QUARTZ SYNTHESIZER AM-FM STEREO TUNER

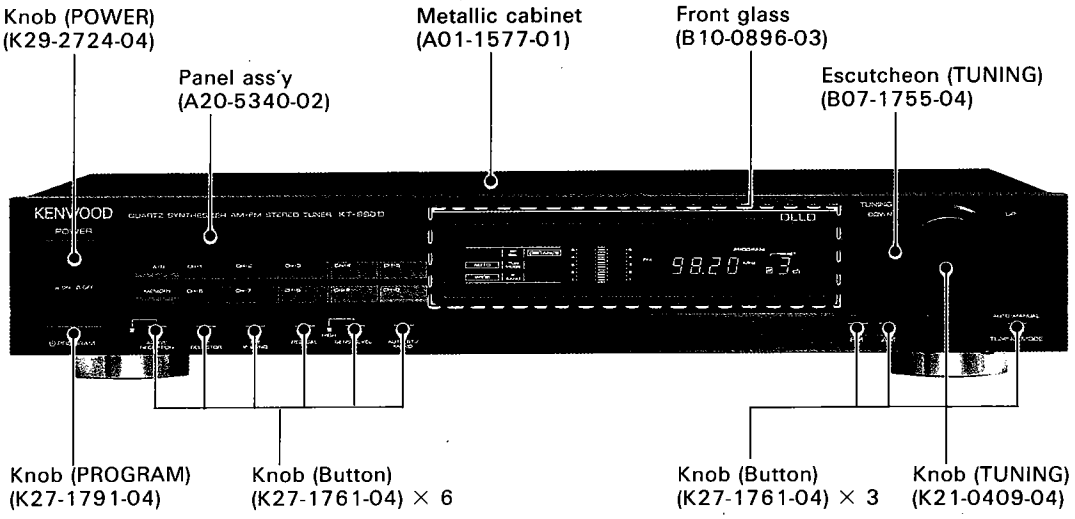
KT-990D

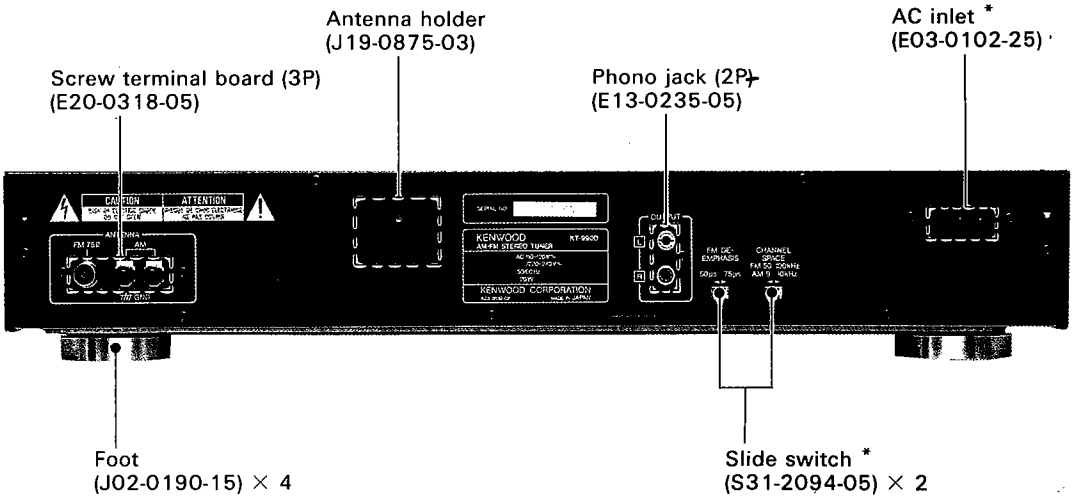
SERVICE MANUAL

KENWOOD

B51-3435-00 (G) 2658

434





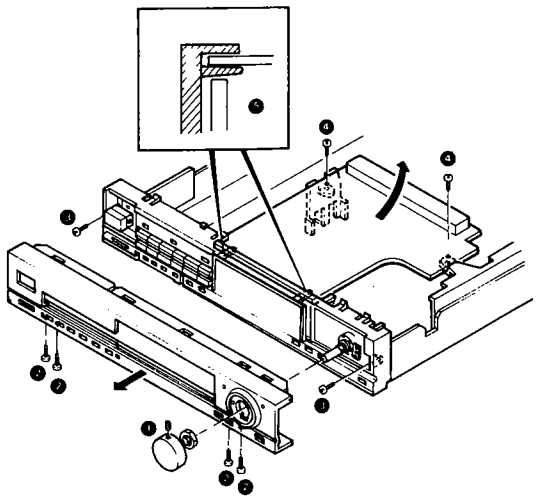
* Refer to parts list on page 42.

CONTENTS

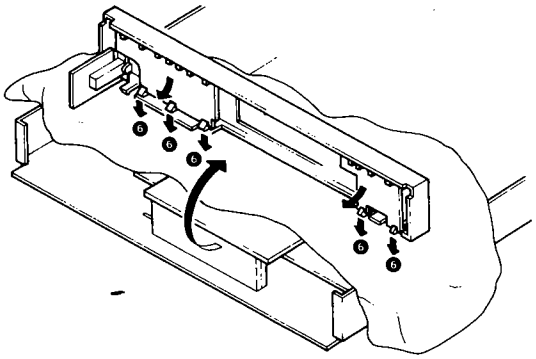
DISASSEMBLY FOR REPAIR

(Remove the metallic cabinet before proceeding to the following.)

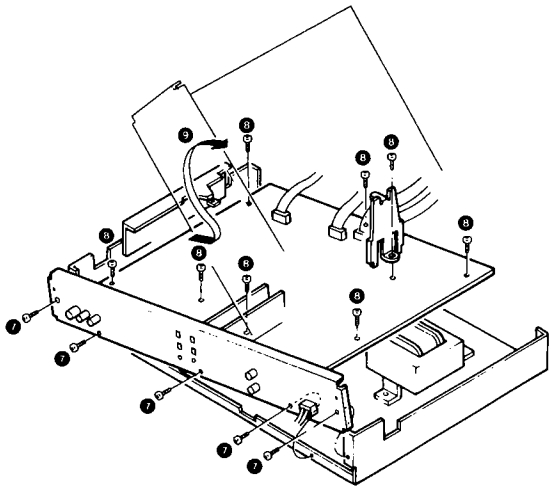
1. Loosen the screw on the tuning control knob, and take out the knob. Then, remove the hex nut attached to the tuning shaft (❶).
2. Remove the 4 screws fixing the front panel to the sub-panel from the bottom side (❷), disengage the 4 lugs on the top side, and take out the front panel in the direction of the arrow.
3. Remove the 2 screws fixing the sub-panel to the chassis (❸).
4. Remove the 2 screws fixing the Sub-Circuit Unit (X13-5750-11) (A/4) to the metal fixture (❹), and take out the Sub-Circuit Unit in the direction of the arrow.
5. When attaching the Sub-Circuit Unit (X13-) (A/4), take care to insert the PC board between the lugs on the sub-panel (❺).



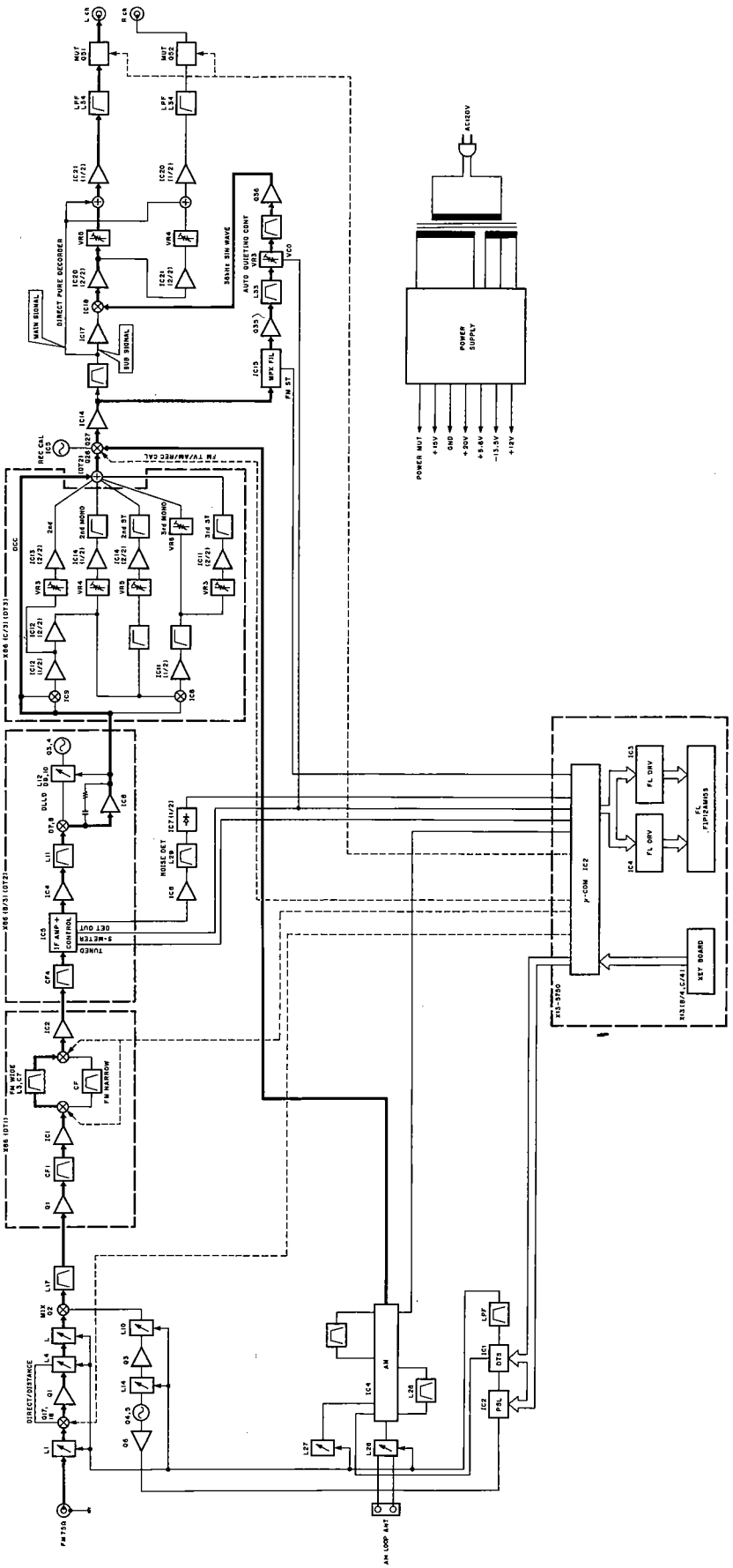
6. Place a cloth on the set main body, place the sub-panel on the cloth as shown in the illustration, disengage the lugs fixing the Sub-Circuit Units (X13-) (B/4) and (C/4) to the sub-panel (❻), and take out the PC boards in the direction of the arrow.



7. Remove the 5 screws fixing the rear panel to the chassis (❼).
8. Remove the 8 screws fixing the Tuner Unit (X05-3420-11) to the chassis (❽).
9. Take out the Tuner Unit (X05-) in the direction of the arrow (❾). Be careful not to hit the metal fixture (No. 718 in the exploded view diagram) at this time.



BLOCK DIAGRAM



CIRCUIT DESCRIPTION

Function of components

Tuner unit (X05-3420-11)

Components	Use/Function	Operation/Condition/Interchangeability
Q1	FM IF amplifier	
Q2	Mixer	
Q3	FM OSC (TUNED) buffer	
Q4,5	FM OSC	
Q6	OSC buffer	For PS.
Q8	Regulator (control)	12V power supply for FM/TV circuitry.
Q9	Regulator (error amplifier)	
Q10	AM power switch	Power switch for AM circuitry.
Q11	FM/AM power control	When the base is "H" (set by 5V from the microprocessor), Q10 is turned ON setting the AM mode.
Q12~14	PLL loop filter	
Q15,16	DIS/DIR switching	Goes ON when the input is "H". Turns Q17 and Q18 ON.
Q17,18	DIS/DIR switching	Driver. Q17 is ON for DIS and Q18 is ON for DIR.
Q19~21	WIDE/NARROW switching	When the input to Q19 is "H", Q20 is turned ON (Wide).
Q22	STOP control	When the output from IC8 (2/2) is "L", Q22 is turned ON and the STOP signal goes "L".
Q23	STOP SENSE switching	SENSE is High when the input is "H".
Q24,25	REC CAL control	REC CAL is set when the input to Q24 is "H".
Q26	AM switching	Switches the AM signal.
Q27	REC CAL switching	Switches REC CAL.
Q28	Forced Mono control	Forced Mono mode is set when the input is "H".
Q34	Auto quieting control	Automatically controls the SUB demodulation level during the small antenna input operation.
Q35	38kHz sine wave generator amplifier	Using the tuning circuit (38kHz) of LC as the load, turns the rectangular wave into a sine wave.
Q36	38kHz buffer amplifier	Sends the 38kHz signal from the tank circuit to the SUB demodulator at a low impedance.
Q37	Current mirror constant-current circuit	Used as the load resistance to IC18.
Q38		Performs current regulating operation together with Q37.
Q39		Used as the load resistance to IC18.
Q40		Performs current regulating operation together with Q39.
Q41,42		Constant-current load (GND side).
Q43	Gain switching	Goes ON in Narrow mode to control the separation (Narrow).
Q44	SUB signal demodulation switching	OFF in Stereo mode, ON is Mono mode.
Q51,52	OUTPUT muting	Used for muting the output signal.
Q53,54	Muting control	Muting is activated when the base of Q54 is "L".
Q55	Regulator	Main 15V output.
Q56,57	Regulator	−13V output.
Q58,59	Regulator	For +28V Tr.
Q60	Regulator	For +5V PLL, prescaler IC.
Q61	Regulator	−17.5V for FL.

Tuner unit (X05-3420-11)

Components	Use/Function	Operation/Condition/Interchangeability
IC1 (LM7001)	PLL IC	Reference frequencies FM: 25kHz/50kHz, AM: 9kHz/10kHz.
IC4 (LA1245)	AM system	
IC5 (M5218P)	REC CAL	Generates REC CAL signal (400Hz).
IC6 (BA401)	Noise amplifier	120kHz noise tuning amplifier.
IC7 (M5218P) 1/2 2/2	Noise OUT DIS/DIR. OUT	Noise present/absent output. 5V output when present. 5V output when ANT input is 70 dBμ.
IC8 (M5218P) 1/2 2/2	STOP detect OUT STOP detect	Outputs the STOP signal. Detects the TUNED bandwidth in FM mode.
IC9 (M5218P)	T meter control	Controls the lighting of the T meter (red portions on the left and right).
IC14 (NJM4560D)	Notch filter	114kHz.
IC15 (LA3350S)	38kHz generator (sine wave)	Auto quieting control, beacon control.
IC16 (μPC78L12J)	3-terminal regulator	IN: +15V, OUT: +12V.
IC17 (NJM4560D)	MAIN signal buffer	
IC18 (MC1495L)	SUB signal demodulator	Linear multiplier.
IC19 (M5218P)	Subcarrier buffer	38kHz.
IC20 (NJM4560D) 1/2 2/2	Stereo demodulator, deemphasis SUB signal demodulator	Adds the MAIN and SUB signals. Current/voltage converter.
IC21 (NJM4560D) 1/2 2/2	Stereo demodulator, deemphasis SUB signal demodulator	Adds the MAIN and SUB signals. Current/voltage converter.
IC22 (M5231TL)	Regulator	V_{REF}=1.8V, for +15V.
IC23 (μPC7805HF)	3-terminal regulator	5V (output 5.6V).

IF-DET UNIT (X86-1020-02)

Components	Use/Function	Operation/Condition/Interchangeability
Q1	IF amplifier	
Q3,4	PLL DET VCO	10.7MHz.
Q5	FM signal switching	Switches over between REC CAL, AM, etc.
Q6	Gain control	Turns ON to rise the gain when in the NARROW mode.
Q7	DCC ON-OFF switching	Corrects distortion based on the auto stop signal input.
IC2,3 (BA401)	IF amplifier	
IC4 (μPC1163HA)	IF amplifier	
IC5 (LA1231NS)	IF system	IF amplifier, band muting signal generator, S meter, quadrature detector.
IC6 (NJM4560D) 1/2 2/2	PLL DET DC amplifier FM/AM signal amplifier	

IF/DET unit (X86-1020-02)

Components	Use/Function	Operation/Condition/Interchangeability
IC8 (NJM4200D)	Tertiary distortion generator	Linear multiplier.
IC9 (NJM4200D)	Secondary distortion generator	Linear multiplier.
IC11 (M5218P) 1/2	Tertiary current/voltage converter	
2/2	Distortion phase correction amplifier	Tertiary distortion is Stereo mode.
IC12 (M5218P) 1/2	Secondary distortion current/voltage converter	
2/2	Distortion output correction amplifier	Increases distortion in NARROW mode.
IC13 (M5218P) 1/2	Reference voltage generator	VCC/2=7.5V.
2/2	DET distortion correction amplifier	Corrects the distortion in PLL DET.
IC14 (M5218P) 1/2	Mono distortion correction amplifier	Used for correcting the secondary distortion.
2/2	Stereo distortion correction amplifier	Used for correcting the tertiary distortion.

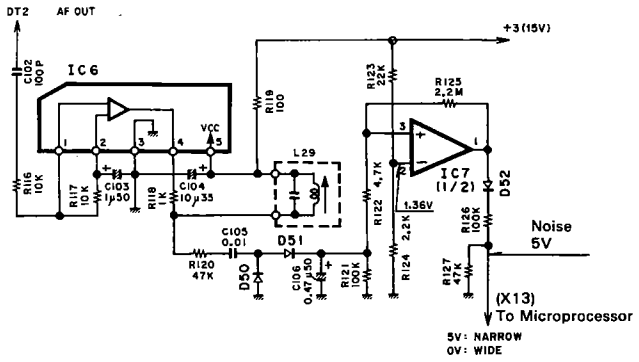
Sub-circuit unit (X13-5750-11)

Components	Use/Function	Operation/Condition/Interchangeability
IC1 (μPD4069UBC)	Waveform shaper	The Schmitt circuit shapes the waveforms of the CE, UP and DOWN pulses.
IC2 (CXP5016-216S)	Microprocessor	
IC3,4 (LC7570)	FL driver	
IC5 (M5218P)	S meter temperature compensator	Corrects the S meter lighting point error due to temperature.
Q1	RESET control	When turned ON, activates RESET.
Q2	CE control	When turned OFF, 5V is applied to CE.
Q3	M type frequency span switching	When ON, the step is set to 50kHz with FM and 9kHz with AM.
Q4	DOWN LED control	When ON, the DOWN LED is illuminated.
Q5	UP LED control	When ON, the UP LED is illuminated.
Q6	S meter center grid control	When ON, 5V is applied to the S meter center grid.
Q7	T meter right grid control	When ON, 5V is applied to the T meter right side grid.
Q8	T meter left grid control	When ON, 5V is applied to the T meter left side grid.
Q9	Q6 control	When ON, controls Q6.
Q10	TS meter, ST, BIL, 1st/2nd/6th grid and permanent ON control	When ON, 5V is applied to the emitters of Q6, Q7, Q8, Q16 and Q17, to grids Nos. 1, 2 and 6, and to permanent ON.
Q11	Q10 control	When ON, controls Q10.
Q12	SENS LEVEL LED control	When ON, the HIGH LED is illuminated.
Q13	ACTIVE RECEPTION LED control	When ON, the ACTIVE RECEPTION LED is illuminated.
Q16	STEREO indicator control	When ON, the STEREO indicator is illuminated.

Noise detector and electric field strength detector circuits

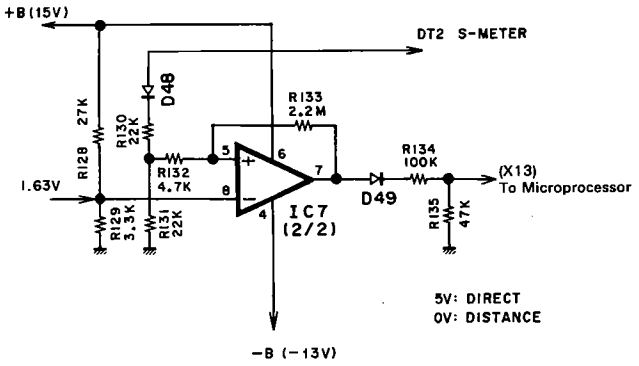
1. Noise detector

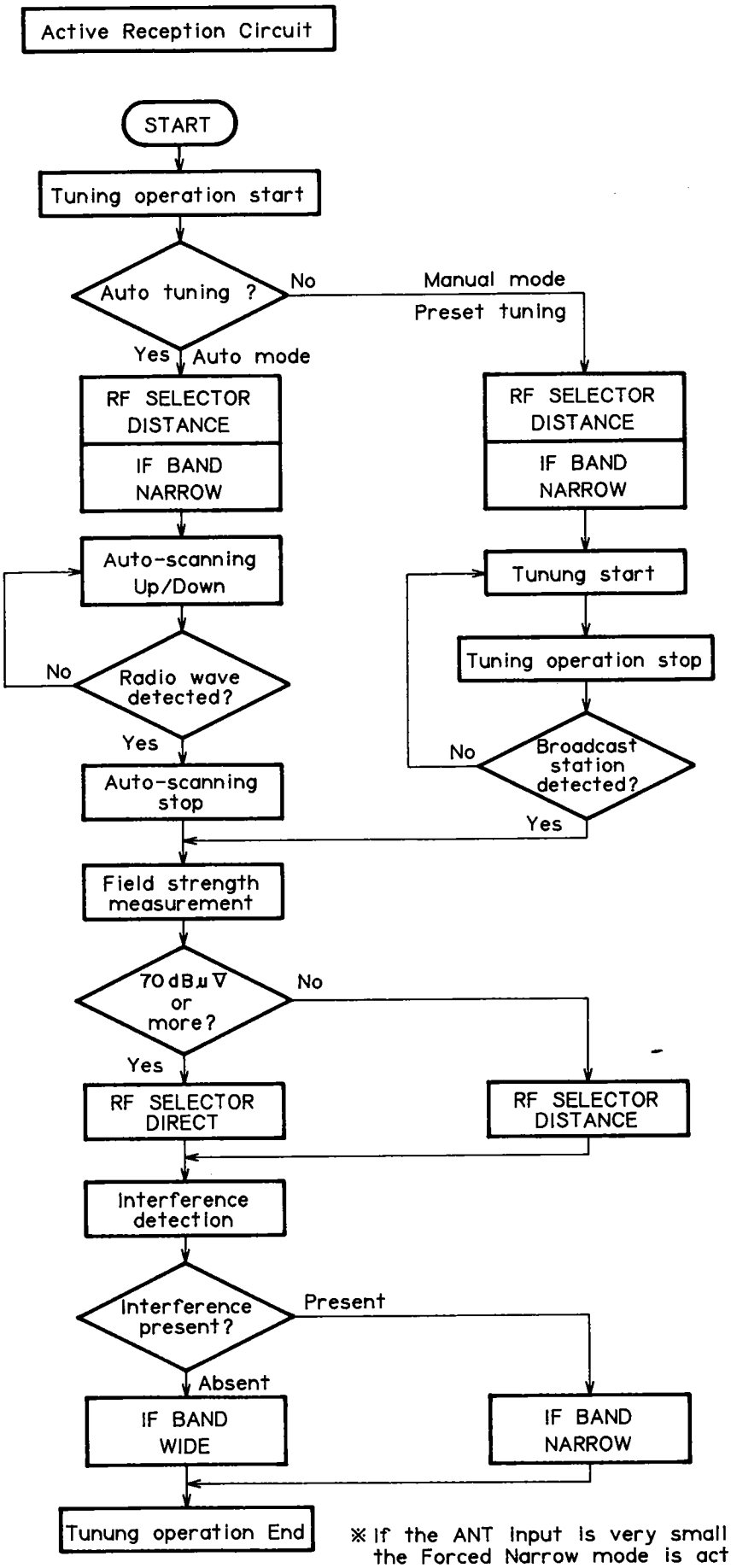
This circuits detects the presence/absence of interference from adjacent stations, etc., and applies the microprocessor with the Noise present (5V) or absent (0V) signal. The detection output is extracted from AF OUT of IC5 (LA1231N) in the daughter (2), and only the noise component is amplified by 120kHz (center frequency) tuning amp IC6 (BA401). The output is regulated by D50 and D51, and the comparator in IC7 outputs "H" = 14V ("L": −12V) when the noise DC voltage attains about 1.4V. This output is 5V/0V converted by D52, R127 and R128, and applied to the microprocessor port.



2. Field strength detector

The S meter voltage from IC5 (LA1231N) in DT2 is detected and, when the field strength exceeds 70 dB with respect to the ANT input voltage, the IC7 output goes "H" = 14V. This is 5V/0V converter and supplied to the microprocessor.

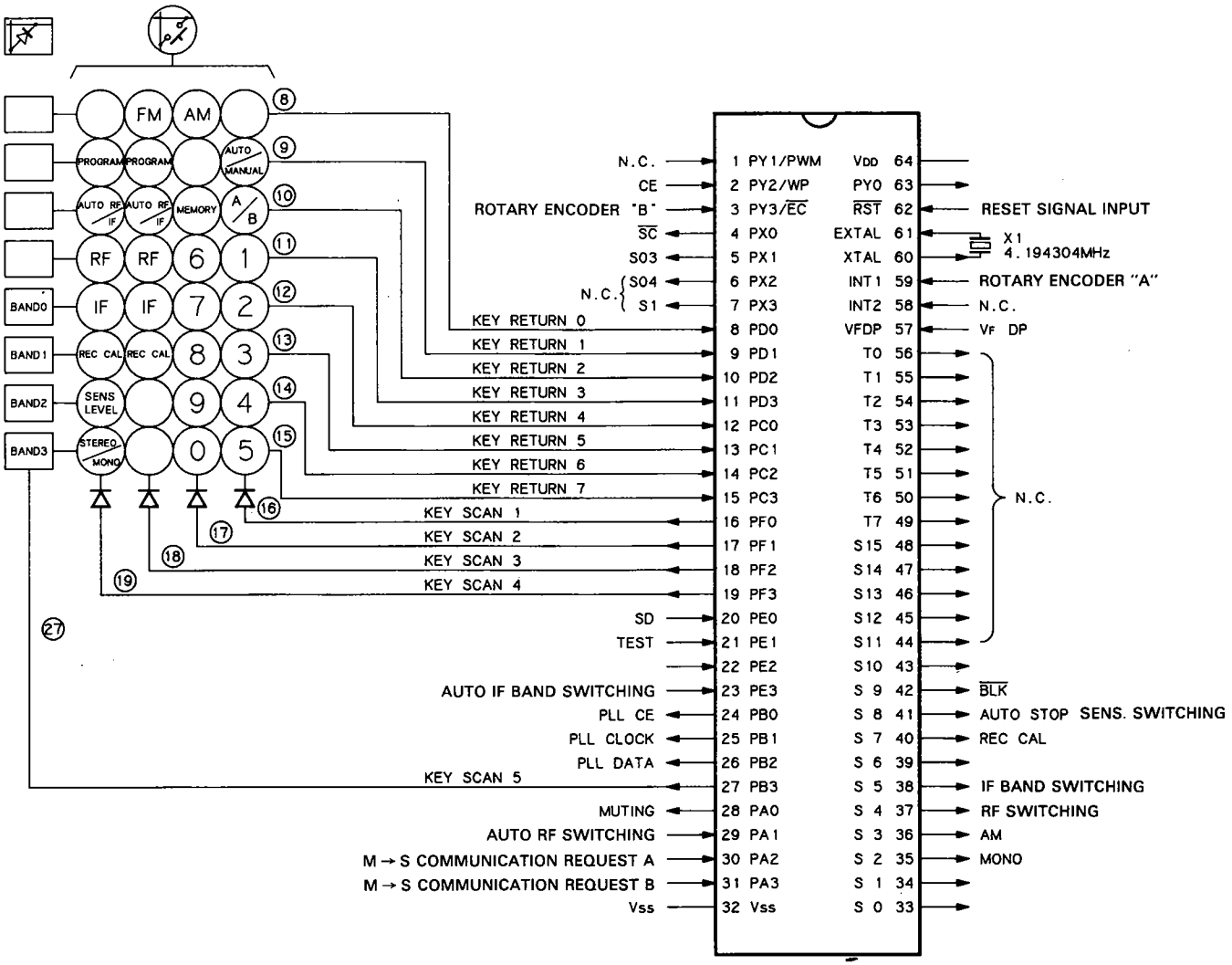




※ If the ANT input is very small (less than 10dBF) the Forced Narrow mode is activated regardless of the presence or absence of interference.

IC2: CXP5016-216S(X13-5750-11)
Microprocessor IC

Terminal connection diagram & keymatrix connection



Functions of diodes and switches

Destination Type	Band Set Switches B3 B2 B1 B0	Band	Receiving Frequency Range	Inter-Channel Space	Intermediate Frequency	PLL IC1(LM7001) PLL Reference Frequency	PLL Input Terminal	PLL Output B01 (P7)	PLL Output B02 (P8)	PLL Output B03 (P9)	Auto Tuning
K	1 0 0 0	FM	87.5MHz~108.0MHz	100kHz	+10.7MHz	50kHz	FMIN	L	L	H	O
		AM	530kHz~1610kHz	10kHz	+450kHz	10kHz	AMIN	※			O
E	1 1 1 1	FM	87.5MHz~108.0MHz	50kHz	+10.7MHz	50kHz	FMIN	L	L	H	O
		AM	531kHz~1602kHz	9kHz	+450kHz	9kHz	AMIN	*	※		O

O: Without diode 1: With diode

*: AM is controlled by the microprocessor IC (IC2) in the (X13-) unit.

Port allocation

Terminal No.	Symbol	I/O	H/L	Name	Function
1	PY1	O	H	N.C.	On the PC board, shall be ready for being pulled up with a resistor.
2	PY2	I	H	C.E.	Backup (AC OFF) detection terminal. H: AC ON, L: AC OFF. When the "L" level is detected, the backup status is set and clock is stopped. (Note) The rise from "L" to "H" shall be faster than the rise of the reset signal.
3	PY3	I	H	ROTARY ENCODER "B"	Rotary encoder output signal input. H: ON, L: OFF.
4	PX0	O	H	SC	Serial shift clock output. H: Normal.
5	PX1	O	H	SOB	Serial display data output.
6	PX2	O	—	SOA	N.C.
7	PX3	O	—	SI	
8~15	PD0~PD3	I	H	KEY RETURN 0~7	Key return inputs. H: Input present, L: Input absent. All terminals are pulled down (by 10K to 100K).
16~19	PF0~PF3	O	H	KEY SCAN 1~4	Key scanning signals.
20	PE0	I	H	SD	Auto-tuning stop display input. H: TUNE, L: SIGNAL.
21	PE1	I	L	TEST	Test mode setting input. H: Normal, L: Test. Normally pulled up. When testing is required, the TEST terminal is connected to GND.
22	PE2				NC
23	PE3	I	H/L	AUTO IF BAND	IF band switch input signal for AUTO RF/IF switching mode. H: Narrow, L: Wide.
24	PB0	O	H	PLL C.E.	Chip Enable output for PLL IC. Connected to pin 3 CL of LM7001.
25	PB1	O	H	PLL CLOCK	Clock output for PLL IC. Connected to pin 4 CL of LM7001.
26	PB2	O	H	PLL DATA	Data output for PLL IC. Connected to pin 5 DATA of LM7001.
27	PB3	O	H	KEY SCAN5	Key scanning signal.
28	PA0	O	L	MUTING	Muting control terminal. H: Muting ON, L: Muting OFF. Conditions for Muting ON: 1) when Power is turned ON/OFF, 2) when the band is switched, 3) during recalling a preset CH, 4) during manual tuning, 5) during auto tuning, 6) during IF band switching, 7) during RF switching 8) during REC CAL ON/OFF switching.
29	PA1	I	H/L	AUTO RF switching	RF switching signal input in AUTO RF/IF switching mode. H: Direct, L: Distance.
30	PA2	O	H	M→S communication request	Data transfer request signal output for M → S display. H: Communication request, L: Normal.
31	PA3				
32	Vss	—	—	Vss	
33	S0	—			NC
34	S1	—			NC
35	S2	O	H/L	MONO/ST	FM Mono/Stereo reception control output. H: Mono, L: Streo.
36	S3	O	H	AM	AM pack power control output. H: Power ON, L: Power OFF.
37	S4	O	H	RF SELECTOR	RF switching signal output. H: Distance, L: Direct. Fixed at Distance (H) in other reception modes than FM.

Terminal No.	Symbol	I/O	H/L	Name	Function
38	S5	O	H/L	FM IF BAND	IF band switching signal output. H: Wide, L: Narrow. Fixed at Wide in other reception modes than FM.
39	S6		——	——	NC
40	S7	O	H	REC CAL	REC CAL reference signal transmission request signal output. H: REC CAL reference signal transmission request, L: Normal.
41	S8	O	H/L	AUTO STOP SENS. LEVEL	Auto tuning stop sensitivity switching signal output. H: High, L: Low.
42	S9	O	H	$\overline{BLK}$	Control signal output of pin 6 $\overline{BLK}$ of FL driver IC (LC7570). H: FL display ON, L: FL display OFF.
43~56	S10~S15 T7~T0	O	H		N.C. Only pin 56 shall be set ready for being pulled up.
57	V_{FPD}	—	—		FL -B power supply connection.
58	INT_2	I	H		N.C.
59	INT_1	I	H	ROTARY ENCODER "A"	Rotary encoder output signal input. H: ON, L: OFF.
60	XTAL	—	—	CL1	Clock oscillation terminals. X'tal: 4.194304 MHz.
61	EXTAL	—	—	CL2	
62	$\overline{RST}$	I	L	RESET	Reset signal input. H: Normal, L: Reset.
63	PYO	O	—		N.C. On the PC board, shall be set ready for being pulled up.
64	V_{DD}	—	—	V_{DD}	+B terminal (5V).

Preset channel memory

- When the MEMORY key is held depressed for more than 0.2 second then the key is released, preset channel display "—" blinks for about 5 seconds. In this period, select A/B and press a numeric key (1 to 0); the preset channel memory is stored and the stored channel is displayed.
- When the MEMORY key is pressed again while "—" is blinking, the display remains the same, but the unit gets ready for another preset channel memory for another 5 seconds. If nothing is does after the key has been pressed, the preset channel memory becomes impossible in about 5 seconds; the preset channel display returns to the last channel display, and the MEMORY indicator goes off.
- When an operation which is accompanied by muting is activated while "—" is blinking, the preset channel memory mode is canceled immediately. This occurs when one of the RF, IF, AUTO TUNING SYSTEM, REC CAL, FM and AM keys is pressed or when the rotary encoder is rotated. However, if the blinking of "—" was started during the AUTO TUNING SYSTEM operation, the preset channel memory mode is not canceled even when the AUTO TUNING SYSTEM key is pressed.
- The MEMORY key is not accepted while the muting timer is activated.
- The MEMORY indicator lights while the key is pressed. When the key is held depressed for more than 0.2 second, the indicator continues to light even after the key has been released and, at this time, "—" on the preset channel display starts blinking.

Programming feature

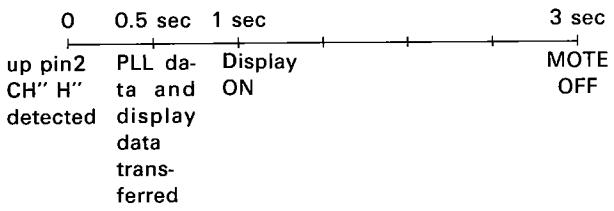
- Last Ch → Last Ch band ┬ A: Ch0 of A → Ch0 of B
  └ B: Ch0 of B → Ch0 of A

REC CAL

- During REC CAL operation, keys other than the REC CAL key are not accepted.
- The REC CAL operation is canceled by turning power OFF (when the microprocessor is reset).
- The preset channel memory mode is canceled when the REC CAL key is pressed.
- When the REC CAL key is pressed during frequency scanning in the Auto Tuning mode, the frequency scanning pauses temporarily. The frequency scanning resumes when the REC CAL mode is canceled by pressing the REC CAL key again.
- When the REC CAL key is pressed during the AUTO TUNING SYSTEM operation, the AUTO TUNING SYSTEM operation will be carried out until the end.

Keys valid only with FM band:
AUTO TUNING SYSTEM, RF, IF

Display and muting OFF timing at power ON (Resetting)



Countermeasure against overrun

- Turn power ON with the FM, RF and REC CAL keys held depressed simultaneously. The microprocessor will be initialized and data including backup data is cleared.

Other

- Band preset scanning is possible in Test mode; when the key for the same band is pressed successively, the preset memory channels for the band are received in sequence.

Initial setup condition

Band: FM
Frequency: 87.50MHz
Tuning mode: Auto
RF: Distance
IF: Wide
Channel mode: A
ST/MONO: Stereo
Preset channel: 

SENS LEVEL: "H" (all types).
REC CAL: OFF
PROGRAM: OFF
AUTO TUNING SYSTEM: OFF
Preset channel memory: FM 87.50 MHz for all of CH1 to CH0.

AM initial setup condition

Frequency: 530 (531 kHz E-TYPE) kHz
RF: Direct. However, all indicators including RF SEL are OFF.
IF: Wide. However, all indicators including IF BAND are OFF.
Channel mode: A
ST/MONO: Mono regardless of tuning mode
Preset channel: 

SENS LEVEL: "H" (all types).
REC CAL, PROGRAM, AUTO TUNING SYSTEM: OFF

Output Port Logic in Different Modes

MODE \ Output Part Pin No.		MONAURAL ㉟	AM POWER ㊱	RF ㊲	IF ㊳	TV f-RESP ㊴	SENSE ㊵
At initial resetting (when backup is NG) (FM Mode)		L	L	H	H	H	H
FM	AUTO	H/L	L	H/L	H/L	H	H/L
	MANUAL	H/L	L	H/L	H/L	H	H/L
AM		H	H	L	H	H	H/L

H: MONAURAL
L: STEREO

H: AM POWER ON
L: AM POWER OFF

H: DISTANCE
L: DIRECT

H: WIDE
L: NARROW

H: NORMAL
L: HI FI (LED is illuminated.)

H: SENSE H (LED is illuminated.)
L: SENSE L

Auto tuning system (ATS)

- The ATS operation mode can be turned ON/OFF only during FM band reception.
- When the RF or IF key is pressed during FM band reception, the ATS mode is canceled immediately. If the ATS operation has been activated, it is also aborted at this time.
- As the final ATS operation mode is stored in memory, the ATS operation is started if the final mode was the ATS mode when the microprocessor is reset, power is turned ON, or when any of the FM band key, numeric keys or A/B key is pressed during receiving a band other than FM.
- When the rotary encoder is rotated in the ATS mode or when the ATS key is pressed during tuning (frequency scanning) operation, RF is set to the Distance and IF to Narrow.
  However, if SD (microprocessor pin 20) "H" is not detected as the result of frequency scanning, the RF and IF mode will not change even after the end of frequency scanning.
- Even when the reception status changes after the ATS operation has ended, the ATS operation will not resume.

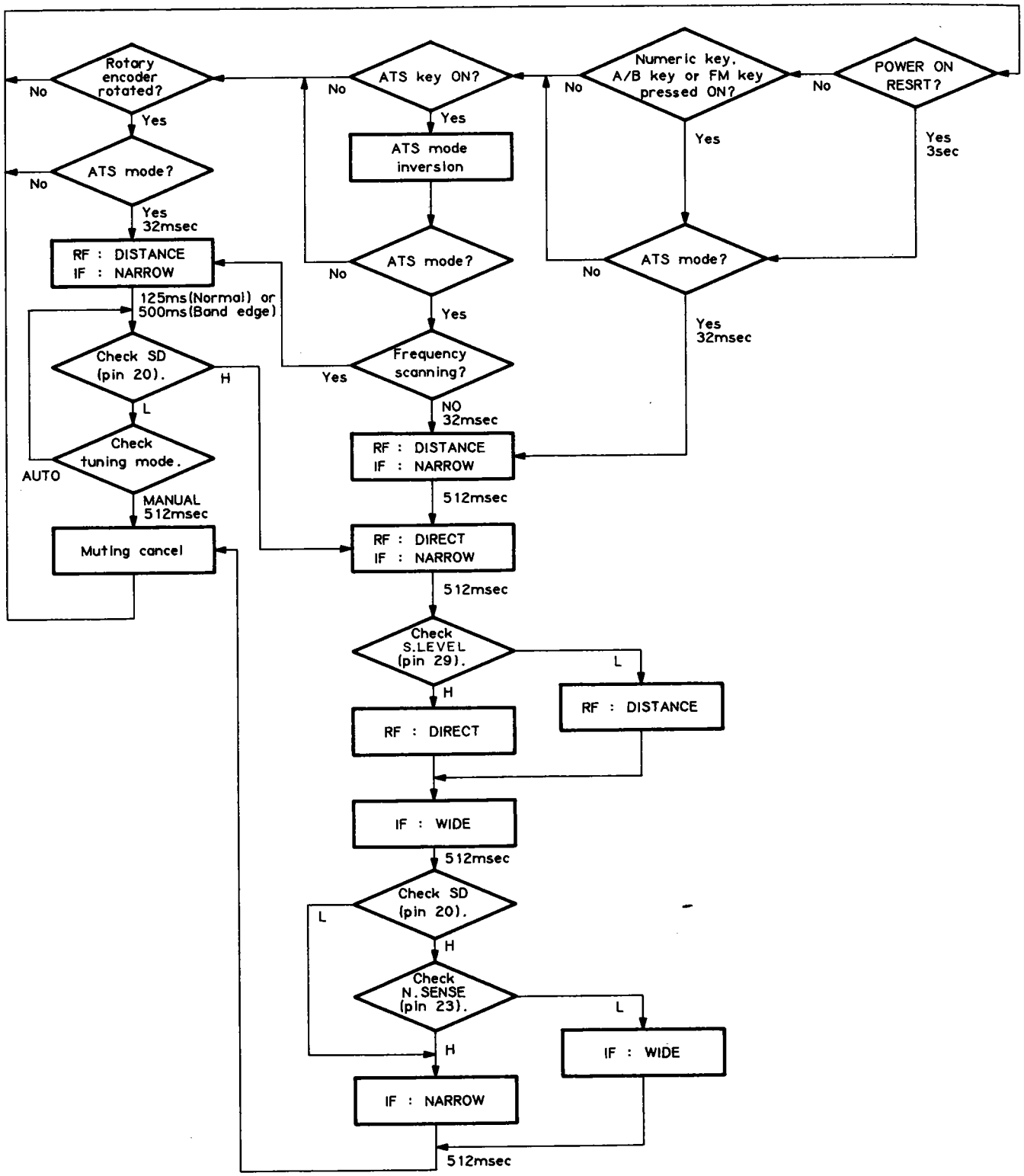
Test Frequencies that are stored in memory channels in test mode

- Band preset scanning is possible only in Test mode.

CHANNEL \ TYPE	K	E
A-1	FM 87.5MHz	FM 87.5MHz
A-2	89.1MHz	89.1 MHz
A-3	98.0MHz	98.0 MHz
A-4	106.0MHz	106.0 MHz
A-5	108.0MHz	108.0 MHz
A-6	87.5MHz	87.5 MHz
A-7	87.5MHz	87.5 MHz
A-8	87.5MHz	87.5 MHz
A-9	87.5MHz	87.5 MHz
A-0	87.5MHz	87.5 MHz
B-1	AM 530 kHz	AM 531 kHz
B-2	630 kHz	630 kHz
B-3	990 kHz	990 kHz
B-4	1440 kHz	1440 kHz
B-5	1610 kHz	1602 kHz
B-6	FM 87.5MHz	FM 87.5MHz
B-7	87.5MHz	87.5 MHz
B-8	87.5MHz	87.5 MHz
B-9	87.5MHz	87.5 MHz
B-0	87.5MHz	87.5 MHz

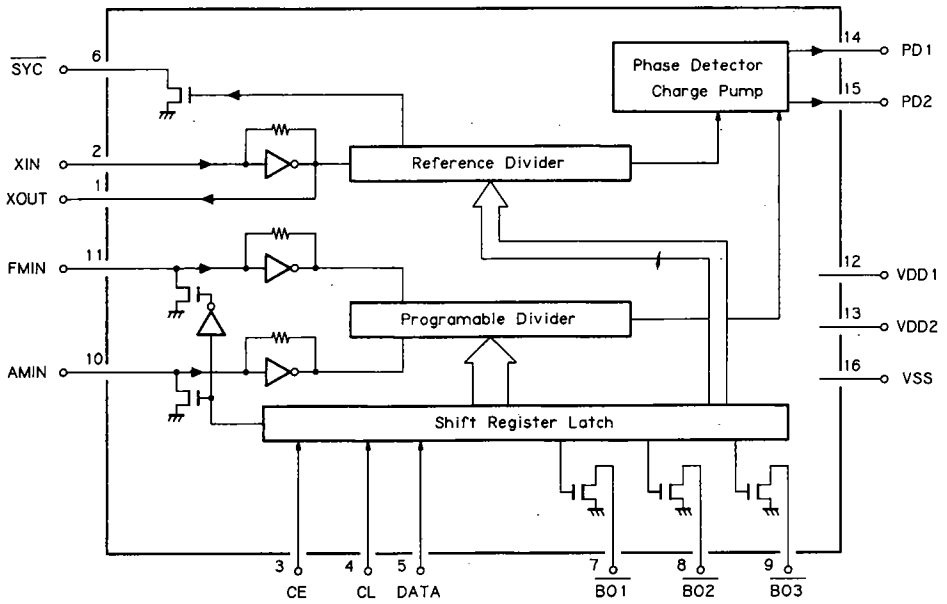
Note) The Test mode is entered by turning power ON with the TEST terminal set to 0V (GND). As the band preset scanning is activated in Test mode, these frequencies can be received in sequence with out pressing the memory channel keys, but by just pressing one of the band switches (FM /AM).

Auto tuning system operation flowchart



IC1: LM7001(X05-3420-11)
PLL frequency synthesizer

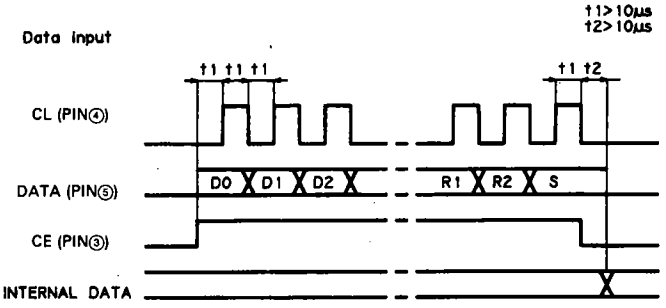
Block diagram



Terminal description

Pin no.	Pin name	I/O	Function
1	XOUT	O	Crystal oscillator (7.2 MHz).
2	XIN	I	
3	CE	I	Data input.
4	CL	I	
5	DATA	I	
6	$\overline{SYC}$	I/O	Clock for controller (400 kHz).
7	$\overline{BO1}$	O	Band data output. $\overline{BO1}$ can be used as a time base output (8 Hz)
8	$\overline{BO2}$	O	
9	$\overline{BO3}$	O	
10	AMIN	I	Local oscillator signal input.
11	FMIN	I	
12	VDD1		Power supply. VDD2 for back-up.
13	VDD2		
14	PDD1	O	Charge pump output.
15	PD2	O	
16	VSS		Power supply.

Data input

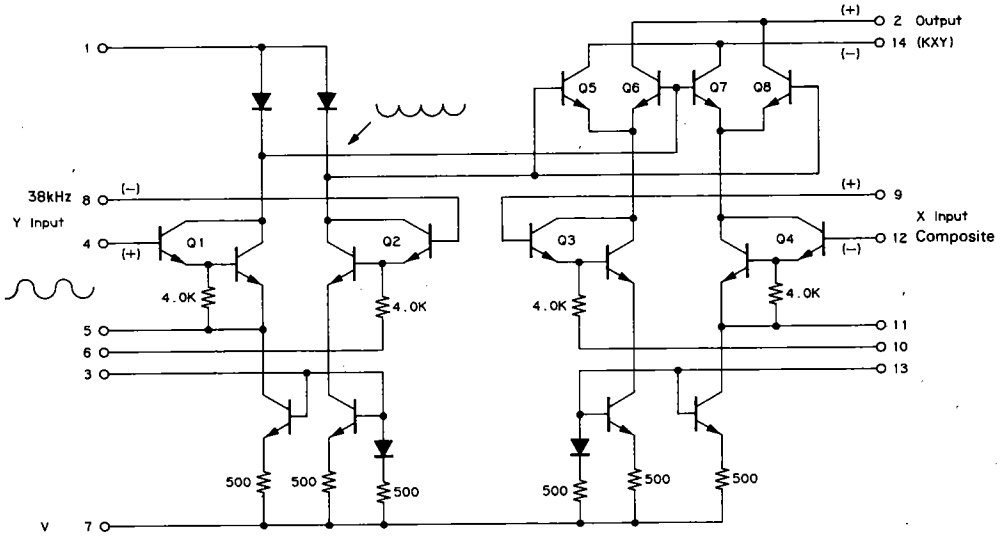


IC18: MC1495L (X05-3420-11)
MPX SUB demodulator

MPX SUB Decoder (IC18: MC1495L)

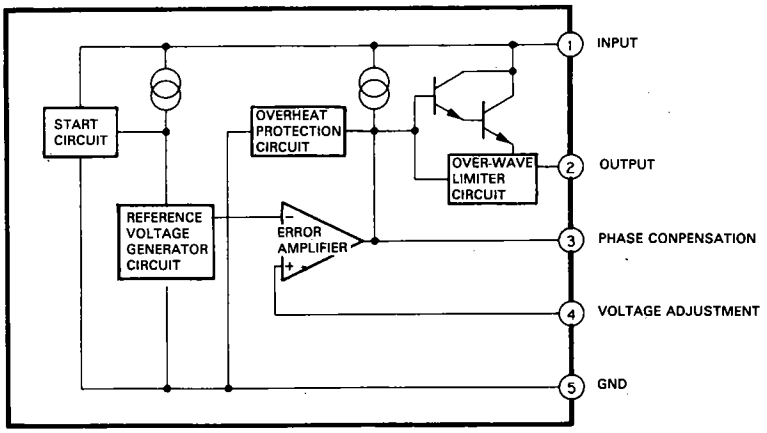
The Direct Pure MPX enables stereo decoding without causing beat interference, in theory, by linear-multiplying two analog signals (stereo composite signal and 38 kHz sine wave sub carrier signal).
This unit provides the linear multiplier with high S/N ratio, which is designed with the new theory, so that the high signal-to-noise rationof 94 dB for the MPX unit itself and the resistance to overmodulation of 400% (dynamic range: 106 dB are realized while the conventinal characteristics are maintained.

Internal equivalent circuit



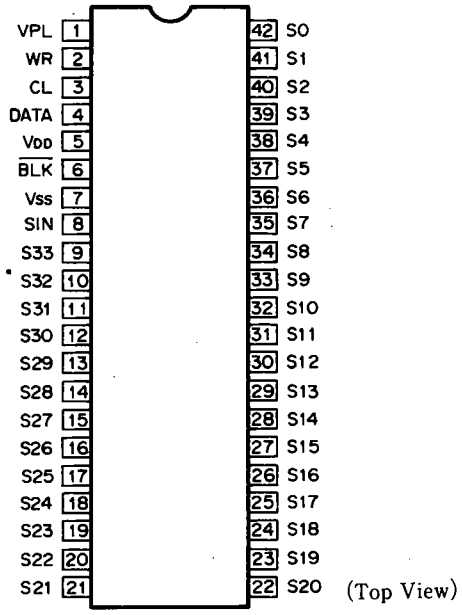
IC22: M5231TL (X05-3420-11)
Constant voltage power supply

Block diagram



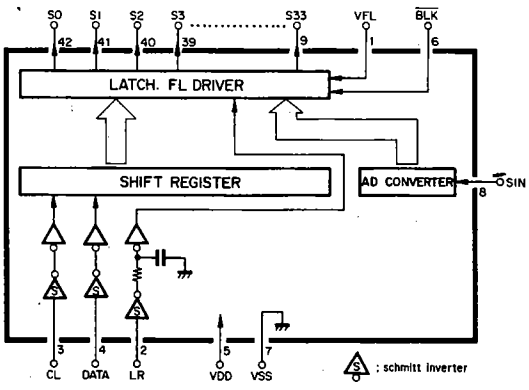
IC3, 4: LC7570(X13-5750-11)
FL driver IC

Pin configuration



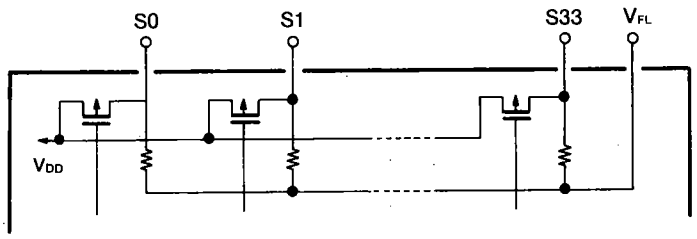
(Top View)

Equivalent block diagram



Explanation of terminals

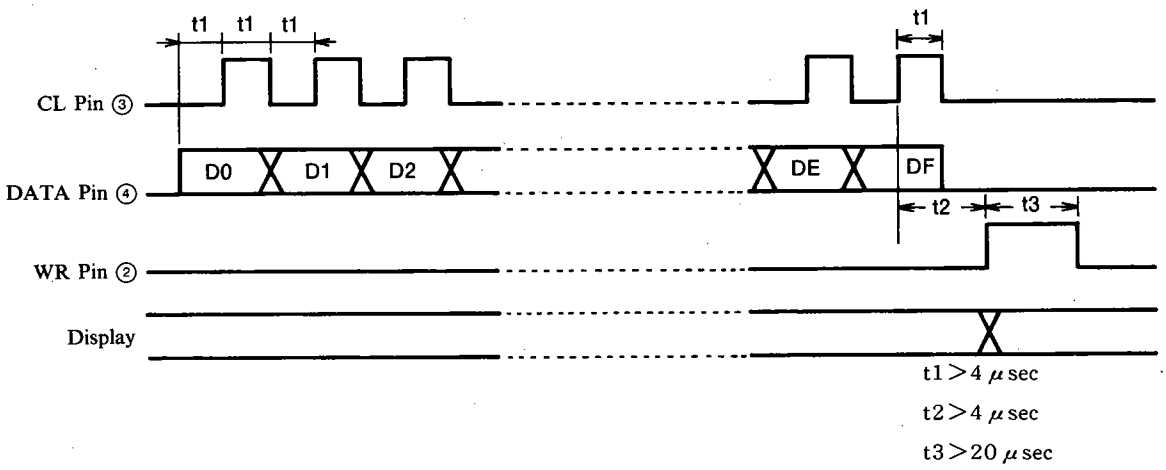
S0~S33, V_{FL}: Segment outputs, pull-down resistor common terminal.



SIN: AD converter input.
1st point lighting level: 0.1 V_{DD} (typical)
2nd point lighting level: 0.2 V_{DD} (typical)
3rd point lighting level: 0.3 V_{DD} (typical)
4th point lighting level: 0.4 V_{DD} (typical)
5th point lighting level: 0.5 V_{DD} (typical)

$\overline{BLK}$: Display OFF input.
$\overline{BLK}$="0" (V_{SS})..... OFF
$\overline{BLK}$="1" (V_{DD}).....ON
CL, DATA, WR : Data inputs
V_{DD}, V_{SS} : Power supply terminals

Data input



Input at D0

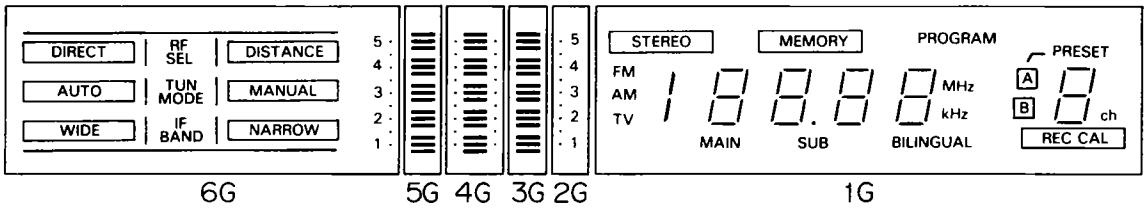
D0	D1	D2	D3	D4	D5	D6	DA	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20	DC	D21	D22	D23	D24	D25	D26	D27	DD	D28	D29	D30	D31	D32	D33	DE	DF

D0~D33 : Display data
DA~DE : Dummy bit (don't care)
DF : S29~S33 switching

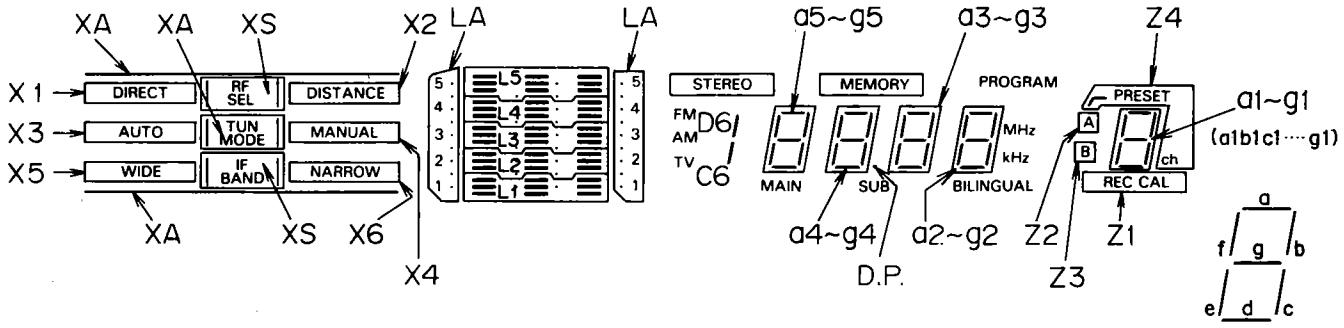
Dn="1" : Sn="1" (=V_{DD})
Dn="0" : Sn="0" (=V_{FL})
D_F ="0" : D29~D33 → S29~S33
D_F ="1" : AD1 → S33
AD2 → S32
AD3 → S31
AD4 → S30
AD5 → S29

FL1: FIP12AM15S (X13-5750-11)
Fluorescent indicator tube

Grid division



Anode Internal connection



Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Electrode	F	F	P_{X2}	P_{X4}	NC	P_{X6}	P_{X5}	P_{X3}	P_{X1}	P_{XA}	P_{XS}	P_{LA}	P_{L1}	P_{L2}	P_{L3}	NC	P_{L4}	P_{L5}	NC	P_{MAIN}
Pin No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Electrode	P_{SUB}	NC	P_{Z2}	P_{Z3}	P_{Z1}	P_{Z4}	P_{TV}	6G	P_{kHz}^{AM}	5G	$P_{D.P.MHz}^{FM}$	P_{c6}^{b6}	P_{RAM}^{PROG}	4G	P_{ORY}^{MEM}	P_{REO}^{STE}	3G	P_{e5}	2G	P_{g5}
Pin No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Electrode	P_{f5}	P_{a5}	NC	P_{b5}	P_{c5}	P_{d5}	P_{e4}	P_{g4}	P_{f4}	P_{a4}	P_{b4}	P_{c4}	P_{d4}	NC	P_{e3}	P_{g3}	P_{f3}	P_{a3}	P_{b3}	P_{c3}
Pin No.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	
Electrode	P_{d3}	P_{e2}	P_{g2}	NC	P_{f2}	P_{a2}	P_{b2}	P_{c2}	P_{d2}	P_{e1}	P_{g1}	P_{f1}	P_{a1}	P_{b1}	1G	P_{c1}	P_{d1}	F	F	

Notes F: Filament G : Grid P : Anode NC : No Connection

ADJUSTMENT

No.	ITEM	INPUT SETTINGS	OUTPUT SETTINGS	TUNER SETTINGS	ALIGNMENT POINTS	ALIGN FOR	FIG.
FM SECTION Unless otherwise specified, the individual switches should be set as following: SELECTOR:FM IF BAND:WIDE RF SELECTOR:DISTANCE TUNING MODE:AUTO REC CAL:OFF PROGRAM:OFF							
1	BAND EDGE (1)	–	Connect a DC voltmeter between TP3(VT) and TP4(GND).	TUNING MODE: MANU 87.5MHz	L14 (X05-)	3.0V	(a)
2	BAND EDGE (2)	–	Connect a DC voltmeter between TP3(VT) and TP4(GND).	TUNING MODE: MANU 108.0MHz	TC1 (X05-)	25.0V	(a)
Repeat alignments 1 and 2 several times.							
3	DISCRIMINATOR	(A) 98.0MHz 0 dev 100dBμ(ANT input)	Connect a DC voltmeter between TP5(AFC)and TP6(VREF).	98.0MHz	L9 (X86-)	0.000V±10mV	(b)
4	PLL DETECTOR	(A) 98.0MHz 0 dev 100dBμ(ANT input)	Connect a DC voltmeter between TP7(VCC/2) and TP8(DET).	98.0MHz	L12 (X86-)	0.000V±20mV	(c)
5	MPX VCO	(A) 98.0MHz 0 dev 100dBμ(ANT input)	Connect a frequency counter between TP19(GND) and TP20(VCO).	98.0MHz	VR3 (X05-)	19.000kHz±10Hz	(d)
6	RF ALIGNMENT	(A) 98.0MHz 1kHz,±75kHz dev	(B)	98.0MHz	★ L1,4,7,10 (X05-)	Maximum amplitude and symmetry of the oscilloscope display.	
★ Repeat the sequence from L1→L4→L7→L10→L1·····a few times.							
7	IFT(1)	(A) 98.0MHz 1kHz,±75kHz dev	(B)	98.0MHz	L17 (X05-)	Maximum amplitude and symmetry of the oscilloscope display.	
8	IFT(2)	(A) 98.0MHz 1kHz,±75kHz dev	(B)	98.0MHz	L11 (X86-)	Maximum amplitude and symmetry of the oscilloscope display.	
9	AUTO-STOP SENSITIVITY	(A) 98.0MHz SELECTOR: MAIN 1kHz,±75kHz dev 12dBμ(ANT input)	–	98.0MHz	VR1 (X86-)	Position where the STEREO indicator lights when the control is rotated gradually clockwise from the most.	
10	DISTORTION(1) DET	(C) 98.0MHz SELECTOR: MONO 1kHz,±75kHz dev ✻ 80dBμ(ANT input)	(B)	98.0MHz	VR3 (X86-)	Minimum distortion.	
11	DISTORTION(2) MONO	(C) 98.0MHz SELECTOR: MONO 1kHz,±75kHz dev ✻ 80dBμ(ANT input)	(B)	98.0MHz	VR4 (X86-)	Minimum distortion.	
12	DISTORTION(3) MONO	(C) 98.0MHz SELECTOR: MONO 1kHz,±75kHz dev ✻ 80dBμ(ANT input)	(B)	98.0MHz	VR6 (X86-)	Minimum distortion.	
Adjust 10, 11 and 12 alternately a few times to minimize the MONO distortion. ✻ E & T types: 1kHz, ±46kHz dev.							
13	DISTORTION(4) STEREO	(C) 98.0MHz SELECTOR: SUB 1kHz,±68.25kHz dev Pilot:±6.75kHz dev 80dBμ(ANT input)	(B)	98.0MHz	VR7 (X86-)	Minimum distortion.	
14	DISTORTION(5) STEREO	(C) 98.0MHz SELECTOR: SUB 1kHz,±68.25kHz dev Pilot:±6.75kHz dev 80dBμ(ANT input)	(B)	98.0MHz	L33 (X05-)	Minimum distortion.	
After the adjustment of 14, adjust 13 again to minimize the distortion at 1kHz.							

No.	ITEM	INPUT SETTINGS	OUTPUT SETTINGS	TUNER SETTINGS	ALIGNMENT POINTS	ALIGN FOR	FIG.
15	DISTORTION(6) STEREO	(C) 98.0MHz SELECTOR: L or R 1kHz,±68.25kHz dev Pilot:±6.75kHz dev 80dBμ(ANT input)	(B)	98.0MHz	VR5 (X86-)	Minimum distortion.	
15′	DISTORTION(7) STEREO NARROW (E & T types)	(C) 98.0MHz SELECTOR: L or R 1kHz,±68.25kHz dev Pilot:±6.75kHz dev 80dBμ(ANT input)	(B)	98.0MHz IF BAND: NARROW	VR2 (X86-)	Minimum distortion.	
	Repeat the adjustments from 10 to 15 a few times to minimize the distortion.						
16	SEPARATION (1) R→L	(C) 98.0MHz SELECTOR: R 1kHz,±68.25kHz dev Pilot:±6.75kHz dev 80dBμ(ANT input)	(B)	98.0MHz	VR4 (X05-)	Minimum crosstalk.	
17	SEPARATION (2) L→R	(C) 98.0MHz SELECTOR: L 1kHz,±68.25kHz dev Pilot:±6.75kHz dev 80dBμ(ANT input)	(B)	98.0MHz	VR5 (X05-)	Minimum crosstalk.	
	Repeat the adjustments of 16 and 17 a few times so that the R-to-L and L-to-R separations are equal.						
AM	SECTION Keep the AM loop antenna installed. SELECTOR:AM TUNING MODE:AUTO REC CAL:OFF PROGRAM:OFF						
[1]	BAND EDGE (1)	–	Connect a DC voltmeter between TP3(VT) and TP4(GND).	530kHz	L27 (X05-)	1.5V	(a)
[2]	BAND EDGE (2)	–	Connect a DC voltmeter between TP3(VT) and TP4(GND).	1610kHz	TC3 (X05-)	8.0V	(a)
	Repeat alignments [1] and [2] several times.						
[3]	RF ALIGNMENT (1)	(D) ☆ 630kHz 400Hz,30% mod	(B)	630kHz	L26 (X05-)	Maximum amplitude and symmetry of the oscilloscope display.	
[4]	RF ALIGNMENT (2)	(D) ☆ 1440kHz 400Hz,30% mod	(B)	1440kHz	TC2 (X05-)	Maximum amplitude and symmetry of the oscilloscope display.	
	Repeat alignments [3] and [4] several times.						
[5]	IFT	(D) ☆ 999kHz 400Hz,30% mod	(B)	999kHz	◆ L28 (X05-)	Maximum amplitude and symmetry of the oscilloscope display.	
	◆ L28 has been preset so the adjustment is usually not required. ☆ The peak will be easier to locate if the test loop antenna is used.						

REGLAGE

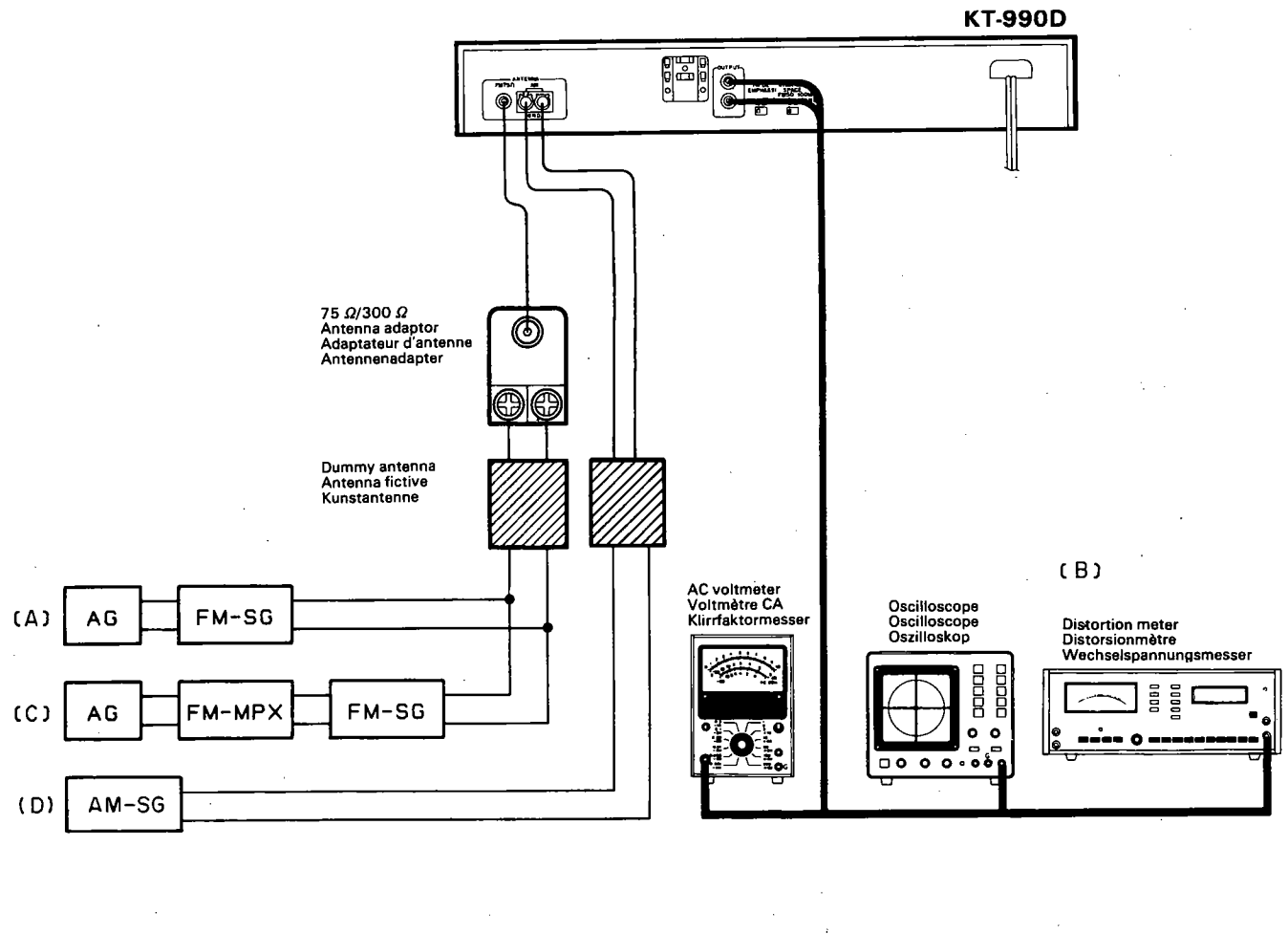
N°	ITEM	REGLAGE DE L'ENTREE	REGLAGE DE LA SORTIE	REGLAGE DU TUNER	POINT DE L'ALIGNEMENT	ALIGNER POUR	FIG
SECTION MF	Sauf en cas d'indications spéciales, régler chaque commutateur comme suit: SELECTOR:FM IF BAND:WIDE RF SELECTOR:DISTANCE TUNING MODE:AUTO REC CAL:OFF PROGRAM:OFF						
1	BORD DE BANDE (1)	—	Connecter un voltmètre CC entre les TP3(VT) et 4(GND).	TUNING MODE: MANU 87,5MHz	L14 (X05-)	3,0V	(a)
2	BORD DE BANDE (2)	—	Connecter un voltmètre CC entre les TP3(VT) et 4(GND).	TUNING MODE: MANU 108,0MHz	TC1 (X05-)	25,0V	(a)
	Répéter les points 1 et 2 plusieurs fois.						
3	DISCRIMINATEUR	(A) 98,0MHz 0dév 100dBμ (Entrée ANT)	Connecter un voltmètre CC entre les TP5(AFC) et 6(VREF).	98,0MHz	L9 (X86-)	0,000V±10mV	(b)
4	DETECTEUR PLL	(A) 98,0MHz 0dév 100dBμ (Entrée ANT)	Connecter un voltmètre CC entre les TP7(VCC/2) et 8(DET).	98,0MHz	L12 (X86-)	0,000V±20mV	(c)
5	MPX VCO	(A) 98,0MHz 0dév 100dBμ (Entrée ANT)	Connecter un compteur de fréquence entre les TP19(GND) et 20(VCO).	98,0MHz	VR3 (X05-)	19,000kHz±10Hz	(d)
6	ALIGNEMENT HT	(A) 98,0MHz 1kHz. ±75kHz dév	(B)	98,0MHz	★ L1.4.7.10 (X05-)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope.	
	★ Répéter la séquence L1→L4→L7→L10→L1····· plusieurs fois.						
7	TRANSFORMATEUR FI(1)	(A) 98,0MHz 1kHz. ±75kHz dév	(B)	98,0MHz	L17 (X05-)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope.	
8	TRANSFORMATEUR FI(2)	(A) 98,0MHz 1kHz. ±75kHz dév	(B)	98,0MHz	L11 (X86-)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope.	
9	SENSIBILITE ARRET AUTOMATIQUE	(A) 98,0MHz Sélection:MAIN 1kHz. ±75kHz dév 12dBμ (Entrée ANT)	—	98,0MHz	VR1 (X86-)	Position où l'indicateur STEREO s'allume quand la commande est tournée graduellement dans le sens des aigguilles d'une montre à partir du réglage à fond dans le sens contraire des aiguilles d'une montre.	
10	DISTORSION (1) DET	(C) 98,0MHz Sélection:MONO 1kHz. ±75kHz dév ✻ 80dBμ (Entrée ANT)	(B)	98,0MHz	VR3 (X86-)	Distorsion minimale.	
11	DISTORSION (2) MONO	(C) 98,0MHz Sélection:MONO 1kHz. ±75kHz dév ✻ 80dBμ (Entrée ANT)	(B)	98,0MHz	VR4 (X86-)	Distorsion minimale.	
12	DISTORSION (3) MONO	(C) 98,0MHz Sélection:MONO 1kHz. ±75kHz dév ✻ 80dBμ (Entrée ANT)	(B)	98,0MHz	VR6 (X86-)	Distorsion minimale.	
	Ajuster 10, 11 et 12 alternativement plusieurs fois pour minimiser la distorsion MONO. ✻ E et T type: 1kHz. ±46kHz dév.						
13	DISTORSION (4) STEREO	(C) 98,0MHz Sélection:SUB 1kHz. ±68,25kHz dév Pilote:±6,75kHz dév 80dBμ (Entrée ANT)	(B)	98,0MHz	VR7 (X86-)	Distorsion minimale.	
14	DISTORSION (5) STEREO	(C) 98,0MHz Sélection:SUB 1kHz. ±68,25kHz dév Pilote:±6,75kHz dév 80dBμ (Entrée ANT)	(B)	98,0MHz	L33 (X05-)	Distorsion minimale.	
	Après l'ajustement de 14, ajuster 13 à nouveau pour minimiser la distorsion à 1kHz.						

N°	ITEM	REGLAGE DE L'ENTREE	REGLAGE DE LA SORTIE	REGLAGE DU TUNER	POINT DE L'ALIGNEMENT	ALIGNER POUR	FIG
15	DISTORSION (6) STEREO	(C) 98,0MHz Sélection:L ou R 1kHz.±68,25kHz dév Pilote:±6,75kHz dév 80dBμ (Entrée ANT)	(B)	98,0MHz	VR5 (X86-)	Distorsion minimale.	
15'	DISTORTION (7) STEREO (E et T type)	(C) 98,0MHz Sélection:L ou R 1kHz.±68,25kHz dév Pilote:±6,75kHzdév 80dBμ (Entrée ANT)	(B)	98,0MHz IF BAND: NARROW	VR2 (X86-)	Distorsion minimale.	
	Répéter les ajustements de 10 à 15 plusieurs fois pour minimiser la distorsion.						
16	SEPARATION (1) D→G	(C) 98,0MHz Sélection:R 1kHz.±68,25kHz dév Pilote:±6,75kHz dév 80dBμ (Entrée ANT)	(B)	98,0MHz	VR4 (X05-)	Diaphonie minimale.	
17	SEPARATION (2) G→D	(C) 98,0MHz Sélection:L 1kHz.±68,25kHz dév Pilote:±6,75kHz dév 80dBμ (Entrée ANT)	(B)	98,0MHz	VR5 (X05-)	Diaphonie minimale.	
	Répéter les ajustements de 16 et 17 plusieurs fois pour que les séparations D à G et G à D soient égales.						
	SECTION MA Laisser l'antenne bouche MA installée. SELECTOR: AM TUNING MODE:AUTO REC CAL:OFF PROGRAM:OFF						
[1]	BORD DE BANDE (1)	–	Connecter un voltmètre CC entre les TP3(VT) et 4(GND).	530kHz	L27 (X05-)	1,5V	(a)
[2]	BORD DE BANDE (2)	–	Connecter un voltmètre CC entre les TP3(VT) et 4(GND).	1610kHz	TC3 (X05-)	8,0V	(a)
	Répéter les points [1] et [2] plusieurs fois.						
[3]	ALIGNEMENT HT (1)	(D) ☆ 630kHz 400Hz.30% mod	(B)	630kHz	L26 (X05-)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope.	
[4]	ALIGNEMENT HT (2)	(D) ☆ 1440kHz 400Hz.30% mod	(B)	1440kHz	TC2 (X05-)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope.	
	Répéter les points [3] et [4] plusieurs fois.						
[5]	TRANSFORMATEUR FI	(D) ☆ 999kHz 400Hz.30% mod	(B)	999kHz	◆ L28 (X05-)	Amplitude et symétrie maximale de l'affichage de l'oscilloscope.	
	◆ L28 a été préréglé de manière à ce que l'ajustement ne soit pas normalement requis. ☆ La crête sera plus facile à localiser si l'antenne à boucle test est utilisée.						

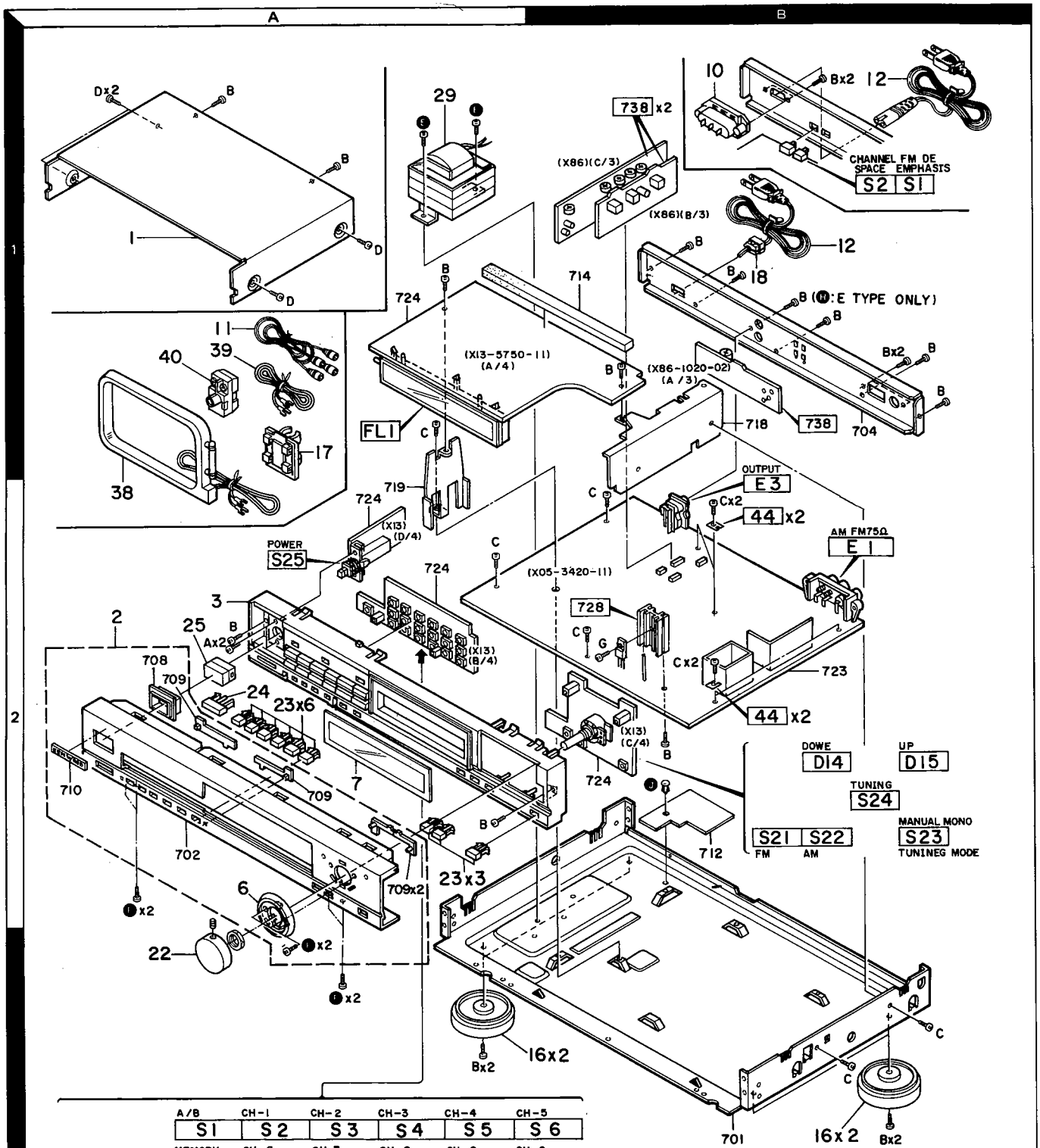
ABGLEICH

NR.	GEGENSTAND	EINGANGS-EINSTELLUNG	AUSGANGS-EINSTELLUNG	TUNER-EINSTELLUNG	ABGLEICH-PUNKTE	ABGLEICHEN FÜR	ABB.
	UKW-EMPFANGSABTEILUNG Außer wenn anders angegeben, die verschiedenen Schalter wie folgt einstellen: SELECTOR:FM IF BAND:WIDE RF SELECTOR:DISTANCE TUNING MODE:AUTO REC CAL:OFF PROGRAM:OFF						
1	BANDKANTE (1)	–	Einen Gleichspannungs-messer zwischen TP4(GND) und TP3(VT) anschließen.	TUNING MODE: MANU 87,5MHz	L14 (X05-)	3,0V	(a)
2	BANDKANTE (2)	–	Einen Gleichspannungs-messer zwischen TP4(GND) und TP3(VT) anschließen.	TUNING MODE: MANU 108,0MHz	TC1 (X05-)	25,0V	(a)
	Abstimmungen 1 und 2 mehrere Male wiederholen.						
3	DISKRIMINATOR	(A) 98,0MHz 0 Hub 100dBμ (ANT-Eingang)	Einen Gleochspannungs-messer zwischen TP5(AFC) und TP6(VREF) anschließen.	98,0MHz	L9 (X86-)	0,000V±10mV	(b)
4	PLL-DETEKTOR	(A) 98,0MHz 0 Hub 100dBμ (ANT-Eingang)	Einen Gleichspannungs-messer zwischen TP7(VCC/2) und TP8(DET) anschließen.	98,0MHz	L12 (X86-)	0,000V±20mV	(c)
5	MPX VCO	(A) 98,0MHz 0 Hub 100dBμ (ANT-Eingang)	Einen Frequenzmesser zwischen TP19(GND) und TP20(VCO) anschließen.	98,0MHz	VR3 (X05-)	19,000kHz±10Hz	(d)
6	HF-ABGLEICH	(A) 98,0MHz 1kHz.±75kHz Hub	(B)	98,0MHz	★ L1.4.7.10 (X05-)	Maximal Amplitude und Symmetrie des Oszilloskopbildes.	
	★ Die Folge von L1→L4→L7→L10→L1·····einige Male wiederholen.						
7	ZF-ÜBERTRAGER (1)	(A) 98,0MHz 1kHz.±75kHz Hub	(B)	98,0MHz	L17 (X05-)	Maximal Amplitude und Symmetrie des Oszilloskopbildes.	
8	ZF-ÜBERTRAGER (2)	(A) 98,0MHz 1kHz.±75kHz Hub	(B)	98,0MHz	L11 (X86-)	Maximal Amplitude und Symmetrie des Oazilloskopbildes.	
9	AUTOSTOP-EMPFINDLICHKEIT	(A) 98,0MHz Wähler:MAIN 1kHz.±75kHz Hub 12dBμ (ANT-Eingang)	–	98,0MHz	VR1 (X86-)	Position, wo die STEREO-Anzeige leuchtet, wenn der Regler von der Einstellung ganz entgegen dem Uhrzeiger-sinn langsam im Uhrzeiger-sinn gedreht wird.	
10	KLIRRFAKTOR (1) DET	(C) 98,0MHz Wähler:MONO 1kHz.±75kHz Hub * 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR3 (X86-)	Minimal Klirrfaktor.	
11	KLIRRFAKTOR (2) MONO	(C) 98,0MHz Wähler:MONO 1kHz.±75kHz Hub * 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR4 (X86-)	Minimal Klirrfaktor.	
12	KLIRRFAKTOR (3) MONO	(C) 98,0MHz Wähler:MONO 1kHz.±75kHz Hub * 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR6 (X86-)	Minimal Klirrfaktor.	
	10, 11 und 12 abwechselnd einige Male einstellen, um die MONO-Verzerrung zu minimieren. * E und T Typen: 1kHz. ±46kHz Hub.						
13	KLIRRFAKTOR (4) STEREO	(C) 98,0MHz Wähler:SUB 1kHz.±68,25kHz Hub Pilotten: ±6,75kHz Hub 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR7 (X86-)	Minimal Klirrfaktor.	
14	KLIRRFAKTOR (5) STEREO	(C) 98,0MHz Wähler:SUB 1kHz.±68,25kHz Hub Pilotten: ±6,75kHz Hub 80dBμ (ANT-Eingang)	(B)	98,0MHz	L33 (X05-)	Minimal Klirrfaktor.	
	Nach der Einstellung von 14 erneut 13 einstellen, um die Verzerrung bei 1kHz zu minimieren.						

GEGENSTAND	EINGANGS-EINSTELLUNG	AUSGANGS-EINSTELLUNG	TUNER-EINSTELLUNG	ABGLEICH-PUNKTE	ABGLEICHEN FÜR	ABB.
KLIRRFAKTOR (6) STEREO	(C) 98,0MHz Wähler:L oder R 1kHz.±68,25kHz Hub Pilotten: ±6,75kHz Hub 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR5 (X86-)	Minimal Klirrfaktor.	
KLIRRFAKTOR (7) STEREO NARROW (E & T Typen)	(C) 98,0MHz Wähler:L oder R 1kHz.±68,25kHz Hub Pilotten: ±6,75kHz Hub 80dBμ (ANT-Eingang)	(B)	98,0MHz IF BAND: NARROW	VR2 (X86-)	Minimal Klirrfaktor.	
Die Einstellungen von 10 bis 15 einige Male wiederholen, um die Verzerrung zu minimieren.						
STEREO KANAL TRENNUNG (1) R → L	(C) 98,0MHz Wähler:R 1kHz.±68,25kHz Hub Pilotten: ±6,75kHz Hub 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR4 (X05-)	Minimales Übersprechen.	
STEREO KANAL TRENNUNG (2) L → R	(C) 98,0MHz Wähler:L 1kHz.±68,25kHz Hub Pilotten: ±6,75kHz Hub 80dBμ (ANT-Eingang)	(B)	98,0MHz	VR5 (X05-)	Minimales Übersprechen.	
Die Einstellungen von 16 und 17 einige Male wiederholen, so daß die Trennung von Rechts zu Links und von Links zu Rechts gleich ist.						
-EMPFANGSABTEILUNG Die MW-Rahmwnantenne angebracht lassen. SELECTOR:AM TUNING MODE:AUTO REC CAL:OFF PROGRAM:OFF						
BANDKANTE (1)	–	Einen Gleichspannungs-messer zwischen TP3(VT) und TP4(GND) anschließen.	530kHz	L27 (X05-)	1,5V	(a)
BANDKANTE (2)	–	Einen Gleichspannungs-messer zwischen TP3(VT) und TP4(GND) anschließen.	1610kHz	TC3 (X05-)	8,0V	(a)
Abstimmungen [1] und [2] mehrere Male wiederholen.						
HF-ABGLEICH (1)	(D) ☆ 630kHz 400Hz.30% mod	(B)	630kHz	L26 (X05-)	Maximal Amplitude und Symmetrie des Oszilloskopbildes.	
HF-ABGLEICH (2)	(D) ☆ 1440kHz 400Hz.30% mod	(B)	1440kHz	TC2 (X05-)	Maximal Amplitude und Symmetrie des Oszilloskopbildes.	
Abstimmungen [3] und [4] mehrere Male wiederholen.						
ZF-ÜBERTRAGER	(D) ☆ 999kHz 400Hz.30% mod	(B)	999kHz	◆ L28 (X05-)	Maximal Amplitude und Symmetrie des Oszilloskopbildes.	
◆ L28 ist ab Werk eingestellt, so daß normalerweise keine Einstellung erforderlich ist.						
☆ Bei Verwendung der Test-Rahmenantenne kann die Spitze leichter gefunden werden.						



EXPLODED VIEW



A/B	CH-1	CH-2	CH-3	CH-4	CH-5
S1	S2	S3	S4	S5	S6

MEMORY	CH-6	CH-7	CH-8	CH-9	CH-0
S7	S8	S9	S10	S11	S12

PROGRAM		ACTIVE RECEPTION	RF SELECTOR	FM IF BAND	REC CAL	MUSIC	TV SOUND MUSIC/NEWS	BILINGUAL
S13	D12	S14	S15	S16	S17	D13	S18	S19

A	M3x6		: N30-3006-46
B	ø3x8	(Bi-Tap) BLK	: N89-3008-45
C	ø3x8	(Bi-Tap)	: N89-3008-46
D	ø4x8	(Bi-Tap) BLK	: N89-4008-45
E			: N09-1966-05
F	ø3x8		: N09-0301-05
G	M3x6	BLK	: N30-3006-45
H	ø3x8	(Bi) BLK	: N09-1280-05
J	PR		: N29-0067-05

KT-990D