

Chinese line telegraph Model 63

Date of issue: October 2022.

After publishing over 340 Wireless for the Warrior Volume 2 'Supplements', the amount of source material gradually dried up. Not directly related material, but within the scope of the WFTW website and interest, will be published in a new range entitled the 'Various Series'.



Model 63
Country of origin:
China

Line telegraph Model 63 with originally issued headphones, earth pin and Morse key.

DATA SUMMARY

Organisation: PRC.

Manufacturer: ChiCom (?)

Year of Introduction: Probably 1963. (Production of components in the examined set were marked October 1970).

Purpose: Miniature DC line telegraph for hand-speed Morse communication with similar equipment

Function:

Circuit features: Valve AF oscillator DC keyed from the remote side. Side tone on transmit at local side.

Frequency: 1kHz +/-20%; 4.5mW in headphones.

Line: Two wire field line or single wire with earth return. Distance of reliable communication was much dependent on condition, type and length of the line.

Line current: Operation 2~15mA; calling 3~12mA.

Valve: 1K2 (DF96, 1F33 or 1AJ4).

Meter range: +/- 40mA from mid-scale bi-polar meter.

Power supply: Dry batteries 1.5V LT and 45V HT.

Consumption: LT 25mA; HT depending on line current settings, but minimally 2mA.

Size (mm) and weight:

	height	length	width	weight
Model 63 (set only)	145	105	105	1500g
Weight complete set in canvas bag	3500g.			

Accessories: 4.4kΩ impedance headphones type TA-4, spare valve type 1K2 (fitted inside), Morse key (believed type D-116A), earth pin and lead, canvas bag and possibly spare batteries.

REMARKS

Model 63 was a miniature DC Morse line telegraph set, developed and manufactured in China, believed in the first half of the 1960s.

Requiring a second similar set at the remote side, it operated on a two wire field line or a single wire with earth return. The minimum usable line current was 2mA; this produced a 1kHz note in the headphones. The self contained set was housed in a metal case with a hinged and removable lid, and when closed, was fully waterproof. A complete set was carried along with accessories in a canvas carrying bag. It was powered externally by 1.5V LT and 45V HT dry batteries, connected to three terminals fitted on the front panel. A Morse key and up to two high resistance TA-4 headphones were connected to sockets fitted on the front panel.

The system switch had three positions: off, stand-by and operation (see page 2 for functional operating diagrams with descriptions).

- In the operating position the keyed line voltage from the distant station was fed to a type 1K2 valve which was then brought to oscillation on 1kHz. A separate galvanic isolated winding on the transformer connected to the headphones.

- In stand-by position, the local station could be called by the remote station by pressing its Morse key, which actuated a relay in the local station resulting in a 1kHz calling note into the headphones. The line current, normally set to minimum reliable operation, could be set by a line current control and read on a bi-polar meter.

(Continued on page 2)

References

- User handbook for Model 63, n.d.
- Lend of set for taking photographs and permission to use his scans of user handbook courtesy J. Rijnders, PA0CHS.
- ChiCom Type 63 Wire Telegraph Set, N6CC, 2011.
<https://www.n6cc.com/chicom-type-63-wire-telegraph-set/>
- Der Summer-Telegraph 40, D-782, OdH, 10-11-1942.

The choice of components and mechanical construction of the miniaturised Chinese Model 63 appeared to be surprisingly good. The lid with rubber gaskets will close the set hermetically when not in use. In the stand-by position, no battery consumption was required. Other interesting features were the line current control allowing the line current to be set to minimum; apart from saving HT battery life, it reduced the chance of overhearing. Connecting the batteries and earth pin might have been rather awkward with only three terminals. Although the Model 63 was not a Fullerphone, similar DC line telegraphs can be found in the 'Electronic Fullerphones' tab on the WftW website. These instruments required, however, a certain amount of battery consumption in stand-by.

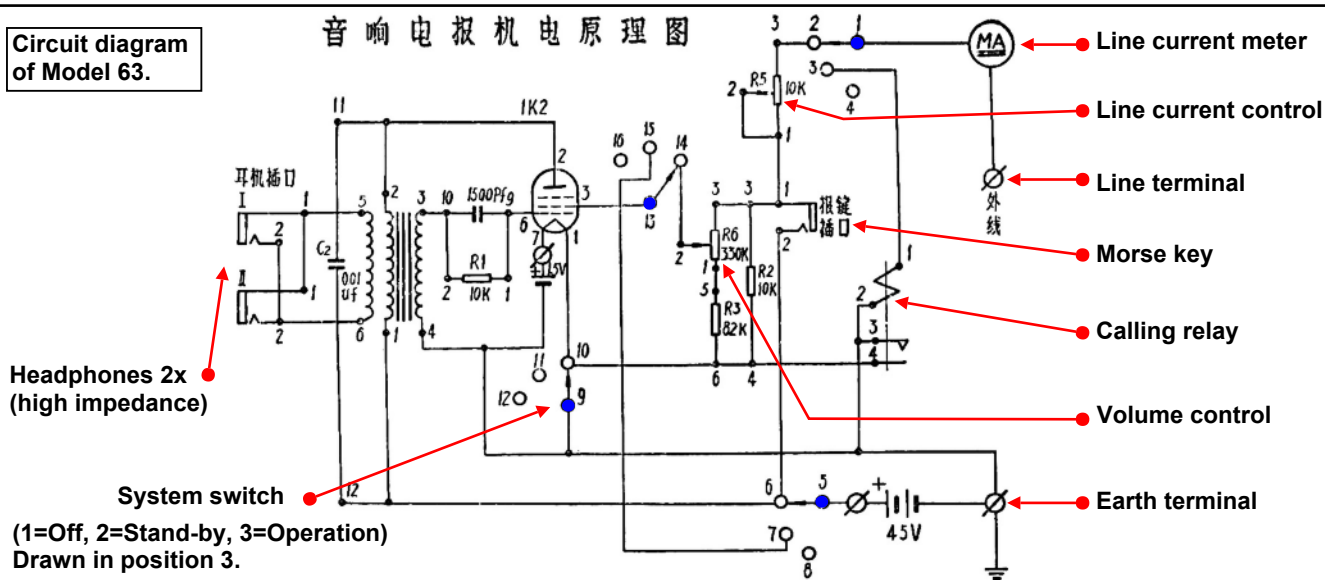
(<http://www.wftw.nl/ful.html>).

The electrical design of the WW2 German 'Sutel 40' (SummerTelegraph 40), translated 'BuzzerTelegraph 40', principally an electronic Fullerphone, came close to that of the Model 63. For calling it required the use of a separate field telephone.



Circuit diagram of Model 63.

音响电报机电原理图



Functional operating diagrams of the line Morse telegraph Model 63

Local side Line Remote side

Stand-by position (2).

Functional circuit diagram of Model 63 in stand-by position (2), ready for receiving a call to be heard in the headphones. Pressing the Morse key at a similar set at the remote side activated a relay which closed a contact from the 1.5V battery to the 1K2 valve filament. This produced a 1kHz note into the high impedance headphones.

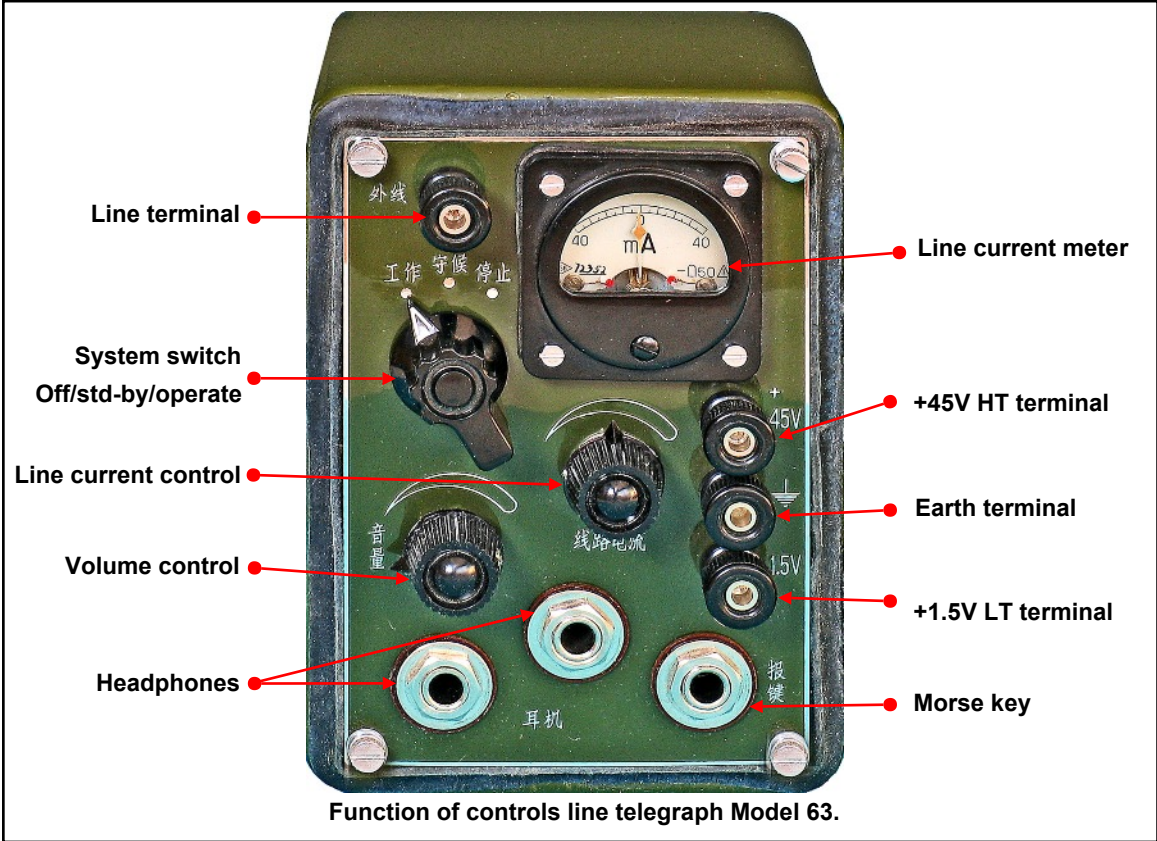
Operation position (receive) (3).

Functional circuit diagram of Model 63 in operating (receive) position (3): Pressing the Morse key at the remote side resulted in a positive voltage on the screen grid which started the 1K2 valve to oscillate at 1kHz. In order to save the battery life of the HT battery, the line current was set to the minimal current for reliable communication before establishing operation.

Operation position (transmit) (3).

Functional circuit diagram of Model 63 in operating (transmit) position (3): Pressing the Morse key at the local side resulted in a positive voltage on the screen grid at the remote side which started the 1K2 valve to oscillate on 1kHz. During transmitting the side-tone (own signals) could be heard in the headphones at the local side.

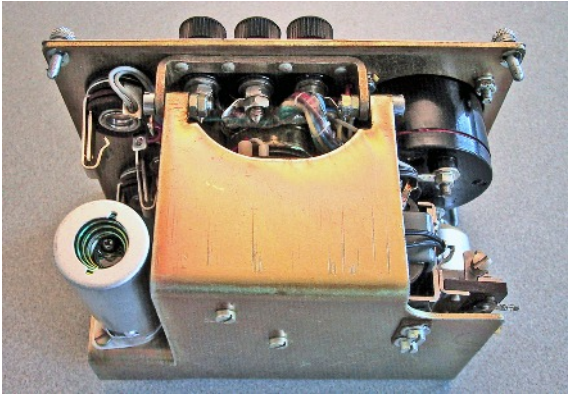
The remote station (right) is drawn in operation position (3).



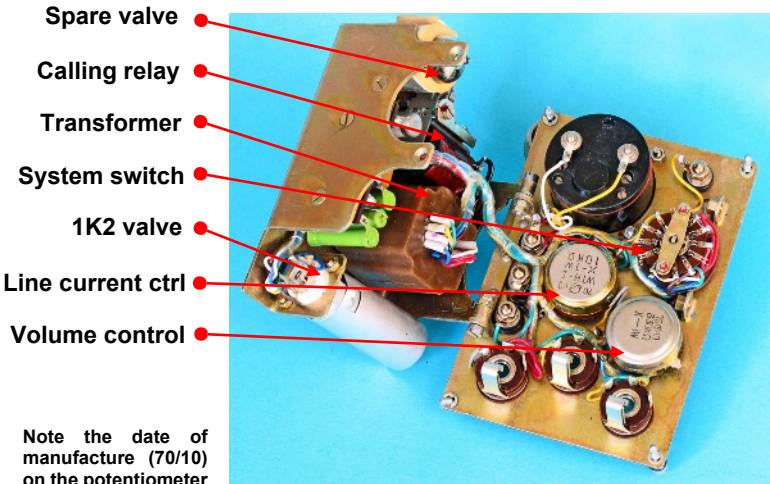
Canvas bag for carrying a complete Model 63.



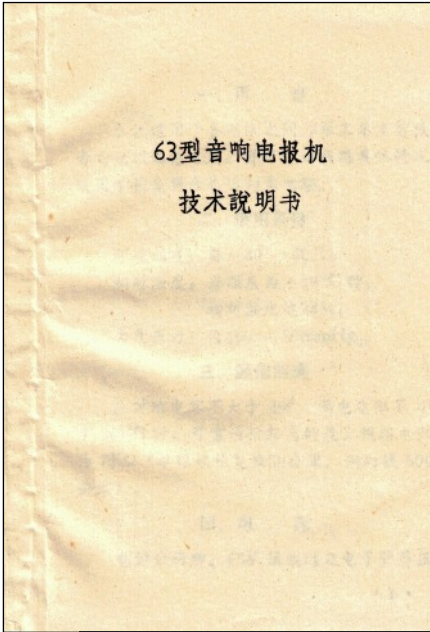
Top view of opened Model 63 showing spare valve, calling relay and line current meter (above).



Internal view of the telegraph set Model 63 as seen from the right hand side with the hinged sub-chassis closed.



Internal view of Model 63 with sub-chassis opened.



To complete the technical description of the Model 63 line telegraph, scans of all the pages of its rare user 'handbook' were printed below and on the next page. The size of the manual, written in the Chinese language, was only 84x122mm, the pages sewn together with white thread.

一、用 途

本机适用于各部队之间作单工单流有线音响电报通信之用，并可根据线路具体情况使用于被复线或长途幻象电路。

二、使用条件

环境温度：自-30°~50°C；
相对湿度：当温度为+30°C时，相对湿度达98%；
大气压力：为460~780mmHg。

三、通信距离

在对地电容不大于4μf，漏电阻不小于30KΩ时，可靠通信距离的最大线路电阻为7KΩ（单根轻被复线50公里，铜幻线500公里）。

四、电 源

电源分两种：45V 供线路及电子管屏压

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电源；1.5V 供电子管灯丝电源。

五、工作电流及输出功率、频率

工作电流：
通报2~15mA，信号3~12mA。
输出功率：
在耳机端输出功率不小于4.5mW。
频率：1,000±20%Hz。

六、结 构

1. 本机的成套组成部分为：

- (1) FLB2.175.004 电报机（主机）1台；
- (2) TA—4高阻抗头耳机(4,400Ω) 1副；
- (3) D—116—A电键1只；
- (4) FLB6.614.013号元件1根；
- (5) FLB6.640.474号线1根；
- (6) FLB6.873.002WX帆布袋1只。

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为了便于携带（1）至（5）各件均装在帆布袋内。

2. 主机机件布置：

编 号	名 称
1	±40mA直流电流表
2	外线接线柱
3	电源接线柱
4	R ₅ 10KΩ1W炭膜电位器
5	R ₆ 330KΩ1W炭膜电位器
6	六刀三位小型波段开关
7	报键插口
8	耳机插口

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七 体积和重量

全机重量3.5公斤。
主机重量1.5公斤。
全机体积（装入帆布袋后）150×200×300mm³。
主机体积105×105×145mm³。

八、准备与使用

1. 将主机、头戴耳机、报键、导线和导电件从帆布袋内取出，把主机竖直安放在适于工作的位置上并开启机盖。

2. 连接地线：先将导电件插入地下，并用水灌入导电件的凹槽内以保证与地有可靠的接触。然后紧固导线与导电件的连接，并将导线的另一端与主机的“ ”接线柱连接好。

3. 连接电源：按下述规定将电源接至主机的电源接线柱上。

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45V的“+”接至“+45V”接线柱。
1.5V的“+”接至“1.5V”接线柱。
45V的“-”接至“⚡”接线柱。

接线时要绝对避免各电源出线间发生不应有的相碰从而烧坏电子管或电源短路，此时波段开关应旋至“停止”位。

4. 检查并调整报键接点间的距离和弹簧的弹力，然后把插塞插入“报键插口”内。

5. 将头戴耳机的插塞插入“耳机插口”内，并把耳机戴在头上。

6. 将波段开关旋至“工作”位，按下报键，在自己的耳机内应有音频信号的响声，表示机器完好，最后将外线接至“外线”接线柱，即可进行工作。

九、电路说明

1. 电原理图简介：
本电路是由一只电子管所组成的 LC 报

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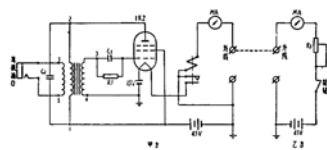
荡电路，频率为1,000±20% 赫。所需直流功率，由45伏电池供给，灯丝直流电压为1.5伏。音频变压器初级线圈1,2与电容器C₂组成振荡回路，次级线圈3,4与栅漏电阻R₁及旁路电容器C₁组成了耦合电路，以维持频率为1,000赫的等幅振荡；第三线圈5,6为变压器输出线圈，接至负载耳机上，当电子管帘栅极上有足够的正电压时，便产生振荡，输出负载耳机，即成为音响电报机。

2. 通报电路：

(a) 守候位：设乙方发报（波段开关在“工作”位），甲方守候（波段开关在“守候”位），两方线路简图如图一所示，此时甲机电子管振荡电路内45伏屏板与帘栅极电压已接上，故当乙方按下报键发送讯号时，45伏电源正极由乙方报键接点—可变电位器R₅—乙方电流表MA—外线线路而至甲方的电流表MA—继电器线圈1,2而至电源负极地。在线路电流不低于3毫安时，继电器即

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动作。继电器动作后，由其接点3,4的闭合，便将甲机电子管的灯丝电路接通而产生振荡，甲方耳机鸣响。

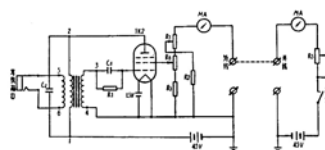


图一

(b) 工作位：在甲方收到乙方要求通报讯号后，应把报机上的波段开关至“工作”位，此时甲乙两方通报线路简图如图二所示。此时甲机振荡电路的屏极电源45伏，与灯丝电源1.5伏，均已接通，当乙方按报键发报时，45伏电源正极经由报键接点—可变电位器 R_5 —电流表MA—外线线路至甲方的电流表MA—可变电位器 R_6 —串联电阻 R_6 ， R_5 与 R_6 电阻相并联后到电源负极地。由于

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甲方电子管帘栅板得到 R_6 音量电位器上所产生的电压降而产生振荡，甲方能从耳机中听到与乙方发报一致的音响讯号。



图二

十、调整

1. 在工作时，收方可调节 R_6 （线路电流电位器）以控制音量，守候时音量固定在最高状态，音量控制不起作用。

2. 在工作时，可调节线路电流，使工作电流保持在5mA以下。

3. 继电器的调整：本机所用电磁继电器的技术数据见下表，若不动作或有吸住现象，可调整接触螺钉与螺旋簧，到能正常工作为止。

继电器数据表：

电阻	3.90CΩ±10%	
匝数	18.000	
线径	Φ0.07	
接触压力(g)	衔铁吸合时	≥6
	衔铁释放时	≥5
接点空隙(mm)	开路接点之间	≥0.15
电流(mA)	吸动电流	≤3
	释放电流	≥1.3

十一、维护及故障分析

1. 继电器和报键的接点应定期用四氯化碳擦拭，保证接触良好。

2. 要定期进行对继电器的检查维护，检查继电器的灵敏度和动作是否正常，并进行适当的调整，检查接点有否烧坏和接触不良

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的现象。

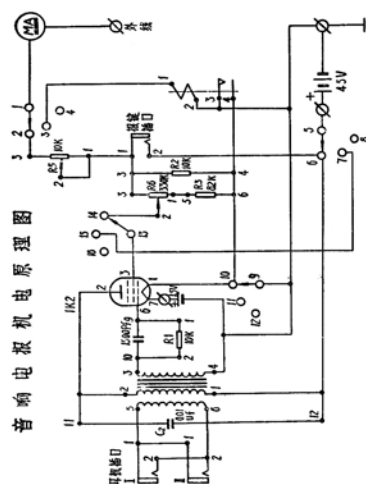
3. 应定期测量电源电压，当电压降至36V与0.9V时，应更换新的电池。

4. 如工作不能进行，应用万用表分别在各位位置按电原理图和接线图逐段进行检查，找出故障所在。

5. “工作、守候、停止”的波段开关，如发现接触不良现象，可换接在其余的空位置上。

6. 当故障均无发生以及电路均完好而没有得到足够的信号时，应更换电子管，可能电子管有衰老或损坏。

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音响电报机接线图

FLB4.835.004	SRP3.602.073	FLB4.501.515	JR-272	FLB5.282.003	FLB4.739.031	JR-272	JR-272
接线柱	电流表	3W6D真空管	继电器	电位器	电位器	继电器	继电器
45V	1.5V	45V	45V	45V	45V	45V	45V
1.5V	1.5V	1.5V	1.5V	1.5V	1.5V	1.5V	1.5V
45V	1.5V	45V	45V	45V	45V	45V	45V
1.5V	1.5V	1.5V	1.5V	1.5V	1.5V	1.5V	1.5V
45V	1.5V	45V	45V	45V	45V	45V	45V
1.5V	1.5V	1.5V	1.5V	1.5V	1.5V	1.5V	1.5V