Docket No.: **SA-510**
Exhibit No.: **9F**

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Airworthiness Directive (AD) 94-01-07
Boeing 737 Service Bulletin 737-27-1185
Boeing 737 Service Letter 737-SL-27-57
AD 94-01-07 Final Rule NPRM Comments
AD 80-07-02 Fortner Engineering Control Valve

94-01-07

BOEING

Amendment 39-8789 **Docket 93-NM-79-AD**

Applicability: Model 737 series airplanes; line positions 1 through 2453, inclusive; certificated in any category.

Compliance: Required as indicated, unless accomplished previously.

To prevent the rudder actuator piston and the rudder to operate with reduced force capability or to move in a direction opposite to the intended direction, which could result in reduced controllability of the airplane, accomplish the following:

(a) Within 750 flight hours after the effective date of this AD, perform a test of the main rudder power control unit (PCU), part number 65-44861-2/-3/-4/-5/-6/-7/-8/-9, to detect internal leakage of hydraulic fluid, in accordance with Boeing Service Letter 737-SL-27-82-B, dated July 13, 1993.

(1) If no discrepancy, as described in paragraph 3.B. of the Service Letter, is detected, repeat the test at intervals not to exceed 750 flight hours.

(2) If any discrepancy, as described in paragraph 3.B. of the Service Letter, is detected during any check, prior to further flight, accomplish either paragraph (a)(2)(i) or (a)(2)(ii) of this AD:

(i) Replace the main rudder PCU with a serviceable PCU in accordance with the Model 737 Overhaul Manual. After such replacement, repeat the test at intervals not to exceed 750 flight hours.

(ii) Replace the main rudder PCU with a new main rudder PCU having part number 65-44861-11 or 65C37052-2/-3/-4/-5/-6/-7/-8/-9, in accordance with Boeing Service Bulletin 737-27-1185, dated April 15, 1993. Such replacement constitutes terminating action for the tests required by this AD.

(b) Within 5 years after the effective date of this AD, replace the main rudder PCU, part number 65-44861-( ), with a new main rudder PCU having part number 65-44861-11 or 65C37052-2/-3/-4/-5/-6/-7/-8/-9, in accordance with Boeing Service Bulletin 737-27-1185, dated April 15, 1993. Such replacement constitutes terminating action for the tests required by this AD.

(c) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA, Transport Airplane Directorate. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Seattle ACO.

NOTE: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Seattle ACO.

(d) Special flight permits may be issued in accordance with **FAR 21.197** and **21.199** to operate the airplane to a location where the requirements of this AD can be accomplished, provided that the airplane has not failed the internal leakage test required by this AD.

(e) The tests shall be done in accordance with Boeing Service Letter 737-SL-27-82-B, dated July 13, 1993. The replacement shall be done in accordance with Boeing Service Bulletin 737-27-1185, dated April 15, 1993. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from Boeing Commercial Airplane Group, P.O. Box 3707 , Seattle, Washington 98124-2207. Copies may be inspected at the FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

(f) This amendment becomes effective on March 3, 1994.

FOR FURTHER INFORMATION CONTACT:

Kenneth W. Frey, Aerospace Engineer, Seattle Aircraft Certification Office, Systems & Equipment Branch, ANM-130S, FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington 98055-4056; telephone (206) 227-2673; fax (206) 227-1181.

Number: 737-27-1185
Date: April 15, 1993
Revision 1: April 14, 1994
ATA System: 2721

Revision Transmittal Sheet

SUBJECT: FLIGHT CONTROLS - RUDDER AND TAB - RUDDER POWER CONTROL UNIT - REPLACEMENT OF THE DUAL SERVO VALVE

This revision includes all pages of the service bulletin.

COMPLIANCE INFORMATION RELATED TO THIS REVISION

Federal Aviation Administration (FAA) Airworthiness Directive 94-01-07, Amendment 39-8789, is related to this service bulletin.

No more work is necessary on airplanes changed by the initial release of this service bulletin.

SUMMARY

This revision is sent to change one step and remove three steps in Paragraph III, Accomplishment Instructions. In Part I, step C is changed to add the functional test of the PCU. This test was part of step E. Steps D and E are not necessary, and are removed. In Part II, step D is not necessary, and is removed.

The data given in Notices of Status Change 737-27-1185 NSC 1 and NSC2 are included in this revision.

Paragraph I.A., Effectivity, shows changes of airplane operators. Each operator should examine the Effectivity paragraph for changes.

Vertical lines are put on the left edge of each page, except in Paragraph I.A., Effectivity, to show the location of important changes.

Pages with a revision number and date, but no vertical lines, have no important changes.

REVISION HISTORY

Initial Release: April 15, 1993
Revision 1: April 14, 1994

Number: 737-27-1185
Date: April 15, 1993
Revision 1: April 14, 1994
ATA System: 2721

Summary

SUBJECT: FLIGHT CONTROLS - RUDDER AND TAB - RUDDER POWER CONTROL UNIT - REPLACEMENT OF THE DUAL SERVO VALVE

THE BOEING COMMERCIAL AIRPLANE GROUP RECOMMENDS THAT EACH OPERATOR EXAMINE THIS SERVICE BULLETIN IMMEDIATELY.

BACKGROUND

This service bulletin gives instructions to replace the dual servo valve on the rudder power control unit (PCU).

Under certain conditions, the secondary slide in the servo valve can go past the intended maximum-travel position. On some PCUs, this can cause the rudder actuator piston and the rudder to move opposite to the intended direction.

Refer to the following for more detailed information on this condition:

- Telex M-7272-92-5416, dated 16 October 1992
- Telex M-7272-92-5916, dated 16 November 1992
- Service Letter 737-SL-27-83, dated 6 May 1993.

The new dual servo valve has improved internal secondary stops. These new stops will prevent the condition described above.

ACTION (PRR 35153)

Replace the dual servo valve on the rudder PCU.

COMPLIANCE

Boeing recommends that the operator do the changes given in this service bulletin as soon as parts are available and the rudder power control unit (PCU) is removed for scheduled or unscheduled maintenance. Boeing also recommends that the operators do the change on their spare rudder PCUs as soon as parts are available. There is a limited number of parts available from the supplier. Contact Parker-Hannifin for supply data.

Federal Aviation Administration (FAA) Airworthiness Directive 94-01-07, Amendment 39-8789, is related to this service bulletin.

EFFECTIVITY

All 737 airplanes, line positions 1 through 2453

MANPOWER

Part I - Replace the PCU

Total Man-hours - 9 for each airplane
Elapsed Time - 7 Hours

Part II - Replace the dual servo valve

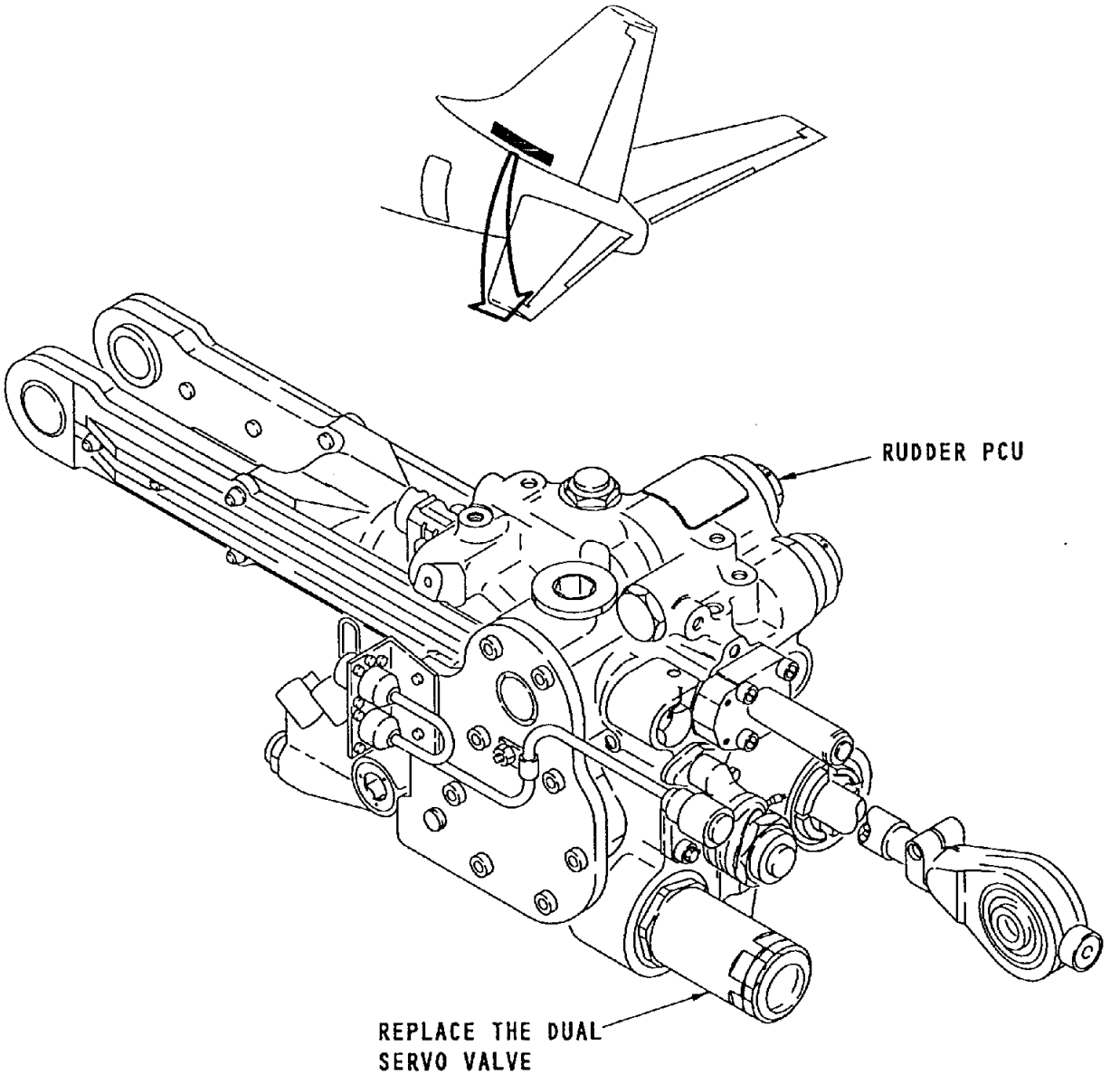
Total Man-hours - 6 for each PCU
Elapsed Time - 6 Hours

The change to the dual servo valve assembly, as given in the Parker service bulletin, is not included.

MATERIAL INFORMATION

Operator Supplied Parts

(5)



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Number: 737-27-1185
Date: April 15, 1993
Revision 1: April 14, 1994
ATA System: 2721

SUBJECT: FLIGHT CONTROLS - RUDDER AND TAB - RUDDER POWER CONTROL UNIT - REPLACEMENT OF THE DUAL SERVO VALVE

THE BOEING COMMERCIAL AIRPLANE GROUP RECOMMENDS THAT EACH OPERATOR EXAMINE THIS SERVICE BULLETIN IMMEDIATELY.

I. PLANNING INFORMATION

A. Effectivity

1. Airplanes

Refer to Service Bulletin Index Document D6-19567, Part 3 for Airplane Variable Number, Line Number, and Serial Number data.

This service bulletin is for the airplanes shown below. An equivalent change is on subsequent production airplanes. Refer to PRR35153 for data about this change.

IDENTIFICATION BY CUSTOMER, CUSTOMER CODE, GROUP AND VARIABLE NUMBER

AER LINGUS (ARL)
PG255 PG573 PK029 PK641-PK642 PP951-PP952 PT161-PT169
PW591-PW596 PY281 PY322-PY323

AERO CONTROLS, INC (AEO)
PG629

AERO COSTA RICA (AOR)
PK872-PK873

AEROLINEAS ARGENTINAS (ARG)
PH705-PH708 PH741-PH743 PK102-PK103 PY007

AERON AVIATION (AAV)
PJ072

AIR ALGERIE (ALG)
PK361 PK631 PK633-PK634 PL717-PL725 PY051-PY053

AIR ATLANTA ICELANDIC (AID)
PJ104 PY002

AIR AUSTRAL (AUX)
PT215

AIR BELGIUM (ABL)
PW504

AIR BERLIN GMBH (BER)
PM561 PW032 PW047 PW517

AIR CALEDONIE INTERNATIONAL (NCI)
PP918

AIR CHINA (BEJ)
PM281-PM283 PP521-PP522 PQ361-PQ367

AIR COLUMBUS (COB)
PP904 PP907

AIR EUROPA (ARE)
PM381-PM382 PP501-PP502 PP831 PP835 PP840 PP846

AIR FRANCE (AFA)
PL502-PL503 PN101-PN117 PP902 PP910-PP912 PS604 PS606
PT148 PT211 PT501-PT511

AIR GABON S.A. (GBN)
PY191

AIR GUINEE (GNE)
PY651

AIR HOLLAND CHARTER B.V. (HOL)
PP504

AIR MADAGASCAR (MAD)
PG375 PL793

AIR MALAWI, LTD. (AML)
PS602

AIR MALTA (MLT)
PL621-PL626 PQ791

AIR NAMIBIA (NAM)
PN492

AIR NAURU (NAU)
PK356 PK581 PY286

AIR NEW ZEALAND, LTD. (ANZ)
PJ009 PJ117-PJ119 PK211 PK213-PK214 PK216-PK220 PM181
PY741

AIR ONE AB SWEDEN (AOW)
PJ003

AIR PACIFIC (APC)
PT058

AIR TANZANIA (TNZ)
PY611-PY612

AIR TOULOUSE INTERNATIONAL (TOL)
PL716

(8)

AIR UK (LEISURE) (UKL)
PW001 PW014 PW017 PW051-PW054

AIR ZAIRE (ZAI)
PY111 PY113

AIR ZIMBABWE (ZMB)
PN431-PN433

AIRTOURS INT'L AVIATION (GUERNSEY) LTD. (GUE)
PW116

ALASKA AIRLINES (ASA)
PJ301-PJ302 PW231-PW239 PY112 PY134-PY135 PY270 PY461-PY463

ALBATROS AIRLINES (ABS)
PG251 PG253

ALL NIPPON AIRWAYS CO. LTD. (ANA)
PG584-PG586 PK711-PK716

ALOHA (ALO)
PG046 PK286-PK287 PK691-PK695 PK697 PP825-PP826 PV271-PV272
PY001 PY231 PY242 PY451

ALYEMDA DEM. YEMEN AIRLINES (ALY)
PY409-PY410

AMERICA WEST AIRLINES, INC. (AMW)
PC004 PG036 PK283 PK565 PK696 PL081
PL172 PL551-PL562 PL801 PP181-PP187 PP189 PP194-PP199
PP891-PP899 PP901 PP903 PP931-PP934 PS666-PS669

AMIRI FLIGHT (ABD)
PK495

ANGOLA AIRLINES (ANG)
PK661 PK664-PK666 PY162

ANSETT AIRLINES OF AUSTRALIA (ANS)
PP908-PP909 PP914 PQ026-PQ041

ANSETT WORLDWIDE AVIATION SERVICES (AWW)
PA001 PA003-PA004 PC003

ARAMCO ASSOCIATED CO. (ARM)
PL151 PL456 PY241 PY243-PY244

ARCO (ATR)
PN452-PN453

ARKIA ISRAELI AIRLINES, LTD (ARK)
PG575

ASEAN AVIATION (L) INC. (ASJ)
PG578-PG583

ASIANA AIRLINES (AAR)
PT212-PT213 PV201-PV202 PW005 PW007-PW009 PW011 PW013
PW018-PW020 PW025

ATASCO USA, INC. (ATJ)
PL762

AVENSA (AVN)
PK042-PK043 PM383

AVIATECA (AVT)
PL737 PL740-PL741 PL747 PP352 PP379 PP384
PP948 PY201

AVIATION SALES CO., INC. (ASC)
PG331 PG401

AVIOGENEX AIR TRANSPORT (AVG)
PL501 PL506 PN501-PN502

BALKAN BULGARIAN AIRLINES (BUL)
PT216-PT217 PT220

BAVARIA (BAV)
PL455

BEST LEISURE (BES)
PJ108 PJ113

BHOJA AIR (BHO)
PK614

BIRGENAIR (BIR)
PS654

BOURAQ INDONESIA AIRLINES (PTB)
PJ001 PK501 PL742-PL744 PL746 PL803

BRAATHENS S.A.F.E. (BRT)
PJ007 PK882 PT001 PT003-PT011 PT021-PT025 PW062
PW571-PW576

BRITISH AIRWAYS (BAB)
PK731-PK765 PK771-PK777 PK779 PN001 PP353 PW091-PW094
PW101 PW106 PW111-PW112 PW115 PW117 PW119
PW301-PW323

BRITISH MIDLAND (BMA)
PP916 PP923-PP924 PQ281 PQ292 PT181 PT184-PT185
PT295 PW004 PW006 PW046 PW120 PW265
PW501

CALDWELL AIRCRAFT TRADING CO. (CAS)
PG402

CAMEROON AIRLINES (CAM)
PM171 PY046-PY047

CANADIAN AIRLINES INTERNATIONAL LTD. (CDI)
PK358 PK671-PK675 PK677-PK681 PK822 PK881 PK884
PL401-PL417 PL764-PL770 PM141-PM142 PY151-PY154 PY303-PY304 PY421-PY422
PY441

CARNIVAL AIR (CVL)
PG305 PG312 PJ008 PL712 PW061 PW063
PW072 PW266 PW296

CASINO EXPRESS (CIN)
PG279 PG436

CAYMAN AIRWAYS (CAY)
PK222 PK561

CHIA (CHS)
PW026 PW030 PW034-PW035 PW048

CHINA AIR LINES, INC. (CHI)
PN472-PN474

CHINA HAINAN AIRLINES (HNA)
PS611 PS613

CHINA SOUTHERN AIRLINES (GUN)
PK636-PK637 PM251-PM254 PM406-PM409 PM541 PN405 PS631
PT041-PT049 PT052

CHINA SOUTHWEST AIRLINES (XIN)
PM413-PM414 PP631-PP634 PQ295 PQ401-PQ405

CHINA XINHUA AIRLINES (XIH)
PQ264

CIS AIR HOLDINGS, LTD. (CIS)
PG302

COMAIR (CML)
PG354 PG356

CONQUEST SUN AIRLINES, INC. (CQT)
PG438

CONTINENTAL AIRLINES, INC. (CAL)
PA006-PA009 PA011-PA012 PA014 PA016-PA020 PG056 PG064
PG199 PG225 PG433 PG501-PG505 PG621-PG625 PG627-PG628
PG630 PG704 PL001 PP671-PP699 PP701-PP726 PP730
PP732-PP733

COPA COMPANIA PANAMENA DE AVIATION S.A. (COP)
PC001 PJ107 PJ112 PK617 PL745 PY341

CORSE AIR INTERNATIONAL (COR)
PW661-PW662

CROATIA AIRLINES (CRH)
PK904 PK906-PK907 PK928 PK932

(11)

CSA CZECHOSLOVOKI AIRLINES (CSA)
PT617-PT621

DAMANIA AIRWAYS LTD. (DAI)
PL451-PL452 PN081-PN082

DELTA AIR LINES, INC. (DAL)

PK611	PK613	PK623-PK624	PK632	PL221	PL611
PN131-PN163	PN401-PN404	PN407-PN420	PP231-PP243	PQ801	

DEUTSCHE BA (DBA)

PP508	PP510-PP511	PP514-PP517			

DUKE FARMS (DFI)
PP991

E G AND G (EGN)

PG037	PG208	PG210	PG215	PG431	PL763

EAST WEST AIRLINES (INDIA) (BOM)

PK615-PK616	PK819	PK824	PL171		

EDRESS, SHIEKH M. (SME)
PL505

EGYPTAIR (EGP)

PK254-PK255	PK257-PK258	PT561-PT565			

EL AL ISRAEL AIRLINES, LTD. (ELA)
PL631-PL632

ETHIOPIAN AIRLINES, CORP. (ETH)
PN512

EURALAIR (ERA)

PG026	PG028-PG029	PT146-PT147	PY004	PY006	

EUROBELGIAN AIRLINES (EBA)

PP930	PS653	PS655-PS656	PW118		

EUROPE AERO SERVICE (EUR)

PK203	PK215	PK282	PK359	PK564	PK612
PQ228-PQ229	PT214				

EUROPEAN AIRLINES (EUF)
PQ227

FALCON AVIATION (FLK)
PS636-PS638

FAR EASTERN AIR TRANSPORT (FAT)

PA002	PA005	PG055	PG226	PG228	PG230
PK562	PN481				

FAUCETT (COMPANIA DE AVIATION S.A. (FCT)

PC002	PG034	PG213	PK241	PL711	PL758

FLIGHTSTAR AVIATION CORPORATION (FST)
PG274

FORTUNE AVIATION (FOR)
PK432

FRENCH POSTAL OFFICE (FPO)
PP925 PQ421 PS607 PS641-PS644 PY101-PY103 PY302
PY344

GARUDA INDONESIAN AIRWAYS (GIA)
PQ282-PQ289

GATARI AIR SERVICE (GRI)
PL441

GB AIRWAYS (GBA)
PJ110-PJ111

GERMANIA FLUGGESELLSCHAFT MBH (GER)
PP503 PP506-PP507 PQ231-PQ237

GOVERNMENT OF BRAZIL (BRZ)
PK068-PK069

GOVERNMENT OF MEXICO (MXG)
PC005 PG223 PP919

GOVERNMENT OF PAKISTAN (PKG)
PS612

GOVERNMENT OF SHARJAH (SHJ)
PL581

GPA GROUP LTD. (GUI)
PK252 PK354-PK355 PL027 PW015

GULF AIR (GUL)
PK462 PK464 PK466-PK468

HAPAG LLOYD (HAP)
PL504 PT101-PT105 PW511-PW516 PW518-PW520

HEAVYLIFT AIRCRAFT ENGINEERING (HVL)
PJ109

ICELANDAIR (ICE)
PW561-PW564

INDIAN AIR FORCE (IDF)
PH712-PH713 PM016-PM017

INDIAN AIRLINES (IND)
PH021 PH024 PH709 PH711 PK231-PK233 PK235-PK240
PM001-PM006 PY631

INDONESIAN AIR FORCE (IDO)
PL601-PL603

INNER MONGOLIAN AIRLINES (IML)
PS614-PS616

INTEGRATED RESOURCES (INH)
PG271 PG273 PG403

INTERAMERICA S.A. DE C.V. (INJ)
PL761

INTERNATIONAL AIR LEASES (IAL)
PG043 PG047-PG048

INTERNATIONAL AIRLINE SUPPORT GROUP (ASG)
PG021

INTERNATIONAL PACIFIC TRADING CO. (IPT)
PG224 PG572 PG574 PJ102

IRAN AIR (IRN)
PH731 PK391 PY021-PY022

IRAQI AIRWAYS (IRQ)
PY141-PY142

ISTANBUL AIRLINES (IST)
PW002 PW022 PW024 PW028 PW036 PW156-PW157

JAPAN TRANSOCEAN AIR CO., LTD. (SWL)
PK521 PK523-PK528 PN451 PN454 PN456

JET AIRWAYS (INDIA) PVT. LTD. (JPL)
PP920-PP921 PP926-PP927

JETALL HOLDING CORPORATION (JEL)
PY005

JUGOSLOVENSKI AEROTRANSPORT (JAT)
PP771-PP779

KENYA AIRWAYS (KEN)
PK253 PK256

KLM ROYAL DUTCH AIRLINES (KLM)
PP861-PP875 PW611-PW620

KOREAN AIR FORCE (KAF)
PP221

LACSA (LAC)
PK357 PK871

LADECO (LDE)
PJ004-PJ006 PK212 PK281 PK826 PK830 PL802
PQ486

LAN-CHILE S.A. (LAN)
PK360 PK825 PL025 PL028

LAPA (LAZ)
PG355 PK047 PK051 PK463

LAUDA AIR LUFTFAHRT AG (LAL)
PP851-PP852 PW701-PW702

LINA CONGO (LNA)
PY411

LINHAS AEREAS DE MOCAMBIQUE (LAM)
PH703 PM397-PM398 PY031

LITHUANIAN AIRLINES (LIJ)
PK563

LOT POLISH AIRLINES (LOT)
PT651-PT655

LUFTHANSA GERMAN AIRLINES (DLH)
PK901-PK903 PK905 PK911-PK927 PK929-PK931 PK933-PK938 PQ051-PQ092
PS701-PS703 PT002 PT331-PT360 PV231-PV237 PY345-PY346

LUXAIR (LUX)
PT671-PT672 PW741-PW742

MAERSK AIR (MRS)
PM551 PP505 PP512-PP513 PT121 PT123-PT125

MALAYSIAN AIRLINES SYSTEM BERHAD (MAS)
PQ771 PT301-PT302 PW027 PW031 PW033 PW038-PW039
PW041 PW043-PW044 PW065-PW068 PW201-PW219

MALEV HUNGARIAN AIRLINES (HGA)
PK284-PK285 PK827 PM401 PM404-PM405

MANDALA AIRLINES (MND)
PL061 PL421 PN002

MARKAIR, INC. (ALK)
PN493 PP301 PP305 PQ226 PS657 PW042
PW113-PW114 PW502 PY056-PY057 PY592-PY595

MIDAIR (MAI)
PY342

MODILUFT (MOU)
PK908-PK910

MONARCH AIRLINES, LTD. (MON)
PP821 PP823-PP824 PP832 PP913 PS601

MONTELY II (MOY)
PJ031

MORRIS AIR (MOR)
PP162 PP164-PP165 PP169 PP188 PP190-PP192 PP201-PP205
PP302 PP304 PP351 PP378 PP381-PP382 PP727
PP827

NASA (NAS)
PA099

NATIONAL AIRLINES (NAW)
PJ105-PJ106

NATIONAL CIVIL AVIATION ADM-TURKMENISTAN (TUE)
PQ265

NICA (NICARAGUENCE DE AVIACION) (NIC)
PK823

NIGERIA AIRWAYS, LTD. (NIA)
PL781-PL782 PL784-PL788

NORDAM (NOP)
PK221

NORDIC EAST (NOE)
PJ002

NOROESTE (NOS)
PT054

NWT AIR (NTA)
PX701 PY132-PY133

OLYMPIC AIRWAYS (OLY)
PK301-PK304 PK307-PK310 PM021-PM023 PW711-PW716

OMAN AIR (OMR)
PP928-PP929

P. T. AIRFAST (PTF)
PG204 PG278 PY343

PAKISTAN INTERNATIONAL AIRLINES CORP. (PIA)
PP281-PP286

PEGASUS AIRLINES (PGS)
PW029 PW064 PW261

PETROLAIR SYSTEMS S. A. (PTS)
PL471

PHILIPPINE AIRLINES, INC. (PAL)
PM384-PM385 PM387-PM388 PM390-PM391 PM393-PM395 PP935-PP936

PLUNA (PLU)
PL201-PL203

POLARIS AIRCRAFT LEASING CORP. (PLS)
PG201-PG202 PG205 PG207 PG218-PG219 PG272 PG276
PG651-PG652 PK026-PK028 PK461 PK465 PK874 PQ301

POLY TECHNOLOGIES, INC. (PTI)
PP728-PP729 PS609-PS610

POLYNESIAN AIRLINES (PLY)
PP947 PQ293

PRESIDENTIAL AIR (PRB)
PG432

PRINCE TALAL (PTA)
PN455

QANTAS AIRWAYS, LTD. (QAN)
PQ001-PQ016 PW531-PW544

REPUBLIC OF NIGER (NIR)
PY166

RIO-SUL (ROS)
PT059

ROYAL AIR MAROC (RAM)
PK271-PK274 PT218 PT581-PT583 PW631-PW634 PY671-PY672

RYANAIR (RYR)
PJ114-PJ115 PK801-PK804

SABENA S.A. (SAB)
PK041 PK044-PK046 PK048-PK050 PK052-PK053 PK431 PK433
PP961-PP967 PT611-PT616 PW010 PW503 PW681-PW683 PW761
PY272-PY275

SAHARA INDIAN AIRLINES (SAQ)
PK820

SAHSA (SERVICIO AEREO DE HONDURAS,S.A.) (SAH)
PJ032 PJ071 PL736

SAUDI ARABIAN AIRLINES CORP. (SVA)
PK311-PK317 PL726-PL735 PY036-PY037

SAUDI ROYAL FLEET (SRF)
PK318

SCANDINAVIAN AIRLINES SYSTEM (SAS)
PT182-PT183 PT186-PT187 PT701-PT703

SERVICIOS AEREOS RUTAS ORIENTE, (SARO) (SEV)
PA015 PA021-PA022 PK351 PK353

SHAHEEN AIR INTERNATIONAL (SHK)
PK514-PK515

SHANNONAIR LEASING LTD. (SLE)
PK352

SHENZHEN AIRLINES (SHZ)
PS691-PS692

SIERRA PACIFIC AIRLINES (SRP)
PK627

(17)

SILKAIR (SLK)
PM392 PM396 PP509 PS652

SINGAPORE AIRLINES, LTD (SIA)
PQ222

SOLOMON AIRLINES, LTD. (SOI)
PW293

SOUTH AFRICAN AIRWAYS (SAA)
PG353 PL101-PL113

SOUTHWEST AIRLINES CO. (SWA)
PK082 PK091-PK099 PK541-PK560 PK621 PK628-PK630 PM051-PM066
PP101-PP161 PP163 PP166-PP168 PP193 PP303 PP380
PP731 PP822 PS751-PS752 PU001-PU025

SUDAN (SUD)
PY156-PY157

SUNEXPRESS AIR (SNS)
PM389 PM399 PM402

T A PORTUGUESES (TAP)
PK971 PK973-PK974 PN083-PN086 PP985-PP986 PQ302-PQ307 PY721

TACA INTERNATIONAL AIRLINES, INC. (TAC)
PG059 PG352 PK223 PN491 PP946 PQ294
PQ331-PQ332 PQ481 PY131

TAESA (TES)
PK622 PK625-PK626 PM410-PM411 PP833-PP834 PP841-PP842 PP915
PT050-PT051 PT053 PT055

TAG (TAG)
PT219

TAT EUROPEAN AIRLINES (TTR)
PY003 PY301 PY321 PY361-PY362

TEA BASEL (TEB)
PP838 PP845 PQ224-PQ225 PS651

THAI AIR FORCE (TAF)
PK519

THAI AIRWAYS INTERNATIONAL, INC. (TII)
PK511 PW161-PW166

TRANS ALSACE AIRLINES (TAQ)
PW012

TRANS EUROPEAN AIRWAYS ITALIA S.P.A. (TEI)
PP984 PQ221 PQ223 PQ230

TRANSAERO (TRX)
PK451-PK452

TRANSAVIA AIRLINES (TAV)
PG074 PK502-PK504 PK821 PP801-PP808 PP922

TRANSBRASIL AIRLINES INC. (TBL)
PP836-PP837 PP843-PP844 PP847-PP848 PQ241-PQ243 PS603 PS605
PW016 PW021 PW023 PW037

TRANSMILE AIR SERVICES (TML)
PY381

TUNIS AIR (TUN)
PK861-PK863 PT641 PY621

TURKISH AIRLINES (THY)
PM552-PM554 PM557-PM560 PT056-PT057 PW040 PW045 PW049-PW050
PW281

UKRAINE INTERNATIONAL AIRLINES (UKR)
PM555-PM556

UNITED AIR LINES, INC. (UAL)
PG001-PG004 PG006-PG013 PG015-PG019 PG022-PG025 PG027 PG030
PG032-PG033 PG038-PG040 PG045 PG051-PG054 PG057 PG060-PG063
PG065-PG072 PG075 PK201-PK202 PL002-PL023 PQ101-PQ199 PQ201-PQ202
PT381-PT399 PT401-PT432

UNITED STATES AIR FORCE (USF)
PJ201-PJ219

USAIR, INC. (USA)
PG041-PG042 PG073 PG206 PG301 PG303-PG304 PG306-PG311
PG313-PG314 PG474 PG576 PK288-PK289 PK591-PK599 PK601-PK610
PK883 PM101-PM119 PN021-PN043 PP001-PP010 PP012-PP054 PP376-PP377
PP383 PP401-PP440 PP471-PP475 PV001-PV010 PV012-PV055

VARIG AIRLINES (VAR)
PK111-PK116 PK118-PK120 PK141-PK146 PL453-PL454 PP839 PP905-PP906
PP917 PP981-PP982 PP987-PP990 PQ251-PQ262 PQ266-PQ267 PQ290-PQ291

VARSA (VAB)
PG351

VASP (VSP)
PG435 PG437 PG439-PG440 PG471-PG473 PH011-PH013 PK061-PK062
PK065-PK067 PL756 PX071

VENEZUELA - GOVERNMENT OF (VNZ)
PK070

VISCOUNT AIR SERVICE INC. (VAS)
PG203 PG209 PG212 PG216-PG217 PG220-PG222 PJ101
PJ103 PK305-PK306

VIVA AIR (VIV)
PP391-PP393 PP983 PQ341-PQ344 PS608

WHIRLPOOL FINANCIAL CORP (ZZW)
PG214

WUHAN AIRLINES (WUH)
PQ491-PQ492

XIAMEN AIRLINES CO. LTD. (XIA)
PK635 PM255 PN521 PT026-PT027

YEMEN AIRWAYS (YEM)
PK341

YUNNAN PROVINCIAL IMPORT & EXPORT CORP. (YUN)
PM412 PP651-PP652 PQ263 PQ411-PQ413

ZAMBIA AIRWAYS (ZAM)
PK291 PL026

IDENTIFICATION BY VARIABLE NUMBER

PA001-PA022	PA099	PA231-PA232	PC001-PC005	PG001-PG075	PG199
PG201-PG230	PG251-PG255	PG271-PG279	PG301-PG314	PG331-PG332	PG351-PG356
PG375	PG401-PG403	PG431-PG442	PG471-PG475	PG501-PG505	PG571-PG586
PG621-PG630	PG651-PG652	PG701-PG705	PH001	PH011-PH013	PH021-PH024
PH701-PH715	PH731-PH732	PH741-PH743	PJ001-PJ009	PJ031-PJ032	PJ071-PJ072
PJ101-PJ119	PJ201-PJ219	PJ301-PJ302	PK026-PK029	PK041-PK053	PK061-PK070
PK081-PK082	PK091-PK099	PK101-PK103	PK111-PK120	PK141-PK146	PK201-PK204
PK211-PK223	PK231-PK241	PK251-PK258	PK271-PK274	PK281-PK289	PK291
PK301-PK318	PK341	PK351-PK361	PK391	PK431-PK433	PK451-PK452
PK461-PK469	PK495	PK501-PK504	PK511-PK515	PK519	PK521-PK528
PK541-PK565	PK581	PK591-PK599	PK601-PK617	PK621-PK637	PK641-PK642
PK661-PK666	PK671-PK681	PK691-PK697	PK711-PK716	PK731-PK765	PK771-PK779
PK801-PK804	PK819-PK827	PK830	PK861-PK863	PK871-PK874	PK881-PK884
PK901-PK938	PK971-PK974	PL001-PL028	PL061	PL081	PL101-PL113
PL151	PL171-PL172	PL201-PL203	PL221	PL401-PL417	PL421
PL441	PL451-PL456	PL471	PL491	PL501-PL506	PL551-PL562
PL581	PL601-PL603	PL611	PL621-PL626	PL631-PL632	PL711-PL712
PL716-PL747	PL756	PL758	PL761-PL770	PL781-PL788	PL793
PL801-PL803	PM001-PM006	PM016-PM017	PM021-PM023	PM051-PM066	PM101-PM119
PM141-PM142	PM171	PM181	PM251-PM255	PM281-PM283	PM381-PM399
PM401-PM414	PM541	PM551-PM561	PN001-PN002	PN021-PN043	PN081-PN086
PN101-PN117	PN131-PN163	PN401-PN420	PN431-PN433	PN451-PN456	PN471-PN474
PN481	PN491-PN493	PN501-PN502	PN511-PN512	PN521	PP001-PP054
PP101-PP169	PP181-PP199	PP201-PP205	PP221	PP231-PP243	PP281-PP286
PP301-PP305	PP351-PP353	PP376-PP384	PP391-PP393	PP401-PP440	PP471-PP475
PP501-PP517	PP521-PP522	PP631-PP634	PP651-PP652	PP671-PP699	PP701-PP733
PP771-PP779	PP801-PP808	PP821-PP827	PP831-PP848	PP851-PP852	PP861-PP875
PP891-PP899	PP901-PP936	PP946-PP948	PP951-PP952	PP961-PP967	PP981-PP991
PP993	PQ001-PQ016	PQ026-PQ041	PQ051-PQ092	PQ101-PQ199	PQ201-PQ202
PQ221-PQ237	PQ241-PQ243	PQ251-PQ267	PQ281-PQ295	PQ301-PQ307	PQ331-PQ332
PQ341-PQ344	PQ361-PQ367	PQ401-PQ405	PQ411-PQ413	PQ421	PQ481
PQ486	PQ491-PQ492	PQ771	PQ791	PQ801	PS601-PS616
PS631	PS636-PS638	PS641-PS644	PS651-PS657	PS666-PS669	PS691-PS692
PS701-PS703	PS751-PS752	PT001-PT011	PT021-PT027	PT041-PT059	PT101-PT105
PT121-PT125	PT146-PT148	PT161-PT169	PT181-PT187	PT211-PT220	PT295
PT301-PT302	PT331-PT360	PT381-PT399	PT401-PT432	PT501-PT511	PT561-PT565
PT581-PT583	PT611-PT621	PT641	PT651-PT655	PT671-PT672	PT701-PT703
PU001-PU025	PV001-PV055	PV201-PV202	PV231-PV237	PV271-PV272	PW001-PW054
PW061-PW068	PW072	PW091-PW094	PW101	PW106	PW111-PW120
PW156-PW157	PW161-PW166	PW201-PW219	PW231-PW239	PW261	PW265-PW266
PW281	PW293	PW296	PW301-PW323	PW501-PW504	PW511-PW520
PW531-PW544	PW561-PW564	PW571-PW576	PW591-PW596	PW611-PW620	PW631-PW634
PW661-PW662	PW681-PW683	PW701-PW702	PW711-PW716	PW741-PW742	PW761
PX071	PX701	PY001-PY008	PY021-PY022	PY031	PY036-PY037
PY046-PY048	PY051-PY053	PY056-PY057	PY101-PY103	PY111-PY113	PY131-PY135
PY141-PY143	PY151-PY154	PY156-PY157	PY161-PY162	PY166	PY191
PY201	PY221-PY222	PY231	PY241-PY244	PY270-PY275	PY281
PY286	PY301-PY304	PY321-PY323	PY341-PY346	PY361-PY362	PY381
PY401	PY409-PY411	PY421-PY422	PY441	PY451	PY461-PY463
PY591-PY595	PY611-PY612	PY621	PY631	PY651	PY671-PY672
PY721	PY741				

2. Spares

Examine your spares supply for the parts identified in Paragraph II.D., Existing Parts Accountability. If any parts are found, refer to Paragraph II.D., Existing Parts Accountability, for the recommended use.

B. Reason

This service bulletin gives instructions to replace the dual servo valve on the rudder power control unit (PCU).

Under certain conditions, the secondary slide in the servo valve can go past the intended maximum-travel position. On some PCUs, this can cause the rudder actuator piston and the rudder to move opposite to the intended direction.

Refer to the following for more detailed information on this condition:

- Telex M-7272-92-5416, dated 16 October 1992
- Telex M-7272-92-5916, dated 16 November 1992
- Service Letter 737-SL-27-83, dated 6 May 1993.

The new dual servo valve has improved internal secondary stops. These new stops will prevent the condition described above.

This revision is sent to change one step and remove three steps in Paragraph III, Accomplishment Instructions. In Part I, step C is changed to add the functional test of the PCU. This test was part of step E. Steps D and E are not necessary, and are removed. In Part II, step D is not necessary, and is removed.

The data given in Notices of Status Change 737-27-1185 NSC 1 and NSC2 are included in this revision. NSC1 added references for the rudder PCU 65-44861-10 in the table in Paragraph I.D., Existing Parts Accountability. NSC2 clarified the compliance statements on the Summary page and in Paragraph I.D.

C. Description

Replace the dual servo valve on the rudder PCU.

Revision 1 - No more work is necessary on airplanes changed by the initial release of this service bulletin.

An evaluation form is attached to this service bulletin. Please use this form to tell us what you think of the quality of this service bulletin.

D. Compliance

Boeing recommends that the operator do the changes given in this service bulletin as soon as parts are available and the rudder power control unit (PCU) is removed for scheduled or unscheduled maintenance. Boeing also recommends that the operators do the change on their spare rudder PCUs as soon as parts are available. There is a limited number of parts available from the supplier. Contact Parker-Hannifin for supply data.

Federal Aviation Administration (FAA) Airworthiness Directive (AD) 94-01-07, Amendment 39-8789, is related to this service bulletin.

E. Approval

This service bulletin was examined by the Federal Aviation Administration (FAA). The repairs and changes specified in this service bulletin comply with the applicable Federal Aviation Regulations (FAR) and are FAA approved.

The FAA has examined the configuration changes specified in Revision 1 to Service Bulletin 737-27-1185, "FLIGHT CONTROLS - RUDDER AND TAB - RUDDER POWER CONTROL UNIT - REPLACEMENT OF THE DUAL SERVO VALVE". The FAA has approved the configuration changes as an alternative to those specified in Airworthiness Directive (AD) 94-01-07, Amendment 39-8789.

F. Manpower

The data below shows an estimate of the man-hours necessary to do this change for each airplane. This estimate is for direct labor only, done by an experienced crew. Adjust the estimate with operator man-hour data if necessary. The estimate does not include lost time. These are some examples of lost time:

- Time to adjust to the workplace
- Time to schedule the work
- Time to examine the work
- Time to cure the materials
- Time to make the parts
- Time to find the tools.

The change to the dual servo valve assembly, as given in Parker service bulletin 68010-27-162, is not included.

PART I

Task	Number of Persons	Man-Hours	Elapsed Time (Hours)
Remove PCU	1	2	2
Install PCU	1	3	3
Functional Test (Airplane)	2	4	2
TOTAL FOR EACH AIRPLANE		9	7

PART II

Replace the Dual Servo Valve	1	2	2
Functional Test (PCU)	1	4	4
TOTAL FOR EACH PCU		6	6

G. Material - Price and Availability

The operator can supply the parts shown in Paragraphs II.A., Parts Necessary For Each Airplane, and II.B., Parts Necessary to Change Spares.

H. Special Tools - Price and Availability

None

I. Weight and Balance

None

J. References

1. Existing Data:

   a. Engineering Change Memo PRR 35153

   b. Boeing All-Base Telex M-7272-92-5416, dated 16 October 1992

   c. Boeing All-Base Telex M-7272-92-5916, dated 16 November 1992

   d. Boeing Service Letter 737-SL-27-83, dated 6 May 1993

   e. FAA Airworthiness Directive 94-01-07, Amendment 39-8789

   f. 737 Maintenance Manual Subject 27-21-91

   g. Overhaul Manual 27-20-01, with the March 1, 1993 (or later) Temporary Revision

   h. Boeing Standard Overhaul Practices Manual 20-50-10

   i. Parker Service Bulletin 68010-27-162, "Flight Controls - Servo Valve Assembly - Replacing 68010-5003 Servo Valve Assembly with 68010-5005 or -5007" *

   * The supplier was told to send copies of the service bulletin to each operator.

2. Data supplied with this service bulletin:

   None

3. Installation Drawings:

   None

K. Publications Changed

Publication	Chapter-Section
Overhaul Manual	27-20-01
737 Illustrated Parts Catalog	27-20

L. Electrical Load Data

Not changed

II. MATERIAL INFORMATION

A. Parts Necessary For Each Airplane

Parts and Materials Supplied by the Operator:

Quantity	Part Number		Name
1	65-44861-11 or 65C37052-( )	(a)(b)	Rudder Power Control Unit
1	BAC27DHY0358	(c)	Nameplate

(a) The new part number that is necessary depends on the part number of the existing unit. See Paragraph II.D., Existing Parts Accountability, for the new part number that is necessary.

(b) You can change the existing PCU as shown in this service bulletin to get the new PCU.

(c) The nameplate is necessary if the operator does the change to the PCU.

B. Parts Necessary to Change Spares

To get the part shown below, refer to Paragraph I.G., Material - Price and Availability.

Quantity	Part Number		Name
1	68010-5005 or 68010-5007	(a)	Dual Servo Valve Assembly
1	BAC27DHY0358		Nameplate

(a) Refer to Parker service bulletin 68010-27-162

Parker Hannifin Corporation (V92003)
Customer Support Commercial
16666 Von Karman Avenue
Irvine, CA 92714

C. Special Tools and Equipment

Maintenance and overhaul tools shown in Overhaul Manual 27-20-01, with the March 1, 1993 (or later) Temporary Revision are necessary. Examine operator tool supply to make sure all necessary tools are available. Operators who do not have these tools can send the PCU to Parker Hannifin Corporation.

D. Existing Parts Accountability

The parts shown below are changed by this service bulletin. There is one rudder power control unit (PCU) installed on each airplane. Components or subassembly parts are indented. There is one dual servo valve installed on each rudder PCU.

Existing Part Number	RUC	Name	Quantity	New Part Number	PNC	RC
65-44861-2	RWK	Rudder PCU	1	65C37052-2	R	C
65-44861-3	RWK	Rudder PCU	1	65C37052-3	R	C
65-44861-4	RWK	Rudder PCU	1	65C37052-4	R	C
65-44861-5	RWK	Rudder PCU	1	65C37052-5	R	C
65-44861-6	RWK	Rudder PCU	1	65C37052-6 65-44861-11	R S	C C
65-44861-7	RWK	Rudder PCU	1	65C37052-7 65-44861-11	R S	C C
65-44861-8	RWK	Rudder PCU	1	65C37052-8	R	C
65-44861-9	RWK	Rudder PCU	1	65C37052-9 65-44861-11	R S	C C
65-44861-10	RWK	Rudder PCU	1	65C37052-10	R	C
. 68010-5003	RWI	Dual Servo Valve	1	68010-5005 68010-5007	R S	C C

RUC Recommended Use Code

- RWK - Make the change as given in this service bulletin.
- RWI - Make the change as given in Parker Service Bulletin 68010-27-162.

PNC Part Number Code

- R - This is the part number after the change.
- S - This is the part number for the new equivalent or replacement part.

RC Replacement Code

- C - You can use the old part to replace the new part. If you use the old part, you cancel the effect of the change given in this service bulletin.

III. ACCOMPLISHMENT INSTRUCTIONS

NOTES:

1. The paragraphs identified with letters give the general work instructions and the necessary tests.
2. Figure 1 is a general locator.
3. The accomplishment instructions are divided into two parts as follows:

   Part I - Replacement of the rudder power control unit (PCU) on the airplane.

   Part II - Replacement of the dual servo valve on the PCU.
4. Obey all warnings and cautions in the specified manual sections.

PART I - REPLACEMENT OF THE RUDDER POWER CONTROL UNIT (PCU) ON THE AIRPLANE.

A. Remove the rudder power control unit (PCU) 65-44861-( ). Refer to 737 Maintenance Manual 27-21-91.

B. Install the rudder PCU 65-44861-11 or 65C37052-( ). See the table in Paragraph II.D., Existing Parts Accountability, for the new part number that is necessary. Refer to 737 Maintenance Manual 27-21-91 for installation instructions.

C. Do the adjustment and the functional test of the rudder PCU. Refer to 737 Maintenance Manual 27-21-91.

D. (This step is removed.)

E. (This step is removed.)

F. Put the airplane back to a serviceable configuration.

PART II - REPLACEMENT OF THE DUAL SERVO VALVE ON THE PCU.

A. Remove the dual servo valve 68010-5003. Refer to the Overhaul Manual 27-20-01.

B. Install a new dual servo valve 68010-5005 or -5007. Refer to Overhaul Manual 27-20-01, with the March 1, 1993 (or later) Temporary Revision.

C. Change the part number of the rudder PCU. See the table in Paragraph II.D., Existing Parts Accountability, for the new part number. Use a new nameplate BAC27DHY0358. Refer to Boeing Standard Overhaul Practices Manual 20-50-10.

   NOTE: Put the original serial number and the new part number on the nameplate.

D. (This step is removed.)

E. Do the hydraulic and operational tests of the rudder PCU. Refer to Overhaul Manual 27-20-01, with the March 1, 1993 (or later) Temporary Revision.

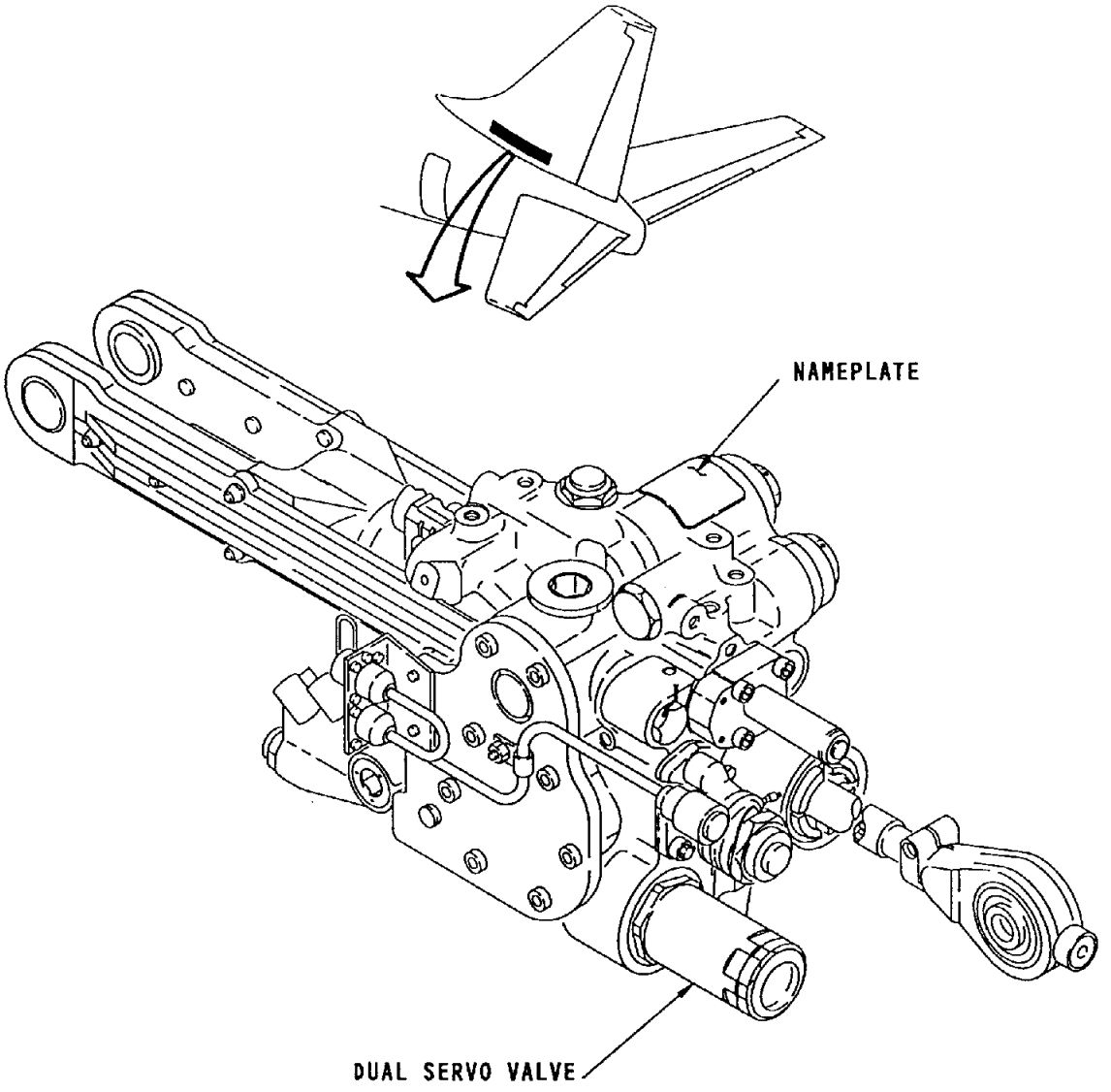

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FIGURE 1. REPLACEMENT OF THE DUAL SERVO VALVE IN THE RUDDER PCU

28

Number: 737-27-1185
Date: April 15, 1993
Revision 1: April 14, 1994
ATA System: 2721
Prepared By: Bob Kleinschmidt

Evaluation Form

SUBJECT: FLIGHT CONTROLS - RUDDER AND TAB - RUDDER POWER CONTROL UNIT - REPLACEMENT OF THE DUAL SERVO VALVE

Use this evaluation form to tell us what you think of the quality of this service bulletin. We will use the data that you give us to improve the quality of our service bulletins. Please include data about these or other items:

- Did this service bulletin meet your estimate of quality?
- How easy is this service bulletin to understand?
- Are the Planning Information, Material Information and Accomplishment Instructions satisfactory?
- Will you do this service bulletin fully? If not, please tell us why.
- Is the Manpower estimate satisfactory?

NOTE: Please do not use this evaluation form to tell us to make changes to your manuals. To make these changes, please use a Publication Change Request (PCR) form.

Please give us this data:

OPERATOR: _____ TODAY'S DATE: _____

PREPARED BY: _____ TITLE: _____

ORGANIZATION: _____ TELEX CODE: _____

TELEPHONE NUMBER: _____

COMMENTS: _____

If you have other comments please use the other side. Thank you for the time you used to complete this form.

Give the completed evaluation form to your Boeing Field Service Representative or send the evaluation form directly to this address:

R.G. Kelsey, Manager
Service Bulletin Engineering
Boeing Commercial Airplane Group
P.O. Box 3707, Mail Stop 2L-02
Seattle, WA 98124-2207

BOEING 737

SERVICE LETTER

Customer Support FIELD SERVICE ENGINEERING • BOEING COMMERCIAL AIRPLANES • P.O. BOX 3707 • SEATTLE, WASHINGTON 98124

737-SL-27-57
ATA: 2726-20
December 5, 1989

SUBJECT: RUDDER FEEL AND CENTERING UNIT LUBRICATION

MODEL: 737 Series

APPLICABILITY: All 737 Airplanes delivered prior to Airplane Line Position 1793, excluding Line Position 1786. (Airplane Line Position 1793 was delivered in October 1989.)

REFERENCES:
(a) Illustrated Parts Catalog 27-20-04-01
(b) Service Letter 737-SL-27-24, dated 28 June 1983
(c) Maintenance Manual 12-22-21
(d) Maintenance Manual 27-21-82
(e) Overhaul Manual 27-24-32
(f) D6-17594-1 Rev N, 737 Maintenance Planning Data Document, Section 1-5, Page 14 and Section 4-27, Page 4
(g) D6-38278, 737-300/-400 Maintenance Planning Data Document, Pages 5.1-18 and 5.1-19

The following is a verbatim transcript of telegraphic message M-7272-89-6912 dated 5 December 1989, sent to all Boeing 737 Operators, Boeing 737 Field Service Bases, Regional Directors, and Boeing Spares.

"BACKGROUND:

"AN OPERATOR REPORTED RUDDER CONTROL SYSTEM BINDING DURING APPROACH ON TWO RECENTLY DELIVERED MODEL 737-400 AIRPLANES. ON BOTH AIRPLANES, EXCESSIVE RUDDER PEDAL FORCE WAS REQUIRED TO FREE THE RUDDER CONTROL SYSTEM. AN INVESTIGATION BY THE OPERATOR REVEALED WATER ON THE RUDDER FEEL AND CENTERING UNITS OF BOTH AIRPLANES, AND INSUFFICIENT MIL-G-23827 GREASE APPLIED TO THE REFERENCE (A) ITEM 125, P/N 69-57909-4 SPRING GUIDE ROD ASSEMBLY AND ITEM 80, P/N 69-57910-2 SLIDER BEARING. THE OPERATOR CONCLUDED THAT THE RUDDER CONTROL BINDING RESULTED FROM WATER FREEZING ON THE RUDDER FEEL AND CENTERING UNIT DUE TO INSUFFICIENT MIL-G-23827 GREASE.

"A SUBSEQUENT INVESTIGATION AT BOEING HAS DISCLOSED SEVERAL P/N 65C25410-2 RUDDER FEEL AND CENTERING UNITS WITH INSUFFICIENT MIL-G-23827 GREASE. THESE UNITS WERE INSTALLED ON UNDELIVERED AIRPLANES AND IN PRODUCTION STORES. IT WAS ALSO NOTED DURING THIS INVESTIGATION THAT THE PRESENCE OF GREASE ON THESE UNITS AS APPLIED PER THE CURRENT PRODUCTION APPLICATION PROCEDURE MAY BE DIFFICULT TO DETECT BY VISUAL INSPECTION.

"DISCUSSION:

"SEVERAL OPERATORS PREVIOUSLY REPORTED SIMILAR RUDDER CONTROL SYSTEM BINDING BETWEEN 1980 AND 1982. OUR INVESTIGATION AT THAT TIME INCLUDED ENVIRONMENTAL TESTS ON A NEW RUDDER FEEL AND CENTERING UNIT. THESE TESTS DISCLOSED THAT BINDING OF THE CENTERING UNIT COULD OCCUR IF A SUBSTANTIAL AMOUNT OF WATER WAS RETAINED AND FROZEN BETWEEN THE P/N 69-57910-2 SLIDER BEARING AND THE P/N 69-57909-4 ROD ASSEMBLY. THESE TESTS ALSO SHOWED THAT THE ADDITION OF MIL-G-23827 GREASE BETWEEN THE ROD AND THE BEARING PREVENTED THIS CONDITION (NO LUBRICATION WAS SPECIFIED IN THIS LOCATION AT THAT TIME).

"WE SUBSEQUENTLY REVISED THE PRODUCTION DRAWINGS TO SPECIFY THE APPLICATION OF MIL-G-23827 GREASE BETWEEN THE AFOREMENTIONED BEARING AND ROD. WE ALSO ISSUED THE REFERENCE (B) SERVICE LETTER WHICH SUGGESTED THAT OPERATORS APPLY MIL-G-23827 GREASE TO RUDDER FEEL AND CENTERING UNITS ON IN-SERVICE AIRPLANES, AS WELL AS TO THOSE IN OPERATOR STORES.

"BOEING ACTION:

"IN ORDER TO PRECLUDE FUTURE OCCURRENCES OF INSUFFICIENT APPLICATION OF MIL-G-23827 GREASE, WE HAVE INITIATED A REVISION TO THE 65C25410 RUDDER FEEL AND CENTERING UNIT ASSEMBLY DRAWING WHICH WILL CLARIFY AND QUANTIFY THE GREASING PROCEDURES. WE ARE COORDINATING THIS REVISION WITH THE SUPPLIER, THE STEARNS COMPANY, IN ORDER TO ENSURE PROPER GREASING OF THE RUDDER FEEL AND CENTERING UNIT SPRING ASSEMBLIES DURING ASSEMBLY. THE REFERENCE (C) AND (D) MAINTENANCE MANUALS, THE REFERENCE (E) OVERHAUL MANUAL, AND THE REFERENCE (F) AND (G) MAINTENANCE PLANNING DATA DOCUMENTS WILL BE REVISED TO INCLUDE THE IMPROVED GREASING PROCEDURES.

"THIS DRAWING REVISION ALSO RESULTS IN A PART NUMBER CHANGE FOR THIS ASSEMBLY FROM 65C25410-2 TO 65C25410-3. THIS WILL PROVIDE ACCOUNTABILITY FOR NEW FEEL AND CENTERING UNITS ASSEMBLED PER THE REVISED LUBRICATION REQUIREMENT. THE P/N 65C25410-3 RUDDER FEEL AND CENTERING UNIT WILL BE INSTALLED ON MODEL 737 AIRPLANES LINE POSITION 1817 AND ON.

"THE RUDDER FEEL AND CENTERING UNITS INSTALLED ON UNDELIVERED 737 AIRPLANES LINE POSITION 1786, AND LINE POSITIONS 1793 THROUGH 1816 WILL BE REGREASED PER THE DRAWING REVISION PRIOR TO DELIVERY.

"SUGGESTED OPERATOR ACTION:

"SINCE THE PRESENCE OF MIL-G-23827 GREASE AS APPLIED PER THE CURRENT PRODUCTION APPLICATION PROCEDURE MAY BE DIFFICULT TO DETECT ON THESE UNITS, IT IS SUGGESTED THAT OPERATORS REGREASE ALL APPLICABLE RUDDER FEEL AND CENTERING UNITS INSTALLED ON THEIR AIRPLANES AND IN THEIR SPARES STORES PER THE FOLLOWING PROCEDURE IN ORDER TO PRECLUDE POSSIBLE RUDDER CONTROL SYSTEM BINDING. (ONCE ACCESS IS GAINED TO THE RUDDER FEEL AND CENTERING UNIT, GREASE APPLICATION REQUIRES SIMILAR TIME AND EFFORT AS INSPECTION.)

(31)

737-SL-27-57

"FOR UNITS INSTALLED ON IN-SERVICE AIRPLANES, GAIN ACCESS TO THE RUDDER FEEL AND CENTERING UNIT THROUGH ACCESS DOORS 9509 AND 9511, WHICH ARE SHOWN IN MM 12-31-51 FIGURE 201. DISPLACE THE RUDDER FEEL AND CENTERING UNIT SPRING ASSEMBLY GUIDE ROD BY COMPLETELY DEPRESSING ANY RUDDER PEDAL. APPLY A FILM (100 PERCENT COVERAGE REQUIRED) OF MIL-G-23827 GREASE TO THE EXPOSED PORTION OF THE P/N 65-57909-4 ROD ASSEMBLY. ALLOW THE RUDDER PEDALS TO RECENTER, THEN APPLY GREASE TO ACCESSIBLE PORTIONS OF THE ROD THROUGH THE SPRING CARTRIDGE. THE GREASE FILM COATING SHOULD BE SUFFICIENT SUCH THAT THE PRESENCE OF GREASE CAN BE EASILY VERIFIED BY VISUAL EXAMINATION. CYCLE THE RUDDER PEDALS 10 TIMES TO DISTRIBUTE THE GREASE.

"ON SPARES UNITS NOT INSTALLED ON AN AIRPLANE, DISPLACE THE SPRING ASSEMBLY GUIDE ROD BY ROTATING THE REFERENCE (A) ITEM 430, P/N 69-57905-1 SHAFT. APPLY MIL-G-23827 GREASE TO THE P/N 69-57909-4 ROD ASSEMBLY WHILE THE SPRING CARTRIDGE IS FULLY DISPLACED FROM THE NEUTRAL POSITION AND AFTER THE SPRING CARTRIDGE IS RESTORED TO THE NEUTRAL POSITION AS DESCRIBED IN THE PREVIOUS PARAGRAPH. CYCLE THE P/N 69-57905-1 SHAFT 10 TIMES TO DISTRIBUTE THE GREASE ON THE SPRING CARTRIDGE SHAFT.

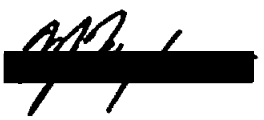
"IT SHOULD BE NOTED THAT THE REFERENCE (F) AND (G) MAINTENANCE PLANNING DATA DOCUMENT PAGES SPECIFY THAT THE RUDDER FEEL AND CENTERING UNIT BE GREASED DURING EVERY C-CHECK. WE HAVE DETERMINED THAT UNITS WHICH WERE GREASED DURING A C-CHECK DO NOT REQUIRE UNSCHEDULED MAINTENANCE. ACCORDINGLY, THE SUGGESTED OPERATOR ACTION APPLIES ONLY TO THE FOLLOWING RUDDER FEEL AND CENTERING UNITS:

"1) UNITS INSTALLED ON 737 AIRPLANES DELIVERED PRIOR TO LINE POSITION 1793, EXCLUDING LINE POSITION 1786, WHICH HAVE NOT YET COMPLETED THEIR FIRST C-CHECK.

"2) REPLACEMENT UNITS INSTALLED ON IN-SERVICE 737 AIRPLANES WHICH HAVE NOT COMPLETED A C-CHECK SINCE THIS INSTALLATION.

"3) SPARE UNITS IN OPERATORS STORES.

"WE SUGGEST THAT OPERATORS ACCOMPLISH THIS SERVICE AT AN EARLY MAINTENANCE OPPORTUNITY WHEN MANPOWER AND FACILITIES ARE AVAILABLE."



T.J. Taylor
Service Engineering
Manager - Systems

BDJ:ms

[4910-13-P]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 93-NM-79-AD; Amendment 39-8789; AD 94-01-07]

Airworthiness Directives; Boeing Model 737 Series Airplanes

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule.

SUMMARY: This amendment adopts a new airworthiness directive (AD), applicable to certain Boeing Model 737 series airplanes, that requires repetitive tests of the main rudder power control unit (PCU) to detect excessive internal leakage of hydraulic fluid, stalling, or reversal, and the eventual replacement of the main rudder PCU with an improved model. This amendment is prompted by results of an investigation which revealed that the secondary slide in the servo valve of certain PCU's can go past the intended maximum-travel position. The actions specified by this AD are intended to prevent secondary slide overtravel from occurring, which could cause the rudder actuator piston and the rudder to operate with reduced force capability or to move in a direction opposite to the intended direction; this could result in reduced controllability of the airplane.

DATES: Effective [insert date 30 days after date of publication in the Federal Register]. March 3, 1994

The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of [insert date 30 days after date of publication in the Federal Register].

ADDRESSES: The service information referenced in this AD may be obtained from Boeing Commercial Airplane Group, P.O. Box 3707, Seattle, Washington 98124-2207. This information may be examined at the Federal Aviation Administration (FAA), Transport Airplane Directorate, Rules Docket, 1601 Lind Avenue, SW., Renton, Washington; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

FOR FURTHER INFORMATION CONTACT: Kenneth W. Frey, Aerospace Engineer, Seattle Aircraft Certification Office, Systems & Equipment Branch, ANM-130S, FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington 98055-4056; telephone [redacted] fax (206) 227-1181.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations to include an airworthiness directive (AD) that is applicable to certain Boeing Model 737 series airplanes was published in the Federal Register on August 16, 1993 (58 FR 43301). That action proposed to require periodic tests of the main rudder PCU to detect excessive internal leakage of hydraulic fluid, stalling, or reversal, and the correction of discrepancies. That action also proposed to require the eventual replacement of the main rudder PCU with an improved model; such replacement would constitute terminating action for the periodic tests.

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comments received.

Several commenters request that the proposed rule be revised to require a one-time internal leakage test of the PCU, instead of the proposed repetitive tests every 750 flight hours. These commenters consider that the existing pre-flight controls check is adequate to detect rudder control anomalies that would be due to dual servo valve secondary slide overtravel; since this check is performed prior to each flight, it will verify the function of the rudder control system on a regular basis. These commenters believe that the proposed repetitive test is not appropriate or reliable, since it is sensitive to variables such as temperature and the inspecting technician's individual technique and judgment. In addition, some of these commenters believe that the secondary slide overtravel problems are attributable to either adverse tolerance build-up or improper assembly of the PCU during manufacture, and are not due to wear or deterioration of the valve over time; therefore, these commenters consider that repetitive tests are unnecessary. One commenter states that the proposed test has not proved to be reliable in identifying rudder PCU anomalies, and that this test could cause a rise in the number of removals of PCU's that would typically be serviceable; this would have a severe economic impact on affected operators.

The FAA does not concur with the commenters' request. First, the FAA notes that rapid rudder inputs are a factor in uncovering rudder control anomalies. During a pre-flight check, the flight crew may not cycle the rudder PCU at a rate fast enough to uncover secondary slide overtravel. For this reason, the FAA does not agree that all rudder

control anomalies due to secondary slide overtravel can be detected during pre-flight checks.

Second, although the FAA agrees that the required repetitive test is not completely repeatable and could be subject to the judgment of the technician, the FAA recognizes it as a written procedure for maintenance crews to follow, which emphasizes cycling of the rudder pedals at a maximum rate. While this test cannot ensure that the secondary slide overtravel anomaly does not exist, it can detect certain conditions that contribute to secondary slide overtravel. For example, the overtravel anomaly, combined with either (1) a secondary summing arm missing its stop or (2) a primary slide jamming to the secondary slide, would be detected during the repetitive test. During bench testing on one PCU, the secondary summing arm was observed hitting its stop on some occasions and missing it on others; this intermittent condition, if combined with the secondary overtravel anomaly and rapid rudder inputs, could cause rudder control problems. For these reasons, the FAA has determined that the required repetitive tests will contribute to flight safety because they exercise the rudder pedals at a rapid rate and they can detect high internal leakage within the servo valve.

Several commenters request that the compliance time for replacing the main rudder PCU be extended from the proposed 5 years to at least 7 years. These commenters state that such an extension is necessary to avoid the economic burden to operators that would be caused by a campaign of scheduled removals. A 7-year compliance time would correspond to a typical overhaul period for the main rudder PCU, and

would avoid unscheduled removal of PCU's that exhibit no operational anomalies. Some commenters note that the design feature that allows secondary slide overtravel has existed for over 25 years and, over that time period, has accumulated 55 million flight hours in the affected fleet with no known in-flight control problems. These commenters state that it would be extremely rare for the problem condition to exist in combination with other factors so as to result in a reduction of rudder control capability. For these reasons, these commenters consider that extending the compliance time for completion of the replacement would not appreciably affect the safety of the fleet.

The FAA does not concur with the commenters' request to extend the compliance time for replacement of the PCU. Although the FAA acknowledges that no known in-flight control problems have been documented on Model 737 airplanes with regard to the subject condition, the FAA does recognize that two PCU's have been removed from Model 737 series airplanes after the pilot identified rudder control problems during the pre-flight check. In developing an appropriate compliance time for this action, the FAA considered the safety implications of incidents such as these, the availability of required parts, and the normal maintenance schedules for timely accomplishment of the replacement. Further, only the original equipment manufacturer possesses approved data allowing it to accomplish the rework of the affected PCU's; therefore, the compliance time also was based on the capability of this manufacturer to schedule and modify all of the affected servo valves. In light of these items, the FAA has determined

that 5 years for compliance is appropriate. The FAA considers that a 5-year compliance time allows ample time for all affected PCU's to be modified by the manufacturer, without creating a burden on either the operators or the manufacturer. Five years also allows ample time for the replacement to be accomplished coincidentally with scheduled major airplane inspection and maintenance activities, thereby minimizing the costs associated with special airplane scheduling. However, paragraph (c) of the final rule does provide affected operators the opportunity to apply for an adjustment of the compliance time if data is presented to justify such an adjustment.

One commenter strongly supports the proposed rule, but considers that the 5-year compliance time for replacement of the PCU's is too long. This commenter requests that replacement of all affected PCU's should begin immediately as replacement parts become available, instead of allowing operators to operate airplanes equipped with potentially defective PCU's for up to 5 years. This commenter notes that the addressed anomaly was first discovered in July 1992 and, by the time the proposed rule becomes effective and the end of the 5-year compliance period is reached, approximately 7 years will have elapsed since then. This amount of time is too long, considering the significance of the addressed unsafe condition.

The FAA does not concur with the commenter's request to shorten the compliance time for replacement of the PCU's. For the same reasons explained previously, the FAA has determined that a 5-year compliance time is appropriate. The repetitive tests of the PCU required by this

AD will provide an acceptable level of safety in the interim. Additionally, the commenter should not assume that all operators will wait until the end of the compliance time before replacement the PCU's. In fact, the FAA has been advised that the PCU manufacturer has already begun rework activity and some airlines have already begun replacement procedures.

One commenter requests that paragraph (a)(2) of the proposed rule be revised to provide operators with the option of installing a serviceable, non-modified PCU, rather than only a modified PCU, if a discrepancy is detected during any test. Operators should be allowed to use this non-modified PCU, provided that it is repetitively tested until replacement of all PCU's is required in 5 years. Such a revision to the rule would prevent unnecessary grounding of an airplane if a discrepancy is detected and a modified PCU is not available. The FAA concurs and has revised the final rule accordingly.

Another commenter requests that the proposed rule be revised to address third-party repaired parts. This commenter states that at least one repair facility is producing FAA-approved replacement slide and sleeve assemblies to overhaul the Parker-Hannifin main rudder PCU dual servo valves. The commenter believes that it is the FAA's responsibility to ensure that third-party replacement parts are reworked in a controlled manner to the same level of safety as that provided by the retrofit plan developed by the original equipment manufacturer (OEM), since the replacement parts were approved solely by the FAA without support from the OEM.

The FAA does not concur that such a revision to the rule is necessary. Paragraph (c) of the final rule contains a provision that allows third-party replacement part manufacturers to submit proposed design changes to the FAA for approval as alternative methods of compliance with the AD.

One commenter suggests that the discussion of the requirements of the proposed rule be revised to clarify that the test of the main rudder PCU is necessary not only to detect excessive internal leakage of hydraulic fluid, but to detect and correct possible stalling and reversal as well. The FAA concurs. Although the test is accomplished to detect excessive internal leakage, the AD requires that any discrepancy, such as stalling and reversal, that is detected during the test must be corrected prior to further flight. The AD references Boeing Service Letter 737-SL-27-82-B for a description of the possible discrepancies that could be found during the required test. The wording to the preamble of this final rule has been revised to include reference to the possible discrepancies of stalling and reversal; however, the wording of the AD itself needs no revision.

This same commenter suggests that the description of the unsafe condition on which this AD action is based could be worded more accurately. This commenter states that the actions specified by the AD are intended to prevent secondary slide overtravel from occurring, which could cause the rudder actuator piston and the rudder to "operate with reduced force capability or to move in a direction opposite to the intended direction." The FAA concurs with the commenter's suggestion and has revised the appropriate wording accordingly.

Two commenters suggest that the cost impact information in the preamble to the notice was not totally accurate in showing the complete costs to operators, especially those costs related to the required repetitive tests. One commenter states that each test would require approximately 8 work hours to accomplish, and that, based on the 750-flight hour repetitive test interval, most airplanes would be required to be tested between 6 and 10 times over the next 5 years (until replacement of the PCU is completed). Another commenter states that the total time required for removing and installing the PCU is 20 work hours. The FAA concurs that the economic information should be clarified. The cost impact figures, as stated in the preamble to the notice, were based on the latest data that the FAA had at that time. The cost impact information, below, has been revised to delineate the costs of the required actions, based on this latest information provided by the commenters.

Paragraphs (a)(1) and (a)(2) of the final rule have been revised to correctly reference paragraph "3.B." of Boeing Service Letter 737-SL-27-82-B for the description of possible discrepancies that could be found during the required test. The notice had incorrectly referenced paragraph "B." rather than "3.B."

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes previously described. The FAA has determined that these changes will neither significantly increase the economic burden on any operator nor increase the scope of the AD.

There are approximately 2,448 Model 737 series airplanes of the affected design in the worldwide fleet. The FAA estimates that 729 airplanes of U.S. registry will be affected by this AD.

It will take approximately 8 work hours per airplane to accomplish the required test actions, at an average labor rate of $55 per work hour. Based on these figures, the total cost impact of the tests required by this AD on U.S. operators is estimated to be $320,760, or $440 per airplane, per test.

According to information provided by commenters to the notice that preceded this rule, some airplanes may require to be tested between 6 and 10 times prior to the required replacement of the PCU (within 5 years). In the case of those airplanes requiring 6 tests, the total cost impact of the required repetitive tests would be $2,640 per airplane over 5 years; in the case of those airplanes requiring 10 tests, the total cost impact of the required repetitive tests would be $4,400 per airplane over 5 years.

The number of required work hours, as indicated above, is presented as if the tests required by this AD were to be conducted as "stand alone" actions. However, in actual practice, these tests could be accomplished coincidentally or in combination with normally scheduled airplane inspections and other maintenance program tasks. Therefore, the actual number of necessary "additional" work hours would be minimal in many instances. Additionally, any costs associated with special airplane scheduling should be minimal.

It will take approximately 20 work hours per airplane to accomplish the required replacement of the PCU (removal and installation), at an

average labor rate of $55 per work hour. Required parts will be supplied by the manufacturer at no cost to operators. Based on these figures, the total cost impact of the replacement required by this AD is estimated to be $801,900, or $1,100 per airplane.

The 5-year compliance time for the replacement of the PCU, as specified in paragraph (b) of this AD, will allow ample time for the replacement to be accomplished coincidentally with scheduled major airplane inspection and maintenance activities, thereby minimizing the costs associated with special airplane scheduling.

The total cost impact figures described above are based on assumptions that no operator has yet accomplished any of the requirements of this AD action, and that no operator would accomplish those actions in the future if this AD were not adopted. However, the FAA has been advised that several operators already have accomplished at least the initial required test of the PCU's on their affected fleets, and certain operators already have replaced some PCU's. Therefore, the future economic cost impact of this rule on U.S. operators is less than that indicated above.

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

For the reasons discussed above, I certify that this action (1) is not a "significant regulatory action" under Executive Order 12866; (2) is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and (3) will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. A final evaluation has been prepared for this action and it is contained in the Rules Docket. A copy of it may be obtained from the Rules Docket at the location provided under the caption "ADDRESSES."

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends 14 CFR part 39 of the Federal Aviation Regulations as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. App. 1354(a), 1421 and 1423; 49 U.S.C. 106(g); and 14 CFR 11.89.

§ 39.13 - [Amended]

2. Section 39.13 is amended by adding the following new airworthiness directive:

94-01-07 BOEING: Amendment 39-8789. Docket 93-NM-79-AD.

Applicability: Model 737 series airplanes; line positions 1 through 2453, inclusive; certificated in any category.

Compliance: Required as indicated, unless accomplished previously.

To prevent the rudder actuator piston and the rudder to operate with reduced force capability or to move in a direction opposite to the intended direction, which could result in reduced controllability of the airplane, accomplish the following:

(a) Within 750 flight hours after the effective date of this AD, perform a test of the main rudder power control unit (PCU), part number 65-44861-2/-3/-4/-5/-6/-7/-8/-9, to detect internal leakage of hydraulic fluid, in accordance with Boeing Service Letter 737-SL-27-82-B, dated July 13, 1993.

(1) If no discrepancy, as described in paragraph 3.B. of the Service Letter, is detected, repeat the test at intervals not to exceed 750 flight hours.

(2) If any discrepancy, as described in paragraph 3.B. of the Service Letter, is detected during any check, prior to further flight, accomplish either paragraph (a)(2)(i) or (a)(2)(ii) of this AD:

(i) Replace the main rudder PCU with a serviceable PCU in accordance with the Model 737 Overhaul Manual. After such replacement, repeat the test at intervals not to exceed 750 flight hours.

(ii) Replace the main rudder PCU with a new main rudder PCU having part number 65-44861-11 or 65C37052-2/-3/-4/-5/-6/-7/-8/-9, in accordance with Boeing Service Bulletin 737-27-1185, dated April 15, 1993. Such replacement constitutes terminating action for the tests required by this AD.

(b) Within 5 years after the effective date of this AD, replace the main rudder PCU, part number 65-44861-(), with a new main rudder PCU having part number 65-44861-11 or 65C37052-2/-3/-4/-5/-6/-7/-8/-9, in accordance with Boeing Service Bulletin 737-27-1185, dated April 15, 1993. Such replacement constitutes terminating action for the tests required by this AD.

(c) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA, Transport Airplane Directorate. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Seattle ACO.

NOTE: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Seattle ACO.

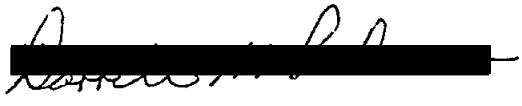
(d) Special flight permits may be issued in accordance with FAR 21.197 and 21.199 to operate the airplane to a location where the requirements of this AD can be accomplished, provided that the airplane has not failed the internal leakage test required by this AD.

(e) The tests shall be done in accordance with Boeing Service Letter 737-SL-27-82-B, dated July 13, 1993. The replacement shall be done in accordance with Boeing Service Bulletin 737-27-1185, dated April 15, 1993. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from Boeing Commercial Airplane

Group, P.O. Box 3707, Seattle, Washington 98124-2207. Copies may be inspected at the FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

(f) This amendment becomes effective on [insert date 30 days after date of publication in the Federal Register].

Issued in Renton, Washington, on January 3, 1994.



Darrell M. Pederson, Acting Manager,
Transport Airplane Directorate,
Aircraft Certification Service.

80-07-02

BOEING

Amendment 39-3721 as amended by Amendment 39-3742

Applies to all Model 707/720/727/737/747 series airplanes that contain the hydraulic components, listed below, that have been repaired or parts produced by FORTNER ENGINEERING AND MANUFACTURING, INC., OF GLENDALE, CALIFORNIA under FAA Repair Station Certificate No. 417-5.

Accomplish the following:

A. To detect a control valve which could cause control surface reversal, within three days from the effective date of this AD, unless already accomplished within the last 14 days, conduct a one time manual input hardover test on the flight control systems containing parts listed in paragraph B below, as follows:

Rudder (yaw damper off), elevator (autopilot off) and aileron (autopilot off) and all associated hydraulic systems on. Run the hydraulic systems for approximately ten minutes or until the system is at normal operating temperatures prior to conducting the hardover tests. Apply an abrupt hardover command one way, stop to stop, until the flight surface reaches full travel. The commanded rate must be rapid enough to saturate the control valve, as evidenced by a noticeable resistance in the control input. The flight control shall be held hardover in that position for five seconds. Repeat this procedure applying an abrupt command in the opposite direction.

1. On the 737, use of single hydraulic systems during the test can be an aid in isolation of individual actuators.

a. Use the "B" system electric pumps or an external hydraulic source to pressurize the "B" hydraulic system (ground interconnect closed).

b. Turn on the "B" Flight Control hydraulics circuit breaker.

c. Conduct the elevator and aileron control checks. Failure of the test indicates that the right hand elevator actuator (as viewed from the airplane tail) or the upper aileron actuator is faulty.

d. Open the ground interconnect or use an external hydraulic source to pressurize the "A" hydraulic system.

e. Turn "off" the "B" Flight Control hydraulic circuit breaker and turn "on" the "A" Flight Control hydraulic circuit breaker.

f. Conduct the elevator and aileron control checks (failure of the test indicates that the left hand elevator actuator or lower aileron actuator is faulty).

2. On the 727 elevator, conduct the hardover tests using hydraulic system A and then hydraulic system B. If a surface reversal occurs, isolation should be accomplished by removal of an actuator and the use of a bench functional test with a maximum rate input to confirm the fault. If the fault cannot be confirmed, the other actuator should be checked.

3. On the 707 Rudder package with the series yaw damper, it is recommended that only pedal inputs be made, since this is adequate to provide the necessary valve overtravel (up to 200% of active travel).

4. The 747 inboard elevator test procedure is as follows:

   a. Turn on all four ADP's and pressurize #1 hydraulic system only.

   b. Pull column full aft into stops at maximum rate and hold for 3 to 5 seconds. Check for signs of abnormality such as column reversal. Repeat for full forward column.

   c. Turn off #1 hydraulic system and repeat max rate test with hydraulic systems #2, #3 and #4 individually.

   d. A malfunction in System #1 or #2 indicates a problem with the right hand inboard elevator: System #3 or #4 indicates the left hand inboard elevator.

      During these tests, observe the appropriate aileron, elevator or rudder positions or their cockpit indicators. If the flight surface reverses direction or if the rudder pedals or flight control wheel back drive in the opposite direction of command, immediately notify the FAA Northwest Region (telephone (206) 767-2600) and remove the associated power control unit from service.

B. Within 30 days from the effective date of this airworthiness directive, remove from service any of the following valve assemblies, and their detail subassemblies, that have been overhauled or produced by Fortner Engineering and Manufacturing, Inc., and replace with units which are either new manufacture or have been overhauled in accordance with FAA approved data:

PCU UNIT (Used on)	Valve Assy. P/N*	Lap Assy. P/N**	Supplier
707/720 Series Yaw Damper rudder	60010-5003, -5005, -5007	60010-1/-9/ -13	Bertea PCU P/N 60000( )
727 Elevator PCU P/N 68000-( )	68010-5001	68010-1	Bertea
737 Aileron/Elevator PCU P/N 65-44761-( )	65-44828-2/-4	65-44671-1, -3	Boeing/Bertea
737 Rudder PCU P/N 65-44861-( )	68010-5003 This part has been covered by FAA telegraphic AD T80NW-4 dated 1-29-80.	68010-11	Bertea
747 Inboard Elevator PCU	93610-5003	93610-11	Bertea

P/N 93600-( )

*Component part numbers to be removed. **Note:** *Some operators refer to the valve assembly as the lap assembly.*

**These part numbers are the original Bertea or Bertea/Boeing detail subassembly part numbers. These lap subassemblies may have been replaced with Fortner assemblies by the repair station or operator. The Fortner Engineering and Manufacturing parts are to be removed from service.

C. Airplanes may be flown, in accordance with **FAR 21.199** to a maintenance base, for the purpose of complying with this AD.

NOTE: These parts, repaired or produced by Fortner Engineering and Manufacturing, Inc. of Glendale, California, referenced herein were not installed on new production airplanes delivered by Boeing nor were they overhauled or produced by Fortner Accessory Service Corporation, a subsidiary of Parker Haniffin Corporation.

Amendment 39-3721 became effective April 3, 1980.

This amendment 39-3742 becomes effective April 21, 1980.