# FLIGHT CONTROLS — FLAP MICROSWITCHES — INCORPORATION OF MOD N835 (N22) & N874 (N24)

## 1. PLANNING INFORMATION

### A. Effectivity

(1) Aircraft affected:

(a) **N22 Series** line sequence numbers 1 to 9, 11 to 29, 31, 33, 35, 37, 39 to 41, 43, 45, 47 to 59, 61, 63, 65 to 70, 82 to 88, 90 to 95, 97, 100, 102 to 114, 116, 118, 125,126, 131 to 134, 137, 138, 141, 143 to 158, 166 to 170.

**NOTE**

Mod N835 is not applicable to FAA Certificated N22S aircraft line sequence numbers 159 to 165 inclusive. These aircraft are fitted with CO G582A.

(b) **N24 Series** line sequence numbers 10, 30, 32, 34, 36, 38, 42, 44, 46, 60, 62, 64, 71 to 81, 89, 96, 98, 99, 101, 115, 117, 119 to 124, 127 to 130, 135, 136,139, 140, 142.

(2) Spares affected:

None.

(3) It is a prerequisite that Mod N875 (N22) or N876 (N24)(Ref SB ANMD-57-13 Rev 1) is previously or concurrently fitted.

### B. Reason

The current flap microswitches are individually installed in the wing and require to be adjusted for correct microswitch actuation whilst being installed, which results in a cumbersome method of adjustment. Moisture contamination in the flap microswitches causing short circuits is still a possible source of uncommanded flap operations, despite incorporation of ASTA Modification N608 (Ref ANMD-27-40) which introduced plastic bagging around the flap microswitch installation.

### C. Description

New hermetically sealed microswitches are installed in the wing as a pre-assembled microswitch assembly. Correct microswitch actuation can be adjusted and checked on a bench prior to fitment to the wing so that the only adjustment required is for set-up of correct flap angle. The new microswitches being sealed will not short circuit due to moisture/water contamination, eliminating the flap microswitches as a cause of uncontrolled flap operations.

### D. Compliance

(1) Incorporation of this Service Bulletin is mandatory.

(2) To be carried out at the next 300 hr inspection, or in conjunction with the embodiment of Service Bulletin ANMD-57-13 Rev 1 (Mod N875 or N876).

| Page No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rev No | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

E. **Approval**

The requirement detailed herein has been approved by a person authorised under Civil Aviation Regulation 35 and conforms to the Type Certification requirements.

F. **Manpower**

6 manhours.

G. **Material – Price and Availability**

Kits NMD-27-50-1 and NMD-27-50-2 are available free of charge upon request from Nomad Customer Support - Boeing Aerospace Support - ASTA. Other parts to be locally sourced as noted.

H. **Tooling**

None.

I. **Weight and Balance Change**

None.

J. **References**

Maintenance Manual Chap 27-50-00, 27-50-03

K. **Publications Affected**

Maintenance Manual
Illustrated Parts Catalogue

2. **ACCOMPLISHMENT INSTRUCTIONS**

A. **PART 1 - Removal of existing flap microswitch installation**

**WARNING**

DO NOT OPERATE FLIGHT CONTROLS WITH CONTROL COMPONENTS DISCONNECTED OR WHEN PERSONNEL ARE WORKING IN THE AREA CONCERNED. SERIOUS INJURY TO PERSONNEL OR DAMAGE TO COMPONENTS AND STRUCTURE COULD OCCUR.

(1) Apply external power, set the flap circuit breakers and the battery switch to ON.

(2) Ensure cabin doors are shut and extend the flaps (Ref MM Chap 27–50–00).

(3) Set the battery switch to OFF, trip the flap circuit breakers and remove external power.

(4) Gain access to the cam/microswitch assembly (Ref Fig 1) at wsta 62.528 by opening the appropriate LH wing trailing edge doors.

(5) **Post-Mod N46 (N22 Series) or N124 (N24 Series)**: Remove the moulded plastic cover by loosening the two screws (Ref MM Chap 27-50-03, Fig 202, Sheet 2). Retain Cover Assembly 1/N-45-1356 (screws, washers and distance pieces to be replaced if damaged, Ref IPC Chap 27-50-02. Fig 2).

(6) **Post-Mod N608**: Remove the plastic bag around the outboard end of the moulded cover and wiring loom (Ref MM Chap 27-50-03, Fig 203), and remove the moulded plastic cover by loosening the two screws (Ref MM Chap 27-50-03, Fig 202, Sheet 2). Retain Cover Assembly 1/N-45-1356 (screws, washers and distance pieces to be replaced if damaged, Ref IPC Chap 27-50-02 Fig 2).

**CAUTION**

ENSURE THAT THE CABLE IDENTS AT MICROSWITCH CONNECTIONS ARE LEGIBLE. IF IDENTS ARE MISSING OR OBSCURE FIT NEW IDENTS ON DISCONNECTION.

(7) Disconnect the electrical connections at the microswitches, discard wires (idents C12E22 and C13D22) that connect between microswitches.

(8) Remove and discard shearbolt (NAS1304-9), locknut (MS21083N4) and washer (AN960PD416) from the cam lever and idler arm attachment to the flap control rod.

**CAUTION**

DO NOT REMOVE THE BOLT AT THE IMMEDIATE OUTBOARD FLAP CONTROL ROD JUNCTION.

(9) Remove and discard the locknut (MS21083N5) and washer (AN960PD516L) **(Post-Mod N46 or N124)** from the flap idler arm mounting bolt.

(10) Remove and retain the adjustment bolt (AN3-4A) and remove and discard washer (AN960PD10).

(11) Withdraw the cam assembly and mounting plate from the wing.

B. **PART 2 - Installation of Mod N835 (N22)**

Cam/Microswitch assembly (1/N-45-1724) is supplied fully assembled with cams set. However, it is recommended that prior to installation on the wing correct activation of the microswitches be checked as follows (Ref Figs 2, 3 and 4):

(1) Using a Multimeter, check microswitches B2, B1 and D as follows:

(a) Hold the cam lever fully counter-clockwise.

(b) Insert a 0.060 inch feeler gauge between microswitch B2 roller and its actuating cam.

(c) Confirm microswitch activates when the feeler gauge is inserted, and deactivates when the feeler gauge is withdrawn.

(d) Repeat steps (a) to (c) for microswitches B1 and D.

(2) If an adjustment is necessary proceed as follows:

(a) Slacken only those screws securing the cams needing adjustment.

(b) With cam lever rotated fully counter-clockwise place a 0.060 inch feeler gauge between the microswitch roller and the lower step of the cam. Slide cam on the lever until the

switch just activates and torque tighten screws to 5–10 lb in. Recheck microswitch activation of all three cams in the group and adjust as required.

(3) Using a Multimeter, check microswitches A2, A1 and C as follows:

(a) Hold the cam lever fully clockwise.

(b) Insert a 0.060 inch feeler gauge between microswitch A2 roller and its actuating cam.

(c) Confirm microswitch activates when the feeler gauge is inserted, and deactivates when the feeler gauge is withdrawn.

(d) Repeat steps (a) to (c) for microswitches A1 and C.

(4) If an adjustment is necessary proceed as follows:

(a) Slacken only those screws securing the cam needing adjustment.

(b) With cam lever rotated fully clockwise, place a 0.060 inch feeler gauge between the microswitch roller and the lower step of the cam. Slide cam on the lever until the switch just activates and torque tighten screws to 5–10 lb in. Recheck microswitch activation of all three cams in the group and adjust as required.

**NOTE**

- In the above steps, if a cam segment cannot be adjusted to activate the microswitch, the cam should be removed and the adjustment/securing holes carefully enlarged.
- If the cam segment holes are enlarged, ensure the part is free from all burrs and sharp edges. Touch up exposed surfaces with Alodine.

(5) Pass special bolt (1/N–45–1740) through flap control rod and idler arm and secure with new locknut (MS21083N4) and washer (NAS1149D463K), torque tighten to 30–40 lb in.

(6) Fit cam/microswitch assembly in place on the mounting bolt with the end of cam lever extending over the special flap control rod bolt (1/N–45–1740), securing to mounting bolt with new locknut (MS21083N5) and washer (NAS1149D563K) and to the special bolt with washer (NAS1149D0363K) and split pin (MS24665–132), torque tighten locknut to 60–85 lb in.

(7) Secure mounting plate to aircraft structure using retained adjusting bolt (AN3–4A) and new washer (NAS1149D0363K). Do not fully tighten bolt.

(8) Apply external power, set the flap circuit breakers and the battery switch to ON. Raise the flaps to 22°.

(9) Set the battery switch to OFF, trip the flap circuit breakers and remove external power.

(10) Remove backlash from the flap system by lifting the trailing edge.

(11) Rotate the cam/microswitch assembly mounting plate counter-clockwise to ensure release of both A1 and A2 microswitches. Then rotate the mounting plate clockwise until the either microswitch A1 or A2 just activates. Tighten the adjusting bolt to 15–20 lb in.

(12) Connect wire leads as follows:

(a) Identify leads from microswitches (Ref Fig 4).

(b) Cut off crimped lugs (MS25036-148) from the aircraft cable wire ends and connect to the external wire leads from microswitches (Ref Fig 4) using solder sleeves (M83519/1-2) or crimp splices (M81824/1-2).

**NOTE**

Stagger wire splices to prevent excessive build up of wire bundle diameter.

(c) Unused wire leads from microswitches (Ref Fig 4) to be capped using insulated wire caps (324484 AMP) and suitably stowed in a separate bundle.

(d) Secure cable to mounting plate with clip (NX3), screw (MS35206-246), nut (MS21044N08) and two washers (NAS1149DN832K). Secure aircraft wire bundle using waxed nylon cordage (WN25).

(13) Apply external power, set the flap circuit breakers and the battery switch to ON. Ensure cabin doors are closed.

(14) Functionally check the operation of the flap system over full range, including operation of the AUTO switch and stall warning system (Ref MM Chap 27-50-00 and MM Chap 31-52-00).

(15) With all adjustments completed, extend the flaps and install cover assembly (1/N-45-1356) over the microswitch and cam assembly. Close and secure the wing trailing edge doors.

(16) Check the operation of the landing gear up warning system (Ref MM Chap 32-60-00).

(17) Set the battery switch to OFF, trip the flap circuit breakers and remove external power.

C. **PART 3 - Installation of Mod N874 (N24)**

Cam/Microswitch assembly (1/N-45-1725) is supplied fully assembled with cams set. However, it is recommended that prior to installation on the wing correct activation of the microswitches be checked as follows (Ref Figs 5, 6 and 7):

**NOTE**

Microswitches B2 and A2 are not used, and there are only two cams per group to check/adjust.

(1) Using a Multimeter, check microswitches B1 and D as follows:

(a) Hold the cam lever fully counter-clockwise.

(b) Insert a 0.060 inch feeler gauge between microswitch B1 roller and its actuating cam.

(c) Confirm microswitch activates when the feeler gauge is inserted, and deactivates when the feeler gauge is withdrawn.

(d) Repeat steps (a) to (c) for microswitch D.

(2) If an adjustment is necessary proceed as follows:

(a) Slacken only those screws securing the cam needing adjustment.

(b) With cam lever rotated fully counter-clockwise, place a 0.060 inch feeler gauge between the microswitch roller and the lower step of the cam. Slide cam on the lever until the switch just activates and torque tighten screws to 5–10 lb in. Recheck microswitch activation of the other cam in the group and adjust as required.

(3) Using a Multimeter, check microswitches A1 and C as follows:

(a) Hold the cam lever fully clockwise.

(b) Insert a 0.060 inch feeler gauge between microswitch A1 roller and its actuating cam.

(c) Confirm microswitch activates when the feeler gauge is inserted, and deactivates when the feeler gauge is withdrawn.

(d) Repeat steps (a) to (c) for microswitch C.

(4) If an adjustment is necessary proceed as follows:

(a) Slacken only those screws securing the cam needing adjustment.

(b) With cam lever rotated fully clockwise, place a 0.060 inch feeler gauge between the microswitch roller and the lower step of the cam. Slide cam on the lever until the switch just activates and torque tighten screws to 5–10 lb in. Recheck microswitch activation of the other cam in the group and adjust as required.

**NOTE**

- In the above steps, if a cam segment cannot be adjusted to activate the microswitch, the cam should be removed and the adjustment/securing holes carefully enlarged.
- If the cam segment holes are enlarged, ensure the part is free from all burrs and sharp edges. Touch up exposed surfaces with Alodine.

(5) Pass special bolt (1/N–45–1740) through flap control rod and idler arm and secure with new locknut (MS21083N4) and washer (NAS1149D463K), torque tighten to 30–40 lb in.

(6) Fit cam/microswitch assembly in place on the mounting bolt with the end of cam lever extending over the special flap control rod bolt (1/N–45–1740), securing to mounting bolt with new locknut (MS21083N5) and washer (NAS1149D563K) and to the special bolt with washer (NAS1149D0363K) and split pin (MS24665–132), torque tighten locknut to 60–85 lb in.

(7) Secure mounting plate to aircraft structure using retained adjusting bolt (AN3–4A) and new washer (NAS1149D0363K). Do not fully tighten bolt.

(8) Apply external power, set the flap circuit breakers (ACT and CONT) and the battery switch to ON. Raise the flaps to fully UP.

(9) Trip the flap control (CONT) circuit breaker. Select the flap lever to fully DOWN. lower the flaps in small increments, by momentarily resetting the CONT circuit breaker until the flaps reach 10°.

(10) Set the battery switch to OFF, trip the flap actuator (ACT) circuit breaker and remove external power.

(11) Remove backlash from the flap system by lifting the trailing edge.

(12) Rotate the cam assembly mounting plate counter-clockwise to ensure release of A1 microswitch. Then rotate the mounting plate clockwise until the A1 microswitch just activates. Tighten the securing bolt to 15–20 lb in.

(13) Connect wire leads as follows:

(a) Identify leads from microswitches (Ref Fig 7).

(b) Cut off crimped lugs (MS25036-148) from the aircraft cable wire ends and connect to the external wire leads from microswitches (Ref Fig 7) using solder sleeves (M83519/1-2) or crimp splices (M81824/1-2).

**NOTE**

Stagger wire splices to prevent excessive build up of wire bundle diameter.

(c) Unused wire leads from microswitches and aircraft wire bundle (Ref Fig 7) to be capped using insulated wire caps (324484 AMP) and suitably stowed in separate bundles.

(d) Secure cable to mounting plate with clip (NX3), screw (MS35206-246), nut (MS21044N08) and two washers (NAS1149DN832K). Secure aircraft wire bundle using waxed nylon cordage (WN25).

(14) Apply external power, set the flap circuit breakers and the battery switch to ON. Ensure cabin doors are closed.

(15) Functionally check the operation of the flap system over full range, including operation of the stall warning system (Ref MM Chap 27-50-00 and MM Chap 31-52-00).

(16) With all adjustments completed, extend the flaps and install cover assembly (1/N-45-1356) over the microswitch and cam assembly. Close and secure the wing trailing edge doors.

(17) Check the operation of the landing gear up warning system (Ref MM Chap 32-60-00).

(18) Set the battery switch to OFF, trip the flap circuit breakers and remove external power.

3. **MATERIAL INFORMATION**

A. **Parts Required per Aircraft - Mod N835 (N22)**

| New Parts - Kit, NMD-27-50-1 (Mod N835) consisting of the following: | | | |
|---|---|---|---|
| Part No | Description | Qty | Instruction/Disposition |
| 1/N-45-1724 | Cam Assy | 1 | |
| 1/N-45-1740 | Bolt, Special | 1 | |
| MS21044N08 | Nut | 1 | |
| MS21083N4 | Nut | 1 | |
| MS21083N5 | Nut | 1 | |
| MS24665-132 | Split Pin | 1 | |
| MS35206-246 | Screw, Machine-Pan Head | 1 | |
| NAS1149DN832K | Washer | 2 | |
| NAS1149D0363K | Washer | 2 | |
| NAS1149D463K | Washer | 1 | |
| NAS1149D563K | Washer | 1 | |
| NX3 | Clip | 1 | |
| M83519/1-2 | Solder Sleeves | 12 | Local source |
| S01-02-R | Solder Sleeves - Alternative | | Raychem |
| M81824/1-2 | Crimp Splices - Alternative | | Local source |
| D-436-37 | Crimp Splices - Alternative | | Raychem |
| AMP 324484 | Wire Caps | 2 | Local source |
| WN25 | Nylon Cordage | A/R | Local source |

| Parts Removed | | | |
|---|---|---|---|
| Part No | Description | Qty | Instruction/Disposition |
| 1/N-45-1356 | Cover | 1 | Retain |
| MS35207-271 | Machine Screw | 2 | Retain |
| 1A/N-45-1356 | Distance Tube | 2 | Retain |
| AN960PD10 | Washer | 2 | Retain |
| MS21083N5 | Locknut | 1 | Discard |
| AN960PD516L | Washer | 1 | Discard |
| 1/N-45-1359 | Tie Plate | 1 | Discard |
| AN960PD716L | Washer | 1 | Discard |
| NAS1304-9 | Shear Bolt | 1 | Discard |
| MS21083N4 | Locknut | 1 | Discard |
| AN960PD416 | Washer | 1 | Discard |
| 2/N-45-1297 | Cam Assy | 1 | Discard |
| AN3-4A | Bolt | 1 | Retain |
| AN960PD10 | Washer | 1 | Discard |

| Parts Removed (cont) | | | |
|---|---|---|---|
| Part No | Description | Qty | Instruction/Disposition |
| 1/N-45-1354 | Mounting Plate | 1 | Discard |
| MSS25253-1 | Microswitch | 6 | Discard |
| JV82 | Actuator, Tandem, Roller | 2 | Discard |
| JV5 | Actuator, Roller | 2 | Discard |

B. **Parts Required per Aircraft - Mod N874 (N24)**

| New Parts - Kit, NMD-27-50-2 (Mod N874) consisting of the following: | | | |
|---|---|---|---|
| Part No | Description | Qty | Instruction/Disposition |
| 1/N-45-1725 | Cam Assy | 1 | |
| 1/N-45-1740 | Bolt, Special | 1 | |
| MS21044N08 | Nut | 1 | |
| MS21083N4 | Nut | 1 | |
| MS21083N5 | Nut | 1 | |
| MS24665-132 | Split Pin | 1 | |
| MS35206-246 | Screw, Machine-Pan Head | 1 | |
| NAS1149DN832K | Washer | 2 | |
| NAS1149D0363K | Washer | 2 | |
| NAS1149D463K | Washer | 1 | |
| NAS1149D563K | Washer | 1 | |
| NX3 | Clip | 1 | |
| M83519/1-2 | Solder Sleeves | 12 | Local source |
| S01-02-R | Solder Sleeves - Alternative | | Raychem |
| M81824/1-2 | Crimp Splices - Alternative | | Local source |
| D-436-37 | Crimp Splices - Alternative | | Raychem |
| AMP 324484 | Wire Caps | 2 | Local source |
| WN25 | Nylon Cordage | A/R | Local source |

| Parts Removed | | | |
|---|---|---|---|
| Part No | Description | Qty | Instruction/Disposition |
| 1/N-45-1356 | Cover | 1 | Retain |
| MS35207-271 | Machine Screw | 2 | Retain |
| 1A/N-45-1356 | Distance Tube | 2 | Retain |
| AN960PD10 | Washer | 2 | Retain |
| MS21083N5 | Locknut | 1 | Discard |
| AN960PD516L | Washer | 1 | Discard |
| 1/N-45-1359 | Tie Plate | 1 | Discard |
| AN960PD716L | Washer | 1 | Discard |
| NAS1304-9 | Shear Bolt | 1 | Discard |
| MS21083N4 | Locknut | 1 | Discard |
| AN960PD416 | Washer | 1 | Discard |
| 1/N-45-1384 | Cam Assy | 1 | Discard |
| AN3-4A | Bolt | 1 | Retain |
| AN960PD10 | Washer | 1 | Discard |
| 1/N-45-1354 | Mounting Plate | 1 | Discard |
| MSS25253-1 | Microswitch | 6 | Discard |
| JV82 | Actuator, Tandem, Roller | 2 | Discard |
| JV5 | Actuator, Roller | 2 | Discard |

4. **SPECIAL TOOLS AND EQUIPMENT**

None.

5. **RECORDING ACTION**

Record compliance with Service Bulletin NMD–27–50 in the Airframe Log Book.

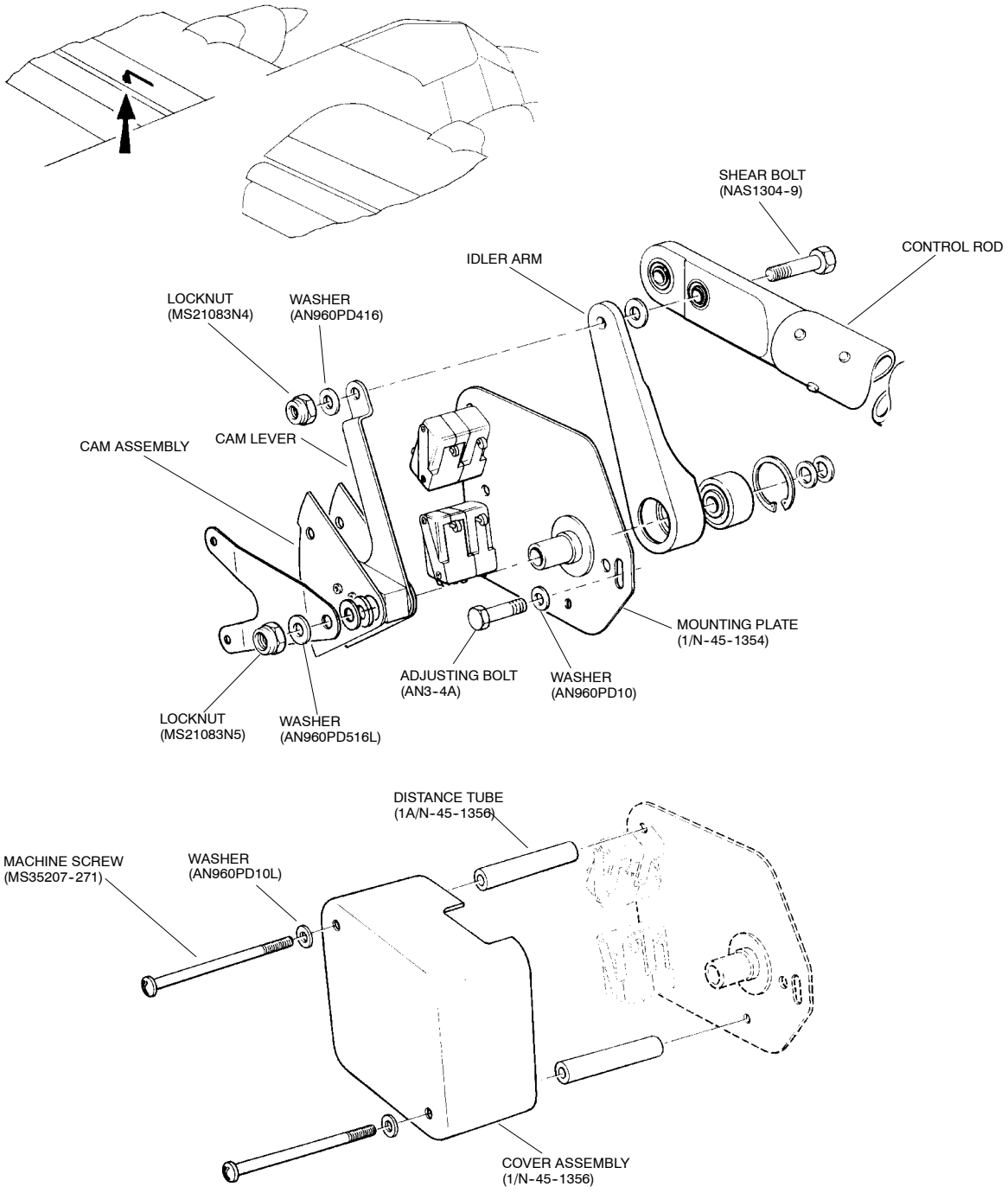


**Figure 1 Existing Cam/Microswitch Assembly (Post-Mod N46 or N124)**

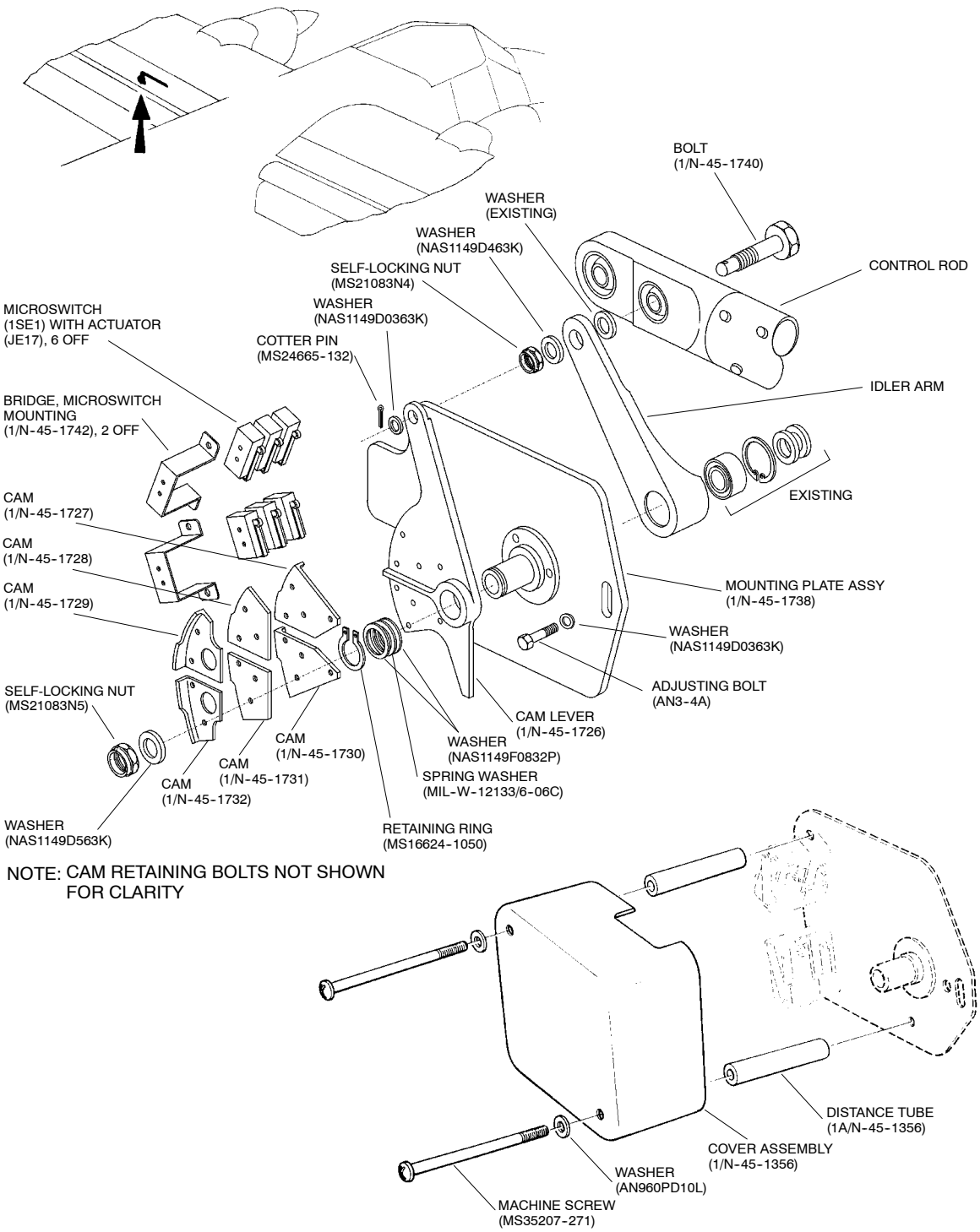


**Figure 2 Cam/Microswitch Assembly (Mod N835)**

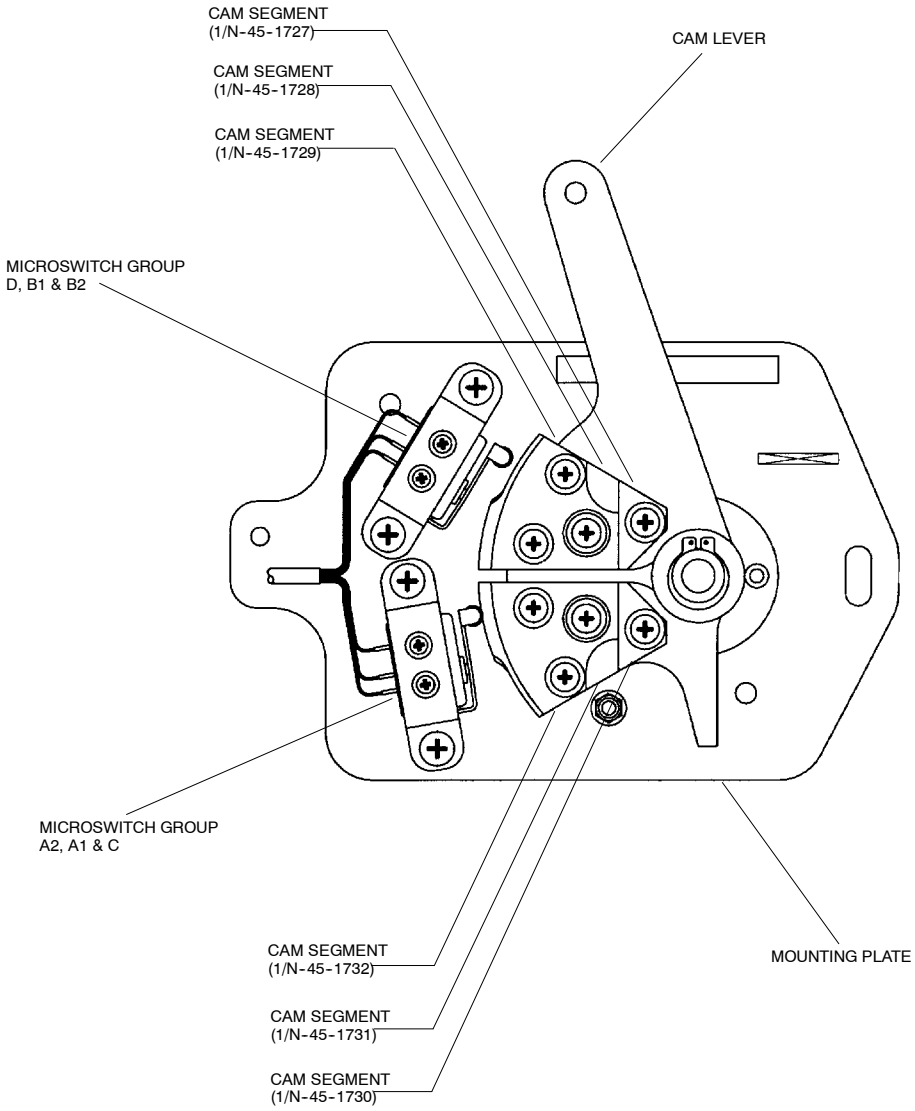


**Figure 3 Cam/Microswitch Assembly (Mod N835)**

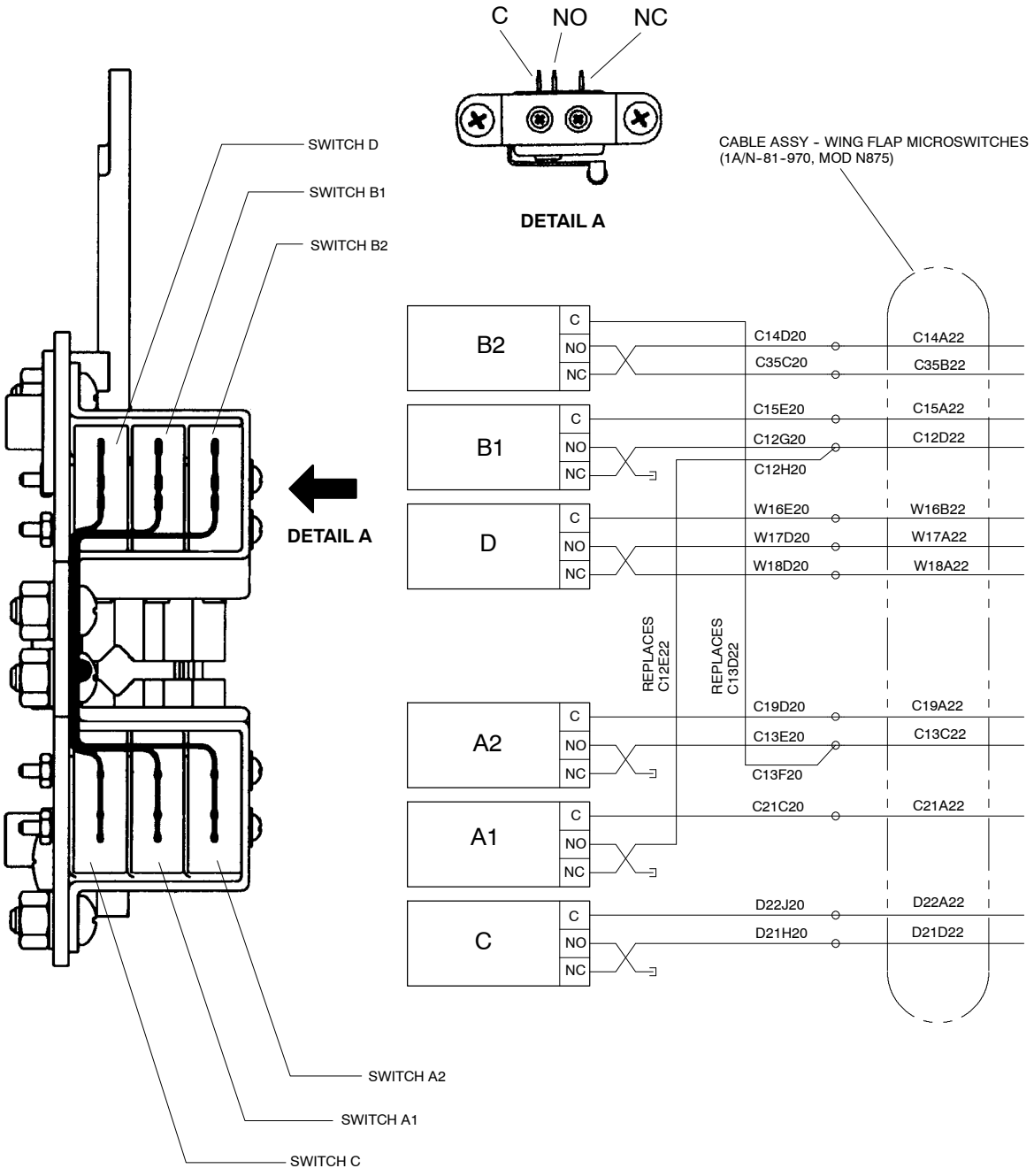


**Figure 4 Mod N835 (N22) Microswitch Positions and Schematic Wiring Diagram**

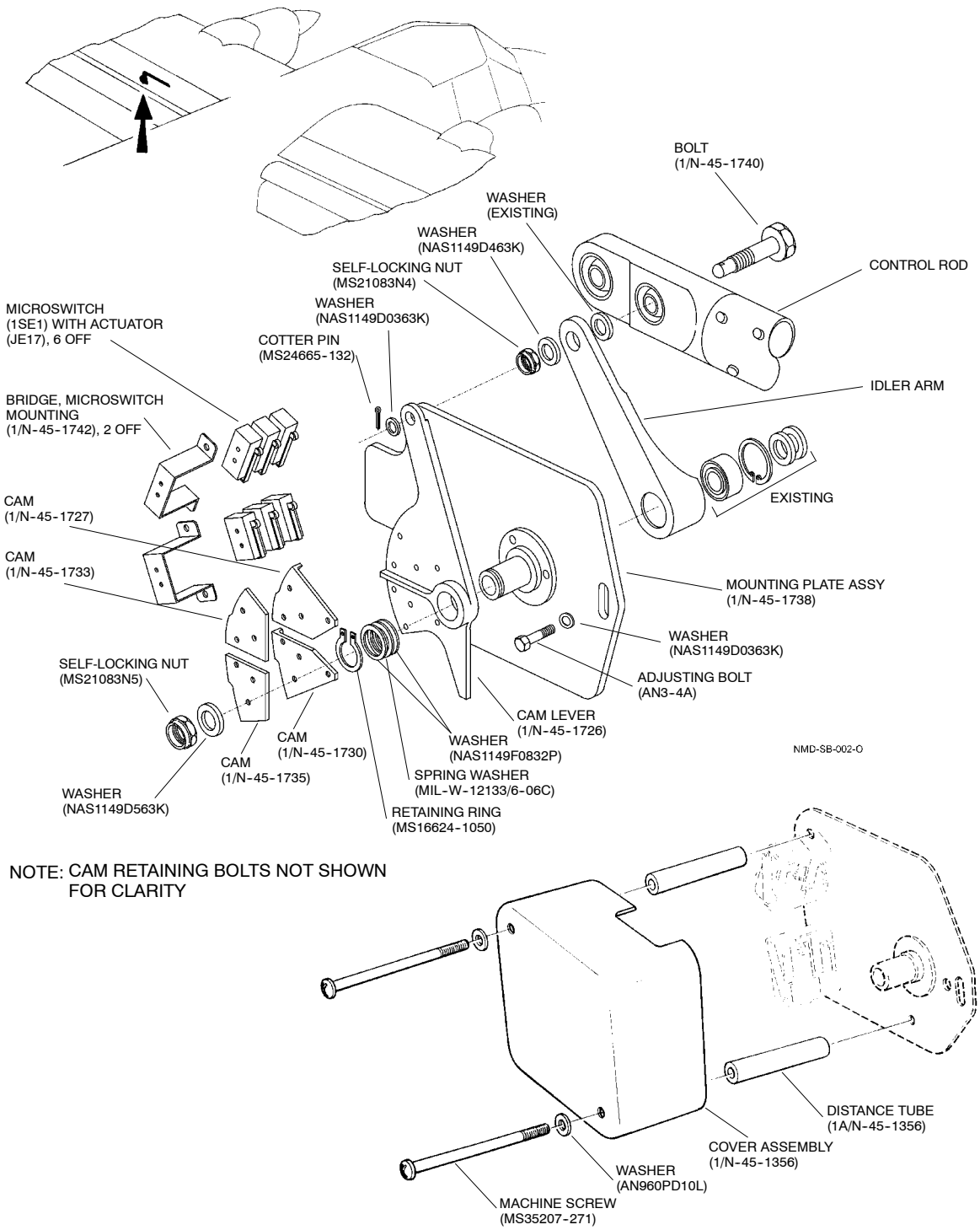


**Figure 5 Cam/Microswitch Assembly (Mod N874)**

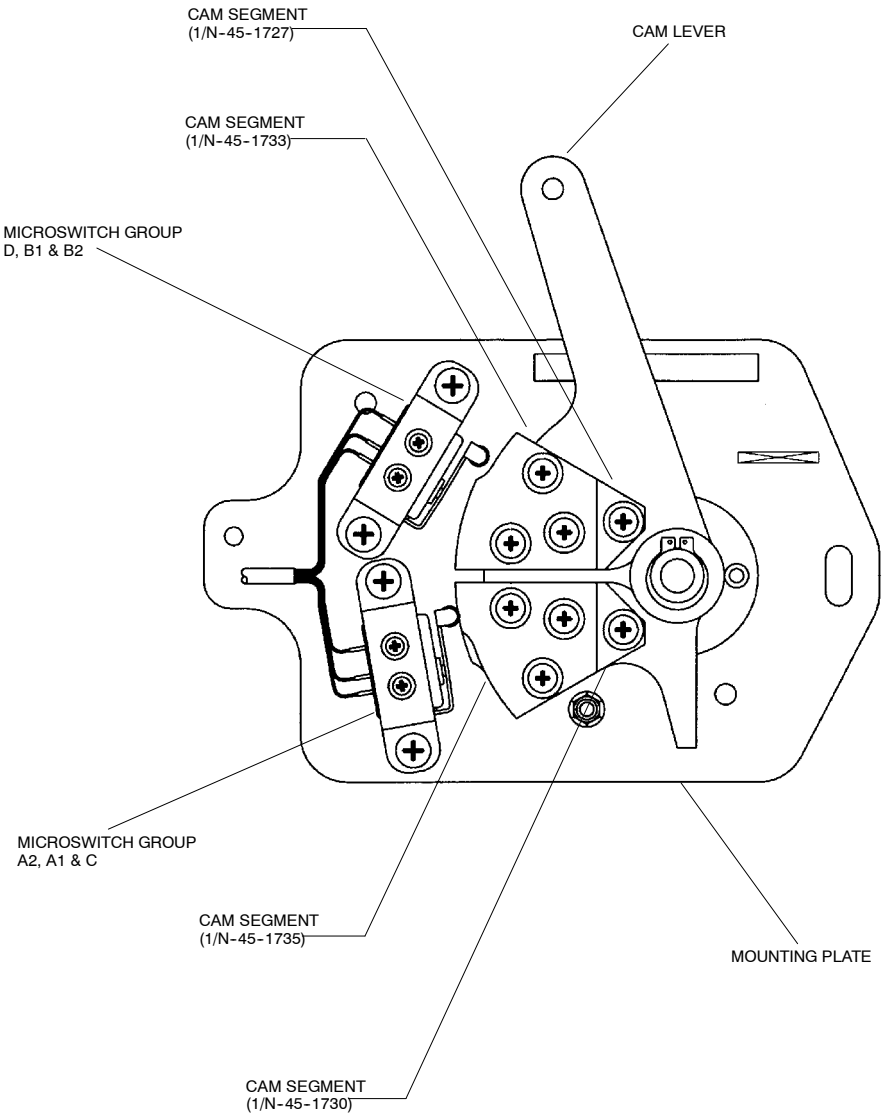


**Figure 6 Cam/Microswitch Assembly (Mod N874)**

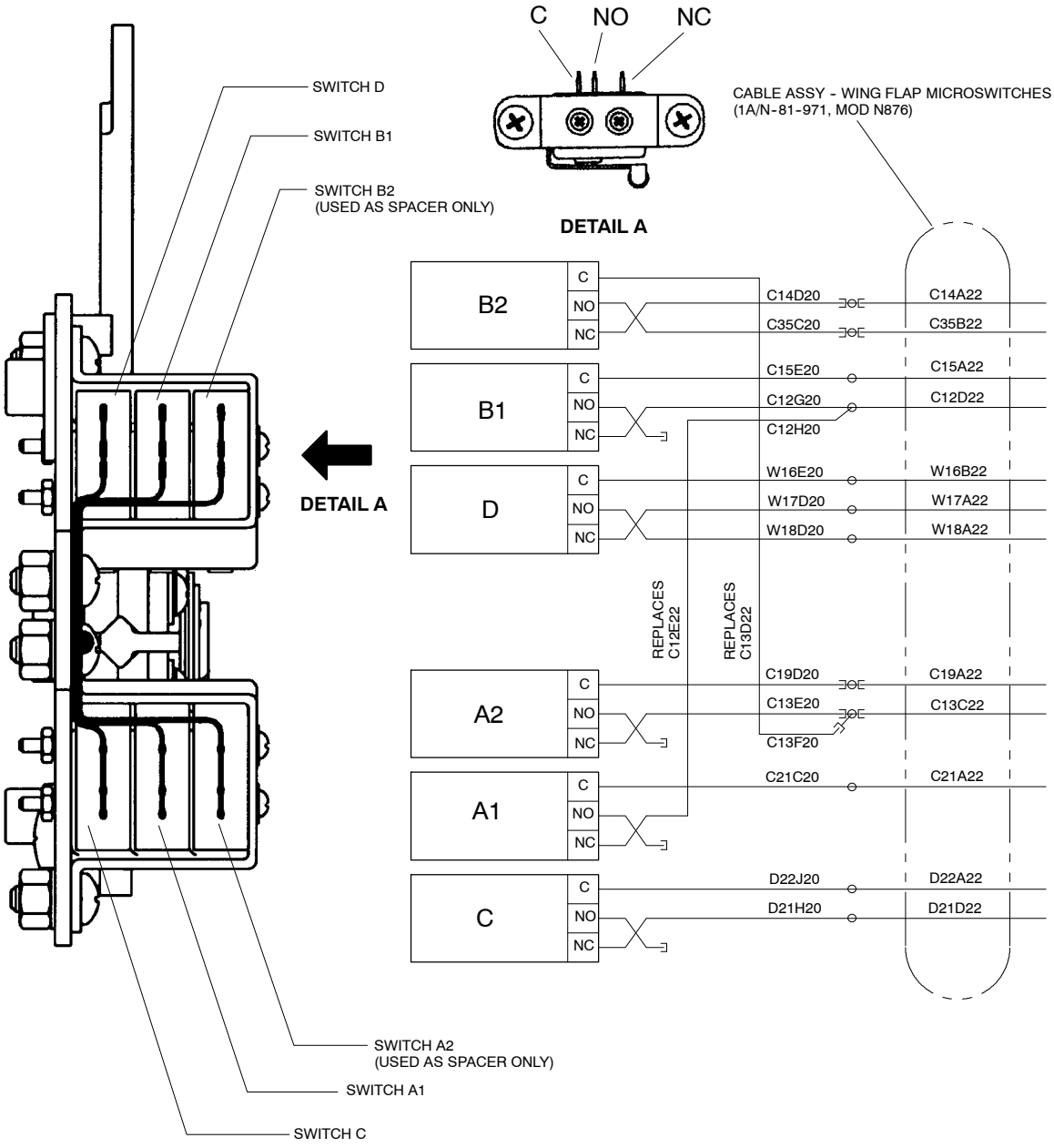


**Figure 7 Mod N874 (N24) Microswitch Positions and Schematic Wiring Diagram**