose Gear Actuating Cylinder.

1. Inspect nose gear actuating cylinder and determine if cylinder is of the swivel head type installed in accordance with Field Service Bulletin No. 19, dated January 23, 1947. (If requirements of Field Service Bulletin No. 19 have not been accomplished, they must be complied with at this time.)