NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF AVIATION SAFETY
WASHINGTON, D.C. 20594

April 18, 2006

SYSTEMS GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA06MA010

A. ACCIDENT

Operator: Flying Boat, Inc. DBA, Chalk's Ocean Airways
Aircraft: Grumman Mallard G-73T, N2969
Location: Miami, FL
Date: December 19, 2005
Time: 1439 Eastern Standard Time

B. SYSTEMS GROUP

Chairman — Steven Magladry
National Transportation Safety Board
Washington, DC

Member — Tracy Perkins
Chalks Ocean Airways
Fort Lauderdale, FL

C. SUMMARY

On December 19, 2005, at 2:39 pm eastern standard time, a Grumman Mallard G73T, N2969, operated by Flying Boat Inc. as Chalks Ocean Airways flight 101, crashed into a shipping channel adjacent to the Port of Miami shortly after takeoff. The aircraft, a seaplane, had departed from the Miami Seaplane Base (X44), and took off from the shipping channel with 2 crew and 18 passengers (including 3 infants). The scheduled flight was destined to Bimini, Bahamas, operating under the provisions of Title 14 Code of Federal Regulations Part 121. The seaplane was retrofitted with Pratt & Whitney PT-6 turboprop engines. Witness and video recordings indicated a fire on the right wing and showed the wing separating prior to impacting the water. All 20 occupants suffered fatal injuries. Visual meteorological conditions prevailed at the time of the accident.

The systems group convened between December 20 and December 23, 2005 to document the condition of the accident airplane. This report summarizes those activities. Attachment 1 contains release information for proprietary data.

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft Recovery

During recovery, in order to facilitate transporting the wreckage, some of the flight control cables were intentionally cut. The cables were marked with tape and identified by numbers. Cable segments identified with the same number were connected at the time of initial recovery from the water.

2.0 Flight Controls

2.1 Description of Lateral Controls

The ailerons are controlled by a throw-over wheel, which is mounted on the single control column (See Figure 1). The wheel is connected to the base of the column through two chain loops. The second chain loop is attached to two control cables. The cable run is illustrated in Figure 2. The cables terminate at a bellcrank on each wing. Motion of the bellcrank is transmitted to the aileron through a pushrod.

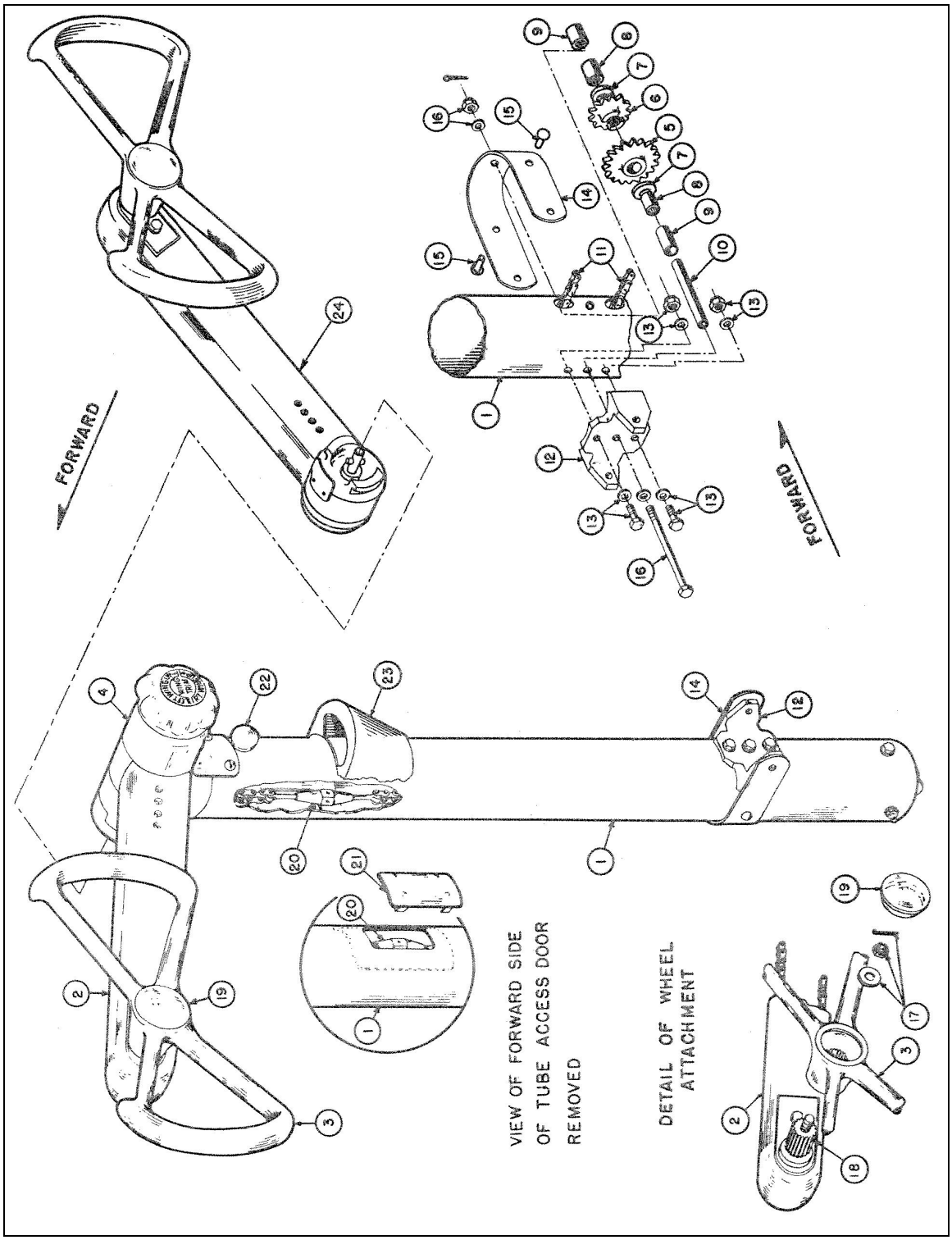

Figure 1. Control Wheel and Column

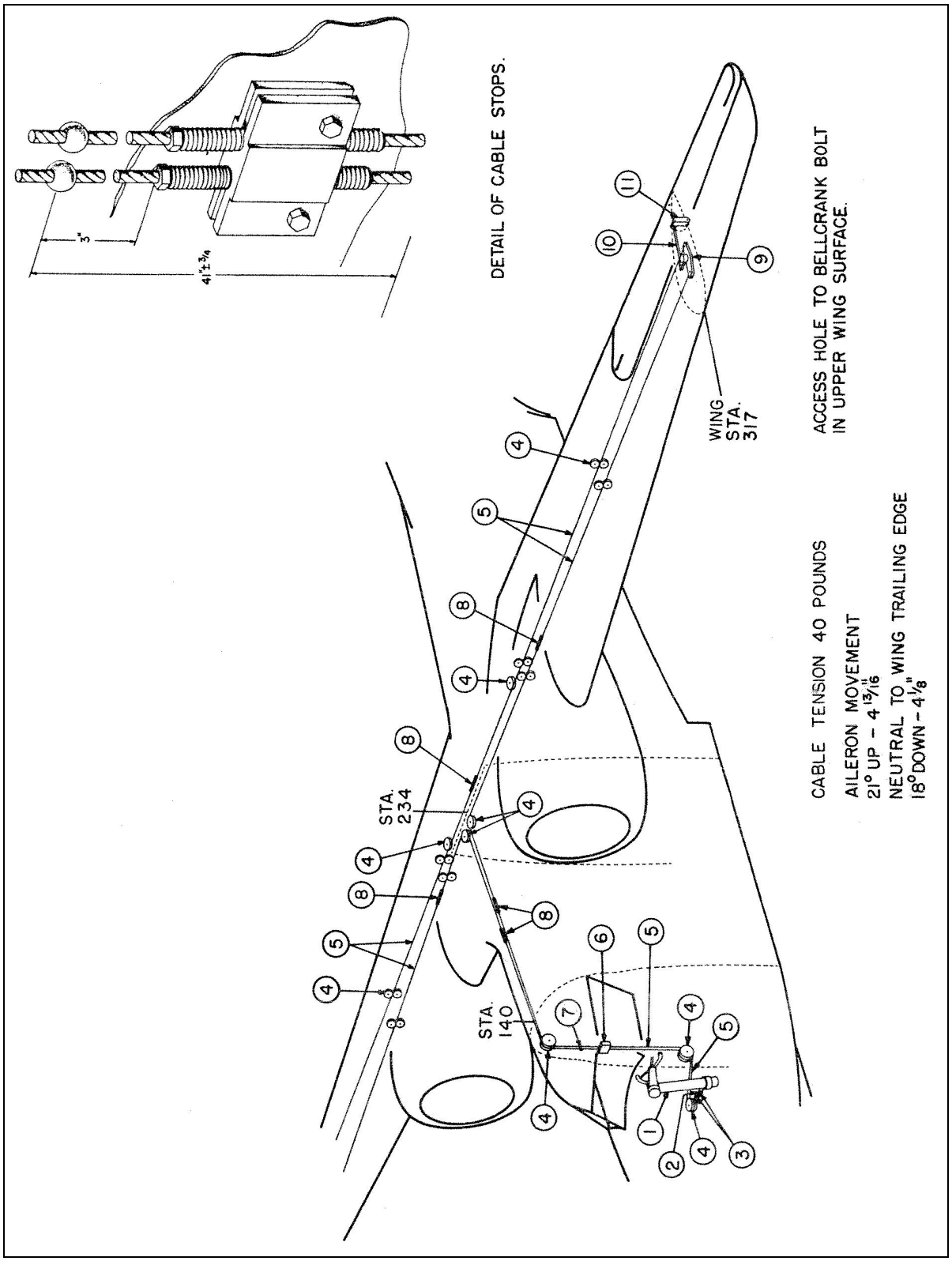

Figure 2. Aileron Control System

2.2 Lateral Controls Accident Airplane Findings

The control wheel and column was recovered from the accident site (Figure 3). The wheel had only one spoke remaining. Each end of the lower chain was connected to a cable segment. The upper chain was fractured, but the control orientation could be determined. A clockwise (left turn) motion of the wheel caused the upper cable exiting the control column to retract toward the column. This control cable segment identified by (1) in Figure 3 was fractured approximately 16 inches from the chain attach point, the other cable segment was fractured approximately 19 inches from the chain attach point. By measuring cable segment lengths, it was determined that this cable was attached to the forward portion of the right wing bellcrank, Figure 4. A pull on this cable caused the right wing aileron to move trailing edge down. Correct orientation of the control cables was confirmed. On both wings, the bellcranks and pushrod connections were intact to the aileron surface.

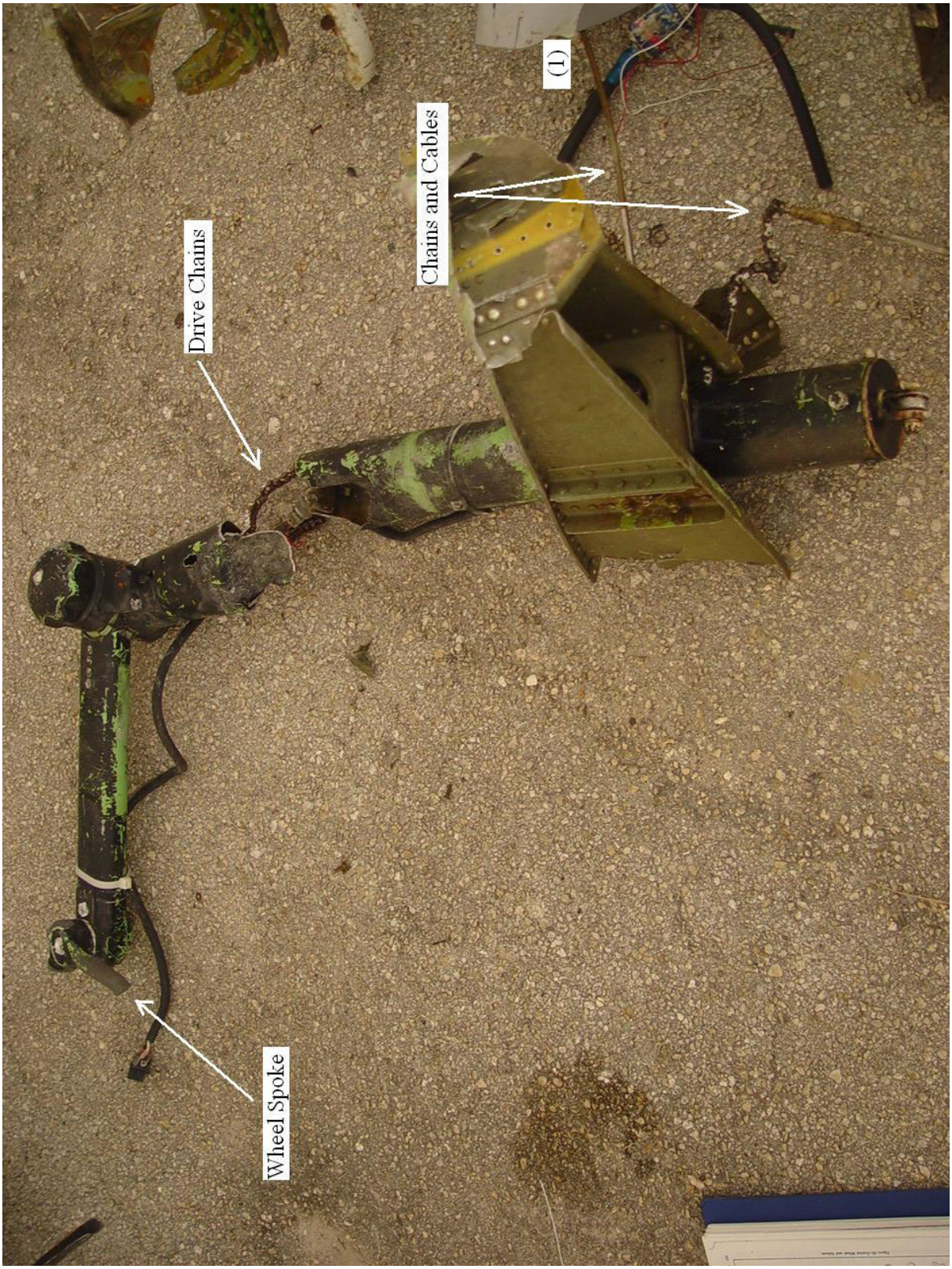

Figure 3. Control wheel and column

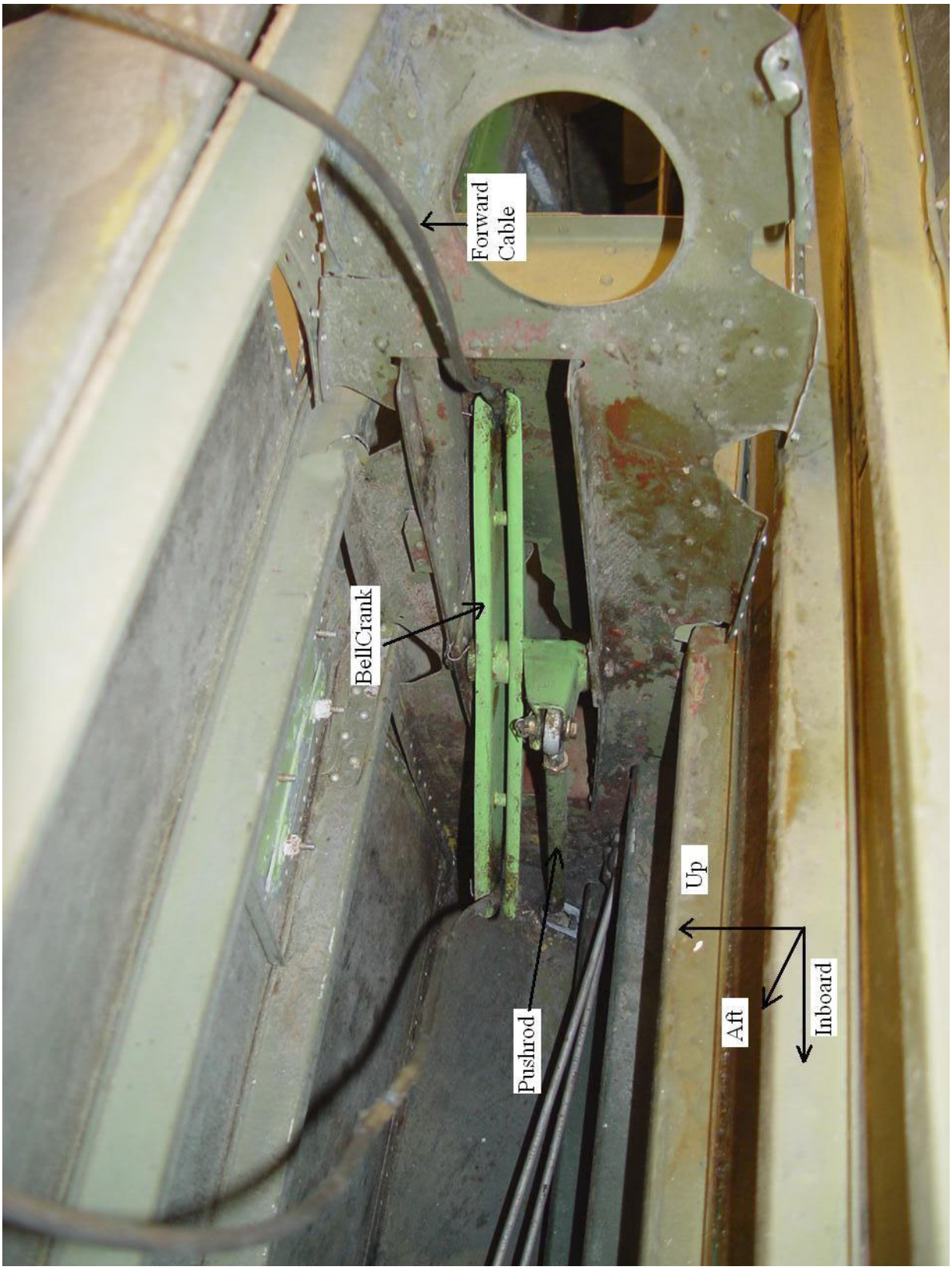

Figure 4. Right Wing Aileron Quadrant.

2.3 Description of Elevator Controls

The elevators are controlled through the column, mounted on the centerline of the airplane. The column is connected at its' base to a pushrod (Figure 5, item 10), which is connected to a bellcrank (item 9) mounted on one end of a torque tube (item 8). At the other end of the torque tube is a cable quadrant (item 7). The cables are routed as shown in Figure 6. The cables terminate at a quadrant between the two elevators. The quadrant is connected to torque tubes which extends to each elevator. The two torque tubes are rigidly linked at the quadrant so that they are only able to move in the same direction.

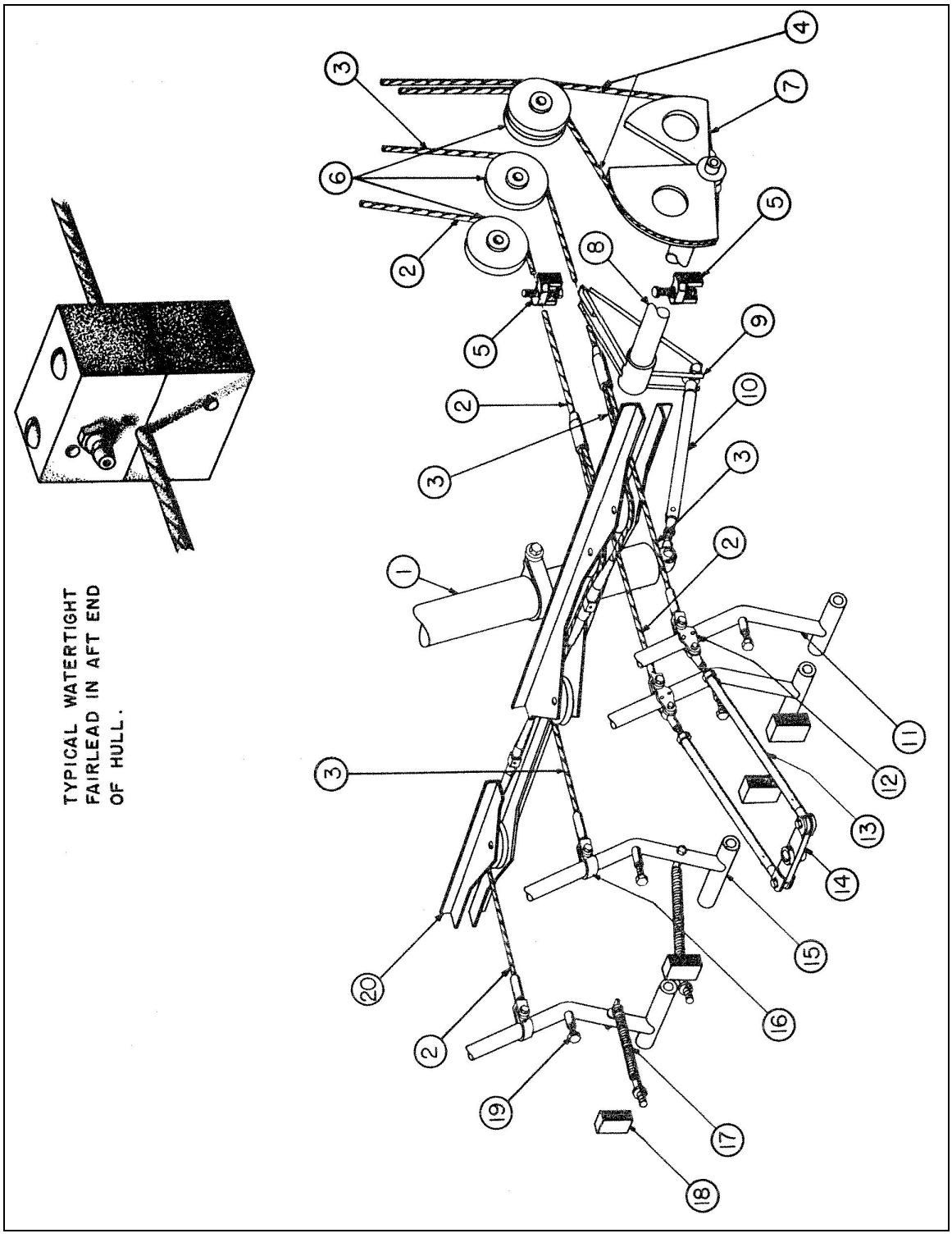

Figure5. Elevator and Rudder Controls.

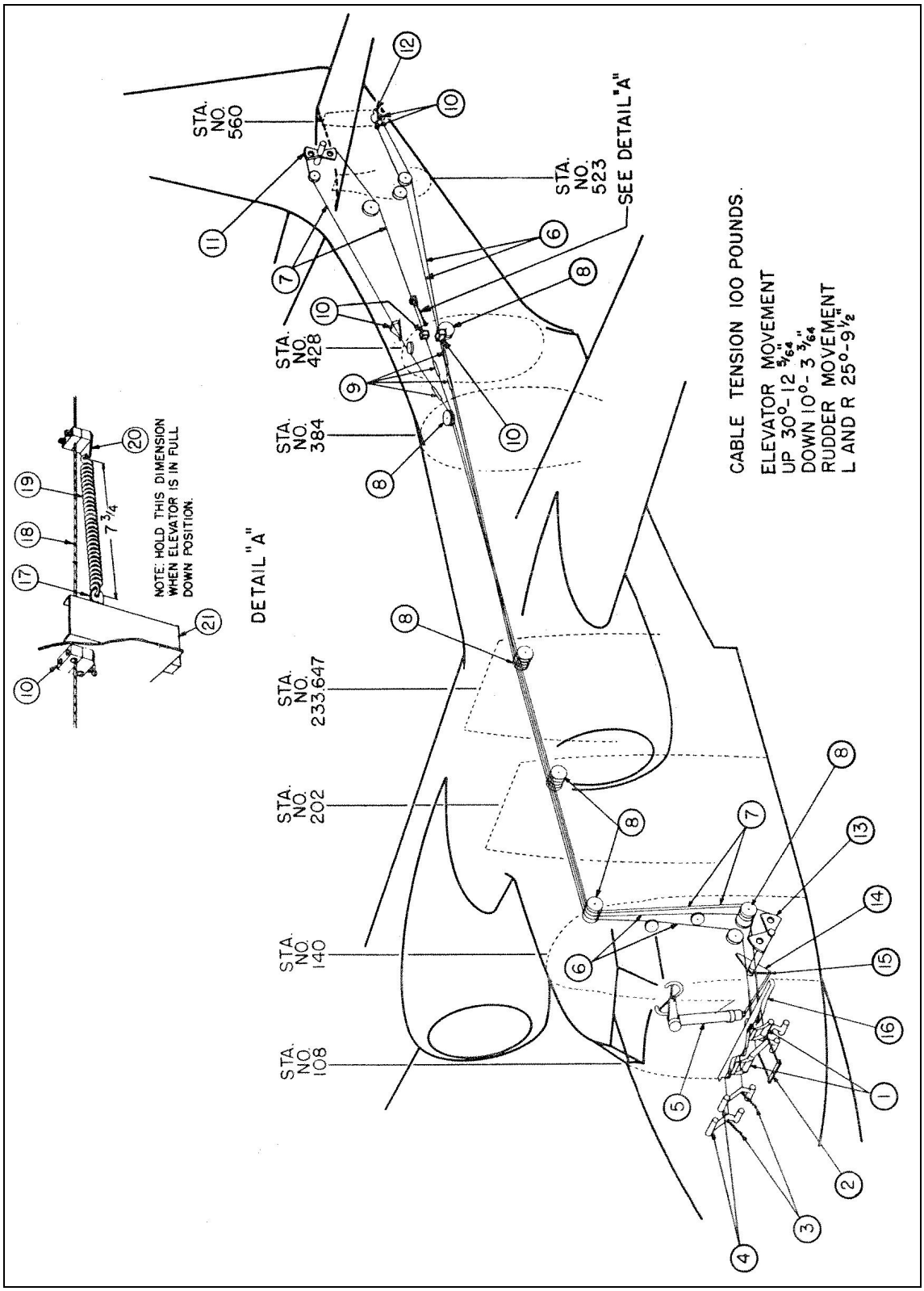

Figure 6. Elevator and Rudder Cable Routing

2.4 Elevator Controls Accident Airplane Findings

The elevator torque tube (Figure 5, item 8) was located in the wreckage (Figure 7). One of the control cables was detached from the quadrant, but one was still attached to a portion of the quadrant. It could be determined how the quadrant segment was attached to the damaged torque tube. The torque tube, bellcrank, and pushrod were damaged but still connected. The pushrod was fractured and separated from the base of the control column. The control cables were intact from the front cable quadrant to the aft quadrant. The elevators were found to be attached to the aft torque tubes and cable quadrant. Correct orientation of the control cables was confirmed.

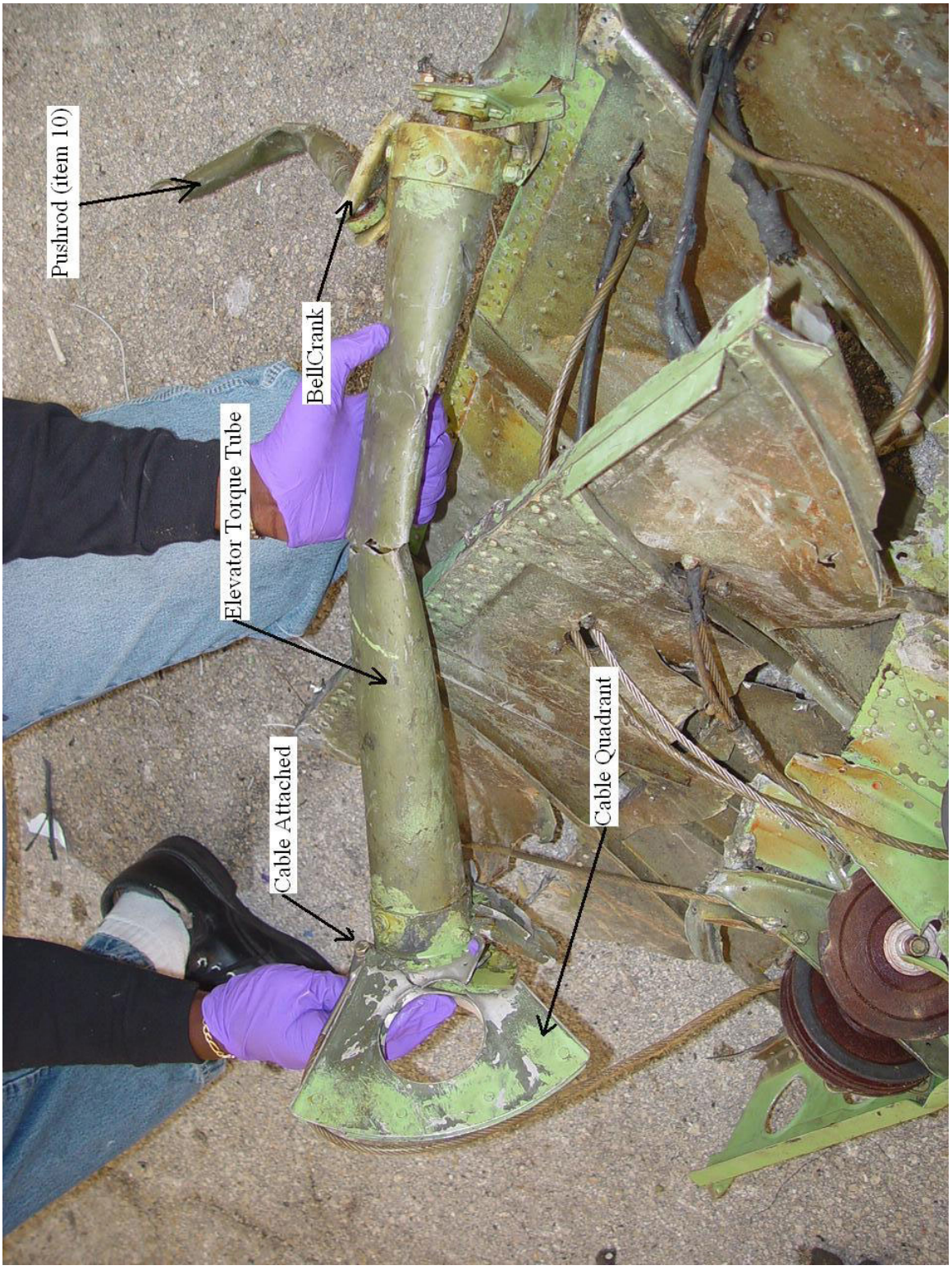

Figure 7. Forward elevator torque tube.

2.5 Description of Rudder Controls

The rudder is controlled by a set of conventional pedals (Figure 8), which are connected through cables (Figure 5 and 6) to the rudder sector. An auxiliary set of pedals is installed for the co-pilot, and cables from these pedals are swaged to the cables from the captain’s pedals.

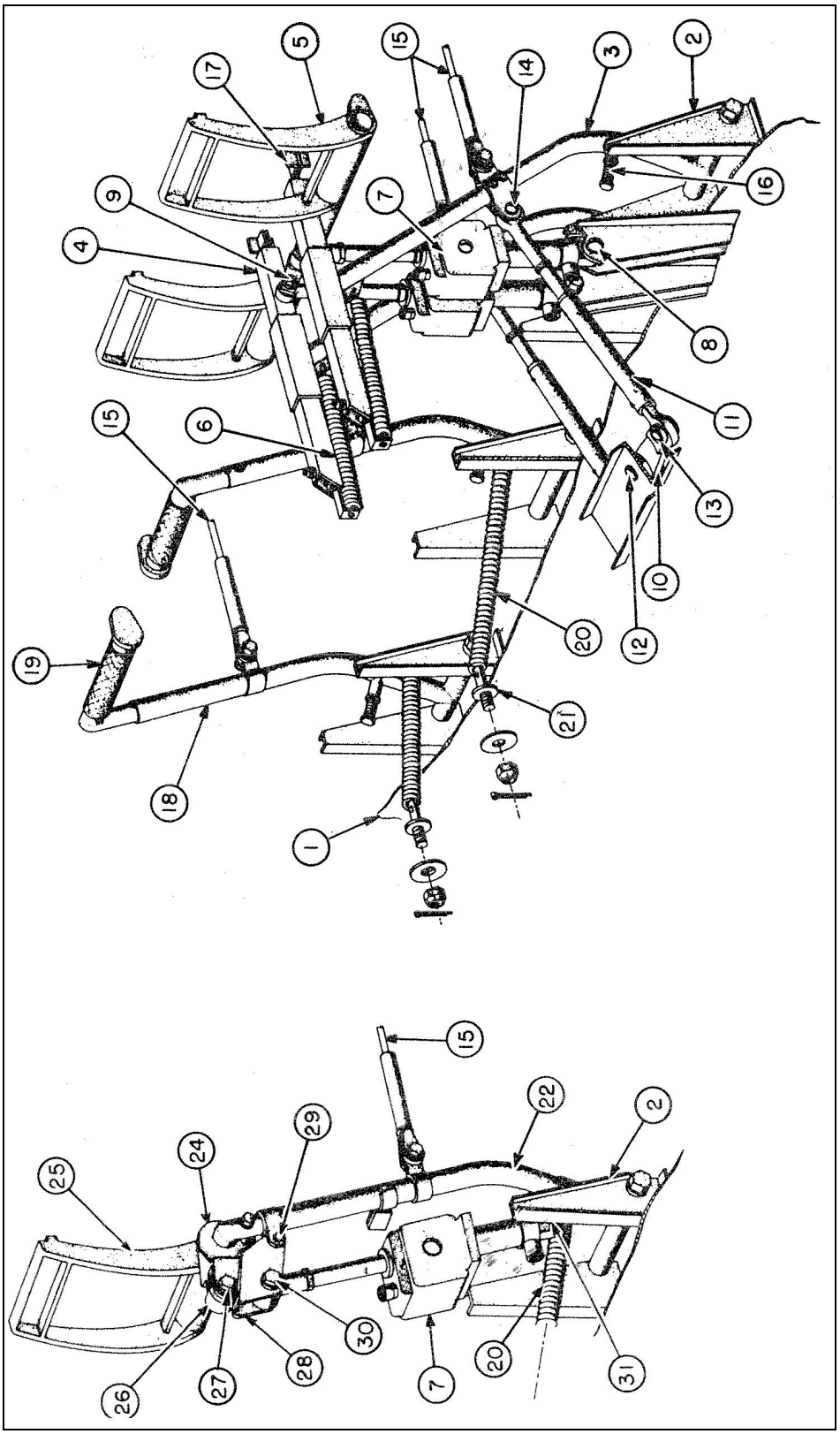

Figure 8. Rudder Pedal Assembly.

2.6 Rudder Controls Accident Airplane Findings

All four pedals, though damaged, were located in the wreckage. The captains and first officers pedals are shown in Figures 9 and 10 respectively. The control cables to all four pedals were found to be still attached to pedal structure (Figure 11). The swages and cable continuity was intact from all four pedals to the rudder sector. Correct orientation of the control cables was confirmed.

Figure 9. Captains rudder pedals.

Figure 10. First officer's rudder pedals.

Figure 11. Rudder pedals and control cables.

2.7 Description of Flap Controls

The flaps are operated by a handle in the cockpit, which is connected through cables to a flap control mechanism and hydraulic selector valve mounted in the center section between the two flaps (Figure 12). The flaps are actuated by a hydraulic actuator on each flap. The position is fed back to the selector valve through a follow up rod.

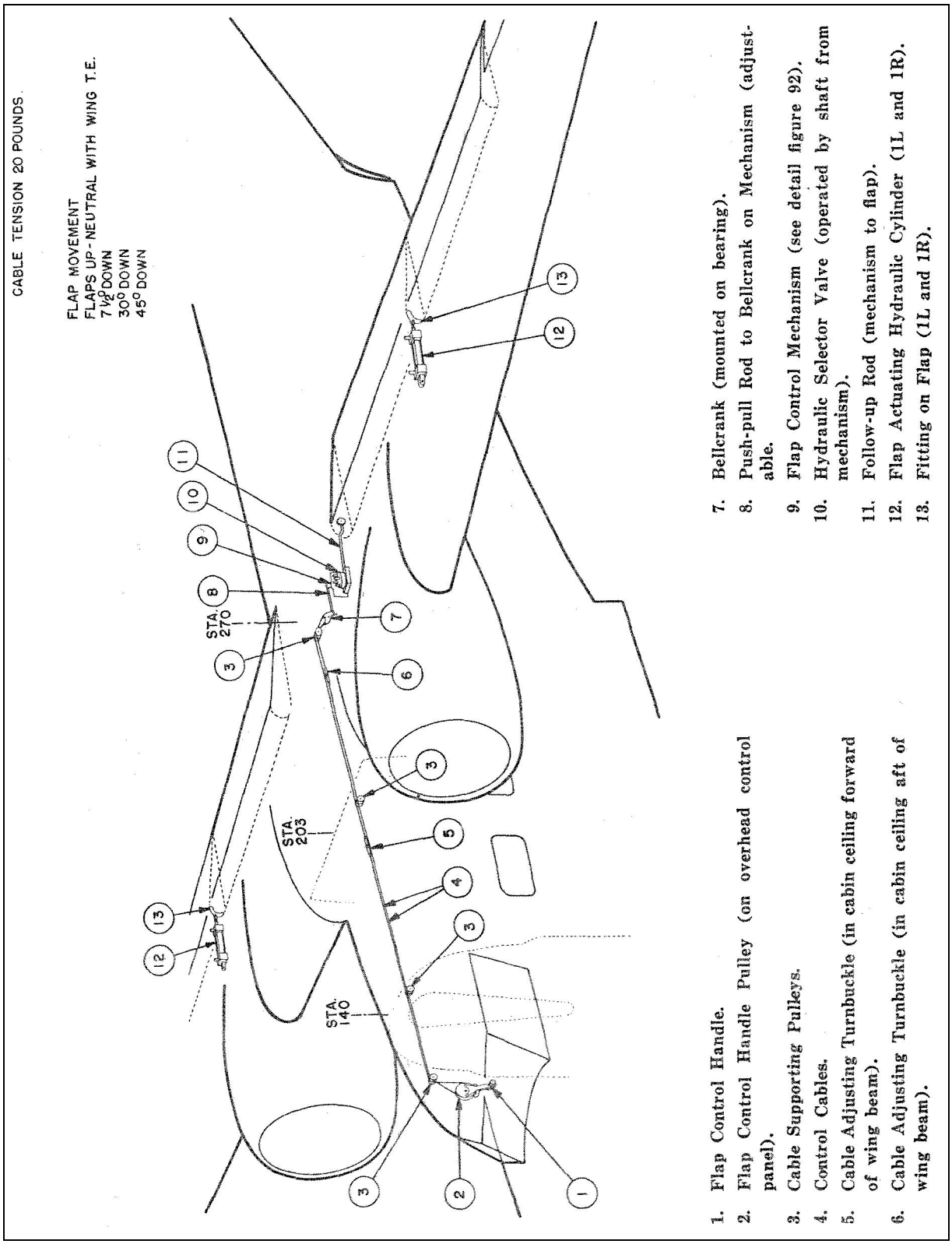

Figure 12. Wing Flap Control System.

2.8 Flap Control Accident Airplane Findings

The flap handle was found to be in the 0 degree position (Figure 13). The hydraulic actuator was still attached to each flap. The selector valve and follow up were located in the wreckage, but the follow up was detached from the flap. The control cables were fractured.

Figure 13. Flap handle position.

3.0 Description of Electrical System

The Electrical system is a 28 volt DC system, powered by two generators (one on each engine) or a 24 volt, 34 amp battery when the engines are not operating. The wiring is shown in Frankes Aviation diagram FA-5100 (Figure 14). There is a single power feeder cable, which provides power from a junction box on each wing, through the wing box, to a stud in the main junction box in the fuselage.

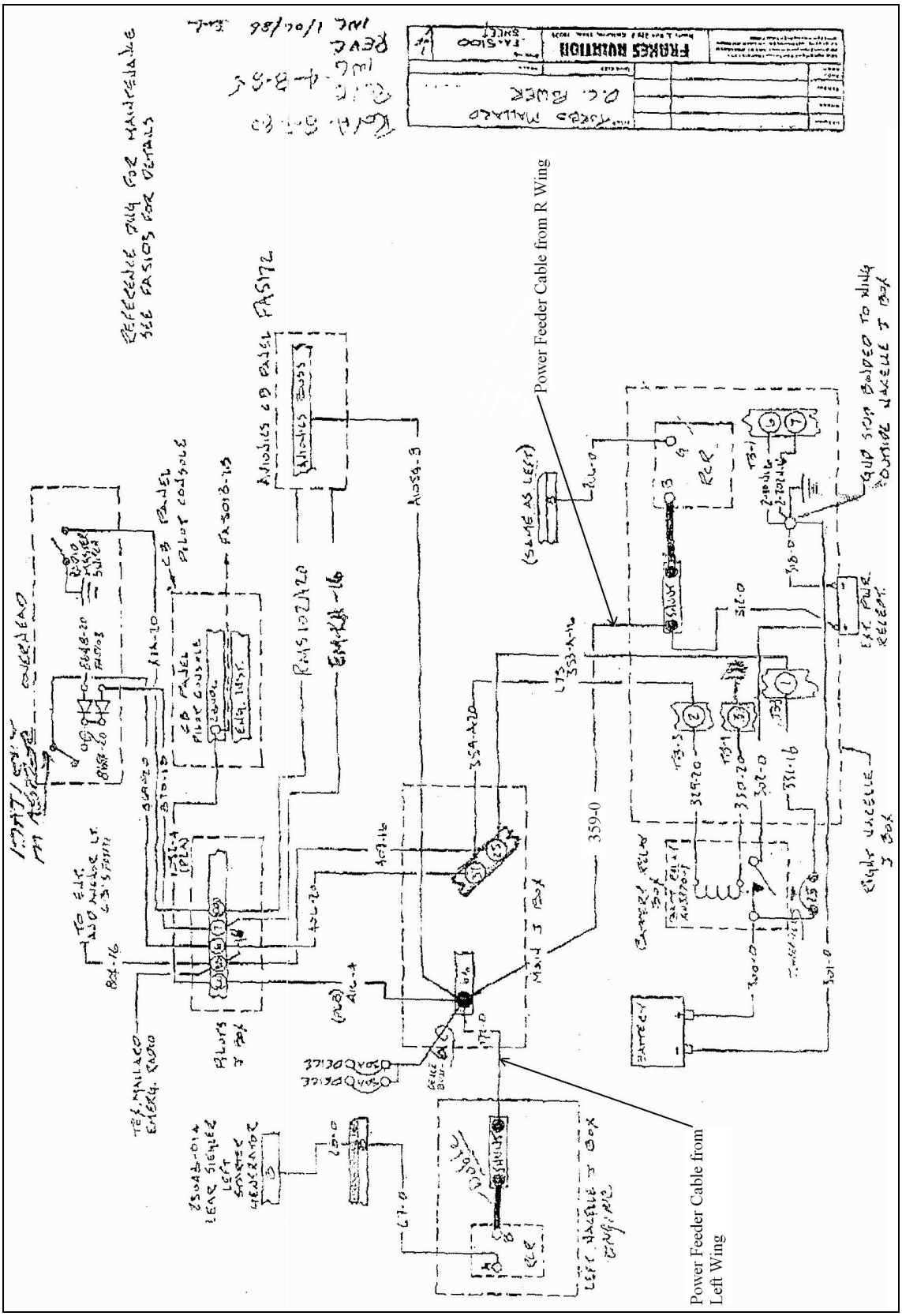

Figure 14. Electrical Power Schematic.

3.1 Electrical System Accident Airplane Findings

The right nacelle junction box, relay box and external power connection were located in the wreckage (Figure15). The main power cable (359-0) was not connected to the shunt in the junction box. The connection was loose as though it had been connected, but had pulled away. The main junction box and power feeder cables were not located in the wreckage.

Figure 15. Right wing nacelle junction box.

4.0 Cockpit Instruments, Panels, and Miscellaneous Components

The following instruments, panels, and components werer recovered from the wreckage:

Cockpit Instruments:

Altimeter
ADI (2)
Course Indicator (2)
RMI
Radio Altimeter
Sideslip Indicator (2)
Fuel Totalizer
Fuel Pressure Indicator
Two receiver tuning heads

Two panels with circuit breakers were recovered. The following CBs were open:

Bilge Pump
Comp Ckpt Flood Lights
Avionics Master
Fuel Qty Flap Gear Ind
Auto Feather L & R
De-ice R
PX-PY
Hyd Boost
ITT L & R
NG L
Prop Gov Test
GPWS Anun
HDPN AMP 1
ADF AC

Miscellaneous Components:

Bilge panel
Voltage regulator (2)
Attitude digitizer
Air data module
TCAS Unit
Signal conditioning unit (J-Box)
Collins DME receiver
Caution relay box
GPS unit
HSI slaving accessory

ADF Controller
Pitot Heat Detector

Steven H. Magladry
Aerospace Engineer

Attachment 1

To

SYSTEMS GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

Magladry Steve

From: English Bill
Sent: Tuesday, May 30, 2006 9:34 AM
To: Magladry Steve; Murphy Brian; Schulze Dana; Cruz Pocholo; Fox Matthew
Subject: FW: Grumman Manual

FYI

-----Original Message-----
From: Frakes Aviation ----------
Sent: Tuesday, May 30,----------
To: English Bill
Subject: Re: Grumman Manual

Bill,

Thank you for asking. You may use anything that is from the printed manuals, Frakes and/or Grumman. If there is anything from proprietary material that you would like to use please identify the specific material and I am sure there will be no objection.

Regards,

Joe Frakes

Magladry Steve

From: English Bill
Sent: Tuesday, May 30, 2006 12:08 PM
To: Magladry Steve
Subject: FW: Proprietary information

-----Original Message-----
From: Frakes Aviation ----------
Sent: Tuesday, May 30, 2006 12:08 PM
To: English Bill
Subject: Proprietary information

Bill,

All Frakes Aviation and/or Grumman Drawings are proprietary, however, the attached Drawing FA5100 sheet 1 you may use.

Regards,

Joe Frakes