



400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE INFORMATION REPORT

AIR 1899

Issued August 1985
Revised

AIRCRAFT HYDRAULIC SYSTEM CHARACTERISTICS

1. PURPOSE: The purpose of this document is to provide system design information on various aircraft fluid power systems.
2. SCOPE: Supply data comparing various aircraft fluid power system design requirements in order to provide a more complete frame of reference for future aircraft fluid power system design.

3. DEFINITION:

The following design information will be provided:

Design Specification	Governing military specifications.
System pressure	Fluid power system operating pressure.
Hydraulic fluid	Type of fluid aircraft system designed for.
Accumulator data	Usage, volume, and precharge requirements.
Reservoir data	System reservoir requirements - volume and pressure.
System quiescent flow	Flow requirements for each individual system.
Hydraulic pump data	System pump requirements.
Auxiliary pump data	System auxiliary pump or back-up data.
Tubing data	Material, size and usage.
Fitting data	Material, size, type and connection.
Temperature	Specific system temperature.
Seal material type	System seal material and usage.
Filtration	System filtration data.
Hydraulic motor data	System hydraulic motor requirements.
Hand pump data	Pressure, displacement requirements.
Relief valve setting	Max. flow pressure and min. reseal pressure.

4. GENERAL: The information exchange may be used to find similar type systems, components, and materials which will in turn help solve problems and lower costs. If more detailed information is required, direct contact with the aircraft manufacturer will help resolve the particular problem or question.

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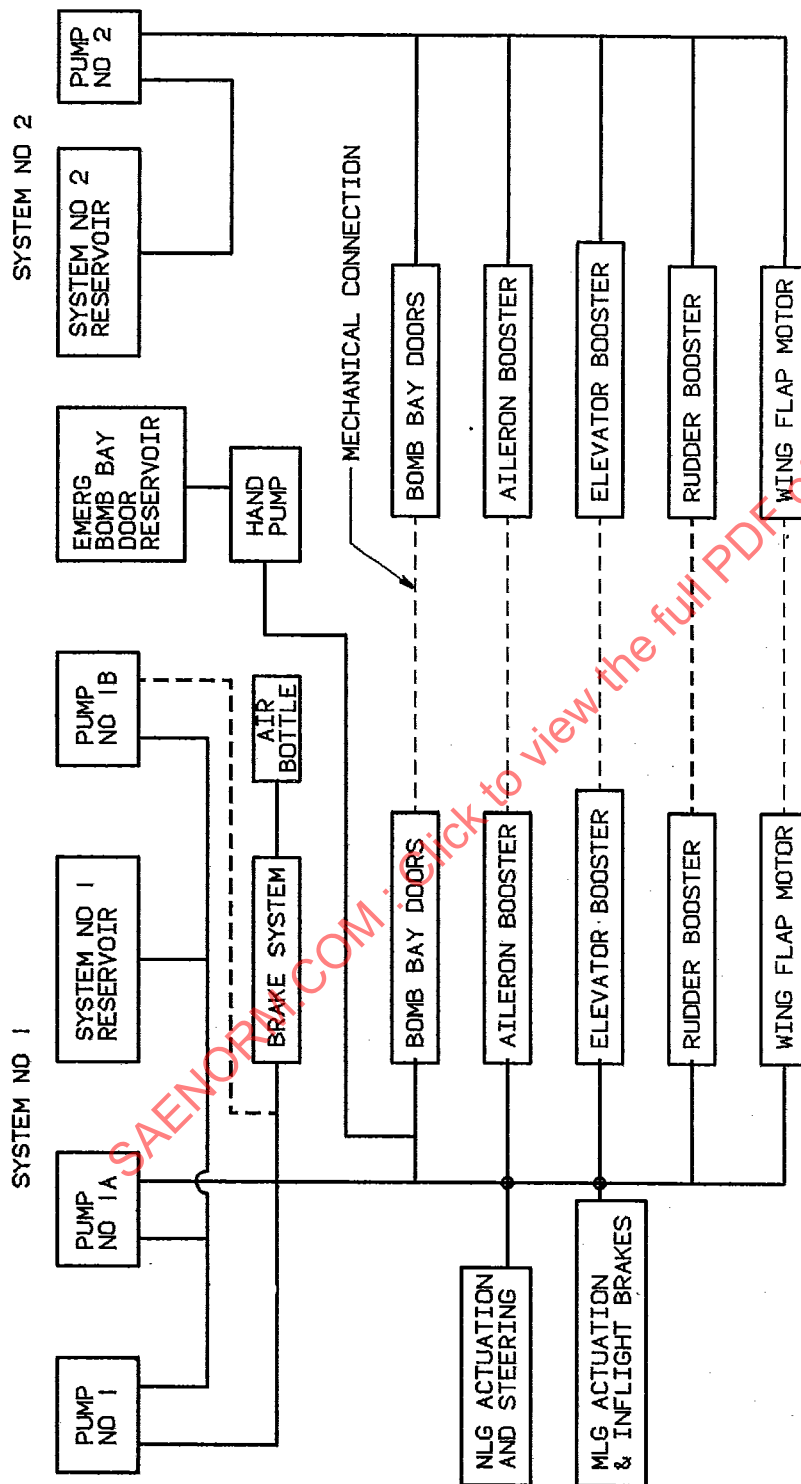
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PREPARED BY THE
 MILITARY AIRCRAFT AND HELICOPTER PANEL OF
 SUBCOMMITTEE A-6A, FLUID POWER
 SYSTEMS OF
 SAE COMMITTEE A-6,
 AEROSPACE FLUID POWER AND CONTROL TECHNOLOGIES

AIRCRAFT - P-3

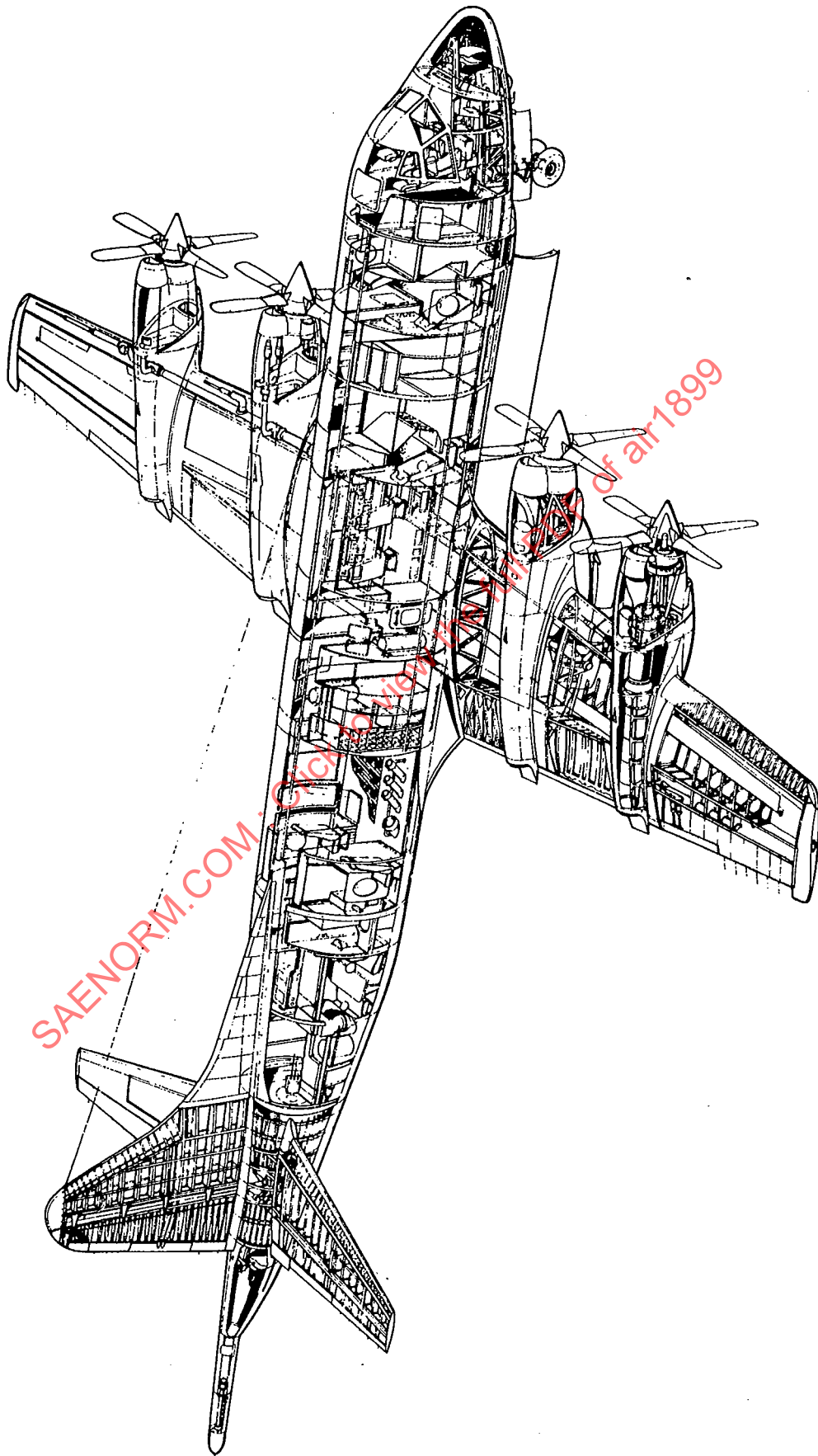
1. DESIGN SPECIFICATION			MIL-H-5440 D			
2. SYSTEM PRESSURE			3000 PSIG			
3. HYDRAULIC FLUID			MIL-H-5606			
4. ACCUMULATOR DATA			USAGE		VOLUME	PRE-CHARGE
			BRAKE ACCUMULATOR STEERING CONT VALVE ACCUM		200 CUIN 4.0 CUIN	800 PSI SPRING
5. RESERVOIR DATA TYPE AND PRESS FULL SYSTEM VOLUME RESERVOIR VOLUME			SYSTEM NO. 1		SYSTEM NO. 2	
			AIR/OIL 12 PSI 1155 CU IN 3742 CU IN 1294 CU IN		AIR/OIL 12 PSI 231 CU IN 924 CU IN 231 CU IN	
6. SYSTEM QUIESCENT FLOW			SYS NO 1, 0.3 GPM		SYS NO 2, 0.3 GPM	
7. HYDRAULIC PUMP DATA TYPE RATED FLOW @ NOTED PRESSURE CASE FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END MOTOR/PUMP SPEED RATIO			SYS NO 1, 2 UNITS		SYS NO 2, 1 UNIT	
			ELECT MOTOR DRIVEN-3/ 200/115 V.AC 8.0 GPM AT 0 TO 2200 PSI 6.0 GPM AT 2950 +50/-0 PSI 0.0 GPM AT 3000 +150/-0 PSI 1.8 GPM MIN @ 8.0 GPM RATED FLOW 0.598 CU IN/REV 3200 RPM, PUMP & 11400 RPM, MOTOR CCW 3.3625			
8. AUXILIARY PUMP INPUT POWER TYPE PRESSURE-FLOW SPEED DISPLACEMENT VOLTS AMPS HP/KW			AUXILIARY BRAKE SYSTEM			
			ELECT MOTOR DRIVEN-28 V.DC 0.20 GPM AT 3000PSI (PRESS SWITCH CONTROLLED) FIXED DISPLACEMENT (GEAR TYPE) 18 TO 30 V.DC 32 AMPS AT 26V MAX .42 HP/KW			
9. TUBING DATA	DIA(IN)	W.T.(STL)	W.T.(AL)	SPECIFICATION		USAGE
	0.250	0.030	0.035	PRESSURE LINES		PRESS
	0.250	0.016		CRES 304 1/8 H		PRESS
	0.250			PER AMS 5566		RETURN
	0.375	0.028	0.035	RETURN LINES		PRESS
	0.375			AL ALLOY 6061-T6		RETURN
	0.500	0.035	0.035	PER WW-T-606/T6		PRESS
	0.500					RETURN
	0.625	0.042	0.035			PRESS
	0.625					RETURN
	0.750	0.049	0.035			PRESS
	0.750					RETURN
10. FITTING DATA			MS FLARELESS			
11. TEMPERATURE RANGE			-45°F TO +160°F			
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)						
13. FILTRATION MAIN RETURN CASE DRAIN FLIGHT CONTROL & SUBSYSTEM			5 MICRON ABS			
			5 MICRON ABS			
			25 MICRON ABS			
			15 MICRON ABS			
14. HYDRAULIC MOTOR DATA			(WING FLAP DRIVE) 2.8 GPM 0.095 CIR			
15. HAND PUMP DATA			AN6248-2 0.7 CU IN/CYCLE			
16. RELIEF VALVE SETTINGS			*SYS NO 1, SYS NO 2 & AUX SYS: 3450 PSI MAX AT 8 GPM & 3200 PSI MIN, RESEAT *RESERVOIR VENT, 12 PSI MAX AT 16 GPM OR MINUS 1 PSI AT 2 CFM OF FILTERED AIR			



P-3 HYDRAULIC SYSTEM BLOCK DIAGRAM

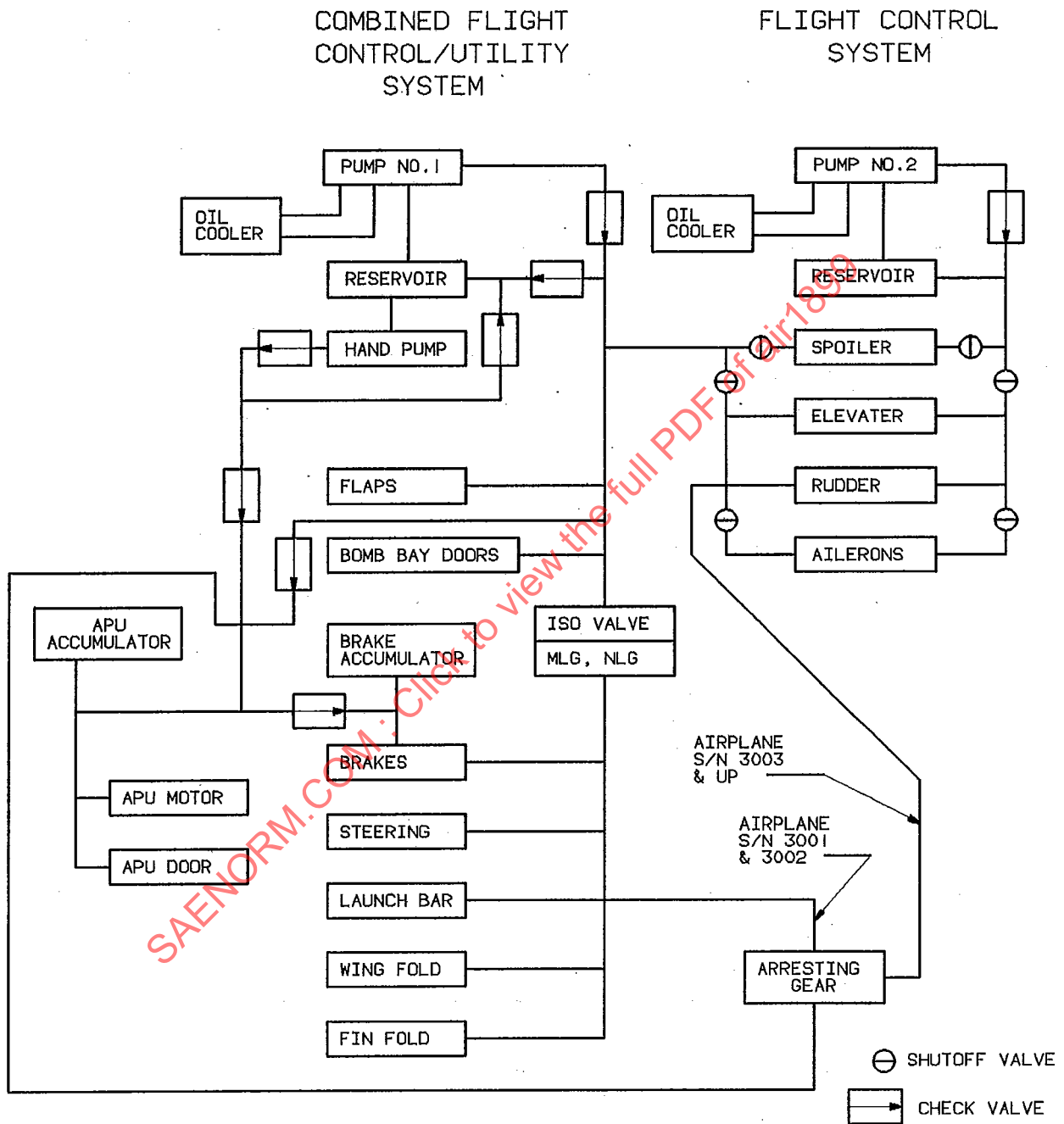
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LOCKHEED P-3C ORION



AIRCRAFT - S-3A

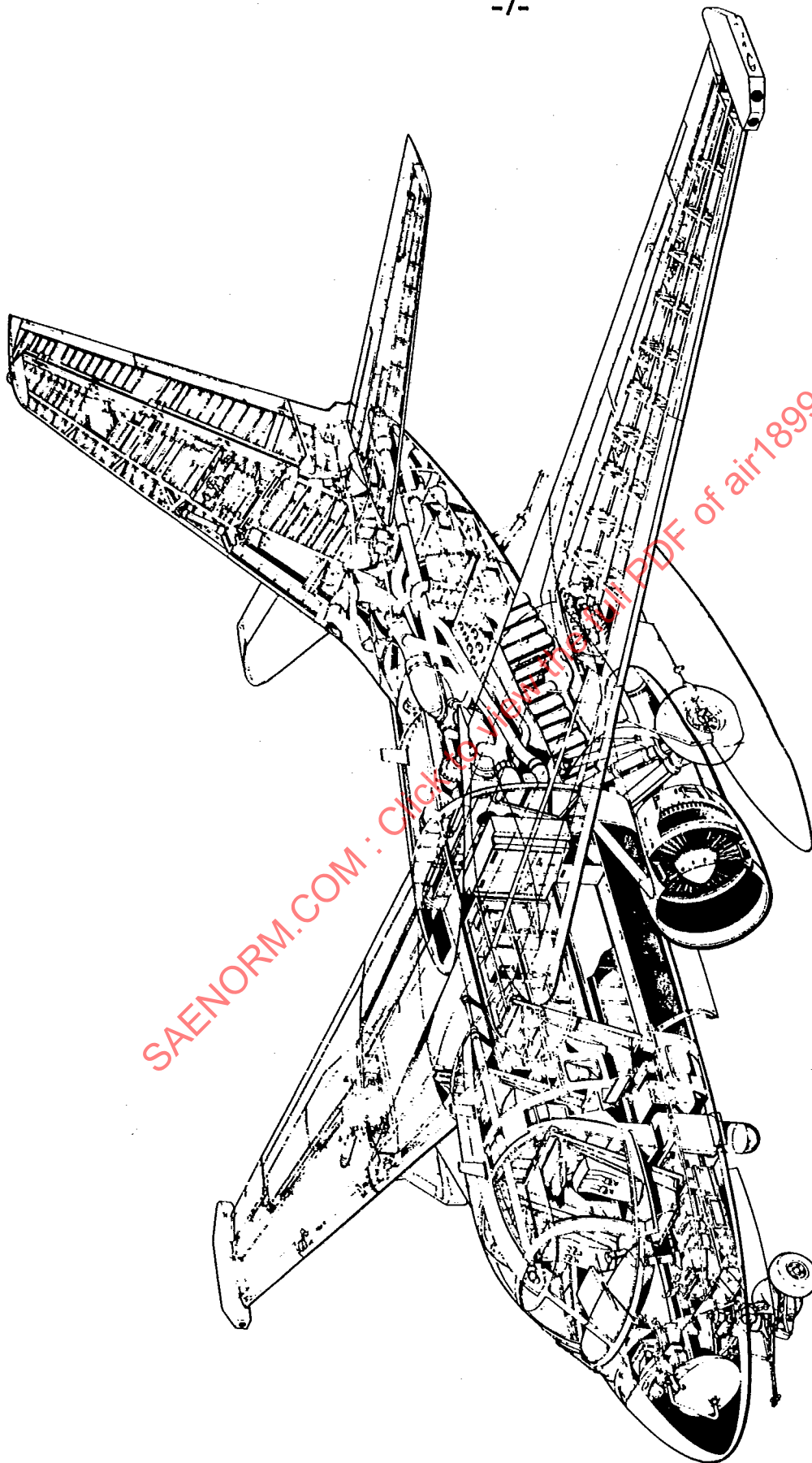
1. DESIGN SPECIFICATION			MIL-H-5440 D			
2. SYSTEM PRESSURE			3000 PSIG			
3. HYDRAULIC FLUID			MIL-H-5606			
4. ACCUMULATOR DATA			USAGE		VOLUME	PRE-CHARGE
			APU ACCUMULATOR EMER BRAKE ACCUMULATOR		250 CU IN 129 CU IN	1900 PSI 1000 PSI
5. RESERVOIR DATA TYPE AND PRESS FULL SYSTEM VOLUME RESERVOIR VOLUME			COMBINED SYSTEM		FLIGHT CONT SYSTEM	
			BOOTSTRAP, 93 PSI 693 CU IN 3241 CU IN 1340 CU IN		BOOTSTRAP, 93 PSI 208 CU IN 968 CU IN 323 CU IN	
6. SYSTEM QUIESCENT FLOW			COMBINED SYS. 0.3-0.5 GPM		FLT CONT SYS 0.3-0.5 GPM	
7. HYDRAULIC PUMP DATA TYPE PRESSURE RATED FLOW CASE FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END ENG/PUMP SPEED RATIO PUMP DATA GROUND IDLE APPROACH LONG RANGE CRUISE CLIMB MILITARY			FLIGHT SYSTEM		COMBINED SYSTEM	
			SAME PUMP DATA AS COMBINED SYSTEM		ENGINE DRIVEN 2875 PSI MIN FULL FLOW 28.8 GPM 3.0-4.2 GPM RATED FLOW 1.24 CU IN/REV 5890 RPM 630 IN-LB MAX CCW 0.329 3718 RPM 5149 RPM 5149 RPM 5758 RPM ----	
8. AUXILIARY PUMP DATA						
9. TUBING DATA		DIA(IN)	W.T.(STL)	W.T.(TI)	SPECIFICATION	USAGE
		0.188	0.016		21-6-9 CRES PER AMS 5561	NLG UNLOCK PRESS PRESS & RETURN PRESS & RETURN PRESS RETURN PRESS RETURN PRESS RETURN RETURN & SUCTION
		0.250	0.016			
		0.375	0.020			
0.500	0.026					
0.500	0.020					
0.625	0.033					
0.625	0.020					
0.750	0.039					
0.750	0.020					
1.000	0.026					
	0.250		0.035	COMM. PURE TITA.	L.G. UP & DOWN	
	0.375		0.035	LCC SPEC C-08-1335	COILED TUBES	
	0.500		0.035		WING FOLD COILED TUBES	
10. FITTING DATA			BRAZED CONNECTIONS, MS FLARELESS REMOVABLE CONN.			
11. TEMPERATURE RANGE			-65°F TO +275°F			
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)						
13. FILTRATION MAIN RETURN CASE DRAIN			5 MICRON ABS 5 MICRON ABS 5 MICRON ABS			
14. HYDRAULIC MOTOR DATA			BOMB BAY DOORS-2.97 GPM, 0.05 CIR WING FOLD 0.25 CIR			
15. HAND PUMP DATA			AN6248			
16. RELIEF VALVE SETTINGS			*COMBINED & FLIGHT CONT SYS, 3700 PSI MAX AT 29 GPM & 3175 PSI MIN RESEAT *COMBINED SYS RESERVE, 3400 PSI MAX AT .5GPM & 3200 PSI MIN RESEAT *COMBINED & FLIGHT CONT RESERVE OVERB'D 140 PSI MAX AT 25 GPM & 115 PSI MIN RESEAT *ACCUM THERMAL, 3850 PSI MAX AT 30GPM & 3390 PSI MIN RESEAT			



S-3A HYDRAULIC SYSTEM BLOCK DIAGRAM

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LOCKHEED 8-3A VIKING



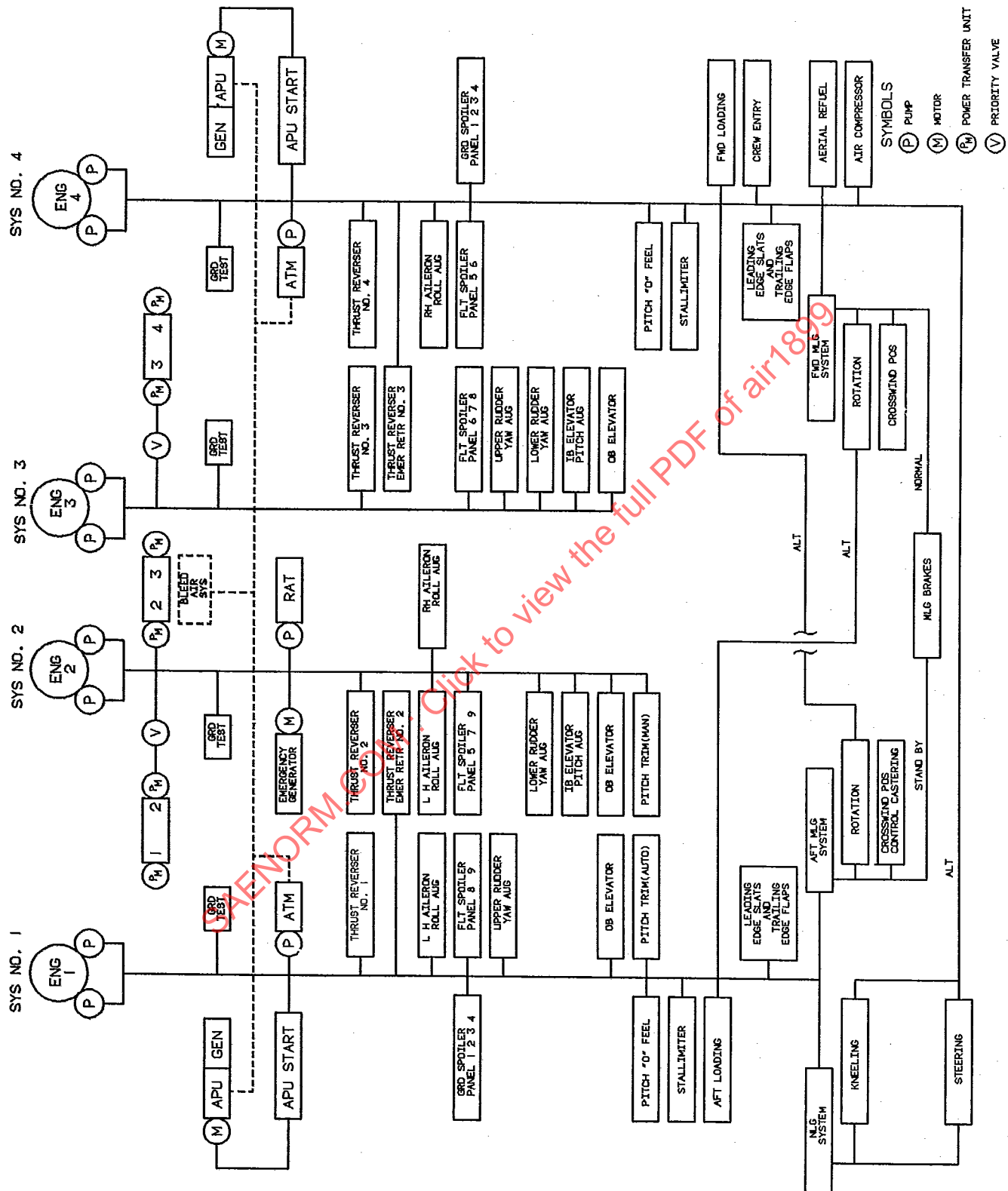
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AIRCRAFT - C-5A

1. DESIGN SPECIFICATION		MIL-H-5440 D					
2. SYSTEM PRESSURE		3000 PSIG					
3. HYDRAULIC FLUID		MIL-H-5606					
4. ACCUMULATOR DATA		USAGE		VOLUME	PRECHARGE		
		APU START (SELF DISPLACEMENT) RAM AIRTURBINE-EXTEND		500 IN ³ 500 IN ³	1500 PSI 1500 PSI		
5. RESERVOIR DATA TYPE PRESSURE FULL RESERVOIR VOLUME		COMBINED SYSTEM	FLIGHT SYSTEM		HYD. DRIVEN		
		TWO (2) SYSTEMS UNPRESSURIZED BOOST PUMP 10 GALS	TWO (2) SYSTEMS UNPRESSURIZED BOOST PUMP 5.7 GALS				
6. SYSTEM QUIESCENT FLOW		10 GPM	10 GPM				
7. HYDRAULIC PUMP DATA TYPE PRESSURE RATED FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END ENGINE TO PAD RATIO		ENGINE DRIVEN, VARIABLE VOLUME (8) 2/ENGINE 3000 PSI 60 GPM (AT CRUISE) 3.0 IN ³ /REV 5000 RPM (FULL FLOW) 1500 IN.POUNDS					
7A. PUMP DATA GROUND IDLE FLIGHT CRUISE		3250 RPM (40 GPM) 5000 RPM (60 GPM)					
8. AUXILIARY PUMP DATA TYPE PRESSURE FLOW SPEED DISPLACEMENT HYD. SYSTEMS		AIR TURBINE 3000 PSI 40 GPM 5200 RPM 1.8 CU. IN./REV 1 & 4	RAM AIR 3000 PSI 32-40 GPM 5250-6800 RPM 1.5 CU. IN./REV 2	POWER TRANSFER UNITS 3000 PSI 35 GPM 5600 RPM 1.52 CU. IN./REV 1/2, 2/3, 3/4			
9. TUBING DATA		DIA	W.T. (STL)	W.T. (AL)	SPECIFICATION	USAGE	
		0.250	0.016	0.020	AM 350 CRT (FOR STL)	PRESSURE	
		0.375	0.018	0.020			
		0.500	0.020	0.028			
		0.625	0.022	0.035			
		0.750	0.026	0.049	6061-T6 (FOR AL)	RETURN SUCTION RETURN SUCTION RETURN SUCTION	
		1.000	0.035	0.049			
		1.250	0.043	0.035			
		1.250		0.065			
		1.500	0.052	0.035			
1.500		0.072					
1.750		0.035					
10. FITTING DATA REPAIR:		SIZE RANGE	TYPE	MATERIAL	CONNECTION		
		1/4-1/2	PERMANENT & DETACHABLE	17-4PH	MS WELDED		
11. TEMPERATURE RANGE		-65F TO +275F					
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)		PISTON MS 28775 BUNA-N O-RINGS MS 28778 BUNA-N O-RINGS					
13. FILTRATION MAIN-PRESSURE RETURN CASE DRAIN FLIGHT ACTUATORS		15 MICRON ABS 5 MICRON ABS 5 MICRON ABS 15 MICRON ABS					
14. HYDRAULIC MOTOR DATA		SYSTEM	DISPLACEMENT (CU. IN./REV)	SPEED (RPM)	PRESSURE (PSI)	FLOW (GPM)	TORQUE (IN-LB)
		FLAPS(2)	1.5	3946	3000	26	700
		STAB. TRIM	0.37/0.95	4000/6500	3000	6/27	180/450
		M.L. GEAR(4)	0.6	7500	3000	20	300
		N.L. GEAR	0.6	4500	3000	12	300
		NLG DOOR(2)	0.6	5400	3000	14	300
		NOSE VISOR	0.6	4500	3000	12	300
		CARGO DOOR	0.6	6500	3000	17	300
		APU START(2)	0.37	10,000	3000	16	180
		EMER. GEN.	0.22	12,000	3000	10.2	100
15. HAND PUMP DATA		STANDARD 1 CU. IN./STROKE PUMP TO CHARGE APU START ACCUMULATORS					

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SECTION 4.3



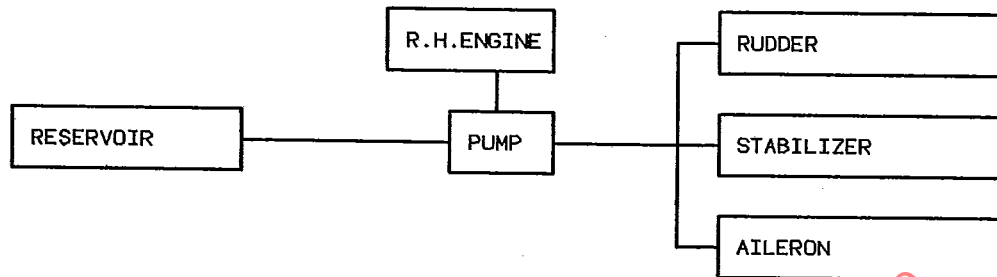
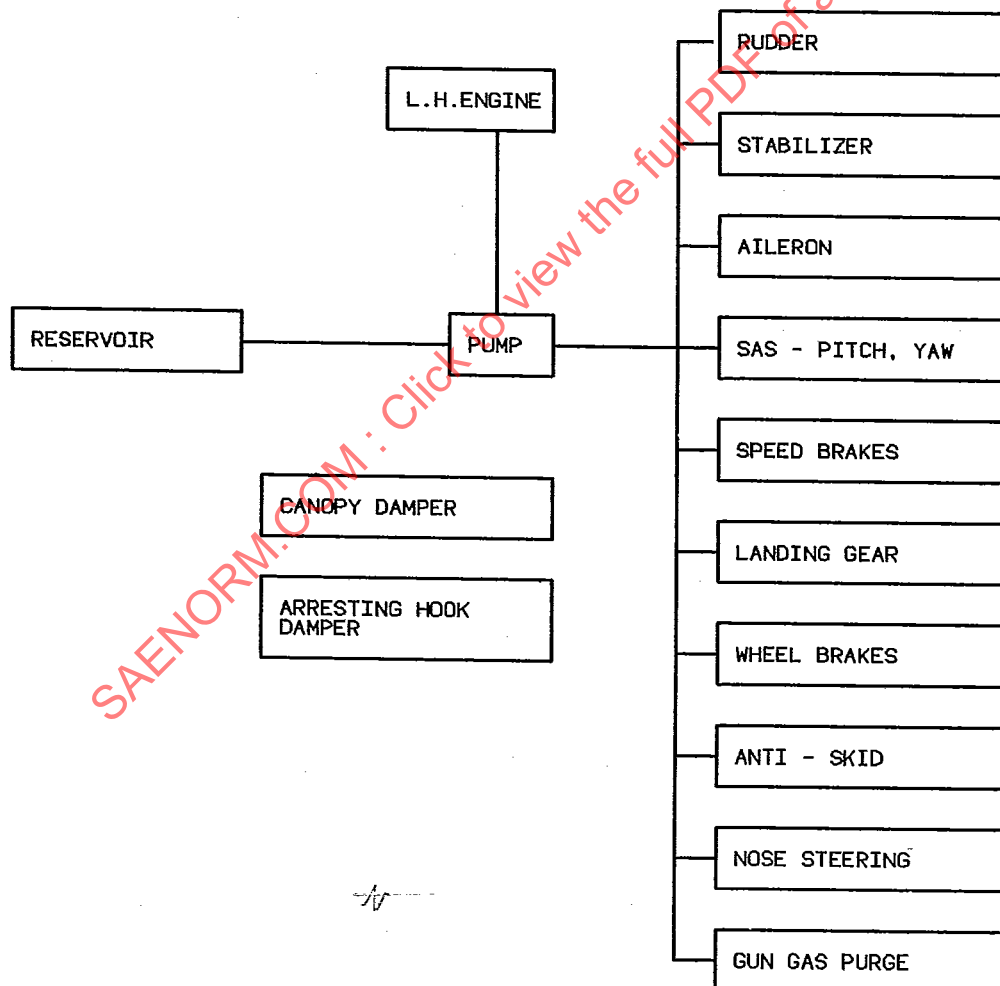
C-5A HYDRAULIC SYSTEM POWER DISTRIBUTION

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SECTION 4.4

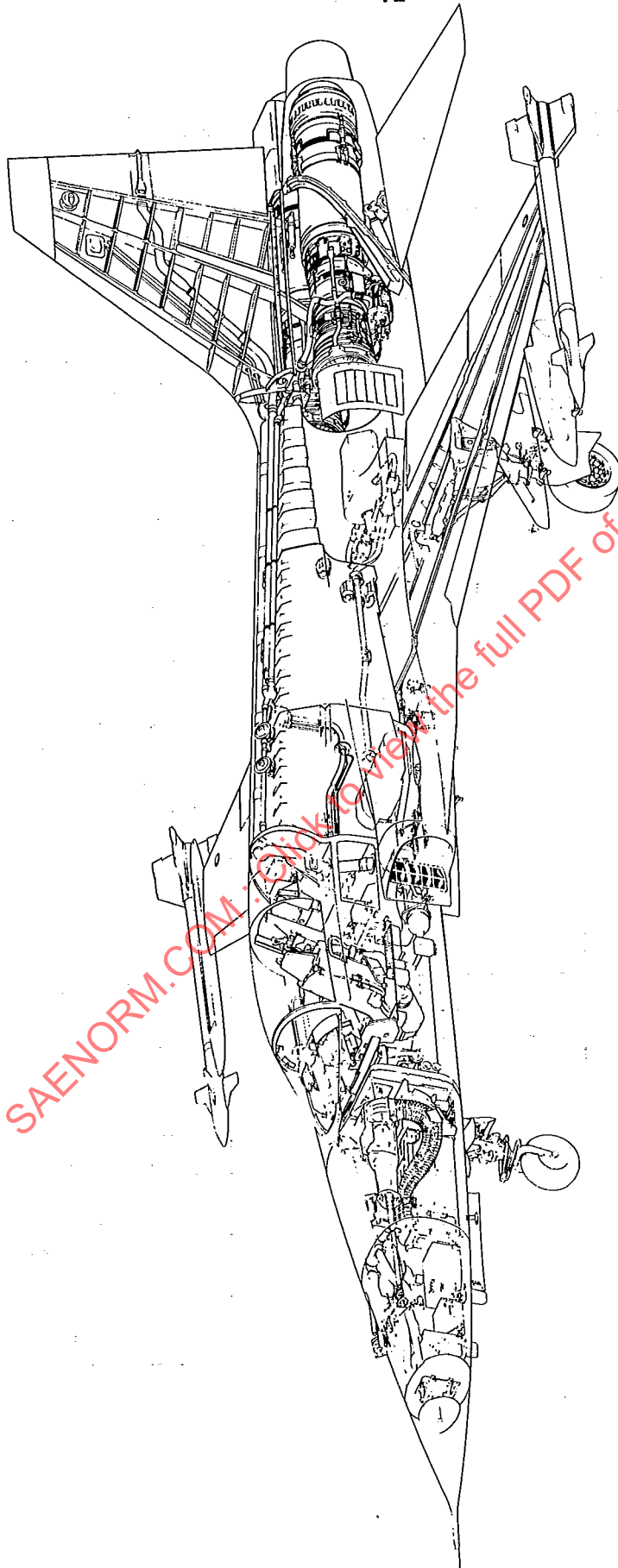
AIRCRAFT - F-5E

1. DESIGN SPECIFICATION	MIL-H-5440 B (ALSO D & F)				
2. SYSTEM PRESSURE	3000 PSI				
3. HYDRAULIC FLUID	DESIGNED FOR MIL-H-5606				
4. ACCUMULATOR DATA	NONE				
5. RESERVOIR DATA	UTILITY & FLT. CONTROL SYSTEM				
TYPE AND PRESS FILL LEVEL SYSTEM VOLUME RESERVOIR VOLUME REFILL VOLUME	AIR / OIL 16 PSIG 428 CU.IN. 1100 CU.IN. UTILITY - 525 CU.IN. F. C. 477 CU.IN. 368 CU.IN.				
6. SYSTEM QUIESCENT FLOW	UTILITY & FLT. CONTROL : 1.0 GPM				
7. HYDRAULIC PUMP DATA	UTILITY OR FLT. CONTROL				
TYPE PRESSURE RATED FLOW CASE FLOW DISPLACEMENT RATED SPEED TORQUE ENG/PUMP SPEED RATIO	ENGINE DRIVEN - CHECK VALVE TYPE 2600 PSI FULL FLOW 9.9 GPM NOT APPLICABLE 0.6 CU.IN./REV 3900 RPM 360 IN-LB GEAR BOX RATIOS : LOW 0.219 HIGH 0.330				
7A. PUMP SPEED DATA GROUND IDLE CLIMB	2731 RPM 3752 RPM				
8. AUXILIARY PUMP DATA					
9. TUBING DATA	DIA (IN)	W.T. (STL)	W.T. (AL)	SPECIFICATION	USAGE
	0.250	0.028	0.035	CRES 304 1/8 H	PRESS & RETURN
	0.375	0.028	0.049		PRESS & RETURN
	0.500	0.035	0.049		PRESS & RETURN
	0.625	0.042	0.049	AL 5052-0	RETURN
	0.750	0.049	0.049	COND A	SUPPLY
	1.000				SUPPLY
10. FITTINGS DATA	MS FLARELESS, AND SOME PERMASWAGE				
11. TEMPERATURE RANGE	-65°F TO +275°F				
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)	FILLED TEFLON : U-CUPS FOR 1ST STAGE ROD SEALS. MS28775 O-RINGS AND TEFLON MS BACKUPS.				
13. FILTRATION	10 MICRON NOMINAL				
14. UTILITY PUMP/MOTOR	NOT APPLICABLE				
15. HAND PUMP DATA	NOT APPLICABLE				
16. RELIEF VALVE SETTING	3500 CRACK, 3750 FULL FLOW				

F-5E HYDRAULICS SYSTEMS BLOCK DIAGRAMFLIGHT CONTROL SYSTEMUTILITY SYSTEM

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NORTHROP F5E



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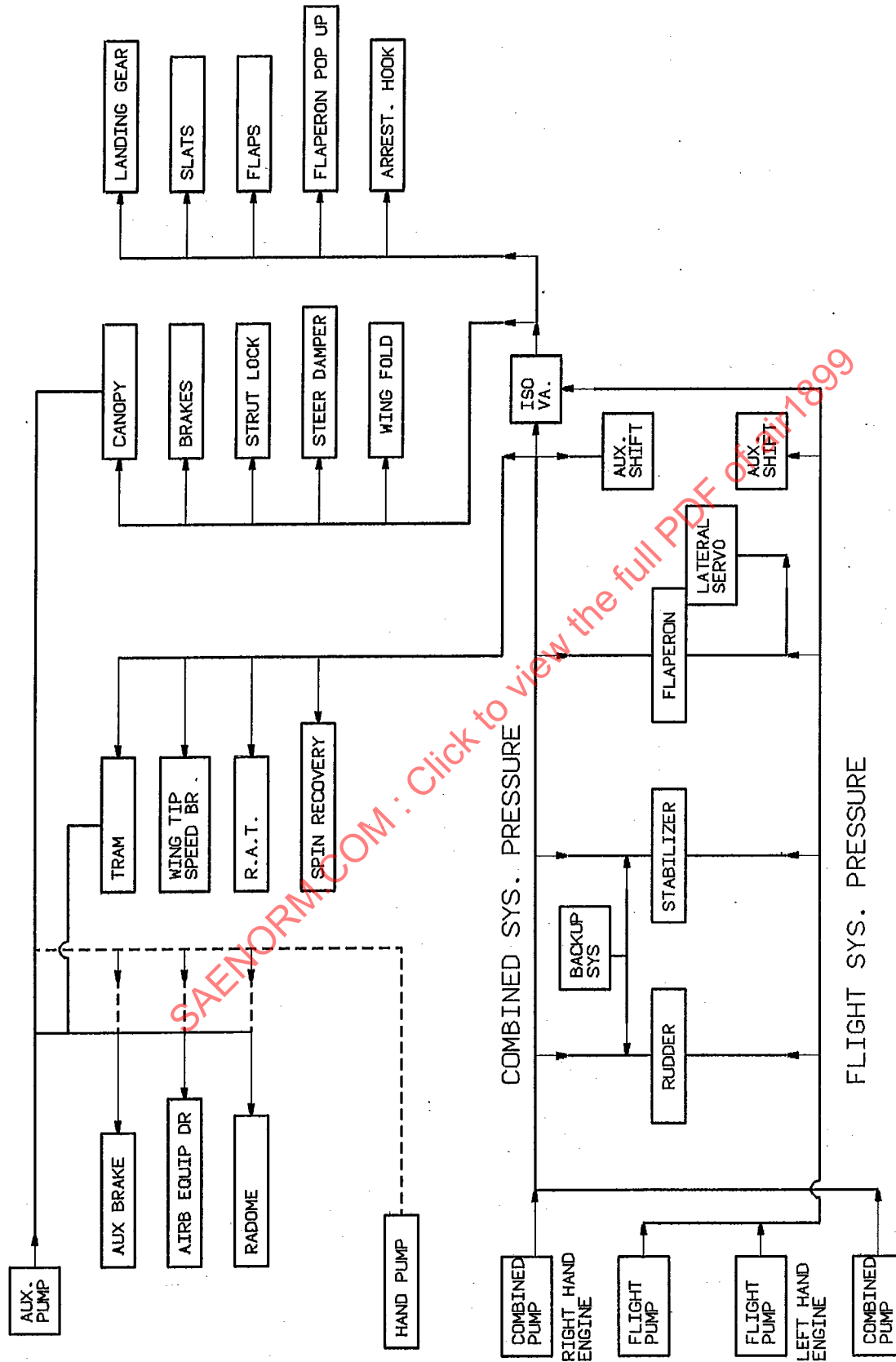
SECTION 4.5

AIRCRAFT - A6A

1. DESIGN SPECIFICATION		MIL-H-5440 B					
2. SYSTEM PRESSURE		3000. PSIG					
3. HYDRAULIC FLUID		MIL-H-5606					
4. ACCUMULATOR DATA		USAGE		VOLUME	PRECHARGE		
		FLIGHT SYSTEM MAIN ACCUM.		25 CU IN	2000 PSI		
		COMBINED SYSTEM MAIN ACCUM.		25 CU IN	2000 PSI		
		BRAKE SYSTEM EMERGENCY		50 CU IN	800 PSI		
		RAM AIR TURBINE EMERG EXTEN		50 CU IN	500 PSI		
5. RESERVOIR DATA TYPE AND PRESS FULL SYSTEM VOLUME RESERVOIR VOLUME		FLIGHT SYSTEM	COMBINED SYSTEM		BACK-UP SYSTEM		
		AIR/OIL 40 PSI	AIR/OIL 40 PSI		SPRING/OIL 40 PSI		
		170 CU IN	688 CU IN		24 CU IN		
		1290 CU IN	3000 CU IN		48 CU IN		
		255 CU IN	1040 CU IN				
6. SYSTEM QUIESCENT FLOW		COMB - 1.02GPM, FLT NORM 1.02GPM, STAB AUX 2.54GPM					
7. HYDRAULIC PUMP DATA TYPE PRESSURE RATED FLOW CASE FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END ENG/PUMP SPEED RATIO PUMP DATA GROUND IDLE APPROACH LONG RANGE CRUISE		FLIGHT SYSTEM ENGINE DRIVEN 2900 PSI FULL FLOW 14.2 GPM 0.7 GPM 0.92 CU IN/REV 3750 RPM 490 IN LBS CCW 0.34 PUMP RPM 2380 RPM 3168 RPM 3960 RPM		COMBINED SYSTEM (SAME AS FLIGHT SYS)			
8. AUXILIARY PUMP INPUT POWER TYPE PRESSURE FLOW SPEED DISPLACEMENT VOLTS AMPS HP/KW		ELEC MOTOR DR-BACKUP 3000 P.S.I. 3GPM@1000, 0GPM@3100PSI 5650 RPM 0.128 CU IN/REV 115/200 AC 400 CPS 8.66 A 2.41 HP		ELEC MOTOR DR-AUXILIARY 3000 P.S.I. 0.6GPM @ 2700 P.S.I. ----- 0.023 CU IN/REV 24 VDC CONTINUOUS 60 A MAX -----			
9. TUBING DATA		DIAMETER	W.T. (STL)	W.T. (AL)	MATERIAL	USAGE	
		0.250	0.016 (P)	0.035 (P)	18-8 & 6061-T6	(P) PRESS	
		0.250	0.020 (P)	0.035 (R)	18-8 & 6061-T6	(P) PRESS & (R) RETURN	
		0.375		0.049	6061-T6	PRESS & RETURN	
		0.500		0.065	6061-T6	PRESS & RETURN	
		0.625	0.042 (P)	0.042 (R)	18-8 & 5052-0	(P) PRESS & (R) RETURN	
		0.750	0.049 (P)	0.049 (R)	18-8 & 5052-0	(P) PRESS & (R) RETURN	
		1.000	0.058 (P)	0.065 (R)	18-8 & 5052-0	(P) PRESS & (R) RETURN	
10. FITTING DATA		SIZE RANGE	TYPE	MATERIAL	CONNECTION		
		.25-1.0	DETACHABLE	304 S. S.	37 DEGREES FLARED		
11. TEMPERATURE RANGE (DES)		-65 DEGREES F TO +275 DEGREES F					
12. SEAL MATERIAL TYPE FLT ACTUATORS		PISTON - SPRING LOADED TEFLON MS28775 BUNA-N O-RINGS MS28778 BUNA-N O-RINGS					
13. FILTRATION MAIN RETURN CASE DRAIN FLIGHT ACTUATORS OTHER		FLIGHT SYSTEM		COMBINED SYSTEM		BACK-UP SYSTEM	
		5 MICRON ABS		5 MICRON ABS		5 MICRON ABS	
		5 MICRON ABS		5 MICRON ABS			
		5 MICRON ABS		5 MICRON ABS			
		15 MICRON ABS		15 MICRON ABS			
		CHEM DRIER		CHEM DRIER			
14. HYDRAULIC MOTOR DATA		SYSTEM	DISPLACEMENT CU IN/REV	SPEED RPM	PRESSURE PSI	FLOW GPM	TORQUE IN-LB
		FLAP SLAT	0.115 0.115	10000 10000	3000 3000	5.03 5.03	45.5 45.5
15. HAND PUMP DATA		PRESSURE - 3000 PSI DISPLACEMENT - 1.8 IN3/CYCLE 750 PSI 0.45 IN3/CYCLE 3000 PSI					
16. RELIEF VALVE SETTING		3560 PSI MAX FLOW 3100 PSI MIN RESEAT					

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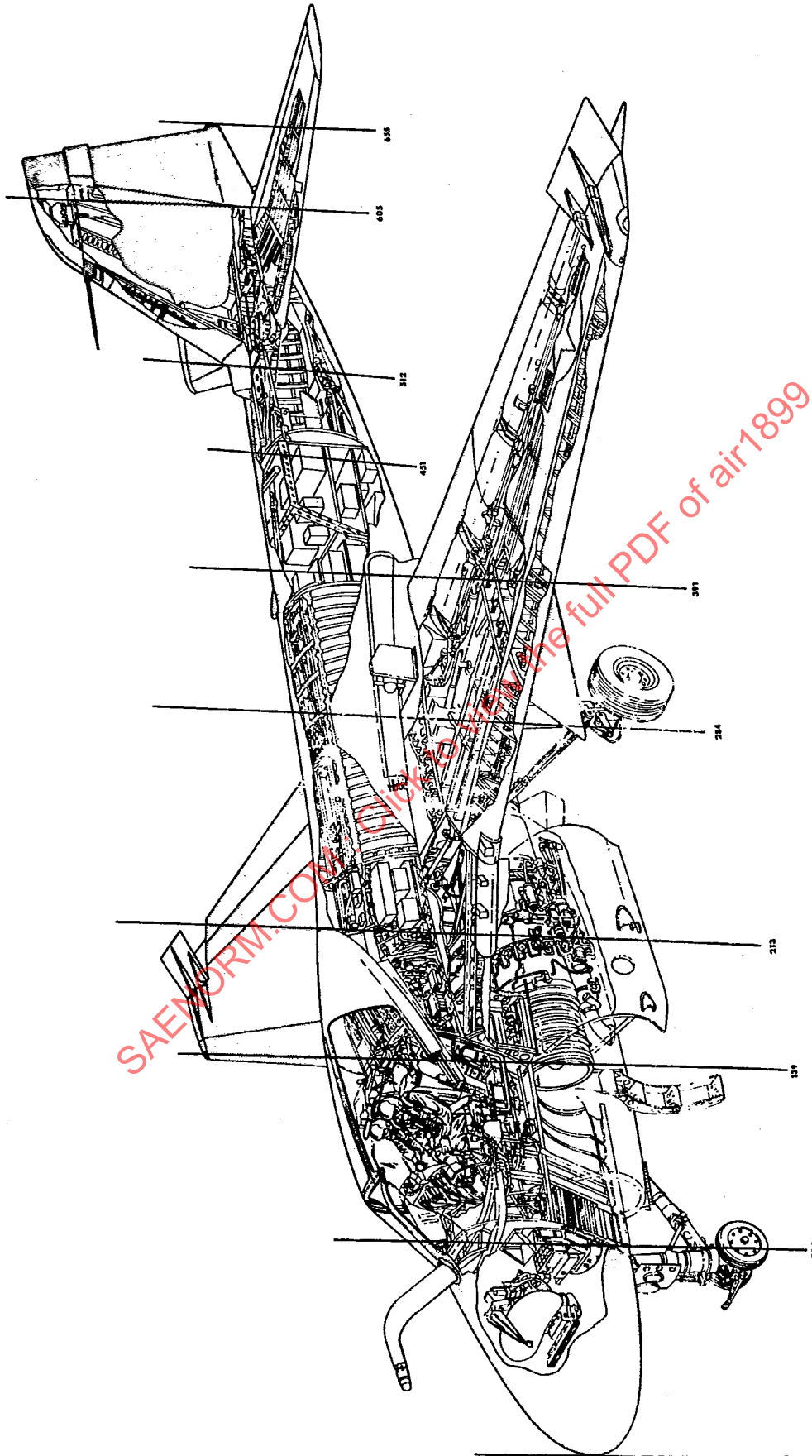
SECTION 4.5



A6A HYDRAULIC SCHEMATIC

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GRUMMAN A-6A



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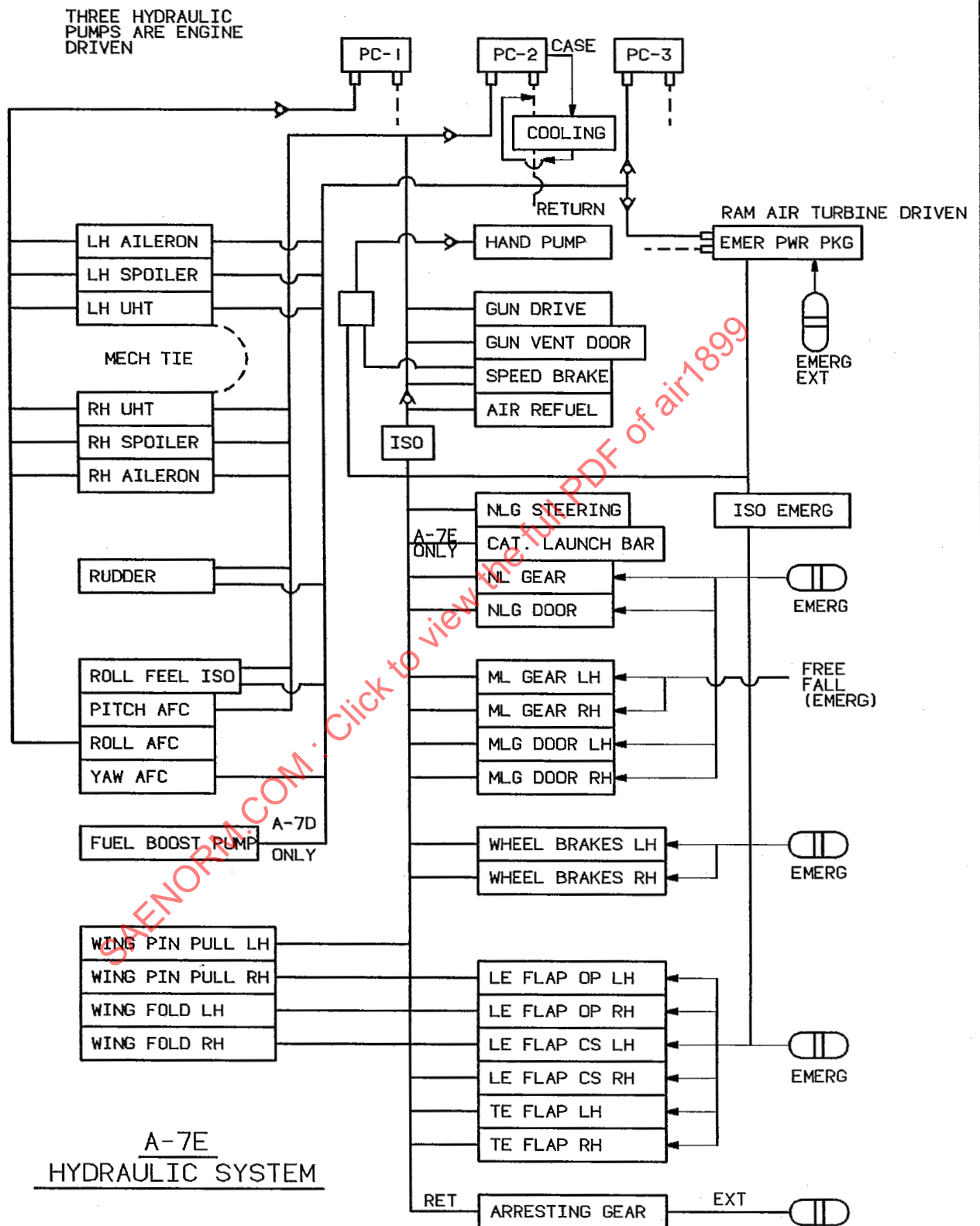
SECTION 4.6

AIRCRAFT - A-7

1. DESIGN SPECIFICATION			MIL-H-5440 D					
2. SYSTEM PRESSURE			3000 PSIG					
3. HYDRAULIC FLUID			MIL-H-5606					
4. ACCUMULATOR DATA			USAGE		VOLUME	PRECHARGE		
			UTILITY BRAKE ACCUM. SURGE DAMPER RESERVOIR PRESS. ACCUM. EMERG LANDING GEAR ACCUM. EMERG FLAP ACCUM. EMERG BRAKE ACCUM. EMERG POWER PKG ACCUM(RAT) ARRESTING GEAR ACCUM.		25 CU IN 25 CU IN 25 CU IN 142.5 CU IN 155.5 CU IN 73.3 CU IN 73.3 CU IN 81.9 CU IN	700 PSI 1000 PSI 1500 PSI 1450 PSI 1250 PSI 1400 PSI 1300 PSI 1100 PSI		
5. RESERVOIR DATA TYPE AND PRESS SYSTEM VOLUME TOTAL RESERVOIR VOLUME			PC-1	PC-2	PC-3			
			BOOTSTRAP 90 PSI 540 CU IN 265 CU IN	BOOTSTRAP 97.5PSI 1592 CU IN 1280 CU IN	BOOTSTRAP 90 PSI 515 CU IN 265 CU IN			
6. SYSTEM QUIESCENT FLOW			PC-1 1.2GPM, PC-2 2.06PM, PC-3 1.16PM					
7. HYDRAULIC PUMP DATA TYPE PRESSURE RATED FLOW CASE FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END ENG/PUMP SPEED RATIO			PC-1		PC-2	PC-3		
			IN LINE 3000 PSI 24.1 GPM ----- 1.15 CU IN/REV 5890 RPM CCW 0.454		IN LINE 3000 PSI 42.3 GPM 1.90 GPM 1.80 CU IN/REV 5890 RPM CCW 0.454	IN LINE 3000 PSI 15.6 GPM 1.5 GPM 0.90 CU IN/REV 4400 RPM CW 0.339		
8. AUXILIARY PUMP INPUT POWER TYPE PRESSURE						RAM AIR TURBINE DRIVE IN LINE PUMP 3000 PSI		
9. TUBING DATA	DIA (IN)	W.T.(STL)	W.T.(AL)	SPECIFICATION	USAGE			
	0.188 0.250 0.250 0.375 0.375 0.500 0.500 0.625 0.625 0.750 0.750 0.750 1.000 1.000 1.000	0.020 0.020 0.022 0.035 0.028 0.042 0.035 0.049 0.028 0.042 0.065 0.035 0.058 0.083	 0.028 0.035 0.028 0.035 0.065 0.065	CRES 321 1/8 H CRES 304 AL 6061-T6	PNEUMATIC PRESS PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN PRESS & RETURN			
10. FITTING DATA			SIZE RANGE	TYPE	MATERIAL	CONNECTION		
			3/16 TO 1"	PERMANENT & DETACHABLE	AL & CRES	MS FLARELESS BRAZED		
11. TEMPERATURE RANGE (DES)			-65 DEGREES F TO +275 DEGREES F					
12. SEAL MATERIAL TYPE FLT ACTUATORS			PISTONS-SPRING LOADED TEFLON, O-RING WITH TEFLON CAP, BUNA-N O-RING, T-RING - MS28775 WITH TEFLON CAP, M83248 VITON, FLUOROSILICONE (LOW PRESSURE), N756-75 O-RINGS - CVC4233 O-RINGS (STATIC)					
13. FILTRATION MAIN RETURN CASE DRAIN FLIGHT ACTUATORS OTHER			PCI, 2 & 3 5 MICRON ABS DISPOSABLE NONE 5 MICRON ABS DISPOSABLE NONE COMPONENTS 45 MICRON ABS RESERVOIR RELIEF VALVE 65 MICRON ABS					
14. HYDRAULIC MOTOR DATA (A-7D ONLY)			SYSTEM	DISPLACEMENT CU IN/REV	SPEED RPM	PRESSURE PSI	FLOW GPM	TORQUE IN-LB
			FUEL BST PUMP GUN DRIVE	.057 .950	6100 6600	2500 DIFF. 3000	1.75 26.0	18 MAX 125 MIN 325 MAX
15. HAND PUMP DATA			0.7 CU.IN./CYCLE TO 3000 PSI					
16. RELIEF VALVE SETTING			3850 PSI FULL FLOW & 3390 PSI RESEAT					

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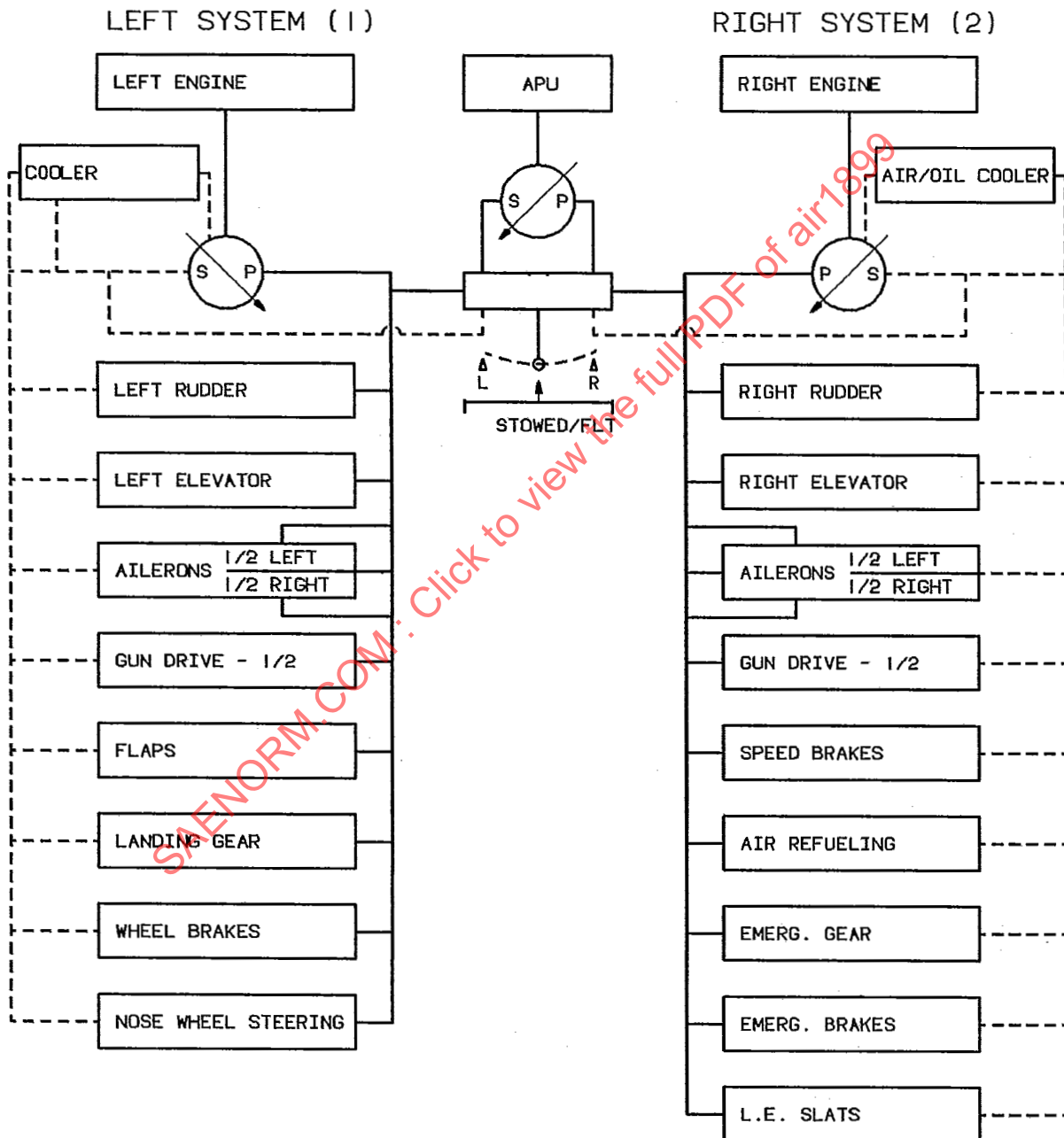
SECTION 4.6



AIRCRAFT - A-10A

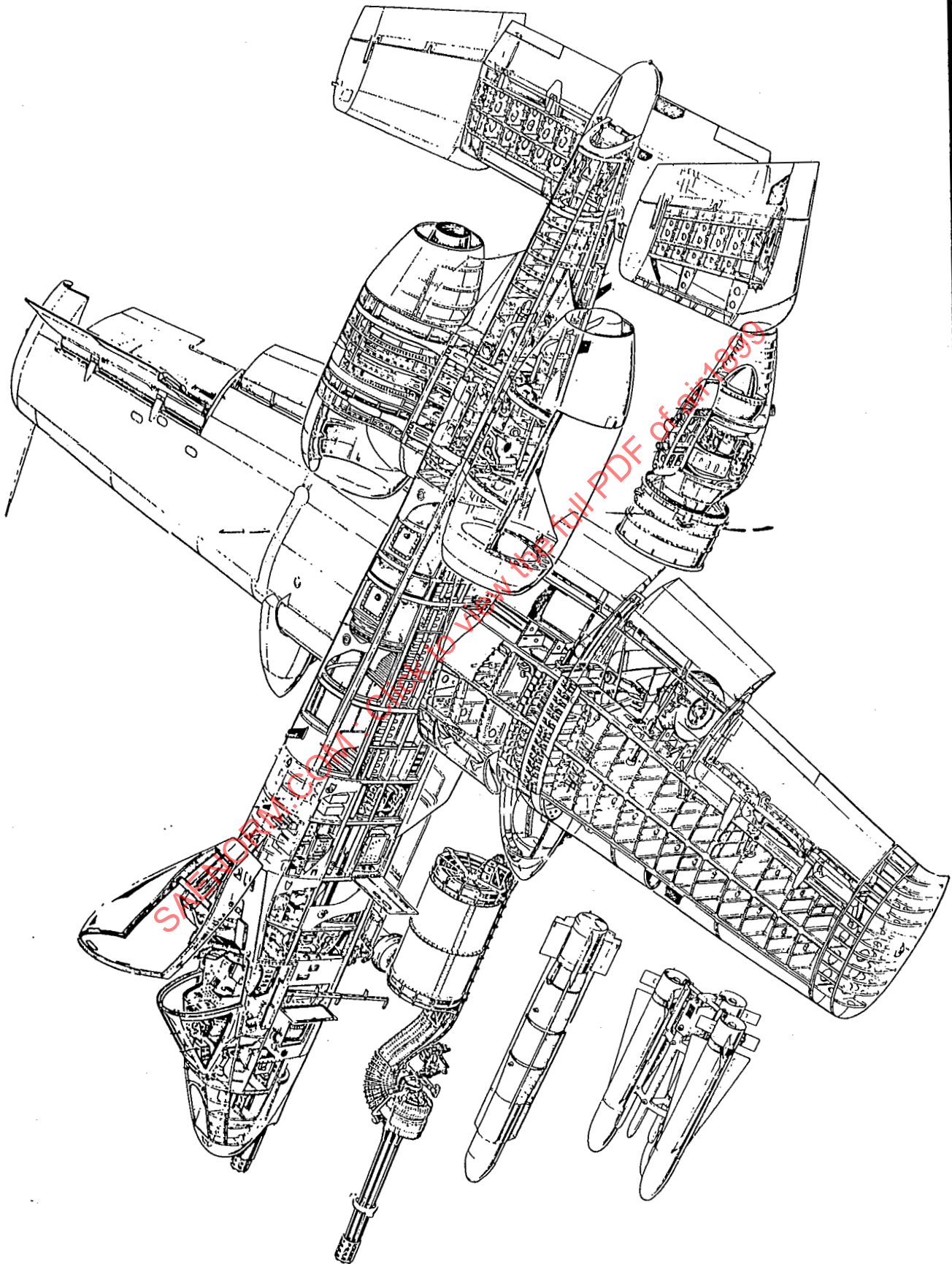
1. DESIGN SPECIFICATION		MIL-H-5540 F				
2. SYSTEM PRESSURE		3000 PSIG				
3. HYDRAULIC FLUID		DESIGNED FOR MIL-H-83282				
4. ACCUMULATOR DATA		USAGE		VOLUME	PRECHARGE	
		EMERGENCY L/G ACCUM.		50 CU IN	1200 PSI	
		EMERGENCY BRAKE ACCUM.		50 CU IN	1200 PSI	
		RESV. B'STRAP (LEFT)		10 CU IN	1600 PSI	
RESV. B'STRAP (RIGHT)		10 CU IN	1600 PSI			
5. RESERVOIR DATA TYPE AND PRESS. SYSTEM VOLUME TOTAL RESV. VOLUME		LEFT(#1) FLT. CONT.& UTIL.		RT.(#2) FLT. CONT.& UTIL.		
		BOOTSTRAP - 70 PSIG		BOOTSTRAP - 70 PSIG		
		4068 CU IN		4068 CU IN		
		550 + 25 CU IN		550 + 25 CU IN		
		- .0 CU IN		- 0 CU IN		
6. SYSTEM QUIESCENT FLOW		LEFT : 0.74 GPM		RIGHT : 2.75 GPM		
7. HYDRAULIC PUMP DATA TYPE PRESSURE RATED FLOW DISPLACEMENT ROTATION (FROM SHAFT END) RATED SPEED: A. GROUND IDLE B. CRUISE C. TAKE-OFF		ENGINE DRIVEN VARIABLE DELIVERY PUMP 3100 ± 75 PSIG 43 GPM 1.9 CU IN/REV. CCW 3717 RPM 5113 RPM 5709 RPM				
8. AUXILIARY PUMP TYPE PRESSURE FLOW SPEED DISPLACEMENT (MAX.)		APU DRIVEN VARIABLE 3025 ± 75 PSIG 10 GPM 8000 ± 300 RPM 0.3 CU IN/REV.				
9. TUBING DATA	DIA(IN)	W.T.(STL)	W.T.(AL)	SPECIFICATION	USAGE	
	0.2500	0.020	0.028	21-6-9 DRES. AMS 5561	PRESS & RETURN	
	0.3125	0.020	0.025		PRESS & RETURN	
	0.3750	0.020	0.028		PRESS & RETURN	
	0.5000	0.026	0.028		PRESS & RETURN	
	0.6250	0.033	0.035		PRESS & RETURN	
	0.7500	0.039	0.035	PRESS & RETURN		
	1.0000	N/A	0.049	6061-T6 AL MIL-T-7081	RETURN	
	10. FITTING DATA		SIZE RANGE	TYPE	MATERIAL	CONNECTION
		0.25 - 1.0	PERMASWAGED PERMANENT & ATTACHABLE	CRES.& AL.	CONNECTS TO MS FLARELESS	
11. TEMPERATURE RANGE		-40F TO +275F (FLUID); -65F TO 160F (AMBIENT)				
12. SEAL MATERIAL/TYPE		FLT. ACTUATORS		COMPONENTS		
		SHAMBAN S11065, S11589, S13077; MS28775, MS28774		PUMP - MS28775 (TEFLON) "T" SEAL, M83248/1/2 (VITON)		
13. FILTRATION PRESSURE RETURN APU CASE DRAIN		FLIGHT SYSTEMS 5 M ABS 5 M ABS 5 M ABS				
14. HYDRAULIC MOTOR DATA (GUN DRIVE MOTOR)(2)		DISPLACEMENT (CU IN/REV.)	SPEED (RPM)	PRESSURE (PSI)	FLOW (GPM)	TORQUE (IN-LB)
		0.97	6200	2578	26	300
15. HAND PUMP DATA		NONE				
16. RELIEF VALVE SETTINGS		3850 PSI MAX. @ 45 GPM				

A-10A HYDRAULICS SYSTEMS BLOCK DIAGRAM



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FAIRCHILD A-10A



AIRCRAFT - F-14A

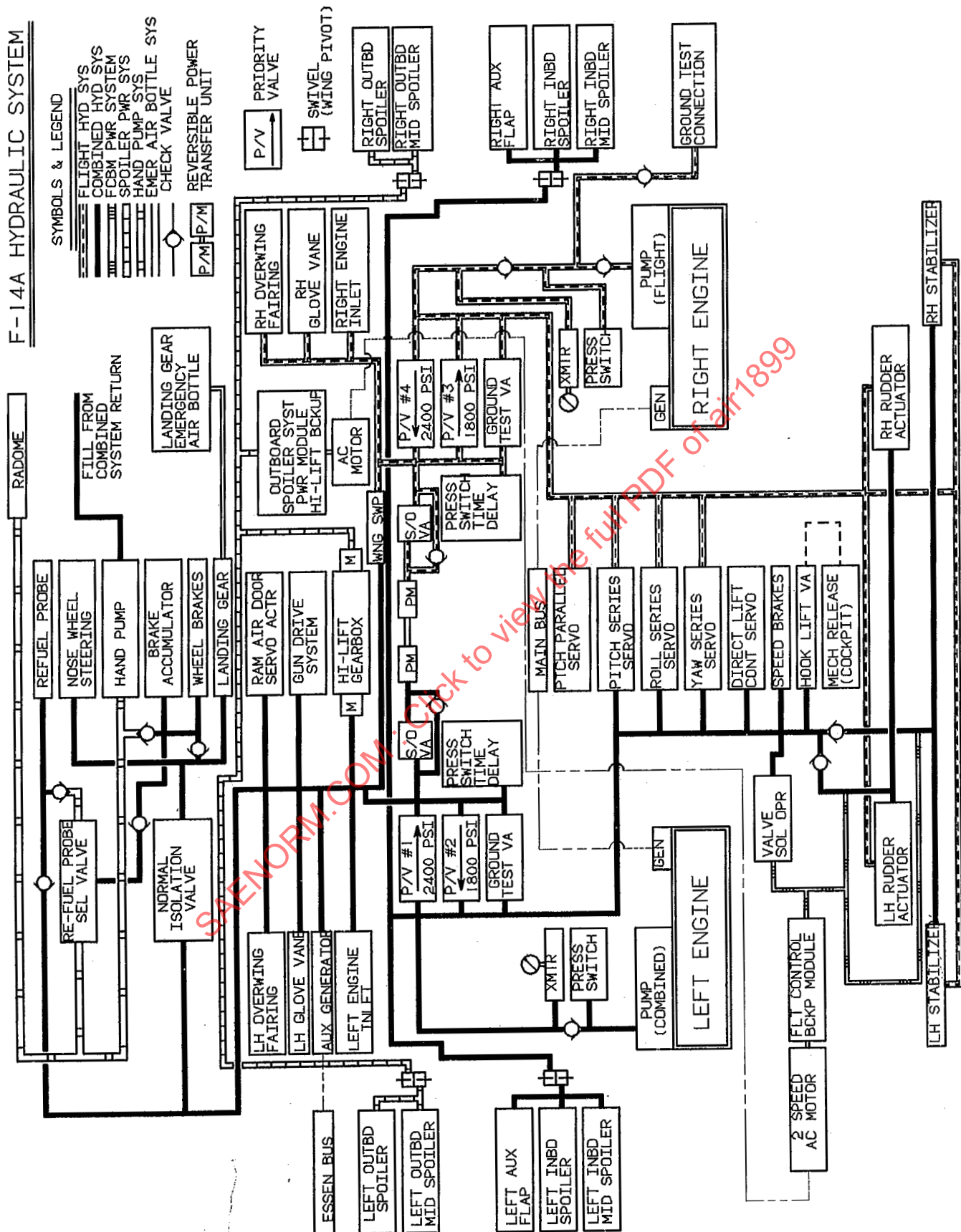
4. DESIGN SPECIFICATION		MIL-H-5440 D					
2. SYSTEM PRESSURE		3000 PSIG					
3. HYDRAULIC FLUID		MIL-H-5606 D					
4. ACCUMULATOR DATA		USAGE		VOLUME	PRECHARGE		
		COMBINED SYS RESERVOIR		50 CU IN	1800 PSI		
		WHEEL BRAKE		50 CU IN	1900 PSI		
		FLIGHT SYSTEM RESERVOIR		200 CU IN	1900 PSI		
				75 CU IN	1800 PSI		
5. RESERVOIR DATA		COMBINED SYSTEM		FLIGHT SYSTEM			
TYPE PRESSURE FULL RESERVOIR VOLUME		BOOTSTRAP		BOOTSTRAP			
		105 PSI		105 PSI			
		1340 CU.IN.		724 CU.IN.			
		1684 CU.IN.		787 CU.IN.			
6. SYSTEM QUIESCENT FLOW		FLIGHT: 2-3GPM, COMBINED: 3-6GPM					
7. HYDRAULIC PUMP DATA		ENGINE DRIVEN, VARIABLE VOLUME					
TYPE PRESSURE RATED FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END ENGINE TO PAD RATIO 7A. PUMP DATA GROUND IDLE FLIGHT M=.2 CRUISE M=.7		3000 PSI					
		84 GPM					
		3.70 CU.IN./REV					
		5540 RPM (FULL FLOW)					
		2000 IN-LB					
		CCW					
		.388					
		PUMP RPM					
		3867 RPM					
		3892 RPM					
		4868 RPM					
8. AUXILIARY PUMP DATA		FLIGHT CONTROL BACKUP		SPOILER MOD. & HI LIFT BACKUP			
TYPE PRESSURE FLOW		AC MOTOR DRIVEN BACKUP		AC MOTOR DRIVEN			
		3000 PSI		3000 PSI			
		14.5 GPM-500 PSI (HI)		6.5 GPM-2050 PSI			
		2.4 GPM-3000 PSI (HI)		0.5 GPM-3000 PSI			
		7.2 GPM-500 PSI (LOW)					
		1.2 GPM-3000 PSI (LOW)					
SPEED		12000 RPM (HI)		11300 RPM			
		6000 RPM (LOW)					
DISPLACEMENT		0.32 CU.IN./REV		0.133 CU.IN./REV			
8A. TRANSFER PUMP DATA		HYD PUMP/MOTOR, FIXED DISPLACEMENT					
TYPE PUMP OUTPUT RATED MOTOR INPUT RATED RATED FLOW DISPLACEMENT		0-30 GPM @ 2050 PSI-2400 PSI					
		30 GPM @ 2050 PSI					
		0-33 GPM @ 2400 PSI-3000 PSI					
		32.8 GPM @ 2850 PSI					
		5750 RPM					
		1.27 CU.IN./REV					
9. TUBING DATA		DIAMETER	W.T.(STL)	W.T.(TI)	MATERIAL	USAGE	
		0.187	0.028		CRES 304 1/8 H	COIL	
		0.187	0.028		CRES 321	PNEUMATIC	
		0.250	0.020		CRES 321	PRESS & RETURN	
		0.250	0.028		CRES 304 1/8 H	COIL	
		0.250	0.028		CRES 321	PRESS & RETURN	
		0.375	0.042		CRES 321	PRESS & RETURN	
		0.375	0.042		CRES 304 1/8 H	COIL	
		0.375		0.028	TI, 3AL-2.5V	PRESS & RETURN	
		0.500		0.036	TI, 3AL-2.5V	PRESS & RETURN	
		0.625		0.044	TI, 3AL-2.5V	PRESS & RETURN	
		0.750		0.054	TI, 3AL-2.5V	PRESS & RETURN	
		1.000		0.073	TI, 3AL-2.5V	PRESS & RETURN	
		1.500		0.042	TI, 3AL-2.5V	SUCTION	
10. FITTING DATA		SIZE RANGE	TYPE	MATERIAL	CONNECTION		
		.187-1.50	PERMANENT & DETACHABLE	17-4 PH 6AL-4VTI	LIP SEAL BRZ&CRYOFIT		
		LIP SEAL & CRYOFIT					
11. TEMPERATURE RANGE		-65F TO +275F					
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)		PISTON - SPRING LOADED TEFLON MS 28775 BUNA-N O-RINGS MS 28778 BUNA-N O-RINGS					
13. FILTRATION		5 MICRON ABS 5 MICRON ABS 5 MICRON ABS 5 MICRON ABS 25 MICRON ABS INLET					
14. HYDRAULIC MOTOR DATA		SYSTEM	DISPLACEMENT (CU. IN./REV)	SPEED (RPM)	PRESSURE (PSI)	FLOW (GPM)	TORQUE (IN-LB)
		EM GEN	0.173 MAX	12000	3000	9.00	
		WNG SWP	1.15	7510	3000	40.00	
		HI-LIFT	0.22	9400	3000	8.95	
		GUN DRIVE	0.93	5700MIN 6450MAX	3000	22.95 25.96	
15. HAND PUMP DATA		RESERVOIR CAPACITY - 0.063 GAL. DISPLACEMENT - 0.7 CU.IN./CYCLE					
16. RELIEF VALVE SETTINGS		3750 PSI FULL FLOW		3250 PSI MIN RESEAT			

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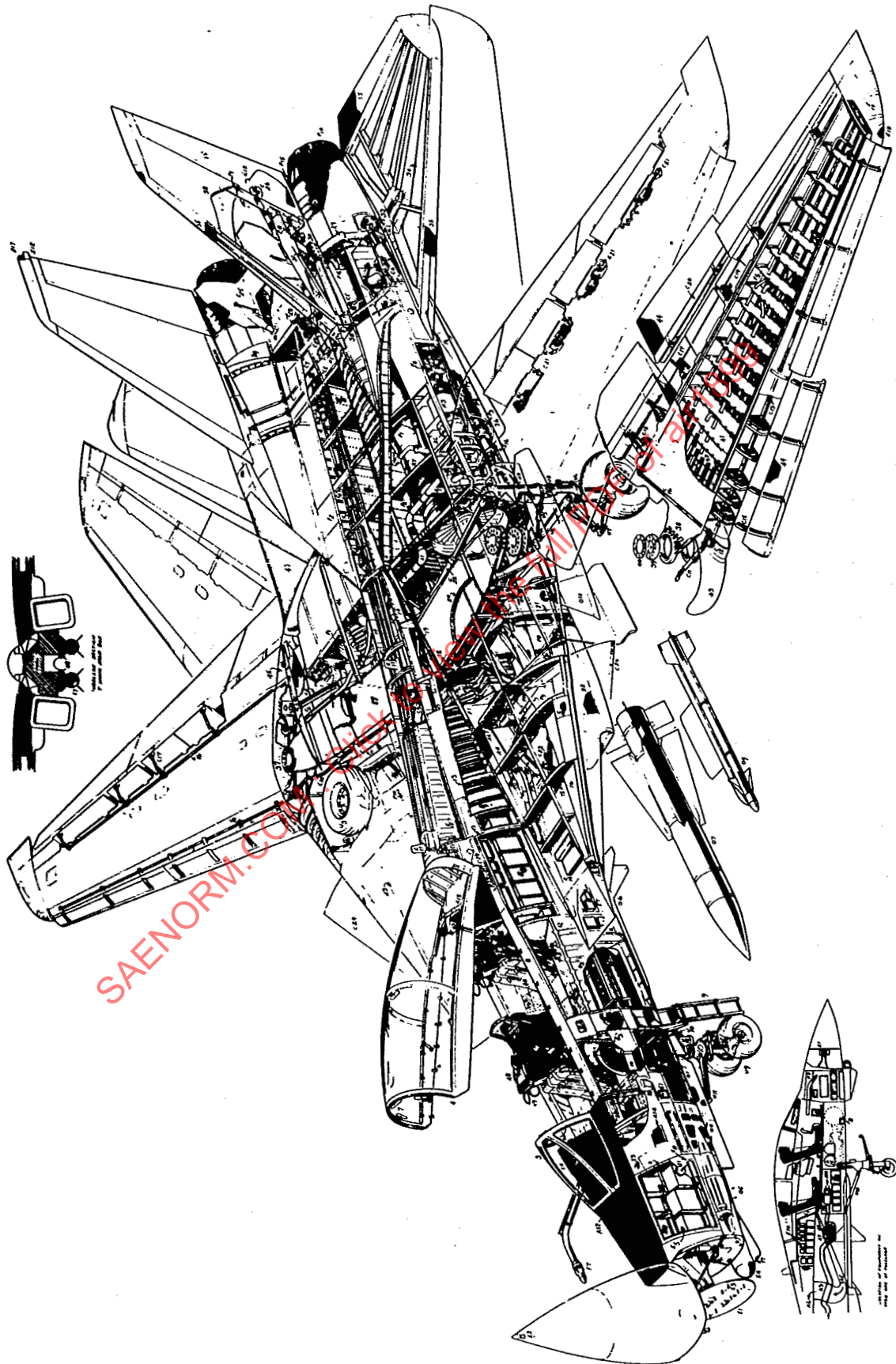
SECTION 4.8

F-14A HYDRAULIC SYSTEM

SYMBOLS & LEGEND



GRUMMAN F-14A



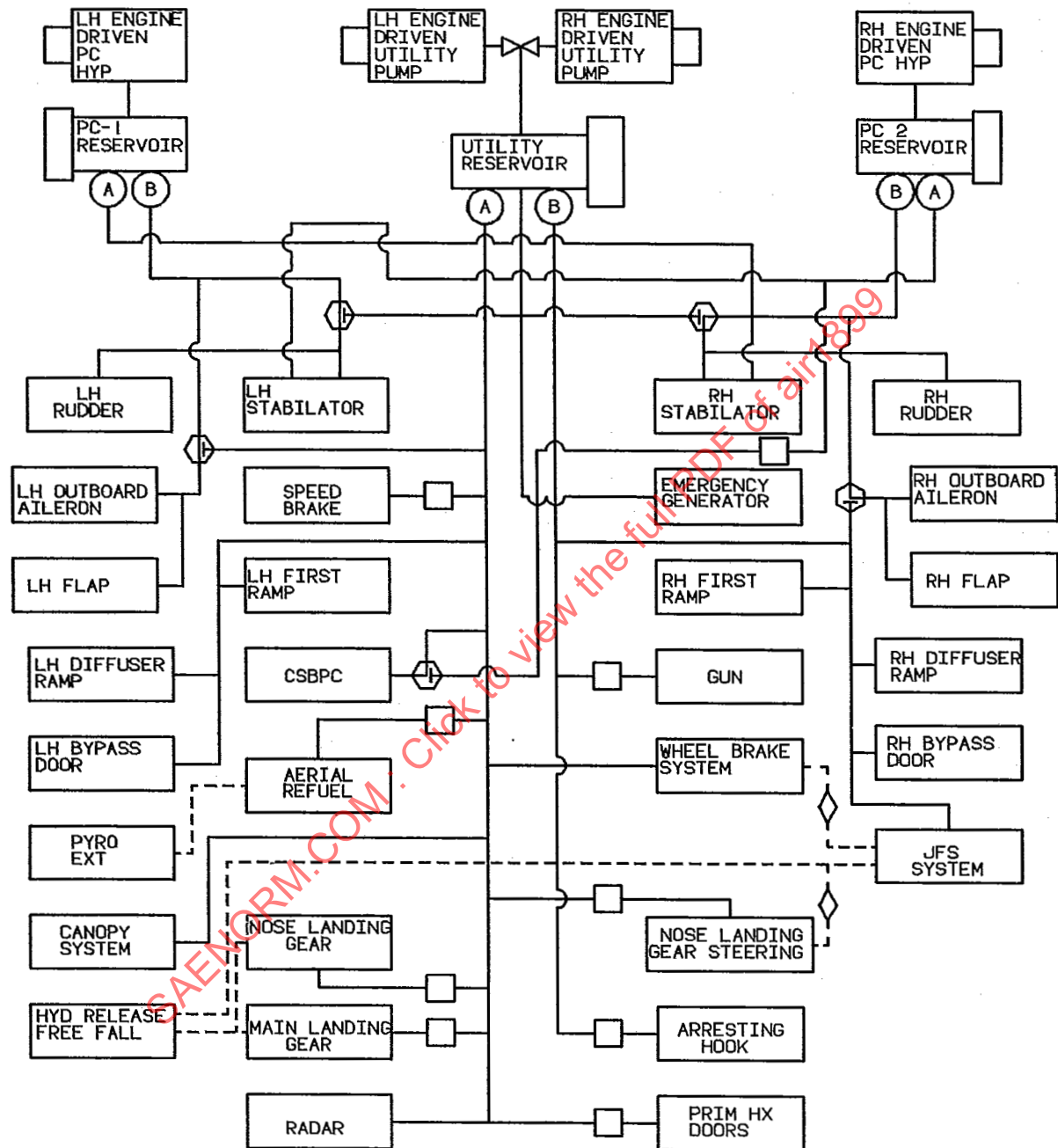
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SECTION 4.9

AIRCRAFT - F-15A

1. DESIGN SPECIFICATION		MIL-H-5440 E											
2. SYSTEM PRESSURE		3000 PSIG											
3. HYDRAULIC FLUID		MIL-H-5606											
4. ACCUMULATOR DATA		USAGE			VOLUME		PRECHARGE						
		CENTRAL SYSTEM			NONE		NONE						
		JET FUEL STARTER(JFS)-SELF			220 GAS		1720 PSIG						
		DISPLACING 2 PER A/C			142 OIL								
		CANOPY SUPPLY			50 GAS		784 PSIG						
		45 OIL											
5. RESERVOIR DATA		PC SYSTEM		UTILITY SYSTEM									
TYPE		BOOTSTRAP WITH RESERVOIR LEVEL SENSING											
PRESSURE		48 PSIG		56 PSIG									
SYSTEM VOLUME		1065 CU.IN.		3350 CU.IN.									
RESERVOIR VOLUME		355 CU.IN.		950 CU.IN.									
6. SYSTEM QUIESCENT FLOW		PC SYSTEMS - 1.3 GPM, UTILITY SYSTEM - 2.7 GPM											
7. HYDRAULIC PUMP DATA		PC SYSTEMS				UTILITY SYSTEM							
TYPE		VARIABLE DELIVERY, AXIAL PISTON				3000 PSIG							
PRESSURE		3000 PSIG				56 GPM							
RATED FLOW		56 GPM				4600 RPM							
RATED SPEED		4600 RPM				3.0 CIR							
DISPLACEMENT		3.0 CIR				CCW							
ROTATION FROM SHAFT END		CCW				.262							
PUMP/ENGINE PAD RATIO		.262				2890 RPM							
GROUND IDLE		2570 RPM				3710 RPM							
CRUISE		3360 RPM				4340 RPM							
TAKE-OFF (MAX)		3780 RPM				3110 RPM							
APPROACH		2970 RPM											
8. AUXILIARY PUMP DATA													
9. TUBING DATA		DIA (IN)		W.T. (TI)		W.T. (AL)		MATERIAL		USAGE			
		0.250		0.016				TI 3AL-2.5 V		PRESS & RETURN			
		0.250		0.028				TI 3AL-2.5 V		COILED TUBE			
		0.375				0.028		AL 6061-T6		RETURN ONLY			
		0.375		0.019				TI 3AL-2.5 V		PRESS & RETURN			
		0.375		0.042				TI 3AL-2.5 V		COILED TUBE			
		0.500				0.028		AL 6061-T6		RETURN ONLY			
		0.500		0.026				TI 3AL-2.5 V		PRESS & RETURN			
		0.500		0.056				TI 3AL-2.5 V		COILED TUBE			
		0.625				0.035		AL 6061-T6		RETURN ONLY			
		0.625		0.032				TI 3AL-2.5 V		PRESS & RETURN			
		0.625		0.039				TI 3AL-2.5 V		COILED TUBE			
		0.750				0.035		AL 6061-T6		RETURN ONLY			
		0.750		0.039				TI 3AL-2.5 V		PRESS & RETURN			
		1.000				0.042		AL 6061-T6		RETURN ONLY			
		1.000		0.051				TI 3AL-2.5 V		PRESS & RETURN			
		1.250				0.049		AL 6061-T6		RETURN ONLY			
		1.250		0.065				TI 3AL-2.5 V		PRESS & RETURN			
		1.500		0.032				TI 3AL-2.5 V		SUCTION ONLY			
10. FITTING DATA		SIZE RANGE		TYPE		MATERIAL		CONNECTIONS					
		.25-1.50		PERMANENT		UNALLOYED TI		PERMASWAGE					
				DETACHABLE		6061 AL AL		LIP SEAL					
11. TEMPERATURE RANGE		-65F TO +275F											
12. SEAL MATERIAL (FLIGHT ACTUATORS)		MS 28775 BUNA-N O-RINGS ROD SEAL : MS28775 O-RING ON TEFLON PISTON SEAL : TURCON SLEEVE SEAL : T SECTION & 2 BACKUP O-RINGS											
13. FILTRATION		CENTRAL MANIFOLD-COMMON ELEMENT 15 MICRON ABS 15 MICRON ABS 15 MICRON ABS											
14. HYDRAULIC MOTOR DATA		SYSTEM		DISPLACEMENT (CU.IN./REV)		SPEED (RPM)		PRESSURE (PSI)		FLOW (GPM)		TORQUE (IN-LB)	
		SUN DRV		.95		6600				29		275	
		EMER GN		.52		12000							
		JFS		.30		---							
15. HAND PUMP DATA		1 CU.IN./CYCLE TO 2000 PSI .45 CU.IN./CYCLE TO 2000-3800 PSI											
16. RELIEF VALVE SETTING		PC SYSTEMS						UTILITY SYSTEM					
CRACKING PRESSURE :		3450 PSIG						3450 PSIG					
FULL FLOW PRESSURE :		3500 PSIG @ 45 GPM						3750 PSIG @ 104 GPM					
RESEAT PRESSURE :		3250 PSIG						3250 PSIG					

F-15A HYDRAULIC SYSTEM BLOCK DIAGRAM



○ RLS VALVE

□ CONTROL VALVE

◇ MANUAL VALVE

▷ CHECK VALVE



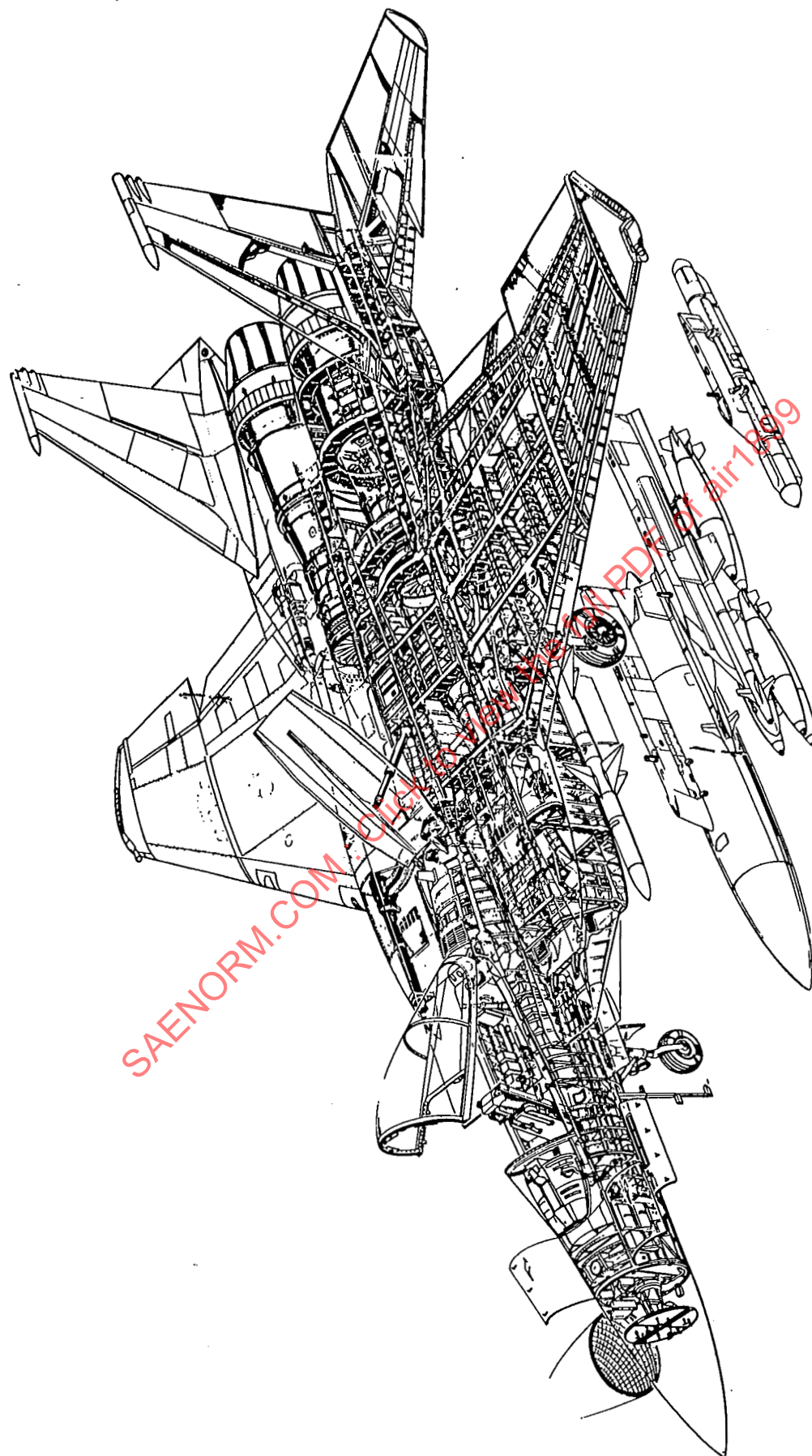
SWITCHING VALVE WITH RPS

--- EMERGENCY

CSBPC CONTROL STICK BOOST PITCH COMPENSATOR

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MCDONNELL-DOUGLAS F-15A



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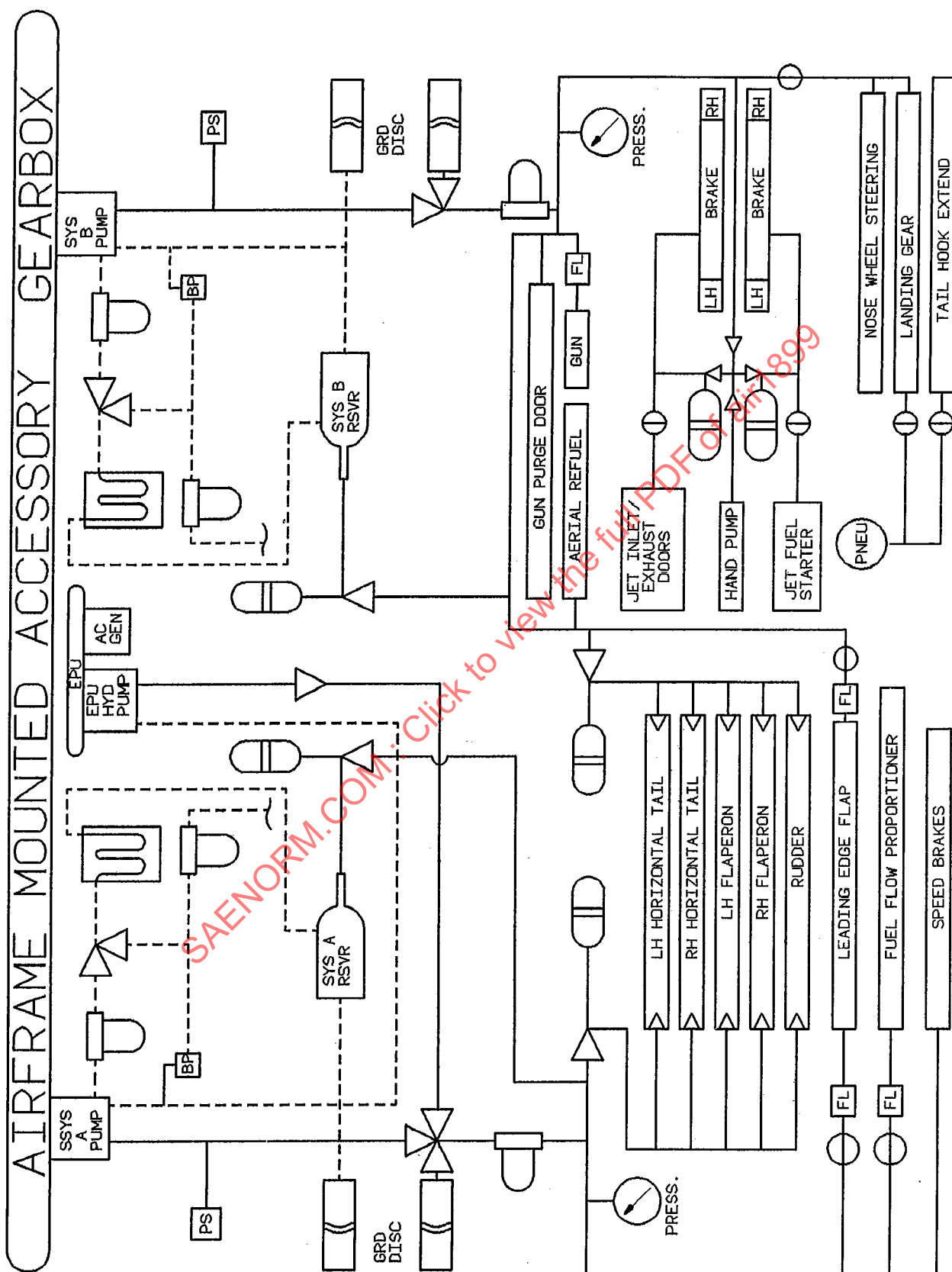
SECTION 4.10

AIRCRAFT - F-16

1. DESIGN SPECIFICATION	MIL-H-5440				
2. SYSTEM PRESSURE	3100. PSIG				
3. HYDRAULIC FLUID	MIL-H-5606				
4. ACCUMULATOR DATA	USAGE		VOLUME		
	RESERVOIR PRESSURIZATION FLIGHT CONTROL SUPPLY WHEEL BRAKES / JFS START		25 CU IN 100 CU IN 200 CU IN		
5. RESERVOIR DATA	SYSTEM A		SYSTEM B		
	TYPE PRESSURE TOTAL CAPACITY		BOOTSTRAP 85 PSIG 800 CU IN		
6. SYSTEM QUIESCENT FLOW	SYSTEM A		SYSTEM B		
	1.20 GPM		2.00 GPM		
7. HYDRAULIC PUMP DATA	TYPE PRESSURE RATED FLOW DISPLACEMENT RATED SPEED ROTATION FROM SHAFT END				
8. AUXILIARY PUMP DATA	ENGINE DRIVEN 3100 PSI 42.5 GPM 1.80 CU IN/REV 5800 RPM CCW				
	EMERGENCY POWER UNIT (EPU) : RUNS ON HYDRAZINE AND/OR BLEED AIR				
9. TUBING DATA	VARIABLE DELIVERY POSITIVE DISPL. - AXIAL PISTON 3000 - 3050 PSIG 22.7 GPM 0.75 CU IN/REV 7500 RPM NOM.				
	TYPE PRESSURE RATED FLOW DISPLACEMENT RATED SPEED				
10. FITTING DATA	PERMANENT - PERMASWAGE DETACHABLE - DYNATUBE				
	TEMPERATURE RANGE				
11. SEAL MATERIAL (FLIGHT ACTUATORS)	-40F TO +275F				
	ROD SEAL : SHAMBAN HAT SEAL WITH MIL-R-83461 ELASTOMER HEAD SEAL : CAST IRON				
12. FILTRATION	MAIN - 15 MICRON ABSOLUTE RETURN - 15 MICRON ABSOLUTE CASE DRAIN - 15 MICRON ABSOLUTE				
	MOTOR DISPLACEMENT (CIR)				
13. HAND PUMP DATA	SPEED (RPM)				
	PRESSURE (PSI)				
14. RELIEF VALVE SETTINGS	FLOW (GPM)				
	TORQUE (IN-LB)				
15. HAND PUMP DATA	GUN DRIVE JFS FUEL FLOW PROPORTIONER LEADING EDGE FLAP				
	0.93 0.42 0.38 0.77				
16. RELIEF VALVE SETTINGS	6000 13400 1720 4800				
	3000 3000 3000 3000				
17. RELIEF VALVE SETTINGS	26.0 24.0 2.8 16.0				
	450 200 179 367				
18. RELIEF VALVE SETTINGS	0.7 CU.IN./CYCLE TO 3000 PSI (MANUAL MODE) 0.26 GPM AT 375 RPM AND 3000 PSI (POWER MODE)				
	CRACKING PRESSURE : 3600 PSIG FULL FLOW PRESSURE : 3850 PSIG RESEAT PRESSURE : 3400 PSIG				

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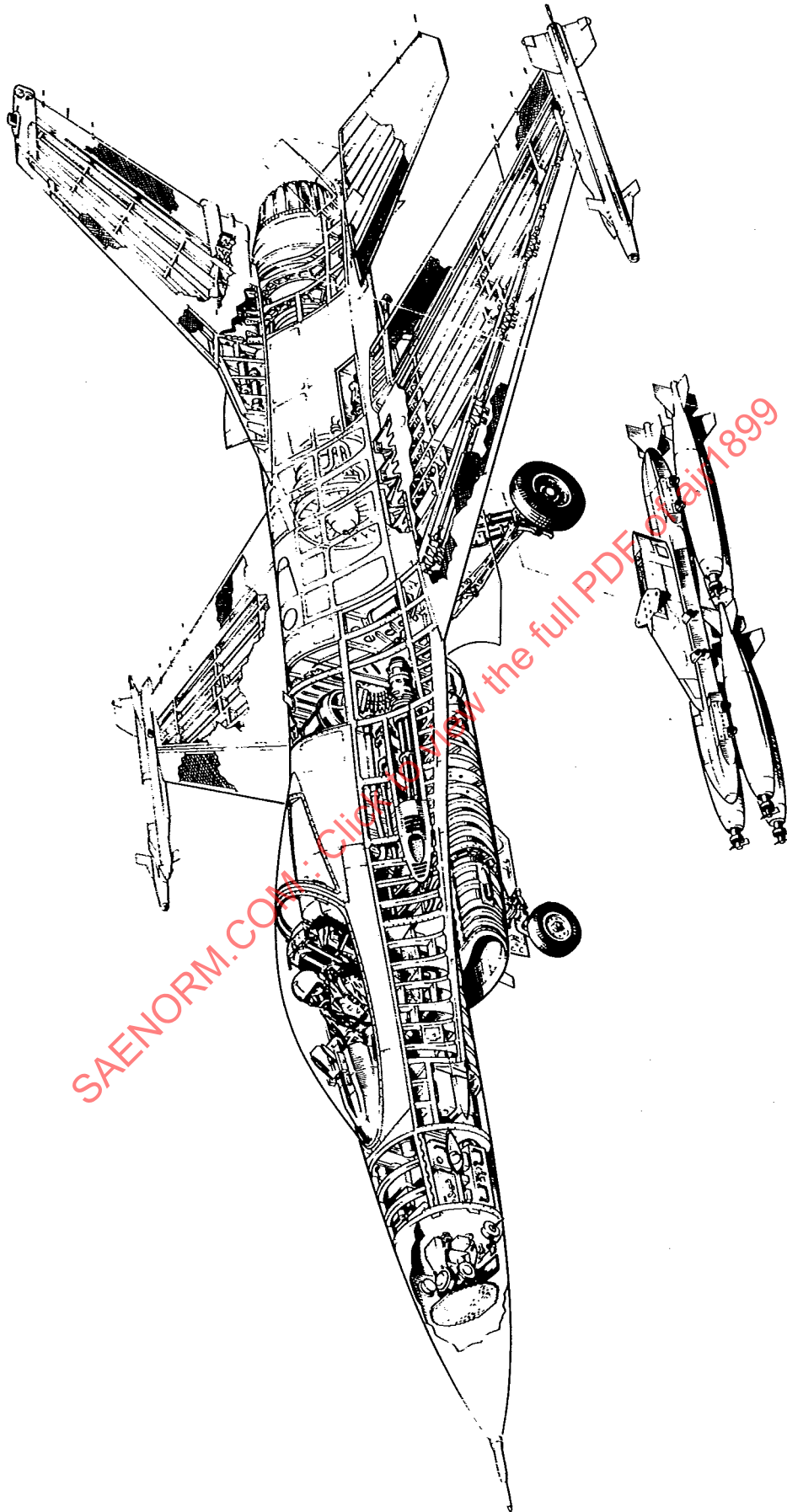
SECTION 4.10



AIRCRAFT F-16 HYDRAULIC SYSTEM ARRANGEMENT

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GENERAL DYNAMICS F-16



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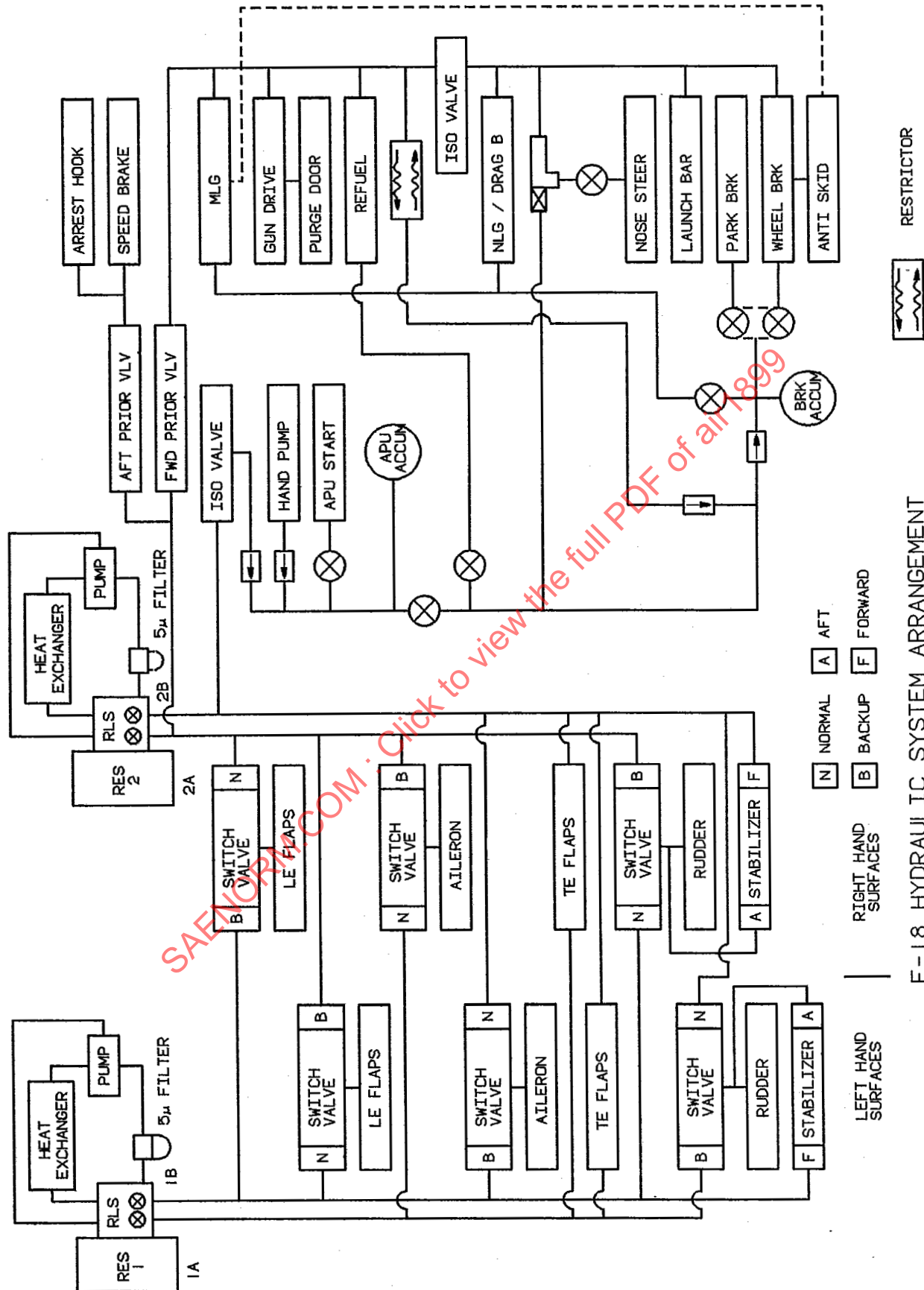
SECTION 4.11

AIRCRAFT - F-18

1. DESIGN SPECIFICATION		MIL-H-5440 F				
2. SYSTEM PRESSURE		3000 PSIG				
3. HYDRAULIC FLUID		MIL-H-83282 A				
4. ACCUMULATOR DATA		VOLUME		PRECHARGE		
AUXILIARY POWER UNIT (SELF DISPLACING)		290 CU.IN. GN ₂ 143 CU.IN. OIL (MAX)		1950 PSIG		
EMERGENCY BRAKE		100 CU.IN. GN ₂ 50 CU.IN. OIL		1500 PSIG		
5. RESERVOIR DATA		SYSTEM 1		SYSTEM 2		
TOTAL CAPACITY		450 CU.IN.		766 CU.IN.		
NORMAL SERVICE		364 CU.IN.		547 CU.IN.		
TYPE		BOOTSTRAP *		BOOTSTRAP *		
PRESSURE		85 PSI		85 PSI		
		* WITH RESERVOIR LEVEL SENSING				
6. SYSTEM QUIESCENT FLOW		SYSTEM 1		SYSTEM 2		
		3.1 GPM		3.5 GPM		
7. HYDRAULIC PUMP DATA		SYSTEM 1		SYSTEM 2		
TYPE		VARIABLE DELIVERY, AXIAL PISTON				
PRESSURE		3000 PSIG		3000 PSIG		
RATED FLOW		56 GPM		56 GPM		
RATED SPEED		4600 RPM		4600 RPM		
DISPLACEMENT		3.0 CIR		3.0 CIR		
ROTATION FROM SHAFT END		CCW		CCW		
PUMP/ENGINE PAD RATIO		0.2736		0.2736		
WINDMILL		690 RPM		690 RPM		
GROUND IDLE		2875 RPM		2875 RPM		
FLIGHT IDLE		3220 RPM		3220 RPM		
85%		3910 RPM		3910 RPM		
CRUISE		4048 RPM		4048 RPM		
100%		4600 RPM		4600 RPM		
8. AUXILIARY PUMP DATA						
9. TUBING DATA	DIA (IN.)	W.T. (TI)	W.T. (STL)	MATERIAL	USAGE	
	0.250	0.016		3AL-2.5V TI (PERMASWAGE)	PRESS & RETURN	
	0.250	0.028			COILED TUBE	
	0.375	0.019			PRESS & RETURN	
	0.375	0.042			COILED TUBE	
	0.500	0.026			PRESS & RETURN	
	0.500	0.056			COILED TUBE	
	0.625	0.032			PRESS & RETURN	
	0.750	0.039			PRESS & RETURN	
	1.000	0.028			RETURN ONLY	
	1.000	0.051			PRESS & RETURN	
10. FITTING DATA		SIZE RANGE	TYPE	MATERIAL	CONNECTIONS	
		0.25-1.25	PERMANENT (PERMASWAGED) & DETACHABLE (PERMASWAGE LIP SEAL AND DYNATUBE)	6AL-4V TI 21-6-9 CRES	METAL TO METAL (LIP SEAL)	
11. TEMPERATURE RANGE		-40F TO +275F				
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)		MS83461/1 : O-RINGS ROD SEAL : TWO STAGE MS83461/1 O-RING ON TEFLON AND O-RING WITH 2 BACKUP RINGS PISTON SEAL : MS83461/1 O-RING ON TEFLON VALVE SLEEVE SEAL : T SECTION & 2 BACKUP RINGS				
13. FILTRATION		TYPE : CENTRAL MANIFOLD FOR PRESSURE AND RETURN WITH COMMON ELEMENT PRESSURE - 5 MICRON ABS. (NON-BYPASSING) RETURN - 5 MICRON ABS. (WITH BYPASS RELIEF) CASE DRAIN - 5 MICRON ABS. (WITH BYPASS RELIEF)				
14. HYDRAULIC MOTOR DATA		MOTOR DISPLACEMENT (CIR)	SPEED (RPM)	PRESSURE (PSI)	FLOW (GPM)	TORQUE
		GUN DRIVE	0.95	6600	2200	29.0
		APU START	0.365	14000	3000	22.0
		LEADING EDGE FLAP	0.620	6975	3000	19.0
						302
15. HAND PUMP DATA		0.5 CU.IN. / CYCLE TO 3000 PSI				
16. RELIEF VALVE SETTING		SYSTEM 1 & SYSTEM 2 : HIGH PRESSURE CRACKING PRESSURE : 3600 PSIG, MAX. FULL FLOW PRESSURE : 3600 PSIG, MAX. AT 56 GPM RESEAT PRESSURE : 3250 PSIG, MIN.				

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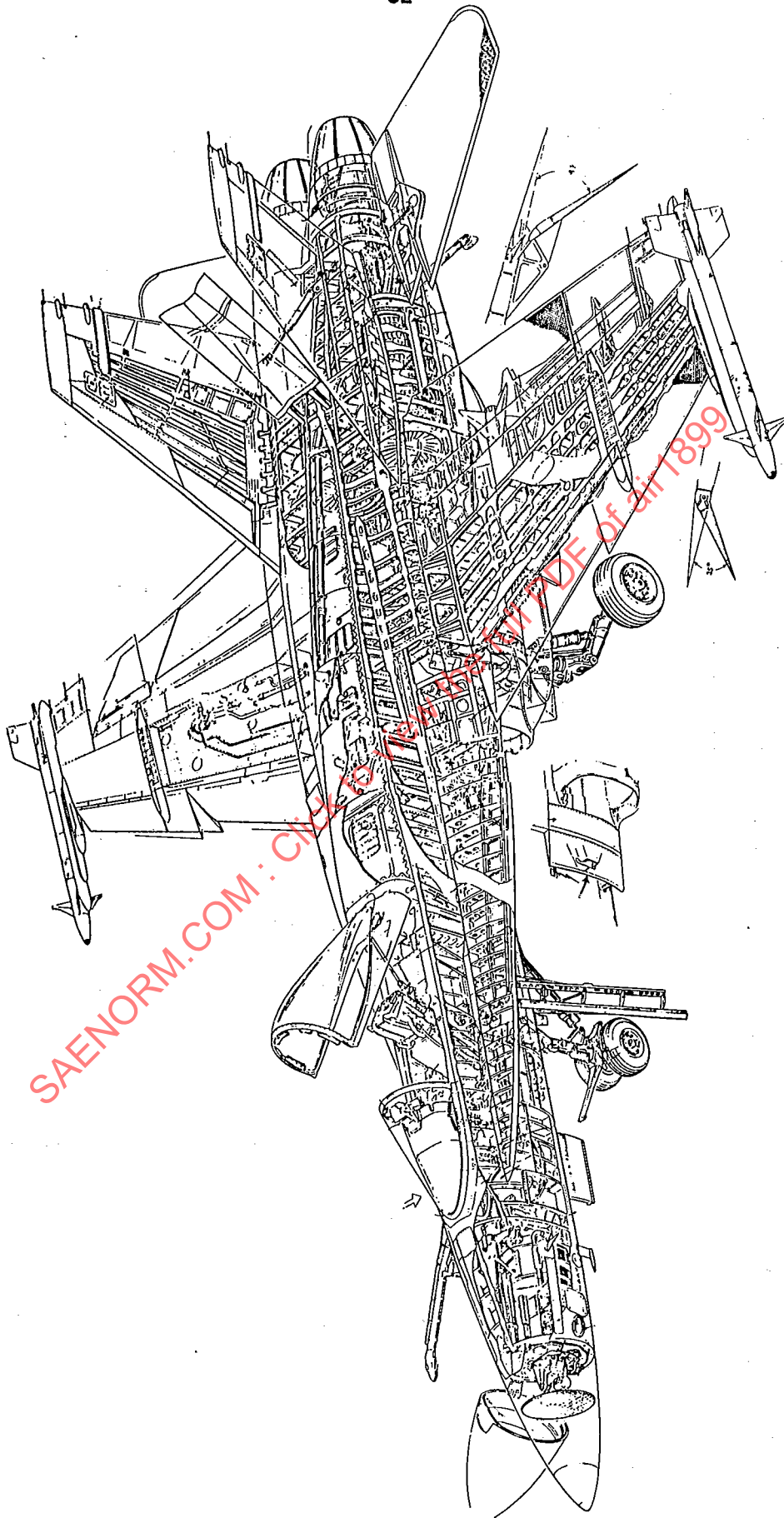
SECTION 4.11



F-18 HYDRAULIC SYSTEM ARRANGEMENT

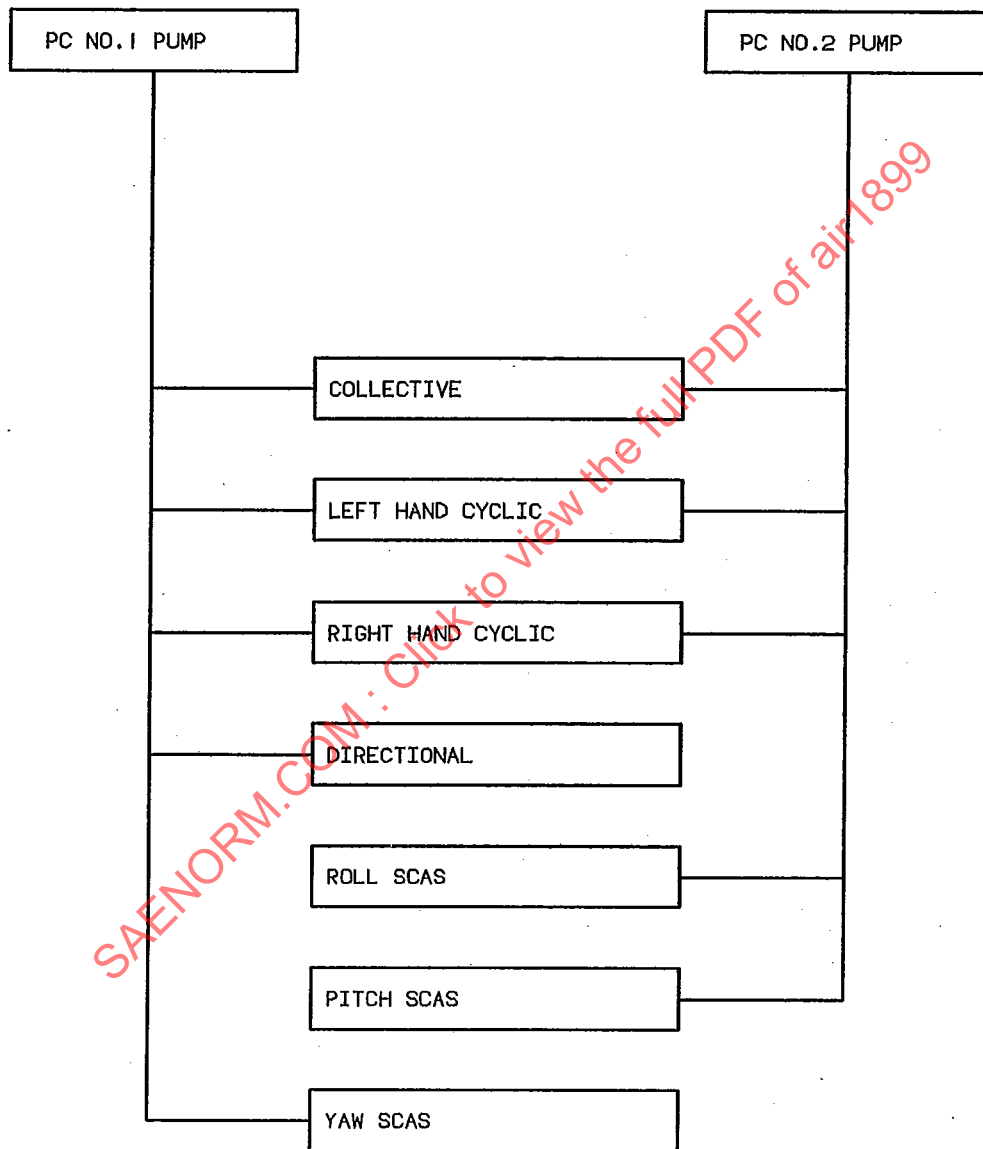
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MCDONNELL-DOUGLAS F-18



HELICOPTER - 214A

1. DESIGN SPECIFICATION		MIL-H-5440			
2. SYSTEM PRESSURE		3000. PSIG			
3. HYDRAULIC FLUID		MIL-H-5606			
4. ACCUMULATOR DATA					
5. RESERVOIR DATA		PC SYSTEM NO.1		PC SYSTEM NO.2	
TYPE AND PRESS. FULL SYSTEM VOLUME RESERVOIR VOLUME - FULL		BOOTSTRAP 75 PSIG. 276.06 CU.IN. 57.50 CU.IN.		BOOTSTRAP 75 PSIG. 278.55 CU.IN. 57.50 CU.IN.	
6. SYSTEM QUIESCENT FLOW		PC NO.1 0.196 GPM		PC NO.2 0.313 GPM	
7. HYDRAULIC PUMP DATA		PC NO.1		PC NO.2	
TYPE PRESSURE RATED FLOW DISPLACEMENT RATED SPEED ROTATION FROM SHAFT END MAIN ROTOR TO PAD RATIO		VARIABLE DELIVERY PRESSURE COMPENSATED 3000 PSIG. 6.5 GPM. 0.31 CU.IN./REV. 5250 RPM CCW 1:17.58		VARIABLE DELIVERY PRESSURE COMPENSATED 3000 PSIG. 6.8 GPM. 0.31 CU.IN./REV. 5550 RPM CCW 1:18.52	
8. AUXILIARY PUMP DATA					
9. TUBING DATA	DIA(IN)	W.T.(STL)	W.T.(AL)	MATERIAL	USAGE
MS FLARELESS	0.250	0.020		6061-T6 AL	DRAIN
	0.250	0.020		CRES 304 1/8 HARD	PRESS. & RET.
	0.375	0.028	0.035	6061-T6 AL	RETURN
	0.375	0.028	0.035	CRES 304 1/8 HARD	PRESSURE
	0.500	0.035	0.035	6061-T6 AL	RETURN
	0.500	0.035	0.035	CRES 304 1/8 HARD	PRESSURE
	0.625	0.035	0.035	6061-T6 AL	PUMP SUCTION
10. FITTING DATA		MS FLARELESS			
11. TEMPERATURE RANGE		-65F TO +275F			
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)		MS28775 BUNA-N O-RING ROD SEAL : MS28775 O-RING ON TEFLON PISTON HEAD SEAL : MS28775 O-RING UNDER TEFLON			
13. FILTRATION		PRESSURE ELEMENT - 15 MICRON ABS (CLEANABLE) RETURN ELEMENT - 15 MICRON ABS (CLEANABLE)			
14. HYDRAULIC MOTOR DATA					
15. HAND PUMP DATA					
16. RELIEF VALVE SETTINGS		PC NO.1 & PC NO.2 : 3850 PSID MAX. AT 7.0 GPM 3250 PSID MIN. RESEAT			

214A HYDRAULIC SYSTEM BLOCK DIAGRAM

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SECTION 4.13

AIRCRAFT - MRCA

1. DESIGN SPECIFICATION		MIL-H-5440 D					
2. SYSTEM PRESSURE		3940 PSIG					
3. HYDRAULIC FLUID		MIL-H-5606					
4. ACCUMULATOR DATA (AT 68F)		USAGE		VOLUME	PRE-CHARGE		
		SYSTEM MAIN ACCUMULATOR		50 CU IN	2000 PSI		
		CANOPY ACCUMULATOR		100 CU IN	1500 PSI		
		BRAKE ACCUMULATOR		60 CU IN	2000 PSI		
PITCH FEEL ACCUMULATOR		7.3 CU IN	800 PSI				
5. RESERVOIR DATA TYPE AND PRESSURE FULL SYSTEM VOLUME RESERVOIR VOLUME TOTAL		BOOTSTRAP 4000PSI	BOOTSTRAP 120PSI				
		990 CU.IN.	990 CU.IN.				
6. SYSTEM QUIESCENT FLOW		3.17 GPM					
7. HYDRAULIC PUMP DATA TYPE PRESSURE RATED FLOW DISPLACEMENT RATED SPEED TORQUE ROTATION FROM SHAFT END ENGINE/PUMP SPEED RATIO		ENGINE DRIVEN					
		3800 PSI FULL FLOW					
		46 GPM					
		1.95 CU IN/REV					
		6000 RPM					
		1240 IN-LB					
		CCW					
8. AUXILIARY PUMP TYPE PRESSURE FLOW SPEED DISPLACEMENT VOLTS AMPS		ELECTRIC MOTOR DRIVEN					
		4000 PSI					
		1.58GPM, 2000PSI 3.17GPM, 3800PSI					
		8700 RPM					
		.088 CU IN/REV					
		26 VDC					
		200 AMPS					
9. TUBING DATA	DIAMETER (IN)	W.T. (STL)	W.T. (AL)	MATERIAL	USAGE		
	0.196 : 0.314			PRESSURE	PRESS : RETURN		
	0.236 : 0.472			NIMONIC 75	PRESS : RETURN		
	0.393 : 0.590			RETURN: AMS 5556 C	PRESS : RETURN		
	0.551 : 0.708				PRESS : RETURN		
	0.629 : 0.866				PRESS : RETURN		
	0.787 : 1.102				PRESS : RETURN		
10. FITTING DATA REPAIR:		SIZE RANGE	TYPE	MATERIAL	CONNECTION		
		.196-1.102 IN	DETACHABLE	B.S. S96, L85	60 CONE, SWAGED PANAVIA STND		
		PERMASWAGE					
11. TEMPERATURE RANGE (DES)		-65F TO 275F					
12. SEAL MATERIAL TYPE (FLIGHT ACTUATORS)		MS 28775 BUNA-N O-RINGS					
		MS 28778 BUNA-N O-RINGS DYNA-SEALS, VARIOUS SPECIAL SEALS					
13. FILTRATION MAIN RETURN		15 MICRON ABS					
		5 MICRON ABS					
14. HYDRAULIC MOTOR DATA		SYSTEM	DISPLACEMENT	SPEED (RPM)	PRESSURE	FLOW (GPM)	TORQUE (IN-LB)
		WING	1.049CUIN/REV	4950	4000 PSI	25.5*	470
		FLAP	.200 CUIN/REV	10200	4000 PSI	8.8	97
		SLAT	.087 CUIN/REV	14500	4000 PSI	5.5	36
15. HAND PUMP DATA		PRESSURE 4000 PSI DISPLACEMENT .415 CU.IN. PER DOUBLE STROKE					
16. RELIEF VALVE SETTINGS							

