

# CASIO FA-1

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## INSTRUCTION MANUAL

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## MANUAL DE INSTRUCCION

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Congratulations on your purchase of CASIO FA-1 adapter designed for CASIO FX-501P/502P calculators.

The FA-1 adapter is designed exclusively to connect the FX-501P/502P with an ordinary tape recorder.

Wrong connections and operation will not damage the calculator and tape recorder but programs and data may be lost or transfer of them may not be carried out properly.

It is advised that you get a good knowledge of operation.

## INDEX

CONSTRUCTION . . . . .	1
PURPOSES . . . . .	1
REQUIREMENTS FOR CONNECTING TAPE RECORDER . . . . .	2
PRECAUTIONS FOR CONNECTING TAPE RECORDER . . . . .	2
SETTING UP FOR RECORDING AND PLAYBACK . . . . .	3
RECORDING (SAVING ON TAPE) . . . . .	4
PLAYBACK (LOADING TO CALCULATOR) . . . . .	4
RECORDING CHECK . . . . .	5
MUSIC FEATURE . . . . .	6
■ Basic operation . . . . .	6
■ Synthesizing music . . . . .	7
■ Analysis, programming, loading program, and playing . . . . .	8
■ Music feature—summary . . . . .	9
CONTENTS OF DEMONSTRATION TAPE PROVIDED . . . . .	10
HOW TO PLAY GAMES (DEMONSTRATION TAPE PROVIDED) . . . . .	11
SPECIFICATIONS . . . . .	23

## CONSTRUCTION



Keyboard overlay sheet for music

## PURPOSES

- To keep programs of CASIO FX-501P/502P on magnetic tape
  - To keep data of CASIO FX-501P/502P on magnetic tape
  - To load programs kept on magnetic tape to the FX-501P/502P
  - To load data kept on magnetic tape to the FX-501P/502P
- The following is the unique feature of CASIO.
- You can synthesize music by coding a music program with "notes", their "duration", and "tempo" given as data. Play it back through the tape recorder.

## REQUIREMENTS FOR CONNECTING TAPE RECORDER

### • Tape recorders connectable to the FA-1

Tape recorders and tape decks which use cassette tape, micro-cassette tape or open-reel tape.

### • Requirements for tape recorder

1. The input impedance is more than 10 kilohms and the minimum input level higher than 3 mV at the MICROPHONE or equivalent input terminal of the tape recorder.
2. The output impedance is less than 10 ohms and the output level higher than 2.5 V at the EARPHONE, MONITOR, or equivalent output terminal of the tape recorder.
3. Distortion of input and output signals is less than 15% in the frequency range of 1 kHz to 3 kHz.

Adding to the above requirements, the tape recorder must be equipped with input and output jacks fitting to mini-plugs. Almost all cassette tape recorders (including radio-cassette tape recorders and cassette tape decks) which are available on markets at present meet the above requirements.

Connection may be possible even if the requirements are not exactly met. When the requirements are not met, the tape recorder and calculator will not be damaged by connection.

**Note:** If the plug and jack do not fit, replace the plug with a suitable one.

## PRECAUTIONS FOR CONNECTING TAPE RECORDER

Confirm the following to let the tape recorder connected to the FA-1 operate properly.

- The tape recorder's jacks are free from rust and damage.
- The magnetic head is clean and not worn excessively.
- The magnetic tape to be used is an ordinary one, available on markets and its frequency response is not deteriorated excessively.
- The tape is free from damage and creases. Avoid to make recording on the beginning and end of tape (respectively for about 30 seconds).
- Operate the tape recorder by batteries if it does not work well with AC line power.

- Fit the calculator to the FA-1 securely. Do not remove the calculator in the middle of operation. Before removing the calculator, turn off its power switch.
- Use the same recorder for recording and playback. Though it is uncommon, it may be impossible to play back tapes on which recording is made with another tape recorder.

## SETTING UP FOR RECORDING AND PLAYBACK

### ■ Connections

- Connect the FA-1's white plug to the tape recorder's MIC Jack (preferably to the R-channel jack for a stereo tape recorder).
- Connect the FA-1's black plug to the tape recorder's EAR, MONITOR or EX SP Jack (of the same channel as the white plug with a stereo tape recorder).

### ■ Recording level adjustment

- Let the automatic level control work if the tape recorder is provided with it.
- Otherwise adjust the level control while recording test data so that the VU meter reads zero.

**Note:** Avoid to use such a tape recorder that its level meter pointer deflects very widely.

### ■ Output level adjustment

- Set the volume control at a higher position than an ordinary listening position, in between the center mark and MAX. (MAX is preferable normally.)
- With a stereo tape recorder, set the channel balance control to MAX toward the channel used.
- If the MIXING feature is provided, adjust the SOURCE level to MAX and the MIN level to MIN.

### ■ Miscellaneous adjustment

- Set the TONE, BASS, and TREBLE controls to a medium level.
- Set the tape selector in accordance with the type of tape.

## RECORDING(SAVING ON TAPE)

### ■ To save calculator program on magnetic tape:

1. Set the FA-1's mode switches at CAL and SAVE/LOAD respectively.
2. Position the tape suitably and record the tape counter reading.
3. Depress  $\text{[REC]}$ ,  $\text{[3]}$ ,  $\text{[0]}$ , and  $\text{[END]}$  in this sequence and input a three-digit file number.
4. Start the recorder in the recording mode.
5. Depress  $\text{[END]}$ .
  - Recording is completed in about 11 to 16 seconds ("0." is displayed).
6. Stop the tape recorder.

### ■ To save calculator data on magnetic tape:

1. Set the FA-1's mode switches at CAL and SAVE/LOAD respectively.
2. Position the tape suitably and record the tape counter reading.
3. Depress  $\text{[REC]}$ ,  $\text{[3]}$ ,  $\text{[0]}$ , and  $\text{[END]}$  in this sequence and input a three-digit file number.
4. Start the tape recorder in the recording mode.
5. Depress  $\text{[END]}$ .
  - Recording is completed in about 9 to 13 seconds ("0." is displayed).
6. Stop the tape recorder.

## PLAYBACK(LOADING TO CALCULATOR)

### ■ To load a program or programs from a magnetic tape back to the calculator:

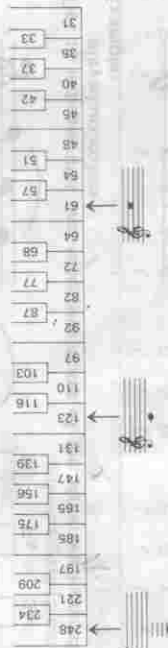
#### • To load all programs at a time:

1. Set the FA-1's mode switches at CAL and SAVE/LOAD respectively.
2. Position the tape so that the tape counter reads 1 or 2 before the recorded counter reading.
3. Depress  $\text{[REC]}$ ,  $\text{[3]}$ ,  $\text{[0]}$ ,  $\text{[END]}$  (PROGRAM ALL CLEAR),  $\text{[END]}$ , and  $\text{[END]}$  in this sequence and input the three-digit file number given at the time of saving.
4. Start the tape recorder in the playback mode.
5. Depress  $\text{[END]}$ , "F"  $\text{[P]}$   $\text{[0]}$   $\text{[0]}$  (file number) " is displayed during playback.
  - Loading is completed in about 11 to 16 seconds ("0." is displayed).
6. Stop the tape recorder.

**Note:** If the program is not found, operation ends with error ("E" displayed).

## MUSIC FEATURE

- You can enjoy composing, arranging and playing music with the system of CASIO FX-501P/502P, FA-1 adapter and a tape recorder.
- Basic operation**
  - Set the FA-1's mode switches at MUSIC and SAVE/LOAD respectively.
  - Put the codes of notes into the M-registers of the calculator.
  - In the WRT mode, program music by representing notes and their duration by code numbers.
  - Execute the program in the RUN mode. You will listen to the music through the tape recorder. (Record the music on a magnetic tape and play it back if the tape recorder does not allow to monitor recording.)
- Put the codes of notes into the M-registers.**





# CONTENTS OF DEMONSTRATION TAPE PROVIDED

• The demonstration tape provided has the following contents. (\* Normal position)

Tape counter reading	Time (in seconds)	File No.	Contents
0	0	—	Blank
3	07"	—	Für Elise (music)
33	145"	—	Sakura Sakura (music)
50	240"	100	Für Elise (program) for FX-502P
54	305"	100	" (register data) "
68	330"	200	Sakura Sakura (program) for FX-501P
78	400"	200	" (register data) "
88	430"	300	Bombarding game
98	500"	400	Hit-mole game
109	530"	500	Guess-number game
120	600"	600	Number ordering game
132	630"	700	Take-stone game
144	700"	800	Hit & Blow game
	725"	—	Blank

**Note:** Fill the columns of tape counter reading by yourself since it varies with the tape recorder.  
Set the FA-1's mode switch at MUSIC only to reload the register data of "Sakura Sakura".

2. Load a tape on the tape recorder and put it in the recording mode. (The tape may be stationary.)
3. Put the calculator in the RUN mode ( $\square$ ) and depress  $\square$ .  
• You will listen to the music through the earphone. If the tape recorder is provided with mixing feature, no earphone is needed and you will listen to the music through the speaker.
4. The music ends when the calculator displays "0." Rewind the tape if recording is made on it. Then you can play it back through the speaker (with the earphone disconnected).

## ■ Music feature—Summary

- The system of the FX-501P/502P, the FA-1, and a tape recorder is needed to play music.
- The music feature is a kind of programmed operation. At this time the FA-1's mode switch must be set at MUSIC.  
(At the CAL position, the keys do not represent notes and rests.)
- To save music programs and register data on magnetic tape, operate the calculator just as recording ordinary programs and data with the FA-1's mode switches set at CAL and SAVE/LOAD.
- To reload music programs and data saved on a magnetic tape, operate the calculator just as reloading ordinary programs and data with the FA-1's mode switches set at CAL and SAVE/LOAD.

**Note:** When the FX-501P's L-registers are used to keep the codes of notes, set the mode switches at MUSIC and SAVE/LOAD to load data into the registers.

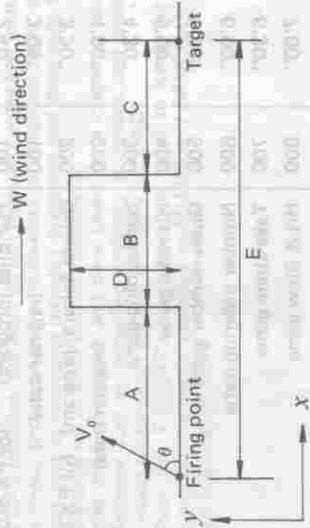
# HOW TO PLAY GAMES (DEMONSTRATION TAPE PROVIDED)

## Bombarding game

### Description

This is a game to bombard a target.

The calculator holds data A, B, C, D, and W shown at left. But the player knows E and W only. (B and D is the width and height of a barrier existing between the firing point and the target.) The player inputs initial velocity  $V_0$  (m/sec) and firing angle  $\theta$  (degrees) considering the wind direction W.



Requirements for the shell to pass over the barrier:

Gravitational acceleration  $g = 9.8 \text{ [m/sec}^2]$

Traveling distance of shell in t seconds

$$X = (V_0 \cos \theta + W)t = V_x t$$

$$Y = V_0 \sin \theta t - \frac{1}{2} g t^2 = V_y t - 4.9 t^2$$

$$\frac{V_y}{V_x} A - \frac{4.9}{V_x^2} A^2 > D$$

$$\frac{V_y}{V_x} (A+B) - \frac{4.9}{V_x^2} (A+B)^2 > D$$

Firing range when the above requirements are met:

$$X_{\text{END}} = \frac{V_x V_y}{4.9}$$

Step	Data input operation	Read-out	Remark
1	<b>MODE</b> <b>1</b>		
2	<b>PO</b>	18310000.	Distance to target
3	<b>AC</b>	34.	Wind direction
4	<b>(V<sub>0</sub>)</b> <b>100</b> <b>EXE</b>	HLT	Wind velocity
5	<b>(θ)</b> <b>30</b> <b>EXE</b>	0.	HLT displayed at bottom
6	<b>30</b> <b>EXE</b>	000000.	Barrier not exceeded
7		18310000.	
8	<b>AC</b>	0.	
9	<b>(V<sub>0</sub>)</b> <b>120</b> <b>EXE</b>	HLT	
10	<b>(θ)</b> <b>45</b> <b>EXE</b>	227.	Hit 227 meters beyond target
11		18310000.	
12		34.	
13	<b>AC</b>	0.	
14		...	
15		...	
16	<b>(θ)</b> <b>42</b> <b>EXE</b>	505.	Hit target shown by "SOS"
17	* Displayed repeatedly		
18			
19			
20			



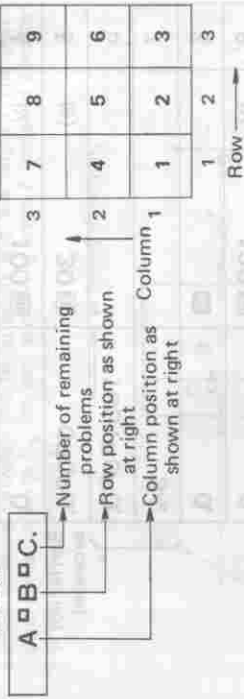
## Hit-mole game

### Description

You press keys designated by calculator's messages. Your reflex and nimbleness will be tested.  
Three games are included as explained below.

#### 1. P0 program

Message

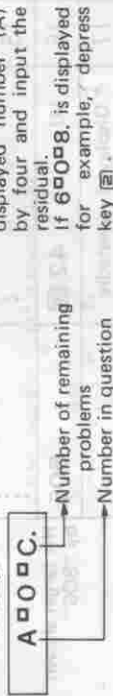


#### Example

When "1 2 3 9" is displayed, you have nine problems remaining and are requested to press key **9**. The displaying lasts for about one second. If you make no input during the time, you will lose the chance. When all ten trials are completed, the calculator displays how many times you have succeeded.

#### 2. P1 program

Message



#### 3. P2 program

This is the same as the P1 program but that the number (A) may have two digits.

Step	Data input operation	Read-out	Remark
1	<b>MODE</b> <b>1</b>	<b>1 0 1 0 1 0</b>	Displayed for about 1 second
2	(Respond within 1 second)	<b>1</b>	
3		<b>2 0 3 0 9</b>	Displayed for about 1 second
4	(Respond within 1 second)	<b>6</b>	
5		<b>:</b>	
6		<b>:</b>	
7		<b>3 0 1 0 1</b>	
8	(Respond within 1 second)	<b>7</b>	
9		<b>8</b>	Number of correct answers
10			
11			
12			
13			
14			
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16			
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18			
19			
20			

## Number guessing game

### Description

The calculator holds a secret number which is smaller than 50. Referring to messages, you guess the secret number. As you input a number, the calculator displays a message which indicates an area where the secret number is included.

### Example

Let the secret number be 25.

1st message

000050.

(The secret number is between 0 and 50.)

Lower limit

Upper limit

If you input 35

2nd message

000035.

(The secret number is between 0 and 35.)

If you input 15

3rd message

150035.

(The secret number is between 15 and 35.)

If you input 25

4th message

3.

(The secret number is hit at the third trial.)

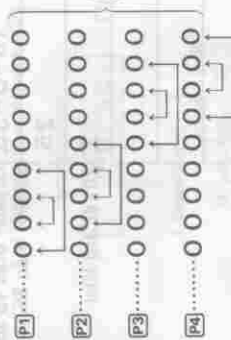
Step	Data input operation	Read-out	Remark
1	MODE 1	000050.	PAUSE state
2	35	35.	PAUSE state Smaller than 35.
3		000035.	PAUSE state Greater than 15 and smaller than 35.
4	15	15.	
5		150035.	
6	25	25.	
7		3.	Hit at 3rd trial
8			
9			
10			
11			
12			
13			
14			
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16			
17			
18			
19			
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# Number ordering game

## Description

Try to rearrange nine digits generated randomly into the ascending order.

First, input a level code of 1 to 9 (1 : easiest, 9 : hardest) and depress **[P0]**. A number of the corresponding level will be displayed. Use keys **[P1]** through **[P9]** appropriately.



Digits will be interchanged as shown at left depending on the key depressed.

Minimize the number of steps (depressing keys).

To restore the initial number:

Depress **[M]** **[P0]**.

Step	Data input operation	Read-out	Remark
1	<b>[MODE]</b> <b>[1]</b>		
2	<b>[2]</b> <b>[P0]</b>	451236789.	
3	<b>[P2]</b>	432156789.	
4	<b>[P1]</b>	123456789.	
5	<b>[3]</b> <b>[P0]</b>	345129876.	
6	<b>[P4]</b>	345126789.	
7	<b>[P1]</b>	154326789.	
8	<b>[P2]</b>	123456789.	
9			
10			
11	To retry with	451287639	
12	<b>[4]</b> <b>[M]</b> <b>[1]</b>		
13	<b>[5]</b> <b>[M]</b> <b>[2]</b>		
14	<b>[:]</b>		
15	<b>[:]</b>		
16	<b>[9]</b> <b>[M]</b> <b>[9]</b>		
17	<b>[P5]</b>	451287639.	
18	<b>[P3]</b>	451236789.	
19	<b>[P2]</b>	432156789.	
20	<b>[P1]</b>	123456789.	

# Take-stone game

## Description

You and the calculator take a stone or stones alternately. You will win if the last one is left for the calculator.

### Rules:

- (1) The calculator will generate and display the number of stones in the range of 4 to 59.
- (2) You have choices of tactics. At your first turn:
  - (1) To let the calculator play first ..... Depress **[P1]**.
  - (2) To take a stone ..... Depress **[P1]**.
  - (3) To take two stones ..... Depress **[P2]**.
  - (4) To take three stones ..... Depress **[P3]**.
- (3) You have choices of (2) to (4) above at subsequent turns.
- (4) The calculator takes one to three stones at its turn automatically.

### Contents of display:

At your turn



Number of stones left at present

Number of stones left by calculator

Number of stones left by your last play

(Kept displayed for about a second)

At calculator's turn



Number of stones left at present

Number of stones left by you

Number of stones left by calculator's last play

Step	Data input operation	Read-out	Remark
1	<b>[MODE]</b> <b>[1]</b>		
2	(Take a stone) <b>[P1]</b>	00023.	Kept displayed for about a second
3		002322.	
4	(Take two stones) <b>[P2]</b>	2322221.	Kept displayed for about a second
5		2222118.	
6	(Take three stones) <b>[P3]</b>	211817.	Kept displayed for about a second
7		181714.	
8	(Take three stones) <b>[P3]</b>	171413.	Kept displayed for about a second
9		141310.	
10	(Take three stones) <b>[P3]</b>	14109.	Kept displayed for about a second
11		1096.	
12	(Take a stone) <b>[P1]</b>	9665.	Kept displayed for about a second
13		6654.	
14		5441.	You lose.
15		(E.)	(You win.)
16			
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# Hit-and-blow game

## Description

### Guess a 4-digit number

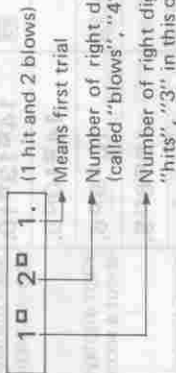
#### Operation:

- 1) Let the calculator hold a four-digit number by the following operation:  
Key operation:  $\boxed{\text{MODE}}$ ,  $\boxed{\text{1}}$  (The calculator is now in the RUN mode),  $\boxed{\text{INV}}$ ,  $\boxed{\text{A}}$  (A four-digit random number consisting of different digits is generated and held by the calculator.)
- 2) Guess the number the calculator holds by inputting a four-digit number. Key operation:  $\boxed{\square}$ ,  $\boxed{\square}$ ,  $\boxed{\square}$ ,  $\boxed{\square}$  ( $\square$ : numeric key).
- 3) The calculator judges whether you are right or not.

#### Example:

Let us assume the calculator holds "1234".

If your guess is "5432" (key operation:  $\boxed{\text{5}}$ ,  $\boxed{\text{4}}$ ,  $\boxed{\text{3}}$ ,  $\boxed{\text{2}}$ ), the calculator displays:



Referring to the message displayed, you make a guess several times until the right number is reached.

When your guess "hits" the secret number (key operation:  $\boxed{\text{1}}$ ,  $\boxed{\text{2}}$ ,  $\boxed{\text{3}}$ ,  $\boxed{\text{4}}$ ), the calculator displays:

$\boxed{4}$   $\boxed{0}$   $\boxed{0}$   $\boxed{n}$ . (You have succeeded at the  $n$ -th trial.)

Now the game ends.

To restart the game with a new secret number, depress  $\boxed{\text{INV}}$  and  $\boxed{\text{A}}$ .

Step	Data input operation	Read-out	Remark
1	$\boxed{\text{MODE}}$ $\boxed{\text{1}}$		
2	$\boxed{\text{INV}}$ $\boxed{\text{A}}$	O.	1 hit & 2 blows
3	$\boxed{5432}$ $\boxed{\text{P0}}$	$\boxed{1}$ $\boxed{2}$ $\boxed{1}$ .	1 blow
4	$\boxed{8901}$ $\boxed{\text{P0}}$	$\boxed{0}$ $\boxed{1}$ $\boxed{2}$ .	2 hits & 1 blow
5	$\boxed{5231}$ $\boxed{\text{P0}}$	$\boxed{2}$ $\boxed{1}$ $\boxed{3}$ .	1 hit & 2 blows
6	$\boxed{7241}$ $\boxed{\text{P0}}$	$\boxed{1}$ $\boxed{2}$ $\boxed{4}$ .	3 hits
7	$\boxed{1236}$ $\boxed{\text{P0}}$	$\boxed{3}$ $\boxed{0}$ $\boxed{5}$ .	You have succeeded at the 6th trial.
8	$\boxed{1234}$ $\boxed{\text{P0}}$	$\boxed{4}$ $\boxed{0}$ $\boxed{6}$ .	
9			
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# SPECIFICATIONS

<b>Model:</b>	FA-1 (designed for CASIO FX-501P/502P)
<b>Output terminal:</b>	white mini-plug, output impedance: approx. 3 kilohms, output level: 3 — 10 mV
<b>Input terminal:</b>	black mini-plug, input impedance: approx. 10 kilohms, input level: 2.5 — 50 V
<b>Data recording format:</b>	Kansas City standards
<b>Power source:</b>	supplied by FX-501P/502P
<b>Power consumption:</b>	0.001 W (together with FX-501P/502P)
<b>Usable temperature:</b>	0°C — 40°C (32°F — 104°F)
<b>Dimensions:</b>	25.5mmH x 88mmW x 173mmD (1"H x 3-1/2"W x 6-3/4"D)
<b>Weight:</b>	155 g (5.5 oz)