Marlin
ELECTRONICS LTD

SERVICE MANUAL

TIROS MK II

Marlin Electronics Ltd. P.O. Box 27092, Auck.

Marlin
ELECTRONICS LTD

SERVICE MANUAL

TIROS MK II

Marlin Electronics Ltd. P.O. Box 27092, Auck.

MARLIN " TIROS"

General Description.

The Radio-telephone consists of a transmitter and receiver housed in a metal Cabinet 9" high, 13" deep and 22" wide. All controls are brought to the front panel. The bi-panel is made of perspex and anodised aluminium to prevent corrosion.

The power for the Radio-telephone is derived from either 12 volt or 24 volt storage batteries. The unit is self-contained the power supply for the R.F. section being a Transistor D.C. convertor type.

The transmitter has a power in-put of 100 watts and a tunable receiver which covers 0.55 mc/s to 4.0 mc/s.

OPERATING INSTRUCTIONS.

RECEIVE

1. Switch the receiver on with the ON/OFF switch.

2. Select the band by the BC/SW switch (B.C. - broadcast. S.W. - MARINE.)

3. Tune the receiver with the tuning knob.

4. The volume is adjusted with the VOLUME control.

5. The "NOISE LIMITER" may be switched on to reduce high noise peaks under noisy receiving conditions.

6. To NETT on to the correct frequency - select the desired frequency with the frequency selector switch, press the NETT button and tune the receiver until the netting signal is tuned in.

TRANSMIT.

1. Switch the "XMTR" standby switch on.

2. Insure the LOUDHAIL/XMT switch is in the XMT position.

3. Select the transmitting channel with the frequency selector switch (2012, 2045 etc.)

4. To tune the aerial, press the pressel switch on the microphone and tune the fine and coarse controls until the meter reads maximum.

5. The set is now tuned and ready for use. Press the pressel switch on the microphone and speak into the microphone with normal speaking voice.

LOUDHAILER OPERATION.

Switch the LOUDHAIL/XMT switch to the LOUDHAIL position, press the pressel switch on the microphone and speak into the microphone with a normal speaking voice.

INSTALLATION

The Radio-telephone should be fitted in a convenient position close to the aerial lead-in, at the same time being close to the batteries so as to keep the battery leads as short as possible.

It is also necessary to ensure that the voltage at the battery input terminals on the set, with fully charged batteries, does not fall below 11.8 volts (on TRANSMIT).

If the battery leads must be long, it will be necessary to increase the effective diameter of the conductors to overcome the loss in voltage.

The equipment is normally negative earth. In order to make the system positive earth the transistor power supply in the set has to be modified. It is advisable to return the set to the factory for this modification.

AERIALS

It is difficult to recommend the best aerial to instal unless the type of boat to be fitted is specified, but for best results the inverted "L" type aerial should be installed if at all practicable. The following points should be borne in mind, when erecting these aerials:-

1. The aerial should be as high as possible and kept clear of surrounding objects.

2. The lead should be as direct as possible, at the same time, bearing in mind the possibility of picking up interference.

3. Adequate insulation must be used. One insulator at each support must be used, together with a lead-in insulator to the place of operation.

4. The aerial should be as long as possible but must not exceed a quarter wave-length at the highest frequency used.

5. Avoid having finger-tight junctions in the aerial.
   It is always best to have a continuous length of wire from start to finish of the aerial.

EARTHING EQUIPMENT

In order to obtain best results the set should be earthed and it is suggested that a short direct heavy copper wire connection be made between the black terminal on the cabinets, marked EARTH, and the nearest effective "earthing" point. The "earth" point may be any convenient metallic object that is in direct contact with the water.

NOTE: The earth terminal on the set is connected to the chassis by means of a .005 mfd mica condenser. This is to block D.C. which may flow in the earth lead to prevent electrolysis action, but sufficient to by-pass R.F.

The following suggestions for "earth" points:-

(a) Non-metallic hulls:

Copper, plate fitted to hull.

Metal keel.

Engine bear bolts.

Rudder mounting.

(b) Metallic hulls:

As above or metal hull.

ELECTRICAL INTERFERENCE

IGNITION

To reduce ignition interference the following points should be observed:-

1. Install the set as far as possible from the engine.

2. Try to arrange the aerial system so that the lead-in avoids the metalwork associated with the engine.
   Also it should be kept as far as possible from the ignition wiring.

3. Avoid, if possible, earthing the set to the engine.

4. Do not run the aerial lead-in parallel or close to lighting wires.

If the above points have been observed and there is still excessive ignition noise, it may be necessary to try one or more of the following:-

(a) If the ignition coil is not mounted on the engine block, either a heavy wire should earth it to the engine, or if possible, the coil should be mounted on the engine.

(b) Fit a 0.5 mfd condenser between the "batt" terminal on the coil and earth.

(c) Fit a suppressor resistor in the coil-to-distributor lead as close to the distributor as possible. The resistor should preferably be one of the screw-in type of about 10k ohms in value.

(d) Suppression by the insertion of suppressors in each plug (10k ohms).

GENERATOR

The interference set up by the generator can be distinguished readily by rhythmic crackling which becomes a medium pitched "whir" as the motor is speeded up.

The method of suppression is to fit 0.5 mfd condensers from the armature to earth.

If this method is not satisfactory, break the field circuit with a switch to eliminate the generator noise completely.

AUXILIARY GENERATING EQUIPMENT

Fit a 0.5 mfd condenser between each brush and earth with the minimum length of wire.

MARLIN TIROS MARK II

General Description:

The radio-telephone consists of a transmitter and receiver housed in a metal cabinet. Dimensions - 9" high, 14" deep and 11" wide overall. All controls are brought to the front panel.

The power for the radio-telephone is derived from either 12 volt or 24 volt storage batteries.

The unit is self contained, the receiver being completely transistorised having a battery drain of only 400 MA.

The power supply and modulators for the transmitter being also transistorised.

The transmitter has an input power of 100 watts and a receiver which covers from .53mc/s - 1.6 mc/s B/C band tunable (and 2.0 mc/s up to 6mc/s) crystals controlled up to 6 spot frequencies.

Incorporated in the equipment is a polarity and voltage protection.

Manufactured by : Marlin Electronics Limited.
P.O. Box 27092,
MT. ROSKILL.

Auckland.

- - - - - - - - - - - - - - - -

Controls and Terminals:

OFF/Receiver ON/Transmitter stand by - This switch controls the power supplied to the receiver and transmitter from the batteries.

Low High - This toggle switch in the low position decreases input power to the transmitter.

Transmitter Channels - This switch selects the appropriate frequency for the transmitter on the marine band.

Volume Control - This control adjusts the volume of the receiver.

Squelch Control - This control is used for muting the receiver.

Receiver Channels - This switch selects the B.C. band or the appropriate frequency on the marine band.

B.C. Tuning - This control is used for tuning the B.C. band.

Loading Coarse and Fine - These switches tune the aerial to the transmitter.

Pressel Switch on Microphone - This button switches from receiver to transmitter.

Aerial Terminal - This connects aerial lead to the radio - telephone.

Earth Terminal - This connects earth lead to the radio - telephone.

Battery Terminals - This connects the leads from the battery on to the radio - telephone.

Operating Instructions :

Receive -

1. Switch the receiver on with the off/receiver on/transmitter standby switch to receiver on.
   When switch is on, receiver on, the battery drain is approximately .0.4 amp and should be left in that position when listening on broadcast or marine band only so as to conserve the batteries as much as possible.
2. To listen to the broadcast band, set the channel selector switch to broadcast.
3. The desired station can now be selected by the tuning control.
4. To listen to the marine band. Set the channel selector switch to the required channel.
5. The volume is adjusted with the volume control.
6. The squelch control can be adjusted to cut background noise in absence of a signal.

Transmit :

1. Switch the transmitter valve filaments on by switching the off/receiver on/transmitter standby switch to the transmitter standby position. Unit will now draw total current of 2 amp. Allow one minute for the valves to heat up.
2. Select the transmitting frequency with the transmitter channel selector (2045, 2182 etc.)
3. To tune the aerial, press the pressel switch on the microphone and tune the coarse and fine controls until the P.A. meter reads maximum.
4. The set is now ready for use. Press the pressel switch on the microphone and speak into the microphone with a normal speaking voice.
5. The low high power switch is provided to reduce the output of the transmitter when working a station in close proximity.

Installation :

The radio-telephone should be fitted in a convenient position close to the aerial lead in, at the same time being close to the battery so as to keep the battery leads as short as possible. It is also necessary to ensure that the voltage at the battery input terminals on the set, with fully charged batteries, does not fall below 11.8 volts for 12 volt system and not below 23 volts for 24 volt system (on transmit). If the battery leads must be long it will be necessary to increase the effective diameter of the conductors to overcome the loss in voltage.

The equipment has a floating battery input system. So as long as the negative lead is connected to the negative terminal, and the positive lead is connected to the positive terminal (if polarity is reversed the radio-telephone renders inoperative without damaging the equipment.) The equipment still works regardless of the type of earthing used. (Positive or negative earth.)

Voltage Protection : If the supply voltage for 12 volt system drops below 10 volts or above 16 volts the transmitter will not operate. This is a safety protection for the power supply and modulation transistors. For 24 volt system the same applies but minimum voltage is 20 volts and maximum voltage is 32 volts.

AERIALS

It is difficult to recommend the best aerial to install unless the type of boat to be fitted is specified, but for best results the inverted "L" type aerial should be installed if at all practicable. The following points should be borne in mind, when erecting these aerials: -

1. The aerial should be as high as possible and kept clear of surrounding objects.
2. The lead should be as direct as possible, at the same time, bearing in mind the possibility of picking up interference.

Cont.

AERIALS Cont.

3. Adequate insulation must be used. One insulator at each support must be used, together with a lead-in insulator to the place of operation.

4. The aerial should be as long as possible but must not exceed a quarter wave-length at the highest frequencey used.

5. Avoid having finger-tight junctions in the aerial. It is always best to have a continuous length of wire from start to finish of the aerial.

EARTHING EQUIPMENT

In order to obtain best results the set should be earthed and it is suggested that a short direct heavy copper wire connection be made between the black terminal on the cabinets, marked EARTH, and the nearest effective "earthing" point. The "earth" point may be any convenient metallic object that is in direct contact with the water.

NOTE: The earth terminal on the set is connected to the chassis by means of a .005 mfd mica condenser. This is to block D.C. which may flow in the earth lead to prevent electrolysis action, but sufficient to by-pass R.F.

The following suggestions for "earth" points: -

(a) Non-metallic hulls:
Copper, plate fitted to hull.
Metal keel.
Engine bear bolts.
Rudder mounting.

(b) Metallic hulls:
As above or metal hull.

- - - - - - - - - - - - - - -

ELECTRICAL INTERFERENCE

IGNITION

To reduce ignition interference the following points should be observed : -

1. Install the set as far as possible from the engine.
2. Try to arrange the aerial system so that the lead-in avoids the metalwork associated with the engine. Also it should be kept as far as possible from the ignition wiring.
3. Avoid, if possible, earthing the set to the engine.
4. Do not run the aerial lead-in parallel or close to lighting wires.

If the above points have been observed and there is still excessive ignition noise, it may be necessary to try one or more of the following: -

(a) If the ignition coil is not mounted on the engine block, either a heavy wire should earth it to the engine, or if possible, the coil should be mounted on the engine.

(b) Fit a 0.5 mfd condenser between the 'batt' terminal on the coil and earth.

(c) Fit a suppressor resistor in the coil-to-distributor lead as close to the distributor as possible. The resistor should preferably be one of the screw-in type of about 10K ohms in value.

(d) Suppression by the insertion of suppressors in each plug (10K ohms).

- - - - - - - - - - - - -

GENERATOR

The interference set up by the generator can be distinguished readily by rhythmic crackling which becomes a medium pitched "whir" as the motor is speeded up.

The method of suppression is to fit 0.5 mfd condensers from the armature to earth.

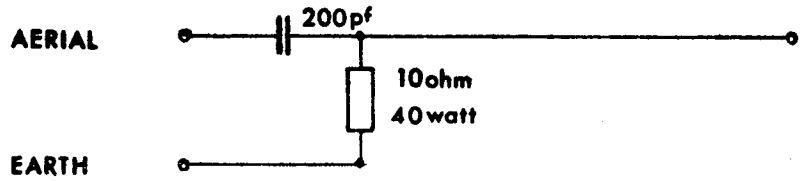
If this method is not satisfactory, break the field circuit with a switch to eliminate the generator noise completely.

AUXILIARY GENERATING EQUIPMENT

Fit a 0.5 mfd condenser between each brush and earth with the minimum length of wire.

- - - - - - - - - - - - -

FIG.1.



XTALS Freq.

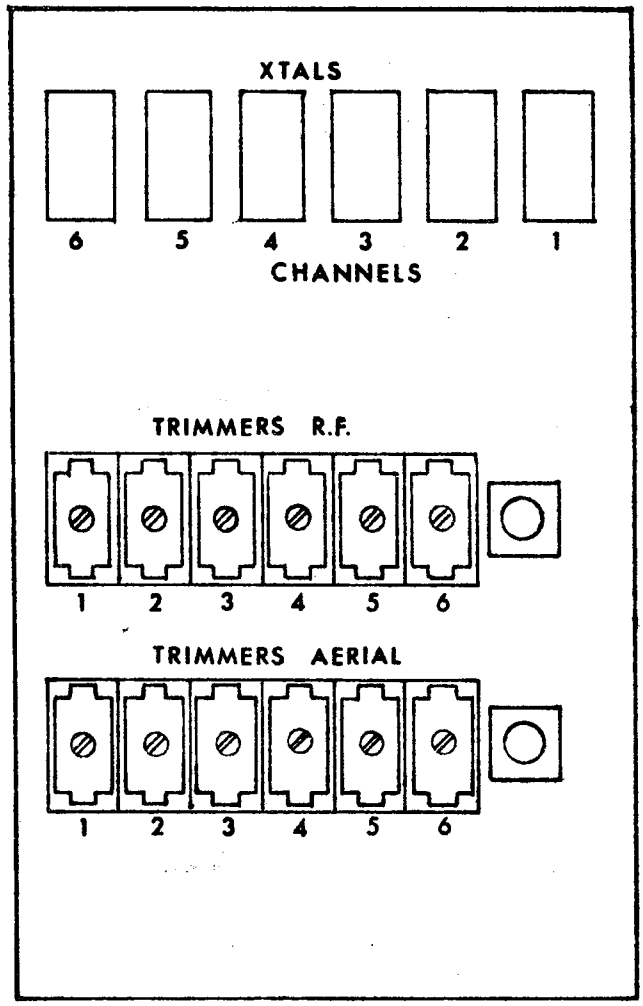
RX.	TX
2188	2188
2152	2162
2128	2128
2090	2090
2068	2068
2045	2045.

+465 KC/s
Receive XTALS

RX

FIG.2.

TX →



→ XTALS.
1 2 3 4 5 6 7

Technical Information :

Transmitter Alignment -

1. Remove top cover.
2. Select required channel for alignment.
3. Check if the correct crystal is in the corresponding socket.
4. Disconnect appropriate wire from tank coil.
5. Place wire on various points of the tank coil until resonance is found (or minimum reading on meter) this should read 40 MA. ± 20%.
6. Connect dummy lead as per Fig. 1.
7. Connect VTVM (R.F. Probe) 50 volt AC range across the 10 ohm 40 watt resistor. Press Pressel switch and adjust coarse and fine loading switches to read maximum on VTVM which should read about 23 volts AC. Plate current on the PA meter should read about 180-200 MA. If undercoupled both meter readings are low. Remove appropriate link wire from bottom on tank coil and move up one turn. If overcoupled the VTVM will read low and PA meter high, so reverse procedure.
8. To check modulation connection scope through low capacity probe across 10 ohm 40 watt resistor (Fig.1.)
9. Observe transmitter carrier output when modulation occurs, it should be approximately 90%.

- - - - - - - - - - - -

Receiver Alignment -

General

Allow the test equipment to warm up for 10-15 minutes before starting the alignment.

Signal Generator

Use AM RF signal generator, modulated 30% at 400 c/s, connect ground lead to chassis and the output across (dummy lead Fig. 1) 10 ohm 10 watt resistor.

Output Meter

Connect an output meter (AC voltmeter or oscilloscope) across the speaker voice coil connections.

Output Level

Attenuate the signal generator output throughout the alignment so as to maintain the output level below 1 watt.

Controls

Set volume control at maximum and the squelch control at minimum.

Set receiver channel selector on Broadcast.

IF Alignment :

1. Connect signal generator to collector of RF transistor via a 0.1 mfd capacitor.
2. Adjust signal generator to 465 Kc/s EXACTLY.
3. Set broadcast tuning dial to HF end.
4. Adjust IF transformers from detector stage up to the front stages for maximum.

BC Alignment :

1. Connect signal generator through dummy lead (Fig. 1) to aerial input.
2. Tune signal generator to 1600 Kc/s.
3. Set dial to 1600 Kc/s.
4. Adjust B.C. oscillator trimmer RF end AE trimmer for maximum.

Cont....

BC Alignment :

5. Set signal generator to 530 Kc/s.
6. Tune dial to 530 Kc/s.
7. Adjust oscillator coil for maximum output.
8. Repeat step 2, 3 and 4.
9. Sensitivity should be approximately 10/uV for 50MW output.

Marine Band Alignment :

1. Set receiver channel selector to the highest frequency used in the marine band on the receiver.
2. Adjust signal generator for maximum output.
3. Adjust appropriate trimmer on SW board as per Fig. 2. for maximum output.
4. Sensitivity should be approximately 8/uV for 50 MW output.

- - - - - - - - - - - - - - -

CAPACITORS

* REF. CHANGES FOR 24 VOLT CIRCUIT

CIR. REF.	VALUE	TYPE	W.V.D.C.
C 1	5-55 PF	TRIMMER	
C 2	10 K PF	DISC.CER.	500
C 3	1 K PF	DISC.CER.	500
C 4	5-55 PF	TRIMMER	
C 5	5-55 PF	TRIMMER	
C 6	5-55 PF	TRIMMER	
C 7	5-55 PF	TRIMMER	
C 8	5-55 PF	TRIMMER	
C 9	5-55 PF	TRIMMER	
C10	10 K	POLYESTER	50
C11	100 PF	CER.	500
C12	5-55 PF	TRIMMER	
C13	10 K PF	POLYESTER	50
C14	1 K PF	DISC.CER.	500
C15	470 PF	POLYSTYRENE	125
C16	5-55 PF	TRIMMER	
C17	5-55 PF	TRIMMER	
C18	5-55 PF	TRIMMER	
C19	5-55 PF	TRIMMER	
C20	5-55 PF	TRIMMER	
C21	5-55 PF	TRIMMER	
C22	10 K PF	POLYESTER	50
C23	10 K PF	DISC.CER.	500
C24	10K PF	POLYESTER	50
C25	150 PF	POLYESTER	125
C26	5-55 PF	TRIMMER	
C27	4 PF	DISC.CER.	500
C28	1.5K PF	POLYESTER	50
C29	50 K PF	POLYESTER	50
C30	5 PF	DISC.CER.	500
C31	50 K PF	POLYESTER	50
C32	50 K PF	POLYESTER	50
C33	30 PF	DISC.CER.	50
C34	10 K PF	POLYESTER	50
C35	20 K PF	MYLAR	125
C36	5 MF	ELEC.	12
C37	5 MF	ELEC.	12
C38	5 MF	ELEC.	12
C39	1 MF	ELEC.	12
C40	3 MF	ELEC.	6
C41	100 MF	ELEC.	10
C42	5 K PF	POLYESTER	50
C43	5 K PF	POLYESTER	50
C44	200 MF	POLYESTER	3
C45	25 MF	ELEC.	25
C46	10 MF	ELEC.	6
C47	5K PF	DISC.CER.	500
C48	10K	DISC.CER.	500
C49	22 PF	CER.TUBE	500
C50	150 PF	CER.TUBE	500
C51	10 PF	CER.TUBE	500
C52	0.1 MF	POLYESTER	50
C53	0.2 MF	POLYESTER	50
C54	25 MF	ELEC.	25
C55	500 MF	ELEC.	12
C56	0.27 MF	DISC.CER.	25
C57	250 PF	TUBE.CER.	1000
C58	5K PF	DISC.CER.	5K
C59	5K PF	DISC.CER.	5K
C60	5K PF	DISC.CER.	500
C61	1K PF	DISC.CER.	500
C62	5K PF	DISC.CER.	500
C63	10 PF	DISC.CER.	5K
C64	150 PF	TUBE CER.	1K
C65	1K PF	FEED THRU	2K
C66	5K PF	DISC.CER.	500
C67	22 PF	TUBE CER.	500
C68	220 PF	TUBE CER.	500
C69	5K PF	DISC.CER.	500
C70*	500 MF	ELEC.	12
C71	100 MF	ELEC.	25
C72*	500 MF	ELEC.	12
C73	8 MF	ELEC.	450
C74	8 MF	ELEC.	450
C75	0.27 MF	DISC.CER.	25
C76*	0.27 MF	DISC.CER.	25
C77*	0.27 MF	DISC.CER.	25
C78	15K PF	DISC.CER.	1K
C79	5K PF	DISC.CER.	500
C80	5K PF	DISC.CER.	500
C81	5K PF	DISC.CER.	500
C82	100 PF	TUBE CER.	500
C83	22 PF	TUBE.CER.	500

* CHANGES TO 24 VOLT CIRCUIT

C70	- DELETE -		
C72	500MFD	ELEC.	50
C76	.1 MFD	DISC.CER.	100
C77	.1 MFD	DISC.CER.	100

RESISTORS

CIR. REF.	VALUE	WATTS	TOL.
R 1	470 K	½	10%
R 2	47	½	10%
R 3	10 K	½	10%
R 4	1 K	½	10%
R 5	1 K	½	10%
R 6	47	½	10%
R 7	22 K	½	10%
R 8	4.7 K	½	10%
R 9	2.2 K	½	10%
R10	33 K	½	10%
R11	1.2 K	½	10%
R12	10 K	½	10%
R13	56 K	½	10%
R14	10 K	½	10%
R15	2.7 K	½	10%
R16	1 K	½	10%
R17	470 K	½	10%
R18	5 K	POT	
R19	10 K	½	10%
R20	6.8 K	½	10%
R21	820	½	10%
R22	10 K	½	10%
R23	10 K	½	10%
R24	10 K	½	10%
R25	15 K	½	10%
R26	6.8 K	½	10%
R27	470	½	10%
R28	5	½	10%
R29	22 K	½	10%
R30	3.9 K	½	10%
R31	350	½	10%
R32	20	½	10%
R33	1	1	10%
R34	27 K	½	10%
R35	27 K	½	10%
R36	6.8 K	½	10%
R37	820	½	10%
R38	6.8 K	½	10%
R39	150	½	10%
R40	10 K	½	10%
R41	10 K	½	10%
R42	6.8 K	½	10%
R43	47 K	½	10%
R44	220	½	10%
R45	2.7K	½	10%
R46	1 K LIN POT		10%

* REF. CHANGES AND ADDITIONS FOR 24 V. CURCUIT

CIR.REF.	VALUE	WATTS	TOL.
R47	4.7 K	½	10%
R48	820	½	10%
R49	250	PRESET POT	
R50*	120	½	10%
R51	820	½	10%
R52*	100	6	10%
R53	15 K	6	10%
R54	15 K	6	10%
R55	3.3 K	6	10%
R56	47	½	10%
R57	47	½	10%
R58	820	½	10%
R59	22 K	1	10%
R60	15 K	1	10%
R61	1 K	1	10%
R62	100 K	½	10%
R63	6.8 K	6	10%
R64*	560	½	10%
R65	4.7	1	10%
R66	1 K	1	10%
R67	47	1	10%
R68*	470	1	10%
R69*	3.3	10	10%
R70*	150	8	10%
R71	150 K	½	10%

* CHANGES AND ADDITIONS FOR 24 VOLT CIRCUIT

R50	2.2 K	½	10%
R52	330	6	10%
R64	1.5 K	1	10%
R68	1.5 K	1	10%
R69	10	10	10%
R70	1 K	10	10%
R72	100	6	10%
R73	28	5	10%
R74	.5	5	10%
R75	32	5	10%