

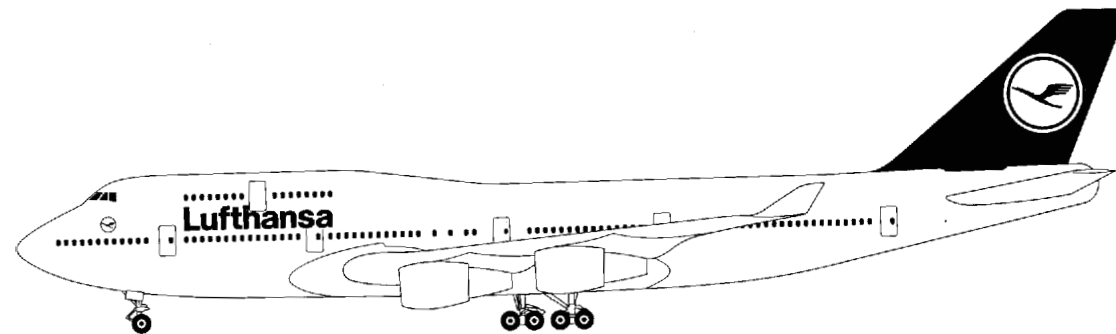


Lufthansa Technical Training

Training Manual B 747-400

ATA 22-21 YAW DAMPER SYS.

ATA Spec. 104 Level 3



Book No:

Lufthansa
Technical Training GmbH
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ATA 22-21 YAW DAMPER SYSTEM

YAW DAMPER SYSTEM



YAW DAMPER SYSTEM - INTRODUCTION

The purpose of the yaw damper system is to improve the airplane's directional stability and ride quality.

The yaw damper system commands small rudder movements as required to ensure correct turn coordination, to correct for dutch roll and to suppress body structural modal oscillations. It uses sensor inputs from the inertial reference system (IRS), air data computers (ADC) and dedicated accelerometers for computing the commands.

Dutch roll is an oscillatory motion common to swept-wing airplanes operating in turbulent and unstable air that causes random yawing. Dutch roll is explained on the graphic.

Turn coordination is done by the rudder movement to balance accelerations in a turn. The graphic illustrates uncoordinated turn conditions.

Structural modal oscillation is body bending about the wing area excited by turbulence. The yaw damper system suppresses this oscillation with corrective rudder commands based on lateral acceleration signals from the modal accelerometers.

YAW DAMPER SYSTEM

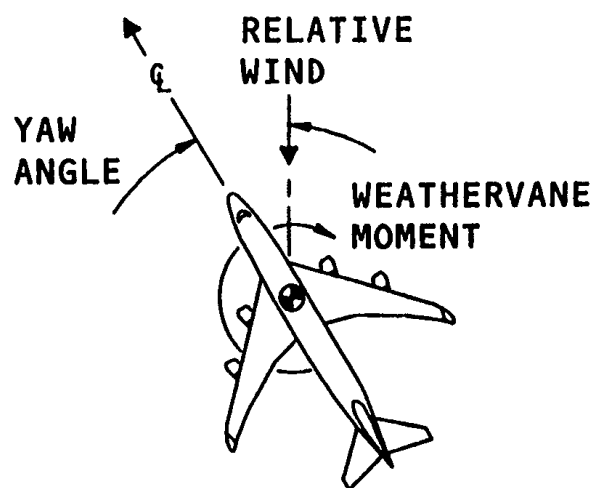


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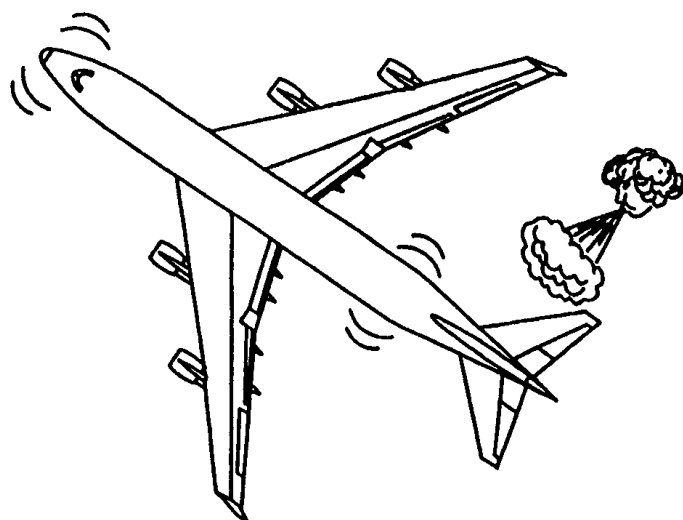
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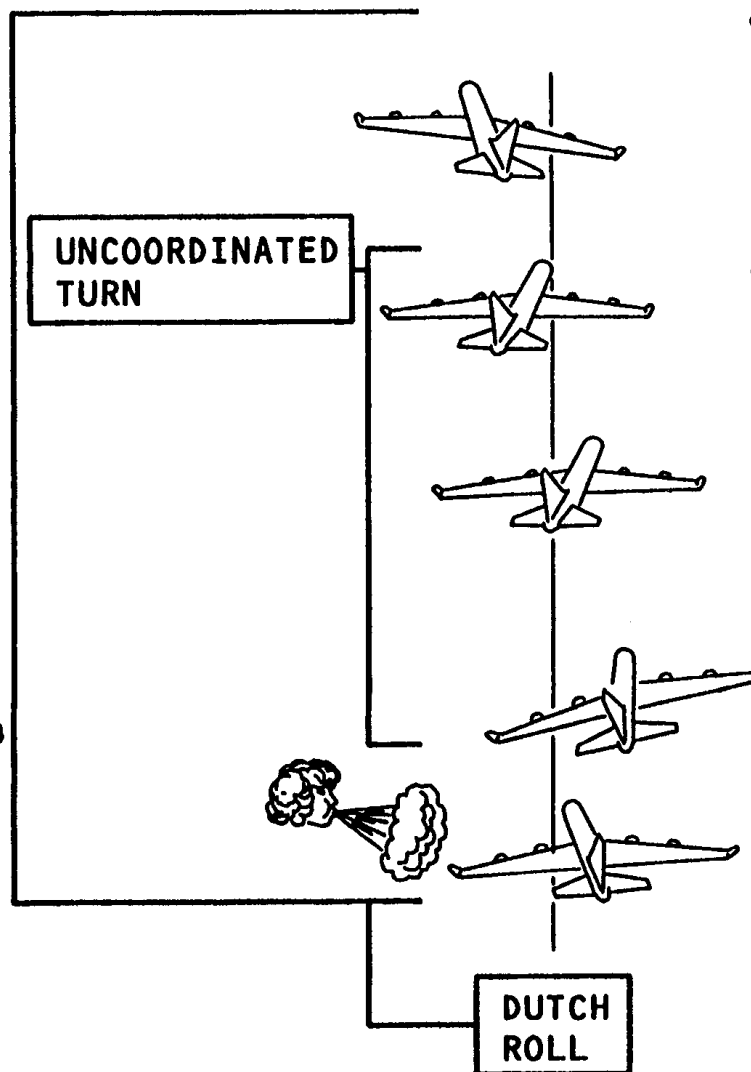
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SIDESLIP



STRUCTURAL MODAL EXCITATION



- CYCLE REPEATS
- ROLL RIGHT CAUSES LEFT WING TO INCREASE DRAG - AIRCRAFT STARTS YAW LEFT AND SIDE SLIPS TO RIGHT
- LEFT WING INCREASES LIFT - AIRCRAFT STARTS ROLL RIGHT
- ROLL LEFT CAUSES RIGHT WING TO INCREASE DRAG - AIRCRAFT STARTS YAW RIGHT AND SIDE SLIPS TO LEFT
- RIGHT WING INCREASES LIFT - AIRCRAFT STARTS ROLL LEFT
- TAIL MOVES TO THE RIGHT - AIRCRAFT YAWS LEFT

Figure 1 YAW DAMPER SYSTEM - INTRODUCTION

YAW DAMPER SYSTEM



YAW DAMPER SYSTEM

The dual yaw damper system provides:

- Dutch roll dampening (gust response suppression)
- Turn coordination
- Structural modal suppression

Signal inputs to the yaw damper module (YDM) are received from:

- IRUs
- ADCs
- Modal accelerometers
- Air ground system
- Hydraulic pressure switches

Each YDM provides an output to one yaw damper actuator to control rudder movement. The upper YDM commands the upper rudder. The lower YDM commands the lower rudder.

The flight control electronics power supply modules (FCEPSM) provide power to the YDM. An on/off switch and integral INOP light are provided in the YDM control panel.

The failure indications of the yaw damper (Y/D) to the flight crew and ground maintenance personnel are:

- The Y/D control panel INOP light comes on
- EICAS level C and level S messages, YAW DAMPER UPP and/or YAW DAMPER LWR shows

Maintenance tests of the yaw damper system and a fault history are available through the central maintenance computer system CMCS.

YAW DAMPER SYSTEM



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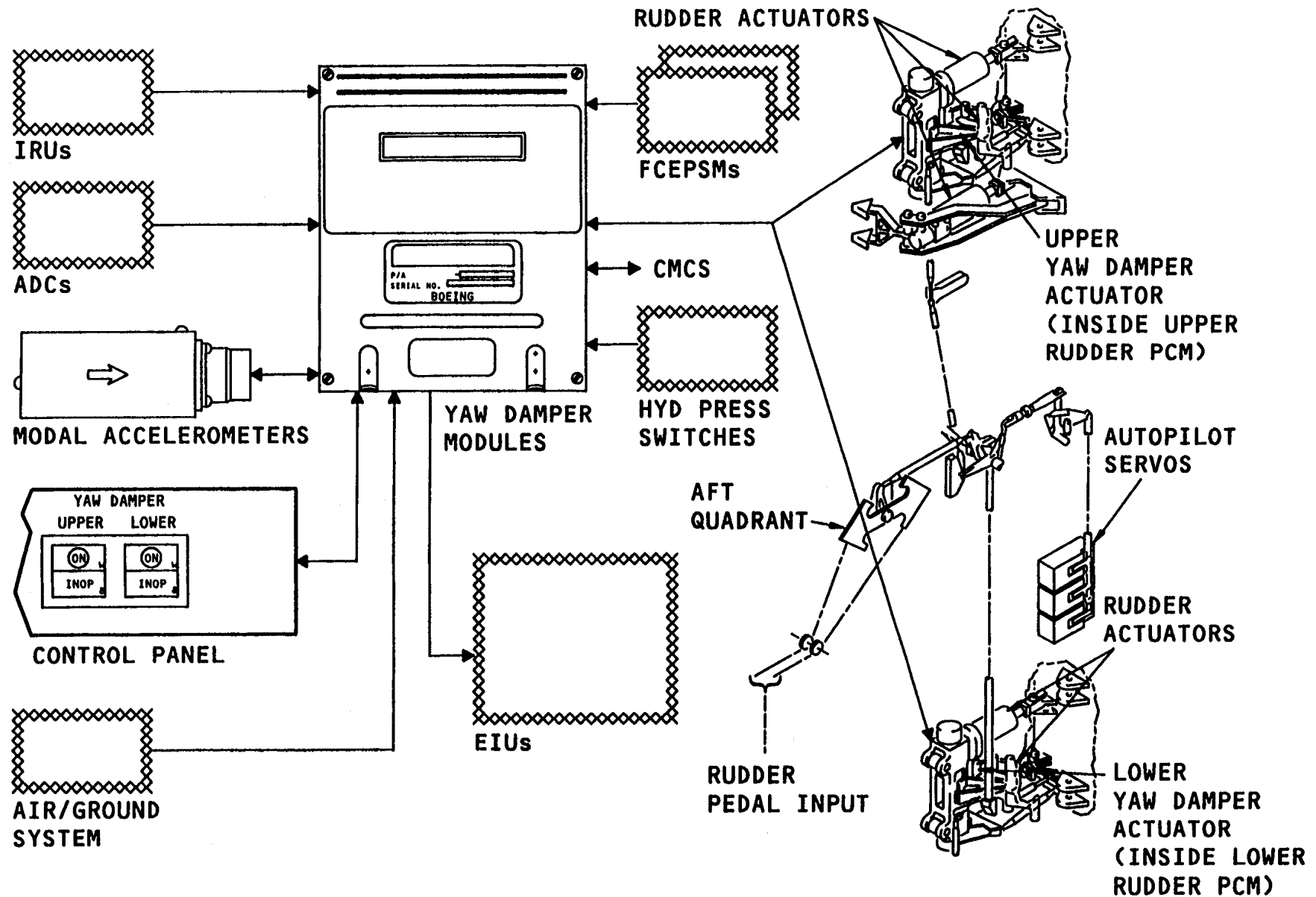


Figure 2 YAW DAMPER SYSTEM

YAW DAMPER SYSTEM



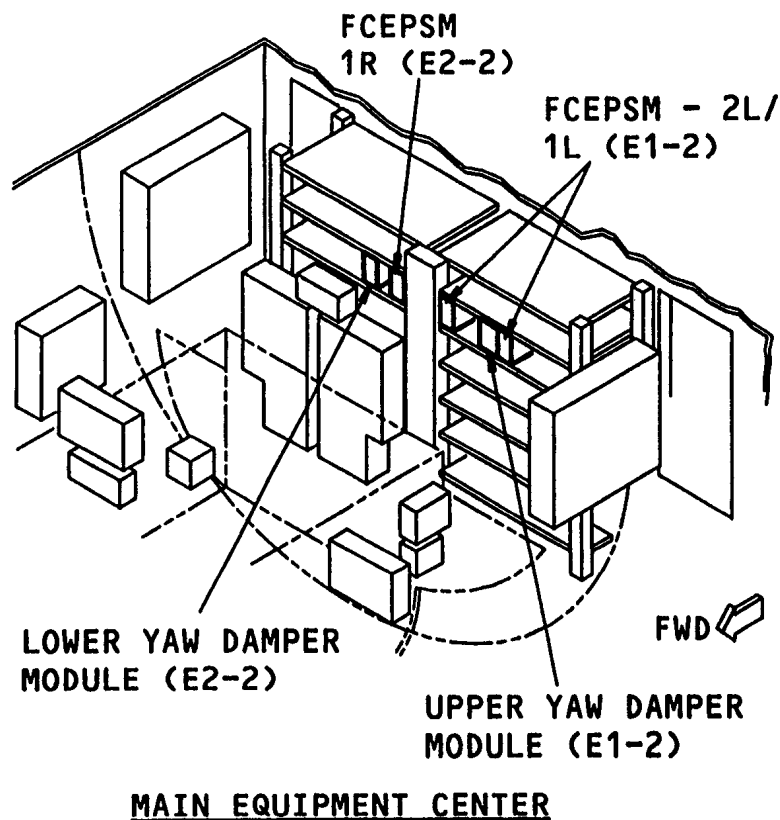
Y/D-COMPONENT LOCATIONS-1

The yaw damper system components are:

- Upper yaw damper module
- Lower yaw damper module
- Yaw damper control panel
- Yaw damper circuit breakers

The components that interface with the yaw damper system are:

- Flight control electronics power supply modules (FCEPSM)
- FCEPSM circuit breakers



PILOT'S OVERHEAD
PANEL (P5)

- YAW DAMPER
CONTROL PANEL

OVERHEAD CIRCUIT
BREAKER PANEL (P7)

- UPR YAW DAMPER
- LWR YAW DAMPER
- FLT CONT ELEC 2L AC
- FLT CONT ELEC 2L DC
- FLT CONT ELEC 1L AC
- FLT CONT ELEC 1L DC
- FLT CONT ELEC 2R DC
- FLT CONT ELEC 1R AC
- FLT CONT ELEC 1R DC

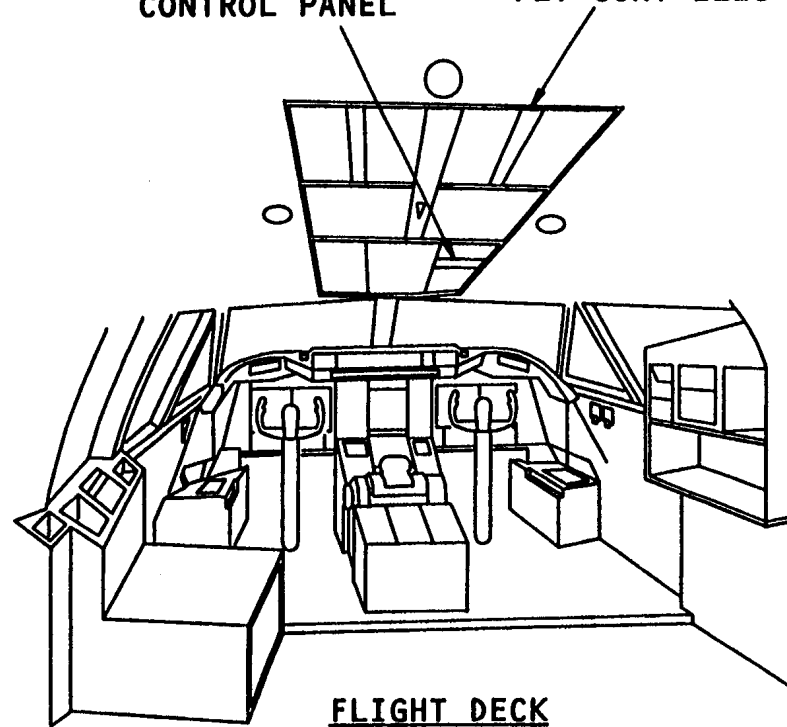


Figure 3 Y/D-COMPONENT LOCATIONS-1

YAW DAMPER SYSTEM



Y/D-COMPONENT LOCATIONS-2

The yaw damper system components are:

- Left and right forward modal accelerometers
- Left and right aft modal accelerometers
- Upper and lower rudder power control modules and yaw damper actuators

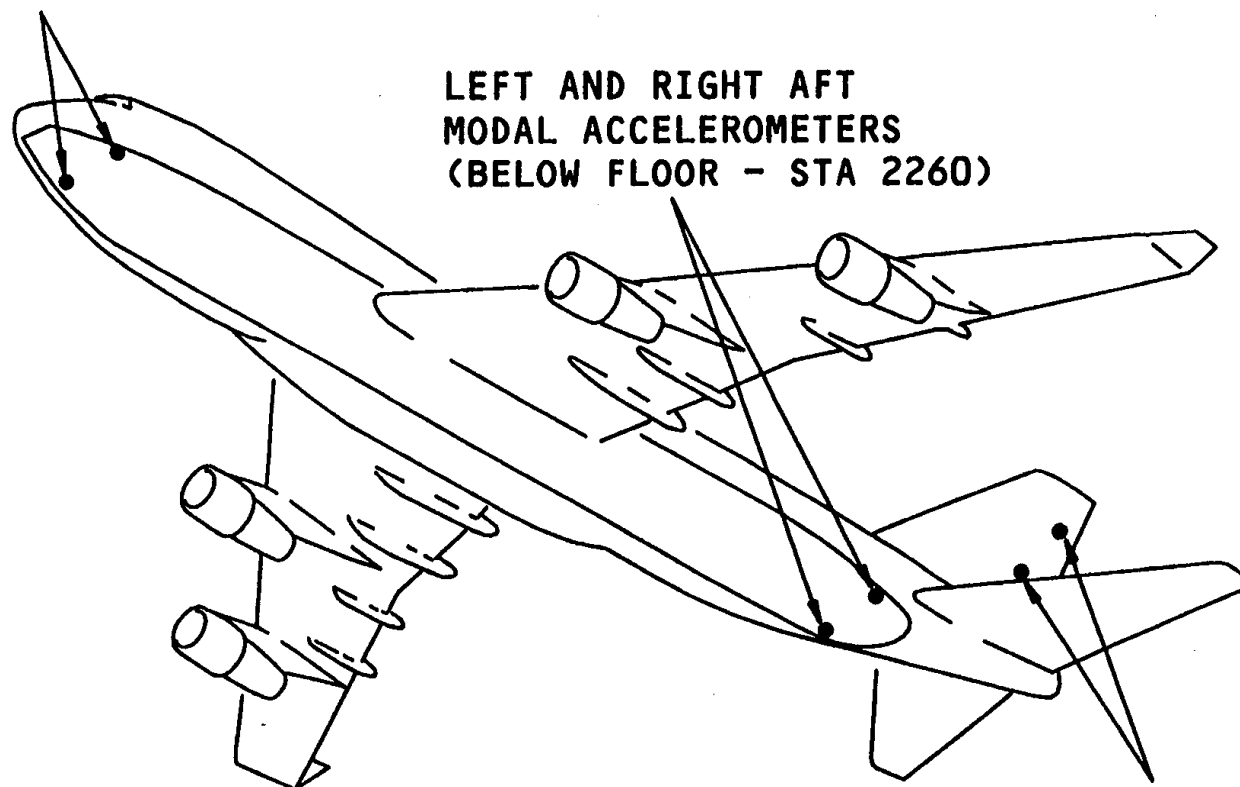
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**LEFT AND RIGHT FORWARD
MODAL ACCELEROMETERS
(BELOW FLOOR - STA 320)**

**LEFT AND RIGHT AFT
MODAL ACCELEROMETERS
(BELOW FLOOR - STA 2260)**



**UPPER AND LOWER RUDDER
POWER CONTROL MODULES (RPCMs)
AND YAW DAMPER ACTUATORS
(INSIDE RPCM'S)
(RUDDER STA 220 AND 95)**

Figure 4 Y/D-COMPONENT LOCATIONS-2

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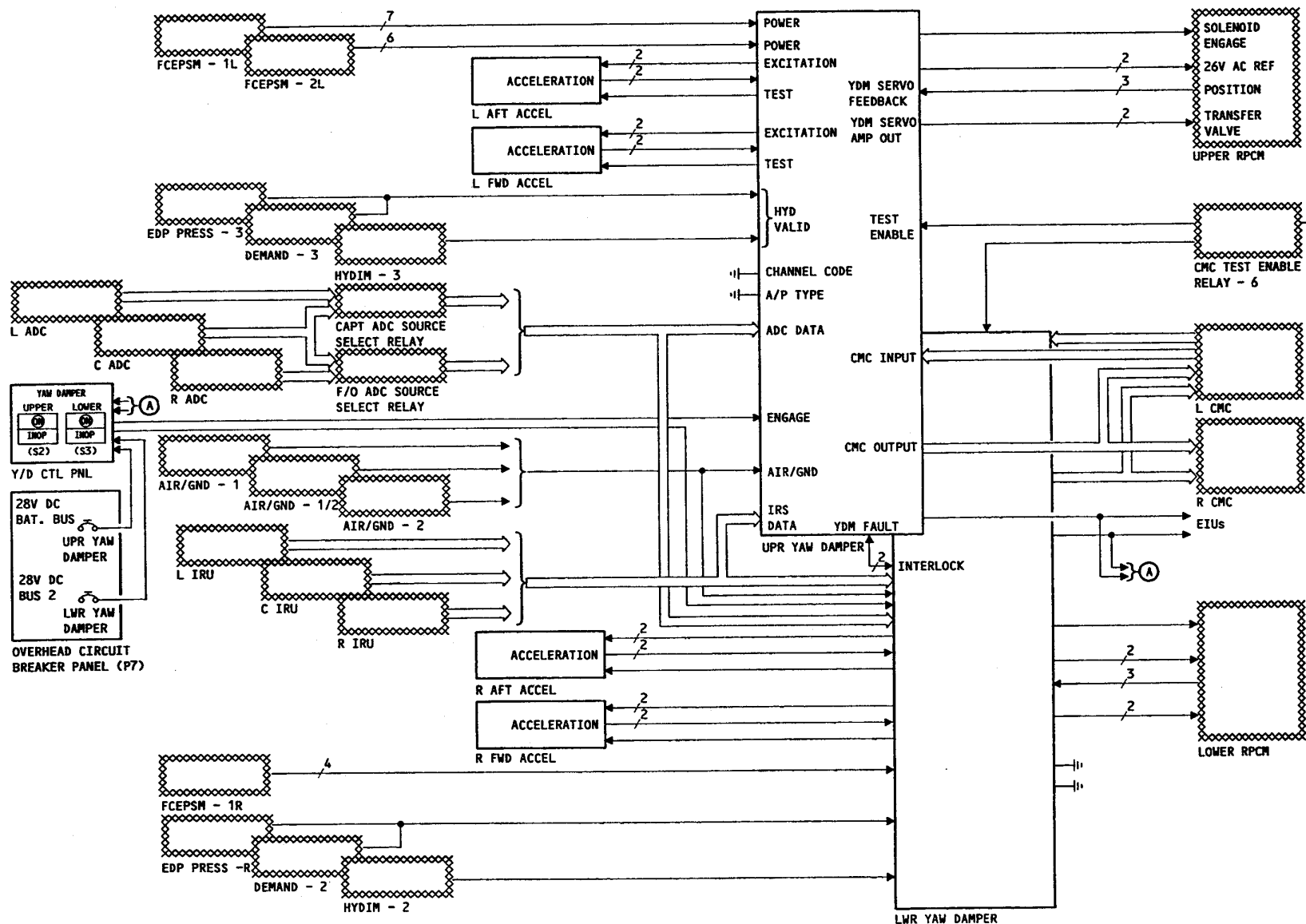


Figure 5 Y/D - INTERFACE DIAGRAM



YAW DAMPER SYSTEM

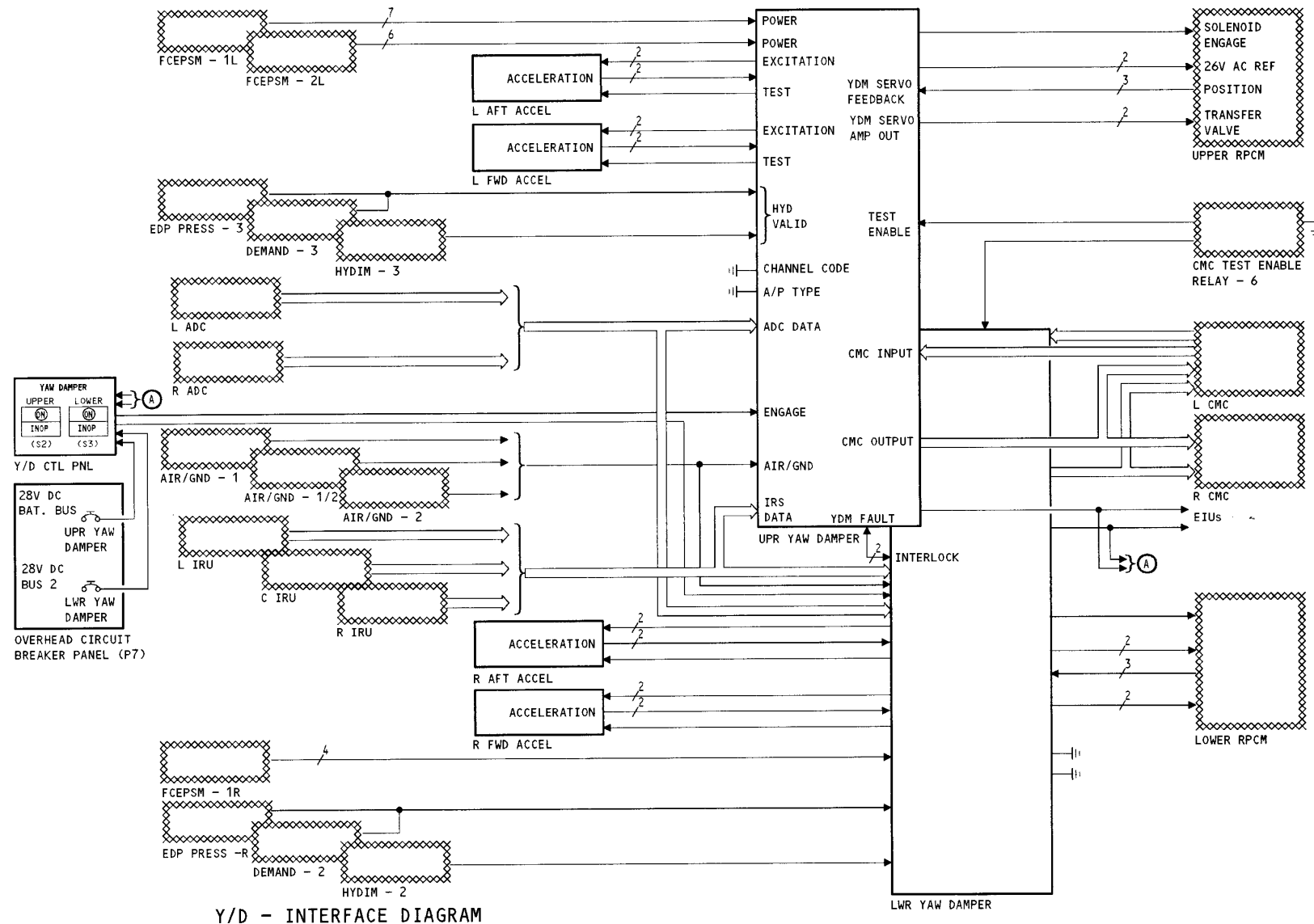


Figure 6 Y/D INTERPHASE DIAGRAM

YAW DAMPER SYSTEM



Y/D-UPPER-POWER DISTRIBUTION

AC Power Distribution

The upper yaw damper module (YDM) receives 26v ac power from the left flight control electronic power supply modules (FCEPSMs). FCEPSM-1L supplies 26v ac to the YDM and the Y/D actuator LVDT; FCEPSM-2L is selected if the first fails. The ac power to the left FCEPSMs comes from the FCE 1L and 2L ac circuit breakers. Both left FCEPSMs receive 115v ac through circuit breakers from the AC standby bus.

DC Power Distribution

Number 1 and 2 flight control electronic dc circuit breakers are used for engage relay power. The upper yaw damper module receives 28v dc through circuit breakers from the battery bus.

The FCEPSMs provide +/- 15v dc and +5v dc for:

- Monitor processor power
- Control processor power
- Failure warning
- Internal tests
- External tests
- Accelerometer excitation

YAW DAMPER SYSTEM

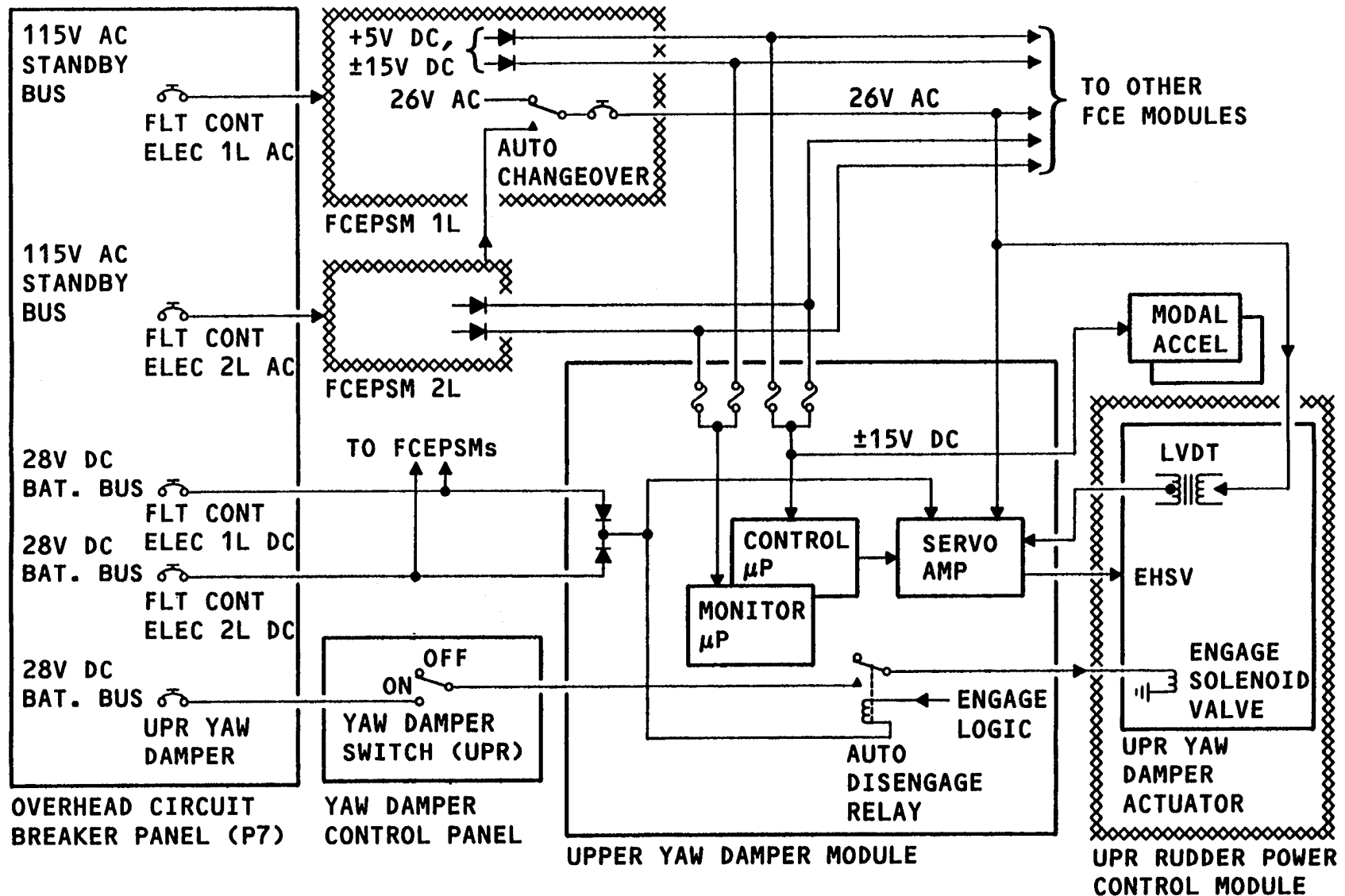


Figure 7 Y/D - UPPER - POWER DISTRIBUTION

YAW DAMPER SYSTEM



UPPER Y/D - POWER DISTRIBUTION

AC Power Distribution

The upper yaw damper module (YDM) receives 26V ac power from the left flight control electronic power supply modules (FCEPSMs). FCEPSM-1L supplies 26v ac to the YDM and the Y/D actuator LVDT; FCE PSM-2L is selected if the first fails. The ac power to the left FCEPSMs comes from the FCE 1L and 2L ac circuit breakers. Both left FCEPSMs receive 115V ac through circuit breakers from the AC standby bus.

DC Power Distribution

Number 1 and 2 flight control electronic dc circuit breakers are used for engage relay power. The upper yaw damper module receives 28v dc through circuit breakers from the battery bus.

The FCEPSMs provide +/- 15V dc and +5V dc for:

- Monitor processor power - Control processor power - Failure warning - Internal tests External tests - Accelerometer excitation

YAW DAMPER SYSTEM

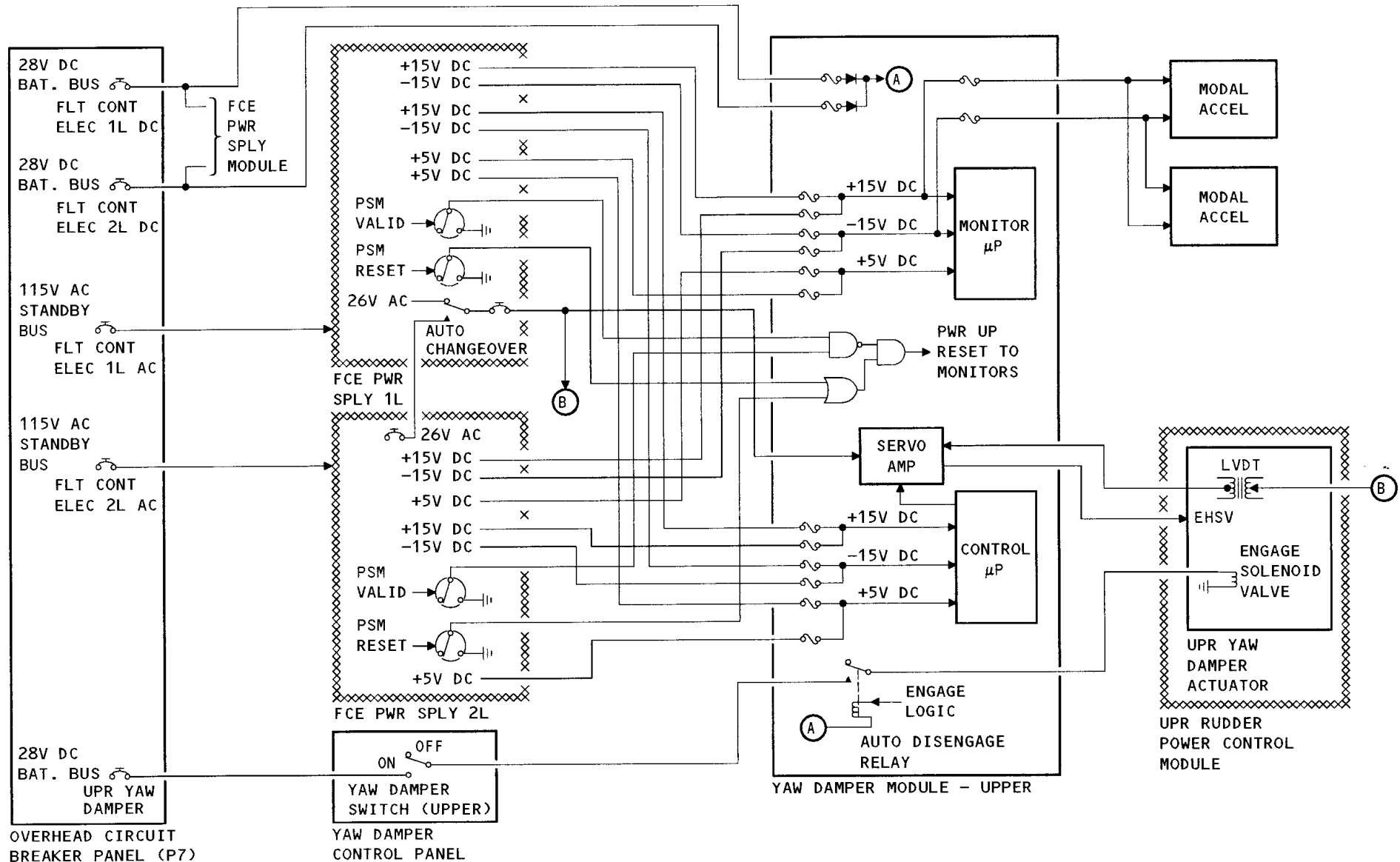


Figure 8 UPPER Y/D POWER DISTRIBUTION

YAW DAMPER SYSTEM



Y/D-LOWER-POWER DISTRIBUTION

The power for the lower yaw damper module is similar to that for the upper yaw damper module. The lower yaw damper module receives +5v dc and +/- 15v dc and 26v ac from only the FCEPSM-1R. This power supply receives 115v ac from bus 1. DC power to the lower yaw damper module comes from DC bus 1 and bus 2.

YAW DAMPER SYSTEM



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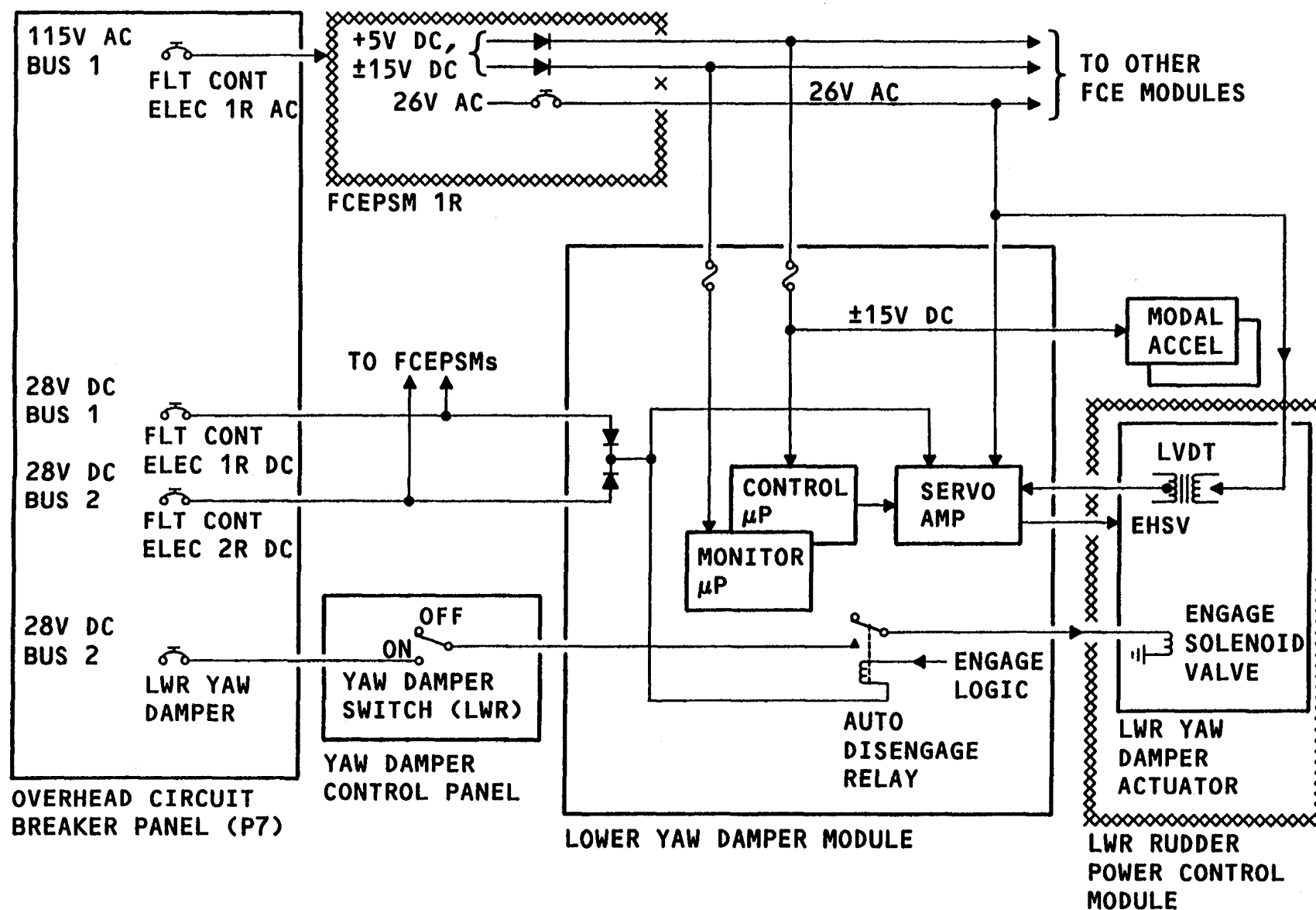


Figure 9 Y/D - LOWER - POWER DISTRIBUTION



LOWER Y/D - POWER DISTRIBUTION

The power for the lower yaw damper module is similar to that for the upper yaw damper module. The lower yaw damper module receives +5v dc and +/- 15v dc and 26v ac from only the FCE PSM-IR. This power supply receives 115v ac from bus 1. DC power to the lower yaw damper module comes from DC bus 1 and bus 2.

YAW DAMPER SYSTEM



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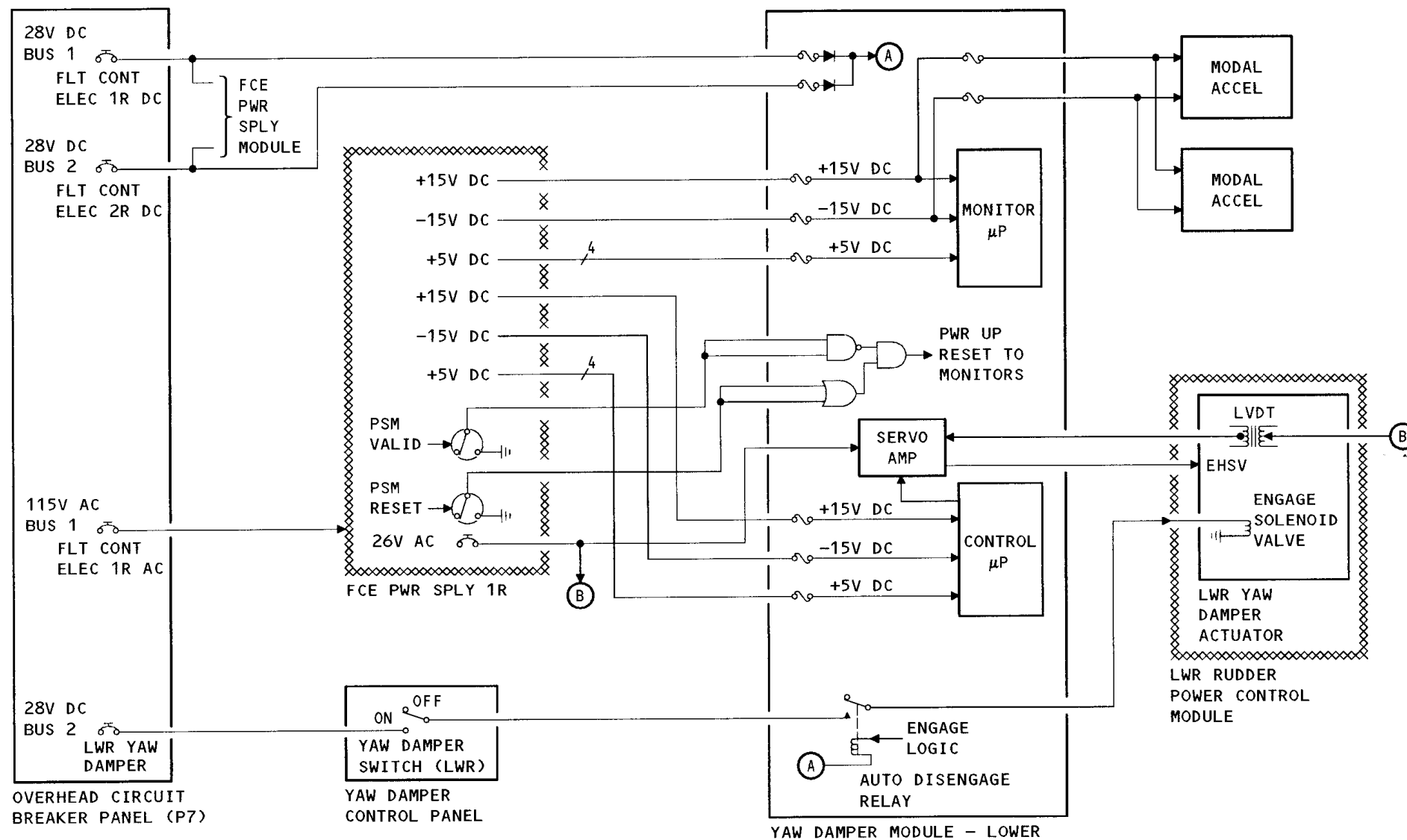


Figure 10 LOWER Y/D POWER DISTRIBUTION

YAW DAMPER SYSTEM



Y/D-HYDRAULIC DISTRIBUTION

Hydraulic systems 1 and 3 supply hydraulic pressure to the upper rudder PCM control valve and systems 2 and 4 supply the lower rudder PCM control valve. The upper yaw damper actuator uses system 3 and the lower yaw damper actuator uses system 2.

The YDM receives two electrical inputs to detect system pressure status. one input from the hydraulic interface module (HYDIM) and the other from the hydraulic pressure switches. These

„switches are part of system 2 and system 3 pressure assemblies. These two inputs should be opposite states. This means the HYDIM input is in a high state, while the pressure switch is in a low state with normal hydraulic pressure.

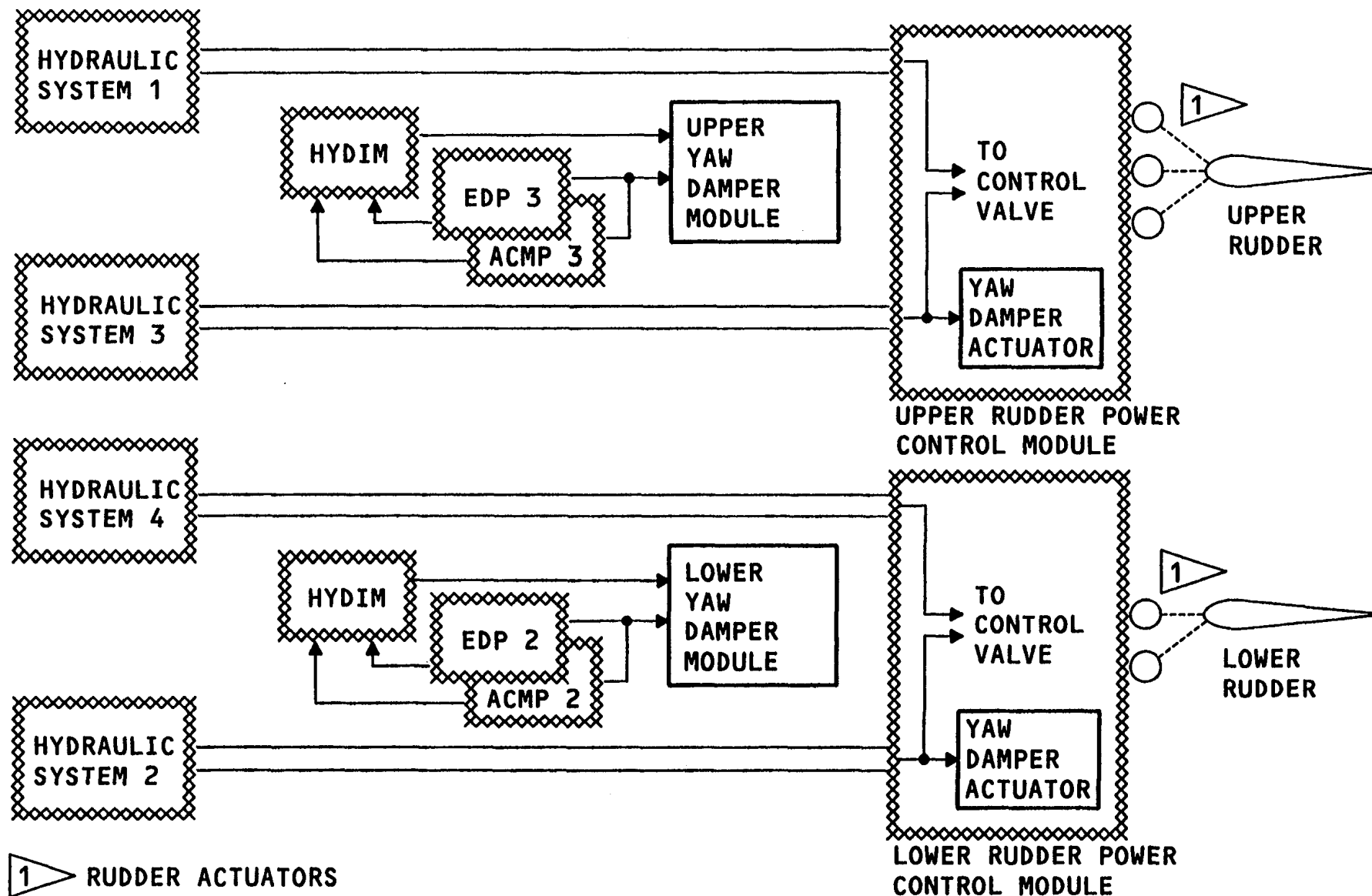


Figure 11 Y/D-HYDRAULIC DISTRIBUTION

YAW DAMPER SYSTEM



Y/D-DIGITAL INTERFACE

The digital information conforms to the ARINC 429 Specification. The digital interfaces are shown here.

The data sent from the ADC to each YDM is:

- Impact pressure
- Indicated AOA
- True airspeed
- Overspeed discrete

The data sent from the IRU to each YDM is:

- Lateral acceleration
- Roll rate
- Yaw rate
- Ground speed
- Roll angle

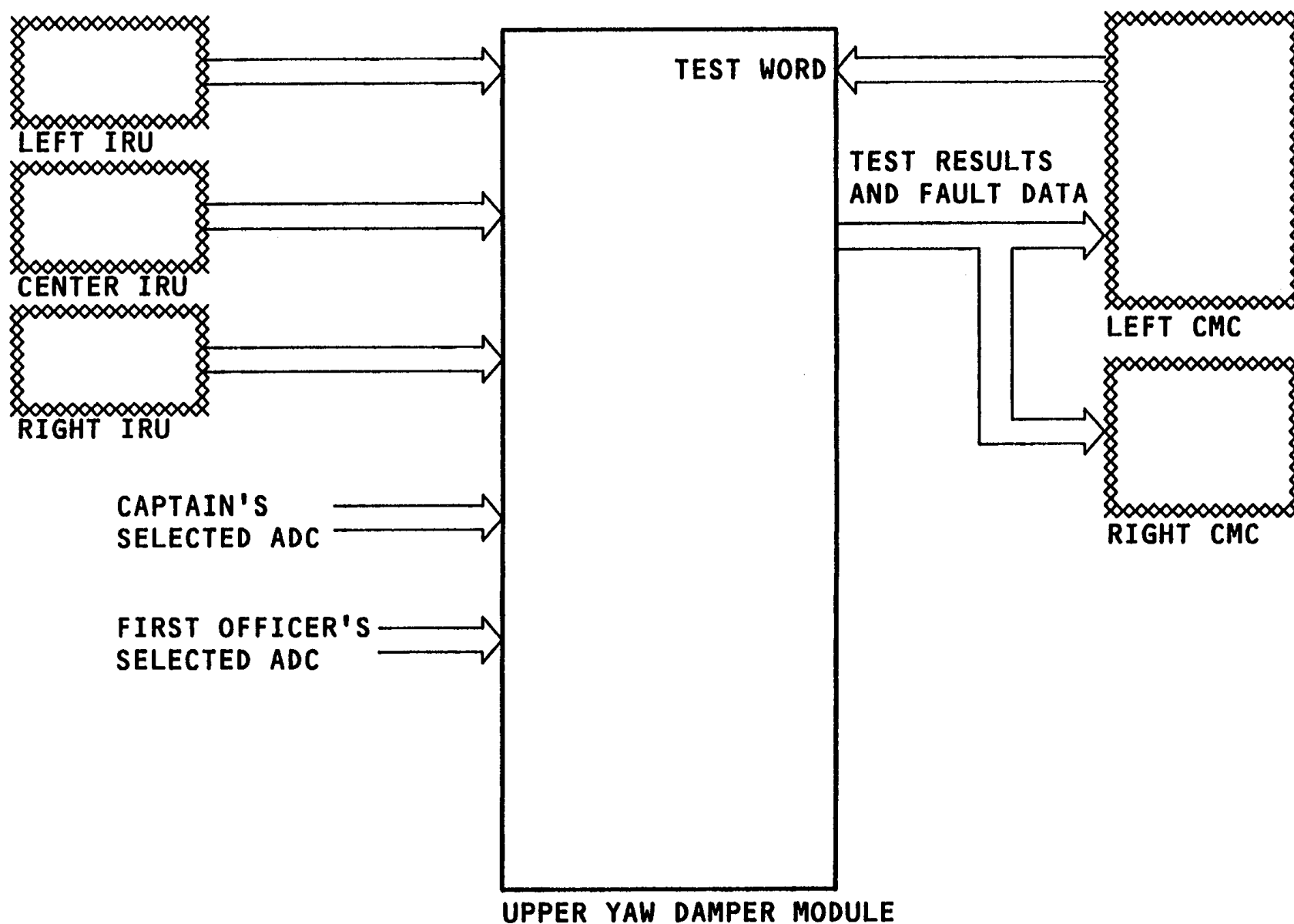


Figure 12 Y/D - DIGITAL INTERFACE

YAW DAMPER SYSTEM



Y/D-ANALOG INTERFACE

General Description

The analog interfaces with the yaw damper system are:

- The flight control electronic power supply modules (FCEPSM)
- Air ground system
- Hydraulic systems
- Modal accelerometers
- Program pins
- Y/D interlock
- Ground test enable relay

Ground Test Enable Relay

The ground test relay supplies a discrete when the ground test enable switch is in the enable position.

FCEPSM

Each of the two FCEPSM's provide a valid and a reset discrete. The valid is used for fault reports and the reset is used to start the power-up test.

Air/ground System

The air/ground system provide three discretes for air/ground logic.

Hydraulic System

Two discretes come from the hydraulic system-one from the hydraulic interface module and one from the demand and EDP switches.

Program Pins

Airplane type code and position (upper or lower) code are supplied by program pins.

Y/D Interlock

If a Y/D module is not installed, the other module provides the INOP discrete for the missing module through an interlock.

Control Panel

The control panel supplies 28v dc when the engage switch is on and receives the INOP indication.

Modal Accelerometers

A test discrete is supplied to the modal accelerometers. The output is acceleration.

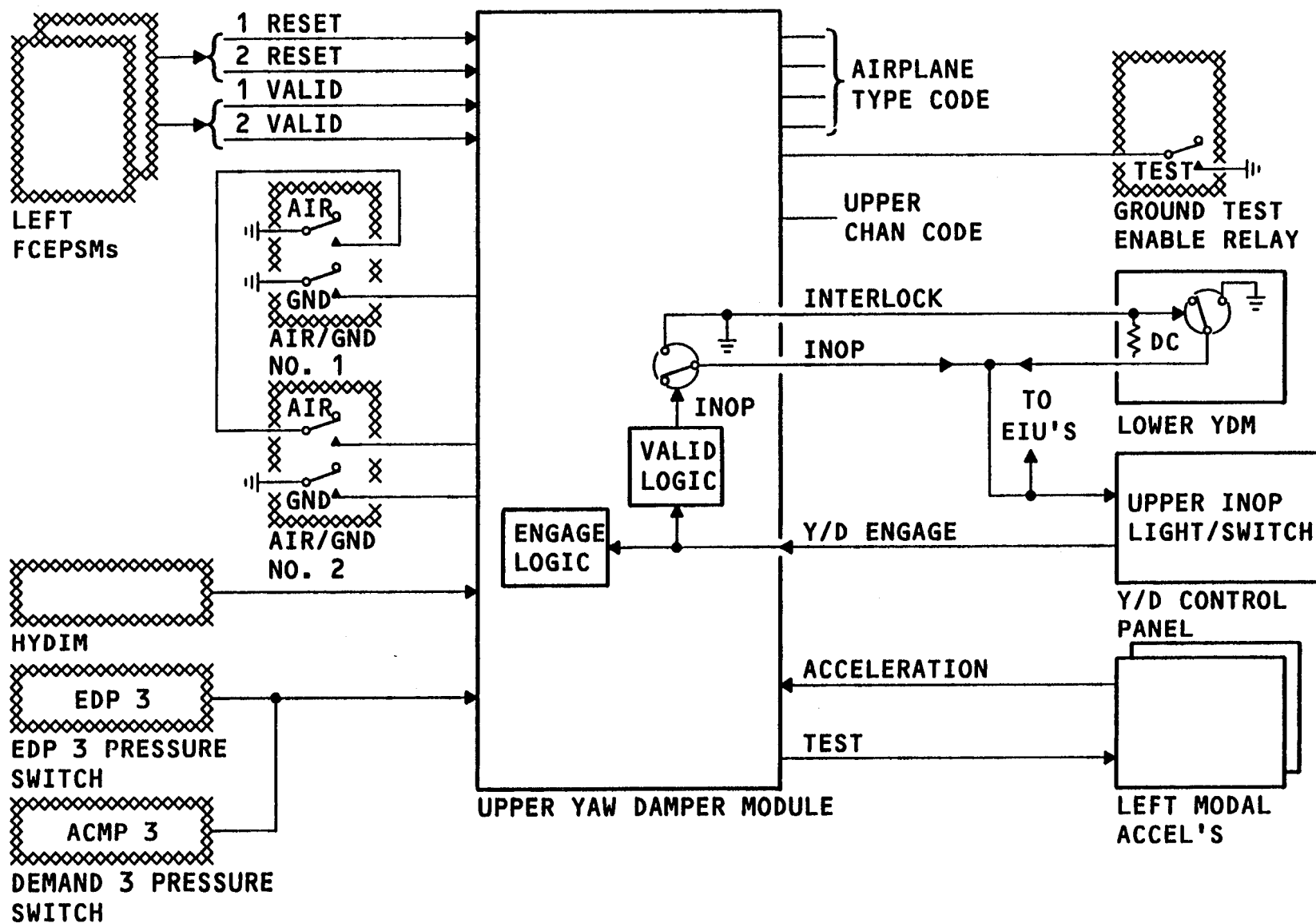


Figure 13 Y/D - ANALOG INTERFACE

YAW DAMPER SYSTEM

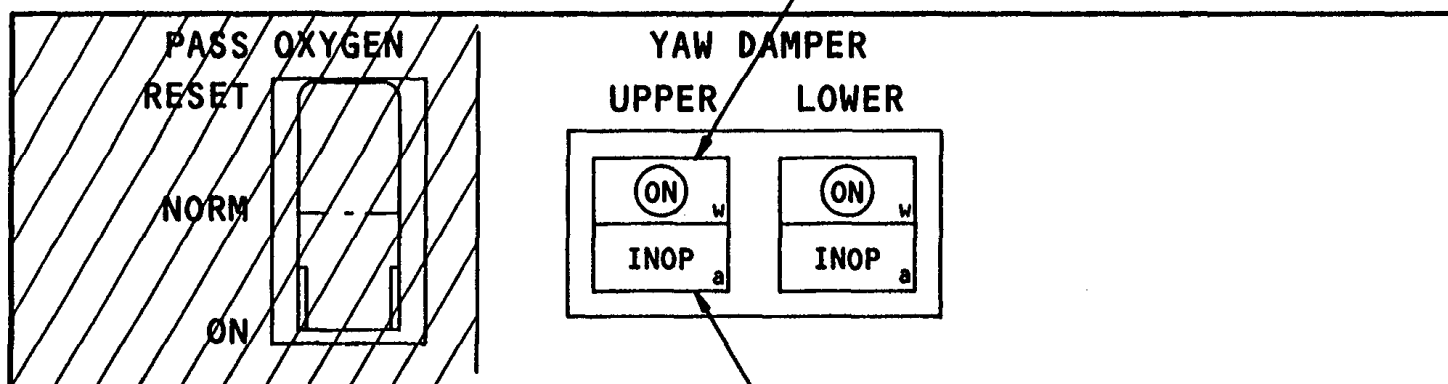


Y/D-CONTROL PANEL

The upper and lower yaw damper engage switches are alternate action push-button switches. When the switch is pushed, an ON indication becomes visible. Normally the switches are pushed on and remain on. If the yaw damper is selected off or detects a fault, the amber INOP light comes on. The INOP light is off when the system is operational.

**YAW DAMPER ENGAGE SWITCH
(ALTERNATE ACTION)**

- ON - YAW DAMPER COMMANDED
TO ENGAGE
- OFF - (BLANK) YAW DAMPER
COMMANDED TO DISENGAGE

**YAW DAMPER INOPERATIVE LIGHT COMES
ON (AMBER) WHEN:**

- YAW DAMPER SWITCH OFF
- ACTUATOR FAULT DETECTED
- ACTUATOR LVDT FAULT DETECTED
- NO IRUs IN NAV MODE
- YAW DAMPER MODULE FAULT DETECTED
- YAW DAMPER INTERLOCK

Figure 14 Y/D - CONTROL PANEL

YAW DAMPER SYSTEM



Y/D MODULE AND FCE POWER SUPPLY MODULE

Yaw Damper Module General Description

The yaw damper module (YDM) is 5 modular concept units (MCU-ARINC 600) in size. There is no display or indication on the module. The central maintenance computer is used for all troubleshooting and test activity.

The YDM contains two microprocessors, located on two cards, one for control and one for monitor.

The YDM has one ARINC 429 transmitter and six receivers on both the control and monitor cards.

The YDM power consumption is less than 35 watts.

The YDM weighs less than 13 pounds.

The YDM cooling is per ARINC 600.

CAUTION: STATIC SENSITIVE. DO NOT HANDLE BEFORE READING PROCEDURE FOR HANDLING ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (REF 20-41-02/201).

CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

FCE Power Supply Module General Description

The FCE power supply modules send +15v dc and +5v dc to the YDM for both the arm and control microprocessors.

CAUTION: STATIC SENSITIVE. DO NOT HANDLE BEFORE READING PROCEDURE FOR HANDLING ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (REF 20-41-02/201). CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

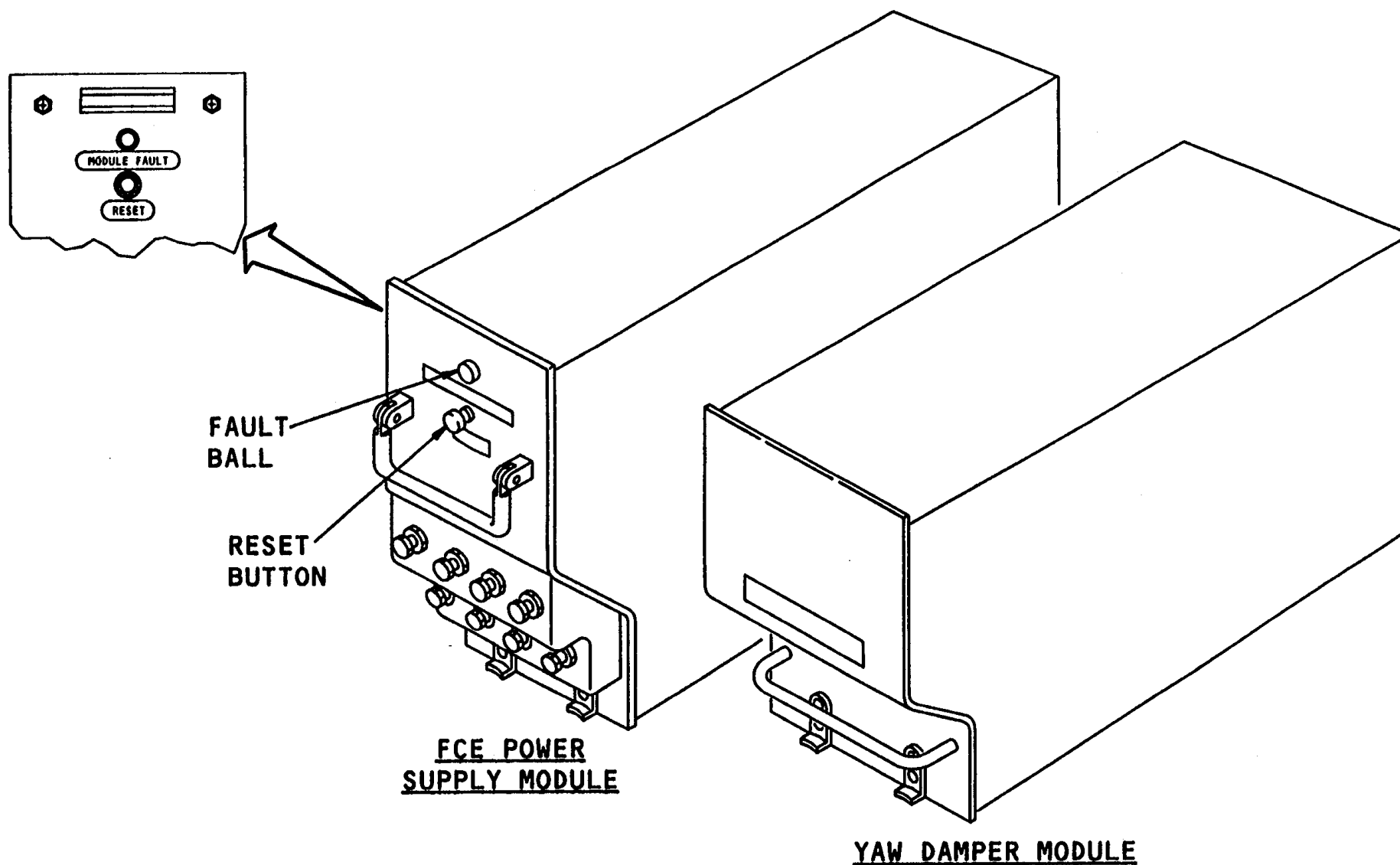


Figure 15 YAW DAMPER MODULE AND FCEPSM

YAW DAMPER SYSTEM



Y/D MODULE AND FCE POWER SUPPLY MODULE

Yaw Damper Module General Description

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CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

FCE Power_Supply Module General Description

The FCE power supply modules send:

- $\pm 15\text{v}$ dc to the YDM
- $+5\text{v}$ dc to the YDM
- 26 V ac to the Rudder Power Controller Module for LVDT excitation
- 26 V ac to the YDM for reference ac for the demodulators

CAUTION: STATIC SENSITIVE. DO NOT HANDLE BEFORE READING PROCEDURE FOR HANDLING ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (REF 20-41-02/201). CONTAINS DEVICES THAT CAN BE DAMAGED BY STATIC DISCHARGE.

YAW DAMPER SYSTEM

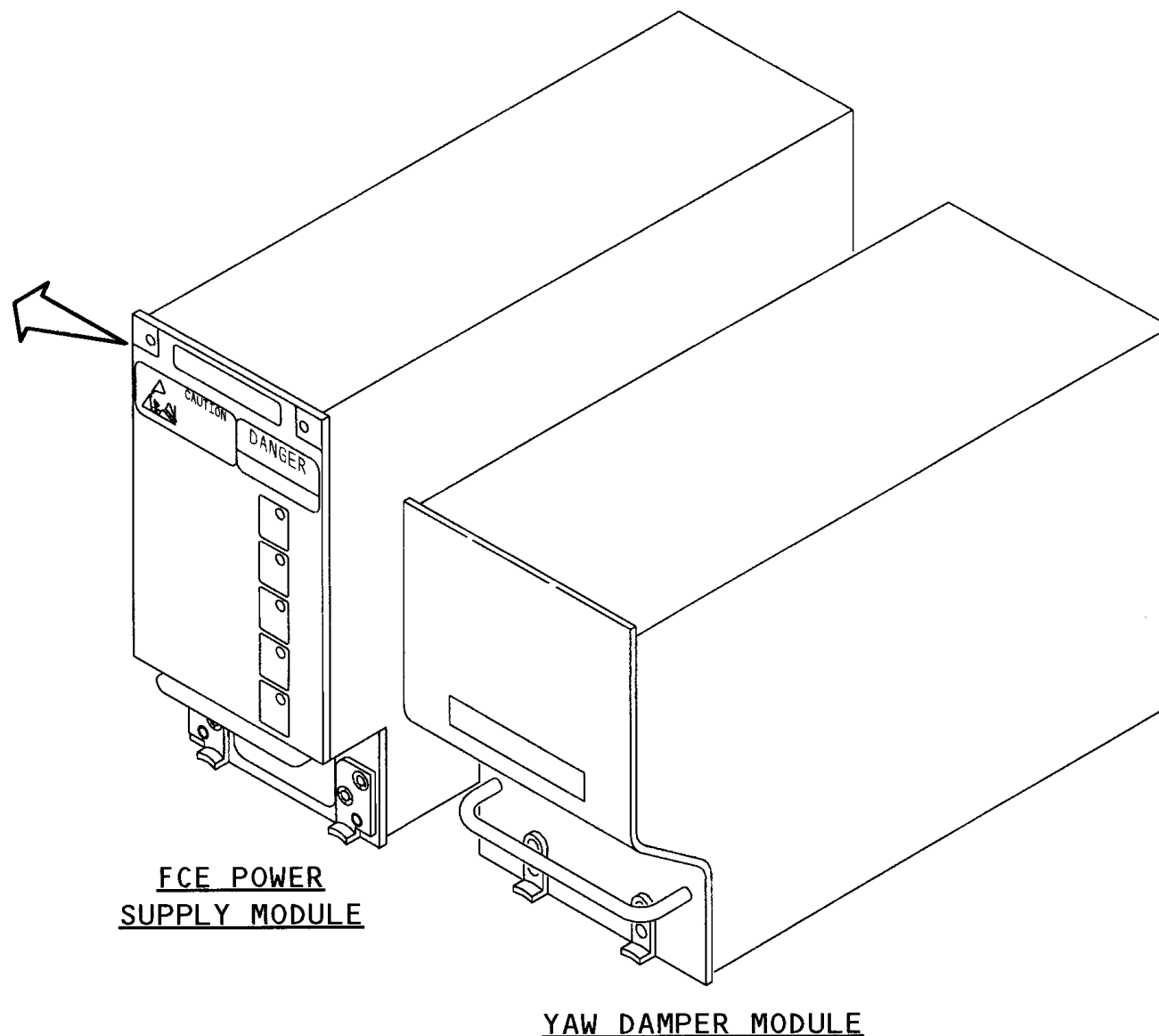
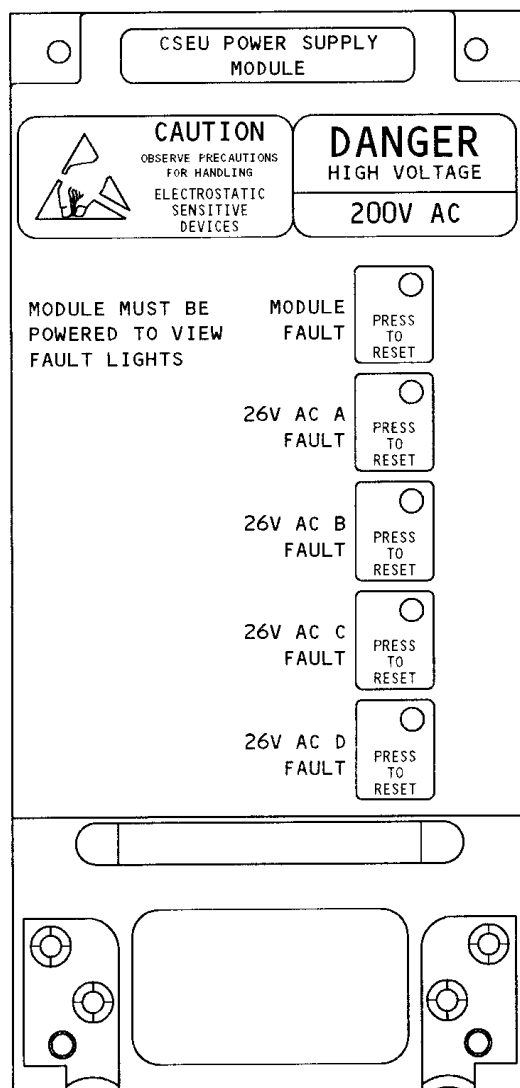


Figure 16 Y/D & FCE POWER SUPPLY MODULES

YAW DAMPER SYSTEM



Y/D-MODAL ACCELEROMETERS

General Description

The accelerometers provide lateral acceleration inputs to the yaw damper module (YDM) to suppress the lateral flex and bend of the airplane body.

Installation

The installation of the left and right forward and the left and right aft accelerometers are similar. Only one is shown as an example. An alignment arrow on the accelerometer shows the correct orientation. Access to each accelerometer is from below the main deck floor. Access to the forward accelerometers is through the main equipment center on the forward side of the station 320 bulkhead. Access to the aft accelerometers is through an opening in the bulk cargo compartment aft lining. The accelerometers are attached to the forward side of the station 2200 floor beam. The four accelerometers are located at right and left buttock lines 65 at the aft locations and 85 at the forward locations.

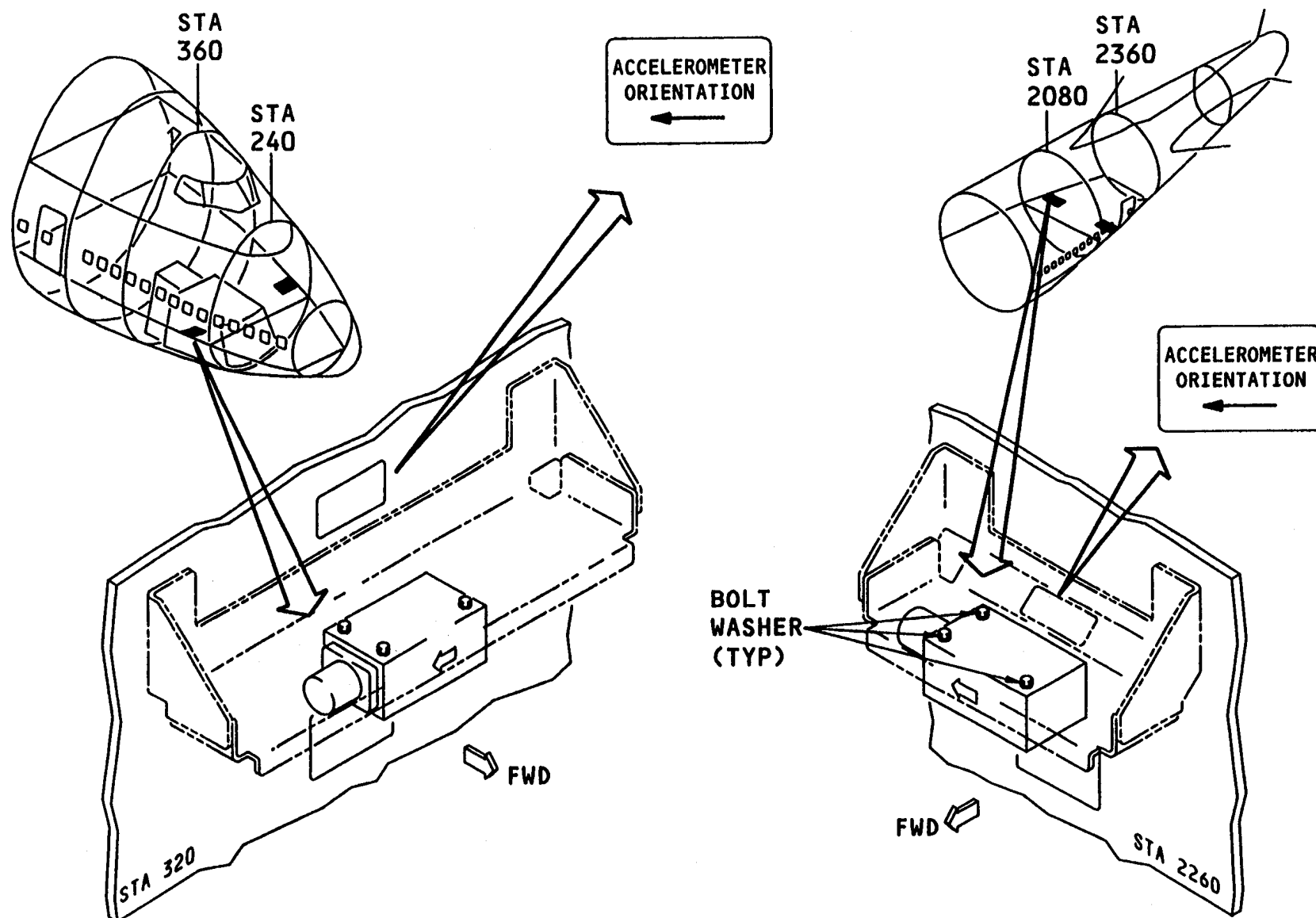


Figure 17 Y/D-MODAL ACCELEROMETERS

YAW DAMPER SYSTEM



Y/D - ACTUATOR COMPONENTS

Engage Solenoid Valve

A single solenoid valve is installed on each rudder power control module (RPCM). The engage solenoid valve is electrically controlled by the YDM logic and operated by +28v dc through the Y/D control panel switch to open or close. When commanded to open it supplies hydraulic pressure flow to the electrohydraulic servo valve (EHSV).

Electrohydraulic Servo Valve (EHSV)

One EHSV is installed on each RPCM. It is controlled by a rudder command from the YDM when it is engaged. This causes proportional movement of the RPCM's hydraulic control valve which supplies an extend or retract hydraulic command to the rudder actuators for left or right rudder surface deflection.

Linear Variable Differential Transformer (LVDT)

A single LVDT is located on each Y/D actuator piston on the upper and lower RPCMs. The LVDT supplies linear actuator position feedback to the YDM in a closed loop operation with the EHSV. It is excited by 26v ac from the respective flight control electronic power supply module (FCEPSM).

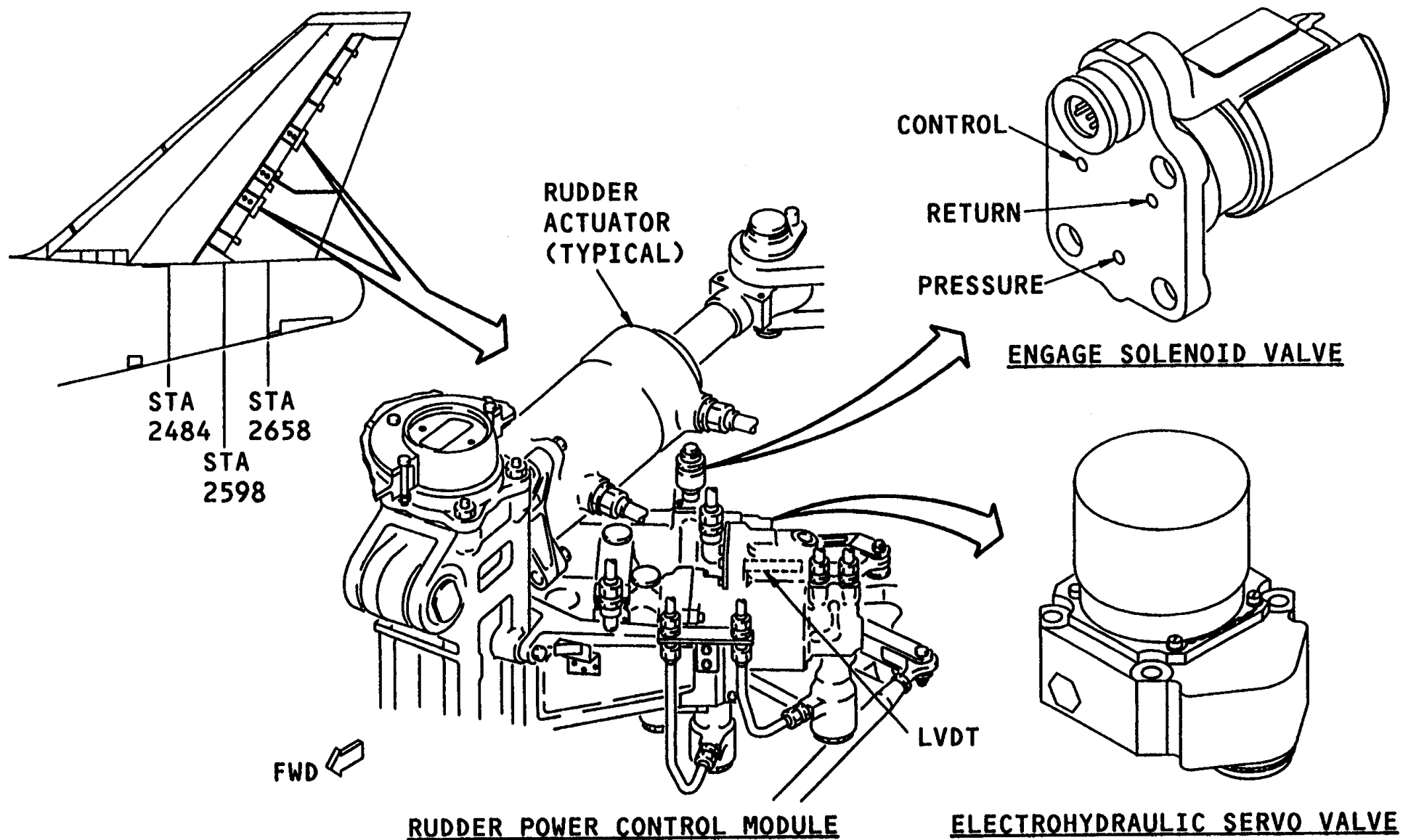


Figure 18 Y/D - ACTUATOR COMPONENTS

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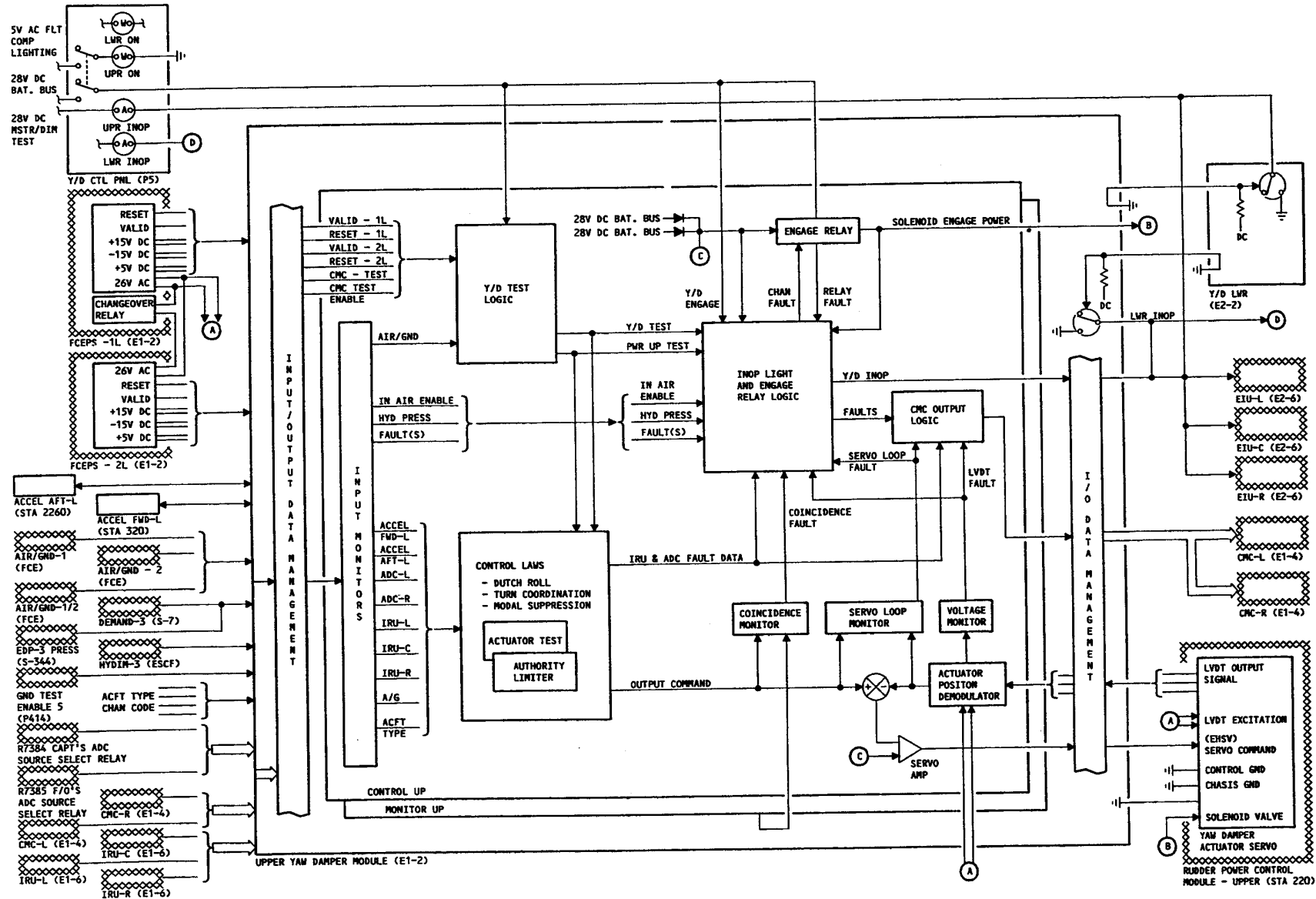


Figure 19 Y/D - SCHEMATIC DIAGRAM

YAW DAMPER SYSTEM



Y/D-OPERATIONAL MODES

Power-Up

Power-up occurs when power is applied to the system. If power is applied on the ground, the power-up test mode starts. If in the air, a 5-second easy-on fade-in occurs.

Power-Up Test

During the power-up test, the INOP light will be on (5 seconds maximum). If the test passes, the INOP light goes out and the ground operational mode is entered. If the test fails, the INOP light remains on.

Ground Operational Mode

The ground operational mode is entered on the ground if the power-up test is passed. In this mode, the yaw damper is engaged but will produce no command. The normal transition from this mode is to the flight mode when the air/ground status changes to in-air.

YDM Actuator Test

The YDM actuator test is entered from the ground operational mode by a test request from the CMC. This test involves rudder motion. If the test passes, the yaw damper returns to the ground operational mode. If it fails, the fault INOP mode is entered.

Flight Mode

The flight mode is entered either from the power-up mode or the ground operational mode, through the fade-in mode. The flight mode normally transitions to the ground operational mode, through the fade-out mode when the aircraft lands.

Fault INOP Mode

In the fault INOP mode, the yaw damper disengages and the INOP light comes on. This mode is entered when a fault is detected. This mode is exited by cycling the engage switch or by autorecovery. Autorecovery to an operational mode is allowed for these conditions:

- Any IRU engages in the NAV mode
- A transient YDM FAULT (duration of less than 5 seconds is detected)

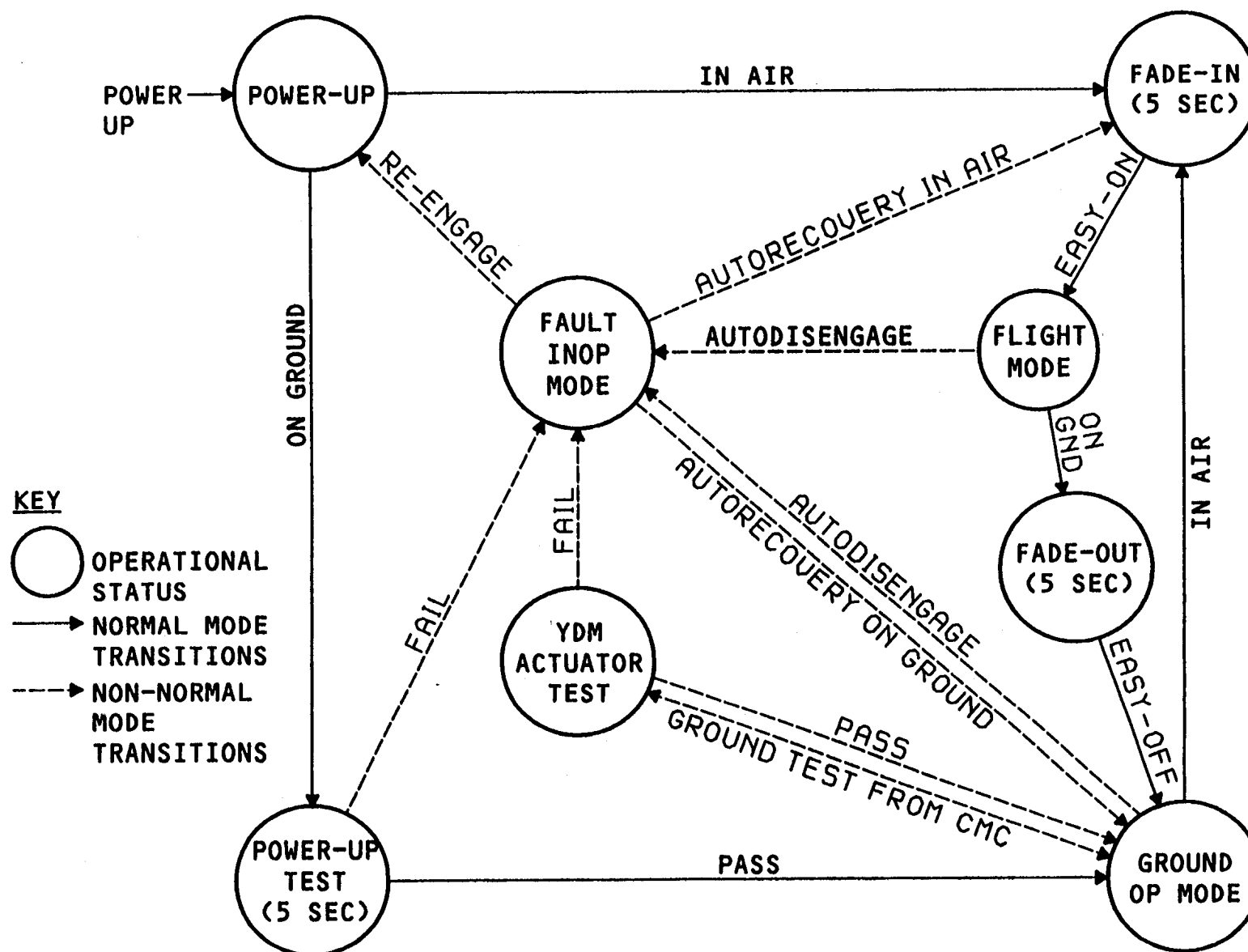


Figure 20 Y/D - OPERATIONAL MODES

YAW DAMPER SYSTEM



Y/D-COMMAND

Input

Each YDM contains two microprocessors (control and monitor) with different hardware and software that calculate and monitor inputs and outputs of the YDM. Limit of the command is performed by the authority limit logic and is an important function. Inputs into the YDM that are used to determine the magnitude of the output signal are:

- Number of valid IRUs
- Number of valid ADCs
- True airspeed ADC overspeed
- Ground speed

Inputs for the command calculation are:

- Lateral acceleration
- Impact pressure Body angle of attack
- Body yaw rate
- Body roll rate
- Body roll angle
- Modal acceleration

Command

The yaw damper turn coordination and modal suppression commands are summed together. If the ADC overspeed discrete is set, the modal suppression command is turned off. The maximum command of each yaw damper module is limited to four degrees rudder movement. The four degrees includes the maximum modal suppression command of one degree.

A LVDT on the rudder power control module monitors the movement of the yaw damper actuator. Feedback from the LVDT completes the servo loop in the yaw damper system. LVDT voltage and servo loop monitors are used to detect failures. This failure causes removal of the command signals.

There is a reduced command if the system is degraded. The system is considered degraded if some system input is invalid -for example, an ADC.

YAW DAMPER SYSTEM

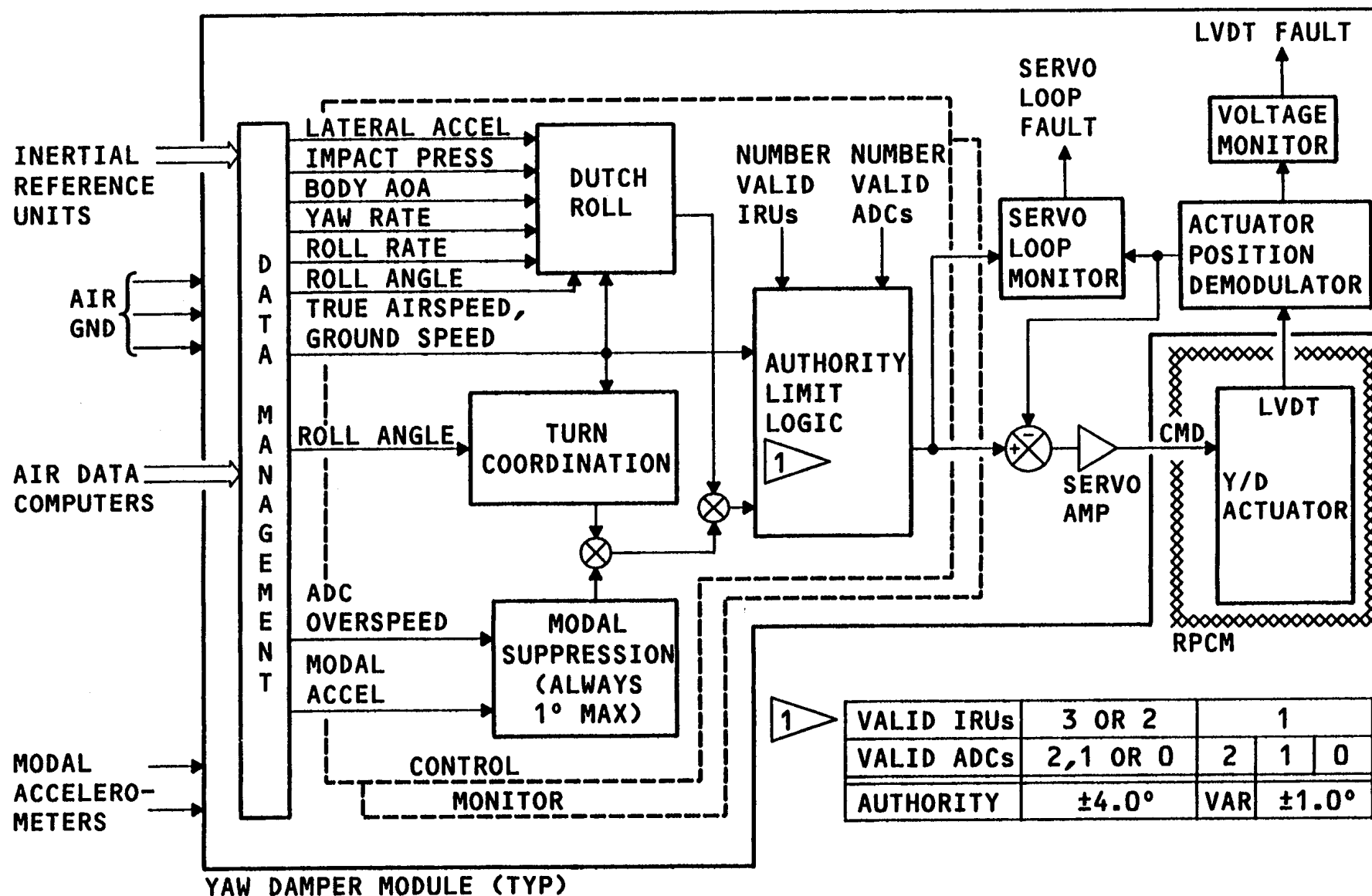


Figure 21 Y/D - COMMAND

YAW DAMPER SYSTEM



Y/D-ENGAGEMENT

The coincidence monitor compares the control and monitor outputs. A difference causes the YDM to not engage or to disengage. LVDT or servo loop faults also cause the YDM to not engage or to disengage.

The engage logic verifies that the power-up test passes if on the ground and will energize the engage solenoid. If power comes on in the air, the power-up test is not done. The contacts of the engage relay are monitored. If a faulty relay is detected, the YDM disengages.

If the YDM disengages or is off, the YDM INOP output goes to EICAS and also turns on the YDM INOP light on the Y/D control panel.

The CMC output logic monitors the YDM fault circuits. When a fault is detected, the CMC output logic sends this data to the CMC. When the CMCS tests the yaw damper system, the test results are sent from the CMC output logic to the CMCS.

YAW DAMPER SYSTEM



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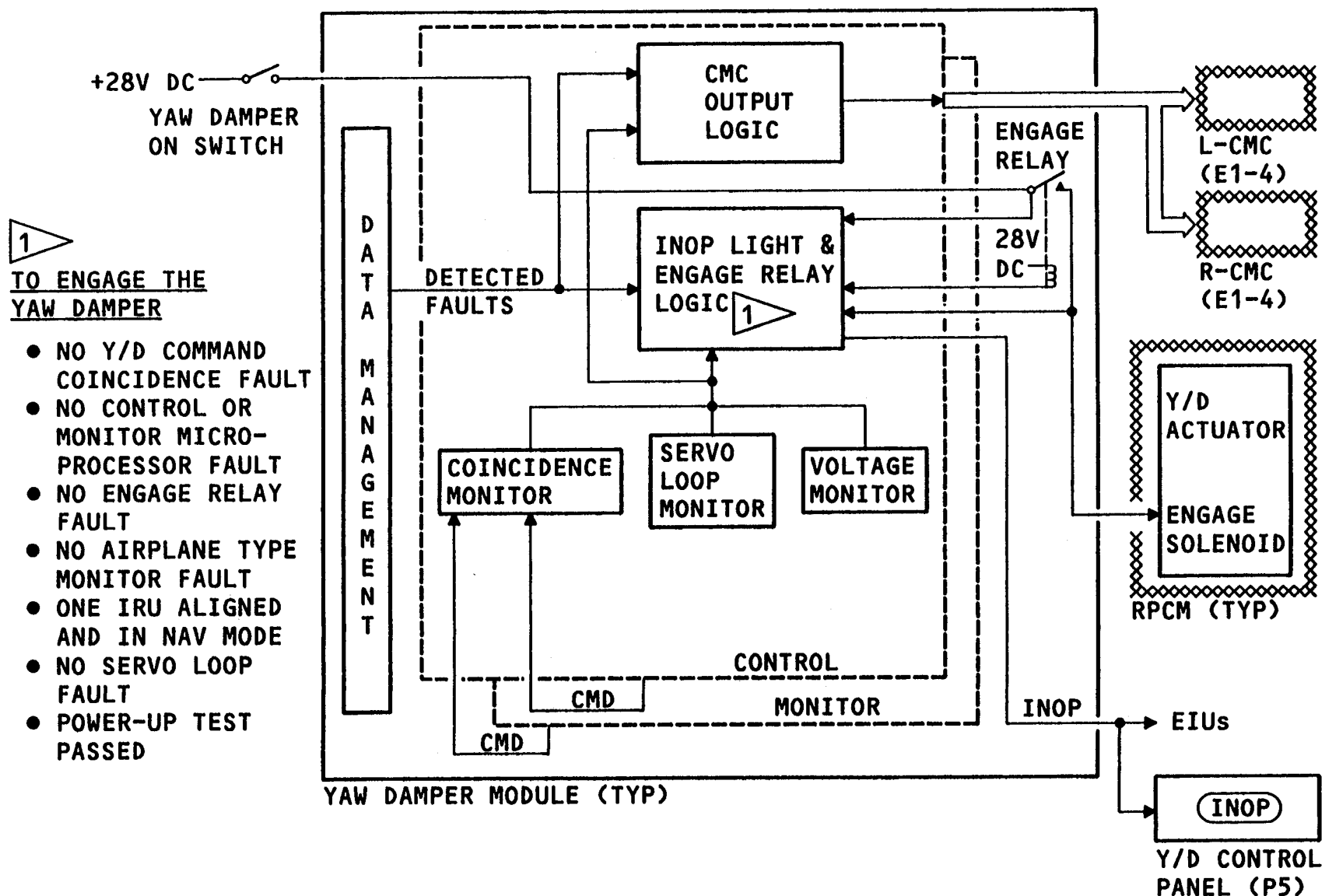


Figure 22 Y/D - ENGAGEMENT

YAW DAMPER SYSTEM



Y/D-ACTUATOR OPERATION

When the yaw damper is engaged, the solenoid valve is energized to allow control hydraulic pressure into the EHSV. With no command present, the yaw damper actuator is centered by mechanical springs on the yaw damper actuator piston. With a command to the EHSV the balanced output of the EHSV changes so control pressure is placed on one side or the other of the yaw damper actuator piston.

The yaw damper actuator and the RPCM control valve are connected by an actuating arm. With an input from the rudder pedals, the actuating arm pivots at the yaw damper actuator and moves

the RPCM control valve. If the yaw damper moves the control valve, the actuating arm pivots on the input control device. If both rudder pedal and yaw damper actuator command the control valve, the two inputs are combined. When the RPCM control valve is moved, control pressure is sent to the rudder actuators which causes rudder surface movement.

Feedback for the yaw damper actuator position comes from the linear variable differential transformer (LVDT).

If a system failure is detected or if the yaw damper is turned off, the engage solenoid valve de-energizes and the yaw damper actuator returns to the neutral position.

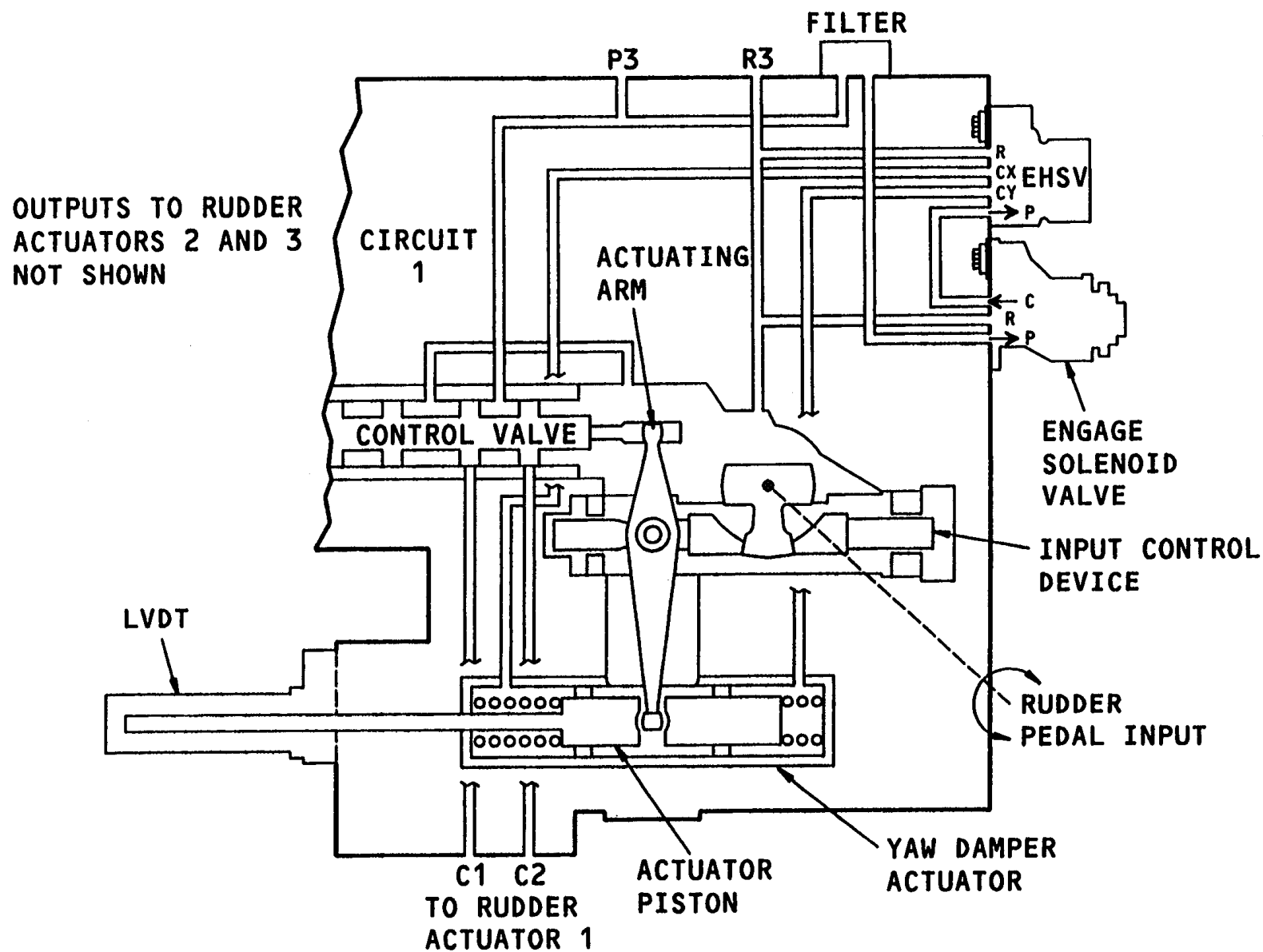


Figure 23 Y/D - ACTUATOR OPERATION

YAW DAMPER SYSTEM



Y/D-GROUND TEST

General Description

Access to the yaw damper ground tests is by selecting GROUND TESTS on the CMC menu and selecting 22 YAW DAMPER on the GROUND TESTS menu. The desired yaw damper test can be initiated from the GROUND TESTS menu page.

Ground Tests

The tests are:

- UPR YDM TEST
- LWR YDM TEST
- UPR YDM ACTUATOR
- LWR YDM ACTUATOR

The YDM test is the same test that is performed at power-up. The YDM ACTUATOR test is a test which sends a test signal to the actuator and monitors the performance.

To perform the Y/D ground test(s):

- Align one or more IRUs with the IRU mode select switch in the NAV position.

Put the ground test enable switch in the flight deck (P-461) or the one in the MEC to the enable position.

Put the upper or lower Y/D switch on the Y/D control panel (P-5) to ON.

Pressurize hydraulic system 3 to do the upper Y/D actuator test, and hydraulic system 2 for the lower Y/D actuator test on overhead panel (P-5).

WARNING: MAKE SURE THAT PERSONS AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

If one of the ground test enable switches is not in the enable position, the enable page shows when the test is started.

Ground Test Results

The word PASS or FAIL on the same line shows a passed or failed ground test. Push the adjacent line select key (LSK) to show the GROUND TEST MSG page. This gives more data about the test failure.

Ground Test and Fail Indications

The EICAS status page and FLIGHT CONT maintenance page show rudder deflection (+/-4 degrees) while the Y/D actuator test is in progress.

The main and auxiliary EICAS show the failure status of the Y/D(s) in both normal and ground test operation modes.

The Y/D control panel shows INOP while the Y/D is in ground test and when the Y/D fails in normal operation.

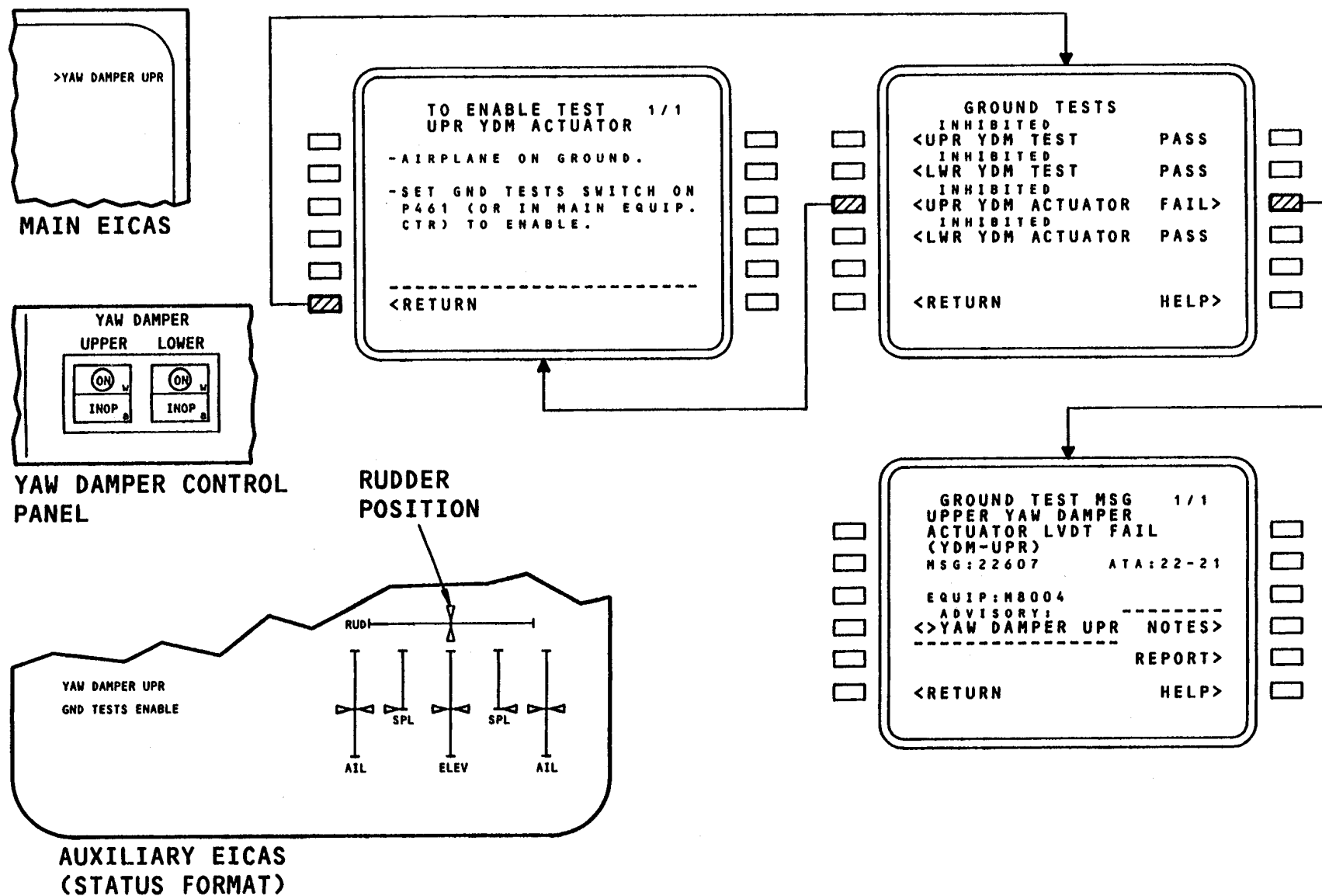


Figure 24 Y/D - GROUND TEST

YAW DAMPER SYSTEM



Y/D-FLIGHT DECK EFFECTS AND CMC MESSAGES

Flight Deck Effects

The EICAS message >YAW DAMPER UPR or >YAW DAMPER LWR will show on the EICAS display when any Y/D is inoperative due to:

- A module or actuator fault
- All IRU's are off or in the Align mode
- The engage switch or module power is off

CMC Messages

The types of CMC messages-shown for the Y/D system are;

- Component failure - a component within the Y/D system has failed either during normal operation or during ground test.
- Input sensor failure - a data bus or discrete input to the Y/D module has failed or been determined to be invalid.

Disagree - data that is being received from more than one source is in disagreement.

Test interface failure - during ground test, the Y/D module or actuator did not respond to a test command or a test indication did not occur.

YAW DAMPER SYSTEM


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FLIGHT DECK EFFECTS
 >YAW DAMPER Z (ADVISORY)
(MAIN EICAS)

 >YAW DAMPER Z (STATUS)
(AUX EICAS)
TYPE

EICAS MESSAGE

EICAS MESSAGE

DESCRIPTION
 YAW DAMPER Z INOPERATIVE
DUE TO MODULE OR ACTUATOR FAULT,
IRUs OFF OR IN ALIGN, ENGAGE
SWITCH OR MODULE POWER OFF
CMC MESSAGESCOMPONENT FAILURE
 X-YAW DAMPER ACTUATOR FAIL (YDM-Z)
YDM-Z FAIL
INPUT SENSOR FAILURE
 EXCITATION FAIL (YDM-Z)
HYD-W PRESSURE SWITCH FAIL (YDM-Z)
X-YAW DAMPER ACTUATOR LVDT FAIL (YDM-Z)
FORWARD ACCELEROMETER FAIL (YDM-Z)
AFT ACCELEROMETER FAIL (YDM-Z)
PROGRAM PIN INPUT FAIL (YDM-Z)
YDM-Z ~ CMC BUS FAIL
ADC-Y ~ YDM-Z FAIL
IRU-Y ~ YDM-Z FAIL
CMC ~ YDM-Z DATA FAIL (YDM-Z)
YDM-Z FAIL OR ADC-Y ~ YDM-Z FAIL
YDM-Z FAIL OR CMC ~ YDM-Z FAIL
DISAGREE
 AIR/GND-1 INTERFACE FAIL (YDM-Z)
AIR/GND-2 INTERFACE FAIL (YDM-Z)
AIR/GND 1/2 INTERFACE (YDM-Z)
AIR/GND 2ND FAIL (YDM-Z)
IRU DISAGREE (YDM-Z)
ADC DISAGREE (YDM-Z)
TEST INTERFACE FAILURE
 INOP INDICATION CIRCUIT FAIL (YDM-Z)
X-RUDDER FAIL 'NO MOVEMENT' (YDM-Z)
YDM-Z NO TEST RESPONSE
X YDM ACTUATOR TEST FAIL 'USER
ABORTED TEST'

 W = (2) OR (3)
X = (UPPER) OR (LOWER)
Y = L (LEFT), C (CENTER) OR R (RIGHT)
Z = (UPR) OR (LWR)

Figure 25 Y/D-FLIGHT DECK EFFECTS AND CMC MESSAGES

YAW DAMPER SYSTEM



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YAW DAMPER SYSTEM

ACCEL	- ACCELEROMETER
ACMP	- AC MOTOR PUMP
ADP	- AIR DRIVEN PUMP
AOA	- ANGLE OF ATTACK
C	- CONTROL PRESSURE
CMD	- COMMAND
EDP	- ENGINE DRIVEN PUMP
EHSV	- ELECTROHYDRAULIC SERVO VALVE
FCE	- FLIGHT CONTROL ELECTRONICS
FCEPSM	- FLIGHT CONTROL ELECTRONICS POWER SUPPLY MODULE
HYDIM	- HYDRAULIC INTERFACE MODULE
INOP	- INOPERATIVE
LVDT	- LINEAR VARIABLE DIFFERENTIAL TRANSFORMER
LWR	- LOWER
MCU	- MODULAR CONCEPT UNIT
NAV	- NAVIGATION MODE
P	- PRESSURE SUPPLY
PCM	- POWER CONTROL MODULE
PSM	- POWER SUPPLY MODULE
R	- RETURN PRESSURE
RPCM	- RUDDER POWER CONTROL MODULE
TYP	- TYPICAL
UPR	- UPPER
Y/D	- YAW DAMPER
YDM	- YAW DAMPER MODULE

Figure 26 Y/D - ABBREVIATION/ ACRONYM LIST

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