

## Engineering Command Summary

### Addressing

#### Remote Outstation Address

**Command :** R(M)          addRes(reMote address)

Defines the outstation address of the remote BMS outstation where the control values for each of the control zones are located. This outstation must be on the same LAN as the LTX-21. This address is also used to set the time in the LTX-21. The default value for R(M) is zero, which prevents the LTX-21 from updating any of the zones control values or time values.

#### Outstation PIN Number

**Command :** R(P)          addRes(Pin number)

If the remote outstation has PIN protection it is necessary to configure the LTX with the PIN code if any data such as temperatures or fault codes are written back to the outstation. Configure the LTX PIN access using R(P=x) where x is the 4 digit PIN number. The PIN provided must be at least level 95 to allow data to be written into the outstation. The same PIN is used for both primary and secondary outstations. The default value is R(P=10000), meaning PIN access is disabled.

#### Alarm Address and LAN

**Command :** R(A,R)          addRes(Alarm address, alaRm lan)

Defines the address and remote Lan of the target for BMS alarms. The default value for R(R) is zero, the local LAN. The default value for R(A) is also zero, this value defines no alarm target so no alarms are transmitted.

#### Local Address and Lan

**Command :** R(L,N)          addRes(Local address, local laN)

The local address is defined by the controller that to which the LTX-21 is attached and is automatically detected.

#### Device Identifier

**Command :** R(D)          addRes(iDentifier)

The identifier is a 15 character text identifier that can consist of upper and lower case characters, numbers, spaces and punctuation excluding inverted commas. The identifier is used in alarm transmissions should be set to identify the device and its function. The identifier is written by placing inverted commas around the string e.g. R(D="abcd").

## Alarm Configuration

<b>Command :</b> R(G)                      addRess(alarm confiGuration)
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Alarm configuration options are set by the value of R(G). Each bit controls the reporting of particular types of alarms such as critical, non-critical and common. See the *Advanced Applications* section for details on calculating the required value of R(G). The default value is R(G=5), meaning that unit alarm reporting is enabled for critical and non-critical faults.

## Non-Critical Alarm Filter Time

<b>Command :</b> R(F)                      addRess(non-critical Filter time)
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The alarm filter is used only for Non-critical alarms and can be used to prevent short 'glitch' alarms from being reported. Filter time defines the minimum time in minutes that an alarm must exist before it is reported. Similarly an alarm must be cleared for the same amount of time before the alarm is reported. If R(F=0) then all alarms are reported no matter how short the duration before the alarm clears or changes. The default value is zero, no alarm filtering.

## Critical Alarm Filter Time

<b>Command :</b> R(T)                      addRess(critical filter Time)
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The alarm filter is used only for Critical alarms and can be used to prevent short 'glitch' alarms from being reported. Filter time defines the minimum time in minutes that an alarm must exist before it is reported. Similarly an alarm must be cleared for the same amount of time before the alarm is reported. If R(T=0) then all alarms are reported no matter how short the duration before the alarm clears or changes. The default value is zero, no alarm filtering.

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## Feedback Offset Indexes

### Switchover Zone

<b>Command :</b> F(S)                      oFfset(Switchover zone)
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Defines the zone at which control switches from primary to secondary LG1. The default value is zero, meaning all zones are located on the primary LG1. If F(S=1) then all zones are located on the secondary LG1.

### Hexadecimal Fault Code Offset

<b>Command :</b> F(H)                      oFfset(Hexadecimal fault code offset)
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Defines the offset into the Sensor array in the remote outstation (and the secondary if used) where fault codes can be reported. The codes are reported in hexadecimal and written into the Units field S(%). The default value is zero, no feedback of hex fault codes. Values are only reported for active zones, if H=1 then S1(%) contains the hex fault code for Zone 1, and S16(%) contains the fault code for Zone 16.

### Decimal Fault Code Offset

<b>Command :</b> F(D)                      oFfset(Decimal fault code offset)
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Defines the offset into the analog array in the remote outstation (and the secondary if used) where fault codes can be reported. The codes are reported in decimal and written into the

analog node value The default value is zero, no feedback of decimal fault codes. Values are only reported for active zones, if D=101 then A101(V) contains the decimal fault code for Zone 1, and A116(V) contains the fault code for Zone 16.

## Return Air Temperature Offset

**Command :** F(R) oFfset(Return air temperature offset)

Defines the offset into the analog array in the remote outstation (and the secondary if used) where return air temperatures can be reported. The default value is zero, no feedback of return air temperatures. Values are only reported for active zones, if D=101 then A101(V) contains the return air temperature for Zone 1, and A116(V) contains the return air temperature for Zone 16. The temperatures are reported to a resolution of 0.5°C, the resolution available from the indoor units.

## Heat Exchanger Temperature Offset

**Command :** F(E) oFfset(heat Exchanger temperature offset)

Defines the offset into the analog array in the remote outstation (and the secondary if used) where heat exchanger temperatures can be reported. The default value is zero, no feedback of heat exchanger temperatures. Values are only reported for active zones, if D=101 then A101(V) contains the heat exchanger temperature for Zone 1, and A116(V) contains the heat exchanger temperature for Zone 16. The temperatures are reported to a resolution of 1.0°C, the resolution available from the indoor units.

## Alarm Byte Offset

**Command :** F(A) oFfset(Alarm byte offset)

Defines the offset into the digital byte array in the primary remote outstation where the alarm byte is written to. The default value is F(A=0), feature disabled.

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## Zone Control

### Zone Remote Analogue Array Offset

**Command :** Zx(R) Zone x(Remote offset) where x=1 to 16

The remote offset defines the location of the control values for Zone x. If R is greater than 17 then the zone is a *BMS Master* and the value defines an offset into the remote outstation analogue array. Each zone corresponds to five consecutive values in the analog array beginning at the location defined by Zx(R). If R is between 1 and 16 then the zone is a slave zone controlled from the LTX. The special case Zx(R=x) makes the zone *stand-alone*, this is for commissioning purposes and allows the units operating conditions to be manually controlled by the commissioning engineer.

In the case of a BMS Master, for example Z2(R=161) specifies that Zone 2 corresponds to analogue nodes 161 to 165 in the remote outstation. In this case the values are as follows

- A161(V) is the setpoint temperature
- A162(V) is the fanspeed
- A163(V) is the run mode
- A164(V) is the louver control
- A165(V) is the on/off state

The default value for Zx(R) is zero, this indicates that the remote link feature for zone x is not activated and the network outputs for this zone are only controlled by the local analog array values.

## Zone Alarm Summary

**Command :** Zx(A) Zone x(Alarms) where x=1 to 16

The alarm summary is a read-only command that returns the hexadecimal alarm code for the corresponding indoor unit. In addition the command also returns the return-air temperature and heat-exchanger temperatures for the unit. The zone number is equal to the address of the indoor unit on the X-Y network attached to the LG1.

For example the command Z1(A)Z2(A)Z3(A) will produce the response of the form:

```
Z1  CODE:99  RA:0.0  HE:0.0  LOCAL KEYPAD E:COMMS
Z2  CODE:--  RA:19.5  HE:7.0  BMS CONTROL
Z3  CODE:09  RA:23.5  HE:18.0  Z2 GROUP SLAVE
```

The hex fault code is reported together with the return air temperature (RA) and the heat exchanger temperature (HE) of the unit. If no fault exists then two dashes ‘—’ are displayed instead of a code. Note that the fault code is not filtered, but shows the current code readback from the unit.

The status of the zone is also returned in the data. The following statuses can occur

Text	Status
NOT ACTIVE	Zx(R) is zero - zone is not polled and no data is displayed
STAND ALONE	Zx(R=x) - zone is controlled from its settings within the LTX – commissioning mode
Zy GROUP SLAVE	Zx(R=y) , y is 1 to 16. The zone is a slave to zone y in the LTX
BMS CONTROL	A BMS Master with OnOff set to BMS control {0,1}
LOCAL KEYPAD	A BMS Master with OnOff set to local keypad control {10,11}

Additional information is also provided if there are communications problems with the indoor unit.

Text	Status
E:COMMS	The zone is polled, but the LG1 is not responding with data for this zone. If E:COMMS occurs for all zones then the LTX-21 is probably not communicating with the LG1. If there is no reply from only some of the units, check that the addresses of the units correspond to the allocated zone numbers, also check that the number of units defined in LG1 covers all allocated addresses. The LTX-21 will generate a ‘99’ fault code for the zone if there is no reply from the unit after 8 attempts
E:UPDATE	Data is being returned from the zone but is inconsistent with the required operating condition. Common reasons for this to occur are <ul style="list-style-type: none"> <li>- if louver activation is called for on a unit without louvers – or the louver jumper CN21 has been removed</li> <li>- heating is called on a cooling only unit.</li> <li>- The unit has a local hold-off device such as a Toshiba T2</li> <li>- The rotary switch SW01 on the unit is not set to 1, SW02 not set correctly or the unit has not been repowered after addressing.</li> </ul>

The command Z(A) returns the data for all 16 LTX-21 zones.

## Last Fault Code

**Command :** Zx(C) Zone x(last fault Code) where x=1 to 16

The last recorded fault condition for the specified unit. This is not filtered and is therefore useful in systems where short term faults such as 09 and 0B may be missed. In addition if only

common alarms are being reported then Zx(C) provides a record of the last fault for each unit. The command Z(C) will return the last fault code for all 16 units.

## Zone Setpoint

**Command :** Zx(S) Zone x(Setpoint) where x=1 to 16

The current setpoint of the unit. If the unit is under BMS control then this value is the setpoint sent from the BMS. The value is limited to the range 18 to 29, values from the BMS outside of this range will be hard limited. If the zone is under local keypad control then the value reflects the current setpoint readback from the keypad. Under stand-alone control the value is editable so that the unit can be manually controlled from the LTX, e.g. Z1(S=25) sets the setpoint of zone 1 to 25°C.

## Zone Fanspeed

**Command :** Zx(F) Zone x(Fanspeed) where x=1 to 16

The current fanspeed of the unit. If the unit is under BMS control then this value is the fanspeed sent from the BMS. The value is limited to the range 0 to 3 {0=AUTO, 1=LOW, 2=MEDIUM, 3=HIGH}, values from the BMS outside of this range will be hard limited. If the zone is under local keypad control then the value reflects the current fanspeed readback from the keypad. Under stand-alone control the value is editable so that the unit can be manually controlled from the LTX, e.g. Z1(F=2) sets the fanspeed of zone 1 to MEDIUM.

## Zone Mode

**Command :** Zx(M) Zone x(Mode) where x=1 to 16

The current mode of the unit. If the unit is under BMS control then this value is the mode sent from the BMS. The value is limited to the range 0 to 3 {0=AUTO, 1=HEAT, 2=FAN ONLY, 3=COOL}, values from the BMS outside of this range will be hard limited. If the zone is under local keypad control then the value reflects the current mode readback from the keypad. Under stand-alone control the value is editable so that the unit can be manually controlled from the LTX, e.g. Z1(F=3) sets the mode of zone 1 to COOL.

## Zone Louver

**Command :** Zx(L) Zone x(Louver) where x=1 to 16

The current louver state of the unit. If the unit is under BMS control then this value is the louver state sent from the BMS. The value is limited to the range 0 to 1 {0=OFF, 1=ON}, values from the BMS outside of this range will be hard limited. If the zone is under local keypad control then the value reflects the current louver state readback from the keypad. Under stand-alone control the value is editable so that the unit can be manually controlled from the LTX, e.g. Z1(L=1) switches on the louver in zone 1.

## Zone Unit Enable

**Command :** Zx(E) Zone x(unit Enable) where x=1 to 16

The on/off state of the unit. If the unit is under BMS control then this value is the on/off state sent from the BMS (0 or 10 = off, 1 or 11=on). The value is limited to the range 0 to 1 {0=OFF, 1=ON}, values from the BMS outside of this range will be hard limited. If the zone is under local keypad control then the value reflects the current on/off state readback from the keypad.

Under stand-alone control the value is editable so that the unit can be manually controlled from the LTX, e.g. Z1(L=1) switches on the unit in zone 1.

## Zone Keypad Enable

**Command :** Zx(K) Zone x(Keypad) where x=1 to 16

The lockout state of the units local keypad. Under BMS control this value determined by the state of the OnOff variable, values {0,1} operate the unit under central control and K=0. values {10,11} operate the unit under local control and K=1. This value always zero for slave zones because they are always under central control of the master zone. Under stand-alone control the value is editable so that the unit can be manually controlled from the LTX, the value is limited to values {0,1}. e.g. Z1(K=1) switches the unit in zone 1 to local keypad control.

When viewing unit settings using Z(S,F,M,L,E), the source of the values is determined by the value of K for each zone. If K=0 then the values reflect settings sent from the LTX, sourced either from the BMS, a Master Zone or simply from these values if the zone is under stand-alone control. If K=1 then the values reflect those readback from the unit itself.

## Zone Defaults

**Command :** Z17(S,F,M,L,E,K)

Zone 17 is a special zone used to contain the default values for the units. Z17(A,R,C) do not work as the zone simply holds the default operating values for the units. These default values are used when the LTX is powered up or reset, and if a communications failure occurs between the LTX and the BMS. The operating conditions of all units are set by defining values for Z17(S,F,M,L,E,K). If Z17(K=1) then when default conditions are in use the local keypads are unlocked, allowing users local control over the units until BMS communications are restored. The factory default settings are Z17(S=21,F=0,M=0,L=0,E=1,K=0).

## Unit Readback Data

**Command :** Ux(S,F,M,L,E) where x=1 to 16

Unit Readback returns the unit settings readback from the indoor units. This is useful to confirm that units are being set correctly and to identify units that are not updating. When units are operating in local mode the Unit Readback data shows the current user settings from the local keypad. As with the Zone command data for all units can be readback using U(S,F,M,L,E).

## Analogue Array

### Analogue Value

**Command :** Ax(V) Analogue(Value) where x=1 to 80

The LTX-21 contains a simple analogue array containing the data read from the BMS. Data is only written in BMS Master zones that read data from the BMS. The zones relate to the local analogue array as follows

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Z11	Z12	Z13	Z14	Z15	Z16
Setpoint	1	6	11	16	21	26	31	36	41	46	51	56	61	66	71	76
Fan Speed	2	7	12	17	22	27	32	37	42	47	52	57	62	67	72	77
Mode	3	8	13	18	23	28	33	38	43	48	53	58	63	68	73	78
Louvre	4	9	14	19	24	29	34	39	44	49	54	59	64	69	74	79
On/Off	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80

The values contained within the analogue array are exactly the values read from the BMS and are not range limited. The analogue array does not usually need to be accessed but is sometimes useful as a diagnostic tool as it allows the raw data from the BMS to be viewed.

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## Time

### Current Time

**Command :** T(H,N,D,M,Y) Time(Hour, miNute, Day, Month, Year)

Returns the current time as set by the remote outstation defined by R(M). Default values are all zero before communications are established.

### Last Reset Time

**Command :** T(L) Time(Last reset)

Returns the time of the last LTX power-up or reset providing communication was established with the primary remote outstation. Default values are all zero before communications are established.

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## Alarm Review

### Alarm Review

**Command :** Vx reView x (x=1..20)

Allows the last 20 alarms to be reviewed. The command Vx displays the 10 alarms from x to x+9 in the alarm buffer. If x>11 then returns alarms x to 20. The alarm at index 1 is the earliest alarm and index 20 contains the latest alarm (if at least 20 alarms have been generated). So V1 displays alarms 1 to 10 and V11 displays alarms 11 to 20 in the buffer.

If an alarm has not been acknowledged by the alarm supervisor then an asterisk "\*" will be displayed after the index number and the alarm is still queued for transmission.

The alarm review buffer retains alarm information across node resets but does not retain alarms across power-ups.

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## LTX Commands

A number of commands are available for performing various diagnostic operations via text commands. The basic format of the commands is "#(command)".

### Reset Command

**Command :** #(R=1) #(Reset)

Causes the LTX-21 to perform a software reset as if the device were re-powered. The command requires that #(R=1) is entered rather than simply #(R) to reduce the chance of a reset occurring due to mistyping.

## Wink Command

<b>Command :</b> #(W)                      #(Wink)
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Causes the yellow service LED on the front of the LTX-21 to blink several times. Useful for identifying a specific device if several are in use.

## Test Alarm Command

<b>Command :</b> #(A)                      #(test Alarm)
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If a valid alarm address is set, #(A) causes the LTX-21 to send a test alarm to the alarm supervisor, and causes another alarm to be sent when it receives an acknowledgement from the supervisor. A useful commissioning tool for proving the alarm reporting route in both directions. The LTX-21 locally responds to the #(A) command by responding with ">TEST ALARM OCCURRED", and when the supervisor acknowledgement is received with ">TEST ALARM CLEARED".

## Send Service Pin Message Command

<b>Command :</b> #(S)                      #(Service pin)
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The same as pressing the Service Pin on the front of the LTX when installing the device in a LonWorks engineering tool. Useful if the LTX is physically inaccessible.

## Clear Faults Command

<b>Command :</b> #(C)                      #(Clear faults)
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Resets all indoor units causing any faults to clear and any stopped units to restart. This requires the nvoClearance Network Variable to be bound. This is equivalent to causing a physical reset from a remote controller keypad. This command is very useful as it allows units to be restarted that have locked out due to stopping faults(e.g. through high temperature/high pressure faults).

Note that 99 faults will not be cleared as they are generated by the LTX and will only be cleared when communications with a unit are re-established.