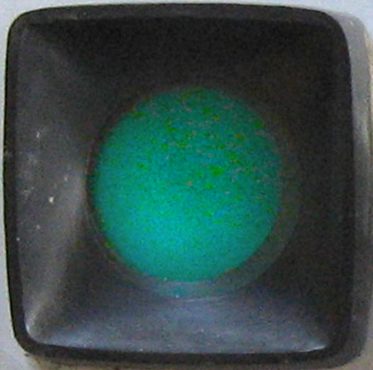


FLAT — SHARP

FLAT — SHARP

CHROMATIC

OCTAVE



ON
OFF



POWER

MICROPHONE →

 **YAMAHA**
TUNING SCOPE PT-4

PORTABLE TUNING SCOPE

MODEL PT-4

OPERATION MANUAL

The Yamaha Tuning Scope Model PT-4 is a portable, easy-to-use instrument whereby you can ascertain with your eyes the correct tuning of a musical instrument. With this unit, tuning accuracy can be verified at a glance, for any type of instrument.

Please read this manual carefully, to make full use of the revolutionary precision and convenience the tuning scope affords, and to avoid abusing its power.

With proper care, model PT-4 will afford long years of durable, dependable service for precision tuning.

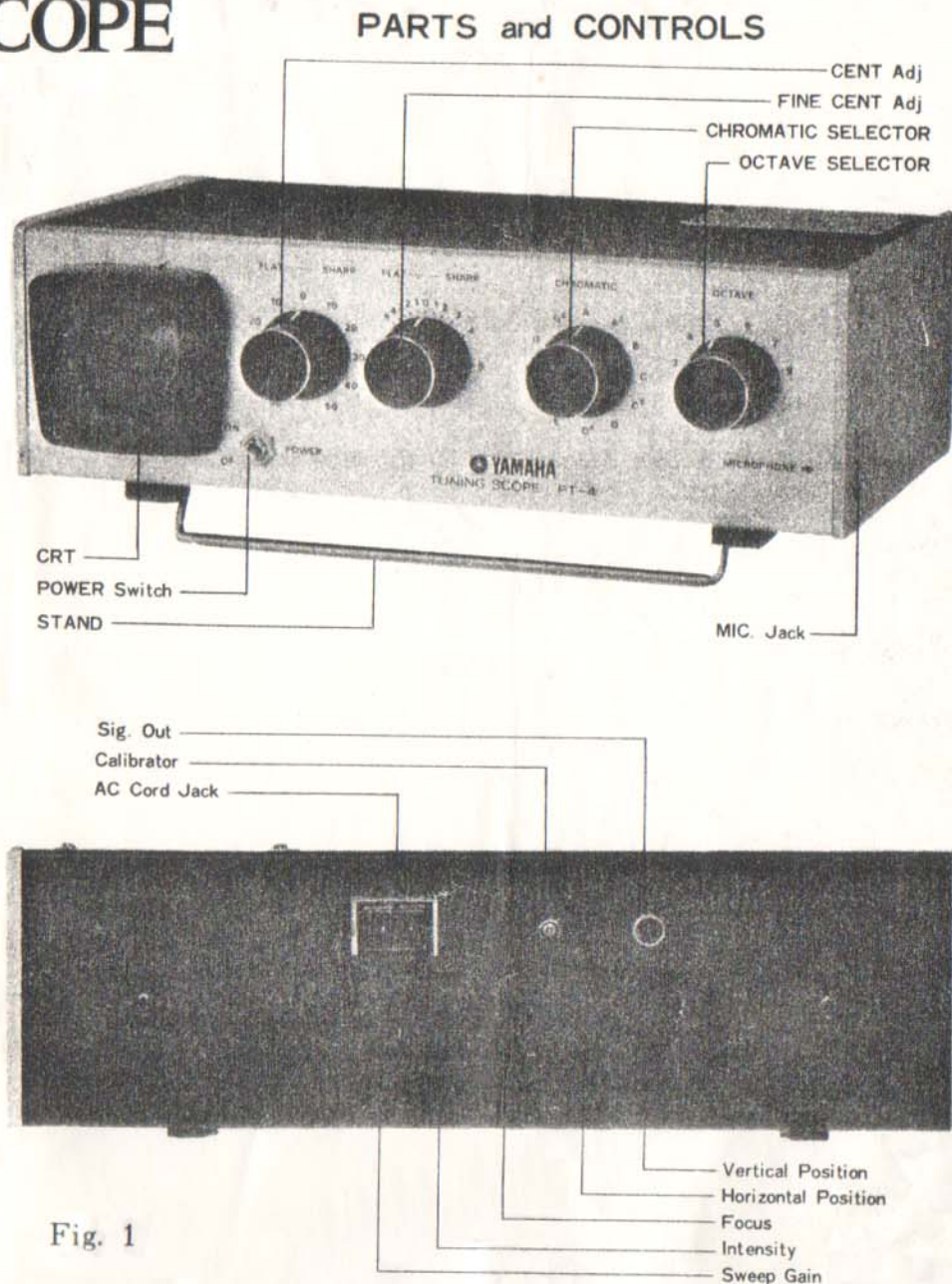


Fig. 1

PREPARATION

1. Remove the unit from the bag place it by the musical instrument. The wire stand can be lifted the unit; if this makes the scope too high to read comfortably, leave wire stand down and use the rubber feet as the stand.
※ PT-4 can be used with the case on.
2. Take out the power cord from Subcase and plug it into an electric outlet.
3. Take out the microphone from this case and plug it into the MIC jack. Then place it in a position to pick up sounds from the instrument to be tuned
4. Turn on the power switch. After a few seconds a green pattern approximately 10mm wide will appear across the Cathode Ray Tube (CRT).

OPERATION

1. PIANOS

Since harmonic overtones are not simple multiples of integral frequencies, the OCTAVE and CHROMATIC selectors and CENT adjusters must be set for each note.

- 1) Match the CHROMATIC selector setting to the key to be tuned.
- 2) Find the OCTAVE selector and CENT adjuster settings by referring to the Standard Piano Tuning Table . (See the right side).The cent must be set by balancing the two selector settings. This can be seen by considering the settings when tuning the third key from the left (i.e., the lowest B):
First set the OCTAVE selector to 3 and the CHROMATIC selector to B. Then set for -18 by turning the CENT adjuster to 20 on the FLAT side and the fine CENT adjuster to 2 on the SHARP side. In other words, (-) corresponds to "flat" and (+) to "sharp."

- 3) Strike only one string for each note (stop the others with a mute), and tune so that the striped pattern stops moving.
- 4) Tune the other strings by ear, so that all beats are eliminated.
- 5) If you glance at the tuning standard table, you will see that some notes in the same octave have the same CENT. For example, the CENT for notes 43 through 49 is zero. In such a case it is better to differentiate by tuning the higher notes above the setting (i.e., so that the striped pattern moves slightly to the right), instead of tuning the lower ones below it.
- 6) In the 8th octave it is sometimes difficult to ascertain in which direction the pattern is moving if there is a large difference between the string's frequency and the CENT setting of the tuning scope. In this case, move the adjusters back and forth to find which direction the pattern is moving. Be sure to reset the adjusters to their correct positions before tuning the string. Repeat the adjustment two or three times to be sure there is no mistake in the direction.

Note:

Pattern movement to the left means the note is flat, to the right, sharp. Always tune to stop such movement.

2. ORGANS and OTHER INSTRUMENTS

- 1) Set the CENT adjusters to zero.
- 2) Set the CHROMATIC selector to the note you wish to tune.
- 3) Sound the note and tune so that the striped pattern stops. The OCTAVE selector can be turned to any setting whereby pattern movement is clearly visible; in other words, the lower ranges require lower OCTAVE selector settings, and vice versa.

Note:

When tuning an electronic instrument, the signal can be fed directly to the tuning scope without using the microphone. Plug the signal cord (signal: app. 10mV) into the MIC jack via a coupling condenser.

MEASUREMENTS

Using model PT-4 it is also possible to measure exactly how far an instrument is out of tune. This operation is essentially the opposite of that used in tuning.

Set the OCTAVE and CHROMATIC selectors to the note to be measured. Then sound that note on the instrument and adjust the CENT adjuster and fine CENT adjuster until pattern motion stops. The CENT adjuster setting at that time shows the exact extent to which the instrument is out of tune on an $a=440$ Hz equally tempered scale. If the pattern does not stop moving within an adjustment range of ± 55 cents, the note is more than one-half semi-tone off key. In this case measurement can be continued by first adjusting the CHROMATIC selector, then turning the CENT adjusters fully back. For example, if an A tone is more than 55 cents flat, turn the CHROMATIC selector to G[#], set the CENT adjusters to +55, and continue measuring.

CALIBRATION METHOD

In order to calibrate the PT-4 Portable Tuning Scope, use either a frequency measuring instrument with a range of at least 880 to 1700 Hz, more accurate than $\pm 5 \times 10^{-6}$, or a tone or electric signal generator with the same rated accuracy. The former can be an electronic counter with a crystal-controlled standard frequency, the latter a standard tuning fork, or a crystal-controlled audio frequency standard instrument. With the frequency measuring instrument, connect the Sig. Out jack of the PT-4, located on the rear of the unit (see Fig. 1), to the input terminal of

the measuring instrument, (input impedance must be $50K\Omega$ or more). Then adjust the PT-4 calibrator so that the signal matches its rated setting.

Note:

When using a signal or tone generator, feed it to the MIC jack (directly or through the microphone), set the PT-4 selectors and adjusters to that tone and adjust the calibrator while watching the CRT.

PRECAUTIONS

1. Although the PT-4 is not affected by ordinary vibrations, such as when it is carried in a vehicle, be careful not to knock or drop it.
2. Do not place heavy objects on the unit, even when it is in its bag.

MAINTENANCE

1. The unit is factory adjusted for a clear pattern, but if this fades and loses its focus after some use, correct it with the Intensity and Focus adjusters.
2. If the Intensity adjuster is set too far to the right, the extreme brightness will eventually burn out the CRT. Therefore, do not set for more brightness than is necessary. Be sure to turn off the power switch when the tuner is not in use.
3. The size, horizontal and vertical positions of the striped pattern can be adjusted using the "Horiz. Size," "Horiz. Pos." and "Vert. Pos." adjusters, located on the rear of the unit.
4. To remove the cover panel, first take off the two screws from the rear of the unit, then pull the cover panel loose from the upper part and lower of the front panel. Do not pry the upper part and lower of the front with unit a screwdriver or other tool.

5. Do not tamper with the Calibrator except when it is necessary to adjust the calibration. Unnecessary turning may throw the standard frequency out of order.

STANDARD PIANO TUNING TABLE

SPECIFICATIONS OF MODEL PT-4

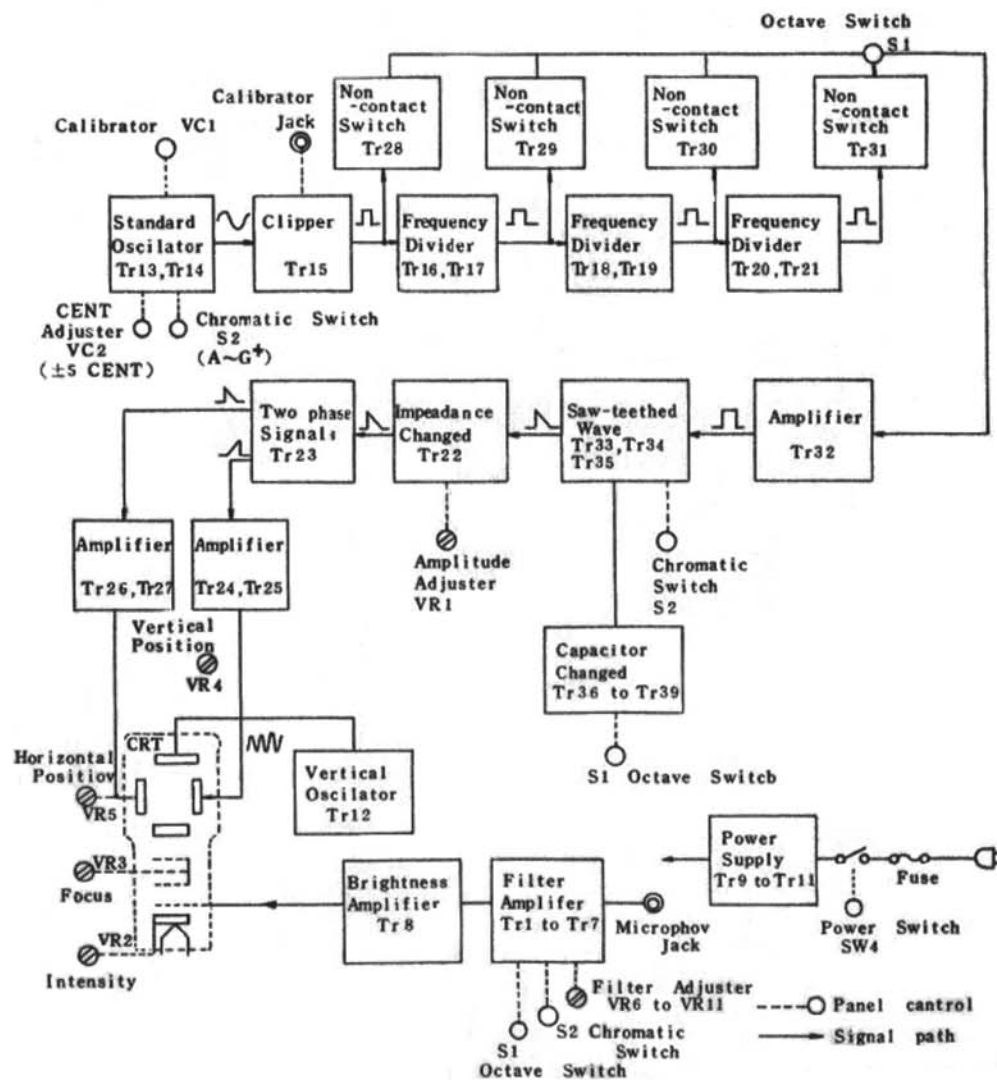
Measurable Tone Range :	Full eight octaves (27.5Hz. to 6645Hz)
Operative Temp. Range :	-10°C to + 40°C (14°F to 104°F)
Relative Error of Standard Frequency :	±1 cent (1/100 semitone) under rated voltage and temp.
Variable Range of Standard Frequency :	-55 to + 55 cent
Cathod Ray Tube :	Dia. 3cm (1 1/4") 40FB1E2610B1
Transistors :	39
Diodes :	10
Power Source :	100, 110 or 117V AC, 50 /60Hz(UL spec.) 220 or 240V AC, 50 /60Hz(Europe spec.)
Power Consumption :	5W (±10% rated voltage)
Dimensions (W×H×D):	23.5(9") × 7.8(3") × 15.0cm(6")
Net Weight :	2Kg (4.4 lbs.)
Accessories :	Black leatherette sholder bag with accessory case Dinamic Microphone × 1 Power Cord (2m-6 1/2') × 1 Spare Fuse × 1

OCTAVE SELECTOR	CHRO-MATIC	OFF SET (CENT)	OCTAVE SELECTOR	CHRO-MATIC	OFF SET (CENT)	OCTAVE SELECTOR	CHRO-MATIC	OFF SET (CENT)	OCTAVE SELECTOR	CHRO-MATIC	OFF SET (CENT)
3	A ₁	-19	4	A ₂₅	- 2	5	A ₄₉	0	7	A ₇₃	+ 7
	A ₂ [#]	-18		A ₂₆ [#]	- 2		A ₅₀ [#]	+ 1		A ₇₄ [#]	+ 8
	B ₃	-17		B ₂₇	- 1		B ₅₁	+ 1		B ₇₅	+ 9
	C ₄	-15		C ₂₈	0		C ₅₂	+ 1		C ₇₆	+10
	C ₅ [#]	-14		C ₂₉ [#]	0		C ₅₃ [#]	+ 1		C ₇₇ [#]	+11
	D ₆	-13		D ₃₀	0		D ₅₄	+ 1		D ₇₈	+12
	D ₇ [#]	-12		D ₃₁ [#]	0		D ₅₅ [#]	+ 1		D ₇₉ [#]	+13
	E ₈	-11		E ₃₂	0		E ₅₆	+ 2		E ₈₀	+14
	F ₉	-10		F ₃₃	- 1		F ₅₇	+ 2		F ₈₁	+15
	F ₁₀ [#]	- 9		F ₃₄ [#]	- 1		F ₅₈ [#]	+ 2		F ₈₂ [#]	+16
	G ₁₁	- 8		G ₃₅	- 1		G ₅₉	+ 2		G ₈₃	+17
	G ₁₂ [#]	- 7		G ₃₆ [#]	- 1		G ₆₀ [#]	+ 3		G ₈₄ [#]	+19
4	A ₁₃	- 6	4	A ₃₇	- 1	6	A ₆₁	+ 3	8	A ₈₅	+21
	A ₁₄ [#]	- 5		A ₃₈ [#]	- 1		A ₆₂ [#]	+ 3		A ₈₆ [#]	+23
	B ₁₅	- 5		B ₃₉	- 1		B ₆₃	+ 3		B ₈₇	+25
	C ₁₆	- 5		C ₄₀	- 1		C ₆₄	+ 4		C ₈₈	+28
	C ₁₇ [#]	- 5		C ₄₁ [#]	- 1		C ₆₅ [#]	+ 4			
	D ₁₈	- 4		D ₄₂	- 1		D ₆₆	+ 4			
	D ₁₉ [#]	- 3		D ₄₃ [#]	0		D ₆₇ [#]	+ 4			
	E ₂₀	- 3		E ₄₄	0		E ₆₈	+ 5			
	F ₂₁	- 3		F ₄₅	0		F ₆₉	+ 5			
	F ₂₂ [#]	- 3		F ₄₆ [#]	0		F ₇₀ [#]	+ 6			
	G ₂₃	- 3		G ₄₇	0		G ₇₁	+ 6			
	G ₂₄ [#]	- 2		G ₄₈ [#]	0		G ₇₂ [#]	+ 7			

TROUBLE SHOOTING CHART

Trouble	Cause or Check Point	Remedy
No pattern on CRT (no spot)	Blown fuse	Replace
	Terminal voltage of C ₂₀ , C ₂₂ and CRT socket not normal	Replace C ₂₀ , C ₂₂ , R ₁₂₀ or R ₁₂₁ Retouch CRT socket
	CRT heater not lit	Replace CRT or PT
	Above all normal	Replace CRT
CRT not swept horizontally *	Tr13 ~ Tr15, Tr22 ~ Tr27 or Tr32 ~ Tr35 and their circuits on C.B. HK-7	Replace defective parts
	Tr16 ~ Tr21 or Tr28 ~ Tr31 (Freq. Divider) defective	Replace defective parts
	Poor contact on wafer #1 or #2 of Oct. S1	Replace defective parts
	VC1 or VC2 short circuit	Replace defective parts
Sound fed to microphone but pattern unaffected *	Microphone defective	Replace
	Poor contact in Mic or Mic jack	Adjust or replace the contact spring
	Tr1 ~ Tr8 and their circuits on C.B. HK-7	Replace defective parts
	* It is only necessary to check those circuits which correspond to Octave or Chromatic selector settings providing defective operation.	By nearly od Bm sine wave form measurement of TP2 point on C.B. HK-7, understand whether Filter ccts elements (Oct. S1 or Chroma. S2) is correct or not.

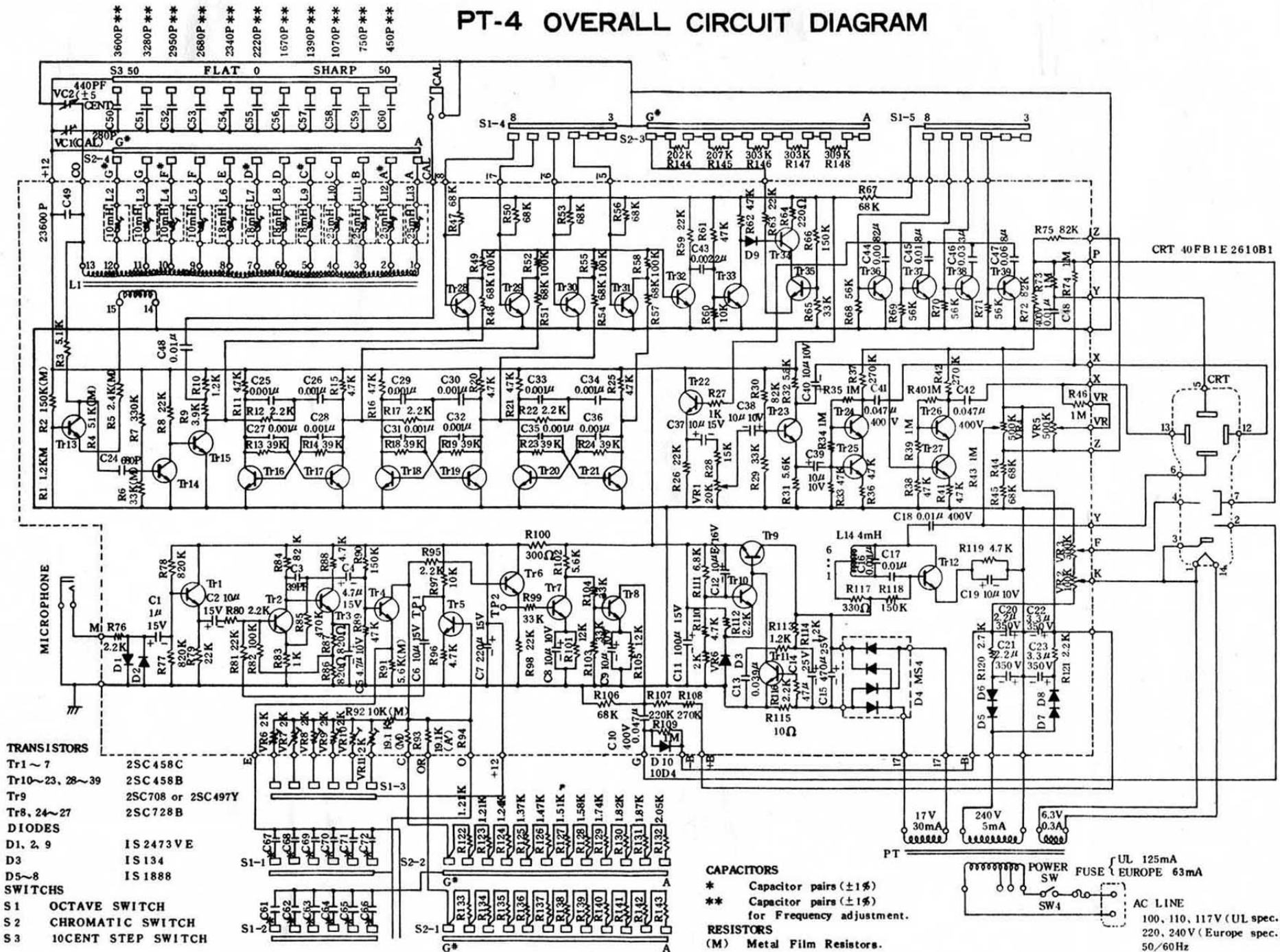
BLOCK DIAGRAM OF MODEL PT-4



PT-4 PART LIST

PARTS No.	DESCRIPTION	SYMBOL	PARTS No.	DESCRIPTION	SYMBOL	PARTS No.	DESCRIPTION	SYMBOL	PARTS No.	DESCRIPTION	SYMBOL
iC04582	2SC458B	Tr10 to 23, 28 to 39	HZ00080	12KΩ (M), ±1% MFR	R1	HA15410	10Ω, ±5% ¼ CFR	R115	*	10.000PF. -do.-	C64, 70
iC04583	2SC458C	Tr1 to 7	HZ00051	33KΩ (M), -do.-	R6	HA15612	1.2KΩ, -do.-	R113, 114	*	20.000PF. -do.-	C65, 71
iC04978	2SC497Y	Tr9	HZ00052	150KΩ (M), -do.-	R1	HA15622	2.2KΩ, -do.-	R112, 116, 121	*	40.000PF. -do.-	C66, 72
iC07281	2SC728B	Tr8	HZ00053	330KΩ (M), -do.-	R7	HA15647	4.7KΩ, -do.-	R110	FA11310	0.001μ F. 50V Polystyrene Film	C16, 25 to 36
iC07282	2SC728B, VCEO ≥ 300V	Tr24 to 27	HH35622	2.2KΩ ±5% ¼P CFR	R144	HA15668	6.8KΩ, -do.-	R111	FA11322	0.0022μ F. -do.-	C43
			HH35627	2.7KΩ, -do.-	R145, 120	HA15768	68KΩ, -do.-	R106	FA11382	0.0082μ F, -do.-	C44
iF00039	1S134 Zener Diode	D3	HH35633	3.3KΩ, -do.-	R146, 147	HA15782	82KΩ, -do.-	R72, 75	FA11410	0.01μ F, -do.-	C17
iF00037	1S2473VE	D1, 2, 9	HH35639	3.9KΩ, -do.-	R148	HA15822	220KΩ, -do.-	R107	FA11418	0.018μ F, -do.-	C45
iH00030	MS4	D4	HN35522	220Ω, ±5% CFR	R64	HA15827	270KΩ, -do.-	R37, 42, 108	FA11433	0.033μ F, -do.-	C46
iH00036	1S1888	D5 to 8	HN35533	330Ω, -do.-	R100	HA15910	1MΩ, ±5% ¼P CFR	R34, 35, 39, 40, 43, 46, 73, 74, 109	FA11439	0.039μ F, -do.-	C13
			HN35582	820Ω, -do.-	R86, 87	HA15815	150KΩ, -do.-	R118	FA11468	0.068μ F, -do.-	C47
GD90010	MAIN OSC coil	L1	HN35610	1KΩ, -do.-	R27, 83				FC04410	0.01μ F, 400V Polystyrene Film	C18, 48
GD90011	Variable coil 25mH	L2~5	HN35612	1.2KΩ, -do.-	R10	HT57001	20KΩ, -do.-	VR1	FC04447	0.047μ F, -do.-	C10, 41, 42
GD90018	Variable coil 18mH	L6~9	HN35622	2.2KΩ, -do.-	R12, 17, 22, 76, 95	HT57002	100KΩ, -do.-	VR2	FG11139	39PF, 50V Ceramic	C3
GD90019	Variable coil 10mH	L10~13	HN35639	3.9KΩ, -do.-	R9	HT57003	500KΩ, -do.-	VR3 to 5	FJ14610	1μ F, 25V EC	C1
GE90016	YT-030 HF coil	L14	HN35647	4.7KΩ, -do.-	R11, 15, 16, 20, 21, 25, 36, 41, 62, 88, 96, 119	HY00011	3KΩ B	VR6 to 12	FJ14647	4.7μ F, -do.-	C4, 5
			HN35656	5.6KΩ, -do.-	R31, 32, 102				FJ13710	10μ F, 16V EC	C2, 6, 8, 9, 12, 19, 38, 39, 40
HZ00034	1.21KΩ (M), ±1% MF	R122, 123, 133, 134	HN35710	10KΩ, -do.-	R60, 97	**	2360PF ±1% 50V Polystyrene Film	C49	FJ13822	220μ F, -do.-	C7
HZ00035	1.24KΩ (M), -do.-	R124, 135	HN35712	12KΩ, ±5% ¼P CFR	R101, 105	**	3600PF, -do.-	C50			
HZ00036	1.37KΩ (M), -do.-	R125, 136	HN35715	15KΩ, -do.-	R28	**	3280PF, -do.-	C51	iJ00001	40FB1E2610B1	C.R.T.
HZ00037	1.47KΩ (M), -do.-	R126, 137	HN35722	22KΩ, -do.-	R8, 26, 59, 63, 79, 80, 81, 98	**	2950PF, -do.-	C52	LB30020	3-poles Mold Type	CAL. JACK.
HZ00038	1.51KΩ (M), -do.-	R127, 138	HN35733	33KΩ, -do.-	R29, 65, 99, 103, 104	**	2680PF, -do.-	C53	LB30021	-do.-	MIC. JACK.
HZ00039	1.58KΩ (M), -do.-	R128, 139	HN35747	47KΩ, -do.-	R33, 38, 61, 89	**	2340PF, -do.-	C54	FY00005	Poly-Variable Capacitor	VC1
HZ00040	1.74KΩ (M), -do.-	R129, 140	HN35756	56KΩ, -do.-	R68 to 71	**	2200PF, -do.-	C55	FY00006	Air-Variable Capacitor	VC2
HZ00041	1.82KΩ (M), -do.-	R130, 141	HN35768	68KΩ, -do.-	R44, 45, 47, 48, 50, 51, 53, 54, 55, 56, 67	**	1670PF, -do.-	C56	KA50043	SEMI-FIXED RESISTOR	S2
HZ00042	1.87KΩ (M), ±1% MFR	R131, 142	HN35782	82KΩ, -do.-	R30, 84	**	1390PF, -do.-	C57	KA50044	METAL FILM SEMI-FIXED RESISTOR	S1
HZ00043	2.05KΩ (M), -do.-	R132, 143	HN35810	100KΩ, -do.-	R82	**	1070PF, -do.-	C58	JE00011	Dynamic-Mic.	Mic.
HZ00044	2.4KΩ (M), ±1% MFR	R5	HN35815	150KΩ, -do.-	R66, 90	**	750PF, -do.-	C59	GA02460	Rotary-Switch 4-Sections, 1 Pole	PT Power Transformer Europe Spec.
HZ00045	5.1KΩ (M), -do.-	R3, 4	HN35847	470KΩ, -do.-	R85	**	450PF, -do.-	C60	GA02470	Rotary-Switch 4-Sec. 2-Pole, 6-Pos.	-do.- Toggle Switch 125V 10A 250V 5A
HZ00047	5.6KΩ (M), -do.-	R91	HN35882	820KΩ, -do.-	R77, 78	*	1230PF, -do.-	C61, 67	KA30015	Power Transformer Ol. Spec.	S4
HZ00048	10KΩ (M), -do.-	R92	HB15739	39KΩ, ±5% ¼ CFR	R13, 14, 18, 19, 23, 24	*	2500PF, -do.-	C62, 68			
HZ00049	19.1KΩ (M), -do.-	R93, 94	HB15810	100KΩ, -do.-	R49, 52, 55, 58	*	5000PF, -do.-	C63, 69			

PT-4 OVERALL CIRCUIT DIAGRAM



- TRANSISTORS**
 T1 ~ 7 2SC458C
 T10 ~ 23, 28 ~ 39 2SC458B
 T9 2SC708 or 2SC497Y
 T8, 24 ~ 27 2SC728B
- DIODES**
 D1, 2, 9 IS2473VE
 D3 IS134
 D5-8 IS1888
- SWITCHES**
 S1 OCTAVE SWITCH
 S2 CHROMATIC SWITCH
 S3 10CENT STEP SWITCH

- CAPACITORS**
 * Capacitor pairs ($\pm 1\%$)
 ** Capacitor pairs ($\pm 1\%$) for Frequency adjustment.
- RESISTORS**
 (M) Metal Film Resistors.
- POWER FUSE**
 UL 125mA
 EUROPE 63mA
- AC LINE**
 100, 110, 117V (UL spec.)
 220, 240V (Europe spec.)
 50/60Hz

