

# HTA 300

Clarity Control Module

ENG

Code/Rev.: M139/90C Date: 2024-02-14

Phone: +420 251 013 400 clarity@dataapex.com www.dataapex.com DataApex Ltd. Petrzilkova 2583/13 158 00 Prague 5 Czech Republic

Clarity<sup>®</sup>, DataApex<sup>®</sup> and  $\blacktriangle^{\mathbb{R}}$  are trademarks of DataApex Ltd. Microsoft<sup>®</sup> and Windows<sup>TM</sup> are trademarks of Microsoft Corporation.

DataApex reserves the right to make changes to manuals without prior notice. Updated manuals can be downloaded from www.dataapex.com.

Author: MP

# Contents

1 HTA 300 Control module	1
2 Requirements	2
3 Installation Procedure	3
3.1 Autosampler Setup - communication	3
3.1.1 Connections	
3.2 Clarity Configuration	6
4 Using the control module	8
4.1 HT300A	9
4.1.1 Method Setup - AS - Basic & Washing	9
4.1.2 Method Setup - AS - Filling tab	
4.1.3 Method Setup - AS - Internal standard & syncro	13
4.2 HT300L	15
4.2.1 Method Setup - AS - Basic tab	
4.2.2 Method Setup - AS - Washing tab	17
4.2.3 Method Setup - AS - Derivatisation tab	
4.3 Hardware Configuration	
4.4 Device Monitor	21
5 Sequence	
5.1 Injection Modes	
6 Troubleshooting	

To facilitate the orientation in the **HTA 300** manual and **Clarity** chromatography station, different fonts are used throughout the manual. Meanings of these fonts are:

*Open File* (italics) describes the commands and names of fields in **Clarity**, parameters that can be entered into them or a window or dialog name.

WORK1 (capitals) indicates the name of the file and/or directory.

ACTIVE (capital italics) marks the state of the station or its part.

Chromatogram (blue underlined) marks clickable links referring to related chapters.

The bold text is sometimes also used for important parts of the text and the name of the **Clarity** station. Moreover, some sections are written in format other than normal text. These sections are formatted as follows:

Note:	Notifies the reader of relevant information.
Caution:	Warns the user of possibly dangerous or very important information.

#### Marks the problem statement or trouble question.

Description: Presents more detailed information on the problem, describes its causes, etc.

Solution: Marks the response to the question, presents a procedure how to remove it.

# 1 HTA 300 Control module

This manual describes the setting of **HT300A**, **HT300L**, **HT300LV**, **HT310A** and **HT310L** autosamplers. **HT300A** and **HT310A** are autosamplers for gas chromatography, while **HT300L** and **HT310L** are autosamplers for liquid chromatography and **HT300LV** is an autosampler supporting large sample volumes. **HT310A** and **HT310L** samplers have a fixed 10-vial trays that can not be upgraded to a full tray size, but are otherwise fully compatible with **HT300A** nad **HT300L** autosamplers and unless stated otherwise in the text, all described settings and features apply equally to both 300 and 310 variants.

The control module enables direct control of the instrument over serial line. Direct control means that the autosampler can be completely controlled from the **Clarity** environment. Instrument method, controlling for example the vials and further device specific functions (e.g. washing), will be saved to the measured chromatograms.



Fig. 1: HT300A autosampler

# 2 Requirements

- Clarity Installation with AS Control module (p/n A26).
- Free serial port in the PC (fast 16550 UART).
- *Note:* Modern computers usually have only 1 (if any) serial (COM) port installed. To use more devices requiring the port, the **MultiCOM** adapter (p/n MC01) is available.
  - Straight serial DB9F-DB9M cable (p/n SK02).
- *Note:* Cables are not part of **Clarity** Control Module. It is strongly recommended to order required cables together with the Control Module.
- *Caution:* The recommended firmware version in the autosampler is at least **3.21**. Otherwise it is not recommended to use the internal standard of the autosampler.

# **3 Installation Procedure**

## 3.1 Autosampler Setup - communication

The autosampler communicates with PC using straight RS232-compliant DB9F-DB9M cable. When using 3-core cable, pins 7-8 must be connected on autosampler side.

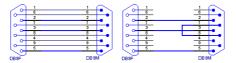


Fig. 2: Serial cable DB9F-DB9M and 3-core cable

COM port settings on the PC side are:

#### 9600, n, 8, 1

(as seen on <u>AS Status</u> dialog below, check only in case of problems with communication)

- *Note:* If serial communication cannot be established and all parameters of communication are correctly set (speed, parity, etc.), then we recommend to remeasure the cable according to the **Fig. 1** on pg. **1**. or **Fig. 2** on pg. **3**. (especially pin connection 2 and 3).
- Note: We supply 3m Serial cable DB9F DB9M, but you can order longer, 3-core cable DB9F DB9M.

### 3.1.1 Connections

Besides the serial RS-232 cable, following connections must be made to the **autosampler IN/OUT connector** (DB15F connector or DB9F at older pieces):

- The ClarityStart (IN) input must be connected to the autosampler Inject output.
- The **Clarity** active sequence **Ready signal (OUT)** output must be connected to the autosampler **Ready input** or the respective pins on HTA connector must be short-circuited.

The designations of pins are dependent on model number and are described in following tables:

Connection	Clarity cable	9-pin connector (old models)	PIN	15-pin connector (*)	PIN
Start	IN (red)	SMP_inst	3	SAMPINS_ NO	3
	IN (shield)	GNDGC	5	SAMPINS_ COM	6
				SAMPINS NC	15
Ready	OUT(red)			GC_Ready NON	9
			6	GC READY	4
	OUT (shield)	GNDGC	5	GND	5

#### Tab. 1: HT300A - designations of pins

Relay contact: NC = norm. closed, NO = norm. open, COM = common contact (\*) = New models above S/N 10300.

Tab. 2: HT300L and HT300LV - designations of pins

Connection	Clarity cable	9-pin connector (old models)	PIN	15-pin connector (*)	PIN
Start	IN (red)	SMP_inst	3	SAMPINS_ NO	3
	IN (shield)	GNDGC	5	SAMPINS_ COM	6
Ready	OUT (red)	GC_Ready	6	GC_READY	9
	OUT (shield)	GNDGC	5	GND 5	5

(\*) New models above S/N 10300.

Refer to manual manual for description of cables supplied with the autosampler.

RS232 · COM	RS-232 cable		► RS232 - COM
AS	GC_READY	OUT1	PC
I/O Port	SAMINS	M1	A/D converter
	RS-232 cable		
RS232 · COM 🕇	1	1	RS232 - COM
RS232 · COM) AS	GC_READY (short circuited)		+RS232 · COM PC

Fig. 3: HTA 300 scheme of connection

# 3.2 Clarity Configuration

System Configuration					
Setup Co	ntrol Modules		Noter of Instruments:	1	
Name	Used	③ Instrume	nt 1 🗢 Instrument 2 🗢 I	nstrument 3 🕒 Instr	ument 4
AS     AS     AF 300A     AS     AS	Instrument 1		t Type F Sampler 1 H	тот 6	
Auxiliary		Contraction of the second seco	tector ermostat ive xiliary s & Outputs		
				Device	Number
		Ext. Start [			
		Ready Dig.	Output:		
			ous Settings		
			Units Setup	Method Op	tions
Add Remove	about Setup		ОК	Cancel	Help
Available Control Modules				— C	×
	Installed Only F	ilter: All	√ нт зоо 2		
Name 🔺	Status Vendor	Comment	Module Info		
E 🛞 S	installed HTA	Euro AS300, HT300	L, HT310A, HT		
GC GC Detector Detector Datance Thermostat Valve III Fraction Collector Capillary Electrop Datanary Electrop					
Add Car	ncel			Help	

Fig. 4: How to add HTA 300 to System Configuration

- Start the **Clarity** station by clicking on the A icon on the desktop.
- Invoke the *System Configuration* dialog accessible from the *Clarity* window using the *System Configuration...* command.
- Press the Add button ① (see 3.2 on pg. 6.) to invoke the Available Control Modules dialog.
- You can specify the searching filter 2 to simplify the finding of the driver.
- Select the **HT300A** Sampler and press the *Add* <sup>(2)</sup> button.

The HTA AS 300 Setup dialog will appear.

HTA Euro AS300 Setup				
COM Port	COM1	~		
Sampler Type	HTA AS300A	~		
	K Cancel	Help		

Fig. 5: HTA AS 300 Setup

- Fill in the COM Port and Sampler Type fields and press the OK button.
- Choose HTA AS 300A as sampler type for both HT300A and HT310A that are described in this manual.
- Choose HTA AS 300L or HTA AS 300LV as sampler type according to the type of sampler you have.

The **HTA 300** Sampler will appear in the *Setup Control Modules* ③ list of the *System Configuration* dialog.

- Drag the sampler icon from the Setup Control Modules list on the left side to the desired Instrument tab on the right side () (or use the -> button () to do so).
- Set the *Start* and *Ready* input and output numbers for your acquisition card according to the wires used for synchronization.

# 4 Using the control module

In the *Method Setup* dialog of the instrument with assigned autosampler a new Method Setup - AS tab will appear..

The *From AS* and *To AS* buttons serve for transfer of methods from and to autosampler.

*Caution:* If you have injection methods already established in the sampler, it is advisable to download them to **Clarity** using the *From AS* button and save them as a **Clarity** method.

The AS Status button displays the AS Status dialog.

#### Parameter ranges and precisions

#### HT300L

All <u>volumes</u> are set in  $\mu$ I with precision of ±0,01  $\mu$ I (or ±0,1  $\mu$ I for volumes bigger than 10  $\mu$ I respectively) and ranging from 0 to 500  $\mu$ I. Valid volume range also depends on mounted syringe.

<u>Speeds</u> are set in  $\mu$ /s with precision of ±0,01  $\mu$ /s (or ±0,1 $\mu$ /s for speed greater than 10  $\mu$ /s) in range 1 - 100  $\mu$ /s.

#### HT300LV

All <u>volumes</u> are set in  $\mu$ I with precision of  $\pm 1 \mu$ I and ranging from 0 to 10000  $\mu$ I (10 ml). Valid volume range also depends on mounted syringe.

<u>Speeds</u> are set in  $\mu$ /s with precision of  $\pm 1 \mu$ /s in range 100 - 10000  $\mu$ /s (10 ml/s).The AS Status button displays the <u>AS Status</u> dialog.

The AS Status button displays the AS Status dialog.

# 4.1 HT300A

## 4.1.1 Method Setup - AS - Basic & Washing

Basic and washing parameters of the method.

All <u>volumes</u> are set in  $\mu$ l with precision of ±0,01  $\mu$ l (or ±0,1  $\mu$ l for volumes bigger than 10  $\mu$ l respectively) and ranging from 0 to 500  $\mu$ l.

<u>Speeds</u> are set in  $\mu$ *l/s* with precision of ±0,01  $\mu$ *l/s* (or ±0,1 $\mu$ *l/s* for speed greater than 10  $\mu$ *l/s*) in range 1 - 100  $\mu$ *l/s*.

				<b></b>			
		7	1	6 🗳	•		
New	Open Save	Save as	Report setup Audit t	trail Send metho e-mail			
elect San	mler	Sampler 1		Enabled			
cicce our	nprer						
		н	TA AS300A Sampler Meth	od			
	Basic & Washing	Filling Internal	Standard & Syncro				
	Method No.		Sample Wash Cycles		From AS		
	0 ~		0				
	Prewash Mode	Prewash Vol.	Prewash Cycles	Presolvent			
	Injection ~	0	0	A v			
	Injection V						
	Postwash Mode	Postwash Vol.	Postwash Cycles				
	Postwash Mode	Postwash <u>V</u> ol.	Postwash C <u>v</u> cles	Postsolvent			
		Postwash <u>V</u> ol. 0	Postwash C <u>v</u> cles 0		AS Status		
	Postwash Mode	_		Postsolvent	AS Status		
	Postwash Mode	_		Postsolvent	AS Status		
	Postwash Mode	_		Postsolvent	AS Status		
	Postwash Mode	0		Postsolvent	AS Status		
Event Ta	Postwash Mode Injection V Description	0		Postsolvent	AS Status		

Fig. 6: Method Setup - AS - Basic & Washing

#### Method No.

Internal method number under which the method is stored in sampler; when reading method from sampler current number is used, methods saved into sampler remain there even after closing **Clarity**.

Range: 0 - 9

#### Sample Wash Cycles

Number of times the system should be flushed with sample (rather than solvent) prior to injection.

#### Prewash / Postwash

Parameters are set up separately for washing prior to *Prewash* and after *Postwash* injection.

#### Solvent

Solvent is placed in one of four special vials marked A - D.

#### Wash Mode

Sets washing mode. Can be one of Injection - pre/post every injection, Sample - pre/post every sample and Step - pre/post every sequence step.

#### Wash Volume

Volume of washing solvent in  $\boldsymbol{\mu} \boldsymbol{I}$ 

### Wash Cycles

Number of washes

## 4.1.2 Method Setup - AS - Filling tab

Volume and speed settings.

All the volumes are set in µµl with precision of ±0,01 µl (or ±0,1µl for volumes bigger than 10 µl respectively) and ranging from 0 to 500 µl. Speeds are set in µl/s with precision of ±0,01 µl /s (or ±0,1 µl/s for speed greater than 10 µl/s) in range 1 - 100 µl/s.

Method Setup default3 - #12; 26.04.2023 11:17:27			×
Image: New Open         Image: Save as         Image: Save as			
Select Sampler Sampler 1			
HTA AS300A Sampler Method			
Basic & Washing Filling Internal Standard & Syncro			
Sample Volume Air Volume Fill Volume From AS			
<u>d</u> <u>o</u>			
Pre Inj. Dwell Time Post Inj. Dwell Time Injection Speed Fill Speed			
Bubble Elimination No. of Strokes Viscosity Delay			
0 0			
AS Status			
Description			
Demo Mode: Stand-by			
Event Table AS Measurement Integration Calculation Advanced			
R OK Cancel	<b>D</b> 3	Send Meth	od

Fig. 7: Method Setup - AS - Filling

#### Sample Volume

Volume of sample to be injected

#### Air Volume

Volume of air to be injected with sample

#### **Fill Volume**

When internal standard is NOT used, syringe can be washed with sample rather than with solvent. This parameter sets sample-washing volume (set *Sample wash cycles* onBasic & washing page too).

#### Pre and post injection dwell time

Time (in seconds ranging 0 - 99 s) during which the needle remains in injector prior and post injection - used for temperature leveling

#### **Injection Speed**

Speed of sample injection

#### **Fill Speed**

Speed of sample aspiration

#### No. of strokes

Number of pull-up strokes of the plunger (0 - 15) prior to sample aspiration - useful for bubble removal

### Stroke Delay

The time (in s, 0 - 15) the syringe stays in sample after aspiration - useful for viscous samples

## 4.1.3 Method Setup - AS - Internal standard & syncro

Determines when injection starts:

√lethod S	Setup default3 - #12; 26.04.2023	11:17:27		-	⊐ ×
New	Open Save Save as		thod by Help		
Select San	mpler Sampler 1	Enabled			
	1	TA AS300A Sampler Method			
	Basic & Washing Filling Interna	Standard & Syncro			
	Injection Syncro Injection	Mode A-start Wait Time	From AS		
	Normal V Normal	(front) V 1			
	Using Internal Standard				
	ISTD Volume	ISTD Vial			
	0	O For Tray Vial Number			
	Air Gap Mode <u>Air Gap Volume</u>	O For Sector 0			
	Post V 0		AS Status		
	Description				
	Dense Marker Chard has				
Event Ta	Demo Mode: Stand-by able AS Measurement Integra	tion Calculation Advanced			
Event la	aure AS measurement Integra	uon calculaton AuVanced			
R ox	K Cancel			Seno	d Method

Fig. 8: Method Setup - AS - Internal standard & syncro

#### Injection syncro

The *Injection syncro* field, together with the *Injection mode* and *A-start wait time* fields, govern the synchronization of injections.

Synchronization	Output signal to GC	Start injection (signal from GC)
Normal	At the beginning of the syringe plunger movement	At the reception of the GC Ready signal
Twin (trigger)	At the beginning of the syringe plunger movement	At the reception of the signal GC Ready it starts collecting; then, it waits for an external synchronism (SYNC-IN) to continue with the injection
A-start	When sensor touches the injector	At the reception of the GC Ready signal
Delayed	At the end of the syringe plunger movement	At the reception of the GC Ready signal

Tab. 3: Injection	syncro options
-------------------	----------------

When A-Start syncro method is used also the parameter Syncro A-Start wait time can be specified; it is the time sampler waits prior to injection; time is set in seconds

Range 0 - 25,5 s in steps 0,1 s

When two injectors are configured, parameter Injection mode can be specified to one of following values:

- Normal (front) injection into the front injector; this is the default for one injector
- Rear injection into the rear injector
- Confirmation injection of one sample into both injectors
- High throughput injection of different samples into both injectors

The AS 300 autosampler allows for mixing sample and the internal standard during injection. This function is configured with following parameters:

#### Using internal standard

Whether use internal standard at all

#### **ISTD** volume

The volume of internal standard, values are again in  $\mu\mu$ l with precision of ±0,01  $\mu$ l (±0,1 $\mu$ l for volumes bigger than 10  $\mu$ l respectively) ranging 0 - 500  $\mu$ l

#### Air gap mode

Method of separation of sample and internal standard in syringe with an air bubble; allowed values are **Post** - there is only one bubble in between sample and ISTD - and **Double** - there is one bubble on each side of the sample

#### Air gap volume

Volume of the air bubble

#### ISTD vial

ISTD vial placement; can be specified either as position for whole tray or within sector where the current sample vial is (only for trays with sectors)

# 4.2 HT300L

## 4.2.1 Method Setup - AS - Basic tab

Basic parameters of the method.

Method Setup default3 - #12; 26.04.2023 11:17:27			×
New Open Save Save as Report setup Audit trail Send method by e-mail			
Select Sampler Sampler 1			
HTA AS300L Sampler Method			
Basic         Washing         Derivatisation           Method No.         Analysis time         From AS           0         0         10           Sample Volume         Pullup Strokes         Fill Speed           0         0         10           Viscosity Delay (6)         Pullup Yolume         Injection Speed           0         0         10			
Description Demo Mode: Stand-by Event Table 10 Management Interpreter Coloristics Advanced			
Event Table AS Measurement Integration Calculation Advanced	<b>3</b> s	Send Meth	nod

Fig. 9: Method Setup - AS - Basic

#### Method No.

Internal method number ranging *0-9* under which the method is stored in sampler; when reading method from sampler current number is used, methods saved into sampler remain there even after closing the **Clarity** station.

#### Analysis Time

The time the HPLC analysis will take in hours and minutes. This is necessary to make sure the injections are made at the correct time. Valid values are 0-23 hours and 0-59 minutes.

#### Sample Volume

Volume of sample to be injected

*Note:* The Sample Volume field is used only in Single Run injections.

#### **Pullup Strokes**

Number of pullup strokes of the plunger (0 - 15) prior to sample aspiration - useful for bubble removal

#### Fill Speed

Speed of sample aspiration

#### Viscosity Delay

The time (in s, 0 - 15) the syringe stays in sample after aspiration - useful for viscious samples

### Pullup Volume

Volume of each of the pullup strokes

### **Injection Speed**

Speed of sample injection

## 4.2.2 Method Setup - AS - Washing tab

Syringe washing parameters of the method.

Parameters are set up separately for washing prior to (**Prewash**) and after (**Postwash**) injection:

Method Se	etup de	fault3 - #12	; 26.04.2023	11:17:27						×
New	Open	Save	Save as	Report setup	Audit trail	Send metho e-mail				
Select Sam	pler		Sampler 1		Enabled	ł				
			1	HTA AS300L Samp	ler Method					
	Basic	Washing	Derivatisation							
	Prew	ash <u>C</u> ydes	Prewash Vol	ume Prewash	Mode Pr	esolvent	From AS			
		q	0	) Injectio	n V A	~				
	Loop	Wash Cycles								
	_	0	0	_						
	Samp	le W. Cycles 0	Sample Wash		Loop As Well					
	Postv	vash Cycles	Postwash Vo			stsolvent				
		0	0	) Injectio	n v 🛛 A	~	AS Status			
1	Descript	ion								
	Demo M	lode: Stand-	by							
Event Tal	_			ition Calculation	Advanced					
п ок		Cancel	-					Э	Send Met	nod

Fig. 10: Method Setup - AS - Washing

#### Wash Cycles

Number of washes

#### Wash Volume

Volume of washing solvent in µl

#### Wash Mode

Sets washing mode. Can be one of:

- Injection pre/post every injection,
- Sample pre/post every sample and
- Step pre/post every sequence step.

#### Solvent

Solvent is placed in one of four special vials marked A - D.

#### Loop Wash Cycles

Number of times the loop should be washed. Prewash solvent is used for flushing the loop.

#### Loop Wash Volume

Volume of washing solvent in µl

#### Sample Wash Cycles

Number of times the system should be flushed with sample (rather than solvent) prior to injection

#### Sample Wash Volume

Volume of washing solvent in µl

### Flush Loop As Well

When this check box is set, loop is washed with the sample after washing the syringe, otherwise syringe is discharged into the waste vial.

ethod S	Setup default3 - #	12; 26.04.2023 11:	17:27					×
New	Open Save		Report setup Audit trail	Send method by e-mail	? Help			
elect San	mpler	Sampler 1	Second					
		HT/	A AS300L Sampler Method					
	Basic Washin	g Derivatisation		F	rom AS			
	Drv. <u>C</u> ydes 0		Derivatising Agent Vial					
	Drv. <u>V</u> olume 0	Drv. Time [min] 0	O For Sector	0				
					Status			
	Description			AS	status			
	Demo Mode: Star	ad bu						
Event Ta			n Calculation Advanced					
		,						
🔒 ок	Cancel					3	Send Meth	hod

## 4.2.3 Method Setup - AS - Derivatisation tab

Fig. 11: Method Setup - AS - Derivatisation

Derivatisation parameters are set on the last page (this feature can be used for dillutions or internal standard as well):

#### **Using Derivatising Agent**

Whether use derivatisation at all.

#### **Derivatisation Cycles**

How many times should be the sample injected with derivatising agent.

#### **Derivatisation Time**

The time the unit will leave injected derivatising solution in vial prior to aspiration.

#### **Derivatising Agent Vial**

Derivatising agent vial placement; can be specified either as postition for whole tray or within sector where the current sample vial is from (only for trays You can also use solvent vials **A-D** for derivatising agent.

Extended (P) positions on 110-vials tray can be specified either as 0P-9P or by number 100-109, solvent vials can be specified as A-D or 110-113.

# 4.3 Hardware Configuration

Hardware Configuration										
Type of Sampler: HTA AS300L										
Connection: Demo										
Vial Type: 10 mL										
Syringe Type:	10 mL 🗸									
Number of Injectors:	1 ~									
Mounted Tray:	Tray 110 pos. 🗸									
	OK <u>C</u> ancel									

Fig. 12: Hardware Configuration

In the full version, this dialog displays automatically detected communication port settings and some parameters of the sampler, like vial and syringe type, number of injectors and tray size.

*Note:* In demo version parameters can be set according to real possibilities of the sampler, which means there are three sizes of vials from 2 to 10 ml, eight sizes of syringe ranging from 1 to 500  $\mu$ l single or twin injectors and tray for 10, 40 or 110 vials.

## **4.4 Device Monitor**

Device Monitor of the autosampler display it status information.

lnstrument 1 - Device Monitor															
<u>F</u> ile	Co <u>n</u> trol	<u>V</u> iew	Window	<u>H</u> elp		⊩	$\models \models$	⊳	iði	0	н,	Ь	7ª	Ш	0
HT 300A Sampler 1 Demo Mode: Stand-by C										0					
For he	Ip press F	1.													//

Fig. 13: Device Monitor of the autosampler

# **5** Sequence

## **5.1 Injection Modes**

The autosampler allows for partial or full loop injections. The user must observe for correct injection volumes with respect to installed loop size - for partial loopfill maximum of 50% loop volume is recommended, for full loop injection at least 200-300% of loop volume should be injected. Checking for valid volumes is neither performed by the sampler nor by the software.

# 6 Troubleshooting

When the remedy for some problem cannot be discovered easily, the recording of communication between **Clarity** and the autosampler can significantly help the **DataApex** support to discover the cause of the problem.

The recording can be enabled by adding or amending the COMMDRV.INI file in the **Clarity** installation directory (C:\CLARITY\CFG by default). The file can be edited in any text editor (e.g. Notepad). Following section should be edited or added:

[COM1] echo=on textmode=on filename=HTA300\_%D.txt; reset=off

- *Note:* %*D* (or %*d*) in the filename parameter means that the log will be created separately for each day. The *reset=off* parameter disables deleting the content of the log each time the station is started during the same day.
- *Note:* The created \*.TXT files will greatly help in diagnosis of unrecognized errors and problems in communication.