1. GENERAL TECHNICAL DESCRIPTION

1-1. INTENDED USE AND OPERATION INSTRUCTIONS

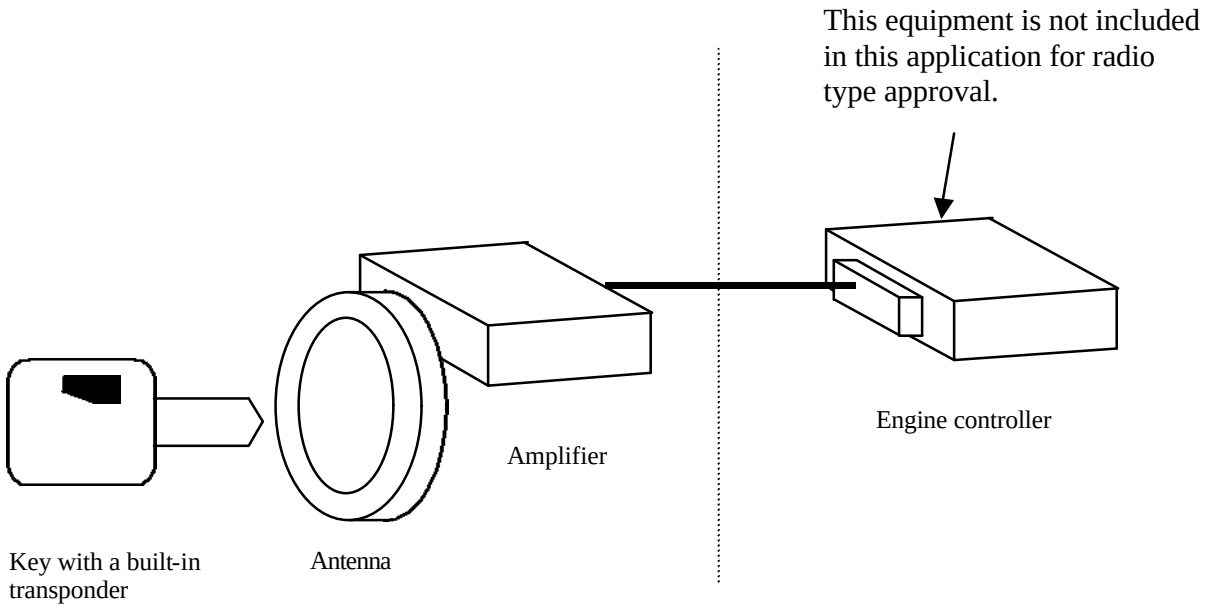
This equipment, known as a car immobilizer, is an anti-theft device to prevent unauthorized use of a motorcycle. The equipment allows the engine to be disabled when the ignition system is manipulated without using the proper key, such as by the direct connection of a power supply line or the breakdown of the key-cylinder. The system is composed of a radio frequency link between a transponder integrally incorporated within an ignition key and a radio frequency module (RFM) with an antenna installed on the key-cylinder case of the ignition system and an engine control module (ECM) connected by wire to the RFM. The ECM controls operation of the engine.

Whenever the ignition key is inserted into the key-cylinder and turned to the “ON” position, the RFM continues to generate a radio frequency operating on frequency 125 kHz powered by the ECM, and a bi-directional transmission in half duplex mode between the RCM and the transponder occurs. The transponder requires no internal power supply; it derives its power from the magnetic component of the radio frequency carrier. Data is stored in the transponder and the ECM in its non-volatile memory (EEPROM). Date is transmitted via radio frequency link by ASK-modulating this carrier. Absorption modulation is used to transmit data from the transponder to the ECM. The transponder absorbs the magnetic field which hence modulates the current in the antenna of the RFM.

Upon receiving the start command from the ECM, the energized transponder transmits its identifier to the ECM. The ECM sends its own password (A) together with a set of random numbers to the transponder in return. If the received password matches the password (A) and the set of random numbers received in accordance with the pre-determined protocol, and transmits the resultant encrypted data to the ECM. The ECM compares the received data with the pre-calculated data using the transponder’s password (B) stored in the ECM and the same random numbers in turn, whereupon the matching being verified as a result of the comparison, the ECM enables the engine to be activated. If the result is negative, it disables the engine and causes the indicator light on the instrument panel to blink continuously. The random numbers are revised every time the engine is activated in order to prevent unauthorized use of the vehicle by an ignition key being duplicated.

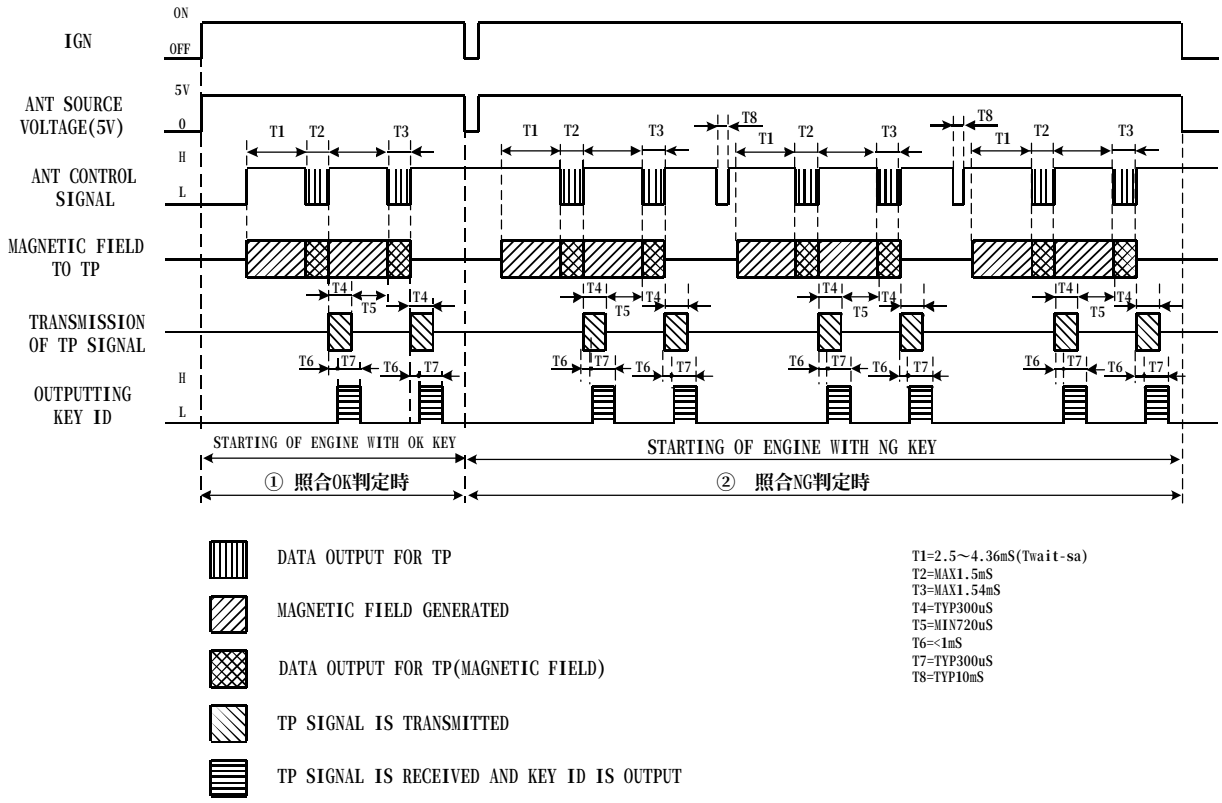
1-2. CONSTRUCTION OF IMMOBILIZER SYSTEM

The construction of the system is shown below.



1-3. TIMING DIAGRAM

The timing diagram of the system is shown below.



2.TECHNICAL SPECIFICATIONS

2-1.Fundamental Specifications

-Nominal voltage : 5V(Transformed from the 12V battery)

-Power source : Regulated lead-asid battery(12V)

2-2.Transponde specifications(Referd to Philips reference manual)

-Model number : PCF7936AS(Security transponder for car immobilizer manufactured by Philips)

-Operating frequency :N.A.

-Number of channel :N.A.

-Emission designator :N.A.

-Maximum output field strength :N.A.

-Type of antenna :Ferrite core antenna

2-3.RF module specifications

-Operating frequency :125kHz

-Number of channel :1

-Emission designator :NON

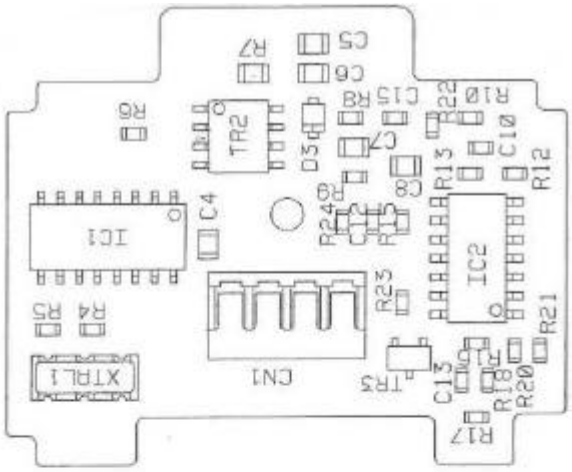
-Maximum output field strength :200dBuA/m(@2cm)

-Type of antenna :Loop antenna

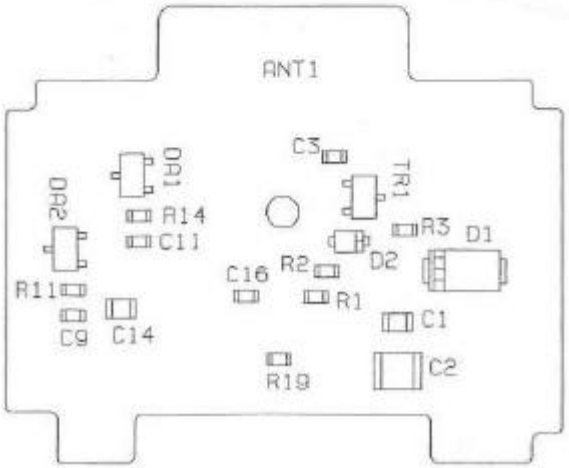
6.lists of parts and components

SYMBOL	PARTS No.	MANUFACTURER	CHARACTLISTICS	
C1,4,14	GRK40F104Z25	MURATA		
C2	TMK325F106Z	TAIYOUYUUDEN		
C3,12	GRM39R102M50	MURATA	1000pf	50v
C5,6	ECHU1H182GB	MATSUSHITA	0～2700p	50v
C7	ECUV1H473ZFX	MATSUSHITA	0.047uf	50v
C8	C2012X7R1H223M	T D K	0.022uf	50v
C9	GRM39CH221J50	MURATA	220pf	50v
C10	NOT MOUNTED			
C11,13	GRM39CH101J50	MURATA	100pf	50v
C15	NOT MOUNTED			
C16	GRM39R471K50	MURATA	470pf	50v
D1	NOT MOUNTED			
D2	NOT MOUNTED			
D3	1SS376	ROHM	1SS376	
DA1,2	DAN217	ROHM		
IC1	TC74HC4060AF	TOSHIBA	TC74HC4060AF	
IC2	LMC6034	NATIONAL SEMI CONDUCTOR	LMC6034	
R1	MCR03EZHJ222	ROHM	2.2k	1/16w
R2,10	MCR03EZHJ102	ROHM	1k	1/16w
R3,19,20	MCR03EZHJ103	ROHM	10k	1/16w
R4,17	MCR03EZHJ105	ROHM	1M	1/16w
R5	MCR03EZHJ681	ROHM	680	1/16w
R6,22	MCR03EZHJ000	ROHM	0	1/16w
R7	MCR10EZHJ510	ROHM	0～100Ω	
R8	MCR03EZHJ471	ROHM		470 1/16w
R9,11,18	MCR03EZHJ104	ROHM	100k	1/16w
R12,13,16	MCR03EZHJ472	ROHM	4.7k	1/16w
R14	MCR03EZHJ224	ROHM	220k	1/16w
R15	MCR03EZHJ393	ROHM	39k	1/16w
R21	MCR03EZHJ222	ROHM	2.2k	1/16w
R23	NOT MOUNTED			
R24	NOT MOUNTED			
TR1	2SC2412K	ROHM	2SC2412K	
TR2	FW332	SANYO		
TR3	DTC114EKA	ROHM	DTC114EK	
XTAL1	CSTCC4.00MGA0H6	MURATA		

7.Component layout of P.C.B

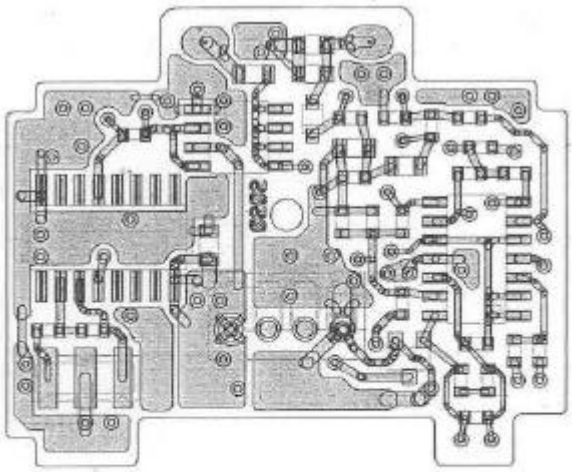


Top side of P.C.B

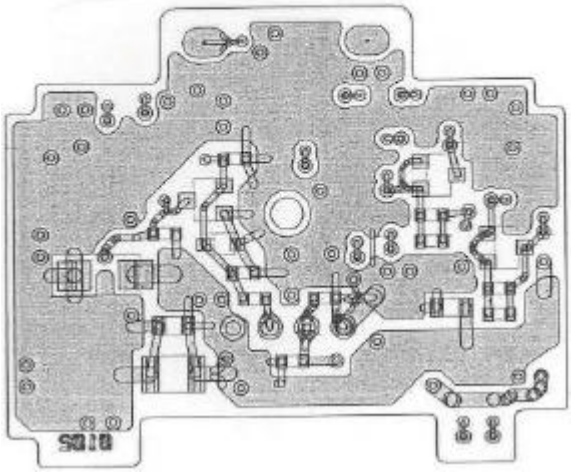


Bottom side of P.C.B

8.pattern layout of P.C.B



Top side of P.C.B



Bottom side of P.C.B