

MQTT Communication Protocol

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MQTT COMMUNICATION PROTOCOL

Date	Version	Changes
07/02/2018	1.0.0.0	Preliminary version

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Protocol used

1.1 FEATURES

This document is preliminary and is created to clarify the communication methods between Seneca enabled RTUs and a mqtt json-based Cloud system.

1.2 COMPATIBLE RTUs

At the moment, the compatible RTUs are the following:

Configurator	Product
SEAL	Z-GPRS3, Z-LOGGER3, Z-UMTS

1.3 Means of transport

The standard protocol MQTT (Message Queue Telemetry Transport) revision adopted is the 3.1.1. The rtu is capable to connect with any broker compatible with this version; the payload is a JSON (JavaScript Object Notation) based packet. The authentication must be with user and password and can be plain or SSL (secure) based.

1.4 Authentication

The Mqtt client is compatible in with username/password method, the protocol can be plain or secured with encryption (SSL) within this restrictions:

Plain	SSL
Z-GPRS3, Z-LOGGER3, Z-UMTS	Z-UMTS

1.5 Topics

The topic topography is decided by the configuration you set with the Seal software at setup time. We can divide the topics in two families. The first one it the system topics that describe the state of the machine. The second one represent variables of the program and the embedded I/O. We can sum this situation with this table:

Topic	Mode	Description	Type
sts	Publish	Online status	System
ev	Publish	Events	System
cfg	Publish	Configuration	System
app	Publish	System status	System

ec<x>	Publish	Event control <x> status	System
<label>	Publish/Subscribe	Program/Modbus	Variables
<label>	Publish	Onboard I/O	Embed
act	Subscribe	Commands	System

The indent of the topic can change but the system ones cannot have get/set postfix.

1.5.1 Status

This topic represent the connectivity status of the RTU, every time it connect to the Mqtt broker the variable is refreshed.

Name	/sts
Type	System
Mode	Read only
Example (JSON)	<code>{"tms":1518663826,"session":"online","val":2}</code>
Session	<p>online: the rtu just connected to the broker.</p> <p>timeout: the rtu lost the connection for some reasons. It is normally not sent by the rtu itself but from the broker, is a LWT packet.</p> <p>offline: the rtu send this packet when the shutdown command (or reset) is received.</p>
Tms	The timestamp of the packet.
Val	The same as session but with a numeric annotation.

1.5.2 Events

This topic represent the message channel of the RTU, every time an event is fired a new packet is sent. Messages can be customer made or generated by the system.

Name	/ev
Type	System
Mode	Read only
Example (JSON)	<code>{"ev":[{"src":7,"id":2,"tms":1518618725,"msg":"MSG 0"}]}</code>

Tms	The timestamp of the packet.
Src	The type of the message: ACK = 1, STATUS = 2, ALERT = 3, ERROR = 4, WARNING = 5, NOTE = 6, MESSAGE = 7, INFO = 8, DEBUG = 9.
Id	The id of the event control that generated the event.
Msg	The payload of the message.

1.5.3 Event Control

This topic represent the status of an event control of the RTU, it is a number that have to be masked to extract the meaning of every bit.

Name	/ecXX (where XX is the number of the event control)
Type	System
Mode	Read only
Example (JSON)	<code>{"tms": 1518663873, "val": 4009754624}</code>
Tms	The timestamp of the packet.
Val	The value is a number that has to be masked to extract the meaning of the bit. The structure is quite complex, here it is some of the usual needs. STATE_MASK 0x000000ff, ARM 0x01000000, ACK 0x02000000, LOG 0x04000000, RUN 0x08000000, ALARM 0x10000000, ENABLE 0x80000000

1.5.4 Application

This topic represent the status of the entire RTU, it is a number that have to be masked to extract the meaning of every bit.

Name	/app
Type	System
Mode	Read only
Example (JSON)	<code>{"tms": 1511185043, "val": 1879048447}</code>
Tms	The timestamp of the packet.
Val	The value is a number that has to be masked to extract the meaning of the bit. The structure is quite complex, is not needed for the normal usage and can be discarded.

1.5.5 Configuration

This topic represent the configuration of the entire RTU, the type of payload may vary, the rtu send a train of all configuration of the program. This topic is refreshed every time a configuration change command is sent through mqtt.

Name	/cfg
Type	System
Mode	Read only
Example (JSON)	See example table, due to the length of the payload some are truncated with "...".
Tms	The timestamp of the packet.

Description	Sample
AIN Configuration	<pre>{ "ain": [{ "idx": 0, "low": 15, "max": 30, "min": 10, "del0": 1, "del1": 1, "high": 20, "delta": 0.1 }, ...] }</pre>
Device information	<pre>{ "dev": { "fw_rev": 100, "fw_code": 9100, "hw_code": 30208, "app_code": 0, "fw_build": 0, "fw_model": 100, "fw_option": 4, "app_option": 0 } }</pre>
Digital input	<pre>{ "din": [{ "idx": 0, "thr": 0, "del0": 1, "del1": 1 }, ...] }</pre>

	<pre> } </pre>
Custom Messages	<pre> "msg": [{ "idx":0, "txt":"MSG 0 ON" }, { "idx":1, "txt":"MSG 0 OFF" }, ...] </pre>
Email address book	<pre> { "email": [{ "ea":""," "grp":0, "idx":0 }, ...] } </pre>
Phone address book	<pre> "phone": [{ "pn":""," "grp":0, "idx":0 }, ...] </pre>

1.5.6 Value

This topic represent a value of a variable of the program or an embedded I/O or sensor like dbm, temperature or a gps position (where applicable).

Name	/<<name>>
Type	System
Mode	Read / Write (if capable)
Example (JSON)	<code>{"tms":1518420817,"val":1}</code>
Tms	The timestamp of the packet.
Val	The value is represented by the json number format.

1.5.7 Act

This topic is used to send command to the RTU for configuration changes or to modify embed variable values.

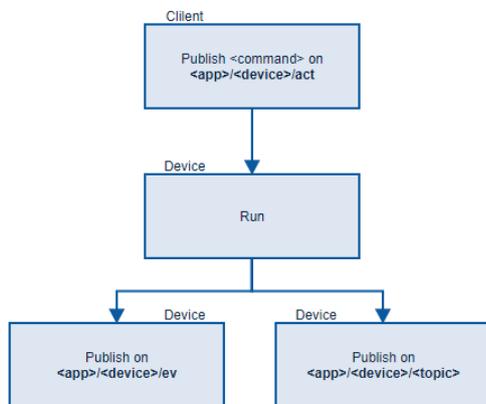
Name	/act
------	------

Type	System
Mode	Write only
Example (JSON)	<code>{"act":123456 }</code> (see changing value paragraph)

1.5.8 Changing values and configurations

This operation is different if you want to change an embedded or a program variable. Normally embed variables are read only, like DOUTs. If you want to change some values on the system,, not only read from topics, you can act like this:

Command	Type	Method
System command like reset or configuration change	System	Public on /act
Change an embed variable	System	Public on /act
Change a program variable	Variables	Public on the variable topic



When you change a value on a subscribed topic (set) a new value is published (get) accordingly to the number sent. In case of configuration or command, the flow is different. You need to send your payload on the /act of the device. At this moment the device put the command in the queue and start running this new order; the command is queued so the execution cannot be immediate. Once run the device make two operations: the first is to update the topics that are linked to this command: for instance if I close a DOUT the topic is updated with the new state. The second publish regard the notification on a /ev topic that the command run. These two notifications are queued on different stack so the fact that the act came before the update is not predictable.

The act received that notify the run command have a specific payload: the number that is sent with the ack represent the number of commend sent to the RTU since last start.

```
{"ack":123456 }
```

1.5.9 Sending a command

A normal command is a code that is sent in the /act topic in order to reset or close a DOUT: the command list is the same of the HTTP post commands and the list is in the command table paragraph. The format is this:

```
{"act":123456 }
```

The act value is a json number format.

1.5.10 Changing configuration

The configuration is based on the principle seen in the last paragraph but the payload differ depending which configuration you want to set. The table represent the schema for each configuration change.

Paylod example	Description
<pre>{msg:{idx: 0, txt: "MESSAGE"}}</pre>	This change a custom message, the idx is given by the configuration sent on the /cfg topic.
<pre>{"ain":{"idx": 0, "max":+32768, "high":+32768, "low":+32768, "min":+32768, "delta":+32768, "de10":100, "de11":100}}</pre>	This change the ain configuration, the idx is given by the configuration sent on the /cfg topic. The rest are the same parameters found on the Seal Ain configuration.

1.5.11 RTU ZGPRS3 (v202), ZUMTS (v100), MYALARM2 (v600)

Code	Group	Description
185466880	Download Configuration	DOWNLOAD FW
185467136	Download Configuration	DOWNLOAD SETUP
185467392	Download Configuration	DOWNLOAD CFG
185467648	Download Configuration	DOWNLOAD PHONEBOOK
185467904	Download Configuration	DOWNLOAD SETUP AND FW
184680448	Application Control	APP STATUS MESSAGE
184687872	Application Control	APP CUSTOM MESSAGE 1
184688128	Application Control	APP CUSTOM MESSAGE 2
184688384	Application Control	APP CUSTOM MESSAGE 3
150994944	Application Control	APP SEND RING TO ADMINISTRATOR
150994945	Application Control	APP SEND SMS TO ADMINISTRATOR
201326592	Application Control	APP BIT_CLR
201392128	Application Control	APP BIT_SET

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201523200	Application Control	APP INC
201457664	Application Control	APP DEC
201588736	Application Control	APP CLR
201654272	Application Control	APP CPY
201719808	Application Control	APP SET_AMPX
201719809	Application Control	APP SET_AMPX1
201719810	Application Control	APP SET_AMPX2
201719811	Application Control	APP SET_AMPX3
201719812	Application Control	APP SET_AMPX4
218103808	Application Control	APP SET_U16
234881024	Application Control	APP SET_S16
1048576	TEST Debug	CTX CTX STS1
2097152	TEST Debug	CTX CTX STS2
65536	TEST Debug	CTX CTX CLR1
131072	TEST Debug	CTX CTX SET1
262144	TEST Debug	CTX CTX CLR2
524288	TEST Debug	CTX CTX SET2
185466625	TEST Debug	CTX SEND TEST EMAIL
185466627	TEST Debug	CTX SEND TEST FTP
17104896	Digital Inputs	DIN RESET ALL TOTALIZERS
17039360	Digital Inputs	DIN1 RESET TOTALIZER
16777216	Digital Inputs	DIN1 RESET COUNTER
16842752	Digital Inputs	DIN1 NOTIFY AND RESET COUNTER
17170432	Digital Inputs	DIN1 RESET WORKTIME
17039616	Digital Inputs	DIN2 RESET TOTALIZER

16777472	Digital Inputs	DIN2 RESET COUNTER
16843008	Digital Inputs	DIN2 NOTIFY AND RESET COUNTER
17170433	Digital Inputs	DIN2 RESET WORKTIME
17039872	Digital Inputs	DIN3 RESET TOTALIZER
16777728	Digital Inputs	DIN3 RESET COUNTER
16843264	Digital Inputs	DIN3 NOTIFY AND RESET COUNTER
17170434	Digital Inputs	DIN3 RESET WORKTIME
17040128	Digital Inputs	DIN4 RESET TOTALIZER
16777984	Digital Inputs	DIN4 RESET COUNTER
16843520	Digital Inputs	DIN4 NOTIFY AND RESET COUNTER
17170435	Digital Inputs	DIN4 RESET WORKTIME
16908288	Digital Inputs	DIN RESET ALL COUNTERS
17039360	Digital Inputs	DIN1 RESET TOTALIZER
16777216	Digital Inputs	DIN1 RESET COUNTER
16842752	Digital Inputs	DIN1 NOTIFY AND RESET COUNTER
17170432	Digital Inputs	DIN1 RESET WORKTIME
17039616	Digital Inputs	DIN2 RESET TOTALIZER
16777472	Digital Inputs	DIN2 RESET COUNTER
16843008	Digital Inputs	DIN2 NOTIFY AND RESET COUNTER
17170433	Digital Inputs	DIN2 RESET WORKTIME
17039872	Digital Inputs	DIN3 RESET TOTALIZER
16777728	Digital Inputs	DIN3 RESET COUNTER

16843264	Digital Inputs	DIN3 NOTIFY AND RESET COUNTER
17170434	Digital Inputs	DIN3 RESET WORKTIME
17040128	Digital Inputs	DIN4 RESET TOTALIZER
16777984	Digital Inputs	DIN4 RESET COUNTER
16843520	Digital Inputs	DIN4 NOTIFY AND RESET COUNTER
17170435	Digital Inputs	DIN4 RESET WORKTIME
16973824	Digital Inputs	DIN NOTIFY AND RESET ALL COUNTERS
17039360	Digital Inputs	DIN1 RESET TOTALIZER
16777216	Digital Inputs	DIN1 RESET COUNTER
16842752	Digital Inputs	DIN1 NOTIFY AND RESET COUNTER
17170432	Digital Inputs	DIN1 RESET WORKTIME
17039616	Digital Inputs	DIN2 RESET TOTALIZER
16777472	Digital Inputs	DIN2 RESET COUNTER
16843008	Digital Inputs	DIN2 NOTIFY AND RESET COUNTER
17170433	Digital Inputs	DIN2 RESET WORKTIME
17039872	Digital Inputs	DIN3 RESET TOTALIZER
16777728	Digital Inputs	DIN3 RESET COUNTER
16843264	Digital Inputs	DIN3 NOTIFY AND RESET COUNTER
17170434	Digital Inputs	DIN3 RESET WORKTIME
17040128	Digital Inputs	DIN4 RESET TOTALIZER
16777984	Digital Inputs	DIN4 RESET COUNTER
16843520	Digital Inputs	DIN4 NOTIFY AND RESET COUNTER

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17170435	Digital Inputs	DIN4 RESET WORKTIME
17235968	Digital Inputs	DIN RESET ALL WORK TIMERS
17039360	Digital Inputs	DIN1 RESET TOTALIZER
16777216	Digital Inputs	DIN1 RESET COUNTER
16842752	Digital Inputs	DIN1 NOTIFY AND RESET COUNTER
17170432	Digital Inputs	DIN1 RESET WORKTIME
17039616	Digital Inputs	DIN2 RESET TOTALIZER
16777472	Digital Inputs	DIN2 RESET COUNTER
16843008	Digital Inputs	DIN2 NOTIFY AND RESET COUNTER
17170433	Digital Inputs	DIN2 RESET WORKTIME
17039872	Digital Inputs	DIN3 RESET TOTALIZER
16777728	Digital Inputs	DIN3 RESET COUNTER
16843264	Digital Inputs	DIN3 NOTIFY AND RESET COUNTER
17170434	Digital Inputs	DIN3 RESET WORKTIME
17040128	Digital Inputs	DIN4 RESET TOTALIZER
16777984	Digital Inputs	DIN4 RESET COUNTER
16843520	Digital Inputs	DIN4 NOTIFY AND RESET COUNTER
17170435	Digital Inputs	DIN4 RESET WORKTIME
17301504	Digital Inputs	DIN RESET ALL COUNTERS AND TOTALIZERS
17039360	Digital Inputs	DIN1 RESET TOTALIZER
16777216	Digital Inputs	DIN1 RESET COUNTER
16842752	Digital Inputs	DIN1 NOTIFY AND RESET COUNTER

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17170432	Digital Inputs	DIN1 RESET WORKTIME
17039616	Digital Inputs	DIN2 RESET TOTALIZER
16777472	Digital Inputs	DIN2 RESET COUNTER
16843008	Digital Inputs	DIN2 NOTIFY AND RESET COUNTER
17170433	Digital Inputs	DIN2 RESET WORKTIME
17039872	Digital Inputs	DIN3 RESET TOTALIZER
16777728	Digital Inputs	DIN3 RESET COUNTER
16843264	Digital Inputs	DIN3 NOTIFY AND RESET COUNTER
17170434	Digital Inputs	DIN3 RESET WORKTIME
17040128	Digital Inputs	DIN4 RESET TOTALIZER
16777984	Digital Inputs	DIN4 RESET COUNTER
16843520	Digital Inputs	DIN4 NOTIFY AND RESET COUNTER
17170435	Digital Inputs	DIN4 RESET WORKTIME
33558544	Digital Outputs	DOUT ALL OFF
33554448	Digital Outputs	DOUT1 OFF
33554464	Digital Outputs	DOUT1 ON
33554496	Digital Outputs	DOUT1 TOGGLE
33554576	Digital Outputs	DOUT1 PULSE OFF
33554592	Digital Outputs	DOUT1 PULSE ON
33554624	Digital Outputs	DOUT1 PULSE TOGGLE
17170688	Digital Outputs	DOUT1 RESET WORKTIME
33882112	Digital Outputs	DOUT1 SET PWM DUTY
33619968	Digital Outputs	DOUT1 PULSE OFF TIMED
33685504	Digital Outputs	DOUT1 PULSE ON TIMED

33558528	Digital Outputs	DOUT2 OFF
33562624	Digital Outputs	DOUT2 ON
33570816	Digital Outputs	DOUT2 TOGGLE
33591296	Digital Outputs	DOUT2 PULSE OFF
33595392	Digital Outputs	DOUT2 PULSE ON
33603584	Digital Outputs	DOUT2 PULSE TOGGLE
17170689	Digital Outputs	DOUT2 RESET WORKTIME
33947648	Digital Outputs	DOUT2 SET PWM DUTY
33751040	Digital Outputs	DOUT2 PULSE OFF TIMED
33816576	Digital Outputs	DOUT2 PULSE ON TIMED
33562656	Digital Outputs	DOUT ALL ON
33554448	Digital Outputs	DOUT1 OFF
33554464	Digital Outputs	DOUT1 ON
33554496	Digital Outputs	DOUT1 TOGGLE
33554576	Digital Outputs	DOUT1 PULSE OFF
33554592	Digital Outputs	DOUT1 PULSE ON
33554624	Digital Outputs	DOUT1 PULSE TOGGLE
17170688	Digital Outputs	DOUT1 RESET WORKTIME
33882112	Digital Outputs	DOUT1 SET PWM DUTY
33619968	Digital Outputs	DOUT1 PULSE OFF TIMED
33685504	Digital Outputs	DOUT1 PULSE ON TIMED
33558528	Digital Outputs	DOUT2 OFF
33562624	Digital Outputs	DOUT2 ON
33570816	Digital Outputs	DOUT2 TOGGLE
33591296	Digital Outputs	DOUT2 PULSE OFF
33595392	Digital Outputs	DOUT2 PULSE ON

33603584	Digital Outputs	DOUT2 PULSE TOGGLE
17170689	Digital Outputs	DOUT2 RESET WORKTIME
33947648	Digital Outputs	DOUT2 SET PWM DUTY
33751040	Digital Outputs	DOUT2 PULSE OFF TIMED
33816576	Digital Outputs	DOUT2 PULSE ON TIMED
33570880	Digital Outputs	DOUT TOGGLE ALL
33554448	Digital Outputs	DOUT1 OFF
33554464	Digital Outputs	DOUT1 ON
33554496	Digital Outputs	DOUT1 TOGGLE
33554576	Digital Outputs	DOUT1 PULSE OFF
33554592	Digital Outputs	DOUT1 PULSE ON
33554624	Digital Outputs	DOUT1 PULSE TOGGLE
17170688	Digital Outputs	DOUT1 RESET WORKTIME
33882112	Digital Outputs	DOUT1 SET PWM DUTY
33619968	Digital Outputs	DOUT1 PULSE OFF TIMED
33685504	Digital Outputs	DOUT1 PULSE ON TIMED
33558528	Digital Outputs	DOUT2 OFF
33562624	Digital Outputs	DOUT2 ON
33570816	Digital Outputs	DOUT2 TOGGLE
33591296	Digital Outputs	DOUT2 PULSE OFF
33595392	Digital Outputs	DOUT2 PULSE ON
33603584	Digital Outputs	DOUT2 PULSE TOGGLE
17170689	Digital Outputs	DOUT2 RESET WORKTIME
33947648	Digital Outputs	DOUT2 SET PWM DUTY
33751040	Digital Outputs	DOUT2 PULSE OFF TIMED
33816576	Digital Outputs	DOUT2 PULSE ON TIMED

33562640	Digital Outputs	DOUT OFF1 ON2
33554448	Digital Outputs	DOUT1 OFF
33554464	Digital Outputs	DOUT1 ON
33554496	Digital Outputs	DOUT1 TOGGLE
33554576	Digital Outputs	DOUT1 PULSE OFF
33554592	Digital Outputs	DOUT1 PULSE ON
33554624	Digital Outputs	DOUT1 PULSE TOGGLE
17170688	Digital Outputs	DOUT1 RESET WORKTIME
33882112	Digital Outputs	DOUT1 SET PWM DUTY
33619968	Digital Outputs	DOUT1 PULSE OFF TIMED
33685504	Digital Outputs	DOUT1 PULSE ON TIMED
33558528	Digital Outputs	DOUT2 OFF
33562624	Digital Outputs	DOUT2 ON
33570816	Digital Outputs	DOUT2 TOGGLE
33591296	Digital Outputs	DOUT2 PULSE OFF
33595392	Digital Outputs	DOUT2 PULSE ON
33603584	Digital Outputs	DOUT2 PULSE TOGGLE
17170689	Digital Outputs	DOUT2 RESET WORKTIME
33947648	Digital Outputs	DOUT2 SET PWM DUTY
33751040	Digital Outputs	DOUT2 PULSE OFF TIMED
33816576	Digital Outputs	DOUT2 PULSE ON TIMED
33558560	Digital Outputs	DOUT ON1 OFF2
33554448	Digital Outputs	DOUT1 OFF
33554464	Digital Outputs	DOUT1 ON
33554496	Digital Outputs	DOUT1 TOGGLE
33554576	Digital Outputs	DOUT1 PULSE OFF

33554592	Digital Outputs	DOUT1 PULSE ON
33554624	Digital Outputs	DOUT1 PULSE TOGGLE
17170688	Digital Outputs	DOUT1 RESET WORKTIME
33882112	Digital Outputs	DOUT1 SET PWM DUTY
33619968	Digital Outputs	DOUT1 PULSE OFF TIMED
33685504	Digital Outputs	DOUT1 PULSE ON TIMED
33558528	Digital Outputs	DOUT2 OFF
33562624	Digital Outputs	DOUT2 ON
33570816	Digital Outputs	DOUT2 TOGGLE
33591296	Digital Outputs	DOUT2 PULSE OFF
33595392	Digital Outputs	DOUT2 PULSE ON
33603584	Digital Outputs	DOUT2 PULSE TOGGLE
17170689	Digital Outputs	DOUT2 RESET WORKTIME
33947648	Digital Outputs	DOUT2 SET PWM DUTY
33751040	Digital Outputs	DOUT2 PULSE OFF TIMED
33816576	Digital Outputs	DOUT2 PULSE ON TIMED
117637120	Event Controls	EV RESET ALL EVENTS
117440512	Event Controls	EV1 RESET EVENT
117506048	Event Controls	EV1 DISABLE EVENT
117506049	Event Controls	EV1 ENABLE EVENT
117440768	Event Controls	EV2 RESET EVENT
117506304	Event Controls	EV2 DISABLE EVENT
117506305	Event Controls	EV2 ENABLE EVENT
117441024	Event Controls	EV3 RESET EVENT
117506560	Event Controls	EV3 DISABLE EVENT
117506561	Event Controls	EV3 ENABLE EVENT

117441280	Event Controls	EV4 RESET EVENT
117506816	Event Controls	EV4 DISABLE EVENT
117506817	Event Controls	EV4 ENABLE EVENT
117441536	Event Controls	EV5 RESET EVENT
117507072	Event Controls	EV5 DISABLE EVENT
117507073	Event Controls	EV5 ENABLE EVENT
117441792	Event Controls	EV6 RESET EVENT
117507328	Event Controls	EV6 DISABLE EVENT
117507329	Event Controls	EV6 ENABLE EVENT
117442048	Event Controls	EV7 RESET EVENT
117507584	Event Controls	EV7 DISABLE EVENT
117507585	Event Controls	EV7 ENABLE EVENT
117442304	Event Controls	EV8 RESET EVENT
117507840	Event Controls	EV8 DISABLE EVENT
117507841	Event Controls	EV8 ENABLE EVENT
117442560	Event Controls	EV9 RESET EVENT
117508096	Event Controls	EV9 DISABLE EVENT
117508097	Event Controls	EV9 ENABLE EVENT
117442816	Event Controls	EV10 RESET EVENT
117508352	Event Controls	EV10 DISABLE EVENT
117508353	Event Controls	EV10 ENABLE EVENT
117443072	Event Controls	EV11 RESET EVENT
117508608	Event Controls	EV11 DISABLE EVENT
117508609	Event Controls	EV11 ENABLE EVENT
117443328	Event Controls	EV12 RESET EVENT
117508864	Event Controls	EV12 DISABLE EVENT

117508865	Event Controls	EV12 ENABLE EVENT
117443584	Event Controls	EV13 RESET EVENT
117509120	Event Controls	EV13 DISABLE EVENT
117509121	Event Controls	EV13 ENABLE EVENT
117443840	Event Controls	EV14 RESET EVENT
117509376	Event Controls	EV14 DISABLE EVENT
117509377	Event Controls	EV14 ENABLE EVENT
117444096	Event Controls	EV15 RESET EVENT
117509632	Event Controls	EV15 DISABLE EVENT
117509633	Event Controls	EV15 ENABLE EVENT
117444352	Event Controls	EV16 RESET EVENT
117509888	Event Controls	EV16 DISABLE EVENT
117509889	Event Controls	EV16 ENABLE EVENT
117444608	Event Controls	EV17 RESET EVENT
117510144	Event Controls	EV17 DISABLE EVENT
117510145	Event Controls	EV17 ENABLE EVENT
117444864	Event Controls	EV18 RESET EVENT
117510400	Event Controls	EV18 DISABLE EVENT
117510401	Event Controls	EV18 ENABLE EVENT
117445120	Event Controls	EV19 RESET EVENT
117510656	Event Controls	EV19 DISABLE EVENT
117510657	Event Controls	EV19 ENABLE EVENT
117445376	Event Controls	EV20 RESET EVENT
117510912	Event Controls	EV20 DISABLE EVENT
117510913	Event Controls	EV20 ENABLE EVENT
117445632	Event Controls	EV21 RESET EVENT

117511168	Event Controls	EV21 DISABLE EVENT
117511169	Event Controls	EV21 ENABLE EVENT
117445888	Event Controls	EV22 RESET EVENT
117511424	Event Controls	EV22 DISABLE EVENT
117511425	Event Controls	EV22 ENABLE EVENT
117446144	Event Controls	EV23 RESET EVENT
117511680	Event Controls	EV23 DISABLE EVENT
117511681	Event Controls	EV23 ENABLE EVENT
117446400	Event Controls	EV24 RESET EVENT
117511936	Event Controls	EV24 DISABLE EVENT
117511937	Event Controls	EV24 ENABLE EVENT
117446656	Event Controls	EV25 RESET EVENT
117512192	Event Controls	EV25 DISABLE EVENT
117512193	Event Controls	EV25 ENABLE EVENT
117446912	Event Controls	EV26 RESET EVENT
117512448	Event Controls	EV26 DISABLE EVENT
117512449	Event Controls	EV26 ENABLE EVENT
117447168	Event Controls	EV27 RESET EVENT
117512704	Event Controls	EV27 DISABLE EVENT
117512705	Event Controls	EV27 ENABLE EVENT
117447424	Event Controls	EV28 RESET EVENT
117512960	Event Controls	EV28 DISABLE EVENT
117512961	Event Controls	EV28 ENABLE EVENT
117447680	Event Controls	EV29 RESET EVENT
117513216	Event Controls	EV29 DISABLE EVENT
117513217	Event Controls	EV29 ENABLE EVENT

117447936	Event Controls	EV30 RESET EVENT
117513472	Event Controls	EV30 DISABLE EVENT
117513473	Event Controls	EV30 ENABLE EVENT
117448192	Event Controls	EV31 RESET EVENT
117513728	Event Controls	EV31 DISABLE EVENT
117513729	Event Controls	EV31 ENABLE EVENT
117448448	Event Controls	EV32 RESET EVENT
117513984	Event Controls	EV32 DISABLE EVENT
117513985	Event Controls	EV32 ENABLE EVENT
167772160	Modem GSM	GSM CREDIT
83886080	Modem GSM	GSM RESTART
67108864	Log Control	LOG STOP
67108865	Log Control	LOG START
50528256	Timer Controls	TMR START TIMERS BY COUNT
50462720	Timer Controls	TMR1 RESET TIMER
50462721	Timer Controls	TMR1 STOP TIMER
50462722	Timer Controls	TMR1 START TIMER
50462723	Timer Controls	TMR1 PAUSE TIMER
50462976	Timer Controls	TMR2 RESET TIMER
50462977	Timer Controls	TMR2 STOP TIMER
50462978	Timer Controls	TMR2 START TIMER
50462979	Timer Controls	TMR2 PAUSE TIMER
50463232	Timer Controls	TMR3 RESET TIMER
50463233	Timer Controls	TMR3 STOP TIMER
50463234	Timer Controls	TMR3 START TIMER
50463235	Timer Controls	TMR3 PAUSE TIMER

50463488	Timer Controls	TMR4 RESET TIMER
50463489	Timer Controls	TMR4 STOP TIMER
50463490	Timer Controls	TMR4 START TIMER
50463491	Timer Controls	TMR4 PAUSE TIMER
50463744	Timer Controls	TMR5 RESET TIMER
50463745	Timer Controls	TMR5 STOP TIMER
50463746	Timer Controls	TMR5 START TIMER
50463747	Timer Controls	TMR5 PAUSE TIMER
50464000	Timer Controls	TMR6 RESET TIMER
50464001	Timer Controls	TMR6 STOP TIMER
50464002	Timer Controls	TMR6 START TIMER
50464003	Timer Controls	TMR6 PAUSE TIMER
50464256	Timer Controls	TMR7 RESET TIMER
50464257	Timer Controls	TMR7 STOP TIMER
50464258	Timer Controls	TMR7 START TIMER
50464259	Timer Controls	TMR7 PAUSE TIMER
50464512	Timer Controls	TMR8 RESET TIMER
50464513	Timer Controls	TMR8 STOP TIMER
50464514	Timer Controls	TMR8 START TIMER
50464515	Timer Controls	TMR8 PAUSE TIMER
50593792	Timer Controls	TMR START TIMERS BY TIME
50462720	Timer Controls	TMR1 RESET TIMER
50462721	Timer Controls	TMR1 STOP TIMER
50462722	Timer Controls	TMR1 START TIMER
50462723	Timer Controls	TMR1 PAUSE TIMER
50462976	Timer Controls	TMR2 RESET TIMER

50462977	Timer Controls	TMR2 STOP TIMER
50462978	Timer Controls	TMR2 START TIMER
50462979	Timer Controls	TMR2 PAUSE TIMER
50463232	Timer Controls	TMR3 RESET TIMER
50463233	Timer Controls	TMR3 STOP TIMER
50463234	Timer Controls	TMR3 START TIMER
50463235	Timer Controls	TMR3 PAUSE TIMER
50463488	Timer Controls	TMR4 RESET TIMER
50463489	Timer Controls	TMR4 STOP TIMER
50463490	Timer Controls	TMR4 START TIMER
50463491	Timer Controls	TMR4 PAUSE TIMER
50463744	Timer Controls	TMR5 RESET TIMER
50463745	Timer Controls	TMR5 STOP TIMER
50463746	Timer Controls	TMR5 START TIMER
50463747	Timer Controls	TMR5 PAUSE TIMER
50464000	Timer Controls	TMR6 RESET TIMER
50464001	Timer Controls	TMR6 STOP TIMER
50464002	Timer Controls	TMR6 START TIMER
50464003	Timer Controls	TMR6 PAUSE TIMER
50464256	Timer Controls	TMR7 RESET TIMER
50464257	Timer Controls	TMR7 STOP TIMER
50464258	Timer Controls	TMR7 START TIMER
50464259	Timer Controls	TMR7 PAUSE TIMER
50464512	Timer Controls	TMR8 RESET TIMER
50464513	Timer Controls	TMR8 STOP TIMER
50464514	Timer Controls	TMR8 START TIMER

50464515	Timer Controls	TMR8 PAUSE TIMER
50659328	Timer Controls	TMR ROTATE TIMERS BY COUNT
50462720	Timer Controls	TMR1 RESET TIMER
50462721	Timer Controls	TMR1 STOP TIMER
50462722	Timer Controls	TMR1 START TIMER
50462723	Timer Controls	TMR1 PAUSE TIMER
50462976	Timer Controls	TMR2 RESET TIMER
50462977	Timer Controls	TMR2 STOP TIMER
50462978	Timer Controls	TMR2 START TIMER
50462979	Timer Controls	TMR2 PAUSE TIMER
50463232	Timer Controls	TMR3 RESET TIMER
50463233	Timer Controls	TMR3 STOP TIMER
50463234	Timer Controls	TMR3 START TIMER
50463235	Timer Controls	TMR3 PAUSE TIMER
50463488	Timer Controls	TMR4 RESET TIMER
50463489	Timer Controls	TMR4 STOP TIMER
50463490	Timer Controls	TMR4 START TIMER
50463491	Timer Controls	TMR4 PAUSE TIMER
50463744	Timer Controls	TMR5 RESET TIMER
50463745	Timer Controls	TMR5 STOP TIMER
50463746	Timer Controls	TMR5 START TIMER
50463747	Timer Controls	TMR5 PAUSE TIMER
50464000	Timer Controls	TMR6 RESET TIMER
50464001	Timer Controls	TMR6 STOP TIMER
50464002	Timer Controls	TMR6 START TIMER
50464003	Timer Controls	TMR6 PAUSE TIMER

50464256	Timer Controls	TMR7 RESET TIMER
50464257	Timer Controls	TMR7 STOP TIMER
50464258	Timer Controls	TMR7 START TIMER
50464259	Timer Controls	TMR7 PAUSE TIMER
50464512	Timer Controls	TMR8 RESET TIMER
50464513	Timer Controls	TMR8 STOP TIMER
50464514	Timer Controls	TMR8 START TIMER
50464515	Timer Controls	TMR8 PAUSE TIMER
50724864	Timer Controls	TMR ROTATE TIMERS BY TIME
50462720	Timer Controls	TMR1 RESET TIMER
50462721	Timer Controls	TMR1 STOP TIMER
50462722	Timer Controls	TMR1 START TIMER
50462723	Timer Controls	TMR1 PAUSE TIMER
50462976	Timer Controls	TMR2 RESET TIMER
50462977	Timer Controls	TMR2 STOP TIMER
50462978	Timer Controls	TMR2 START TIMER
50462979	Timer Controls	TMR2 PAUSE TIMER
50463232	Timer Controls	TMR3 RESET TIMER
50463233	Timer Controls	TMR3 STOP TIMER
50463234	Timer Controls	TMR3 START TIMER
50463235	Timer Controls	TMR3 PAUSE TIMER
50463488	Timer Controls	TMR4 RESET TIMER
50463489	Timer Controls	TMR4 STOP TIMER
50463490	Timer Controls	TMR4 START TIMER
50463491	Timer Controls	TMR4 PAUSE TIMER
50463744	Timer Controls	TMR5 RESET TIMER

50463745	Timer Controls	TMR5 STOP TIMER
50463746	Timer Controls	TMR5 START TIMER
50463747	Timer Controls	TMR5 PAUSE TIMER
50464000	Timer Controls	TMR6 RESET TIMER
50464001	Timer Controls	TMR6 STOP TIMER
50464002	Timer Controls	TMR6 START TIMER
50464003	Timer Controls	TMR6 PAUSE TIMER
50464256	Timer Controls	TMR7 RESET TIMER
50464257	Timer Controls	TMR7 STOP TIMER
50464258	Timer Controls	TMR7 START TIMER
50464259	Timer Controls	TMR7 PAUSE TIMER
50464512	Timer Controls	TMR8 RESET TIMER
50464513	Timer Controls	TMR8 STOP TIMER
50464514	Timer Controls	TMR8 START TIMER
50464515	Timer Controls	TMR8 PAUSE TIMER
83951616	Variables Controls	XVAR STOP
83951617	Variables Controls	XVAR START