EXHIBIT 3

Theory Of Operation Statement

E86 touch system with radio transmission

The E86 touch system with radio transmission is a probing system designed to be used on large CNC milling machines, lathes and machining centers and for all applications on CNC machine tool machine that require non line of sight between transmitter and receiver.
The system is easy to use and allows low cost installation.

The touch system with radio transmission consist of the following components:

Probe: it is a switch with highly repeatibility features. Various probes having different measuring features are available, depending on the characteristic of the part being measured.

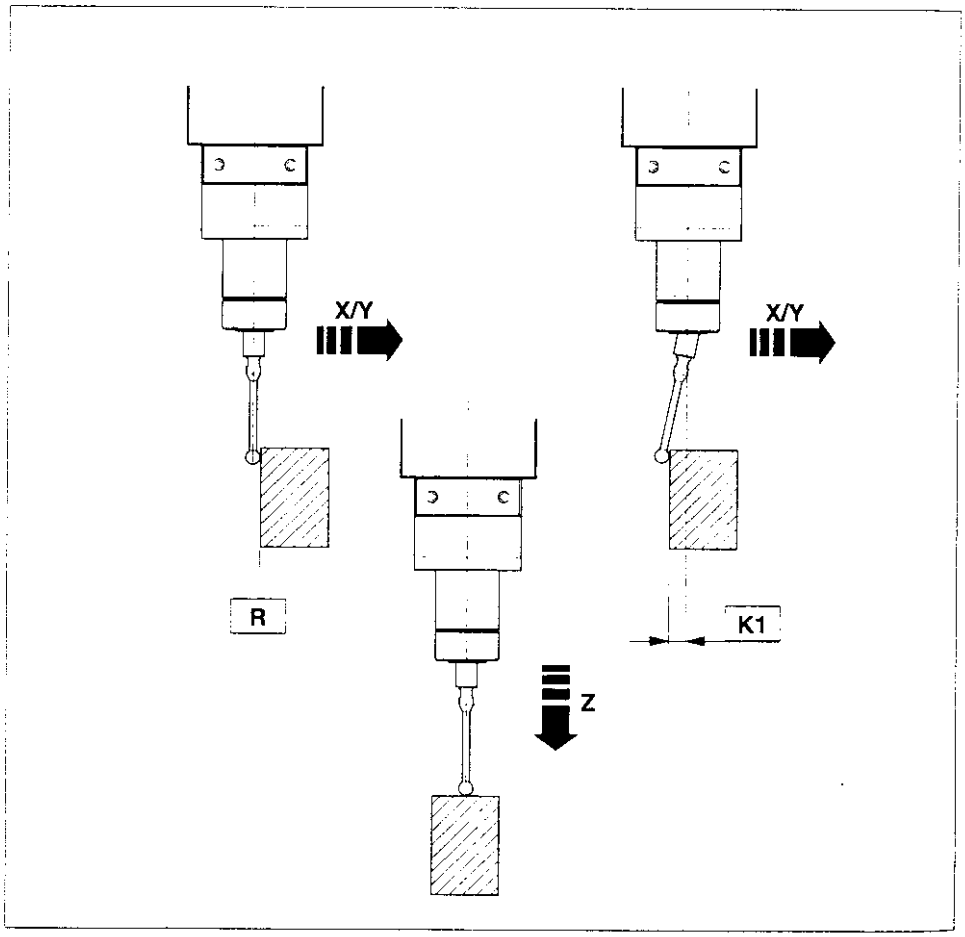
Probe station: (commercially named "transmitter") it is designed to be assembled on a tool holder and to be used by a machine tool like a standard tool. It is battery powered. It is a transceiver that sends the status of probe and battery to the base station through a radio signal. The probe station is normally in stand-by mode waiting for an activation command. The activation can be "radio" through a radio signal from a base station or "mechanical" through a switch mounted on the tool holder. The system allows the use of sixteen channels for transmission.

Base station: (commercially named "antenna") it sends the activation signal to the probe station and receives the radio signal sent by it. The base station is connected to the interface unit by means of a shielded cable that can be up to 30m long.

Interface: it is connected to the base station through an RS485 duplex serial channel. It processes the data received from the base station and sends to it the commands for reception and activation. The interface is connected to the 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.



Technical Description 8304860000F REV. B

TITLE

E86 SYSTEM

UPDATING

Rev.	Date	Description	Prepared by:		Symbol
			Dept.	Signature	
-	28/10/96		CTEPP	A. Ferrari	
A	06/06/97	Inserted initial positions of the dip-switch	CTEPP	A. Ferrari	
B	05/03/98	Added USA version	CTEPP	A. Ferrari	

	Dept.	Signature	Date
Approved	CTEPP	D. Malpezzi	
Issued	CTEPP	A. Ferrari	5/3/98

1 GENERAL INFORMATION

By the commercial name *E86* a telemeter/telecontrol for industrial applications is identified.
This system is composed by three units: two of them are radio-frequency devices and the third is an auxiliary one, named interface. At the moment, 2 versions of this system exist: one for Europe market working in the 433.92MHz band and one for American market working in the 915MHz band. The European system has been studied to satisfy the I-ETS 300 220 norm, the CEPT T/R 01-04 recommendation and the current European norms of electromagnetic compatibility; the American system to satisfy the FCC norms part 15 (47CFR15.249)
Here below you can find a brief description of the single units:

- *probe station*: it is a transceiver supplied by a 9V battery ANSI 1604 format to be mechanically connected to a Mida™ touch probe, which is substantially a switch with high repeatability features. This unit is designed to be assembled on a tool support and to be used by a tool machine (milling machine, lathe, machining center, etc.) like a normal tool. The following characteristics of the transmitter section are shown:

	European Version	American Version
channel	16 channels with 80KHz step (see TAB.3)	16 channels with 200KHz step (see TAB.3)
frequency	from 433.20MHz (channel 1) to 434.64MHz (channel 16)	from 912.2MHz (channel 1) to 916.8MHz (channel 16)
effective radiated power	less than 1mW	less than 1mW
modulation of TX signal	digital FSK	
antenna	integrated	

- *base station*: it is a transceiver connected, through a shielded cable, to the *interface*, which supplies it with power supply and data communication in base band, according to the RS485 standard. This unit is mechanically fixed to the machine. The following characteristics of the transmitting section are shown:

	European Version	American Version
channel	1 single channel	
frequency	433.92MHz	913.5MHz
effective radiated power	less than 10mW	less than 1mW
modulation of TX signal	digital ASK	
antenna	integrated	

- *interface*: it is connected to one or two *base stations* and from them receives the data, in base band, transmitted by the *probe station*. After a proper elaboration, it updates the output status towards the numeric control.

The main function of the system is the transmission to the machine numeric control of the touch probe status connected to the *probe station*. This unit is normally in stand-by and is activated by the numeric control only when necessary. Two different versions of the *probe station* exist in function of the activation technique, which can be mechanical, in this case the power supply arrives to the

2 TECHNICAL FEATURES

system	European v.	American v.
Transmitted signals	probe status and battery	
Transmission distance	10m not in sight	7m not in sight
Activation distance	5m in sight	2m in sight
Minimum distance for re-use of the same channel	100m	
Minimum distance for the use of channels n=1	3m	
Minimum channels for the use of the other channels	1m	
Total number of channels	16 set with dip-switch	
Delay from the status variation of the output probe	about 4.8ms	
Repeatability of this delay	less than 20µs	
probe station	**European v.**	**American v.**
Battery	9V ANSI1604 format. It can be alkaline. lithium. Zn-carbide o Ni-Cd.	
Battery life in continuous working	70h (alkaline batt.)	65h (alkaline batt.)
Battery life in stand-by (only for RF activation)	4000h	2000h
Dimensions	Ø60mm x H58mm	
Seal level	IEC IP68 - 0.3 bar per 30'	
LED visible indication	A led for probe and battery status	
Antenna	Integrated (microstrip on teflon)	
base station	**European v.**	**American v.**
Max. length of the connection cable with interface	30m	
Dimensions	Ø92mm x H119mm	
Seal level	IEC IP67	
Fixing	Screw or magnetic	
LED visible indications	RF signal level	
Antenna	Integrated (helical - normal mode)	
interface		
Power supply	D.C. 18-35V	
Output signals	SSR: PROBE1,PROBE2 / SKIP LOW BATTERY.ERROR	
Input signals	Opto-insulated: START Iso-channel Selection	
LED visible indications	Power supply, Probe status. Battery status. Error	
Programming o receiving channel	Through dip-switch	

TAB.1

	European version	American version
channel	16 channels with step 80KHz (see TAB.3)	16 channels with step 200KHz (see TAB.3)
frequency	from 433.20MHz (channel 1) to 434.64MHz (channel 16)	from 912.2MHz (channel 1) to 916.8MHz (channel 16)
effective radiated power	less than 1mW	less than 1mW
modulation of TX signal	digital FSK	
frequency deviation	"1" ⇒ +12khz. "0" ⇒ -12khz	"1" ⇒ +25khz. "0" ⇒ -25khz
bit frequency	20Kb/s	
transmitted signal	22 bit (see below)	

TAB.2

CHANNEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FREQUENCY EUROPE	433.20	433.28	433.36	433.44	433.52	433.60	433.68	433.76	434.08	434.16	434.24	434.32	434.40	434.48	434.56	434.64
FREQUENCY AMERICA	912.20	912.40	912.60	912.80	914.20	914.40	914.60	914.80	915.20	915.40	915.60	915.80	916.20	916.40	916.60	916.80

TAB.3

The transmitted signal is composed by messages of 22 bit constituted by a constant part (start sequence) and by a variable one. The variable part has a Manchester codification. that means after each information bit. the same bit is transmitted inverted. The constant part has a well recognizable codification from Manchester code and has two purposes: identification of the beginning of a new message and allowing the eventual interruption of a message during transmission. The constant part of the message is the sequence of 6 bit 111000. The variable one is constituted by 8 bit that due to Manchester codification become 16. Messages can be of three types:

a) identifying message: transmitted for systems with RF activation during the activation phase;
b) status message: continuously during the normal working:
c) variation message: transmitted in correspondence of a probe status variation

Here below you can find a content description of the various types of message leaving aside Manchester codification:

I0	I1	ID	DT	T	B0	B1	P

where:

I0÷1 : iso-channel identification code;
ID : ID=1 for identification message ; ID=0 per status or variation message;
DT : DT=1 per identification and variation messages;
T : probe status;
B0÷1 : if DT=1, message repetition number; if DT=0. B1=battery status and B0=0 (reserved for future expansions);
P : parity bit (even parity).

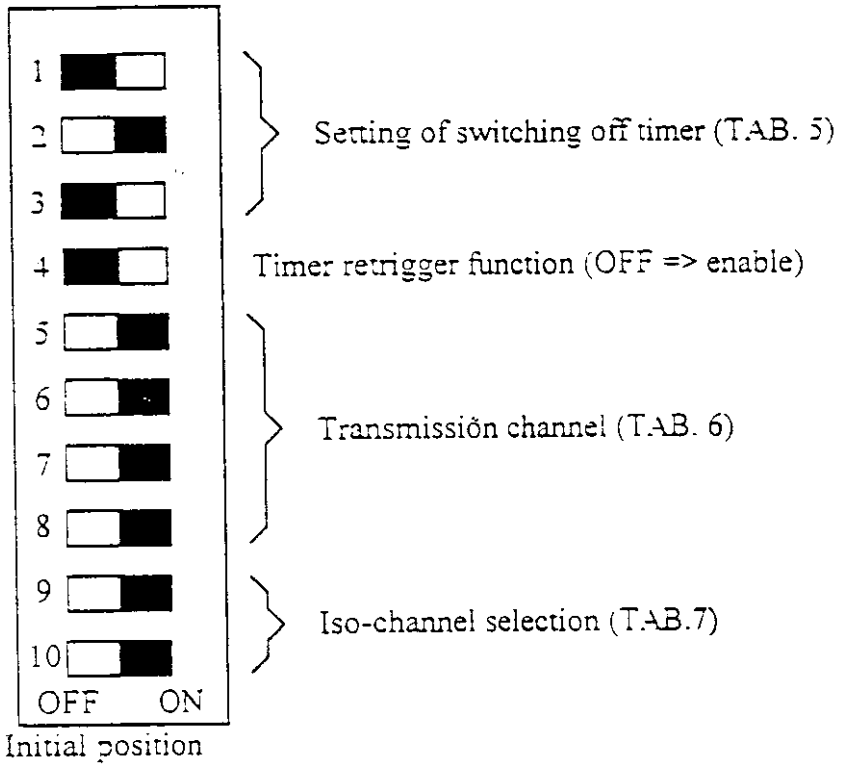


FIG.2

The probe station is provided with a timer for time automatic switching off. The dip-switch from 1 to 3 set this time according to the following table:

DSW1	DSW2	DSW3	TIME
ON	ON	ON	4"
OFF	ON	ON	8"
ON	OFF	ON	16"
OFF	OFF	ON	33"
ON	ON	OFF	1' 7"
OFF	ON	OFF	2' 14"
ON	OFF	OFF	4' 28"
OFF	OFF	OFF	8' 57"

TAB.5

In case of mechanical activation, setting the dip-switch 1-3 ON. instead of a switching off time of 4", you obtain an infinite time, that means the transmitter switches off only at the micro-switch opening.
The dip-switch 4 set in OFF position enables the retrigger function. i.e. the above mentioned timer is reset at every status variation of the touch.
The transmission channel is set by 5-8 according to the following table:

4 BASE STATION

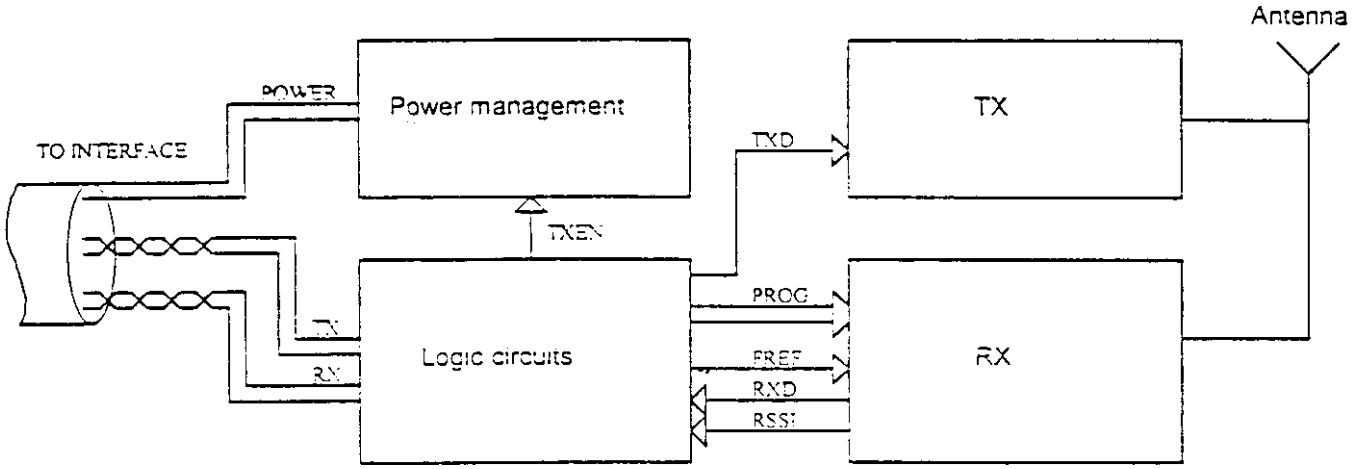


FIG.3

Referring to fig. 3, the transmission section (TX), is supplied in function of the TXEN enabling signal. When TXEN=1 the transmission section is powered on. As previously described, it is an AM transmitter centered around the frequency of 433.92MHz for the European version and of 913.5MHz for the American one. The oscillator of this transmitter uses a SAW resonator.
The receiving section (RX) receives from logic circuits the reference frequency (FREF) and the programming signal (PROG) and returns the received signal (RXD) and the signal indicating the received RF signal level (RSSI). That receiver has a double frequency conversion and the frequency of the two local oscillators can be read in the following table:

	EUROPEAN VERSION			AMERICAN VERSION		
CHANNEL	OL1	IF1	OL2	OL1	IF1	OL2
1	322.50	110.7	100	802	110.2	99.5
2	322.58	110.7	100	802	110.4	99.7
3	322.66	110.7	100	802	110.6	99.9
4	322.74	110.7	100	802	110.8	100.1
5	322.82	110.7	100	804	110.2	99.5
6	322.90	110.7	100	804	110.4	99.7
7	322.98	110.7	100	804	110.6	99.9
8	323.06	110.7	100	804	110.8	100.1
9	323.38	110.7	100	805	110.2	99.5
10	323.46	110.7	100	805	110.4	99.7
11	323.54	110.7	100	805	110.6	99.9
12	323.62	110.7	100	805	110.8	100.1
13	323.70	110.7	100	806	110.2	99.5
14	323.78	110.7	100	806	110.4	99.7
15	323.84	110.7	100	806	110.6	99.9
16	323.94	110.7	100	806	110.8	100.1

TAB.8

5 INTERFACE

The following figure shows a simplified schematic of the interface. As you can see, the interface can manage up to two base stations in order to realize a system in space diversity. The logic circuits, through the RS485 connection, provide to program the base station, defining the working mode (reception mode or transmission mode) and the radio-frequency channel. The logic circuits decode the received signal, manage the space diversity of the two receivers, introduce the anti-bounce on the probe status and produce all the necessary timing for the correct LOW_BATT, SKIP and ERROR signal generation. The logic inputs and outputs are opto-insulated. The interface signal towards the Numeric Control (C.N.) are:

1. power supply signals:
   - 24V
   - 0V
   - GNDT (case ground)
2. input signals:
   - START: activation command
   - SEL0,SEL1: iso-channel selection
3. output signals:
   - PROBE1: probe status - programmable N.O./N.C.
   - PROBE2/SKIP: probe or skip status (see below) - programmable N.O./N.C.
   - LOW_BATT: battery status - programmable N.O./N.C.
   - ERROR: error (received signal absent or weak) - always N.C.

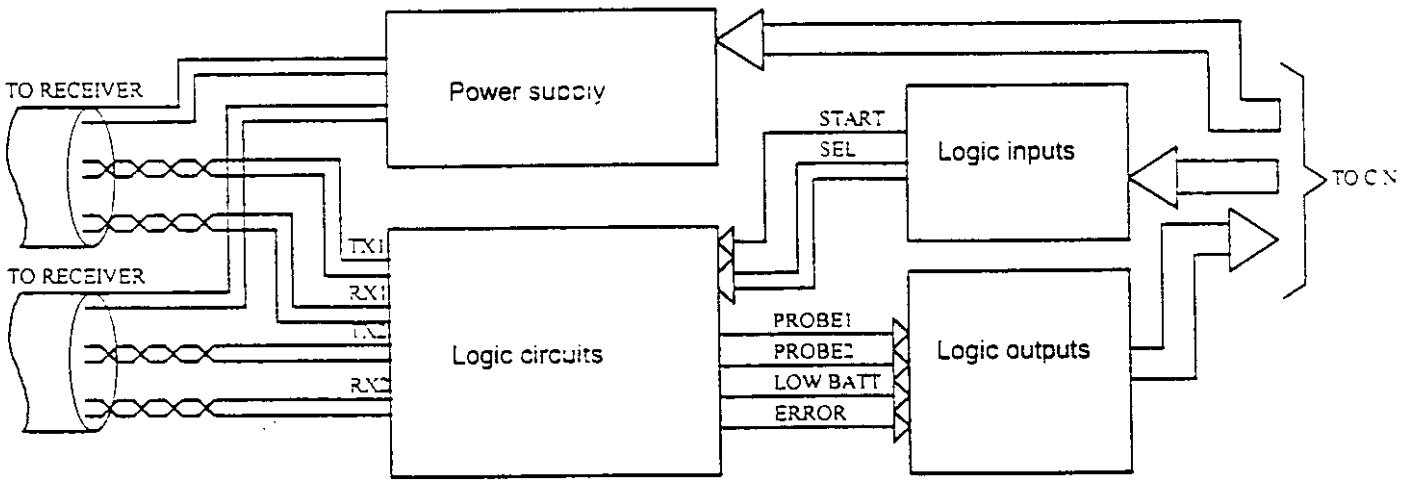


FIG.4

The interface is programmable through a ten-position dip-switch: