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**Apollo Saturn AS-207  
Instrument Unit System  
Functional Interconnection Diagram**

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**Classification and Content Approval**

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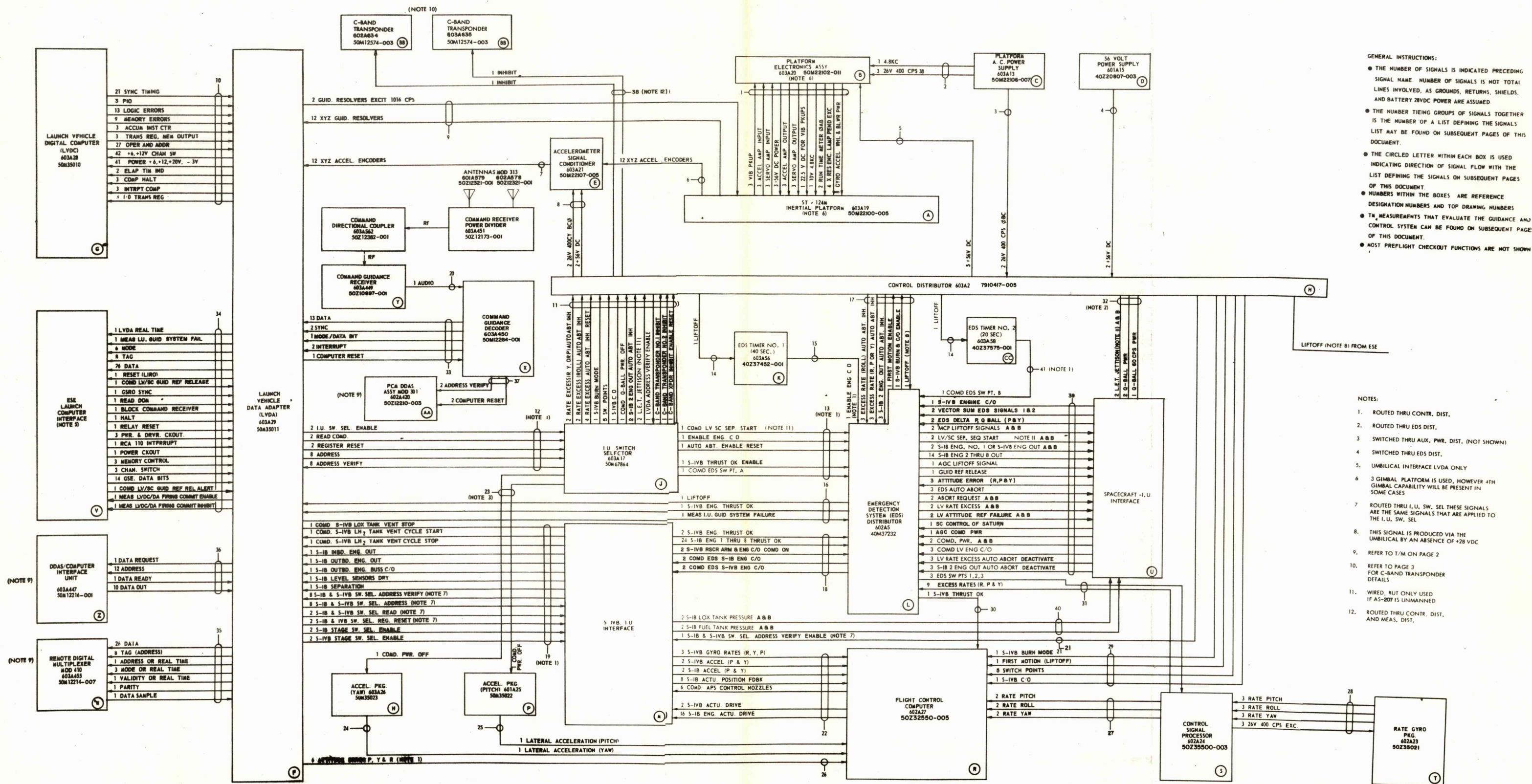
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## INTRODUCTION

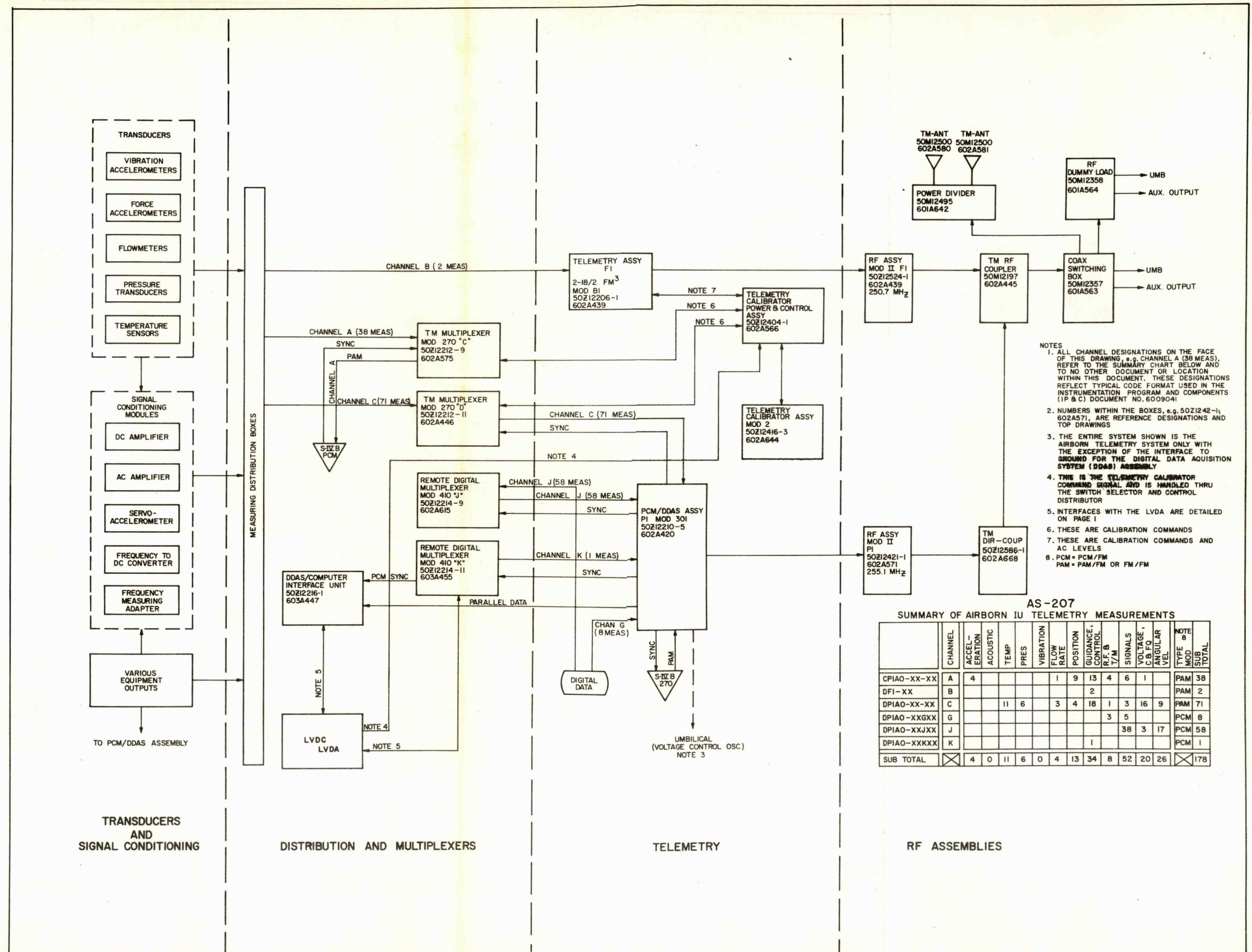
This document is a functional definition of interface signals for the Saturn Vehicle SA-207 Instrument Unit System. It includes the Flight Control Hardware and its inter-connection with the Launch Computer, Digital Telemetry, Emergency Detection System and the Payload. The Telemetry and RF are also covered in some detail. These are shown as a block diagram with most signals defined functionally on subsequent pages of the document. Also included is a list of signals that are telemetered or ESE displayed which are used in evaluating the Flight Control Hardware. These are referenced to the definition whenever possible.



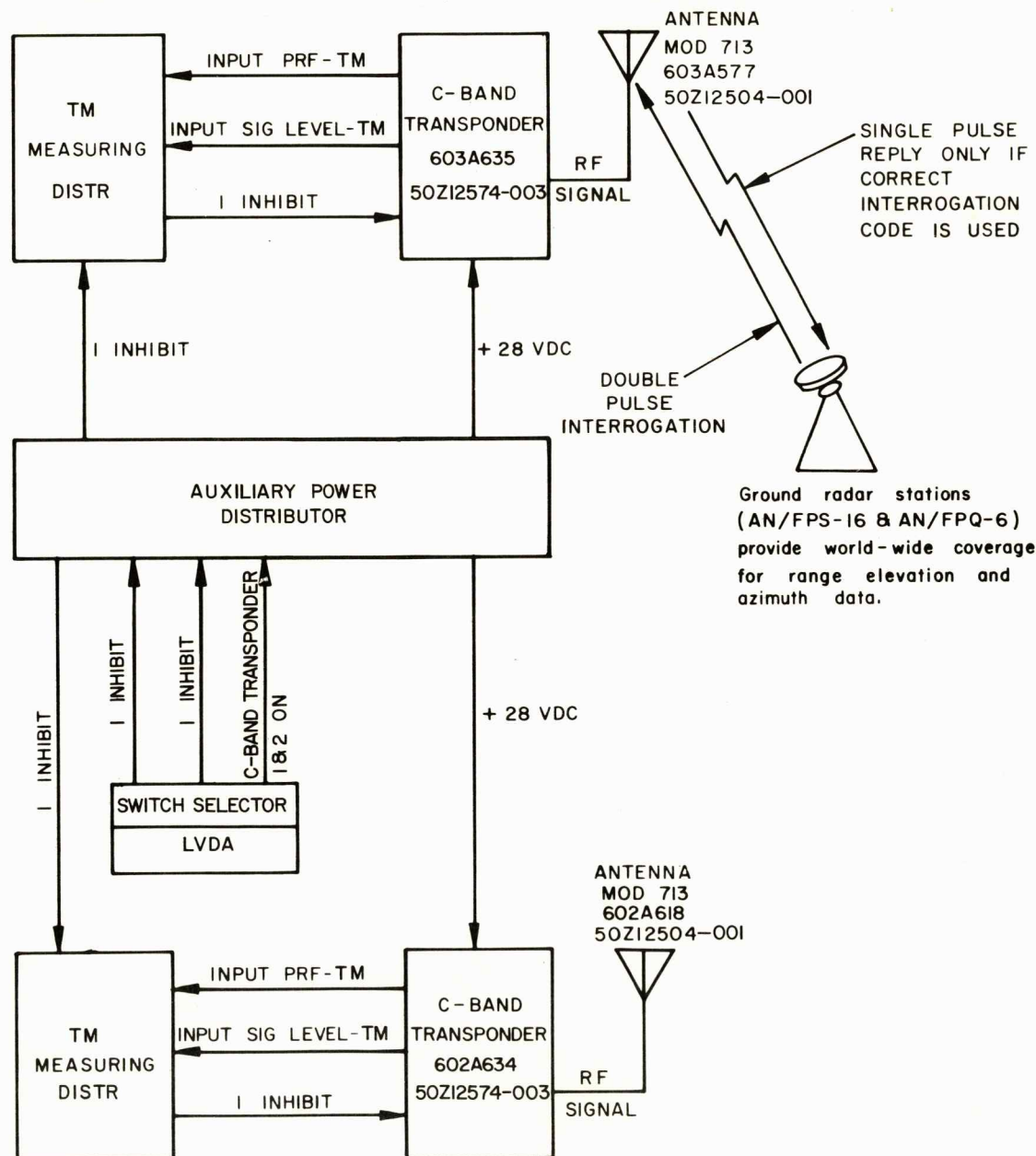
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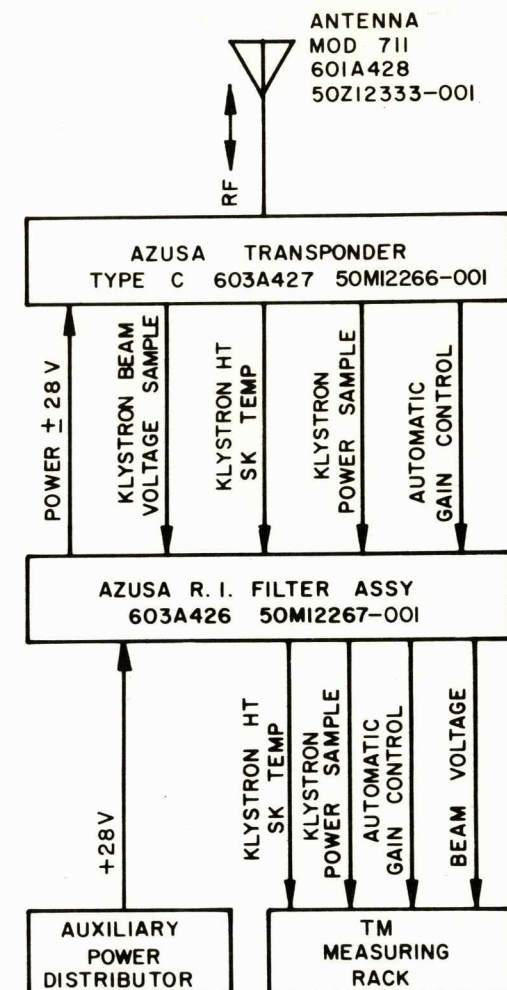








C-BAND SYSTEM



AZUSA SYSTEM

1. Tracking stations located at Cape Kennedy and Grand Bahama provide real time coverage for initial boost phase of flight.
2. Azusa tracking information is processed to provide impact prediction data to the range safety control officer.

Number Signal	Signal Name	From	To	Function
9	GYRO & ACCEL WHEEL & BLOWER PWR	B	A	Gyro and Accelerometer Wheel, and Blower Power, 26V 400 Hz A, B, C Phase 3 lines for each of the above purposes.
	X RES. ENC. LAMP, PEND EXCIT	B	A	X gimbal resolver, Optisyn encoder lamp and platform erection pendulum excitation. 26V 400 Hz, A, C, Phase 2 lines for resolver, 2 for other purposes.
2	RUN TIME METER	B	A	Elapsed running time on the equipment. 26V 400 Hz, A, B Phase.
1	10V 4.8 KHz	B	A	Platform Detector references and Gyro & Accel. SG PRI. Excitation.
1	22.5 VDC	B	A	Vibration pickups power source.
3	SERVO AMP. OUTPUT	B	A	Servo Amplifier Outputs to P/F XYZ gimbal torquers.
3	ACCEL. AMP. OUTPUT	B	A	Accelerometer Amplifier Out- puts to XYZ Accel. Drive Motors.
5	+56V DC POWER	B	A	Primary power for Microsyn Amplifier, Platform erection pendulum preamplifiers and XYZ gimbal gyro and accelero- meter preamps.
3	SERVO AMP. INPUT	A	B	Servo Amplifier Inputs from XYZ Gyros.
3	ACCEL. AMP INPUT	A	B	Accelerometer Amplifier Inputs from XYZ accelerometers.
3	VIB PKUP	A	B	Vibration pickups XYZ output routed through Platform Elec- tronics Assy. to telemetry.

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Number Signal	Signal Name	From	To	Function
1	4.8KC	C	B	Reference for P.E.A. Mods and Demods, also P/F Accel. & Gyro SG PRI.
3	26V 400 Hz	C	B	3 Phase Gyro and Accel. Wheels, Encoder lamps, Pendulum, running time meter power source.

3

Number Signal	Signal Name	From	To	Function
2	26V AC	C	H	26V, 400 Hz , Phase BC for Accel. Sig. Cond. Time Meter

4

Number Signal	Signal Name	From	To	Function
2	+56V DC	D	H	To provide 56V DC to Control Dist. for distribution to Platform Electronics Assy. and Accel. Sig. Cond.

5

Number Signal	Signal Name	From	To	Function
5	+56V DC	H	B	+56V DC from the 56 Volt supply through the Control Distributor to power the Platform Electronics Assy. amplifiers and drivers.

6-7

Number Signals	Signal Name	From	To	Function
12	XYZ ACCELEROMETER ENCODERS	A E	E F	The signals represent the velocity change along the XYZ vectors. The optisyns attached to the accelerometers originate the signals which, when buffered and shaped in the Accelerometer Signal Conditioner, are received by the LVDA as R and Q bits, gray code.

8

Number Signals	Signal Name	From	To	Function
2	26V 400 Hz B, C Ø	H	E	Elapsed time indicator PWR.
2	+56V DC	H	E	Power for +20V DC Power Supply.

9

Number Signals	Signal Name	From	To	Function
2	GUID. RESOLVER EXCITATION	F	A	26 VAC 1016 Hz, resolver primary powers. The two lines feed the various resolvers in such a manner that ones failure will still allow the use of some XYZ coarse or fine and thus only cause a reduction in accuracy not total failure.
12	XYZ GUIDANCE RESOLVERS	A	F	Two speed resolvers, coarse and fine gimbal angles, which are a primary and a backup attitude indicator with respect to the XY and Z reference frame.

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Number Signals	Signal Name	From	To	Function
21	SYNC TIMING	G	F	12, WXYZ clocks, 3 channels.3 Phase B NOT, 3 channels.3 Buffer Osc NOT, 3 channels.3 Timing Gate 5 NOT, 3 channels.
3	PIO	G	F	Process In/Out one line per channel.
13	LOGIC ERRORS	G	F	Detected errors in LVDC sent to Error Monitor Register.
9	MEMORY ERRORS	G	F	3, Even Memory Module Error One line per channel.3, Odd Memory Module Error One line per channel.3, Simulations Memory Module Errors One line per channel.
3	ACCUM. INST. CTR.	G	F	Accumulator Instruction Counter, One line per channel.
3	TRANS. REG., MEM. OUT- PUT	G	F	Transfer Register, Memory Output being handled.
27	OPERAND ADDR	G	F	Operand Address, 9 bits of address and command to LVDA, for each of 3 channels.
42	+6V, +12V CHAN SW	F	G	Channel Switching to check triple redundant circuits.
41	POWER +6, 12, 20V, -3V	F	G	Power Supplies located in the LVDA furnish power to the LVDC.

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Number Signals	Signal Name	From	To	Function
2	ELAP TIM IND	F	G	Elapsed time indicating total computer run time.
3	COMP HALT	F	G	Computer halt signal for each of 3 channels.
3	INTRPT COMP	F	G	Interrupt computer signal for each of 3 channels.
3	I/O TRANS REG	F	G	Input/Output thru transfer register.

Number Signals	Signal Name	From	To	Function
2	RATE EXCESS (R, Y or P) AUTO ABORT INHIBIT	J	H	Roll, Yaw or Pitch rate excessive Auto-Abort Deactivate Relayed to EDS Dist.
2	RATE EXCESS (ROLL) AUTO ABORT INHIBIT	J	H	Roll Rate excessive Auto-Abort Deactivate. Relayed to EDS.
4	RATE EXCESS AUTO ABORT INH. RESET	J	H	Enable Rate Excess Auto-Abort.
1	S-IVB BURN MODE	J	H	Switched thru the Control Dist. to the Flight Control Computer to enable the appropriate electronics for S-IVB engine control.

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Number Signals	Signal Name	From	To	Function
3	SW POINTS	J	H	These are discretes which control the Control Dist. Switch Point relays to the Flight Control Computer. These are actually 5 switch points. Two are not used on SA-203.
1	S-IVB CUTOFF	J	H	Relayed thru the Control Dist. to the Flight Control Computer to switch in the proper electronics for use during Coast Mode.
1	COMD. Q-BALL PWR. OFF	J	H	Q-Ball Power and Heater Power turned off just prior to S-IB eng. cutoff. Relayed thru Control Dist. to S.C.
2	S-IB 2 ENG. OUT AUTO ABT. INH.	J	H	S-IB two engines out auto abort deactivate. Relayed to EDS Dist.
2	L.E.T. JETTISON	J	H	Launch Escape Tower Jettison command relayed through Control Dist. to S.C.
1	LVDA ADDRESS VERIFY ENABLE	H	J	Enable the address verify lines in the I.U. Switch Selector.
1	C-BAND TRANSPONDER NO. 1 INHIBIT	J	H	Inhibits one C-band transponder to prevent interference with the other.
1	C-BAND TRANSPONDER NO. 2 INHIBIT	J	H	Inhibits one C-band transponder to prevent interference with the other.
1	C-BAND TRANSPONDER INHIBIT ENABLE RESET	J	H	Resets C-band transponder inhibit relays.

Number Signals	Signal Name	From	To	Function
2	I.U. SW. SEL. ENABLE	F	J	Picks the I.U. stage switch selector to be used.

12 (cont.)

Number Signals	Signal Name	From	To	Function
2	READ COMMAND	F	J	This is the execute command to turn on the driver previously selected with the 8 bit address. Its drop out caused address and stage select reset.
2	REGISTER RESET	F	J	This resets the address and stage select relay should a malfunction be detected. Reset is normally automatic as the read command drops out.
8	ADDRESS	F	J	The 8 bit addresses or compliments of each will select one of 112 drivers to operate an I.U. stage function. All zeros and all ones are used for test purposes only.
8	ADDRESS VERIFY	J	F	The compliment of the address is fed back to the LVDA to provide a check on the address relays in the switch selector.

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Number Signals	Signal Name	From	To	Function
1	COMD. LV/SC SEPARATION START	J	L	Spacecraft separation start command.
1	ENABLE ENG. CUTOFF	J	L	Manual or EDS Engine Cutoff Arm.
1	AUTO ABORT ENABLE RESET	J	L	Inhibits EDS liftoff signals A&B to the spacecraft.
1	S-IVB THRUST OK ENABLE	J	L	Enables application of thrust OK Signal "B" to be applied to EDS Dist. from S-IVB.

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13 (cont.)

Number Signals	Signal Name	From	To	Function
1	COMD. EDS SW. PT. A	J	L	This causes switching the point at which the rate switches will activate from 3°/sec. to 5°/sec. in Pitch and Yaw.

14

Number Signals	Signal Name	From	To	Function
1	LIFTOFF	H	K	To start timer at liftoff.

15

Number Signals	Signal Name	From	To	Function
1	ENABLE ENGINE CUTOFF	H	K	Manual or EDS cutoff arm used as a backup signal to enable engine cutoff signal from the I.U. Switch Selector. Activates 40 seconds after liftoff.

16

Number Signals	Signal Name	From	To	Function
1	LIFTOFF	L	F	Originates from the ground to EDS and relayed to LVDA. Indicates first movement of vehicle.

Number Signals	Signal Name	From	To	Function
1	S-IVB ENGINE THRUST OK	L	F	Indicates S-IVB engine thrusting
1	MEAS I.U. GUIDANCE SYSTEM FAILURE	F	L	Indicates reasonableness checks on the platform data have been evaluated as a guidance failure.

Number Signals	Signal Name	From	To	Function
3	EXCESS RATE (ROLL) AUTO ABT. INH.	H	L	Roll rate excessive Auto Abort Deactivate.
3	EXCESS RATE (R, P or Y) AUTO ABT. INHIBIT	H	L	Roll, Pitch or Yaw rate excessive Auto Abort Deactivate.
3	S-IB 2 ENG. OUT AUTO ABT. INH.	H	L	S-IB 2 Eng. Out auto Abort Deactivate.
1	FIRST MOTION ENABLE	L	H	Enables First Motion to be applied to the Flight Control Computer through the Control Dist.
1	S-IVB BURN AND C/O ENABLE	L	H	Enables S-IVB Burn and Cutoff signals to be applied to the Flight Control Computer thru the Control Dist.
1	LIFTOFF	H	L	Initiates Liftoff Signals in EDS Dist.

Number Signals	Signal Name	From	To	Function
2	S-IVB ENG. THRUST OK	M	L	Indicate loss of active engine thrusting.
24	S-IB ENG. 1 THRU 8 THRUST OK	M	L	Indicate loss of each active engine thrusting.
2	S-IVB RSCR ARM & ENG. C/O COMD. ON	M	L	Range Safety Destruct Armed for S-IVB.



Number Signals	Signal Name	From	To	Function
2	COMD. EDS S-IB ENG. C/O	L	M	EDS or manual cutoff of S-IB active engines.
2	COMD. EDS S-IVB ENG. C/O	L	M	EDS or manual cutoff of active S-IVB engine.

Number Signals	Signal Name	From	To	Function
1	COMD. S-IVB LOX TANK VENT STOP	M	F	Request from S-IVB to LVDC in I.U. to stop LOX vent.
1	COMD. S-IVB LH <sub>2</sub> TANK VENT CYCLE START	M	F	Requests computer to initiate S-IVB ullage rocket firing and 15 seconds later initiate an S-IVB vent command.
1	COMD. S-IVB LH <sub>2</sub> TANK VENT CYCLE STOP	M	F	Request to terminate the LH <sub>2</sub> tank vent cycle.
1	S-IB INB. ENG. OUT	M	F	Indicates inboard engine out.
1	S-IB OUTB. ENG. OUT	M	F	Indicates S-IB outboard engine out.
1	S-IB OUTB. ENG. BUSS CUTOFF	M	F	Indicates all outboard engines out.
1	S-IB LEVEL SENSORS DRY	M	F	Indicates a certain fluid level has been reached, causes interrupt.
1	S-IB SEPARATION	M	F	Indicates separation of S-IB and S-IVB.
8	S-IB & S-IVB SW. SEL. ADDRESS VERIFY	M	F	The compliment of the address to the S-IB or S-IVB SW. Selectors is fed back to the LVDA to provide a check on the address interface lines and address relays in the switch selector.

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Number Signals	Signal Name	From	To	Function
8	S-IB & S-IVB SW. SEL. ADDRESS	F	M	The 8 bit address or compliments of each will select one of 112 drivers to operate a stage function. All zeros and all ones are used for test purposes only.
2	S-IB & S-IVB SW. SEL. READ	F	M	This is the execute command to turn on the driver previously selected with the 8 bit address. Its dropout causes address and stage select reset.
2	S-IB & S-IVB SW. SEL. RESET	F	M	This resets the address and stage select relay should a malfunction be detected. Reset is normally automatic as the read command drops out.
2	S-IB STAGE SW. SEL. ENABLE	F	M	Picks the S-IB stage switch selector to be used.
2	S-IVB STAGE SW. SEL. ENABLE	F	M	Picks the S-IVB stage switch selector to be used.

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Number Signal	Signal Name	From	To	Function
1	AUDIO	Y	X	An 18.25 KHz audio tone represents a sub-bit "zero" and 22.25 KHz tone represents a sub-bit "one". These tones are at a rate of 1 KHz.

21

Number Signal	Signal Name	From	To	Function
1	S-IB & S-IVB SW. SEL. ADDRESS VERIFY ENABLE	H	M	Enables the LVDA-S-IB and S-IVB address verify lines.



Number Signal	Signal Name	From	To	Function
16	S-IB ACTUATOR DRIVE	R	M	Drive engine actuator to desired position, 4 engines, one actuator for pitch, one for yaw for each engine, 2 coils per actuator.
2	S-IVB ACTUATOR DRIVE	R	M	Drive engine actuators to desired position, 1 engine one actuator for pitch, one for yaw.
6	COMD. APS CONTROL NOZZLES	R	M	Operate the Auxiliary Propulsion System Nozzles for attitude stabilization. Six nozzles for positive and negative vehicle motion in pitch, yaw and roll.
8	S-IB ACTU. POS. FEEDBACK	M	R	Feedback, indicating physical position of 4 pitch and 4 yaw actuators on 4 S-IB engines. As determined by the actuator control pot. position.
2	S-IB ACCELERATION (PITCH & YAW)	M	R	Lateral Accelerations of S-IB Stage in Pitch & Yaw as determined by the Accelerometers in the S-IB Stage. These units must be wired into the system at the Flight Control Computer and are used in place of the I.U. Control Accelerometers.
2	S-IVB ACCELERATION (PITCH & YAW)	M	R	Lateral Accelerations of S-IVB Stage in Pitch & Yaw as determined by the Accelerometers in the S-IVB Stage. These units must be wired into the system at the Flight Control Computer and are used in place of the I.U. Control Accelerometers.
2	S-IVB GYRO RATES (ROLL, PITCH & YAW)	M	R	Angular rates of the vehicle about Pitch, Yaw & Roll axes. These units must be wired into the system at the Flight Control Computer and are used in place of the I.U. rate gyros for control only but do not affect the EDS.

23

Number Signals	Signal Name	From	To	Function
2	COMD. PWR. OFF	J	N,P	To turn control Accels. off at a predetermined time after liftoff.

24

Number Signal	Signal Name	From	To	Function
1	LATERAL ACCELERATION (YAW)	N	R	Lateral acceleration along the yaw axis for use during controlled attenuation times programmed portions of flight.

25

Number Signal	Signal Name	From	To	Function
1	LATERAL ACCELERATION (PITCH)	P	R	Lateral acceleration along the pitch axis for use during controlled attenuation times programmed portion of flight.

26

Number Signal	Signal Name	From	To	Function
6	ATTITUDE ERRORS (P, Y & R)	F	R	These are the three changes in vehicle attitude required to accomplish the mission flight plan using the computed guidance scheme.

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Number Signal	Signal Name	From	To	Function
2	RATE PITCH	S	R	Rate about the pitch axis is determined from a triple redundant rate gyro input.

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(27) (cont.)

Number Signal	Signal Name	From	To	Function
2	RATE ROLL	S	R	Rate about the roll axis is determined from a triple redundant rate gyro input.
2	RATE YAW	S	R	Rate about the yaw axis is determined from a triple redundant rate gyro input.

(28)

Number Signal	Signal Name	From	To	Function
3	PITCH RATE	T	S	Rate about the pitch axis from three separate rate gyros in the same plane.
3	ROLL RATE	T	S	Rate about the roll axis from three separate rate gyros in the same plane.
3	YAW RATE	T	S	Rate about the yaw axis from three separate rate gyros in the same plane.
3	26V 400 Hz	S	T	Rate gyro wheel power, and microsyn reference.

(29)

Number Signal	Signal Name	From	To	Function
1	S-IVB BURN MODE	H	R	Activates the proper electronics in the Flight Control Computer for control of S-IVB engine.
1	FIRST MOTION (LIFTOFF)	H	R	This signal is activated at liftoff upon closure of the liftoff relay contacts in the Control Dist. It starts the C.A.T. Program. It also initiates S-IB Burn, applies power to the appropriate servo amps and the 60V actuator power supplies if these have not already been initiated from the ground.

Number Signals	Signal Name	From	To	Function
5	SWITCH POINTS	H	R	These are discretes which switch the appropriate attention into the servo loops at the proper time during flight.
1	S-IVB C/O	H	R	Switches in the appropriate electronics for Coast Mode Operation.

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Number Signals	Signal Name	From	To	Function
1	S-IVB THRUST OK	L	R	Indication that the S-IVB engine is thrusting. "OR'ed" with S-IVB Burn in Flight Control Computer.

31

Number Signal	Signal Name	From	To	Function
9	EXCESS RATES (R, P&Y)	S	L	Indicate overrates in Roll, Pitch, or Yaw.
3	EDS SW. PTS. 1, 2, 3	L	S	This causes switching the point at which the rate switcher will activate from 3°/sec. to 5°/sec. in Pitch and Yaw only. Roll is unaffected due to internal disconnect in Cont. Sig. Processor.

32

Number Signal	Signal Name	From	To	Function
2	L.E.T. JETTISION A&B	H	U	Launch Escape Tower Jettison Command indicate to Control Programmer, Redundant signals.

32 (cont.)

Number Signals	Signal Name	From	To	Function
2	Q-BALL POWER	H	U	Supply +28V Power to the Q-Ball.
1	Q-BALL HEATER POWER	H	U	Supplies 60Hz Power to the Q-Ball.

33

Number Signal	Signal Name	From	To	Function
13	DATE	X	F	Thirteen data bits are used either as mode or data information by the LVDC.
2	SYNC	X	F	These signals are ANDed in the LVDA to eliminate noise on the line or a failure in one bit giving false information. These indicate that data from the DCS is available to the LVDC.
1	MODE/DATA BIT	X	F	This defines for the LVDC whether the 13 data bits are to be used as data bits or as a mode command.
2	INTERRUPT	X	F	These signals are ANDed in the LVDA. They will interrupt the LVDC and initiate transfer of data into the LVDC.
1	COMPUTER RESET	F	X	Upon transfer of the data bits to the LVDC a computer reset pulse of 60 ms is issued to the decoder by the LVDC. This pulse clears the decoder logic for receipt of the next word.

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Number Signals	Signal Name	From	To	Function
1	MEAS LVDC/DA FIRING COMMIT INHIBIT	F	V	Double memory error in LVDC has occurred (TLC).



Number Signal	Signal Name	From	To	Function
1	MEAS LVDC/DA FIRING COMMIT ENABLE	F	V	Indication of guidance reference release.
1	COMD. LV/SC GUID. REF. RELEASE ALERT	V	F	Prepare to receive guidance reference release.
14	GSE DATA BITS	V	F	13 Bits, information and 1 Bit defining the other 13 as mode or data.
3	CHAN SWITCH	V	F	Used to energize 3 relays. By energizing the 3 possible pairs the 3 simplex channels of the LVDC and LVDA can be checked.
3	MEMORY CONTROL	V	F	These are used in conjunction with LVDA power switching of +20V to assure the ener- gizing of circuitry in the correct time relationship to prevent loss of memory bits. The lines are: memory connect, control line power sequencing +20VDC to memories through current limit resistor- memory short, control line power sequencing bypass memory +20VDC current limiting resistor--memory release, control line power sequenc- ing removes and shorts +20 VDC.
1	POWER CHECKOUT	V	F	Control line checkout of duplexed power supplies.
1	RCA 110 INTERRUPT	V	F	Forces the LVDC to accept the 14 bits of mode information ahead of normal programmed checks.
3	POWER & DRIVER CHECKOUT	V	F	Control lines used in check- out of duplexed power supplies and TMR output drivers.
1	RELAY RESET	V	F	Control line to reset logic channel checkout relays.

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Number Signal	Signal Name	From	To	Function
1	HALT	V	F	Signal which initializes all registers within the LVDC prior to accepting initial routines. It is also used during ground to vehicle power transfer and prior to power downs.
1	BLOCK COMMAND RECEIVER	V	F	This bit determines whether the GSE or the command system will be gated into the LVDA.
1	READ DOM	V	F	(Data Output Multiplexer) Synchronizing pulse, indicating a word has been read by GSE and steps the DOM i.e., a new word is transferred from the DOM delay line buffer to the Buffer Register handling transfer of this information to GSE. If a Computer Telemetry PIO (Process Input Output) takes place before the DOM word has been read it will have priority, and LVDC data will be substituted for DOM data. The DOM will reload the same data for transmission as soon as the LVDC word has been transmitted.
1	GSRO SYNC	V	F	When the sync bit appears, the LVDC will check the 14 bits for valid mode information. Sync will be used for syncing in either Load in or Read out modes.
1	COMD. LV/SC GUID. REF. RELEASE	V	F	Indicates the guidance system is inertial and puts the LVDC into a pre-launch mode looking for lift-off. Actually switched through EDS Dist. Release alert precedes release signal.
1	RESET (LIRO)	F	V	Serves as data received bit (Load in Mode) or data ready bit (Read Out Mode) by resetting the Sync bit in the GSE. After 5 ms delay the Reset Signal is turned off and the program requested begun.

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Number Signal	Signal Name	From	To	Function
26	DATA	F	V	Full computer data word excluding parity bits.
8	TAG	F	V	Address indicating origin of data bits.
6	MODE	F	V	Flight modes are indicated with these six bits.
1	MEAS. I.U. GUID. SYSTEMS FAILURE	F	V	Indicates reasonableness checks on platform data have been evaluated as guidance failure. Also sent to Space Craft. Actually switched through EDS Dist.
1	LVDA REAL TIME	F	V	Real time bit from Mode/Real Time Register in LVDA.

Number Signal	Signal Name	From	To	Function
26	DATA	F	W	Full Data word excluding parity bits.
8	TAG (ADDRESS)	F	W	7 address bits A3-9, plus one bit, A2 which is a Logic 1 as a result of the decoded PIO meaning Computer Telemetry Operation, Logic 0 meaning LVDC DOM.
1	ADDRESS OR REAL TIME	F	W	A1 is an address bit if a Computer Telemetry Operation or a Real Time bit if LVDA, DOM operation.
3	MODE OR REAL TIME	F	W	Is a Mode bit when LVDC Data, or a Real Time bit when LVDA Data. Modes are flight modes.
1	VALIDITY OR REAL TIME	F	W	Is a Validity bit when LVDC Data, or a Real Time bit when LVDA Data. Will indicate register bits invalid during load of tag or buffer registers. Invalid also when the buffer register contains orbital checkout address bits.



Number Signal	Signal Name	From	To	Function
1	PARITY	F	W	Odd parity is generated for use in checking words to telemetry.
1	DATA SAMPLE	W	F	Synchronizing pulse, indicating a word has been read by the telemetry equipment and steps the DOM (data output multiplexer) i.e., a new word is transferred from the DOM delay line buffer to the Buffer Register handling transfer of this information to telemetry. If a Computer Telemetry PIO takes place before the DOM word has been read, it will have priority, and LVDC data will be substituted for DOM data. The DOM will reload the same data for transmission as soon as the LVDC word has been transmitted.

Number Signal	Signal Name	From	To	Function
1	DATA REQUEST	F	Z	Resets storage register within the DDAS/CIU to accept data requested and conditions address register to accept address of data requested.
12	ADDRESS	F	Z	Address of requested data.
1	DATA READY	Z	F	Address of requested data has compared with address going through the DDAS/CIU. The 10 bits of data have been placed in the storage register and this signal tells the LVDA the requested data is now available from that register.
10	DATA OUT	Z	F	Requested data.

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Number Signals	Signal Name	From	To	Function
2	ADDRESS VERIFY	X	AA	If all criteria for a proper command word are satisfied, a 60 ms address verification pulse is sent to PCM telemetry.
2	COMPUTER RESET	X	AA	After receipt by Command Decoder of computer reset pulse from LVDA, it is subsequently relayed to the ground through PCM telemetry. This pulse must appear at the ground command station within 200 ms of the address verify pulse.

Number Signals	Signal	From	To	Function
1	INHIBIT	H	BB	Inhibit One Transponder, so both are not in use, thereby causing interference with each other.
1	INHIBIT	H	BB	Inhibit One Transponder, so both are not in use, thereby causing interference with each other.

Number Signals	Signal	From	To	Function
1	S-IVB ENGINE C/O	U	L	Provides a manual means for the AGC to initiate S-IVB engine thrust termination during SC control of Saturn.
2	VECTOR SUM EDS SIGNALS 1&2	U	L	Vector sum P&Y signals 1&2 reflect redundancy.
2	EDS DELTA P, Q-BALL (P&Y)	U	L	Delta pressure, provide angle of attack information to LV instrumentation.

AS-207-IU SIGNAL DEFINITIONS  
(Use with Page 1)

Number Signal	Signal Name	From	To	Function
2	MCP LIFTOFF SIGNALS A&B	L	U	Discreets "A" & "B" used to start sequence in the Spacecraft Mission Control Programmer.
2	LV/SC SEPAR. SEQUENCE START A&B	L	U	Spacecraft separation start command indicate to Control Programmer. Redundant signals.
2	S-IB ENG #1 OR S-IVB ENG. OUT A&B	L	U	Indicates S-IB ENG. #1 or S-IVB engine out. A set of lites indicates either S-IB or S-IVB depending on the stage active. Signals and lites are redundant.
14	S-IB ENG. 2 THRU 8 OUT	L	U	Indicates any or all Eng. 2 thru 8 are out. Signals and lites are redundant.
1	AGC LIFTOFF SIGNAL	L	U	Discreet to Apollo Guidance Computer to start time base.
1	GUID. REF. RELEASE	L	U	Guidance Reference Release to Spacecraft computer.
3	ATTITUDE ERROR (R, P, Y)	U	L	Supply differential attitude error information from the SC to the IU during SC control of Saturn.
3	AUTO EDS ABORT	L	U	Auto-Abort conditions have taken place, S-IB 2 engines out or PR of Y overrate. 2 of 3 voting in Apollo.
2	ABORT REQUEST A&B	L	U	Range Safety Destruct Armed from S-IVB or pad abort request. Redundant signals each to 2 lites.
2	LV RATE EXCESSIVE A&B	L	U	P, R, or Y rate switch in control Signal Processor indicate excessive rate. Redundant signals to lites.

AS-207-IU SIGNAL DEFINITIONS  
(Use with Page 1)



Number Signal	Signal Name	From	To	Function
2	LV ATTITUDE REFERENCE FAIL A&B	L	U	Indicates reasonableness checks on platform data have been evaluated as a guidance failure, redundant signals to lites.
1	SC CONTROL OF SATURN	U	L	Provides a manual means for the AGC to assume control of Saturn from the IU guidance.
1	AGC COMMAND POWER	U	L	Power to enable the following signals from EDS to Spacecraft: AGC Liftoff Signal Guidance Ref. Release
2	COMMAND POWER A&B	U	L	Power to enable the following signals from EDS to Spacecraft: LV/SC Sep. Seq. start L.E.T. Jettison MCP Liftoff Signal
3	COMD. LV ENG. CUTOFF	U	L	Spacecraft cutoff of active engines. Triple redundant signals.
3	LV RATE EXCESS AUTO- ABORT DEACTIVATE	U	L	Rate excessive Auto-Abort deactivate, triple redundant signals.
3	S-IB 2 ENG. OUT AUTO- ABORT DEACTIVATE	U	L	S-IB 2 Engine Out Auto-Abort deactivate, triple redundant signals.

Number Signals	Signal Name	From	To	Function
2	S-IVB LOX BANK PRESSURE A&B	M	U	LOX Pressure Indicate, redundant signals and gages.
2	S-IVB FUEL TANK PRESSURE A&B	M	U	Fuel Pressure Indicate, redundant signals and gages.

AS-207 IU. SIGNAL DEFINITIONS  
(Use with Page 1)

Number Signals	Signal Name	From	To	Function
1	COMD. EDS SW. PT. B	CC	L	This caused switching the point at which the rate switches will activate from 3°/sec. to 5°/sec. in pitch & yaw.

AS-207-IU SIGNAL DEFINITIONS  
(Use with Page 1)

AS-207-IU TELEMETRY MEASUREMENTS  
WHICH EVALUATE FLIGHT CONTROL HARDWARE

Source Letter/or Signal List Number	ESE Display	Signal Name	Source	Range
25	*	Accel. Pitch Control	Control Accel. Pitch	$\pm 5M/sec^2$
24	*	Accel. Yaw Control	Control Accel. Yaw	$\pm 5M/sec^2$
M	*	Position Pitch Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Pitch Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Pitch Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Pitch Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Pitch Actuator	S-IVB Stage	$\pm 7.5$ Deg.
M	*	Position Yaw Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Yaw Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Yaw Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Yaw Actuator	S-IB Stage	$\pm 8$ Deg.
M	*	Position Yaw Actuator	S-IVB Stage	$\pm 7.5$ Deg.
U	*	EDS Delta P Pitch Q-Ball	Q-Ball	$\pm 4.0$ PSID
U	*	EDS Delta P Yaw Q-Ball	Q-Ball	$\pm 4.0$ PSID
R22	*	Delta I Pitch Actuator	Control Computer	$\pm 14MA$
R22	*	Delta I Pitch Actuator	Control Computer	$\pm 14MA$
R22	*	Delta I Pitch Actuator	Control Computer	$\pm 14MA$



Source Letter/or Signal List Number	ESE Display	Signal Name	Source	Range
R22	*	Delta I Pitch Actuator	Control Computer	<u>+14</u> MA
R22	*	Valve Current, Pitch Actuator	Control Computer	<u>+50</u> MA
R22	*	Delta I Yaw Actuator	Control Computer	<u>+14</u> MA
R22	*	Delta I Yaw Actuator	Control Computer	<u>+14</u> MA
R22	*	Delta I Yaw Actuator	Control Computer	<u>+14</u> MA
R22	*	Delta I Yaw Actuator	Control Computer	<u>+14</u> MA
R22	*	Valve Current, Yaw Actuator	Control Computer	<u>+50</u> MA
R22	*	Attitude Control Engine Pitch Engine Relay I <sub>p</sub> , III <sub>p</sub>	Control Computer	<u>+2.5</u> VDC
R22	*	Attitude Control Engine, Engine Relay I <sub>II</sub> , I <sub>IV</sub>	Control Computer	<u>+2.5</u> VDC
R22	*	Attitude Control Engine, Engine Relay III <sub>II</sub> , III <sub>IV</sub>	Control Computer	<u>+2.5</u> VDC
1	*	X Accel. Pickup	ST-124M thru Plat- form Elec. Assy.	<u>+1</u> Deg.
1	*	Y Accel. Pickup	ST-124M thru Plat- form Elec. Assy.	<u>+1</u> Deg.
1	*	Z Accel. Pickup	ST-124M thru Plat- form Elec. Assy.	<u>+1</u> Deg.
8		X Accel.Channel,A1	Accel.Signal Con- ditioner	.05M/sec/Pulse
8		X Accel.Channel,B1	Accel.Signal Con- ditioner	.05M/sec/Pulse
8		Y Accel.Channel,A1	Accel.Signal Con- ditioner	.05M/sec/Pulse
8		Y Accel.Channel,B1	Accel.Signal Con- ditioner	.05M/sec/Pulse

AS-207-IU TELEMETRY AND ESE DISPLAYED SIGNALS  
THAT EVALUATE THE FLIGHT CONTROL HARDWARE (use with Page 1)

Source Letter/or Signal List Number	ESE Display	Signal Name	Source	Range
8		Z Accel.Channel,A1	Accel.Signal Con- ditioner	.05M/sec/Pulse
8		Z Accel.Channel,B1	Accel.Signal Con- ditioner	.05M/sec/Pulse
2		Voltage 4.8 KC Plat- form Excitation	Platform Pwr. Supply	8 to 12 VAC
2		Voltage 4.8 KC Servo Amplifiers Supply	Platform Pwr. Supply	8 to 12 VAC
1	*	X Gyro Pickup (Servo Amplifier Input)	ST-124M thru Plat- form Elec. Assy.	$\pm 1$ Deg.
1	*	Y Gyro Pickup (Servo Amplifier Input)	ST-124M thru Plat- form Elec. Assy.	$\pm 1$ Deg.
1	*	Z Gyro Pickup (Servo Amplifier Input)	ST-124M thru Plat- form Elec. Assy.	$\pm 1$ Deg.
1		Output X Gyro Servo	ST-124M thru Plat- form Elec. Assy.	$\pm 1.25$ VDC
1		Output Y Gyro Servo	ST-124M thru Plat- form Elec. Assy.	$\pm 1.25$ VDC
1		Output Z Gyro Servo	ST-124M thru Plat- form Elec. Assy.	$\pm 1.25$ VDC
26	*	Attitude Pitch Ladder Output	LVDA	$\pm 15$ Deg.
26	*	Attitude Yaw Ladder Output	LVDA	$\pm 15$ Deg.
26	*	Attitude Roll Ladder Output	LVDA	$\pm 15$ Deg.
34,35		Guidance Computer Operation (LVDC/ LVDA Word)	LVDA	0 or 28 VDC
26	*	Attitude Error Sig- nal (Angular Posi- tion Roll)	ST-124M thru Plat- form Elec. Assy.	$\pm 45$ VDC
26	*	Attitude Error Sig- nal (Angular Posi- tion Yaw)	ST-124M thru Plat- form Elec. Assy.	$\pm 45$ VDC

AS-207-IU TELEMETRY AND ESE DISPLAYED SIGNALS  
THAT EVALUATE THE FLIGHT CONTROL HARDWARE (Use with Page 1)

Source  
Letter/or

Signal List ESE

Number	Display	Signal Name	Source	Range
26	*	Attitude Error Signal (Angular Position Pitch)	ST-124M thru Plat- form Elec. Assy.	$\pm 45$ VDC
-		Switch Selector Zero Indicate	Switch Selector	0 or 28 VDC
-	*	Switch Selector Output	Switch Selector	0 to 5 VDC
12	*	Switch Selector Stage Select	Switch Selector	0 or 28 VDC
12	*	Switch Selector Read Command	Switch Selector	0 or 28 VDC
12		Switch Selector Reset	Switch Selector	0 or 28 VDC
12	*	Switch Selector Register Verification	Switch Selector	0 or 28 VDC
12	*	Switch Selector Register Test	Switch Selector	0 or 28 VDC
27	*	Angular Velocity Pitch Control	Control Signal Processor	$\pm 10$ Deg./sec
27	*	Angular Velocity Yaw Control	Control Signal Processor	$\pm 10$ Deg./sec
27	*	Angular Velocity Roll Control	Control Signal Processor	$\pm 10$ Deg./sec
28	*	Angular Velocity Pitch EDS Group 1 (Spare)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Yaw EDS Group 1 (reference)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Roll EDS Group 1 (Command)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Pitch EDS Group 2 (Command)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Yaw EDS Group 2 (Spare)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Roll EDS Group 2 (Reference)	Rate Gyro Package	$\pm 10$ Deg./sec

AS-207-IU TELEMETRY AND ESE DISPLAYED SIGNALS  
THAT EVALUATE THE FLIGHT CONTROL HARDWARE (Use with Page 1)



Source  
Letter/or

Signal List ESE

Number	Display	Signal Name	Source	Range
28	*	Angular Velocity Pitch EDS Group 3(Reference)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Yaw EDS Group 3(Command)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Angular Velocity Roll EDS Group 3 (Spare)	Rate Gyro Package	$\pm 10$ Deg./sec
28	*	Pitch Rate Switch EDS Group 1	Control Signal Processor	0 or 28 VDC
28	*	Yaw Rate Switch EDS Group 1	Control Signal Processor	0 or 28 VDC
28	*	Roll Rate Switch EDS Group 1	Control Signal Processor	0 or 28 VDC
28	*	Pitch Rate Switch EDS Group 2	Control Signal Processor	0 or 28 VDC
28	*	Yaw Rate Switch EDS Group 2	Control Signal Processor	0 or 28 VDC
28	*	Roll Rate Switch EDS Group 2	Control Signal Processor	0 or 28 VDC
28	*	Pitch Rate Switch EDS Group 3	Control Signal Processor	0 or 28 VDC
28	*	Yaw Rate Switch EDS Group 3	Control Signal Processor	0 or 28 VDC
28	*	Roll Rate Switch EDS Group 3	Control Signal Processor	0 or 28 VDC
L	*	EDS S-IB One Engine Out (Engines 1-8)	EDS	0 or 28 VDC
L	*	EDS S-IB One Engine Out (Engines 2-8)	EDS	0 or 28 VDC
L	*	EDS S-IB Two Engines Out Signal A	EDS	0 or 28 VDC
L	*	EDS S-IB Two Engines Out Signal B	EDS	0 or 28 VDC
L	*	EDS + 6D95 Bus Energized	EDS	0 or 28 VDC

AS-207-IU TELEMETRY AND ESE DISPLAYED SIGNALS  
THAT EVALUATE THE FLIGHT CONTROL HARDWARE (Use with Page 1)

Source  
Letter/or  
Signal List ESE

Number	Display	Signal Name	Source	Range
L	*	EDS S-IB or S-IVB En Engine Cutoff from Spacecraft	EDS	0 or 28 VDC
L	*	EDS or Manual Cutoff of S-IB or S-IVB	EDS	0 or 28 VDC
L	*	EDS or Manual Cutoff of S-IB or S-IVB	EDS	0 or 28 VDC
L	*	EDS-Manual Cutoff of S-IB or S-IVB Engine Armed	EDS	0 or 28 VDC
L		EDS-Manual Cutoff of S-IB or S-IVB Engine Armed	EDS	0 or 28 VDC
R	*	S-IB Burn	Flight Control Computer	0 or 28 VDC
R	*	S-IVB Burn	Flight Control Computer	0 or 28 VDC
R	*	Servo Amplifier Com- parator Pitch	Flight Control Computer	0 or 28 VDC
R	*	Servo Amplifier Com- parator Yaw	Flight Control Computer	0 or 28 VDC
R	*	Spatial Amplifier Com- parator Roll-Yaw 1	Flight Control Computer	0 or 28 VDC
R	*	Spatial Amplifier Com- parator Pitch	Flight Control Computer	0 or 28 VDC
R	*	Spatial Amplifier Com- parator Roll-Yaw II	Flight Control Computer	0 or 28 VDC
A	*	Summation Gyro Currents (ST-124M-3)	ST-124M Inertial	0 to 7.5 VDC
A	*	Summation Accelerometer Currents (ST-124M-3)	ST-124M Inertial Platform	0 to 7.5 VDC
H	*	S-IB Stage Separation	Control Distributor	0 or 28 VDC
16	*	EDS Switch Point Moni- tor (No.1, No.2, No.3)	EDS	0 or 28 VDC

AS-207-IU TELEMETRY AND ESE DISPLAYED SIGNALS  
THAT EVALUATE THE FLIGHT CONTROL HARDWARE (Use with Page 1)

Source Letter/or Signal List Number	ESE Display	Signal Name	Source	Range
S	*	EDS Comparator Relay Monitor No. 1	Control Signal Processor	0 or 28 VDC
S	*	EDS Comparator Relay Monitor No. 2	Control Signal Processor	0 or 28 VDC
S	*	EDS Comparator Relay Monitor No. 3	Control Signal Processor	0 or 28 VDC
S	*	EDS Wheel Speed Group 1	Control Signal Processor	0 or 28 VDC
S	*	EDS Wheel Speed Group 2	Control Signal Processor	0 or 28 VDC
S	*	EDS Wheel Speed Group 3	Control Signal Processor	0 or 28 VDC
L	*	EDS Rate Gyro Roll Activate	EDS	0 or 28 VDC
L	*	EDS Rate Gyro Pitch and Yaw Activate	EDS	0 or 28 VDC
S	*	EDS Monitor Angular Velocity Roll Group 1	Control Signal Processor	$\pm 25$ Deg./sec
S	*	EDS Monitor Angular Velocity Roll Group 2	Control Signal Processor	$\pm 25$ Deg./sec
S	*	EDS Monitor Angular Velocity Roll Group 3	Control Signal Processor	$\pm 25$ Deg./sec
X		Address Verify Pulse No. 1, 2	Command Decoder	0 or 5 VDC
X		Computer Reset Pulse No. 1, 2	Command Decoder	0 or 5 VDC
39	*	Mode Switch SC/IU	Spacecraft	0 or 28 VDC

AS-207-IU TELEMETRY AND ESE DISPLAYED SIGNALS  
THAT EVALUATE THE FLIGHT CONTROL HARDWARE (Use with Page 1)