C.B.

JWR™ ®



MODEL M2.
INSTRUCTION MANUAL

CITIZENS BAND TRANSCEIVER
40 CHANNEL. 27 F.M.



INSTRUCTION MANUAL FOR 40 CHANNEL FM SOLID STATE CITIZENS BAND 2-WAY RADIO

SPECIFICATIONS

GENERAL

Channels	40
Frequency Range	27.60125 to 27.99125 FM
Frequency Control	Crystal Phaselock Synthesizer
Frequency Tolerance	±0.005%
Frequency Stability	±0.002%
Operating Temperature Range	−5°C to +45°C
Microphone	Plug in 4 pin Dynamic Type
Input Voltage	13.8V DC (Positive or Negative Ground)
Current Drain	Receive: 1.5A at maximum audio Output: 0.5A standy (no signal)
Size	190mm x 146mm x 51mm
Weight	1.25 Kilograms
Antenna Connector	Standard SO 239 Type
Semiconductors	14 Transistor 4 IC 16 Diode 1 FET
Meter	Illuminated, indicates relative power output and received signal strength.
Channel Indicator	Green LED
Power Bandswidth	10.5 V to 16 V
Attenuator	10 dB Attenuator fitted as standard
Circuit Protection	Able to sustain an SWR reading of 20 : 1 for up 5 minutes

TRANSMITTER

FM Power	4 watts/0.4 watts as specified in MPT 1320 via Hi/Lo Attenuator of 10 dB -
Modulation	High and Low Frequency Modulation
FM Deviation	up to ±2.5 KHz

Frequency Response	40 DHz — 2.4 KHz
Output Impedance	50 Ohms Unbalanced
Output Indicators	Meter shows relative RF Power Output, receiving signal strength, Mod-Tmx Lamp indicates Transmit Mode.
Harmonic Suppression and Spurious Emissions	Better than required in MPT 1320

RECEIVER

Sensitivity	1 uV for 10 dB S/N
Signal to Noise Ratio at 20 dB	2 uV
Selectivity	5 KHz
Image Rejection	More than 45 dB
IF Rejection	50 dB
Automatic Gain Control (AGC)	100 dB
Squelch	0.1 uV — 1.5 uV
Audio Frequency Response at 10dB	250 Hz — 2.5 KHz
Distortion	Less than 5%
Adjacent Channel Rejection	More than 80 dB
Cross Modulation	More than 50 dB
IF Frequency	455 KHz/10.695 MHz
Audio Output Power	3 W into 8 Ohm (10% distortion)
Built in Speaker	8 Ohms
External Speaker (Optional)	8 Ohms; disconnects internal speaker when connected.

SECTION I

INSTALLATION

WARNING

Operation of this equipment requires a valid Licence issued by the The Post Office. Do not transmit with your equipment until you have obtained your licence. Illegal operation can result in severe penalties. Be sure that you read all the regulations specified in the licence before operating your transmitter.

Location

Plan the location of the transceiver and microphone bracket before starting the installation selecting a location that is convenient for operation and that does not interfere with the driver or passengers in the vehicle. In most motor vehicles, (except motor cycles) the transceiver is usually mounted to the underneath of the dash panel, with the microphone bracket beside it.

Mounting and Connection

Your JWR transceiver is supplied with a universal mounting bracket. The transceiver is held in the bracket by two (2) bolts, permitting adjustment to the most convenient angle.

The bracket must be mounted with the machine screws and the nuts supplied, the mounting must be mechanically strong and also provide a good electrical connection to the chassis of the vehicle. Then proceed to mount the transceiver as follows:

1. After you have determined the most convenient location in your vehicle, hold the radio complete with mounting bracket loosely fitted in the exact located required. Providing nothing will interfere with the mounting in the position you have decided, remove the mounting bracket from the transceiver and use this bracket as a template to mark the location for the mounting bolts. Before commencing drilling, check that nothing will interfere with the mounting bolts and also check that there are no wires behind where you are going to drill that you may damage.

2. Drill out the holes and trim off any excess metal and then mount the bracket with the machine screws supplied and tighten up these screws as much as possible without straining or stripping the threads.

3. Connect the antenna cable plug to the SO 239 receptacle on the rear of the set. The majority of CB antennas are terminated with a type PL-259 plug and this mates with the SO 239 receptacle on the rear panel of the set.

4. Connect the microphone to the set and attach the microphone clip in the position that you have connected.

5. Only when you have completed operations 1 to 4 should you now connect the power cord plug to the DC power socket on the rear panel of the unit.

6. **NEGATIVE GROUND SYSTEMS —** Almost all cars, buses and trucks are negative earth systems. The red lead at the end of the power cord connects to the positive terminal (+) of the battery or electrical system, and the black lead connects to the negative terminal (–) on the battery or to a suitable chassis earth point.

NOTE

In Position Earth Vehicles connect the red lead to the negative (–) terminal of the battery or suitable chassis earth point, and the black lead to the positive (+) terminal of the battery or electrical system.

Providing that you have a licence as mentioned; you are now nearly ready to join the millions of users of Citizens Band Radio; but to protect your investment, we highly recommend that you either take your car, bus or truck to your dealer to have him check that your antenna is fully matched with your transceiver, i.e. that the Standing Wave Ratio (SWR) is correct. To explain very briefly, the actual length of your antenna makes a difference to the way your transceiver performs.

What you are trying to achieve is that you are transmitting as much power as possible through your antenna as is allowed by the Home Office, and that as little power as possible is being Reflected (REF) back through your antenna cable and antenna into your transceiver, which could damage the transceiver power transistors. What you are trying to achieve is as much Forward (FWD) power as is allowed to enable you to obtain the benefit of this top quality transceiver, and use it to get the maximum range possible, using legal equipment.

If however, you wish to carry out these checks yourself, you will need as very basic items, a JWR 7083 SWR Meter and a JWR 7126 24" Patch Lead, both of which items are readily available from your dealer.

If you have decided to have a go at this yourself and you have armed yourself with an SWR Meter and a Patch Lead, we will talk you through the very basics of this check.

1. Ensure that your transceiver is turned off.
2. Uncouple the antenna plug from the back of the panel and plug this into the SWR Meter at the side where it says ANT. Using the Patch Lead, couple one end into the back of the transceiver and the other end into the SWR Meter where it reads XMTR and you are ready to go.
3. Switch on the transceiver and turn to channel 1, on the SWR meter you will see a two (2) position switch marked FWD and REF. move this switch to FWD and press the transmit button on the microphone. You should see the needle on the SWR meter move clockwise across the dial and using the rotary control above the FWD/REF switch position the needle on the SET mark. Without touching the rotary control, move the FWD/REF switch to REF switch and you should see the needle move back across the scale and take note of where it stops.

4. Release the transmit button and change to channel 40 and carry out the same procedure again and note where the needle stops on REF you are now ready to carry out some final adjustments to your antenna.
   A very quick guide is that ideally, you are trying to trim your antenna so that the SWR meter needle moves as little as possible from channel 1 to 40 when carrying out the checks previously described. If the reading is higher on channel 40 than on channel 1 then the antenna needs shortening. If it reads lower on channel 40 than channel 1 then it needs lengthening.

5. The instructions on your antenna will tell you how to go about lengthening or shortening the antenna, but do not take off too much at a time only about 1/4" until such time as you have the least possible movement on the SWR meter scale on channel 1 and 40, then do a final check on channel 20 and you should find the scale hardly moves at all on this channel.
   Ideally you are looking for a reading of 1.1:1 on your scale, readings of up to 2:1 are acceptable but will reduce performance. Readings of 3:1 and above are not acceptable and could cause damage to your transceiver. Once you have reached the best possible SWR you can either leave the meter permanently in line as a continual reference, or, turn the transceiver off and uncouple the Patch Lead and the SWR Meter and screw the antenna lead back into the rear of the transceiver, and you are now ready to transmit.

Ignition Noise Interference

Use of a mobile transceiver at low signal levels is normally limited by the presence of electrical noise. The primary source of noise in most vehicles is generated from the Alternator/Dynamo and the ignition system in the vehicle. Under most operating conditions, when the signal level is adequate, the background noise does not present a serious problem. Also when extremely low level signals are being received, the transceiver may be operated with the vehicle engine turned off as the unit requires very little current and will therefore not drain the battery. Even though your transceiver has a selective automatic noise limiter, in some installations ignition interference may be high enough to make good communications impossible. These noises come from several sources and many possibilities and variations between vehicles may require different solution to reduce the noice. JWR can offer, via your dealer, a selection of suppressions items that may help to cure the problems.

There are:

7049	100 amp Alternator/Generator Filter
7052	Hotline Filter for Electronic Ignition
7054	Sparkplug Suppressors in pairs
7055	In line Distributor Suppressors
7056	Alternator Noise Filter
7057	Generator Noise Filter
7212	NFS 1000 Complete Suppression Kit

Your JWR dealer will gladly assist you with any suppression problems which might occur.

Antenna

Since the maximum Effective Radiated Power (ERP) output of the transceiver via the antenna is limited by the Home Office of Two (2) Watts (ERP). The antenna is one important factor affecting transmission distance, and only a properly matched antenna will allow maximum power transfer from the 50 Ohm transmission line to the radiating element. This must be of the type recommended in your licence by the Home Office, and how to get the maximum performance out of this is dealt with in item 2 on the use of an SWR meter in this instruction book.

Mobile whip antennas utilise the metal body of the vehicle as a ground plane and when mounted at the corner of the vehicle, they are slightly directional in the direction of the body of the vehicle. For all practical purposes however, the radiation pattern is non-directional, and the slight directional characteristic will only be observed at extreme distances. A standard SO 239 antenna connector is provided on the transceiver for easy connection to standard PL-259 cable termination.

If the transceiver is not mounted on a metal surface, it may be necessary to run a separate ground or earth wire from the unit to a good metal electric earth in the vehicle.

When installed in a boat, the transceiver will not operate at maximum efficiency without a ground plane unless the vessel has a steel hull.

Before installating your transceiver in a boat, consult your dealer for all information regarding adequate grounding systems and the prevention of electrolysis between fittings in the hull and the water.

Base Station Operation
(Operation from 220-240 AC Domestic current)

To operate your transceiver from your home or office, using the regular domestic electricity as the power source, you will require a separate power supply capable of supplying at least 2 amps at 13.8 V DC output. Your dealer can offer you the following recommended power supplies from JWR:

Part No 7194 3/5 amp Part No 7195 6/8 amp

Simply connect the Red (+) and Black (–) leads from the transceiver to the corresponding terminals of the AC power supply.

NOTE

Do not attempt to operate this transceiver by connecting directly to the Mains 220/240 volt AC power.

When operated as a Base Station reference must be made to the regulations laid down by the Home Office as to the length of antenna used and its height before operation. Failure to use the correct legal antenna may result in severe penalties.

Remote Speaker

The external speaker jack (EXT SPKR) on the rear panel is used for remote receiver monitoring. The external speaker should have 8 Ohms impedance and be capable of handling at least 3 Watts. When an external speaker is connected, the internal speaker is disconnected.

Your dealer can offer you a range of external speakers including the JWR part numbers, 7077, 7239.

SECTION II

OPERATION

CONTROLS AND INDICATORS



A. CONTROLS AND FUNCTIONS

1. **VOLUME/ON/OFF SWITCH.** Turn clockwise to switch on transceiver and set to the desired listening level.

2. **SQUELCH.** This control is used to cut off or eliminate receiver or FM background noise in the absence of an incoming signal. For maximum receiver sensitivity it is recommended that the control be adjusted only to the point where the receiver/FM background noise is eliminated.
   Turn fully counterclockwise, then slowly clockwise until the receiver noise disappears. Any signal to be received must now be slightly stronger than the average received noise.
   Any further movement clockwise of the control will increase the threshold level which the signal must overcome in order to be heard. Only very strong signals will be heard at a maximum clockwise setting. You may

experience intermittent popping sounds or very garbled background voices on certain channels and this is caused by operators of units both in U.K. and abroad which have a sideband facility (SSB) which is not allowed by U.K. legislation, sometimes breaking across your incoming signal. This is called "Bleeding Across" but this should not inconvenience your operation as by careful use of the squelch control, the majority of these signals can be blanked out.

On first hearing this type of interference, you may well think that your set is faulty, but if you are at all unsure, please contact your local dealer and he will explain this in detail to you and show you how to overcome the problem.

CHANNEL SELECTOR

This control selects any one of the forth (40) Citizens Band channels desired for use. Whilst no actual hard and fast rules have been laid down by the Home Office, it is recommended that Channel 19 be reserved for the Mobile Channel for use by people who are on Motorways and Main roads so that if an emergency services or to other road users to save time and hopefully lives. Channel 9 should be reserved for pure emergency use so that assistance can be immediately obtained should an emergency arise, from one of the many organizations such as REACT who constantly monitor this channel.

It is also hoped that a general calling manual (Breaker Channel) will be established so that you know exactly which channel to go to for contacting people in whichever area you happen to be.

The Channel Selector is digitally displayed in the Channel Window alongside the Channel Selector Control.

HI/LO SWITCH

This operates the 10 dB attenuator and reduces the actual power from your transceiver from 4 watts to 0.4 watts and must be used in any installation where the antenna exceeds the legislation laid down by the Home Office. You will also find that by using the lower power setting in town and country, you will achieve a much clearer speech pattern over distances of up to 2 miles, and the person whom you are talking to will also benefit from this and you should experiment with your friends as to the exact range that is obtainable on this setting.

NOTE. When the HI/LO switch is on the LO setting, your needle will not move so far across the dial, this is because you are only using 1/10th of the normal power, but this has no effect on signal strength on reception.

B. INDICATORS

1. **POWER/S METER.** Sometimes referred to as the S + RF Meter, this shows relative transmitter power than transmitting and input signal strength when receiving. You will, however, find that FM receptions, on many occasions, you can receive a signal quite clearly and fully understand what the other user is talking about without your needle moving. This is one of the peculiarity of FM where as on the non legalised AM type of transceiver the actual carrier wave which the transceiver puts out and which carried your voice remains constant, and your actual speech signal causes this carrier to change its amplitude whereas on FM transceiver, the RF amplitude carrier remains constant, and your speech signal causes the frequency to change up and down. So whilst the actual barrier that you are receiving may be weak and not moving your needle, the speech signal is strong and this is the part you wish to hear.

2. **MOD-TMX LAMP.** This lamp will glow faintly green when your transceiver is on receive, and will glow much brighter when you actually key your microphone to talk.

C. PRESS-TO-TALK MICROPHONE

The receiver and transmitter are controlled by the press-to-talk (PTT) switch on the microphone which in turn is connected to the transceiver via the 4 pin plug on the left hand side of the transceiver front case. Press the switch and the transmitter is activated, release the switch to receive. When transmitting hold the microphone about two (2) inches from your mouth and talk clearly in a normal voice. The transceiver comes complete with a low impedance, dynamic microphone.

D. OPERATING PROCEDURE

1. Turn the set ON by turning the VOLUME control clockwise until a click is heard.

2. Set the VOLUME for comfortable listening.

3. Listen to the background noise from the speaker and then turn the SQUELCH slowly clockwise until the noise just disappears (No signal should be present). Leave the control at this setting and the SQUELCH should be now properly adjusted to allow signals to break through the threshold whilst the transceiver remains quiet. The receiver will remain quiet until a signal is actually received. Do not advance the control too far or some of the weaker signals will not be heard.

4. Set the CHANNEL selector switch to the desired channel.

E. OPERATING PROCEDURE TO TRANSMIT

1. Select the chosen channel from transmission.

2. If the channel is clear, depress the PTT switch and the microphone, the transmit light will glow bright and you are ready to go.
   HAVE FUN WITH YOUR NEW JWR M-2 TRANSCEIVER, YOU HAVE JUST JOINED THE MANY MILLIONS OF CITIZEN BAND RADIO USERS IN THE WORLD.

Just a few small but important don't.

Please do not swear on channel, it not only causes embarrassment to other people, but could well cause you severe problems with Government officials who will be monitoring.

Don't Advertise.

Try not to interfere with other people who may be using the airways.

Don't after making contact with another breaker, stay on the breaker channel.

Don't give out an emergency or 10-33 call unless you are sure that it is genuine.

SECTION III

MAINTENANCE AND ADJUSTMENT

The transceiver that you have just purchased is specifically designed for the type of environment which is encountered in mobile installations.

The use of all Sold State Circuitry and its light weight result in high reliability. Should a failure occur, however, you are covered by the warrantee which comes to you with your M-2. Should failure arise outside of the warrantee period, only use genuine JWR replacement parts, please do not substitute. Refer to the schematic drawing and the parts list.

NOTE

If the performance described in the OPERATING section of this manual is not obtained, please check that all the installation and operating instructions have been carried out before contacting your dealer.

PARTS LIST

Symbol No.	Description	Part No.
IC101	IC MC-3357P	M-2/1
IC201	IC MC-145106P/LC-7137	M-2/2
IC202	IC KIA-7310/AB-103/TA -7310	M-2/3
IC301	IC KIA-7205CP/TA-7205CP	M-2/4
Q101	2SC 380TM	M-2/5
Q102	2SC 380TM	M-2/6
Q103	2SC 380TM	M-2/7
Q201	2SC 380TM	M-2/8
Q202	2SC 380TM	M-2/9
Q203	2SA 1015Y	M-2/10
Q204	2SC 1815GR	M-2/11
Q205	2SC 380TM	M-2/12
Q301	2SC 1815GR	M-2/13
Q302	2SC 1815GR	M-2/14
Q303	2SC 1815GR	M-2/15
Q304	2SC 1173-O	M-2/16
Q305	2SC 2314-F	M-2/17
Q306	2SC 2078D/2SC-1306	M-2/18
F101	3SK-45B/3SK-107	M-2/19
D101	Diode IS2473/IN4148	M-2/20
D102	Diode IS2473/IN4148	M-2/21
D103	Diode IS2473/IN4148	M-2/22
D104	Diode IS2473/IN4148	M-2/23
D105	Diode IS2473/IN4148	M-2/24
D201	Diode IS2473/IN4148	M-2/25
D202	Diode IS2473/IN4148	M-2/26
D203	Zener Diode GZA5.1, 5V 500mw	M-2/27
D204	SVC-251	M-2/28
D205	SVC-251	M-2/29
D206	Diode IS2473/IN4148	M-2/30
D207	Zener Diode GZA10, 9.7V 500mw	M-2/31
D301	Diode IS2473/IN4148	M-2/32
D302	Diode IS2473/IN4148	M-2/33
D303	Diode IN4002/10DI/DS 135E/30DI	M-2/34
D304	Diode IS2473/IN4148	M-2/35
CF101	Ceramic Filter SFE10.7 MS2(RED)	M-2/36
CF102	Ceramic Filter CFU455G2	M-2/37
CF103	Ceramic Filter CFU455G2	M-2/38
CT201	Trimer 20PF 6.5ϕ/5ϕ	M-2/39
CT202	Trimer 20PF 6.5ϕ/5ϕ	M-2/40
CT203	Trimer 20PF 6.5ϕ/5ϕ	M-2/41
X201	Crystal 16.50625MHZ	M-2/42
X202	Crystal 16.96125MHZ	M-2/43
X203	Crystal 10.240MHZ	M-2/44
	LED Lamp 3ϕRed	M-2/45
	LED Display UL-2231 Green	M-2/46
	ANT.Connector W/Washer	M-2/47
	Earphone Jack W/Washer 3.5ϕ	M-2/48
	Speaker 8 ohm 3" 2W	M-2/49
	Meter 240 Micro Ampere	M-2/50
VR101	Volume 10Kohm (SW)	M-2/51
VR102	Volume 5Kohm	M-2/52
T309	Choke Transformer EI-19	M-2/53
SW101	Slide Switch 2P2C KSA-2215	M-2/54

Symbol No.	Description	Part No.
	Rotary Switch GPS-0372	M-2/55
	Microphone W/Connector	M-2/56
	Plug Assy 500 ohm Dynamic	
	Nut Locker	M-2/57
	Silicon Grease	M-2/58
	Wax Micro 3Kg/GA	M-2/59
	Power Cord W/Fuse Holder	M-2/60
	Foam Flux	M-2/61
	PCB Main	M-2/62
	PCB Switch	M-2/63
	PCB LED	M-2/64
	Empire Tube 1ϕ	M-2/65
	Empire Tube 2ϕ	M-2/66
	Binding Tube	M-2/67
	Jump Wire 0.6ϕ	M-2/68
T101	IFT 7mm 27MHZ A	M-2/69
T102	IFT 7mm 27MHZ B	M-2/70
T103	IFT 7mm 10.7MHZ	M-2/71
T104	IFT 7mm 455KHZ A	M-2/72
T105	IFT 7mm 455KHZ B	M-2/73
T201	IFT 10mm 10.240MHZ	M-2/74
T202	IFT 10mm 16MHZ VCO	M-2/75
T207	IFT 10mm TX27MHZ A	M-2/76
T208	IFT 10mm TX27MHZ B	M-2/77
T209	IFT 10mm TX27MHZ C	M-2/78
T301	IFT 10mm TX27MHZ D	M-2/79
T303	IFT 10mm TX27MHZE	M-2/80
T305	IFT 10mm TX27MHZ F	M-2/81
T307	IFT 10mm TX27MHZ G	M-2/82
L106	Microinductor 5.6mH	M-2/83
L203	Microinductor 100μH	M-2/84
L204	Microinductor 22μH	M-2/85
L205	Microinductor 470μH	M-2/86
L206	Microinductor 470μH	M-2/87
L302	Choke Coil A 2.2μH	M-2/88
L304	Microinductor 6.8μH	M-2/89
L306	Choke Coil B 0.3μH	M-2/90
L308	Choke Coil C 0.51μH	M-2/91
L310	Choke Coil D 0.51μH	M-2/92
L311	Spring Coil 0.26μH	M-2/93
RV101	Semi Fixed R100KB 8ϕ	M-2/94
RV301	Semi Fixed R5KB 8ϕ	M-2/95
RV302	Semi Fixed R50KB 8ϕ	M-2/96
RV303	Semi Fixed R10KB 8ϕ	M-2/97
R101	Carbon R56KΩ	M-2/98
R102	Carbon R330KΩ	M-2/99
R103	Carbon R270KΩ	M-2/100
R104	Carbon R100Ω	M-2/101
R105	Carbon R100Ω	M-2/102
R106	Carbon R22KΩ	M-2/103
R107	Carbon R10KΩ	M-2/104
R108	Carbon R1KΩ	M-2/105
R109	Carbon R100Ω	M-2/106
R110	Carbon R3.3KΩ	M-2/107
R111	Carbon R1KΩ	M-2/108
R112	Carbon R270KΩ	M-2/109
R113	Carbon R1.5KΩ	M-2/110
R114	Carbon R15KΩ	M-2/111
R115	Carbon R100KΩ	M-2/112

Symbol No.	Description	Part No.
R116	Carbon R22KΩ	M-2/113
R117	Carbon R1KΩ Straight	M-2/114
R118	Carbon R1KΩ	M-2/115
R119	Carbon R1.8KΩ	M-2/116
R120	Carbon R10KΩ	M-2/117
R121	Carbon R2.2KΩ	M-2/118
R122	Carbon R2.2KΩ	M-2/119
R123	Carbon R47KΩ	M-2/120
R124	Carbon R100KΩ	M-2/121
R125	Carbon R330KΩ	M-2/122
R126	Carbon R470Ω	M-2/123
R128	Carbon R2.2KΩ	M-2/124
R129	Carbon R82KΩ	M-2/125
R130	Metal Oxide R10Ω/2W	M-2/126
R131	Carbon R27KΩ	M-2/127
R132	Carbon R330Ω	M-2/128
R133	Carbon R47KΩ	M-2/129
R201	Carbon R1.5KΩ	M-2/130
R202	Carbon R1.5KΩ	M-2/131
R203	Carbon R1.5KΩ	M-2/132
R204	Carbon R1.5KΩ	M-2/133
R205	Carbon R1.5KΩ	M-2/134
R206	Carbon R1.5KΩ	M-2/135
R207	Carbon R1.5KΩ	M-2/136
R208	Carbon R1.5KΩ	M-2/137
R209	Carbon R1.5KΩ	M-2/138
R210	Carbon R1.5KΩ	M-2/139
R211	Carbon R1.5KΩ	M-2/140
R212	Carbon R1.5KΩ	M-2/141
R213	Carbon R1KΩ	M-2/142
R214	Carbon R1.5KΩ	M-2/143
R215	Carbon R470Ω	M-2/144
R216	Carbon R27KΩ	M-2/145
R217	Carbon R150Ω	M-2/146
R218	Carbon R1KΩ	M-2/147
R219	Carbon R22KΩ	M-2/148
R220	Carobn R47Ω	M-2/149
R221	Carbon R1.5KΩ	M-2/150
R222	Carbon R1.5KΩ	M-2/151
R223	Carbon R2.2KΩ	M-2/152
R224	Carbon R10KΩ	M-2/153
R225	Carbon R22KΩ	M-2/154
R226	Carbon R330Ω	M-2/155
R227	Carbon R100Ω	M-2/156
R228	Carbon R1KΩ	M-2/157
R229	Carbon R120Ω	M-2/158
R230	Carbon R100KΩ	M-2/159
R231	Carbon R1KΩ	M-2/160
R232	Carbon R330Ω	M-2/161
R233	Carbon R10KΩ	M-2/162
R234	Carbon R100Ω	M-2/163
R235	Carbon R100Ω	M-2/164
R236	Carbon R470Ω	M-2/165
R237	Carbon R2.7KΩ	M-2/166
R238	Carbon R4.7Ω	M-2/167
R239	Carbon R22Ω	M-2/168
R240	Carbon R47Ω	M-2/169
R241	Carbon R47Ω	M-2/170
R242	Carbon R100KΩ	M-2/171

Symbol No.	Description	Part No.
R243	Carbon R680Ω	M-2/172
R301	Carbon R10KΩ	M-2/173
R302	Carbon R22KΩ	M-2/174
R303	Carbon R1.5KΩ	M-2/175
R304	Carbon R3.3KΩ	M-2/176
R305	Carbon R10KΩ	M-2/177
R306	Carbon R33KΩ	M-2/178
R307	Carbon R1KΩ	M-2/179
R308	Carbon R150Ω	M-2/180
R309	Carbon R4.7KΩ	M-2/181
R310	Carbon R10KΩ	M-2/182
R311	Carbon R220KΩ	M-2/183
R312	Carbon R56KΩ	M-2/184
R313	Carbon R220KΩ	M-2/185
R314	Carbon R220KΩ	M-2/186
R315	Carbon R10KΩ	M-2/187
R316	Carbon R10KΩ	M-2/188
R317	Carbon R1KΩ	M-2/189
R318	Carbon R1.5KΩ	M-2/190
R319	Carbon R68Ω	M-2/191
R320	Carbon R820Ω	M-2/192
R321	Carbon R1KΩ	M-2/193
R322	Carbon R100Ω	M-2/194
R323	Carbon R68Ω	M-2/195
R324	Carbon R1KΩ	M-2/196
R325	Metal Oxide R10Ω/1W	M-2/197
R326	Carbon R68Ω	M-2/198
R327	Carbon R4.7Ω	M-2/199
R328	Carbon R1.2K	M-2/200
R329	Carbon R47K	M-2/201
R330	Carbon R2.7K	M-2/202
C101	Ceramic Condenser 33pf	M-2/203
C102	Ceramic Condenser 68pf	M-2/204
C103	Ceramic Condenser 100pf	M-2/205
C104	Ceramic Condenser 0.0047μf	M-2/206
C105	Ceramic Condenser 0.022μf	M-2/207
C106	Ceramic Condenser 22pf	M-2/208
C107	Ceramic Condenser 0.022μf	M-2/209
C108	Ceramic Condenser 0.022μf	M-2/210
C109	Ceramic Condenser 68pf	M-2/211
C110	Ceramic Condenser 0.001μf	M-2/212
C111	Ceramic Condenser 0.022μf	M-2/213
C112	Elyt Cap. 47μf/16WV	M-2/214
C113	Ceramic Cap. 0.022μf	M-2/215
C114	Ceramic Cap. 22pf	M-2/216
C115	Ceramic Cap. 100pf	M-2/217
C116	Elyt Cap. 10μf/16WV	M-2/218
C117	Ceramic Cap. 0.022μf	M-2/219
C118	Ceramic Cap. 0.022μf	M-2/220
C119	Elyt Cap. 4.7μf/16WV	M-2/221
C120	Ceramic Cap. 0.022μf	M-2/222
C121	Ceramic Cap. 0.022μf	M-2/223
C122	Ceramic Cap. 10pf CH	M-2/224
C123	Ceramic Cap. 0.1μf	M-2/225
C124	Ceramic Cap. 0.001μf	M-2/226
C125	Ceramic Cap. 0.001μf	M-2/227
C126	Mylar Cap. 0.0022μf	M-2/228
C127	Elyt Cap. 1μf/50WV	M-2/229

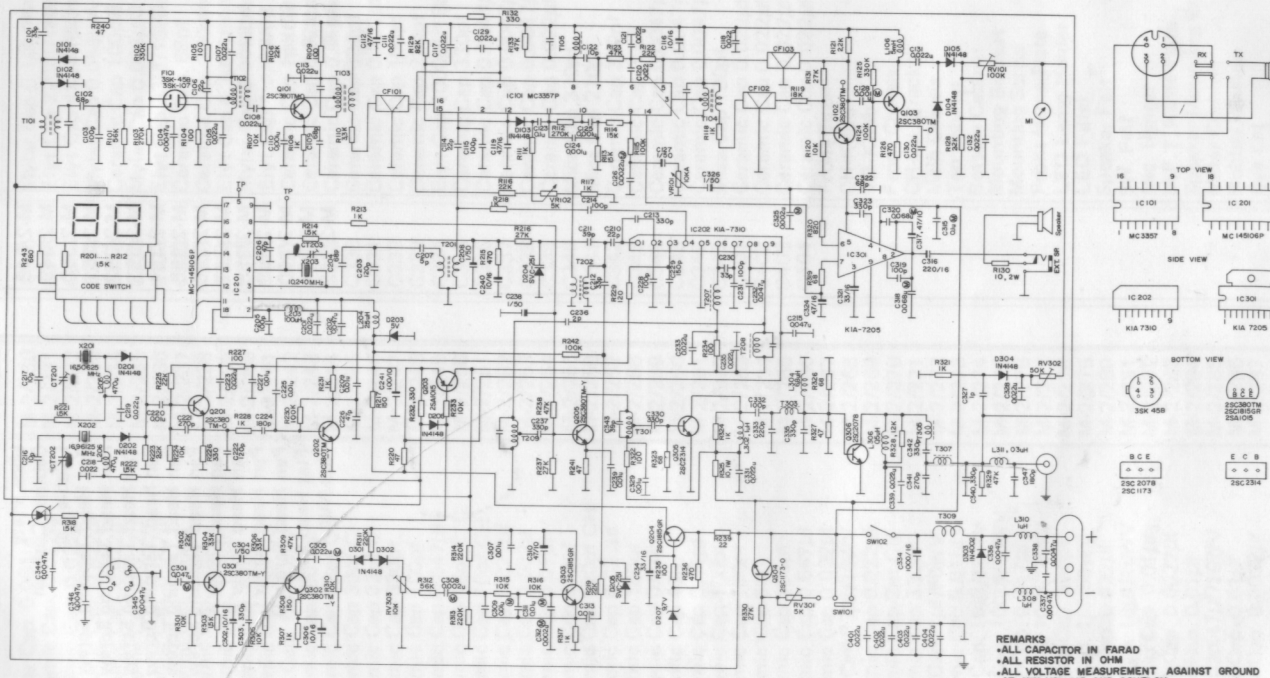
Symbol No.	Description	Part No.
C128	Mylar Cap. 0.001μf	M-2/230
C129	Ceramic Cap. 0.022μf	M-2/231
C130	Ceramic Cap. 0.022μf	M-2/232
C131	Ceramic Cap. 0.022μf	M-2/233
C132	Ceramic Cap. 0.022μf	M-2/234
C201	Ceramic Cap. 0.022μf	M-2/235
C202	Ceramic Cap. 0.047μf	M-2/236
C203	Ceramic Cap. 120pf	M-2/237
C204	Ceramic Cap. 68pf	M-2/238
C205	Ceramic Cap. 100pf	M-2/239
C206	Ceramic Cap. 47pf	M-2/240
C207	Ceramic Cap. 5pf CH	M-2/241
C208	Elyt Cap. 1μf/50WV	M-2/242
C209	Ceramic Cap 0.01μf	M-2/243
C210	Ceramic Cap 22pf CH	M-2/244
C211	Ceramic Cap 39pf CH	M-2/245
C212	Ceramic Cap 33pf CH	M-2/246
C213	Ceramic Cap 330pf	M-2/247
C214	Ceramic Cap 100pf	M-2/248
C215	Ceramic Cap 0.047μf	M-2/249
C216	Ceramic Cap 10pf CH	M-2/250
C217	Ceramic Cap 10pf CH	M-2/251
C218	Ceramic Cap 0.022μf	M-2/252
C219	Ceramic Cap 0.022μ	M-2/253
C220	Ceramic Cap 0.01μf	M-2/254
C221	Ceramic Cap 270pf	M-2/255
C222	Ceramic Cap 120pf CH	M-2/256
C223	Ceramic Cap 0.022μf	M-2/257
C224	Creamic Cap 180pf	M-2/258
C225	Creamic Cap 0.01μf	M-2/259
C226	Creamic Cap 47pf	M-2/260
C227	Creamic Cap 0.01μf	M-2/261
C228	Creamic Cap 100pf	M-2/262
C229	Creamic Cap 150pf	M-2/263
C230	Creamic Cap 330pf	M-2/264
C231	Creamic Cap 100pf	M-2/265
C232	Creamic Cap 0.047μf	M-2/266
C233	Creamic Cap 0.022μf	M-2/267
C234	Elyt Cap 33μf/16WV	M-2/268
C235	Ceramic Cap 0.022μf	M-2/269
C236	Ceramic Cap 2pf CH	M-2/270
C237	Ceramic Cap 330pf	M-2/271
C238	Elyt Cap. 1μf/50WV	M-2/272
C239	Ceramic Cap 0.01μf	M-2/273
C240	Elyt Cap. 10μf/16WV	M-2/274
C241	Elyt Cap. 100μf/10WV	M-2/275
C301	Mylar Cap. 0.047μf	M-2/276
C302	Elyt Cap. 10μf/16WV	M-2/277
C303	Ceramic Cap. 330pf	M-2/278
C304	Elyt Cap. 1μf/50WV	M-2/279
C305	Mylar Cap. 0.022μf	M-2/280
C306	Elyt Cap. 10μf/16WV	M-2/281
C307	Ceramic Cap. 0.01μf	M-2/282
C308	Mylar Cap. 0.0022μf	M-2/283
C309	Mylar Cap. 0.01μf	M-2/284
C310	Elyt Cap 47μf/10WV	M-2/285
C311	Mylar Cap. 0.01μf	M-2/286
C312	Mylar Cap. 0.0022μf	M-2/287
C313	Ceramic Cap. 0.01μf	M-2/288

Symbol No.	Description	Part No.
C315	Mylar Cap 0.1μf	M-2/289
C316	Elyt Cap 220μf/16WV	M-2/290
C317	Elyt Cap 47μf/10WV	M-2/291
C318	Mylar Cap 0.068μf	M-2/292
C319	Ceramic Cap 100pf	M-2/293
C320	Mylar Cap 0.068μf	M-2/294
C321	Elyt Cap 33μf/16WV	M-2/295
C322	Ceramic Cap. 68pf	M-2/296
C323	Ceramic Cap. 330pf	M-2/297
C324	Elyt Cap 4.7μf/16WV	M-2/298
C325	Mylar Cap 0.0022μf	M-2/299
C326	Elyt Cap 1μf/50WV	M-2/300
C327	Ceramic Cap 1pf CH	M-2/301
C328	Ceramic Cap 0.022μf	M-2/302
C329	Ceramic Cap 0.01μf	M-2/303
C330	Ceramic Cap 330pf	M-2/304
C331	Ceramic Cap 0.022μf	M-2/305
C332	Ceramic Cap 100pf	M-2/306
C333	Ceramic Cap 220pf	M-2/307
C334	Elyt Cap 1000μf/16WV	M-2/308
C335	Ceramic Cap 330pf	M-2/309
C336	Ceramic Cap 0.0047μf	M-2/310
C337	Ceramic Cap 0.0047μf	M-2/311
C338	Ceramic Cap 0.0047μf	M-2/312
C339	Ceramic Cap 0.022μf	M-2/313
C340	Mica Cap 330pf	M-2/314
C341	Mica Cap 270pf	M-2/315
C342	Ceramic Cap 330pf	M-2/316
C343	Ceramic Cap 39pf	M-2/317
C344	Ceramic Cap 0.0047μf	M-2/318
C345	Ceramic Cap 0.0047μf	M-2/319
C346	Ceramic Cap 0.0047μf	M-2/320
C347	Mica Cap 180pf	M-2/321
C401	Ceramic Cap 0.022μf	M-2/322
C402	Ceramic Cap 0.022μf	M-2/323
C403	Ceramic Cap 0.022μf	M-2/324
C404	Ceramic Cap 0.022μf	M-2/325
	Front Bezel	M-2/326
	CH-Knob	M-2/327
	VR-Knob	M-2/328
	Front Chassis	M-2/329
	CH-Sel. Bracket	M-2/330
	Main Chassis	M-2/331
	Top Cabinet	M-2/332
	Bottom Cabinet	M-2/333
	Mounting Bracket	M-2/334
	Mounting Screw	M-2/335
	Front Name Plate	M-2/336
	LED Lamp Holder	M-2/337
	LED Filter	M-2/338
	Speaker Felt	M-2/339
	SW. Felt	M-2/340
	Mic. Hanger	M-2/341
	M.P.T. Name Plate	M-2/342
	Speaker Mounting Bracket	M-2/343
	Meter Cushion	M-2/344
	Rubber Washer	M-2/345
	Eye Let	M-2/346
	Owner Manual	M-2/347

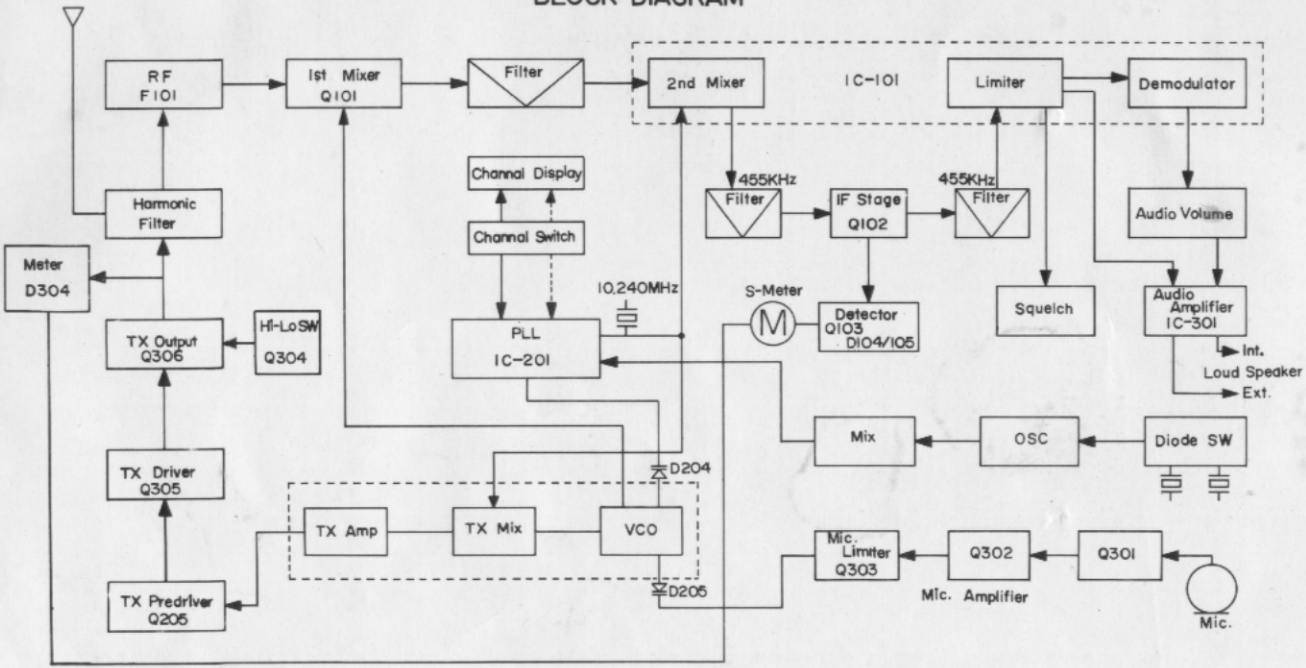
Symbol No.	Description	Part No.
	Styrol Foam	M-2/348
	Display Box	M-2/349
	Master Carton Box	M-2/350
	Poly Bag A	M-2/351
	Poly Bag B	M-2/352
	Poly Bag C	M-2/353
	Poly Bag D	M-2/354
	Silicagel	M-2/355
	Vinyl Tape	M-2/356
	P.P Band	M-2/357
	Band Clamper	M-2/358
	I.C. Heat Sinker	M-2/359
	Tr. Heat Sinker	M-2/360
	Shield Plate A	M-2/361
	Shield Plate B	M-2/362

Symbol No.	Description	Part No.
	Mica. Plate	M-2/363
	Cabinet Cushion	M-2/364
	I Cable Tag	M-2/365
	Pan Head Tapping Screw A	M-2/366
	Pan Head Tapping Screw B	M-2/367
	Pan Head Tapping Screw C	M-2/368
	Pan head Tapping Screw D	M-2/369
	Pan Head Tapping Screw E	M-2/370
	Pan Head Tapping Screw F	M-2/371
	Pan Head Screw A	M-2/372
	Pan Head Screw B	M-2/373
	Pan Head Screw C	M-2/374
	Pan Head Screw D	M-2/375
	Flat Head Screw	M-2/376
	Hex Nut	M-2/377

SCHEMATIC DIAGRAM



BLOCK DIAGRAM



CITIZENS BAND RADIO SERVICE

Channel	Channel Frequency in MHz	Channel	Channel Frequency in MHz
1	27.60125	21	27.80125
2	27.61125	22	27.81125
3	27.62125	23	27.82125
4	27.63125	24	27.83125
5	27.64125	25	27.84125
6	27.65125	26	27.85125
7	27.66125	27	27.86125
8	27.67125	28	27.87125
9	27.68125	29	27.88125
10	27.69125	30	27.89125
11	27.70125	31	27.90125
12	27.71125	32	27.91125
13	27.72125	33	27.92125
14	27.73125	34	27.93125
15	27.74125	35	27.94125
16	27.75125	36	27.95125
17	27.76125	37	27.96125
18	27.77125	38	27.97125
19	27.78125	39	27.98125
20	27.79125	40	27.99125

We reserve the right to change specifications without notice.

JWR™®

Electronics Division
John Woolfe Racing Ltd., Woolfe House, Norse Road, Bedford, MK41 OLF England.
01234 220700