POWER-OVER-ETHERNET
SYSTEM ATTENUATOR
MODEL 624

INSTRUMENT MANUAL

Ver 2.2

January 2023

GENERAL INFORMATION

WARRANTY

Flann Microwave Ltd warrants each product of its manufacture to be free from defects in material and workmanship. Our obligation under this warranty is limited to servicing or adjusting any products returned to our address for that purpose and to make good at our facility any part or parts thereof (power supplies, transistors, integrated circuits, batteries, diodes and displays) within one year after making delivery to the original purchaser and which in our examination shall disclose to our satisfaction to have been thus defective. Such returns must have prior authorization from Flann Microwave Ltd and must be returned as per our detailed instructions with transportation charges prepaid. Warranty returns or repairs must first be authorized by Flann. Flann does not authorize any third party to assume for them any other liability in connection with the original sale than the foregoing. ***Unauthorized tampering with sealed screws will invalidate the warranty and may result in damage to the product.***

DESIGN CHANGES

Flann Microwave Ltd reserves the right to make changes in the design of its products without reference and without incurring any obligation to make the same alterations on products previously purchased.

SPECIFICATION CHANGES

Flann Microwave Ltd reserves the right to change any specification noted herein without prior notice.

REPAIRS

When wishing to return instruments for repairs, or for any other reason, please contact this Company for shipping instructions. To expedite repair service, it is important to provide type number, serial number and a detailed description of the reason, including all fault symptoms, for the return of the instrument.

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GETTING STARTED

Plug an Ethernet cable into a switch or router capable of providing Power-over-Ethernet (PoE) to IEEE 802.3af.

The Ethernet interface is provided by a Lantronix XPort AR device. Under no circumstances should this device be re-configured. Details of the XPort AR are on the Lantronix website at:

http://www.lantronix.com/device-networking/embedded-device-servers/xport-ar.html

The device name and the MAC address are shown on the instrument label and are fixed. When supplied from the factory, the device is configured to connect automatically to a network using the DHCP protocol and the IP address will be assigned by the network at the time of connection. The Lantronix 'DeviceInstaller' program is a utility which can be run to read that IP address. This utility can be downloaded from the Lantronix website at:

https://www.lantronix.com/products/deviceinstaller/

The examples below show how to establish communication with the attenuator using Telnet or RAW.

TELNET

To control the instrument using a Telnet connection:

Enter the instrument's IP address, e.g. 128.0.0.59, and the port number of 23;
Once connected, the terminal window should display an identification string, for example, 'ci-19-Flann26624>'. Type 'enable' and press return;
The terminal window will now display 'ci-19-Flann26624(enable)#';
Type 'connect line 1' and press return to establish connection to the instrument;
To test the connection type 'identity?' and press return. The instrument will return its identity string, e.g. FLANN MICROWAVE, 624PRVA, 123456, V1.8.

Note that some control programs do not display the typed information, so care is required when entering control commands to prevent syntax errors. The \n terminator is not required in Telnet.

RAW

To control the instrument using a RAW connection:

Enter the IP address, e.g. 128.0.0.59 and use port 10001;
You are now connected to the instrument;
To test the connection, enter 'identity?\n' and press return. The instrument will return its identity string, e.g. FLANN MICROWAVE, 624PRVA, 123456, V1.8.

Note that the \n terminator is required for RAW commands unless using a program, such as PuTTY, that terminates every command string.

ENVIRONMENTAL CONSIDERATIONS

The attenuator is designed to operate in 'non-hazardous' areas. The environment in which the product is to be used is commercial, light industrial, either indoors or in a protected outdoor environment.

The operating environment must conform to the conditions shown in Table 1. Operation outside these ranges cannot be guaranteed and may pose dangerous implications to the operator or cause mechanical or electrical failure to the equipment. ***The device will generate heat during operation, and it is important to maintain adequate ventilation or cooling at all times.***

Environmental Condition	Ranges
Temperature Operating	+5°c to +35°c
Temperature Non-Operating	0 to +40°c
Humidity operating (max)	90 % without condensation
Humidity Non-operating (max)	95 % without condensation

Table 1: Environmental Considerations

REFERENCE SECTIONS

SYSTEM FUNCTIONS AND FEATURES

Power up Procedure

When the instrument is connected to a PoE compatible network the instrument resets to the 50 dB reference position. This action may be disabled if required, however the instrument must be reset as soon as possible to establish the correct reference alignment. Refer to the 'PWR_ON_RST' and 'RESET_INST' commands.

The instrument can be programmed to return to the last setting prior to power being removed. Refer to the 'HOLD_SET' command.

The instrument is supplied in 'Value' mode, covering the range of 0.0 dB to 50.0 dB, with the smallest incremental value being 0.1 dB. It is possible to position the instrument using motor steps in the range 0 to 2410, giving increased resolution at lower attenuation settings. Refer to the 'STEPS_SET' command and Table 2 below. Note that the steps are from the reference position of 50.0 dB.

Also note that when changing from 'Steps' mode to 'Value' mode, the attenuator will enter the Reset procedure to re-synchronise to the reference position.

Attenuation dB	Steps	Attenuation dB	Steps	Attenuation dB	Steps
50.0	0	33.0	149	16.0	562
49.0	5	32.0	164	15.0	603
48.0	11	31.0	179	14.0	647
47.0	17	30.0	195	13.0	695
46.0	23	29.0	212	12.0	746
45.0	30	28.0	230	11.0	801
44.0	37	27.0	249	10.0	861
43.0	45	26.0	270	9.0	926
42.0	52	25.0	291	8.0	997
41.0	61	24.0	314	7.0	1075
40.0	70	23.0	339	6.0	1162
39.0	79	22.0	365	5.0	1260
38.0	89	21.0	393	4.0	1371
37.0	100	20.0	422	3.0	1501
36.0	111	19.0	454	2.0	1661
35.0	123	18.0	488	1.0	1875
34.0	136	17.0	524	0.0	2410

Table 2: Attenuation – Steps from Reference

When the high attenuation setting is active, this enables a coarse attenuation setting of approximately 85 dB. Refer to the 'HIGH_ATTEN' command.

In 'Steps' mode, it is possible to enter a negative value up to -200 to achieve a very approximate high attenuation value. For example, -39 steps roughly equates to 60 dB. The attenuation accuracy beyond 50 dB cannot be guaranteed.

Instrument Errors

Instrument errors can be identified by interrogating the Status Byte. Refer to the 'INST_STAT?' command on page 10 and the interpretation list, Table 3, on page 11.

Firmware Upgrades

Users will be able to upgrade to the latest version of the Model 624 firmware over the Ethernet interface by following the instructions given in the Flann Microwave Ltd website, www.flann.com.

A copy of the latest issue of this manual will also be available for download.

ETHERNET COMMAND STRUCTURE

This section details the commands available and the valid operands that may accompany them.

NOTATION

Upper case bold characters represent the program codes, which must appear exactly as listed. Program code commands are not case sensitive, ie upper and lower case characters are accepted. Note that the input buffer is 50 bytes maximum.

Characters enclosed in the {} brackets are qualifiers attached to the root mnemonic. A space may be inserted between it and the root mnemonic. eg {ON|OFF} shows that either ON or OFF can be attached to the root mnemonic.

For example, the 'PWR_ON_RST' command has three possible applications: -

1. **PWR_ON_RST ON** - Switch on the Power-on Reset
2. **PWR_ON_RST OFF** - Switch off the Power-on Reset
3. **PWR_ON_RST?** - Query the present state of the Power-on Reset

Each program command must be terminated with \n (Hex 0x0a), *unless using Telnet*
For example: 'VALUE_SET45.3\n'

Query Commands

For instrument state commands (identified with 'Query: Valid'), append the question mark character (?) instead of the {ON|OFF} to interrogate the state of the functions. The instrument responds to the query with a '1' or a '0' to indicate On or Off, respectively. For a settable function such as VALUE_SET *value*, using VALUE_SET? causes the instrument to respond by sending the function's current value.

COMMAND SET

VALUE_SET [*value*]
Switches to value mode and sets the microwave instrument to ***value***
Query: Valid, returns setting
Value 0 to 50.0 (dB)

STEPS_SET [*value*]
Switches to Steps mode and sets the microwave instrument to ***value***
Query: Valid, returns number of steps from reference
Value -200 to 2410

INCR_SET *value*
Sets the stored increment to ***value***
Query: Valid, returns stored increment
Value 0 to 50.0 (dB) if in value mode, or 0 to 2410 if in Steps mode

INCREMENT
Increase the microwave instrument setting by the stored increment
Query: Invalid

DECREMENT
Decrease microwave instrument setting by the stored increment
Query: Invalid

STORE_VAL *value*
Sets the stored setting to ***value***
Query: Valid, returns stored setting
Value 0 to 50.0 (dB) if in value mode, or 0 to 2410 if in Steps mode

REC_SETTING
Sets the instrument to the stored setting
Query: Invalid

HIGH_ATTEN {ON|OFF}
Sets the high attenuation feature on or off
Query: Valid, returns 1 for on, or 0 for off

HOLD_SET {ON|OFF}
Returns the microwave instruments to the position when power was removed
Query: Valid, returns 1 for on, or 0 for off

INST_MODE?
Outputs the current operating mode
Query: Valid, returns either 0 for VALUE MODE or 1 for STEPS MODE

PRECISION {ON|OFF}
Enables or disables the precision setting feature
Query: Valid, returns 1 for on, or 0 for off

Note: When ON, this feature gives higher attenuation accuracy and repeatability by always driving to the required position from the same direction. The attenuation value will go higher than the required setting momentarily during positioning from the 0 dB direction. This applies to both Steps and Value modes.

PWR_ON_RST {ON|OFF}
Enables or disables the Power-on reset
Query: Valid, returns 1 for on, or 0 for off

PWR_STAT?
Outputs the power-up statistics
Query: Valid, returns a string of 50 characters maximum

RESET_INST
Resynchronise the instrument by driving to the reference position of 50.0 dB
Query: Invalid

IDENTITY?
Outputs the identity string, eg 'FLANN MICROWAVE, 624PRVA, 123456, V1.8', where 123456 is the instrument serial number, and V1.8 is the firmware version
Query: Valid, returns the identity string of the instrument.

INST_STAT?
Request the value of the status register
Query: Valid, return the status register value, a value from 0 to 255

STATUS BYTE

Bit	Value	Error
0	1	EEPROM error – failure to read or write to the EEPROM
1	2	Out of range request – incorrect value requested
2	4	Power on – a power-on has occurred since the last read of the register
3	8	Command error – incorrect syntax in a command line
4	16	Execution error – failure to achieve setting
5	32	Not used
6	64	Error E2 – no encoder output found
7	128	Error E1 – encoder index not found

Table 3 – Status Byte interpretation

Note: The value of the Status Register will return to zero after being read.

COMMAND SUMMARY

Command	Suffix	Action	Query
INCREMENT		Increase setting by stored increment	
DECREMENT		Decrease setting by stored increment	
VALUE_SET	Value	Switches to value mode and sets to value	?
STEPS_SET	Value	Switches to steps mode and sets to value	?
INCR_SET	Value	Stores increment in the present operating mode	?
RESET_INST		Reinitialise the instrument on the active channel	
INST_MODE?		Outputs the current operating mode	?
HIGH_ATTEN	ON/OFF	Enable or disable the high attenuation feature	?
PRECISION	ON/OFF	Enable or disable the precision setting feature	?
REC_SETTING		Returns the instrument to the stored setting (see below)	
STORE_VAL	Value	Store a setting determined by value (mode dependent)	?
IDENTITY?		Returns the instrument identity string	?
INST_STAT?		Returns the Status Register value from 0 to 255	?
PWR_STAT?		Returns the power-up statistics	?
PWR_ON_RST	ON/OFF	Enable/Disable power-on reset	?
HOLD_SET	ON/OFF	Return instrument to last power-off condition	?

Table 4 – Command Summary

Examples:

RESET_INST\n	reset the instrument
VALUE_SET? \n	returns a value of 50
VALUE_SET23.4 \n	position to 23.4 dB
VALUE_SET?\n	returns the value 23.4
STEPS_SET453\n	switch to steps mode and position to 453
STEPS_SET?\n	returns the value 453
INCR_SET10\n	store an incremental value of 10 steps
INCREMENT\n	move +10 steps
DECREMENT\n	move -10 steps

A command string must be no more than 50 bytes, and terminated by a newline (Hex 0x0a) when in RAW. Note that the \n terminator is not required when using Telnet.

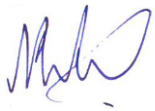
REGULATORY INFORMATION

DECLARATION OF CONFORMITY

Manufacturer	Flann Microwave Ltd Dunmere Road Bodmin Cornwall PL31 2QL United Kingdom
Product	Programmable System Attenuator Model Number: xx624-8395 where 'xx' is the waveguide size. For example, model 26624 is WG26
European Standards	EN61000-6-1:2007 EN61000-6-3:2007
Technical File Number	TCF11

It is declared that the above product conforms to the essential requirements of the Electromagnetic Compatibility Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC when used in accordance with the instructions for use, as detailed in the appropriate technical file.

Signed



Dr James Watts
For and on behalf of Flann Microwave Ltd
Date: 19 January 2015

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) REGULATIONS

Flann Microwave is registered with the United Kingdom Environment Agency as a supplier of electrical and electronic equipment, and makes the required declarations in accordance with WEEE Regulations.

Where this product was supplied to a customer in the United Kingdom:

When this product is at the end of its life, Flann Microwave will accept its return for safe disposal and recycling. Please contact Flann Microwave for full instructions before returning any WEEE. The return address is:

Flann Microwave Ltd
Dunmere Road
Bodmin
Cornwall PL31 2QL

Tel. 01208 77777

Where this product was supplied to a customer outside the United Kingdom:

Please follow local regulations regarding the disposal and recycling of WEEE, or contact your distributor for advice.

Flann Microwave Ltd can provide information on the materials used in this instrument to assist in their recycling or safe disposal.