

## 8000H SERIES

### Instrumentation Amplifiers



#### FEATURES

- 1, 10 and 20 Watt Models
- 18 Models from 1—40 GHz
- High Efficiency Switching Regulator and Converter
- Lightweight-Compact
- Low Spurious Modulation
- Protective Features
- LED Fault Indicators
- Ease of Maintenance, Low MTTR
- Wide Range of Options
- Full One Year Warranty — No Hour Limit

#### DESCRIPTION

The Hughes 8000H Series of traveling-wave tube amplifiers offers even higher reliability than the previous series of TWTAs. This is achieved through an improved power supply design which reduces thermal dissipation.

Each amplifier consists of a PPM-focused metal-

ceramic traveling-wave tube, a fully filtered, regulated solid state power supply and a complete air cooling system assembled within a compact instrument case.

The 8000H series incorporates a new modular design for ease of maintenance.



## OPERATIONAL FEATURES

### Controls (front panel)

- Prime Power On/Off
- RF Operate/Standby
- Fault Reset

### Operational Status Indicators (front panel)

- Prime Power On/Standby
- RF Operate
- Remote/Local (optional)

### Metering (front panel)

- Helix Current
- RF Power Output (optional)

### LED Fault Indicators (front panel)

- Helix Current Overload
- High TWT or Power Supply Temperature
- Low Line Voltage
- Safety Interlock Open

### Protection

- Prime Power Fuse (rear panel)
- TWT Warm-up Delay

- Automatic Sequencing of High Voltage and Beam Current
- Helix Current Overload
- High TWT or Power Supply Temperature
- Low Line Voltage Shut Down
- Safety Interlocks

### Automatic Recycle

In the event of a momentary fault condition, such as a line voltage surge or helix overload, the unit reverts to "ready". This feature automatically recycles the TWTA from "ready" to "RF on" after a proportionate time delay. Recycling is normally set to allow 2 cycles but can be set for 1 to 9 times. If the fault condition continues after the predetermined number of reset cycles, the unit will revert to the standby mode. The fault condition must then be cleared and the amplifier manually reset. This option, when used in conjunction with options D and F, is valuable in remote unattended sites, such as antenna ranges, satellite earth stations, and communication links.

## OPTIONS LIST

### Option A 220/240 V Input Voltage

This option provides for 198 to 264 VAC, 47 to 63 Hz operation.

### Option D Unattended Protection

This option is for use in unattended applications such as ranges, component aging, ground terminals, communication links, etc. This feature protects the amplifier from possible damage due to extended operation in the standby mode by reverting the unit to "off" after the predetermined number of auto recycles have been completed. In order to restore the unit to "RF on," the prime power switch must be manually reset, either locally or remotely, if used in conjunction with options F or H. The unit will then time-in with normal (heater warm-up) time delay.

### Option E Rackmounting

This option allows the unit to be mounted in a standard EIA 19-inch cabinet.

### Option F Local/Remote

This option provides remote control of the amplifier's on/off prime power switch and the RF (operate) on/off switch. The status of the amplifier's faults and an analog voltage, proportional to the amplifier's helix current, is also made available. The distance can be up to 150 meters and is limited by the impedance of the cable used to connect the remote panel to the unit.

### Option G 380 to 420 Hz

This option provides the capability of operating from a primary AC power source at an input frequency from 380 to 420 Hz.

### Option H Logic Circuit (TTL)

This option consists of computer-compatible transistor-transistor logic (TTL) command and control circuitry which provides turn-on, turn-off, and reset functions, as well as full status indication. The prime power for these control circuits is normally supplied internally but may be supplied from an external source (contact factory). This option replaces the relays used in option F with logic (5 V) circuits and also provides TTL-compatible drivers for the status and fault lines.

### Option I 28 V Input Voltage

This option allows the unit to operate from either a negative or a positive 28 ( $\pm 3$ ) volt dc bus for various airborne and communications applications or special lab requirements. (Polarity must be specified at time of order). This option is not available for all units.

### Option J Isolators/Circulators

This option protects the traveling-wave tube from varying VSWR conditions. All isolators are mounted within the amplifier. Due to the insertion loss of the isolator, the output power will be slightly lower (0.5 dB typical) than the level normally available from these units.

### Option K High Gain

This option adds a solid state amplifier at the input to the traveling-wave tube in order to provide higher gain when minimal drive power is available.

### Option M 48 V Input Voltage

This option allows the amplifier to be operated from either a negative or a positive 48 (-4, +8) Vdc bus. This option is designed for telecommunication applications. (Polarity must be specified at time of order.)

### Option N Input Attenuator

This option allows the amplifier gain to be reduced by 20 dB for those applications which can provide excessive drive power to the input of the TWTA or for those applications requiring RF gain adjustment.

Other options may be available upon request.

## RF INTERFACE

Model Number	Input Location	Input Type	Output Location	Output Type
8001H11	C	WR42, UG596	A	WR42, UG596
8001H12	C	WR28, UG600	A	WR28, UG600
8010H01	D	N	B	N
8010H02	D	N	B	N
8010H03	D	N	B	N
8010H04	D	SMA	B	SMA
8010H06	D	N	B	N
8010H07	D	N	B	N
8010H09	D	N	B	N
8010H13	D	N	B	N
8010H14	D	N	B	N
8010H15	D	SMA	B	SMA
8010H16	D	N	B	N
8020H01	D	N	B	N
8020H02	D	N	B	N
8020H03	D	N	B	N
8020H04	D	SMA	B	WR62, UG419
8020H09	D	N	B	N
8020H10	D	N	B	N
8020H15	D	SMA	B	SMA

<b>J1 REMOTE CONTROL INTERFACE (OPTION F) CANNON DBMA-25S OR EQUIVALENT</b>		
<b>Pin Number</b>	<b>Nomenclature</b>	<b>Characteristics</b>
<b>Commands</b>		
1 2 13	Power On Operate Command Enable +15 VDC	Form "A" contact to ground 150 mA maximum Form "A" contact to ground 65 mA maximum +15 VDC $\pm 0.5$ @ 215 mA maximum user supplied
<b>Status</b>		
3 5 22	Power On Operate Remote Indicator	Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff Form "A" contact to ground 100 mA maximum
<b>Faults</b>		
4 6 7 8 9 14 15	Summary Fault Line Under Voltage Interlock Thermal Helix Current Summary Fault (VPC/RCU subsystem use) Low RF (RCU option)	Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff Low=Fault (<1 V), $Z_{out} = 1 K\Omega$ , High=Norm (APX 14 V) High=Fault (APX 14 V), Low=Norm (<1 V), $Z_{out}=1 K\Omega$
<b>Analog</b>		
10 11 17	Helix Current RF Power (RCU option) Ground	0 to 5 V full scale, $Z_{out}=1 K\Omega$ 0 to 5 V full scale, $Z_{out}=1 K\Omega$ Chassis

<b>J1 TTL REMOTE CONTROL INTERFACE (OPTION H) CANNON DBMA-25S OR EQUIVALENT</b>		
<b>Pin Number</b>	<b>Nomenclature</b>	<b>Characteristics</b>
<b>Commands</b>		
1 2 25	Power On Operate Reset	1 TTL load, 0.1 $\mu F$ input, Low=True 1 TTL load, 0.1 $\mu F$ input, Low=True 1 TTL load, Low=True
<b>Status</b>		
3 5 14 16 17 19 20 23 24	Power On Operate Fault Power On Ground Ready Ready Operate Fault	Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff Open collector darlington output (emitter grounded) +50 V maximum standoff TTL output, Fanout=2 Chassis TTL output, Fanout=2 Open collector darlington output (emitter grounded) +50 V maximum standoff TTL output, Fanout=2 TTL output, Fanout=2

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**HUGHES**  
AIRCRAFT COMPANY

**ELECTRON DYNAMICS DIVISION**  
Industrial Electronics Group

