K-36-01

The Engineering Society For Advancing Mobility Land Sea Air and Space ®

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE RECOMMENDED PRACTICE

Submitted for recognition as an American National Standard

ARP1482

Issued 12-78
Revised 3-89

REV. A

RECOMMENDATIONS FOR FUEL AND OIL SYSTEM SCHEMATICS

1. PURPOSE:

This document defines a standard set of symbols for use in functional schematics of aircraft fuel and oil systems and components.

2. SCHEMATIC:

For purposes of this document, a schematic is defined as a diagram descriptive of the functions and flow paths of a system or component. Such a schematic is intended only to provide a general understanding of the system or component depicted in an easily understood format. As such, portrayal of the physical positions and aspects of the components is not required and may, in fact, be undesirable.

3. COMPONENTS:

The following figures set forth the basic component symbols, as well as modifiers that specify drives and accessories.

4. SPECIAL COMPONENTS:

It is recognized that most systems will require the occasional use of unique components not described in this document. Where possible, these should be represented by combinations of the symbols herein. The resulting combination for a given component should be surrounded by a dashed line, if necessary to make it clear that it is a single component. Several examples of composite symbols are presented in the figures.

5. PLUMBING:

Tubing and hoses should be represented by solid double lines. Each line should be identified as to function by use of the appropriate cross-hatch code described in the figures. It is recommended that line size (outside diameter for tubing, inside diameter for hose) be specified in the format 0X.XX, suffixed with the appropriate material/type letter code listed in this document.

6. LEGENDS:

It is recommended that each system schematic contain a legend identifying the nomenclature of all symbols used. Numerical codes should be used to relate the symbols in the legend to the appropriate locations on the schematic.

7. COMPONENT DRAWINGS:

It is recommended that each component drawing include a schematic of the component represented thereon.

8. OTHER SYMBOLS AND SYSTEMS:

Refer to SAE AS1290 for symbols relevant to actuators, control valves, and other components associated with hydraulic and pneumatic systems.

9. NOMENCLATURE:

Refer to SAE AIR1660 and AIR1615 for definitions of the nomenclature used herein.

CODES FOR ELECTRICAL DRIVES:

AC MOTOR	ACM
DC MOTOR	DCM
STEPPER MOTOR	SM
TORQUE MOTOR	TM
AC SOLENOID	ACS
DC SOLENOID	DCS

CODES FOR PNEUMATIC DRIVES:

AIR TURBINE MOTOR	ATM
AIR PRESSURE MOTOR	APM

CODES FOR HYDRAULIC DRIVES:

FUEL TURBINE MOTOR	FTM
HYDRAULIC MOTOR	HM
FUEL PRESSURE MOTOR	FPM

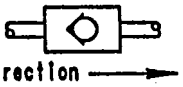
CODES/SYMBOLS FOR MECHANICAL DRIVES:

ENGINE DRIVEN	ED
FLOAT ACTUATED	
MANUAL	
GRAVITY ACTUATED	

MISCELLANEOUS CODES:

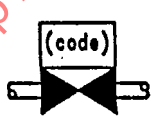
NORMALLY-OPEN	NO
NORMALLY-CLOSED	NC

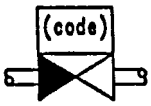
CHECK VALVE:



SHUTOFF VALVES:

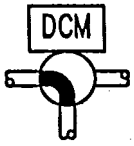
MANUAL 

ACTUATED, NORMALLY-OPEN 

ACTUATED, NORMALLY-CLOSED 

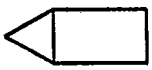
ROTARY VALVES:

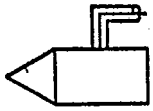
BASIC SYMBOL 

EXAMPLE- 3 WAY, 2 POSITION, DC MOTOR ACTUATED 

LEVEL CONTROL SHUTOFF VALVES:

BASIC SYMBOLS

INTEGRAL 

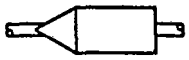
REMOTE PILOT-OPERATED 

LEVEL CONTROL SHUTOFF VALVES: (continued)

MOUNTING

TANK MOUNTED (REFUEL)

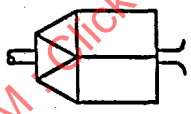
LINE MOUNTED (REFUEL OR DEFUEL)



REDUNDANCY

DUAL, SERIES (REFUEL, TANK MOUNTED)

DUAL, PARALLEL, (REFUEL, TANK MOUNTED)

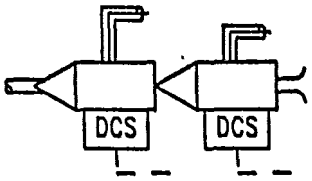


VARIATIONS

DEFUEL, INTEGRAL, TANK MOUNTED

REFUEL/DEFUEL, INTEGRAL, TANK MOUNTED

DUAL, REFUEL, TANK MOUNTED, REMOTE PILOT, DC SOLENOID PRECHECK

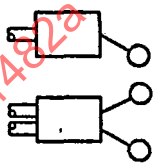


LEVEL CONTROL PILOT VALVES:

BASIC SYMBOLS

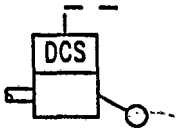
SINGLE

DUAL

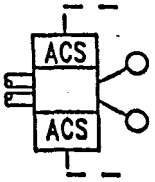


VARIATIONS

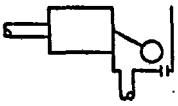
SINGLE, DC SOLENOID PRECHECK



DUAL, AC SOLENOID PRECHECK



SINGLE, FLOTATION PRECHECK

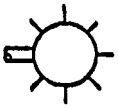


RELIEF VALVE:

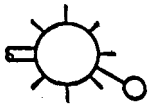
flow direction →

VENT VALVES:

BASIC SYMBOL

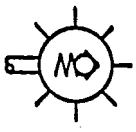


FLOAT OPERATED

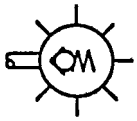


VENT VALVES: (continued)

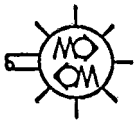
PRESSURE RELIEF



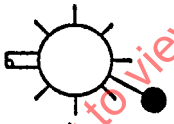
VACUUM RELIEF



PRESSURE AND VACUUM RELIEF



GRAVITY OPERATED

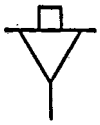


DRAIN VALVES:

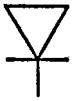
BASIC SYMBOL

flow direction

EXTERNAL

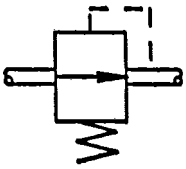


INTERNAL OR FLUSH

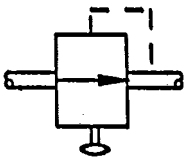


REGULATORS:

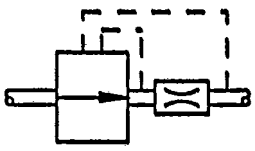
GAUGE PRESSURE



ABSOLUTE PRESSURE

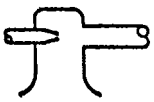


FLOW



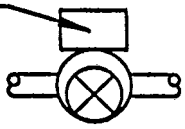
PUMPS:

EJECTOR



add code

CENTRIFUGAL



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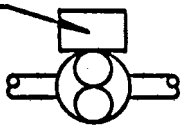
GEAR



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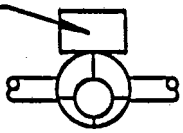
VANE



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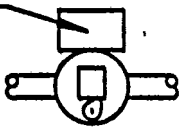
PISTON



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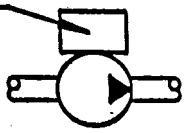
TYPE UNSPECIFIED



GRAVITY REFUELING CONNECTIONS:

CAP- BASIC SYMBOL 

FLUSH CAP 

EXTENDED CAP 

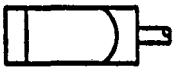
SCUPPER 

AERIAL REFUELING CONNECTIONS:

REFUELING HOSE AND DROGUE (mates with probe) 

RECEIVER PROBE (mates with drogue) 

REFUELING BOOM (mates with receptacle) 

RECEIVER RECEPTACLE (mates with boom) 

PRESSURE REFUELING CONNECTIONS:

SINGLE POINT CAP AND ADAPTER (BASIC SYMBOL) 

FLUSH CAP AND ADAPTER 

EXTENDED CAP AND ADAPTER 

CLOSED CIRCUIT RECEPTACLE (RETURN TO REFUEL STATION) 

INDICATOR SWITCHES:

GAUGE PRESSURE 

ABSOLUTE PRESSURE 

DIFFERENTIAL PRESSURE 

FLOAT 

TEMPERATURE 

FLOW RATE 

TRANSDUCERS:

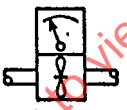
GAUGE PRESSURE 

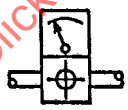
ABSOLUTE PRESSURE 

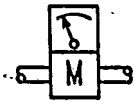
DIFFERENTIAL PRESSURE 

FLOAT 

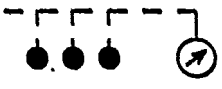
TEMPERATURE 

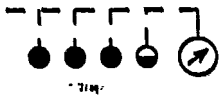
FLOW RATE (VOLUMETRIC) 

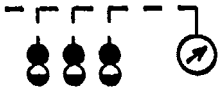
FLOW RATE (POSITIVE DISPLACEMENT) 

MASS FLOW RATE (ANGULAR MOMENTUM RECOVERY TYPE) 

QUANTITY MEASURING DEVICES:

ELECTRONIC (BASIC SYMBOL) 

EXTERNAL COMPENSATION 

SELF COMPENSATION 

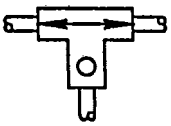
QUANTITY MEASURING DEVICES: (continued)

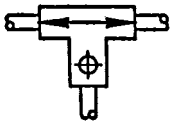
DENSITOMETER 

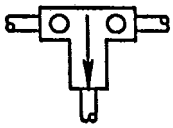
DRIP STICK 

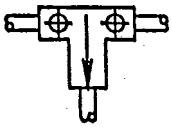
DIP STICK 

FLOWRATE PROPORTIONERS:

VOLUMETRIC DIVIDER 

POSITIVE DISPLACEMENT DIVIDER 

VOLUMETRIC EQUALIZER 

POSITIVE DISPLACEMENT EQUALIZER 

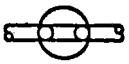
COUPLINGS:

QUICK DISCONNECT-NON-SELF-SEALING 

QUICK DISCONNECT-SELF-SEALING 

COUPLINGS: (continued)

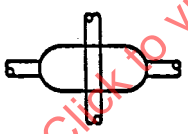
BREAKAWAY VALVE-SELF-SEALING



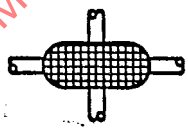
COMBINATION SELF-SEALING DISCONNECT AND BREAKAWAY VALVE

HEAT EXCHANGERS:

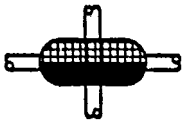
BASIC SYMBOL



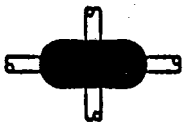
GAS TO GAS



LIQUID TO GAS
OR
GAS TO LIQUID

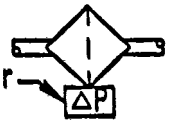


LIQUID TO LIQUID



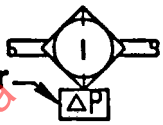
SEPARATORS:

FILTER



SEPARATORS:

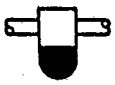
MICRONIC FILTER



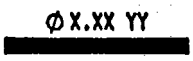
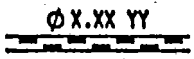
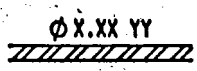
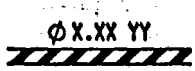
SCREEN

STRAINER

GAS/LIQUID



LINES:

ENGINE FEED	
MOTIVE FLOW	
REFUEL	
TRANSFER	
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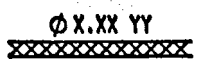
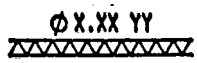
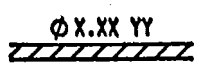
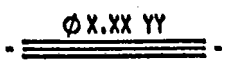
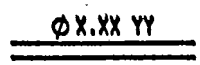
DEFUEL	
VENT	
PRESSURIZATION	
SENSING	
DRAIN	
ELECTRICAL	

note: X.XX = line size; YY = material (see pg. 2)