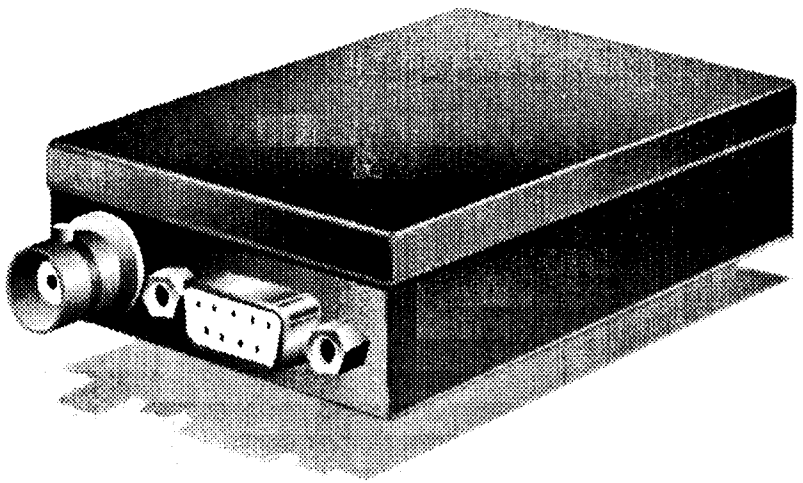
TEKK

T-NET MICRO
SERVICE MANUAL



2 WATT UHF DATA RADIO

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CRYSTAL SPECIFICATIONS

TRANSMITTER

HOLDER ---------- HC-18/T Wire Lead
MODE OF OSCILLATION ---------- Fundamental
LOAD CAPACITY ---------- 32 PF Parallel
SERIES RESISTANCE ---------- 20 OHM
DRIVER LEVEL ---------- 2 MW
HOLDER CAPACITY ---------- 7 PF Max
OPERATING TEMPERATURE ----------20° C to 60° C
FREQUENCY TOLERANCE AT 25° C ----------+/- 5 PPM
FREQUENCY STABILITY AT -20° C TO 60° C ----------+/- 5 PPM
FREQUENCY CALCULATION ---------- Operating Frequency Divided by 27

RECEIVER

HOLDER ---------- HC-18/T Wire Lead
MODE OF OSCILLATION ---------- Third Overtone
LOAD CAPACITY ---------- 32 PF Parallel
SERIES RESISTANCE ---------- 35 OHM
DRIVER LEVEL ---------- 2 MW
HOLDER CAPACITY ---------- 7 PF Max
OPERATING TEMPERATURE ----------20° C to 60° C
FREQUENCY TOLERANCE AT 25° C ----------+/- 5 PPM
FREQUENCY STABILITY AT -20° C TO 60° C ----------+/- 5 PPM
FREQUENCY CALCULATION ----------(FO-21.4)/9

PERFORMANCE SPECIFICATIONS

9-PIN INTERFACE

PIN #	FUNCTION
1	Supply Volgate 7.5 V 12.0 V DC (Nominal 9.6 V DC)
2	Ground
3	PTT (Low to Transmit)
4	Data In
5	Data Out
6-9	Not Used

GENERAL SPECIFICATIONS

FCC ID/Part ---------- GOXKS-900/15,22,90
FREQUENCY ----------450 to 470 Mhz (KS 900)
430-450 Mhz (KS 900L)
OPERATING TEMPERATURE ---------- -30° to +60° C
VOLTAGE ---------- 9.6 Nominal (7.5 to 12.0 V. DC)
DIMENSIONS ----------3 1/2 X 2 1/8 X 13/16
5.0 OZ
RF CONNECTOR ---------- BNC/50 OHM
INTERFACE CONNECTOR ---------- 9 PIN "D"

RECEIVER

SENSITIVITY ---------- 0.35 Uv
SELECTIVITY ---------- 70 Db
SPURIOUS REJECTIONS ---------- 60 Db
AUDIO RESPONSE ---------- Flat
DISTORTION ---------- 5%
RECEIVER RECOVERY TIME ---------- 8 m/Sec
FREQUENCY STABILITY ----------+/- 5 PPM
AUDIO OUTPUT ----------750 mv RMS
CURRENT DRAIN ---------- 20 MA

TRANSMITTER

POWER OUTPUT ----------2 Watts @ 9.6 VDC
MODULATION ----------Direct FM
ATTACK TIME ---------- 8 m/Sec
AUDIO RESPONSE ---------- Flat
DISTORTION ---------- < 5%
MAXIMUM DATA MOD ---------- 50 mVRMS for 3.5 KHz Deviation
SPURIOUS & HARMONIC EMISSIONS ---------- < 60 dB
AUDIO DISTORTION ---------- < 5%

THEORY OF OPERATION

RF AMPLIFIER

Receive signals entering the RX side pass through C-1 and resonator T1 to the RF amplifier Q1. (MPS911) Q1's output is amplified and filtered by resonator T2, then fed into Q2 (MPS911).

1ST LOCAL OSCILLATOR

Q5 (C3195) is a third overtone crystal oscillator. Its output is tuned by T6 and fed into Q4 (MPS911). This frequency is 3X the crystal's. Q4's output again triples the frequency (9X total) and is tuned by resonator T5.

FIRST MIXER

Q4's output is fed into the first mixer, Q2. Q2 subtracts this frequency from the receiving frequency (FC) to provide the first I.F. of 21.4 MHZ. The 21.4 MHZ signal is then tuned by T3 and filtered by 2 monolithic crystal filters. (F1 & F2) FX (crystal frequency) = (FC-21.4)/9.

I.F. AMPLIFIER

The 21.4 MHZ signal is amplified by Q3 (C3195) and applied to IC1 (PIN 19). IC1 and X3 function as the second LO and mixer producing a second LO of 20.945 MHZ. Internal to IC1, the second mixer produces the second I.F. signal of 455 KHZ. The 455 KHZ signal is filtered by F3 (CFW455D, 20 KHZ bandwidth) and fed back into IC1 to a high gain amplifier, limiter and quadrature detector (which is tuned by T4). The detected audio appears on PIN 11, IC1.

RECEIVER VOLTAGE REGULATOR

IC2 (78L05) is a voltage regulator that provides a stable 5 Volt supply to the receiver RF and IF circuitry.

TRANSMITTER

CRYSTAL OSCILLATOR AND MODULATOR

Q7 (C3195) is a fundamental crystal oscillator. THJ1 is a thermistor that compensates for negative crystal drift. The modem audio is applied to VD-1 (MV2209) through PIN 4 of the 9-pin connector. This causes VD-1's capacitance to shift. It is this changing capacitance that results in frequency modulation of the crystal frequency passing through the modulator. The frequency of the crystal is as follows: FX=FT/27.

MULTIPLIERS

Q8 (C3195) triples the frequency and is double tuned by T7 and T8. Q9 (MPS911) also triples the frequency and is double tuned by T9 and T10. This signal is again tripled (27 X total) by Q10 (MPS911) which is tuned by T11.

RF AMPLIFIER STAGES

Q12 (MRF581) is the driver that produces about 300 MW of power to the final transistor (Q13 (MRF652), which in turn produces up to 2 watts of output power. Each amplifier stage must be properly tuned by the variable capacitors in their circuits to achieve the proper gain. The 2 watts of power is then routed to the antenna terminal through the antenna switching circuit and a low pass filter. L4, TC6, and TC7 make up the final impedance matching network, matching Q13's output to 50 OHMs. C66, 67, 68, L1 and L2 make up a five pole PI network low pass filter. C65 and L3 are a notch filter to remove harmonic products from the output signal.

TX POWER SUPPLY

Q6 (A562) is a switching transistor. When PTT is activated (grounding PIN3), Q6's base will be forward biased causing it to conduct, delivering voltage to the low-level transmitter stages. Q6 also supplies a positive voltage to the send-receive antenna switching diode D-10 (3401) causing it to conduct and switching the RF input signal to the receiver to a very low level. IC-3 (78L05) is a voltage regulator that supplies a stable 5 volts to Q7 and the varactor circuitry.

ALIGNMENT PROCEDURES

ALIGNMENT PROCEDURES

RECEIVER

1. Connect a service monitor to the radio antenna connector with a 50 OHM coaxial cable.
2. Connect the sinad meter across PIN 5 (data out).
3. Connect supply voltage to PIN 1 and ground to PIN 2.
4. Input a 1 KHZ tone with a 3 KHZ modulation on PIN 4 (data in).
5. Tune TC1 for proper frequency.
6. Connect a spectrum analyzer to TP1. Tune T6 and T5 for maximum.
7. Tune T1, 2 and 3 for best sinad.
8. T4 is preset at the factory and normally does not need adjustment. If required, increase generator level to 1K and while watching a clean sine wave on an oscilloscope, tune for maximum amplitude and cleanest sine wave.
9. Repeat steps 5-8 for more precise tuning.

   NOTE: For easier and more precise tuning, as receiver sensitivity increases, decrease generator level to keep the sinad reading approximately 8 DB.
10. Check to make sure sensitivity is better than .35 UV at 12 DB.
11. Increase generator level to 1K and switch service monitor to distortion meter. Check to make sure reading is 5%. If not, retune receiver as above checking distortion meter closely.
12. Check audio output and make sure it is 100 MV +/- 10%.

TRANSMITTER

1. Connect a service monitor to the radio antenna connector with a 50 OHM coaxial cable.
2. Connect supply voltage (9.6 volt nominal measured at the radio) to PIN 1, ground to PIN 2.
3. Connect a spectrum analyzer to the sampling port of your watt meter.
4. Ground PIN 3 (PTT) to transmit.
5. Adjust TC 2 to proper transmit frequency.
6. Tune T7, 8, 9, and 10 for maximum power with minimum spurs.
7. Tune T11, TC5, 6 and 7 for maximum power out.
8. Check that power out is 2+ watts at 9.6 volts.
9. Check that all spurious emissions are 60 DB down or better.
10. Input a 1 KHZ tone/50 MV output to PIN 4. Check that modulation is 3-5 KHZ.

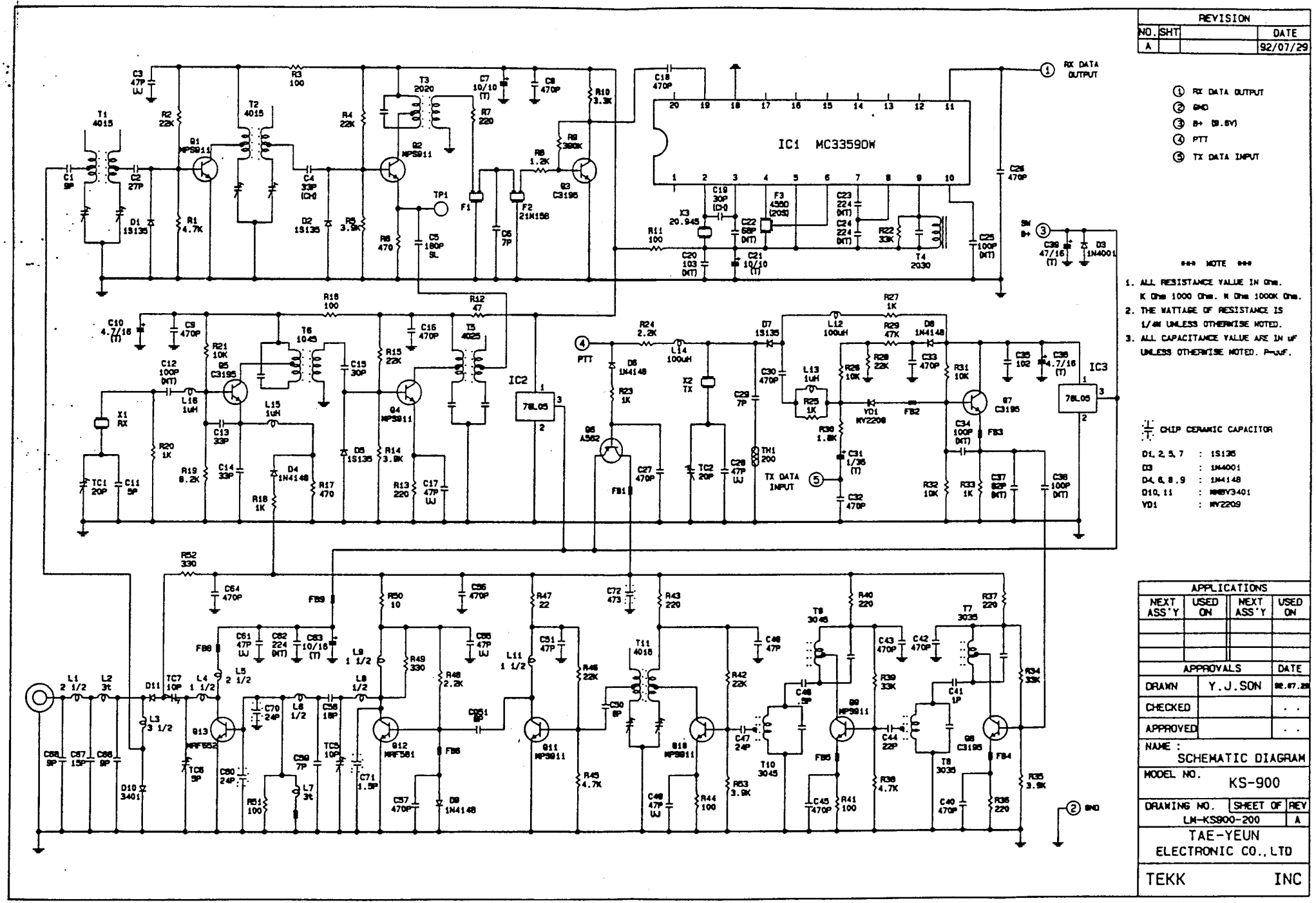
PARTS LIST

DESCRIPTION	SPECIFICATION	REMARKS
BRACKET		BLACK
CASE		BLACK
SHIELD PLATE; TIN		
COVER		BLACK
NUT	M2	
S. WASHER	M2	
GIFT BOX		

DESCRIPTION	SPECIFICATION	REMARKS
POLY BAG		
CARBON RESISTOR	10 ohm	R50
" "	100 ohm	R3, 11, 16, 41, 44, 51
" "	1 Kohm	R18, 20, 23, 25, 27, 33
" "	10 Kohm	R21, 26, 31, 32
" "	1.2 Kohm	R8
" "	1.8 Kohm	R30
" "	22 ohm	R47
" "	220 ohm	R7, 13, 36, 37, 40, 43
" "	2.2 Kohm	R24, 48
" "	22 Kohm	R2, 4, 15, 28, 42, 46
" "	330 ohm	R49, 52
" "	3.3 Kohm	R10
" "	33 Kohm	R22, 34, 39
" "	3.9 Kohm	R5, 14, 35, 53
" "	390 Kohm	R9
" "	47 ohm	R12
" "	470 ohm	R6, 17
" "	4.7 Kohm	R1, 38, 45
" "	47 Kohm	R29
" "	8.2 Kohm	R19
THERMISTOR	200 ohm	TH1
CERAMIC CAPACITOR: 50V	102 pF	C35
" "	1 pF	C41
" "	15 pF	C67
" "	18 pF	C58
" "	180 pF	C5
" "	22 pF	C44
" "	24 pF	C47
" "	27 pF	C2
" "	30 pF	C15, 19
" "	33 pF	C4, 13, 14
" "	47 pF	C3, 17, 28, 48, 49, 51, 55, 61
" "	470 pF	C8, 9, 16, 18, 27, 30, 32, 33, 40, 42
" "	0.5 pF	C46
CERAMIC CAPACITOR: CH	5 pF	C11
CERAMIC CAPACITOR: 50V	6 pF	C50, 051
" "	7 pF	C6, 29, 59
" "	9 pF	C1, 66, 68

DESCRIPTION	SPECIFICATION	REMARKS
TANTALLUM CAPACITOR	10ROK 10SCS	C7, 21
" "	10M 16SCS	C63
" "	47M 16SCS	C39
" "	4R7K 16SCS	C10,36
TANT52285 CAPACITOR	1ROK 35SCS	C31
CHIP CAPACITOR	GMC2INPO	C71
" "	MC12-473Z	C72
MULTILAYER CAPACITOR	101JAA	C12, 25, 34, 38
" "	103KAA	C20
" "	224MAA	C23, 24, 62
" "	680JAA	C22
" "	820JAA	C37
TRIMMER CAPACITOR	20 pF	TC1, 2, 5, 7
" "	5 pF	TC6
GENERAL SI-TRANSISTOR	562-Y	Q6
RF SI-TRANSISTOR	MRF 381	Q12
" "	MRF 652	Q13
" "	MPS 911	Q1, 2, 4, 9, 10, 11
" "	3195-Y	Q3, 5, 7, 8
SWITCHING SI-DIODE	IN 4148	D4, 6, 8, 9
RECTIPLE SI-DIODE	1A IN 4001	D3
VARICAP DIODE	MV 2209	VD1
PIN SI-DIODE	MMBV3401	D10, 11
PIN SI-DIODE	1S135	D1, 2, 5, 7
IF AMP I.C.	MC3359DW	IC1
REGULATOR I.C.	MC78L05	IC2, 3
I.F.T. COIL	2020	T3
" "	2030	T4
" "	4025	T1, 2, 5, 11
" "	3035	T7, 8
" "	3045	T9, 10
" "	1045	T6
INDUCTOR COIL	100 uH	L12, 14
" "	1 uH	L13, 15, 16
COIL SPRING	0.45 mm*1-1/2	L4, 9, 11
" "	0.45 mm*2-1/2	L1, 5
" "	0.45 mm*3	L2
" "	0.45 mm*3-1/2	L3
" "	0.70 mm*1/2	L6, 8

DESCRIPTION	SPECIFICATION	REMARKS
BEAD COIL	L5 BF 40	L7
" "	2.9 X 2 X 1	FB1, 2, 3, 4, 5, 6, 8, 9
CRYSTAL UNIT HC-18U	20.945 MHz	X3
CERAMIC FILTER	CFW 455D	F3
" "	MCF MF21RB (21m15b 21.4 MHz)	F1, 2



REVISION			
NO.	SHT		DATE
A			92/07/29

APPLICATIONS			
NEXT ASS'Y	USED ON	NEXT ASS'Y	USED ON

APPROVALS		DATE
DRAWN	Y.J.SON	92.07.29
CHECKED		. .
APPROVED		. .

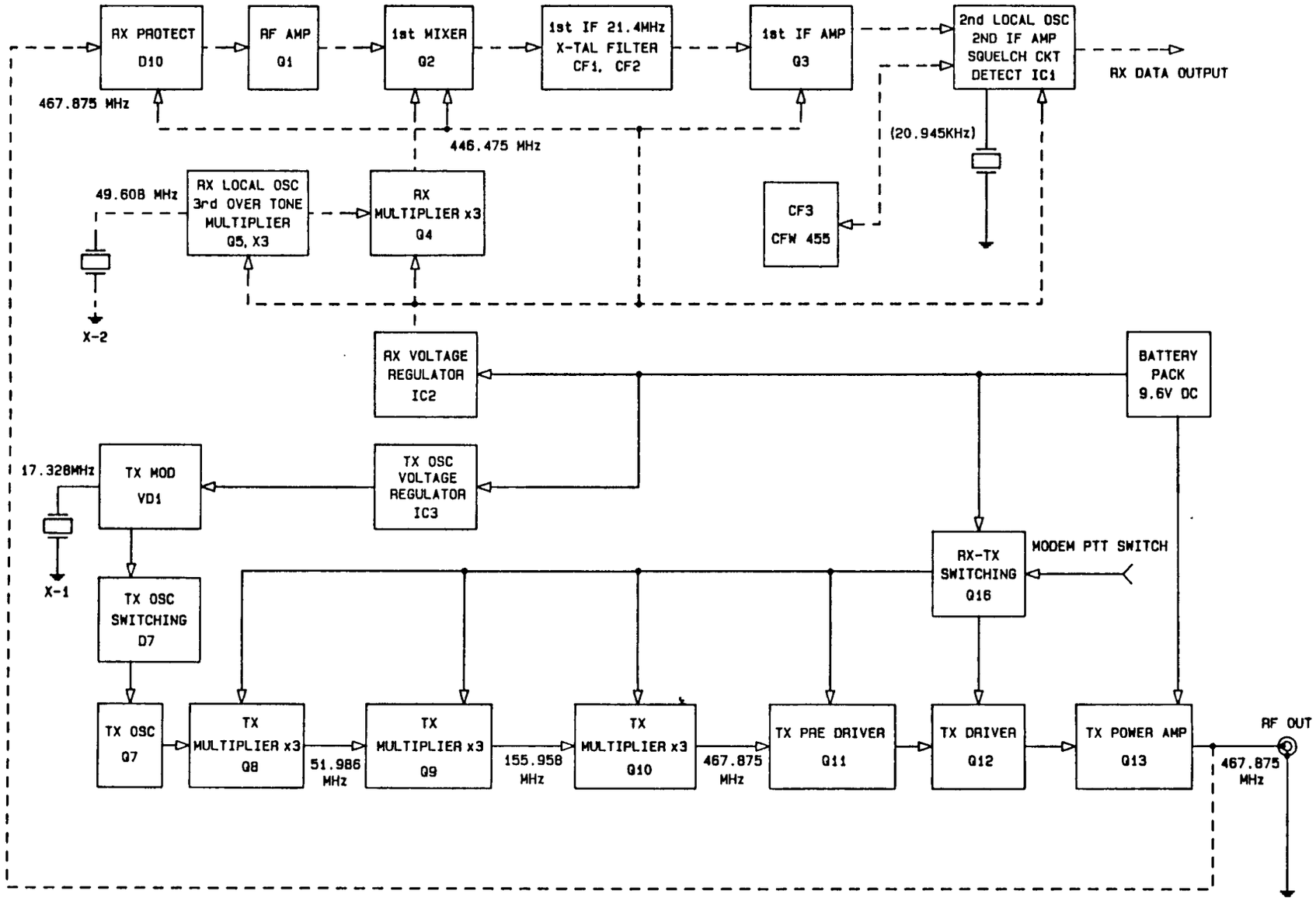
NAME : SCHEMATIC DIAGRAM

MODEL NO. KS-900

DRAWING NO.	SHEET OF	REV
LM-KS900-200		A

TAE-YEUN ELECTRONIC CO., LTD

TEKK INC



REVISION			
NO.	SHT		DATE
A			92/07/

*** NOTE ***

- - - RECEIVER

——— TRANSMITTER

APPLICATIONS			
NEXT ASS'Y	USED ON	NEXT ASS'Y	USED ON

APPROVALS		DATE
DRAWN		
CHECKED		
APPROVED		

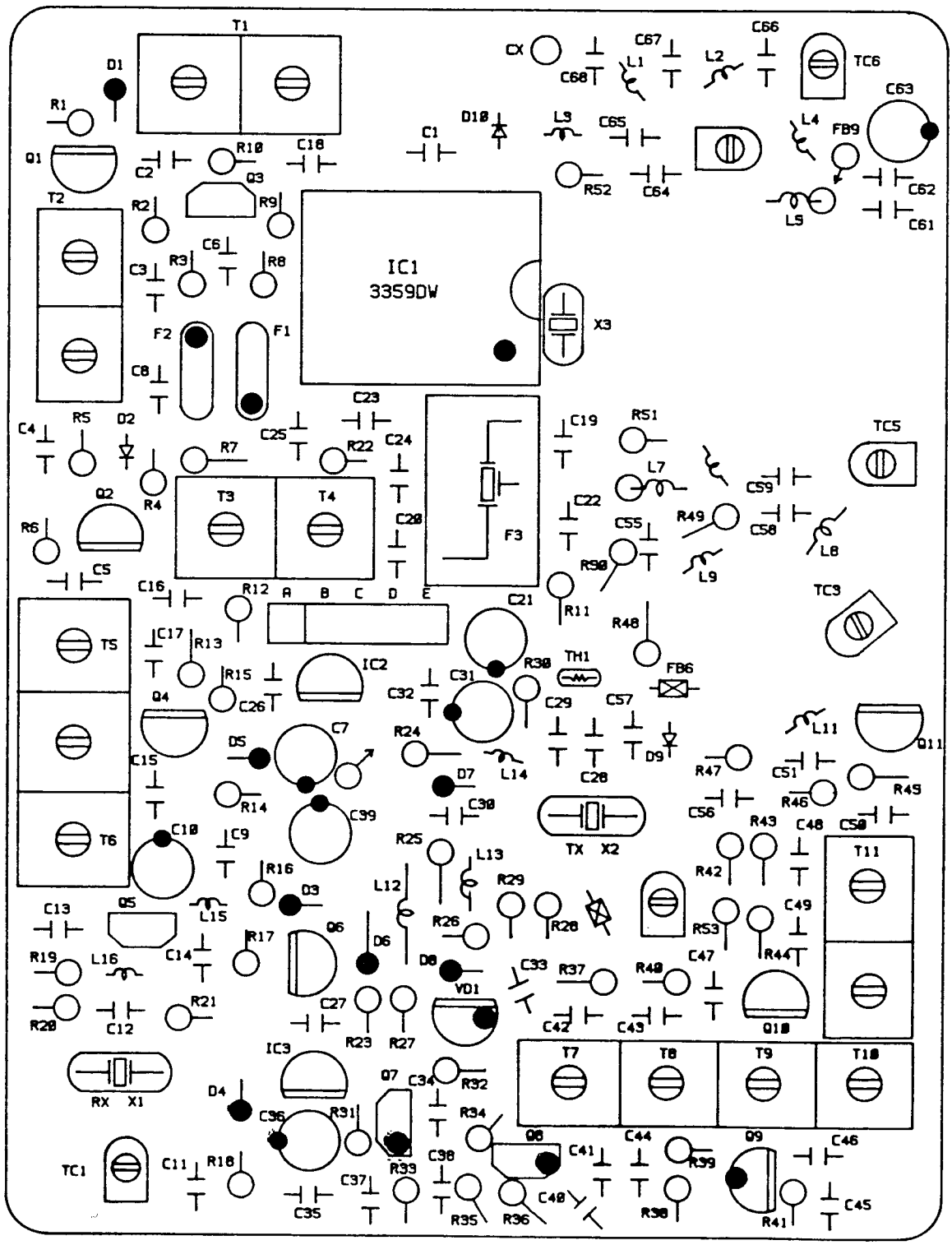
NAME: BLOCK DIAGRAM

MODEL NO. KS-900

DRAWING NO.	SHEET OF	RE
LM-KS900-100		A

TAE-YEUN
ELECTRONIC CO., LTD

TEKK INC


IC1
3359DW
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
VD1
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
IC2
IC3
TH1
TC1
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TC9
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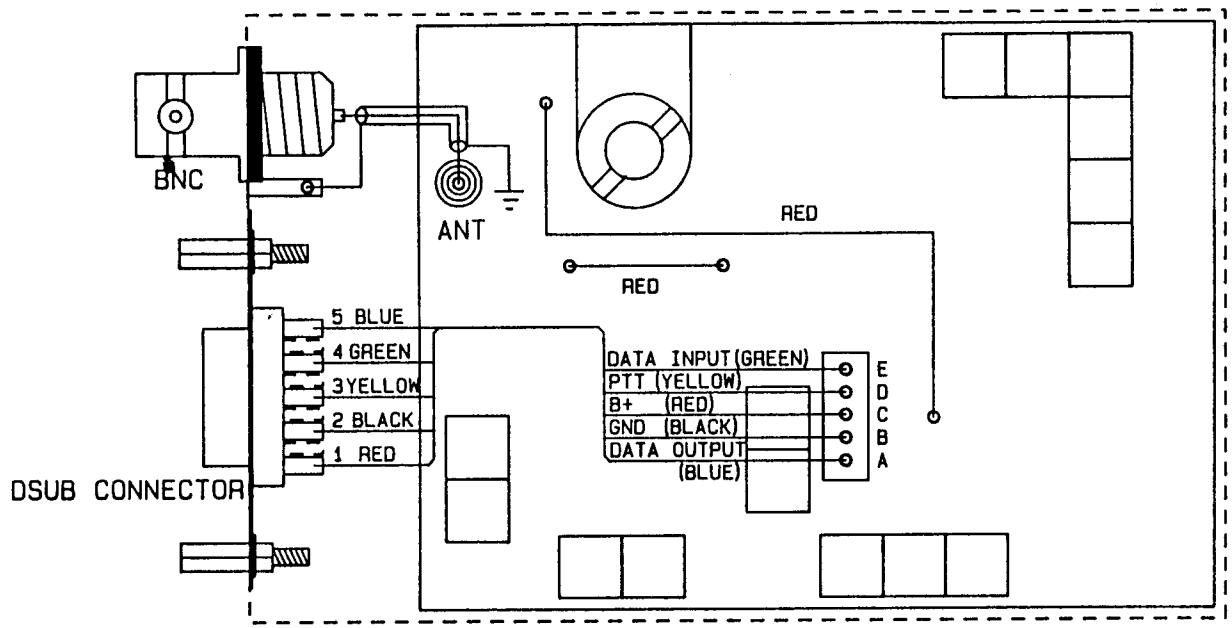

NEXT ASS'Y	ON USED	NEXT ASS'Y	ON USED

APPROVALS		DATE
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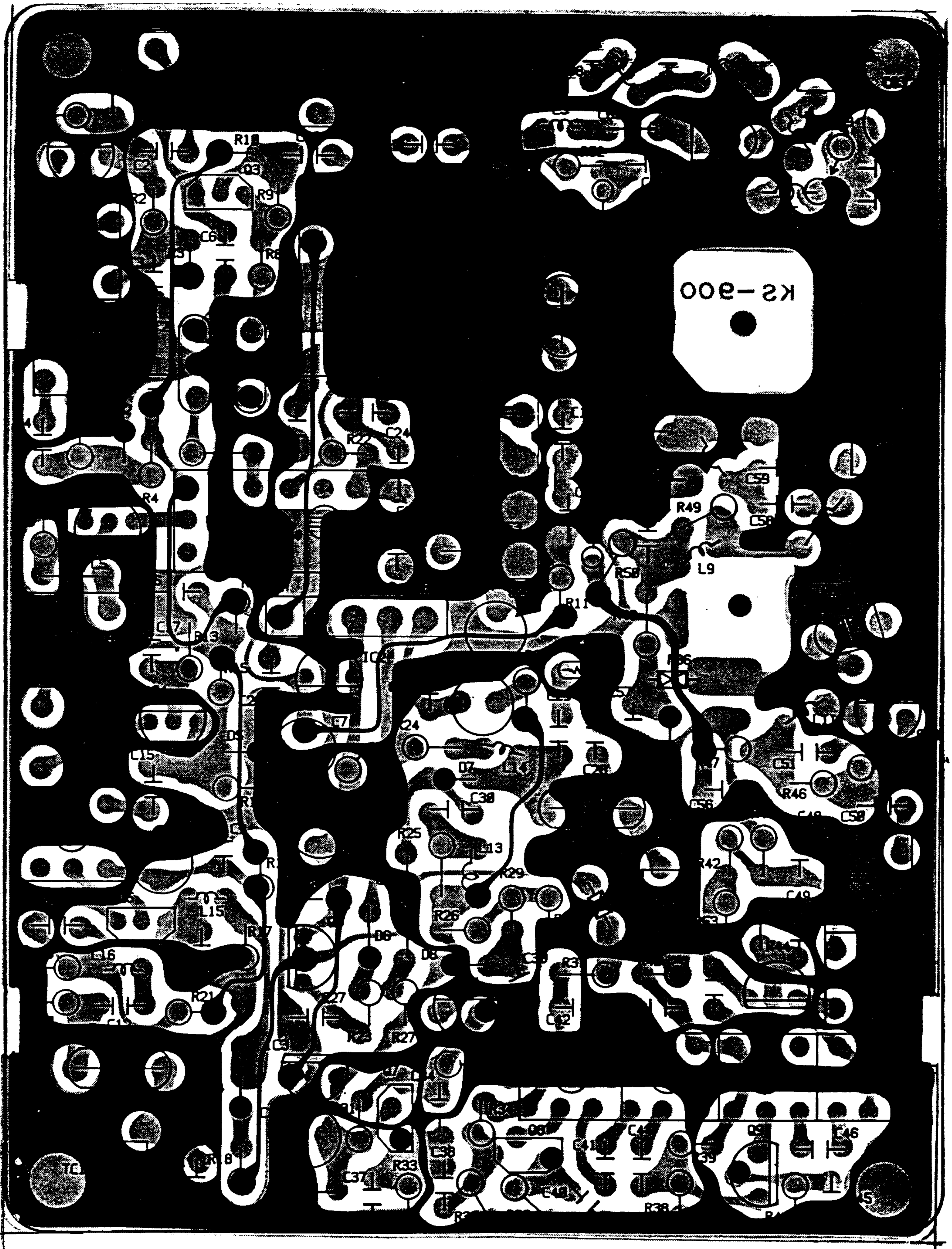
CHECKED	S.H.KIM	
APPROVED		

NAME :	WIRING	
MODEL NO.	KS-900	
DRAWING NO.	SHEET OF	REV A

TAE-YEUN
ELECTRONIC CO., LTD

TEKK INC



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