ALERT BULLETIN

AB 2015:19/3-6
5/29/2015
1253218

TO: Bombardier Inc. Canadair

INFO: FAA (AVP-1, AVP-200, AFS-200, AFS-280, AFS-300, ANM-100, SEA-ACO, SEA-AEG, AQS-230), A4A, ALPA, AMFA, ASAP, ATSG, CAPA, IAM, IATA, ICASS, IFALPA, NBAA, NTSB, PAMA, RAA, TWU, USAPA

FROM: Linda J. Connell, Director
NASA Aviation Safety Reporting System

SUBJ: CRJ-700 Uncommanded Rudder Movement

We recently received an ASRS report describing a safety concern which may involve your area of operational responsibility. We do not have sufficient details to assess either the factual accuracy or possible gravity of the report. It is our policy to relay the reported information to the appropriate authority for evaluation and any necessary follow-up. We feel you should be aware of the following:

ASRS received a report from a CRJ-700 Captain describing an inflight rudder anomaly. Reporter stated they noticed "erratic uncommanded rudder movement" climbing through FL180. Rudder indication on EICAS was noted as "dead center" but yaw was evident. Reporter further stated the rudder movement continued through the landing and was still moving on the ground after the aircraft was parked at the gate.

ASRS has previously alerted on this issue. Alert messages 2014:42/3-21 and 2013:34/3-23 are also attached.

To properly assess the usefulness of our alert message service, we would appreciate it if you would take the time to give us your feedback on the value of the information that we have provided. Please contact Dennis Doyle at (408) 541-2831 or email at dennis.j.doyle@nasa.gov

Aviation Safety Reporting System
P.O. Box 189 | Moffett Field, CA | 94035-0189

ACN: 1253218

Time
Date: 201504
Local Time Of Day: 1201-1800

Place
Locale Reference.ATC Facility: ZZZ.ARTCC
State Reference: US
Altitude.MSL.Single Value: 18000

Aircraft 1
ATC / Advisory.Center: ZZZ
Make Model Name: Regional Jet 700 ER/LR (CRJ700)

Component 1
Aircraft Component: Rudder Control System

Person 1
Function.Flight Crew: Captain
Function.Flight Crew: Pilot Flying
ASRS Report Number: 1253218

Events
Anomaly.Aircraft Equipment Problem: Critical
Detector.Person: Flight Crew
Result.Flight Crew: Landed in Emergency Condition
Result.Flight Crew: Returned To Departure Airport

Narrative 1
On climb out passing 18000 we started getting erratic uncommanded rudder movement. First to the right then to the left. We checked our flight control page on the EICAS and noticed everything was normal on the page with the rudder indication dead center but the rudder was still moving as the brick was moving back and forth and the aircraft was yawing back and forth. It was not violent, but you could feel it moving. We slowed down to to 250 knots initially to avoid aggravating the situation as every rudder input you have given to the aircraft slightly aggravated the rudder. We were worried that we had a PCU that was going bad and it could possibly hardover on us. We opted to return since it was closest with most CFR in the area and the longest runways. We told the controllers what was happening and told them we needed to slow down and descend. We proceeded to complete the checklists and headed back. On the descent the aircraft was still moving back and forth with the rudder still moving erratically. We asked the controllers for wide shallow turns on to final and a slower speed which made the ride back much better for us. Throughout the remainder of the flight, the rudder indication stayed centered and normal even though the actual aircraft was still swaying from rudder movement. We had no other indication or any alerted messages. After landing we taxied to the gate and parked without incident, shut the aircraft down and went outside to look at the rudder for any damage. When we got outside to look at the rudder, it was still moving back and forth with the engines shut down and the hydraulic pumps still on.

Callback 1
The reporter has not been informed of the cause of these rudder oscillations but he believes that a PCU anomaly is the only unannunciated fault that could cause the rudder to move uncommanded.

Synopsis
CRJ700 flight crew passing FL180 experience erratic uncommanded rudder movement. With the aircraft yawing back and forth, no movement is visible on the EICAS flight control page. The crew elects to slow down, and return to the departure airport for an uneventful landing. After parking at the gate with the engines shut down but with the hydraulic pumps on the rudder was still moving back and forth.

Previous Alert(s)

ALERT BULLETIN

AB 2014:42/3-21
11/28/2014
1196338

TO: Bombardier Inc. Canadair

INFO: FAA (AVP-1, AVP-200, AFS-200, AFS-280, AFS-300, ANM-100, SEA-ACO, SEA-AEG, AQS-230), A4A, ALPA, AMFA, ASAP, ATSG, CAPA, IAM, IATA, ICAO, ICASS, IFALPA, IPA, NTSB, PAMA, RAA, TWU

FROM: Linda J. Connell, Director
NASA Aviation Safety Reporting System

SUBJ: CRJ-200 Uncommanded Yaw

We recently received an ASRS report describing a safety concern which may involve your area of operational responsibility. We do not have sufficient details to assess either the factual accuracy or possible gravity of the report. It is our policy to relay the reported information to the appropriate authority for evaluation and any necessary follow-up. We feel you should be aware of the following:

ASRS received a report from an air carrier Captain describing an uncommanded yaw incident in his CRJ-200. Reporter stated the yaw was first noticed during climb as a "kick" with a slight yaw. Captain further stated the yaw quickly became more pronounced and the aircraft entered a "Dutch Roll" condition. Captain disconnected the autopilot at that time, declared an emergency, and diverted to a nearby airport.

ASRS has previously alerted on this type of event. Alert message 2013:34/3-23 is also attached.

(Keywords: CRJ Uncommanded Yaw)

To properly assess the usefulness of our alert message service, we would appreciate it if you would take the time to give us your feedback on the value of the information that we have provided. Please contact Dennis Doyle at (408) 541-2831 or email at dennis.j.doyle@nasa.gov

Aviation Safety Reporting System
P.O. Box 189 | Moffett Field, CA | 94035-0189

ACN: 1196338

Time
Date: 201408
Local Time Of Day: 0601-1200

Place
Locale Reference.ATC Facility: ZZZ.ARTCC
State Reference: US
Altitude.MSL.Single Value: 25000

Environment
Flight Conditions: VMC

Aircraft 1
ATC / Advisory.Center: ZZZ
Make Model Name: Regional Jet 200 ER/LR (CRJ200)

Component 1
Aircraft Component: Rudder Control System

Component 2
Aircraft Component: Rudder Trim System

Component 3
Aircraft Component: Aileron Trim System

Person 1
Function.Flight Crew: Captain
Function.Flight Crew: Pilot Not Flying
ASRS Report Number: 1196338

Events
Anomaly.Aircraft Equipment Problem: Critical
Anomaly.Inflight Event / Encounter: Other / Unknown
Detector.Person: Flight Crew
Result.General: Declared Emergency
Result.Flight Crew: Diverted
Result.Flight Crew: Landed in Emergency Condition
Result.Air Traffic Control: Provided Assistance

Narrative 1
CRJ-200 aircraft departed with passengers and three crew members. Flight was 90 miles north of [our next fix] and was flying direct to [it] per ATC. The aircraft was on autopilot and was climbing at 290 KTS IAS through FL250 up to FL280. The flight conditions at the time were VMC and no turbulence. As the aircraft climbed to final cruise altitude, the crew observed the aircraft slightly yaw in both directions; it felt like a "kick". The aircraft then self-corrected back to wings level. This occurred two more times within a few minutes of each other. The crew verified that the hydraulics were all in the 'Normal' operating range. The Captain instructed the Flight Attendant to suspend cabin service and return to her seat. The seat belt sign was still on at the time. The aircraft was now at FL280.

The rudder pedals were "guarded" by both crew members as a precaution while they monitored the aircraft and the Flight Control Page for any abnormalities. Moments later the aircraft once again began a yawing moment in both directions. This time the yawing was more pronounced

and the aircraft entered a 'Dutch Roll'. The Captain immediately took control of the aircraft, disconnected the autopilot and flight director and corrected the aircraft attitude. The Captain felt intermittent oscillation of "bumps" in the rudder pedals and needed to apply control inputs to the rudder pedals to counteract the rudder pedals from yawing the aircraft. The QRH for Uncommanded Yawing Emergency Procedure was completed and an emergency was declared with ATC. The aircraft diverted to [a nearby airport], conducted an ILS approach and landed. During the descent to landing, the Captain felt intermittent oscillations in the rudder pedals followed by slight yawing in both directions but was manageable. The aircraft landed at 45,400 LBS and taxied to the gate without incident.

Callback 1

Reporter stated rudder movement continued to be indicated on their EICAS Flight Control Page throughout the flight and was also felt in the aircraft's movement. Initially, he and the First Officer (F/O) were not sure if they were being hit by strong crosswinds during their climb. But when the 'Dutch Roll' occurred, he immediately disconnected the Auto-Pilot, Flight Director and Yaw Damper to take control of the upset and followed the remainder of their QRH for 'Uncommanded Yawing Emergency Procedures,' those procedures also instructs pilots to place both feet on the rudder pedals.

Reporter stated a stronger 'kick' in the sudden yaw oscillations were noticed along with wings dropping after the Yaw Damper was turned 'Off' and continued until they landed. He has experienced unusual upsets in the past and trained in simulators for certain upsets, but this event included a continued intermittent and pulsating yawing. Both rudder pedals were moving with the yaw oscillations and he had to apply greater force to counter the uncommanded yaw input. He remembered the two previous B737 aircraft that had crashed due to uncommanded rudder movements and felt they should get their CRJ-200 aircraft on the ground as quickly as possible. He continued to adjust flap settings on approach and landed with Flaps-45 without any problems.

Synopsis

A Captain reports experiencing uncommanded yawing oscillations and rudder pedal movement in a CRJ-200 aircraft during climb to final cruise altitude. When the CRJ entered a 'Dutch Roll', the pilot disconnected the autopilot and flight director to correct the aircraft attitude. An emergency was declared and flight diverted. During descent, oscillations continued to be felt in pedals with yaw in both directions.

ALERT BULLETIN

AB 2013:34/3-23
10/25/13
1107245, 1108399

TO: Bombardier Inc. Canadair

INFO: FAA (AFS-800, AFS-230, AFS-200, MKC-AEG, AFS-300, AVP-1, AVP-200, AQS-230), A4A, ALPA, AMFA, APA, ASAP, ATSG, CAPA, ICASS, IAM, IATA, IFALPA, IPA, NTSB, PAMA, RAA, TWU, USAPA

FROM: Linda J. Connell, Director
NASA Aviation Safety Reporting System

SUBJ: CRJ-200 Uncommanded In-Flight Yaw

We recently received an ASRS report describing a safety concern which may involve your area of operational responsibility. We do not have sufficient details to assess either the factual accuracy or possible gravity of the report. It is our policy to relay the reported information to the appropriate authority for evaluation and any necessary follow-up. We feel you should be aware of the following:

ASRS received reports from a CRJ-200 flight crew describing a sudden and abrupt yaw in both directions accompanied by a "shudder" movement in both rudder pedals. Reporters indicated that the EICAS displayed YD 1 INOP, attempts were made to reset but within moments YD-1 again disengaged. On a subsequent maintenance ferry flight the aircraft made a sharp lateral and uncommanded movement of about 10 to 15 degrees on either side of the course. An emergency was declared during the second event due to continuous uncommanded lateral oscillations. Reportedly, no QRH procedures are currently available to remedy this type of in-flight malfunction.

ACN 1108399 describes a similar event. This report is also enclosed.

(Keywords: Uncommanded Yaw)

To properly assess the usefulness of our alert message service, we would appreciate it if you would take the time to give us your feedback on the value of the information that we have provided. Please contact Dennis Doyle at (408) 541-2831 or email at dennis.j.doyle@nasa.gov

Aviation Safety Reporting System
P.O. Box 189 | Moffett Field, CA | 94035-0189

ACN: 1107245

Time
Date: 201308
Local Time Of Day: 1201-1800

Place
Locale Reference.ATC Facility: ZZZ.ARTCC
State Reference: US
Altitude.MSL.Single Value: 30000

Environment
Flight Conditions: VMC

Aircraft 1
Make Model Name: Regional Jet 200 ER/LR (CRJ200)

Component 1
Aircraft Component: Rudder

Component 2
Aircraft Component: Autoflight Yaw Damper

Person 1
Function.Flight Crew: First Officer
Function.Flight Crew: Pilot Not Flying
ASRS Report Number: 1107245

Person 2
Function.Flight Crew: Captain
Function.Flight Crew: Pilot Flying
ASRS Report Number: 1107246

Events
Anomaly.Aircraft Equipment Problem: Critical
Detector.Person: Flight Crew
Result.General: Declared Emergency
Result.General: Maintenance Action
Result.General: Flight Cancelled / Delayed
Result.Flight Crew: Diverted
Result.Flight Crew: Landed in Emergency Condition
Result.Air Traffic Control: Provided Assistance

Narrative 1

How should a flight crew respond when their aircraft suddenly exhibits apparent flight control malfunctions which don't have a corresponding QRH procedure? Here is how we handled the situation when it happened to us: The flight crew consisted of [our] Captain, a Flight Attendant and I, as First Officer. During that flight I was PF, and while enroute at FL300 with Auto Pilot engaged, the aircraft suddenly and abruptly yawed first in one direction, then the other, followed by EICAS displaying a YD 1 INOP status message. We attempted to reset YD-1, but within moments YD-1 disengaged itself again, with another significant lateral movement of the aircraft and corresponding deviation of the EFIS "brick". Moments prior to YD-1 disengaging a mechanical "shudder" was felt in both rudder pedals.

There is no specific QRH procedure for operating with one Yaw Damper INOP, so we referenced QRH "YAW DAMPER Caution Message" in case we lost the other Yaw Damper, kept YD-1 off, continued to destination and landed there. Contract Maintenance came out, and after troubleshooting it was decided that the aircraft should be ferried under Special Flight Permit with YD-1 disengaged. As YD-1 was to remain disengaged, we briefed the departure at the gate to include possibly having to reference QRH in the event that YD-2 also went offline. We took off with the Captain flying and me performing PNF duties. Ride conditions were smooth and everything appeared normal until approximately 16,000 feet in the climb, at which time a sudden, abrupt lateral movement was felt. It seemed to be the same symptom as we had experienced on our earlier flight.

We verified that YD-1 was still disengaged and YD-2 remained engaged, nevertheless after a few moments we felt another sharp lateral movement. Thinking that we might now have a problem with YD-2, and with no specific QRH procedure available, we reasoned that disconnecting YD-2 might resolve the issue. We disconnected YD-2, which also resulted in disconnection of the Auto Pilot. At first it seemed like the issue was resolved, but after approximately 30-45 seconds the aircraft again abruptly deviated laterally. For a time, the aircraft remained in a skid with the "brick" displaced to the left, showing that left rudder trim was needed. The Captain applied left rudder trim, but the "brick" unexpectedly moved even further left. The trim was then neutralized, but while EICAS indicated that the rudder trim had returned to neutral, the aircraft continued to skid with the "brick" displaced to the left. Additional abrupt deviations were felt in both directions for the remainder of the flight with increasing frequency and variable extent.

I estimate that on average we experienced these excursions at intervals ranging from approximately once every 45 seconds to one minute, but with occasional "bursts" of multiple excursions in the space of 5-10 seconds. The frequency and severity seemed random, both before and after YD-2 was disengaged. I must stress that these events were not related to turbulence, nor were they the result of any control input by the flight crew. I have flown both the CRJ-200 and 900 series for several years under a wide variety of conditions, however the only time I have encountered similar symptoms was during my initial Simulator training while the SIM Instructor was demonstrating flight with both Yaw Dampers disengaged and my SIM Partner kicked the rudder pedals sharply (as directed by the SIM Instructor).

The excursions we experienced were spontaneous and on occasion quite violent, sometimes resulting in approximately 15-degrees of heading change in one second with no apparent change in track. We appeared to have a Primary Flight Control malfunction with an unknown cause producing unpredictable effects, and were concerned that the excursions might worsen and perhaps eventually become unrecoverable. We decided it would be prudent to land the aircraft as soon as practicable. The next airport on our route was directly ahead of us about 15 minutes flying time; we declared an Emergency and initially requested clearance there, and began a descent to 10,000' feet. We were cleared as requested, but while descending we realized another airport was considerably closer (approximately 20nm away), and also had a long runway (12,600'feet). We decided to go there instead, and were re-cleared direct to that airport, then handed off to Approach.

We requested weather, which was reported as wind calm, BKN027, 10SM, and we were told to expect an ILS approach. We configured the FMS and NAV radios, briefed the flight Attendant, and performed the Descent and Approach Checklists. The aircraft continued to exhibit erratic lateral controllability, but the Captain was able to hand-fly to the final approach course and join the localizer inbound. We decided to land at Flaps 20, because we believed we might retain better controllability with a faster approach speed and the resultant higher airflow and a flatter touchdown profile. We also referenced QRH because with both Yaw Dampers disengaged we had the YAW DAMPER Caution message displayed, and this procedure directs a landing at Flaps 20. We completed the approach and landed under control, rolled out and cleared the runway, and were directed by Ground crew to a hardstand. Knowing that maintaining [electrical] power was essential to preserving any fault codes, we kept the APU running for an hour or more while

waiting for a Ground Power Unit to become available. After establishing Ground Power we handed the airplane over to the ground personnel, having explained to them that it was imperative that the [electrical] power remain on until Maintenance arrived.

Narrative 2

We were to be operating flight as a Maintenance Ferry Flight under Special Flight Permit. This was done as a result of experiencing uncommanded lateral movement [yaw] followed by Yaw Damper-1 (YD-1) failure on our inbound flight. Hence the flight was to be operated with only Yaw Damper-2 (YD-2) engaged and available. Minimum flight crew of three was on board; myself as PIC, First Officer and a Flight Attendant. After receiving proper documentation from a contract Maintenance Technician, plus required briefings from Maintenance Control and Duty Chief Pilot with regards to the Special Flight Permit, we pushed back and taxied for departure. I was the Pilot Flying (PF), Climbing through 15,000' feet, Auto Pilot was engaged, Speed Mode 290 knots and FMS in the active FMA window and only YD-2 available and engaged.

Reaching 16,000 feet, the aircraft made sharp, lateral uncommanded movements, resulting in a heading change of about 10-15 degrees on the either side of the course. About 30-seconds later, additional uncommanded movement was experienced but with a bit more of a sharp and choppy lateral displacement. On the earlier flight, we had experienced similar uncommanded movement and it had resulted in YD-1 failure. Since on the earlier flight situation, the uncommanded movement ceased after the YD-1 had failed, hence based on this earlier experience, it seemed as if the YD-2 might be suffering a similar malfunction. For the sake of logical, rational reasoning and after experiencing some more uncommanded inputs, the YD-2 was disengaged, which in turn disengaged the Auto Pilot. Thereafter, the whole flight was flown manually.

The uncommanded lateral movements kept reoccurring approximately every 30 to 60 seconds. There is no QRH procedure available to remedy this malfunction, but we utilized the QRH "YAW DAMPER MSG" as a reference. (NOTE: The intensity and frequency of the uncommanded lateral movement was more or less similar, before and after the YD-2 was disengaged.) At this point we had no idea what was causing this uncommanded lateral movement, and whether or not it might worsen, and perhaps cause a complete loss of control. An Emergency condition was declared, "Primary Flight Control malfunction- Rudder control". We selected a diversionary airport, about 100 NM to the north. We chose not to turn back due to thunderstorms approaching the airfield and to avoid turning as much as possible. While the FO was preparing for arrival, the uncommanded lateral movements started occurring much more frequently and with each new one the intensity seemed to be escalating. (Note: I would like to point out that at this time we were straight and wings level, descending to 10,000' feet. No turns were performed and the ride conditions were smooth, hence no lateral movements were commanded by us.) As the unknown was getting worse we decided to divert to a closer airport. It has a 12,600 foot long runway, is a very familiar airport and has scheduled mainline service. ATC was notified of the change.

Since we had no idea if this aircraft will land properly, as it is very likely that during touchdown and flare, an uncommanded movement can cause an unrecoverable situation; therefore CFR was requested to be available by the Runway. Company was notified via ACARS, the Flight Attendant was briefed, and she secured the cabin and herself. (Another fact to be noted is that while slowing to 250 knots, the "Turn/ Slip indicator" ('Brick') was displaced to the left; on applying left rudder trim the 'Brick' further displaced to the left. In response, I neutralized the rudder trim and manually controlled the slip/skid condition by attempting to center the 'Brick' with smooth rudder inputs).

Referencing the QRH, we discussed and elected to use Flaps 20 for landing. This provided for a flatter approach and faster approach speed when compared to a Flaps 45 landing; thereby enhancing the flight control effectiveness. We felt that this would provide additional control authority with which to counter any uncommanded control movement while attempting to land. The landing went well and upon touchdown the rudder and tiller appeared to be working normally. We taxied the aircraft to a hard stand as directed by the Ground crew. We did not want

to shut down the aircraft's AC electrical power in order to preserve the maintenance fault codes. The ground crew informed us that they have only two Ground Power Units (GPU's) and both are currently in use, and so we'll have to wait a while before we can utilize the GPU. Hence we waited with the APU operating, coordinated with Maintenance Control, Dispatch, Duty Chief Pilot and Scheduling. After approximately one hour the GPU was brought over, and after successfully transferring the AC [electrical] power from the APU generator to the external AC power source, we shut down the APU and handed off the aircraft to the Ground crew.

Callback 2

Reporter stated that with both Yaw Dampers and the Auto Pilot disengaged, he was flying manually. With the sudden, sharp, uncommanded rudder inputs, he was so busy trying to compensate he could not tell, thinking back on the event, if the rudder pedals followed the uncommanded rudder inputs, or if he was just responding to correct for the uncommanded lateral deviations.

Reporter stated that on the first flight, when the lateral deviations started, the aircraft felt like it was flying left than right, than left and right, with wings staying level. Because YD-1 had failed (disengaged), the CRJ-200 was a 'No-Go' for revenue flight and had to be ferried to their Maintenance Base with only YD-2 operating. He was PF during the Ferry Flight and noticed the lateral deviations gradually picking up in intensity. No EICAS indication, no movement on the Synoptic Slip indicator on the PFD, North pointer was displaced to the left. No Rudder displacement was noted on the Synoptic Page. The Hydraulics Page showed Hydraulic Pressure was good and no fluctuations and Hydraulic Quantity was also good. He disengaged the YD-2 which disconnected the Auto Pilot. The intensity and frequency of the uncommanded lateral movement was more or less similar, before and after the YD-2 was disengaged.)

Reporter stated the CRJ's Rudder Control have full authority on the rudder pedals, such as needed in crosswinds during landing flares, even with the Yaw Dampers engaged. But during this incident, the slower the airplane got when turning final, the more un-coordinated and slipping the aircraft became. [It was] difficult to turn to the left (left base turn). Doesn't know what would have happened if he had tried to turn to the right.

Reporter stated that currently no QRH procedures are available to remedy this type of malfunction in flight. He was quite concerned recently when discussing the issue with one of the aircraft manufacturer's representatives who said the two events he and his First Officer experienced, "it was impossible for that type of event to happen". The CRJ-200 aircraft they had flown did not have any prior history of Yaw Damper issues. He does not know if the aircraft's age may be a contributing factor. Maintenance replaced Yaw Damper Computers-1 and -2. Circuit cards were also removed and replaced in Flight Control Computers 1 and 2. Although he has military airframe maintenance experience, he does not know if the Yaw Dampers or Yaw Damper Computers are life limited. His First Officer had informed him that a third incident with the same conditions of lateral deviations had occurred following theirs, on a different CRJ-200 aircraft.

Synopsis

A Captain and First Officer (F/O) report experiencing sudden, sharp, uncommanded lateral rudder inputs while flying a CRJ-200 aircraft during a Revenue and Ferry flight. Uncommanded lateral movements kept recurring every 30 to 60 seconds even with Yaw Dampers-1 and -2 and Autopilot disengaged. No QRH procedure available to remedy malfunction. Emergency landing was declared.

ACN: 1108399

Time
Date: 201308
Local Time Of Day: 0001-0600

Place
Locale Reference.ATC Facility: ZZZ.ARTCC
State Reference: US
Altitude.MSL.Single Value: 31000

Environment
Flight Conditions: VMC

Aircraft 1
Make Model Name: Regional Jet 200 ER/LR (CRJ200)

Component 1
Aircraft Component: Autoflight Yaw Damper

Component 2
Aircraft Component: Rudder Control System

Person 1
Function.Flight Crew: First Officer
Function.Flight Crew: Pilot Flying
ASRS Report Number: 1108399

Person 2
Function.Flight Crew: Captain
Function.Flight Crew: Pilot Not Flying
ASRS Report Number: 1108887

Events
Anomaly.Aircraft Equipment Problem: Critical
Anomaly.Inflight Event / Encounter: Other / Unknown
Detector.Person: Flight Crew
Result.General: Maintenance Action
Result.Flight Crew: Diverted
Result.Flight Crew: Landed in Emergency Condition

Narrative 1

At cruise FL310, about 5 minutes into leveling out, I noticed an abrupt yawing motion. I initially thought that the Captain had bumped the rudder pedal. I looked over at him and his feet were not near the pedals. I asked him if he felt that and he said 'Yes'. It was not turbulence, as it was a smooth altitude and didn't feel like turbulence. After another minute or two it happened again, in both directions. I then decided to disconnect the Autopilot and hand fly it to make sure it wasn't the automation. As I was hand flying and my feet resting on the rudder pedals it happened again in both directions. I then reconnected the Autopilot and every 2-3 minutes we'd get that same uncommanded yaw. The rudder pedals would move along with the direction of yaw as though someone was pushing on them. It created very obvious yaw motion with a few degree nose left/right each time. It created an unstable and undesirable flight path. About seven minutes after we noticed the issue, we asked for lower and descended to FL270. As it kept happening in small intervals we slowed down to Vma. We had no guidance from the QRH, or any other books, so we decided to divert.

We were about 40 miles away when we decided to divert. We were cleared direct to the airport and made a left turn, descended and landed uneventfully. The rudder kept kicking left and right during the decent. Upon landing the Yaw Damper-1 (YD-1) Status message illuminated. We found out later the Yaw Damper-1 was faulty. We were nervous the rudder movement was going to get worse and we didn't want any type of full rudder deflection so that's why we decided to divert. I had never experienced this before in the past 5.5 years as a First Officer and the Captain was green with high minimums, so we took the precaution. Mechanical issue...no suggestions except create a checklist for "Uncommanded Rudder Movement."

Narrative 2

The yaw movements appeared to come from rouge rudder movements, rudder deflection remained minimal (referencing the Flight Control page on the EICAS). Troubleshooting a vital control component with Maintenance was not considered a safe alternative, instead we decided that an expeditious landing was the safest course while the aircraft was in our complete control. No EICAS message appeared in flight. "YD 1 INOP" status message was noticed on roll-out after landing on [Runway] XR, and remained on into the gate. The AP was disengaged in-flight in an attempt to isolate the rudder deflection, the rudder continued to deflect. The rudder remained responsive to our control inputs throughout the flight. The landing occurred under the aircraft's Max Landing Weight.

Synopsis

A flight crew reported they experienced abrupt yawing motions in a CRJ-200 aircraft that created an unstable flight path. The First Officer noted the rudder pedals would move along with the direction of yaw as though someone was pushing on them. Rudder continued to kick left and right during descent. No QRH procedure available for uncommanded rudder movement.