

# AS731/AS732 Generator Controller RS232 Communication Protocol

mi6263  
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catalogue section 75



## Initiating Communications

With direct connection, set communication speed to 9600 baud, 8 bits, 1 stop bit, no parity.  
The Autostart AS731/AS732 does not use any software or hardware handshaking.

## Requesting and Sending Data

The AS731/AS732 can be interrogated or controlled by sending the following command bytes:-

01H	Request Autostart/system status data
02H	Request Autostart program profile (Should be followed by 18H, and profile text)
03H	Prepare Autostart to receive new program profile
04H	Request instrument identification
06H	Engine start
07H	Engine stop
08H	Autostart reset (after shutdown)
0AH	Reload generator (after load-drop)
10H	Toggle any output programmed as Com output 1
11H	Toggle any output programmed as Com output 2
17H	Request Autostart profile text
18H	Prepare Autostart to receive new profile text
19H	Switch Autostart to Manual mode
1AH	Switch Autostart to Auto mode
1BH	Manual start command
1CH	Manual stop command

## 01H: Request AS731/AS732 system status

Once the host PC has requested status from the Autostart (by sending a single-byte 01H), the unit will respond with a 64 byte data stream in the following order:-

Byte	Description
0	Fault code (00H if no faults detected. See Note 1 for details)
1	State (00 - 05H)
2	Start attempt No. (00-09H)
3	CPU port 4 output word (See Note 9 for details)
4	Timeout Flags #1 (See Note 2 for details)
5	Timeout Flags #2 (See Note 2 for details)
6	General Flags #1 (See Note 3 for details)
7	General Flags #2 (See Note 3 for details)
8	General Flags #3 (See Note 3 for details)
9	General Flags #4 (See Note 3 for details)
10	General Flags #5 (See Note 3 for details)
11	General Flags #6 (See Note 3 for details)
12	General Flags #7 (See Note 3 for details)
13	General Flags #8 (See Note 3 for details)
14	Event Input status byte (See Note 4 for details)
15	Generator AC frequency (Hz)
16	Engine speed RPM (from Magnetic-pickup) MSB
17	Engine speed RPM (from Magnetic-pickup) LSB
18	Battery voltage (8-bit ADC value) (See Note 5 for details)
19	Start-delay timer MSB (In 100mS counts)
20	Start-delay timer LSB (In 100mS counts)
21	Preheat timer MSB (In 100mS counts)

22	Preheat timer LSB (In 100mS counts)
23	Crank timer MSB (In 100mS counts)
24	Crank timer LSB (In 100mS counts)
25	Crank-cool timer MSB (In 100mS counts)
26	Crank-cool timer LSB (In 100mS counts)
27	Override timer MSB (In 100mS counts)
28	Override timer LSB (In 100mS counts)
29	Warmup timer MSB (In 100mS counts)
30	Warmup timer LSB (In 100mS counts)
31	Restoration timer MSB (In 100mS counts)
32	Restoration timer LSB (In 100mS counts)
33	Cool-down timer MSB (In 100mS counts)
34	Cool-down timer LSB (In 100mS counts)
35	Energize-to-stop timer MSB (In 100mS counts)
36	Energize-to-stop timer LSB (In 100mS counts)
37	Hours run (internal counter)
38	Hours run 1 BCD 0.1 & 0.01 hours
39	Hours run 2 BCD 10 & 1 hours
40	Hours run 3 BCD 1000 & 100 hours
41	Hours run 4 BCD 100,000 & 10,000 hours
42	Analog oil pressure (psi) (See Note 6 for details)
43	Analog engine temperature (°C) (See Note 6 for details)
44	Load-release fault code (See Note 1 for details)
45	AC voltage, gen phase 1 (MSB) (See Note 7 for details)
46	AC voltage, gen phase 1 (LSB) (See Note 7 for details)
47	AC voltage, gen phase 2 (MSB) (See Note 7 for details)
48	AC voltage, gen phase 2 (LSB) (See Note 7 for details)
49	AC voltage, gen phase 3 (MSB) (See Note 7 for details)
50	AC voltage, gen phase 3 (LSB) (See Note 7 for details)
51	AC current, gen phase 1 (MSB) (See Note 8 for details)
52	AC current, gen phase 1 (LSB) (See Note 8 for details)
53	AC current, gen phase 2 (MSB) (See Note 8 for details)
54	AC current, gen phase 2 (LSB) (See Note 8 for details)
55	AC current, gen phase 3 (MSB) (See Note 8 for details)
56	AC current, gen phase 3 (LSB) (See Note 8 for details)
57	AC current IDMT value MSB
58	AC current IDMT value LSB
59	AC current IDMT count value MSB
60	AC current IDMT count value LSB
61	Battery voltage (MSB)
62	Battery voltage (LSB)
63	Contactorm timer MSB (In 100mS counts)
64	Contactorm timer LSB (In 100mS counts)
65	Checksum MSB
66	Checksum LSB

**Notes:**Note 1: Fault codes

Code (Hex)	Description
07	No speed signal
08	Engine not stopped (Speed signal present)
09	Bad oil pressure
0C	Generator over voltage
0D	Under speed/frequency
0E	Engine failed to start
0F	Engine over-speed
10	Emergency stop
11	Low oil pressure
12	High engine temperature
17	Charge failure
1C	Generator under volts
38	Generator over-current (Tripped)
44	Generator over-current (IDMT timeout)
57	Analog oil sender open-circuit fault
58	Engine not stopped (WL voltage present)
59	Magnetic-pickup sensor failure
B8	Analog high engine temperature warning
B9	Analog high engine temperature shutdown
BC	Generator over-current (Warning)
BD	Analog low oil pressure warning
BE	Analog low oil pressure shutdown
C6	High battery voltage
C7	Low battery voltage
F0	Input 3
F1	Input 4
F2	Input 5

Note2: Timeout flags

## Timeout flags byte #1

Bit	Description
0	Start delay
1	Preheat
2	Crank
3	Crank cool
4	Override time
5	Warm-up delay
6	Restoration delay
7	Cool-down time

## Timeout flags byte #2

Bit	Description
0	Loss of speed signal timer
1	Energize to stop timer
2	-
3	-
4	-
5	-
6	-
7	-

Note 3: General purpose flags

Byte #1

Bit	Description
0	1= -
1	1= -
2	1= Magnetic pickup reading valid
3	1= Warning fault active
4	1= Shutdown fault active
5	1= Low oil pressure true
6	1= In AUTO mode
7	1= In MANUAL mode

Byte #2

Bit	Description
0	1= In OFF mode
1	1= Emergency stop active
2	1= -
3	1= -
4	1= Generator AC voltage OK
5	1= Remote start input active
6	1= Generator frequency above crank-cut value (Engine running)
7	1= Generator frequency below crank-cut value (Engine stopped)

Byte #3

Bit	Description
0	1= Generator frequency within limits
1	1= Overspeed detected
2	1= Maximum number of start attempts expired
3	-
4	1= Start sequence under way
5	1= Generator has been on load
6	1= Load-in-manual mode software switch true
7	1= Shutdown fault is active

Byte #4

Bit	Description
0	1= Load release condition true
1	1 = In program mode
2	1= Warning currently being displayed
3	1= No preheat state required
4	1= Energize-to-stop output being used
5	1= Energised to stop output true
6	1= Last Battery voltage measurement was below limit
7	1= Last Battery voltage measurement was above limit

Byte #5

Bit	Description
0	1= Generator AC current below high limit
1	1= Charge fail input true
2	-
3	1= Test off load programmable input true
4	-
5	1= Manual restoration programmable input true
6	1= Generator contactor output used
7	-

Note 3: General purpose flags (cont.)

Byte #6

Bit	Description
0	1= Magnetic pickup fitted
1	-
2	-
3	-
4	1= Analog LOP alarm
5	1= Analog HET alarm
6	-
7	1= Oil pressure in psi, 0= Oil pressure in bar

Byte #7

Bit	Description
0	1= Analog LOP sensor selected
1	1= Analog HET sensor selected
2	-
3	-
4	1= Battery charger fitted 0= Charge-alternator fitted
5	1= Charge-alternator WL voltage above crank-cut level
6	-
7	-

Byte #8

Bit	Description
0	-
1	-
2	1= Test start required
3	-
4	-
5	-
6	-
7	-

Note 4: Input status byte

Bit	Description
0	-
1	-
2	Low Oil pressure (digital)
3	High Engine temperature (digital)
4	Input 3
5	Input 4
6	Input 5
7	-

Note 5: Analog battery voltage

To convert the ADC reading to voltage:-

$$V = ( (\text{ADC value MSB}) \times 256 + (\text{ADC value LSB}) ) / 10$$

Note 6: Analog oil pressure & engine temperature

To convert oil pressure from Psi to Bar:-

$$\text{Bar} = \text{Psi} / 14.493$$

To convert engine temperature from °C to F:-

$$F = C \times 9/5 + 32$$

Note 7: Analog AC generator-voltage

To convert the ADC reading to voltage:-

$$V = (\text{ADC MSB}) \times 256 + (\text{ADC LSB})$$

Note 8: Analog AC current (generator)

To convert AC current to decimal:-

$$I_{\text{decimal}} = (\text{ADC MSB}) \times 256 + (\text{ADC LSB})$$

Note 9: CPU port 4

Bit	Description
0	Programmable output #4
1	Programmable output #3
2	Programmable output #2
3	Programmable output #1
4	Fuel relay
5	Crank relay
6	-
7	-

## **02H: Request AS731 Program Profile**

Once the host PC has requested the Program Profile from the Autostart (by sending a single-byte 02H), the unit will respond with a 312 byte data stream in the following order:-

<b>Byte</b>	<b>Description</b>
0	Start delay MSB (note 1)
1	Start delay LSB (note 1)
2	Preheat delay MSB (note 1)
3	Preheat delay LSB (note 1)
4	Crank period MSB (note 1)
5	Crank period LSB (note 1)
6	Crank-cool period MSB (note 1)
7	Crank-cool period LSB(note 1)
8	Override period MSB (note 1)
9	Override period LSB (note 1)
10	Warm-up period MSB (note 1)
11	Warm-up period LSB (note 1)
12	Restoration delay MSB (note 1)
13	Restoration delay LSB (note 1)
14	Cool-down period MSB (note 1)
15	Cool-down period LSB (note 1)
16	Speed signal delay MSB (note 1)
17	Speed signal delay LSB (note 1)
18	Energise to stop period MSB (note 1)
19	Energise to stop period LSB (note 1)
20	Bad oil pressure hold-off time MSB (see note 1) *
21	Bad oil pressure hold-off time LSB (see note 1) *
22	Communications timeout period MSB (see note 1) *
23	Communications timeout period LSB (see note 1) *
24	Key repeat timer MSB (see note 1) *
25	Key repeat timer LSB (see note 1) *
26	Contactors delay MSB (see note 1)
27	Contactors delay LSB (see note 1)
28	Internal 1 second timer MSB (see note 1) *
29	Internal 1 second timer LSB (see note 1) *
30	Auxillary timer MSB (see note 1) *
31	Auxillary timer LSB (see note 1) *
32	No. of flywheel teeth MSB (see note 2)
33	No. of flywheel teeth LSB (see note 2)
34	Crank-cut speed rpm MSB (see note 2)
35	Crank-cut speed rpm LSB (see note 2)
36	Over-speed rpm MSB (see note 2)
37	Over-speed rpm LSB (see note 2)
38	Under-speed rpm MSB (see note 2)
39	Under-speed rpm LSB (see note 2)
40	Crank-cut frequency Hz rpm MSB (see note 2)
41	Crank-cut frequency Hz LSB (see note 2)
42	Over-frequency Hz MSB (see note 2)
43	Over-frequency Hz LSB (see note 2)
44	Under-frequency Hz MSB (see note 2)
45	Under-frequency Hz LSB (see note 2)
46	Battery voltage high MSB (see note 2)
47	Battery voltage high LSB (see note 2)
48	Battery voltage low MSB (see note 2)
49	Battery voltage low LSB (see note 2)
50	No. of start attempts MSB (see note 2)
51	No. of start attempts LSB (see note 2)
52	Generator under voltage level MSB (see note 2)
53	Generator under voltage level LSB (see note 2)

54	Generator voltage OK level MSB (see note 2)
55	Generator voltage OK level LSB (see note 2)
56	CT ratio MSB (see note 2)
57	CT ratio LSB (see note 2)
58	Full load current Amps MSB (see note 2)
59	Full load current Amps LSB (see note 2)
60	Reserved MSB
61	Reserved LSB
62	Reserved MSB
63	Reserved LSB
64	IDMT constant MSB (see note 2)
65	IDMT constant LSB (see note 2)
66	Over current instant-trip factor (x10) MSB (see note 2)
67	Over current instant-trip factor (x10) LSB (see note 2)
68	Analog LOP alarm level psi MSB (see note 2)
69	Analog LOP alarm level psi LSB (see note 2)
70	Analog LOP shutdown level psi MSB (see note 2)
71	Analog LOP shutdown level psi LSB (see note 2)
72	Analog HET alarm level psi MSB (see note 2)
73	Analog HET alarm level psi LSB (see note 2)
74	Analog HET shutdown level psi MSB (see note 2)
75	Analog HET shutdown level psi LSB (see note 2)
76	Charge-start period (In minutes) MSB
77	Charge-start period (In minutes) LSB
78	RS485 address MSB
79	RS485 address LSB
80	Generator over voltage level MSB (see note 2)
81	Generator over voltage level LSB (see note 2)
82	Over-speed override level % MSB (see note 2)
83	Over-speed override level % LSB (see note 2)
84	Number of generator phases MSB (see note 2)
85	Number of generator phases LSB (see note 2)
86	Remote test time (minutes) MSB (see note 2)
87	Remote test time (minutes) LSB (see note 2)
88	Reserved MSB
89	Reserved LSB
90	Reserved MSB
91	Reserved LSB
92	Reserved MSB
93	Reserved LSB
94	Reserved MSB
95	Reserved LSB
96	Load in manual switch (00 =YES <>00 = NO)
97	Generator under voltage action (00 = Load dump <>00 = Shutdown)
98	Charge fail input selection: 00 = Battery charger; 01 = Charge Alternator; 02 = not used
99	Analog oil pressure display units (00 = bar <>00 = psi)
100	Analog engine temperature display units (00 = °F <>00 = °C)
101	Remote start polarity. 00=open +VE. 01=close to +VE
102	WL crank-cut enable. (00 = YES <>00 = NO)
103	Hours run enable (00 = YES <> 00 = NO)
104	Magnetic pickup fitted (00 = YES <> 00 = NO)
105	AC generator fitted (00 = YES <> 00 = NO)
106	Over-current action (00 = Load dump <>00 = Shutdown)
107	Under-frequency action (00 = Load dump <>00 = Shutdown)
108	Switch-off delay (00 = NO <>00 = YES)
109	Phase / Line voltage display (00 = Phase <>00 = Line)
110	Load-in-remote enable (00 = YES <> 00 = NO)
111	Load-in-test enable (00 = YES <> 00 = NO)



112	Programmable input 3 action (see table 1)
113	Programmable input 4 action (see table 1)
114	Programmable input 5 action (see table 1)
115	MODEM phone-out status (00 = Never 01 = Shutdown only 02 = Warning or shutdown)
116	Programmable input 3 polarity. 0=CLS to neg 1=open from neg
117	Programmable input 4 polarity. 0=CLS to neg 1=open from neg
118	Programmable input 5 polarity. 0=CLS to neg 1=open from neg
119	Reserved
120	Programmable output 1 action (see table 2)
121	Programmable output 2 action (see table 2)
122	Programmable output 3 action (see table 2)
123	Programmable output 4 action (see table 2)
124	Reserved
125	Reserved
126	Reserved
127	Reserved
128-143	Programmable input 3 message (see note 3)
144-160	Programmable input 4 message (see note 3)
161-175	Programmable input 5 message (see note 3)
176-191	Site name remote Comms (see note 3)
192-207	MODEM phone-out number (see note 4)
208-223	Power-up message (see note 3)
224-239	Reserved
240-255	Reserved
256	Analog LOP sender select (see table 3)
257	Analog HET sender select (see table 4)
258	Reserved
259	Reserved
260	Reserved
261	Reserved
262	Reserved
263	Reserved
264	Switch-on PIN number (BCD digits 1 & 2)
265	Switch-on PIN number (BCD digits 3 & 4)
266	Program mode PIN number (BCD digits 1 & 2)
267	Program mode PIN number (BCD digits 3 & 4)
268	Remote log-on PIN number (BCD digits 1 & 2)
269	Remote log-on PIN number (BCD digits 3 & 4)
270	Mode change PIN number (BCD digits 1 & 2)
271	Mode change PIN number (BCD digits 3 & 4)
272-309	Reserved
310	Checksum MSB (see note 5)
311	Checksum LSB (see note 5)

**Tables:**

Table 1: Programmable input 3, 4 &amp; 5 setting

Value	Input Action
00	Not used
01	Shutdown (overridden)
02	Shutdown (no override)
03	Warning (overridden)
04	Warning (no override)
05	Display only (overridden)
06	Display only (no override)
07	Load release
08	Lamp test
09	Manual load-restore
0A	Test: off load
0B	Alarm mute
0C	Load reset
0D	Remote MAN/AUTO mode
0E	External MAN start
0F	External MAN stop

Table 2: Programmable output 1 - 4 setting

Value	Output action
00	Not used
01	Auto mode selected
02	Manual mode selected
03	Auto or Man mode selected
04	Start warning
05	Engine active
06	Engine running
07	External alarm enable
08	Generator available
09	Engine cooling
0A	Preheat mode 1
0B	Preheat mode 2
0C	Preheat mode 3
0D	Preheat mode 4
0E	Energise to stop
0F	Generator contactor
10	Field flashing
11	Louvre control
12	Charger isolate
13	Lamp test
14	Common alarm
15	Alarm (muteable)
16	Shutdown fault
17	Warning fault
18	Start fail
19	Over-speed / over-frequency
1A	Under-speed / under-frequency
1B	Generator under-volts
1C	Generator over-volts
1D	High current warning
1E	High current shutdown
1F	Generator out of limits
20	No speed signal
21	Magnetic pickup failure
22	Emergency stop

23	LOP shutdown
24	LOP warning
25	HET shutdown
26	HET warning
27	Input 3
28	Input 4
29	Input 5
2A	Charge-failure
2B	Battery voltage low
2C	Battery voltage high
2D	Battery voltage out of limits
2E	PC control A mode 1
2F	PC control A mode 2
30	PC control B mode 1
31	PC control B mode 2
32	Remote test

Table 3: (low) oil pressure sender/switch selection

Value	Sender type
00	Switch: close to negative
01	Switch: open from negative
02	Analog: Datcon
03	Analog: VDO 7-bar
04	Analog: Murphy
05	Analog: VDO 5-bar

Table 4: (high) engine temperature sender/switch selection

Value	Sender type
00	Switch: close to negative
01	Switch: open from negative
02	Analog: Datcon
03	Analog: VDO
04	Analog: Murphy
05	Analog: BMI

**Notes:**

- 1 Timers are stored as 16-bit unsigned multiples of 100mS i.e. If a timer is set to 3 minutes then timer value returned will be  $3 \times 60 \times 10 = 1800$  (0708h MSB = 07, LSB = 08). Timers marked with an asterisk \* are not intended to be user programmable and should not be changed from their default values.
- 2 System values are stored as 16-bit unsigned integers i.e. 300 flywheel teeth will be stored as 012Ch (MSB = 01 LSB = 2C)
- 3 16 character messages should only include the standard ASCII character set (ASCII 00 – ASCII 7F) characters outside this range will cause the LCD to display unpredictable characters.
- 4 The MODEM phone-out number should only use characters: 0 1 2 3 4 5 6 7 8 9 and ,
- 5 Checksum is calculated by adding all the bytes in the profile (from 0 – 309) and storing the result in bytes 310 & 311.

**18H: Receive Program Profile Text**

Profile text is stored as ASCII text with no checksum. Send 18H followed by 1024 bytes of text.

Product Discontinued



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