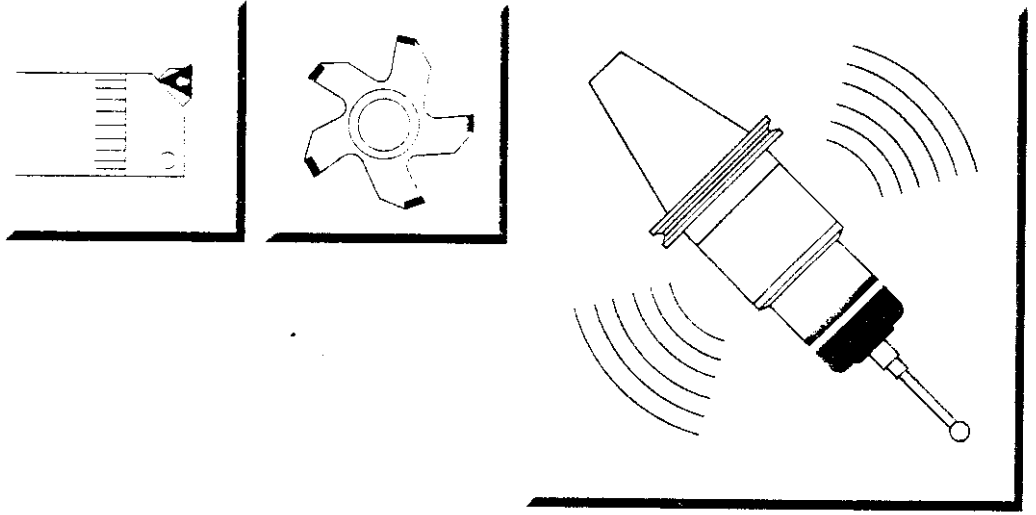


**EXHIBIT 5**

**Instruction Manual**

FCC ID: NX1E86B



***mida***  
**MARPOSS**

## 1.1 SPECIFICATIONS AND GENERAL WARNINGS

### PREMISE

This instruction manual supplies all the specific information necessary to know and correctly use your MARPOSS equipment.

The descriptions reported in this manual are aimed to the following personnel:

- MARPOSS personnel or Customer's personnel who has to install the equipment.
- Customer's technicians who directly operate the MARPOSS equipment.
- Customer's technicians who are responsible of the maintenance of the production line where the MARPOSS equipment is installed.

ALL RIGHTS ARE RESERVED. THIS MANUAL IS INTENDED FOR CUSTOMER'S INTERNAL USE ONLY. ANY OTHER USE IS FORBIDDEN.

### FINAL TEST AND WARRANTY

The defects of the materials are covered by the warranty with the following limitations:

- DURATION OF THE WARRANTY: the warranty covers all repairs made within the agreed terms.
- OBJECT OF THE WARRANTY: the warranty is applied to the product and to its parts marked with serial number or other identification number by MARPOSS.

The above mentioned warranty has to be considered valid, unless of different agreements between MARPOSS and the Customer.

### GENERAL SAFETY SPECIFICATIONS

This equipment has been manufactured in conformity with **CEI EN60950** specifications.

### CONVENTIONS AND SYMBOLS BEING USED

While writing this book, a few conventions have been adopted and more precisely:

- There are two types of safety notices.

#### Warning



This note indicates the possibility to damage the electronic unit or other devices connected to it, or the possibility to loose data.

#### Attention



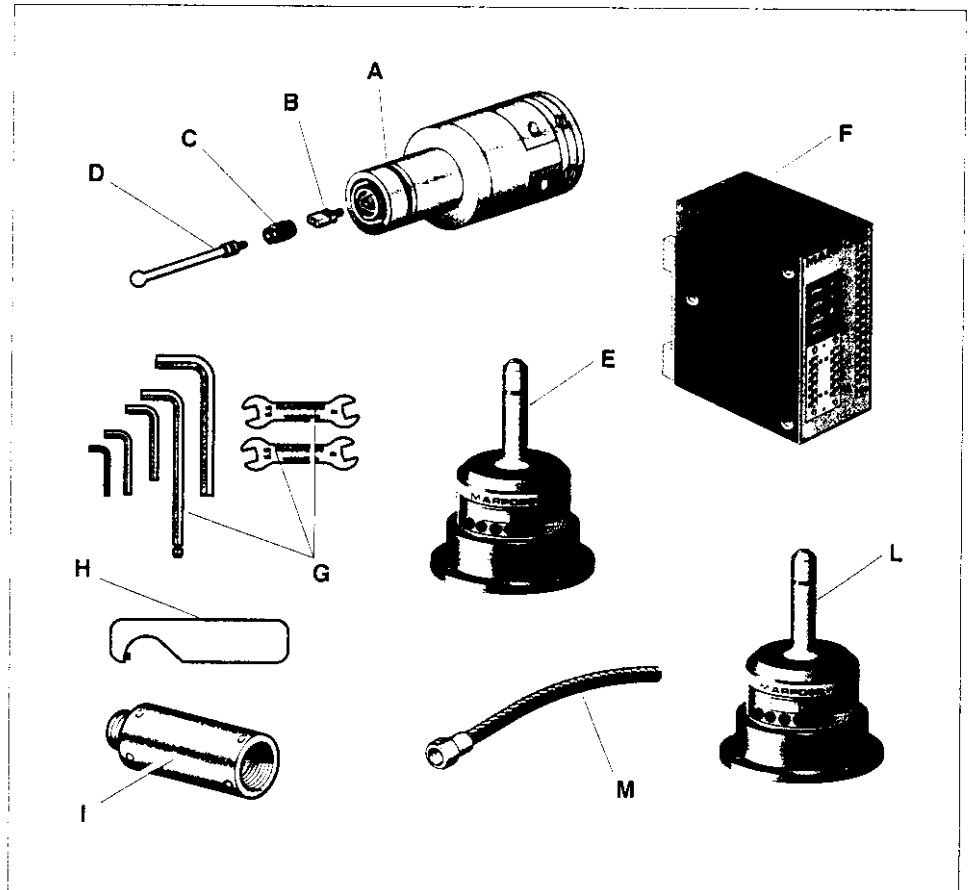
This note indicates dangerous conditions for the operator/technician.

The most important information helpful to understand and use the system are placed inside a box marked by the word **"Note"**, and they are written in heavy types.

2

### 2.1 SYSTEM COMPONENTS

- A - Touch probe and E86 transmitter
- B - Crash protection pin (optional)
- C - Stylus retainer (optional)
- D - Stylus
- E - E86 antenna
- F - E86 interface unit
- G - Two, open-ended spanners (CH 5 and 5.5) and a set of Allen keys
- H - Special spanner for T25 probe and mechanical extensions
- I - Probe extensions (optional)
- L - Auxiliary antenna (optional)
- M - Anaconda cable sheath for receiver cable (optional)



**3.1 SYSTEM COMPONENTS**

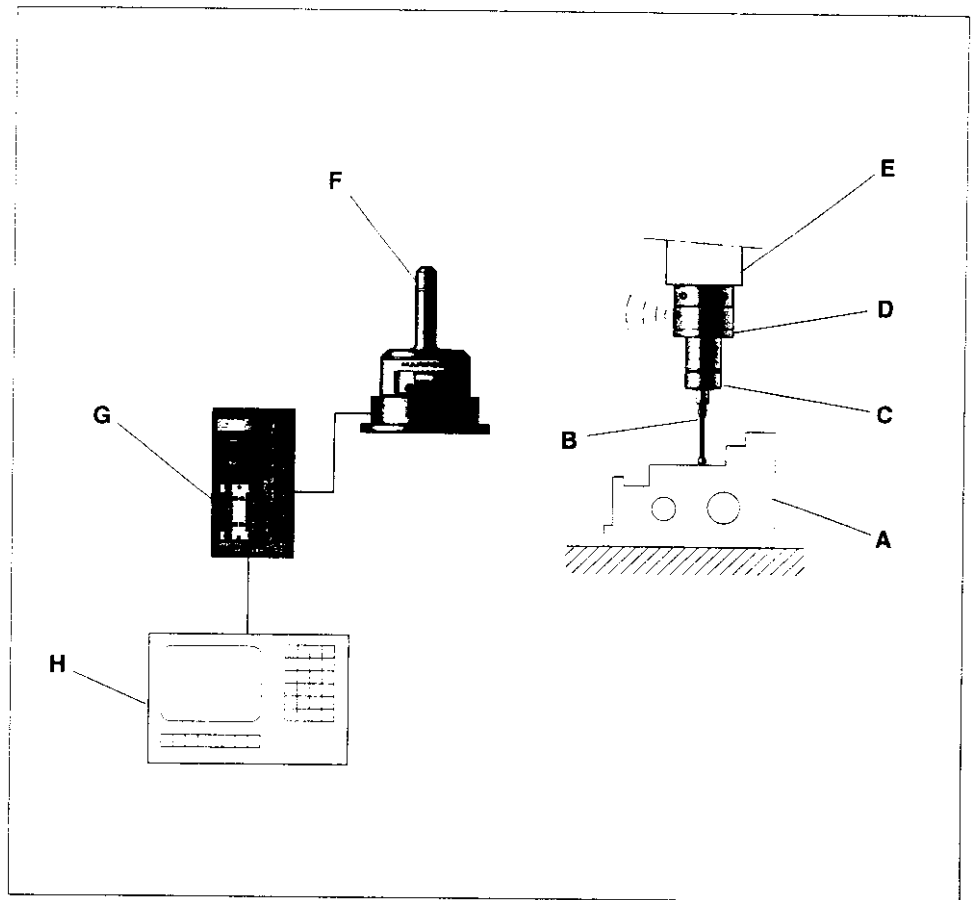
The radio transmission system identifies workpiece coordinate which are processed by the machine tool CNC in order to define measurements.

The points are detected by a probe consisting of a multi-directional precision microswitch; point data is then transmitted by a radio transmission system, consisting of a transmitter and receiver, to an interface unit and from here to the CNC.

The measuring cycle calls up the probe/transmitter unit (mounted on a tool taper) from the tool magazine and then inserts the unit into the spindle. The system is easy to use and has been designed for use in hostile industrial environments. The system is designed for use on machining centers and milling machines for the **identification, positioning and measurement** of parts still to be machined and for the measurement of machined parts.

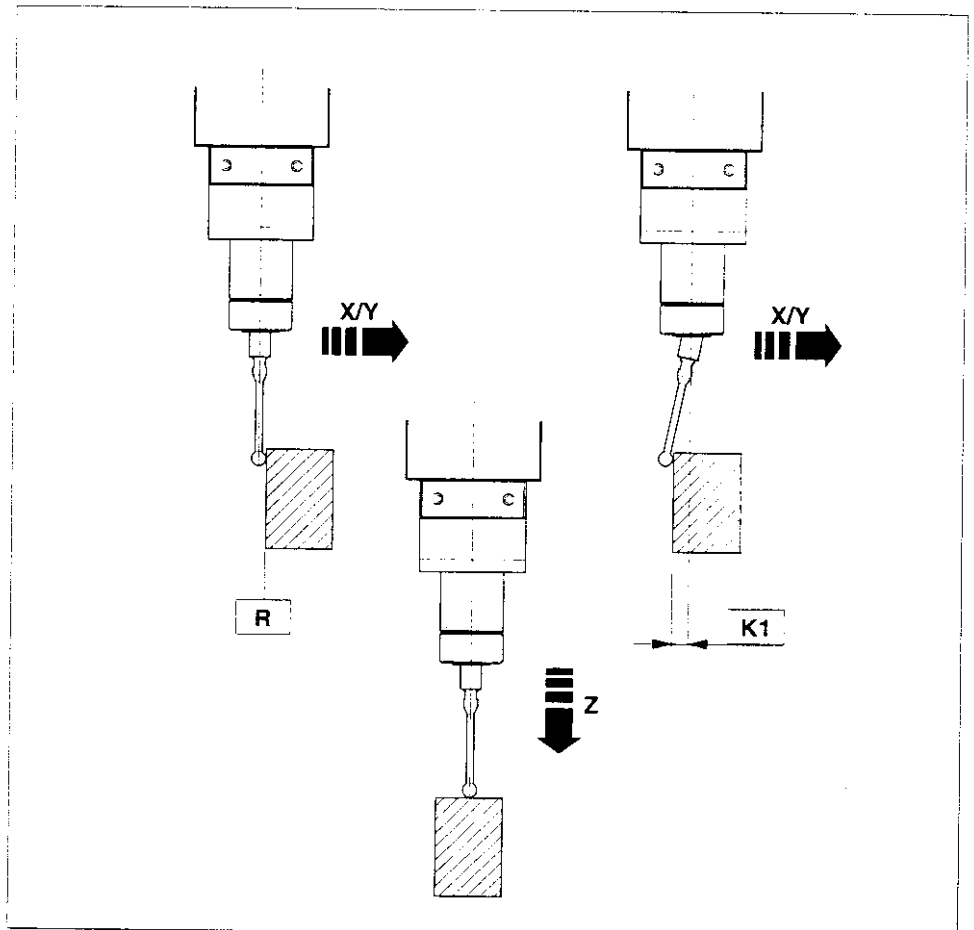
The typical system configuration consists of:

- A - Part to be measured
- B - Stylus
- C - Touch probe
- D - E86 transmitter
- E - Machine tool spindle
- F - E86 antenna
- G - E86 interface unit
- H - Machine tool CNC



#### 4.1 SYSTEM OPERATION

- This measuring system is **multi-directional** and operates in the **x/y/+z** hemisphere.
- The contact between the stylus and the part surface to be tested generates a signal used by the machine tool to memorise the contact point and stop the machine axes. To ensure a high degree of repeatability we recommend the use of a constant measuring speed.
- The measuring speed chosen must enable stoppage of the machine axes within the **overtravel** limits of the probe used.
- Before using the probe, carry out a calibration cycle to define the systematic error of the probe/machine tool/CNC system. Systematic error is a characteristic of each measuring direction and is repeatable; each measurement direction should therefore be calibrated. To calibrate the system, measure known machine points (**R**) and then calculate the difference between these values and the values measured (**R+K1**). The difference (**K1**) must be entered in the tool correction parameters of the CNC and called up whenever a measurement operation in the related direction takes place.



### 5.1 MEASUREMENT PROBE

The measurement probe is a multi-directional precision microswitch used on Numeric Control (NC) metal cutting machine tools for testing and measuring **tools** and **workpieces**.

Four different models of multi-directional touch probes operating in the x/y/+z hemisphere are available; the four models have different dimensions and overtravel value.

For each probe model there are two versions with different front guards as follows:

- **Version "G"** with cloth-backed gasket providing protection against coolant.
- **Version "S"** with metal chip guard.

There is therefore a specific probe to match all machine tool needs as follows.

- Probe **T25G** - Probe **T25S**
- Probe **TL25G** - Probe **TL25S**
- Probe **T36G** - Probe **T36S**
- Probe **T60G** - Probe **T60S**

#### PROBE CHARACTERISTICS

Probe type	T25	TL25	T36	T60
Probe axes	$\pm X, \pm Y, +Z$	$\pm X, \pm Y, +Z$	$\pm X, \pm Y, +Z$	$\pm X, \pm Y, +Z$
Unidirectional probe repeatability ( $2\sigma$ ) with speeds up to 600 mm/min	1 $\mu\text{m}$	1 $\mu\text{m}$	1 $\mu\text{m}$	1 $\mu\text{m}$
Measuring force on X, Y plane	200 gf	90 gf	260 gf	280 gf
Measuring force in Z direction	1200 gf	550 gf	1200 gf	1200 gf
Overtravel on X, Y plane	11.2 mm	11.2 mm	14.4 mm	22 mm
Overtravel in Z direction	4 mm	4 mm	4.2 mm	6.4 mm
CHARACTERISTICS FOR STYLUS LENGTH	35 mm	35 mm	40 mm	50 mm
IEC protection rating	IP67	IP67	IP67	IP67

### 5.1 SONDA DI MISURA

La sonda di misura è un microinterruttore multidirezionale di precisione utilizzata nelle applicazioni su macchine ad asportazione di truciolo a CN, per il controllo e la misura di **utensili** e **pezzi**. Sono disponibili quattro diversi modelli di sonde touch multidirezionali nell'emisfero x/y/+z che differiscono per dimensioni e valore di extracorsa del braccetto. Per ciascun modello di sonda esistono due differenti versioni a seconda del tipo di protezione frontale:

- **"Versione G"** con guarnizione telata per una migliore protezione contro il liquido refrigerante.
- **"Versione S"** con scudo metallico di protezione ai trucioli.

Per risolvere in modo ottimale le specifiche esigenze che si manifestano sulle differenti macchine utensili, sono disponibili le seguenti sonde:

- Sonda **T25G / T25S**
- Sonda **TL25G / TL25S**
- Sonda **T36G / T36S**
- Sonda **T60G / T60S**

#### CARATTERISTICHE SONDA

Tipo sonda	T25	TL25	T36	T60
Assi sonda	$\pm X, \pm Y, +Z$	$\pm X, \pm Y, +Z$	$\pm X, \pm Y, +Z$	$\pm X, \pm Y, +Z$
Ripetibilità unidirezionale sonda ( $2\sigma$ ) con velocità fino a 600 mm/min.	1 $\mu\text{m}$	1 $\mu\text{m}$	1 $\mu\text{m}$	1 $\mu\text{m}$
Forza di misura nel piano X, Y	200 gf	90 gf	260 gf	280 gf
Forza di misura nella direzione Z	1200 gf	550 gf	1200 gf	1200 gf
Extracorsa nel piano X, Y	11,2 mm	11,2 mm	14,4 mm	22 mm
Extracorsa nella direzione Z	4 mm	4 mm	4,2 mm	6,4 mm
CARATTERISTICHE RIFERITE AL BRACCETTO DI	35 mm	35 mm	40 mm	50 mm
Grado di protezione secondo norme IEC	IP67	IP67	IP67	IP67

## 6.1 DESCRIPTION

The radio transmission system consists of three items:

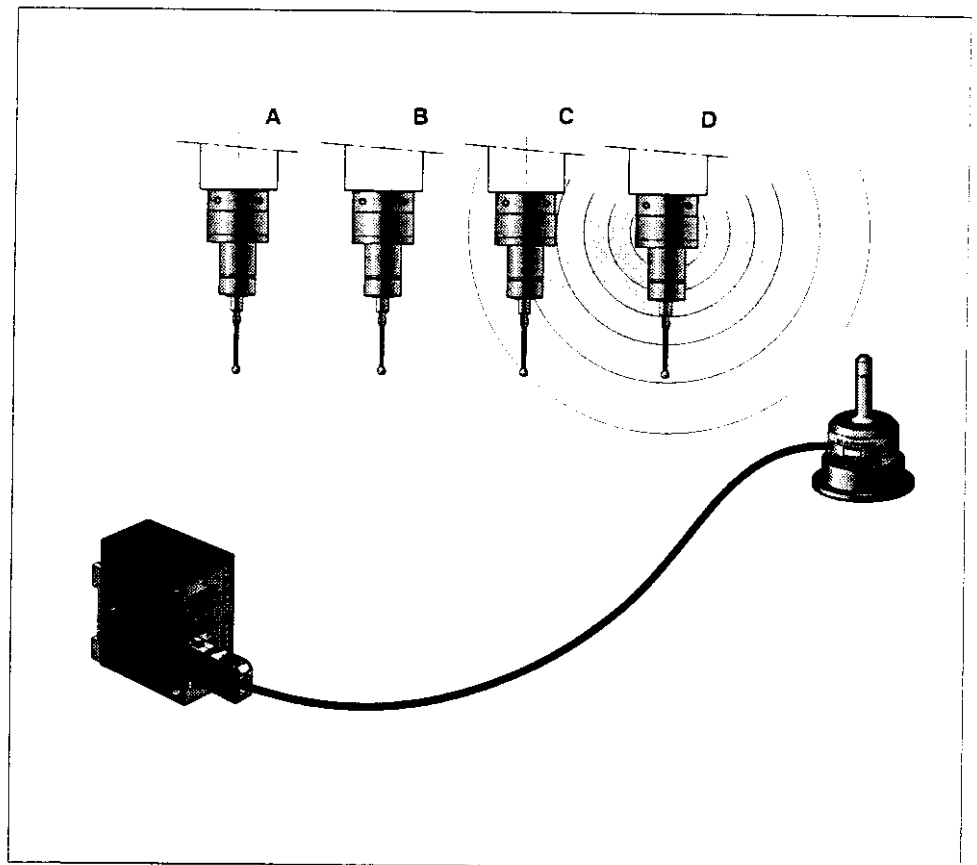
- ◆ Transmitter: detect the data needed to the CNC for the measure determination.
- ◆ Antenna: receive the transmitter signal and send it to the E86 interface unit.
- ◆ Interface unit: processes the signals received from the antenna and transmit them to the CNC.

The system allow the programming of 16 different transmission channel. Four probes can be used on the same channel.

Two antennas can be connected to the E86 interface unit to enlarge the transmission field and its reliability.

### Technical Features

- Transmission distance: 10 m
- Activation distance: 2m.
- Transmission channel: 16
- Transmission frequency: 912.2 ÷ 916.8 MHz





## 6.2 TRANSMISSION ACTIVATION

The transmitter is usually in the stand-by mode; transmission is started in one of the following ways depending on the transmitter version:

- **radio starting**
- **mechanical starting** (by micro-switch on the taper shank).

### 6.2.1 RADIO STARTING

The system is activated by a radio signal emitted from the antenna to the transmitter. The transmission is started by a signal from the machine logic (START input signal - M code).

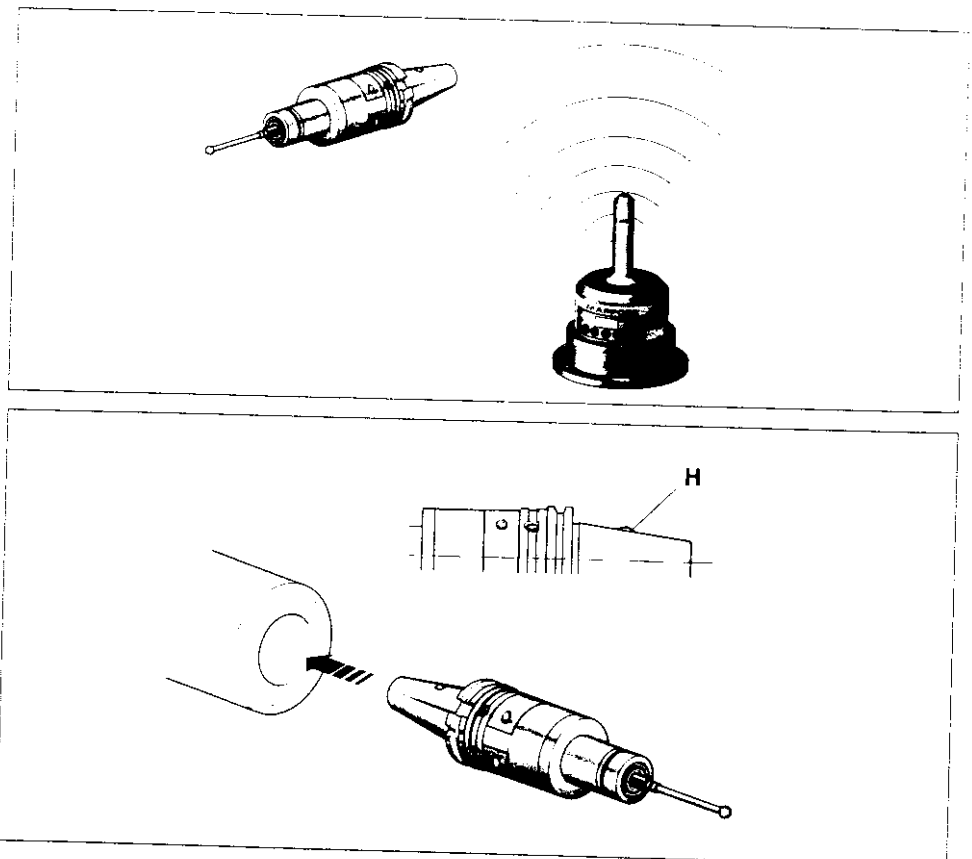
### 6.2.2 MECHANICAL STARTING

The taper shank of the probe/transmitter assembly is fitted with a microswitch (H). Inserting the shank into the spindle triggers the microswitch and starts transmission.

#### Caution



When the transmitter is returned to the tool magazine ensure that the microswitch cannot be triggered.



### 6.3 STOPPING TRANSMISSION

When the transmitter is not in use it is switched to the stand-by mode in order to prolong battery life.

6

#### Transmitter with radio starting

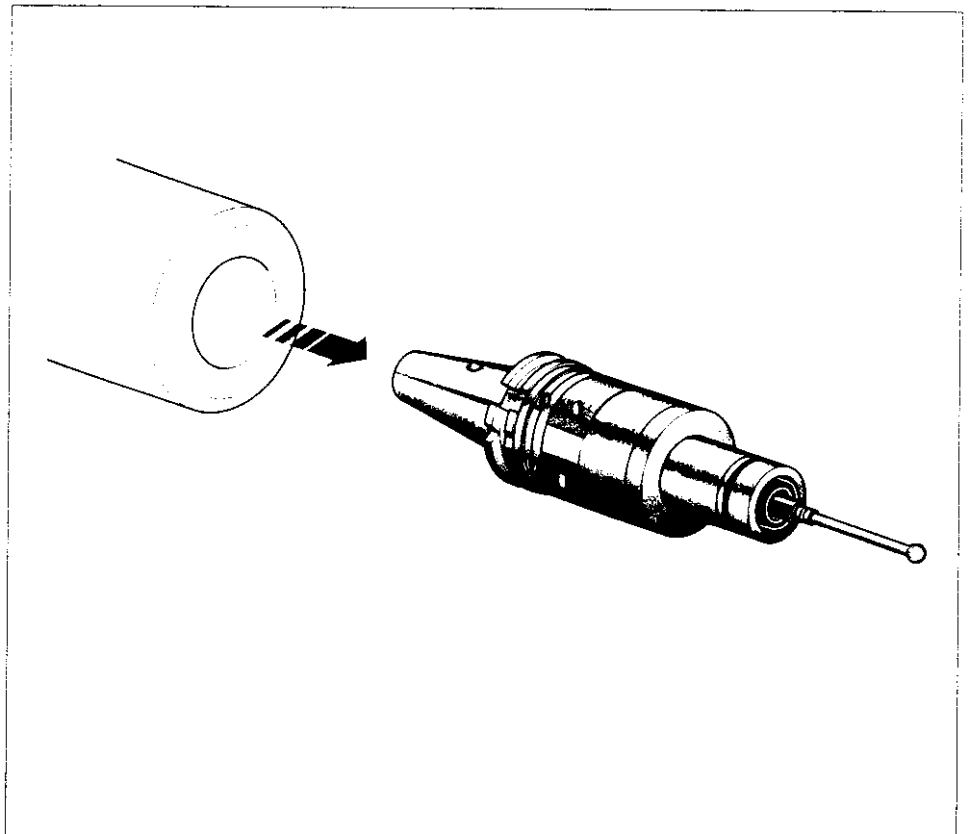
- Automatic stopping

The transmitter is automatically switched off when the time-out set on the transmitter timer during starting has elapsed (see Transmitter programming).

#### Transmission with mechanical starting

- Mechanical stopping

Transmission is stopped when the transmitter is removed from the spindle and the microswitch on the taper shank is released.



## 7.1 DESCRIPTION

The transmitter optically transmits the measurement data to be processed by the CNC to the antenna (see "Optical Transmission"). This data includes:

- Probe status: contact open/contact closed
- Battery status: battery low or discharged

A Green LED indicate the probe, battery and transmission status.

LED constant lit = Probe deflected

1 Flash every 2secs. = transmission activated

2 Flash every 2secs. = battery low

Two types of transmitter are available:

- Transmitter with radio activation.

Transmission is started by a radio signal sent from the antenna

- Transmitter with mechanical activation.

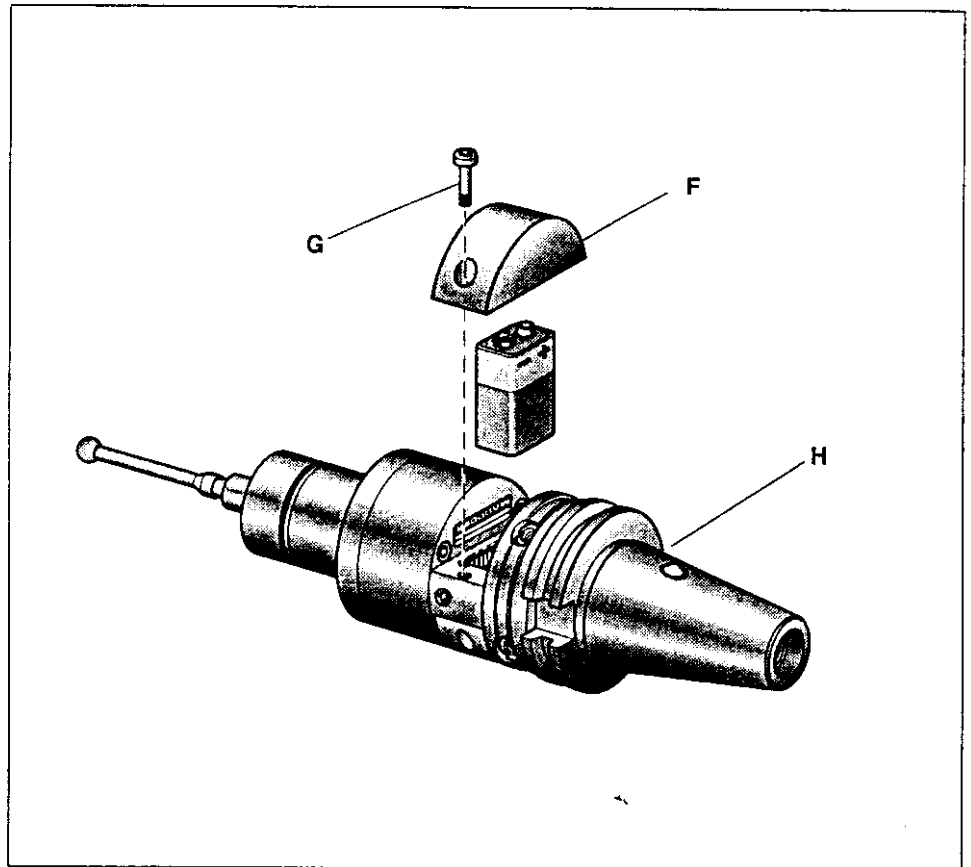
The transmission is started by a microswitch (H) mounted on the shank

### Technical features

- Power suppl: 9V battery
- Transmisson distance 10 m

### Battery connection

The battery is housed in the battery compartment. To change the battery, unscrew the two screws (G) and remove the cover marked with battery symbol (F).



## 7.2 BATTERY LIFE

BATTERY TYPE	RECOMMENDED BRAND	CONTINUOUS OPERATION	STAND-BY OPERATION
Alkaline	Duracell MN1604 Philips 1604 Varta 4022	65 hours	85 days
Lithium	Tadiran TL5306 Kodak U9VL	146 hours	190 days

**Note:** The transmitter is delivered complete with an alkaline battery placed inside the package. Fit the battery on the transmitter before its installation (see "Fitting/ changing the transmitter battery").

**Caution****TRANSMITTER WITH MECHANICAL TRIGGERING**

Check that the shape of the tool magazine taper does not interfere with or trigger the micro-switch (H).



**LITHIUM BATTERY:** Danger of explosion if lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended (see table). Dispose of used batteries in compliance to the regulations in force.

Battery life depends on the length of transmitter operating time and the type of battery used.

The table shows battery life on the basis of battery type with the transmitter operating in the continuous and stand-by modes; the values shown are based on experience.

## 7.2 DURATA DELLA BATTERIA

TIPO BATTERIA	BATTERIA CONSIGLIATA	FUNZIONAMENTO CONTINUO	FUNZIONAMENTO STAND-BY
Alcalina	Duracell MN1604 Philips 1604 Varta 4022	65 ore	85 giorni
Litio	Tadiran TL5306 Kodak U9VL	146 ore	190 giorni

**Note:** Una batteria alcalina è fornita con il trasmettitore all'interno dell'imballo. Inserire la batteria nel trasmettitore prima dell'installazione (vedere "Inserimento/sostituzione batteria trasmettitore").

**Avvertenza****TRASMETTITORE CON ATTIVAZIONE MECCANICA**

Verificare che la sede del cono nel magazzino utensili abbia una conformazione tale da evitare l'azionamento del microinterruttore (H) di attivazione.




**BATTERIE AL LITIO:** Le batterie al litio possono esplodere se non sostituite in modo corretto. Sostituire solo con tipo uguale o equivalenti (vedi tabella). Eliminare le batterie usate in conformità con le normative vigenti.

La durata della batteria dipende dal tempo di utilizzo del trasmettitore e dal tipo di batteria utilizzata. Nella tabella sono riportati i valori di durata in funzione della batteria e in condizione di funzionamento continuo e stand-by del trasmettitore.

### 7.3 PROGRAMMING THE TRANSMITTER

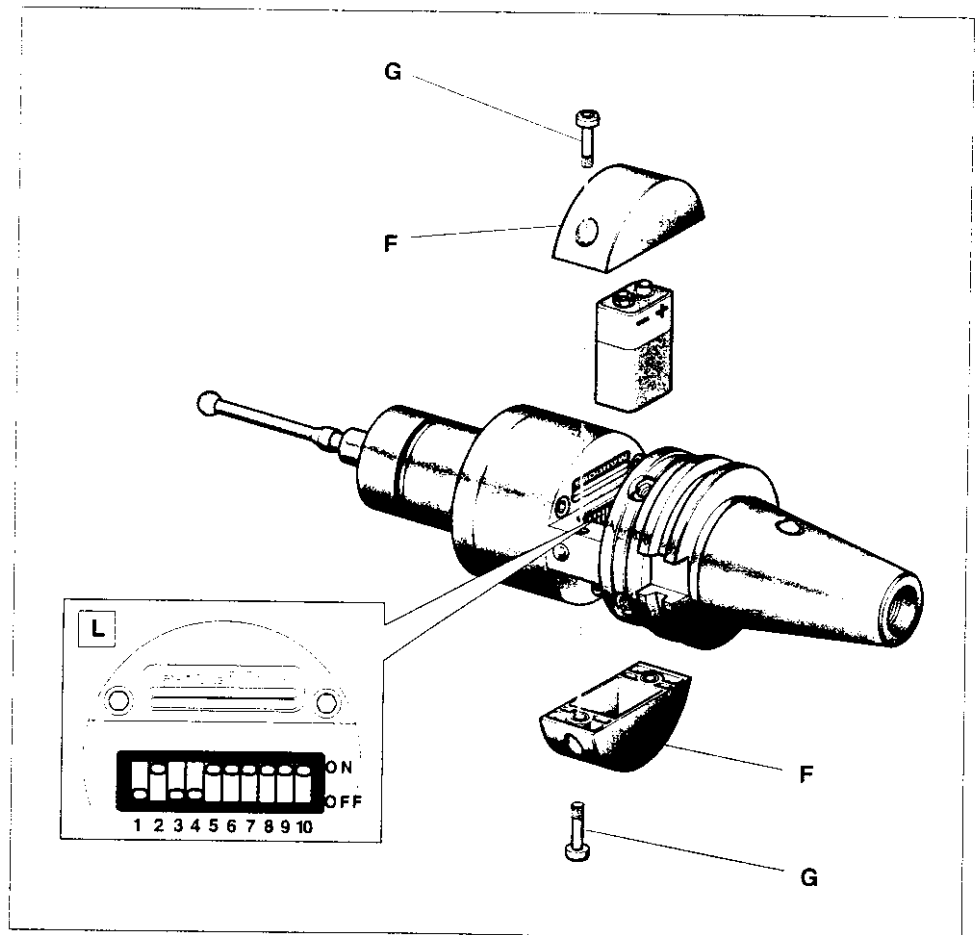
#### Warning

 Marposs declines all responsibility for damage caused by internal programming changes carried out by unauthorised personnel.

- The transmitter is programmed by setting the ON/OFF dip-switches (L).
- To reach the dip-switches (L), remove the four screws (G) and remove both the covers (F) from the battery compartment.

**Note:** The transmitter is supplied with the dip-switches programmed as shown in Figure (L). The configuration setted is also indicated on the table with a gray box.

(continued ...)



### 7.3 PROGRAMMING THE TRANSMITTER

Dip-switch functions are as follows:

- **Dip-switches 1, 2, 3:** program the automatic transmission time-out timer as shown in the table below (see also "Stopping transmission").  
In case of mechanical activation the dip-switches 1-2-3 must be set in ON position

DIP-SWITCH			TIME OUT
1	2	3	
ON	ON	ON	4 secs.
OFF	ON	ON	8 secs.
ON	OFF	ON	17 secs.
OFF	OFF	ON	33 secs.
ON	ON	OFF	1 min. 07 secs.
<b>OFF</b>	<b>ON</b>	<b>OFF</b>	<b>2 mins. 14 secs.</b>
ON	OFF	OFF	4 mins. 28 secs.
OFF	OFF	OFF	8 mins. 57 secs.

- **Dip-switch 4:** • OFF position, → timer zero-setting after every change in probe status.
- **Dip-switches 5, 6, 7, 8:** Allows the transmission channel setting according to the below table.

DIP-SWITCH				CHANNEL
5	6	7	8	
ON	ON	ON	ON	1
OFF	ON	ON	ON	2
ON	OFF	ON	ON	3
OFF	OFF	ON	ON	4
ON	ON	OFF	ON	5
OFF	ON	OFF	ON	6
ON	OFF	OFF	ON	7
OFF	OFF	OFF	ON	8
ON	ON	ON	OFF	9
OFF	ON	ON	OFF	10
ON	OFF	ON	OFF	11
OFF	OFF	ON	OFF	12
ON	ON	OFF	OFF	13
OFF	ON	OFF	OFF	14
ON	OFF	OFF	OFF	15
OFF	OFF	OFF	OFF	16

- **Dip-switch 9, 10:** Allows the identification code setting

DIP-SWITCH		IDENTIFICATION CODE
9	10	
ON	ON	A
OFF	ON	B
ON	OFF	C
OFF	OFF	D

**Note:** A transmitter is identified by the working channel number and the identification code ( for eg. 12B). Verify that the transmitter and interface working channels setted match.

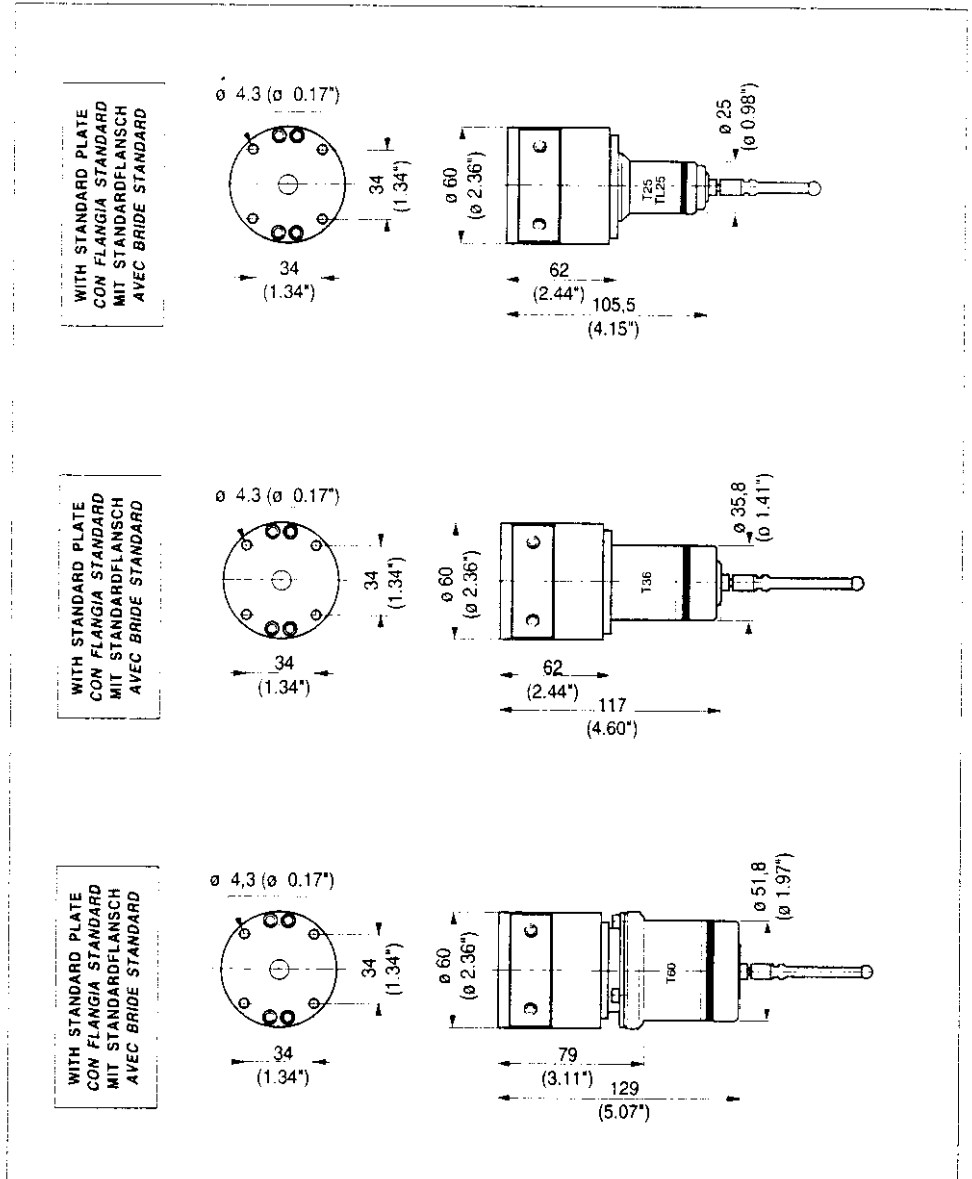
7.4 TRANSMITTER DIMENSIONS WITH PROBE

7.4 DIMENSIONI TRASMETTITORE CON SONDE

7.4 ABMESSUNGEN DER SENDERMODULE MIT ANGEBAUTEN SCHALTMESSKÖPFEN

7.4 DIMENSIONS DES EMETTEURS AVEC PALPEURS

7



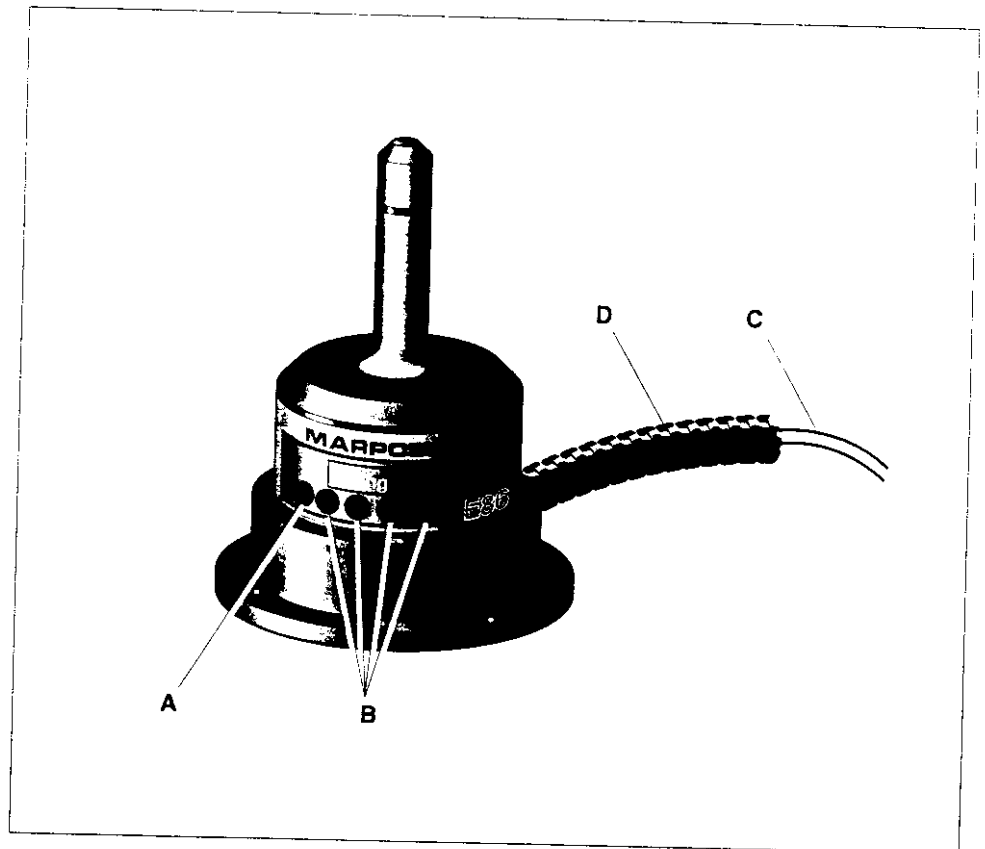
### 8.1 DESCRIPTION

The antenna receives the data emitted by the transmitter and send them to the E86 interface unit connected via cable.

On the front of the antenna the following elements are visible:

- A** - Red LED. Lit when the system is not operating or the transmitter signal is not received.
- B** - One yellow LED and three green LEDs. They indicate the signal strength. During the installation they allow to find the suitable antenna location.
- C** - 15 m (49.21 ft) shielded cable (5-core + shield) for connection to interface unit.

As an option, the antenna cable can be supplied with an Anaconda sheath (**D**) to provide full protection in heavy duty conditions.





## 8.2 CONNECTING UP THE ANTENNA

Connect the antenna to the E86 interface unit as shown in the connection diagram (see chapter 9.5 "Connecting up the interface unit").

The cable is connected to the terminal block on the bottom of the electrical board. To disconnect up the antenna proceed as follow:

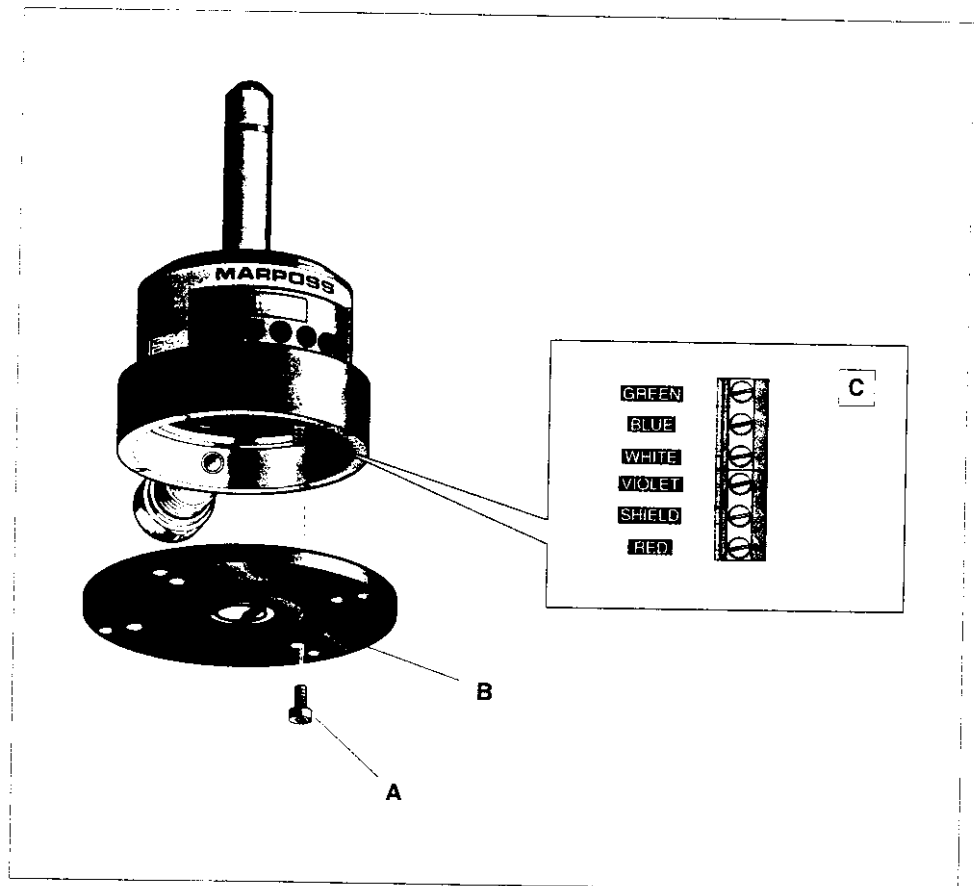
- Unscrew the screw (A)
- Remove the plate (B)

### Caution



When connecting ensure that the wire and terminal coding match.

The color of each terminal on the electrical board (C) has a matching colored wire.



**8.3 FITTING THE ANTENNA TO THE MACHINE**

- The antenna can be fixed provisionally with a magnetic base in order to locate the correct position and verify that the signal emitted by the transmitter is received during the probing system movement.
- For permanent installation the antenna can be fixed by using the four screw on issue.

**8.3 MONTAGGIO DELL' ANTENNA**

- *L' antenna può essere fissata provvisoriamente mediante la base magnetica per definire la posizione di fissaggio più idonea e verificare che il segnale emesso dal trasmettitore venga ricevuto durante gli spostamenti del sistema di tastatura.*
- *Per il montaggio permanente fissare l' antenna con le quattro viti in dotazione.*

**8.3 ANBAU DES EMPFÄNGERMODULS**

- Das Empfängermodul wird provisorisch mit der Magnetbasis befestigt, um die optimale Befestigungsposition zu finden und um den Empfang des vom Sender übertragenen Signals beim Verfahren des Schaltsystems sicherzustellen.
- Die entgeltliche Befestigung des Empfängermoduls erfolgt über die vier mitgelieferten Schrauben.

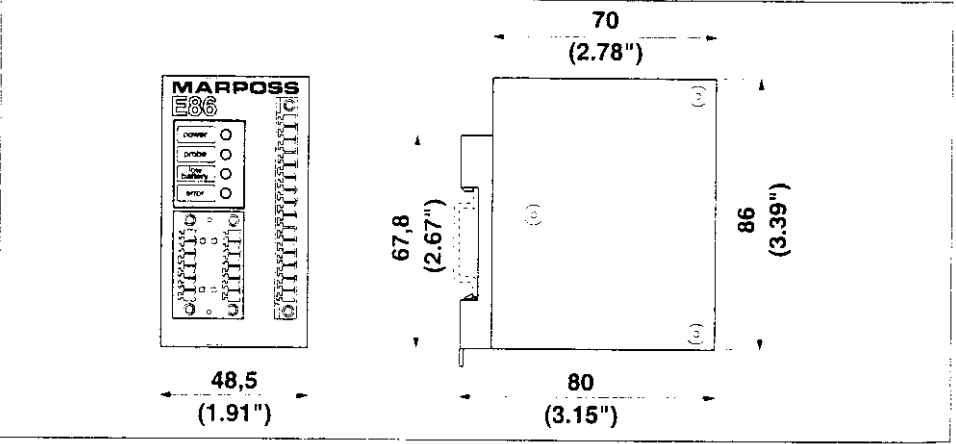
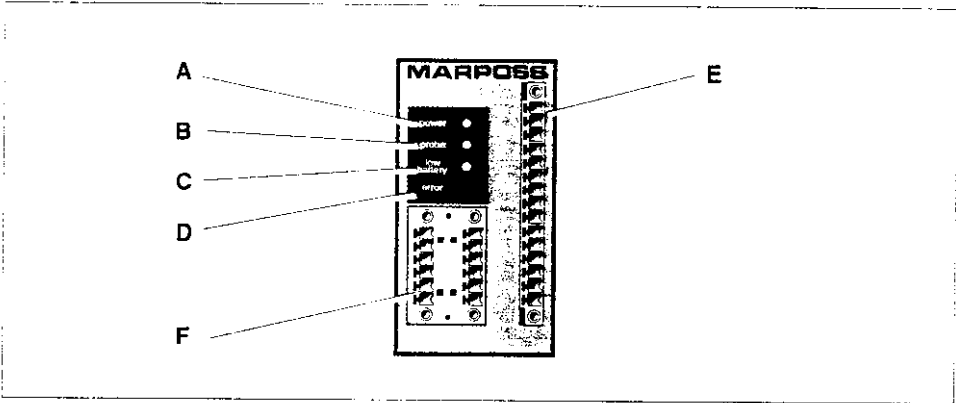
**8.3 MONTAGE DE L'ANTENNE**

- *L'antenne peut être fixée provisoirement par la base magnétique pour définir la meilleure position de fixation et vérifier si le signal émis par l'émetteur est bien reçu pendant les déplacements du palpeur.*
- *Pour le montage définitif, fixer l'antenne avec les quatre vis fournies dans le conditionnement.*

9.1 INTERFACE UNIT FRONT PANEL

9)

- A - "power" (green) LED : indicates that the interface unit is powered up.
- B - "probe" (green) LED : indicates probe status. When lit, indicates that the probe stylus is deflected. When unlit, indicates that the probe stylus is in the rest position.
- C - "battery low" (yellow) LED : indicates that the battery life is low or that the battery is discharged.(see also the LOW BAT output signal - "Connecting up the interface unit").
- D - "error" (red) LED : indicates an error condition. It lights up to indicate that the probe is outside the range of the transmission field or that the system is not activated (see also Error output signal - "Connecting up the interface unit").
- E - terminal block : I/O connection to the machine CNC.
- F - terminal block : antenna connection



### 9.3 E86 INTERFACE UNIT TECHNICAL FEATURES

- Power supply** : 24 VDC, un stabilised (18-35 V)  
300 mA with two receivers connected up
- Input signals** : Opto-insulated inputs, 24 V 10 mA.
- SEL 0 - SEL 1** : Working channel selection
- START** : Transmission activation

**Note:** **SINK** or **SOURCE** connections can be used for input signal connections.  
For **SINK** connection, connect the "COM" to the "+24V" terminal.  
For **SOURCE** connection, connect the "COM" to the "0V" terminal.

- Output signals** : Solid state relay contact (SSR), 50 V - 40 mA.
- ERROR** : Communication error (probe off, probe outside transmission field, transmitter battery completely discharged).
- PROBE 1** : This is the output signal for the status of the probe currently in use (Probe status = seated position or deflected).
- PROBE 2/SKIP** : Additional output signal for the probe currently in use; can be programmed as a probe status signal (probe in seated position or deflected) or a SKIP signal (pulse) according to the dip-switch 3 position (See "Programming the interface unit").
- LOW BAT** : Low battery level signal indicated by the "Low Battery" LED on the panel (by using an alkaline battery the system runs for about 5 hours after the Low Battery Signal).

### 9.3 CARATTERISTICHE TECNICHE INTERFACCIA E86

- Alimentazione** : 24 VDC non stabilizzata (18-35 V)  
300 mA max. (con due antenne collegate)
- Segnali ingresso** : Ingressi optoisolati 24 V - 10 mA
- SEL 0 - SEL 1** : Selezione canale di lavoro
- START** : Attivazione della trasmissione

**Nota:** Il collegamento dei segnali di ingresso può essere di tipo **SINK** (collegare "COM" alla "+24V") oppure di tipo **SOURCE** (collegare "COM" alla "0V").

- Segnali di uscita** : Contatti Relè a Stato Solido (SSR) 50V - 40 mA
- ERROR** : Errore di comunicazione (sonda non attivata o fuori dalla portata del campo di trasmissione, batteria trasmettitore completamente scarica).
- PROBE 1** : Segnale relativo allo stato della sonda in uso (sonda a riposo o sonda deflessa).
- PROBE 2/SKIP** : Segnale addizionale relativo allo stato della sonda in uso; può essere programmato come segnale di stato sonda (a riposo o deflessa) o SKIP (impulso) a seconda del posizionamento del dip-switch 3 dell'unità di interfaccia.
- LOW BAT** : Segnale di batteria quasi scarica (utilizzando una batteria alcalina il funzionamento residuo del sistema in condizione di Low Battery è pari a circa 5 ore).

#### 9.4 PROGRAMMING THE INTERFACE UNIT

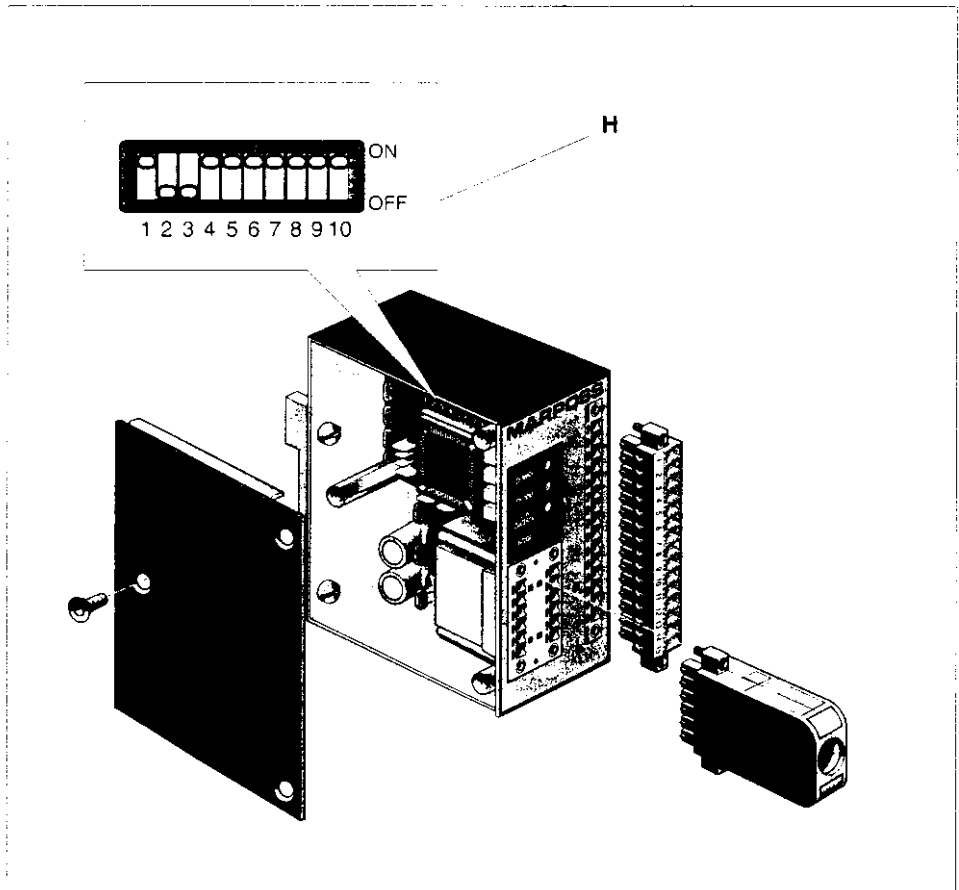
The interface unit is programmed by setting the ON/OFF dip-switches (H).

**Note:** The interface is supplied with the dip-switches programmed as shown in Figure. The configuration set is indicated on the table with a gray box.

To program the interface unit, proceed as follows:

- Switch off the interface unit.
- Remove the three retaining screws and remove the cover.

(continued ...)



#### 9.4 PROGRAMMING THE INTERFACE UNIT

Program the unit on the dip-switches (H) using the table below to obtain the operating mode required.

DIP SWITCH (H)	OFF	ON
1	Debounce time 100 msecs	Debounce time 20msec
2	Signal transmission: normal	Signal transmission: fast
3	PROBE 2 output = SKIP (pulse at every probe status change).	PROBE 2 output = PROBE (Probe status: triggered or in rest position)
4	PROBE 1 output contact = N.C. (normally closed).	PROBE 1 output contact = N.O. (normally open).
5	PROBE 2 output contact = N.C. (normally closed).	PROBE 2 output contact = N.O. (normally open).
6	LOW BATTERY output contact = N.C. (normally closed).	LOW BATTERY output contact = N.O. (normally open).

(continued ..)

#### 9.4 PROGRAMMAZIONE DELL'UNITÀ DI INTERFACCIA

Mediante il dip-switch (H) eseguire la programmazione del modo di funzionamento, secondo tabella:

DIP SWITCH (H)	OFF	ON
1	Antirimbalo = 100 ms	Antirimbalo = 20 ms
2	Ricezione del segnale: normale	Ricezione del segnale; veloce
3	Uscita PROBE 2 = SKIP (impulso ad ogni cambio di stato della sonda)	Uscita PROBE 2 = PROBE (Stato sonda: contatto aperto o contatto chiuso)
4	Contatto di uscita PROBE 1 = N.C. (normale chiuso)	Contatto di uscita PROBE 1 = N.O. (normale aperto)
5	Contatto di uscita PROBE 2 = N.C. (normale chiuso)	Contatto di uscita PROBE 2 = N.O. (normale aperto)
6	Contatto di uscita LOW BATTERY = N.C. (normale chiuso)	Contatto di uscita LOW BATTERY = N.O. (normale aperto)

(segue)

#### 9.4 PROGRAMMING THE INTERFACE UNIT

The dip switches 7-8-9-10 sets the receiving channel as indicated in the below table:

7	8	9	10	CHANNEL
ON	ON	ON	ON	1
OFF	ON	ON	ON	2
ON	OFF	ON	ON	3
OFF	OFF	ON	ON	4
ON	ON	OFF	ON	5
OFF	ON	OFF	ON	6
ON	OFF	OFF	ON	7
OFF	OFF	OFF	ON	8
ON	ON	ON	OFF	9
OFF	ON	ON	OFF	10
ON	OFF	ON	OFF	11
OFF	OFF	ON	OFF	12
ON	ON	OFF	OFF	13
OFF	ON	OFF	OFF	14
ON	OFF	OFF	OFF	15
OFF	OFF	OFF	OFF	16

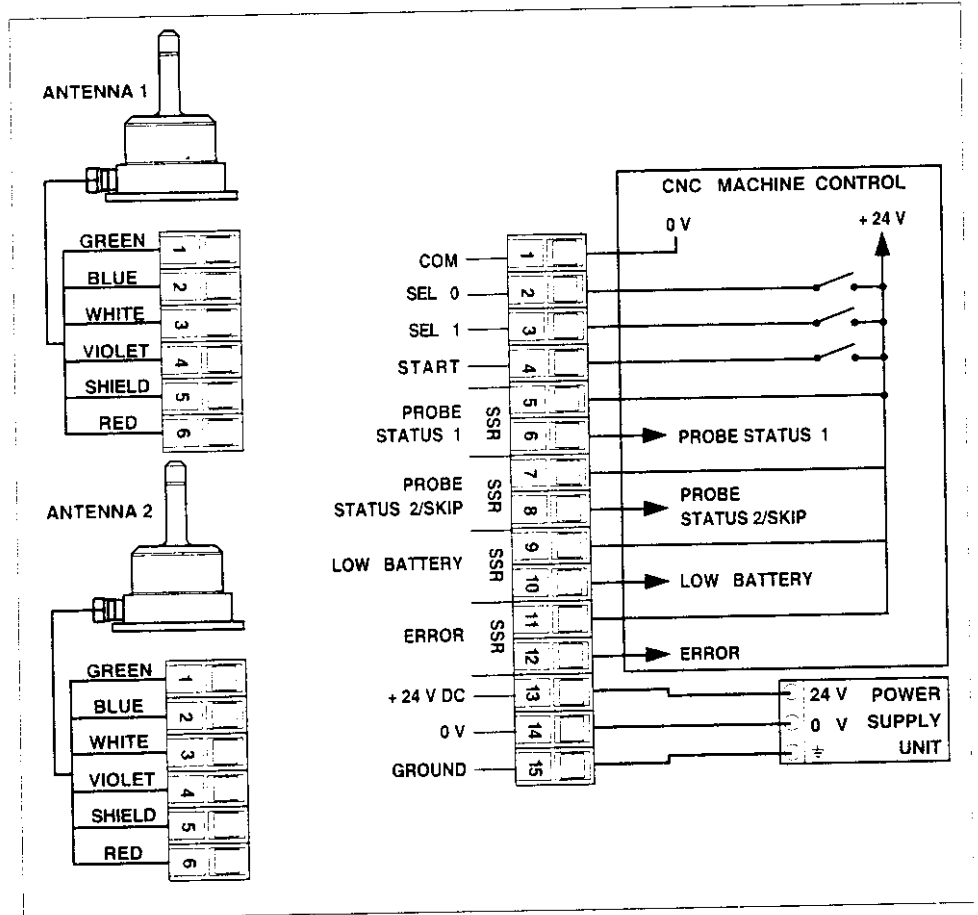
#### 9.4 PROGRAMMAZIONE DELL'UNITÀ DI INTERFACCIA

Mediante i dip switch 7-8-9-10 è possibile programmare il canale di ricezione come indicato nella tabella sottostante:

7	8	9	10	CANALE
ON	ON	ON	ON	1
OFF	ON	ON	ON	2
ON	OFF	ON	ON	3
OFF	OFF	ON	ON	4
ON	ON	OFF	ON	5
OFF	ON	OFF	ON	6
ON	OFF	OFF	ON	7
OFF	OFF	OFF	ON	8
ON	ON	ON	OFF	9
OFF	ON	ON	OFF	10
ON	OFF	ON	OFF	11
OFF	OFF	ON	OFF	12
ON	ON	OFF	OFF	13
OFF	ON	OFF	OFF	14
ON	OFF	OFF	OFF	15
OFF	OFF	OFF	OFF	16

### 9.5 CONNECTING UP THE INTERFACE UNIT

The interface unit card has a terminal block for connections. Connect the wires to the screw terminals using the connection diagram.



#### CONDITION WITH SOURCE CONNECTION

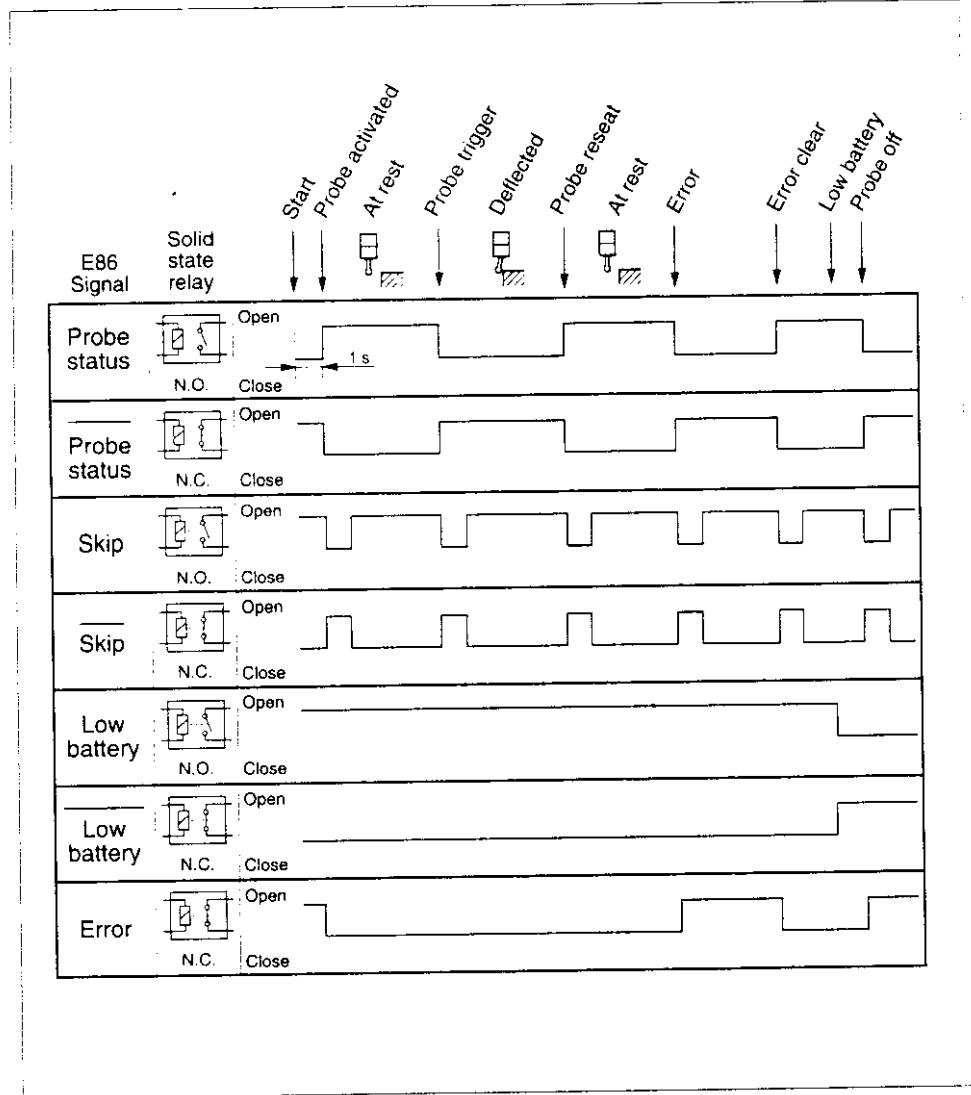
SEL 0	SEL 1	ID. CODE
OPEN/0V	OPEN/0V	A
24 V	OPEN/0V	B
OPEN/0V	24 V	C
24 V	24 V	D

(continued ...)



### 9.5 CONNECTING UP THE INTERFACE UNIT

I/O diagram of interface unit E86



**Note:** The activation time, typically lower than 1 sec. can increase up to about 3 secs. if the working area is disturbed by electromagnetic interferences.

### 10.1 ASSEMBLING THE PROBE TO THE TRANSMITTER

To fit/remove the probe to/from the transmitter, follow the instructions below.



**Caution**

When fitting the probe to the transmitter, ensure that the seal rings are in good condition and correctly positioned.

**PROBE T25/TL25**

- Tighten the holder (A) to the transmitter using the special spanner supplied (A1).
- Using the special spanner supplied screw the probe to the holder (A).

**PROBE T36**

- Fix the probe to the holder (B) using the screws (B1).
- Using the special spanner supplied screw the holder (B) to the transmitter.

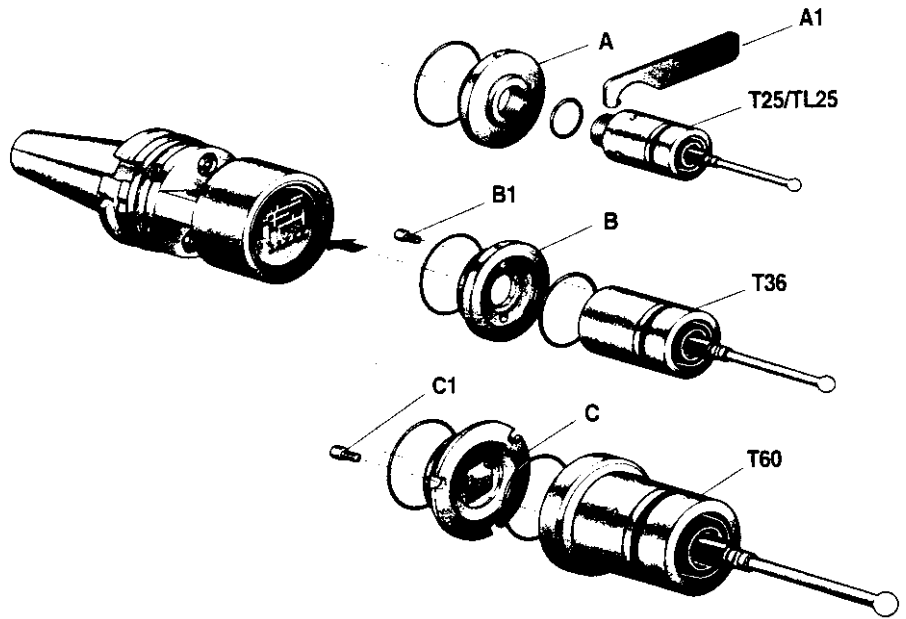
**PROBE T60**

- Fix the probe to the holder (C) using the screws (C1).
- Using the special spanner supplied screw the holder (C) to the transmitter.



**Caution**

When you have completed the above operations, align the system.(see page 66)



### 11.1 INSERTING PROBE EXTENSIONS (OPTIONAL)

The probe extension is fitted between the probe and the transmitter: the purpose of the extension is to increase the measuring depth of the system.  
To fit an extension, proceed as follows:

**Caution**

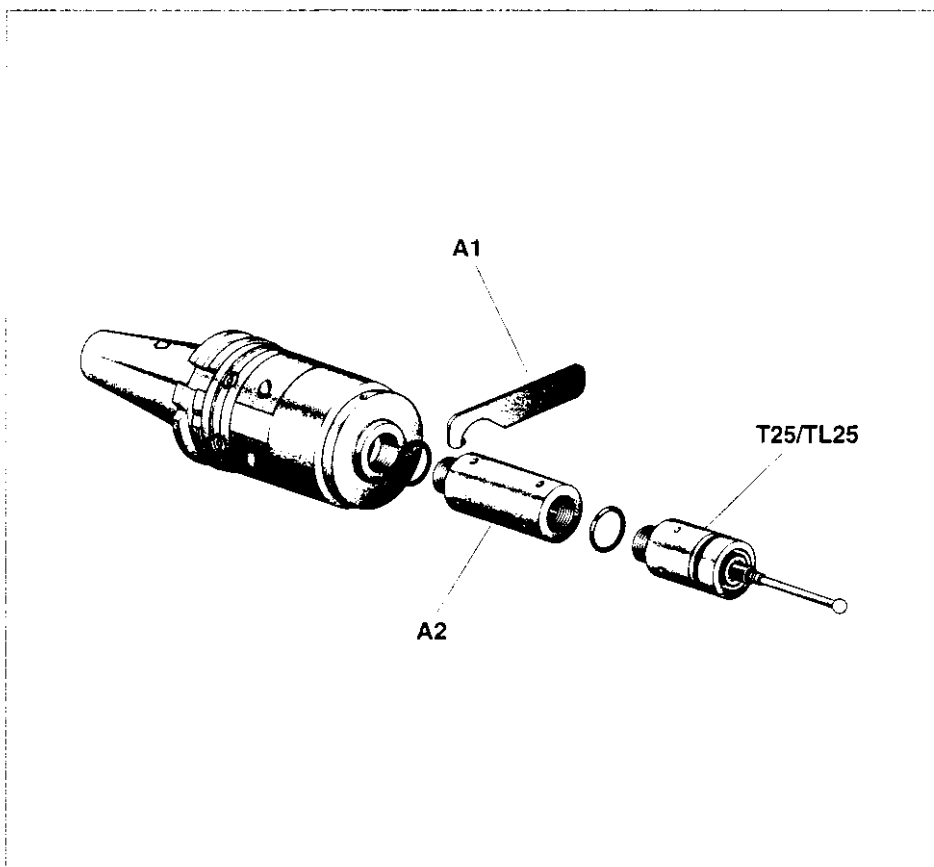


When fitting an extension, ensure that the seal rings are in good condition and correctly positioned.

• **T25/TL25 probe extension**

- Using the spanner supplied (**A1**), remove the probe from the transmitter.
- Fit the extension (**A2**) complete with seal rings between the probe and the transmitter.
- Using the spanner provided (**A1**), tighten the probe/extension/transmitter assembly.

(continued)



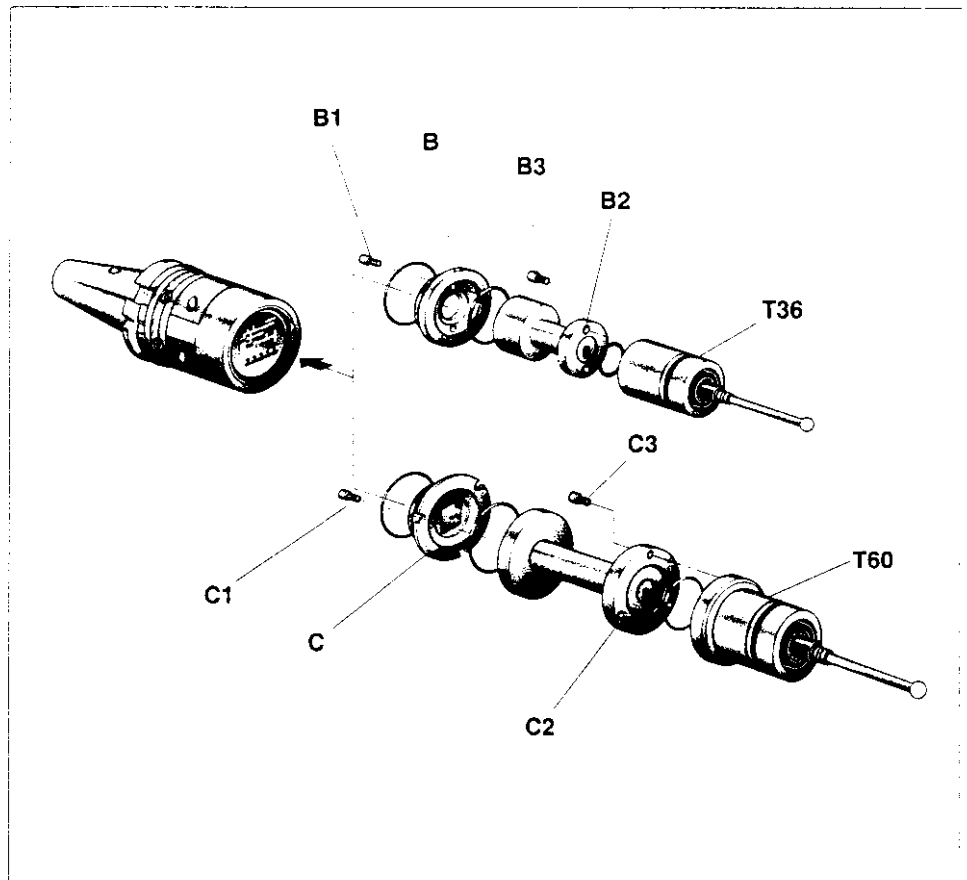
### 11.1 INSERTING PROBE EXTENSIONS (OPTIONAL)

- **T36 probe extension**

- Unscrew the holder (**B**) from the transmitter.
- Unscrew the screws (**B1**) and remove the probe from the holder (**B**).
- Fix the extension (**B2**) to the holder (**B**) using the screws (**B1**).
- Fix the extension/holder assembly to the transmitter using the spanner
- Fix the probe to the extension using the screws (**B3**).

- **T60 probe extension**

- Unscrew the holder (**C**) from the transmitter.
- Unscrew the screws (**C1**) and remove the probe from the holder (**C**).
- Fix the extension (**C2**) to the holder (**C**) using the screws (**C1**).
- Screw the extension/holder assembly to the transmitter using the spanner
- Fix the probe to the extension using the screws (**C3**).



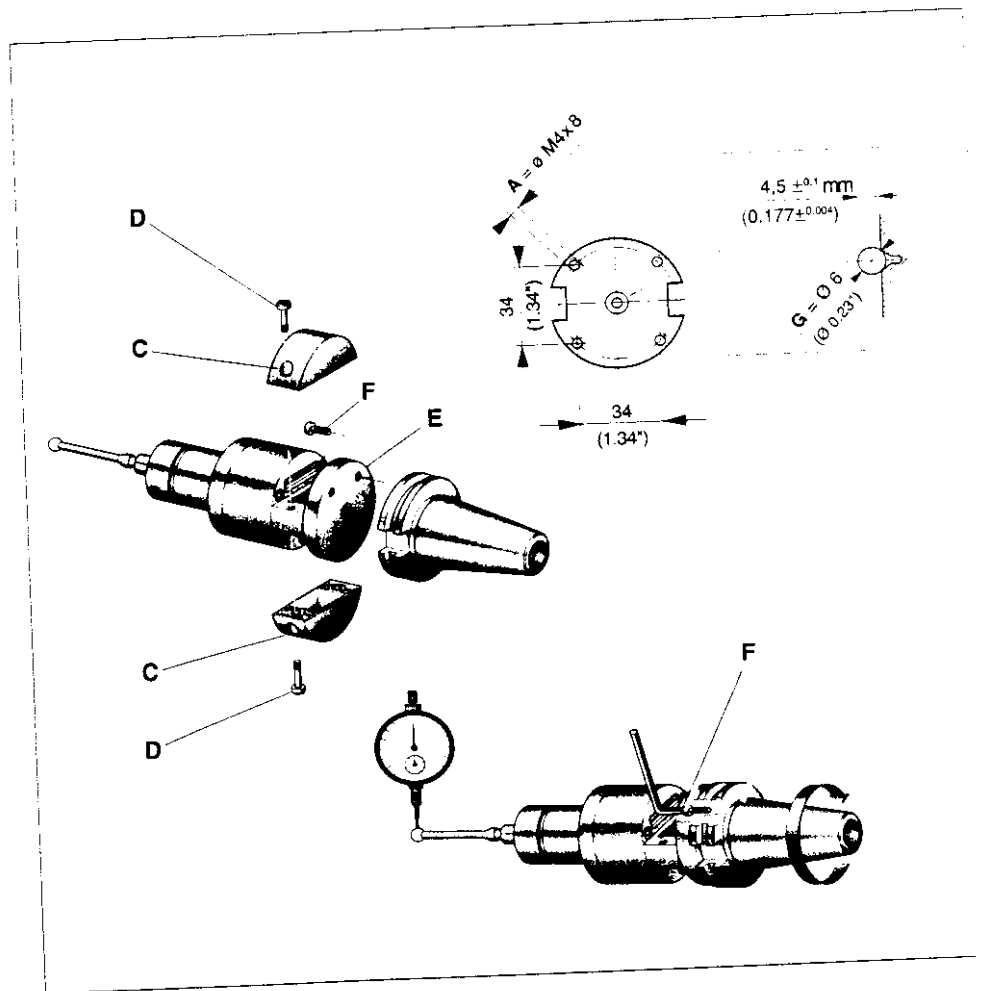
### 12.1 FIXING THE TRANSMITTER

Remove the battery compartment covers (C) on the transmitter by removing the screws (D); this provides access to the four holes (E) on the standard holder.

- Drill four M4 x 8 threaded holes (A) and a central countersink (B) on the taper as shown in Figure.
- Join the transmitter and the taper inserting the 6 mm diam. ball (G) into the countersink on base of the taper and into the countersink on the standard holder.
- Lightly tighten the four screws (F).

#### Aligning the system

- Fit the probe stylus (see "Fitting the probe stylus").
- Using the four screws (F), align the centre of the stylus sphere with the taper axis.
- When you have completed alignment, tighten the four screws (F) working diagonally.



## 12.2 FIXING THE TRANSMITTER WITH THE ADJUSTING PLATE

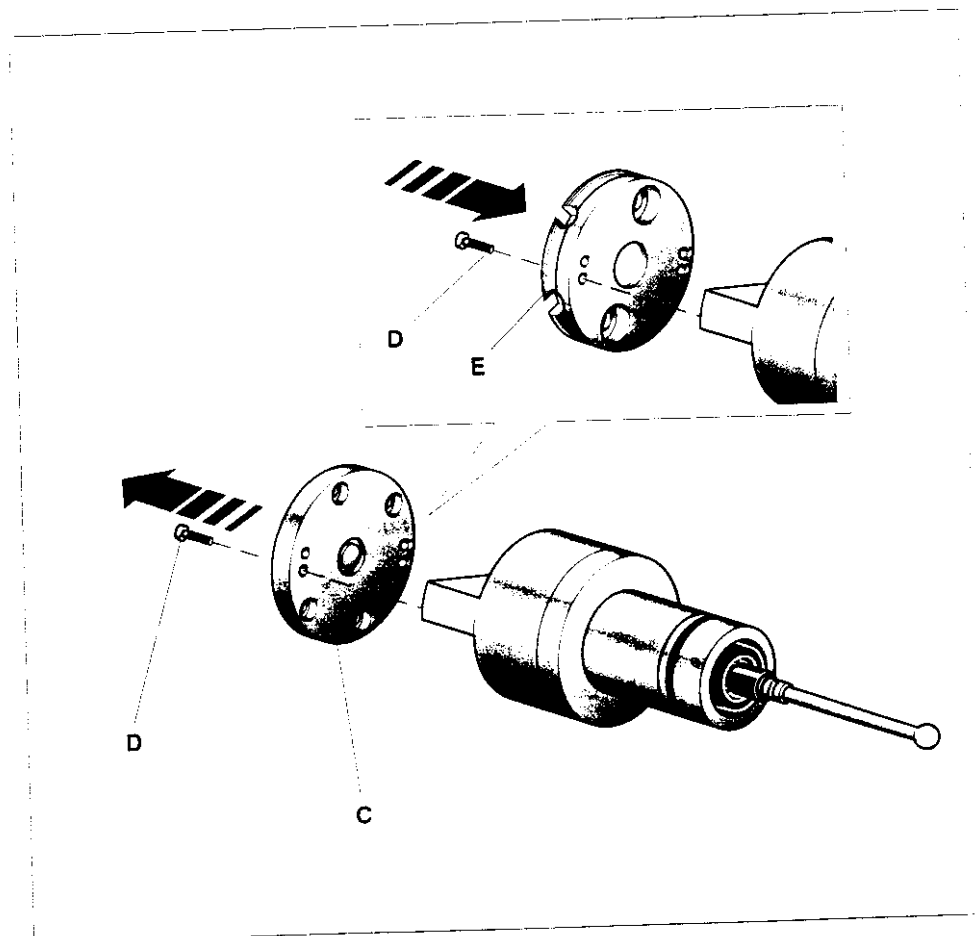
- 1- Remove the battery compartment covers on the transmitter by removing the screws (see Chapt. 12.1).

**Note:** The operations in points 2, 3, 4 and 5 below refer to the transmitter with radio starting only. Transmitters with mechanical starting (i.e. with a microswitch on the taper) are supplied complete with a taper and with the holders already fitted.  
For mechanical transmitters continue this fitting procedure from point 6 onwards.

- 2- Unscrew the four screws (D) and remove the standard holder (C).

- 3- Fit the adjustable holder (E) to the transmitter using the four screws (D).

(continued ...)



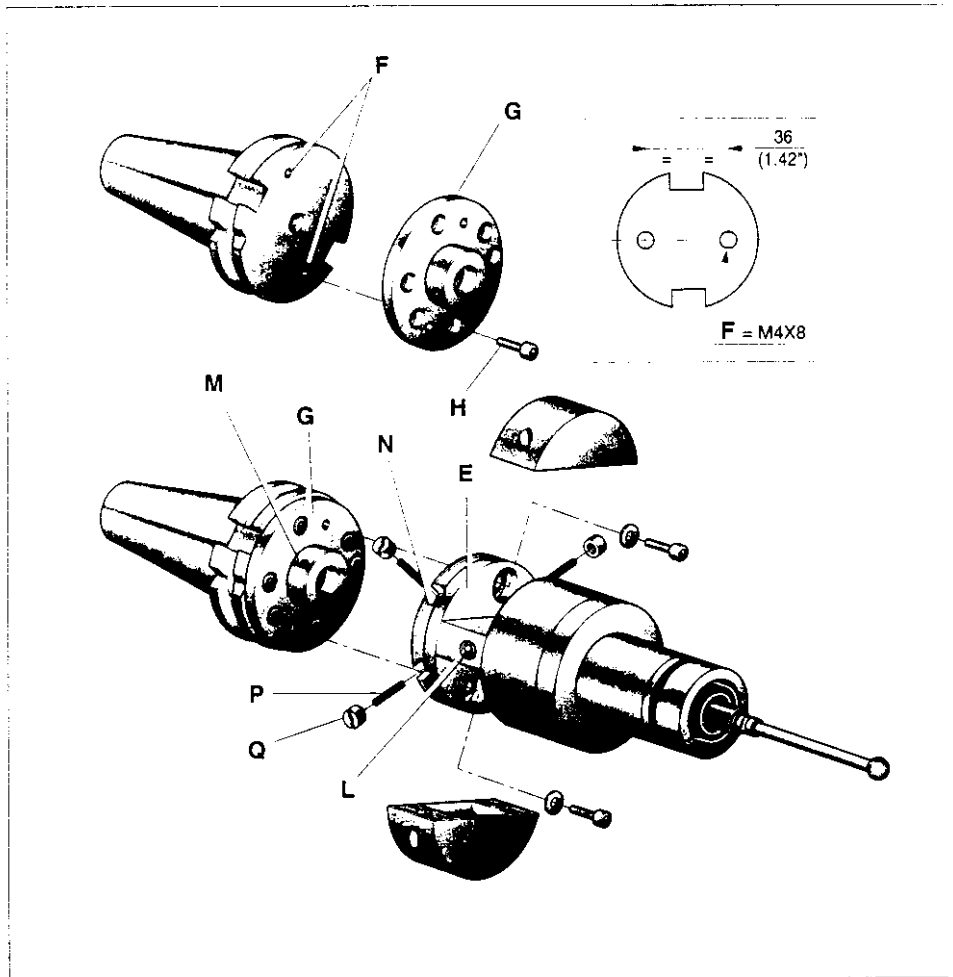
**12.2 FIXING THE TRANSMITTER WITH THE ADJUSTING PLATE**

- 4 - Drill two M4 x 8 threaded holes (F) on the tool taper as shown in Figure.
- 5 - Fix the adjustable holder (G) to the tool taper using the two screws (H).

**Note: The holder (G) has three pairs of fixing holes to enable correct angular orientation of the transmitter LED (L) toward the operator.**

- 6 - Join the transmitter to the taper. Match up the four threaded holes (M) on the taper holder (G) with the four slots (N) on the transmitter holder (E).
- 7 - Insert the four threaded stud screws (P) through the slots (N) and into the threaded holes (M) and tighten using the spanner provided.
- 8 - Fit and tighten the four special nuts (Q) on the stud screws.

(continued ...)



## 12.2 FIXING THE TRANSMITTER WITH THE ADJUSTING PLATE

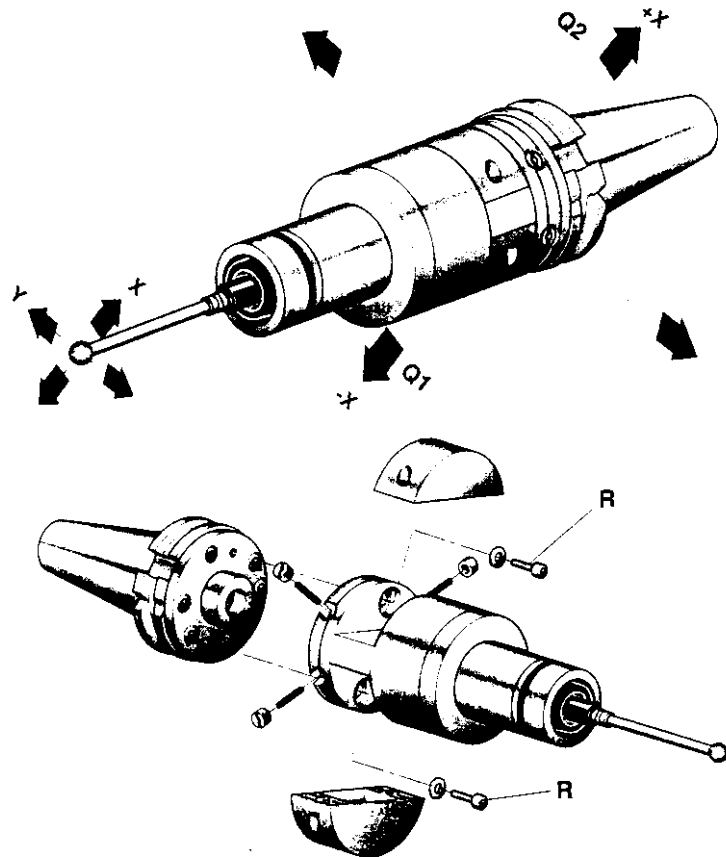
### Aligning the system

- 9 - Fit the probe stylus (see "Fitting the probe stylus").
- 10 - Using the four special nuts (**Q**), align the centre of the stylus sphere with the taper axis. Maximum permitted travel: 1.7 mm in the four directions.

#### Example:

To move the stylus sphere towards "- X", tighten (**Q1**) or loosen (**Q2**) as required. Use this method for the other directions.

- 11 - When you have completed alignment, fit and tighten the two clamping screws (**R**).



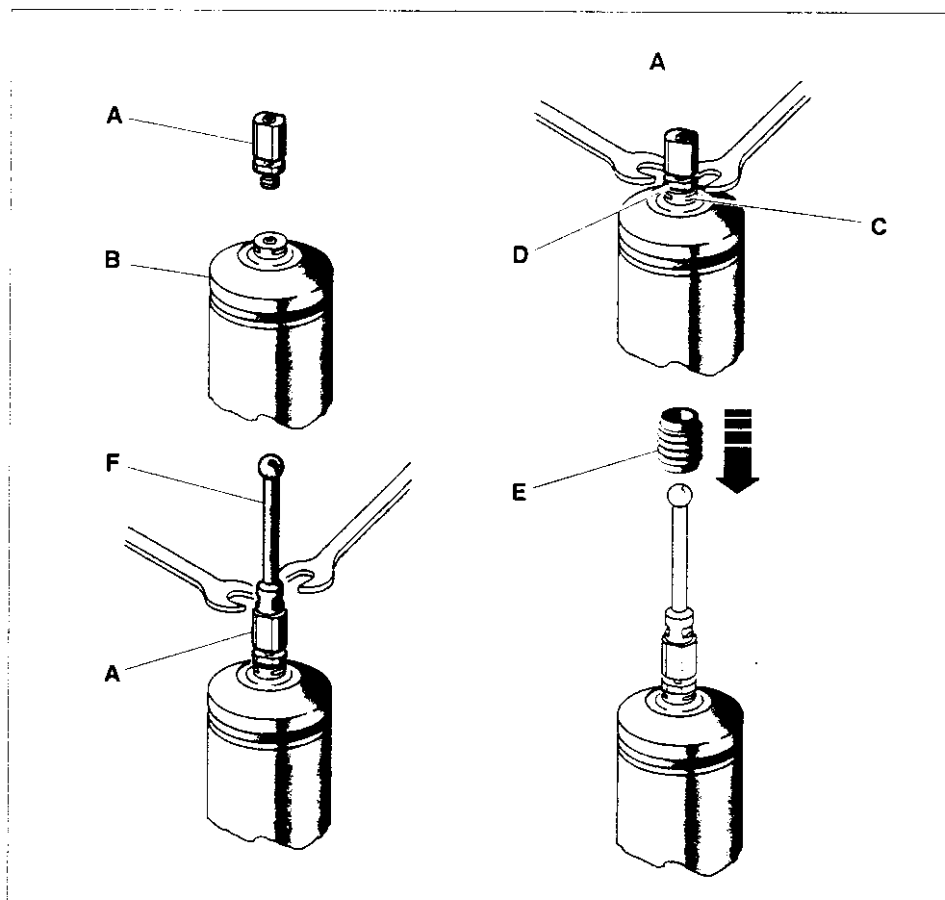


### 13.1 FITTING THE PROBE STYLUS

To fit the stylus to the probe, proceed as follows:

**Note:** The procedure described below involves the fitting of a break pin between the probe and the stylus. The purpose of the break pin is to protect the stylus from damage in the event of accidental knocks or blows to the probe by disconnecting the stylus from the probe.

- Fit the break pin (A) to the probe (B).
- Using the spanner provided, hold the stylus holder (C) in position and then, using the other spanner, tighten the break pin (A).
- To tighten the break pin (A), insert the spanner in position (D) on the lower part of the pin.
- Screw the stylus (F) onto the break pin (A). Using one spanner, hold the break pin in position and, using the other spanner provided, tighten the stylus.
- Fit the holder (E) over the stylus and slide it down to cover the break pin (A).  
The purpose of this holder is to hold the stylus in place when the break pin breaks.
- If the break pin is not to be used, screw the stylus directly onto the probe. Hold the stylus holder (C) in position with the spanner provided and then tighten the stylus with the other spanner.



### 14.1 FAULT FINDING GUIDE

Faults are indicated by the LED on the interface unit panel.

#### Power LED off

<b>CAUSE</b>	No power supply	<b>REMEDY</b>	Check that power is arriving at terminals 13 and 14 on the terminal board of the interface unit.
	Fuse open		Wait some minutes with interface unit not powered

#### Error LED is lit

<b>CAUSE</b>	Transmitter-Antenna out of transmission range	<b>REMEDY</b>	Check that the green "tuning" LED on the antenna remains lit during probe movement.
	Transmitter battery low or completely discharged		Change the battery.
	Transmission time has elapsed		Give the start signal to restart the system.
	No electrical connection between the antenna and the interface unit		Check the connecting cable and connections between the antenna and the interface unit.
	Electrical or electromagnetic interference		Move the antenna cable away from other power cables Change working channel

#### Probe LED does not change status when the probe is touched

<b>CAUSE</b>	No electrical connection between the probe and the transmitter	<b>REMEDY</b>	Check the electrical connection between the probe and the transmitter.
	Probe is damaged		Remove the probe from the transmitter. Connect the spring contacts and then break the connection.
	Transmitter damaged		If the LED continues not to change status, this indicates that the transmitter is faulty. If the LED changes status, this indicates that the probe is faulty.

#### Poor repeatability

<b>CAUSE</b>	Stylus is loose	<b>REMEDY</b>	Check that the stylus and the break pin (where fitted) are fully tightened on the probe.
	Holder is loose		Tighten all screws.
	Seal is pierced or damaged		Change the probe.

## 15.1 ORDINARY MAINTENANCE

### 15.1.1 CLEANING AND INSPECTION

To ensure top, trouble-free performance, clean and inspect the measuring system at regular intervals. Cleaning and inspection intervals must be defined in accordance with operation conditions.

**- Checking cable condition**

Check the cable condition and the tightness of the cable clamps at regular intervals.

**- Checking seal condition**

The front of the probe is fitted with two seals which provide optimum protection under normal operating conditions. At regular intervals, check the outer seal for signs of wear. Change worn seals. If the inner seal is damaged, return the probe to the manufacturer for repair.

## 15.1 MANUTENZIONE ORDINARIA

### 15.1.1 PULIZIA E CONTROLLI

*Per ottenere sempre le migliori prestazioni dal sistema di misura, è buona norma sottoporlo a regolari operazioni di pulizia e controllo.*

*Si tratta di operazioni semplici da eseguire periodicamente in funzione delle condizioni di impiego.*

**- Verifica integrità cablaggio**

*Verificare periodicamente l'integrità dei cavi ed il serraggio dei morsetti elettrici.*

**- Controllo tenuta guarnizioni**

*Anteriormente la sonda è protetta da due guarnizioni sufficienti per un'ottima protezione in normali condizioni di impiego. Controllare periodicamente che la guarnizione esterna non presenti segni di usura. In tal caso, provvedere alla sostituzione della guarnizione stessa. In caso di danneggiamento della guarnizione interna, la sonda dovrà essere inviata al fornitore per la riparazione.*

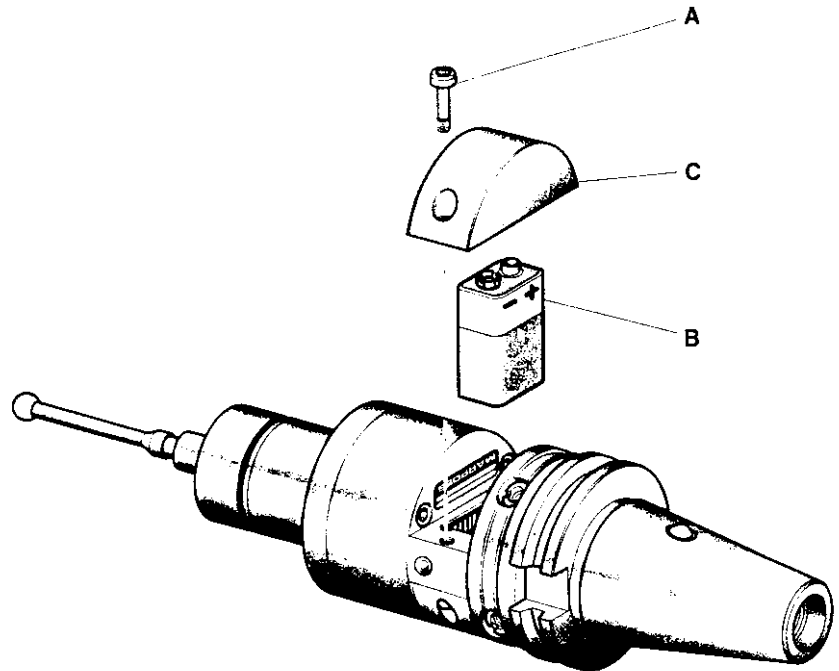
### 15.1.2 FITTING/CHANGING THE BATTERY

The transmitter battery must be changed when the "low battery" LED on the interface unit lights up and when the LOW BAT output signal is transmitted.

To change the battery, proceed as follows:

- Unscrew the two screws **(A)** of the battery compartment cover **(C)** (marked with the battery symbol).
- Remove the old battery and insert the new battery **(B)** into the battery compartment cover **(C)** ensuring that the poles match.
- Refit the cover **(C)** noting the electrical contacts.
- Refit and tighten the cover retaining screws **(A)**.

In to chapt. 7.2 "Battery Life" shows the duration of different battery types under various operating conditions.



## 15.2 EXTRAORDINARY MAINTENANCE

### 15.2.1 CHANGING THE BREAK PIN AND THE STYLUS

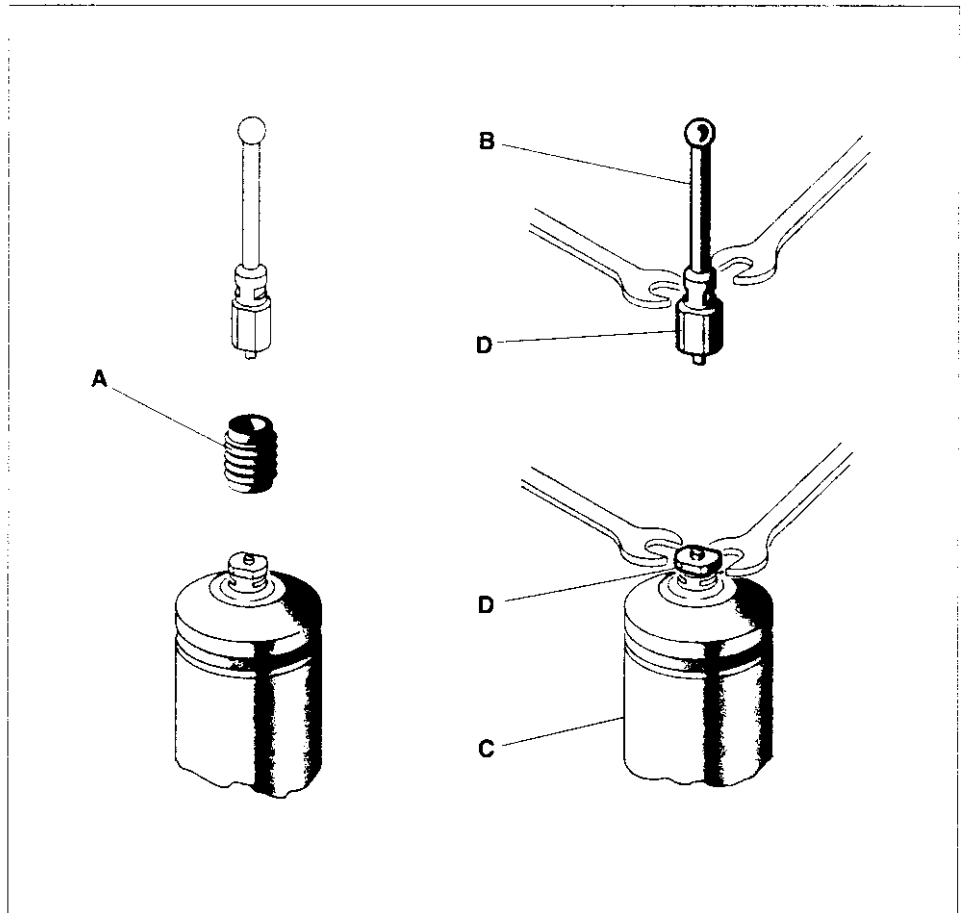
Should the stylus or break pin become damaged due to an accidental knock to the probe they must be replaced.

Proceed as follows:

- 1 - Slide the holder (A) off the broken or bent break pin.
- 2 - Unscrew stylus (B) and the probe (C) from the broken break pin (D).  
Remove the damaged stylus from the probe (C).

**Note:** During the above operation hold the stylus holder clamped in position using the spanner provided.

- 3 - Fit the new break pin and stylus (see "Fitting the probe stylus").



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**15.2.2 REPLECEMENT OF OUTER SEAL**

- 1 - Remove the sensing stylus and protection pin, if any.
- 2 - Remove the front protection cover (B) and seal (C) from the probe body (A).
- 3 - Check for wear of the front seal (D) and, if necessary, replace.
- 4 - Fit the new front protection cover and seal until it snaps into place.

**15.2.2 SOSTITUZIONE GUARNIZIONE ESTERNA**

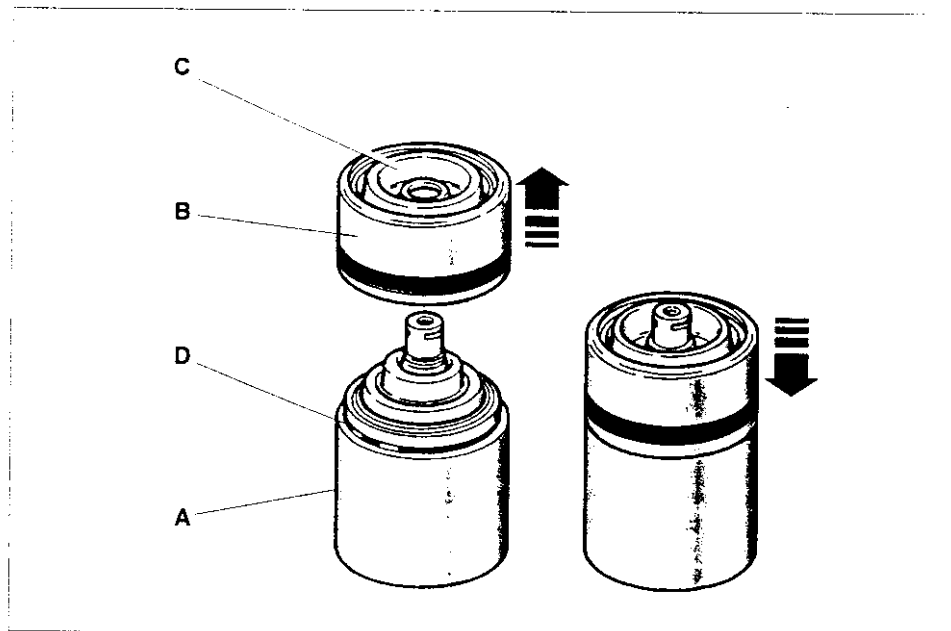
- 1 - Togliere il braccetto e l'eventuale spina di rottura.
- 2 - Sfilare dal corpo sonda (A) la protezione anteriore (B) con guarnizione (C).
- 3 - Controllare lo stato dell'anello di tenuta anteriore (D) ed eventualmente sostituirlo.
- 4 - Inserire la nuova protezione anteriore con guarnizione fino a scatto avvenuto.

**15.2.2. ERSETZEN DER SCHUTZKAPPE MIT DICHTUNG**

- 1 - Tasterarm und Sollbruchstück entfernen.
- 2 - Schutzkappe (B) mit Dichtung (C) vom Meßkopf (A) ziehend abschrauben.
- 3 - Dichtung (D) überprüfen und gegebenenfalls ersetzen.
- 4 - Schutzkappe wieder aufsetzen und andrücken, bis sie einrastet.

**15.2.2 REPLACEMENT DU JOINT EXTERIEUR**

- 1 - Enlever le bras et la broche de rupture éventuelle.
- 2 - Avec un mouvement de rotation, ex-traire du corps (A) la protection avant (B) avec le joint (C).
- 3 - Contrôler l'état de la bague d'étanchéité avant (D) et la remplacer.
- 4 - Insérer la nouvelle protection avant avec joint jusqu'à l'encliquetage.



16.1 SPARE PART LIST

	CODE N°	DESCRIPTION	NOTES
T25-TL25-T36-T60 TOUCH PROBES	1019108005	Crash protection pin 15 mm (0.59")	
	1019108003	Stylus retainer	
	2915335007	Spare part kit for T25G/TL25G	INCLUDING: probe shield with rubber seal, probe (front-rear) o-ring and stylus retainer
	2915340010	Spare part kit for T36G	INCLUDING: probe shield with rubber seal, probe front o-ring and stylus retainer
	2915345007	Spare part kit for T60G	INCLUDING: probe shield with rubber seal, probe front o-ring and stylus retainer
	2915335011	Front protection for T25G/TL25G	
	2915340006	Front protection for T36G	
	2915345012	Front protection for T60G	
	3415335031	Touch probe T25G	
	3424306010	Touch probe TL25G	
	3415340050	Touch probe T36G	
	3415345030	Touch probe T60G	
	2019923021	Transmitter fixing flange for T25G/TL25G	Complete with o-ring seals
	2019923022	Transmitter fixing flange for T36G	Complete with o-ring seals
	2019923023	Transmitter fixing flange for T60G	Complete with o-ring seals
	2915335100	Extension for probe T25G/TL25G L=50 mm (1.97")	
	2915335110	Extension for probe T25G/TL25G L=100 mm (3.94")	
	2915335120	Extension for probe T25G/TL25G L=150 mm (5.90")	
	2915340125	Extension for probe T36G L=50 mm (1.97")	
	2915340126	Extension for probe T36G L=100 mm (3.94")	
	2915340127	Extension for probe T36G L=150 mm (5.90")	
	2915345040	Extension for probe T60G L=50 mm (1.97")	
	2915345050	Extension for probe T60G L=100 mm (3.94")	
	2915345060	Extension for probe T60G L=150 mm (5.90")	
	8871862010	Transmitter for radio activation	
	8871862110	Transmitter for switch activation	
	3019917110	Shank with activation switch DIN69871/A 40 with adjusting plate	
	3019917120	Shank with activation switch DIN69871/A 45 with adjusting plate	
	3019917130	Shank with activation switch DIN69871/A 50 with adjusting plate	
	3019917140	Shank with activation switch CAT 40 with adjusting plate	
3019917150	Shank with activation switch CAT 45 with adjusting plate		
3019917160	Shank with activation switch CAT 50 with adjusting plate		
6134238100	Battery cover with contacts		
4162100005	9V alkaline battery		
6134267300	Battery cover		
2015340100	Wrenches kit	INCLUDING: wrenches for sensing finger and hexagon key 1.5(0.06)-2(0.08)-2.5(0.10) 3(0.12)-4(0.16)mm	
1320131000	Special wrench for T25/TL25		
1320367000	Special wrench for T25/TL25/T36/T60 flange		
2919917110	Transmitter adjusting plate		
ANTENNA	6871860100	Antenna	
	4152606101	Flexible conduit protection ø11 mm (0.43")	Specify meters
INTERFACE	8304860000	E 86 interface unit	