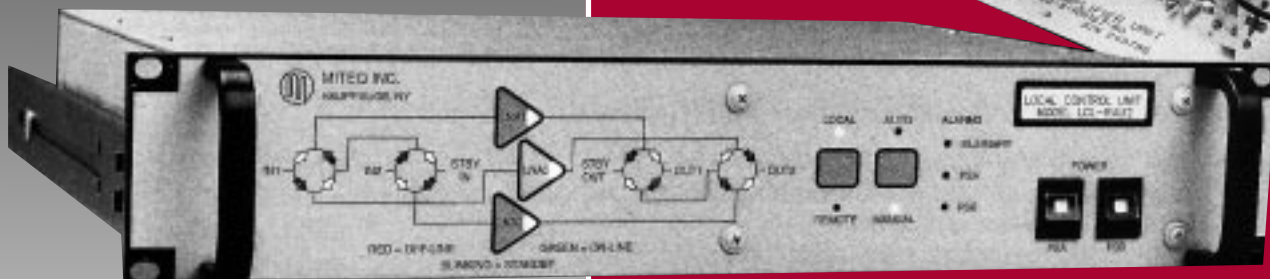
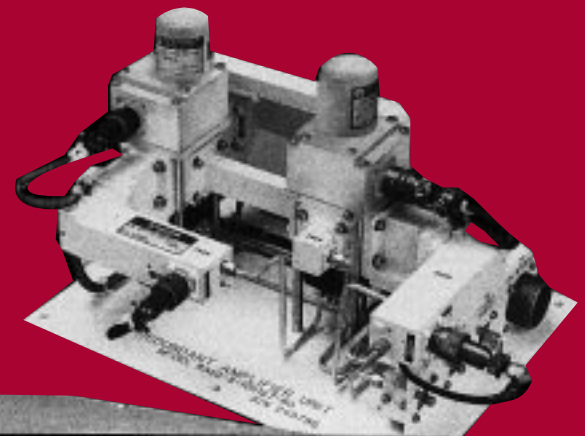




## FEATURES

- Low amplifier noise temperature
- Fully redundant power supplies
- Remote control via RS485
- Automatic/manual control from both local and remote mode
- Remote status
- Off-line input/output access
- Amplifier current fault detection
- Weather resistant amplifier/switch plate assembly

# 1:1 AND 1:2 REDUNDANT LOW-NOISE AMPLIFIER SYSTEMS



## OPTIONS

- Remote RS422, RS232, IEEE-488 or contact closure
- Connector types: SMA female, N female, or waveguide
- Amplifier/switch assembly enclosures, weather resistant
- Input transmit reject filter
- Internal noise source
- Input/output signal monitors
- Remote control unit

MITEQ 1:1 and 1:2 redundant low-noise amplifier systems are designed to ensure continuous operation without disruption of signal transmission.

A fault condition in the on-line LNA, or an operator generated command, will switch the standby LNA to the on-line position and remove the on-line LNA from the signal path.

The redundant low-noise amplifier consists of an amplifier/switch assembly and a local control unit. The amplifier/switch assembly can be mounted to an antenna feed up to 200 feet away from the local control unit.

## MODEL NUMBERS

Each low-noise amplifier system (LNA) consists of:

1 Redundant amplifier/switch unit assembly (RAU unit).  
Refer to table for model number.

1 Local control unit (control and monitoring circuitry with power supplies).  
Model LCL-RAU (1:1 system),  
LCL-RAU2 (1:2 system).

1 Interconnection cable.

Frequency (GHz)	1:1 RAU Model Number*	1:2 RAU Model Number*	Interface Input/Output*
1.53 – 1.56	RAU-X-153156-N	RAU2-X-153156-N	SMA/SMA
2.1 – 2.7	RAU-X-2127-N	RAU2-X-2127-N	SMA/SMA
2.2 – 2.29	RAU-X-2229-N	RAU2-X-2229-N	WR430/SMA
3.4 – 4.2	RAU-X-3442-N	RAU2-X-3442-N	WR229/SMA
3.7 – 4.2	RAU-X-3742-N	RAU2-X-3742-N	WR229/SMA
3.62 – 4.2	RAU-X-3642-N	RAU2-X-3642-N	WR229/SMA
7.25 – 7.75	RAU-X-7278-N	RAU2-X-7278-N	WR112/SMA
10.95 – 11.7	RAU-X-109117-N	RAU2-X-109117-N	WR75/SMA
10.95 – 12.2	RAU-X-109122-N	RAU2-X-109122-N	WR75/SMA
10.7 – 11.7	RAU-X-107117-N	RAU2-X-107117-N	WR75/SMA
10.95 – 12.75	RAU-X-109127-N	RAU2-X-109127-N	WR75/SMA
11.7 – 12.2	RAU-X-117122-N	RAU2-X-117122-N	WR75/SMA
11.7 – 12.75	RAU-X-117127-N	RAU2-X-117127-N	WR75/SMA
12.2 – 12.75	RAU-X-122127-N	RAU2-X-122127-N	WR75/SMA
17.7 – 20.2	RAU-X-177202-N	RAU2-X-177202-N	WR42/WR42
18.8 – 19.6	RAU-X-188196-N	RAU2-X-188196-N	WR42/WR42
19.2 – 20.2	RAU-X-192202-N	RAU2-X-192202-N	WR42/WR42
19.7 – 20.2	RAU-X-197202-N	RAU2-X-197202-N	WR42/WR42

\*Notes:

- X in model number indicates amplifier/switch unit assembly enclosure -  
S - Weather resistant plate assembly  
For outdoor mounting, sheltered environment, no direct rainfall.  
W - Weather resistant enclosure  
For outdoor mounting, non-sheltered environment.
- N in model number indicates noise temperature of amplifier at +23°C ambient temperature. Noise temperatures are not defined due to continuing development of lower noise temperature amplifiers. Consult MITEQ for lowest noise temperature.  
  
Example: For a 1:1 redundant LNA system, 10.95 – 12.75 GHz, 75°K amplifier noise temperature mounted on a weather resistant plate the model numbers are:  
  
Redundant amplifier unit: Model RAU-S-109127-75  
Local control unit: Model LCL-RAU
- Consult MITEQ for available waveguide flanges and alternate connector types.

## GENERAL SPECIFICATIONS

### RF SPECIFICATIONS

Gain .....	50 dB minimum, 53 dB typical
Gain flatness.....	0.4 dB p-p/40 MHz, 1.0 dB p-p/500 MHz, 1.5 dB p-p/750 MHz, 2.0 dB p-p/10.95 – 12.75 GHz, 3.0 dB p-p/17.7 – 20.2 GHz
Gain slope .....	0.2 dB/10 MHz maximum
Gain stability .....	±0.2 dB/24 hours (constant temperature), ±2 dB maximum/-30°C to +60°C
Power output (1 dB compr.) .....	+10 dBm minimum
AM/PM conversion.....	0.5°/dB maximum to 0 dBm output
Group delay (±20 MHz) .....	0.02 ns/MHz maximum linear, 0.001 ns/MHz <sup>2</sup> maximum parabolic, 0.1 ns peak-to-peak maximum ripple
Spurious outputs .....	Below thermal noise level
Isolation .....	50 dB minimum
Input return loss .....	19 dB minimum, 14 dB minimum above 17 GHz
Output return loss .....	20 dB minimum
Input/output impedance.....	50 ohms

### LOCAL CONTROL UNIT PRIME POWER REQUIREMENTS

Voltage .....	100, 120, 220, 230/240 VAC +10%, -13% (rear panel selectable), 250 VAC maximum
Frequency .....	47–63 Hz
Power consumption .....	25 W typical steady state, 100 W peak during switchover

### REDUNDANT AMPLIFIER/SWITCH ASSEMBLY PRIME POWER REQUIREMENTS

RF switch control voltage	
Coaxial .....	Supplied from LCL unit
Waveguide	
Below 10 GHz .....	Externally supplied AC voltage 100, 120, 220, 230/240 VAC +10%, -13% (factory set at time of order)
Above 10 GHz .....	DC voltage supplied from LCL unit

### SWITCH SPECIFICATIONS

Switch type.....	Four-port transfer
Switch drive.....	Latching, manual override
Switching time .....	150 ms maximum, coaxial, 150 ms maximum, waveguide above 10 GHz, 250 ms maximum, waveguide below 10 GHz

### PHYSICAL

Weight, local control unit.....	25 pounds nominal
Weight, amplifier/switch assembly ..	15 to 30 pounds typical depending on frequency band and options
LCL unit overall dimensions.....	19" x 3.5" height x 17" (chassis depth 15")
Remote interface connectors .....	DE-9S for RS485 and RS422, DB-25P for RS232, DB-25S for contact closure, IEEE-488 receptacle for IEEE-488
DC voltage test points .....	Jack receptacle

## MODES OF OPERATION

Local mode -	Commands are received from the keys on the front panel.
Remote mode -	Commands are received from a remote system controller via the remote interface connector. All front panel keys are disabled with the exception of local/remote mode selection.
Automatic mode -	Switchover occurs if a fault is detected in the on-line unit.
Manual mode -	Switchover may be executed either via the front panel keys (local mode) or the remote interface (remote mode).

### FRONT PANEL/REMOTE FUNCTIONS, LOCAL CONTROL UNIT (1:1 System)

#### FRONT PANEL FUNCTIONS

##### Commands

- Unit 1: On line/standby
- Unit 2: On line/standby
- Local/remote
- Auto/manual

##### Alarms (LED indicators)

- Unit 1
- Unit 2
- Power supply A
- Power supply B
- System

#### REMOTE

##### Commands

- Unit 1: On line
- Unit 2: On line
- Auto
- Manual

##### Status

- Unit 1: On line
- Unit 1: Standby
- Unit 2: On line
- Unit 2: Standby
- Remote
- Local
- Auto
- Manual
- System: Normal
- System: Fail
- Unit 1: Normal
- Unit 1: Fail
- Unit 2: Normal
- Unit 2: Fail

### FRONT PANEL/REMOTE FUNCTIONS, LOCAL CONTROL UNIT (1:2 System)

#### FRONT PANEL FUNCTIONS

##### Commands

- Unit 1 on line, Unit 2 on line, Unit 3 standby
- Unit 2 on line, Unit 3 on line, Unit 1 standby
- Unit 1 on line, Unit 3 on line, Unit 2 standby
- Local/remote
- Auto/manual

##### Alarms (LED indicators)

- Unit 1
- Unit 2
- Unit 3
- Power supply A
- Power supply B
- Summary

#### REMOTE

##### Commands

- Unit 1 on line, Unit 2 on line, Unit 3 standby
- Unit 2 on line, Unit 3 on line, Unit 1 standby
- Unit 1 on line, Unit 3 on line, Unit 2 standby
- Auto
- Manual

##### Status

- Unit 1: On line
- Unit 1: Standby
- Unit 2: On line
- Unit 2: Standby
- Unit 3: On line
- Unit 3: Standby
- Remote
- Local
- Auto
- Manual
- System: Normal
- System: Fail
- Unit 1: Normal
- Unit 1: Fail
- Unit 2: Normal
- Unit 2: Fail
- Unit 3: Normal
- Unit 3: Fail

## OPTIONS

Note: System noise temperature will increase and return loss will degrade for any additional component located before the amplifier. This applies to Options 2 and 3.

2. Test input/output couplers.
  - A. Input test coupler.  
Below 3.6 GHz, coaxial coupler 40 dB nominal coupling level.  
Above 3.6 GHz, crossguide coupler 40 dB nominal coupling level.
  - B. Output test coupler.  
SMA female connector with 20 dB nominal coupling level.  
Consult MITEQ for other coupling levels.
  
3. Transmit reject filter.

Passband (GHz)	Rejection Band (GHz)	Rejection (dB Minimum)	Insertion Loss (dB)	Return Loss (dB)
1.530 – 1.559	1.6265 – 1.6605	35	0.75	20
2.20 – 2.29	2.025 – 2.107	30	0.75	20
3.62 – 4.2	5.845 – 6.425	65	0.05	28
7.25 – 7.75	7.9 – 8.4	80	0.2	23
10.95 – 12.75	14.0 – 14.5	50	0.15	25
17.7 – 20.2	27.9 – 30.0	70	0.25	26
18.8 – 19.6	27.9 – 30.0	70	0.25	26
19.2 – 20.2	27.9 – 30.0	70	0.25	26
19.7 – 20.2	27.9 – 30.0	70	0.25	26

Note: Consult MITEQ for other pass/rejection bands.

4. Noise source.
  - A. 15.5 EWR (dB) noise source.
  - B. 30 to 35 ENR (dB) noise source.
  
6. Local control unit to amplifier/switch assembly cable length.
  - A. 5 feet.
  - B. 25 feet.
  - C. 50 feet (standard).
  - D. 100 feet.
  - E. 150 feet.
  - F. 200 feet (maximum).
 Consult MITEQ for other lengths.
  
11. Increased gain.  
Gain: 60 dB minimum.
  
17. Remote control.
  - A. RS422.
  - B. RS485 (standard).
  - C. RS232.
  - D. Contact closure.
  - F. IEEE-488.
  
22. Dedicated remote panel.  
Provides remote control and status over dedicated RS485 bus.  
Option 17B (RS485 remote bus) must be ordered.

# 1:1 AND 1:2 REDUNDANT LOW-NOISE AMPLIFIER SYSTEMS

## ENVIRONMENTAL

### Local control unit

#### Operating

Ambient temperature ..... 0 to 50°C  
Relative humidity ..... Up to 95% at 30°C  
Atmospheric pressure ..... Up to 10,000 feet

#### Nonoperating

Temperature ..... -50° to +70°C  
Relative humidity ..... Up to 95% at 40°C  
Atmospheric pressure ..... Up to 40,000 feet  
Shock and vibration ..... Normal handling by commercial carriers

### Amplifier/switch assembly

#### Operating

Ambient temperature ..... -30° to +60°C  
Relative humidity ..... Up to 95% at 30°C (open plate assembly),  
up to 100% at 30°C (weather resistant only)  
Atmospheric pressure ..... Up to 10,000 feet  
Shock and vibration ..... Normal antenna levels

#### Nonoperating

Temperature ..... -50° to +70°C  
Relative humidity ..... Up to 95% at 40°C (open plate assembly),  
up to 100% at 30°C (weather resistant only)  
Atmospheric pressure ..... Up to 40,000 feet  
Shock and vibration ..... Normal handling by commercial carriers

Notes: Missing option numbers are not applicable to this product.

For literature describing local control (front panel) and remote control (bus protocols) of the 1:1 redundant amplifier system, refer to MITEQ's Technical Note 25T011.

For literature describing local control (front panel) and remote control (bus protocols) of the 1:2 redundant amplifier system, refer to MITEQ's Technical Note 25T012.

