

ADJUSTMENT PROCEDURES
IC-FR4000 UHF REPEATER

1. PREPARATION

1 – 1. REQUIRED TEST EQUIPMENT

DC power supply	13.6V DC	15A or more
RF power meter	impedance	50ohm range:5-60W
Frequency counter	Freq range	0.1-1000MHz
FM deviation meter	freq range	50-500MHz measuring range 0 to ± 10 kHz
Ammeter		10A and 30A
DC voltmeter	input impedance	50kohm/V DC or better
Audio generator	Frequency range	300-3000 Hz asuring range 1-500 mV
SSG	Frequency range	1-1000MHz Output level 0.1uV-32mV
Oscilloscope	Frequency range	DC-20MHz 0.01-20V
Attenuator	Power attenuation	40 or 50 dB

1 – 2. CLONENING SET UP DATA

- ①TURN ON CS-FR3000 「Maker Reserved」 Mode and reading initial data from IC-FR400.
- ②Turn on [POWER] sw then display on LCD 「Initial Error」 .
- ③Connect a cloning cabel to IC-FR4000 then Cloning Adjustment data with CS-FR3000.
- ④IF cloning complete shows 「CLONE OK」 on lcd ,turn off [POWER] switch.

2. ADJUSTMENT MODE

2-1. Preparation

- ①Connect DC power supply to the [DC] input.
- ②Set output voltage to 13.6V then turn the output on.

2-2. ENTERING THE ADJUSTMENT MODE

- ①PRESS and hold [CH-DN]/[CH-UP] key then turn on [POWER] sw.
- ②When a beep sounds heard, release [CH-DN]/[CH-UP] key.
the [CH-DN] key again pushed within 2 seconds.

2-3. ADJUSTMENT

※Connect RF POWER Meter to teh TX ANT Connector.

※Connect RF SSG to the RX ANT Connector and RF signal OFF.

2-3-1. TVCO UNIT、RVCO UNIT PLL VOLTAGE SET

Set to follotion condition

CH DISPLAY : ch 「A01」

MODULATIN : OFF

- ①CHECK POINT TX UNIT 「CP1」
- ②ALIGNMENT POINT TVCO UNIT C17。

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A01 LW TXREF 127	1.0V $\pm 0.2V$	TVCO UNIT C17	TX UNIT CP1

- ③CHECK POINT RX UNIT 「CP1」。
- ④ALIGNMENT POINT RVCO UNIT C17

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A01 LW TXREF 127	4.3V $\pm 0.2V$	RVCO UNIT C17	RX UNIT CP1

2－3－2. TX UNIT REF FREQUENCY SET

Loosely couple the frequency counter to the TX antenna connector.

CH DISPLAY : ch 「A01」

MODULATION : OFF

①press [PROG] key and set to 「TXREF」 on LCD

②TX MODE set the TX frequency adjustment value。

Adjustment Point	LCD DISPLAY	Value	REF No.	CK.POINT
[MON] [RPT/BASE]	A01 LW TXREF ***	400.2750MHz ±400Hz	-----	TX ANTENNA Connector

2－3－3. RX unit ref frequency set

Connect frequency counter to the RX UNT HJ4

CH DISPLAY : ch 「A01」

RF SSG : OFF

①press [PROG] key and set to 「RXREF」 on LCD

②Set the LOCAL frequency adjustment value。

Adjustment Point	LCD DISPLAY	Value	REF No.	CK.POINT
[MON] [RPT/BASE]	A01 LW RXREF ***	359.9250MHz ±500Hz	-----	RX UNIT HJ4

2－4. RECEIVER SECTION

1.Connect 4ohm terminator to the [SP] jack.

2.Connect an AC millivolt meter and SINAD meter to the terminator.

2－4－1. RECEIVER SENSITIVITY

Connect an RF SSG to the [RX ANT] connector.

Connect an DC voltmeter to the RX UNIT CP18

CH DISPLAY : ch 「A03」

SSG FREQUENCY : ch 「A03」 frequency (see attached fig.4)

MODULATION : f=1kHz、MOD=3.0kHz

SQL VOL :CCW

SET the RF SSG output to 0dB uV

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A03 LW MRTUN 083	DC Voltmeter peak	RX UNIT C11,C12,C10, C27,C28,C26	RX UNIT CP18

2－5．TX SECTION

2－5－1．TX OUTPUT POWER

1.Connect RF power meter to the [TX ANT] connector.

2.Connect an RF SSG to the [RX ANT] connector.

CH DISPLAY : ch 「A06」

MODULATION : OFF

①press [PROG] key and set to 「HW POWER」 on LCD

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A06 HW POWER ***	50W	-----	TX POWER

②press [PROG] key and set to 「LW POWER」 on LCD

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A06 LW POWER ***	10W	-----	TX POWER

2－6．TX MODULATION

2－6－1．TX MODULATION (WITHOUT TONE)

Loosely couple the modulation analyzer to the TX antenna connector.

Connect an AF OSC to the MIC connector .

Set AF OSC output level to the 40mV rms.

CH DISPLAY : ch 「A07」

RF SSG OUT :OFF

SSG MODULATION : OFF

Set modulation analyzer to following condition.

HPF OFF

LPF 20kHz

DE EMP OFF

P to P (P-P)/2

①Press [CH-UP]key set to ch display [A07]

②TX MODE

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A07 LW M DEV ***	4.50kHz	-----	TX DEV

③Press [CH-UP]key set to ch display [A08]

④TX MODE

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A08 LW LMODC ***	4.50kHz	-----	TX DEV

⑤Press [CH-UP]key set to ch display [A09]

⑥TX MODE

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A09 LW HMODC ***	4.50kHz	-----	TX DEV

2-6-2. CTCSS (WIDE) DEV SET

AF OSC output :OFF
 CH DISPLAY : ch 「A10」
 RF SSG OUT :OFF
 SSG MODULATION : OFF

Set modulation analyzer to following condition.

HPF OFF
 LPF 20kHz
 DE EMP OFF
 P to P (P-P)/2

①Press [CH-UP]key set to ch display [A10]

②TX MODE

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A10 LW CTCDEV***	0.70kHz	-----	TX DEV

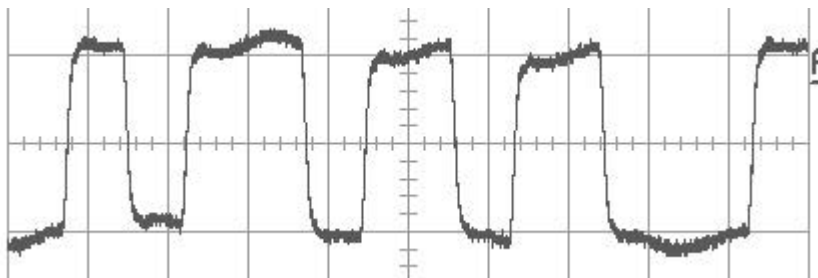
2-6-3. DTCS(WIDE) DEV SET

Connect oscilloscope to the modulation analyzer detect output.

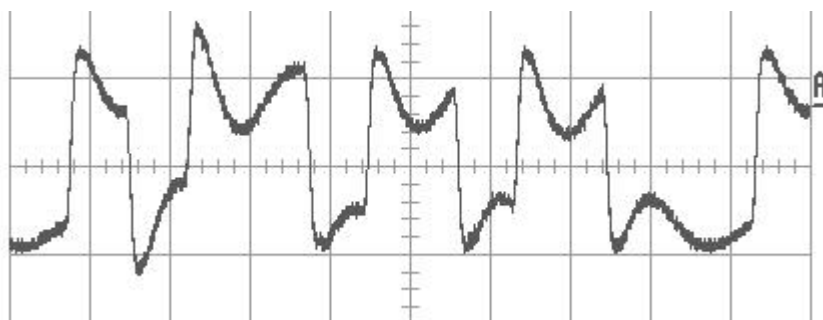
①Press [CH-UP]key set to ch display [A11]

②TX MODE

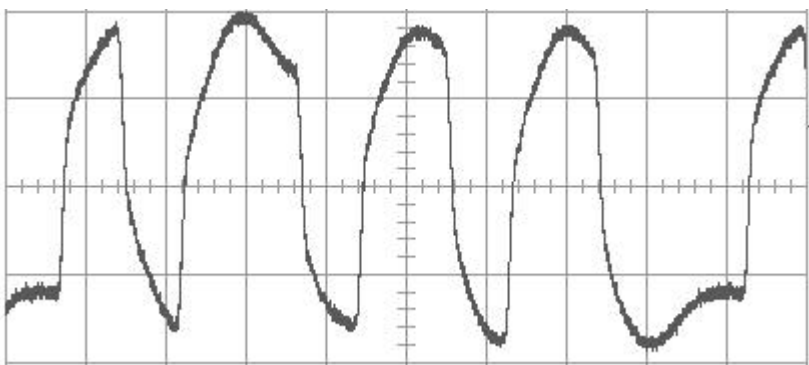
Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A11 LW DTCADJ***	see fig1	-----	TX DEV



← (fig.1)



← (fig.2)



← (fig.3)

3－6－4. CTCSS (NARROW) DEV SET

①Press [CH-UP]key set to ch display [A12]

②TX MODE

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A12 LN CTCDEV***	0.35kHz	-----	TX DEV

3－6－5. REPEATER (WIDE)

CH DISPLAY : ch 「A13」

RF SSG OUT : OFF

SSG MOD : f=1kHz、MOD=3.0kHz

①Press [CH-UP]key set to ch display [A13].

②Set SSG RF OUTPUT to +60dBμ.

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A13 LW RPTAF ***	3.0kHz	-----	TX DEV

2－6－6. REPEATER (NARROW)

CH DISPLAY : ch 「A14」

RF SSG OUT : OFF

SSG MOD : f=1kHz、MOD=3.0kHz

①Press [CH-UP]key set to ch display [A14].

②Set SSG RF OUTPUT to +60dBμ.

Adjustment Pattern	LCD DISPLAY	Value	REF No.	CK.POINT
C	A14 LN RPTAF ***	1.5kHz	-----	TX DEV

3. APPENDIX

3-1. ADJUSTMENT MODE CHANNEL

fig.4

CH	Rx f (MHz)	Tx f (MHz)	ADJ MODE	レベル	POWER	W/N	MODE CHANGE
A01	429.9250	400.2750	VC0 LOCK VOLTAGE	L	L	W	TX/RX
			Tx/Rx Ref Frequency				
A02	429.9250	429.7250	RX SENSE	H	L	W	--
A03	415.0750	415.2750	RX SENSE	M	L	W	--
A04	400.0750	400.2750	RX SENSE	L	L	W	--
A05	400.0750	400.2750	RPTSQ L	L	L	W	--
A06	415.0750	415.2750	TX POWER H / L	M	H/L	W	High/Low
A07	415.0750	415.2750	VC0 MOD Level	M	L	W	--
A08	400.0750	400.2750	VC0 MOD Balance	L	L	W	--
A09	429.9250	429.7250	VC0 MOD Balance	H	L	W	--
A10	415.0750	415.2750	CTCSS DEV (WIDE)	M	L	W	CTCSS 151.4Hz
A11	415.0750	415.2750	DTCS MOD Balance	M	L	W	DTCS "071"
A12	415.0750	415.2750	CTCSS MOD (NARROW)	M	L	N	CTCSS 151.4Hz
A13	410.2750	415.2750	RPT (WIDE)	M	L	W	--
A14	410.2750	415.2750	RPT (NARROW)	M	L	N	--
A15	415.0750	415.2750	NOT USE	M	L	W/N	W/N
A16	415.0750	415.2750	NOT USE	M	L	W/N	W/N
A17	400.1250	400.5000	BASE MODE	L	L	W/N	NONE/67.0/151.4/254.1/"071" /EMOD1/EMOD2
A18	415.1250	415.5000		M			
A19	429.1250	429.5000		H			
A20	400.1250	400.5000		L	H		
A21	415.1250	415.5000		M			
A22	429.1250	429.5000		H			
A23	400.1250	400.5000	[25DTMF0]output	L	L	W/N	400/1K/3K/CWID/MBEEP, DTMFデコード
A24	415.1250	415.5000	[CWID]output	M			
A25	429.1250	429.5000	[MBEEP]output	H			
A26	402.0750	407.0750	TELEPHONE FUNCTION	L	L	W/N	ON-HOOK/RING-DET/OFF-HOOK/DTMF DIAL/ DTMF検出/ON-HOOK検出/Phone Patch
							ON-HOOK/RING-DET/OFF-HOOK/ PULSE DIAL(10PPS)/ PULSE DIAL(20PPS)/BMR(33.3 /39.2%切替)
A27	402.0750	407.0750					
A28	400.0750	405.0750	RPT MODE	L	H	W/N	CTCSS67Hz/151.4Hz/254.1Hz/DTCS "071"/5TONE/N.SQL
A29	410.0750	415.0750		M			
A30	429.9250	424.9250		H			
A31	410.0750	415.0750	SCRAMBLER CHECK	M	L	W/N	SCRANBLER ON/OFF
A32	410.0750	415.0750	FFSK UNIT CHECK	M	L	W/N	1200Bit1/Bit0

3-2. 調整モードのキー操作資料

		フロントパネル	ACC端子
ch切替	+ 1	[CH-UP]	
	- 1	[CH-DN]	
	5bit設定		[D0]～[D4]
試験信号切替		[PROG]	[EXT PTT] 19pin
W/N切替		[ANI CLR]	[MS/I] 3pin
D/A値切替	+ 1	[RPT/BASE]	[EXT RPT/BASE] 6pin
	- 1	[MONI]	[EXT MONI] 7pin
REMOTE ON/OFF		[REMOTE]	
ノイズスケルチ強制オフ/オン		[SP MUTE]	
送信ON/OFF		MIC PTT	