

# Acu-Trac<sup>®</sup> J1708 Mode Messaging

#### **Product Overview**

SSI's Acu-Trac<sup>®</sup> ultrasonic fuel level transmitters broadcast and receive commands ove the SAE J1708 serial data link enabling the level transmitters to communicate and share data with other modules located on the bus.

The level transmitter messages can be loosely organized to three categories as follows:

- 1) Standard PID's
- 2) Transport Protocol Messages
- 3) Data Link Escape Messages

The Standard PID's are used to pull data from the link such as odometer reading, road speed, percent engine load and the like as well as to provide data to other modules located on the link.

The transport protocol messages are used to report and route fuel data through off vehicle communications equiupment such as Qualcomm.

The Data Link Escape Messages are used to program parameters into the level transmitter and to provide a simple alternative means to acquire fuel data over the J1708 data link.

## **Setup & Programming Commands**

PID 84 Road Speed	Request Response Purpose	None Automated PID 84 J1587 Standard Broadcast Data used by the level transmitter to determine if the vehicle has stopped.
PID 89 Power Take Off Status	Request Response Purpose	None Automated PID 89 J1587 Standard Broadcast Data used by the level transmitter to determine if the PTO option is engaged.
PID 92 Percent Engine Load	Request Response Purpose	None Automated PID 89 J1587 Standard Broadcast Data is used by the level transmitter to determine if fuel is being used for PTO purposes or if the additional fuel is being used while idling.
PID 96 Fuel Level	Request Response Where	Automated PID 96 J1587 Standard Broadcast 143 96 D1 chk D1 Fuel level as a percent of total capacity at 0.5% / bit

## **Standard PID's Continued**

PID 96 Fuel Level	Request	PID 194 J1587 Standard Request/Broadcast													
	Response	143	194	0	chk										
	Response	143	194	2	96	D1	chk								
	Response	143	194	2	96	D2	chk								
	Where	D1 Diagnos	stic data b	oyte, 44 act	ive fault, 98	inactive fau	lt								
		D2 Low Fu	el diagnos	stic data by	rte 33										
PID 234 Software	Request	PID 234 J1	587 Stan	dard Requ	est										
PN & Revision	Response	143	234	14	143	D1-D13	chk								
Level	Where	D1 D6 Mea	asuremen	t Processo	r Software I	PN & Rev lev	rel								
		D7 Delimite	7 Delimiter ascii "*" Communications Processor												
		D8 D13 So	oftware PN	N & Rev lev	el										
PID 243 Make,	Request	PID 243 J1	587 Stan	dard Requ	est										
Model, and Serial	Response	143	243	17	143	D1-D16	chk								
Number	Where	D1 D5 Mak	ke ascii "F	LS12"											
		D6 Delimite	er ascii "*"	I											
		D7 Revisio	n ascii "0'	I											
		D8 Delimite	er ascii "*"	u –											
		D9 D16 As	cii Serial	Number											
PID 245 Total	Request	PID 245 J1	587 Stan	dard Requ	est directed	to MID 128									
Vehicle Distance	Response	PID 245 J1	587 Stan	dard Respo	onse										
	Purpose	Data used	by the lev	el transmit	ter to calcul	ate average	MPG & distance to empty.								
PID 250 Total	Request	PID 250 J1	587 Stan	dard Requ	est directed	to MID 128									
Fuel Used	Response	e PID 250 J1587 Standard Response													
	Purpose	PID 250 J1587 Standard Response Data used by the level transmitter to calculate how much fuel was burned through the engine for cumulative Idle/PTO, fuel loss, and fill measurements.													

# Transport Protocol Messages

Setup and programming command messages are defined below.

PID 197 Connection Management	Request Response Purpose	J1587 Sta J1587 Sta To facilitat	indard R	TS, CTS	S, EON	I, Abort			1							
Analog Gauge Driv		l mand	MID	198	7	143	1	D1		D3	crch	crcl	ch			
	Write Com	e mand	MID	198	15	143	1	D1		D11	crch	crcl	ch			
	Resp	oonse	143	198	15	MID	1	D1		D11	crch	crcl	ch			
	Whe	re	D1 Reserved Always 0													
			D2 Lev	vel trans	mitter	MID Alw	ays 14	3								
			D3 Me	essage H	leader	Always	130									
			16 bit DAC Output Voltage at Capacity Maximum Limit at 10.04 mv D4, E per bit, (msb first lsb last)										)5			
				DAC Ou , (msb fi		oltage at last)	Capac	ity Mini	mum Li	imit at 1	0.04 m\	/ D6, D	7			
			D8, D9	9 16 bit (	Capaci	ty Maxin	num Li	mit 0.12	25% pe	r bit, (m	sb first l	sb last)	)			
			D10, E	011 16 b	oit Cap	acity Mir	nimum	Limit 0.	125% p	oer bit, (	msb firs	t Isb la	st)			
			crch H	ligh byte	of the	16 bit ci	rc perfo	ormed o	on mess	sage by	tes D1 -	D11				
			crcl Lc	w byte o	of the f	6 bit crc	perfor	med on	messa	age byte	es D1 - [	D11				

Tank Capacity	Read Command Write	MID	198	7	143	1	D1		D3	crch	crcl	chk	
	Command	MID	198	11	143	1	D1		D5	crch	crcl	chk	
	Response	143	198	11	MID	1	D1		D5	crch	crcl	chk	
	Where	D1 Re	served	Always	; 0								
		D2 Le	vel trans	smitter	MID Alw	ays 14	.3						
		D3 Me	essage H	Header	r Always 123								
		D4, D5	5 16 bit <sup>-</sup>	Tank vo	olume in	gallon	s, (msb	first Isb	last)				
		crch High byte of the 16 bit crc performed on message byte								tes D1 -	- D5		
		crcl Lo	w byte	of the 1	16 bit cro	perfo	med on	messa	ge byte	es D1 –	D5		

chk

chk

chk

Tank Size, Shape, and Measurement Operation	Read Command	MID	198	7	143	1	D1		D3	crch	crcl	chk	
	Write Command Segment 1	MID	198	13	143	1	D1		D11	chk			
	Write Command Segment 2	MID	198	9	143	2	D12		D16	crch	crcl	chk	
	Response Segment 1	143	198	13	MID	1	D1		D11	chk			
	Response Segment 2	143	198	9	MID	2	D12		D16	crch	crcl	chk	
	Where	D1 Re	served A	Always	0								
		D2 Lev	vel trans	mitter	MID Alwa	ays 14	3						
		D3 Me	ssage H	leader	Always -	123							
		D4-D7 Isb last		amete	r/Depth 4	l byte	floating p	point va	alue in i	nches,	(msb fii	rst	
		D8-D1	1 Tank f	ull leve	el 4 byte f	loating	g point va	alue in	inches,	(msb fi	rst Isb	last)	
		D12-D	15 Tank	width	4 byte flo	ating	point val	ue in ir	nches, (	msb firs	st Isb la	st)	
		D16 M	easuren	nent o	peration i	node	selectior	where	Э,				
		D16 Measurement operation mode selection where, Analog output selection 1 = Voltage, 2 = Current loop, 4 High Nibble Low Nibble = Linear Output & 8 = Non Linear Output Measurement mode, 0 = Linear distance, 1 = Cylindrical level & 2 = Rectilinear level											
		crch H	igh byte	of the	16 bit cr	c perfo	ormed or	n mess	age byt	es D1 -	D16		

crcl Low byte of the 16 bit crc performed on message bytes D1 - D16

Configure Idle/Satellite Communications	Read Command	MID	198	7	143	1	D1		D3	crch	crcl	chk
Parameter	Write Command	MID	198	11	143	1	D1		D7	crch	crcl	chk
	Response	143	198	11	MID	1	D1		D7	crch	crcl	chk
	Where	D1 Re	eserved	Always	0							
		D2 Le	vel trans	mitter	MID Alw	ays 14	.3					
		D3 Me	essage H	leader	Always	125						
		b0 F b1 C Gen of th Gen exce b3 fr Gen exce Gen notif Gen link disa ecm Gen	Reset acc Generate arate an are idle fu- arate an ess of the uel notifi- arate an fication b arate an is disabl bled fue a have be arate an	cumula a mini- autom el b2 n autom e PTO cation autom e b4 lo autom 5 quar autom ed and l change en exco- autom	tion optic ations to imized F nated fue notificatio nated fue ss notific nated fue ss notific natic Fue I the b6 f ge notific changed. nated fue 7 notifica	0 after uel Da el mess n para el mess er. el mess el Data uel col ation c	sending ta mess sage wh meter. sage wh sage fue quantity. sage fue nsumed quantity sage wh	g fuel da age up en idle en PTC el was ra el was a ge wher is in ex or if the	on sele fuel co ) fuel c emove dded in the le ccess o level t	onsumed onsume d from the n excess ovel trans ovel trans f the se ransmit	I is in e ed is in ne tank s of the smitter/ nsor ter and/	is in fill data or
		High	Nibble	Tank F	ification ill notification oss notifications	ation q	uantity a					
		High	Nibble	Idle fue	tification el consur el consu	med no	otificatio					
		High at 1	n Nibble gallon p	Level t er bit	w Fuel N ransmitte el level ne	ər disa	bled fue	l chang				
		crch H	ligh byte	of the	16 bit cr	rc perfo	ormed o	n mess	age by	rtes D1 ·	- D7	
		crcl Lo	ow byte o	of the 1	I6 bit crc	perfor	med on	messa	ge byte	es D1 -	D7	

Fuel Data	Request Segment 1	MID	198	7	143	1	0	205	207	209	chk	
	Response Segment 2	143	198	17	MID	1	D1		D15	chk		
	Response	143	198	17	MID	2	D16		D28	crch	crcl	chk
	Where	D2, D3 D4, D5 D6, D7 D8, D9 D10, D last) 16 bit of first lsk D14, D last) 16 bit of last) D18 8 Where b0 Cur param b1 Cur transm Cumul abled of b3 Cur transm b4 Cur transm b5 Fue b6 Lev b7 Hos D19 8 D23 32 D24, D D28 ur D29 cr	5 16 bit <sup>7</sup> 7 16 bit 1 9 16 bit 0 0 11 16 bit 0 0 11 16 bit 0 0 0 12, 0 0 15 16 bit 0 0 12, 0 0 15 16 bit 0 0 12, 0 0 15 16 bit 0 15 16 1	Fuel Q Fank vo VIPG @ Cumm it Cum it Cum famper 013 las it Cum Fuel Ac smit Re idle fu fuel Ac smit Re idle fu PTO f neter fuel ac fuel a fuel	uantity ( olume ( ) 1/256 i Idle Fuel im PTO ( Fuel Co t) im Fuel I dded to the eason uel consu uel consu mated tr bat from the est from the est on the est on the est on the est on the est on the fuel I for Date ( the Total F	1 gall mpg/bi I Cons Fuel C onsume Lost fro ne Tan umed of umed of umed of umed of umed of ansmi he tan the tan	on/bit, ( it, (msb sumed @ onsume ed w No om the 7 k @ 1/8 exceede exceede exceede while se t param k excee k exceed k excee k exceed f were e rst Isb la nsb, first istance perform	msb firs first Isb 2 1/8 ga ed @ 1/ 0 Data L Tank @ 3 gallon/ d auton ed auto nsor co eter eded au exchang ast) D20 t Isb las (msb, fi ned on 1	st Isb Ias Iast) allon/bit 8 gallor ink @ 1 1/8 gal /bit, (ms hated tr mated tr mated tr mated tr mated tr domated tomated tomated tomated tomated tomated tomated tomated tomated tomated	st) s, (msb f h/bit, (m I/8 gallo lon/bit, ( sb first ls ansmit cations d d ing the s ast) je bytes	sb first on/bit, (r (msb fir sb D16, b2 was stop	lsb msb st lsb D17 dis-

# Data Link Escape Messages

Analog Gauge Drive Transfer Function	Read Command	MID	254	143	3	192	1	130	chk				
Parameters	Write Command	MID	254	143	11	192	9	130	D1	D2		D8	chk
	Response	143	254	MID	11	192	9	130	D1	D2		D8	chk
	Where		2 16 bit first Isb		output Vo	oltage @	@ Capa	city Ma	ximum	Limit @	10.04	mv per	bit,
			4 16 bit first Isb		output Vo	oltage @	@ Capa	city Mir	nimum L	_imit @	10.04 n	nv per	bit,
		D5-D	6 16 bit	Capac	ity Maxiı	mum Li	mit 0.12	25% pe	r bit, (m	isb first	sb last)	)	
		D7-D	8 16 bit	Capac	ity Minin	num Lir	mit 0.12	5% per	bit, (m	sb first l	sb last)		
Distance to Empty Data	a Request		MID	254	143	3	192	1	207	chk			
	Response	<del>)</del>	143	254	MID	8	207	6	D1	D2		D6	chk
	Where		D1-D2	2 16 bit I	Distance	e to em	pty @ 1	mile/bi	it, (msb	first Isb	last)		
			D3-D4	16 bit I	Fuel Qu	antity @	⊉ 1/8 ga	llon/bit	, (msb f	first Isb I	ast)		
			D5-D6	6 16 bit l	MPG @	1/256	mpg/bit,	(msb f	irst Isb	last)			
Fuel Optimization Data	Request		MID	254	143	3	192	1	205	chk			
	Response	<del>)</del>	143	254	MID	8	205	6	D1	D2		D6	chk
	Where		D1-D2	16 bit 1	Tank vol	ume @	1 gallo	n/bit, (r	nsb first	t Isb last	:)		
			D3-D4	16 bit I	Fuel Qu	antity @	⊉ 1/8 ga	llon/bit	, (msb f	irst Isb I	ast)		
			D5-D6	6 16 bit l	MPG @	1/256	mpg/bit,	(msb f	irst Isb	last)			
Fuel Tank Capacity	Read Command	ł	MID	254	143	3	192	1	123	chk	chk		
	Write Command	1	MID	254	143	7	192	7	123	D1	D2	chk	
	Response	<del>)</del>	143	254	MID	6	193	6	D1	D2	chk		
	Where		D1-D2	16 bit 7	Tank vol	ume in	gallons,	, (msb i	first Isb	last)			
			D3-D4	Unuse	d								

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Idle/PTO/Fill/Lo	oss Data	Req	quest		MID	254	143	3	192	1	206	chk			
		Res	sponse		143	254	MID	14	206	12	D1	D2		D12	chk
		Whe	ere		D1-D2	16 bit	Cumm I	dle Fue	el Consu	umed @	2 1/8 ga	llon/bit,	(msb f	irst Isb	last)
					D3-D4	16 bit	Cumm F	PTO Fu	el Cons	umed (	@ 1/8 g	allon/bit	, (msb	first Ist	last)
						irst Isb	Cumm F last)	uel Co	onsumed	d w No I	Data Lii	nk @ 1/	8 gallo	n/bit,	
						irst Isb	Cumm F last)	<sup>-</sup> uel Re	moved	from the	e Tank (	@ 1/8 g	allon/b	it,	
						0 16 bi irst Isb	t Cumm last)	Fuel A	dded to	the Tar	nk @ 1/	8 gallon	/bit,		
					D11-D	12 16 k	oit spare	always	s 0, (ms	b first Is	sb last)				
Idle/PTO Parameters Programming	Read Comma Write	nd	MID	254	143	3	192	192	1	125	chk				
5 5	Comma	nd	MID	254	143	6	192	192	4	125	D1	D2	D3	D4	chk
	Respons	143	254	143	6	192	192	4	125	D1	D2	D3	D4	chk	
	Where		b0 Res b1 General b2 not General b3 fue General deneral b6 fue the set General b7 not D2 8 b High N Low N D3 8 b High N Low N D4 8 b High N	set acc nerate ate an ificatio ate an l notificati ate an otificati ate an it consu nsor a ate an ificatio it Fill L libble F it Idle/ libble I ibble F it Disa	automa automa automa automa automa automa automa automa automa automa n quant .oss No fank Fill uel Los PTO No dle fuel DTO fuel bled/Lo _evel tra	tons to omatic F ated fue neter. ated fue aramete ated fue atic Fue in exce m have tificatio notifica s notific consur I consu w Fuel ansmitte	tion para 0 after s -uel Dat el messa el messa er. el messa el messa el Data m ess of th e been e el messa n Param ation qui cation q qui cation qui catio	ending a mess ge whe ge whe ge fuel nessage e senso xchang ge whe neter antity @ uantity @ uantity neter fication ification Pale ed fuel	fuel dat age upo en idle fu en PTO was ren was ad e when or disab ged. en the fu 2 10 gal @ 10 gal @ 10 gal m quantit rameter change	on selectuel cons fuel cons fuel cor moved f ded in c the sen led fuel uel quar llons pe allons p ty @ 1 g ty @ 1 g	sumed i nsumed from the excess sor/data change ntity is le er bit er bit gallon p gallon p gallon p	is in exc is in ex e tank is of the fil a link is e notifica ess than er bit per bit	cess o in exc ll notific disable ation qu n the lo	f the P <sup>-</sup> ess of f cation b ed and uantity w fuel I	FO the b4 of the or if

Measurement Filter Timer Constant	Read Command		MID	254	143	3	192	1	131	chk			
	Write Command		MID	254	143	11	192	9	131	D1	chk		
	Response		143	254	MID	11	192	9	131	D1	chk		
	Where		D1 Me	asurem	ent Filte	er Time	Consta	nt at 0.	8 secon	ids/bit			
Fuel Tank Size, Shape, and Measurement	Read Command	MID	254	143	3	192	1	129	chk				
Operation Parameters	Write Command	MID	254	143	16	192	14	129	D1	D2		D13	chk
F	Response	143 254 MID 16 192 14 129 D1 D2 D13 chł											chk
	Where	D1-D4 Tank Diameter/Depth 4 byte floating point value in inches, (msb first lsb last)											
		D5-D8	3 Tank	Air Gap	4 byte f	loating	point va	lue in i	nches,	(msb fir	rst Isb la	ast)	
		D9-D1	12 Tank	width 4	4 byte flo	pating p	point val	ue in in	iches, (i	msb firs	t Isb la	st)	
		D13 N	leasur	ement c	peratior	n mode	selectio	on whei	re,				
	High Nibble Analog output selection 1 = Voltage, 2 = Current loop, 4 = Linear & 8 = Non Linear Output											inear O	utput
			libble N inear le		ement m	ode, 0	= Lineaı	r distan	ce, 1 =	Cylindr	ical leve	el & 2 =	



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