

ADJUSTMENT

OUTLINE OF ADJUSTMENT MODE

The adjustment items on the service adjustment mode menu are set in service adjustment mode. The data is updated when a write operation is performed with the switch on menu No. B3, Write into EEPROM. The following items must be set as shown to adjust correctly:

• Settings for adjustment

Item	Setting
IF-SHIFT	Center (0Hz)
RIT	OFF
AIP	OFF
NB	OFF
Power	HIGH
Microphone gain control by ALC	OFF

• Frequencies and modes for adjustment

Menu No.	Frequency	Mode	TX/RX
A0	145.040	FM	RX
A1	145.040	FM	RX
A2	145.040	FM	RX
A3	144.950	LSB	TX
A4	144.950	USB	TX
A5	144.039	USB	RX
A6	144.039	USB	RX
A7	144.039	USB	RX
A8	145.040	FM	RX
A9	145.040	FM	RX
AA	144.950	USB	TX
AB	144.950	USB	TX
AC	144.950	USB	TX
AD	144.780	FM	TX
AE	144.950	USB	TX
AF	144.950	USB	TX
B0	144.950	USB	TX
B1	144.980	FM	TX
B2	144.950	USB	TX
B3	145.040	FM	RX

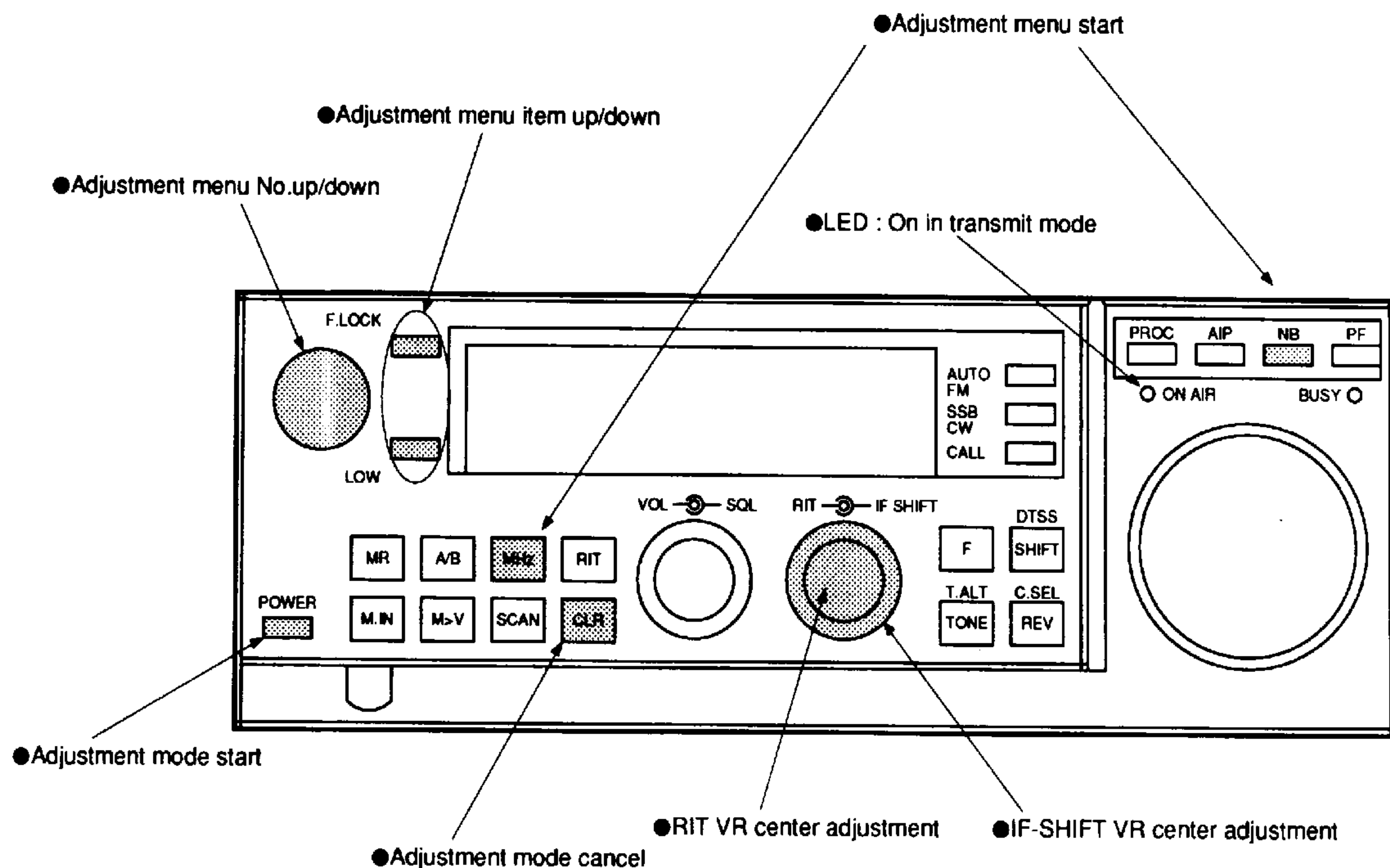
SERVICE ADJUSTMENT MODE MENU

Menu No.	Menu contents
A0	Checksum display
A1	RIT VR mechanical center correction
A2	IF-SHIFT VR mechanical center correction
A3	LSB carrier point adjustment
A4	USB carrier point adjustment
A5	S meter curve adjustment (except FM) S1
A6	S meter curve adjustment (except FM) S9
A7	S meter curve adjustment (except FM) Full scale
A8	S meter curve adjustment (FM) Start
A9	S meter curve adjustment (FM) Full scale
AA	RF meter curve adjustment (low)
AB	RF meter curve adjustment (middle)
AC	RF meter curve adjustment (high)
AD	DTMF single tone output
AE	ALC start (for microphone gain control by ALC)
AF	ALC zone max. (for microphone gain control by ALC)
B0	ALC zone max. + 6 dB (for microphone gain control by ALC)
B1	FM microphone gain (high level)
B2	SSB microphone gain
B3	Write into EEPROM

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ADJUSTMENT

PANEL OPERATION IN ADJUSTMENT MODE



Setting

- 1) Hold down the NB and MHz keys and switch the power on. (Turn the encoder to change the menu number.)
- 2) When the UP or DOWN key is pressed, the menu number is set.
- 3) Menu numbers A1 to A9 and AA to AC can be used in adjustment mode.
- 4) Press the CLR key to cancel adjustment mode. (It is also canceled when the power is turned off.)

ADJUSTMENT

A0 CHECKSUM DISPLAY

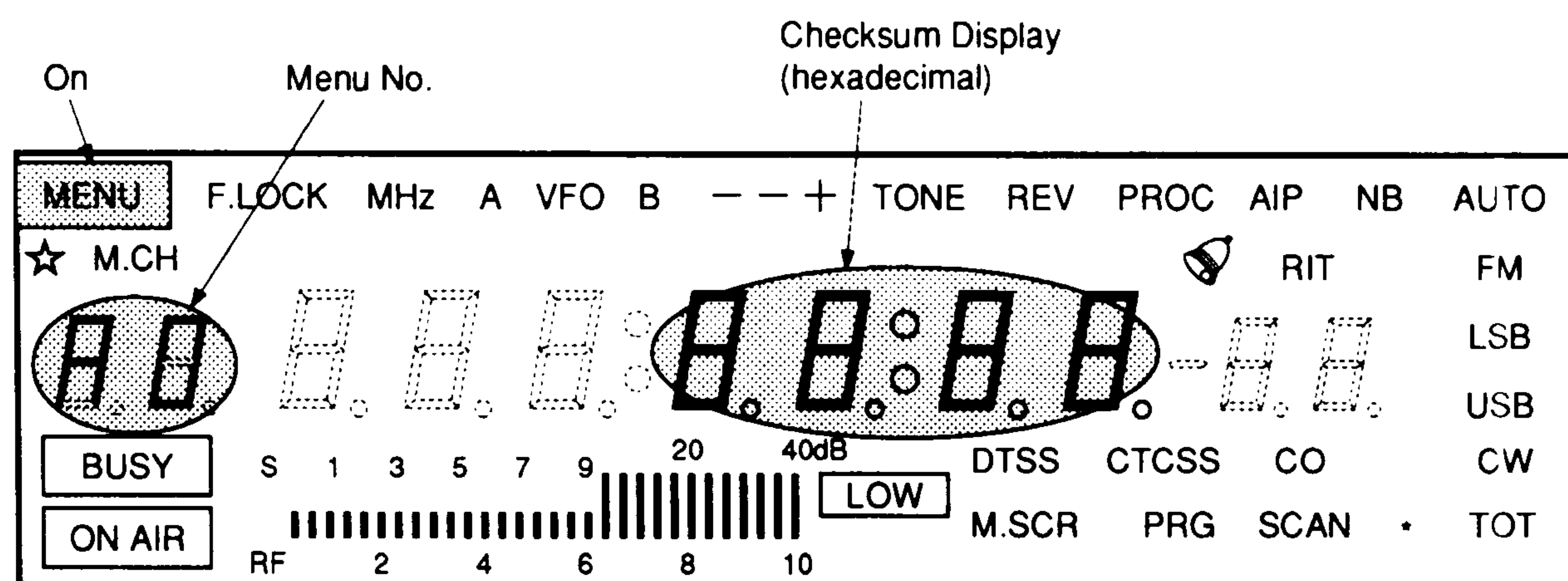
• Adjustment function

Displays the version of the installed program. Displays the two low-order bytes of the checksum obtained by adding all the program codes.

• Adjustment procedure

None

• Display



A1 RIT VR MECHANICAL CENTER CORRECTION

• Adjustment function

Input the RIT control center position to the microcomputer so that the RIT frequency is zero when the RIT control is at the center position on the panel.

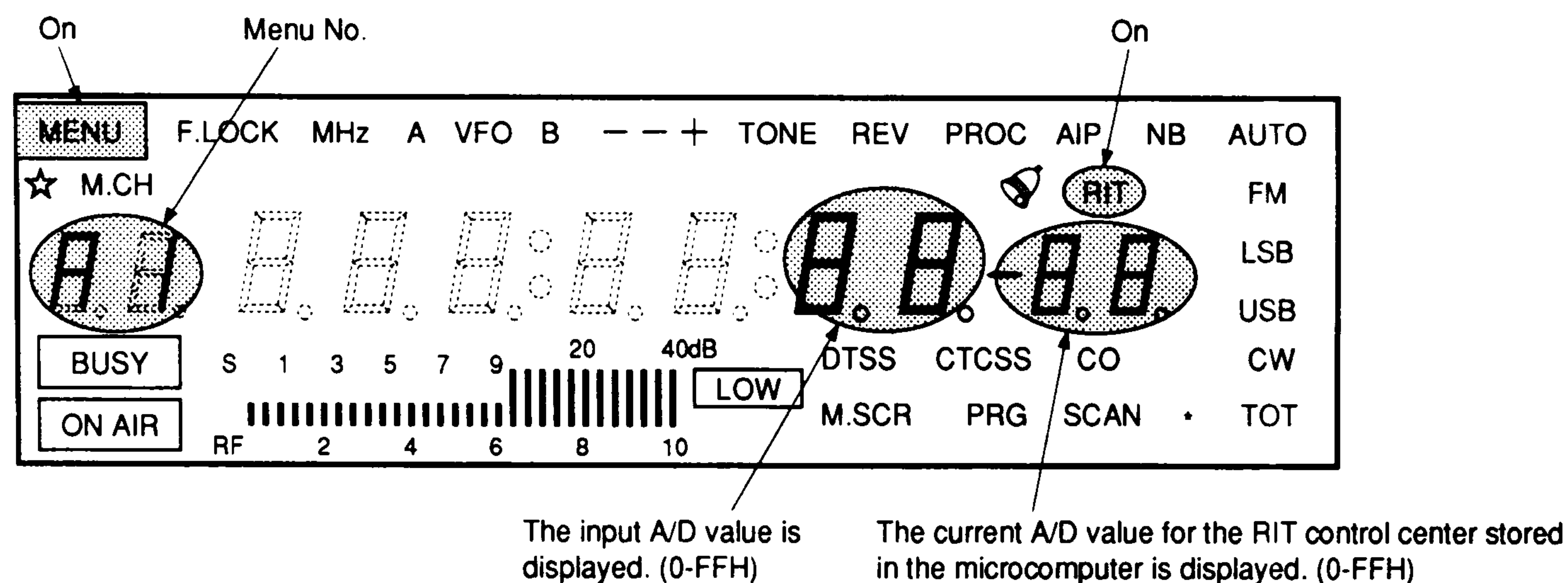
• Adjustment procedure

1. Set the RIT control to the center position on the panel.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Remarks

The center position can be input unconditionally without pressing the key. However, the key must be pressed to prevent this menu item data from being modified accidentally when the RIT control is not at the center. When the key is pressed, data is updated and the two displays match.

• Display



ADJUSTMENT

A2 IF-SHIFT VR MECHANICAL CENTER CORRECTION

• Adjustment function

Input the IF-SHIFT control center position to the micro-computer so that the IF-SHIFT frequency is zero when the IF-SHIFT control is at the center position on the panel.

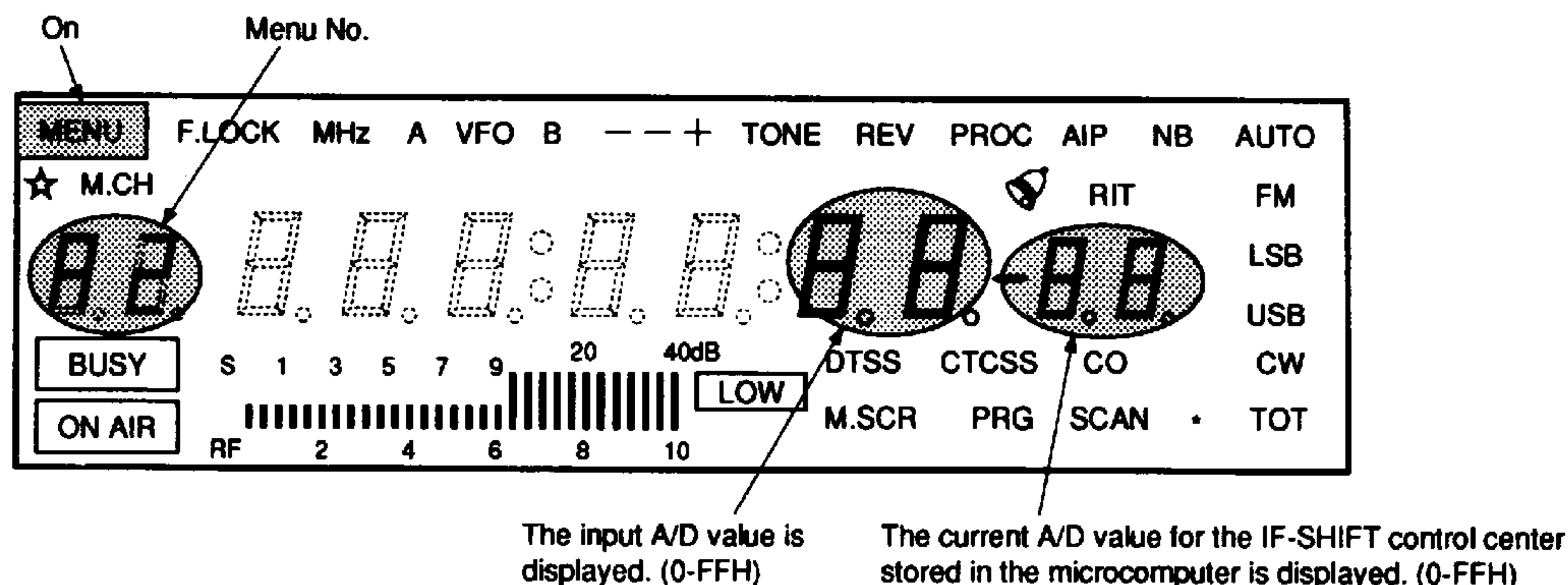
• Adjustment procedure

1. Set the IF-SHIFT control to the center position on the panel.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Remarks

The center position can be input unconditionally without pressing the key. However, the key must be pressed to prevent this menu item data from being modified accidentally when the IF-SHIFT control is not at the center. When the key is pressed, data is updated and the two displays match.

• Display



A3 LSB CARRIER POINT ADJUSTMENT

• Adjustment function

Adjust the carrier point in 10 Hz steps to correct variations of the IF filter center frequency in LSB mode.

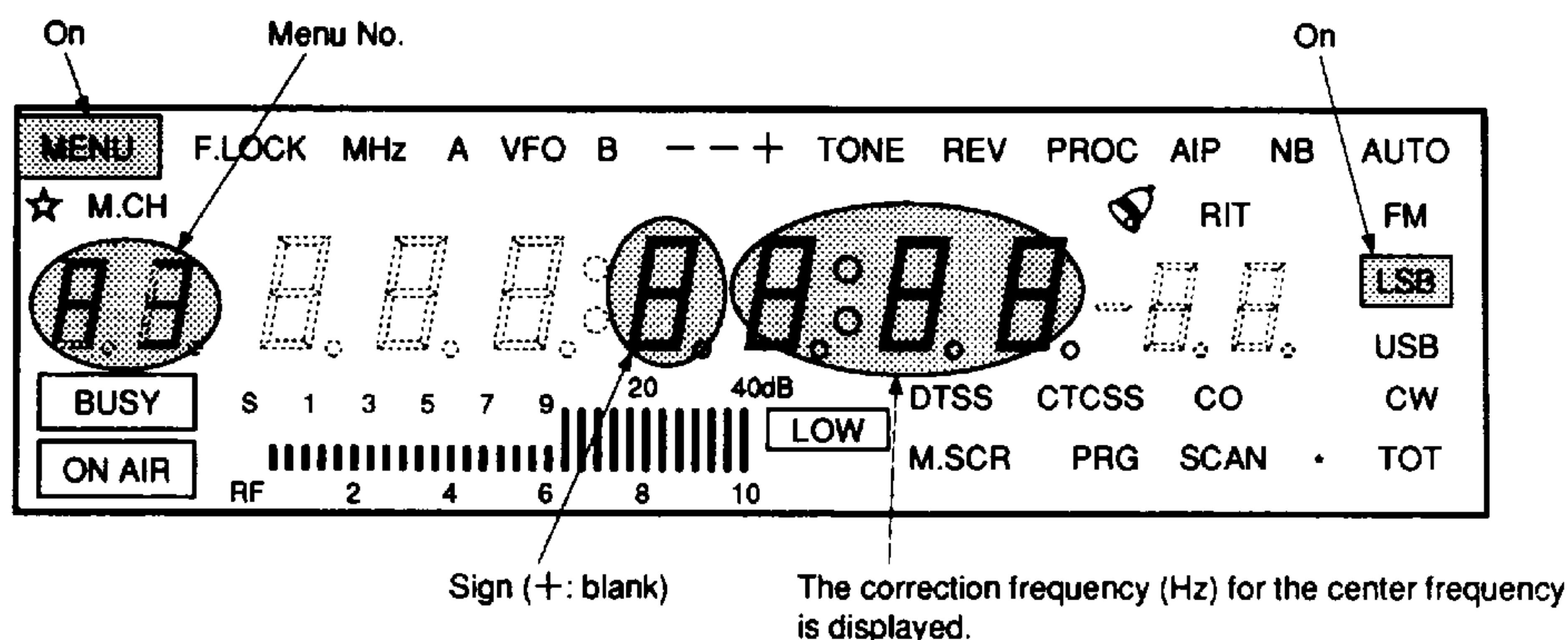
• Adjustment procedure

1. Transmit.
2. Change the correction frequency with the F.LOCK/LOW key or MIC UP/DOWN key.

• Remarks

The plus sign (+) indicates the frequency is moving away from the carrier frequency. (Same as IF-SHIFT)

• Display



ADJUSTMENT

A4 USB CARRIER POINT ADJUSTMENT

• Adjustment function

Adjust the carrier point in 10 Hz steps to correct variations of the IF filter center frequency in USB mode.

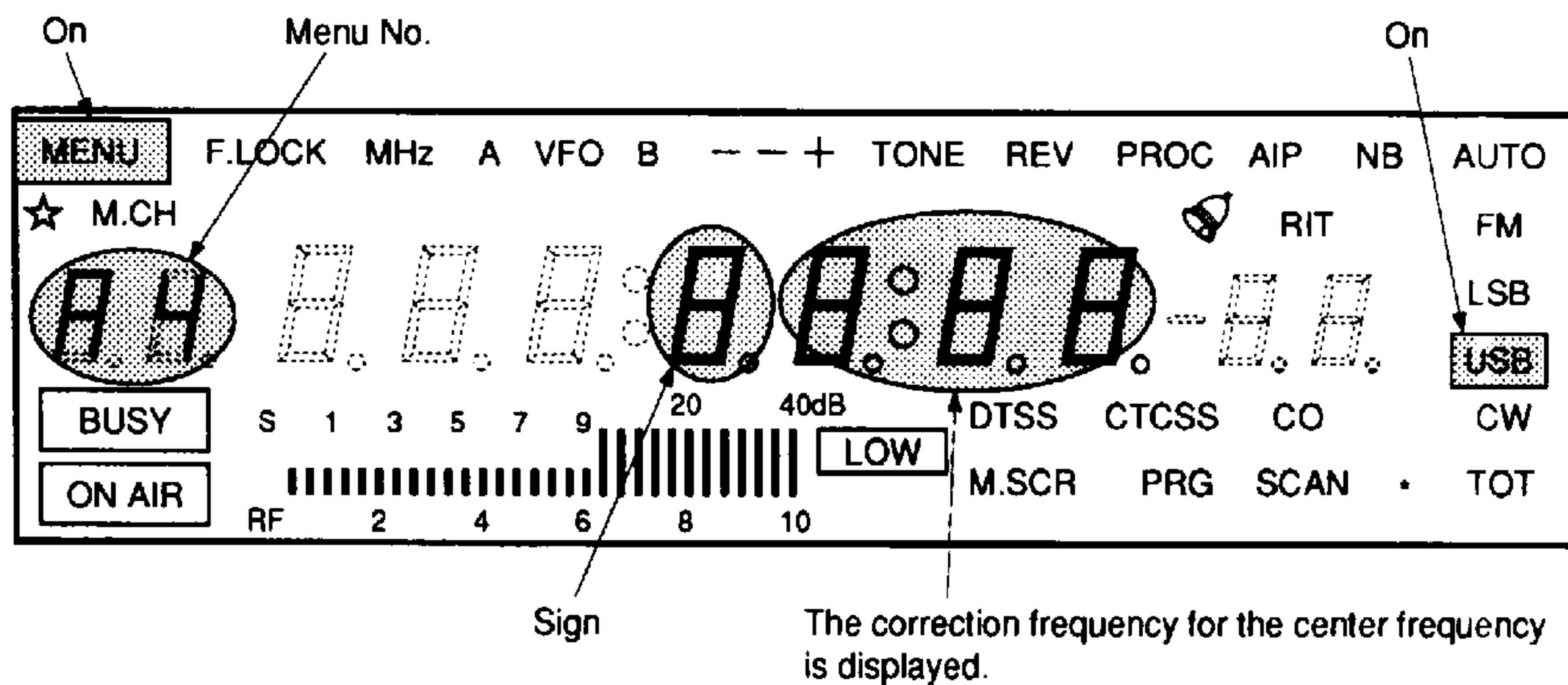
• Adjustment procedure

1. Transmit.
2. Change the correction frequency with the F.LOCK/LOW key or MIC UP/DOWN key.

• Remarks

The plus sign (+) indicates the frequency is moving away from the carrier frequency. (Same as IF-SHIFT)

• Display



A5 S METER CURVE ADJUSTMENT (S1) (ANY MODE EXCEPT FM)

• Adjustment function

Input the S meter voltage at which two bars of the S meter light to the microcomputer to correct variations of the S1 level of the S meter.

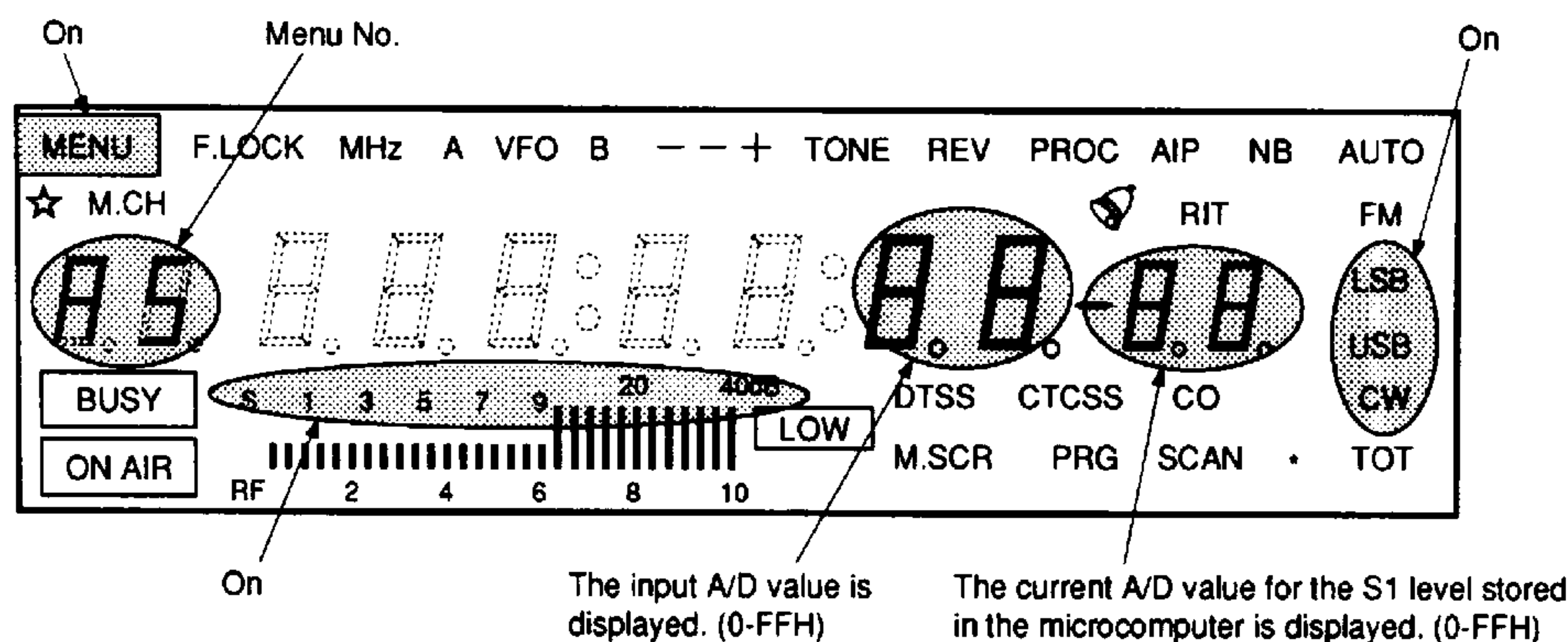
• Adjustment procedure

1. Input the specified level at which S9 begins to light with the SG.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The threshold is the input level minus the fixed value (9: approximately 0.18 V). When the input signal exceeds the threshold, one bar of the S meter lights. The curve between S1 and S9 is obtained from the levels of menus A5 and A6 by line approximation. Only the A/D values of the S1, S9, and full-scale levels are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the key is pressed. The default for S1 is 63, approximately 1.24 V.



ADJUSTMENT

A6 S METER CURVE ADJUSTMENT (S9) (ANY MODE EXCEPT FM)

• Adjustment function

Input the S meter voltage that indicates S9 (the first large segment) to correct variations of the S9 level of the S meter.

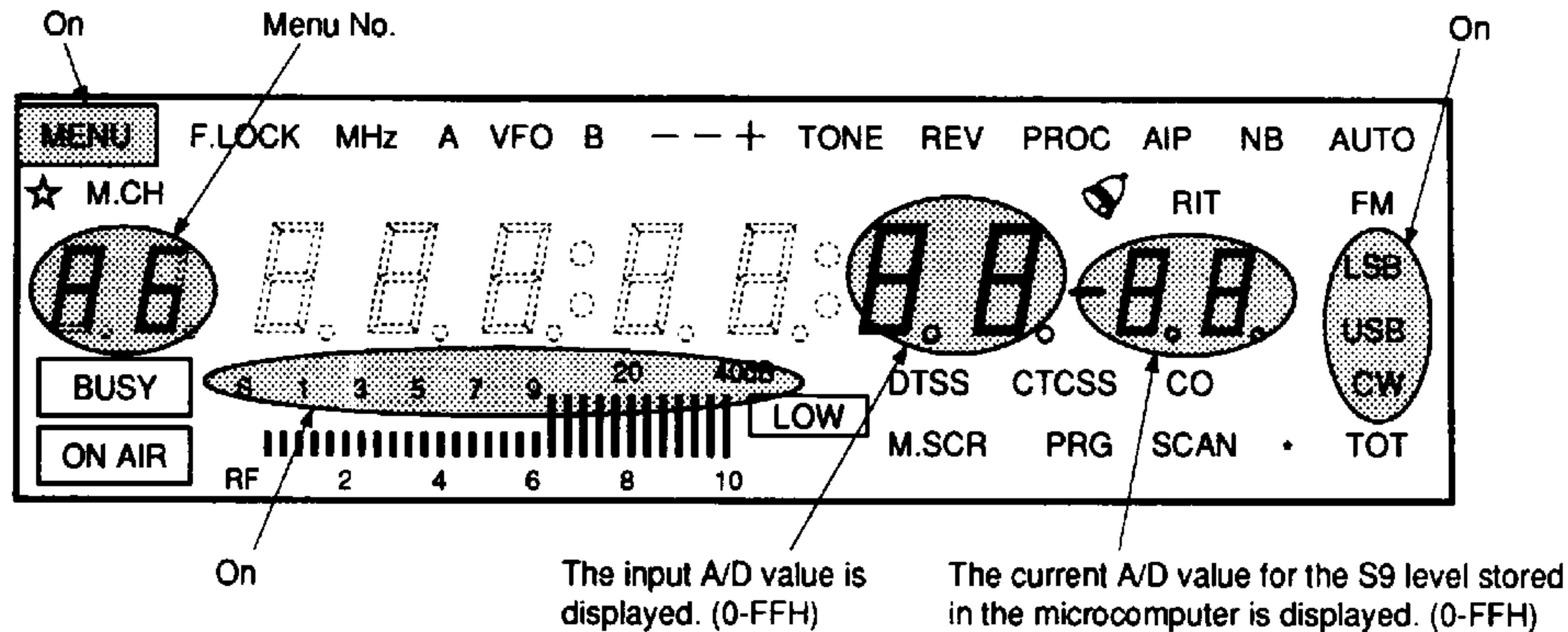
• Adjustment procedure

1. Input the specified level at which S9 begins to light with the SG.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The curve between S1 and S9 is obtained from the level of menus A5 and A6 by line approximation. The curve between S9 and full scale is obtained from the levels of menus A6 and A7 by line approximation. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The default for S1 is 121, approximately 2.37 V.



A7 S METER CURVE ADJUSTMENT (FULL SCALE) (ANY MODE EXCEPT FM)

• Adjustment function

Input the S meter voltage at which all the segments of the S meter light to correct variations of the full-scale level of the S meter.

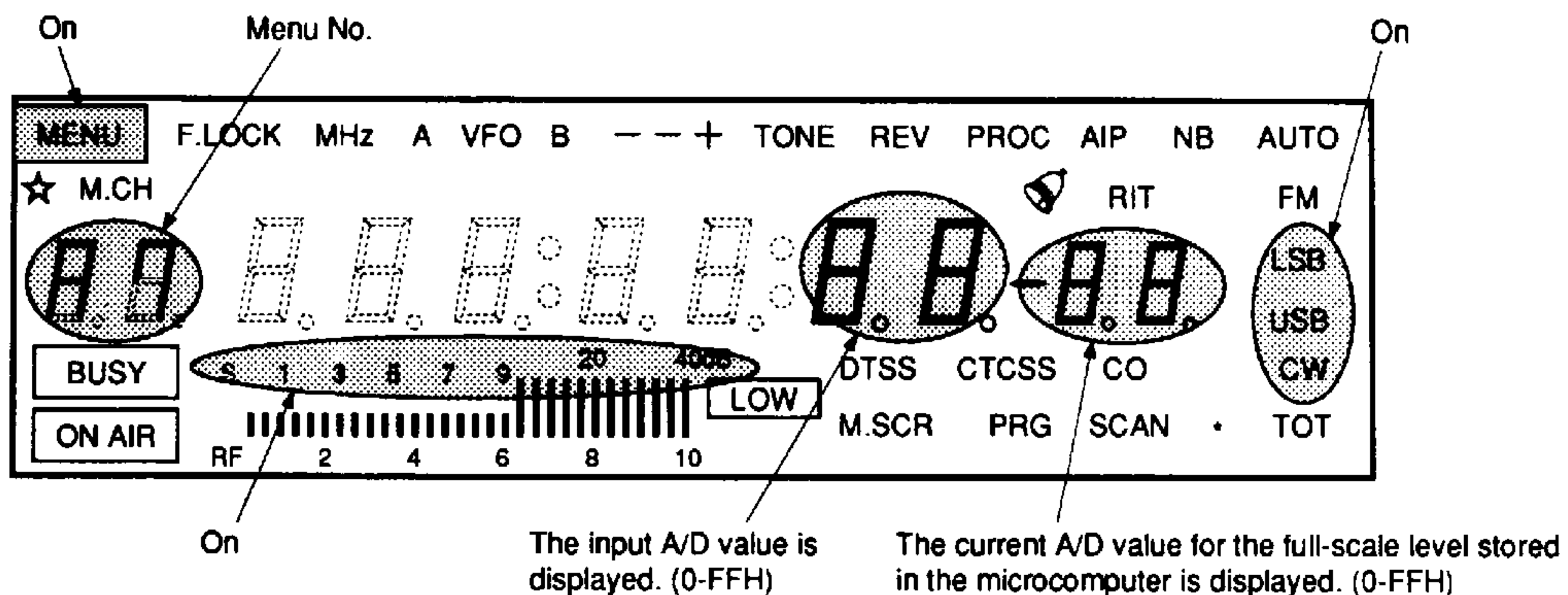
• Adjustment procedure

1. Input the specified level at which S9+40 dB begins to light with the SG.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The curve between S9 and full scale is obtained from the levels of menus A6 and A7 by line approximation. The meter bars operate according to the currently set curve. The curve is calculated when the key is pressed. The default for full scale is 158, approximately 3.10 V.



ADJUSTMENT

A8 S METER CURVE ADJUSTMENT (S1) (FM)

• Adjustment function

Input the S meter voltage at which two bars of the S meter light to the microcomputer to correct variations of the S1 level of the S meter.

• Adjustment procedure

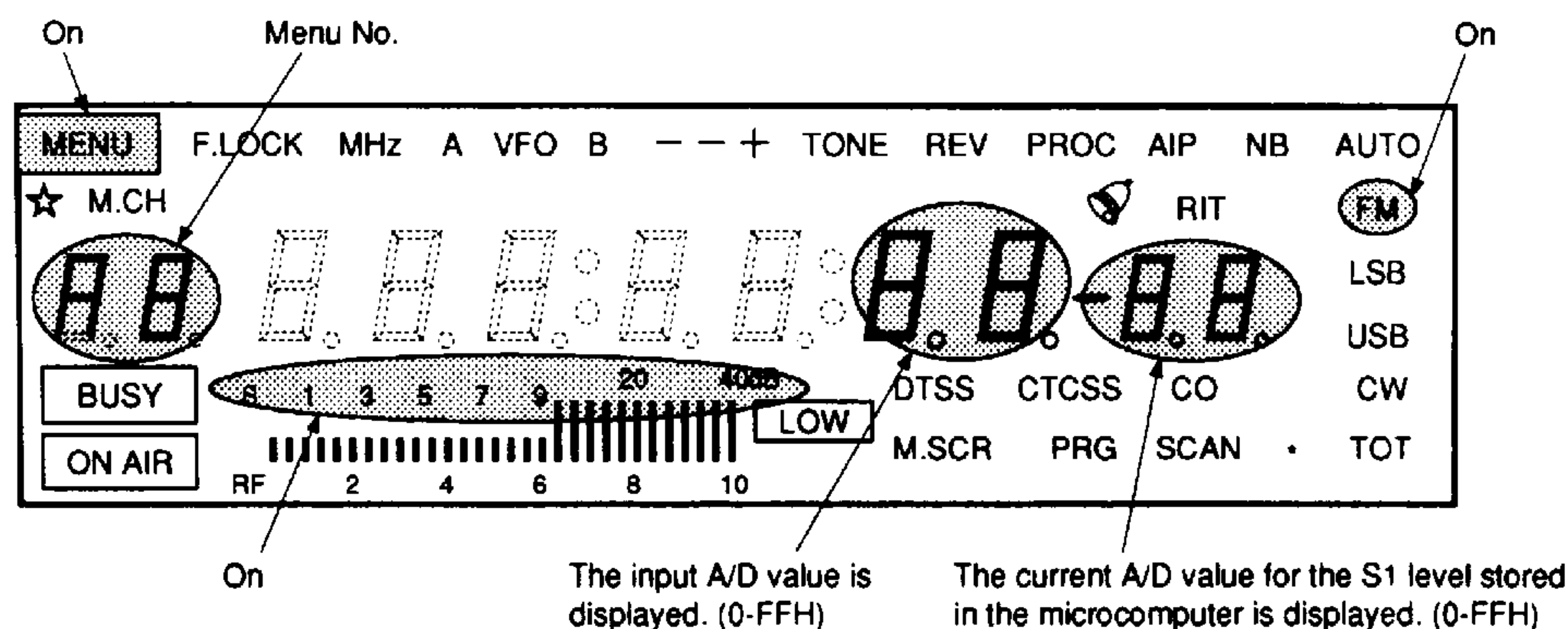
1. Input the specified level at key S1 begins to light with the SG.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The threshold for the S meter start is the input level minus the fixed value (1; approximately 0.02 V). When the input signal exceeds the threshold, one bar of the S meter lights. The curve between S1 and full scale is obtained from the levels of menus A8 and A9 by line approximation. Only the A/D values of the S1 and full-scale levels are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the key is pressed.

The default for S1 is 111, approximately 2.18 V.



A9 S METER CURVE ADJUSTMENT (FULL SCALE) (FM)

• Adjustment function

Input the voltage at which all the segments of the S meter light to correct variations of the full-scale level of the S meter.

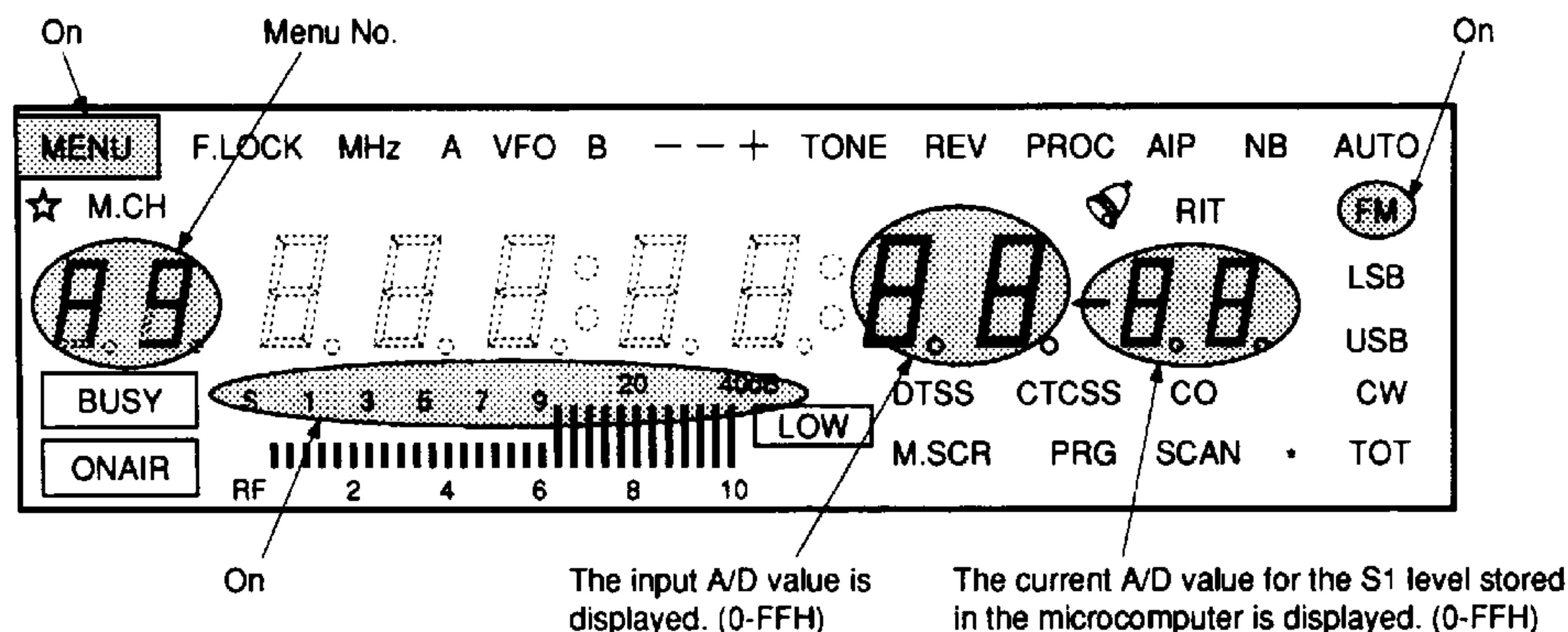
• Adjustment procedure

1. Input the specified level at which S9+40 dB begins to light from the SG.
2. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

Only the A/D values of S1 and full-scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the key is pressed. The default for full scale is 143, approximately 2.80 V.



ADJUSTMENT

AA RF METER CURVE ADJUSTMENT (LOW)

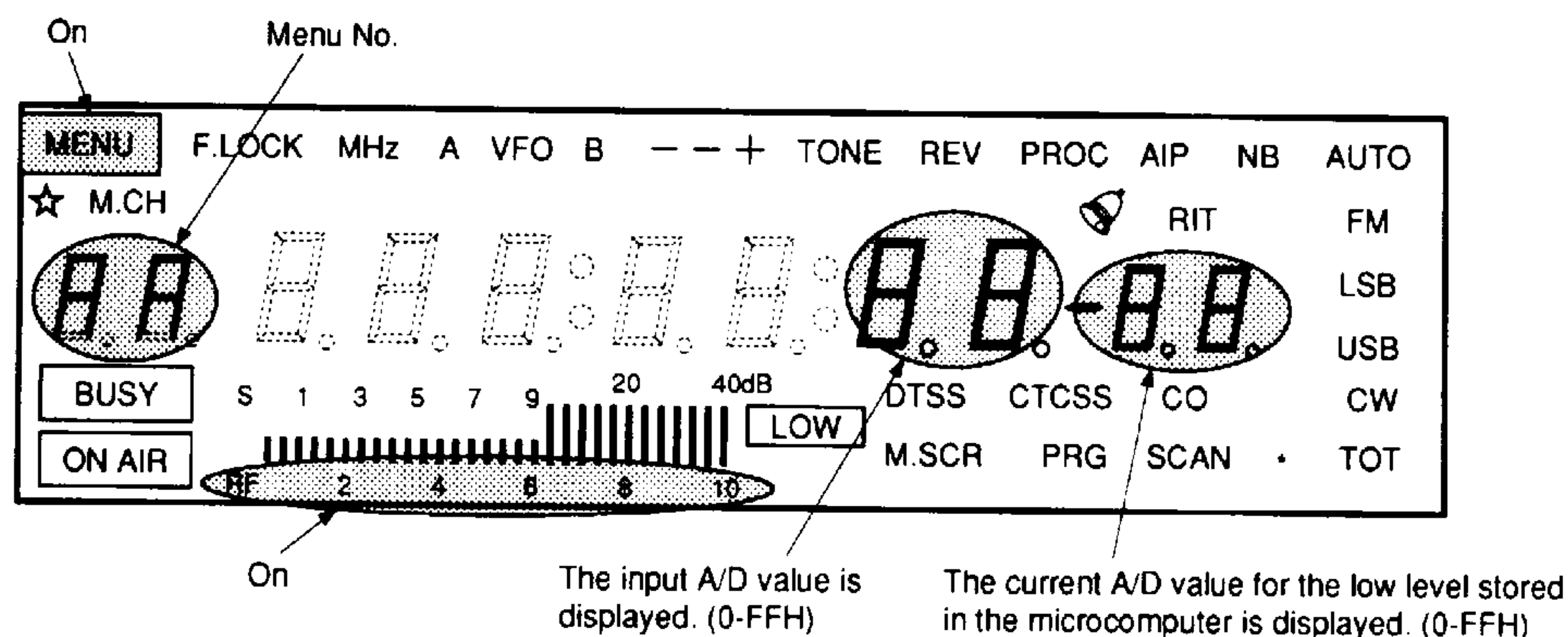
• Adjustment function

Input the voltage at which the RF meter indicates scale 2 to the microcomputer to correct variations of the low level of the RF meter.

• Adjustment procedure

1. Transmit.
2. Connect the AG to the microphone socket and input the specified level at which RF 2 begins to light.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display



• Remarks

The threshold for the RF meter start is the input level minus the fixed value (19; approximately 0.37 V). The curve is obtained from the levels of menu AA and the start level by line approximation. The curve between 2 and 6 is obtained from the levels of menus AA and AB by line approximation. Only the A/D values for 2, 6, and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the key is pressed. The default is 56, approximately 1.10 V.

AB RF METER CURVE ADJUSTMENT (MIDDLE)

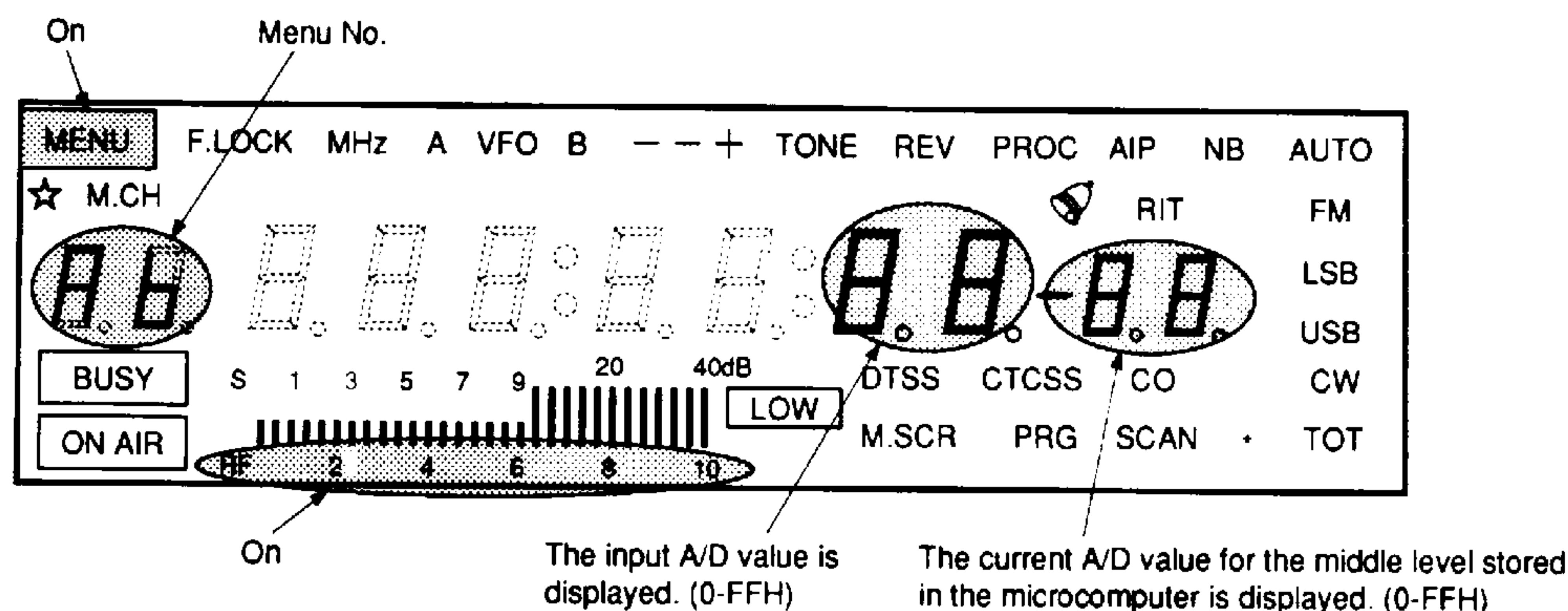
• Adjustment function

Input the voltage at which the RF meter indicates scale 6 to the microcomputer to correct variations of the middle level of the RF meter.

• Adjustment procedure

1. Transmit.
2. Connect the AG to the microphone socket and input the specified level at which RF 6 begins to light.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display



• Remarks

The curve between 2 and 6 is obtained from the levels of menus AA and AB by line approximation. The curve between 6 and full scale is obtained from the levels of menus AB and AC by line approximation. Only the A/D values for 2, 6, and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the key is pressed. The default is 114, approximately 2.24 V.

ADJUSTMENT

AC RF METER CURVE ADJUSTMENT (HIGH)

• Adjustment function

Input the voltage at which all the segments of the RF meter light to the microcomputer to correct variations of the full-scale level of the RF meter.

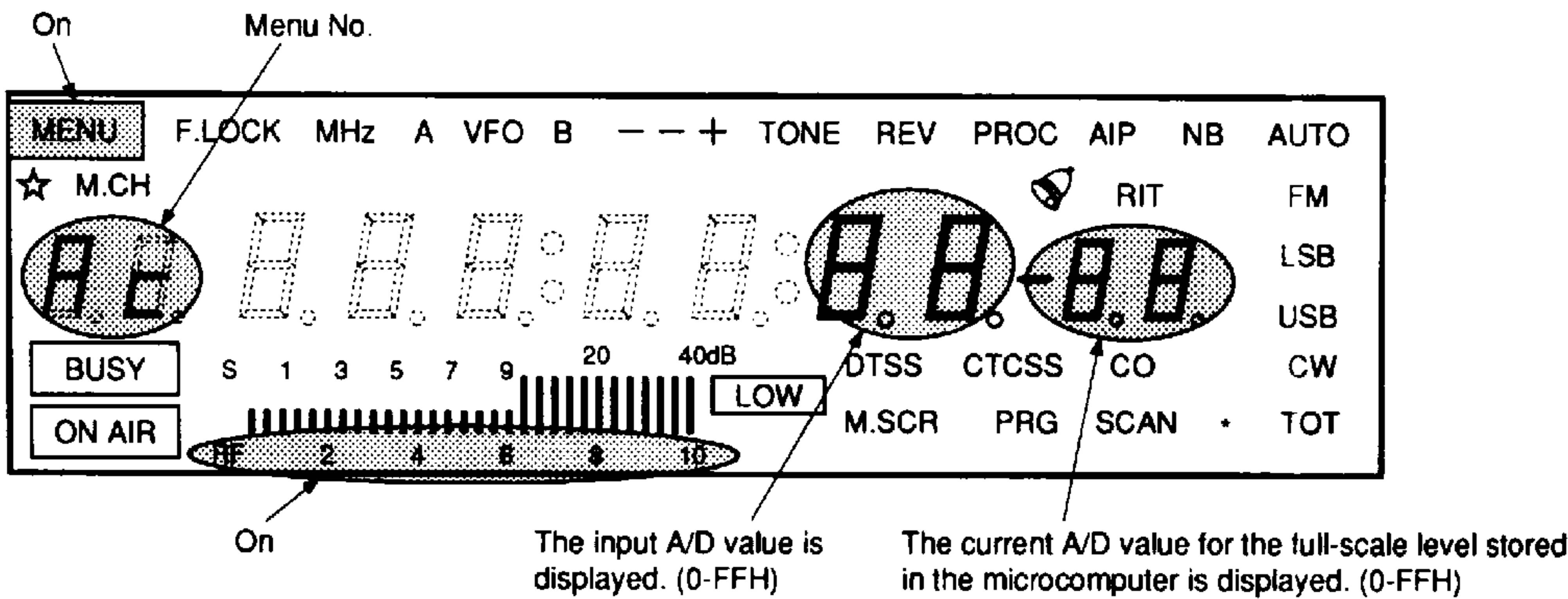
• Adjustment procedure

- 1. Transmit.
- 2. Connect the AG to the microphone socket and input the specified level at which RF 10 begins to light.
- 3. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The curve between 6 and full scale is obtained from the levels of menus AB and AC by line approximation. Only the A/D values for 2, 6, and full scale are stored in the EEPROM. The meter bars operate according to the currently set curve. The curve is calculated when the UP/DOWN key is pressed. The default is 171, approximately 3.35 V.



AD DTMF SINGLE TONE OUTPUT

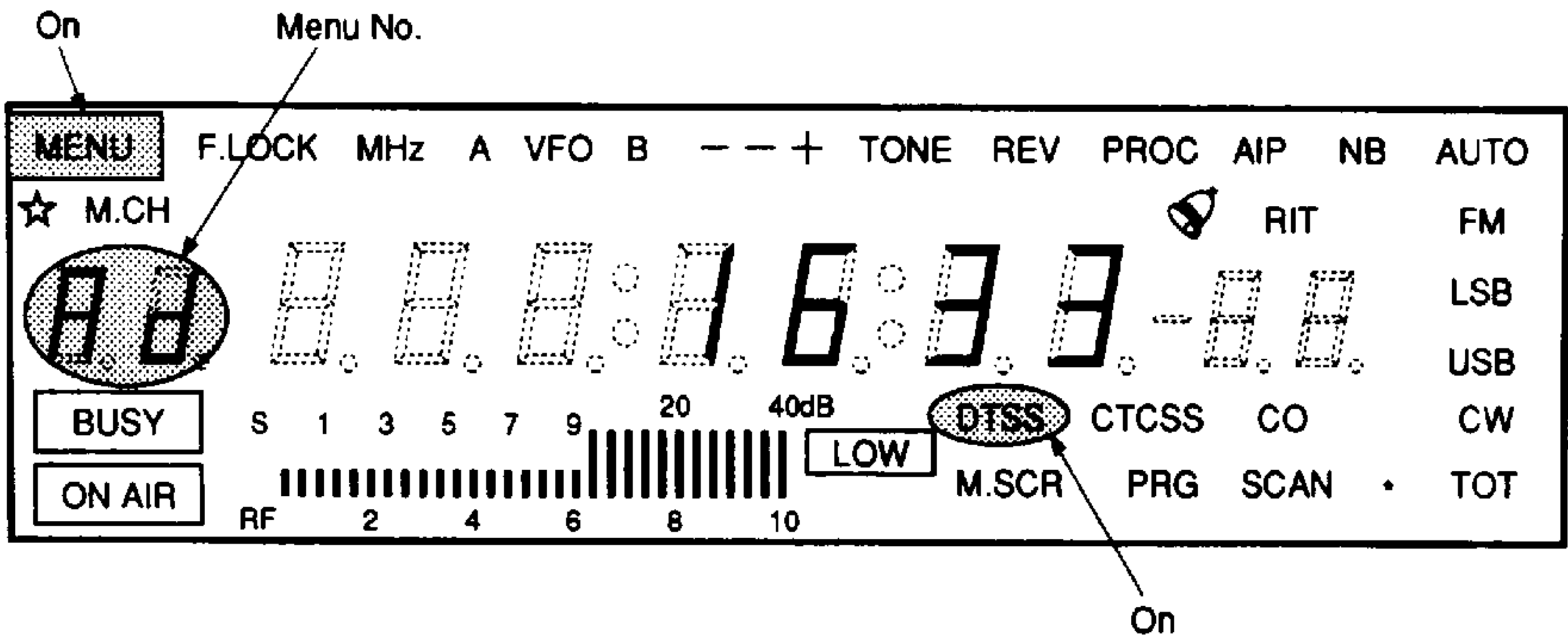
• Adjustment function

Output a single tone to check the DTMF deviation.

• Adjustment procedure

- 1. Confirm that "1633" is displayed. If "OFF" is displayed, press the F.LOCK/LOW key or the MIC UP/DOWN key to display "1633".
- 2. Transmit.
- 3. Check the deviation with a tester.

• Display



ADJUSTMENT

AE ALC START READ

• Adjustment function

Read the threshold voltage for microphone gain control by ALC.

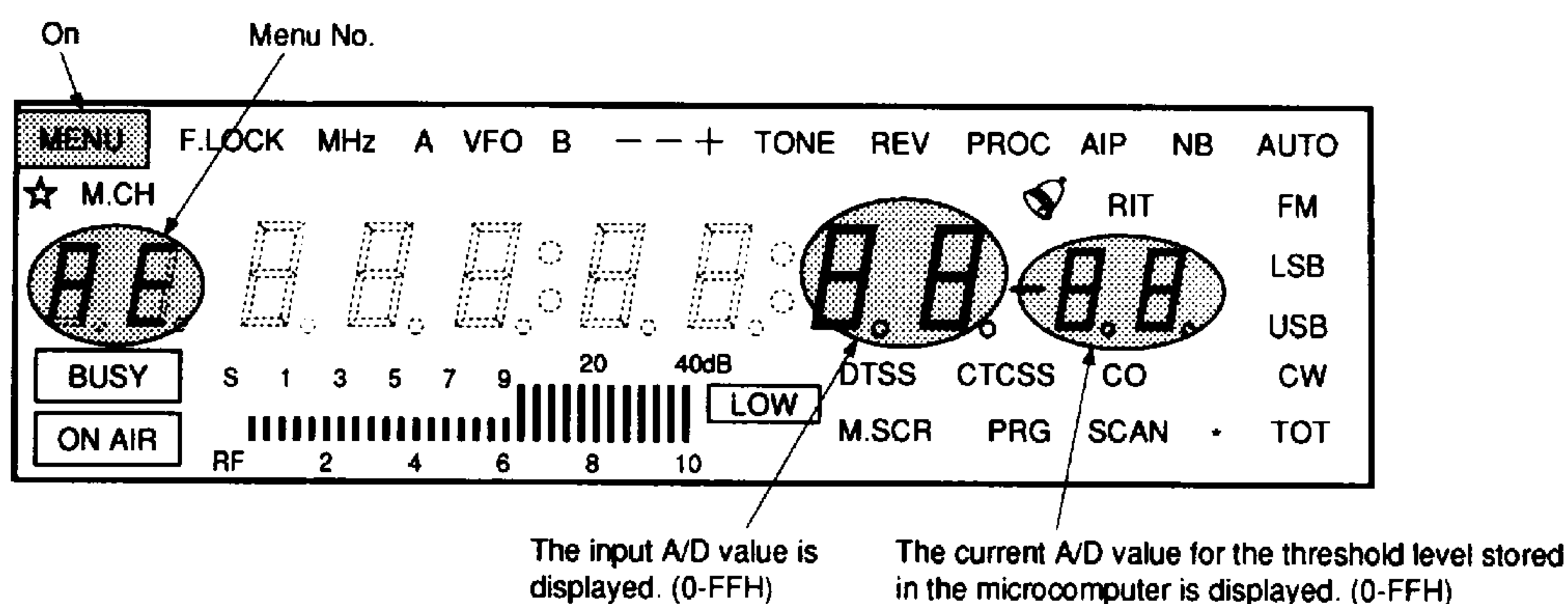
• Adjustment procedure

1. Transmit
2. Input the level at which the ALC starts from the AG.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The level read in this menu is used as a threshold for the low and correct microphone gain. The default is 224, approximately 4.40 V.



AF ALC ZONE MAX. READ

• Adjustment function

Read the threshold voltage for microphone gain control by ALC.

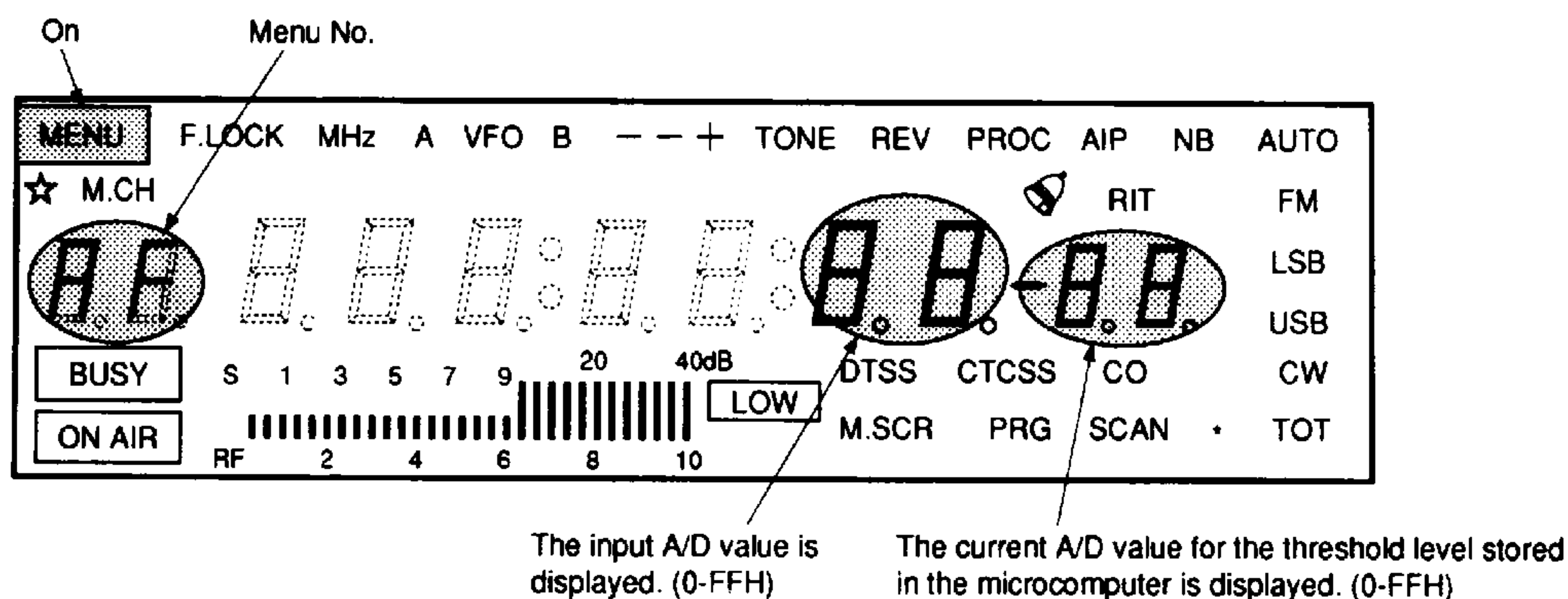
• Adjustment procedure

1. Transmit.
2. Input the maximum level of the ALC zone from the AG.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display

• Remarks

The level read in this menu is used as a threshold for the correct and high microphone gain. The default is 82, approximately 1.60 V.



ADJUSTMENT

B0 ALC FULL SCALE READ

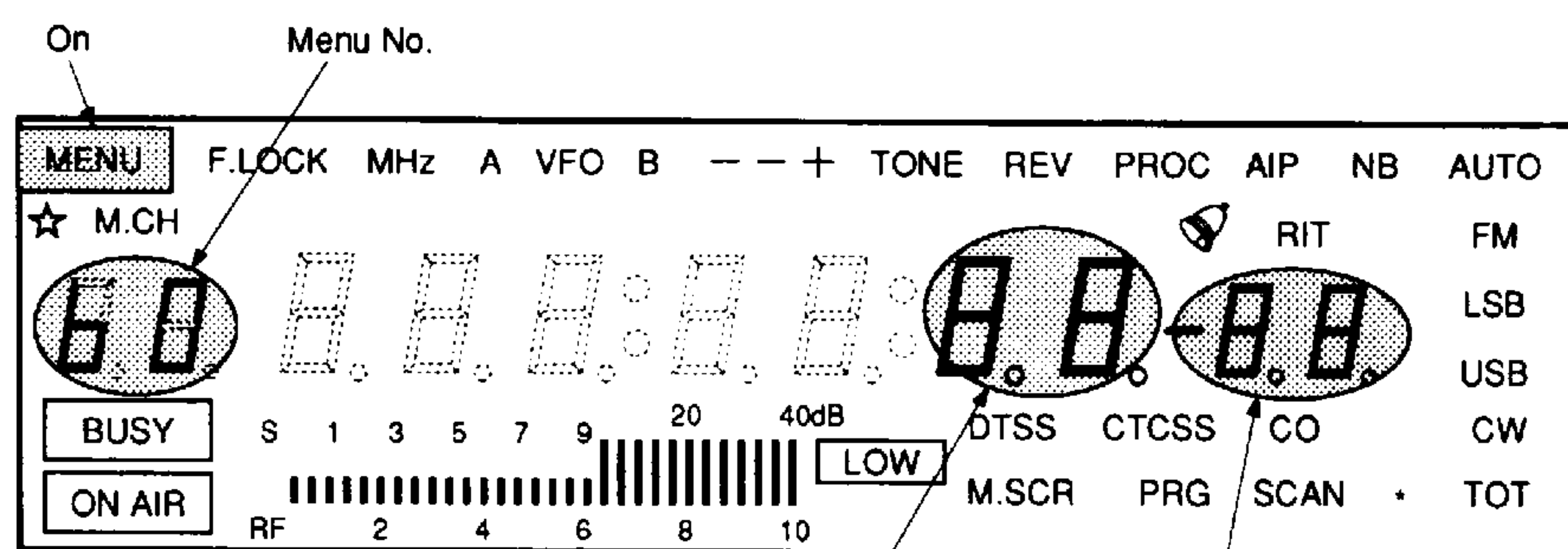
• Adjustment function

Read the threshold voltage for microphone gain control by ALC.

• Adjustment procedure

1. Transmit
2. Input the maximum + 6 dB level of the ALC zone from the AG.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key.

• Display



The input A/D value is displayed. (0-FFH)

The current A/D value for the threshold level stored in the microcomputer is displayed. (0-FFH)

B1 FM MICROPHONE GAIN

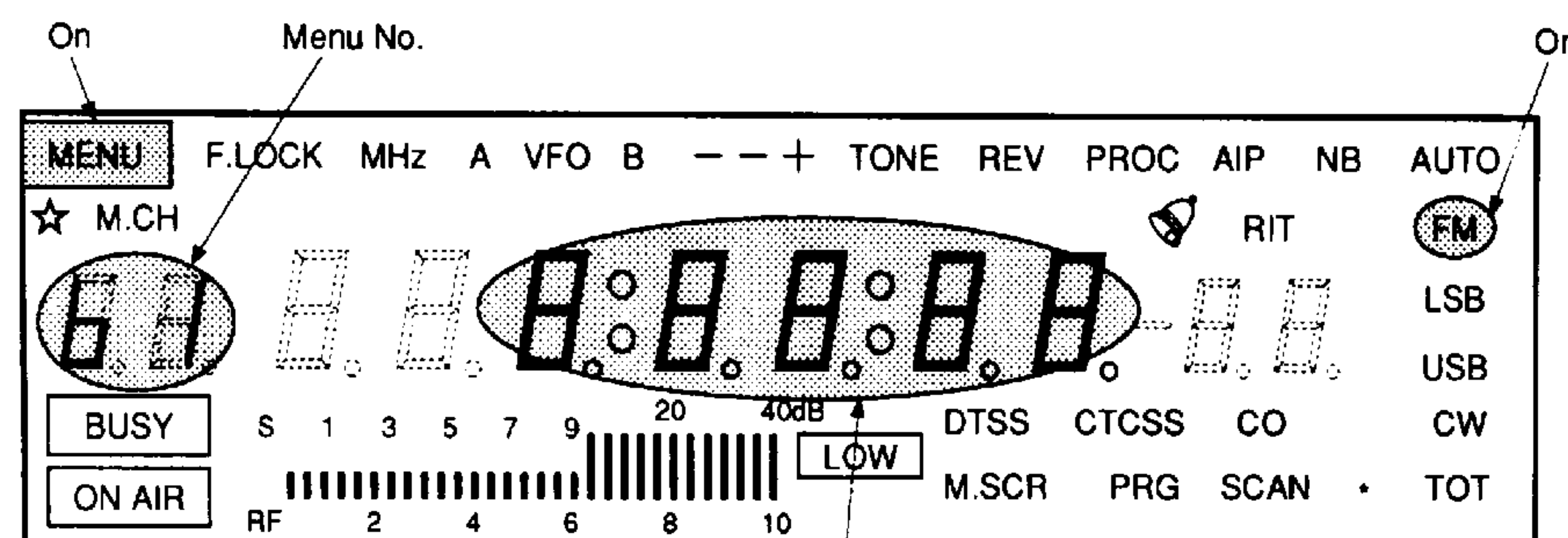
• Adjustment function

Set the low level for FM microphone gain.

• Adjustment procedure

1. Transmit.
2. Input the specified level from the AG.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key to change the microphone gain and obtain the specified deviation.

• Display



Microphone gain level

• Remarks

The high level is the level set in this menu + 6 dB.

ADJUSTMENT

B2 SSB MICROPHONE GAIN

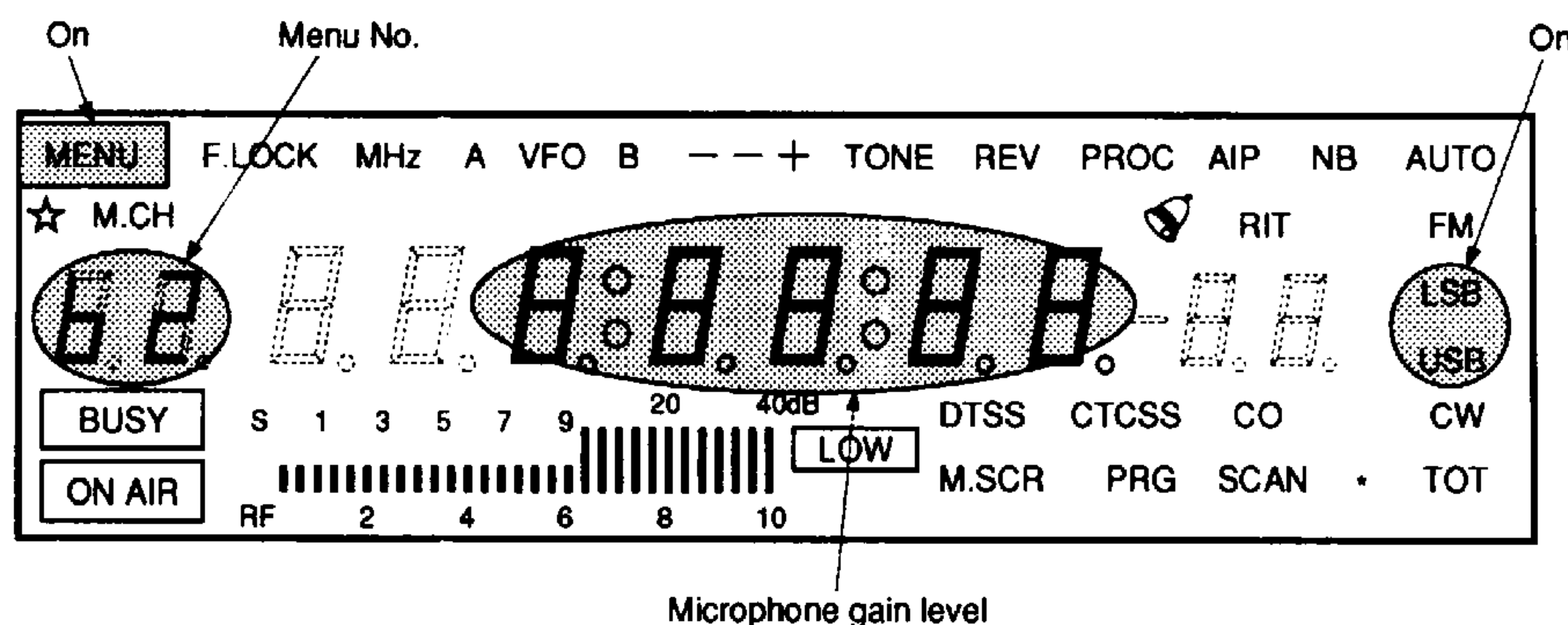
• Adjustment function

Set the SSB microphone gain.

• Adjustment procedure

1. Transmit
2. Input the specified level from the AG.
3. Press the F.LOCK/LOW key or the MIC UP/DOWN key to change the microphone gain and obtain the specified output.

• Display



B3 WRITE INTO EEPROM

• Adjustment function

Write setting values into the EEPROM.

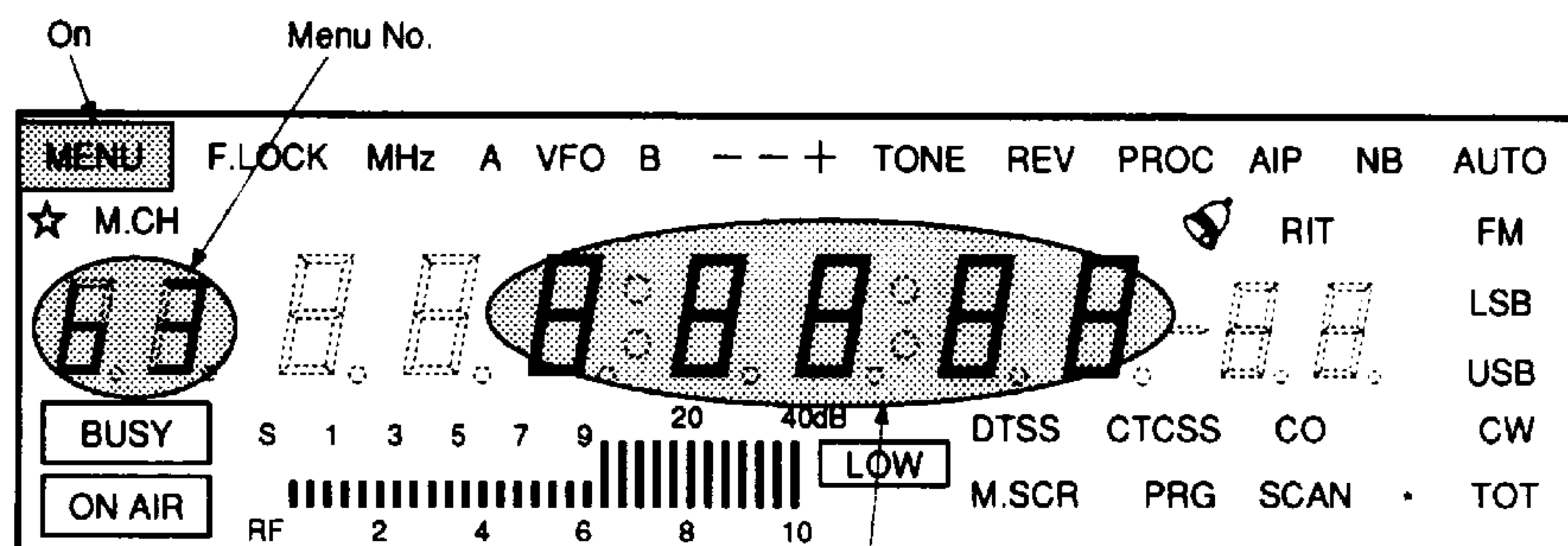
• Adjustment procedure

1. Press the F.LOCK/LOW key or UP/DOWN key.
2. While data is being written "run" is displayed.
3. If the data is written correctly, "good" is displayed.
4. If a write error occurs, "error" is displayed. If "error" is displayed repeatedly, press the key again. If "error" is still displayed repeatedly, check the EEPROM or other hardware for defects.

• Remarks

When this menu is selected and the key is pressed, the setting is written unconditionally even if it is not changed. Two sets of the same data are written into the EEPROM.

• Display



Initial stage

0000

Writing

0000

Normal end

9999

Write error

0000

ADJUSTMENT

Test equipment for adjustment

1. Tester or Digital Volt Meter

- 1) Input resistance: $1\text{M}\Omega$
- 2) Voltage range: FS = 1.5 to 1000V AC/DC
A tester with high accuracy is acceptable, but beware that a precise reading is not possible when measuring high impedance circuits.

2. DC Ammeter

- 1) Voltage range: 5A, 10A, 20A

3. RF VTVM (RF V.M)

- 1) Input impedance: $1\text{M}\Omega$ or more, 3pF or less
- 2) Voltage range: FS = 10mV to 300V
- 3) Measurable frequency: 500MHz or more

4. AF Voltmeter (AF V.M)

- 1) Measurable frequency: 50Hz to 10kHz
- 2) Input resistance: $1\text{M}\Omega$ or more
- 3) Voltage range: FS = 10mV to 30 V

5. AF Generator (AG)

- 1) Frequency range: 100Hz to 10kHz
- 2) Output: Can limit range between a maximum of 1V and minimum of 1mV.
Low distortion factor

6. AF Dummy Load (AF DM)

- 1) Impedance: 8Ω
- 2) Capacity: 3W or more

7. Oscilloscope (oscillo, synchro)

Something that can get vertical amp frequency characteristics of 100MHz or more; external cycles with as much high sensitivity as possible.

8. Tracking Generator

- 1) Center frequency: 50kHz to 500MHz.
- 2) Frequency deviation: $\pm 35\text{MHz}$.
- 3) Output voltage: 100mV or more.

9. SSG (Standard Signal Generator)

- 1) Oscillation frequency: 50kHz to 500MHz
- 2) Output: $-127\text{dBm}/0.1\mu\text{V}$ to $7\text{dBm}/0.5\text{V}$
- 3) Output impedance: 50Ω
- 4) Should get AM and FM
Something with oscillation frequency that is stable at non-modulation and has small frequency modulation component.

10. Frequency Counter (f. counter)

- 1) Minimum input voltage: 50mV
- 2) Measurable frequency: 500MHz or more

11. Noise Generator

Something that generates noise that includes a high frequency component of up to 450MHz or more that is close to ignition noise.

12. RF Dummy Load (Dummy Load)

- 1) Impedance: 50Ω
- 2) Capacity: 50W or more

13. Power Meter (transit type and terminal type)

- 1) Measurable frequency: 500MHz or more
- 2) Impedance: 50Ω
- 3) Measuring range: 50W or more
When there is a 50Ω dummy load for RF use, only transit type is acceptable.

14. Spectrum Analyzer

- 1) Frequency measuring range: 100kHz to 500MHz or more
- 2) Resolution range: 1kHz to 3MHz
When there is no spectrum analyzer, an electric intensity measuring device is acceptable (measuring range: 10 to 500MHz)
Voltage: Something with 10 to 17V variability
Current: 20A or more

15. Linear Detector (LD)

Measurable Frequency: 500MHz or more

16. DC Power Source

Voltage: Something with 10 to 17 V variability
Current: 20A or more

17. Microphone with UP/DOWN

MC-47

18. Service Tools

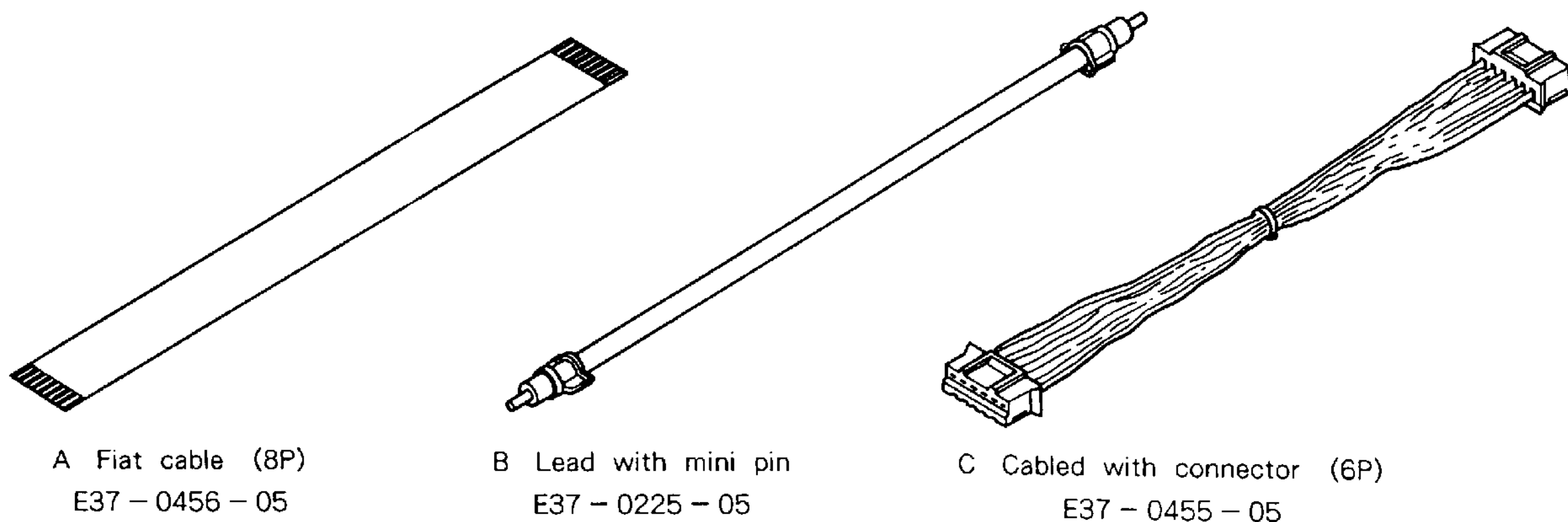
Extension cables (3)

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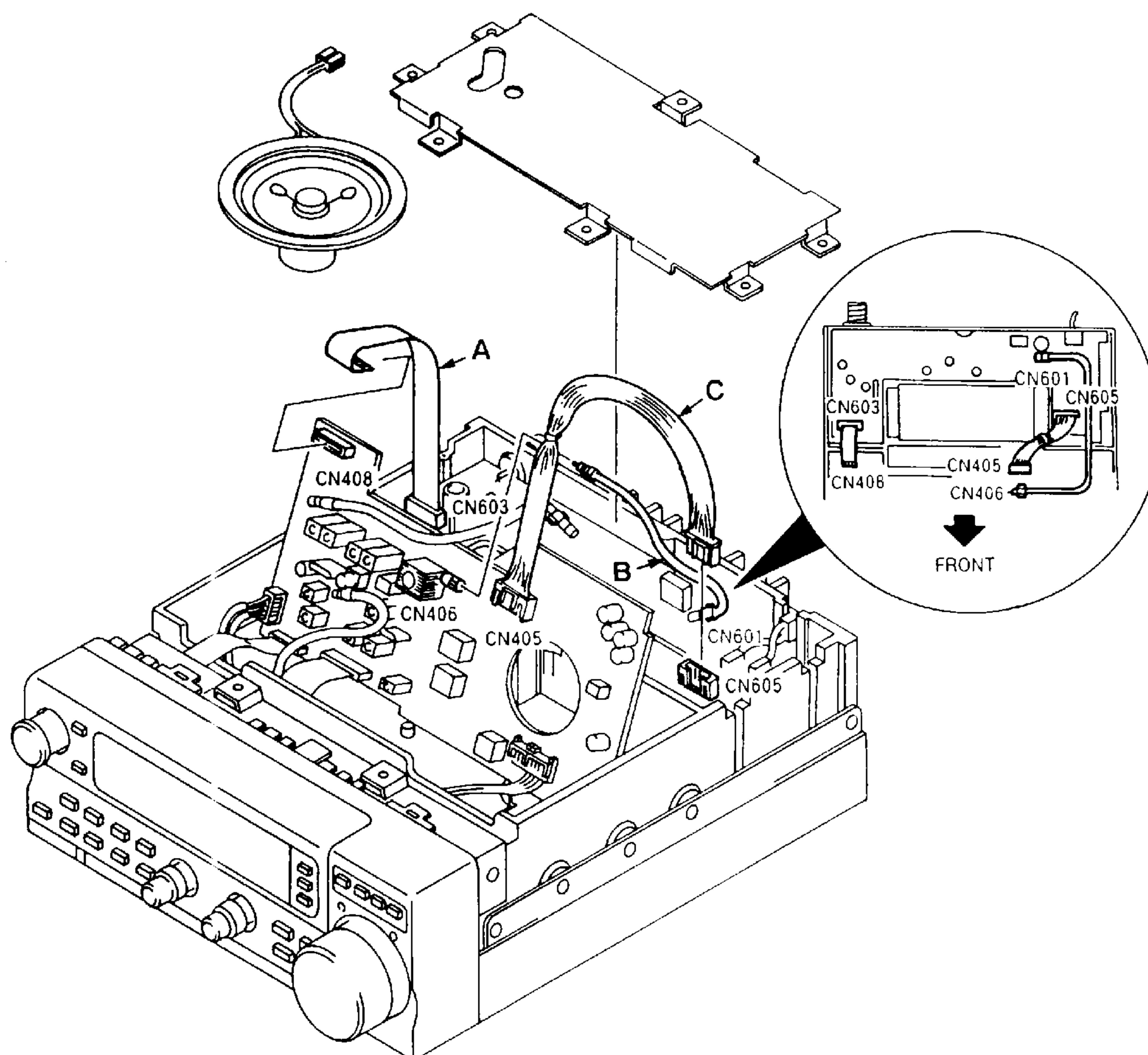
ADJUSTMENT

Adjustment service jig

(Extension Cable 15 cm)



Service jigs usage



ADJUSTMENT

TX/RX Common Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Supply DC 13.8V				After all LCDs are lighted, A VFO 144.000.0 CW is displayed.			
	2) Reset POWER:OFF While pressing MR key POWER ON							
	3) Auto Mic Gain Control: OFF The lock setting for main unit key is ON.				(1) F key: Press for 1.5 sec will go MENU mode. (2) A/B key: press once MENU A→B (3) Turn encoder and set MENU No. to 61. MENU 61 (4) F.LOCK key: press once ON→OFF (5) Turn encoder and set MENU No. to 69. MENU 69 (6) F.LOCK key: press once OFF→ON (7) CLR key: press once returns to VFO mode.			
	4) Center calibration of RIT and IF SHIFT RIT VR: Center IF SHIFT: Center (Adjustment Mode)							
			(1) Setting Method While pressing NB key and MHz key at same time, turn POWER: ON. (2) Adjustment Mode (About operations, refer to P67 to P78) (3) Cancellation Method After saving in EEPROM, press CLR key once or POWER: OFF.					

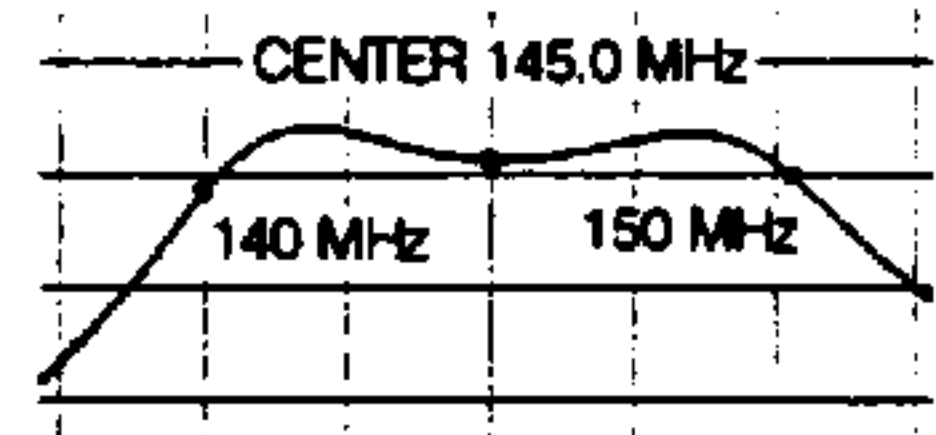
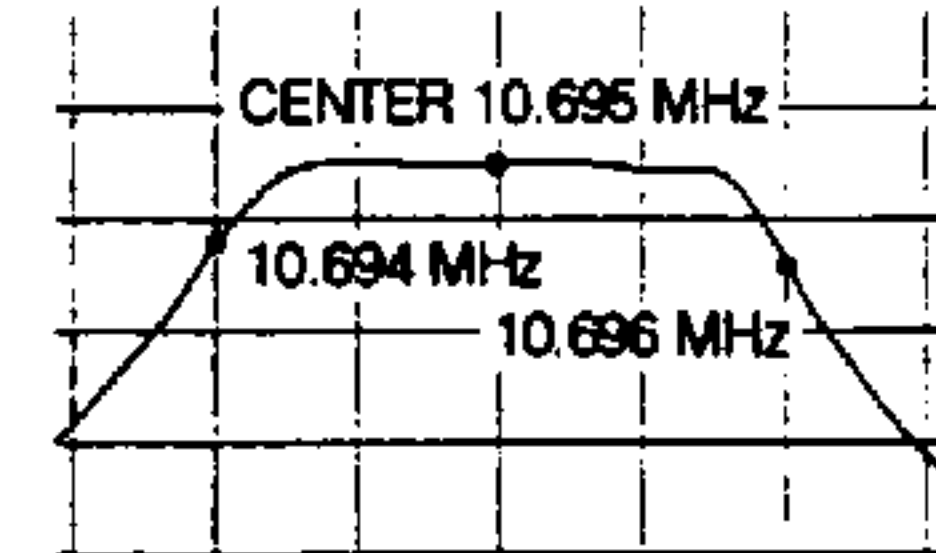
PLL/CAR Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Reference Oscillation (TCXO)	1) MODE: FM	f. counter Oscillo or RF V.M	TX-RX (A/5)	TP3	TX-RX (A/5)		Check.	20.480,000MHz±20Hz
2. CAR Oscillation level (10.695MHz)	1) MODE: USB	Oscillo or RF V.M		TP4		L204	Level MAX	(Ref.) Align with 2 times standard oscillation.
3. 30.72MHz level	1) MODE: FM			TP9		L207 L208	Level MAX	(Ref.)Align with 3 times standard oscillation.
4. 92.16MHz level	1) MODE: FM			IC202 (Pin 2)		L210 L211	Level MAX	
5. 103.625MHz level	1) MODE: FM			TP5		L217 L218	Level MAX	
6. Lock voltage	1) Frequency: 144.000MHz MODE: USB	DC V.M	TP6	(VCO)	TC1	3.5V	±0.1V	
	2) Frequency: 145.999MHz: E 147.799MHz: K, M MODE: USB					Check.	4.0 to 5.0V: E 5.0 to 6.5V: K, M	

RX Adjustment

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. RFG	1) Frequency: 145.039MHz MODE: USB	DC V.M	TX-RX (A/5)	TP1	TX-RX (A/5)	VR4	3.0V	±0.03V

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
2. Helical	1) Remove CN402 of TX-RX (B/5) 2) Frequency: 145.040MHz MODE: FM Tracking Generator output: -10dBm Spectrum Analyzer Setting fc: 145.000MHz: E 146.000MHz: K, M SPAN: 25MHz REF: -40dBm	Trk. Gen. Spectrum Analyzer	Rear panel TX-RX (B/5)	ANT CN413	TX-RX (B/5)	L401 L402	Repeat adjustment 2 to 3 times and with gain at maximum, adjust waveform to figure at below.  REF -30.0 dBm, ATT 10 dB, MKR 145.00 MHz -44.45 dBm, 5 dB/CAL OFF, RBW 300 kHz, POS PK, VBW 100 kHz, SWP 50 ms	
3. MCF (10.695MHz)	1) Remove CN402 of TX-RX (B/5) 2) Frequency: 145.040MHz MODE: FM Tracking Generator output: -10dBm Spectrum Analyzer Setting REF: -30dBm fc: 10.695MHz SPAN: 50kHz		TX-RX (B/5)	CN414 CN403 (Pin 4)		L407 L408	 REF -10.0 dBm, ATT 10 dB, MKR 10.6950 MHz -35.1 dBm, 10 dB/CAL OFF, RBW 1 kHz, POS PK, VBW 1 kHz, SWP 30 ms	
Attach CN402.								
4. BPF	1) Frequency: 145.039MHz: E 146.039MHz: K, M MODE: USB SSG output: -123dBm (0.16μV)	SSG SP (AF D.M) Oscillo AF V.M	Rear panel	ANT EXT SP	TX-RX (B/5)	L403 L404 L405 L410	AF output MAX	
5. IF AMP	1) Frequency: 145.039MHz: E 146.039MHz: K, M MODE: USB SSG output: -123dBm (0.16μV) IC2 VR: 9 o'clock				TX-RX (A/5)	L1 IC2 (L 2pcs.)	AF output MAX	
6. LO1	1) Frequency: 145.039MHz: E 146.039MHz: K, M MODE: USB SSG output: -123dBm (0.16μV)					TC201	AF output MAX	
7. NB	1) Frequency: 145.039MHz: E 146.039MHz: K, M MODE: USB SSG output: -93dBm (5.0μV)	SSG Oscillo or DC V.M	Rear panel TX-RX (A/5)	ANT IC1 (Pin 4)		IC1 (L 2pcs.)	Voltage: MIN	(Ref.) Approx. 3.1V
	2) SSG output: OFF						Check	4.0 to 5.0V
8. IF GAIN	1) Frequency: 145.039MHz: E 146.039MHz: K, M MODE: USB SSG output: -109dBm (0.8μV)	SSG SP (AF D.M) Oscillo AF V.M	Rear panel	ANT EXT SP	Front panel	AF VOL	Set AF output to 0.63V	
	2) SSG output: -119dBm (0.25μV)				TX-RX (A/5)	IC2 (VR)	Adjust AF output to 0.4V	
	3) SSG output: -109dBm (0.8μV)						Check.	AF output 0.63V
When adjusting items 9 to 11, set to Adjustment mode and refer to menu operations (P67 to P78).								
9. SSB S meter (S1)	1) MENU No.: A5 SSG freq.: 145.040MHz output: -113dBm (0.5μV)	SSG SP (AF D.M) Oscillo AF V.M	Rear panel	ANT EXT SP	Front panel		F.LOCK key: press once	Note: AF output is 1kHz sine wave. (Fine tune the SSG frequency)
(S9)	2) MENU No.: A6 SSG output: -93dBm (5.0μV)						F.LOCK key: press once	
(FULL)	3) MENU No.: A7 SSG output: -53dBm (500μV)						F.LOCK key: press once	

ADJUSTMENT

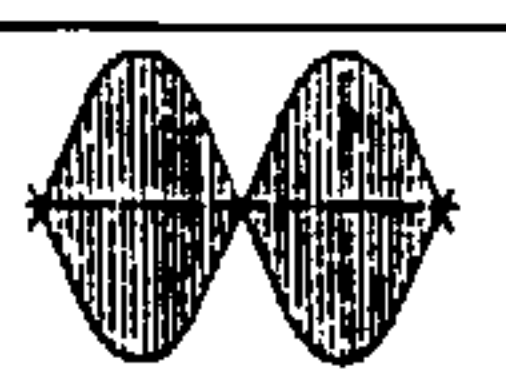
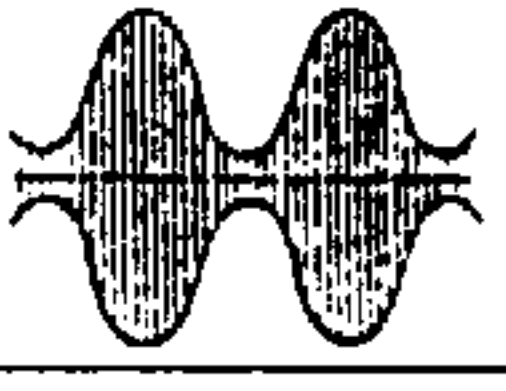
Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
10. FM S meter (S1) (FULL)	1) MENU No.: A8 SSG Freq.: 145.040MHz MOD Freq: 1kHz DEV: 3kHz SSG output: -119dBm (0.25μV) 2) MENU No.: A9 SSG output: -93dBm (5.0μV)	SSG SP (AF D.M) Oscillo AF V.M	Rear panel	ANT EXT SP	Front panel		F.LOCK key: press once	Note: AF output is 1kHz sine wave. (Fine tune the SSG frequency)	
							F.LOCK key: press once		
11. ROM DATA Writing	1) MENU No.: B3	LCD					LCD display: "ready" F.LOCK key: press once		
							LCD display: "good" CLR key: press once		
12. BEEP	1) AF VR: MIN Continuously ON and OFF SSB/CW key.	AF D.M Oscillo	Rear panel	EXT SP	TX-RX (A/5)	VR2	0.4Vp-p	±0.1V	
13. RX Sensitivity(S/N)	1) Frequency: 145.039MHz MODE: USB AIP: OFF SSG output: -125dBm (0.126μV) AF VR: 0.63V (1kHz sine wave)	SSG SP (AF D.M) Oscillo AF V.M)		ANT EXT SP				AF output of SSG output is turned off.	S/N 10dB or more
	2) AIP: ON SSG output: ON				TX-RX (B/5)	VR402		0.2V (-10dB)	
	3) Frequency: 145.040MHz MODE: FM SSG output: -121dBm (0.2μV) MOD Freq.: 1kHz DEV: 3kHz						Measuring SINAD	12dB SINAD or more	
14. Squelch (FM)	1) Frequency: 145.040MHz MODE: FM SSG output: OFF				Front panel	SQL VR	Adjust where squelch is closing.	SQL VR position: 8:00 to 11:00	
	2) SSG output: -128dBm (0.09μV) MOD Freq.: 1kHz DEV: 3kHz			Squelch open.					
	3) SQL VR: MAX			Squelch close.					
	4) SSG output: -118dBm (0.28μV)			Squelch open.					
15. Squelch (SSB)	1) Frequency: 145.039MHz MODE: USB SSG output: OFF					Adjust where squelch is closing.	SQL VR position: 8:00 to 11:00		
	2) SSG output: -125dBm (0.126μV) MOD Freq.: 1kHz DEV: 3kHz						Squelch open.		
	3) SQL VR: MAX						Squelch close.		
	4) SSG output: -115dBm (0.4μV)						Squelch open.		

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
16. S Meter Sensitivity Check	1) Frequency: 145.039MHz MODE: USB SSG output: ON	SSG SP (AF D.M) Oscillo AF V.M)	Rear panel	ANT EXT SP			SSG output check S1 lights	-119dBm to -107dBm (0.25 to 1.0μV) -99dBm to -87dBm (2.5μV to 10μV)
	2) Frequency: 145.040MHz MODE: FM SSG output: ON MOD Freq: 1kHz DEV: 3kHz						S9 lights	
							All lights	-99dBm to -87 dBm (2.5μV to 10μV)

TX Adjustment

Note: When adjusting (items 8 to 10) TX-RX unit (A/5), first attach case (upper) to TX-RX unit (B/5, C/5) side or stand set up.

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. FM TX Freq.	1) Remove CN406 of TX-RX unit (B/5)	f.counter	TX-RX (A/5)	VR1 right bottom terminal	TX-RX (A/5)	TC1	10.6950MHz	±50Hz
	2) MODE: FM							
	3) Transmit							
2. TX IF AMP	1) Frequency: 144.950MHz: E 145.950MHz: K, M MODE: CW Set to the center VR7, 8 and 9 of TX-RX(A/5). fc: 144.950MHz: E 145.950MHz: K, M (Use 10dB ATT) SPAN: 500kHz 2) Transmit.	Spectrum Analyzer	TX-RX (B/5)	CN406	TX-RX (B/5)	L415 L416 L411- L414 L417 TC401- TC404	Repeat adjustment 2 to 3 times and with level at maximum.	Note: If the level is over 10dBm, adjust VR9 of TX-RX (A/5).
					TX-RX (A/5)	VR9	Level: MAX	
When adjusting items 3 to 5, set to Adjustment mode.								
3. MIC sensitivity setting	1) MENU No.: B2	LCD			Front panel		With F.LOCK and LOW key, set characters displayed by LCD.	Display: "-7dB"
4. CAR point	1) LSB CAR Point MENU No.: A3 USB CAR Point MENU No.: A4	Oscillo	TX-RX (B/5)	CN403 (Pin 2)			Adjust oscilloscope waves so that they cross by pressing F.LOCK key and LOW key.	OK  NG 
	2) From MIC terminal AG1: 300Hz 2mV AG2: 2700Hz 2mV	AG AF V.M	TX-RX (D/5)	MIC				
	3) Transmit.							
5. ROM DATA Writing	1) MENU No.: B3	LCD					LCD Display: "ready" F.LOCK key: press once	
							LCD Display: "good" CLR key: press once	
Attach CN406. When adjusting items 6 to 10, turn VR401 and VR603 fully clockwise.								
6. NULL	1) Frequency: 144.980MHz: E 146.980MHz: K, M MODE: FM	Power meter	Rear panel	ANT	TX-RX (C/5)	VR601	45W	±3.0W
	2) Transmit	Oscillo or DC V.M	TX-RX (C/5)	ANT CN608		VR602	Voltage: MIN	0.6V or less

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
7. SSB MIC sensitivity	1) Frequency: 144.950MHz: E 145.950MHz: K, M MODE: USB	Power meter AG AF V.M	Rear panel TX-RX (D/5)	ANT MIC	TX-RX (A/5)	VR1	24W	±1.0W
	2) MIC terminal AG: 1kHz 2.8mV :E AG: 1kHz 5mV :K, M							
	3) Transmit							
8. Carrier level	1) Frequency: 144.950MHz: E 146.950MHz: K, M MODE: CW, LOW SW: ON	Power meter	Rear panel	ANT	TX-RX (A/5)	VR9	42W	±1.0W
	2) Transmit							
9. FM MAX DEV.	1) Frequency: 144.980MHz	Power meter LD AG AF V.M	Front panel TX-RX (D/5)	ANT MIC	TX-RX (A/5)	VR6	Check ±. Larger Value should be 4.4kHz	±100Hz
	2) MIC terminal AG: 1kHz 30mV :E AG: 1kHz 50mV :K, M							
	3) Transmit.							
10. POWER	1) Frequency: 144.0000MHz(FM): E 145.950MHz(FM): K, M	Power meter	Rear panel	ANT	TX-RX (C/5)	VR601	42W	±1W
	2) Transmit.				TX-RX (B/5)	VR401	5W	±0.2W
	3) POWER: LOW							
	4) Transmit.							
11. Protection	1) Frequency: 144.980MHz: E 145.980MHz: K, M MODE: FM Open ANT terminal.	Ammeter		Power supply	TX-RX (C/5)	VR603	5.0A	±0.1A
	2) Transmit.							
When adjusting items 12 to 16, set to Adjustment mode and refer to menu operations (P67 to P78).								
12. RF meter LOW (RF-2) MID (RF-6) HI (FULL)	1) MENU No.: AA Adjust AG input to set transmit output levels shown below.	Power meter AG AF V.M LCD	Rear panel TX-RX (D/5)	ANT MIC	Front panel		F.LOCK key: press once	
	2) Transmit. 5W							
	3) MENU No.: AB						F.LOCK key: press once	
	4) Transmit. 24W							
	5) MENU No.: AC						F.LOCK key: press once	
	6) Transmit. 37W							
13. ALC Meter Start Point Zone MAX FULL	1) MENU No.: AE AG: 1kHz 7mV :K, M AG: 1kHz 4.0 mV :E						F.LOCK key: press once	
	2) Transmit.							
	1) MENU No.: AF AG: 1kHz 14mV :K, M AG: 1kHz 8.0mV :E						F.LOCK key: press once	
	2) Transmit.							
	1) MENU No.: B0 AG: 1kHz 28mV :K, M AG: 1kHz 16mV :E						F.LOCK key: press once	
	2) Transmit.							
14. FM MIC Sensitivity	1) MENU No.: B1 AG 1kHz 5mV: K, M AG: 1kHz 3mV: E	Power meter LD AG AF V.M LCD					Adjust to ±3.0kHz using F.LOCK key and LOW key.	±100Hz
	2) Transmit.							
15. DTMF DEV	1) MENU No.: AD LCD Display: 1633 If the display is "OFF", then F.LOCK key press once.						Check DEV.	±2.5kHz or more
	2) Transmit.							

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
16. ROM DATA Writing	1) MENU No.: B3	LCD			Front panel		LCD display: "ready" F.LOCK key: press once	
							LCD Display: "good" CLR key: press once	
17. Check TONE DEV.	1) 144.980MHz MODE: FM TONE: ON	Power meter LD	Rear panel	ANT			Check DEV.	0.5 to 1.5kHz
	2) Transmit.							
	3) TONE: OFF							
18. Suppression	1) Frequency: 144.980MHz MODE: USB or LSB Spectrum Analyzer fc: 145.000MHz SPAN: 10MHz	Power meter Spectrum analyzer	Rear panel	ANT	TX-RX (A/5)	VR7 VR8	Repeat USB, LSB alternately, CAR level: MIN	-40dB or more for level at CW.
	2) Transmit.							
19. SIDE TONE	1) Frequency: 144.950MHz MODE: USB AF VR: MIN KEY: ON	Oscillo AF V.M	Rear panel	EXT SP KEY	TX-RX (A/5)	VR3	0.2V	±0.1V
20. Check Processor operation	1) Release the lock of main unit key MENU No. 69: ON→OFF	Power meter AG AF V.M	Front panel TX-RX (D/5)	ANT MIC	Front panel		Check by ON and OFF of PROC key.	Power value at ON should be higher than at OFF.
	2) Frequency: 144.950MHz: E 145.950MHz: K, M MODE: USB							
	3) MIC terminal AG: 1kHz 2mV							
	4) Transmit.							
21. Auto MIC Gain control check	1) Frequency: 144.950MHz: E 145.950MHz: K, M MODE: USB						Set F.LOCK key OFF to ON, check after few seconds.	Power value at ON should be higher than at OFF.
	2) MIC terminal AG: 1kHz 2mV							
	3) Set to MENU No. 61, then transmit.							
22. TX Freq. Check	1) Frequency: 144.950MHz: E 145.950MHz: K, M MODE: FM	Power meter f.counter	ANT	Rear panel			144.950MHz: E	±1kHz or less
	2) Transmit.						145.950MHz: K, M	
23. TX Output Check	1) Frequency: 144.950MHz MODE: CW and FM	Power meter					Check	[HI] 37 to 47 W [LOW] 3 to 8 W

ADJUSTMENT

TX-RX UNIT (C/5)

TX RX UNIT (C/5)
VR601: NULL and HI POWER
VR602: NULL
VR603: PROTECTION

TX-RX UNIT (B/5)

TX-RX UNIT (B/5)
TC401: TX IF AMP
TC402: TX IF AMP
TC403: TX IF AMP
TC404: TX IF AMP
VR401: LOW POWER
VR402: RX S/N
L401: Helical (BPF)
L402: Helical (BPF)
L403: BPF
L404: BPF
L405: BPF
L407: MCF (10.695MHz)
L408: MCF (10.695MHz)
L410: BPF
L411: TX IF AMP
L412: TX IF AMP
L413: TX IF AMP
L414: TX IF AMP
L415: TX IF AMP
L416: TX IF AMP
L417: TX IF AMP

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TX-RX UNIT (A/5)

TC1: FM TX Frequency
TC1 (VCO): Lock Voltage
VR1: SSB MIC Sensitivity
VR2: BEEP
VR3: SIDE TONE
VR4: RFG
VR6: FM MAX DEV
VR7: Carrier Suppression
VR8: Carrier Suppression
VR9: Carrier Level
VR (IC2): IF Gain
L (IC1): Noise Blanker
L (IC2): IF AMP
L1: IF AMP
L9: TX IF AMP
L204: Ref. Oscillation Level
L206: CAR Oscillation Level
L207: 30.72MHz Level
L208: 30.72MHz Level
L210: 92.16MHz Level
L211: 92.16MHz Level
L217: 103.625MHz Level
L218: 103.625MHz Level
TC201: L01

(D/5)

