
Type Acceptance Report

TAR 5/21B/28 – Revision 2

mitsubishi MU-2B Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Mitsubishi MU-2B Series based on validation of JCAB Type Certificate numbers 19 and 25 and FAA Type Certificate number A10SW. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers detailed in Appendix 1, which are now eligible for the issue of an Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.177, subject to any outstanding New Zealand operational requirements being met. (See Section 5 of this report for a review of compliance of the basic type design with the operating Rules.) Additional variants or serial numbers approved under the foreign type certificate can become type accepted after supply of the applicable documentation, in accordance with the provisions of NZCAR §21.43(2).

NOTE: The information in this report is correct as at the date of issue. The report is only updated when an application is received to revise the Type Acceptance Certificate. For details on the current type certificate holder and any specific technical data, refer to the latest State-of-Design Type Certificate Data Sheet.

1. Introduction

This report details the basis on which Type Acceptance Certificate No.5/21B/28 was granted in the Standard Category in accordance with NZCAR Part 21 Subpart B.

Specifically the report aims to:

- (a) Specify the foreign type certificate and associated airworthiness design standard used for type acceptance of the model(s) in New Zealand; and
- (b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate; and
- (c) Identify any additional requirements which must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

2. State-of-Design Type Certificate Details

TC/PC Holder: Mitsubishi Heavy Industries, Ltd

Type Certificates: 19 and 25

Issued by: Japan Civil Aviation Bureau

TC Holder: Mitsubishi Heavy Industries, Ltd

TC/PC Holder: Mitsubishi Aircraft International, Inc. (until 31 March 1986)

Type Certificate: A10SW

Issued by: Federal Aviation Administration

NOTE: See details in Section 3 of this report as to which models or serial numbers are covered by which type certificate.

Model: MU-2B-30

MCTOW: 10,360 lb. (s/n 502 through 523, except 505 and 520)
10,800 lb. (s/n 505, 520, 524 and up, or if modified by S/B No.113)

Max. No. of Seats: 10

Noise Standard: Not Applicable

Engine: TPE331-1-151A
Type Certificate: E3WE
Issued by: Federal Aviation Administration

Propeller: Hartzell HC-B3TN-5/T10178 (blade variants as noted on TCDS)
Type Certificate: P15EA
Issued by: Federal Aviation Administration

Model: MU-2B-60

MCTOW: 11,575 lb. [5250 kg]

Max. No. of Seats: 11

Noise Standard: Not Applicable

Engine: TPE331-10-501M or 511M
Type Certificate: E4WE
Issued by: Federal Aviation Administration

Propeller: Hartzell HC-B4TN (propeller variants as noted on TCDS)
Type Certificate: P40EA
Issued by: Federal Aviation Administration

3. Type Acceptance Certificate

The application for New Zealand type acceptance of the MU-2B-30 was from Helicopter Services (BOP) Ltd, dated 10 March 2005. The first-of-type example was serial no. 521, registered ZK-KOH. The MU-2B is a high-wing all-metal pressurised twin turboprop executive aircraft, with an unusual wing configuration which uses spoilers for roll control.

Type Acceptance Certificate Number 5/21B/28 was granted on 27 September 2005 to the Model MU-2B-30 based on validation of JCAB Type Certificate number 25, and includes the TPE331-1 Series engine based on FAA Type Certificate E3WE. Specific serial number applicability is determined by the coverage of the operating documentation supplied. There are no special requirements for import into New Zealand.

The MU-2B Series was approved under two Japanese type certificates, depending on whether they had the short or long fuselage. Aircraft completion was carried out in the USA for that market, under FAA Import type certificate A2PC. Later FAA type certificate A10SW was obtained to allow production in the USA by Mitsubishi Aircraft International (which required an exemption). Thus there are two States-of-Design for the MU-2B, depending on where the aircraft was manufactured. Apart from single examples, aircraft produced under the FAA type certificate have a different model designation to those produced under the JCAB type certificate. The type design is identical under each. The different versions of the MU-2B Series and the State-of-Design type certificate responsibility (indicated by the bold typeface) are as follows:

<i>TC Model:</i>	<i>Sales Name:</i>	<i>Serial Numbers:</i>	<i>Engine:</i>	<i>Type Certificate:</i>	
				<i>FAA:</i>	<i>JCAB:</i>
MU-2B	MU-2B	006-038	TPE331-25AA	<i>A2PC</i>	19
MU-2B-10	MU-2D	TC Cancelled	TPE331-25AB	<i>A2PC</i>	19
MU-2B-15	MU-2DP	TC Cancelled	TPE331-1-151A	<i>A2PC</i>	19
MU-2B-20	MU-2F	121-233	TPE331-1-151A	<i>A2PC</i>	19
MU-2B-25	MU-2K	239-312, 314-316	TPE331-6-251M	<i>A2PC</i>	19
	MU-2K	313		A10SW	
MU-2B-26	MU-2M	319, 320, 322-347	TPE331-6-251M	<i>A2PC</i>	19
	MU-2M	349		A10SW	
MU-2B-26A	MU-2P	321, 348, 350-364 366-394	TPE331-5-252M	A10SW	
MU-2B-30	MU-2G	502-547	TPE331-1-151A	<i>A2PC</i>	25
MU-2B-35	MU-2J	548-651, 653	TPE331-6-251M	<i>A2PC</i>	25
MU-2B-36	MU-2L	655-660, 662-696	TPE331-6-251M	<i>A2PC</i>	25
MU-2B-36A	MU-2N	661, 697-699, 701-730	TPE331-5-252M	A10SW	
MU-2B-40	Solitaire	365, 395-459	TPE331-10-501M	A10SW	
MU-2B-60	Marquise	700, 731-799, 1501-1569	TPE331-10-501M	A10SW	

Notes: 1. Some serial numbers were certified under the Japanese TC only, or were military.

2. Serial numbers 237 and 238 were not manufactured.

3. The serial numbers of aircraft manufactured in San Angelo in the USA by Mitsubishi Aircraft International, Inc. (MAI) are suffixed by "SA." The serial numbers of aircraft manufactured in Japan by Mitsubishi Heavy Industries, Ltd. (MHI) have no suffix.

The prototype Mitsubishi MU-2A flew in 1963, powered by Turbomeca Aztazou engines. The Garrett-powered MU-2B was the production version and was developed into a range of Models with increased engine power, and either a short or stretched fuselage. Some models on the JCAB type certificates can be converted to another model by complying with the provisions of the applicable Service Bulletin or Service Recommendation.

The MU-2B is a fast aircraft with a high wing loading, and uses spoilers for roll control to allow for full-span flaps. There were a number of accidents involving the aircraft in the late 1970s and early 1980s, with the result that it was subject to a Special Certification Review (SCR) by the FAA, which was completed in 1984. No type certification or design standard non-compliances were found but a number of safety recommendations were made.

The MU-2B has since been subject to one other SCR that was completed in 1997 and a safety evaluation by the FAA in 2005. However the design of the Mitsubishi MU-2B twin turboprop is not inherently unsafe, the FAA said in its Report released December 2005. The airplane is complex and high-performance, the FAA said, and pilots and maintenance workers need better training to properly handle and fly it. After reviewing all the data available, the FAA concluded that a SFAR would best address many of the issues presented in the “Completed Actions and Proposed Recommendations” section of the report. These issues included requiring:

- Specific pilot training and testing of the pilot’s skills.
- Specific maintenance training.
- FAA-approved standardized pilot checklist.
- The latest revisions to the maintenance manual and the AFM.

The MU-2B-26A was first type accepted in New Zealand under FAA Type Certificate A10SW in 1995. (See TAR 5/95.) There had also been examples of the MU-2B-30 previously in New Zealand, when type design data had been provided. However the manuals had been discarded as obsolete and type acceptance of the MU-2B-30 had lapsed.

Revision 1 to this report was raised to include the MU-2B-60 variant, after application from the importer dated 30 October 2015. The first-of-type example was serial number 1569SA, to be registered ZK-PSR. Type Acceptance was granted on 18 February 2016 to the MU-2B-60 based on validation of FAA Type Certificate number A10SW.

Revision 2 added details of the cancelled MU-2B-10 and MU-2B-15 models, and the issue of the latest TCDS No.19 Revision 2.

4. Type Data

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents, or were already held by the CAA:

(1) State-of-Design Type certificate:

FAA Type Certificate Data Sheet number A10SW at Revision 17 dated Oct 9, 2009
– MU-2B-60 approved March 2, 1978

JCAB Type Certificate Data Sheet No.19 – Revision 2 dated 16 March, 2016

JCAB Type Certificate Data Sheet No.25 – Revision 1 dated August 25, 2009
– MU-2B-30 approved June 2, 1969

FAA Type Certificate Data Sheet number E3WE at Revision 8 dated Feb 1, 2000
– TPE331-1 approved December 14, 1967

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the MU-2B Series under both JCAB and FAA type certificates is CAR 3 dated May 15, 1956, including Amendments 3-1 through 3-8, plus the Special Conditions stated in FAA letter to the JCAB dated May 14, 1965, modified by FAA letters to the JCAB dated January 25, 1968 and May 12, 1971. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as CAR 3 is the predecessor of FAR 23, which is the basic standard for Normal Category Airplanes called up under Part 21 Appendix C. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

The certification basis of the TPE331-1 is FAR Part 33, including Amendments 1, 2 and 3. This is the basic design standard for aircraft engines called up under CAR Part 21 Appendix C.

(ii) *Special Conditions:*

FAA Letter dated May 14, 1965 – Outlines type certification basis of the MU-2B, plus special conditions for high performance turbine-powered aircraft, as detailed in the letter Attachment A, under the headings Flight, Airframe and Propulsion.

FAA Letter dated January 25, 1968 – Deletes oil pressure warning system Special Condition, when operated under FAR Part 91 only.

FAA Letter dated 12 May 1971 – Special Condition relating to the electric trim tab.

(iii) *Equivalent Level of Safety Findings:*

Nil

(iv) *Exemptions:*

No. 1951 from FAR §21.17(a)(1) – This was granted to allow the MU-2B to be issued with an FAA Type Certificate using the original Japanese type certification basis of CAR 3, which had long been superseded by FAR Part 23 at the date of application, so that the aircraft could be manufactured in the USA. The justification was the economic benefit to the USA and the fact the aircraft could continue to be produced and imported from Japan under the original certification basis.

(v) *Airworthiness Limitations:*

See MU-2B Maintenance Manual Chapter 1A – Airworthiness Limitations

FAA-approved Honeywell International Inc. Service Bulletin TPE-72-0019

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

MU-2B models which were manufactured after January 1, 1975 have been flight tested for noise in accordance with FAR Part 36, Appendix F.

(ii) *Compliance Listing:*

MU-2B-60 Noise Level is 76.5 db(A) – See AFM Section 6.

(4) Certification Compliance Listing:

(Mitsubishi advise the JCAB Compliance Checklist is only available in Japanese.)

Mitsubishi Engineering Reports:

5ET 64267 – Sept 26, 1980 – Fatigue Test of Pressurised Cabin and Baggage Room for MU-2A – Airplane Strength Test Report

5ET 65147 – August 15, 1965 – Loads Analysis for MU-2B

5ET 65148 – August 20, 1965 – Wing Stress Analysis for MU-2B

5ET 65149 – August 28, 1965 – Stress Analysis for Empennage for MU-2B

5ET 65175 – August 18, 1965 – Fuselage Stress Analysis for MU-2B

5ET 65196 – September 1, 1965 – Major Equipment List of MU-2B

YET 66057 – February 20, 1968 – Wing Stress Analysis for MU-2B-10

YET 66057-2 – Wing Stress Analysis for MU-2B-20

YET 66057-4 – April 19, 1969 – Wing Stress Analysis for MU-2B-30

YET 66124 – June 6, 1966 – Electrical Loads Analysis for MU-2B

YET 67108 – April 28, 1967 – Additional Fatigue Test of Pressurised Cabin and Baggage Room for MU-2

YET 69069 – March 31, 1969 – Major Equipment List of MU-2B-30 (MU-2G)

YET 69084 – March 28, 1969 – Loads Analysis for MU-2B-30

YET 69087 – March 25, 1969 – Fuselage Stress Analysis for MU-2B-30

YET 69120 – April 26, 1969 – Stress Analysis of Landing Gear System MU-2B-30

YET 69121 – March 31, 1969 – Stress Analysis Flight Control System MU-2B-30

YET 69129 – Power Source Electrical Load Analysis

YET 69132 – April 19, 1969 – Empennage Stress Analysis for MU-2B-30

YET 69143 – April 16, 1969 – Fatigue Strength Analysis for MU-2B-30

NA-6486 – Feb 2, 1970 – Stress Analysis – Increase of MTOW –MU-2B-30

NA-6497 – January 31, 1970 – Loads Analysis for Weight Up Version MU-2B-30

ND-1569 – March 11, 1970 – Flight Test Report of MU-2B-30 (MTOW: 4,900 kg)

NL-1257 – MU-2B-30 Flight Test Report Guide

NR-0565A – Sept 26, 1980 – MU-2 Test Plan Pressurised Cabin & Baggage Room

MAI Inc. Engineering Report MR0363 – Compliance Report for MU-2B-40 and MU-2B-60 for Addition to Type Certification A10SW

MAI Inc. Engineering Report MR0476 – Compliance Report for MU-2B-40 and MU-2B-60 for Addition to Type Certificate A10SW (CAR 3 Regulation with FAR 23 Regulation Application.)

- (5) Flight Manual: JCAB-Approved MU-2B-30 Airplane Flight Manual YET 69013A
CAA Accepted as AIR 2924
FAA-Approved MU-2B-60 Airplane Flight Manual MR-0273-1
CAA Accepted as AIR 3350

- (6) Operating Data for Aircraft, Engine and Propeller:

(i) *Maintenance Manual:*

MU-2B-30 Maintenance Manual – Document number YET 69016

MU-2B-30 Wiring Diagram Manual – Document number YET 71289

MU-2B-60 Maintenance Manual – Document number MR-0336

MU-2B-60 Wiring Diagram Manual – Document number MR-0337

MU-2B/-10/-15/-20/-25/-26/-26A/-40 Maintenance Requirements Manual –
Document number MR-0178-2

MU-2B-30/-35/-36/-36A/-60 Maintenance Requirements Manual – MR-0179-2

MU-2 Structural Repair Manual – Document number YET 72035A

Honeywell TPE331-1/2/3 Turboprop Maintenance Manual Report No. 72-00-92

(ii) *Current service Information:*

Mitsubishi MU-2 Service News & News Lists

Mitsubishi MU-2 Service Bulletins (67 to 243) & Bulletin List

(iii) *Illustrated Parts Catalogue:*

MU-2B-30 Parts Catalog – Document number YET 69019

MU-2B-60 Parts Catalog – Document number MR-0342-2

Honeywell TPE331-1/2 Series IPC Report No. 72-00-91

- (7) Agreement from manufacturer to supply updates of data in (6):

CAA 2171 from Vice President, Turbine Aircraft Services dated 18 May 2005

CAA 2171 from Deputy General Manager, MHI America Inc. dated 1 Dec 2015

Email from Honeywell Foreign Validation Coordinator dated 8 September 2005

- (8) Other information:

MU-2B-30 Pilot's Operating Manual – Document number YET 69224A

MU-2B-60 Pilot's Operating Manual – Document number MR-0338-1

MHI Engineering Report MR-0270K – Major Equipment List for MU-2B-60

FAA MU-2B Series Airplane Safety Evaluation Report December 2005

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 is a prerequisite for the grant of a type acceptance certificate.

Civil Aviation Rules Part 26

Subpart B - Additional Airworthiness Requirements

Appendix B - All Aircraft

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
B.1	Marking of Doors and Emergency Exits	<i>To be determined on an individual aircraft basis</i>
B.2	Crew Protection Requirements – CAM 8 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

Compliance with the following additional NZ operating requirements has been reviewed for the MU-2B-30 and were found to be covered by either the original certification requirements or the basic build standard of the aircraft, except as noted:

Civil Aviation Rules Part 91

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Shoulder Harness if Aerobatic; >10 pax; Flight Training	Inertial reel shoulder harness fitted integral with pilots seats
91.507	Pax Information Signs - Smoking, safety belts fastened	Not Applicable – Less than 10 passenger seats
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	CAR §3.655(a)(1) N/A CAR §3.655(a)(2) CAR §3.655(a)(3) CAR §3.655(b)(1)(i) CAR §3.655(b)(1)(v) CAR §3.655(b)(1)(ii)
		(8) Coolant Temp (9) Oil Temperature (10) Manifold Pressure (11) Cylinder Head Temp. (12) Flap Position (13) U/c Position (14) Ammeter/Voltmeter
		N/A – Turbine engine CAR §3.655(b)(1)(iii) N/A – Turbine Engine N/A – Turbine Engine See FM Figure 3-6 CAR §3.359 CAR §3.687
91.511 Night	(1) Turn and Slip (2) Position Lights	See FM Figure 3-9 Item #9 CAR 3 paragraph §3.700
		(3) Anti-collision Lights (4) Instrument Lighting
		CAR 3 paragraph §3.705 CAR 3 paragraph §3.696
91.517 IFR	(1) Gyroscopic AH (2) Gyroscopic DI (3) Gyro Power Supply (4) Sensitive Altimeter	See FM Figure 3-9 Item #12 Operational requirement See FM Figure 3-9 Item #25 Operational requirement
		(5) OAT (6) Time in hr/min/sec (7) ASI/Heated Pitot (8) Rate of Climb/Descent
		See FM Figure 3-9 Item #7 See FM Figure 3-9 Item #6 Operational requirement See FM Figure 3-9 Item #8
91.519	IFR Communication and Navigation Equipment	Operational requirement – Compliance as applicable
91.523	Emergency Equipment: (a) More Than 9 pax - First Aid Kits per Table 7 - Fire Extinguishers per Table 8 (b) More than 20 pax - Axe readily acceptable to crew (c) More than 61 pax - Portable Megaphones per Table 9	<i>To be determined on an individual aircraft basis if used on Air Transport operations</i> Not Applicable – Less than 20 passenger seats Not Applicable – Less than 61 passenger seats
91.529	ELT - TSO C91a or C126 after 1/4/97 (or replacement)	<i>To be determined on an individual aircraft basis</i>
91.531	Oxygen Indicators - Volume/Pressure/Delivery	Pressure gauges on oxygen cylinder and in cockpit
91.535	Oxygen for Pressurized Aircraft: (1) Flight Crew Member On-Demand Mask; 15 min PBE (2) 1 Set of Portable 15 min PBE (3) Crew Member - Pax Oxygen Mask; Portable PBE 1201 (4) Spare Oxygen Masks/PBE (5) Min Quantity Supplement Oxygen (6) Required Supplemental/Therapeutic Oxygen Above FL250 - Quick-Donning Crew On-Demand Mask Supplemental O ₂ Masks for Pax/Crew, in Washroom/Toilet Requirements for operation above FL300	Operational requirement – Compliance as applicable [Standard oxygen system is a Scott pressure automatic flow control type, with outlets provided on each side panel. A regulator, including shut-off valve and pressure gauge is installed on the right side panel of the cockpit. 2x Scott Model 358-1449V-01 to TSO C78 fitted in s/n 521] N/A – Maximum altitude for MU-2B-30 is 25,000 ft. (MU-2B-60 is certified for operations up to 31,000 ft.)
91.541	SSR Transponder and Altitude Reporting Equipment	Operational requirement – Compliance as applicable
91.543	Altitude Alerting Device - Turbojet or Turbofan	Not Applicable – Not turbo jet or turbofan powered
91.545	Assigned Altitude Indicator	Operational requirement – Compliance as applicable
A.15	ELT Installation Requirements	<i>To be determined on an individual aircraft basis</i>

Civil Aviation Rules Part 135

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.355	Seating/Restraints – Shoulder harness for flight-crew seats	Inertial reel shoulder harness fitted integral with pilots seats
135.357	Additional Instruments (Powerplant and Propeller)	MU-2B has all instruments required by FAR 23.1303/5
135.359	Night Flight	<i>Operational requirement – Compliance as applicable</i>
	Landing light, Pax compartment	
135.361	IFR Operations	<i>Operational requirement – Compliance as applicable</i>
	Speed, Alt, spare bulbs/fuses	
135.363	Emergency Equipment (Part 91.523 (a) and (b))	<i>Operational requirement – Compliance as applicable</i>
135.367	Cockpit Voice Recorder	N/A – Only for 2-crew helicopters with more than 10 pax
135.369	Flight Data Recorder	Not Applicable – Less than 10 passenger seats
135.371	Additional Attitude Indicator	Not Applicable – Not turbo jet or turbofan powered

NOTES: 1. A Design Rule reference in the Means of Compliance column indicates the Design Rule was exactly equivalent to the CAR requirement, and compliance is achieved for the basic aircraft type design by certification against the original Design Rule.

2. The CAR Compliance Tables above were correct at the time of issue of the Type Acceptance Report. The Rules may have changed since that date and should be checked individually.

3. Some means of compliance above are specific to a particular model/configuration. Compliance with Part 91/119 operating requirements should be checked in each case, particularly oxygen system capacity and emergency equipment.

Attachments

The following documents form attachments to this report:

Photographs first-of-type example MU-2G serial no. 521 ZK-KOH
 Three-view drawing Mitsubishi Heavy Industries Model MU-2B-30
 Copy of JCAB Type Certificate Data Sheet Number 25
 Copy of FAA Type Certificate Data Sheet A10SW

Sign off

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 David Gill
 Team Leader Airworthiness

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 Checked – Andrea Wadsworth
 Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
MU-2B-26A	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
MU-2B-30	Helicopter Services (BOP) Ltd	5/21B/28	27 September 2005
MU-2B-60	Search and Rescue Services Ltd	16/21B/13	15 February 2016