ENSTROM HELICOPTER CORPORATION
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Enstrom TH-28/480 Series Maintenance Manual

Revision 28 Change Pages

Revision 28, dated 20 May 2025, applies to the Enstrom TH-28/480 Series Maintenance Manual, 2001 Edition. Place this cover sheet behind the “Record of Revisions” card after removing and inserting the pages listed below.

Remove Pages	Insert Pages
Cover through ii	Cover through ii
vii through xviii	vii through xx
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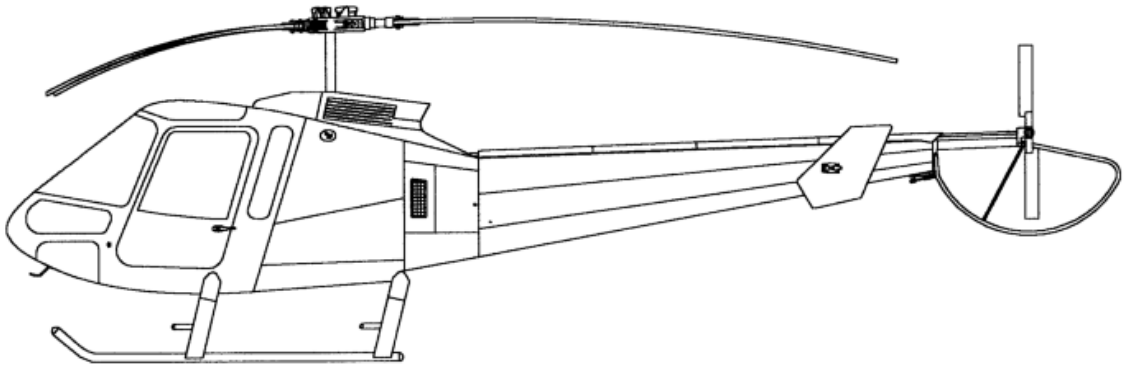
ENSTROM TH-28/480 SERIES MAINTENANCE MANUAL



The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For EASA approval, this Airworthiness Limitations section is approved and variations must also be approved.

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MM-9-2	27 Jan 2025	MM-9-46	27 Jan 2025
MM-9-3	Apr 25/13	MM-9-47	Feb 28/2020
MM-9-4	Apr 25/13	MM-9-48	Feb 28/2020
MM-9-5	Apr 25/13	MM-9-49	20 May 2025
MM-9-6	Apr 25/13	MM-9-50	Feb 28/2020
MM-9-7	Apr 25/13	MM-9-51	Feb 28/2020
MM-9-8	Apr 25/13	MM-9-52	Feb 28/2020
MM-9-9	Apr 25/13	MM-9-53	27 Jan 2025
MM-9-10	27 Jan 2025	MM-9-54	27 Jan 2025
MM-9-11	Apr 25/13	MM-9-55	Apr 25/13
MM-9-12	Apr 25/13	MM-9-56	Apr 25/13
MM-9-12.1	Apr 25/13	MM-9-57	Feb 9/01
MM-9-12.2	Apr 25/13	MM-9-58	Feb 9/01
MM-9-12.3	Apr 25/13	MM-9-59	Feb 9/01
MM-9-12.4	Apr 25/13	MM-9-60	Feb 9/01
MM-9-13	Apr 25/13	MM-9-61	Oct 13/04
MM-9-14	Apr 25/13	MM-9-62	Feb 28/2020
MM-9-15	Aug 22/16	MM-9-63	Feb 28/2020
MM-9-16	20 May 2025	MM-9-64	Feb 28/2020
MM-9-17	Feb 9/01	MM-9-65	Feb 28/2020
MM-9-18	Feb 28/2020	MM-9-66	Feb 28/2020
MM-9-19	Feb 28/2020	MM-9-67	Feb 28/2020
MM-9-20	Feb 28/2020	MM-9-68	Feb 28/2020
MM-9-21	Feb 28/2020	MM-9-69	Feb 28/2020
MM-9-22	Feb 28/2020	MM-9-70	Feb 28/2020
MM-9-23	Feb 28/2020	MM-9-71	Feb 28/2020
MM-9-24	Apr 25/13	MM-9-72	Feb 28/2020
MM-9-25	Apr 25/13	MM-9-73	Feb 28/2020
MM-9-26	Apr 25/13	MM-9-73.1	Feb 28/2020
MM-9-27	27 Jan 2025	MM-9-73.2	Feb 28/2020
MM-9-28	20 May 2025	MM-9-73.3	Feb 28/2020
MM-9-29	27 Jan 2025	MM-9-73.4	Feb 28/2020
MM-9-30	Apr 25/13	MM-9-74	Feb 28/2020
MM-9-31	Feb 28/2020	MM-9-75	Feb 9/01
MM-9-32	Feb 9/01	MM-9-76	Feb 9/01
MM-9-33	Aug 22/16	MM-9-77	27 Jan 2025
MM-9-34	Jul 3/15	MM-9-78	Feb 9/01
MM-9-35	Jun 24/11	MM-9-79	Apr 25/13
MM-9-36	27 Jan 2025	MM-9-80	Feb 9/01
MM-9-37	Feb 28/2020	MM-9-81	Feb 9/01
MM-9-38	Feb 28/2020	MM-9-82	Feb 9/01
MM-9-39	Jun 24/11	MM-9-83	Feb 9/01
MM-9-40	Feb 28/2020	MM-9-84	Feb 9/01
MM-9-41	Feb 28/2020		
MM-9-42	Aug 22/16		

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MM-9-85	Feb 9/01	MM-9-120	Feb 9/01
MM-9-86	Feb 9/01	MM-9-121	27 Jan 2025
MM-9-86.1	Jun 25/14	MM-9-122	27 Jan 2025
MM-9-86.2	Jun 25/14	MM-9-123	27 Jan 2025
MM-9-87	Aug 22/16	MM-9-124	27 Jan 2025
MM-9-88	27 Jan 2025	MM-9-125	Feb 9/01
MM-9-89	27 Jan 2025	MM-9-126	27 Jan 2025
MM-9-90	27 Jan 2025	MM-9-127	27 Jan 2025
MM-9-91	27 Jan 2025	MM-9-128	Apr 25/13
MM-9-92	27 Jan 2025	MM-10-1	20 May 2025
MM-9-93	27 Jan 2025	MM-10-2	20 May 2025
MM-9-93.1	27 Jan 2025	MM-10-3	20 May 2025
MM-9-93.2	27 Jan 2025	MM-10-4	20 May 2025
MM-9-93.3	Apr 25/13	MM-10-5	20 May 2025
MM-9-93.4	Apr 25/13	MM-10-6	20 May 2025
MM-9-94	Apr 25/13	MM-10-7	20 May 2025
MM-9-95	27 Jan 2025	MM-10-8	20 May 2025
MM-9-96	27 Jan 2025	MM-10-8.1	20 May 2025
MM-9-97	27 Jan 2025	MM-10-8.2	20 May 2025
MM-9-98	Apr 25/13	MM-10-9	20 May 2025
MM-9-99	Jun 25/14	MM-10-10	20 May 2025
MM-9-100	Apr 25/13	MM-10-11	20 May 2025
MM-9-101	Feb 9/01	MM-10-12	20 May 2025
MM-9-102	Feb 9/01	MM-10-13	20 May 2025
MM-9-103	Jun 25/14	MM-10-14	20 May 2025
MM-9-104	Apr 25/13	MM-10-15	20 May 2025
MM-9-105	Apr 25/13	MM-10-16	20 May 2025
MM-9-106	Jun 25/14	MM-10-17	20 May 2025
MM-9-106.1	Apr 25/13	MM-10-18	20 May 2025
MM-9-106.2	Jun 25/14	MM-10-19	20 May 2025
MM-9-106.3	Jun 25/14	MM-10-20	20 May 2025
MM-9-106.4	Jun 25/14	MM-10-20.1	20 May 2025
MM-9-106.5	Jun 25/14	MM-10-20.2	20 May 2025
MM-9-106.6	Apr 25/13	MM-10-21	20 May 2025
MM-9-107	Apr 25/13	MM-10-22	20 May 2025
MM-9-108	Feb 9/01	MM-10-23	20 May 2025
MM-9-109	Feb 9/01	MM-10-24	20 May 2025
MM-9-110	Feb 9/01	MM-10-25	20 May 2025
MM-9-111	Feb 9/01	MM-10-26	20 May 2025
MM-9-112	Feb 9/01	MM-10-27	20 May 2025
MM-9-113	Feb 28/2020	MM-10-28	20 May 2025
MM-9-114	Feb 28/2020	MM-10-29	20 May 2025
MM-9-115	Apr 25/13	MM-10-30	20 May 2025
MM-9-116	Feb 9/01	MM-10-31	20 May 2025
MM-9-117	Feb 9/01	MM-10-32	20 May 2025
MM-9-118	Feb 9/01	MM-10-33	20 May 2025
MM-9-119	Jul 3/15	MM-10-34	20 May 2025

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MM-10-35	20 May 2025	MM-11-13.1	Apr 25/13
MM-10-36	20 May 2025	MM-11-13.2	Apr 25/13
MM-10-37	20 May 2025	MM-11-14	Feb 28/2020
MM-10-38	20 May 2025	MM-11-15	Jun 24/11
MM-10-39	20 May 2025	MM-11-16	Apr 25/13
MM-10-40	20 May 2025	MM-11-17	Feb 28/2020
MM-10-41	20 May 2025	MM-11-18	27 Jan 2025
MM-10-42	20 May 2025	MM-11-19	27 Jan 2025
MM-10-43	20 May 2025	MM-11-20	27 Jan 2025
MM-10-44	20 May 2025	MM-11-21	27 Jan 2025
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MM-10-46	20 May 2025	MM-11-23	27 Jan 2025
MM-10-47	20 May 2025	MM-11-24	27 Jan 2025
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MM-10-51	20 May 2025	MM-11-28	27 Jan 2025
MM-10-52	20 May 2025	MM-11-29	27 Jan 2025
MM-10-53	20 May 2025	MM-11-30	Feb 9/01
MM-10-54	20 May 2025	MM-11-31	Feb 9/01
MM-10-55	20 May 2025	MM-11-32	27 Jan 2025
MM-10-56	20 May 2025	MM-11-33	27 Jan 2025
MM-10-57	20 May 2025	MM-11-34	Jul 7/10
MM-10-58	20 May 2025	MM-11-35	Feb 28/2020
MM-10-59	20 May 2025	MM-11-36	Feb 28/2020
MM-10-60	20 May 2025	MM-11-37	27 Jan 2025
MM-10-61	20 May 2025	MM-11-38	Apr 30/14
MM-10-62	20 May 2025	MM-11-39	27 Jan 2025
MM-10-63	20 May 2025	MM-11-40	Feb 28/2020
MM-10-64	20 May 2025	MM-11-41	Feb 28/2020
MM-10-65	20 May 2025	MM-11-42	Feb 28/2020
MM-10-66	20 May 2025	MM-11-43	Jun 25/14
MM-11-1	27 Jan 2025	MM-11-44	Dec 4/15
MM-11-2	27 Jan 2025	MM-11-45	Dec 4/15
MM-11-3	27 Jan 2025	MM-11-46	27 Jan 2025
MM-11-4	Feb 9/01	MM-11-47	Feb 9/01
MM-11-5	Apr 25/13	MM-11-48	Feb 9/01
MM-11-6	Apr 25/13	MM-11-49	Feb 9/01
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MM-11-8	Apr 25/13	MM-11-51	Feb 9/01
MM-11-9	27 Jan 2025	MM-11-52	Feb 9/01
MM-11-10	20 May 2025	MM-11-53	27 Jan 2025
MM-11-10.1	Dec 4/15	MM-11-54	Apr 25/13
MM-11-10.2	Apr 25/13	MM-11-55	Apr 25/13
MM-11-10.3	Apr 25/13	MM-11-56	Feb 28/2020
MM-11-10.4	Apr 25/13	MM-11-57	Feb 28/2020
MM-11-11	Feb 28/2020	MM-11-58	Feb 9/01
MM-11-12	Feb 28/2020		
MM-11-13	Apr 25/13		

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MM-11-59	Feb 28/2020	MM-12-11	27 Jan 2025
MM-11-60	Feb 28/2020	MM-12-12	Nov 15/10
MM-11-61	Jun 25/14	MM-12-13	Feb 9/01
MM-11-62	Jun 25/14	MM-12-14	Feb 9/01
MM-11-63	Feb 28/2020	MM-12-15	Feb 9/01
MM-11-64	27 Jan 2025	MM-12-16	Feb 9/01
MM-11-65	27 Jan 2025	MM-12-17	Nov 15/10
MM-11-66	Feb 28/2020	MM-12-18	Nov 15/10
MM-11-67	27 Jan 2025	MM-12-19	Nov 15/10
MM-11-68	27 Jan 2025	MM-12-19.1	Jul 3/15
MM-11-69	27 Jan 2025	MM-12-19.2	Nov 15/10
MM-11-70	27 Jan 2025	MM-12-20	Nov 15/10
MM-11-70.1	27 Jan 2025	MM-12-21	Nov 15/10
MM-11-70.2	27 Jan 2025	MM-12-22	Nov 15/10
MM-11-71	Dec 4/15	MM-12-23	27 Jan 2025
MM-11-72	Feb 9/01	MM-12-24	Feb 20/08
MM-11-73	Feb 9/01	MM-12-25	Feb 9/01
MM-11-74	Feb 9/01	MM-12-26	27 Jan 2025
MM-11-75	Aug 22/16	MM-12-27	27 Jan 2025
MM-11-76	Feb 9/01	MM-12-28	Feb 20/08
MM-11-77	Feb 9/01	MM-12-29	Feb 9/01
MM-11-78	Jul 3/15	MM-12-30	Feb 9/01
MM-11-79	Jul 3/15	MM-12-31	Jun 21/12
MM-11-80	Feb 9/01	MM-12-32	27 Jan 2025
MM-11-81	Jul 3/15	MM-12-33	27 Jan 2025
MM-11-82	Jul 3/15	MM-12-34	Nov 15/10
MM-11-83	Dec 4/15	MM-12-35	Feb 9/01
MM-11-84	Dec 4/15	MM-12-36	Feb 9/01
MM-11-85	27 Jan 2025	MM-12-37	Feb 9/01
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MM-11-88	Feb 28/2020	MM-12-40	Feb 9/01
MM-11-89	Feb 28/2020	MM-12-41	Feb 9/01
MM-11-90	Feb 28/2020	MM-12-42	Feb 9/01
MM-11-91	Feb 28/2020	MM-12-43	Aug 22/16
MM-11-92	Feb 28/2020	MM-12-44	Feb 9/01
MM-11-93	Feb 28/2020	MM-12-45	Aug 22/16
MM-11-94	Feb 28/2020	MM-12-46	Feb 9/01
MM-12-1	27 Jan 2025	MM-12-47	27 Jan 2025
MM-12-2	27 Jan 2025	MM-12-48	Feb 20/08
MM-12-3	27 Jan 2025	MM-12-49	27 Jan 2025
MM-12-4	27 Jan 2025	MM-12-50	27 Jan 2025
MM-12-5	Feb 9/01	MM-12-51	27 Jan 2025
MM-12-6	Apr 30/14	MM-12-52	27 Jan 2025
MM-12-7	Feb 9/01	MM-12-53	Feb 20/08
MM-12-8	Feb 9/01	MM-12-54	Feb 28/2020
MM-12-9	Nov 15/10	MM-12-55	Feb 20/08
MM-12-10	Nov 15/10		

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MM-12-56	Feb 20/08	MM-12-96	Feb 9/01
MM-12-57	Feb 28/2020	MM-12-96.1	Mar 15/05
MM-12-58	Feb 28/2020	MM-12-96.2	Mar 15/05
MM-12-59	Jun 21/12	MM-12-97	Feb 9/01
MM-12-60	Jun 21/12	MM-12-98	Feb 9/01
MM-12-61	Feb 28/2020	MM-12-99	Feb 9/01
MM-12-62	Feb 28/2020	MM-12-100	Feb 9/01
MM-12-62.1	Feb 28/2020	MM-12-101	Jul 2/04
MM-12-62.2	Feb 28/2020	MM-12-102	Feb 9/01
MM-12-62.3	Feb 28/2020	MM-12-103	Feb 9/01
MM-12-62.4	Feb 28/2020	MM-12-104	Jun 25/14
MM-12-63	Feb 28/2020	MM-12-105	27 Jan 2025
MM-12-64	Feb 28/2020	MM-12-106	Jun 25/14
MM-12-65	Feb 28/2020	MM-12-107	Feb 28/2020
MM-12-66	Feb 28/2020	MM-12-108	Feb 9/01
MM-12-67	Feb 28/2020	MM-12-109	27 Jan 2025
MM-12-68	Feb 28/2020	MM-12-110	Apr 25/13
MM-12-69	Feb 28/2020	MM-12-111	20 May 2025
MM-12-70	Feb 28/2020	MM-12-112	Feb 28/2020
MM-12-71	Feb 28/2020	MM-12-113	Feb 28/2020
MM-12-72	Feb 9/01	MM-12-114	Jul 3/15
MM-12-73	Jun 25/14	MM-12-115	20 May 2025
MM-12-74	Apr 25/13	MM-12-116	Feb 9/01
MM-12-75	Apr 25/13	MM-13-1	27 Jan 2025
MM-12-76	Feb 20/08	MM-13-2	27 Jan 2025
MM-12-77	Nov 15/10	MM-13-3	27 Jan 2025
MM-12-78	Jun 25/14	MM-13-4	27 Jan 2025
MM-12-79	20 May 2025	MM-13-5	Apr 25/13
MM-12-80	Apr 25/13	MM-13-6	Apr 25/13
MM-12-81	Feb 28/2020	MM-13-7	Apr 25/13
MM-12-82	Apr 25/13	MM-13-8	Apr 25/13
MM-12-83	20 May 2025	MM-13-9	Feb 28/2020
MM-12-84	Feb 9/01	MM-13-10	Feb 28/2020
MM-12-85	Feb 28/2020	MM-13-11	Apr 25/13
MM-12-86	Feb 20/08	MM-13-12	Apr 25/13
MM-12-86.1	Jul 2/04	MM-13-13	Apr 25/13
MM-12-86.2	Jul 2/04	MM-13-14	27 Jan 2025
MM-12-86.3	Jul 2/04	MM-13-15	Apr 25/13
MM-12-86.4	Jul 2/04	MM-13-16	Apr 25/13
MM-12-87	Jul 3/15	MM-13-17	Oct 20/09
MM-12-88	Feb 28/2020	MM-13-18	Feb 28/2020
MM-12-89	Feb 28/2020	MM-13-19	Feb 28/2020
MM-12-90	Feb 9/01	MM-13-20	Jul 3/15
MM-12-91	Apr 25/13	MM-13-20.1	Jul 3/15
MM-12-92	Nov 15/10	MM-13-20.2	Oct 20/09
MM-12-93	Feb 9/01	MM-13-21	Feb 9/01
MM-12-94	Feb 9/01	MM-13-22	Feb 28/2020
MM-12-95	Feb 9/01		

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MM-13-24	Feb 28/2020	MM-13-60	Feb 9/01
MM-13-25	Feb 9/01	MM-13-61	Nov 15/10
MM-13-26	Feb 9/01	MM-13-62	Apr 25/13
MM-13-27	27 Jan 2025	MM-13-63	27 Jan 2025
MM-13-28	Feb 9/01	MM-13-64	Apr 25/13
MM-13-29	27 Jan 2025	MM-13-64.1	Apr 25/13
MM-13-30	Feb 9/01	MM-13-64.2	Apr 25/13
MM-13-31	Apr 16/07	MM-13-64.3	Nov 15/10
MM-13-32	Jul 3/15	MM-13-64.4	Nov 15/10
MM-13-33	Jul 3/15	MM-13-64.5	Oct 20/09
MM-13-34	Jul 3/15	MM-13-64.6	Oct 20/09
MM-13-35	Oct 20/09	MM-13-65	Apr 16/07
MM-13-36	Oct 20/09	MM-13-66	Apr 16/07
MM-13-36.1	Oct 20/09	MM-13-67	Apr 16/07
MM-13-36.2	Oct 20/09	MM-13-68	Apr 30/14
MM-13-37	Apr 25/13	MM-13-69	Apr 16/07
MM-13-38	Feb 9/01	MM-13-70	Apr 16/07
MM-13-39	Apr 25/13	MM-13-71	Apr 16/07
MM-13-40	27 Jan 2025	MM-13-72	Feb 28/2020
MM-13-41	27 Jan 2025	MM-13-73	Feb 28/2020
MM-13-42	Feb 9/01	MM-13-74	Feb 28/2020
MM-13-43	27 Jan 2025	MM-13-75	Feb 28/2020
MM-13-44	27 Jan 2025	MM-13-76	Jun 24/11
MM-13-45	27 Jan 2025	MM-14-1	27 Jan 2025
MM-13-46	Nov 15/10	MM-14-2	27 Jan 2025
MM-13-47	Nov 15/10	MM-14-3	27 Jan 2025
MM-13-48	Nov 15/10	MM-14-4	Aug 4/06
MM-13-49	Nov 15/10	MM-14-5	Feb 9/01
MM-13-50	Nov 15/10	MM-14-6	Feb 9/01
MM-13-51	Nov 15/10	MM-14-7	Feb 9/01
MM-13-52	Nov 15/10	MM-14-8	Feb 9/01
MM-13-52.1	Nov 15/10	MM-14-9	Feb 9/01
MM-13-52.2	Nov 15/10	MM-14-10	Feb 9/01
MM-13-52.3	Jul 3/15	MM-14-11	Feb 9/01
MM-13-52.4	Jul 3/15	MM-14-12	27 Jan 2025
MM-13-52.5	Jul 3/15	MM-14-13	Feb 9/01
MM-13-52.6	Jul 3/15	MM-14-14	27 Jan 2025
MM-13-52.7	27 Jan 2025	MM-14-15	27 Jan 2025
MM-13-52.8	27 Jan 2025	MM-14-16	Feb 9/01
MM-13-52.9	Jul 3/15	MM-14-17	Feb 9/01
MM-13-52.10	27 Jan 2025	MM-14-18	Feb 9/01
MM-13-53	27 Jan 2025	MM-14-19	Feb 9/01
MM-13-54	Jul 3/15	MM-14-20	Feb 9/01
MM-13-55	Jul 3/15	MM-14-21	Feb 9/01
MM-13-56	Jul 3/15	MM-14-22	Feb 9/01
MM-13-57	Nov 15/10		
MM-13-58	Nov 15/10		

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MM-14-27	Feb 9/01		
MM-14-28	Feb 9/01		
MM-14-29	Aug 4/06		
MM-14-30	Feb 28/2020		
MM-14-31	Aug 4/06		
MM-14-32	Aug 4/06		
MM-14-33	Aug 4/06		
MM-14-34	Aug 4/06		
MM-14-35	Aug 4/06		
MM-14-36	Jun 24/11		
MM-14-37	Aug 4/06		
MM-14-38	Aug 4/06		
MM-14-39	Jun 24/11		
MM-14-40	Feb 28/2020		
MM-14-41	Jun 24/11		
MM-14-42	Jun 24/11		
MM-15-1	27 Jan 2025		
MM-15-2	Feb 9/01		
MM-15-3	Jul 3/15		
MM-15-4	Feb 9/01		

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1-5. Application of Warnings, Cautions, and Notes

Warnings, Cautions, and Notes emphasize important and critical instructions and are used for the following conditions.

WARNING

Calls attention to use of materials, processes, methods, or procedures that must be followed to avoid personal injury or loss of life.

CAUTION

Calls attention to methods and procedures which must be followed to avoid damage to the aircraft or equipment.

NOTE

Calls attention to information essential to highlight for clarification of procedures.

1-6. Definitions and Abbreviations

Table 1-1. List of Definitions

Airframe	Means the fuselage, stabilizers, tailcone, cowlings, fairings, rotors, and landing gear of the helicopter and their accessories and controls.
Annually	With respect to an annual inspection, annually means within the preceding 12 calendar months.
Approved	Unless used with reference to another person, means approved by the FAA or any person to whom the FAA has delegated its authority in the matter concerned, or approved under the provisions of a bilateral agreement between the United States and a foreign country or jurisdiction.
Empty Weight	Standard empty weight of a standard helicopter including unusable fuel, full operating fluids, and full engine oil. Basic empty weight is standard empty weight plus weight of installed optional equipment.
FAR	Means the Federal Aviation Regulations (FARs) prescribed by the Federal Aviation Administration (FAA). The FARs comprise Title 14 of the Code of Federal Regulations (14 CFR).
Life-Limited Component	Any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual. (Refer to Section 3, *Airworthiness Limitations*, Table 3-1.)

Table 1-2. List of Abbreviations

A/R	As Required
AC	Advisory Circular
AGL	Above Ground Level
ALT	Altitude
APU	Auxiliary Power Unit
ASTM	American Society for Testing and Materials
B.L.	Butt Line
C	Celsius
CAS	Calibrated Airspeed
cc	Cubic centimeter
CCW	Counterclockwise
CFR	Code of Federal Regulations
C.G.	Center of Gravity
C.L.	Center Line
cm	Centimeter
CPC	Corrosion Prevention Compound
CRFS	Crash Resistant Fuel System
°	Degree
EA	Each
EASA	European Union Aviation Safety Agency
EFIS	Electronic Flight Instrument System
EMI	Electromagnetic Interference
F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
Fig.	Figure
FIM	Full Indicator Movement
FLT	Flight
FPM	Feet per Minute
FSII	Fuel System Icing Inhibitor
ft	Foot
ft-lb or *ft-lbs*	Foot-Pound (Force)
ft/min	Feet per Minute
FWD	Forward
gal	Gallon
gal/hr	Gallon per Hour
GCU	Generator Control Unit
GW	Gross Weight
hr or hr(s)	Hour(s)
Hz	Hertz (Cycles per Second)

2-20. Vendor Information

A. The following components listed in Table 2-2 are to be maintained I/A/W the manufacturer's instructions to ensure the continued airworthiness of the aircraft.

B. The owner/operator is responsible for ensuring that current maintenance publications are available to ensure continued airworthiness of the aircraft.

Table 2-2. Vendor Contact Information

Component	Part Number	Manufacturer
Engine	250-C20W	Rolls-Royce 450 S. Meridian Street Indianapolis, IN 46206 Tel: (317) 230-2000 http://www.rolls-royce.com/
Starter/Generator	524-080	Thales Avionics Inc. (Auxilec) 140 Centennial Avenue Piscataway Township, NJ 08854 Tel: (732) 494-6300 https://customeronline.thalesgroup.com/en
Starter/Generator	150SG117Q-3-1 150SG117Q-4-1	Skurka Aerospace, Inc. 4600 Calle Bolero Camarillo, CA 93011 Tel: (805) 484-8884 http://www.skurka-aero.com/
Generator Control Unit (GCU)	VR1528-11B	Thales Avionics Inc. (Auxilec) 140 Centennial Avenue Piscataway Township, NJ 08854 Tel: (732) 494-6300 https://customeronline.thalesgroup.com/en
Generator Control Unit (GCU)	GCSG501-2	Avionic Instruments, LLC 1414 Randolph Avenue Avenel, NJ 07001 Tel: (732) 388-3500 http://www.avionicinstruments.com/
Battery(1)	TSP-1728-20-17SP100	Marathon Power Technologies P.O. Box 8233 Waco, TX 76712-8233 Tel: (254) 776-0650 http://www.mptc.com/
Battery(2)	G-641	Teledyne Battery Products (Gill Batteries) 840 West Brockton Avenue Redlands, CA 92374 Tel: (800) 456-0070 Tel: (909) 793-3131 http://www.gillbatteries.com/
Fuel Cells (Standard)	4122052-"X"	Floats & Fuel Cells, Inc. 4010 Pilot Drive, Suite 103 Memphis, TN 38118 Tel: (800) 647-6148 https://www.ffcfuelcells.com)

Table 2-2. Vendor Contact Information

Component	Part Number	Manufacturer
Fuel Cells (Standard)	4122052-"X"	United Fuel Cells Corporation 853 Adams Road Eagle River, WI 54521 Tel: (715) 479-6149 https://unitedfuelcells.com/contact/
Fuel Cells	4122009-"X"	Zodiac Aerazur Caudebec 4, rue Lesage-Maille Caudebec 76320, France Tel: +33 (1) 6486-6922 http://www.zodiacaerospace.com/en/zodiac-aerosafety-systems-elastomer
Fuel Cell Crossover	500123	
Vent Crossover	500122	Zodiac Aerazur Caudebec 4, rue Lesage-Maille Caudebec 76320, France Tel: +33 (1) 6486-6922 http://www.zodiacaerospace.com/en/zodiac-aerosafety-systems-elastomer
Tension-Torsion (TT Strap) (STC SR03465CH)	AA-ECD-084-480	Airwolf Aerospace LLC 15369 Madison Rd. Middlefield, OH 44062-8404, U.S.A. Tel: (440) 632-1687 / Fax: (440) 632-1685 www.airwolfaerospace.com / info@airwolfaerospace.com
Cargo Hook (option)	2A20B-17149-2	Breeze-Eastern Corporation 35 Melanie Lane Whippany NJ, 07981 U.S.A. (800) 929-1919 / (973) 602-1083 / (973) 602-1090 Fax: (973) 739-9344 customerserives@breeze-eastern.com www.breeze-eastern.com
	528-023-01	Onboard Systems International, Inc. 13915 NW 3rd Court Vancouver, WA 98685 U.S.A. Tel: (800) 275-0883 / (360) 546-3072 Fax: (360) 546-3073 www.onboardsystems.com
Roll Over Valve Assembly(3)	549448	SAFRAN AEROSYSTEMS 4, rue Lesage Maille 76320 Caudebec-lès-Elbeuf, France Tel: +33 (0) 2.32.96.56.00 https://www.safran-group.com/companies/safran-aerosystems
Breakaway Coupling, Vent(3)	ECD115-11	
Breakaway Coupling, Fuel Line(3)	ECD115-15	
Breakaway Coupling, Cross Fill(3)	ECD115-17	
LH Fuel Bladder(3) (CRFS)	ECD4097-1	
RH Fuel Bladder(3) (CRFS)	ECD4097-3	
Frangible Ring(3)	ECD4098-11	

Notes:

1. This is the standard battery for the TH-28 and 480. Refer to the correct publication if an optional or special battery is installed.
2. This is the standard battery for the 480B. Refer to the correct publication if an optional or special battery is installed.
3. Refer to the following Safran Aerosystems reports for instructions for continued airworthiness:
   a. Report DT-00013426, *Maintainability Analysis Report Enstrom B480*, latest revision.
   b. Report DT-00013493, *Storage and Condition Requirement Sheet 480 Series*, latest revision.

2-21. Special Tools

A. The special tools listed in Table 2-3 are used for removal, installation, and overhaul of components used on the TH-28/480 Series aircraft:

NOTE

The special tools listed in Table 2-3 are available through Enstrom's Tool Rental Program. Contact Enstrom Helicopter Product Support for details.

Table 2-3. Special Tools

Part Number	Nomenclature
T-0003	Main Rotor Lead/Lag Lower Nut Tool
T-0005	Damper Rod End Removal Tool
T-0009	Main Rotor Blade Bolt Guide Bullet
T-0011	Main Rotor Hoist Sling
T-0013	Main Rotor Lamiflex Nut Socket
T-0014	Needle Point Grease Adapter
T-0016	Lower Swashplate Gimbal Tool
T-0017	Transmission Hoist Eye
T-0022	Collective Spring Capsule Retainer Tool
T-0026	Main Rotor Blade Tab Bending Tool
T-0027	Main Rotor Blade Tab Angle Tool
T-0035	Oleo Disassembly Tool (Holding)
T-0036	Blade Grip Seal Installation Tool
T-0045-1	Lower Swashplate Dogleg Puller
T-0048	Main Rotor Mast Nut Tool

Table 2-3. Special Tools

Part Number	Nomenclature
T-0051-3	Main Rotor Flapping Nut Tool
T-0054	Swashplate Dogleg Alignment Tool
T-0056-3	Tail Rotor Thrust Bearing Retention Nut Tool
T-0057	Damper Bleeding Fixture
T-0068-3	Tail Rotor Xmsn Output Shaft Runout Tools
T-0079-1	Swashplate Swaging Tool
T-0086	Upper Guidetube Nut Tool
T-0087-15	Tail Rotor Assembly Static Balance Mandrel
T-0092-5	Taper Pin Removal Tool
T-0095	Damper Tool
T-0100-1	Swashplate DU Bushing Removal Tool
T-0102-1	Guidetube Disassembly Tool
T-0104	Swashplate Bushing Installation Tool
T-0121-1	Tail Rotor Static Balance Stand
T-0134	Plate Assembly (Lower Swashplate Assembly)
T-0135-1-SET	Main Rotor Transmission Pinion Crows Foot
T-0136-1	Clutch Removal/Installation Wrench
T-0137-1	Engine Hoist Assembly
T-0139-1	Belt Tension Tool
T-0140	Tail Rotor Rigging Tool
T-0141	Drive Pulley Alignment Tool
T-0143-1	Tail Rotor Driveshaft Alignment Tool
T-0149	Seal Installation Tool (T-T Strap)
T-0151-1	Universal Block Bearing Tool Set (Grease Lubricated)
T-0152	Tail Rotor Balance Tool (Photo Cell Bracket)
T-0160-1	Damper Ring Seal Installation Tools
T-0161-1	Seal Installation Tool
T-0162-1	Universal Block Bearing Tool (Oil Lubricated)
T-0164-1	Upper Pulley Wrench
T-0166-11	Alignment Tool, Oil Cooler Shaft

Table 2-3. Special Tools

Part Number	Nomenclature
T-0168-1	Tail Rotor Assembly Holder
T-0169-1	Oleo Disassembly Tool
T-0172-1	Seal Installation Tool (Double Lip Seal)
T-0174-1	Hub Puller
T-0186-1	Overrunning Bearing Seal Tool Set
T-0194-1	Bore Concentricity Indicator Tool Set
T-0197-7	Torque Multiplier
T-0198-11	Main Rotor Gearbox Oil Draining Enabler
T-0199-1	Laser Alignment Emitter
T-0200-5	Target (Laser) Fixture
T-0203-1	Seal Puller Assembly
T-1575	Swashplate Centering Tool
T-1656-3	Main Rotor Blade Plug Tool
T-1709	Guidetube Bearing Collar Tool
T-1758	Guidetube Clamps
T-2889	Tail Rotor Transmission Rigging Tool
T-2893	Tail Rotor Needle Teeter Bearing Removal/Installation Tool Kit
T-2896-1	Damper Bleeding/Servicing Tool (2 Required)
T-4122100-1	Fuel Bladder Install Tool (CRFS)
RBT18560(2)	Seal Removal Tool (Double Lip Seal)
(1)	Engine Stand
(1)	Main Rotor Transmission Stand
(1)	Main Rotor Hub Stand

Notes:

1. Contact the Enstrom Helicopter Product Support for assistance in obtaining these tools.
2. Available from Dart Helicopter Services

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SECTION 3

AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For EASA approval, this Airworthiness Limitations section is approved, and variations must also be approved.

FAA APPROVED BY Joseph H McGarvey for DATE 4-30-01

MANAGER
CHICAGO AIRCRAFT CERTIFICATION OFFICE
CENTRAL REGION
FEDERAL AVIATION ADMINISTRATION

SECTION 3
LOG OF REVISIONS

Rev. Num.	Rev. Date	Pages Affected	Approval Date	FAA Approved
1	Oct 10/03	MM-3-2, MM-3-40, MM-3-41	Oct 28/03	Joe McGarvey
2	Jun 2/04	MM-3-2, MM-3-5, MM-3-13, MM-3-14, MM-3-40	Sep 8/04	Joe McGarvey
3	Oct 13/04	MM-3-2, MM-3-11 thru MM-3-18, MM-3-40	Nov 09/04	Gregory Michalik
4	Mar 15/05	MM-3-2, MM-3-8, MM-3-33, and MM-3-40	Mar 25/05	Gregory Michalik
5	Aug 4/06	MM-3-2, MM-3-7, MM-3-8, MM3-31 thru MM-3-36	Aug 30/06	Shawn Malekpour
6	Apr 16/07	MM-3-2, MM-3-15 thru MM-3-18, MM-3-31 thru MM-3-36, MM-3-39 thru MM-3-42	Apr 24/07	Shawn Malekpour
7	Feb 20/08	MM3-1 through MM-3-8	Oct 2/08	Gregory Michalik
8	N/A	None	N/A	N/A
9	Dec 12/08	MM-3-7 through MM-3-8	Mar 3/09	Gregory Michalik
10	N/A	None	N/A	N/A
11	Dec 21/09	MM-3-1, MM-3-2, MM-3-5 thru MM-3-8	Jan 6/10	Gregory Michalik
12	N/A	None	N/A	N/A
13	N/A	None	N/A	N/A
14	N/A	None	N/A	N/A
15	N/A	None	N/A	N/A
16	N/A	None	N/A	N/A
17	Jun 24/11	MM-3-6	Jul 15/11	Gregory Michalik
18	N/A	None	N/A	N/A
19	Dec 10/12	MM-3-6	Jan 10/13	Gregory Michalik
20	Apr 25/13	MM-3-1, MM-3-2, MM-3-6, MM-3-7	May 9/13	Gregory Michalik
21	Apr 30/14	None	N/A	N/A
22	Jun 25/14	None	N/A	N/A
23	Jul 3/15	None	N/A	N/A
24	Dec 4/15	MM-3-2 through MM-3-10	Dec 15/15	Gregory Michalik
25	Aug 22/16	MM-3-2, MM-3-3	Aug 26/16	Gregory Michalik
26	Feb 28/20	None	N/A	N/A
27	27 Jan 2025	MM-3-1 through MM-3-3, MM-3-5, MM-3-9	25 Feb 2025	Boubacar Felix T. Diakhite
28	20 May 2025	MM-3-2, MM-3-3	1 Aug 2025	John Raspanti

SECTION 3
EASA LOG OF REVISIONS

Rev. Number	Date	EASA Approved
1	May 29/05	2005-4678
2	May 29/05	2005-4678
3	May 29/05	2005-4678
4	Sep 16/10	EASA 10031817
5	Sep 16/10	EASA 10031817
6	Sep 16/10	EASA 10031817
7	Sep 16/10	EASA 10031817
8	N/A	N/A
9	Sep 16/10	EASA 10031817
10	N/A	N/A
11	Mar 9/11	EASA 10033495, Rev. 1
12	N/A	N/A
13	N/A	N/A
14	N/A	N/A
15	N/A	N/A
16	N/A	N/A
17	May 8/14	EASA 10044744
18	N/A	N/A
19	Apr 1/14	FAA/EASA T.I.P.,FAA Approved on Behalf of EASA by G. Michalik*
20	Apr 1/14	FAA/EASA T.I.P.,FAA Approved on Behalf of EASA by G. Michalik*
21	May 24/17	EASA 10061805
22	N/A	N/A
23	N/A	N/A
24	Jun 22/17	FAA/EASA T.I.P.,FAA Approved on Behalf of EASA by M. Javed♦
25	N/A	N/A
26	N/A	N/A
27	25 Feb 2025	FAA/EASA T.I.P.▼
28	TBD	TBD

* T.I.P., Rev. 3 dated April 23, 2013, Section 3.2.11
♦ T.I.P., Rev. 5 dated September 15, 2015, Section 3.2.11
▼T.I.P., Rev. 7 dated October 19, 2023, Sections 3.3 and 3.5.12.4

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SECTION 4

SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS, AND GENERAL MAINTENANCE

TABLE OF CONTENTS

SECTION 4

SERVICING, RECOMMENDED OVERHAULS, INSPECTIONS, AND GENERAL MAINTENANCE

TABLE OF CONTENTS – CONTINUED (PAGE MM-4-2)

Table 4-2. Servicing Intervals, Methods, and Locations

System	Location	Consumable Identification	Frequency (hr) 25	50	100	Other	As Required	Capacity	Method
Fuel, Standard (P/N 4122052)	1	C001					X	91.7 gal (US) (90.0 gal (US) usable) 347.08 L (340.65 L usable) (Note 1)	
Fuel, Aerazur (P/N 4122009)	1	C001					X	90.0 gal (US) (89.7 gal (US) usable) 340.65 L (339.51 L usable) (Note 1)	
Fuel, CRFS (P/N 4122100)	1	C001					X	90.2 gal (US) (89.5 gal (US) usable) 341.44 L (338.79 L usable) (Note 1)	
Engine Oil	2	C004 (Note 2) C005 (Note 2)			X		X	6.0 qt (US) 5.7 L	Oil can
Overrunning Clutch	3	C004 C005	X (3) (4)			X (3) (4)	X	3.8 fl oz (US) 110 mL	Oil can Syringe
Overrunning Clutch with Vented Clutch Oil Reservoir	3	C004 C005	X (5)			X (5)	X	6.5 fl oz (US) 192 mL	Oil can Syringe
Main Rotor Transmission	4	C006			X		X	6 pt (US) 2.8 L (dry) 5.5 pt (US) 2.6 L (reservicing)	Oil can
Main Rotor Transmission (equipped with oil filter and cooling installation)	4	C006			X		X	6.5 pt (US) 3.1 L (dry) 6.0 pt (US) 2.8 L (reservicing)	Oil can
Tail Rotor Transmission	5	C006			X		X	5 fl oz (US) 0.15 L	Oil can
Main Rotor Dampers	6	C007		X			X	Until full	Tool T-2896
Main Rotor Blade Grips (T-T strap)	7	C011 primary C008 alternate (Note 6)		X				As required	Grease gun
Main Rotor Lead-Lag Bearings	8	C011 primary C008 alternate (Note 6)		X				As required	Grease gun
Main Rotor Flapping Bearings (grease-lubricated)	9	C011 primary C008 alternate (Note 6)		X				As required	Grease gun

Table 4-2. Servicing Intervals, Methods, and Locations - continued

System	Location	Consumable Identification	Frequency (hr) 25	50	100	Other	As Required	Capacity	Method
Main Rotor Flapping Bearings (oil-lubricated)	9	C005				X (7)	X	As required	Oil can
Pitch Change Bellcrank Pivot Bearing	10	C011 primary C008 alternate (Note 6)		X				As required	Grease gun
Upper Pulley Bearing	11	C008			X			As required	Grease gun
Lower Pulley Bearings (grease-lubricated)	12	C008			X			As required (Note 8)	Grease gun
Lower Pulley Bearings (oil-lubricated)	12	C005			X			0.27 fl oz (US) 8 mL (dry) 6 mL (reservicing)	Syringe
Blower Assembly Bearings	13	C008				X (9)		As required (Note 10)	Syringe
Tail Rotor Drive Shaft Bearings	14	C008		X				As required	Grease Gun
Tail Rotor Pitch Control Bearing	15	C008			X			As required	Syringe
Tail Rotor Feathering Bearings	16	C011 primary C008 alternate (Note 6)	X (11)	X				As required	Grease Gun
Tail Rotor Teeter Bearings	17	C011 primary C008 alternate (Note 6)		X				As required	Grease Gun
Collective Guidetube Bearing	18	C008		X				As required	Grease Gun
Cyclic Swashplate Bearing	19	C008		X				As required	Grease Gun
Tail Rotor Control Pivot Points	20	C009			X			As required	Oil Can
Pitch Change Bellcrank Inboard Pivot Points	21	C009		X				As required	Oil Can
Collective Walking Beam Pivot Strap Bushings	22	C009			X			As required	Oil Can

Table 4-2. Servicing Intervals, Methods, and Locations - continued

System	Location	Consumable Identification	Frequency (hr) 25	50	100	Other	As Required	Capacity	Method
Lateral Push/Pull Rod	23	C009		X				As required	Oil Can
Trim Motor Attachment Points	24	C009		X				As required	Oil Can
Tail Rotor Pedal Pivot Points	25	C009			X			As required	Oil Can
Landing Gear Oleos	26	C010			X		X	As required	Oil Can
Battery	27 (Note 12)	(Note 13)				X			(Note 13)
Ground Handling Wheels	28	C008					X	As required	Hand pack
Main Rotor Blades	29	C013				X (14)		As required	Pump or Aerosol

NOTES

1. Differences in the open cell foam (standard), baffle (Aerazur), and open cavity (CRFS) fuel bladder systems will result in a slight variance in total fuel capacity between aircraft (refer to Paragraph 10-2 for serial number effectivity).

2. Recommended oil for the specified average daily temperatures:

Outside Temperature	Recommended Oil
-40°C (-40°F) and above	MIL-PRF-23699 (C005) or MIL-PRF-7808 (C004)
-40°C (-40°F) and below	MIL-PRF-7808 (C004)

3. If the overrunning clutch (ORC) cover is equipped with a sight glass, service the ORC when oil does not fill the sight glass.

4. If the overrunning clutch (ORC) cover is equipped with a sight glass and oil completely fills the sight glass, the servicing interval can be extended to 100 hours. If the ORC cover is equipped with a sight glass and the ORC requires servicing after less than 10 flight hours, inspect the ORC bearing housing seal and power output shaft seal for leaks and replace the seal(s) as required. If the ORC bearing housing and power output shaft seals are not leaking, replace the double lip seals (2 each) in the engine gearbox assembly at or before the next 100 hour/annual inspection.
5. If the overrunning clutch (ORC) is equipped with a vented clutch oil reservoir, the servicing interval can be extended to 100 hours. Service the vented clutch oil reservoir if oil does not fill the reservoir sight glass. The oil level between the reservoir sight glass and the ORC cover sight glass should be the same. Service the reservoir until the oil level is just below the reservoir service port. Allow sufficient time for the oil to flow into the ORC.
6. Do not mix alternate greases unless component is purged of existing grease.
7. 600 hr
8. Do not purge lubricate the lower pulley bearings. Refer to Paragraph 4-33.
9. 300 hr
10. Do not purge lubricate the blower assembly bearings. Refer to Paragraph 4-39.2.
11. Applicable for helicopters operating with infrequent inputs to the tail rotor pitch control system (for example: extended flight with unchanging blade pitch).
12. The battery is located in the right side of the engine compartment in a TH-28 and 480/B. An alternate location is in the baggage box.
13. Service in accordance with manufacturer's instructions.
14. Refer to Paragraph 4-48, 6.

4-40. Recommended Overhaul Cycles

A. Refer to Table 4-8 for components with recommended overhaul cycles established by Enstrom Helicopter Corporation and other component manufacturers.

NOTE

Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual for the overhaul cycle items associated with the engine.

B. Overhaul cycle components authorized for installation on the TH-28,480, and 480B must use the shorter overhaul cycle for the duration of the component overhaul cycle if the component is removed from one model of aircraft and installed on a model with a different overhaul cycle.

Table 4-8. Recommended Overhaul Cycles

COMPONENT	ITEM	OVERHAUL CYCLE		
		TH-28	480	480B
524-080 150SG117Q-3-1 150SG117Q-4-1	Starter/Generator	1,200 Hrs Not Authorized Not Authorized	1,200 Hrs 1,000 Hrs 1,000 Hrs	1,200 Hrs 1,000 Hrs 1,000 Hrs
20306-2	Valve Assembly (Optional Pop-Out Floats)	Not Authorized	3 years to coincide with hydrotesting of reservoir cylinder or after valve activation	3 years to coincide with hydrotesting of reservoir cylinder or after valve activation
28-13525-9	Tail Rotor Transmission	1,000 Hrs	1,200 Hrs	1,000 Hrs
4130020 (All dash numbers) 4130030-1 4130060 (All dash numbers)	Main Rotor Transmission	1,200 Hrs 1,200 Hrs (1) Not Authorized	1,200 Hrs 1,200 Hrs (1) Not Authorized	Not Authorized Not Authorized 1,200 Hrs (2)
4131001-101 4131001-105 4131001-131	Overrunning Clutch	2,400 Hrs 2,400 Hrs 2,400 Hrs	2,400 Hrs 2,400 Hrs 2,400 Hrs	2,400 Hrs 2,400 Hrs 2,400 Hrs
2A20B-17149-2 528-023-01	Cargo Hook (Optional)	(3)	(3)	(3)
549448	Roll Over Valve Assembly (4)	Not Authorized	(3)	(3)
ECD4097-1 ECD4097-3	Bladder Tank LH (4) Bladder Tank RH (4)	Not Authorized	(3)	(3)
ECD115-17 ECD115-11 ECD115-15	Breakaway Coupling (4)	Not Authorized	(3)	(3)

Notes:

1. These Main Rotor Transmissions can only be installed if the aircraft has been modified for installation of main rotor transmissions equipped with the oil filtration/cooling system.

2. Requires a 600 Hour Mandatory Inspection. This is a temporary restriction pending data analysis from the component tear-down inspections. Refer to paragraph 3-2 and Table 3-2 for more information.

3. Refer to the manufacturer's maintenance publications (See Table 2-2).

4. CRFS installation (Refer to Para. 10-2).

4-45. 100 Hour/Annual Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

100 HOUR/ANNUAL INSPECTION CHECKLIST

INITIAL EACH ITEM AFTER ACCOMPLISHMENT	INITIAL	REF
1. GENERAL INSPECTION		
A. Inspect the aircraft records and discrepancy sheets	_____	
B. Check the aircraft and engine records for TBO and Retirement Life items	_____	
C. Check for special airframe or engine inspections	_____	
D. Check compliance with applicable Service Information Letters, Service Directive Bulletins, and Airworthiness Directives	_____	
E. Inspect the aircraft for evidence of fuel and oil leaks	_____	
F. Clean the aircraft thoroughly	_____	
G. Remove the following cowling, access panels, and components:		
1) Keel access panels	_____	
2) Engine access panels	_____	
3) Bottom engine access panel	_____	
4) Aft side access panels	_____	
5) Bottom aft access panel	_____	
6) Horizontal stabilizer spar access panels	_____	
2. AIRCRAFT STRUCTURE & FUSELAGE		
A. Inspect the structure and fuselage for:		
1) Cleanliness & corrosion	_____	
2) Evidence of damage	_____	
3) Cracks, tears, or buckling of skins	_____	
B. Inspect the fuel system for:		
1) Condition and security of the crossover, vent, and supply line	_____	Fig. 10-3
2) Proper operation of the drain valves and the fuel shutoff valve	_____	Fig. 10-3
a) CRFS: Condition, security, and open valve indication of the breakaway coupling valves	_____	Fig. 10-3.1
3) Scupper drain lines for obstructions	_____	Fig. 10-3
4) Condition and security of the fuel quantity and low fuel warning electrical connectors and fuel system electrical grounding connections	_____	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
5) Verify fuel quantity at the indicator. If indication does not correlate to the fuel level, perform fuel quantity transmitter calibration check.	_____	Para. 7-85
6) Condition and security of the external fuel filter (if applicable)	_____	Para. 10-56
7) Condition of the fuel cell cap O-ring and proper operation of the cap	_____	
NOTE Step 8) below applies only to aircraft having an EMI/RFI shielding system (S/N 5134, 5136 through 5197).		
8) Transmit for 10 seconds on 136 MHz and observe the fuel gauge for movement.	_____	Para. 8-74 Para. 10-49,D
3. COMPONENTS (Equipment not specifically listed in this checklist)		
A. Inspect components for:		
1) Security of installation	_____	
2) Cleanliness and evidence of corrosion	_____	
3) Evidence of damage	_____	
4) Cracks, nicks, and scratches	_____	
4. ENGINE		
Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2), for the specific inspection requirements and procedures for the engine assembly.		
NOTE **The procedure for bleeding the engine oil system in the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2) covers only top-mounted filters. Refer to paragraph 13-58.1 for bleeding the oil system.**		
A. Inspect the pylon for cracks and corrosion	_____	
B. Inspect the engine mounts for cracks, bends, corrosion, or wear marks and check the condition of the engine mount bolt torque stripes on the side mounts	_____	SDB T-038
C. Inspect the fuel control and power turbine governor controls for proper rigging, worn or loose connections, and freedom of operation	_____	Para. 13-109 Para. 13-111
D. Inspect the exhaust stacks and the eductor for condition, proper installation, and security	_____	Para. 13-8 Para. 13-17
E. Inspect the engine fire detector for condition, chaffing, and security	_____	
F. Inspect the engine panels for:		
1) Damage or chafing	_____	
2) Security of the hinges and fasteners	_____	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
3) Condition and security of the fire curtain	_____	
5. LANDING GEAR ASSEMBLY		
A. Inspect the landing gear and crosstubes for:		
1) Damage or cracks	_____	SDB T-062
2) Condition of the skid shoes	_____	
3) Security of attachments	_____	
4) Condition of the end caps	_____	
5) Condition of the non-skid tape/paint	_____	
6) Condition of the ground handling wheel mounts	_____	
B. Inspect the landing gear oleos for:		
1) Evidence of corrosion	_____	
2) Evidence of leakage	_____	
3) Proper extension	_____	Para. 4-27
4) Security of attachments	_____	
5) Security of the steps	_____	
6. DRIVE BELT SYSTEM		
A. Inspect the upper pulley for:		
1) Evidence of roughness or looseness of the aft bearing or discoloration of the bearing housing	_____	
2) Condition and security of the taper pin and flex pack	_____	
3) Proper torque on the transmission pinion nut (250 ft-lbs)	_____	
4) Condition of the pulley	_____	Para. 11-49
5) Security and condition of the bearing support truss and attaching hardware	_____	
6) Condition of the pylon	_____	
B. Inspect the drive belt for:		
1) Cracked or missing sections	_____	Para. 11-28
2) Proper tension (2,500 - 1,750 pounds)	_____	SDB T-046
C. Inspect the lower pulley for:		
1) Evidence of roughness or looseness of the bearings or discoloration of the bearing housings	_____	
2) Evidence of bearing seal leakage	_____	
3) Condition of the pulley	_____	Para. 11-21
4) Condition and security of the "H" strut	_____	SDB T-018

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
5) Condition and security of the flex packs	_____	Para. 11-21
6) Condition and security of attaching hardware	_____	
D. Perform the following tasks if the aircraft is equipped with oil lubricated lower pulley bearing assemblies.		
1) Drain the oil from the lower pulley bearing	_____	
2) Inspect the sight plugs for cleanliness and staining. Remove and clean or replace the sight plugs as required.	_____	
3) Service the lower pulley bearing assemblies	_____	Para. 4-24
E. Inspect the overrunning clutch for evidence of oil leakage	_____	SDB T-022 SDB T-027
F. Drain the overrunning clutch and vented oil clutch reservoir (if equipped), inspect the drained oil for metal flakes, and service.		Para. 4-10.1
G. Inspect the vented clutch oil reservoir (if equipped) for evidence of oil leakage	_____	
H. Service the ORC or the vented clutch oil reservoir (if equipped)	_____	Para. 4-10
7. OIL COOLING SYSTEM		
A. Inspect the oil cooler for:		
1) Security of installation	_____	
2) Evidence of oil leakage or cracks	_____	
B. Inspect the scavenge/external oil filter assembly, oil lines, and fittings for condition and security of installation	_____	Para. 13-71
C. Inspect the oil cooler, blower, inlet, and exhaust ducting for condition and security	_____	SDB T-016
D. Inspect the blower shaft bearings for security of installation, excessive wear, and discoloration of the bearing mounts	_____	Para. 13-78,E
E. Remove and inspect the flex packs for cracks	_____	Para. 13-75 Para. 13-77 SDB T-013
F. Condition and security of the taper and roll pins and the flex packs (torque 25 in-lb/2.8 Nm)	_____	
8. AIR INTAKE SYSTEM		
A. Inspect the upper plenum/air inlet for cleanliness, condition, and security, and inspect for clearance between the drive belt and the upper plenum.	_____	Para. 13-29
B. Inspect the transfer ducts for cracks, cleanliness, and condition/bonding of duct boots.	_____	
C. Inspect the lower plenum for cleanliness, condition, security, and bonding of inlet seal and inspect the protective shield for condition and security).	_____	Para. 13-39

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
D. Inspect air particle separator perimeter for gasket condition, security, and seal.	_____	
9. TAIL CONE ASSEMBLY		
A. Inspect the tail cone for:		
1) Cracks in the tail cone mount fittings	_____	SDB T-033
2) Proper security to the pylon	_____	
3) Cracked or damaged bulkheads or doublers	_____	
4) Legibility of decals and markings	_____	
B. Inspect the tail rotor drive shaft for:		
1) Rough or worn bearings	_____	
2) Position of the rubber inserts	_____	
3) Condition and security of the taper pins and flex packs (torque 25 in-lb/2.8 Nm)	_____	
4) Security of the pillow blocks	_____	
C. Inspect the horizontal and vertical stabilizers for:		
1) Damage or cracks	_____	SDB T-004
2) Loose rivets	_____	
3) Security of attachment	_____	SDB T-031
D. Inspect the tail rotor guard for:		
1) Damage and loose rivets	_____	
2) Security of attachment	_____	
E. Inspect the stinger tube for:		
1) Evidence of loose rivets at the aft bulkhead	_____	SDB T-064
2) Security of mounting	_____	
F. Inspect the vibration absorber assembly for condition and security (if installed).	_____	
10. TAIL ROTOR TRANSMISSION		
A. Inspect the tail rotor transmission for:		
1) Evidence of leakage at the seals	_____	SDB T-012
2) Condition and security of the mounting screws	_____	
3) Evidence of a cracked or damaged housing	_____	
4) Condition and security of plugs and sight gauge		
B. Drain the transmission and inspect the chip detector for the presence of magnetic particles	_____	Para. 4-17 Para. 4-57,B,(1)

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
C. Service the transmission	_____	Para. 4-16
D. Inspect the tail rotor pitch controls for:		
1) Worn bushings at the pivot points	_____	
2) Slider assembly for freedom of operation and wear	_____	
3) Condition and security of the control hardware	_____	
11. TAIL ROTOR ASSEMBLY		
A. Inspect the tail rotor assembly for:		
1) Cracks, nicks, dents, scratches, and bends	_____	Para. 9-47
2) Evidence of bond separations, corrosion, and bond line corrosion	_____	
3) Loose tip rivets	_____	
4) Condition and security of the teeter bearings	_____	
a) Purge lubricate the needle bearings (ref. Table 4-2)		
5) Condition and security of the pitch change bearing	_____	
6) Inspect the pitch change links for condition, worn rod end bearings, proper hardware, and security of installation	_____	Para. 12-123 Para. 12-124
7) Fretting of the blades and grips at the attachments	_____	SDB T-055
12. MAIN ROTOR TRANSMISSION		
A. Inspect the main rotor transmission for:		
1) Evidence of leakage	_____	SDB T-002
2) Cleanliness and corrosion	_____	
3) Cleanliness of the sight glass	_____	
4) Condition and security of the mounting bolts and plugs	_____	
5) Condition of the main rotor mast	_____	
6) Condition of the pylon assembly (transmission area)	_____	SDB T-065
B. Drain the transmission and inspect the chip detector and (if applicable) the oil filter for the presence of metal particles	_____	Para. 4-13
C. Replace the oil filter (if applicable)	_____	Para. 4-14
D. (If applicable) Condition and security of heat exchanger, filter housing, pressure switch, oil lines, drain line, fittings, oil pump, and mounting brackets	_____	Para. 11-42
E. Service the transmission	_____	Para. 4-12
13. MAIN ROTOR ASSEMBLY		
A. Inspect the main rotor blades for:		
1) Cleanliness and evidence of corrosion	_____	Para. 9-35
a) Review records for date of last CPC application. Re-apply, if required.	_____	Para. 4-48,6 Para. 4-88

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
2) Evidence of loose rivets	_____	
3) Condition of the bulkheads	_____	
E. Inspect the cabin environmental control system for:		
1) Condition and security of the ducting	_____	
2) Obstruction of the outlets	_____	
3) Proper operation of the control valves and cable	_____	
16. FLIGHT CONTROLS		
A. Inspect the cyclic flight controls for:		
1) Proper range of travel (para. 4-60,B,4 through para. 4-60,B,6)	_____	Para. 4-60, B,4 through Para. 4-60, B,6
2) Freedom of operation	_____	
3) Condition and security of all rod ends, push-pull rods, bellcranks, and vibration absorber assemblies (if installed) forward of the swashplate.	_____	
4) Proper security at all connections forward of the swashplate	_____	
5) Condition and security of the trim assemblies	_____	Para. 12-71
B. Inspect the collective flight controls for:		
1) Proper range of travel (collective contacts up stop and down stop of the collective slider)	_____	
2) Freedom of operation	_____	
3) Proper operation of the collective friction	_____	Para. 12-30 Para. 12-32
4) Condition and security of the torque tube and push-pull rods	_____	
5) Condition and security of the spring capsule	_____	Para. 12-36
6) Proper operation, condition, and security of the droop compensator system	_____	Para. 13-111
7) Proper security at all connections	_____	
C. Inspect the tail rotor controls and cables for:		
1) Proper cable tension and correct range of travel	_____	Para. 12-99
2) Evidence of binding or ratcheting	_____	
3) Cable wear at the pulleys and fairleads	_____	Para. 12-107
4) Condition and security of all rod ends, push- pull rods, and bellcranks	_____	
5) Condition and security of the pedal assemblies	_____	
6) Proper security at all connections	_____	

100 HOUR/ANNUAL INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
17. BATTERY AREA		
A. Inspect the battery as required in accordance with the manufacturer's instructions	_____	
B. Inspect the preservation of the surrounding area	_____	
C. Inspect the condition of the battery cables, case, and hold down	_____	
D. Inspect for corrosion at the cable connections	_____	
E. Inspect the electrical components and wiring for condition and security	_____	
F. Inspect the battery vent tubes for condition, security, and clear of obstructions	_____	
18. ELECTRICAL SYSTEMS		
A. Inspect the starter/generator systems for:		
1) Condition and security of the wiring	_____	
2) Condition and security of the relays, generator shunt, and the current limiter	_____	
3) Condition and security of the GCU	_____	
4) Condition and security of the starter/generator	_____	
5) Condition of the starter/generator brushes (Refer to Paragraph 13-120)	_____	
6) Condition and security of starter/generator cooling duct installation and drain hole unobstructed in rigid air duct (480B S/N 5114 and subsequent & any 480B equipped with Cooling Kit 4230031)	_____	
B. Inspect the external power system for:		
1) Condition and security of the wiring	_____	
2) Condition and security of the external power receptacle and relay	_____	
C. Inspect the electrical bus or terminal strips for condition, security, loose connections, and evidence of arcing	_____	
D. Inspect the cockpit/map and instrument lighting systems for:		
1) Condition and security of the systems components and wiring	_____	
2) Operation of the cockpit/map light and instrument lighting	_____	
E. Inspect the landing, anti-collision, and position light systems for:		
1) Condition and security of the systems components and wiring	_____	
2) Operation of the landing, anti-collision, and position lights	_____	
F. Inspect the caution and warning systems for:		
1) Condition and security of the systems components and wiring	_____	
2) Perform a functional test of the caution system	_____	
3) Perform a functional test of the warning system	_____	

4-46. 200 Hour Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

200 HOUR INSPECTION CHECKLIST

INITIAL EACH ITEM AFTER ACCOMPLISHMENT	INITIAL	REF
1. GENERAL INSPECTION		
A. Perform a complete 100 Hour/Annual Inspection	_____	
2. OIL COOLING SYSTEM		
A. Inspect and replace the scavenge/external oil filter element	_____	
3. MAIN ROTOR ASSEMBLY		
A. Inspect the main rotor retention assemblies for:		
1) Evidence of ratcheting or binding in the feathering bearings	_____	
2) Remove the retention assembly dust cover.		Fig. 9-7,(18)
a) Inspect the T-T strap retention block and pin assembly for condition and security	_____	Fig. 9-7, (29)
b) Inspect for evidence of O-ring/seal leakage	_____	
3) Evidence of a sheared roll pin at the hinge pin	_____	
4) Evidence of ratcheting or binding of the flapping bearings	_____	
5) Proper security of the hinge pin locking tang washer	_____	Fig. 9-6,(5)
B. Drain the flapping bearing oil and reservice (if applicable)	_____	

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4-48. Special Scheduled Inspection - Periodic Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

SPECIAL SCHEDULED INSPECTION CHECKLIST

INITIAL EACH ITEM AFTER ACCOMPLISHMENT	INITIAL	REF
1. MAIN ROTOR TRANSMISSION		
A. Retorque the aft pinion nut 20-25 hours after installation	_____	
2. DRIVE BELT SYSTEM		
A. Inspect the alignment of the Lower Pulley Drive System in accordance with paragraph 11-17 every 12 months	_____	Para. 11-17
B. Inspect the individual elements of the flex packs, P/N ECD4024-1, for cracks and general condition every 12 months	_____	
C. Inspect the drive belt every 50 hours for the following:		
1) Contact with the upper plenum/air inlet	_____	Para. 13-29, B
2) Protruding cord on both the forward and aft edges of the drive belt around the circumference of the lower pulley	_____	
3) Condition of the belt that has been edge-sealed	_____	SDB T-046
3. OIL COOLING SYSTEM		
A. Perform bypass indicator functional test on the Purolator/Facet scavenge/external oil filter assembly in accordance with paragraph 13-71, C every 600 hours	_____	Para. 13-71, C
B. For aircraft operated in dusty environments, inspect the blower impeller for dirt accumulation every 200 hours and clean as required	_____	
4. NEOPRENE COMPONENTS		
A. Inspect components comprised of neoprene materials when helicopter has been in temperatures below -20° C (-4 °F). Visually examine components for breaks, chips, cracks or other deteriorating indications and replace as needed. Neoprene locations:		
1) Vibration dampening pad in tailcone structure	_____	
2) Gasket installed between fuel bladder skin and spacer in installation of fuel cap assembly	_____	
3) Rubber absorber between drag link and pylon mount location in drive assembly	_____	

SPECIAL SCHEDULED INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
4) Clamps attaching the tail rotor guard	_____	
5) Isolator on the oil tank support	_____	
5. TAIL ROTOR TRANSMISSION		
A. For aircraft used in agricultural operations (see SIL T-049):		
1) Inspect the tail rotor transmission gears for cracked or broken teeth every 50 hours.	_____	
2) In the event of a tail rotor transmission chip indication, inspect the chip detector for the presence of metal particles.	_____	Para. 4-57,B Para. 4-57,D
6. MAIN ROTOR BLADES		
A. Perform reapplication of corrosion prevention compound at a minimum once every two years. Shorter intervals may apply to aircraft operating in moderate and severe corrosion environments, as identified in SIL T-035.	_____	Para. 4-88 SIL T-035

4-48.1 Unscheduled Inspection Checklist

AIRCRAFT REGISTRATION NUMBER:		SIGNATURE:	
AIRCRAFT SERIAL NUMBER:		DATE:	
HOURS: Engine:	Flight:		
CYCLES (Start Counter):			

UNSCHEDULED INSPECTION CHECKLIST		
INITIAL EACH ITEM AFTER ACCOMPLISHMENT	**INITIAL**	**REF**
1. SPECIAL INSPECTIONS (See Paragraph 4-49 through Paragraph 4-59)		Para. 4-50
2. FUEL SYSTEM		
A. Aircraft equipped with CRFS:		
1) If the aircraft is tipped more than 25° while on the ground, remove the roll over valve and check for open status.	_____	Para. 10-18.9
2) If the aircraft experiences a 27° left or right roll during a take-off or landing maneuver (on one skid or an uncoordinated flight situation), remove the roll over valve and check for open status.	_____	Para. 10-18.9

4-62. Ground Handling

WARNING

CRFS: Do not exceed 25° tip of the aircraft during ground operations. Exceeding 25° will close the roll over valve. If the roll over valve closes and sticks, the vent system will not operate properly. Maintenance action is required to ensure the roll over valve is open (reference para. 4-48.1 and para. 10-18.9).

4-63. Ground Handling Wheels

A. A set of dual ground handling wheels is provided for moving the aircraft on the ground. The ground handling wheels are attached to the skids at the lugs provided near the aft oleo struts. The wheels are an over center type. If the aircraft must be pushed by hand, do not push on the horizontal stabilizers. Push the aircraft using the aft crosstube. The aircraft may be pushed from the nose if extreme caution is used.

CAUTION

Pushing on the nose of the helicopter may cause the cabin nose to deform thereby weakening the cabin structure and causing extensive repair. Use extreme caution when pushing on the nose to move the aircraft backwards.

4-64. Installation/Removal - Ground Handling Wheels

WARNING

Use extreme caution when installing and removing the ground handling wheels to prevent injury to personnel and to prevent from damaging the aircraft.

NOTE

Two types of ground handling wheels are used. Early production ground handling wheels are installed on lugs located on the sides of the skid tubes. Later production ground handling wheels are installed on a mounting plate attached to the top of the skid tubes.

A. Install the ground handling wheels on the skid tubes as follows:

(1) Early production wheels: Align the slots on the ground handling wheel assembly with the lugs on the skid tube. Install the ground handling wheel and slide the assembly until the lugs are in the recesses in the wheel assembly.

(2) Later production wheels: Remove the safety pin from the ground handling wheel assembly and install the wheel assembly onto the mount lugs on the top of the skid tube. Insert the safety pin into the ground handling wheel assembly.

B. Support the aircraft at the tail rotor guard.

C. Insert the wheel bar into the wheel and lower the wheel by pulling towards the front of the aircraft. Ensure the over-center lock is engaged. Remove the wheel bar from the wheel. Repeat the process for the opposite wheel.

D. Raise the wheel by inserting the wheel bar into the wheel. Release the over-center lock and carefully move the bar towards the aft end of the aircraft. Remove the bar from the wheel.

E. Remove the ground handling wheels by reversing the installation procedure.

4-65. External Power (See Figure 4-12)

NOTE

The external power system is standard equipment on the TH-28 and 480B.

NOTE

A 28-volt DC unit with a minimum output of 300 amperes is required for starting.

A. Use the following procedures for connecting external power:

(1) Turn the helicopter battery and generator switches "OFF".

(2) Turn the external power "OFF".

(3) Plug the external power source cable securely into the external power receptacle.

(4) Turn the external power source "ON".

(5) Turn the helicopter battery switch "ON".

4-66. Parking

A. Retract the ground handling wheels and remove, allowing the helicopter to rest on its skids.

B. Install the main rotor tiedowns.

C. Install the pitot tube cover (TH-28).

D. Install the tail rotor assembly cover.

E. Install the main rotor hub cover.

F. Install a static ground.

G. Secure the aircraft.

NOTE

Preserve or re-validate off-aircraft CRFS components I/A/W manufacturer's instructions. This includes, for example, the CRFS fuel cells, breakaway valve couplings, and roll over valve assembly.

4-76. Low Usage - Aircraft Preservation and Storage

NOTE

Aircraft flown for short periods several times a month.

NOTE

Preserve the engine compressor I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual if warranted by local corrosive conditions.

A. Ground run the aircraft every 14 days until normal operating temperatures for the engine are obtained.

B. Position the main rotor blades so that the tail rotor assembly is horizontal to the ground. Tie down the main rotor blades with the collective locked halfway up to relieve the steady load on the lamiflex bearings or T-T straps, as applicable.

C. Install the main rotor hub and tail rotor assembly covers.

D. Protect the windshields and interior equipment with suitable dust covers and/or solar shields.

NOTE

If the interior temperature of the cabin exceeds 150°F/66°C, ventilate the cabin by opening the doors or vents.

E. Cover the pitot and static air vents.

F. Wash and wax the aircraft monthly to remove contaminants.

G. Prior the next flight, complete the following:

(1) Remove all covers and tiedowns.

(2) Perform a preflight inspection.

NOTE

When inspecting oil levels, inspect for evidence of water contamination.

(3) If preserved, depreserve the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

4-77. Storage Up to 45 Days - Aircraft Preservation and Storage

A. Complete steps A through F of paragraph 4-76.

B. Disconnect the battery.

C. Remove the main rotor blades.

NOTE

Store the main rotor blades on wood racks cut out to the contour of the leading edge of the blades. Use care in handling the blades to prevent damage to the blades and trim tabs.

D. Return the aircraft to service using the following procedures:

(1) Remove all covers and tiedowns.

(2) Connect the battery.

(3) Install the main rotor blades.

(4) Perform a preflight inspection.

NOTE

When inspecting oil levels, inspect for evidence of water contamination.

(5) Lubricate the aircraft I/A/W the 50 Hour requirements.

(6) Depreserve the engine I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

4-78. Storage from 45 Days to 6 Months - Aircraft Preservation and Storage

A. Complete steps A through C of paragraph 4-77.

B. Remove the battery and store in a cool dry area. Clean the battery shelf if required (AC 43.13-1B).

NOTE

The aircraft may require an annual inspection.

C. Return the aircraft to service following the procedures in step D of paragraph 4-77.

NOTE

Pay particular attention to the algebraic signs when computing the weights, moments, and c.g.

D. Enter the weight of the change and the arm (the arm may be determined by using Figure 5-1 and measuring from a known datum point) into the correct blocks (Weight Added + / Weight Removed -).

E. Multiply the weight of the change by the arm and enter the information into the moment block. Ensure the correct algebraic sign is used.

F. Add or subtract the weight and moment of the change to or from the basic aircraft weight and enter the information into the "Running Basic Total" blocks.

G. Divide the moment by the weight and enter the information into the "Arm" block. This is the new or running "Basic Aircraft Weight".

H. To find the actual aircraft empty weight and c.g., subtract the engine oil information found on Form F-511-2 and recalculate the empty weight c.g.

Table 5-1. Weight and Balance Data - Engine Oil
(Engine Oil Reservoir Full - 12.0 Pints (US)/6 Quarts (US))

Type Oil	Weight	Arm	Moment
MIL-PRF-7808	11.25 lb	153"	1721.3
MIL-PRF-23699	12.6 lb	153"	1927.8

NOTES

Refer to Enstrom Type Certificate Data Sheet for unusable fuel data for the TH-28 and 480 aircraft.

Fuel weight is based on the weight of Jet A fuel. The weight will vary for other fuel types.

Table 5-2. Weight and Balance Data - Unusable Fuel

Fuel System Type	Weight (lb)	Arm (in)	Moment (in-lb)
Standard (P/N 4122052)	11.4	143.4	1634.8
Aerazur Fuel Bladder (P/N 4122009)	2.0	143.4	286.8
CRFS (P/N 4122100-1)	5.0	143.4	717.0
Equipment Option: External Fuel Filter (P/N 4220035)	1.3	132.8	172.6

Table 5-3. Weighing Location Arms
(Mechanical Scales)

Weighing Location	Arm
Landing Gear, Left and Right	143.4"
Tail Rotor Transmission	369.7"

Table 5-4. Standard Equipment Locations

Item	Arm
Main Rotor Blades Installed on the Main Rotor Hub	143.4"

SECTION 6

ELECTRICAL SYSTEM

TABLE OF CONTENTS – CONTINUED (PAGE MM-6-5)

TABLE OF CONTENTS – CONTINUED (PAGE MM-6-6)

6-177. Repair – Rotor RPM Audio Horn

A. Replace the horn if damaged or inoperable.

B. Tighten the retaining ring if loose.

6-178. Installation – Rotor RPM Audio Horn

A. Attach the wiring to the horn.

B. Install the horn into the panel and install the retaining ring.

C. Reinstall the circuit breaker panel.

6-179. Rotor RPM Warning Microswitches

6-180. General Description – Rotor RPM Warning Microswitches

The low rotor warning microswitch (SW18) is interfaced with the rotor RPM audio horn and rotor RPM magnetic pickup. In a low rotor RPM condition with collective stick raised (open microswitch), the rotor RPM audio warning is activated. The TH-28 is also configured with a throttle position microswitch (SW22) and audio silencer switch (SW21). (SW21 is used to turn the low rotor RPM audio horn off during conditions that the crew is aware of a low rotor RPM (operations at flight idle, practice “engine out” autorotations, etc.).

6-181. Removal – Rotor RPM Warning Microswitches

A. Ensure all electrical power is off.

B. Gain access the portion of the collective control torque tube located behind the copilot's seat (TH-28)/pilot’s seat (480/B).

C. Disconnect the wiring from the switch.

D. Remove the hardware securing the switch to the mounting bracket and remove the switch.

6-182. Inspection – Rotor RPM Warning Microswitches

A. Inspect the switch for damage, broken or damaged wiring, security of installation, proper operation and adjustment.

6-183. Repair – Rotor RPM Warning Microswitches

A. Replace the switch if damaged or does not properly operate.

B. Repair broken or damaged wiring.

C. Tighten loose mounting hardware.

D. Adjust the switch and/or cam to close or open when collective stick is raised 2°-4° off stop. (TH-28: Also, adjust switch (SW22) so that contact occurs at throttle flight idle stop.)

6-184. Installation – Rotor RPM Warning Microswitches

NOTE

Ensure proper adjustment of all installed microswitches (ENG, RPM, HR (option), and AOG (option)) if any microswitch is replaced or adjusted.

A. Install the switch onto the mounting bracket and secure with the mounting hardware.

B. Connect the electrical wiring.

C. Adjust the switch (para. 6-183,D).

D. Install the collective control covers.

6-185. Engine Out Warning System

6-186. Description – Engine Out Warning System

The engine out warning system consists of the gas producer (N1) tachometer generator, the caution panel, a warning light (LA2 or D43), a microswitch (SW26), a test switch (SW14, S/N 5135 and earlier), and 2 audio horns (AH2 and AH3). The N1 tach generator sends a signal to both the N1 tachometer and to the caution panel. When the engine N1 rpm drops below 58%, the internal circuitry in the caution panel activates the ENGINE OUT warning light (LA2 or D43) and the audio horns (AH2 and AH3). The warning light (LA2 or D43) and audio horns (AH2 and AH3), located on the left side of the center pedestal, will activate anytime the N1 rpm is below 58% and electrical power is applied to the caution system. A microswitch (SW26), located on the collective control torque tube behind copilot's seat, deactivates the audio horns (AH2 and AH3) when the collective controls are on the down stop. The caution panel test/dim switch will illuminate the warning light (LA2 or D43) for test purposes when the N1 is above 58% and the switch is placed in the TEST (TST, S/N 5136 and subsequent) position.

6-187. Gas Producer (N1) Tachometer Generator

Refer to paragraphs 13-129 through 13-132 for maintenance procedures.

6-188. Caution Panel

Refer to paragraphs 6-143 through 6-146 for maintenance procedures.

6-189. Engine Out Warning Light

Refer to paragraphs 6-169 through 6-172 for maintenance procedures.

6-190. Engine Out Audio Horns

Refer to paragraphs 6-175 through 6-178 for maintenance procedures.

6-191. Engine Out Microswitch

Refer to paragraphs 6-181 through 6-184 for maintenance procedures.

6-192. Fire Warning System

6-193. Description – Fire Warning System

The fire warning system consists of a fire/overheat detector, a warning light (LA1 or D45), and a test switch (SW14, S/N 5135 and earlier). The fire/overheat detector is installed in both the "hot" and "cold" sections of the engine compartment. The self test feature of the detector will not illuminate the FIRE warning light (LA1 or D45) if there is a fault with the detector and the caution panel test/dim switch (SW14, S/N 5135 and earlier) is placed in the TEST (TST, S/N 5136 and subsequent) position.

6-194. Fire/Overheat Detector

6-195. Description – Fire/Overheat Detector

The fire/overheat detector sensor tube contains helium gas under a preset pressure and a hydrogen charged core material. The application of heat to the sensor causes an increase in the internal gas pressure which in turn operates a pressure diaphragm switch activating the FIRE warning light (LA1 or D45). The pressure diaphragm switch will return to the normal position when the internal gas pressure decreases. Mechanical damage to the sensor tube will not result in a false alarm.

6-196. Removal – Fire/Overheat Detector

A. Ensure all electrical power is off.

B. Remove the engine access and bottom engine access panels.

C. Disconnect the electrical connector from the fire/overheat detector.

D. Starting at the end of the detector under the engine, remove the detector from the mounting clips and remove the detector from the aircraft.

6-197. Inspection – Fire/Overheat Detector

A. Inspect the fire/overheat detector for security of installation, damaged or broken wiring and electrical connector, and proper operation with the caution panel test/dim switch.

6-198. Repair – Fire/Overheat Detector

A. Replace damaged mounting clips.

B. Repair or replace damaged or broken wiring or electrical connectors.

C. Replace the fire/overheat detector if it fails the self test.

6-199. Installation – Fire/Overheat Detector

A. Starting at the switch/connector end of the detector, install the detector into the aircraft and secure on the mounting clips.

B. Connect the electrical connector.

C. Install the engine access and the bottom engine access panels.

6-200. Fire Warning Light

Refer to paragraphs 6-169 through 6-172 for maintenance procedures.

6-201. Miscellaneous Equipment

6-202. Description – Miscellaneous Equipment

The miscellaneous equipment includes the engine power governor trim system, cyclic trim system, and dual collective engine idle stop system.

6-203. Engine Power Governor Trim System

6-204. Description – Engine Power Governor Trim System

The engine power governor trim system consists of an electrically operated linear actuator (M7) and 2 control switches (SW11 and SW12). The linear actuator (M7) is connected between the droop compensator and the power turbine governor installed on the engine. The system is used to set the governed power turbine rpm (N2). The actuator (M7) is controlled by the GOVN INCR/DECR switches (SW11 and SW12) located on the pilot's and copilot's collective control switch box. Placing the switch in the INCR position causes the linear actuator shaft to extend. Placing the switch in the DECR position causes the linear actuator shaft to retract. Refer to paragraphs 13-104 through 13-107 for the maintenance procedures for the linear actuator and paragraphs 6-12 through 6-15 for the maintenance procedures for the control switches.

6-205. Cyclic Trim System

6-206. Description – Cyclic Trim System

The cyclic trim system consists of 2 trim actuators (M1 and M2), 2 trim control units (TSU1 and TSU2), and 2 control switches (SW31 and SW32). Refer to paragraph 12-44 for a description of the cyclic trim system.

6-224. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Cable ties	Cable ties, Panduit Brand	SST1M-MP
Cable ties	Cable ties, Panduit Brand	SST1.5I-MP
Cable ties	Cable ties, Panduit Brand	SST2S-MP
Cable ties	Cable ties, Panduit Brand	ILT2S-M
Cable ties	Cable ties, Panduit Brand	CBR1M-M
Cable ties	Cable ties, Panduit Brand	CBR2M-M
Cable ties	Cable ties, Panduit Brand	CBR3I-M
Cable ties	Cable ties, Panduit Brand	CBR3S-M
Cleaner	Contact Cleaner (any brand)	
Connector rings	Connector rings, Panduit Brand	CR2-M

6-225. Schematic Diagrams

The following schematic diagrams are for standard equipped 480s and 480Bs. While some information concerning optional equipment is provided in the schematics, the majority of the schematic information for any optional equipment, especially customer specified avionics installations, is provided in a separate schematic package.

Table 6-3. List of Diagrams

Diagram 6-1	Power Distribution
Diagram 6-1.1	Power Distribution (S/N 5134 and 5135)
Diagram 6-1.2	Power Distribution (S/N 5136 and Subsequent)
Diagram 6-2	Terminal Strip Interface
Diagram 6-3	Connector Interface
Diagram 6-4	External Power System
Diagram 6-5	Starter/Generator System
Diagram 6-5.1	Starter/Generator System (S/N 5134 and 5135)
Diagram 6-5.2	Starter/Generator System (S/N 5136 and Subsequent)
Diagram 6-6	Engine Oil Temperature/Pressure System
Diagram 6-7	Torque System
Diagram 6-8	D.C. Volt/Amp System
Diagram 6-9	N_1 Indicating System
Diagram 6-10	Turbine Outlet Temperature (TOT) System
Diagram 6-11	N_2/N_R Indicating System
Diagram 6-12	Fuel Quantity System
Diagram 6-13	M/R Transmission Oil Temperature System
Diagram 6-14	Trim System
Diagram 6-14.1	Trim System (S/N 5154 and Subsequent)
Diagram 6-15	Caution/Warning System
Diagram 6-15.1	Caution/Warning System (S/N 5134 and 5135)
Diagram 6-15.2	Caution/Warning System (S/N 5136 and Subsequent)
Diagram 6-15.3	Caution/Warning System (S/N 5155 and Subsequent)
Diagram 6-16	Fire Detection System
Diagram 6-17	Cockpit/Map Light
Diagram 6-17.1	Cockpit Dome Light
Diagram 6-17.2	Cockpit Dome Light
Diagram 6-18	Instrument Lighting
Diagram 6-18.1	Instrument Lighting (S/N 5134 and Subsequent)
Diagram 6-19	Landing Light
Diagram 6-19.1	Pulse Landing Light (S/N 5121 only)
Diagram 6-19.2	Pulse Landing Light (LED) (Aircraft equipped with G1000H)
Diagram 6-20	Position/Navigation Lighting
Diagram 6-20.1	LED Anticollision Lights
Diagram 6-20.2	LED Position and Strobe Light Assembly
Diagram 6-21	Flight Instrument Interconnect
Diagram 6-22	N_2 Governor Control
Diagram 6-23	Windshield Demister
Diagram 6-24	Hour Meter
Diagram 6-24.1	Hour Meter (S/N 5134 and Subsequent)
Diagram 6-25	M/R Transmission Filtration/Cooling System

NOTE

When installing fittings into instruments, use sealant (Lock-Tite #56931) on the threads installed into the instrument.

7-75. Attitude Indicator (Optional Equipment)

7-76. General Description – Attitude Indicator

The attitude indicator displays the flight attitude of the aircraft relative to the earth. Pitch attitude is indicated by motion of the sphere with respect to the miniature airplane and can be zeroed by positioning the miniature airplane relative to the sphere using the adjusting knob. Roll attitude is indicated by the motion of the roll pointer with respect to the fixed roll scale located at the top of the display. The attitude indicator contains a "PULL TO CAGE" knob used to cage and release the self-contained gyro. The power "OFF" flag is energized (remains out of view) by a tap on the power supply. Any interruption of the indicator power will indicate a failure and the flag will be exposed. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-77. Turn and Slip Indicator (Optional Equipment)

7-78. General Description – Turn and Slip Indicator

The turn and slip indicator is controlled by an electrically actuated gyro. This instrument has a needle (turn indicator) and a ball (slip indicator). Although the needle and ball are combined in one instrument and are normally read and interpreted together, each has its own specific function, and operates independently of the other. The ball indicates when the aircraft is in directional balance, either in a turn or in straight and level flight. If the aircraft is yawing or slipping, the ball will be off center. The needle indicates in which direction and at what rate the aircraft is turning. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-79. Inclinometer

7-80. General Description - Inclinometer

The inclinometer performs the same function as the slip portion of the turn and slip indicator. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-81. Clock

7-82. General Description – Clock

The clock is an electrically powered unit and has a sweep-second pointer. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-83. Fuel Quantity System

7-84. General Description – Fuel Quantity System

The fuel quantity system is a capacitance type quantity indicating system and consists of a fuel quantity indicator and a fuel quantity transmitter (probe). For 480B aircraft S/N 5198 and subsequent, the fuel quantity system also includes a signal converter. For some early aircraft (TH-28 S/N 3006 and 480 S/N 5001-5010), the fuel quantity system includes a signal conditioner.

7-85. Calibration – Fuel Quantity System

NOTES

Service the fuel cells with the type of fuel that will normally be used in the aircraft.

The “standard” fuel system pertains to the P/N 4122054 fuel bladder, which is filled with open cell foam, and is applicable to aircraft S/N 5013 and subsequent. Prior to S/N 5013, aircraft were manufactured with P/N 4122009 fuel bladders (Aerazur). Aircraft S/N 5256 and subsequent are manufactured with the CRFS (P/N 4122100-1) fuel bladders, which are open cavity fuel bladders.

P/N 4122054 fuel cells that are being serviced for the very first time or have been defueled for longer than a 24 hour period will lose approximately 1 gallon/ 3.785 l of fuel capacity when the aircraft is reserviced after the initial servicing during the calibration procedure due to the open cell foam installed in the fuel cells. This fuel can be drained from the cells after defueling the aircraft and letting the aircraft stand for a 24 hour period. This fuel is considered unusable fuel.

Refer to Table 4-2 for fuel system capacities.

Ensure that the density for the type of fuel that will normally be used in the aircraft is used to determine the fuel weight for full fuel.

For CRFS, if the bladders are replacements and have not been previously filled with fuel, it is necessary to completely fill the tanks to fully expand the bladder within the fuel cell structure before proceeding with calibration.

A. Fuel Quantity Transmitter, P/N ECD4092-1 and P/N ECD4092-3

NOTE

ECD4092-1 is applicable to aircraft equipped with the standard fuel system (P/N 4122052). ECD4092-3 is applicable to aircraft equipped with the CRFS (P/N 4122100-1).

(1) Completely defuel (para. 4-5).

(2) Remove the fuel quantity transmitter cover if not already removed.

NOTE

(P/N 4122100-1 CRFS): It is necessary to install Tool T-4122100-1 to secure the fuel quantity transmitter to the fuel cell cover. See Figure 10-2.1, Item 84.

(3) P/N 4122100-1 CRFS: If not already installed, install Tool T-4122100-1 to secure the fuel quantity transmitter to the fuel cell cover.

(4) Position the aircraft 6° nose down (longitudinally).

(5) Service fuel system with fuel volume that represents an empty tank (unusable fuel). Use a graduated cylinder and wait 10 minutes after servicing.

a. P/N 4122052 standard system: 0.7 gallon (US)/2.65 l.

b. P/N 4122100-1 CRFS: 0.75 gallon (US)/2.84 l.

NOTE

If the optional external fuel filter is installed (P/N 4122052 standard system only), include an additional 0.2 gallon (US)/0.76 l of unusable fuel.

(6) Apply 28 VDC power to the aircraft. Ensure FUEL QTY and CAUT PNL circuit breakers are set.

(7) Set the Zero Fuel (“Empty”) indication as follows. (Remove the screw to access the adjustment potentiometer; retain for reinstallation.)

a. Push and hold the push button switch. The LED should be off. If not, turn the potentiometer CCW until LED extinguishes. NOTE: If the empty adjustment is rotated too far in the CCW position, the LED will illuminate. In the case of over adjusting, rotate potentiometer CW until the LED extinguishes.

b. While holding the switch down, adjust the potentiometer CW until the LED just illuminates. Release the switch and the LED will extinguish. The “Empty” has been reset.

(8) Remove aircraft power.

(9) Service the fuel system with the amount of fuel that represents a full tank and wait 10 minutes.

(10) Apply aircraft power.

(11) Set the “Full” Fuel indication as follows.

a. Push and hold the push button switch. The LED may momentarily blink but must remain off. If not, turn the potentiometer CW until LED extinguishes.

b. While holding the switch down, adjust the potentiometer CCW until the LED just illuminates. Release the switch and the LED will extinguish. The “Full” has been reset.

(12) Reinstall the sealing screws over the empty and full adjustment potentiometers.

(13) Perform bonding check using a milliohm meter. (Clean bonding and grounding surface thoroughly before performing bonding check.)

a. Check the resistance from the mounting flange of the fuel level transmitter to the aircraft ground. Resistance shall be 2.5 milliohms or less.

b. Check the resistance from the converter case to aircraft ground. Resistance shall be 2.5 milliohms or less.

(14) Install the fuel quantity probe cover:

a. P/N 4122052 standard system: Install cover in accordance with para. 10-51.1, H, or para. 10-51.2, G, as applicable.

b. P/N 4122100-1 CRFS: Remove Tool T-4122100-1 and install cover in accordance with para. 10-51.4, I.

(15) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

B. Fuel Quantity Probe, P/N ECD4037

(1) Completely defuel the aircraft (para. 4-5).

(2) Level the aircraft (para. 4-67).

(3) Supply external 28 VDC electrical power to the aircraft.

(4) Ensure FUEL QTY and CAUT PNL circuit breakers are set.

NOTE

Steps (5) through (7) only apply to fuel quantity indicator, P/N ECD4038-5, manufactured by Horizon Aerospace/Ultra Electronics.

(5) Place BATT switch to ON.

(6) Verify the fuel quantity indicator passes self-tests (red LED illuminates, needle swings full scale, red LED changes to green and needle drops to “0”).

(7) Place BATT switch to OFF.

NOTE

If the optional fuel filter is installed, service the fuel system with 0.9 gallons/ 3.41 l of fuel.

(8) Service fuel system with 0.7 gallons/2.65 l of fuel from a graduated cylinder and wait 10 minutes.

(9) Place BATT switch to ON.

(10) Connect multimeter to yellow (+) and black (-) leads of the fuel probe.

(11) P/N ECD4038-5 (Horizon indicator): Set the Zero Fuel indication as follows:

a. Adjust low potentiometer on fuel probe to read + 0.33 VDC on the multimeter.

b. Verify the fuel quantity indicator reads 0 ± 0 lbs and log the result.

(12) P/N ECD4038-5 (Ahlers indicator): Set the Zero Fuel indication as follows:

a. Adjust low potentiometer on fuel probe until the fuel quantity indicator reads 0 ± 0 lbs.

b. Verify the voltage reading on the multimeter is between +.251 and +.437 VDC. Log the result.

(13) Remove power, place BATT switch to OFF.

(14) Remove the fuel quantity probe from the fuel tank.

(15) Install fuel probe extension cable between the fuel probe the aircraft's fuel probe connector.

(16) Dip fuel probe in full fuel calibration PVC standpipe cylinder; ensure the black plastic portion of the probe is making contact with the fuel.

(17) Place BATT switch to ON.

(18) P/N ECD4038-5 (Horizon indicator): Set the Full Fuel indication as follows:

a. Set full potentiometer on fuel probe to read +4.98 VDC on the multimeter.

b. Verify fuel quantity reads 605 lbs and log result.

(19) P/N ECD4038-5 (Ahlers indicator): Set the Full Fuel indication as follows:

a. Adjust full potentiometer on fuel probe until fuel quantity indicator reads 605 lbs.

b. Verify voltage reading on the multimeter is between +4.925 and +5.111 VDC. Log the result.

(20) Place BATT switch to OFF.

(21) Remove extension cable. Apply a torque stripe on the potentiometer screws and reinstall the fuel quantity probe.

(22) Install the fuel quantity probe cover.

(23) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

C. Fuel Quantity Probe (P/N 020-986-001) (TH-28 S/N 3006 and 480 S/N 5001-5010)

(1) Completely defuel the aircraft (para. 4-5).

(2) Level the aircraft (para. 4-67).

NOTE

If the optional fuel filter is installed: service the standard fuel system with 0.9 gallons/3.41 l of fuel; service the Aerazur fuel bladder system with 0.5 gallons/1.9 l of fuel.

(3) Service standard fuel system equipped aircraft with 0.7 gallons/2.65 l of fuel. Service Aerazur bladder equipped aircraft with 0.3 gallons/1.14 l of fuel (para. 4-4).

(4) Remove the left side keel access panel or the fuel quantity probe cover as applicable to gain access to the signal conditioner.

(5) Supply external 28 VDC electrical power to the aircraft.

(6) Adjust the "EMPTY" pot in the signal conditioner until the fuel quantity indicator reads "0".

(7) Turn the electrical power "OFF" and completely service the fuel cells.

(8) Turn the electrical power "ON" and adjust the "FULL" pot in the signal conditioner until the fuel quantity indicator reads the correct weight of the fuel in the fuel cells.

(9) Turn the electrical power "OFF" and defuel the aircraft.

(10) Repeat the calibration procedure until the "0" and "FULL" indications on the fuel quantity gauge do not change when the fuel level is at the "0" and "FULL" levels.

(11) Install a sealant on the "EMPTY" and "FULL" adjustment screws after the fuel system has been calibrated.

(12) Install the left side keel access panel or the cover for the fuel quantity probe as applicable.

(13) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

C. Calibrate the fuel quantity system (para. 7-85) if the signal converter was replaced or if it is suspected that the fuel quantity system is out of calibration.

D. Reinstall the instrument panel cover, glare shield, and ventilation ducts, if required.

7-94. Fuel Quantity Transmitter (Probe)

7-95. General Description – Fuel Quantity Transmitter

NOTE

For 480B aircraft S/N 5198 and subsequent, the fuel quantity system includes a signal converter. For some early aircraft (TH-28 S/N 3006 and 480 S/N 5001-5010), the fuel quantity system includes a signal conditioner.

The fuel quantity transmitter, located in the right fuel cell, is a capacitance type probe. Depending on the fuel quantity system configuration, the fuel quantity transmitter sends a signal directly to the fuel quantity indicator or via either a fuel quantity signal converter or a signal conditioner, as noted above. Refer to paragraphs 10-48 through 10-51.4 for maintenance procedures.

7-96. Fuel Flow Display Unit (Optional Equipment)

7-97. General Description – Fuel Flow Display Unit

The fuel flow display unit along with a fuel flow transducer make up the fuel flow system. The display unit displays fuel quantity in pounds, instantaneous fuel flow in pounds per hour, instantaneous endurance in terms of hours and minutes of flight time available at the current fuel flow, and fuel consumed in pounds. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-98. Fuel Flow Transducer

7-99. General Description – Fuel Flow Transducer

The fuel flow transducer is located on the bottom forward portion of the pylon assembly in the engine "hot section".

7-100. Removal – Fuel Flow Transducer

A. Remove the bottom engine access panel.

B. Disconnect the fuel lines from the transducer.

C. Disconnect the electrical connector from the transducer.

D. Remove the mounting hardware and remove the transducer.

7-101. Inspection – Fuel Flow Transducer

A. Inspect the transducer for cracks and security.

B. Inspect the fuel lines for leaks.

C. Inspect the electrical connector for damaged or bent pins and cracked inserts.

7-102. Repair – Fuel Flow Transducer

A. Repair damage electrical connectors.

B. Tighten loose fuel lines.

C. Replace defective or damaged fuel lines.

D. Replace the fuel flow transducer if cracked or damaged.

7-103. Installation – Fuel Flow Transducer

A. Install the transducer onto the mounting bracket and install the mounting hardware.

B. Connect the electrical connector and safety with .020 wire.

C. Connect the fuel lines.

D. Install the bottom engine access panel.

7-104. Transmission Oil Temperature Indicator

7-105. General Description – Transmission Oil Temperature Indicator

The transmission oil temperature indicator indicates transmission oil temperature in degrees Celsius by mains of an electrical resistance type temperature bulb. Refer to paragraphs 7-10 through 7-14 for maintenance procedures.

7-106. Transmission Oil Temperature Bulb

7-107. General Description – Transmission Oil Temperature Bulb

The transmission oil temperature bulb, located on the left front bottom on the main rotor transmission, is a electrical resistance type bulb.

7-108. Removal – Transmission Oil Temperature Bulb

A. Open the left side engine access panel.

B. Remove the temperature bulb by pushing up and rotating a quarter turn counter-clockwise and pulling the bulb from the bayonet mount.

8-13. Access Panels, Covers, and Cowlings

8-14. Removal – Access Panels, Covers, and Cowlings

Remove the following access panels, covers, and cowlings using the procedures listed for each panel, cover, or cowling. Refer to Figure 8-1 for access panel locations.

A. Forward Landing Gear Leg Panel(s):

(1) Remove the screws securing the access panel(s) to the keel access panels and remove the panel(s).

B. Keel Access Panel(s):

CAUTION

Support the keel access panel(s) during the removal process to prevent from damaging the antenna leads before they are disconnected.

(1) Remove the forward landing gear leg panel(s).

(2) Remove the screws securing the panel(s) to the cabin and the outboard screws securing the forward landing gear leg panel(s) to the keel access panel(s).

(3) Disconnect the ground wire from the antenna ground plane and disconnect the antenna lead from the antenna.

(4) Remove the panel(s).

C. Engine Access Panel(s):

(1) Unlock the turn lock fasteners at the bottom edge of the access panel(s).

WARNING

The pneumatic springs have approximately 25 pounds/11.4 kg of pressure. Use extreme caution when removing the pneumatic springs.

(2) If installed, disconnect and remove the pneumatic spring door opener.

(3) Remove the hinge pin securing the access panel hinge half to the hinge half installed on the airframe and remove the panel(s).

D. Bottom Engine Access Panel:

(1) Disconnect the engine and the engine fire pan drain lines.

(2) Remove the screws securing the access panel to the left and right side cowlings, the cabin shell, and the bottom edge of the left and right side engine fire curtain.

(3) Slide the access panel to one side and pull the opposite edge of the panel from under the side cowling and remove the panel.

E. Fuel Cell Cover(s):

NOTE

Procedures for removing the covers are the same for both sides except as noted in the instructions.

(1) Defuel the aircraft (para. 4-5).

(2) Remove the upper plenum/air inlet (para. 13-28).

(3) Remove the air deflector from the top of the cabin.

NOTE

CRFS: Removal of hardware that secures the filler port includes removal of the fuel cap assembly, frangible ring, and flange plate.

(4) Remove the hardware securing the filler port to the fuel cell cover on the left side fuel cell.

NOTE

CRFS: Removal of hardware that secures the fuel quantity transmitter cover is the removal of the frangible cover.

NOTE

TH-28 S/N 3007 and subsequent and 480 S/N 5011 and subsequent have a fuel quantity probe cover and gasket installed on the right fuel cell cover.

(5) Remove the hardware securing the cell to the cover (Aerazur fuel bladder system), the fuel quantity probe cover, and the fuel cell cover to the cell structure.

CAUTION

All or a portion of the fuel cell covers and possibly the filler port assembly are sealed with sealant to prevent fuel leaks. A putty knife or other suitable tool may be required to separate the cover from the cell structure and the filler port. Use extreme caution to prevent from damaging the cover, fuel cell, fuel cell structure, or injuring yourself while removing the cell cover. (NOTE: Sealant is not used to seal the fuel filler port for the CRFS fuel cell.)

(6) Remove the fuel cell cover.

8-17. Installation – Access Panels, Covers, and Cowlings

Install the following access panels, covers, and cowlings using the procedures listed for each panel, cover, or cowling.

A. Forward Landing Gear Leg Panel(s):

(1) Install by reversing the removal instructions.

B. Keel Access Panel(s):

CAUTION

Support the keel access panel(s) during the installation process to prevent from damaging the antenna leads before the panels are installed.

(1) Install by reversing the removal instructions.

C. Engine Access Panel(s):

(1) Install by reversing the removal instructions.

D. Bottom Access Panel:

(1) Install by reversing the removal instructions.

E. Fuel Cell Cover(s):

NOTE

Procedures for installing the covers are the same for both sides except as noted in the instructions.

CAUTION

Use extreme caution to prevent from damaging the cover, fuel cell, fuel cell structure, or injuring yourself while removing the old sealant.

(1) Remove the old sealant from the fuel cell covers, the fuel cell support structures, and possibly the fuel filler port if the left side cover is removed.

NOTE

Do not install the sealant for the fuel cell covers until all troubleshooting, adjusting, and/or repairs have been made to the fuel cells, the fuel quantity system, or the low fuel warning system.

NOTE

Follow the mixing instructions on the sealant container or the sealant may not properly cure.

(2) Using a sealant meeting AMS-S-8802 Type II Class B, apply a bead on all interfacing fuel cell support structures – cowl ring, cabin structure, fuel shelf structure. Ensure the sealant is on the inboard side of the hardware used to secure the cell covers and apply more sealant in areas where needed to ensure proper sealing (lower forward corner for example).

(3) Place the cover in position and install the hardware along the bottom edge of the cover.

NOTE

If equipped with the CRFS, proceed to step (6).

NOTE

Step (4) below only applies to TH-28s and 480s equipped with the Aerazur fuel bladder system.

CAUTION

Do not over inflate the fuel cells to prevent from damaging the fuel cell structure or the fuel cells.

(4) Install the hardware securing the fuel cells to the covers. Inflating the fuel cells might be required to perform this task. To inflate the fuel cells, ensure the fuel shutoff valve is "OFF", the sump drain and low point drain valves are closed, and that the fuel filler port is installed or the port in the fuel cell is taped over. Using filtered, dry, low pressure compressed air, inflate the fuel cells via the overboard vent line. Remove the air source after installing the hardware.

NOTE

Early model TH-28/480s may have had sealant installed between the fuel cell and the fuel cell cover at the filler port and may also have had sealant between the filler port assembly and the fuel cell cover. If your aircraft has had sealant installed in these areas, the sealant does not need to be installed when reinstalling the cover provided the old sealant is removed and the filler port area seals when reassembled.

NOTE

Proceed to step (6) if installing the right side fuel cell cover.

(5) Remove the filler port cap if installed in the filler port assembly. Install a gasket between the fuel cell and the fuel cell cover. Install another gasket onto the filler port assembly flange and position the filler port assembly onto the fuel cell cover. Pull the fuel cell and fuel cell cover together. Align the holes for the hardware, install and torque the hardware for a standard fuel system to 25-30 in-lbs/2.8-3.4 Nm, torque the hardware for an Aerazur fuel bladder system to 40-50 in-lbs/4.5-5.7 Nm. Install the filler port cap.

(6) Install the remaining hardware securing the fuel cell covers.

NOTE

If equipped with the CRFS, proceed to step (8).

NOTE

TH-28 S/N 3007 and subsequent and 480 S/N 5011 and subsequent have a fuel quantity probe cover and gasket installed on the right fuel cell cover.

(7) Install two (2) fuel quantity probe spacers (S/N 5197 and prior) between the fuel cell and the fuel cell cover. Place the gasket and cover for the fuel quantity probe into position, align the holes, and install the hardware. Torque the hardware for a standard fuel system to 25-30 in-lbs/2.8-3.4 Nm, torque the hardware for an Aerazur fuel bladder system to 40-50 in-lbs/4.5-5.7 Nm.

(8) Install the air deflector on the top of the cabin.

(9) Install the upper plenum/air inlet (para. 13-31).

NOTE

Allow the sealant to cure for 24 hours before servicing the fuel cells.

(10) Service the fuel cells (para. 4-4).

(11) Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

F. Baggage Compartment Door:

CAUTION

Support the baggage compartment door while installing the hinge hardware.

(1) Install by reversing the removal instructions.

G. Transfer Duct Access Panel:

(1) Install by reversing the removal instructions.

H. Oil Cooler Access Panel:

(1) Install by reversing the removal instructions.

I. Step Access Panel:

(1) Install by reversing the removal instructions.

J. Upper Plenum/Air Inlet Access Panel:

(1) Install by reversing the removal instructions.

K. Tail Rotor Drive Shaft Covers:

(1) Install by reversing the removal instructions.

L. Tailcone/Horizontal Spar Access Panels:

(1) Install by reversing the removal instructions.

M. Side Cowlings:

(1) Install by reversing the removal instructions.

N. Aft Side Cowlings:

(1) Install by reversing the removal instructions.

O. Aft Bottom Cowling:

(1) Install by reversing the removal instructions.

P. Air Exit Duct:

(1) Install by reversing the removal instructions.

Q. Engine Fire Curtain:

(1) Install by reversing the removal instructions.

(2) Seal openings at the edges of the engine fire curtain using sealant (Dow Corning Brand 732-RTV).

R. Collective Control Covers:

(1) Install by reversing the removal instructions.

9-6. Main Rotor Hub

9-7. Removal – Main Rotor Hub

A. Remove the main rotor blades (para. 9-34).

CAUTION

Foreign objects dropped down the mast must be immediately removed to prevent damaging the flight controls.

B. Remove the hardware securing the pitch change bellcranks to the push-pull rods in the mast.

C. Remove the center pivot bolts from the pitch change bellcranks. Lift the bellcranks from the mounting brackets and allow to hang free on the pitch change links.

NOTE

Install tie wraps to hold the pivot spacers in the bellcranks and the push-pull rods.

D. Remove the safeties from the mast nut and install tool (T-0048).

WARNING

Use extreme caution when removing the mast nut.

E. Remove the mast nut and the washer from the mast using the torque multiplier tool T-0197-7. If this is not available, install T-0048 tool and use a 3/4” drive electric impact wrench. If a 3/4” drive electric impact wrench is not available, install one main rotor blade and pull the breaker bar against the blade while using a large (2 kg) hammer to shock the tool (T-0048).

F. Install the hoist sling (T-0011) so the arms are between the pitch arm and the blade retention assembly, over the lead/lag retaining nut, and outboard of the main rotor damper rod-end. The sling arms are long enough to be double wrapped if preferred (Figure 4-14).

NOTE

Install the left side ground handling wheel and extend to aid in removing the hub assembly.

G. Attach the sling to a lifting device and slowly lift the hub assembly from the mast. The hub must be lifted exactly parallel to the mast. If there are any side loads, the hub will stick on the splines and will not come off. If the hub has been installed for a long period of time, the hub puller (T-0174-1) must be used and the control rods must be removed from inside the mast.

H. Install the hub assembly onto a hub stand.

9-8. Disassembly – Main Rotor Hub (Figure 9-4 or 9-5)

A. Remove main rotor hub from the aircraft (para. 9-7).

NOTE

Mark all parts for reassembly in the same respective positions.

B. Remove the pitch change links and the pitch change bellcranks from the pitch horns (para. 12-93).

C. Remove the dampers (para. 9-26).

D. Remove the retention assemblies (para. 9-14).

E. Remove the hardware from the pitch change bellcrank brackets and remove the brackets (3).

F. Remove the dust covers (4). If the main rotor hub assembly is equipped with oil lubricated flapping bearings, also remove the reservoir (Figure 9-5, 29).

CAUTION

The reservoir may resist removal due to the O-rings installed at the bottom. Pull up and carefully twist the reservoir until it slips out of the universal block. To prevent damage to the reservoir, do not pry on the reservoir bottom plate.

G. Bend the locking tabs (6) out of the recesses in the retaining nuts (5). Install tool (T-0051-1 (preferred) or T-0051-3) on the nuts and remove the nuts and the washers.

H. Turn the hub assembly over and remove the locking keys (10) from the retaining nuts (9).

I. Using tool T-0003, remove the nuts, shims (8), and DU washers (7).

J. Turn the hub assembly over and remove the hardware (11) from the center hub adapter.

K. Remove the upper and lower spline adapters (12 & 18) by tapping them from the hub plates with a nylon drift.

L. Remove the dowel pins (13) from the hub plates (14 & 17) and the center spacer (16) by tapping them through with an aluminum drift.

WARNING

Use extreme caution when removing or installing the blade and grip assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

9-15. Disassembly – Retention Assembly (Figure 9-7)

NOTES

If replacing the tension-torsion straps only, proceed to paragraph 9-19.1.

For Lamiflex equipped aircraft, the blade grip, lamiflex bearing, and lamiflex bearing shims can be removed with the retention assembly installed on the hub assembly.

Lamiflex bearings are discontinued. If the Lamiflex bearings must be replaced, the aircraft must be switched to a T-T strap retention assembly. Refer to Table 9-2 or Enstrom TH-28/480 Series Illustrated Parts Catalog, Figure 8-3 for parts.

A. Lamiflex equipped aircraft:

(1) Remove the main rotor blade (para. 9-34) and disconnect the pitch change link from the pitch change bellcrank (para. 12-93) if the retention assembly is installed on a hub assembly.

CAUTION

Use brass protector plates in the vise jaws to prevent from damaging the retention assembly.

(2) Clamp the retention assembly vertically in a vise if removed from the hub assembly.

(3) Remove the dust cover (18) from the blade end of the retention assembly. Inspect for brass residue (chips or flakes) from the lamiflex bearing, if equipped.

(4) Remove the cotter pin (17) from the retention nut (16) and remove the nut. Use tool (T-0013) if the nut cannot be removed by hand.

(5) Remove the shims (15), lamiflex bearing (14), and nylatron strap (5), if not bonded to the spindle, from the spindle (3).

(6) Pull the blade grip (13) from the spindle. If required, tap the grip with a plastic mallet to aid in removal.

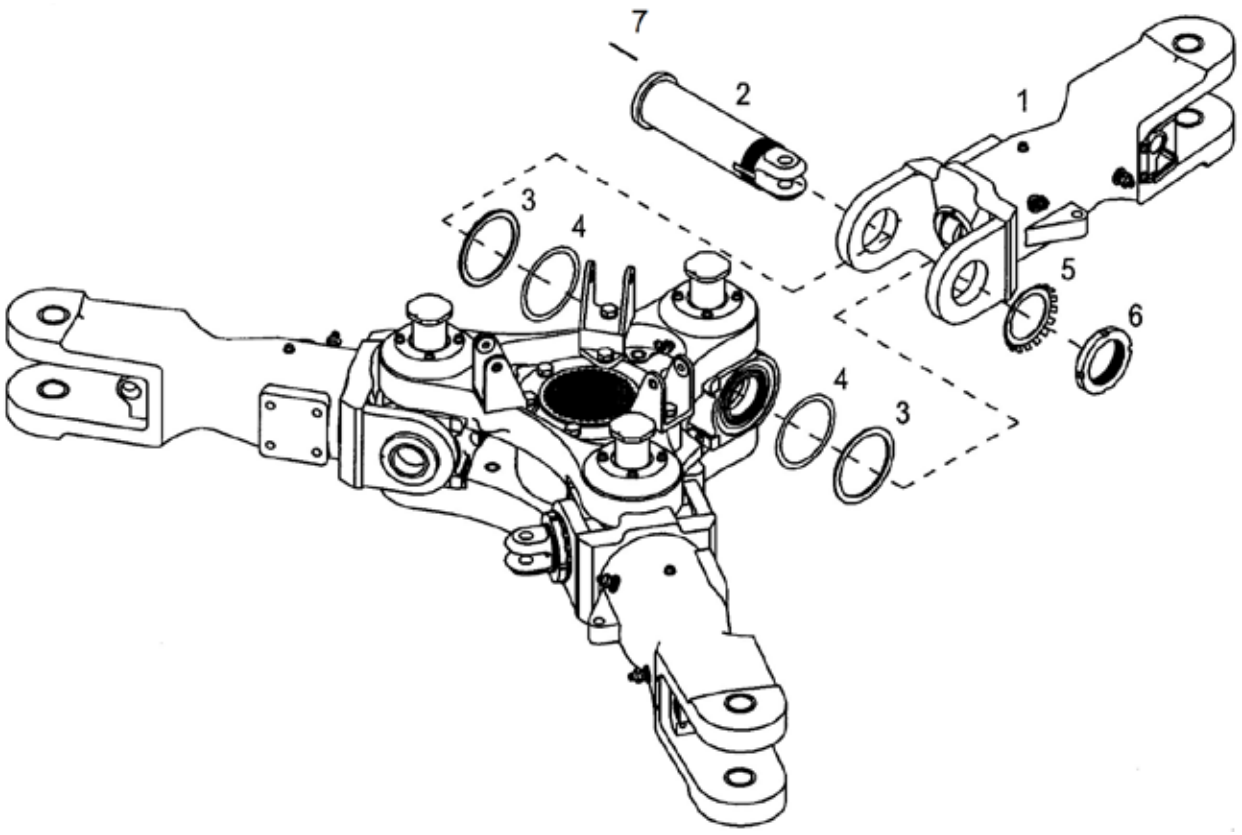
CAUTION

If the lamiflex bearing wears through the nylatron strap, inspect the spindle for damage. The maximum depth allowed is .020"/0.51 mm. Blend the damage out before installing a new nylatron strap.

(7) Peel the nylatron strap (5) from the spindle if bonded to the spindle.

(8) Remove the O-ring (12) and DU washer (11) from the spindle.

(9) Remove the retaining ring (10) from the spindle.



1.	Retention Assembly	5.	Lock Washer
2.	Flapping Hinge Pin	6.	Nut
3.	DU Washer	7.	Pin
4.	Shim		

Figure 9-6. Retention Assembly Installation

(6) Lightly lubricate (MIL-PRF-81322; MIL-PRF-23699) the back of nut (6) and install the lock washer (5) and nut (6) on the hinge pin.

CAUTION

Install the nut (6) with the chamfered side of the nut toward the lock washer (5). If the nut is installed with the chamfered side opposite the lock washer, the lock washer tabs may be damaged when the nut is tightened.

CAUTION

Excessive torque could shear the roll pin installed in the head of the hinge pin.

(7) Insert a long punch into the damper-rod end attach holes in the flapping pin. Torque the nut (6) using tool (T-0051-3) to 150 ft-lb/204.5 Nm. The nut may be torqued to 175 ft-lb/238.6 Nm for aligning one of the lock washer tabs. While torqueing the nut, pull against the punch to avoid shearing off the roll pin that locates the head of the pin against the spindle arm side of the retention assembly.

NOTE

If new parts are installed in the flapping axis, follow the shimming procedure in para. (7)a below.

a. Check the flapping bearing drag resistance at the flapping pin. Initially, the grip should not stay up. If the retention assembly stays up, remove shims in 0.005-inch increments until the retention assembly will drop with no resistance when nut is torqued.

(8) Bend one of the tabs on the lock washer into a slot in the nut.

(9) Install the main rotor damper (para. 9-31), connect the pitch change link to the pitch change bellcrank and the pitch horn (para. 12-96), and install the main rotor blade (para. 9-38).

(10) Lubricate the U-block lead lag and flapping bearings (if the flapping bearings are grease lubricated) (para. 4-31).

(11) Lubricate the retention assembly (para. 4-35).

(12) Service the flapping bearing reservoir if equipped with oil lubricated flapping bearings (para. 4-21).

(13) Perform a maintenance test flight (para. 4-61).

B. Use the following procedure to install a retention assembly **until** the flapping bearings are installed in the universal blocks using the shimming procedure in paragraph 9-24,B or C.

(1) Lubricate the O.D. of the hinge pin (2) (MIL-PRF-81322, grease lubricated flapping bearings; MIL-PRF-23699, oil lubricated flapping bearings).

(2) Install the DU washers (3) on each side of the U-block with the chamfered side inboard toward the U-block.

(3) Carefully slide the retention assembly into position over the DU washers and U-block.

(4) Install the hinge pin through the spindle and U-block. Align the roll pin slot in the hinge pin with the roll pin and seat the hinge pin. Tap the roll pin flush with the hinge pin if it protrudes from the hinge pin.

(5) Install the lock washer (5) and nut (6) on the hinge pin.

CAUTION

Excessive torque could shear the roll pin installed in the head of the hinge pin.

(6) Torque the nut to 50-100 ft-lbs/68.2-136.4 Nm using tool (T-0051-3). Ensure the retention assembly does not remain in the up-stop position.

a. Check the flapping bearing drag resistance at the flapping pin. Initially, the grip should not stay up. If the retention assembly stays up, remove shims in 0.005-inch increments until the retention assembly will drop with no resistance when nut is torqued.

NOTE

Shims may be installed as required on the inboard side of the DU washers to avoid excessive torque in obtaining the flapping preload. All three retention assemblies should have an equal flapping preload.

(7) Lubricate the U-block lead lag and flapping bearings (para. 4-35) and re-check the retention assembly in accordance with para. 9-19, B, (6). Reshim and retorque the nut, if required.

(8) Bend one of the tabs on the lock washer into a slot in the nut when the proper preload has been obtained.

(9) Install the main rotor damper (para. 9-31), connect the pitch change link to the pitch change bellcrank and the pitch horn (para. 12-96), and install the main rotor blade (para. 9-38).

(10) Lubricate the retention assembly (para. 4-35).

(11) Perform a maintenance test flight (para. 4-61).

SECTION 10

FUEL SYSTEM

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FUEL SYSTEM

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FUEL SYSTEM

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10-1. Fuel System

10-2. Description – Fuel System (Figure 10-1)

The fuel system consists of two 45 gallon (US)/170 liter bladder type fuel cells mounted on both sides of the main rotor transmission. Each cell is housed in a composite fuel cell structure and is interconnected to the other fuel cell through a fuel crossover line in the lower one third (⅓) of the fuel cell and an overboard vent crossover line located at the top of each fuel cell. The main fuel supply lines, located at the lowest point in each fuel cell, interconnect at a tee to supply fuel to the engine equally from each fuel cell. The main fuel shutoff valve is incorporated onto the tee and is manually operated from the cockpit. Each fuel cell is equipped with sump drains, and the system is equipped with a low point drain at the fuel shutoff valve. A capacitance fuel quantity probe and a low fuel warning switch are mounted in the right-hand fuel cell. The refueling port is located in the top of the left-hand fuel cell. The right-hand fuel cell is filled by cross-feeding action during refueling. Fuel management is accomplished with the use of a fuel flow system (optional equipment - 480/480B) and a fuel quantity system. The fuel quantity system consists of a capacitance probe or transmitter, a signal conditioning unit (TH-28 Serial Number 3006 and 480 Serial Numbers 5001-5010) or a signal converter unit (480B Serial Numbers 5198 and Subsequent), and a quantity indicating gauge.

The crash resistant fuel system (CRFS) was introduced into production aircraft beginning with S/N 5256. Fuel capacity, fuel transfer, and fuel management aspects are similar to the legacy systems; however, components within the architecture are designed to retain fuel in a crash. The fuel bladders are fabricated from crash resistant material and extensible chimneys on the cross fill and vent connections allow stretch and angular misalignment that resist pull-out at these locations. A combination of lacing, hook and loop patches, and frangible studs and tabs secure the fuel bladder to the fuel shelf structure. A roll-over valve is located on the shared vent to prevent fuel leaks in inverted aircraft orientations. Breakaway couplings, consisting of paired, self-sealing breakaway valves, are installed on the vent, fuel cross fill, and fuel lines. The couplings are frangible and seal the fuel from both directions to prevent leaks in the event of an impact. In the case of an impact that causes a fuel bladder to move with respect to the surrounding structure, the frangible mechanism of the valve halves releases each ball valve to instantly close and prevent fuel flow. The position of the ball valve is indicated by the orientation of indicator dots visible on the surface of the valve. Indicator dots parallel with the valve coupling body indicate an open valve; indicator dots perpendicular to the valve coupling body indicate a closed valve. (See Figure 10-3.1.)

NOTES

Prior to S/N 5013, aircraft were manufactured with P/N 4122009 fuel bladders (Aerazur), which contain baffles. S/N 5013 through S/N 5254 were manufactured with P/N 4122054 fuel bladders, which are filled with open cell foam. (P/N 4122054 is commonly referred to as the standard fuel system.) Beginning with S/N 5256, aircraft are manufactured with the P/N 4122100-1 CRFS installation, which consists of open cavity fuel bladders.

Use of unauthorized fuels or additives may cause fuel cell rubber deterioration. Refer to Table 4-1 for the listing of approved, alternate, and emergency fuels as well as approved anti-icing additives.

Terms that are used interchangeably include: fuel cell/fuel bladder, fuel cell cover/fuel cell skin, fuel fitting/flange plate, and probe/transmitter.

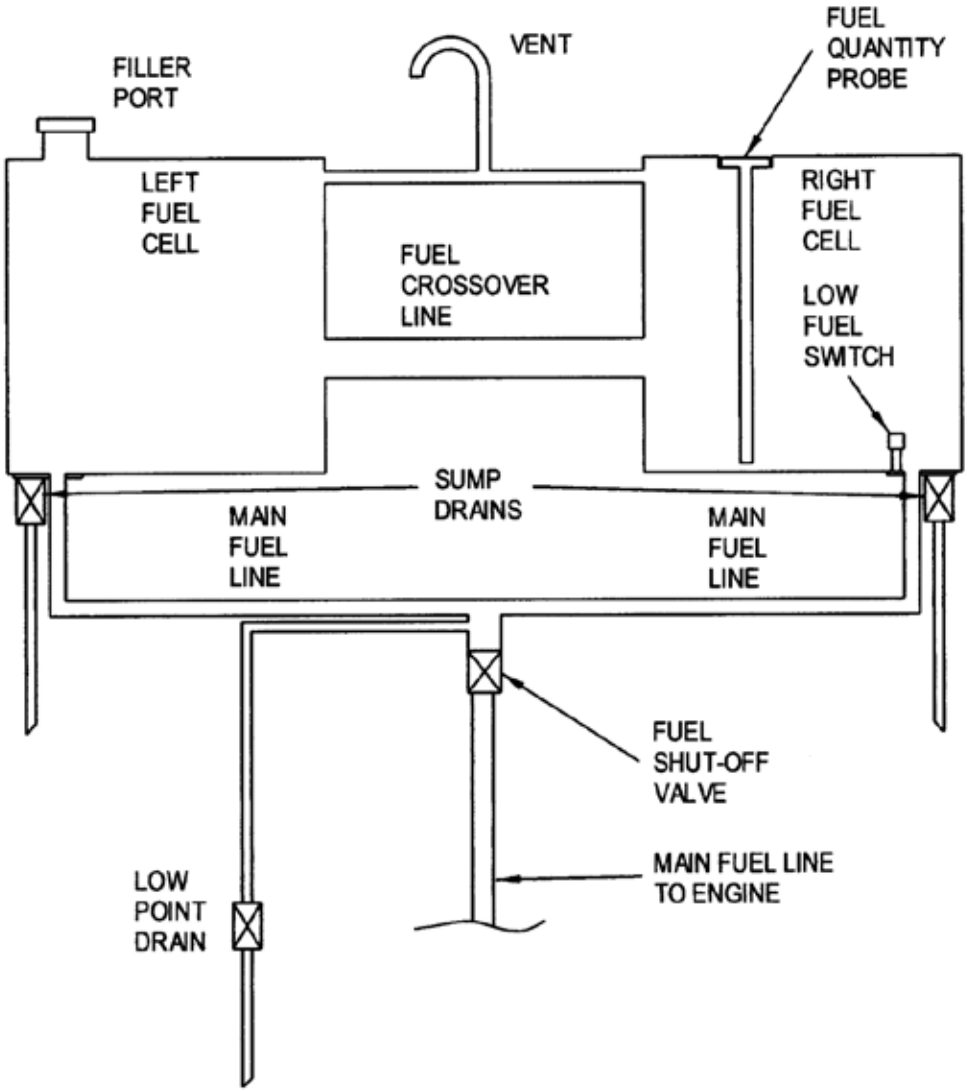


Figure 10-1. Simplified Fuel System Schematic Diagram (Standard and Aerazur)

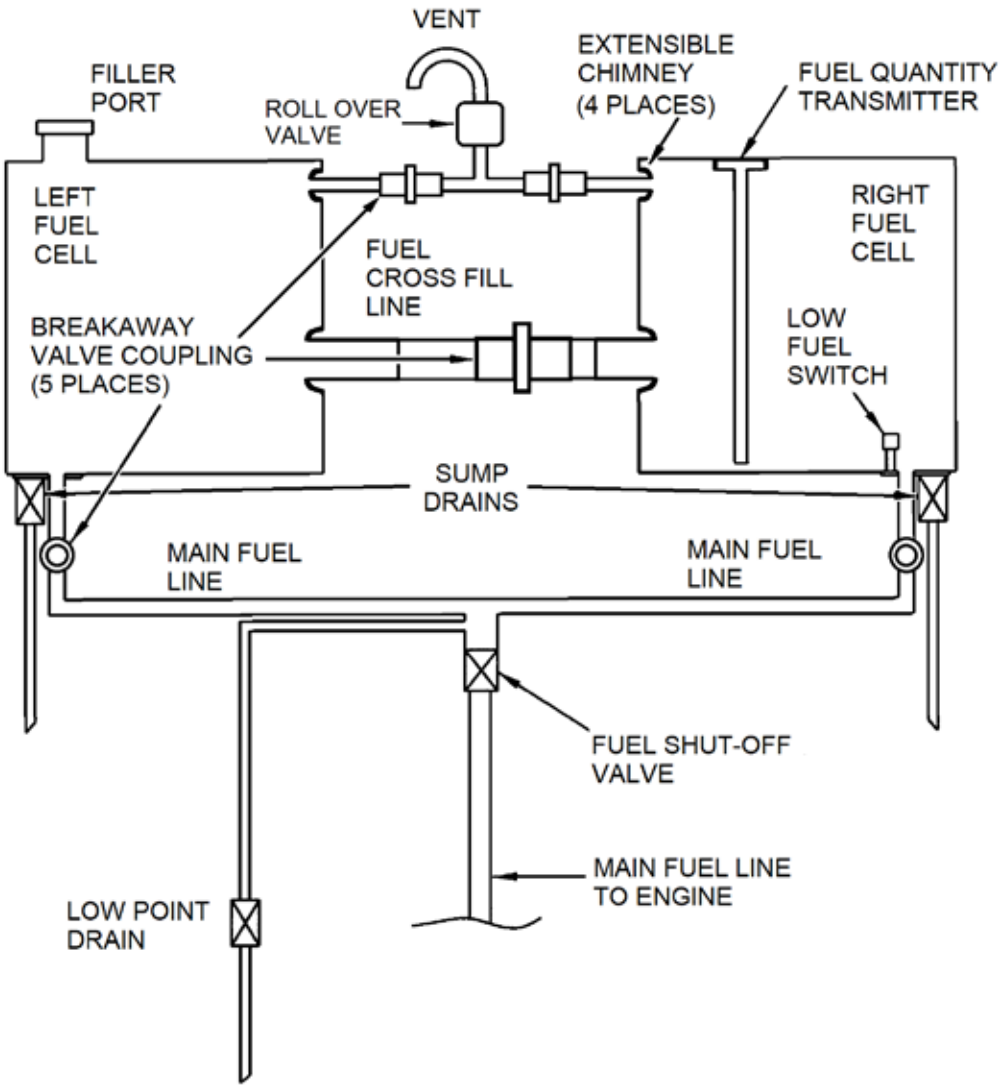
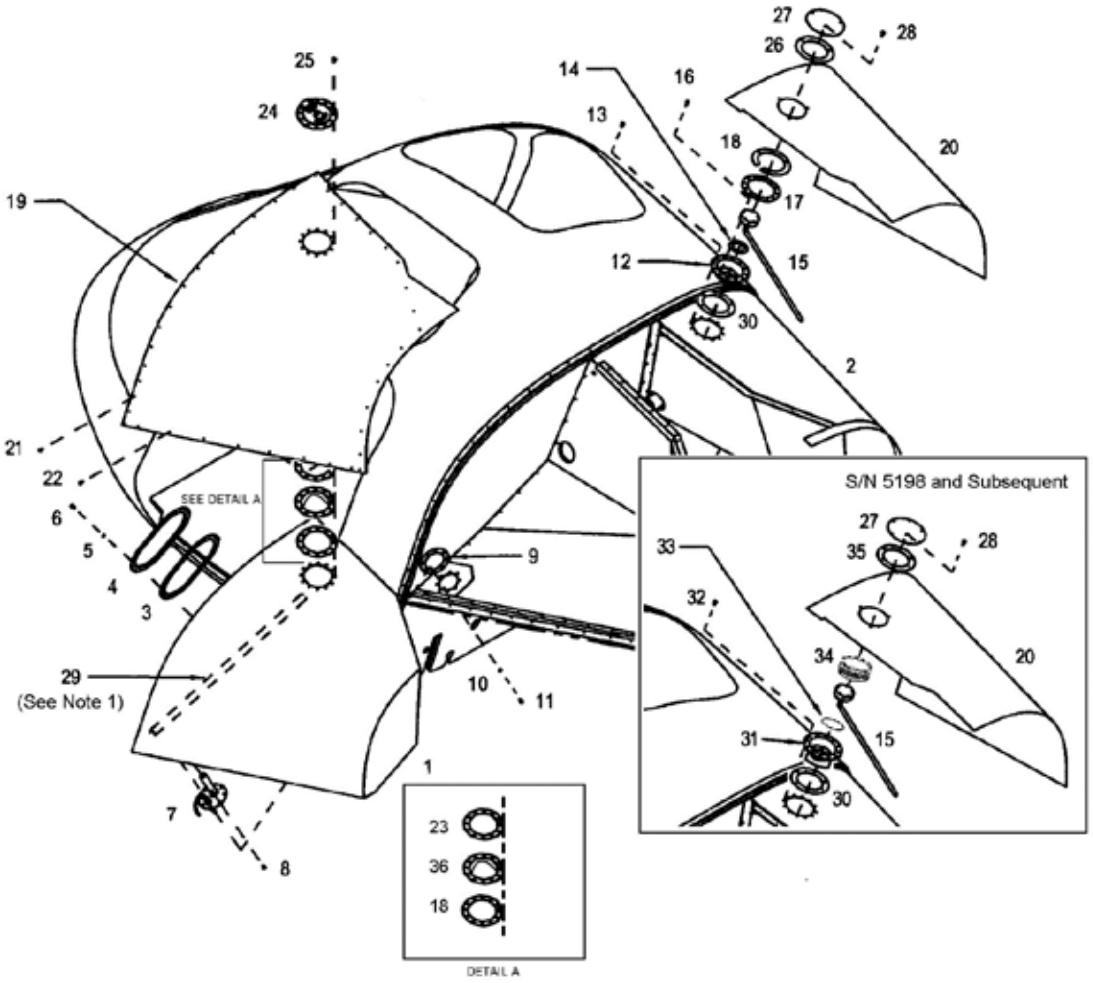


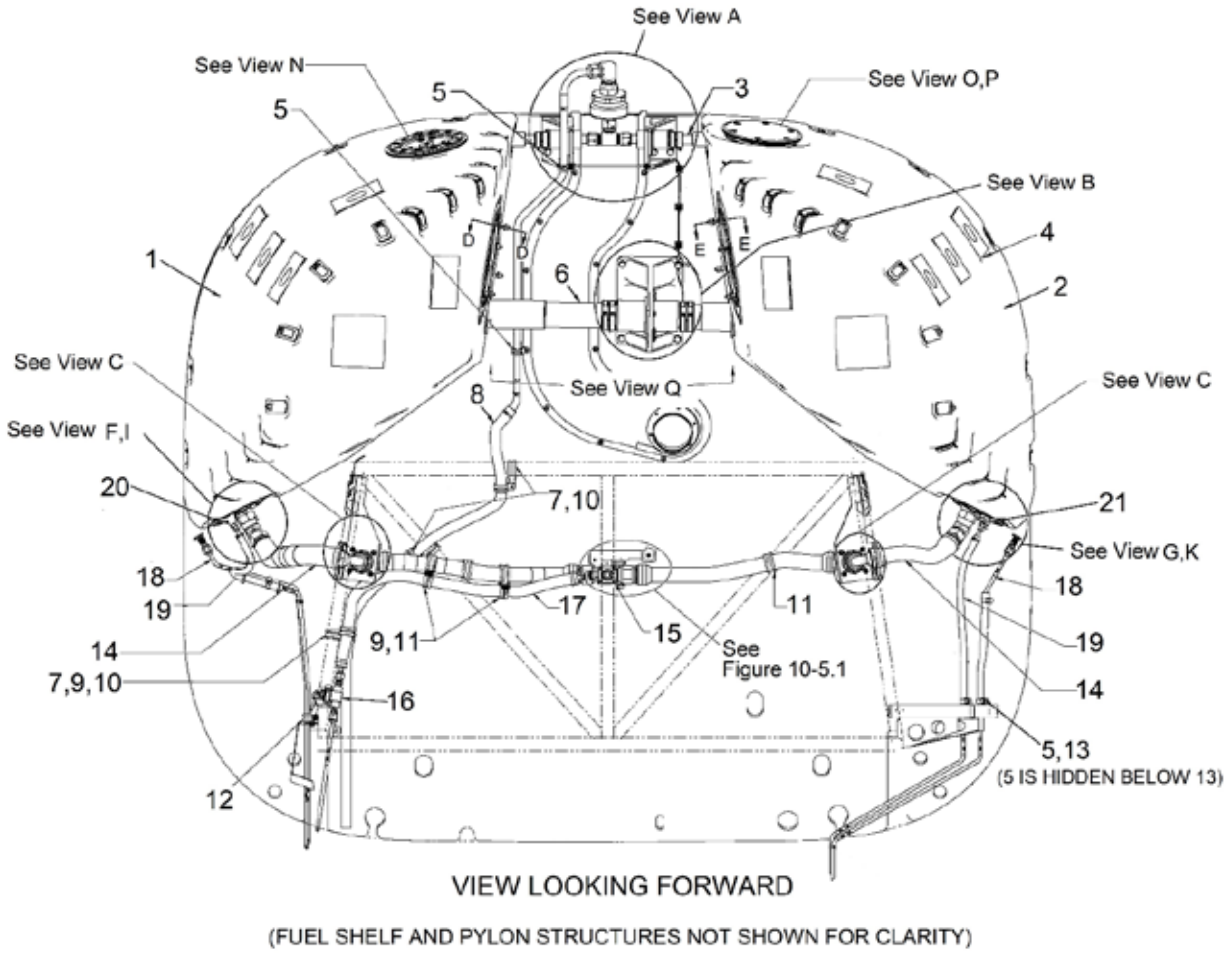
Figure 10-1.1. Simplified Fuel System Schematic Diagram (CRFS)



1.	Left Fuel Cell	19.	Left Fuel Cell Cover
2.	Right Fuel Cell	20.	Right Fuel Cell Cover
3.	Gasket	21.	Screw
4.	Oval Flange Plate	22.	Screw
5.	Washer	23.	Gasket
6.	Screw	24.	Fuel Cap Assembly
7.	Sump/Fuel/Flange Fitting Assembly	25.	Screw
8.	Screw	26.	Gasket
9.	Gasket	27.	Cover Plate
10.	Washer	28.	Screw
11.	Bolt	29.	Dip Stick Tube (See Note 1)
12.	Flanged Mount Plate	30.	Gasket
13.	Screw	31.	Flanged Cup Assembly
14.	Gasket	32.	Bolt
15.	Fuel Quantity Probe (Transmitter)	33.	O-Ring
16.	Screw	34.	Spanner Nut
17.	Gasket	35.	Gasket, Conductive
18.	Spacer	36.	Flange

Note 1: S/N 5231 and subsequent and helicopters that have incorporated SIL T-062 are not equipped with Item 29.

Figure 10-2. Standard Fuel Cell Installation



1. Left Fuel Bladder
2. Right Fuel Bladder
3. Overboard Crossover Vent
4. Velcro (hook)
5. Clamp (size 8)
6. Fuel Cross Fill
7. Clamp (size 12)
8. Vent Tube Assembly
9. Clamp (size 14)
10. Clamp (size 16)
11. Clamp (size 18)
12. Clamp
13. Clamp
14. Fuel Line
15. Shutoff Valve Assembly
16. Shutoff Drain Valve
17. Shutoff Valve Drain Line
18. Scupper Drain Line
19. Sump Drain Line
20. Left Flange Plate Assembly
21. Right Flange Plate Assembly

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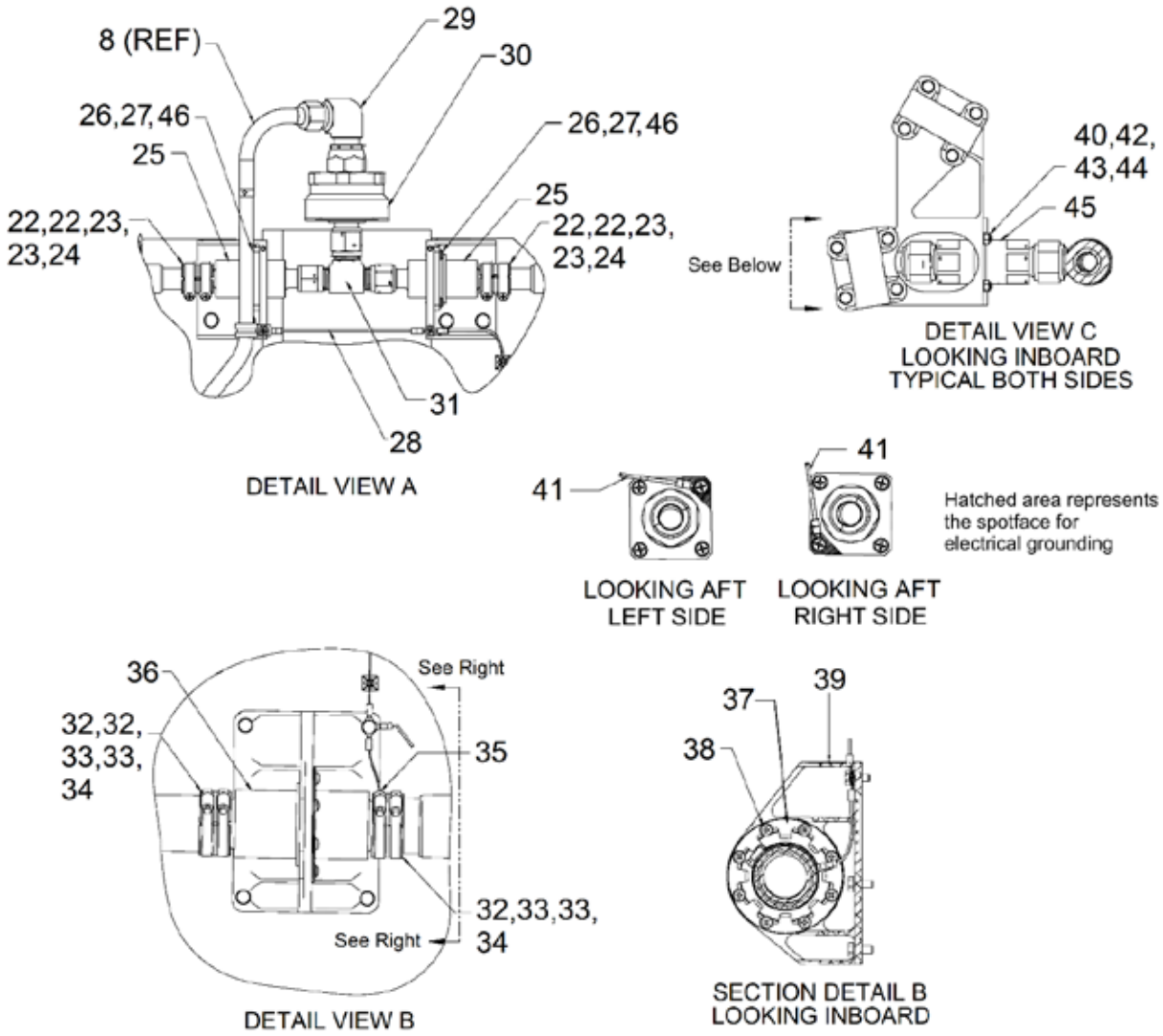
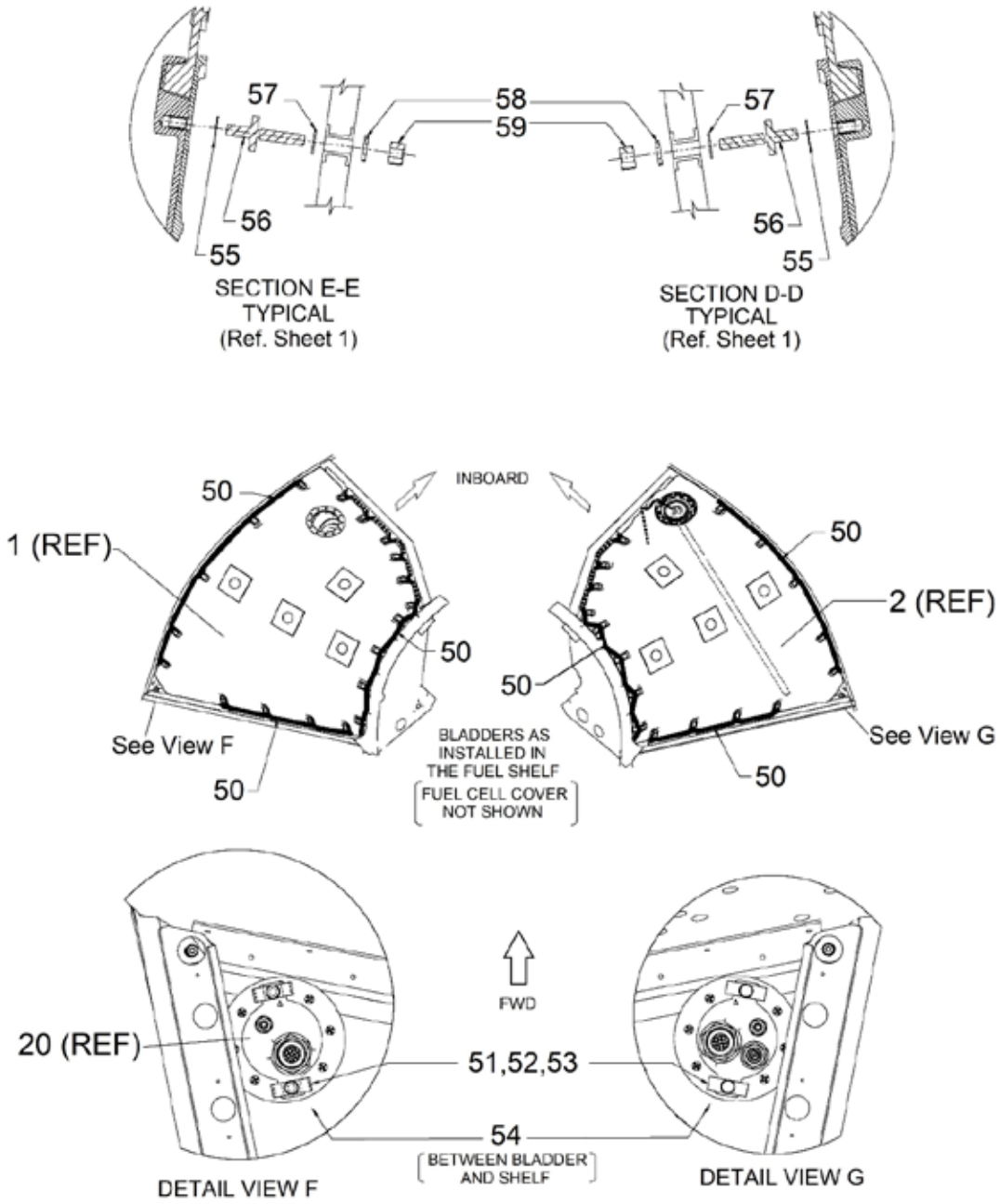
Figure 10-2.1. CRFS Fuel Cell Assembly and Installation



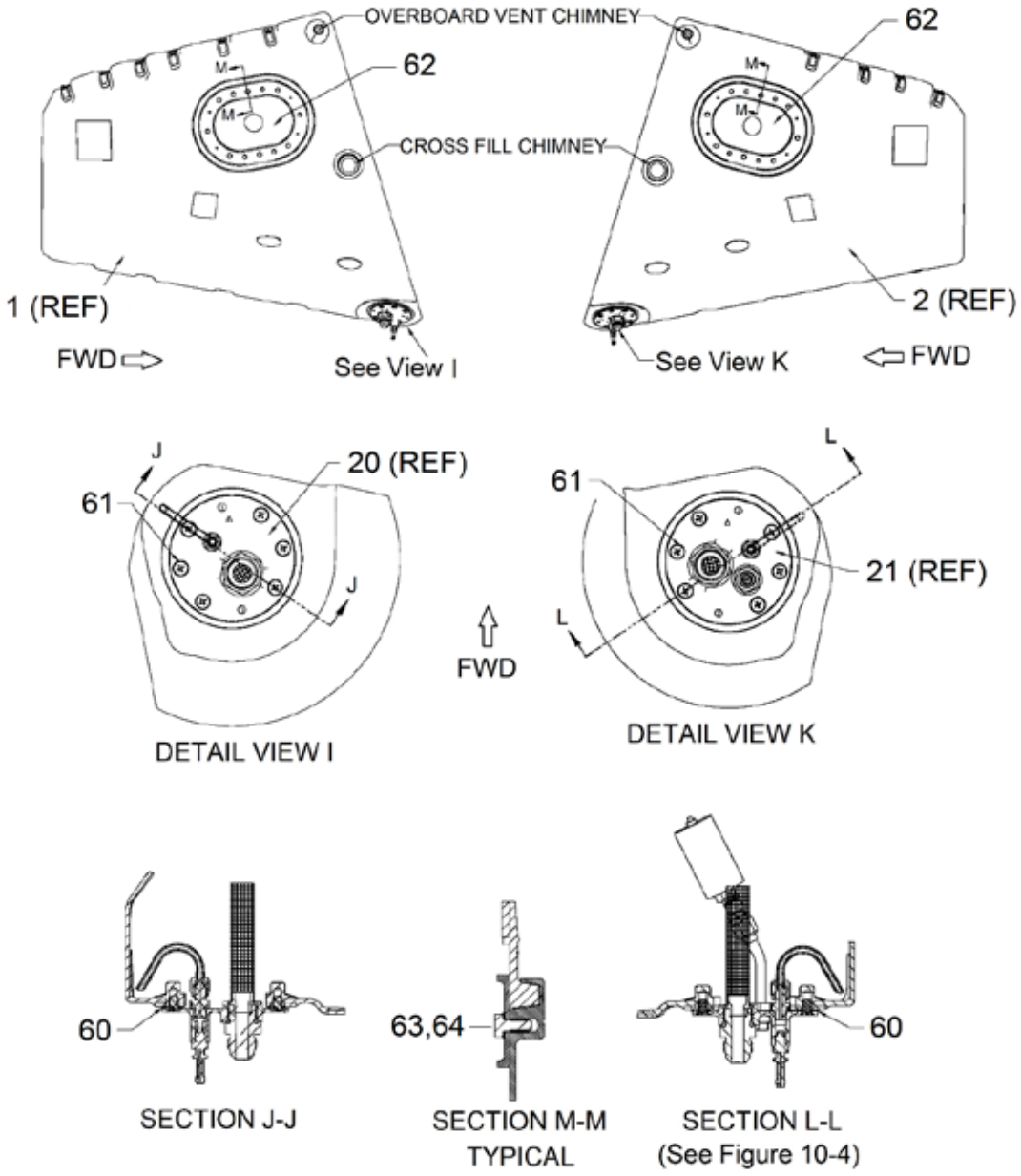
22. Clamp
23. Half Clamp
24. O-ring
25. Vent Breakaway Valve Coupling
26. Screw
27. Washer
28. Ground Strap
29. Fitting
30. Roll Over Valve Assembly
31. Tee Fitting
32. Clamp
33. Half Clamp
34. O-ring
35. Ground Clamp Assembly
36. Cross Fill Breakaway Valve Coupling
37. Frangible Ring
38. Screw
39. Coupling Bracket Assembly
40. Screw
41. Ground Strap
42. Washer
43. Washer
44. Nut
45. Fuel Line Breakaway Valve Coupling
46. Lock Washer

Figure 10-2.1. CRFS Fuel Cell Installation and Assembly



50.	Lacing (Paracord)	55.	Washer
51.	Frangible Tab	56.	Frangible Stud
52.	Bolt	57.	Nylon Washer
53.	Washer	58.	Washer
54.	Flow Diverter	59.	Nut

Figure 10-2.1. CRFS Fuel Cell Installation and Assembly



60. Gasket
61. Screw
62. Access Door (Inner and Outer)
63. Bolt
64. Washer

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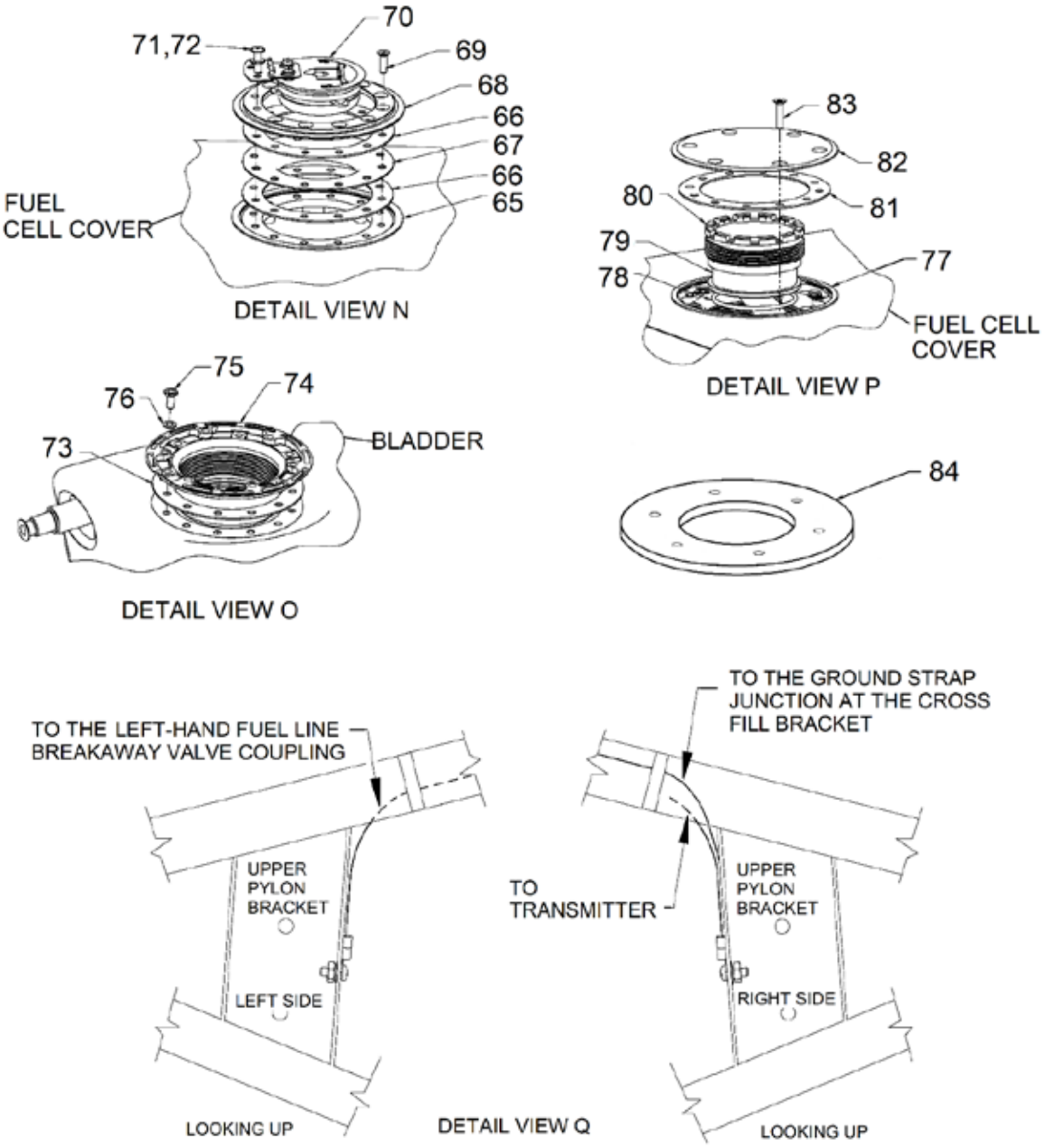
Figure 10-2.1. CRFS Fuel Cell Installation and Assembly



65.	Gasket	75.	Bolt
66.	Gasket	76.	Washer
67.	Flange	77.	Gasket
68.	Frangible Ring	78.	O-ring
69.	Screw	79.	Fuel Quantity Transmitter
70.	Fuel Cap Assembly	80.	Spanner Nut
71.	Screw	81.	Gasket
72.	Washer	82.	Frangible Cover
73.	Gasket	83.	Screw
74.	Flanged Cup	84.	Tool T-4122100-1

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Figure 10-2.1. CRFS Fuel Cell Installation and Assembly

10-3. Fuel Cells

10-4. Removal – Fuel Cells

NOTE

For removing the standard fuel cell, proceed to paragraph 10-4.1. For removing the Aerazur fuel cell, proceed to paragraph 10-4.2. For removing the CRFS fuel cell, proceed to Para. 10-4.3.

10-4.1 Removal – Fuel Cell, Standard Fuel System (Figures 10-2 and 10-3)

NOTES

When possible, remove the fuel cells when the ambient temperature is at least 70°F/21°C.

Removal procedures are the same for both fuel cells unless noted otherwise.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28).

C. Remove the air deflector from the top of the cabin.

D. Remove the fuel cell cover (para. 8-14).

E. Disconnect the electrical connectors for the fuel quantity probe and the low fuel warning switch from the right-side fuel cell.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

F. Loosen the clamps on the lines and allow the rubber to relax.

NOTE

Fuel cell nipples may be softened by applying a hot, moist cloth to ease removal.

G. Disconnect the fuel crossover line (para. 10-15.1).

H. Disconnect the overboard vent crossover line (para. 10-15.1).

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

I. Disconnect the supply line from the fuel cell fitting.

J. Disconnect the sump drain line from the drain valve.

K. Remove the bolts and washers from the plate that secures the fitting assembly to the fuel cell structure.

L. Remove the fuel cell from the fuel cell structure.

M. Once the fuel cell is removed, wipe out any fuel residue and miscellaneous hardware from the cavity of the fuel cell structure.

N. Do not apply oil to the fuel bladder if moving the fuel cell to long term storage. Store removed fuel cells in a bag or box to protect the rubber from UV, ozone, heat, and/or humidity.

10-4.2 Removal – Fuel Cell, Aerazur Fuel Bladder System

NOTES

If practicable, removal of the fuel cells should occur when the ambient temperature is at least 70°F/21°C.

Removal procedures are the same for both fuel cells unless otherwise noted.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28).

C. Remove the air deflector from the top of the cabin.

D. Remove the fuel cell cover (para. 8-14).

E. Disconnect the electrical connectors for the fuel quantity probe and the low fuel warning switch from the right-side fuel cell.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

F. Disconnect the fuel crossover line (para. 10-15.2).

G. Disconnect the overboard vent crossover line (para. 10-15.2).

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

H. Disconnect the supply line from the fuel cell fitting.

I. Disconnect the sump drain line from the drain valve.

J. Unlace the fuel cell from the supports.

K. Remove the fuel cell from the fuel cell structure.

10-4.3 Removal – Fuel Cell, CRFS (Figure 10-2.1)

NOTES

If practicable, removal of the fuel cells should occur when the ambient temperature is at least 70°F/21°C.

Removal procedures are the same for both fuel cells unless noted otherwise.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28).

C. Remove the air deflector.

D. Remove the fuel cell cover (para. 8-14).

E. Disconnect the electrical connectors for the fuel quantity transmitter and the low fuel warning switch if removing the right-side fuel bladder (2).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use care when removing components connected to the breakaway valve couplings.

F. Disconnect the overboard crossover vent line (3).

1) Remove the hose clamps (22), half clamps (23), and O-ring (24) between the breakaway valve coupling (25) and the vent chimney of the bladder (1 or 2) to be removed.

G. Disconnect the cross fill fuel line (6):

1) Remove the hose clamps (32), half clamps (33), and O-ring (34) between the breakaway valve coupling (36) and the cross fill chimney of the bladder (1 or 2) to be removed.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

H. Disconnect the fuel supply line (14) from the flange plate fitting (20 or 21).

I. Disconnect the sump drain line (19) from the sump drain valve (12, Figure 10-4).

J. Disconnect the fuel bladder from the fuel cell structure.

1) Remove the lacing cords (50) (3 cords) that attach the bladder to the structure.

CAUTION

Use caution when removing frangible hardware.

2) Remove the frangible tabs (51) from the flange plate assembly (20 or 21) (2 places) by removing the bolts (52) and washers (53).

CAUTION

Support the fuel cell when removing the frangible stud hardware.

3) Remove the nuts (59) and washers (58) that secure the frangible studs (56) (4 places).

K. Remove the fuel bladder (1 or 2) from the fuel cell structure.

L. Once the fuel bladder is removed, wipe out any fuel residue and miscellaneous hardware from the cavity of the fuel cell structure.

M. Refer to the manufacturer's publications for CRFS fuel bladder storage requirements. (Refer to Table 2-2.)

10-5. Inspection – Fuel Cells

A. Inspect the fuel cells for loose seams, cuts, abrasions, scuffed surfaces, tears, blisters, and for any area that appears to have become soaked with fuel.

1) Before removing a fuel cell, isolate areas of possible leaks by tracing the wetness or staining as far as visibly possible.

B. Inspect fittings, flanges, access doors, and inserts for damage and security.

C. Check gaskets for tightness and ensure no gasket cement has been used.

D. Check all hose clamped connections for tightness, damage, and leaks.

E. CRFS: Inspect CRFS components I/A/W the manufacturer's instructions.

1) If fuel cell cover is removed, check lacing attachments and Velcro patches for damage and security.

10-6. Repair – Fuel Cells

A. Repair the fuel cells I/A/W the manufacturer's instructions.

B. Replace fittings that are damaged beyond repair.

C. Repair inserts I/A/W the manufacturer's instructions.

10-7. Replacement – Fuel Cells

NOTE

For replacing the standard fuel cell, proceed to paragraph 10-7.1. For replacing the Aerazur fuel cell, proceed to paragraph 10-7.2. For replacing the CRFS fuel cell, proceed to Para. 10-7.3.

10-7.1 Replacement – Fuel Cell, Standard Fuel System

NOTES

Refer to the *TH-28/480 Series Illustrated Parts Catalog* for authorized bladder part numbers for the standard fuel system.

Replacement procedures are the same for both fuel cells unless noted. Replace all used packings/O-rings.

Cover all open ports and lines to prevent contamination of the fuel system.

The foam assembly is installed in the replacement fuel cells.

A. Prepare the replacement fuel cell (1 or 2, Figure 10-2) as follows:

1) If installing a new foam assembly, refer to SIL T-054, latest revision. Prior to installing the foam, inspect the bladder cavity for debris.

2) Ensure that the captive nut plate threads are free of debris or sealant and ensure that the sealing surfaces are clean and dry.

3) Install oval flange plate (4):

a) Install a new gasket (3). If needed, install 2 to 4 studs, hand tight, into the flange ring to hold the gasket in place on the fuel cell. (The studs are made by removing the heads from appropriate length AN4-XXA bolts and deburring the cut shank.)

b) Install the oval flange plate (4) (raised surface forward) with bolts (6) and washers (5). Torque (25-30 in-lb/2.8-3.4 Nm) in a crisscross torque pattern (for 24 bolts), making three full rounds to ensure proper gasket seating. Remove the studs as required when installing the bolts and washers.

c) Ensure that there is no movement of the washers. If there is movement, back out the bolt and recheck the threads for debris or sealant. Re-install and torque.

B. Remove the screws (8) that secure the fuel fitting assembly (7) to the fuel cell (1 or 2).

C. Partially separate the fuel fitting assembly from the fuel cell to access the syphon tube assembly nut coupling.

D. Loosen the nut coupling, then pivot the syphon tube toward the fuel strainer.

E. Remove the fuel fitting assembly from the fuel cell. The low fuel warning switch will be mounted on the fuel fitting assembly for the right fuel cell.

F. Position the fuel fitting assembly onto the replacement fuel cell such that the sump drain valve it is oriented toward the low corner of the fuel cell. Pivot the end of the syphon tube to the low corner. Torque the nut coupling (50-65 in-lb/5.6-7.3 Nm).

G. Install the screws to secure the fuel fitting assembly to the fuel cell and torque to 25-30 in-lb/2.8-3.4 Nm.

H. Remove the hardware securing the fuel quantity probe mounting flange (12 or 31) to the fuel cell and remove the fuel quantity probe mounting flange and probe. (The fuel quantity probe remains installed on the mounting flange.) Note the position of the fuel quantity probe.

I. Install new gasket (30) and install the mounting flange (12 or 31) on the replacement fuel cell. Torque the hardware to 25-30 in-lbs/2.8-3.4 Nm.

J. Allow several hours (preferably overnight) after installation of the oval flange plate (4), fuel fitting assembly and mounting flange components and retorque the hardware.

K. Safety wire as required.

10-7.2 Replacement – Fuel Cell, Aerazur Fuel Bladder System

NOTES

Replacement procedures are the same for both fuel cells unless noted. Replace all used packings/O-rings.

Cover all open ports and lines to prevent contamination of the fuel system.

A. Remove the drain valve from the fuel cell. Clean the threads on the drain valve. Coat the threads with sealant (Permatex #1C) and install the valve into the replacement fuel cell.

B. Remove the supply line fitting from the fuel cell. Replace the packing and install the fitting into the replacement fuel cell.

C. Remove the access plates (zippers) from the fuel cell.

D. Remove the strainer assembly installed in the bottom of the fuel cell over the supply line outlet and install in the replacement fuel cell.

E. Remove the fuel quantity probe and the low fuel warning switch from the right fuel cell and install into the replacement fuel cell (para. 10-48.3 and 10-51.3).

NOTE

Ensure that the lacing cord used to secure the internal baffles in the bladder does not interfere with the access plates (zipper) during installation of the plates (zipper). The plates (zipper) will not seal if this occurs.

F. Reinstall the access plates (zippers) and torque the installation hardware to 40-50 in-lbs/4.5-5.7 Nm.

10-7.3 Replacement – Fuel Cell, CRFS

NOTES

Only replace a CRFS fuel bladder with another CRFS fuel bladder.

Refer to the manufacturer’s instructions for preparing a fuel blader if it was removed from long term storage. (Refer to Table 2-2.)

The following procedures are the instructions for transferring the sump, fuel filler port, and fuel quantity transmitter assemblies between fuel bladders.

Replacement procedures are the same for both fuel cells unless noted. Replace all used packings/O-rings.

NOTES

Cover all open ports and lines to prevent contamination of the fuel system.

Refer to Figure 10-2.1 for numbered items.

A. If applicable, remove the fuel quantity transmitter (79) and flanged cup (74) from the right-side bladder (2):

1) Remove the transmitter (79) I/A/W para. 10-48.4.

2) Remove bolts (75) and washers (76) (6 places) that secure the flanged cup (74) to the fuel bladder.

B. Remove the access door (62) from the bladder (1 or 2) being replaced:

1) Remove nylon washers (57), frangible studs (56), and washers (55) (4 places) from the access door (62).

2) Remove bolts (63) and washers (64) (12 places) that secure the access door to the bladder.

C. Remove the flange plate assembly (20 or 21) from bladder (1 or 2) being replaced:

1) Remove screws (61) (6 places) that secure the flange plate assembly (20 or 21) to the bladder.

NOTE

To facilitate access to the syphon B-nut, it may be helpful to remove the fuel strainer assembly. Refer to Figure 10-4 for numbered components in steps 2 and 3.

2) Access the syphon (5) through the bladder side opening and loosen the B-nut coupling, then pivot the syphon tube toward the fuel strainer assembly (15).

3) Remove the flange plate assembly (2) from the fuel cell. The low fuel switch (10) will be mounted on the flange plate assembly for the right fuel cell.

D. Prepare the replacement fuel bladder (1 or 2) as follows:

1) Ensure that any captive nut plate threads are free of debris and ensure that the sealing surfaces are clean and dry.

2) Ensure that the fuel bladder cavity is free of debris.

E. Install the flange plate assembly (20 or 21) in the replacement fuel bladder (1 or 2):

1) Install gasket (60) between bladder and flange plate assembly (20 or 21).

NOTE

Refer to Figure 10-4 for numbered items in steps 2 through 4.

2) Insert flange plate assembly (2) into the bladder opening so that the sump drain valve (12) is turned toward the low corner of the fuel cell and the arrow points forward. The syphon tube (5) should be loose to allow it to pivot within the bladder cavity and ease insertion of the assembly into the bladder.

3) Align the syphon tube (5) to face the lower corner of the bladder and secure the syphon in position:

a) Verify torque on the syphon tube sump fitting (4) (40-65 in-lb/4.5-7.3 Nm).

b) Grip the flanged plate assembly (2) with a 1-3/8 inch wrench.

c) Access the syphon B-nut through the bladder opening and torque (50-65 in-lb/5.6-7.3 Nm).

4) Install new O-ring (14) and the fuel strainer assembly (15), if required (300-500 in-lb/33.9-56.5 Nm).

5) Install the screws (61) (6 places) to secure the flange plate assembly (20 or 21) to the fuel bladder. Torque to 25-30 in-lb/2.8-3.4 Nm.

F. If required, install the fuel quantity transmitter flanged cup (74) in the replacement fuel bladder (2).

1) Install new gasket (73) on bladder ring.

2) Install flanged cup (74) by aligning the bolt pattern and the “FWD” mark.

3) Install bolts (75) and washers (76) (6 places). Torque (25-30 in-lb/2.8-3.4 Nm).

G. Install access doors (62):

1) Install inner and outer doors with bolts (63) and washers (64) (12 places). Torque (25-30 in-lb/2.8-3.4 Nm).

2) Install washers (55) and frangible studs (56) (4 places). Torque (20-25 in-lb/2.3-2.8 Nm).

H. Cover all open ports to prevent contamination of the bladder.

I. Allow several hours (preferably overnight) after installation of access door, flange plate assembly, and fuel quantity transmitter cup (if applicable) and retorque the hardware.

10-8. Installation – Fuel Cells

NOTES

Installation procedures are the same for both fuel cells unless otherwise noted.

Replace all used packings/O-rings.

For installing the standard fuel cell, proceed to paragraph 10-8.1. For installing the Aerazur fuel cell, proceed to paragraph 10-8.2. For installing the CRFS fuel cell, proceed to Para. 10-8.3.

10-8.1 Installation – Fuel Cell, Standard Fuel System

A. Ensure sealing surfaces are dry.

B. Apply a light coat of corn starch (or equivalent) to the inside surface of the fuel cell support structure to allow the fuel cell to be adjusted for final fit.

C. Install the fuel cell into the support structure.

D. Position the gasket between the fitting assembly the support structure. Install the bolts and washers that secure the fitting assembly to the support structure and torque to 25-30 in-lbs/2.8-3.4 Nm. Lockwire bolts with 0.020" lockwire.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

E. Connect the sump drain line to the drain valve.

F. Connect the supply line to the fuel cell fitting.

NOTE

Prior to connecting the overboard vent crossover line (3, Figure 10-3) and crossover line (9), inspect the nipples for restrictions and damage.

G. Connect the overboard vent crossover line (para. 10-18).

I. Connect the crossover line (para. 10-18).

J. Connect the electrical connectors for the fuel quantity probe and the low fuel warning switch in the right side fuel cell.

K. Allow several hours (preferably overnight) after the fuel cell has been completely installed and retorque the hardware.

L. Safety wire as required.

M. Install the fuel cell covers (para. 8-17).

N. Install a filler port gasket between the fuel cell the fuel cell cover and one between the fuel cell cover and the filler port. Install the hardware and torque to 25-30 in-lbs/2.8-3.4 Nm.

O. Install the air deflector on the top of the cabin.

P. Install the upper plenum/air inlet (para. 13-31).

Q. Service the fuel cells (para. 4-4) and check for leaks.

R Check for proper operation of the fuel quantity system (para. 7-85) and the lower fuel warning system (para. 10-41). Install the cover for the fuel quantity probe after determining that the system is operating properly.

S Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-8.2 Installation – Fuel Cell, Aerazur Fuel Bladder System

NOTES

Installation procedures are the same for both fuel cells unless noted.

Replace all used packings/O-rings.

A. Apply a light coat of corn starch (or equivalent) to the inside surface of the fuel cell support structure to allow the fuel cell to be adjusted for final fit.

B. Install the fuel cell into the support structure.

C. Lace the top edge of the fuel cell to the support mounts.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

D. Connect the sump drain line to the drain valve.

E. Connect the supply line to the fuel cell fitting.

F. Connect the overboard vent crossover line (para. 10-18).

G. Connect the crossover line (para. 10-18).

H. Connect the electrical connectors for the fuel quantity probe and the low fuel warning switch in the right fuel cell.

I. Install the fuel cell covers (para. 8-17).

J. Install a filler port gasket between the fuel cell the fuel cell cover and one between the fuel cell cover and the filler port. Install the hardware and torque to 40-50 in-lb/4.5-5.7 Nm.

K. Install the air deflector on the top of the cabin.

L. Install the upper plenum/air inlet (para. 13-31).

M. Service the fuel cells (para. 4-4) and check for leaks.

N. Check for proper operation of the fuel quantity system (para. 7-85) and the low fuel warning system (para. 10-41). If applicable, install the cover for the fuel quantity probe after determining that the fuel quantity system is operating properly.

O. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-8.3 Installation – CRFS Fuel Cell

NOTES

Installation procedures are the same for both fuel cells unless noted. Refer to Figure 10-2.1 for numbered items.

The bladders are previously assembled with the fuel transmitter flange cup and flange plate assemblies installed. If not assembled with those assemblies, refer to the applicable replacement step in Para. 10-7.3 to install the component.

Replace all used packings/O-rings.

A. Ensure sealing surfaces are dry.

B. Set the fuel bladder (1 or 2) into the support structure. Align the bladder with the access door frangible stud openings, cross fill opening, vent opening, hook and loop patches, and flanged plate assembly opening. Ensure an even gap around the vent and cross fill chimneys and the flange plate assembly fuel shelf opening.

C. If not present, install the flow diverter (54) for the interface between the flange plate assembly (20 or 21) and the surface of the fuel shelf compartment.

D. Attach the access door frangible studs (56) to the inboard fuel shelf wall:

1) Install nylon washer (57) over frangible stud (56) and insert studs through fuel shelf wall (4 places).

2) Install washers (58) and nuts (59) on the frangible studs (56). Do not fully tighten at this step.

NOTE

Ensure a gap around all sides of the frangible tab and structure.

E. Install frangible tabs (51) with bolts (52), and washers (53) (2 places). Do not fully tighten at this step.

F. Right-side fuel bladder (2): Install fuel quantity transmitter (79) (para. 10-51.4, steps A through E.

G. Left-side fuel bladder (1): Cover the fuel filler port to help seal the bladder for the next step if a cover is not already installed.

H. Install lacing cords (50):

1) Install lacing cords (50). The cords may be installed in any order.

2) Pull lacing cord (50) tight to remove slack.

3) Tie off the ends.

I. Fully tighten hardware from steps D and E.

1) Access door frangible door stud nuts (59): Torque 7 in-lb/0.8 Nm.

2) Frangible tab bolts (52): Torque 25-30 in-lb/2.8-3.4 Nm.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

CAUTION

Use caution when installing components connected to the breakaway valve couplings.

J. Connect the sump drain line (19) to the sump drain valve (12, Figure 10-4).

NOTE

Hold the elbow by the flats to assist installation of the fitting to the flange plate assembly.

K. Connect the cross fill breakaway valve coupling (36) (para. 10-18.5, A).

L. Connect the fuel supply line (14) to the flange plate assembly (20 or 21).

NOTE

Inspect the chimneys for restrictions and damage before connecting the overboard vent crossover and fuel cross fill.

M. Connect the vent breakaway valve couplings (25) (para. 10-18.5, B).

N. Connect the electrical connectors for the fuel quantity transmitter and the low fuel warning switch in the right-side fuel bladder (2).

O. Allow several hours (preferably overnight) after the fuel cell has been completely installed and retorque the hardware.

P. Install the fuel cell covers (para. 8-17).

Q. Install the fuel cap assembly (70):

1) Remove the temporary fuel port cover.

NOTE

Check that gasket (65) is present. It may be present either adhered to the fuel cell cover or to the underside of the frangible ring (68).

NOTE

To facilitate alignment and installation of the gaskets, flange, and frangible cover, a light coat of spray adhesive may be used as a temporary aid to maintain alignment during installation. Appy spray adhesive (Super 77 or equivalent) to one side of the gaskets (66) and (65, if required). Lightly tack on gasket (66) to the bottom of the flange (67) and to the bottom of the frangible ring (68), respectively. If required, lightly tack on gasket (65) to the bottom of the frangible ring (68).

2) Install gasket (65), if required.

3) Aligning the fastener openings, assemble gasket (66), flange (67), gasket (66), and the frangible ring (68) onto the bladder. Ensure the frangible ring (68) is orientated with the provisions for the fuel cap attachment on the forward side.

NOTE

To facilitate installation, use one or two longer fasteners to hold the assembly together during installation of the screws.

4) Install screws (69) (10 places) and torque (25-30 in-lb/2.8-3.4 Nm).

5) Install the fuel cap assembly (70) with screws (71) and washers (72) (2 places) and torque (25-30 in-lb/2.8-3.4 Nm).

6) Remove the temporary fasteners as required when installing the screws.

R. Install the air deflector on the top of the cabin.

S. Install the upper plenum/air inlet (para. 13-31).

T. Service the fuel cells (para. 4-4) and check for leaks.

NOTE

Before performing either a fuel quantity system calibration or a low fuel warning test procedure, it is necessary to completely fill the tanks to fully expand the bladder within the fuel cell structure if the bladders are replacements and have not been previously filled with fuel.

U. Check for proper operation of the fuel quantity system (para. 7-85) and the low fuel warning system (para. 10-41).

NOTE

Check that gasket (77) is present. It may either be adhered to the fuel cell cover or to the underside of the frangible cover (82).

NOTE

Apply a light coat of spray adhesive (Super 77 or equivalent) to one side of gasket(s) (81) and (77, if required). Lightly tack on the sprayed side of the gasket(s) to the bottom of the frangible cover (82) to aid installation.

V. Install gasket (77), if required.

W. Install gasket (81) and the frangible cover (82) for the fuel quantity transmitter after determining that the system is operating properly. Torque screws (83) to 25-30 in-lb/2.8-3.4 Nm.

X. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-9. Lines and Hoses

NOTE

Refer to Figure 10-2.1 or Figure 10-3, as applicable.

NOTE

CRFS: Refer to para. 10-18.1 for breakaway valve coupling procedures. Refer to para. 10-18.6 for roll over valve assembly procedures.

10-10. Removal – Lines and Hoses

NOTE

The following procedures apply to the fuel supply, sump drain, scupper drain, and the vent lines. Ensure the lines are identified and the installation routing is understood before removal.

NOTE

CRFS: It is not necessary to remove the fuel line breakaway valve coupling when removing the fuel supply line.

NOTE

Defuel the aircraft only if removing the fuel supply lines or the sump drain line from the shutoff valve.

A. Defuel the aircraft (para. 4-5).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

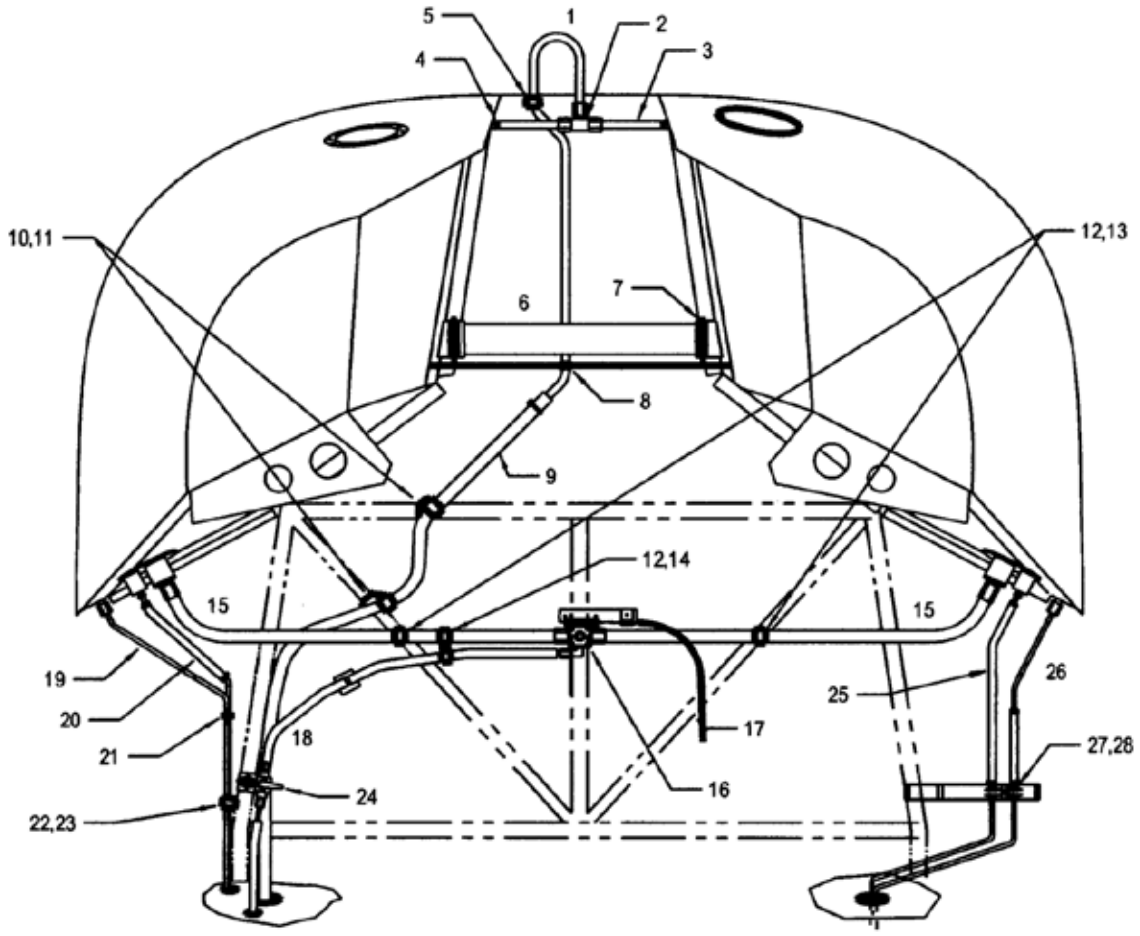
Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

CAUTION

CRFS: When disconnecting fuel lines from the breakaway valve coupling, hold the valve half by the flats to prevent separation of the coupling.

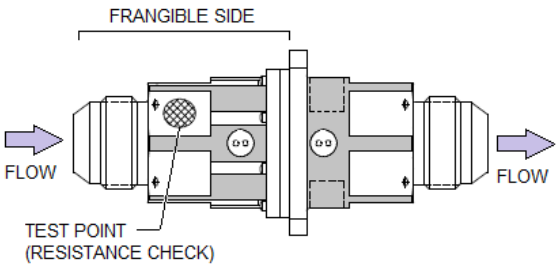
B. Disconnect the line or hose from the fittings.

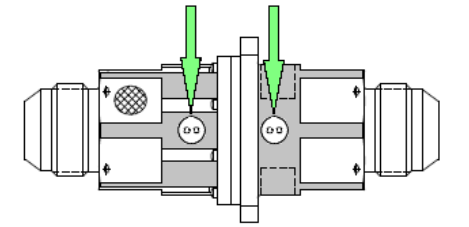
C. If installed, remove the support clamps and remove the line or hose.



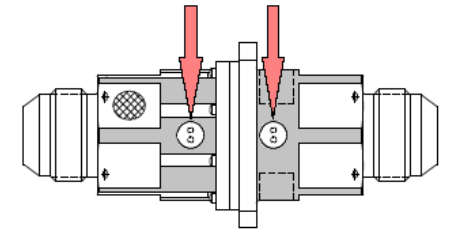
1.	Vent Line	15.	Fuel Line
2.	Tee Fitting	16.	Shutoff Valve Assembly
3.	Crossover Vent Line	17.	Fuel Shutoff Cable
4.	Clamp	18.	Shutoff Valve Drain Line
5.	Clamp	19.	Scupper Drain Line
6.	Fuel Crossover Line	20.	Sump Drain Line
7.	Clamp	21.	Clamp
8.	Grommet	22.	Clamp
9.	Vent Line	23.	Clamp
10.	Clamp	24.	Shutoff Drain Valve
11.	Clamp	25.	Sump Drain Line
12.	Clamp	26.	Scupper Drain Line
13.	Clamp	27.	Clamp
14.	Clamp	28.	Clamp

Figure 10-3. Fuel Lines and Crossovers - Standard System



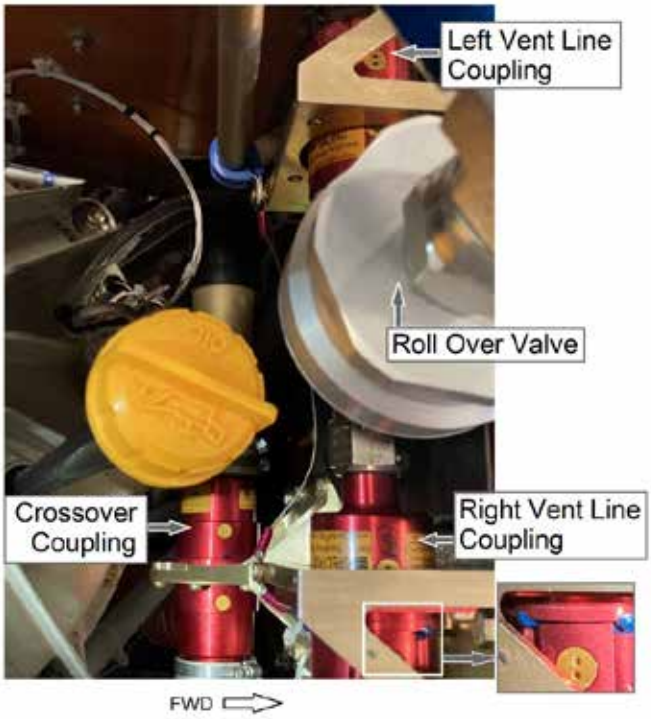


DOTS PARALLEL - VALVES ARE OPEN



DOTS PERPENDICULAR - VALVES ARE CLOSED

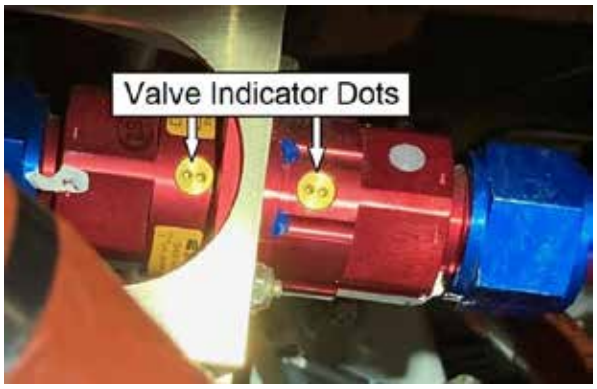
The fuel line breakaway coupling is depicted in the illustrations above.



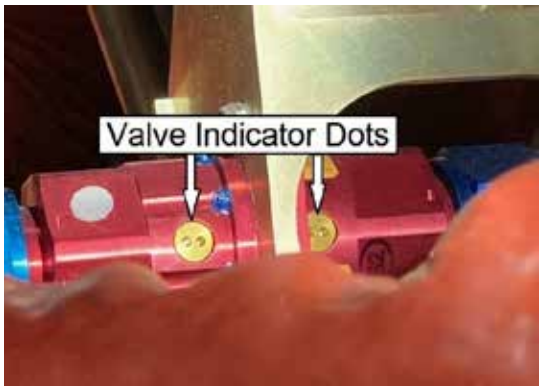
Left and right vent line couplings, crossover coupling, and roll over valve as viewed from the top of the fuselage.

Inset photo in the lower right is a close-up view of the valve indicator dots hidden from view by a bracket.

(The forward scoop and upper plenum are removed for clarity.



Left-side fuel line breakaway coupling as viewed from the left-side engine access panel.



Right-side fuel line breakaway coupling as viewed from the right-side engine access panel.

Figure 10-3.1. CRFS Breakaway Valve Couplings and Roll Over Valve

10-11. Inspection – Lines and Hoses

A. Inspect the hoses for damage and evidence of leakage.

B. Inspect the lines for bends, cracks, corrosion, nicks, and scratches.

10-12. Repair – Lines and Hoses

A. Replace hoses that leak from the coupling or have the fire shield covering worn through.

B. Replace lines that are kinked, cracked, or have bends that cannot be repaired I/A/W AC 43.13-1B.

10-13. Installation – Lines and Hoses

NOTES

The sump drain, scupper drain, and vent lines may be slightly hand formed to aid installation. Do not kink the lines.

The fuel cell vent line on TH-28 Serial Number 3007 and subsequent and 480 Serial Number 5013 and subsequent are manufactured from 0.5 inch/12.7 mm line. Do not attempt to hand form the vent line.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

CAUTION

CRFS: When installing the fuel lines to the breakaway valve couplings, hold the valve half by the flats to prevent separation of the coupling.

A. Install the line or hose and torque the B-nuts.

1) CRFS: Fuel line (to breakaway valve coupling (45)) torque: 650 in-lb/73.4 Nm.

2) CRFS: Vent tube assembly (to 90° fitting (29)) torque: 230-260 in-lb/26.0-29.4 Nm.

B. Install the support clamps.

C. If the aircraft was defueled, service the aircraft (para. 4-4) and check for leaks.

D. If the aircraft was defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-14. Crossovers

NOTE

The CRFS fuel cell crossovers (cross fill and vent chimneys) are integrated into the bladder design and are not removeable. Proceed to para. 10-18.1 for removal, inspection, repair, and installation procedures for the fuel, cross fill, and vent breakaway valve couplings.

10-15. Removal – Crossovers

NOTE

The crossovers include both the fuel crossover and the overboard vent crossover.

10-15.1 Removal – Crossovers, Standard Fuel System (Figure 10-3)

NOTE

Complete defueling is not required for removal of the overboard vent crossover.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

C. If removing the overboard vent crossover, disconnect the vent line from the tee in the crossover.

D. Remove the retaining clamps securing the crossover into the fuel cells.

E. Slightly twist the crossover and remove both ends from the fuel cells.

10-15.2 Removal – Crossovers, Aerazur Fuel Bladder System

NOTE

Complete defueling is not required for removal of the overboard vent crossover.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

C. If removing the overboard vent crossover, disconnect the vent line from the tee in the crossover.

D. Remove the retaining clamps securing the split clamps at both ends of the crossover.

E. Remove the split clamps from the fittings.

F. Remove the clamp securing the crossover to the transmission standoff bracket or the cable tie securing the crossover to the bracket mounted on the backwall.

G. Remove the crossover from the fittings and the packing on each end of the crossover.

10-16. Inspection – Crossovers

A. Inspect the crossovers for damage and evidence of leakage.

B. Inspect the fittings for damage and security.

10-17. Repair – Crossovers

A. Repair the standard fuel system crossovers I/A/W AC 43.13-1B. Replace crossover if damaged beyond repair.

B. Repair the Aerazur fuel bladder system crossovers I/A/W the manufacturer's instructions.

10-18. Installation – Crossovers

A. **Standard Fuel System**

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

NOTE

Use a lubricant (ACF-50, or equivalent) to aid installation of the crossover if required.

CAUTION

When installing clamps (4 and 7, Figure 10-3), do not over torque. Allow the rubber about an hour to relax, then retorque (18 in-lb/2 Nm). Over torquing will result in damage and leaks.

NOTE

Prior to connecting the overboard vent crossover line and crossover line, inspect the fuel cell nipples for restrictions and damage.

(1) Insert the crossover into the fuel cell fittings approximately 1.5 inch/38 mm. If installing the overboard vent, orientate the tee up.

(2) Install the retaining clamps onto the fuel cell fittings (inboard of the crossover bead) and tighten (torque 18 in-lb/2 Nm).

(3) Connect the vent line if installing the overboard vent crossover.

(4) Service the aircraft (para. 4-4) and check for leaks.

(5) Install the upper plenum/air inlet (para. 13-31).

(6) If the aircraft was defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

B. **Aerazur Fuel Bladder System**

(1) Install the packing on one end of the crossover and install the crossover on one of the fittings (orientate the tee in the vent crossover up).

(2) Install the split clamps onto the flange of the fittings and secure with the retaining clamp.

(3) Install the opposite end using the same procedures.

(4) Install the clamp that secures the crossover to the transmission standoff bracket or a cable tie to secure the crossover to the bracket on the backwall.

(5) Connect the vent line if installing the overboard vent crossover.

(6) Service the aircraft (para. 4-4) and check for leaks.

(7) Install the upper plenum/air inlet (para. 13-31).

(8) If the aircraft was defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-18.1 CRFS Breakaway Valve Coupling

NOTE

There are five breakaway valve couplings in the CRFS installation. Of the five couplings, there are three configurations – two overboard vent couplings, one cross fill coupling, and two fuel line couplings. Refer to para. 10-18.2, C, for the vent couplings. Refer to para. 10-18.2, D, for the cross fill coupling. Refer to para. 10-18.2, E, for the fuel line couplings.

NOTE

Refer to Figure 10-2.1 for numbered items.

10-18.2 Removal – CRFS Breakaway Valve Coupling

NOTE

Complete defueling is not required for removal of the vent breakaway valve coupling.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28) and air deflector if removing the fuel cross fill or a vent breakaway valve coupling.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

CAUTION

Use care when handling the breakaway valve couplings.

C. Overboard vent breakaway valve coupling (25) removal:

NOTE

Removal procedures are the same for both breakaway couplings unless noted.

1) If removing the left-side coupling, disconnect the vent tube (8) from the 90° fitting (29) connected to the roll over valve assembly (30).

2) Remove the hose clamps (22), half clamps (23), and O-ring (24) between the coupling (25) and the bladder chimney.

3) Disconnect the coupling (25) from the tee fitting (31).

4) Remove screws (26), lock washer (46) (1 place), and washers (27) (4 places) that secure the coupling (25) to the bracket.

5) Slide the coupling (25) outboard to clear it from the bracket. Pivot the vent chimney down or to the side to facilitate removal of the coupling.

D. Cross fill breakaway valve coupling (36) removal:

1) Disconnect the ground clamp assembly (35) from the coupling bracket assembly (39).

2) Remove the hose clamps (32), half clamps (33), and O-ring (34) between the coupling (36) and the cross fill chimneys.

3) Remove the frangible ring (37) by removing screws (38) (8 places).

4) Slide the coupling (36) outboard to clear it from the bracket (39). Pivot the chimney down or to the side to facilitate removal of the coupling (36).

E. Fuel line breakaway valve coupling (45) removal:

NOTE

Removal procedures are the same for both breakaway couplings unless noted.

CAUTION

When disconnecting fuel lines from the breakaway valve coupling, hold the valve half by the flats to prevent separation of the coupling.

1) Disconnect the fuel lines (14) from the forward and aft coupling (45) ends.

2) Remove the screws (40), washers (42 and 43), and nuts (44) (4 places) that secure the coupling (45) to the bracket.

3) Slide the coupling (45) forward to remove it from the bracket.

10-18.3 Inspection – CRFS Breakaway Valve Coupling

A. Inspect the connections for leaks.

B. Inspect the breakaway valve couplings for security, damage, and indicator dot status.

1) Indicator dots parallel with the valve body indicate the valve is open. Indicator dots perpendicular to the valve body indicate the valve is closed. Refer to Figure 10-3.1.

C. Inspect the frangible ring (37) for security and damage.

D. Inspect the ground straps (28 and 41) and ground clamp assembly (35) for security and damage.

1) Check resistance between each breakaway valve coupling test point and airframe grounding point (100 milliohms or less). (Refer to Figure 10-3.1 for pictorials of the test point. Refer to Figure 10-2.1, Detail View Q, for the left- and right-side airframe grounding locations.)

10-18.4 Repair – CRFS Breakaway Valve Coupling

A. If a CRFS crossover breakaway valve indicates the closed position, send the coupling to the manufacturer for repair. (Refer to Table 2-2.)

10-18.5 Installation – CRFS Breakaway Valve Coupling

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

Use care when handling the breakaway valve couplings.

NOTES

Prior to connecting the overboard vent line and cross fill line, inspect the fuel cell chimneys for restrictions and damage.

Replace all used packing/O-rings.

A. Cross fill breakaway valve coupling (36) installation:

1) From the right side, install the coupling (36) into the bracket opening. Ensure that the orientation of the coupling is such that the valve indicators are facing up and the test point is facing down. Pivot the right-side chimney down or to the side to facilitate installation of the coupling.

2) Install the frangible ring (37) with screws (38) (8 places). Torque 20 in-lb/2.3 Nm.

3) Slide a pair of hose clamps (32) over the left- and right-side bladder cross fill chimneys.

4) Install a new O-ring (34) onto each end of the coupling (36).

5) Install the coupling (36) to the ends of the cross fill chimneys with a pair of half clamps (33) and secure with the pair of hose clamps (32) (torque 18 in-lb/2.0 Nm). Ensure that the half clamps are evenly seated around the connection and that there is full contact between the inboard half clamp and the coupling for electrical grounding.

6) Connect the ground clamp assembly (35) to the coupling bracket assembly (39).

B. Vent breakaway valve coupling (25) installation:

1) Insert the coupling (25) from outboard to inboard into the bracket. Ensure that the final orientation of the coupling is such that the valve indicators and test point are facing up. Pivot the vent chimney down or to the side to facilitate insertion of the coupling into the bracket.

2) Install the coupling (25) to the bracket with screws (26), lock washer (46) (1 place), and washers (27) (4 places). Torque 12 in-lb/1.4 Nm.

NOTE

The lock washer is installed at the single spotface location. (When the coupling is properly installed per step 1), the spotface is at the top, aft location for the left coupling or at the top, forward position for the right coupling.

3) Connect the coupling (25) to the tee fitting (31). Torque 230-260 in-lb/26.0-29.4 Nm.

4) Slide a pair of hose clamps (23) over the vent chimney.

5) Install a new O-ring (24).

6) Install the coupling (25) to the end of the vent chimney with a pair of half clamps (22) and secure with the pair of hose clamps (23) (torque 18 in-lb/2.0 Nm). Ensure that the half clamps are evenly seated around the connection and that there is full contact between the inboard half clamp and the coupling for electrical grounding.

7) If the left-side coupling was installed, connect the vent tube (8) to the 90° fitting (29) connected to the roll over valve assembly (30). Torque 230-260 in-lb/26.0-29.4 Nm.

C. Fuel line breakaway valve coupling (45) installation:

NOTE

Installation procedures are the same for both fuel line breakaway couplings unless noted otherwise.

1) Insert the fuel line breakaway valve coupling (45) from the forward side into the bracket. Ensure that the installation of the coupling is such that the valve indicators and test point are facing outboard.

2) Install the coupling (45) to the bracket with screws (40), washers (42 and 43), and nuts (44) (4 places). Torque 7 in-lb/0.8 Nm. Ensure ground strap (41) is installed at the proper attachment point (bare and clean surface).

CAUTION

When installing fuel lines to the breakaway valve coupling, hold the valve half by the flats to prevent separation of the coupling.

3) Connect the fuel lines (14) to the forward and aft coupling (45) ends. Torque 650 in-lb/73.4 Nm.

D. Service the aircraft (para. 4-4) and check for leaks.

E. Install the air deflector and upper plenum/air inlet (para. 13-31), if required.

F. If the aircraft was defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-18.6 Roll Over Valve Assembly

10-18.7 Removal – Roll Over Valve Assembly

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use a backing wrench when installing or removing fittings to prevent damage.

A. Remove the upper plenum/air inlet (para. 13-28) and air deflector.

B. Disconnect the vent tube (8) from the 90° fitting (29) connected to the roll over valve assembly (30).

C. Disconnect the 90° fitting (29) connected to the roll over valve assembly (30).

D. Disconnect the roll over valve assembly (30) from the tee fitting (31).

10-18.8 Inspection – Roll Over Valve Assembly

A. Inspect the roll over valve assembly for security and damage.

10-18.9 Repair – Roll Over Valve Assembly

A. If any of the conditions described in paragraph 4-48.1, 2, A, have occurred, remove the roll over valve assembly and inspect for open or closed valve status.

1) With the roll over valve assembly positioned upright, blow clean air down through the top opening (maximum 1 psi). If exiting air can be felt at the base of the assembly, the status is open. If exiting air cannot be felt at the base of the assembly, the status is closed.

2) If the status is closed, return the roll over valve assembly to the manufacturer for repair or overhaul. (Refer to Table 2-2.)

10-18.10 Installation – Roll Over Valve Assembly

A. Install the roll over valve assembly (30) to the tee fitting (31). Torque 330-360 in-lb/37.3-40.7 Nm.

B. Install the 90° fitting (29) to the roll over valve assembly (30). Torque 460-500 in-lb/52.0-56.5 Nm.

C. Connect the vent tube (8) to the elbow fitting (29). Torque 230-260 in-lb/26.0-29.4 Nm.

D. Install the air deflector and upper plenum/air inlet (para. 13-31).

10-19. Sump Drain Valves

10-20. Removal – Sump Drain Valves

A. Defuel the aircraft (para. 4-5).

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

B. Disconnect the drain lines from the valves.

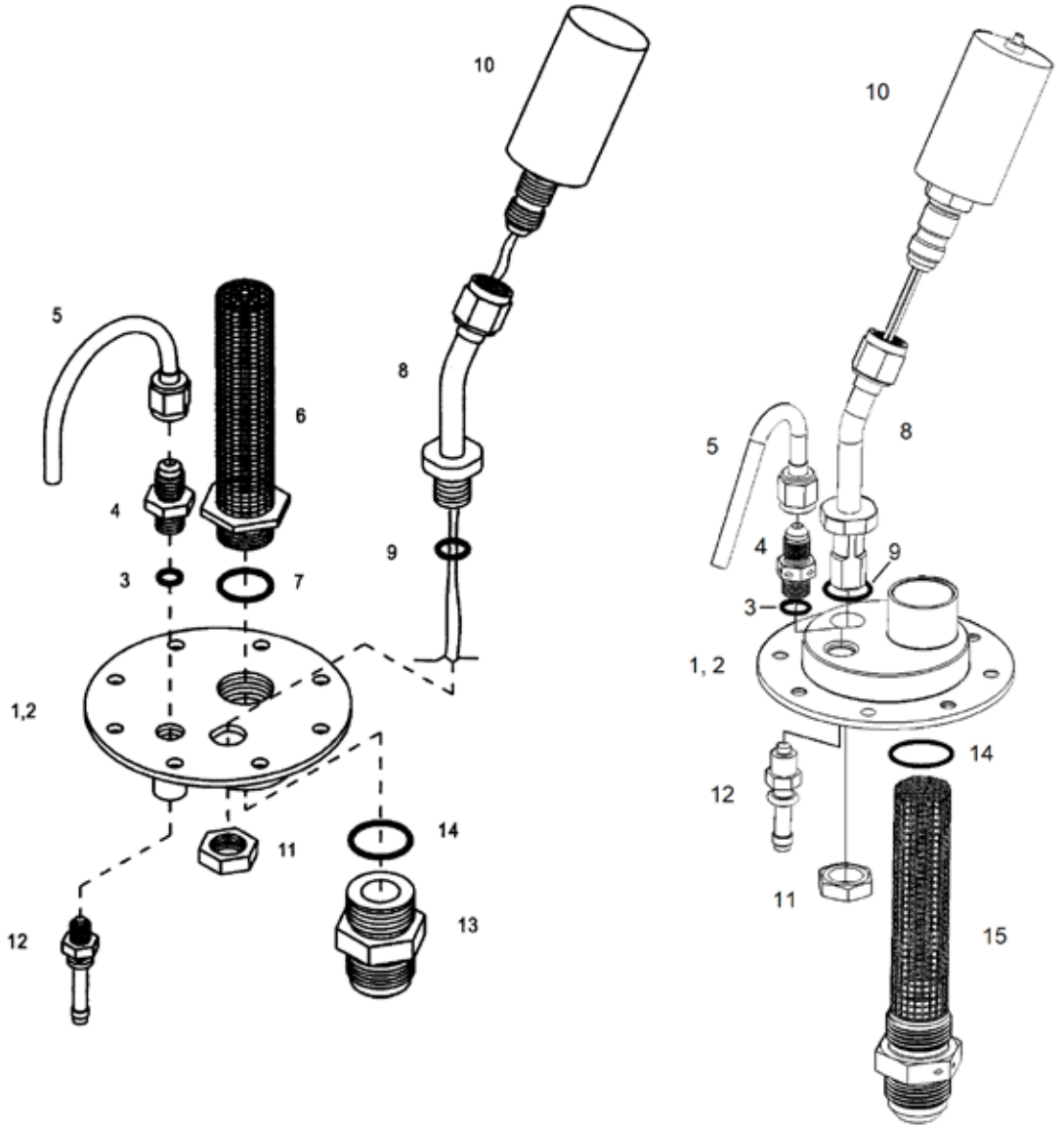
C. Remove the valves.

10-21. Inspection – Sump Drain Valves

A. Inspect the valves for damage, leaks, and proper operation.

10-22. Repair – Sump Drain Valves

A. Replace valves that leak or fail to operate properly after resealing the threads for leaks around the threads or flushing the valve to attempt to remove possible debris from a sticky or leaking valve.



Standard System CRFS

(Right-side sump assembly shown)

1. Flange Plate (Left Side)
2. Flange Plate (Right Side)
3. O-Ring
4. Sump Fitting
5. Syphon Tube Assembly
6. Fuel Strainer Assembly
7. O-Ring
8. Support Tube Assembly (R/S Only)
9. O-Ring (R/S Only)
10. Low Fuel Switch (R/S Only)
11. Nut
12. Sump Drain Valve
13. Fitting
14. O-Ring
15. Fuel Strainer Assembly

Figure 10-4. Sump Assembly

10-23. Installation – Sump Drain Valves

A. Apply sealant (Permatex #1C, Loctite 569) to the valve threads and install the valves (40-44 in-lb/4.5-5.0 Nm).

B. Connect the drain lines to the valves.

C. Service the aircraft (para. 4-4) and check for leaks.

D. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-24. Fuel Shutoff Valve Assembly (Figure 10-5 or Figure 10-5.1)

10-25. Removal – Fuel Shutoff Valve Assembly

A. Defuel the aircraft (para. 4-5).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

CAUTION

Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

B. Disconnect the fuel supply and the drain lines from the shutoff valve assembly.

C. Disconnect the shutoff cable from the valve.

D. Remove the hardware (5) (4) securing the shutoff valve assembly mount (1) to the pylon.

E. Remove the shutoff valve assembly.

10-25.1 Disassembly – Fuel Shutoff Valve Assembly

CAUTION

Perform disassembly in a clean area to prevent contamination.

NOTE

If leakage is detected, the plug valve O-rings (12) may be faulty. The following procedure disassembles the fuel shutoff valve assembly to access the plug valve O-rings.

NOTE

The following procedure is applicable to the fuel shutoff valve assembly configuration depicted in Figure 10-5.1.

A. Remove screws (6) and washers (7) to remove the tee (8).

B. Remove screws (21) and washers (22) to remove the valve body fitting (20).

C. Remove retaining ring (23).

D. Grasp the valve body arm (24). With a slight rotation motion, carefully pull up the valve plug arm to remove the plug valve (13).

10-26. Inspection – Fuel Shutoff Valve Assembly

A. Inspect the valve assembly for damage, leaks, and proper operation.

B. Remove minor nicks, scratches, or corrosion.

10-27. Repair – Fuel Shutoff Valve Assembly

A. Replace the valve assembly if not operating properly.

10-27.1 Assembly – Fuel Shutoff Valve Assembly (Figure 10-5.1)

NOTE

Perform assembly in a clean area to prevent contamination.

NOTE

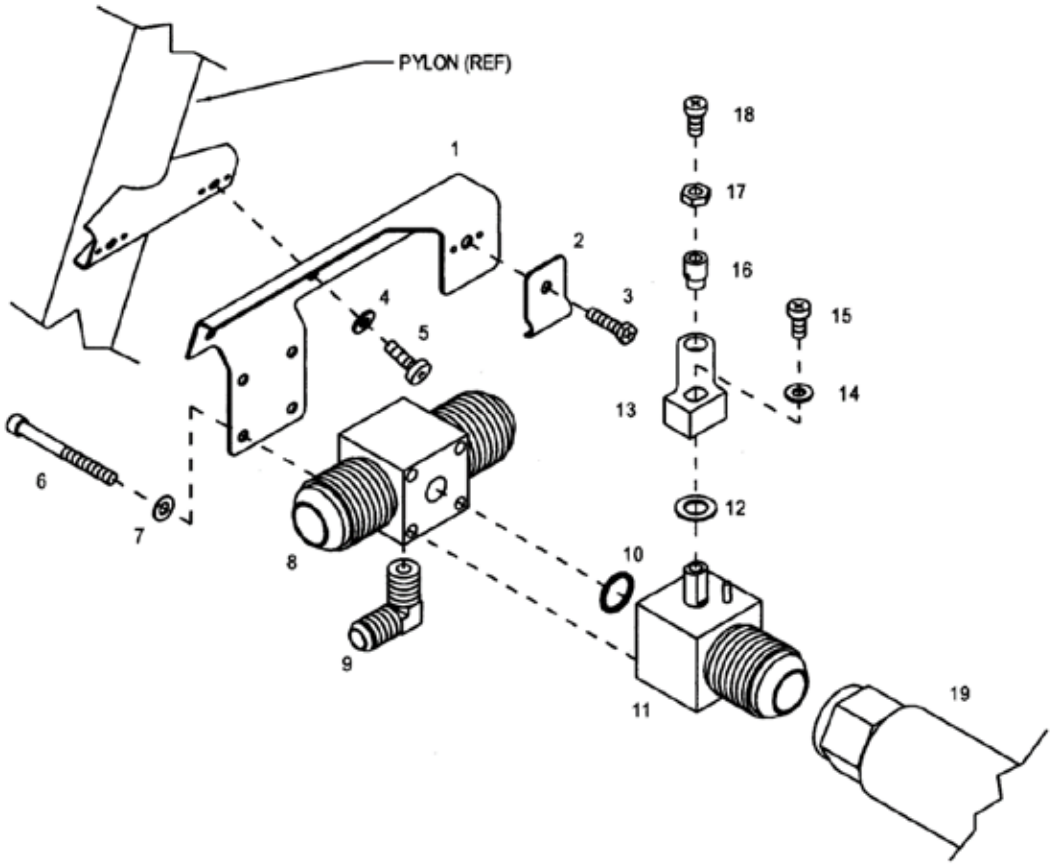
The following procedure is applicable to the fuel shutoff valve assembly configuration depicted in Figure 10-5.1.

A. Install the plug valve (13):

1) Lubricate (Jet A) new O-rings (12) and mating surfaces of the valve body (11).

CAUTION

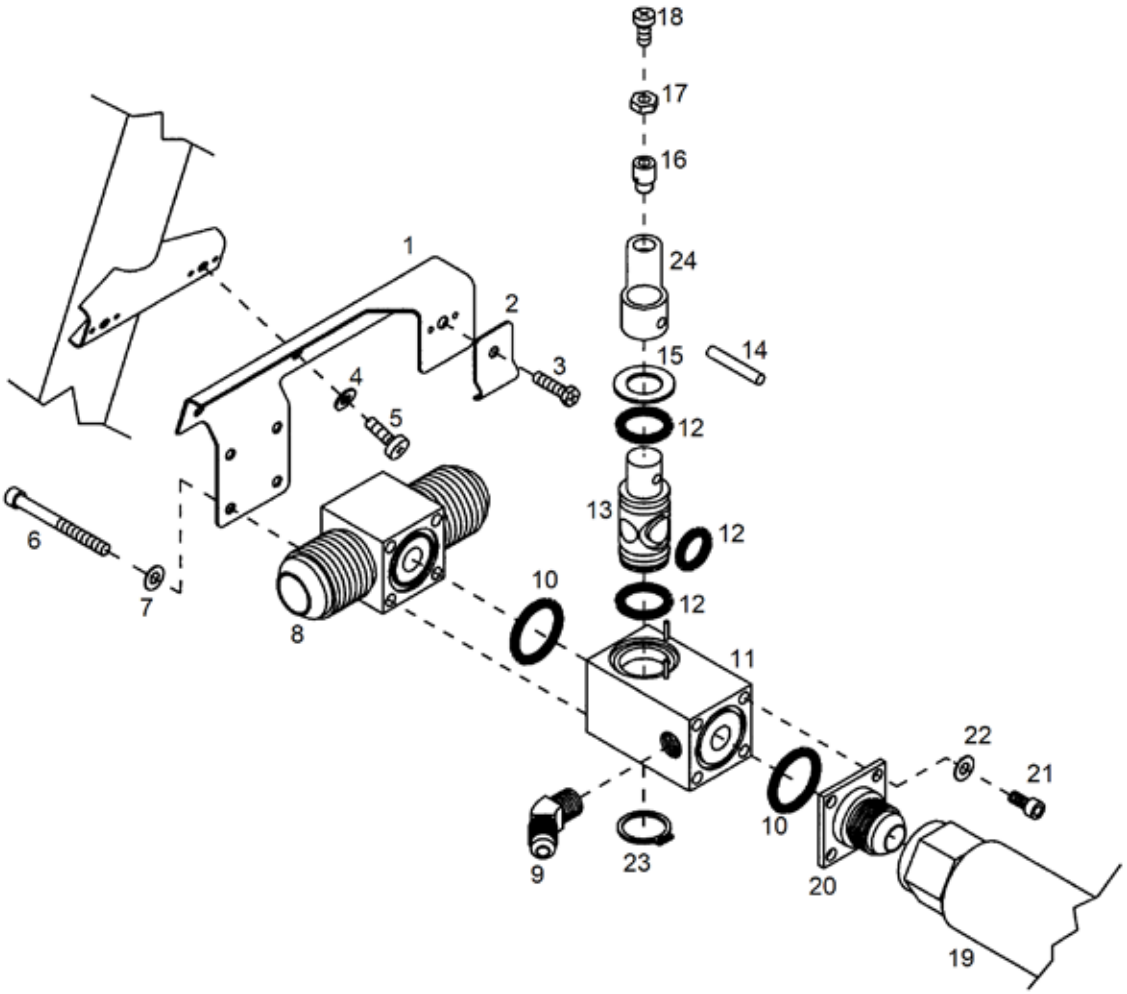
Use care to prevent the O-rings (12) from being pinched or torn during assembly.



480: S/N 5001-5032

1.	Bracket Assembly	11.	Valve Body
2.	Clip	12.	Washer
3.	Screw	13.	Arm
4.	Washer	14.	Washer
5.	Screw	15.	Screw
6.	Screw	16.	Swivel
7.	Washer	17.	Washer
8.	Tee	18.	Screw
9.	Elbow	19.	Fuel Line
10.	O-ring		

Figure 10-5. Fuel Shutoff Valve



480/480B: S/N 5039 and subsequent

1.	Bracket Assembly	13.	Plug Valve
2.	Clip	14.	Pin
3.	Screw	15.	Washer
4.	Washer	16.	Swivel
5.	Screw	17.	Washer
6.	Screw	18.	Screw
7.	Washer	19.	Fuel Line
8.	Tee	20.	Valve Body Fitting
9.	Elbow	21.	Screw
10.	O-ring	22.	Washer
11.	Valve Body	23.	Retaining Ring
12.	O-ring	24.	Valve Body Arm

Figure 10-5.1 Fuel Shutoff Valve

2) Install plug valve (13) with O-rings (12) into the valve body (11). Carefully twist and push the plug valve into the valve body. Press the middle O-ring securely against the plug valve to prevent the O-ring from deforming during installation.

3) Install the retaining ring (23).

B. Lubricate (Jet A) new O-ring (10) and install valve body fitting (20) with screws (21) and washers (22). Torque 12-15 in-lb/1.4-1.7 Nm and lockwire (0.025 inch).

C. Lubricate (Jet A) new O-ring (10) and install tee (8) with screws (6) and washers (7). Torque 12-15 in-lb/1.4-1.7 Nm and lockwire (0.025 inch).

10-28. Replacement – Fuel Shutoff Valve Assembly (Figure 10-5 or Figure 10-5.1)

A. Remove the hardware securing the valve (11) to the tee (8) and to the mounting bracket (1) in accordance (refer to para. 10-25.1). Separate the valve from the tee. Discard the O-ring (10).

B. S/N 5001-5032 only: If replacing the tee (8), remove the drain line elbow (9). Clean the threads and using sealant (Permatex #1C or Loctite 569), install the replacement tee.

C. Install a new O-ring (10) between the valve body (11) and the tee (8).

D. Install the hardware (6) (7) securing the mounting bracket (1) to the valve body (11) and tee (8). Torque 12-15 in-lb/1.4-1.7 Nm and lockwire (0.025 inch).

10-29. Installation – Fuel Shutoff Valve Assembly

A. Install the shutoff valve assembly into position and install the hardware (4) (5) securing it to the pylon.

CAUTION

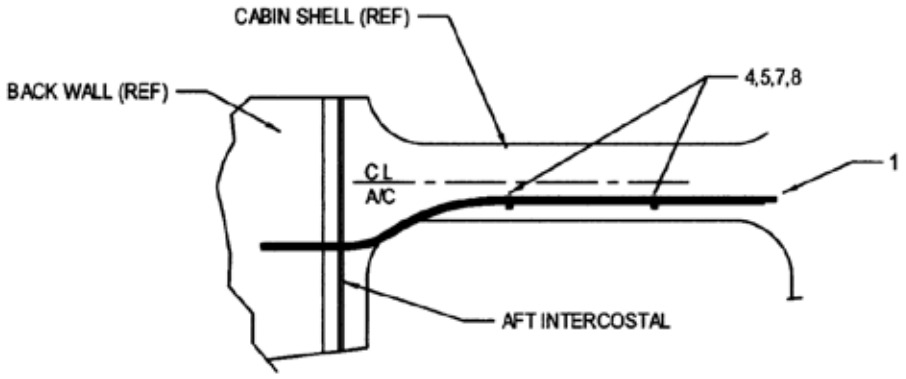
Use a backing wrench when installing or removing fluid lines and fittings to prevent damage.

B. Connect the supply and drain lines to the valve assembly.

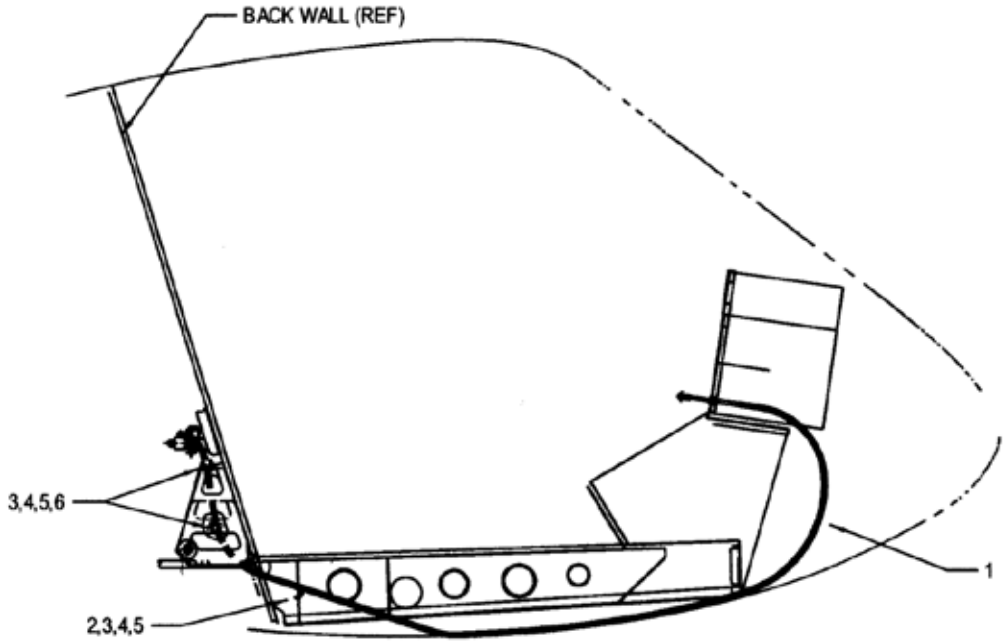
C. Ensure the position of the valve body arm (24) corresponds with the position of the control cable. Connect the cable to the valve body and rig so when the valve is full on there is a small amount of cushion at the control cable knob.

D. Service the aircraft (para. 4-4) and check for leaks. If leaks are present, disassemble (para. 10-25.1) the plug valve (13) from the valve body (11) and check condition of O-rings (12).

E. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.



VIEW LOOKING DOWN AT CABIN BOTTOM



VIEW LOOKING FROM RIGHT SIDE

1.	Shutoff Cable	5.	Nut
2.	Clamp	6.	Clamp
3.	Screw	7.	Clip
4.	Washer	8.	Screw

Figure 10-6. Fuel Shutoff Valve Cable Installation

10-30. Fuel Shutoff Valve Control Cable (Figure 10-6)

10-31. Removal – Fuel Shutoff Control Cable

NOTE

Before removing the cable, be thoroughly familiar with the cable routing (Refer to Figure 10-6).

A. Remove the right-side keel access panel.

B. Gain access to the back of the instrument panel (para. 7-3).

C. Remove the right-side engine access panel.

D. Disconnect the cable from the shutoff valve.

E. Remove the cable from the support clamps.

F. Remove the retaining nut from the cable behind the instrument panel and remove the cable.

10-32. Inspection – Fuel Shutoff Valve Control Cable

A. Inspect the cable for damage, kinks, and proper operation.

10-33. Repair – Fuel Shutoff Valve Control Cable

A. Replace the cable if kinked or binding.

10-34. Installation – Fuel Shutoff Valve Control Cable

A. Install the cable in reverse order of removal.

B. Ensure the position of the valve arm corresponds with the position of the control cable. Connect the cable to the valve and rig so that when the valve is full ON there is a small amount of cushion at the control cable knob.

10-35. Refueling Port Cap

10-36. Removal – Refueling Port Cap

A. Lift the locking handle and rotate the handle counterclockwise.

NOTE

Only early production TH-28/480's use a retainer attached to the refueling port cap. Later production aircraft have the cap attached to the refueling port mount by a safety clip or a hinged refueling port cap may be installed.

B. Remove the cap from the refueling port. Rotate the cap retainer to allow removal from the fuel cell, or disconnect the retention chain from the refueling port and remove the cap from the aircraft, or remove the screws securing the hinge half to the refueling port cap and remove the cap.

10-37. Inspection – Refueling Port Cap

A. Inspect the cap for proper locking and sealing.

B. Inspect the chain and retainer for security, if applicable.

C. Inspect the hinge installation for condition and security, if applicable.

10-38. Repair – Refueling Port Cap

A. Replace the O-ring seal if worn or deteriorated.

B. Repair or replace the retaining chain, if required.

C. Repair or replace the hinge, if required.

D. Adjust the tension of the cap by removing the cotter pin from the nut on the bottom of the cap, adjusting the nut and installing a cotter pin.

10-39. Installation – Refueling Port Cap

A. Replace the packing on the cap.

B. Install the cap retainer into the fuel cell, or attach the retention chain to the refueling port with the safety clip, or install the hinge screws and lockwire, as applicable.

C. Install the cap, rotate the locking handle clockwise and push the handle down into the recess in the cap.

10-40. Low Fuel Warning Switch

NOTE

For CRFS, if the bladders are replacements and have not been previously filled with fuel, it is necessary to completely fill the tanks to fully expand the bladder within the fuel cell structure before proceeding with the functional test.

10-41. Functional Test – Low Fuel Warning Switch

A. Defuel the aircraft (para. 4-5).

B. Verify the electrical circuit is operating properly (para. 6-140).

C. Level the aircraft (para. 4-45).

NOTES

Unusable fuel for the standard fuel system is 1.7 gallons/6.43 liters; however, only use 0.7 gallons/2.65 liters while preparing to check the low fuel warning switch in a standard fuel system equipped aircraft.

Unusable fuel for the CRFS is 0.75 gallons/2.84 liters.

D. Add the volume of fuel that represents unusable fuel:

1) Standard fuel system: Add 0.7 gallons/2.65 liters

2) Aerazur fuel system: Add 0.3 gallons/1.14 liters

3) CRFS: Add 0.75 gallons/2.84 liters

E. Verify the fuel quantity gauge indicates “0” and the LOW FUEL segment of the caution panel is illuminated.

F. Add 6-8 gallons/22.7-30.3 liters of fuel. The LOW FUEL segment should extinguish.

G. Allow the fuel to levels to equalize in the fuel cells.

NOTE

Drain the fuel from the fuel cells using either the low point drain on the shutoff valve or the engine supply hose.

H. Drain fuel from the fuel cells until the LOW FUEL segment illuminates. Measure the amount of fuel drained.

I. The LOW FUEL segment should illuminate according to the following measurements (the measurement represents the volume of useable fuel in the fuel cells):

1) Standard fuel system: 7.0 gallons (US)/26.5 liters, ± 1.0 gallon (US)/3.79 liters

2) Aerazur fuel system: 5.0 gallons (US)/18.93 liters, ± 1.0 gallon (US)/3.79 liters

3) CRFS: 4.0 gallons (US)/14.8 liters, + 1.5 gallons (US)/5.7 liters/ - 0.5 gallons (US)/1.9 liters

NOTE

The low fuel warning switch is not adjustable in the Standard Fuel System or CRFS.

J. Aerazur Fuel Bladder System: If the LOW FUEL segment fails to illuminate or extinguish within the parameters of the test, adjust the position of the switch (para. 10-42).

10-42. Adjustment – Low Fuel Warning Switch, Aerazur Bladder System

NOTE

The low fuel warning switch is not adjustable in the Standard Fuel System or CRFS.

A. Defuel the aircraft (para. 4-5).

B. Remove the right-side fuel cell cover (para. 8-14).

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

C. Disconnect the overboard vent crossover line from the right-side fuel cell (para. 10-15).

D. Disconnect the electrical connectors for the fuel quantity and low fuel warning systems.

E. Unlace the upper portion of the fuel cell.

F. Remove the access plates (zipper) from the fuel cell.

G. Remove the upper portion of the fuel quantity probe from the fuel cell (para. 10-48).

H. Collapse the fuel cell to gain access to the low fuel warning switch mounting bracket.

NOTE

The switch must be orientated toward the front of the aircraft.

I. If the warning segment comes on early, lower the mounting bracket on the probe. If the warning segment comes on late, raise the mounting bracket on the probe.

J. Reinstall the fuel quantity probe.

K. Install the fuel cell access plates (zipper).

L. Reassemble the rest of the right-side fuel cell.

M. Perform a functional test of the low fuel warning system (para. 10-41).

N. If the aircraft was completely defueled, bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-43. Removal – Low Fuel Warning Switch

NOTE

Refer to Figure 10-4.

10-43.1 Removal – Low Fuel Warning Switch, Standard Fuel System and CRFS

A. Defuel the aircraft (para. 4-5).

B. Remove the right fuel cell:

1) Standard: Remove the right fuel cell in accordance with para. 10-4.1.

2) CRFS: Remove the right fuel cell in accordance with para. 10-4.3.

C. Remove the fuel fitting assembly from the fuel cell.

1) Standard: Remove the fuel fitting assembly in accordance with para. 10-7.1, steps B through E.

2) CRFS: Remove the flange plate assembly in accordance with para. 10-7.3, C.

D. Remove the pins from the connector housing if the special tool is available.

NOTE

Cut the wiring to ensure enough wire is available to splice when the low fuel warning switch is installed.

E. If the tool is not available, cut the wiring. Retain the electrical connector for installation of the replacement switch.

F. Remove the low fuel warning switch from the support tube assembly:

1) To facilitate removal, disassemble the support tube assembly and low fuel switch by removing the base nut.

2) Loosen the fitting of the tube assembly to release the switch.

3) Remove sealant residue from the fittings and threads on the ends of the support tube assembly.

4) To facilitate installation of the replacement low fuel switch, attach a length of safety wire (8 in/20 cm) to the end of the wiring of the switch that is to be removed.

5) Remove the switch and wiring from the tube assembly. Pull the safety wire through the tube assembly leaving adequate length to reattach to the replacement switch wiring and adequate tail length to pull the wire harness through the base of the tube assembly.

6) Detach the safety wire from the wiring.

10-43.2 Removal – Low Fuel Warning Switch, Aerazur Fuel Bladder System

A. Defuel the aircraft (para. 4-5).

B. Remove the right-side fuel cell cover (para. 8-14).

C. Remove the fuel quantity probe (para. 10-48.1).

NOTE

If not required, do not remove the switch mounting bracket from the fuel quantity probe.

D. Mark the position of the switch mounting bracket and remove the low fuel switch mounting bracket from the fuel quantity probe.

E. Remove the switch from the mounting bracket.

10-44. Inspection – Low Fuel Warning Switch

A. Inspect the switch for cracks, damage, and security.

10-45. Repair – Low Fuel Warning Switch

A. Replace the switch if it is inoperative or fails the inspection requirements.

10-46. Installation – Low Fuel Warning Switch

10-46.1 Installation – Low Fuel Warning Switch, Standard Fuel System and CRFS

A. If the tooling and parts are available, install the pins onto the wiring for the low fuel warning switch.

B. Insert the low fuel switch wiring and the switch into the support tube assembly.

1) If applicable, attach the safety wire to the wiring of the replacement switch and install switch into the mounting tube pulling the safety wire to guide the wires through the tube. Detach the safety wire.

C. If the wiring for the switch has the pins for the connector installed, install the pins into the electrical connector.

D. Splice the wiring I/A/W AC 43.13-1B if the wiring was cut for removal of the low fuel warning switch.

E. Apply PR 1440 B2 fuel sealant to the support tube threads, the base of the support tube, and the wiring exit on the bottom side of the flange plate.

F. Install the fuel fitting assembly onto the fuel cell:

1) Standard: Install the fuel fitting assembly into the fuel cell in accordance with para. 10-7.1, steps F and G.

2) CRFS: Install the flange plate assembly into the fuel cell in accordance with para. 10-7.3, E).

G. Install the right fuel cell:

1) Standard: Install the right fuel cell in accordance with para. 10-8.1.

2) CRFS: Install the right fuel cell in accordance with para. 10-8.3.

H. Perform a functional test of the low fuel warning switch (para. 10-41).

I. Bleed the fuel system I/A/W the Roll-Royce 250-C20 Series Operation and Maintenance Manual.

10-46.2 Installation – Low Fuel Warning Switch, Aerazur Fuel Bladder System

A. Install the switch onto the mounting bracket and lockwire (0.025").

NOTE

Later production aircraft require the low fuel warning switch and mounting bracket to be installed on the fuel quantity probe after the probe is inserted into the fuel cell. Refer to paragraph 10-51 for the applicable aircraft serial numbers.

B. If removed, install the mounting bracket onto the fuel quantity probe so that the top of the switch mounting bracket is 5.85 inches/14.86 cm from the bottom of the fuel quantity probe.

NOTE

The switch must be orientated toward the front of the aircraft.

C. Install the fuel quantity probe into the fuel cell (para. 10-51.3).

D. Install the right-side fuel cell access cover (para. 8-17).

E. Perform a functional test of the low fuel warning system (para. 10-41).

F. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-47. Fuel Quantity Probe (Transmitter)

10-48. Removal – Fuel Quantity Probe

NOTE

Aircraft S/N 5198 through 5255 are configured with P/N ECD4092-1 fuel quantity transmitter at the time of manufacture.

10-48.1 Removal – Fuel Quantity Probe, Standard Fuel System

NOTE

The fuel quantity transmitter is P/N ECD4092-1. See also Figure 10-1.

A. Defuel the aircraft (para. 4-5).

B. Remove the fuel quantity probe cover and gasket from the right fuel cell cover.

C. Disconnect the fuel quantity transmitter wiring.

D. Remove the safety wire.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

NOTE

The spanner nut may be used as a tool to remove the transmitter. Flip the nut over, install the slotted side over the notches of the transmitter and engage the slots in the groove around the perimeter of the transmitter. Pull up the nut to remove the transmitter.

E. Remove the spanner nut and carefully remove the transmitter.

10-48.2 Removal – Fuel Quantity Probe, Standard Fuel System

NOTE

The following procedure is applicable to 480/B S/N 5197 and Previous. See also Figure 10-1.

A. Defuel the aircraft (para. 4-5).

B. Remove the fuel quantity probe cover from the right fuel cell cover.

C. Disconnect the fuel quantity probe electrical connector.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

D. Remove the screws securing the fuel quantity probe to the mounting flange. Remove the probe and the gasket.

10-48.3 Removal – Fuel Quantity Probe, Aerazur Fuel Bladder System

NOTE

The following procedure is applicable to TH-28 S/N 3006 and previous, and 480 S/N 5012 and previous. See also Figure 10-1.

A. Defuel the aircraft (para. 4-5).

B. Remove the upper plenum/air inlet (para. 13-28) and the air deflector from the top of the cabin.

C. Remove the fuel cell cover from the right side of the aircraft.

D. Disconnect the electrical connectors for the fuel quantity probe and the low fuel warning switch from the right side fuel cell.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

E. Disconnect the overboard vent crossover line from the fuel cell (para. 10-15).

F. Unlace the upper portion of the cell from the supports.

G. Remove the access plates (zipper) from the fuel cell.

H. Loosen the clamp securing the top end of the fuel quantity probe in the mounting cup. Remove the top end of the probe from the cup.

I. Collapse the cell and loosen the clamp securing the lower end of the probe.

J. Remove the fuel quantity probe and low fuel warning switch electrical connectors from the mounting plate on the fuel cell.

K. Remove the fuel quantity probe and low fuel warning switch assembly from the fuel cell.

NOTE

If not required, do not remove the switch mounting bracket from the fuel quantity probe.

L. Remove the low fuel warning switch and bracket from the fuel quantity probe.

10-48.4 Removal – Fuel Quantity Transmitter, CRFS

NOTE

Aircraft S/N 5256 and subsequent are configured with P/N ECD4092-3 fuel quantity transmitter at the time of manufacture. See also Figure 10-2.1.

A. Defuel the aircraft (para. 4-5).

B. Remove screws (83) to remove the fuel quantity transmitter frangible cover (82) from the right fuel cell cover.

C. Disconnect the fuel quantity transmitter wiring.

D. Remove the safety wire.

NOTE

Cover all open ports and lines to prevent contamination of the fuel system.

NOTE

The spanner nut (80) may be used as a tool to remove the transmitter. Flip the nut over, install the slotted side over the notches of the transmitter and engage the slots in the groove around the perimeter of the transmitter. Pull up the nut to remove the transmitter.

E. Remove the spanner nut (80) and carefully remove the transmitter.

10-49. Inspection – Fuel Quantity Probe

A. Inspect the probe for security of installation, damage, and proper operation.

B. Inspect the electrical leads for damage and corrosion.

NOTE

Step C and D below apply to aircraft S/N 5134, 5136 through 5197.

C. Inspect the ferrite beads on the probe and probe wires for condition and security. Inspect for missing, cracked, or chipped beads. Five ferrite bead cores are installed on the fuel probe and three ferrite bead cores are installed on each of the three wire leads.

D. Transmit for 10 seconds on 136.0 MHz and observe the fuel gauge for movement. If movement is detected and the ferrite bead installation is satisfactory, remove the fuel bladder and inspect the shielding coating (para. 8-73, 8-74).

10-50. Repair – Fuel Quantity Probe

A. Replace the probe if the probe is damaged, the electrical wiring or connector is damaged, the ferrite beads are damaged or missing (S/N 5134, 5136 through 5197), or after determining the fuel quantity system is not functioning properly and the cause is the fuel quantity probe.

10-51. Installation – Fuel Quantity Probe

NOTE

Aircraft S/N 5198 through 5254 are configured with ECD4092-1 fuel quantity transmitter at the time of manufacture. See also Figure 10-1.

10-51.1 Installation – Fuel Quantity Probe, Standard Fuel System

A. Install a new O-ring in the base of the flanged cup assembly.

B. Install the fuel quantity probe into the fuel cell. Orientate the end of the probe towards the lower corner of the fuel cell. Ensure the alignment of the three locating holes on the base of the transmitter flange plate with the three alignment pins in the flanged cup assembly.

NOTE

The spanner nut may be used as a tool to install the transmitter. Install the slotted side over the notches of the transmitter and engage the slots in the groove around the perimeter of the transmitter. Push the nut to seat the transmitter in the base of the flanged cup assembly to ensure even compression with the O-ring prior to torquing. Remove the nut and flip over for installation.

C. Install the spanner nut. Torque 120 in-lbs/13.6 Nm

D. Connect the electrical wiring for the fuel quantity probe. Apply a corrosion inhibitor (para. 10-59) to the ground wire and the probe wire connections.

E. Safety (0.032") the spanner nut to one flanged cup assembly attachment bolt.

F. Check the calibration of the fuel quantity system (para. 7-85) if the fuel quantity probe was replaced or the system is suspected of being out of calibration.

G. Perform a leak check while servicing the aircraft.

H. Install conductive gasket and install fuel quantity transmitter cover.

I. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-51.2 Installation – Fuel Quantity Probe, Standard Fuel System

NOTE

The following procedure applies to 480/B aircraft prior to and including S/N 5197. See also Figure 10-1.

A. Install a new gasket on the fuel quantity probe mounting flange.

B. Install the fuel quantity probe into the fuel cell. Orientate the end of the probe towards the lower corner of the fuel cell.

C. Install the screws and torque to 25-30 in-lbs/2.8-3.4 Nm.

D. Connect the electrical connector for the fuel quantity probe.

E. Check the calibration of the fuel quantity system (para. 7-85) if the fuel quantity probe was replaced or the system is suspected of being out of calibration.

F. Perform a leak check while servicing the aircraft.

G. Apply a bead of silicon sealant (RTV type) to the fuel quantity probe cover and install the fuel quantity probe cover.

H. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-51.3 Installation – Fuel Quantity Probe, Aerazur Fuel Bladder System

NOTE

The following procedure is applicable to TH-28 S/N 3006 and previous, and 480 S/N 5012 and previous. See also Figure 10-1.

A. If removed, install the low fuel warning switch and bracket on the fuel quantity probe (para. 10-46).

NOTE

The low fuel warning switch must be orientated toward the front of the aircraft.

B. Install the fuel quantity probe into the fuel cell, place the bottom adapter into the cup on the bottom of the fuel cell, and secure in position with the retaining clamp.

C. Install the electrical connectors for the fuel quantity probe and low fuel warning switch onto the mounting plate in the fuel cell. Ensure they are properly installed or they will leak.

D. Install the upper portion of the fuel quantity probe in the upper cup of the fuel cell and secure with the retaining clamp.

E. Install the fuel cell access plates (zipper) and torque the hardware to 40-50 in-lbs/4.5-5.7 Nm.

F. Reinstall the lacing cord and secure the upper portion of the fuel cell to the support structure.

G. Connect the electrical leads for the fuel quantity probe and low fuel warning switch.

H. Connect the overboard vent crossover (para. 10-18).

I. Install the fuel cell cover (para. 8-17).

J. Install the air deflector and the upper plenum/air inlet (para. 13-31).

K. Check the calibration of the fuel quantity system (para. 7-85) if the fuel quantity probe was replaced or the system is suspected of being out of calibration.

L. Perform a functional test of the low fuel warning system (para. 10-41), adjust as required.

M. Perform a leak check while servicing the aircraft.

N. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-51.4 Installation – Fuel Quantity Transmitter, CRFS

NOTE

Aircraft S/N 5256 and subsequent are configured with P/N ECD4092-3 fuel quantity transmitter at the time of manufacture. See also Figure 10-2.1.

A. Install a new O-ring (78) in the base of the flanged cup assembly (74).

B. Install the fuel quantity transmitter (79) into the fuel bladder:

1) Ensure the alignment of the three locating holes on the base of the transmitter with the three alignment pins in the flanged cup assembly (74).

2) Orientate the end of the transmitter toward the lower corner of the fuel cell and into the rubber cup.

NOTE

The spanner nut (80) may be used as a tool to install the transmitter. Install the slotted side over the notches of the transmitter and engage the slots in the groove around the perimeter of the transmitter. Push the nut to seat the transmitter in the base of the flanged cup assembly to ensure even compression with the O-ring prior to torquing. Remove the nut and flip over for installation.

C. Install the spanner nut (80). Torque 120 in-lbs/13.6 Nm.

D. Connect the electrical wiring for the fuel quantity transmitter. Apply a corrosion inhibitor (para. 10-59) to the ground wire and the transmitter wire connections.

E. Safety (0.032”) the spanner nut (80) to one flanged cup assembly attachment bolt.

F. Service the fuel cells (para. 4-4) and check for leaks.

G. Check the calibration of the fuel quantity system (para. 7-85) if the fuel quantity transmitter was replaced or the system is suspected of being out of calibration.

NOTE

Check that gasket (77) is present. It may either be adhered to the fuel cell cover or to the underside of the frangible cover (82).

NOTE

Apply a light coat of spray adhesive (Super 77 or equivalent) to one side of gasket(s) (81) and (77, if required). Lightly tack on the sprayed side of the gasket(s) to the bottom of the frangible cover (82) to aid installation.

H. Install gasket (77), if required.

I. Install gasket (81) and install fuel quantity transmitter frangible cover (82) with screws (83) (6 places). Torque 25-30 in-lb/2.8-3.4 Nm.

J. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Series Operation and Maintenance Manual.

10-52. External Fuel Filter (Optional Equipment)

NOTE

The external fuel filter is an equipment option for the legacy fuel systems only.

10-53. Description – External Fuel Filter

An optional external fuel filter can be installed on the TH-28 (S/N 3007 and subsequent) and the 480/B (S/N 5003 and subsequent). The filter assembly, located on the left side of the pylon near the lateral trim motor assembly, is installed between the fuel shutoff valve and the engine fuel inlet. The filter assembly incorporates a drain in the bottom of the bowl assembly, a bypass valve, an impending bypass indicator which is an electrical switch that is connected to the caution panel, and a test button for checking the operation of the electrical switch. The filter element is replaced every 300 hours or when the impending bypass indicator activates.

10-54. Filter Element Replacement – External Fuel Filter

A. Pull the fuel shutoff valve to OFF.

B. Disconnect the battery.

C. Place a suitable container beneath the filter assembly drain and drain the fuel from the filter assembly and the fuel lines.

D. Remove the lockwire securing the bowl assembly and remove the bowl assembly from the filter assembly.

E. Discard the filter element, the bowl assembly O-ring, and the filter element seals.

F. Install new filter element seals, a new bowl assembly O-ring, and a new filter element.

G. Install the bowl assembly onto the filter assembly and torque to 100-150 in-lbs/11.7-17.0 Nm. Lockwire the bowl assembly to the filter assembly.

H. Open the fuel shutoff valve.

I. Connect the battery.

J. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

10-55. Removal – External Filter Assembly

A. Pull the fuel shutoff valve to OFF.

B. Disconnect the battery.

C. Place a suitable container beneath the filter assembly drain and drain the fuel from the filter assembly and the fuel lines.

D. Disconnect the electrical connector from the filter assembly.

E. Disconnect the fuel lines from the inlet and outlet ports of the filter assembly.

F. Remove the hardware securing the filter assembly mounting bracket to the pylon and remove the filter assembly from the aircraft.

G. Remove the hardware securing the filter assembly to the mounting bracket and remove the filter assembly from the mounting bracket.

10-56. Inspection – External Filter Assembly

A. Inspect the filter assembly for damage, leaks, and security of installation.

B. Inspect the mounting bracket for cracks, bends, corrosion, and security of installation.

C. Inspect the electrical connector and wiring for general condition.

D. Operate the test button and check for proper operation of the impending bypass switch.

10-57. Repair – External Filter Assembly

A. Replace the filter assembly if damage causes the assembly to be unserviceable.

B. Repair the mounting bracket I/A/W AC 43.13-1B. Replace damaged or missing hardware.

C. Repair or replace the electrical connector or wiring if damaged.

D. Replace the filter assembly if the impending bypass switch does not function properly.

10-58. Installation – External Filter Assembly

A. Install the filter assembly onto the mounting bracket.

B. Position the filter assembly onto the pylon and install the securing hardware.

C. Connect the fuel lines to the inlet and outlet ports.

D. Connect the electrical connector to the filter assembly.

E. Open the fuel shutoff valve.

F. Connect the battery.

G. Bleed the fuel system I/A/W the Rolls-Royce 250-C20 Operation and Maintenance Manual.

10-59. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Adhesive	Multipurpose Spray Adhesive, 3M brand	Super 77
Corrosion Inhibitor, Lubricant	ACF-50, Lear Chemical Research Corp.	10013 10032
Lacing, Cord	750 LB Paracord, Black	MIL-C-5040 (Type IV)
Lockwire	Lockwire (0.032”)	MS20995C32
Sealant	Fuel Tank Sealant, Class B	PR 1440 B2
Sealant	Thread Sealant, Loctite Brand	569
Thread Sealant	Thread sealant, Permatex Brand	1C
Silicone Sealant	Sealant, Dow Corning	732-RTV

D. Assemble the new seal and bearing into the bearing housing.

(1) Place a new seal (2) on the stepped end of T-0186-5. Press the seal into the bearing housing (3) (Figure 11-1c, d).

(2) Determine the amount of shims required for assembly.

a. Measure the distance from the seating surface in the bearing housing to the bottom of the retaining ring groove in the bearing housing (dimension is etched on newer bearing housings). Measure the height of the new bearing stack-up. Determine the amount of shims required to allow .000/.003 inch (.000/.076 mm) pinch fit between the bearing and the retaining ring.

(3) Install the shim stack-up from step (2) into the bearing housing (3).

CAUTION

When installing the bearing set into the bearing housing, pressure may be applied to only the outer race. Damage to the bearing will occur if pressure is applied to the inner race.

NOTE

The bearing set consists of a pair of bearings. The word THRUST on the face of the outer ring indicates the thrust side of the bearing. Also, on the thrust side will be an * mark on the face of the outer ring and an * mark on the face of the inner ring. When installing the bearing set into the bearing housing, best results will be obtained if the bearing set is positioned thrust sides facing together and with the * marks aligned axially (outer * to outer * and inner * to inner *).

(4) Place the bearing housing with the shims installed in the press. Use T-0186-7 to push the bearing set (5) into the bearing housing (Figure 11-1e).

(5) Install the retaining ring (6).

CAUTION

When installing the clutch assembly, pressure may be applied to only the inner race. Damage to the bearing will occur if pressure is applied to the outer race.

(6) Place the clutch assembly (1) in the press. Carefully place the bearing housing (3) onto the clutch shaft and press the bearing housing onto the clutch shaft (Figure 11-1f, g).

(7) Install the retaining ring (7).

E. If a different engine and/or accessory gearbox has been installed in the aircraft, determine if an offset bearing housing is required in accordance with paragraph 13-117, I and install the correct offset bearing housing on the ORC (para. 11-7. D)

11-8. Installation - Overrunning Clutch

NOTE

Replace all used O-rings/packings and gaskets.

CAUTION

Use a backing wrench to prevent damaging fluid/air lines and fittings.

CAUTION

If an offset bearing housing is installed on the ORC, ensure that the notches in the bearing housing are orientated in accordance with the previous maintenance entry or in accordance with the new orientation for the new engine/accessory gearbox combination from paragraph 13-117, I.

A. Lubricate (MIL-PRF-23699) the O-ring (8) on the ORC bearing housing (3). Install a new gasket (9) on the bearing housing. Install the ORC into the accessory gearbox.

B. Install and torque the mounting nuts (10) and washers (11).

C. Install the power output shaft (para. 11-14), if required.

NOTE

The power output shaft must be installed to perform steps C through E.

D. Install the spacer/shim (12) and/or required amount of shims (13) to have .004" to .006" distance/clearance between the spacer/shims and the retaining ring. Install the retaining ring (14).

NOTE

Install the spacer/shim and/or shims so that the thickest item is against the retaining ring.

E. Install the clutch cover (16), O-ring (15), and retaining ring (21). Replace the service plug O-rings (17) and the sight glass O-ring (19). Torque two of the service plugs (18) and sight glass (20) to 20 in-lb/2.3 Nm and lockwire (.025") to the cover.

NOTE

Step F is applicable to aircraft equipped with the vented clutch oil reservoir.

F. Connect the vented clutch oil reservoir oil lines.

G. Service the clutch (para. 4-10). Torque the remaining service plug to 20 in-lbs/2.3 Nm and lockwire (.025") to the cover.

H. Check for leaks.

I. Install the Py-Pg pneumatic line between the fuel control and the power turbine governor. Refer to the Rolls-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

J. Install the engine fuel pump assembly. Refer to the Roll-Royce 250-C20 Series Operation and Maintenance Manual (10W2).

K. Connect the fuel filter differential pressure lines, fuel pump seal drain line and the fuel supply line to the fuel pump.

12-84. Inspection – Upper Swashplate Assembly

A. See Table 12-3 for the detailed inspection requirements for the upper swashplate assembly.

12-85. Assembly – Upper Swashplate Assembly (Figure 12-21)

NOTE

If installing a new bearing, remove the seal from one side of the bearing.

WARNING

Use extreme caution when removing or installing heated parts and assemblies to prevent from injuring personnel.

WARNING

Use protective gloves when handling heated parts.

A. Heat the bearing housing (8) to approximately 250°F/121°C.

B. Lubricate (MIL-PRF-81322) the O.D. of the bearing and the I.D. of the housing. Install the bearing (7) with the open side of the bearing against the closed side of the housing. The bearing must be seated against the inboard flange of the housing. Allow the assembly to cool.

C. Calculate the thickness of the shims (6) required to preload the bearing in the housing using the following procedures:

(1) Use a depth micrometer to measure the distance from the face of the bearing to the face of the housing.

(2) Subtract .003 inch/.08 mm from the measurement in step (a) to equal the required amount of shims.

D. Place the shims on the face of the housing.

E. Install the bearing retainer (5) and secure with screws. Torque the screws in an alternating sequence and lockwire (.025) in pairs.

F. Install tool (T-1709) on the inner race on the sealed side of the bearing. Place the slinger (10) on the open side of the bearing and press the spacer (11) into the inner race of the bearing.

G. Clean the guide tube bores of the control housing (13) and the O.D. of the DU bushings (12) with Loctite Primer.

Table 12-3. Upper Swashplate Assembly

			Inspection Requirements*			
P/N	Fig. 12-21 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action
28-16113-1	1	Nut	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Nut
			Hex corners for rounding or deformation	None Allowed	Not Repairable	Replace Nut
28-16126-1	2	Lock Plate				Replace on re-assembly
28-16112-15, -17	3	Housing	Guide tube bore Dia. .9062 to .9069	+.0003	Not Repairable	Replace Housing
			Nicks and gouges	.005 deep	≤ .025 deep	Blend and polish out smooth
			Threads (crossed or missing)	None Allowed	Not Repairable	Replace Housing
28-16043-19	5	Bearing Retainer	Nicks and scratches	.005 deep	≤ .010 deep	Blend and polish out smooth
ECD013-11	7	Bearing	O.D. 3.9370	-0.0004	Not Repairable	Replace Bearing
			I.D. 2.5591	+.0000 -.0004	Not Repairable	Replace Bearing
			Condition of balls and cage after cleaning	No pits or flat spits allowed	Not Repairable	Replace Bearing

H. Apply adhesive (Loctite #277) to the O.D. of the DU bushings and press the bushings into the bearing housing until they are flush with the face of the control housing. Rotate the assembly and repeat the installation on the opposite end.

I. Install the control housing on the guide tube assembly (15) with the large flange of the housing facing toward the threaded end of the guide tubes.

J. Place the guide tube assembly in an arbor press with the threaded end of the guide tubes up.

K. Lubricate (MIL-PRF-81322) the guide tubes and the I.D. of the holes in the spacer installed in the bearing housing assembly. Press the housing assembly onto the guide tubes with the slinger facing the bearing housing on the guide tube assembly.

L. Lubricate the I.D. of the holes in the bell housing (3) and press the housing onto the guide tubes. Ensure the bell housing is seated into the bearing.

M. Slide the bearing housing up and down on the guide tubes. If the housing is excessively tight or binding, mark the positions of the bell housing, spacer, and the bearing housing on the guide tubes. Press the assembly apart, rotate the above items 120° on the guide tubes and reassemble the components. Re-check to be sure the bearing housing slides with no interference.

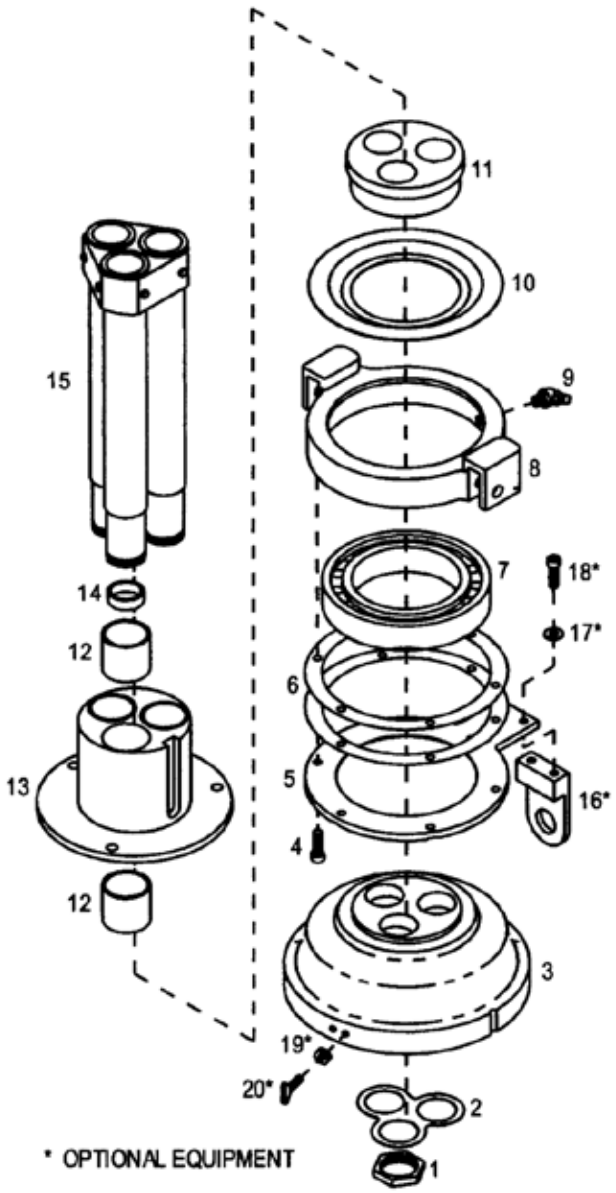
N. Clean the threads of the guide tubes and the nuts (1) with Loctite Primer.

O. Install the aluminum blocks T-1758 on the control housing (13) and clamp in a vise with the bell housing up.

P. Install the lock plate (2) on the guide tubes.

Q. Apply Loctite 277 to the threads of the nuts and install the nuts onto the guide tubes. Torque the nuts to 240 in-lb/27.1 Nm using special socket T-0086.

R. Bend the lock plate against two flats of each nut.



1.	Nut	11.	Spacer
2.	Lock Plate	12.	Bushing
3.	Bell Housing	13.	Control Housing
4.	Screw	14.	Bushing
5.	Bearing Retainer	15.	Guide Tube Assembly
6.	Shims	16.	Magnetic Pickup Bracket
7.	Bearing	17.	Washer
8.	Bearing Housing	18.	Screw
9.	Lube Fitting	19.	Nut
10.	Slinger	20.	Interrupter

Figure 12-21. Upper Swashplate Assembly

12-120. Tail Rotor Pitch Change Links

12-121. Removal – Tail Rotor Pitch Change Links (Figure 12-28, Figure 12-29)

NOTES

Index mark (color code) the pitch change links.

Pitch change links P/N 28-16345-11 or P/N 28-16391-1 must be installed as same part number pairs (either two P/N 28-16345-11 or two P/N 28-16391-1). Pitch change links P/N 28-16391-3 or P/N 28-16391-5 may be installed in combination with each other but not in combination with P/N 28-16345-11 or P/N 28-16391-1. For the barrel type, the pitch change link length and rod end orientation has been set at the factory. Do not disassemble unless the rod ends need replacement.

Paragraphs 12-122 and 12-125 apply to the barrel type pitch change links only.

A. Disconnect the pitch change links from the tail rotor pitch arms. Keep the bolt and washer stack up together for each pitch change link.

B. Remove the hardware securing the pitch change links to the retainer. Remove the pitch change links and spacers from the retainer.

12-122. Disassembly – Tail Rotor Pitch Change Links

A. Loosen the jam nuts from the barrel and remove the rod ends from the barrel.

12-123. Inspection – Tail Rotor Pitch Change Links

A. Inspect the pitch change links for cracks, corrosion, bends, damage, and proper and secure installation.

B. Inspect the rod ends for excessive play.

12-124. Repair – Tail Rotor Pitch Change Links

A. Corrosion, nicks, or scratches in the solid link, barrel, or rod end outer race not exceeding .010"/.25 mm deep may be burnished out. Replace the solid link, barrel, or rod end if cracked or damage exceeds .010"/.25 mm deep.

B. Replace the rod end (28-16345-X) or the pitch change link (28-16391-X), as applicable, if its axial play exceeds .005"/.13 mm.

C. Correctly install improperly installed pitch change links.

12-125. Assembly – Tail Rotor Pitch Change Links

A. Install the jam nuts onto the rod ends and apply Loctite (VC-3) to the threads of the rod ends.

B. Install the right hand rod end into the barrel until the threads completely cover the witness hole in the barrel.

C. Install the left hand rod end into the barrel until the overall length of the pitch change link measures 4.260” ± 0.005”/10.82 cm ± 0.13 cm. Orientate the rod ends 30° from each other (Figure 12-29).

12-126. Installation – Tail Rotor Pitch Change Links (Figure 12-28, Figure 12-29)

NOTE

If the pitch change links (barrel type) being installed are from the factory or the length and rod end bearing orientation are known to be satisfactory (removed serviceable), or if the pitch change links being installed are the solid type, omit steps A and D through F.

A. Lock the tail rotor control pedals in the neutral position.

NOTE

For aircraft manufactured or modified with P/N 28-16391-3 or 28-16391-5 pitch link assemblies, the rod end labeled “**T/R “ BLADE”**, must be installed in the proper orientation as shown in Figure 12-28.

B. Install the left hand thread rod end of the pitch change link and the spacers (3) into the retainer. Install the bolts (1) so that heads are in the direction of rotation, washers (2 & 5), and nuts (6). Torque the nuts and install the cotter pins.

C. Connect the right hand thread rod ends to the pitch arms with the hardware in the following sequence: bolt (1) (bolt head installed in direction of rotation), Harper washer (8), thin spacer (9), O-ring (11), pitch change link rod end (4) (see Note above), thick spacer (10), washer (13), pitch arm, washer(s) (5, 13) (use stack-up retained from para. 12-121,A), and nut (6). Torque the nuts (55-75 in-lb/6.2-8.5 Nm) and install the cotter pins (7). (See also SDB T-055 and SIL T-027, latest revision, respectively.)

NOTE

Omit Steps D and E for aircraft with P/N 28-16391 pitch link assemblies.

D. Adjust the length of the pitch change link assemblies to 4.26"/10.82 cm and center the rod end bearings referenced to the pitch link retainer and the pitch horn. Tighten the jam nuts against the barrel while holding the barrel with a wrench. Recheck for the correct length (4.26"/10.82 cm) and that the rod ends are still centered, adjust as required.

CAUTION

Ensure the right hand thread rod ends are still turned past the witness holes.

E. Using a piece of safety wire, check to ensure the right hand thread rod ends are still turned past the witness holes, adjust as required.

F. Remove the fixture used to center the tail rotor control pedals.

12-127. Consumable Materials List

ITEM	DESCRIPTION	PART NUMBER
Adhesive	“Hot Stuff” Brand	HS-3
Cleaner	Contact Cleaner (any brand)	
Corrosion Preventive Compound	Corrosion Preventive Compound, Black Bear Brand	Par-Al-Ketone[1]
Grease	Grease, Lubriplate Brand	630-AA[2] (06701)
Grease	Grease	MIL-PRF-81322
Lockwire	Lockwire, .025”	MS20995C25
Lockwire	Lockwire, .032”	MS20995C32
Oil	Any grade internal combustion engine motor oil	
Retaining Compound	Loctite 635	63531
Solvent	Citra-Safe, Inland Technology Incorporated	6850-01-378-( )
Solvent	Extreme Simple Green, Sunshine Makers, Inc.	13440
String	Cotton string	
Tape	Double back foam tape, 3M Brand	4016-1
Thread Sealant	Thread sealant, Loctite 277	27731
Thread Sealant	Thread sealant, Loctite Threadlocker Blue 242[3]	24200
Thread Sealant	Thread sealant, Vibra-Tite Brand	VC-3

[1] Or MIL-C-52, Type 1
[2] MIL-PRF-81322 is an acceptable alternate.
[3] Acceptable alternate for Vibra-Tite VC-3.

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