VLBA TECHNICAL
REPORT NO. 16

F118

330/610 MHz FRONT END ADAPTER MODULE

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Specifications

Maximum Voltage to Analog Inputs	± 20 VOLT
Analog Voltage Measurement Range	± 10 VOLT
Number of analog inputs	14
Number of internal analog measurements	1
Number of digital inputs	0
Number of digital readbacks	1
Number of digital command outputs	1
Module Ser. No. relative address	24 hexadecimal
Address ID code	01 hexadecimal
Analog monitor relative address range	08-1F hexadecimal
Digital monitor relative address	22 hexadecimal
Command relative address range	22 hexadecimal
Power supply voltages required	+5, ±15, +28 VOLT

FRONT PANEL CONNECTIONS AND ADJUSTMENTS

BNC jacks AUX1 to AUX4: Auxiliary analog voltage measurement inputs. They are read by monitoring M/C relative addresses 19_{16} through $1C_{16}$.

25-pin D-connectors: Are connected through two 25-conductor cables to the associated F117 Front end control module.

Module Replacement Procedure

I. Removal. Unscrew the knurled plastic screws on the two connectors attached to the front panel. Unplug the connectors from the front panel. Loosen the captivated screws and use the module puller to remove the module from the bin.

II. Replacement. To install a new module, simply insert the module into the bin and tighten the captivated screws. Push the connectors from the cables leading to the F117 module onto the appropriate connectors on the front panel, and tighten the knurled screws.

330/610 MHz FE Monitor/Control (F117 & F118)
[ID No. 01_{16}]

COMMANDS

Function: Noise Calibrator Control Relative Address: 22h

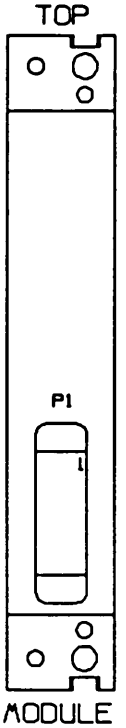
Command	Action
00	Calibrator Diodes OFF
02	LO Cal Continuous
01	LO Cal Modulated
08	HI Cal Continuous
04	HI Cal Modulated

MONITORS

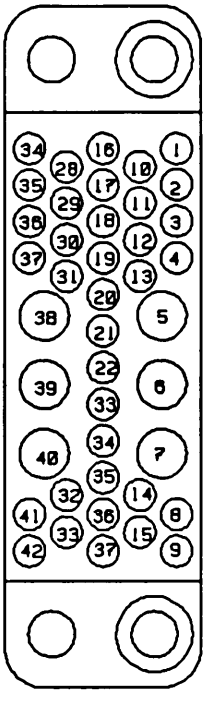
Relative Address	Type	Description	Multiplier[1]	Units	Normal Value
04	Analog	Lo-Cal Diode Current	120	mA	10 mA (on)
05	Analog	Hi-Cal Diode Current	120	mA	10 mA (on)
06	Analog	Lo-Cal Diode Voltage	4	Volts	28 V (on)
07	Analog	Hi-Cal Diode Voltage	4	Volts	28 V (on)
08	Analog	Rack A Temp. Sensor #1 (Top)	10	deg C	26 °C
09	Analog	Helium Pressure Sensor #4	1	Volts	
0A	Analog	+28 Volt Power Supply Monitor	4	Volts	+28 V
10	Analog	-15 Volt Power Supply Monitor	2	Volts	-15 V
11	Analog	330/610 Front End Temp. Sensor	100	Kelvin	315 K
12	Analog	+5 Volt Power Supply Monitor	1	Volts	+5 V
13	Analog	+15 Volt Power Supply Monitor	2	Volts	+15 V
14	Analog	Helium Pressure Sensor #1	1	Volts	
15	Analog	Helium Pressure Sensor #2	1	Volts	
16	Analog	Helium Pressure Sensor #3	1	Volts	
17	Analog	Rack A Temp. Sensor #2 (Bottom)	10	deg C	23 °C
18	Analog	330/610 FE Ser. No. (Analog)	2.5		
19	Analog	Front Panel Auxiliary Input #1	1	Volts	
1A	Analog	Front Panel Auxiliary Input #2	1	Volts	
1B	Analog	Front Panel Auxiliary Input #3	1	Volts	
1C	Analog	Front Panel Auxiliary Input #4	1	Volts	
1D	Analog	Front End +15 V Monitor	2	Volts	+15 V
1E	Analog	Rear Panel Auxiliary Input #1	1	Volts	
1F	Analog	Rear Panel Auxiliary Input #2	1	Volts	
22	Digital	Cal Command Readback (same as commands)			
24	Digital	Serial No. of F117 connected to F118			

[1] An analog data value can be converted to Volts by dividing it by 3276.8. The resulting voltage can then be converted to the Units shown by multiplying it by the corresponding Multipliers.

[2] On front panel of 330/610 MHz Adapter module (F118)

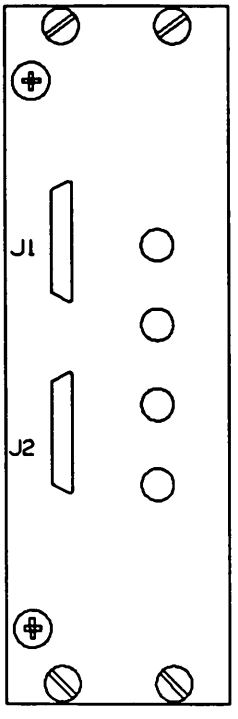


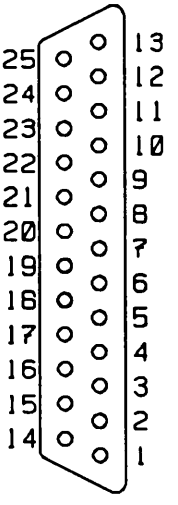
MODULE
(REAR VIEW)



P1 (REAR VIEW)

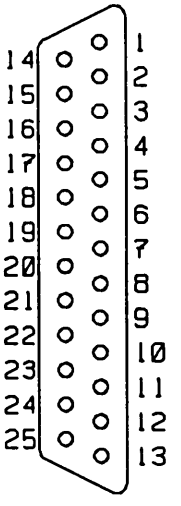
P1					
PIN	FUNCTION	COMMENT	PIN	FUNCTION	COMMENT
1	FE 15V SUPPLY	TO FRONT END	22	EXT ANLG2+	
2	FE 15V RETURN	TO FRONT END	23		
3	HI-CAL OUTPUT		24		
4	CAL OUTPUT		25	TEMP SENS 1	
5			26	TEMP SENS 2	
6			27		
7			28	PS 15V FLT +	FROM FLOAT SUP
8	PS 15V SENSE +	TO FLOAT SUPPL	29	+ 28V SUPPLY	
9	PS 15V SENSE -	TO FLOAT SUPPL	30	PRESS SENS 1	
10	+ 5 V SUPPLY		31	PRESS SENS 2	
11	FE +15V REF	FROM FRONT END	32	PRESS SENS 3	
12	FE GND REF	FROM FRONT END	33	PRESS SENS 4	
13	ANALOG ID		34	GROUND	
14	SENSOR +15V	TO RACK SENSRS	35	PS 15V FLT -	FROM FLOAT SUP
15	SENSOR GND	TO RACK SENSRS	36	SENSOR -15V	TO RACK SENSRS
16	+15V SUPPLY		37		
17	-15V SUPPLY		38		
18	FE TEMP SENSOR		39		
19	EXT ANLG 1-		40		
20	EXT ANLG 1+		41		
21	EXT ANLG 2-		42		





J1 (FRONT VIEW)

SOCKET



J2 (FRONT VIEW)

PLUG

J1					
PIN	FUNCTION	COMMENT	PIN	FUNCTION	COMMENT
1	TEMP SENS 1		14		
2	TEMP SENS 2		15	ANLG 3+ (EXT)	
3	PRESS SENS 1		16	ANLG 3- (EXT)	
4	PRESS SENS 2		17	ADDR 0 (EXT)	
5	PRESS SENS 3		18	ADDR 1 (EXT)	
6	PRESS SENS 4		19	ADDR 2 (EXT)	
7	FE TEMP SENS		20		
8	+ 7.5 VOLT		21		
9	- 7.5 VOLT		22		
10	+ 5 VOLT		23		
11	+ 7 VOLT		24		
12			25		
13	Q GROUND				
J2					
1	GROUND		14	F0	
2			15	F1	
3			16	F2	
4			17	F3	
5			18		
6			19		
7			20		
8			21		
9	PARITY*		22		
10			23		
11	CAL		24		
12	HI-CAL		25		
13					

Description of I/O Lines

42-PIN REAR PANEL CONNECTOR:

FE 15V SUPPLY: 15 Volt supply + output to front end.
FE 15V RETURN: 15 Volt supply - output to front end.
HI-CAL: High-level calibrator output to front end.
CAL: Low-level calibrator output to front end.
PS 15V SENSE + & -: Power supply sense outputs to front end 15 Volt power supply.
+5 VOLT SUPPLY: +5 V input from power supply.
FE +15V REF: +15 Volt sense line from front end. Connected to pin 8.
FE GND REF: Ground sense line from front end. Connected to pin 9, and also used as a reference for analog voltage monitor points.
ANALOG ID: Analog voltage input set by voltage divider in front end which is converted to digital to give a unique serial number to each 330/610 MHz front end.
SENSOR +15V & GND: Power outputs to temperature and pressure sensors in the vertex room.
+15 VOLT SUPPLY: +15 V input from power supply.
-15 VOLT SUPPLY: -15 V input from power supply.
FE TEMP SENSOR: Front end temperature sensor input.
EXT ANLG 1±,2±: Auxiliary analog inputs, currently unused.
TEMP SENS 1,2: Rack temperature sensor inputs.
PS 15V FLT +: Front end floating 15 Volt power supply + input. Connected to pin 1.
+28 VOLT SUPPLY: +28 V input from power supply.
PRESS SENS 1-4: Helium line pressure sensor inputs.
GROUND: Module ground for signals and return for power supplies.
PS 15V FLT -: Front end floating 15 Volt power supply - input. Connected to pin 2.
SENSOR -15V: Power output to temperature and pressure sensors in the vertex room.

DB-25 FEMALE FRONT PANEL CONNECTOR (J1, MONITOR):

TEMP SENS 1,2: Temperature sensor signal outputs to F117 module.
PRESS SENS 1-4: Pressure sensor signal outputs to F117 module.
FE TEMP SENS: Front end temperature sensor signal output to F117 module.
+7.5 VOLT: +15 Volt supply monitor voltage (divided by 2) output to F117.
-7.5 VOLT: -15 Volt supply monitor voltage (divided by 2) output to F117.
5 VOLT: +5 Volt supply monitor voltage output to F117.
7 VOLT: +28 Volt supply monitor voltage (divided by 4) output to F117.
QUALITY GROUND: Common ground return for all analog sensors.
ANLG 3+,ANLG 3-: Extra analog output to F117 used with the internal F118 multiplexer controlled by ADDR 0-2 (below).
ADDR 0-2: Address input lines from F117 for control of F118 multiplexer for additional analog inputs. Used with ANLG 3 (above).

DB-25 MALE FRONT PANEL CONNECTOR (J2, CONTROL):

GROUND: Power supply return ground for front end to F117. Connected to Pin 13.
PARITY: Parity bit output for error checking of frequency bitsused in ID word for the M/C Standard Interface. See description below.
CAL: +28 Volt input to power the front end's low-level calibrator diode. Connected to pin 4 of the 42-pin rear connector.
HI CAL: +28 Volt input to power the front end's high-level calibrator diode. Connected to pin 3 of the 42-pin rear connector.
GROUND: Power supply return ground for front end to F117. Connected to Pin 1.
F0-F3: Frequency bits of ID number output to F117.

Related Documents

1. Specification of Monitor and Control Standard Interface, A55001N002-A, L. R. D'Addario, November, 1985.

2. Specification of Monitor and Control Bus at VLBA Stations, A55001N001, B. G. Clark, December 1984.

II. General Description.

The 330/610 MHz F118 Adaptor module serves a dual function. Its primary purpose is to serve as an interface between the prime focus 330/610 MHz and the standard F117 front end monitor/control interface module. This is required because the F117 is designed to operate with the VLBA cryogenic front ends. Hence much of the capacity of the F117, such as the cryogenics control is not used.

The second function of the F118 is to measure miscellaneous A-rack analog voltages, since the 330/610 MHz front end has only a few voltages to be monitored. These voltages are monitored from power supplies, temperature sensors and helium pressure sensors.

III. Circuit Description.

Referring to the circuit diagram, the main component of the adaptor module is the 8 to 1 CMOS analog multiplexer. Since the adaptor is used to measure voltages from many locations, their returns must be isolated. The voltages monitored at the cryogenic front ends are all referenced to a single ground, so the capability to monitor a single extra differential voltage(ANLG3±) and to output addressing lines(ADDR0-ADDR3) to operate an external multiplexer were included in the F117 Module.

The external multiplexer is connected to four front panel auxiliary inputs, IN1 - IN4, two rear panel auxiliary inputs, EXT ANL 1 & 2, as well as the 330/610 MHz front end analog serial number and power supply voltage monitor points. The analog serial number (S/N) is set by two resistors in the front end which produce a unique voltage for each front end. This eliminates the need to send down a set of parallel lines for a digital S/N from the remote front end. The analog S/N is converted into a digital number by the analog to digital converter.

The +15 volt power supply voltage is measured at the front end by two special lines in the cable connected to the FE. These lines carry almost no current, and are also used as remote sense lines for the +15 volt power supply which powers this FE only. This voltage is divided by two 100 kΩ resistors, to bring the voltage into the range of the Standard Interface's A/D converter. After the voltage is divided, it goes to the multiplexer through an instrumentation amplifier. This amplifier is used to provide a low capacitance and high impedance to the voltage divider to minimize errors. The amplifier also provides a low impedance to drive the relatively high capacitance of the cable connecting the multiplexer to the F117 module.

The adaptor module is also used to monitor the ±15 and +28 volt rack-A power supplies. Since these voltages are out of the range of the voltage measuring circuitry (±10 V), they are divided down. The 15 volt supplies are divided in half by two 10K ohm resistors. The 28 volt supply is divided by four using four 10 KΩ resistors. All (except the FE supply discussed above) are connected to the single-ended monitor points in the F117 module, since they are referenced to chassis ground.

The pressure sensors and the temperature sensors are also monitored with the single-ended monitor circuitry. The temperature sensors, including that in the front end, are actually temperature controlled current sources, so they do not require any ground reference. Instead they require 4 to 30 volts at the '+' terminal, and a current of T μA is sourced by the '-' terminal, where T is the temperature in °K. In the adaptor module the current from each sensor is sunk to chassis ground through a 10KΩ resistor. This produces a voltage of 10 mV/°K, so a temperature of 290 K yields 2.9 V across the 10 KΩ resistor. This voltage is then shifted and amplified by IC 2B so that a voltage of 0.1 V/°C is sent to the

A/D converter. Thus a temperature of 25 °C produces a voltage of 2.5 V. IC 2E provides a precision voltage reference for this shifting.

The negative side of the FE +15 V power supply is connected to chassis ground. Thus, the return current from the FE goes through the antenna structure. Referring to the module wiring list (near the end of this manual) it can be seen that the positive side is connected through the module to the 8-pin connector on the back of the rack. The 8-conductor cable going to the front end is connected to this 8-pin socket. The two reference lines (+15 and ground) are brought back through the cable and connected to the multiplexer to monitor the FE +15 V supply, as well as to the power supply sense inputs. The ground reference is also used as the reference for the differential multiplexer input which is used to measure the analog S/N voltage. This way, any voltage drop in the ground return through the antenna is compensated for.

Other connections to the F117 M/C module include a hard-wired address/ID connected to the F0-F3 and PA lines. These are hard-wired because the adaptor is used only with the 330/610 front end. Use of this ID is described in the M/C standard interface specification A55001N002-A, p 4. The calibrator signals are connected through the module to the 8-pin connector. Their operation is unaffected by the adapter module, and is the same as for the cryogenic modules.

III. Test Procedure.

The test procedure for the F118 module is automated, for the most part, using a computer to 'exercise' the module.

REQUIREMENTS:

1. IBM PC or compatible. Must have serial port on COM1.
2. RS-232 to RS-422/485 converter.
3. F118/L107 Test Box.
3. Working and tested F117 Module.
4. MODTEST program.
5. Voltmeter, preferably digital.
6. Power supply to supply +5 V, ±15 V and + 28 V power.
7. Cables to connect the Test Box to the power supply, and to the F117 and F118 modules.
8. Two 25-conductor cables each with a male D-25 connector on one end, and a female D-25 on the other.

Connect the power supply, the RS-422 converter and the module together with the cable as shown in the connection diagram. Boot the computer up normally, and put the disk with the MODTEST program into whichever disk drive is normally used for running external programs. The DOS disk need not be in the drive, and the MODTEST program can be copied onto a hard disk, if desired. Type 'MODTEST' to execute the program. The program will indicate what to do to check out the module.

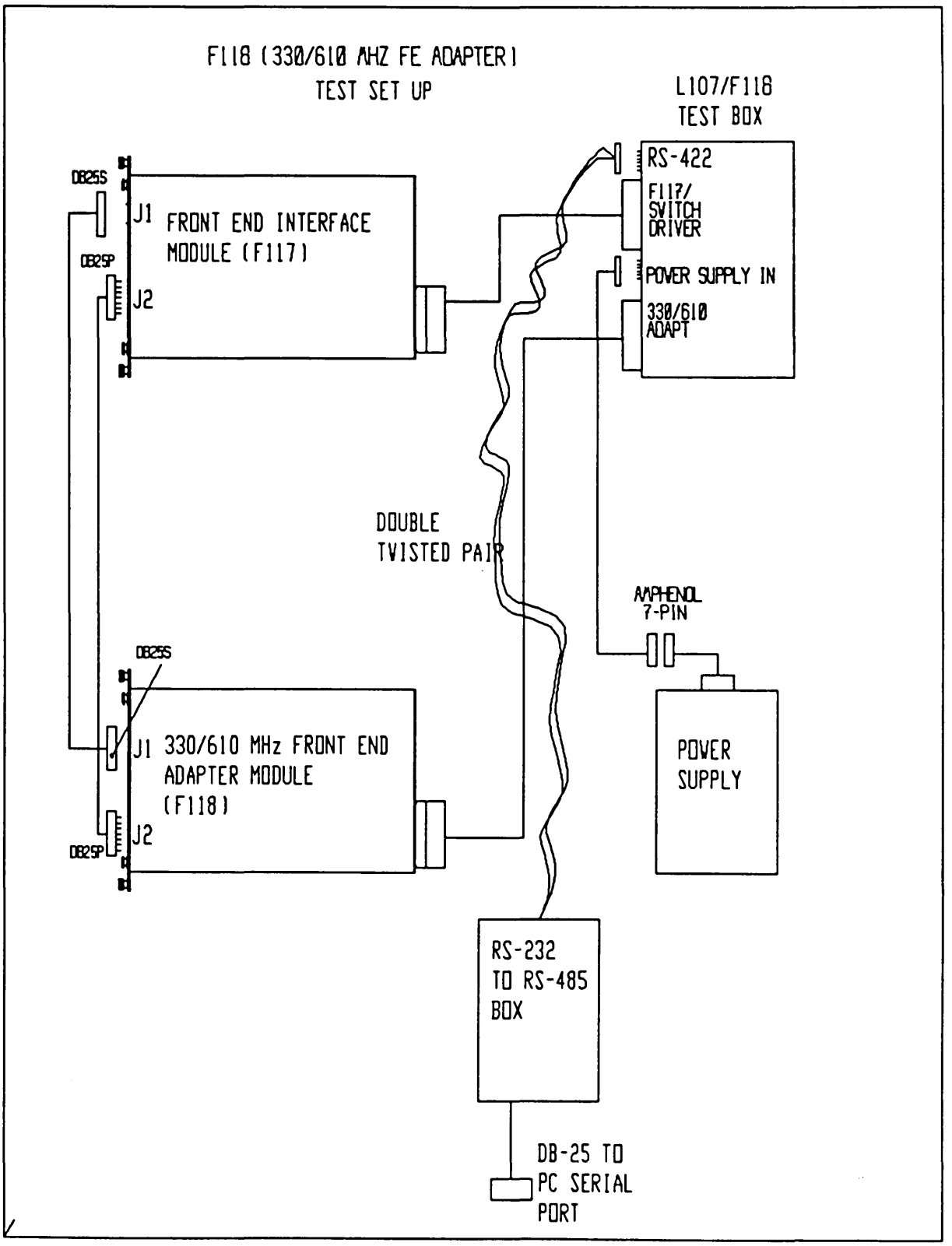


Figure 1. F118 Test Set-up.

F118 MODULE TEST CABLES

F118 MODULE TEST CABLE # 1
(Marked as F118 Cable)
42-pin PLUG to SOCKET
(Plug pin wired to socket pin of same number)

PIN	COLOR	USE
1	red	FE 15 V SUPP
2	black	FE 15 V RETN
3	violet	HI-CAL
4	white	CAL
8	red	PS 15 V SENS+
9	black	PS 15 V SENS-
10	orange	+5 V SUPP
11	white	FE +15 V REF
12	wht/orn	FE GND REF
13	wht/grn	ANALOG ID
14	red	T/P SENS +15 V
15	black	T/P SENS GND
16	red	+15 V SUPP
17	yellow	-15 V SUPP
18	wht/brn	FE TEMP SENS
19	wht/gry	EXT ANLG 1+
20	wht/vio	EXT ANLG 1-
21	wht/yel	EXT ANLG 2+
22	wht/blk	EXT ANLG 2-
25	wht/blu	TEMP SENS 1
26	wht/orn	TEMP SENS 2
28	red	PS 15V FLT +
29	gray	+28 V SUPP
30	wht/grn	PRESS SENS 1
31	wht/brn	PRESS SENS 2
32	wht/gry	PRESS SENS 3
33	wht/vio	PRESS SENS 4
34	black	GROUND
35	black	PS 15V FLT -
36	red	T/P SENS -15 V

F118 MODULE TEST CABLE # 2
(Marked as L107/F117 Cable)
42-pin PLUG to SOCKET
(Plug pin wired to socket pin of same number)

PIN	COLOR	USE
1	blue	AUX IN 1+
2	black	AUX IN 1-
3	black	AUX IN 2+
4	black	AUX IN 2-
8	red	XMIT +
9	black	XMIT -
10	orange	+5 V SUPP
11	blue	-5 V SUPP
14	white	RCV +
15	black	RCV -
16	red	+15 V SUPP
17	yellow	-15 V SUPP
29	gray	+28 V SUPP
34	black	GROUND

F118 MODULE TEST CABLE # 2
(Marked as L107/F117 Cable)
7-pin Amphenol PLUG to SOCKET
(Plug pin wired to socket pin of same number)

PIN	COLOR	USE
A	black	GROUND
C	gray	+28 V SUPP
D	red	+15 V SUPP
E	orange	+5 V SUPP
F	yellow	-15 V SUPP

VLBA PROJECT AUG. 12, 1987 W. WIREMAN
DRAWING:A53510W008
330/610 MHZ ADAPTOR MODULE F118 INTERNAL WIRING HARNESS
REVISION C DATE: 9/4/87
REVISION D DATE: 3/2/88 W-62,W-63,W-64,W-65,J1-1,J1-2
SWAP NEUMONICS W-13 & W-14, W-15 & W-16, J1-19 & J1-20, J1-21 & J1-22

PIN	FUNCTION	COLOR	GA	SOURCE	PI	FUNCTION	COLOR	GA	SOURCE
1.	GND	BLK	22	W-GND	2.	5V	ORG	22	P1-10
3.	GND				4.	5V			
5.	IN1+	GRN TWT PR	26	AUX-1C	6.	IN1-	BLK TWT PR	26	AUX-1S
7.	IN2+	ORG TWT PR	26	AUX-2C	8.	IN2-	BLK TWT PR	26	AUX-2S
9.	IN3+	WHT TWT PR	26	AUX-3C	10.	IN3-	BLK TWT PR	26	AUX-3S
11.	IN4+	YEL TWT PR	26	AUX-4C	12.	IN4-	BLK TWT PR	26	AUX-4S
13.	EXT ANL1-	WHT/ORG	26	P1-19	14.	EXT ANL1+	WHT/GRN	26	P1-20
15.	EXT ANL2-	WHT/BRN	26	P1-21	16.	EXT ANL2+	WHT/GRY	26	P1-22
17.					18.				
19.	FE GND REF	BLK	26	P1-12	20.	ANAL ID	WHT/BLU	26	P1-13
21.					22.	FE 15V REF	RED	22	P1-11
23.					24.				
25.	ANLG 3+	WHT/GRY	26	J1-15	26.	ANLG 3-	WHT/BLK	26	J1-16
27.	GND	BLK	22	W-GND	28.				
29.	ADDR 0	WHT/BRN	26	J1-17	30.	ADDR 1	WHT/VIO	26	J1-18
31.	ADDR 2	WHT/YEL	26	J1-19	32.				
33.	PRES SENS 1	WHT/BRN	26	P1-30,J1-3	34.				
35.	PRES SENS 2	WHT/GRY	26	P1-31,J1-4	36.				
37.	PRES SENS 3	WHT/VIO	26	P1-32,J1-5	38.				
39.	PRES SENS 4	WHT/YEL	26	P1-33,J1-6	40.				
41.	28V	GRY	22	P1-29	42.				
43.	7V	WHT/BLK	26	J1-11	44.				
45.	7.5V	WHT/ORG	26	J1-8	46.				
47.	-7.5V	WHT/GRN	26	J1-9	48.				
49.	GND	BLK	22	W-GND	50.				
51.					52.				
53.					54.				
55.					56.				
57.					58.	FE TEMP SENS	WHT/GRN	26	P1-18,J1-7
59.					60.				
61.					62.	TEMPSENS2OUT	WHT/BLU	26	J1-2
63.	TEMPSENS1OUT	WHT/ORG	26	J1-1	64.	TEMP SENS 2	WHT/BLU	26	P1-26
65.	TEMP SENS 1	WHT/ORG	26	P1-25	66.				
67.					68.				
69.	$\overline{PA}$	WHT/YEL	26	J2-9	70.				
71.					72.				
73.	GND	BLK	22	W-GND	74.				
75.					76.				
77.					78.				
79.					80.				
81.	F0	WHT/BRN	26	J2-14	82.	F1	WHT/BLU	26	J2-15
83.	F2	WHT/ORG	26	J2-16	84.	F3	WHT/GRN	26	J2-17
85.					86.				

INTERNAL WIRING HARNESS (cont.)

87.				88.			
89.				90.			
91.				92.			
93.				94.			
95.	15V	RED	22 P1-16	96.	-15V	YEL	22 P1-17
97.	GND			98.	5V	ORG	26 J1-10
99.	GND	BLK	22 W-GND	100.	5V	ORG	22 P1-10

FRONT PANEL CONNECTORS

J1- DBM-25S

PIN	FUNCTION	COLOR	GA	SOURCE
1.	TEMPSENS1OUT	WHT/ORG	26	W-63
2.	TEMPSENS2OUT	WHT/BLU	26	W-62
3.	PRES SENS 1	WHT/BRN	26	W-33
4.	PRES SENS 2	WHT/GRY	26	W-35
5.	PRES SENS 3	WHT/VIO	26	W-37
6.	PRES SENS 4	WHT/YEL	26	W-39
7.	FE TEMP SENS	WHT/GRN	26	W-58
8.	7.5V	WHT/ORG	26	W-45
9.	-7.5V	WHT/GRN	26	W-47
10.	5V	ORG	26	W-98
11.	7V	WHT/BLK	26	W-43
12.				
13.	Q-GND	BLK	22	W-GND
14.				
15.	ANLG 3+	WHT/GRY	26	W-25
16.	ANLG 3-	WHT/BLK	26	W-26
17.	ADDR 0	WHT/BRN	26	W-29
18.	ADDR 1	WHT/VIO	26	W-30
19.	ADDR 2	WHT/YEL	26	W-31
20.				
21.				
22.				
23.				
24.				
25.				

J2- DBM-25P

PIN	FUNCTION	COLOR	GA	SOURCE
1.	GND	BLK	22	W-GND
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.	$\overline{PA}$	WHT/YEL	26	W-69
10.				
11.	CAL	WHT/BLU	24	P1-4
12.	HI-CAL	WHT/GRY	24	P1-3
13.				
14.	F0	WHT/BRN	26	W-81
15.	F1	WHT/BLU	26	W-82
16.	F2	WHT/ORG	26	W-83
17.	F3	WHT/GRN	26	W-84
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				

BNC CO-AX CONNECTORS			COLOR	GA	SOURCE
AUX 1	CENTER	IN1+	GRN TWT PR	26	W-5
	SHIELD	IN1-	BLK TWT PR	26	W-6
AUX 2	CENTER	IN2+	ORG TWT PR	26	W-7
	SHIELD	IN2-	BLK TWT PR	26	W-8
AUX 3	CENTER	IN3+	WHT TWT PR	26	W-9
	SHIELD	IN3-	BLK TWT PR	26	W-10
AUX 4	CENTER	IN4+	YEL TWT PR	26	W-11
	SHIELD	IN4-	BLK TWT PR	26	W-12

INTERNAL WIRING HARNESS (cont.)

P1 REAR PANEL CONNECTORS

J1 AMP 42 PIN

PIN	FUNCTION	COLOR	GA	SOURCE	PIN	FUNCTION	COLOR	GA	SOURCE
1.	FE 15V	RED	16	P1-28	2.	FE 15V RET	BLK	22	W-GND
3.	HI-CAL	WHT/GRY	24	J2-12	4.	CAL	WHT/BLU	24	J2-11
5.					6.				
7.					8.	PS 15V SNS	RED	22	P1-11
9.	PS GND SNS	BLK	22	P1-12	10.	5V	ORG	22	W-2,W-100
11.	FE 15V REF	RED	22	P1-8,W-22	12.	FE GND REF	BLK	22	P1-9,W-19
13.	ANLG ID	WHT/BLU	26	W-20	14.	SENSOR 15V	RED	22	P1-16
15.	SENSOR GND	BLK	22	W-GND	16.	15V	RED	22	P1-14,W-95
17.	-15V	YEL	22	P1-36,W-96	18.	FE TEMP SENS	WHT/GRN	26	W-58
19.	EXT ANL1-	WHT/ORG	26	W-13	20.	EXT ANL1+	WHT/GRN	26	W-14
21.	EXT ANL2-	WHT/BRN	26	W-15	22.	EXT ANL2+	WHT/GRY	26	W-16
23.					24.				
25.	TEMP SENS 1	WHT/ORG	26	W-65	26.	TEMP SENS 2	WHT/BLU	26	W-64
27.					28.	PS 15V FLT+	RED	22	P1-1
29.	28V	GRY	22	W-41	30.	PRES SENS 1	WHT/BRN	26	W-33
31.	PRES SENS 2	WHT/GRY	26	W-35	32.	PRES SENS 3	WHT/VIO	26	W-37
33.	PRES SENS 4	WHT/YEL	26	W-39	34.	GND	BLK	16	W-GND
35.	PS 15V FLT-	BLK	22	W-GND	36.	SENSOR -15V	YEL	22	P1-17
37.					38.				
39.					40.				
41.					42.				

Data Sheets - Selected Portions

1. TL082 Texas Instruments
2. HI507A Harris Semiconductor
3. AD581 Analog Devices
4. INA101 Burr-Brown

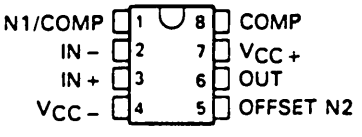
TYPES TL080 THRU TL085, TL080A THRU TL084A
TL081B, TL082B, TL084B
JFET-INPUT OPERATIONAL AMPLIFIERS

D2297, FEBRUARY 1977—REVISED SEPTEMBER 1983

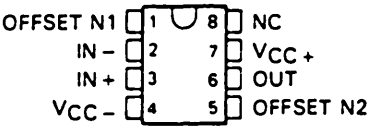
24 DEVICES COVER MILITARY, INDUSTRIAL AND COMMERCIAL TEMPERATURE RANGES

- Low-Power Consumption
- Wide Common-Mode and Differential Voltage Ranges
- Low Input Bias and Offset Currents
- Output Short-Circuit Protection
- Low Total Harmonic Distortion . . . 0.003% TYP
- High Input Impedance . . . JFET-Input Stage
- Internal Frequency Compensation (Except TL080, TL080A)
- Latch-Up-Free Operation
- High Slew Rate . . . 13 V/μs Typ

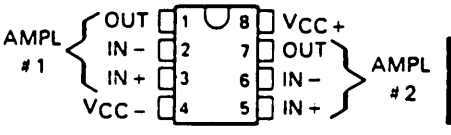
TL080, TL080A
JG OR P DUAL-IN-LINE PACKAGE
(TOP VIEW)



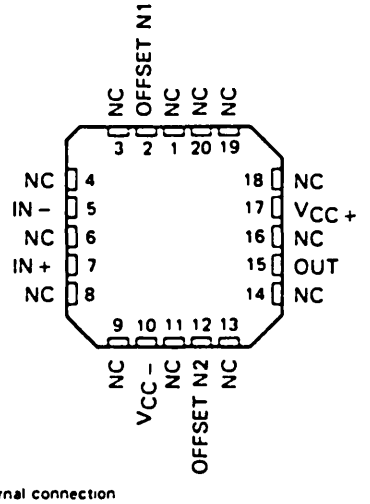
TL081, TL081A, TL081B
JG OR P DUAL-IN-LINE PACKAGE
(TOP VIEW)



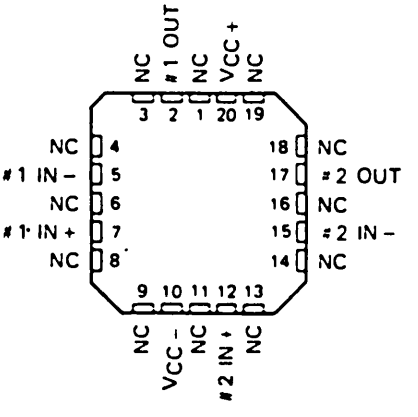
TL082, TL082A, TL082B
JG OR P DUAL-IN-LINE PACKAGE
(TOP VIEW)



TL081M . . . FH OR FK
CHIP CARRIER PACKAGE
(TOP VIEW)



TL082M . . . FH OR FK
CHIP CARRIER PACKAGE
(TOP VIEW)



NC—No internal connection

DEVICE TYPES, SUFFIX VERSIONS, AND PACKAGES

	TL080	TL081	TL082	TL083	TL084	TL085
TL08_M	JG	FH, FK, JG	FH, FK, JG	FH, FK, J	FH, FK, J, W	*
TL08_I	JG, P	JG, P	JG, P	J, N	J, N	*
TL08_C	JG, P	JG, P	JG, P	J, N	J, N	N
TL08_AC	JG, P	JG, P	JG, P	J, N	J, N	*
TL08_BC	*	JG, P	JG, P	*	J, N	*

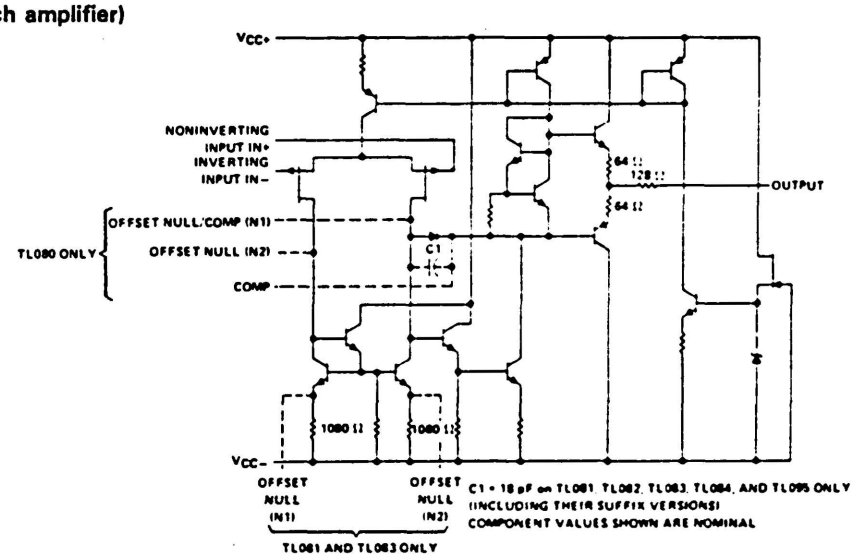
*These combinations are not defined by this data sheet.

description

The TL08_ JFET-input operational amplifier family is designed to offer a wider selection than any previously developed operational amplifier family. Each of these JFET-input operational amplifiers incorporates well-matched, high-voltage JFET and bipolar transistors in a monolithic integrated circuit. The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient. Offset adjustment and external compensation options are available within the TL08_ family.

Device types with an "M" suffix are characterized for operation over the full military temperature range of −55°C to 125°C, those with an "I" suffix are characterized for operation from −25°C to 85°C, and those with a "C" suffix are characterized for operation from 0°C to 70°C.

schematic (each amplifier)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

		TL08_M	TL08_I	TL08_C TL08_AC TL08_BC	UNIT
Supply voltage, V_{CC+} (see Note 1)		18	18	18	V
Supply voltage, V_{CC-} (see Note 1)		−18	−18	−18	V
Differential input voltage (see Note 2)		±30	±30	±30	V
Input voltage (see Notes 1 and 3)		±15	±15	±15	V
Duration of output short circuit (see Note 4)		unlimited	unlimited	unlimited	
Continuous total dissipation at (or below) 25°C free-air temperature (see Note 5)		680	680	680	mW
Operating free-air temperature range		−55 to 125	−25 to 85	0 to 70	°C
Storage temperature range		−65 to 150	−65 to 150	−65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	FH, FK, J, JG, or W package	300	300	300	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	N or P package		260	260	°C

NOTES: 1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-}.
2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
4. The output may be shorted to ground or to either supply. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.
5. For operation above 25°C free-air temperature, refer to Dissipation Derating Curves in Section 2. In the J and JG packages, TL08_M chips are alloy-mounted; TL08_I, TL08_C, TL08_AC, and TL08_BC chips are glass-mounted.

HARRIS

HI-506A/HI-507A

16 Channel CMOS Analog Multiplexer with Overvoltage Protection

FEATURES

- ANALOG/DIGITAL OVERVOLTAGE PROTECTION
- FAIL SAFE WITH POWER LOSS (NO LATCHUP)
- BREAK-BEFORE-MAKE SWITCHING
- DTL/TTL AND CMOS COMPATIBLE
- ANALOG SIGNAL RANGE ±15V
- ACCESS TIME (TYP.) 500ns
- SUPPLY CURRENT AT 1MHz ADDRESS TOGGLE (TYP.) 4mA
- STANDBY POWER (TYP.) 7.5mW

APPLICATIONS

- DATA ACQUISITION
- INDUSTRIAL CONTROLS
- TELEMETRY

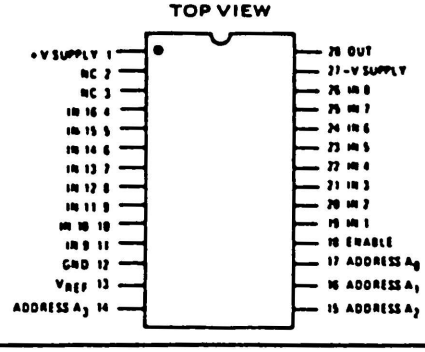
DESCRIPTION

The HI-506A and HI-507A are dielectrically isolated CMOS analog multiplexers incorporating an important feature; they withstand analog input voltages much greater than the supplies. This is essential in any system where the analog inputs originate outside the equipment. They can withstand a continuous input up to 10 volts greater than either supply, which eliminates the possibility of damage when supplies are off, but input signals are present. Equally important they can withstand brief input transient spikes of several hundred volts; which otherwise would require complex external protection networks. Necessarily, ON resistance is somewhat higher than similar unprotected devices, but very low leakage currents combine to produce low errors. Application Notes 520 and 521 further explain these features.

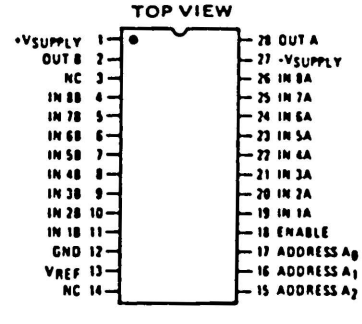
The HI-506A/507A is offered in both commercial and military grades. For additional Hi-Rel screening including 160 hour burn-in specify the "-8" suffix. For further information see Application Notes 520 and 521.

PINOUT

HI-506A

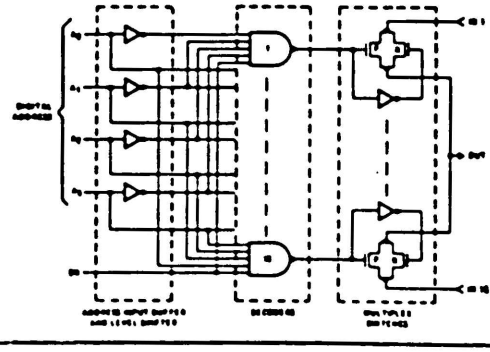


HI-507A

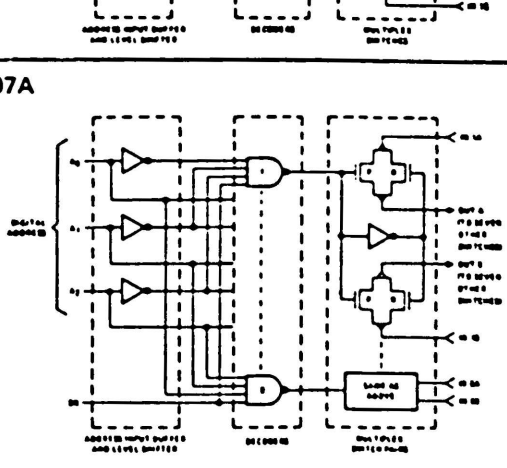


FUNCTIONAL DIAGRAM

HI-506A



HI-507A



SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Between Pins 1 and 27	44V	Total Power Dissipation*	1200mW
V_{REF} to Ground V+ to Ground	22V	Operating Temperature	
V_{EN}, V_A, Digital Input Overvoltage:		HI-506A/507A-2	-55°C to +125°C
V_A | V_{Supply} (+)	+4V	HI-506A/507A-5	0°C to +75°C
V_A | V_{Supply} (–)	-4V	Storage Temperature	-65°C to +150°C
Analog Overvoltage:			
V_S | V_{Supply} (+)	+20V		
V_S | V_{Supply} (–)	-20V	* Derate 19.7mW/°C above T_A = 110°C.	

ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

Supplies = +15V, -15V; V_{REF} (Pin 13) = Open; V_{AH} (Logic Level High) = +4.0V; V_{AL} (Logic Level Low) = +0.8V
For Test Conditions, consult Performance Characteristics section.

PARAMETER		TEMP.	HI-506A/507A-2 -55°C to +125°C MIN.	TYP.	MAX.	HI-506A/507A-5 0°C to +75°C MIN.	TYP.	MAX.	UNITS
ANALOG CHANNEL CHARACTERISTICS									
*V_S, Analog Signal Range		Full	-15		+15	-15		+15	V
*R_{ON}, On Resistance (Note 1)		+25°C		1.2	1.5		1.5	1.8	KΩ
		Full		1.5	2.0		1.8	2.0	KΩ
*I_S (OFF), Off Input Leakage Current		+25°C		0.03			0.03		nA
		Full			±50			±50	nA
*I_D (OFF), Off Output Leakage Current		+25°C		1.0			1.0		nA
	HI-506A	Full			±300			±300	nA
	HI-507A	Full			±200			±200	nA
*I_D (OFF) with Input Overvoltage Applied (Note 2)		+25°C		4.0			4.0		nA
		Full			2.0				μA
*I_D (ON), On Channel Leakage Current		+25°C		0.1			0.1		nA
	HI-506A	Full			±300			±300	nA
	HI-507A	Full			±200			±200	nA
I_{DIFF}, Differential Off Output Leakage Current (HI-509 Only)		Full			±50			±50	nA
DIGITAL INPUT CHARACTERISTICS									
V_{AL}, Input Low Threshold | TTL Drive		Full			0.8			0.8	V
V_{AH}, Input High Threshold | (Note 7)		Full	4.0			4.0			V
V_{AL} | MOS Drive (Note 3)		+25°C			0.8			0.8	V
V_{AH} |		+25°C	6.0			6.0			V
*I_A, Input Leakage Current (High or Low)		Full			1.0			1.0	μA
SWITCHING CHARACTERISTICS									
t_A, Access Time		+25°C		0.5			0.5		μs
		Full			1.0			1.0	μs
t_{OPEN}, Break-Before Make Delay		+25°C	25	80		25	80		ns
t_{ON} (EN), Enable Delay (ON)		+25°C		300	500		300		ns
		Full			1000			1000	ns
t_{OFF} (EN), Enable Delay (OFF)		+25°C		300	500		300		ns
		Full			1000			1000	ns
Settling Time (0.1%)		+25°C		1.3			1.3		μs
(0.025%)		+25°C		4.4			4.4		μs
"Off Isolation" (Note 4)		+25°C	50	68		50	68		dB
C_S (OFF), Channel Input Capacitance		+25°C		5			5		pF
C_D (OFF), Channel Output Capacitance	HI-506A	+25°C		50			50		pF
	HI-507A	+25°C		25			25		pF
C_A, Digital Input Capacitance		+25°C		5			5		pF
C_{OS} (OFF), Input to Output Capacitance		+25°C		0.1			0.1		pF
POWER REQUIREMENTS									
P_D, Power Dissipation		Full		7.5			7.5		mW
*I_+, Current Pin 1 (Note 5)		Full		0.5	2.0		0.5	2.0	mA
*I_-, Current Pin 27 (Note 5)		Full		0.02	1.0		0.02	1.0	mA
*I_+, Standby (Note 6)		Full		0.5	2.0		0.5	2.0	mA
*I_-, Standby (Note 6)		Full		0.02	1.0		0.02	1.0	mA

NOTES:
1. V_{OUT} = ±10V, I_{OUT} = -100 μA.
2. Analog Overvoltage = ±33V.
3. V_{REF} = +10V.
4. V_{EN} = 0.8V, R_L = 1K, C_L = 15pF, V_S = 2VRMS, f = 500KHz.
5. V_{EN} = +4.0V
6. V_{EN} = 0.8V
7. To drive from DTL/TTL circuits, 1KΩ pull-up resistors to +5.0V supply are recommended.

*100% tested for Dash 8 at +25°C and +125°C only.

TRUTH TABLES

HI-506A

A_3	A_2	A_1	A_0	EN	"ON" CHANNEL
X	X	X	X	L	NONE
L	L	L	L	H	1
L	L	L	H	H	2
L	L	H	L	H	3
L	L	H	H	H	4
L	H	L	L	H	5
L	H	L	H	H	6
L	H	H	L	H	7
L	H	H	H	H	8
H	L	L	L	H	9
H	L	L	H	H	10
H	L	H	L	H	11
H	L	H	H	H	12
H	H	L	L	H	13
H	H	L	H	H	14
H	H	H	L	H	15
H	H	H	H	H	16

HI-507A

A_2	A_1	A_0	EN	ON SWITCH PAIR
X	X	X	L	NONE
L	L	L	H	1
L	L	H	H	2
L	H	L	H	3
L	H	H	H	4
H	L	L	H	5
H	L	H	H	6
H	H	L	H	7
H	H	H	H	8

ANALOG DEVICES

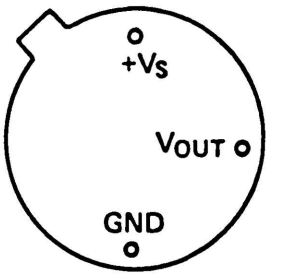
High Precision 10V IC Reference

AD581*

FEATURES

- Laser-Trimmed to High Accuracy:
  - 10.000 Volts ±5mV (L and U)
- Trimmed Temperature Coefficient:
  - 5ppm/°C max, 0 to +70°C (L)
  - 10ppm/°C max, -55°C to +125°C (U)
- Excellent Long-Term Stability:
  - 25ppm/1000 hrs. (Noncumulative)
- Negative 10 Volt Reference Capability
- Low Quiescent Current: 1.0mA max
- 10mA Current Output Capability
- 3-Terminal TO-5 Package

AD581 FUNCTIONAL BLOCK DIAGRAM



TO-5
BOTTOM VIEW

PRODUCT DESCRIPTION

The AD581 is a three-terminal, temperature compensated, monolithic band-gap voltage reference which provides a precise 10.00 volt output from an unregulated input level from 12 to 30 volts. Laser Wafer Trimming (LWT) is used to trim both the initial error at +25°C as well as the temperature coefficient, which results in high precision performance previously available only in expensive hybrids or oven-regulated modules. The 5mV initial error tolerance and 5ppm/°C guaranteed temperature coefficient of the AD581L represent the best performance combination available in a monolithic voltage reference.

The band-gap circuit design used in the AD581 offers several advantages over classical Zener breakdown diode techniques. Most important, no external components are required to achieve full accuracy and stability of significance to low power systems. In addition, total supply current to the device, including the output buffer amplifier (which can supply up to 10mA) is typically 750μA. The long-term stability of the band-gap design is equivalent or superior to selected Zener reference diodes.

The AD581 is recommended for use as a reference for 8-, 10- or 12-bit D/A converters which require an external precision reference. The device is also ideal for all types of A/D converters up to 14 bit accuracy, either successive approximation or integrating designs, and in general can offer better performance than that provided by standard self-contained references.

The AD581J, K, and L are specified for operation from 0 to +70°C; the AD581S, T, and U are specified for the -55°C to +125°C range. All grades are packaged in a hermetically-sealed three-terminal TO-5 metal can.

*Covered by Patent Nos. 3,887,863; RE 30,586

PRODUCT HIGHLIGHTS

1. Laser trimming of both initial accuracy and temperature coefficient results in very low errors over temperature without the use of external components. The AD581L has a maximum deviation from 10.000 volts of ±7.25mV from 0 to +70°C, while the AD581U guarantees ±15mV maximum total error without external trims from -55°C to +125°C.
2. Since the laser trimming is done on the wafer prior to separation into individual chips, the AD581 will be extremely valuable to hybrid designers for its ease of use, lack of required external trims, and inherent high performance.
3. The AD581 can also be operated in a two-terminal "Zener" mode to provide a precision negative 10 volt reference with just one external resistor to the unregulated supply. The performance in this mode is nearly equal to that of the standard three-terminal configuration.
4. Advanced circuit design using the band-gap concept allows the AD581 to give full performance with an unregulated input voltage down to 13 volts. With an external resistor, the device will operate with a supply as low as 11.4 volts.

APPLYING THE AD581

The AD581 is easy to use in virtually all precision reference applications. The three terminals are simply primary supply, ground, and output, with the case grounded. No external components are required even for high precision applications; the degree of desired absolute accuracy is achieved simply by selecting the required device grade. The AD581 requires less than 1mA quiescent current from an operating supply range of 12 to 30 volts.

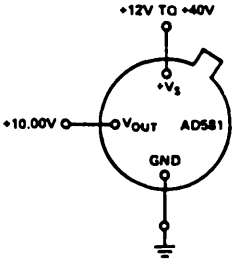
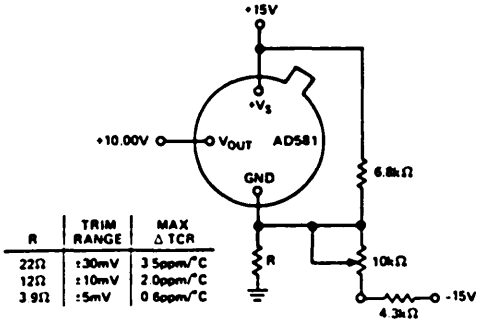


Figure 1. AD581 Pin Configuration (Top View)

An external fine trim may be desired to set the output level to exactly 10.000 volts within less than a millivolt (calibrated to a main system reference). System calibration may also require a reference slightly different from 10.00 volts. In either case, the optional trim circuit shown in Figure 2 can offset the output by up to ±30 millivolts (with the 22Ω resistor), if needed, with minimal effect on other device characteristics.



R	TRIM RANGE	MAX Δ TCR
22Ω	±30mV	3.5ppm/°C
12Ω	±10mV	2.0ppm/°C
3.9Ω	±5mV	0.6ppm/°C

Figure 2. Optional Fine Trim Configuration

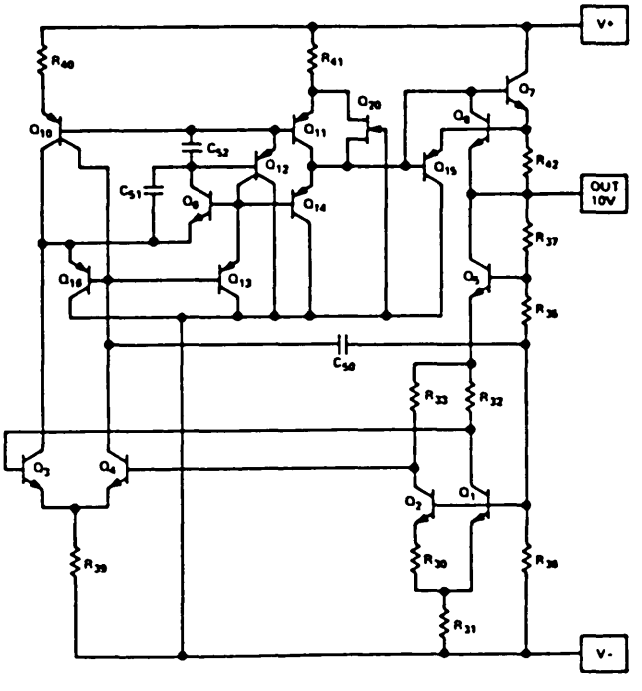


Figure 3. Simplified Schematic

BURR-BROWN®

INA101

Very-High Accuracy INSTRUMENTATION AMPLIFIER

FEATURES

- ULTRA-LOW VOLTAGE DRIFT - 0.25μV/°C
- LOW OFFSET VOLTAGE - 25μV
- LOW NONLINEARITY - 0.002%
- LOW NOISE - 13nV/$\sqrt{Hz}$ at f_0 = 1kHz
- HIGH CMR - 106dB at 60Hz
- HIGH INPUT IMPEDANCE - $10^{10}\Omega$
- LOW COST, TO-100, CERAMIC DIP AND PLASTIC PACKAGE

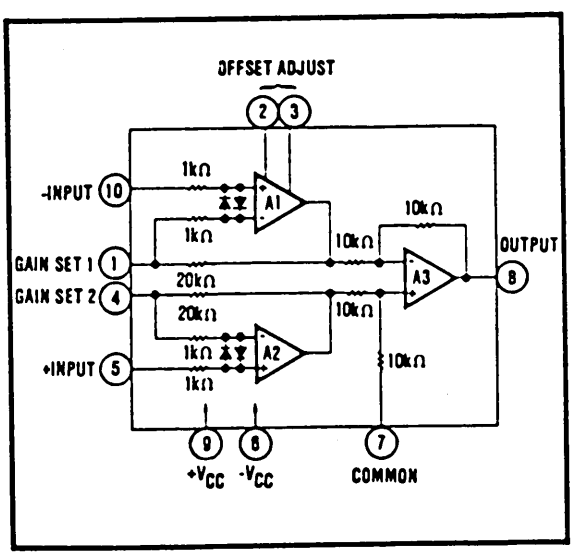
APPLICATIONS

- AMPLIFICATION OF SIGNALS FROM SOURCES SUCH AS:
  - Strain Gages
  - Thermocouples
  - RTDs
- REMOTE TRANSDUCERS
- LOW LEVEL SIGNALS
- MEDICAL INSTRUMENTATION

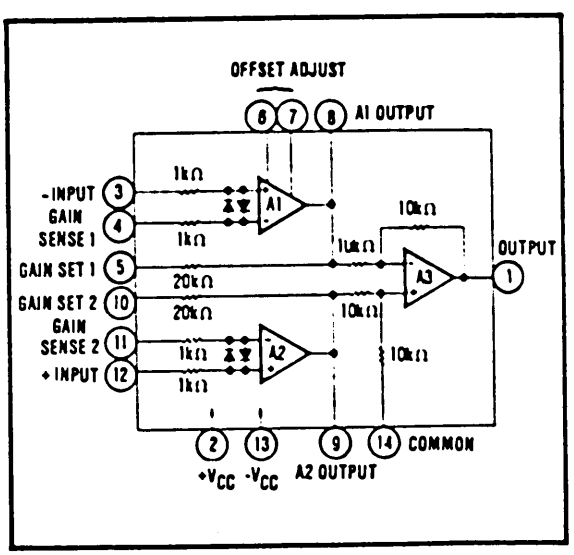
DESCRIPTION

The INA101 is a high accuracy, multistage, integrated-circuit instrumentation amplifier designed for signal conditioning requirements where very-high performance is desired. All circuits, including the interconnected laser-trimmed thin-film resistors, are integrated on a single monolithic substrate.

A multiamplifier design is used to provide the highest performance and maximum versatility with monolithic construction for low cost. The input stage uses Burr-Brown's ultra-low drift, low noise technology to provide exceptional input characteristics.



M Package



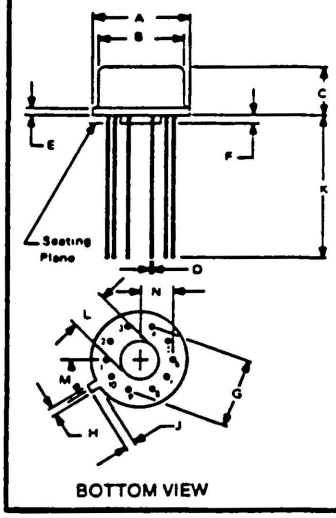
G and P Packages

International Airport Industrial Park - P.O. Box 11400 - Tucson, Arizona 85734 - Tel. (602) 746-1111 - Twx: 910-952-1111 - Cable: BBRCORP - Telex: 66-6491

MECHANICAL

M Package

TO-100



BOTTOM VIEW

Case = $-V_{CC}$

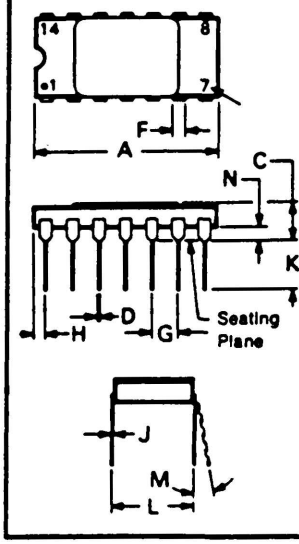
Leads in true position within 0.010" (0.25mm) R at MMC at seating plane.

Pin numbers shown for reference only. Numbers may not be marked on package.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.335	.370	8.51	9.40
B	.305	.335	7.75	8.51
C	.165	.185	4.19	4.70
D	.016	.021	0.41	0.53
E	.010	.040	0.25	1.02
F	.010	.040	0.25	1.02
G	.230 BASIC		5.84 BASIC	
H	.028	.034	0.71	0.86
J	.029	.045	0.74	1.14
K	.500	--	12.70	--
L	.120	.160	3.05	4.06
M	36° BASIC		36° BASIC	
N	.110	.120	2.79	3.05

G Package

Hermetic DIP



Leads in true position within 0.01" (0.25mm) R at MMC at seating plane.

Pin numbers shown for reference only. Numbers may not be marked on package.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.670	.710	17.02	18.0
C	.065	.170	1.65	4.3
D	.015	.021	0.38	0.53
F	.045	.060	1.14	1.52
G	.100 BASIC		2.54 BASIC	
H	.025	.070	0.64	1.7
J	.008	.012	0.20	0.3
K	.120	.240	3.05	6.10
L	.300 BASIC		7.62 BASIC	
M	--	10°	--	10°
N	.009	.060	0.23	1.5

ORDERING INFORMATION

INA101 C G

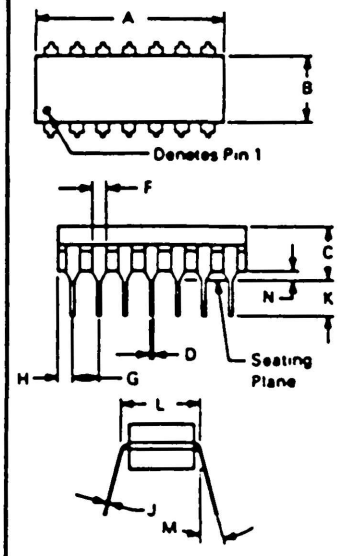
Basic Model Number

Performance Grade Code
- S: −55°C to +125°C
- A, C: −25°C to +85°C
- H: 0°C to +70°C

Package Code
- M: TO-100
- G: 14-Pin Hermetic DIP
- P: 14-Pin Plastic DIP

TO-100 (M Suffix)	Hermetic DIP (G Suffix)	Plastic DIP (P Suffix)
INA101AM	INA101AG	INA101HP
INA101CM	INA101CG	
INA101SM	INA101SG	

P Package



Case = $-V_{CC}$

Leads in true position within 0.10" (0.25mm) R at MMC at seating plane.

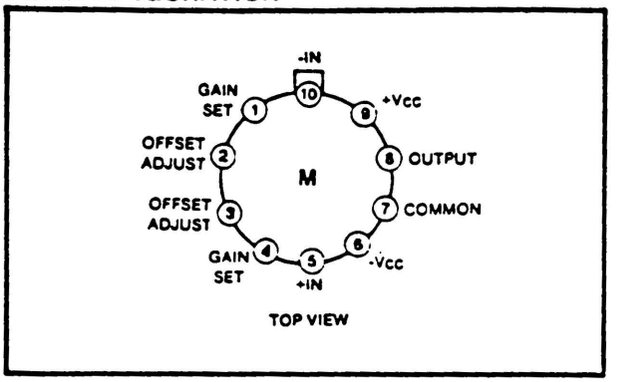
Pin numbers shown for reference only. Numbers may not be marked on package.

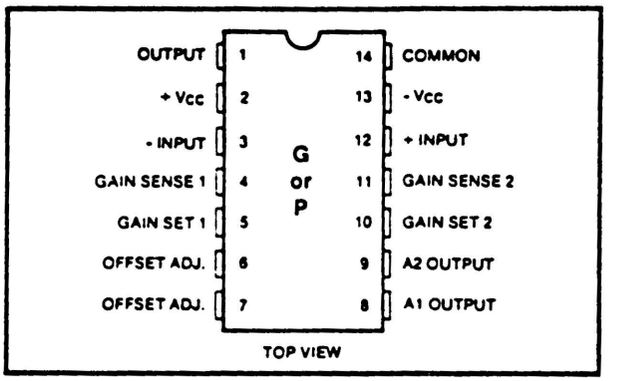
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.660	.785	16.76	19.9
B	.220	.280	5.59	7.1
C	-	.200	-	5.0
D	.015	.023	0.38	0.58
F	.030	.070	0.76	1.78
G	.100 BASIC		2.54 BASIC	
H	.020	.095		
J	.008	.015	0.20	0.3
K	.100	-	2.54	-
L	.300 BASIC		7.62 BASIC	
M	-	15°	-	15°
N	.020	.050	0.51	1.2

ABSOLUTE MAXIMUM RATINGS

Supply	±20V
Internal Power Dissipation	600mW
Input Voltage Range	$\pm V_{CC}$
Operating Temperature Range	−55°C to +125°C
Storage Temperature Range:	
M, G	−65°C to +150°C
P	−40°C to +85°C
Lead Temperature (soldering 10 seconds)	+300°C
Output Short-Circuit Duration	Continuous to ground

PIN CONFIGURATION

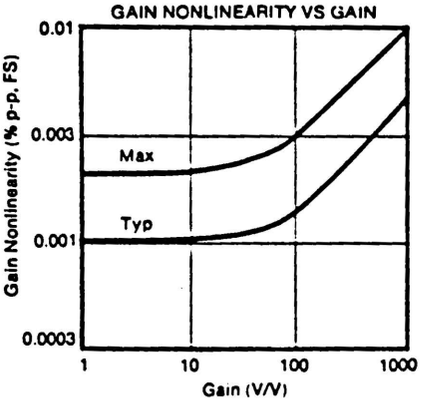




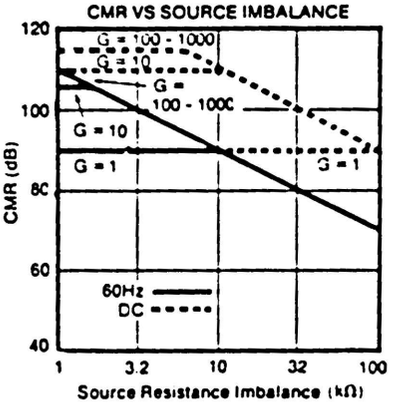
TYPICAL PERFORMANCE CURVES

At +25°C and in circuit of Figure 2 unless otherwise noted.

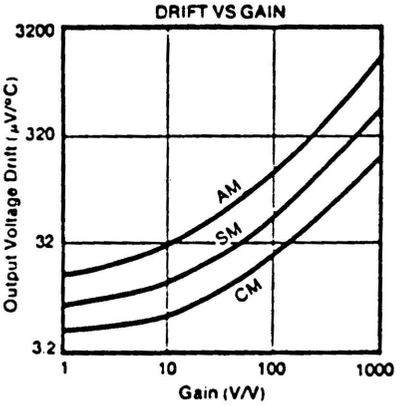
GAIN NONLINEARITY VS GAIN



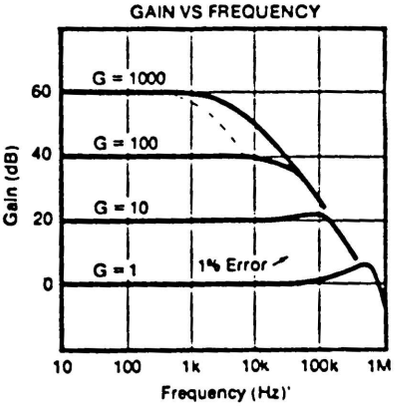
CMR VS SOURCE IMBALANCE



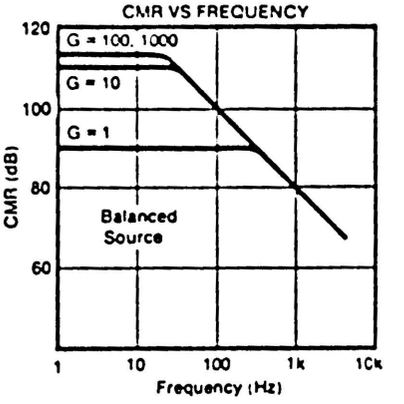
TOTAL OFFSET VOLTAGE DRIFT VS GAIN



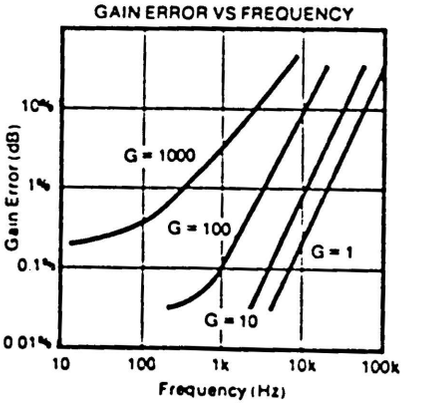
GAIN VS FREQUENCY



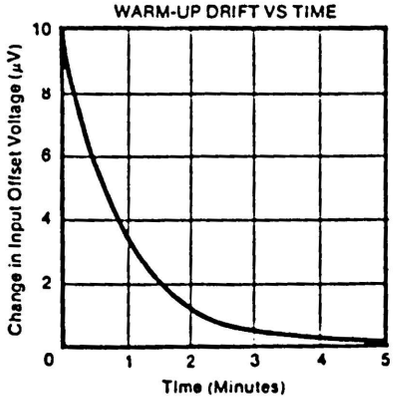
CMR VS FREQUENCY



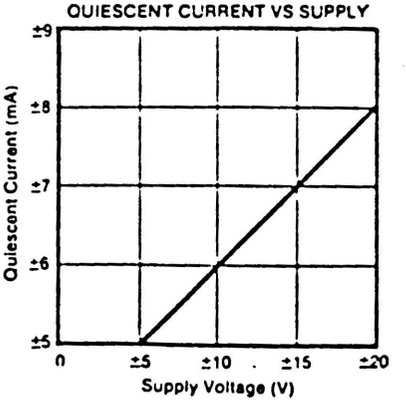
GAIN ERROR VS FREQUENCY



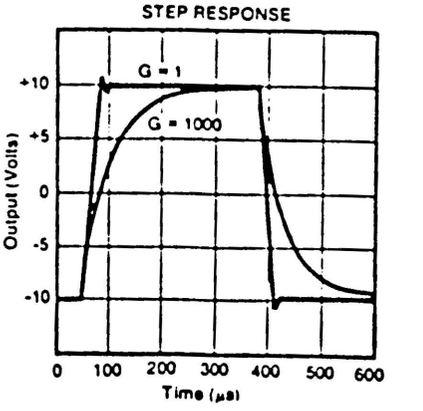
WARM-UP DRIFT VS TIME

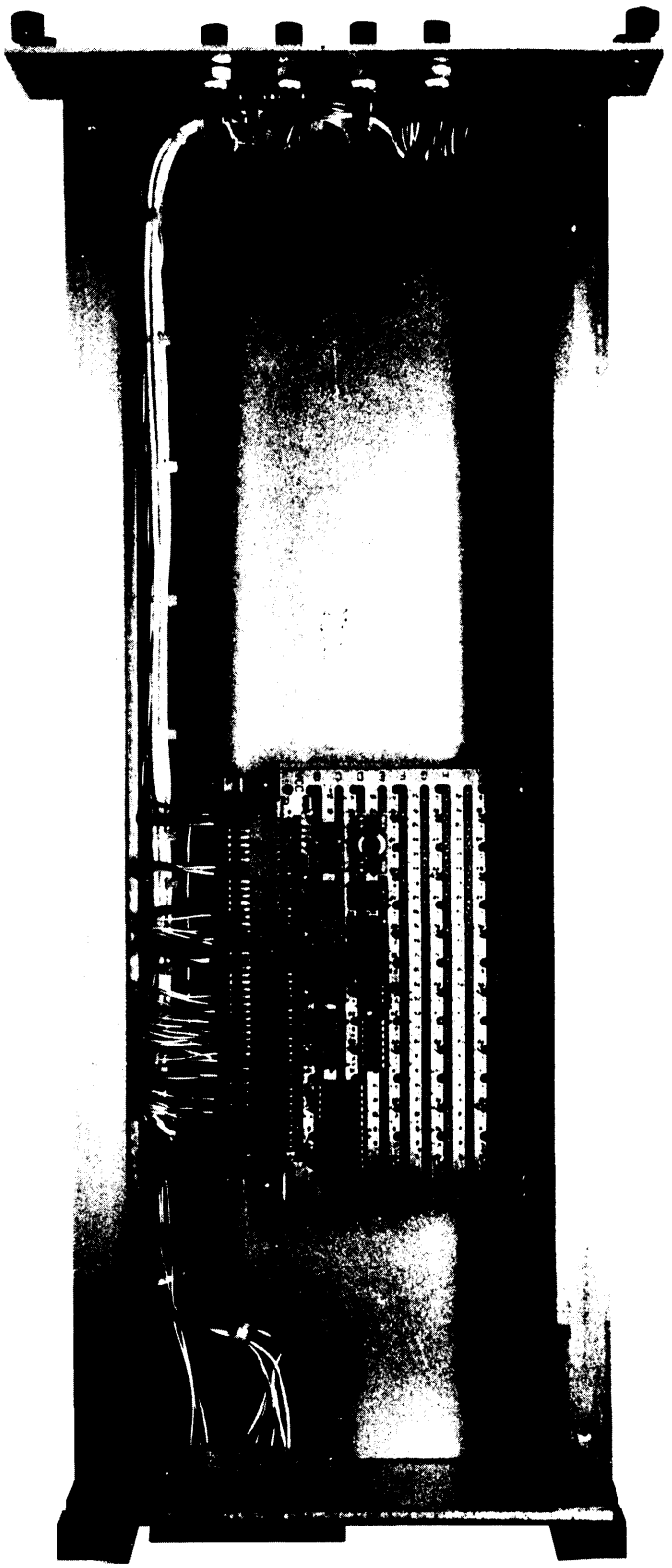


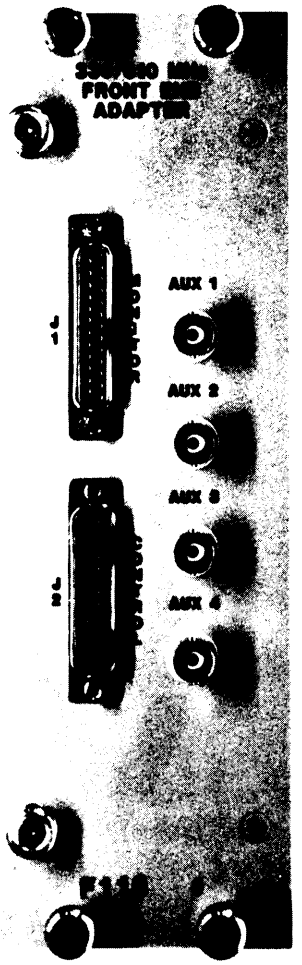
QUIESCENT CURRENT VS SUPPLY

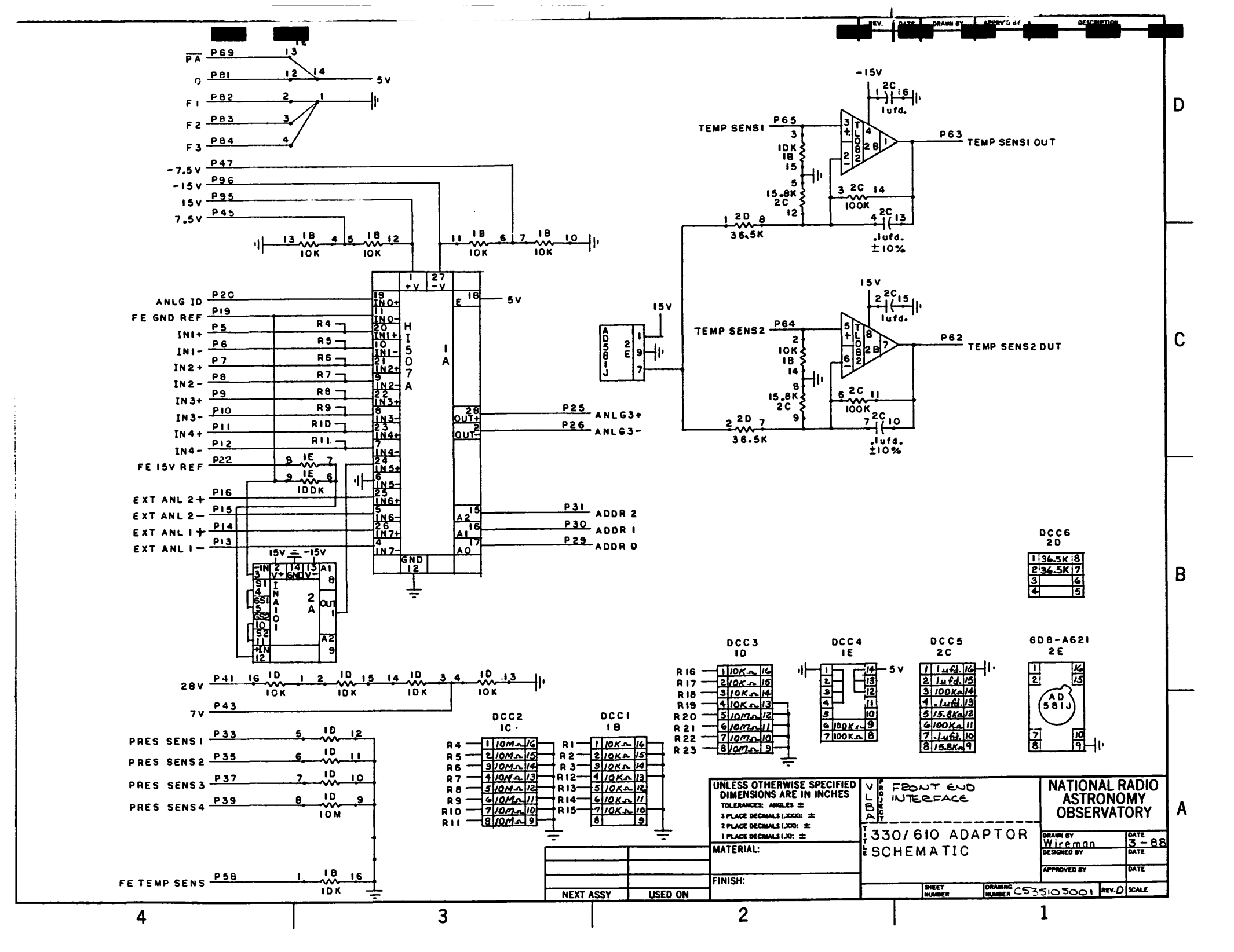


STEP RESPONSE






FRONT
ADAPTER
AUX 1
AUX 2
AUX 3
AUX 4


REV. DATE DRAWN BY APPR'D BY DESCRIPTION
PA P69 13 1E
0 P81 12 14 5V
F1 P82 2 1
F2 P83 3
F3 P84 4
-7.5V P47
-15V P96
15V P95
7.5V P45
13 1B 4 10K 5 1B 12 10K
11 1B 6 10K 7 1B 10 10K
ANLG ID P20
FE GND REF P19
INI+ P5 R4
INI- P6 R5
IN2+ P7 R6
IN2- P8 R7
IN3+ P9 R8
IN3- P10 R9
IN4+ P11 R10
IN4- P12 R11
FE 15V REF P22 8 1E 7 9 1E 6 1DDK
EXT ANL 2+ P16
EXT ANL 2- P15
EXT ANL 1+ P14
EXT ANL 1- P13
HI507A 1A
19 IN0+ 11 IN0- 20 INI+ 10 INI- 21 IN2+ 9 IN2- 22 IN3+ 8 IN3- 23 IN4+ 7 IN4- 24 IN5+ 6 IN5- 25 IN6+ 5 IN6- 26 IN7+ 4 IN7-
1 +V 27 -V 18 E 5V
28 OUT+ P25 ANLG3+
2 OUT- P26 ANLG3-
15 A2 P31 ADDR 2
16 A1 P30 ADDR 1
17 A0 P29 ADDR 0
GND 12
15V -15V
INA101 2A
28V P41 16 1D 1 10K 2 1D 15 1DK 14 1D 3 1DK 4 1D 13 10K
7V P43
PRES SENS1 P33 5 1D 12
PRES SENS2 P35 6 1D 11
PRES SENS3 P37 7 1D 10
PRES SENS4 P39 8 1D 9 10M
FE TEMP SENS P58 1 1B 16 1DK
15V
ADS81J 2E 1 9 7
-15V
TEMP SENS1 P65 3 10K 1B 15 5 15.8K 2C 12
TLO82 3 + 2 - 4 8 1 2B
P63 TEMP SENS1 OUT
3 2C 14 100K
1 2D 8 36.5K
1 2C 16 1ufd.
4 2C 13 .1ufd. ±10%
15V
TEMP SENS2 P64 2 10K 1B 14 8 15.8K 2C 9
TLO82 5 + 6 - 8 7 2B
P62 TEMP SENS2 OUT
6 2C 11 100K
2 2D 7 36.5K
2 2C 15 1ufd.
7 2C 10 .1ufd. ±10%
DCC6 2D
1 36.5K 8
2 36.5K 7
3 6
4 5
DCC3 1D
R16 1 10K 16
R17 2 10K 15
R18 3 10K 14
R19 4 10K 13
R20 5 10MΩ 12
R21 6 10MΩ 11
R22 7 10MΩ 10
R23 8 10MΩ 9
DCC4 1E
1 14 5V
2 13
3 12
4 11
5 10
6 100KΩ 9
7 100KΩ 8
DCC5 2C
1 1ufd. 16
2 1ufd. 15
3 100KΩ 14
4 .1ufd. 13
5 15.8KΩ 12
6 100KΩ 11
7 .1ufd. 10
8 15.8KΩ 9
6D8-A621 2E
1 K
2 15
AD 581J
7 10
8 9
DCC2 1C
R4 1 10MΩ 16
R5 2 10MΩ 15
R6 3 10MΩ 14
R7 4 10MΩ 13
R8 5 10MΩ 12
R9 6 10MΩ 11
R10 7 10MΩ 10
R11 8 10MΩ 9
DCC1 1B
R1 1 10KΩ 16
R2 2 10KΩ 15
R3 3 10KΩ 14
R12 4 10KΩ 13
R13 5 10KΩ 12
R14 6 10KΩ 11
R15 7 10KΩ 10
8 9
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±
3 PLACE DECIMALS (.XXX): ±
2 PLACE DECIMALS (.XX): ±
1 PLACE DECIMALS (.X): ±
MATERIAL:
FINISH:
NEXT ASSY USED ON
VLBA PROJECT FRONT END INTERFACE
TITLE 330/610 ADAPTOR SCHEMATIC
NATIONAL RADIO ASTRONOMY OBSERVATORY
DRAWN BY Wireman DATE 3-88
DESIGNED BY DATE
APPROVED BY DATE
SHEET NUMBER DRAWING NUMBER C535105001 REV. D SCALE
4 3 2 1
D C B A