KENWOOD

INTERFACE

IF-232C

INSTRUCTION MANUAL

KENWOOD CORPORATION

©PRINTED IN JAPAN B50-8066-20 (K,M)(M)
92/12 11 10 9 8 7 6 5 4 3 2 1 91/12

WARNING

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Sub-part J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

The IF-232C is the interface adapter for connection between the RS-232C terminal of a personal computer and the interface terminals of transceivers capable of computer control, such as the TS-940S and the TS-811/711 series.
The interface acts as a voltage converter between the RS-232C port (–12 to +12V) and the TTL levels of the transceiver (0 to +5V), and as a noise-suppressor.

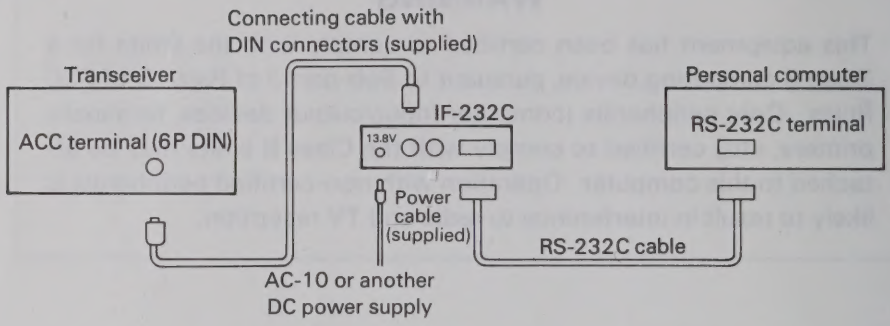
■ ACCESSORIES SUPPLIED

- Connecting cable with DIN connectors .... (E30-2046-05)..... 1 ea.
- Power cable..... (E30-1799-05)..... 1 ea.
- Instruction manual ..... (B50-8066-XX) ..... 1 ea.
- Warranty card (U.S.A. only) ..... (B46-0411-XX)..... 1 ea.

■ CONNECTIONS

Note:

1. After you have confirmed that both the computer and the transceiver are turned OFF connect the power cable as shown in the illustration. The RS-232C cable must be shielded to prevent RF interference. The length of the cable should also be kept to a minimum to prevent RF interference. RS-232C standards specific cable lengths less than 50 feet, but this length is impractical for RF applications.
2. For noise preventation the IF-232C incorporates a photocoupler circuit which provides electrical isolation between the transceiver and the computer. You should use a separate power supply for the IF-232C, as well as for the computer.

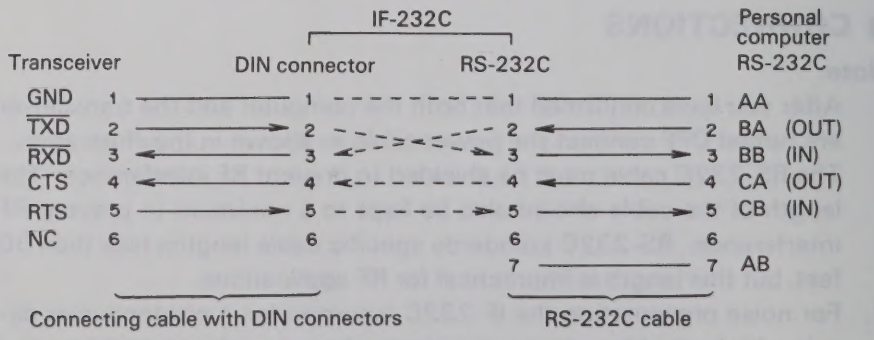


■ RS-232C CABLE

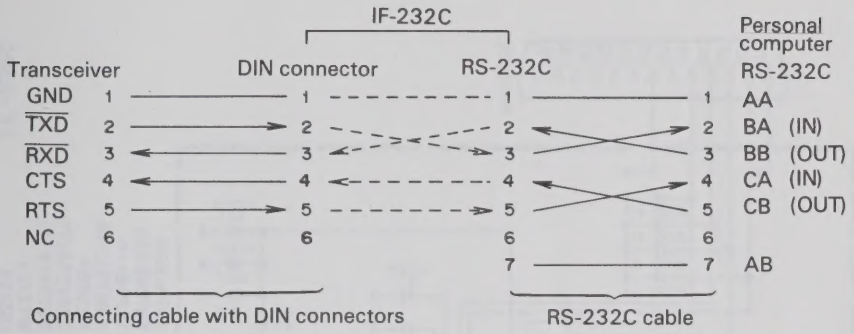
The IF-232C does not include the RS-232C cable, which will have to be purchased from your computer dealer. Make sure you purchase a cable with the correct configuration!

Pay particular attention to the wiring of pin number 2. If you are not sure compare the information contained in your computer manual with the information contained in the illustration below. (When connecting the IF-232C note that the only pins that are used are pin numbers 1, 2, 3, 4, 5, and 7).

● Normal Wiring



● **Reverse or Cross Wired Cables**



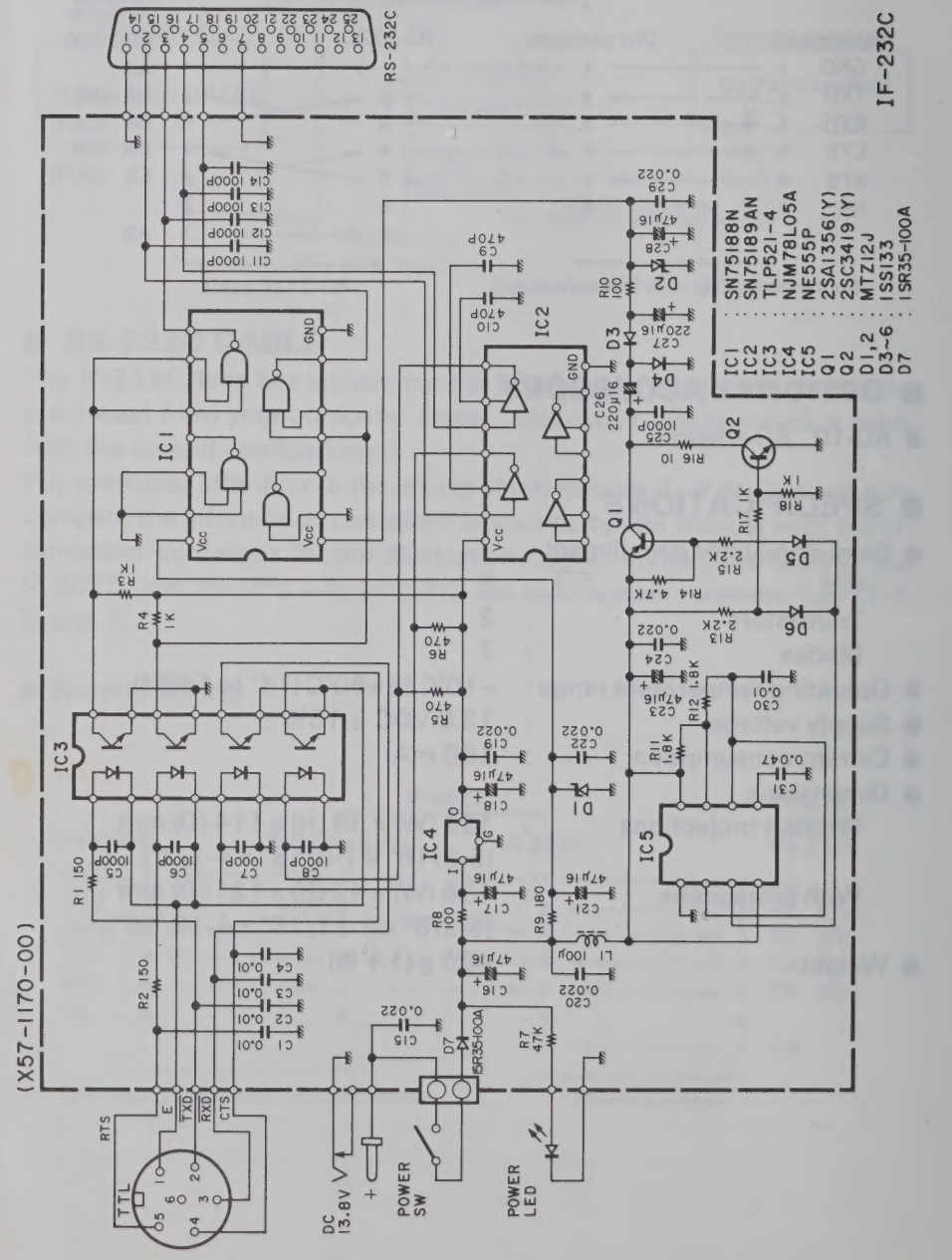
■ OPTIONAL ACCESSORY

● AC-10 AC adapter

■ SPECIFICATIONS

● Semi-conductor compliment
  IC's : 5
  Transistors : 2
  Diodes : 7
● Operating temperature range : −10°C to +60°C (14° to 140°F)
● Supply voltage : 13.8 VDC ±15%
● Current consumption : 150 mA
● Dimensions
  Without projections : 132 (W) × 39 (H) × 114 (D) mm
  (5-3/16" × 1-9/16" × 4-1/2")
  With projections : 136 (W) × 42 (H) × 121 (D) mm
  (5-3/8" × 1-11/16" × 4-13/16")
● Weight : 480 g (1.1 lb)

■ SCHEMATIC DIAGRAM



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IC KIT

IC-10

INSTRUCTION MANUAL

KENWOOD CORPORATION

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92/12 11 10 9 8 7 6 5 4 3 2 1 91/12 11 10

Thank you for purchasing the new IC-10 IC kit. Please read this instruction manual carefully before placing your IC kit in service. This unit has been carefully engineered and manufactured to rigid quality standard, and should give you satisfactory and dependable operation for many years.

The IC-10 IC kit is designed to be installed internally in transceiver the TS-440S, R-5000 to allow computer assisted control of various transceiver operating parameters. Control is performed via the computers RS-232C terminal via the IF-232C interface (level translator).

CONTENTS

1. FEATURES

1. A wide variety of control instructions are possible.
2. Powerful, easy-to-understand instruction set.
3. Common commands that are interchangeable between different transceivers, reducing the number of changes necessary in software development.
4. Simultaneous operation of personal computer and transceiver.

2. SUPPLIED ACCESSORIES

The following accessories are supplied this kit. Confirm that all are present.

1. IC ..... (μPD8251AFC)..... 1 ea.
2. IC ..... (TC4040BP)..... 1 ea.
3. Instruction manual..... (B50-8081-20)..... 1 ea.

Note:

The TS-440S, R-5000 does not include computer software, guidelines are provided but due to the wide variety of computers available, all of which have their own languages it is left up to the owner to design his or her own software package.

3. SPECIFICATIONS

3-1. Interface

Communication method .... Serial interface, full-duplex
Transfer rate ..... 4800 BPS (bits per second)
Synchronization..... Start-stop (Asynchronous)
Bit construction ..... 1 start bit, 8 character bits, 2 stop bits
Parity ..... None
Signal format ..... TTL level

3-2. Terminal connections

Pin No.	Signal Name		I/O
1	GND	Signal ground	
2	$\overline{\text{TXD}}$	Transmit data	Output
3	$\overline{\text{RXD}}$	Receive data	Input
4	CTS	Transmit enable	Input
5	RTS	Receive enable	Output
6	NC		

GND: This is the signal ground terminal.
$\overline{\text{TXD}}$: The transmit data is the serial data from the transceiver to the computer. The output utilizes negative logic.
$\overline{\text{RXD}}$: The receive data is the serial data from the computer to the transceiver. The input utilizes negative logic.
CTS: This signal is supplied from the computer, and is used to inhibit transmit data from the transceiver when the computer is not ready to receive. The input utilizes positive logic. (Transmit data is stopped by a logic low.)
RTS: This signal is applied to the computer, and is used to inhibit transmit data from the computer when the transceiver is not ready to receive it. The output utilizes positive logic. (Inhibit is requested when the level is low.)

Connector pin configuration

(Viewed from the rear)

4. INSTALLATION

Refer to TS-440S instruction manual.
For R-5000, consult our service center.

5. OPERATION

Caution:
Turn the POWER switch OFF before making connections.
With R-5000, unplug the AC plug (or DC plug).

5-1. Precautions for Computer-Connected Operation

When connecting the transceiver with a computer, check the following points.

1. Are the connections correct?
   The transceiver output should be connected to the computer input and the transceiver input to the computer output.

   Example:
   Transceiver's receive data — Computer's receive data
   Transceiver's RTS — Computer's CTS

2. Is the computer's transmisson rate 4800 BPS (bits per second)?
3. Is the computer's bit configuration correct?
   1 start bit, 8 character bits, 2 stop bits, no parity.

5-2. Control Operation

Most computers handle data in the form of "bits", and "bytes". A bit is the smallest piece of information that the computer can handle. A byte is composed of 8 bits. This is the most convenient form for most computer data. This data may be sent in the form of either serial or parallel data strings. The parallel mode is faster, but more complicated, while the serial form is slower it requires less complicated equipment, and therefore is less expensive.

Serial transmission of data occurs over a single line using time-division methods. This use of a single line also offers the advantage of reducing the number of errors due to line noise.

For control of the transceiver via the computer only three lines are theoretically required: transmit data ($\overline{\text{TXD}}$), receive data ($\overline{\text{RXD}}$), and ground (GND). From a practical standpoint it is also necessary to incorporate some means of controlling when this data transfer will occur. The transceiver has the buffer for reception and the computer may have also that. Then the RTS and the CTS lines will control each data transfer never overflow those buffers.

The IF-232C is used in conjunction to provide voltage conversion. RS-232C deals in voltages above and below TTL levels, and must be converted to prevent damage to the transceiver. This interface/conversion is handled by the IF-232C.
The actual command sequence would be similar to those described below:
For example, the radio is placed into the transmit mode whenever the character string "TX" is sent from the computer. The character string "TX" is called a command. It tells the transceiver to do something. There are 23 differ-

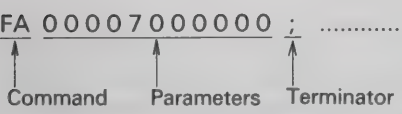
ent commands available for control of the transceiver. R-5000 has 19 commands.

These commands may be incorporated into a computer program written in BASIC or any other high level language such as PASCAL, etc. Programming methods vary from computer to computer so please refer to the instruction manuals included with your terminal program, and computer.

5-3. Commands

The illustration below demonstrates that a command is composed of two alphabetical characters, various parameters, and the terminator to signal the end of the command.

Example:



5-3-1. Command description

A command may consist of either lower or upper case alphabetical characters.

5-3-2. Parameter description (Refer to the parameter list.)

Parameters are used to specify specific information necessary to implement the desired command. The exact number of parameters necessary for each command is predetermined. If a particular parameter is not applicable to the transceiver you are controlling the parameter digits should be filled using any character except the terminator ";".

For example the MC (Memory channel selector) command uses two parameters, 1 column to specify the memory bank number, and 2 columns to specify the memory channel number. To specify CH9 of memory bank number 1, the command would be:

"MC109;" ..... The memory bank number is not necessary when programming the TS-440S, R-5000 so the command could be as given above "MC109" or as:

"MC 09;" ..... In this case a blank has been used to fill the parameter block for the memory bank number.

The following are examples of bad commands:

"MC09;" ..... No memory bank specification (not enough parameters)

"MC19;" ..... Not enough digits in the memory channel parameter, i.e. CH9 should be given as "09".

"MC␣1␣09;" ..... Unnecessary characters between parameters.

"MC109" ..... No terminator

Parameter list

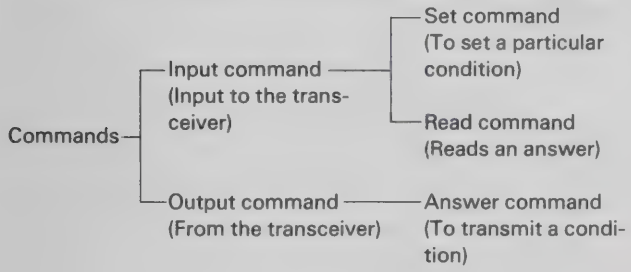
Format No.	Name	Number of columns	Format
1	SW	1	0 = OFF 1 = ON
2	MODE	1	1 = LSB 4 = FM 2 = USB 5 = AM 3 = CW 6 = FSK
3	FUNCTION	1	0 = VFO A 2 = MEMORY 1 = VFO B
4	FREQUENCY	11	Represented in Hz, using 11 columns **Example:** 00007200000 is 7.2 MHz 10 GHz 1 MHz 1 kHz 1 Hz
5	RIT FREQUENCY	5	The first column is "+" or "–", and the remaining four columns indicate the frequency in Hz. **Example:** +1050 is +1.05 kHz
6	—	—	
7	MEMORY CHANNEL	2	Represented in two columns **Example:** 02 is CH2
8	—	—	
9	MEMORY CHANNEL SPLIT SPECIFICATION	1	0 = Receive 1 = Transmit
10	MEMORY LOCKOUT	1	0 = Not locked out 1 = Locked out

Format No.	Name	Number of columns	Format
11	TX/RX	1	0 = Receive 1 = Transmit
12	—	—	
13	—	—	
14	—	—	
15	—	—	
16	MODEL NO.	3	Three column number specifying each set.
17	ANTENNA NO.	1	1 = ANT 1 2 = ANT 2
18	CLOCK	1	1 = CLOCK 1 2 = CLOCK 2
19	CLOCK TIME	6	HHMMSS HH : hour MM : minutes SS : seconds

5-3-3. Terminator

To signal the end of a command it is necessary to use a special character. The character that has been selected for use is the semi-colon ";". This special character must appear as the last character in a particular command string.

5-3-4. Types of commands



Commands can be classified as shown in the chart above. For example, with the FA (Frequency of VFO A) command.

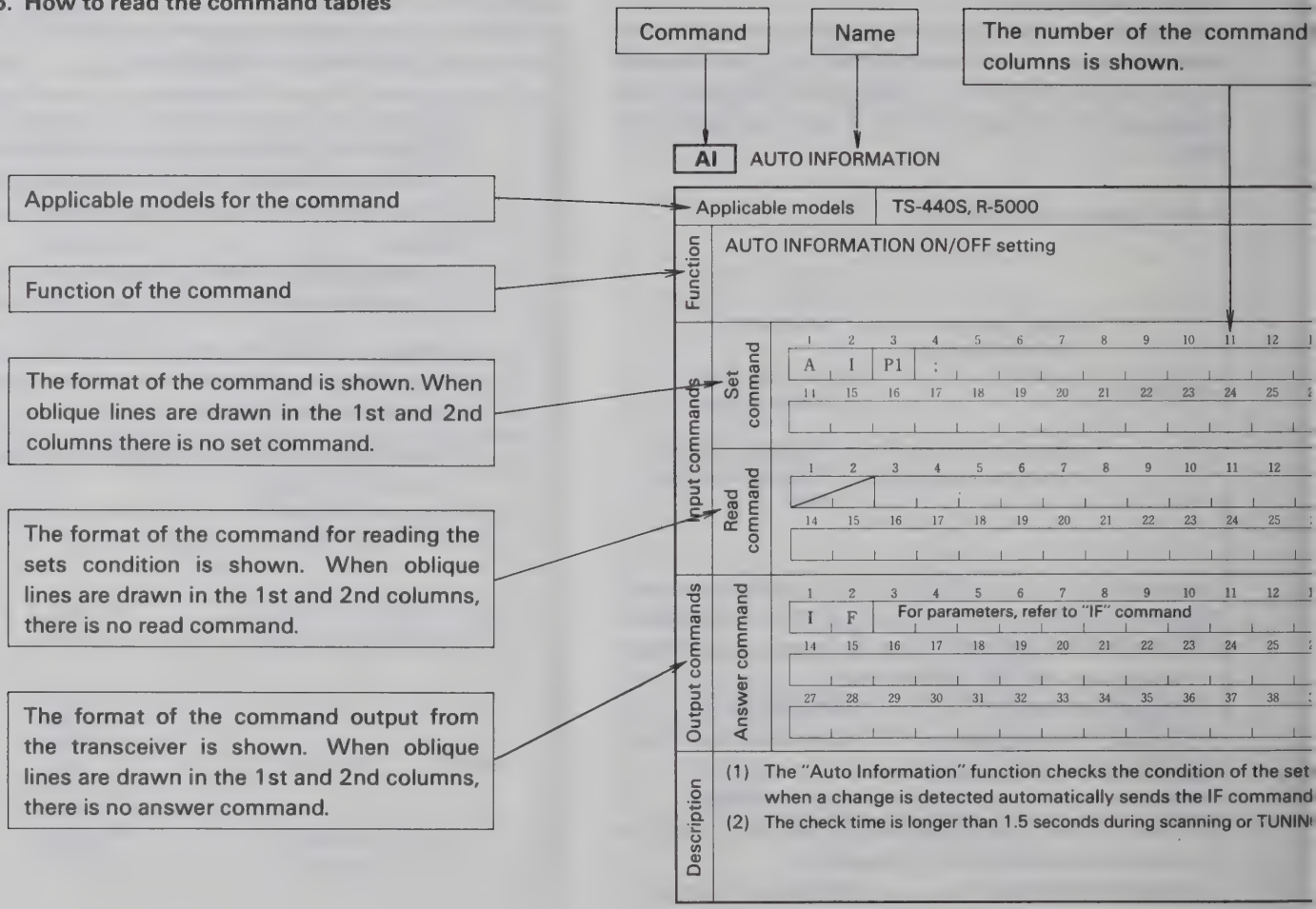
- To set the frequency at 7 MHz, the command sent from the computer to the transceiver is:
  "FA00007000000;"..... (Set command)
- To read the frequency of VFO A, the command sent from the computer to the transceiver is:
  "FA;"..... (Read command)
- When the read command, above, has been sent, the command returned to the computer is:
  "FA00007000000;"..... (Answer command)

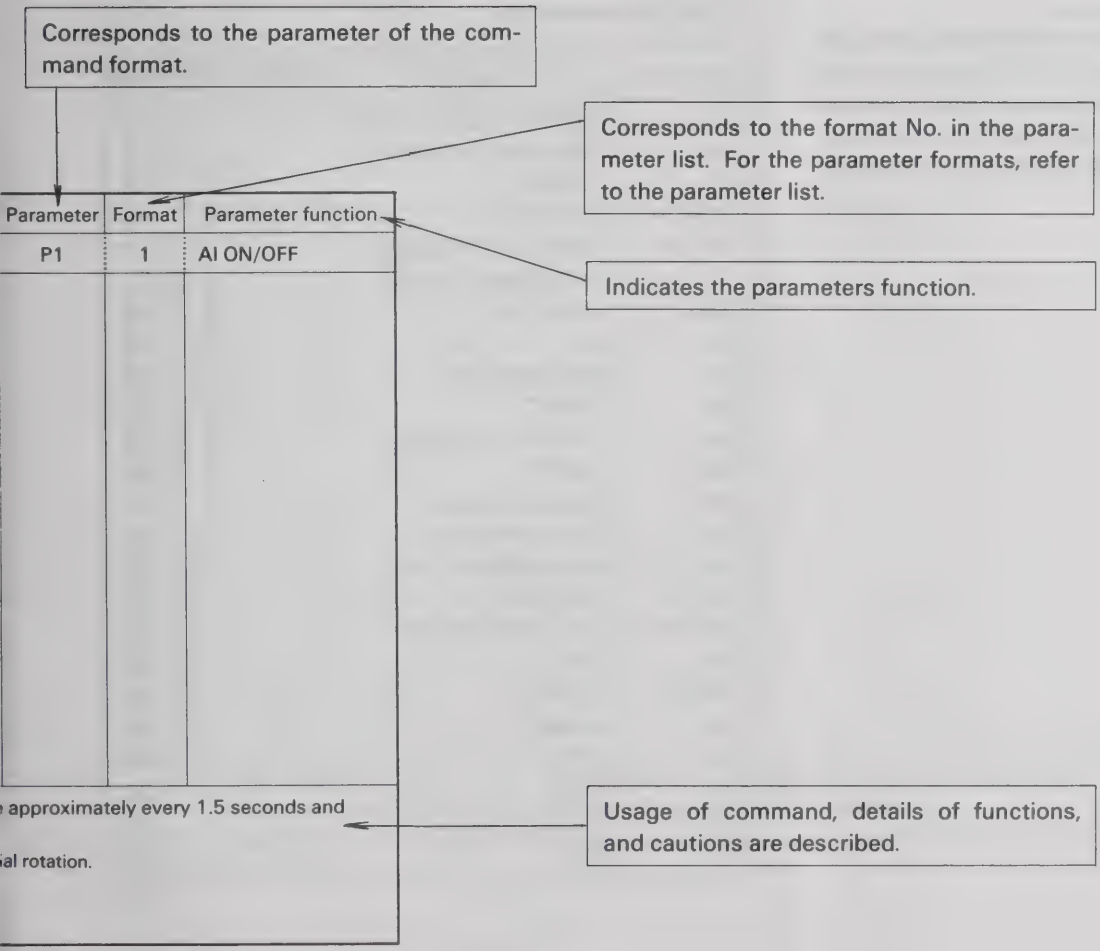
5-3-5. Error messages

In addition to the answer command, the transceiver will send one of the following error messages:

?;	○ When the command syntax is incorrect. ○ When the command was not executed due to the current status of the transceiver, even though the command syntax was correct. **Note:** Occasionally this message may not appear due to microprocessor transientsin the transceiver.
E;	When a communication error occurs, such as an overrun error or framing error occurs during serial data transmissions.
O;	When the receive data is sent but processing cannot be completed.

5-3-6. How to read the command tables




Corresponds to the parameter of the command format.
Corresponds to the format No. in the parameter list. For the parameter formats, refer to the parameter list.
Parameter
Format
Parameter function
P1
1
AI ON/OFF
Indicates the parameters function.
approximately every 1.5 seconds and
al rotation.
Usage of command, details of functions, and cautions are described.

5-3-7. Command Use Precautions

1. When control characters (00 to 1FH) have been included in the receive data, string the command following these control characters may not be correctly received and/or executed. Do not use these control characters.
2. Program execution may be delayed during encoder rotation.

5-3-8. Command list

Command	Function	TS-440S	R-5000	Page
AI	AUTO INFORMATION	○	○	13
AN	ANTENNA NUMBER		○	14
CK	CLOCK		○	15
DN/UP	DOWN/UP	○	○	16
FA/FB	FREQUENCY VFO A/ FREQUENCY VFO B	○	○	17
FN	FUNCTION	○	○	18
ID	ID	○	○	19
IF	INFORMATION	○	○	20
LK	LOCK	○	○	21
MC	MEMORY CHANNEL	○	○	22
MD	MODE	○	○	23
MR	MEMORY READ	○	○	24
MW	MEMORY WRITE	○	○	25
PS	POWER SWITCH		○	26
RC	RIT CLEAR	○		27
RD/RU	RIT DOWN/RIT UP	○		28
RT	RIT	○		29
RX/TX	RX/TX	○		30
SC	SCAN	○	○	31
SP	SPLIT	○		32
ST	STEP		○	33
VR	VOICE RECALL	○	○	34
XT	XIT	○		35

AI AUTO INFORMATION

Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	AUTO INFORMATION ON/OFF setting	P1	1	AI ON/OFF

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
A	I	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13
I	F	For parameters, refer to "IF" command										

14	15	16	17	18	19	20	21	22	23	24	25	26

27	28	29	30	31	32	33	34	35	36	37	38	39

Description

(1) The "Auto Information" function checks the condition of the set once approximately every 1.5 seconds and when a change is detected automatically sends the IF command.

(2) The check time is longer than 1.5 seconds during scanning or TUNING dial rotation.

AN ANTENNA NUMBER

Applicable models	R-5000	Parameter	Format	Parameter function
Function	Switch the antenna number.	P1	17	SET ANT. NO. 1 or ANT. NO. 2.

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
A	N	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13
A	N	;										

14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13
A	N	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

27	28	29	30	31	32	33	34	35	36	37	38	39

Description

For the VHF band, the optional VC-20 converter does not operate.

CK CLOCK

Applicable models	R-5000

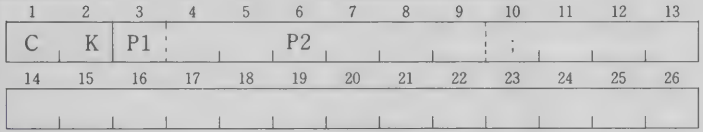
Parameter	Format	Parameter function
P1	18	Time setting and reading.
P2	19	

Function

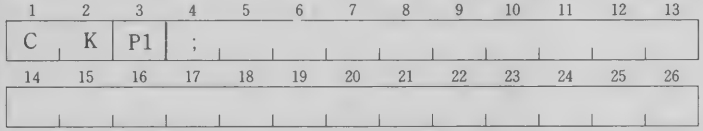
Time setting and reading of the built-in clock.

Input commands

Set command

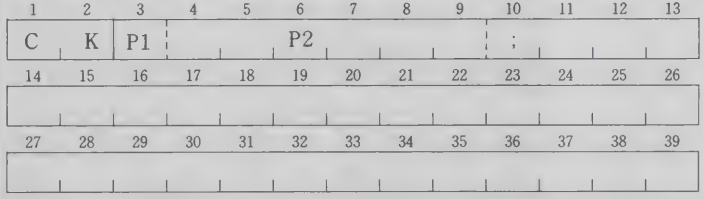


Read command



Output commands

Answer command



Description

As R-5000 is not operating in seconds, anything other than " ; " is usable, and blank is given for reading.

DN UP DOWN/UP

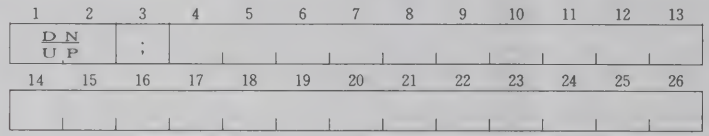
Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function

Function

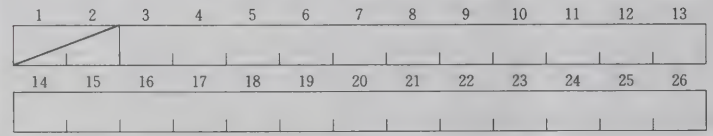
Same function as microphone UP/DOWN switch

Input commands

Set command

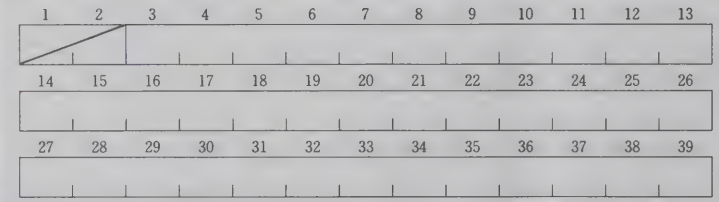


Read command



Output commands

Answer command



Description

With R-5000, the UP/DOWN step intervals are selected with the mode step switch.

FA FB FREQUENCY VFO A/FREQUENCY VFO B

Applicable models	TS-440S, R-5000

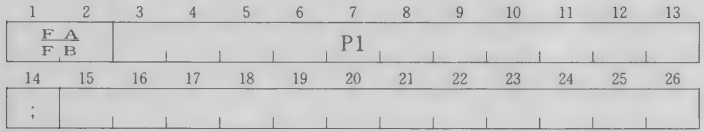
Parameter	Format	Parameter function
P1	4	FREQUENCY

Function

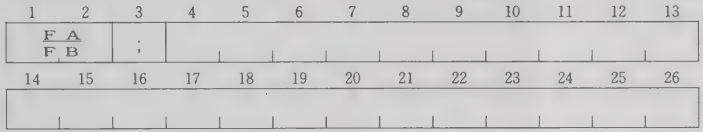
VFO A and VFO B frequency selection and readout

Input commands

Set command

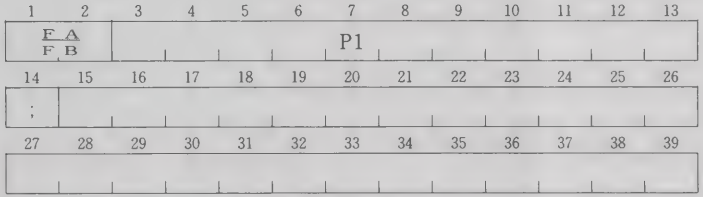


Read command



Output commands

Answer command



Description

Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	VFO A and VFO B MEMORY COM setting (COM: TS-711/811 Only)	P1	3	FUNCTION

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
F	N	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

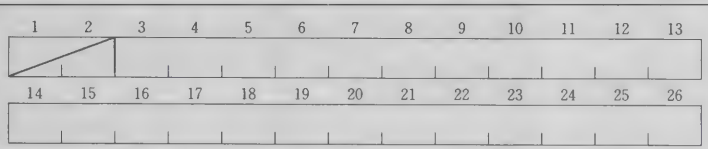
27	28	29	30	31	32	33	34	35	36	37	38	39

Description

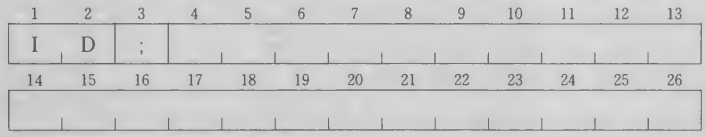
Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	Model No. readout for transceiver recogniztion.	P1	16	TS-440S : 004 R-5000 : 005

Input commands

Set command

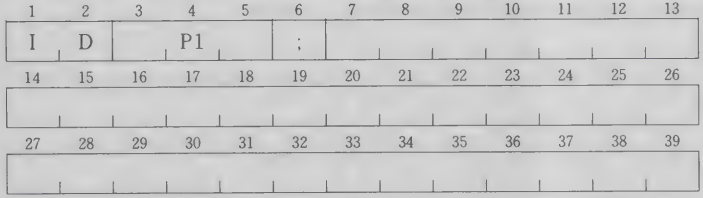


Read command



Output commands

Answer command



Description

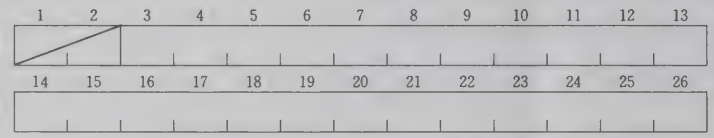
Applicable models	TS-440S, R-5000

Function

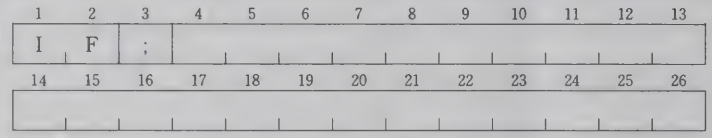
Display of transceivers current condition

Input commands

Set command

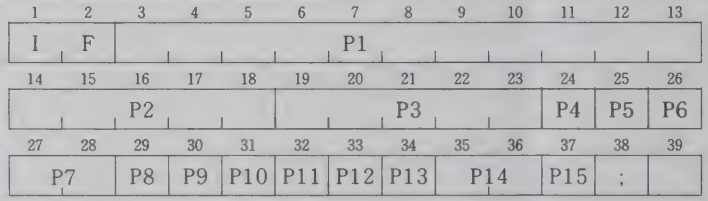


Read command



Output commands

Answer command



Parameter	Format	Parameter function
P1	4	DISPLAY FREQUENCY
P2	–	
P3	5	RIT FREQUENCY
P4	1	RIT ON/OFF
P5	1	XIT ON/OFF
P6	–	
P7	7	MEMORY CHANNEL
P8	11	TX/RX
P9	2	MODE
P10	3	FUNCTION
P11	1	SCAN ON/OFF
P12	1	SPLIT ON/OFF
P13	–	
P14	–	
P15	–	

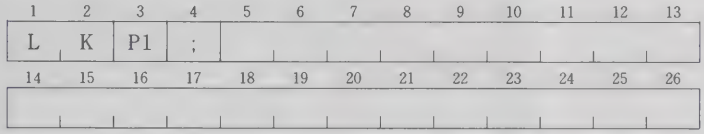
Description

LK LOCK

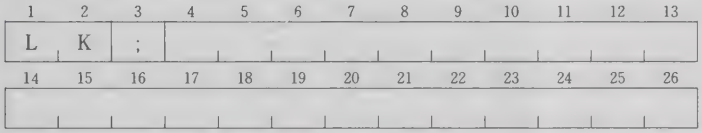
Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	LOCK ON/OFF setting and display	P1	1	LOCK ON/OFF

Input commands

Set command



Read command



Output commands

Answer command

Description

Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	Memory channel setting	P1	–	
		P2	7	MEMORY CHANNEL

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
M	C	P1	P2		;							
14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39

Description

MD MODE

Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	Mode setting	P1	2	MODE

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
M	D	P1	;									
14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39

Description

MR MEMORY READ

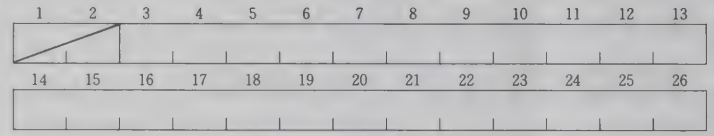
Applicable models	TS-440S, R-5000

Function

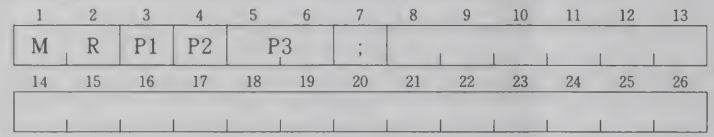
Memory display

Input commands

Set command

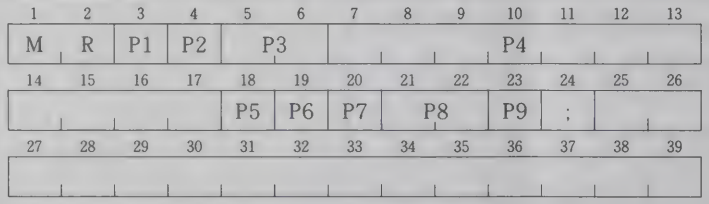


Read command



Output commands

Answer command



Parameter	Format	Parameter function
P1	9	SPLIT SPECIFICAITON
P2	–	MEMORY BANK
P3	7	MEMORY CHANNEL
P4	4	FREQUENCY
P5	2	MODE
P6	10	MEMORY LOCKOUT
P7	–	
P8	–	
P9	–	

Description

(1) All parameters are set to OFF when the memory channel is vacant.

MW MEMORY WRITE

Applicable models	TS-440S, R-5000

Function: Memory entry

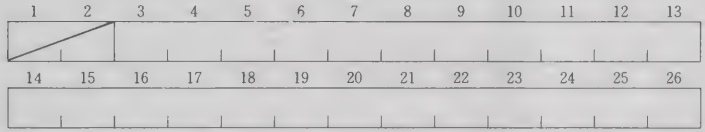
Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
M	W	P1	P2	P3					P4			

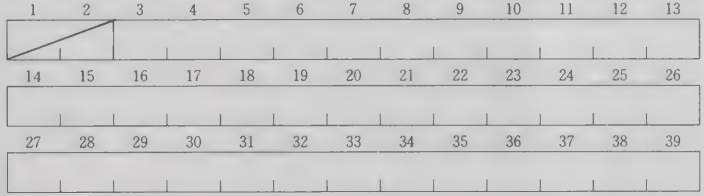
14	15	16	17	18	19	20	21	22	23	24	25	26
				P5	P6	P7	P8		P9	;		

Read command



Output commands

Answer command



Parameter	Format	Parameter function
P1	9	SPLIT SPECIFICATION
P2	–	
P3	7	MEMORY CHANNEL
P4	4	FREQUENCY
P5	2	MODE
P6	9	MEMORY LOCKOUT
P7	–	
P8	–	
P9	–	

Description

(1) The MW command is valid when all parameters have be correctly entered.
(2) When all effective frequency columns are "0", the memory is set to an open channel.
(3) When the split channel is open, the transceiver will be set for the same transmit and receive frequencies, i.e. simplex.

PS Power Switch

Applicable models	R-5000

Parameter	Format	Parameter function
P1	1	Power ON/OFF.

Function

Turning the power supply on and off from external terminals.

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
P	S	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13
P	S	;										

14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13
P	S	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

27	28	29	30	31	32	33	34	35	36	37	38	39

Description

No operation while the power switch is off.
No operation while the timer switch is on (while * is displayed).

RC RIT CLEAR

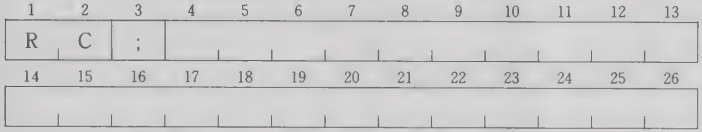
Applicable models	TS-440S	Parameter	Format	Parameter function

Function

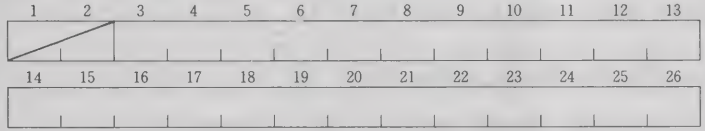
RIT frequency clearance

Input commands

Set command

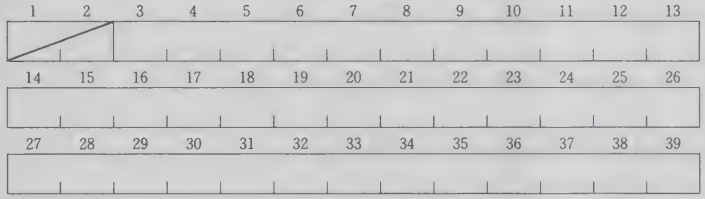


Read command



Output commands

Answer command



Description

When this command is used, the actual RIT frequency becomes different from that indicated by the knob position. When the knob is rotated again, the RIT frequency corresponding to the knob position resumes.

RD RU RIT DOWN/RIT UP

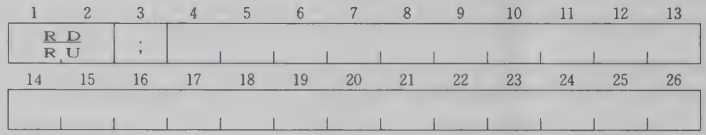
Applicable models	TS-440S	Parameter	Format	Parameter function

Function

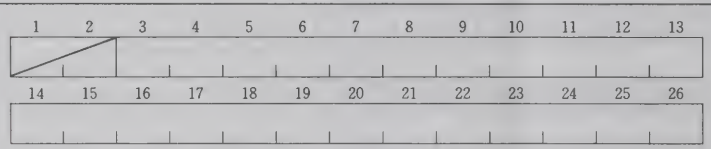
RIT frequency UP/DOWN

Input commands

Set command

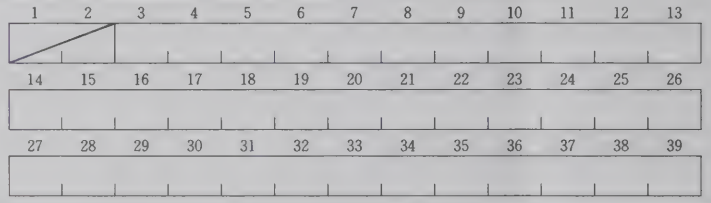


Read command



Output commands

Answer command



Description

When this command is used, the actual RIT frequency becomes different from that indicated by the knob position. When the knob is rotated again, the RIT frequency corresponding to the knob position resumes.

Applicable models	TS-440S	Parameter	Format	Parameter function
Function: RIT ON/OFF setting		P1	1	RIT ON/OFF

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
R	T	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

27	28	29	30	31	32	33	34	35	36	37	38	39

Description

RX **TX** RX/TX

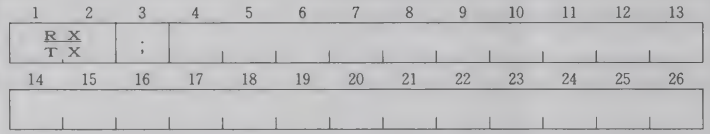
Applicable models	TS-440S	Parameter	Format	Parameter function

Function

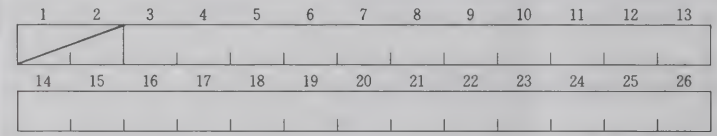
RX: For receive operation
TX: For transmit operation

Input commands

Set command

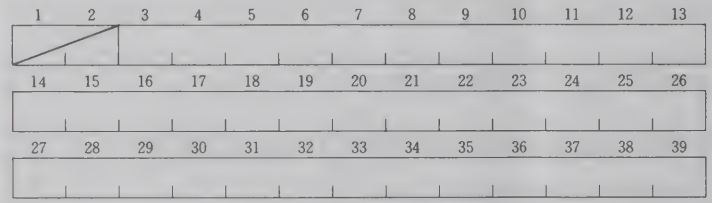


Read command



Output commands

Answer command



Description

After the TX command is excuted, the receiving mode cannot be resumed by the SEND switch, etc. on the transceiver. (This condition is reset by turning the power off.) Unless the receiving mode is resumed by the RX command, operation of the SEND switch on the transceiver cannot be performed.
Special attention should be paid, when this command is excuted at frequencies which do not have actual power, the ON AIR LED is not lit.
When "?;" is replied to the TX command, the TX command is ignored, however, it is recommended to use the TX command in combination with the RX command if possible.

Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function
Function	Scan ON/OFF setting	P1	1	SCAN ON/OFF

Input commands

Set command

1	2	3	4	5	6	7	8	9	10	11	12	13
S	C	P1	;									

14	15	16	17	18	19	20	21	22	23	24	25	26

Read command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

Output commands

Answer command

1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26

27	28	29	30	31	32	33	34	35	36	37	38	39

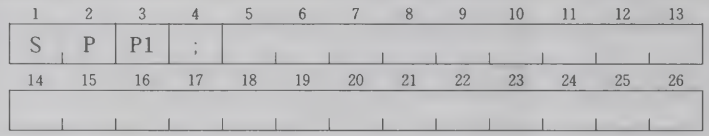
Description

SP SPLIT

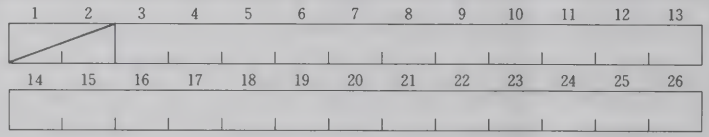
Applicable models	TS-440S	Parameter	Format	Parameter function
Function	SPLIT ON/OFF setting	P1	1	SPLIT ON/OFF

Input commands

Set command

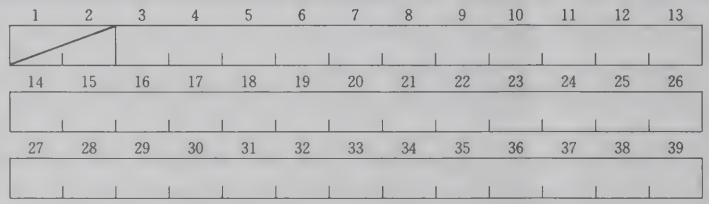


Read command



Output commands

Answer command



Description

ST STEP

Applicable models	R-5000

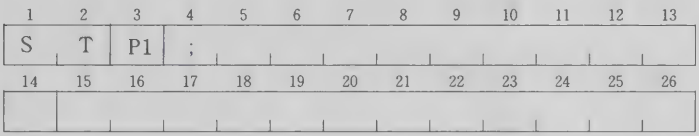
Function

STEP ON/OFF setting.

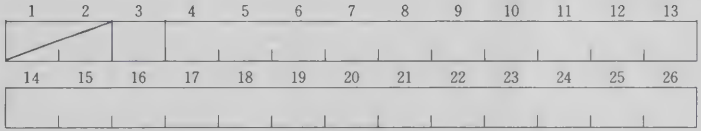
Parameter	Format	Parameter function
P1	1	STEP ON/OFF.

Input commands

Set command



Read command



Output commands

Answer command

Description

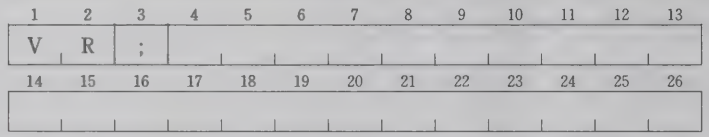
Applicable models	TS-440S, R-5000	Parameter	Format	Parameter function

Function

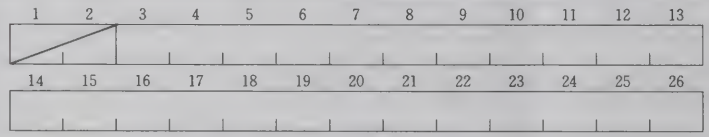
Generation of synthesized voice.

Input commands

Set command

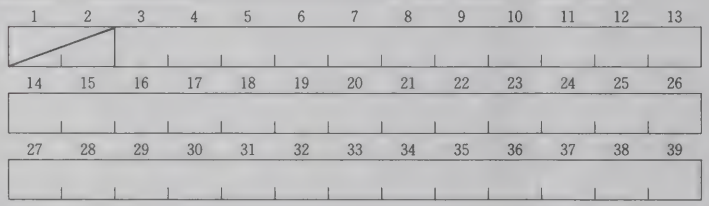


Read command



Output commands

Answer command

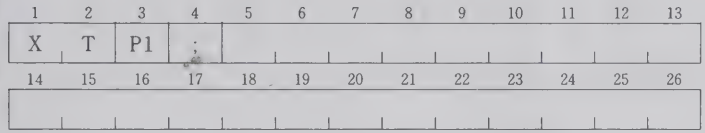


Description

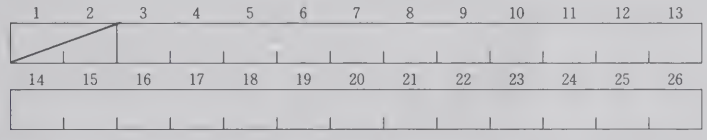
Applicable model	TS-440S	Parameter	Format	Parameter function
Function	XIT ON/OFF setting	P1	1	XIT ON/OFF

Input commands

Set command

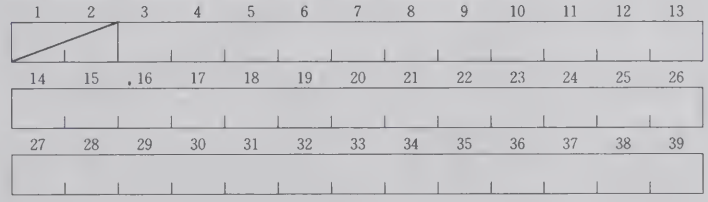


Read command



Output commands

Answer command



Description

KENWOOD

9581

5.7

5.5

4.1

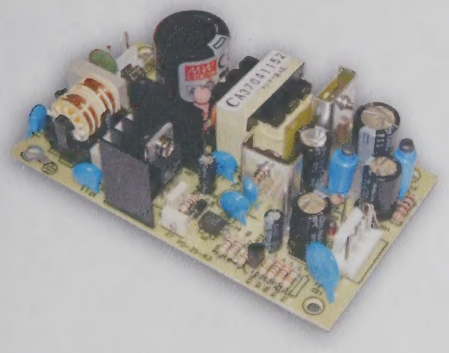
3.4

7.8

T= ONL PQH

MEAN WELL

25W Dual Output Switching Power Supply — PD-25 series



■ Features :

- Universal AC input / Full range
- Low leakage current<0.5mA
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Cooling by free air convection
- 100% full load burn-in test
- Fixed switching frequency at 100KHz
- Low cost
- High reliability
- 2 years warranty

SPECIFICATION

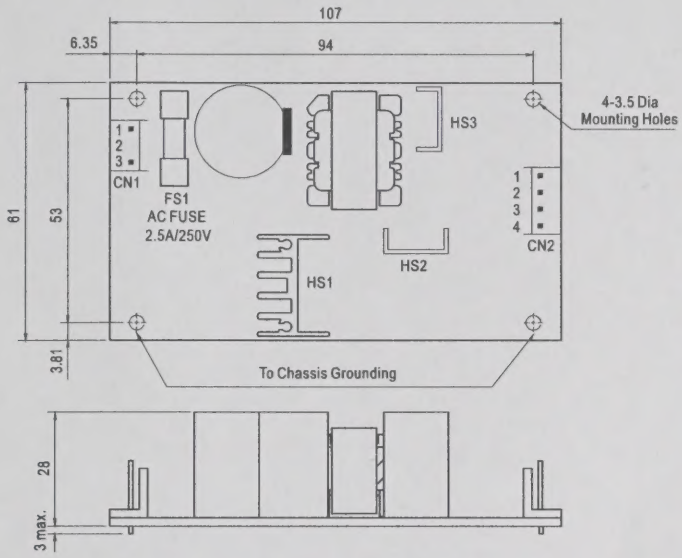
MODEL		PD-25A		PD-25B		PD-2505		PD-2512		PD-2515	
OUTPUT	OUTPUT NUMBER	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2
	DC VOLTAGE	5V	12V	5V	24V	5V	-5V	12V	-12V	15V	-15V
	RATED CURRENT	2.1A	1.2A	1.2A	0.8A	2.5A	2.5A	1A	1A	0.8A	0.8A
	CURRENT RANGE	0.2 ~ 2.5A	0.1 ~ 1.5A	0.2 ~ 2A	0.1 ~ 1A	0.1 ~ 3A	0.1 ~ 2.5A	0.1 ~ 1.2A	0.1 ~ 1.2A	0.1 ~ 1A	0.1 ~ 1A
	RATED POWER	24.9W		25.2W		25W		24W		24W	
	RIPPLE & NOISE (max.) Note.2	50mVp-p	150mVp-p	50mVp-p	200mVp-p	50mVp-p	50mVp-p	50mVp-p	50mVp-p	50mVp-p	50mVp-p
	VOLTAGE TOLERANCE Note.3	±2.0%	±6.0%	±2.0%	±6.0%	±6.0%	±6.0%	±4.0%	±4.0%	±4.0%	±4.0%
	LINE REGULATION	±0.5%	±2.0%	±0.5%	±2.0%	±1.0%	±1.0%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±1.0%	±4.0%	±1.0%	±4.0%	±4.0%	±4.0%	±3.0%	±3.0%	±3.0%	±3.0%
	SETUP, RISE TIME	250ms, 50ms/230VAC 250ms, 30ms/115VAC at full load									
	HOLD UP TIME (Typ.)	100ms/230VAC 16ms/115VAC at full load									
INPUT	VOLTAGE RANGE	85 ~ 264VAC 120 ~ 370VDC									
	FREQUENCY RANGE	47 ~ 63Hz									
	EFFICIENCY(Typ.)	71%		77%		73%		74%		75%	
	AC CURRENT (Typ.)	0.65A/115VAC 0.4A/230VAC									
	INRUSH CURRENT (Typ.)	COLD START 32A									
	LEAKAGE CURRENT	<0.5mA / 240VAC									
PROTECTION	OVERLOAD	Above 105% rated output power									
		Protection type : Hiccup mode, recovers automatically after fault condition is removed									
	OVER VOLTAGE	5.75 ~ 6.75V	13.8 ~ 16.2V	5.75 ~ 6.75V	27.6 ~ 32.4V	5.75 ~ 6.75V	-5.75 ~ -6.75V	13.8 ~ 16.2V	-13.8 ~ -16.2V	17.3 ~ 20.3V	-17.3 ~ -20.3V
		Protection type : Shut off o/p voltage, clamping by zener diode									
	OVER TEMPERATURE	Tj 135℃ typically (U1) detect on main control IC									
		Protection type : Shut down o/p voltage, re-power on to recover									
ENVIRONMENT	WORKING TEMP.	-10 ~ +60℃ (Refer to "Derating Curve")									
	WORKING HUMIDITY	20 ~ 90% RH non-condensing									
	STORAGE TEMP., HUMIDITY	-20 ~ +85℃, 10 ~ 95% RH									
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃) ON CH1 output									
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes									
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 approved									
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2.0KVAC O/P-FG:0.5KVAC									
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH									
	EMC EMISSION	Compliance to EN55022 (CISPR22) Class B, EN61000-3-2,-3									
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5, light industry level, criteria A									
OTHERS	MTBF	507.9Khrs min. MIL-HDBK-217F (25℃)									
	DIMENSION	107*61*28mm (L*W*H)									
	PACKING	0.15Kg; 96pcs/15.9Kg/1.3CUFT									

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance : includes set up tolerance, line regulation and load regulation.
4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on http://www.meanwell.com)
5. Heat Sink HS1,HS2,HS3 can not be shorted.

Mechanical Specification

Unit:mm



AC Input Connector (CN1) : Molex 41791-03 or equivalent

Pin No.	Assignment	Mating Housing	Terminal
1	AC/L	Molex 2139 or equivalent	Molex 2478 or equivalent
2	No Pin		
3	AC/N		

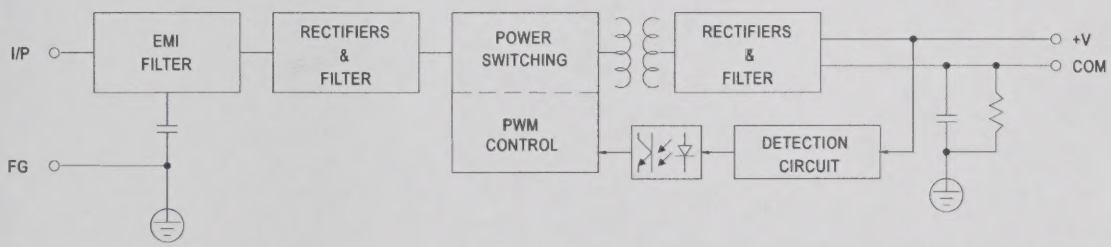
DC Output Connector (CN2) : Molex 41791-04 or equivalent

Pin No.	Assignment	Mating Housing	Terminal
1	V1	Molex 2139 or equivalent	Molex 2478 or equivalent
2,3	COM		
4	V2		

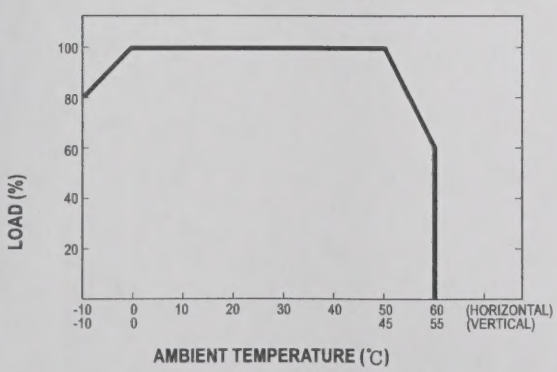
⚠ HS1,HS2,HS3 can not be shorted

Block Diagram

fosc : 100KHz



Derating Curve



Static Characteristics (A)