GUIDEBOOK FOR NORBAR DATA TRANSMISSION

CONTENTS

SECTION 1   INTRODUCTION

AIM OF THIS GUIDEBOOK

This book is designed to assist with using a Norbar electronic measurement product to communicate by serial data (RS-232-C). Over time Norbar products have evolved. This guidebook is designed to document these changes so all versions can be interconnected with the minimum of inconvenience.

NORBAR PRODUCT COVERED BY THIS GUIDEBOOK

BRIEF DESCRIPTION	MANUFACTURED DATES	IDENTIFIER FOR THIS BOOK	SECTION
ETS/TWA/DTS with 25 way D RS-232-C	Before April 1994	'ORIGINAL' ETS/TWA/DTS	2 (A)
ETS/TWA/DTS with 9 way D RS-232-C, not CE marked.	April 1994 to December 1995	'UPGRADE' ETS/TWA/DTS	2 (B)
ETS/TWA/DTS with CE mark	After January 1996	'CE MARKED' ETS/TWA/DTS	2 (C)
TRS	All	TRS	3
PRO-TEST	All	PRO-TEST	4
PRO-LOG	All	PRO-LOG	5
TST, TTT, TTL & TTL-HE	All	TST, TTT, TTL & TTL-HE	6
USM	All	USM	7

Do not interchange the 3 systems without the correct lead or damage may occur.
A system that does not include all Norbar CE marked products may not be compliant.
One off specials and non-standard products are not covered by this guidebook.

WHAT IS RS-232-C ?

The Electronic Industries Association (EIA) devised a standard that specifies the electrical characteristics, connection requirements and signal functions for a serial data interface. Their Recommended Standard is numbered 232, hence RS-232-C. It is used in preference to standard logic levels as RS-232-C levels are more immune to noise pickup and signal distortions.

DTE OR DCE ?

Two interface types are defined: Data Terminal Equipment (DTE) and Data Communications Equipment (DCE).

The scheme dates back many years to when time sharing computers were the normal; a single large mainframe computer was connected to a terminal via a serial interface. The idea was to always connect a DTE interface such as a terminal to a DCE interface such as a mainframe. If the correct pins are designated a straight through lead (Pin 1 to Pin 1, Pin 2 to Pin 2, Pin 3 to Pin 3 …….etc.) can be used.

For example: Data can be transmitted on pin 2 from a DTE to be received on Pin 2 of the DCE, the returning data uses Pin 3 at both DCE and DTE.

DTE (TERMINAL)	DIRECTION	DCE (MAINFRAME)
Pin 2 (Transmit)	⇒	Pin 2 (Receive)
Pin 3 (Receive)	⇐	Pin 3 (Transmit)

Other signal lines (RTS & CTS handshake and DTR & DSR handshake) are treated in a similar way.

Equipment other than a mainframe or terminal can be defined as DTE or DCE, so being potentially confusing. A modern day personal computer is normally designated DTE, as are most Norbar measurement instruments. So when connecting a Norbar instrument to a personal computer (DTE to DTE) it is usually not possible to use a straight through lead, instead special leads need to be used. The 'Data Lead Kit' will cover most of these possibilities, see Appendix A.

PIN CONNECTIONS

The following table shows the EIA standard pin designations. All functions are as seen by DTE.

FUNCTION	SERIAL DATA USING 9 PIN CONNECTOR (KNOWN AS EIA 574)	SERIAL DATA USING 25 PIN CONNECTOR	DO SOME NORBAR PRODUCTS USES THIS FEATURE ?
DATA CARRIER DETECT (DCD)	PIN 1	PIN 8	NO
RECEIVE DATA (RxD)	PIN 2	PIN 3	YES
TRANSMIT DATA (TxD)	PIN 3	PIN 2	YES
DATA TERMINAL READY (DTR)	PIN 4	PIN 20	NO
SIGNAL GROUND	PIN 5	PIN 7	YES
DATA SET READY (DSR)	PIN 6	PIN 6	NO
REQUEST TO SEND (RTS)	PIN 7	PIN 4	YES
CLEAR TO SEND (CTS)	PIN 8	PIN 5	YES
RING INDICATOR (RI)	PIN 9	PIN 22	NO
GROUND (PROTECTIVE)		PIN 1	YES

Throughout this guidebook reference will be made to 'RS-232-C' or 'SERIAL PORT' dependent on how that product is marked.

QUICK CONNECTION TO COMPUTER THAT USUALLY WORKS!

The following information is just to send serial data from a measurement instrument to a computer, as not all computers are the same it should be treated as a guide.

1. Select measurement instrument type and computer COM port connector type from the table:

'RS-232' OR 'SERIAL PORT' OF MEASUREMENT INSTRUMENT			COMPUTER COM PORT	
'ORIGINAL' or 'UPGRADE' ETS/DTS/TWA	'CE MARKED' ETS/DTS/TWA, PRO-TEST, PRO-LOG or TST/TTT/TTL	LEAD	9 WAY D PLUG	25 WAY D PLUG
Pin 2	Pin 3	Transmit ⇒ Receive	Pin 2	Pin 3
Pin 7	Pin 5	Zero volts	Pin 5	Pin 7

2. With correct plug to fit instrument and socket to fit computer wire correct pins together.

The use of screened cable with screened connector covers is recommended to reduce electrical interference problems.

OTHER SOURCES OF INFORMATION

Refer to the original operator's handbook and service manuals for equipment being used.

HOW THIS GUIDEBOOK IS STRUCTURED

The main sections cover the different types of measurement instrument.

All other items are covered in the appendix.

SECTION 2 (A) 'ORIGINAL' ETS/DTS/TWA

These are the early ETS, DTS and TWA instruments, where RS-232-C output was an option.

The interface board is located in the lid portion of the case in the same location as the battery pack option, so only one of these two options can be fitted. To fit the RS-232-C option to an existing ETS / DTS / TWA interface board Part number 41202 is required.

HOW TO IDENTIFY

      (i)   Made before April 1994.
      (ii)   Use of a 25 way D socket for RS-232-C output connector.
      (iii)   The power ON/OFF button is on the front panel.
      (iv)   Model number is shown below.

(NOTE : All 'specials' with RS-232-C output may have a non-standard connector output.)

MODEL NUMBER	INSTRUMENT	RS-232-C OUTPUT?
40050	ETS	NO
40051	ETS with RS-232-C	YES
40052	ETS with Limit Detector	NO
40053	ETS with RS-2432-C and Limit Detector	YES
40054	ETS with RS-232-C (Special)	YES
40055	ETS with remote memory reset	NO
40056	ETS with RS-232-C (Special)	YES
40057	ETS with RS-232-C and remote memory reset	YES
40058	ETS (Special)	NO
40059	ETS (Special)	NO
40060	ETS (Special)	NO
40061	ETS with RS-232-C (Special)	YES
40062	ETS with Limit Detector (Special)	NO
40063	ETS with RS-2432-C and Limit Detector (Special)	YES
40064	ETS for Rate Controller operation	NO
40065	ETS with RS-232-C (Special)	YES
40066	ETS with RS-232-C (Special)	YES
40067	ETS with RS-232-C for Rate Controller operation	YES
40068	ETS with RS-232-C and Limit Detector for Rate Controller operation	YES
40069	ETS with RS-232-C (Special)	YES
40070	ETS with RS-232-C and Limit Detector (Special)	YES
40071	ETS with RS-232-C and Limit Detector (Special)	YES
40072	ETS with RS-232-C, Limit Detector and signal filter for Rate Controller operation	YES
40073	ETS with signal filter	NO
40074	ETS with RS-232-C and signal filter	YES
40075	ETS with Limit Detector and signal filter	NO
40076	ETS with RS-232-C, Limit Detector and signal filter	YES
40077	ETS with RS-232-C (Special)	YES
40078	ETS (Special)	NO
40079	ETS (Special)	NO
40080	ETS with RS-232-C and Limit Detector (Special)	YES
40081	ETS with RS-232-C and Limit Detector for Rate Controller operation	YES
40082	ETS with Limit Detector and remote memory reset	NO
40083	ETS with RS-232-C, Limit Detector and remote memory reset	YES
40084	ETS with Limit Detector (Special)	NO
40085	ETS with RS-232-C and Limit Detector (Special)	YES

MODEL NUMBER	INSTRUMENT	RS-232-C OUTPUT?
40086	ETS with signal filter for Rate Controller operation	NO
40087	ETS with RS-232-C and signal filter for Rate Controller operation	YES
40088	ETS with Limit Detector and signal filter for Rate Controller operation	NO
40089	ETS with RS-232-C (Special)	YES
40090	ETS with RS-232-C and Limit Detector (Special)	YES
40091	ETS with RS-232-C (Special)	YES
40092	ETS (Special)	NO
40093	ETS (Special)	NO
40094	ETS with RS-232-C (Special)	YES
43000	TWA 500	NO
43001	TWA 2800	NO
43002	TWA 5	NO
43003	TWA 50	NO
43004	TWA 5 with RS-232-C	YES
43005	TWA 50 with RS-232-C	YES
43006	TWA 500 with RS-232-C	YES
43007	TWA 2800 with RS-232-C	YES
43008	TWA 1	NO
43009	TWA 1 with RS-232-C	YES
43010	TWA 500 (Special)	NO
43011	TWA 1000 (Special)	NO
43012	TWA 50 (Special)	NO
43013	TWA 10	NO
43014	TWA 100	NO
43015	TWA 1000	NO
43016	TWA 10 with RS-232-C	YES
43017	TWA 100 with RS-232-C	YES
43018	TWA 1000 with RS-232-C	YES
43019	TWA 1 with internal battery pack	NO
43020	TWA 10 with internal battery pack	NO
43021	TWA 100 with internal battery pack	NO
43022	TWA 1000 with internal battery pack	NO
43023	TWA 2800 with internal battery pack	NO
43024	TWA 500 with internal battery pack	NO
43025	TWA 100A	NO
43026	TWA100A with RS-232-C	YES
43027	TWA 100A with internal battery pack	NO
43028	TWA 1000 (Special)	NO
43029	TWA 250 (Special)	NO
43030	TWA 2000 (Special)	NO
43031	TWA 1000 (Special)	NO
43032	TWA 500 (Special)	NO
43033	TWA 1000 (Special)	NO
43034	TWA 100K	NO
43035	TWA 1000K	NO
43036	TWA 10,000K	NO
43037	TWA 100K with RS-232-C	YES
43039	TWA 1000K with RS-232-C	YES
43040	TWA 10,000K with RS-232-C	YES
43041	TWA 100K with internal battery pack	NO
43042	TWA 1000K with internal battery pack	NO
43043	TWA 10,000K with internal battery pack	NO
43044	TWA 1 with signal filter	NO
43045	TWA 10 with signal filter	NO
43046	TWA 100 with signal filter	NO
43047	TWA 100A with signal filter	NO

MODEL NUMBER	INSTRUMENT	RS-232-C OUTPUT?
43048	TWA 1000 with signal filter	NO
43049	TWA 2800 with signal filter	NO
43050	TWA 1 with RS-232-C and signal filter	YES
43051	TWA 10 with RS-232-C and signal filter	YES
43052	TWA 100 with RS-232-C and signal filter	YES
43053	TWA 100A with RS-232-C and signal filter	YES
43054	TWA 1000 with RS-232-C and signal filter	YES
43055	TWA 2800 with RS-232-C and signal filter	YES
43056	TWA 1 with internal battery pack and signal filter	NO
43057	TWA 10 with internal battery pack and signal filter	NO
43058	TWA 100 with internal battery pack and signal filter	NO
43059	TWA 100A with internal battery pack and signal filter	NO
43060	TWA 1000 with battery pack and signal filter	NO
43061	TWA 2800 with internal battery pack and signal filter	NO
43062	TWA 100A (Special)	NO
43063	TWA 100 (Special)	NO
43064	TWA 1000 (Special)	NO
43065	TWA 1000 with RS-232-C (Special)	YES
43066	TWA 1000 (Special)	NO
43067	TWA 100 (Special)	NO
43068	TWA 100K (Special)	NO
43069	TWA 100A with RS-232-C (Special)	YES
43070	TWA 1000 with RS-232-C (Special)	YES
43071	TWA 100A (Special)	NO
43072	TWA 1000 (Special)	NO
43073	TWA 100 with internal battery pack (Special)	NO
43074	TWA 100 (Special)	NO
43075	TWA 500 (Special)	NO
43076	TWA 2800 (Special)	NO
43077	TWA 100 (Special)	NO
43078	DTS	NO
43079	DTS with RS-232-C	YES
43080	DTS with internal battery pack	NO
43081	TWA 100 with signal filter (Special)	NO
43082	DTS with RS-232-C (Special)	YES
43083	TWA 1000 (Special)	NO
43084	TWA 100 (Special)	NO

DIRECTLY COMPATIBLE PRODUCTS

PRODUCT	PART NUMBER
Data printer	60057
Lead to data printer (25 way D to 25 way D)	60065
Print inhibit controller	60151 (With modifications to RS-232-C circuit board within ETS/DTS/TWA)

SPECIFICATION

Data rate	1200 baud (fixed)
Selectable parameters	Parity, start, stop bits and data bits
Maximum number of characters per line	15
Transmitted data voltage levels	+9 volts to –9 volts DC minimum
Print signal 'HIGH' value	+3 volts to +20 volts DC
Output connector	25 way D socket

CONTROL WORD

The control word settings are found internally on the RS-232-C interface board, to make changes complete the following :
A.   Ensure instrument is switched OFF and **disconnect all power to the unit**.
B.   Use full *electrostatic discharge (ESD) precautions. Work at an ESD equipped bench.*
        Do not touch internal components other than those required because human contact
        can cause electronic components to fail.
C.   Remove lid, along with RS-232-C interface board.
D.   Select settings as required, please refer to table below.
        For location of setting switches see instrument handbook.

SWITCH	FUNCTION	OFF	ON	FACTORY SETTING
SW1(1)	Parity enable	Even parity	Odd parity	
SW1(2)	Character length switch	8 data bits	7 data bits	8 data bits
SW1(3)	To be in OFF position	YES	-	Set OFF
SW1(4)	Stop bit select	2 stop bits	1 stop bit	2 stop bits
SW1(5)	Parity inhibit	Inhibits parity generation	Parity selected by SW1A	OFF for no parity

E.   Replace lid and screws before turning 'ON'.

PIN CONNECTIONS

Pin 1	Protective ground (case)
Pin 2	Transmitted data (from ETS/DTS/TWA)
Pin 4	Print signal, request to send (To ETS/DTS/TWA)
Pin 7	Signal ground
Pin 25	+5 volts (from ETS/DTS/TWA). WARNING – Not for powering external devices.

WHEN IS SERIAL DATA SENT ?

1	Press 'MEMORY RESET'.
2	When auto reset function activates.
3	The request to send (RTS) is taken high (PIN 25 is shorted to PIN 4 via a momentary switch on the RS-232-C connector)

Both the measurement value and units of measurement are sent

DATA OUTPUT EXAMPLES

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

1. ETS RS-232-C OUTPUT FOR 0.5Nm TRANSDUCER DISPLAY ZERO (0.0000Nm)

SP	0	DP	0	0	0	0	SP	SP	N	SP	M	CR

2. ETS : DISPLAY ZERO (000lbf.ft)

SP	SP	SP	SP	SP	0	0	0	l	b	f	SP	f	t	CR

3. ETS DISPLAY FULL SCALE (100000 lbf.ft)

SP	SP	1	0	0	0	0	0	l	b	f	SP	f	t	CR

4. TWA 1(METRIC) : DISPLAY FULL SCALE (1.000Nm)

SP	1	DP	0	0	0	SP	SP	N	SP	m	CR

SECTION 2 (B) 'UPGRADE' ETS/DTS/TWA

An RS-232-C port is fitted as standard to all 'UPGRADE' ETS / DTS / TWA.

HOW TO IDENTIFY

    (i)   Made after April 1994 and before December 1995.
    (ii)   Use of a 9 way D socket as RS-232-C output connector.
    (iii)   The power ON/OFF switch is on the back panel.
    (iv)   Model numbers 40300 to 40315 (for ETS) and 43100 to 43139 (for TWA/DTS)

DIRECTLY COMPATIBLE PRODUCTS

PRODUCT	PART NUMBER
Norbar Data Printer	60057
Lead for Printer (9 way D to 25 way D)	61083
Print Inhibit Controller	60144

SPECIFICATION

Data rate	1200 baud (fixed)
selectable parameters	Parity, start and stop bits
Maximum number of characters per line	17
Transmitted data voltage levels	+9 volts to −9 volts
Print signal 'HIGH' value	+3 volts to +20 volts DC
Output connector	9 way D socket

CONTROL WORD

The control word settings are found internally on the main circuit board, to make changes complete the following :

A.   Ensure instrument is switched OFF and **disconnect all power to the unit**.
B.   Use full *electrostatic discharge (ESD) precautions. Work at an ESD equipped bench.*
            Do not touch internal components other than those required because human contact
            can cause electronic components to fail.
C.   Remove lid, along with internal battery pack (if fitted).
D.   Select settings by referring to the table below. (There is a switch setting diagram located
            on the power inlet socket within the instrument.) All switches are factory set OFF.

SWITCH 2	FUNCTION	OFF	ON
2-1.	RESOLUTION SELECTION (NUMBER OF DIGITS)	Standard 5	Reduced 4
2-2.	Not for user selection, DO NOT CHANGE	FACTORY SET	
2-3.	UNITS OF MEASUREMENT OUTPUT WITH RS- 232-C CHARACTER STREAM	Output units	Inhibit units

SWITCH 5	FUNCTION	OFF	ON
5-1	RS-232-C CONTROL WORD PARITY	EVEN	ODD
5-2	RS-232-C CONTROL WORD PARITY	NO PARITY	PARITY ON
5-3	RS-232-C CONTROL WORD CHARACTER LENGTH	8	7
5-4	RS-232-C CONTROL WORD STOP BITS	2	1
5-5	RS-232-C LEADING '+' CHARACTER	INHIBIT +	OUTPUT +

E.   Replace lid and screws before turning 'ON'.

PIN CONNECTIONS

NOTE : The pin configuration used on this connector is to Norbar standard.

PIN NUMBER	FUNCTION
1	Protective ground (case)
2	Transmitted data (from ETS / DTS / TWA)
3	Arm LED for print inhibit option
4	Print signal, request to send (To ETS / DTS / TWA)
5	Arm switch for print inhibit option
6	Mode switch for print inhibit option
7	Signal ground 0V
8	+ 5 volts (from ETS / DTS / TWA). WARNING: Not for powering external devices
9	+ 10 volts (from ETS / DTS / TWA). WARNING: Not for powering external devices

NOTE: If Pin 9 is shorted to Pin 4 (via a momentary switch) data will be transmitted on Pin 2 each time the switch is made and released. Up to 5 outputs per second can be requested in this way.

WHEN IS SERIAL DATA SENT ?

1	Press 'MEMORY RESET'.
2	When auto reset function activates.
3	The request to send (RTS) is taken high (PIN 9 is shorted to PIN 4 via a momentary switch on the RS-232-C connector).

Both the measurement value and units of measurement are sent

DATA OUTPUT EXAMPLES

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

1. Using a DTS with 5Nm torque transducer set to the standard data string. Reading 4.9924 Nm.

4	DP	9	9	2	4	SP	N	m	SP	SP	SP	SP	SP	SP	CR

2. Using TWA 2800 set to the standard data string. Reading 26505 lbf.in.

2	6	5	0	5	SP	l	b	f	SP	i	n	SP	SP	CR

3. Using TWA 100, with a modified data string giving a '+' at the start and no units of measurement.
Reading 34.227 Nm.

+	3	4	DP	2	2	7	CR

NOTE: During the life of the 'UPGRADE' ETS/DTS/TWA there was a change to bring the units of measurement into line with ISO 1000:1992 (BS 5555:1993).

SECTION 2 (C) 'CE MARKED' ETS/DTS/TWA

An RS-232-C port is fitted as standard to all 'CE MARKED' ETS / DTS / TWA instruments.

HOW TO IDENTIFY

(i)   Made after January 1996.
(ii)   Use of a 9 way D socket as RS-232-C output connector.
(iii)   Model numbers 40320 to 40327 (ETS) & 43150 to 43172 (TWA/DTS)
(iv)   The CE mark on the back panel.

DIRECTLY COMPATIBLE PRODUCTS

PRODUCT	PART NUMBER
Norbar Data Printer	60164
Lead for Printer (9 way D to 9 way D)	61086
Print Inhibit Controller	60167

SPECIFICATION

Data rate	1200 baud (fixed)
Selectable parameters	Parity, start and stop bits
Maximum number of characters per line	17
Transmitted data voltage levels	+9 volts to −9 volts
Print signal 'HIGH' value	+3 volts to +20 volts DC
Maximum data stream outputs per second	5
Units of measurement	can be selected as output or inhibited
Data stream initial character option	'blank' or '+' character
Output connector	9 way D socket

CONTROL WORD

CONTROL WORD	OPTIONS	FACTORY SETTINGS
Parity	odd, even or off	no parity
data bits	7 or 8	8 data bits
stop bits	1 or 2	2 stop bits
Leading character	'blank' or '+' character	no leading '+' character

The control word settings are found internally on the main circuit board, to make changes complete the following:

A.   Ensure instrument is switched OFF and **disconnect all power to the unit**.
B.   Use full *electrostatic discharge (ESD) precautions. Work at an ESD equipped bench. Do not touch internal components other than those required because human contact can cause electronic components to fail.*
C.   Remove lid, along with internal battery pack (if fitted).
D   Select settings by referring to the table below. (There is a switch setting diagram located on the power inlet socket within the instrument.) All switches are factory set OFF.

SWITCH 2	FUNCTION	OFF	ON
2-1.	RESOLUTION SELECTION (NUMBER OF DIGITS)	Standard 5	Reduced 4
2-2.	Not for user selection, DO NOT CHANGE	FACTORY SET	
2-3.	UNITS OF MEASUREMENT OUTPUT WITH RS- 232-C CHARACTER STREAM	Output units	Inhibit units

SWITCH 5	FUNCTION	OFF	ON
5-1	RS-232-C CONTROL WORD PARITY	EVEN	ODD
5-2	RS-232-C CONTROL WORD PARITY	NO PARITY	PARITY ON
5-3	RS-232-C CONTROL WORD CHARACTER LENGTH	8	7
5-4	RS-232-C CONTROL WORD STOP BITS	2	1
5-5	RS-232-C LEADING '+' CHARACTER	INHIBIT +	OUTPUT +

E.   Replace lid and screws before turning 'ON'.

PIN CONNECTIONS
The pin configuration used on this connector is to IBM industrial standard pin configuration.

PIN NUMBER	FUNCTION
1	Arm LED for print inhibit option
2	No connection
3	Transmitted data (from ETS/DTS/TWA)
4	Mode switch for print inhibit option
5	Signal ground 0V
6	Arm switch for print inhibit option
7	Request to send (To ETS/DTS/TWA).
8	+ 5 volts (from ETS/DTS/TWA). WARNING: Not for powering external devices
9	+ 10 volts (from ETS/DTS/TWA). WARNING: Not for powering external devices
SHELL	PROTECTIVE GROUNG

NOTE: If Pin 9 is shorted to Pin 7 (via a momentary switch) data will be transmitted on Pin 3 each time the switch is made and released. Up to 5 outputs per second can be requested in this way.

WHEN IS SERIAL DATA SENT ?

1	Press 'MEMORY RESET'.
2	When auto reset function activates.
3	The request to send (RTS) is taken high (PIN 9 is shorted to PIN 7 via a momentary switch on the RS-232-C connector)

Both the measurement value and units of measurement are sent

DATA OUTPUT EXAMPLES

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

1. Using ETS with 5 N.m torque transducer set to the standard data string. Reading 4.9924 Nm.

4	DP	9	9	2	4	SP	N	SP	m	SP	SP	SP	SP	SP	CR

2. Using ETS with 1 Tonne load transducer set to the standard data string. Reading 0.6993 Tonne.

0	DP	6	9	9	3	SP	t	o	n	n	e	f	SP	SP	CR

3. Using ETS with 1000 lbf.ft torque transducer, with modified data string giving a '+' at the start and no units of measurement. Reading 724.4 lbf.ft.

+	7	2	4	DP	4	CR

SECTION 3   TRS

An RS-232-C port is a fitted as standard to all TRS instruments.

HOW TO IDENTIFY

All Transducer Read-Out systems (TRS) in the TRS600 range.

DIRECTLY COMPATIBLE PRODUCTS

PRODUCT	PART NUMBER
Norbar Data Printer	60164
Lead for Printer (9 way D to 9 way D)	38645

Print Inhibit Controllers are not compatible.

SPECIFICATION

Data rate	1200 baud (fixed)
selectable parameters	None
Output connector	4 way HRS socket

CONTROL WORD

The TRS has a fixed control word.

CONTROL WORD (FIXED)	FACTORY SETTINGS
Parity	no parity
data bits	8 data bits
stop bits	2 stop bits

The receiving equipment must be compatible with these parameters.

PIN CONNECTIONS

PIN	1	2	3	4
DESCRIPTION	Ground	TxD (Transmit)	Ground	RxD (Receive)

WHEN IS SERIAL DATA SENT ?

SEND SINGLE READING	
1	Memory Down Load is pressed in Memory Store.
2	The Memory Store key is pressed in Peak Hold mode.
3	When auto reset operates in Auto Reset mode.

SEND FULL MEMORY CONTENTS
Press MEMORY DOWN LOAD.
All 50 memorised readings will be down loaded in the order they were stored. If not all 50 of the memory locations have been used, the unused locations will be sent as zeros. It is possible to eliminate the unused zeros by setting your program to accept only the number of readings you require.

DATA OUTPUT

Data appears in the form "± 9999" (with a decimal point in the required position) followed by a carriage return.

DATA LEAD

The correct data lead will be required to link with the chosen data receiver.

RS-232-C INTERFACE LEAD FOR COMPUTER USE (38645)

TRS OUTPUT HRS PLUG	FUNCTION	9 PIN SOCKET
1	Ground (Red)	Shell
2	Transmit (Blue)	3
3	Ground (Green)	5
4	Receive (Yellow)	2
Shell	Screen	Shell

RS-232-C INTERFACE LEAD FOR PSION USE (38644)

TRS OUTPUT HRS PLUG	FUNCTION	25 WAY D PLUG
1	Ground (Red)	1
2	Transmit (Blue)	3
3	Ground (Green)	7
4	Receive (Yellow)	2
Shell	Screen	Shell

SECTION 4 (A) PRO-TEST

An RS-232-C port is fitted as standard to all PRO-TEST instruments.

HOW TO IDENTIFY
All Pro-Test instruments from model 43180 to model 43190.

DIRECTLY COMPATIBLE PRODUCTS

PRODUCT	PART NUMBER
Norbar Data Printer	60164
Lead for Printer (9 way D to 9 way D)	61086
Print Inhibit Controller	60167

SPECIFICATION

Data rate	1200 baud (fixed)
Selectable parameters	Parity, data bits and stop bits
Maximum number of characters per line	17
Transmitted data voltage levels	+9 volts to −9 volts
Print signal 'HIGH' value	+3 volts to +20 volts DC
Output connector	9 way D socket
Maximum data stream outputs per second	5
Units of measurement	can be selected for output or inhibited
Data stream initial character option	'blank' or '+' character

CONTROL WORD

CONTROL WORD	OPTIONS	FACTORY SETTING
Parity	odd, even or off	no parity
data bits	7 or 8	8 data bits
stop bits	1 or 2	2 stop bits
Leading character	'blank' or '+' character	no leading '+' character

The RS-232-C is setup via a menu option. Press 'SELECT UNITS' and 'PRINT' simultaneously then release.
The third menu is for RS-232-C parameters. For full information see Pro-test handbook.

PIN CONNECTIONS

PIN NUMBER	FUNCTION
1	Arm LED for print inhibit option.
2	Received data (to Pro-Test).
3	Transmitted data (from Pro-Test).
4	Mode switch for print inhibit option.
5	Signal ground 0V.
6	Arm switch for print inhibit option.
7	Request to send to Pro-Test (Low to High transition).
8	+ 5 volts (from Pro-Test) WARNING: Not for powering external devices.
9	Calibration Mode Enable input (Active Low).
Shell	Screen

WHEN IS SERIAL DATA SENT ?

1	Press 'MEMORY RESET'.('PRINT' in track mode).
2	When auto reset function activates.
3	The request to send (RTS) is taken high (PIN 9 is shorted to PIN 7 via a momentary switch on the RS-232-C connector).

Both the measurement value and units of measurement are sent

DATA OUTPUT EXAMPLES

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

1. Using the Pro-Test 400 set to the standard data string. Reading 368.4 N m (clockwise).

| 3 | 6 | 8 | DP | 4 | SP | N | DP | m | CR |

2. Using the Pro-Test 400 set to the standard data string. Reading 45.2 N m (anti-clockwise).

| - | 4 | 5 | DP | 2 | SP | N | DP | m | CR |

3. Using the Pro-Test 1500 set to the standard data string. Reading 1108 lbf ft (clockwise).

| 1 | 1 | 0 | 8 | SP | l | b | f | DP | f | t | CR |

SECTION 4 (B) PRO-TEST SERIES 2

An RS-232-C port is fitted as standard to all PRO-TEST series 2 instruments.

HOW TO IDENTIFY
All Pro-Test Series 2 instruments from model 43218 to model 43220.
These are manufactured after January 2005. The serial port is fitted with a plug and a serial lead to a computer is supplied with the instrument.

SPECIFICATION

Maximum number of characters per line	24
Transmitted data voltage levels	+5 to +9 volts and –5 to -9 volts
Output connector	9 way D plug

CONTROL WORD

CONTROL WORD	OPTIONS	FACTORY SETTING
Parity	odd, even or off	OFF
Baud rate	1200, 2400, 4800, 9600 or 19200.	9600
Data bits	7 or 8	8 data bits
Stop bits	1 or 2	2 stop bits
First character	+/- or None	None
Output units of measurement	YES or NO	YES
Output line feed	YES or NO	NO

To access the SERIAL PORT options press 'PRINT' and 'UNITS' keys simultaneously then release.
For full information see Pro-test handbook.

PIN CONNECTIONS

PIN NUMBER	FUNCTION
1	Not connected.
2	Received data (to Pro-Test Series 2)
3	Transmitted data (from Pro-Test Series 2)
4	Not connected
5	Signal ground 0V
6	Not connected
7	Not connected
8	Not connected
9	Not connected
Shell	Screen

WHEN IS SERIAL DATA SENT?

1	When 'PRINT' pressed in TRACK mode or 'ZERO pressed in other modes.
2	When the 'CLICK & CAM' mode timer operates.

The Pro-Test Series 2 has a 'PRINT / NO PRINT' function, so not requiring an external Print Inhibit Controller.

DATA OUTPUT EXAMPLE

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

1. Using the Pro-Test 400 set to the standard data string. Reading 368.4 N m (clockwise).

3	6	8	DP	4	SP	N	DP	m	CR

2. Using the Pro-Test 400 set to the standard data string. Reading 45.2 N m (anti-clockwise).

-	4	5	DP	2	SP	N	DP	m	CR

3. Using the Pro-Test 1500 set to the standard data string. Reading 1108 lbf ft (clockwise).

1	1	0	8	SP	l	b	f	DP	f	t	CR

SECTION 5   PRO-LOG

A serial port is fitted as standard to all Pro-Log instruments.

HOW TO IDENTIFY

All model numbers 40330.SE & 40330.NE.

DIRECTLY COMPATIBLE PRODUCTS

PRODUCT	PART NUMBER
Norbar Data Printer	60164
Lead for Printer (9 way D to 9 way D)	61086

NOTE : The Pro-Log has a built in 'LOG/NO LOG' function, so not requiring an external Print Inhibit Controller.

SPECIFICATION

Maximum number of characters per line	24
Transmitted data voltage levels	+5 to +9 volts and –5 to -9 volts
Output connector	9 way D socket
Maximum number of requests per second in track mode	1 every 2 seconds

CONTROL WORD

CONTROL WORD	OPTIONS	FACTORY SETTING
Parity	odd, even or off	OFF
Baud rate	1200, 2400, 4800, 9600 or 19200.	9600
Data bits	7 or 8	8 data bits
Stop bits	1 or 2	2 stop bits
First character	+/- or None	None
Output units of measurement	YES or NO	YES
Output line feed	YES or NO	NO
Handshake	NONE, CTS or X-ON/OFF	None
Line delay	X.XX Seconds	0.50 Seconds

The serial port is setup via menu options, follow 'SETUP / CURRENT SETTINGS / SERIAL PORT' from welcome screen.

To return to factory settings use the 'SET TO FACTORY DEFAULTS' function.

PIN CONNECTIONS

PIN NUMBER	FUNCTION
1	Not connected
2	Received data (to Pro-Log)
3	Transmitted data (from Pro-Log)
4	Not connected
5	Signal ground 0V
6	Not connected
7	Not connected
8	CTS (clear to send)
9	Not connected
Shell	Screen

WHEN IS SERIAL DATA SENT ?

1	Press 'MEMORY RESET'.('PRINT' in track mode)
2	When auto reset function activates
3	The request to send (RTS) is taken high (PIN 1 is shorted to PIN 2 via a momentary switch on the ANCILLARIES connector)

Data is also sent when requested from a set up menu.

DATA OUTPUT EXAMPLE

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

DATA OUTPUT EXAMPLE:-

Using the Pro-Log with the serial port set to the factory defaults. Reading 1068.4 lbf.ft (clockwise).

1	0	6	8	DP	4	SP	l	b	f	DP	f	t	CR

SECTION 6   TST / TTT / TTL / TTL-HE

A serial port is fitted as standard to all TST (Torque Screwdriver Tester), TTT (Torque Tool Tester), TTL (Torque Tool Lite) and TTL-HE (Torque Tool Lite – Harsh Environment) instruments.

HOW TO IDENTIFY

INSTRUMENT TYPES:	SERIES 1 (TO SEPTEMBER 2003)	SERIES 2 (FROM OCTOBER 2003)
TST 2	43198	43212
TST 10	43199	43213
TST 25	43200	43214
TTT	43201	43215
TTL	-	43216
TTL-HE	-	43217

SPECIFICATION

	SERIES 1	SERIES 2
Maximum number of characters per line	24	
Transmitted data voltage levels	+5 to +9 volts and –5 to -9 volts	
Output connector	9 way D socket (**Note 1**)	
Maximum number of requests in track mode	1 every 2 seconds	1 every 3 seconds

Note 1: From 2005 a plug connector is fitted and a serial lead to a computer is supplied with the instrument. The TTL-HE has a LEMO® connector, refer to instrument handbook.

CONTROL WORD

CONTROL WORD	OPTIONS	FACTORY SETTING
Parity	odd, even or off	OFF
Baud rate	1200, 2400, 4800, 9600 or 19200.	9600
Data bits	7 or 8	8 data bits
Stop bits	1 or 2	2 stop bits
First character (**Note 2**)	+/- or None	None
Output units of measurement	YES or NO	YES
Output Date & Time	YES or NO	NO
Output line feed	YES or NO	NO
Handshake	NONE, CTS or X-ON/OFF	None
Line delay	0.00 to 9999 seconds	0.50 Seconds
Continuous output (**Note 3**)	YES or NO	NO

Note 2: The 'First Character' feature is available on all TST, TTT, TTL & TTL-HE instruments. The Series 2 instruments use the 'First Character' to have an additional effect on the LO / OK / HI characters send when using limits. The following table gives all options for the FIRST CHARACTER setting:

FIRST CHARACTER:	DIRECTION:	EXAMPLE WITH NO LIMITS	EXAMPLE WITH LIMITS
+/-	Clockwise	+1.0335 N.m	+1.0335 N.m
	Anti Clockwise	-1.0335 N.m	-1.0335 N.m
NONE	Clockwise	1.0335 N.m	LO 1.0335 N.m
	Anti Clockwise	-1.0335 N.m	LO-1.0335 N.m

Note 3: The 'Continuous Output' feature is only available on the Series 2 instruments. If set to 'YES' the instrument will send up to 11 readings per second in track mode. Use the 'Line Delay' setting to regulate the speed of the continuous output.

The serial port is setup via menu options, follow 'SETUP / CURRENT SETTINGS / SERIAL PORT' from the welcome screen.

To return to factory settings use the 'SET TO FACTORY DEFAULTS' function.

PIN CONNECTIONS

NOTE: For TTL-HE refer to instrument handbook.

PIN NUMBER	FUNCTION
1	Not connected.
2	Received data (to TST / TTT / TTL)
3	Transmitted data (from TST / TTT / TTL)
4	Not connected
5	Signal ground 0V
6	Not connected
7	Not connected
8	CTS (clear to send)
9	Not connected
Shell	Screen

WHEN IS SERIAL DATA SENT?

1	When 'RESET / PRINT' is pressed
2	When the 'CLICK & CAM' mode timer operates.
3	When the External memory reset / print is taken high (PIN 1 is shorted to PIN 2 via a momentary switch on the ANCILLARIES connector)

The TST, TTT, TTL & TTL-HE have a 'PRINT / NO PRINT' function , so not requiring an external Print Inhibit Controller.

Data is also sent when requested from a set up menu.

DATA OUTPUT EXAMPLE

SP=Space   DP=Decimal Point (or full stop)   CR=Carriage Return

DATA OUTPUT EXAMPLE:-

Using the TST / TTT / TTL / TTL-HE with the serial port set to the factory defaults. Reading 1068.4 lbf.ft (clockwise).

1	0	6	8	DP	4	SP	l	b	f	DP	f	t	CR

SECTION 7   USM 1 / USM 2

A serial port is fitted as standard to all USM 1 & USM 2 instruments.

NOTE: The USM 1 & USM 2 instruments are supplied with a serial lead (Part 61116) as standard.
The serial port is wired as DCE, so is different to other Norbar products.
Always use the serial lead supplied with the instrument.

HOW TO IDENTIFY

INSTRUMENT TYPE	MODEL NUMBER
USM 1	40331
USM 2	40333

SPECIFICATION

Transmitted data voltage levels	+5 to +10 volts and –5 to -10 volts
Output connector	9 way D socket
Serial lead 61116	9 way plug to 9 way socket. Pin 1-1, 2-2, 3-3, etc.

CONTROL WORD

CONTROL WORD	OPTIONS
Parity	None
Baud rate	9600
Data bits	8
Stop bits	1 or 2

PIN CONNECTIONS

PIN NUMBER	FUNCTION
1	Not connected.
2	Transmitted data (from USM)
3	Received data (to USM)
4	Not connected
5	Signal ground 0V
6	Not connected
7	Not connected
8	Not connected
9	Not connected
Shell	Screen

WHEN IS SERIAL DATA SENT?

Using the 'SEND' feature allows reports to be sent to a computer and bolt groups to be backed up to a computer and restored from a computer.

APPENDIX A   DATA LEAD KIT

The data lead kit is designed to connect all CE marked ETS/DTS/TWA, Pro-Test, Pro-Log and TST/TTT/TTL instruments to a computer or serial printer. Two versions of this kit have been available:

The current version is Part number 60248 and consists of:

PART NUMBER 39264. Serial data lead with null modem 9 way D socket to 9 way D socket.									
9 way D socket		2	3	4	5	6	7	8		Shell
9 way D socket		3	2	6	5	4	8	7		Shell

PART NUMBER 38897. Serial data lead 9 way D socket to 25 way D plug. 2M long.							
9 way D socket		2	3		5	6 & 8			Shell
25 way D plug		2	3		7	20			Shell

PART NUMBER 38900. Gender changer 25 way D socket to 25 way D socket.
This will allow two 25 way D plugs to be interfaced.

PART NUMBER 38903. Gender changer 9 way D plug to 9 way D plug.
This will allow two 9 way D sockets to be interfaced.

Connect Norbar instrument to computer / serial printer using correct lead.
Use a gender changer if required.

The previous version, part number 60229, is obsolete. This kit consisted of:

PART NUMBER 38897. Serial data lead 9 way D socket to 25 way D plug. 2M long									
9 way D socket	1	2	3	4	5	6 & 8	7	9	screen
25 way D plug	4	2	3	5 & 6	7	20	8	not used	screen

PART NUMBER 38898. Serial data lead 9 way D socket to 9 way D plug.									
9 way D socket	1	2	3	4	5	6	7	8	9	screen
9 way D plug	1	2	3	4	5	6	7	8	9	screen

PART NUMBER 38899. Null Modem.									
9 way D Socket	1 & 6	2	3	4	5	7	8	9	screen
9 way D Plug	4	3	2	1 & 6	5	8	7	not used	screen

PART NUMBER 38900. Gender changer 25 way D socket to 25 way D socket.
This will allow two 25 way D plugs to be interfaced.

PART NUMBER 38903. Gender changer 9 way D plug to 9 way D plug.
This will allow two 9 way D sockets to be interfaced.

EXAMPLE OF SENDING DATA FROM A NORBAR PRODUCT TO A COMPUTER.		
From:	To:	Kit parts required:
CE marked ETS/DTS/TWA or Pro-Test or Pro-Log or TST/TTT/TTL	Computer with Com port having 9 way D plug.	Null modem (38899) 9 way D to 9 way D lead (38898)
	Computer with Com port having 25 way D plug.	Gender changer (38903) 9 way D to 25 way D lead (38897) Gender changer (38900)

APPENDIX B   PRINTERS

HISTORY OF NORBAR PRINTERS

Two versions of serial data printers have been produced:

VERSION	PART NUMBER	DISTINGUISHING FEATURES	HANDBOOK PART NUMBER
'ORIGINAL' Printer	60057	Black plastic front	34136
'CE-MARKED' Printer	60164	Metal door on front, CE marked	34219

SPARE PARTS AVAILABLE

ITEM	SPECIFICATION	PART NUMBER
Paper roll	57mm (w) x 19mm (L) x 50mm OD	38341
Ink ribbon	Purple cartridge	38342

For paper or ink replacement please consult printer handbook.

SPECIFICATIONS

PART NUMBER	60057 (ORIGINAL)	60164 (CE MARKED)
Print rate	1.7 lines/second	2.5 lines per second
Data control word (factory set)	1200 baud rate 8 Data bits 2 Stop bits No parity	1200 baud rate 8 Data bits 2 Stop bits no parity
Number of columns	24	24
Character matrix	5x7 dots	5 x 7 dots
Character set	64 character ASCII	64 character ASCII

INPUT CONNECTOR DETAILS

PARAMETER	60057 (ORIGINAL)	60164 (CE MARKED)
Connector type	25 way D	9 way D
Received data	Pin 2	Pin 2
Signal ground	Pin 7	Pin 5
Request to send (from print button on printer)	Pin 4	Pin 7

NON-NORBAR PRINTERS

Any printer with a serial input and the correct control word (or capability of selecting the correct control word) can be used with a Norbar instrument.

For selecting printer control word details see printer handbook.

Ensure the Norbar instrument's control word and printer's control word match exactly.

APPENDIX C   PRINT INHIBIT CONTROLLERS

The print inhibit controller is a remote, hand held device for controlling the serial data output from the ETS, DTS, TWA, or PRO-TEST.
A Print Inhibit Controller is specific to one type of ETS / TWA / DTS and cannot be interchanged between 'ORIGINAL', 'UPGRADE' AND 'CE-MARKED' systems.

PRINT INHIBIT CONTROLLER VERSION	'ORIGINAL' ETS/DTS/TWA	'UPGRADE' ETS/DTS/TWS	'CE-MARKED' ETS/DTS/TWA & PRO-TEST
Model number	60151	60144	60167
ETS/DTS/TWA connector	25 way D plug	9 way D plug	9 way D plug
Printer / computer connector	25 way D socket	25 way D socket	9 way D socket
Compatible with Data Printer	60057	60057	60164

PRINT INHIBIT CONTROLLER FOR 'ORIGINAL' PRODUCTS (60151)

This Print Inhibit Controller has an electronic circuit board built in. For compatibility, the instrument requires a modifiedRS-232-C printed circuit board. These modifications are not covered in this guidebook.

PRINT INHIBIT CONTROLLER FOR 'UPGRADE' PRODUCTS (60144)

9 WAY D PLUG (COLOUR)	FUNCTION
Pin 1 (Screen)	Screen of leads
Pin 2 (Yellow)	Pin 2 of 25 way D socket
Pin 3 (Blue)	Arm LED on hand controller
Pin 4 (Green)	Pin 4 of 25 way D socket
Pin 5 (Green)	Control switch of hand controller
Pin 6 (Yellow)	Arm button of hand controller
Pin 7 (Black)	Pin 7 of 25 way D socket
Pin 8 (Red)	Power for hand controller
Pin 9 (Red)	Pin 25 of 25 way D socket

PRINT INHIBIT CONTROLLER FOR 'CE MARKED' PRODUCTS (60167)

9 WAY D PLUG (COLOUR)	FUNCTION
Screen of hood	Screen of case & screen of both 9 way hoods
Pin 1 (Blue)	Arm LED on hand controller
Pin 2	Not used
Pin 3 (Yellow)	Pin 2 of 9 way D socket
Pin 4 (Green)	Control switch of hand controller
Pin 5 (Black)	Pin 5 of 9 way D socket
Pin 6 (Yellow)	Arm button of hand controller
Pin 7 (Green)	Pin 7 of 9 way D socket
Pin 8 (Red)	Power for hand controller
Pin 9 (Red)	Pin 9 of 9 way D socket

APPENDIX D   LEADS

CHOOSING A CONNECTING LEAD

SOURCE	DESTINATION DEVICE	LEAD TO USE
'ORIGINAL' ETS/DTS/TWA	ORIGINAL PRINTER	60065
	CE MARKED PRINTER	61118
'UPGRADE' ETS/DTS/TWA	ORIGINAL PRINTER	61083
	CE MARKED PRINTER	61091
'CE MARKED' ETS / DTS / TWA, Pro-Test, Pro-Log or TST / TTT / TTL.	ORIGINAL PRINTER	60186
	CE MARKED PRINTER	61086
	COMPUTER	DATA LEAD KIT. See Appendix A

60065 LEAD FROM 'ORIGINAL' ETS/DTS/TWA TO ORIGINAL PRINTER.

25 WAY D PLUG	Pin 1	Pin 2	Pin 4	Pin 7	Pin 25
LEAD (0.7 M APPROX.)	Screen	Data (Yellow)	RTS (Black)	0V (Green)	+V (Red)
25 WAY D SOCKET	Pin 1	Pin 2	Pin 4	Pin 7	Pin 25

60186 LEAD FROM 'CE MARKED' ETS/DTS/TWA TO ORIGINAL PRINTER

9 WAY D PLUG	Hood	Pin 3	Pin 5	Pin 7	Pin 9
LEAD (0.5 M APPROX.)	Screen	Data (Yellow)	OV (Black)	RTS (Green)	+V (Red)
25 WAY D SOCKET	Hood	Pin 2	Pin 7	Pin 4	Pin 25

61083 LEAD FROM 'UPGRADE' ETS/DTS/TWA TO ORIGINAL PRINTER

9 WAY D PLUG	Pin 1	Pin 2	Pin 4	Pin 7	Pin 9
LEAD (0.65 M APPROX.)	Screen	Data (Yellow)	RTS (Green)	OV (Black)	+V (Red)
25 WAY D SOCKET	Not connected	Pin 2	Pin 4	Pin 7	Pin 25

61086 LEAD FROM 'CE MARKED' ETS/DTS/TWA TO CE MARKED PRINTER.

9 WAY D PLUG	Hood	Pin 3	Pin 5	Pin 7	Pin 9
LEAD (0.5 M APPROX.)	Screen	Data (Yellow)	OV (Black)	RTS (Green)	+V (Red)
9 WAY D SOCKET	Hood	Pin 2	Pin 5	Pin 7	Pin 9

61091 LEAD FROM 'UPGRADE' ETS/DTS/TWA TO CE MARKED PRINTER.

9 WAY D PLUG	Hood	Pin 2	Pin 7	Pin 4	Pin 9
LEAD	Screen	Data (Yellow)	0V (Black)	RTS (Green)	+V (Red)
9 WAY D SOCKET	Hood	Pin 2	Pin 5	Pin 7	Pin 9

61118 LEAD FROM 'ORIGINAL' ETS/DTS/TWA TO CE MARKED PRINTER

25 WAY D PLUG	Hood	Pin 2	Pin 7	Pin 4	Pin 25
LEAD	Screen	Data (Yellow)	0V (Black)	RTS (Green)	+V (Red)
9 WAY D SOCKET	Hood	Pin 2	Pin 5	Pin 7	Pin 9

APPENDIX E   MITUTOYO COMPATIBILITY

MITUTOYO PRODUCTS COMPATIBLE WITH NORBAR INSTRUMENTS
The following products are directly compatible   DP3DX
                                                  DP7
                                                  QM1000
                                                  QM5000

For current range of Mitutoyo data processors consult your local representative.
For more information please consult your Mitutoyo data processor manual.
MITUTOYO is a registered trademark of Mitutoyo (UK) Ltd.

NORBAR PRODUCT COMPATIBILITY WITH MITUTOYO

Not compatible	'ORIGINAL' ETS/TWA/DTS
Compatible	'UPGRADE' ETS / TWA / DTS. 'CE MARKED' ETS / TWA / DTS. PRO-TEST. PRO-LOG. TST, TTT & TTL.

SPECIAL REQUIREMENTS OF MITUTOYO DATA COLLECTORS

For DP3DX, DP7, QM1000 and QM5000 families, the units of measurement must be inhibited.
For DP3DX and DP7 families, a '+' character must be added to the start of the data stream.

Consult the Norbar product handbook to enable these provisions to be set.

WIRING NORBAR TO MITUTOYO PRODUCTS

'UPGRADE' ETS / TWA / DTS

RS-232-C OUTPUT	Pin 1	Pin 2	Pin 7
	Lead screen		
MITUTOYO DP7 SERIAL PORT INPUT		Pin 3	Pin 7

For DP3DX or DP7 link PINS 1 & 5 and link PINS 4 & 8 on MITUTOYO input.

For QM5000 link PINS 4 & 5 and link PINS 6 & 8 on MITUTOYO input.

'CE MARKED' ETS / TWA / DTS / PRO-TEST / PRO-LOG / TST / TTT / TTL

RS-232-C OUTPUT	Connector cover	Pin 3	Pin 5
	Lead screen		
MITUTOYO DP7 SERIAL PORT INPUT		Pin 3	Pin 7

For DP3DX or DP7 link PINS 1 & 5 and link PINS 4 & 8 on MITUTOYO input.

For QM1000 or QM5000 link PINS 4 & 5 and link PINS 6 & 8 on MITUTOYO input.

APPENDIX F   USING HYPERTERMINAL

HyperTerminal is free software supplied with Microsoft Windows™. It allows your computer to collect and display data from its COM (serial data) Port. The following instructions were compiled using Windows™ 95, other versions may differ slightly.

Computer requirements

A spare serial communications (COM) port on your computer. This is usually a 9 way D plug or a 25 way D plug.

Connections requirements

The correct lead between the Norbar instrumentation and computer port (See Appendix A for Data lead Kit).

Installing HyperTerminal

Ensure HyperTerminal is installed on the computer by:

Select START / SETTINGS / CONTROL PANEL.
Select "ADD / REMOVE PROGRAMS".
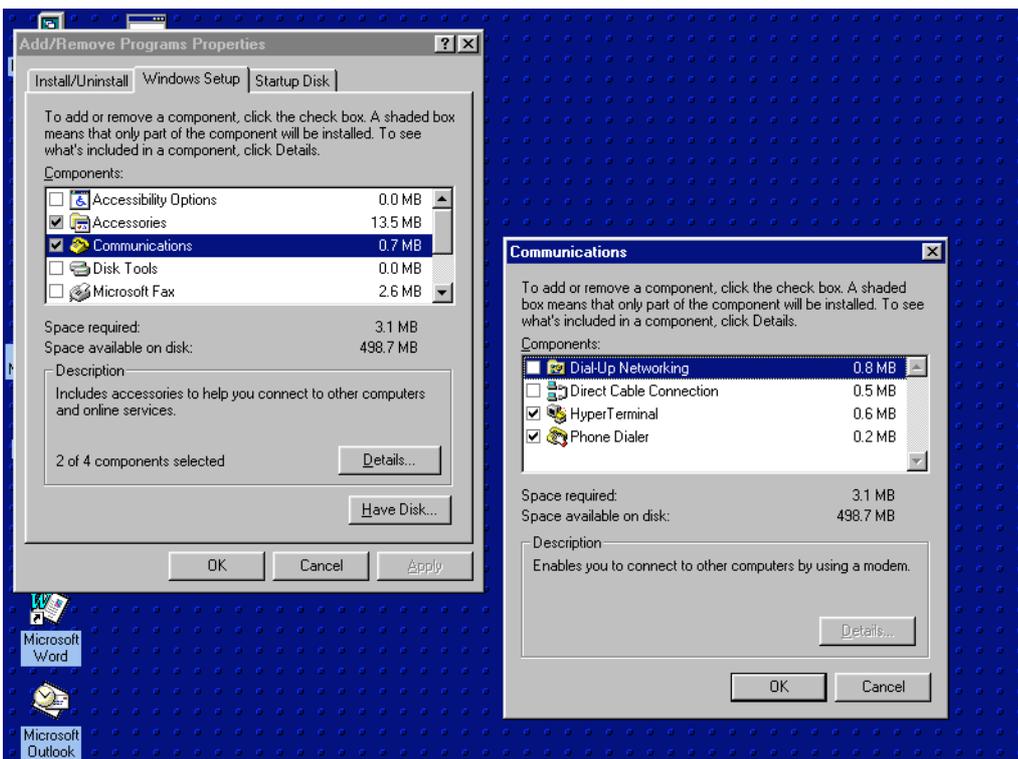
Select "WINDOWS SETUP" tab.

Select "COMMINICATIONS"

Select "HyperTerminal"

If HyperTerminal is not loaded (ticked), you will require the Microsoft Windows™ start up disk.

Follow on screen instructions.
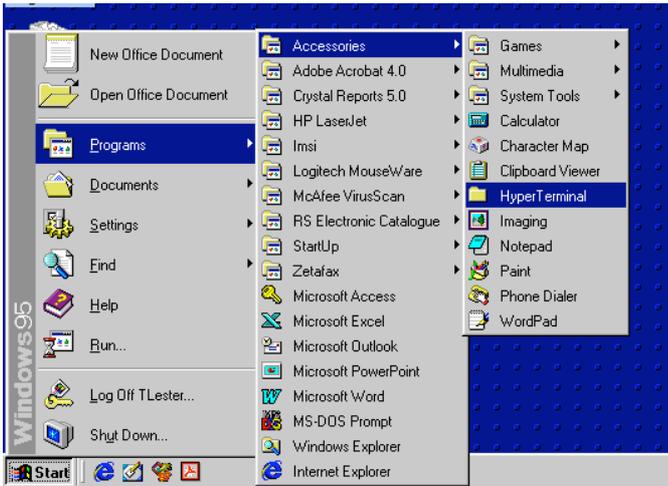
Loading HyperTerminal

Follow path of:

Start
Programs
Accessories
Communications [For windows '98 & 2000]
HyperTerminal.
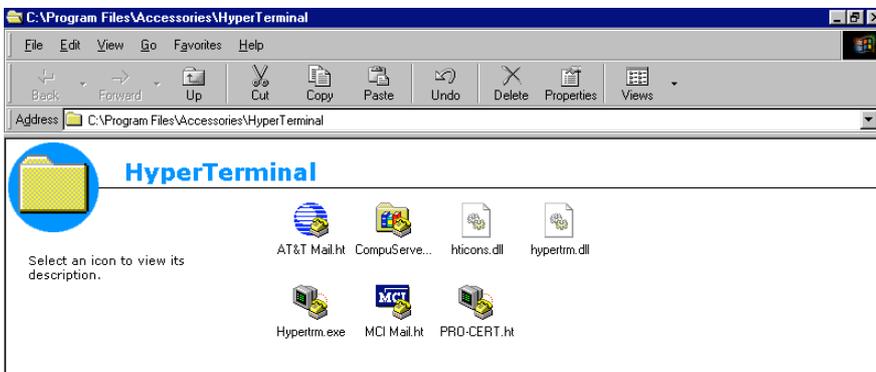
Setting up HyperTerminal

Double click on "Hypertrm.exe".

"Connection Description" window

Enter name for application, and select icon.

Click OK.

"Phone Number" window

Set "Connect using" to required COM port on computer.

Click OK.
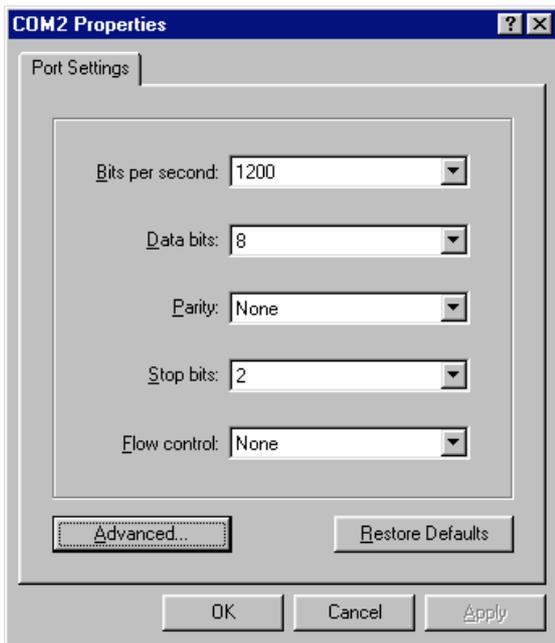
"Com X Properties" window

Port Settings	Suggested settings
Bits per second	1200 or 9600
Data bits	8
Parity	None
Stop bits	2
Flow control	None

Other port settings may be more appropriate for the instrument used.

Ensure port settings are the same as the Norbar instrument.

If a window appears:
"HyperTerminal" window – Unable to open COM X
Click OK.
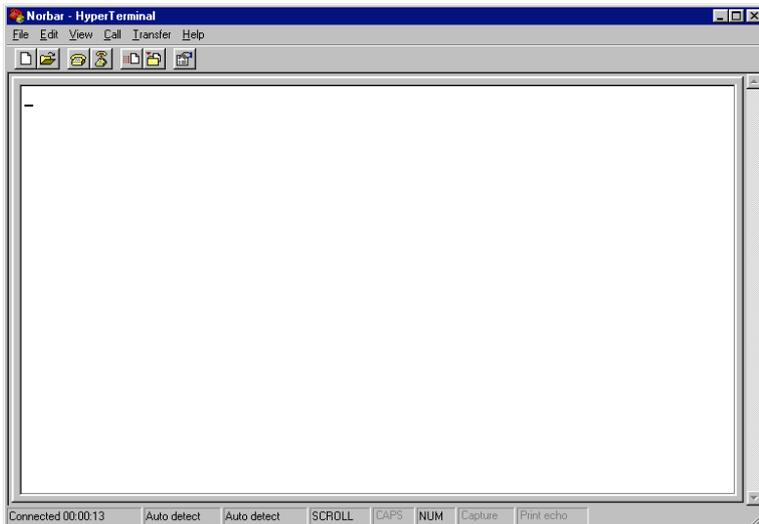
Collecting data

CONNECT - Use "telephone" icon from tool bar or select "connect" from "Call" menu.

Any send command ('PRINT' on Norbar instrument) will be displayed on HyperTerminal.

Use COPY and PASTE features to transfer readings to other computer packages (Word, Excel, etc).

DISCONNECT - Use "replace receiver" icon on tool bar or use "Call" menu.

Exit
Use "File" and Exit

Hints & Tips on using HyperTerminal

1.   Always disconnect before changing settings.

2.   The computer keyboard can control some instruments (E.g. Norbar Pro-Log).
      Ensure Caps Lock is ON.

3.   The properties may need setting to ensure correct operation.

Properties window

Select "Properties". (Either via icon on tool bar or from "File" menu at top left hand corner of window)

Under "Phone Number" tab select "Configure" to set Com port parameters, though these should already be set.

Under "Settings" tab ensure "Emulation" is set to ANSI.

Select "ASCII Setup"

Under "ASCII Receiving" tick:
√ "Append line feeds to incoming line ends"
√ "Wrap lines that exceed terminal width".

Click OK
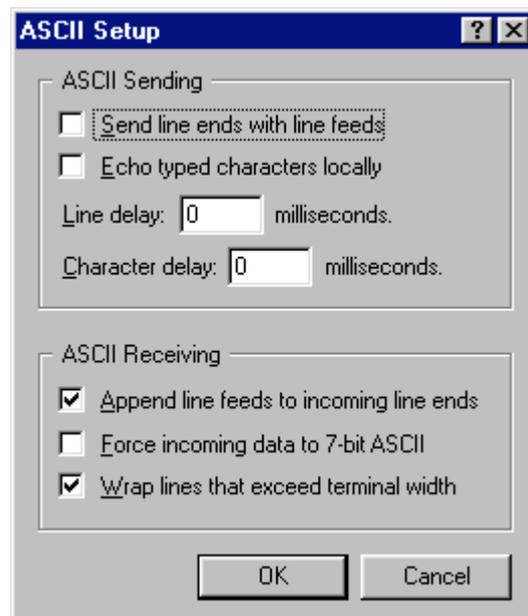
Trouble shooting

If HyperTerminal does not receive data as required double check the complete set up.
See 'Trouble shooting' appendix.
Refer to windows ™ help.

APPENDIX G   WEDGELINK

WedgeLink is a software package that accepts input data from the computer serial port and passes it to an application (e.g. Serial data from torque instrument to Microsoft® word or Excel).

WHERE TO GET WEDGELINK

The WedgeLink software is available for trial & purchase via the internet at:
http://www.microridge.com/wedgelink.htm

Follow online instructions.

The WedgeLink software is NOT available from Norbar.

Norbar have evaluated the software and proved it to work with Norbar torque instruments. These notes were taken with the current version of WedgeLink software in January 2003.

USING WEDGELINK

This is a brief outline of how to use the software with Norbar instruments, for more information please read WedgeLink User Guide (on the Microridge web site) and the Norbar instrument operator's handbook.

1. Open application software to send data to (E.g. WORD, Notepad, Outlook, Excel, PowerPoint…)

2. Open "WedgeLink".

3. Set serial port by following "Setup" / "Input Serial Port".
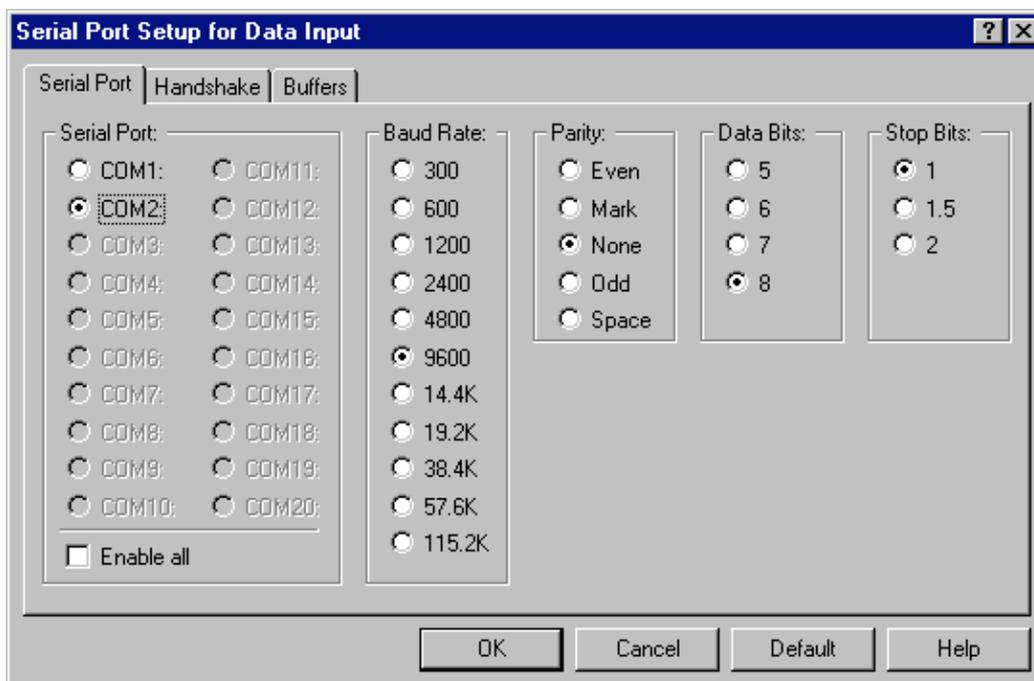
Ensure all settings are as the torque instrument sending the data.

TIP.   If the Serial Port (e.g.: COM1 or COM2) is correct the other settings should match the factory setting for most Norbar instruments.

4. Set target by following "Target" / "Get Target Application"
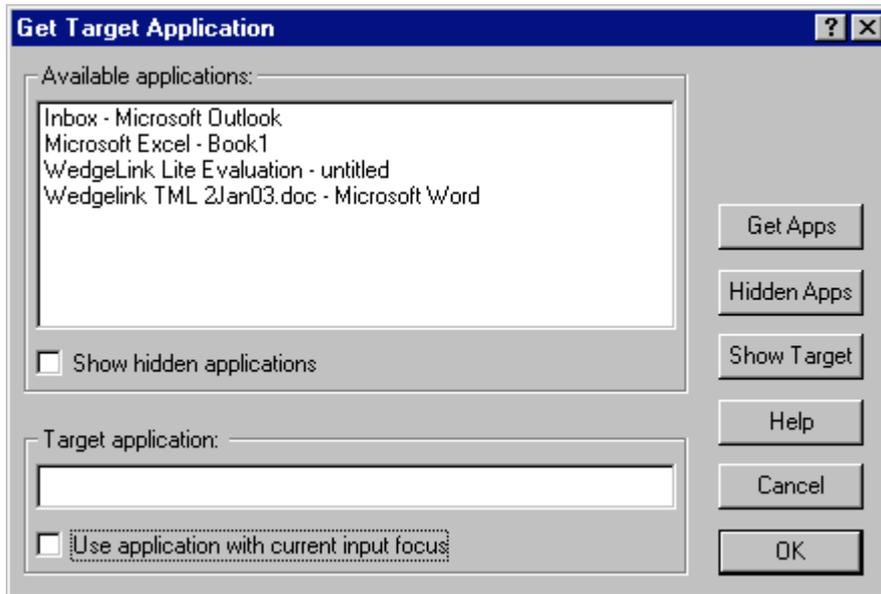
| TIP. | **Use application with current input focus** |
To send data to current application: TICK "Use application with current input focus"
To send data to a specific application: UNTICK "Use application with current input focus" & double click on application required as target.

5. To select where the data goes follow "Collect" & Enable "Send Keystrokes to Application" (or enable status light "Send to app")

6. Enable the serial port input by using "Collect" & TICK "Enable Serial Port Input" (or enable status light "Serial Port")
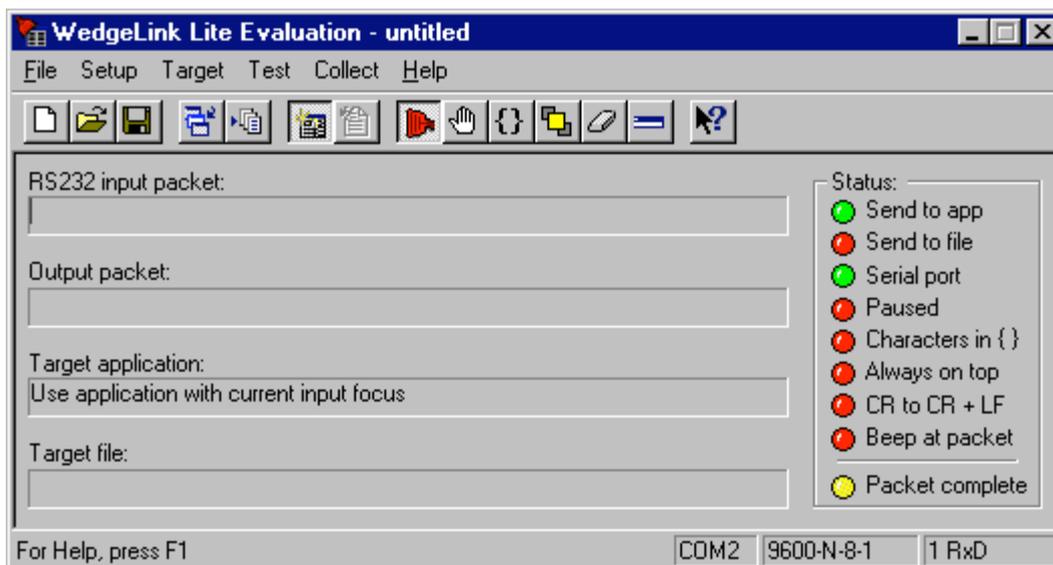
7. If problems are experienced complete the following:

a. Use the "Test" / "Serial Port" feature within WedgeLink to help fault finding.
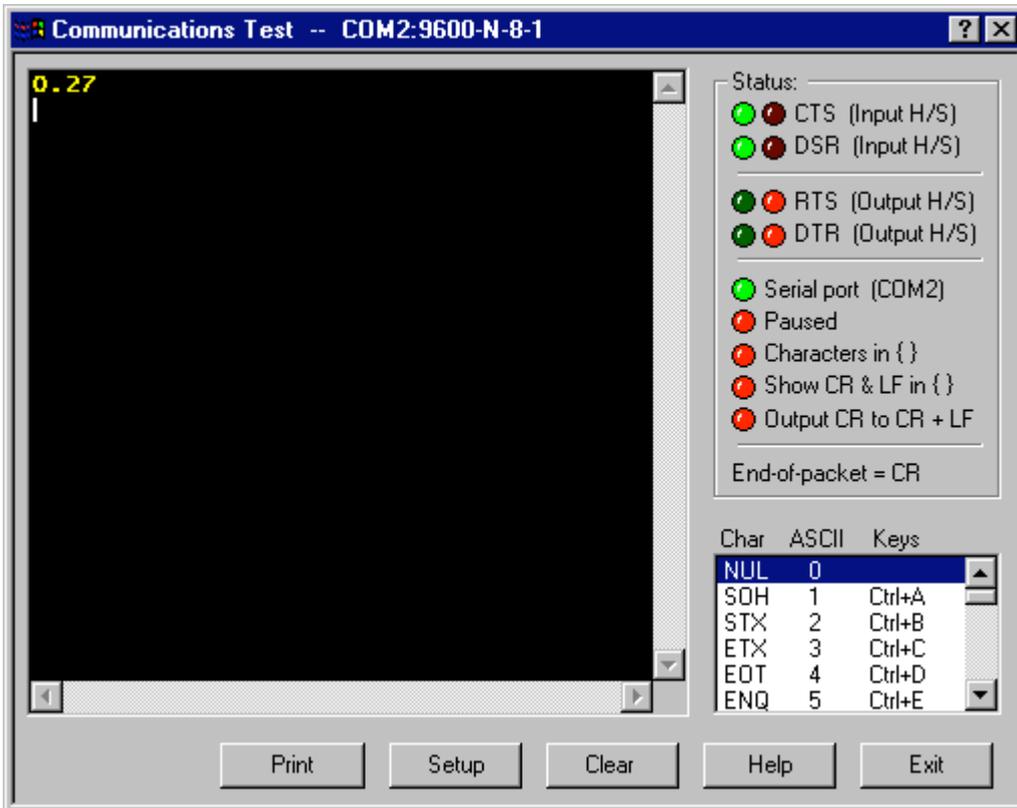
b. See the 'Trouble Shooting' appendix of this guidebook.

c. See the Microridge web site at **http://www.microridge.com/wedgelink.htm**

d. See the torque instrument handbook.

NOTE: Norbar cannot offer backup to the WedgeLink software.

APPENDIX H   USB TO SERIAL CONVERTER

If a serial port is not fitted to the computer (or a spare serial port is not available) the computer's USB port may be used with the addition of a USB Converter (USB to serial converter - Norbar Part Number 60259).

CONNECTING USB

The USB converter will work with Windows 98, ME, 2000 & XP. The following instructions act as a guide; for further information see text file on CD.

1. Insert USB cable into computer.

2. The computer will display:
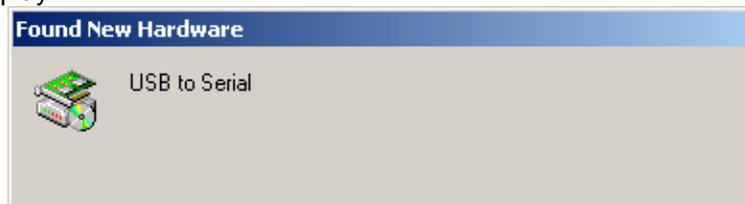
3. Wait. The computer will display:

4. Insert CD & click OK. Software will load. Procedure is complete.

FIND COM PORT NUMBER

Open 'Device Manager'; this can be found on the computer by following:
START / SETTINGS / CONTROL PANEL. Click SYSTEM. Click HARDWARE. Click DEVICE MANAGER
The device manager list includes "PORTS (COM & LPT)". Double click to expand.
The example below shows COM3 has been assigned to the USB port.
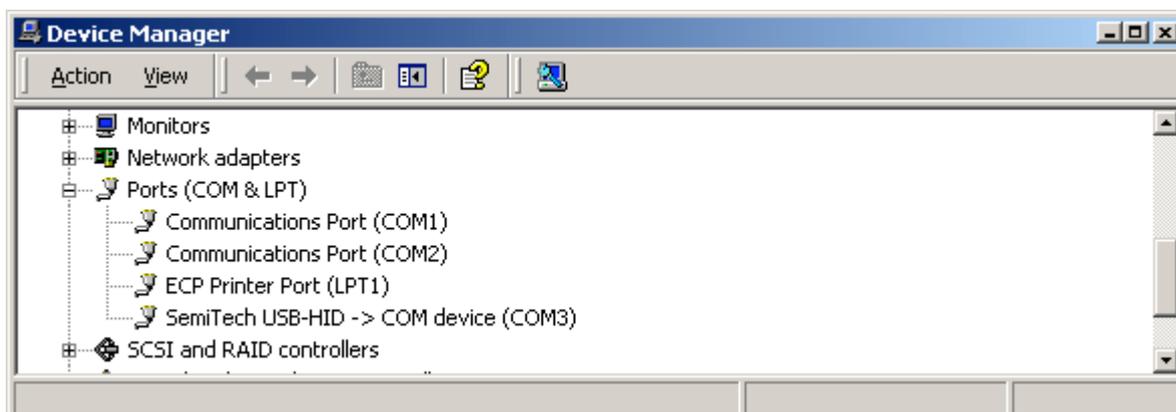
CONNECTING NORBAR INSTRUMENT TO USB PORT

INSTRUMENT:	LEADS REQUIRED:	PROCEDURE:
TTT TST Pro-Test ETS (CE marked) DTS (CE marked) TWA (CE marked) (SERIAL PORT has **SOCKETS**)	Data lead kit required (Part Number 60248 or 60229)	**Data lead kit 60248:** Connect 9 way Mini Gender Changer into instrument. Connect serial lead between instrument & USB converter. **Data lead kit 60229:** Connect 9 way Null Modem into instrument. Connect USB converter to Null Modem.
TTT Series 2 TST Series 2 Pro-Test Series 2 (SERIAL PORT has **PINS**)	Serial lead supplied with instrument (Part Number 39264)	Connect serial lead between instrument & USB converter.
TruCheck Plus	Serial lead supplied with TruCheck. (Part Number 39297)	Connect serial lead between TruCheck & USB converter.
USM1 USM2	The USB converter is NOT designed for connection to the USM instruments.	

TESTING

Run software needed, using COM PORT number selected from 'Find com port number' on previous page.

If reading cannot be downloaded it is recommended to test using HyperTerminal (See 'Appendix F - Using HyperTerminal' for additional information):

	PROCEDURE FOR CONNECTING TO HYPERTERMINAL
1	IMPORTANT: Close down other software using the COM PORT.
2	To open follow FILE / PROGRAMS / ACCESSORIES / COMMUNICATIONS / HYPERTERMINAL.
3	In "Connection description" enter new name, (e.g. 'Name'). Click OK.
4	In "Connect to" select 'Connecting to COM X' (Choose as determined above).
5	In "COMX properties" set as required by Norbar instrument. Click OK. (The defaults are usually 9600 bits per second, 8 data bits, NONE parity, 2 STOP, NONE flow control).
6	In "Name – HyperTerminal" the bottom left of the window shows "connected 00:00:xx".
7	Send data (see instrument instructions). On instruments with PRINT / NO PRINT ensure PRINT is set. Readings sent appear on the HyperTerminal screen.
8	Once working select 'disconnect' from 'Call' tool bar. Close HyperTerminal program.
9	Open software required. Ensure the same COM PORT settings are used.

APPENDIX J   USEFUL PART NUMBERS

HANDBOOKS

	'ORIGINAL'	'UPGRADE'	'CE MARKED'
DATA PRINTER	34136	NOT AVAILABLE	34219
ETS	34071	34120	34210
TWA	34072	34121	34211
DTS	34111	34122	34212
TRS	NOT AVAILABLE	NOT AVAILABLE	34253
PRO-TEST	NOT AVAILABLE	NOT AVAILABLE	34237 & 34299 (Series 2)
PRO-LOG	NOT AVAILABLE	NOT AVAILABLE	34263
TST	NOT AVAILABLE	NOT AVAILABLE	34274 (Series 1) & 34294 (Series 2)
TTT	NOT AVAILABLE	NOT AVAILABLE	34275 (Series 1) & 34295 (Series 2)
TTL	NOT AVAILABLE	NOT AVAILABLE	34297
TTL-HE	NOT AVAILABLE	NOT AVAILABLE	34298

SERVICE MANUALS

	'ORIGINAL'	'UPGRADE'	'CE MARKED'
ETS	07501	34123	34213
TWA	34074	34124	34214
DTS	34112	34125	34215
TRS	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
PRO-TEST	NOT AVAILABLE	NOT AVAILABLE	34240
PRO-LOG	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
TST / TTT / TTL / TTL-HE	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE

LEADS

MODEL NUMBER	DESCRIPTION	VERSION
38644	Lead for TRS	25 pin for Psion
38645	Lead for TRS	9 pin for computer
60065	Data printer lead	'ORIGINAL' ETS/DTS/TWA to 'ORIGINAL' printer
60186	Data printer lead	'CE MARKED' ETS/DTS/TWA to 'ORIGINAL' printer
60248	Data lead kit	'CE MARKED' products
61083	Data printer lead	'UPGRADE' ETS/DTS/TWA to 'ORIGINAL' printer
61086	Data printer lead	'CE MARKED' ETS/DTS/TWA to 'CE MARKED' printer
61091	Data printer lead	'UPGRADE' ETS/DTS/TWA to 'CE MARKED' printer
61116	Serial data lead	USM 1 & USM 2. 9way plug to socket. Pin 1-1, 2-2, 3-3, etc.
61118	Data printer lead	For 'ORIGINAL' ETS/DTS/TWA to 'CE MARKED' printer

OTHER PRODUCTS

MODEL NUMBER	DESCRIPTION	VERSION
38341	Paper roll for printer	60057 & 60164 printers
38342	Ink ribbon for printer	60057 & 60164 printers
41202	RS-232-C board option	For 'ORIGINAL' ETS/DTS/TWA (25 way D)
60057	Data Printer	For 'ORIGINAL' version (25 way D)
60144	Print Inhibit Controller	For 'UPGRADE' ETS/DTS/TWA (9 way D to 25 way D)
60151	Print Inhibit Controller	For 'ORIGINAL' ETS/DTS/TWA (25 way D to 25 way D)
60164	Data Printer	'CE MARKED' version (9 way D)
60167	Print Inhibit Controller	'CE MARKED' ETS/DTS/TWA (9 way D to 9 way D)
60259	USB to serial converter	

APPENDIX K   TROUBLE SHOOTING

In the event of failure to communicate please check:

CORRECT LEAD

Ensure the correct lead is used to link the relevant pins. In many cases a null modem will be required; this may be incorporated in the lead.

CORRECT WIRING

Check for wire continuity using an electronic tester.

BAUD RATE

Ensure baud rate of Norbar product and receiving device match, this is usually 1200 or 9600 baud.

CONTROL WORD

Ensure control word (PARITY, DATA BITS and STOP BITS) of Norbar product matches receiving equipment. The control word of most Norbar products can be set.

CONNECTOR TYPE / GENDER

If the connector type or connector gender is not correct, use a gender changer or make alterations.

HANDSHAKING

This is when communicating devices 'talk' to each other to see if data can be sent. The Pro-log, TST, TTT & TTL products can support handshaking.
Refer to receiving devices manual for control lines to be linked out if handshaking is not to be used.

SPECIAL DATA OUTPUT CONSIDERATIONS

Check if equipment receiving data requires the units of measurement inhibited or a leading character. This is particularly applicable when interfacing to Mitutoyo equipment.

DATA OUTPUT IS OVERWRITTEN

The printer may need a line feed. For the Pro-Log / TST / TTT / TTL set 'Output Line Feed' to YES via the menu 'SET UP / CURRENT SETTINGS / SERIAL PORT.

DATA OUTPUT TOO FAST

The printer may be too slow. To slow down the serial data output (Pro-Log, TST, TTT & TTL only) change the 'Line Delay' via the menu 'SET UP / CURRENT SETTINGS / SERIAL PORT'

TEST OUTPUT

On TST, TTT & TTL select CONFIRM at the end of the serial port settings, the instrument will keep sending a 'TEST OUTPUT' message to help fault finding.

APPENDIX L GLOSSARY OF TERMS

TERM	MEANING
BAUD RATE	The rate at which data is sent down the line. Common baud rates are multiples of 75 bits per second : 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bits per second. It is essential that both the transmitter and receiver operate at the same baud rate.
BREAKOUT BOX	A device to analyse the RS-232-C to help problem solving.
CE	Conformité Européen meaning 'European Conformity'.
CE-MARKED	All instruments made after 1996. These are distinguished by being CE marked.
CTS	Clear To Send
DC	Direct Current.
DCE	Data Communications Equipment
DCD	Data Carrier Detect
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
DTS	Dedicated Transducer System. A single transducer instrument.
EIA	Electronic Industries Association. The body that formed RS-232-C.
ETS	Electronic Transducer System. An instrument capable of interfacing to many compatible transducers.
GENDER CHANGER	A device that has either 2 plug ends or 2 socket ends and straight through wires between pins. It is used to change the gender of a connector.
LED	Light Emitting Diode.
NULL MODEM	A device to swap pins so that 2 DTE items can be connected together.
'ORIGINAL'	An ETS, TWA or DTS instrument made before 1994. These are distinguished by having a power button on the front panel.
PARALLEL	Data transmission using multiple lines, so allowing multiple bits of information to be transmitted simultaneously.
PART NUMBER	A unique identifier for a product. Sometimes referred to a 'Model Number' or 'Part No'
PLUG	The male connecting part.
PRO-LOG	A powerful hand held instrument capable of interfacing with many transducers and logging the results for statistical evaluation.
PRO-TEST	Professional Torque Tester. Instrument for testing and calibrating toque wrenches.
RI	Ring Indicator
RTS	Request To Send
SERIAL	Data transmission along a single line in a sequential fashion.
SOCKET	The female connecting part.
TRS	Transducer Read-out Systems
TST	Torque Screwdriver Tester
TTL	Torque Tool Lite
TTL-HE	Torque Tool Lite – Harsh Environment
TTT	Torque Tool Tester
TWA	Torque Wrench Analyser. A single transducer instrument designed to measure the torque wrenches.
'UPGRADE'	An ETS, TWA or DTS instrument made after 1994, but before 1996. These are distinguished by having the power switch on the back panel, but the unit is not CE marked.
USB	Universal Serial Bus