



**BARLOW
WADLEY**

OPERATING INSTRUCTIONS

FOR

XCR - 30 RECEIVER

Scanned by IW1AXR

Downloaded by
RadioAmateur.EU



RECEIVER XCR-30

OPERATING INSTRUCTIONS

General Description:

The XCR-30 is a specialized, high sensitivity, portable short wave receiver, designed to provide precision frequency tuning over the full short wave spectrum up to 30 MHz, with exceptional frequency stability for both amplitude modulated (A.M.) and single sideband (S.S.B.) transmissions.

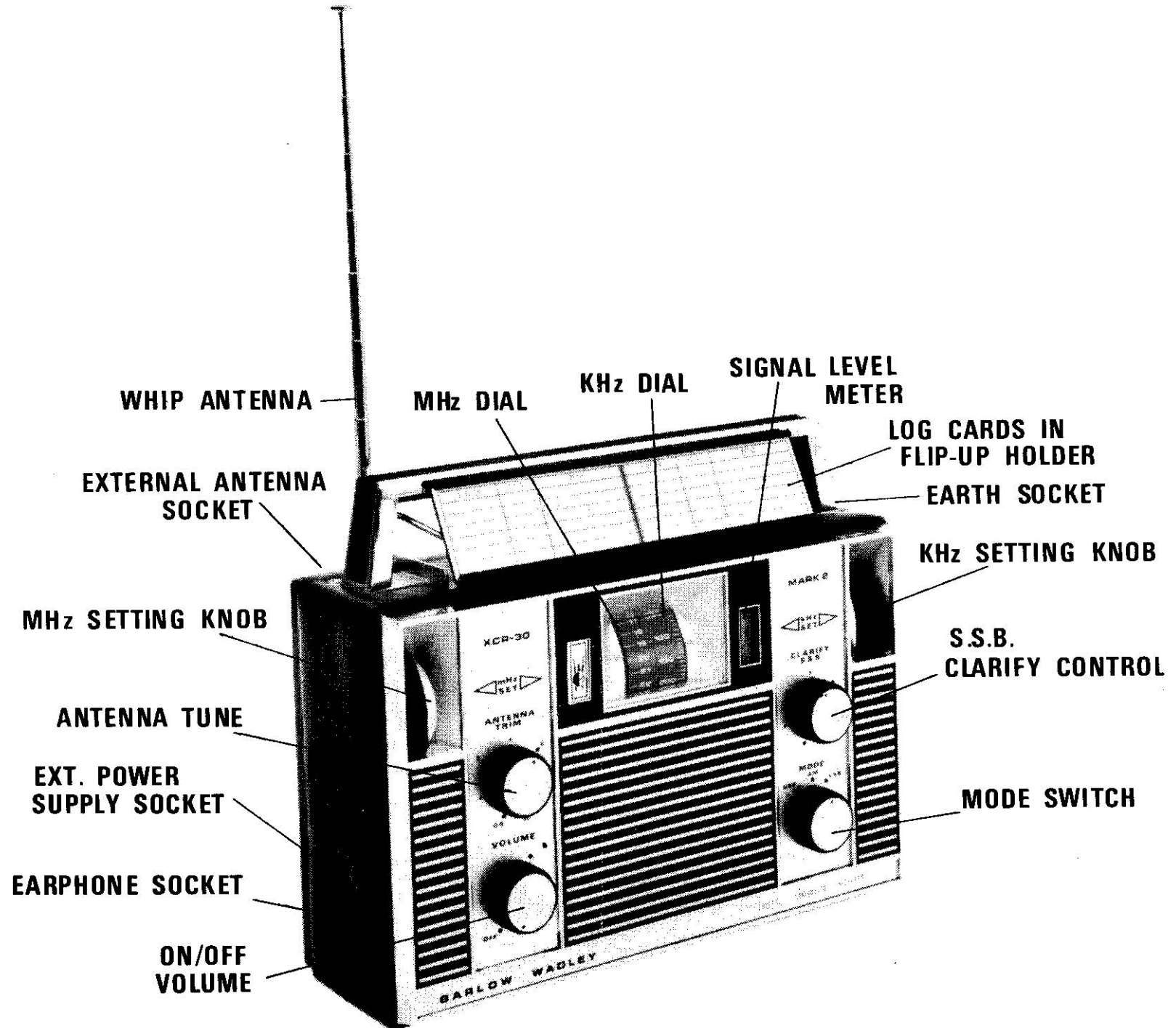
The Circuit:

A multiple heterodyne circuit is incorporated wherein the harmonics of a 1 MHz quartz crystal control the frequency shown on the dials to an accuracy sufficient to locate and identify a station whose frequency is known. The crystal stabilizes the received frequency to eliminate tuning drift over long periods of time and to provide stable single sideband pitch. Frequency selection is a composite function of two dials. The whole number of the frequency (in MHz) is displayed on one dial whilst the second dial displays the remaining decimal portion of the frequency.

The Aerial

A separately tuned whip antenna is provided which enables an excellent level of sensitivity for a portable receiver to be obtained, especially at the higher frequencies where signals are usually weak.

It is also effective for medium wave frequencies since the circuit design allows reception down to 500 KHz. However for indoor use at this frequency, the aerial will not function as efficiently as the ferrite rod type in a conventional medium wave portable.



- WHIP ANTENNA
- EXTERNAL ANTENNA SOCKET
- MHz SETTING KNOB
- ANTENNA TUNE
- EXT. POWER SUPPLY SOCKET
- EARPHONE SOCKET
- ON/OFF VOLUME
- MHz DIAL
- KHz DIAL
- SIGNAL LEVEL METER
- LOG CARDS IN FLIP-UP HOLDER
- EARTH SOCKET
- KHz SETTING KNOB
- S.S.B. CLARIFY CONTROL
- MODE SWITCH

Scan by Dor

THE CONTROLS

— their functions and use:

ON/OFF VOLUME:

This operates in the normal manner and will give full audio volume from any signal which has a useful signal to noise ratio.

MODE SWITCH:

This has three positions marked L.S.B. (Lower Side Band), U.S.B. (Upper Side Band) and A.M. (Amplitude Modulated).

For A.M. reception, switch to the central position before tuning the receiver otherwise a heterodyne whistle will be obtained on all stations. Use of the heterodyne note as an accurate A.M. tuning indicator is explained later. For Single Side Band reception switch to U.S.B. or L.S.B. whichever is appropriate.

S.S.B. CLARIFIER:

This control sets the pitch of the speech or modulation accurately for S.S.B. reception after the station has been roughly located on the main tuning. It should be placed in its central position before any tuning is commenced. It may be used as a fine tuning control on A.M.

THE MHz DIAL:

Calibrations are in 1MHz divisions from 0 to 30 MHz. The whole number portion in MHz of a desired frequency is set on this dial, its function being similar to that of a bandswitch in a conventional portable. An approximate setting of this dial will allow a station to be tuned. Having identified a station, this dial may then be adjusted slightly to improve sensitivity.

THE KHz DIAL:

This is the main tuning dial in a conventional sense. It is accurately calibrated in 10 KHz divisions over 1000 KHz. These divisions are accurately related to the whole number set on the MHz dial. The minor divisions on the scale are accurate to some 5 KHz. Once a station has been accurately tuned on the receiver, the stability is such that it will remain in tune indefinitely.

Scanned by 407/19 4005

ZERO SET CONTROL

This is located immediately below the signal strength meter. It provides a means of zero setting the KHz dial to compensate for calibration errors due to temperature and/or humidity variations should this become necessary.

- (1) Set mode switch to USB.
- (2) Set MHz dial to any whole number.
- (3) Set KHz dial to zero.
- (4) Adjust zero set control to give "zero beat" in audio. That is, rotate zero set control until a whistle is heard, then adjust control to reduce the whistle to the lowest possible pitch. Rotation of the control in either direction from this position should increase the pitch of the whistle. "Zero Beat" has been established in this position.

THE ANTENNA TUNE CONTROL

To provide maximum sensitivity from the whip aerial it is desirable to "tune" the antenna separately by means of the control provided. The complete coverage from 500KHz to 30MHz is provided by one rotation of this control. It occurs in three segments as marked nominally on this control (.5 to 2MHz; 2 to 6 MHz and 6 to 30 MHz). These are consecutive but may be regarded as continuous if desired. When searching for a weak station it is necessary that this control be set roughly in the appropriate segment. Having tuned to a station, the antenna control should be peaked to give maximum signal on the signal strength meter provided. It can, however, be tuned by ear, observing rise in noise level.

TUNING Tuning an A.M. Signal:

1. Switch on and set volume
2. Set mode switch to AM; ignore clarifier or set to centre of scale.
3. Set MHz dial to whole number of MHz. (e.g. Freq. 15.235, set 15 on MHz dial).
4. Set antenna tune to appropriate frequency segment, peaking up noise or incidental signals present, if possible.
5. Set KHz dial to required fraction of a MHz or the number of KHz i.e. the figures after the decimal place in the frequency in MHz (e.g. 15.235 MHz set 200 plus three small divisions plus $\frac{1}{2}$ a division).
6. If the station is heard, tune in accurately on the KHz dial. Peak up the antenna tune by ear or on the meter. Peak up the MHz dial by ear or on the meter.

7. If station is not heard, peak up antenna and MHz dial on any noise or other station heard and search one or two divisions either side of required frequency in case of logging error or dial error.

Tuning a Single Side Band Signal:

S.S.B. Signals of interest to the general listener occur mainly on the amateur bands. They will be encountered with the receiver in the AM mode, as described in the procedure for tuning an A.M. signal. To make SSB Signals intelligible it is necessary to:—

1. Switch to the appropriate U.S.B. or L.S.B. mode, transmissions on the 14, 21 and 28 MHz bands are invariably in U.S.B. mode whilst 3.5 and 7 MHz band transmissions are usually in L.S.B. mode.
2. Pitch the sound by means of the KHz dial initially and finally adjust using the S.S.B. clarifier control.
3. Should the signal be lost by the narrowing of the band pass on S.S.B. mode, a slight retuning will recover it.

Once clarified a S.S.B. signal can remain correctly pitched for quite long periods on this receiver although transmission stability not uncommonly causes the pitch to wander and requires following on the clarifier control. It often happens that the two or more transmissions on a two way "net" are not always pitched quite the same, and require adjustment of the clarifier control.

Tuning a Continuous Wave or Morse Signal:

Most radio Morse signals are not tone modulated and are heard simply as a succession of "thumps" rather than the coded tone required, when received in the A.M. mode. This receiver will convert them to a coded tone by using either of the S.S.B. modes and adjusting the tuning and/or clarifier to give a suitable tone. An interfering station may often be rejected by using the alternative mode or pitching the unwanted signal down to a low inaudible frequency.

BATTERIES:

Six "D" size (1.5v) cells. These are fitted into the battery case provided inside the set by turning the two back cover securing screws anti-clockwise until the back cover can be opened. *Care must be taken to observe battery polarity as indicated in the battery case.*

External Batteries and Phone Jack Sockets:

An external phone socket is provided on the left hand side. The external phones or speaker should be not less than 8 ohms impedance. The jack disconnects the internal speaker automatically. An external power socket is provided alongside the phone socket. The receiver has an internal voltage regulator and thus a D.C. voltage supply from about 7 to 12 volts or somewhat higher, depending upon climate, can be applied. The voltage is regulated to 6.5 volts and at or below this voltage regulation ceases. The receiver will however work quite satisfactorily off a 6 volt supply of good regulation such as an accumulator, and may still be useable down to about 5 volts.

ERRATA

Care must be taken to observe correct polarity.

Centre contacts of plug and socket provided are negative.

External Aerials:

The input circuits of this receiver are adapted to give maximum performance on the whip antenna. When used out of doors an additional aerial, unless specially designed, is unlikely to improve performance. An unduly large aerial may produce overload effects and therefore must be correctly padded and adjusted to give suitable levels of signals and performance.

Indoors, particularly within a ferro-concrete or similar building, an external aerial may be advantageous or essential. This is usually an open elevated wire of some 50 feet in length, connected to the aerial socket provided. This socket is lightly coupled to the input to avoid unduly strong overload interference. If a short external aerial is being used connect it directly to the whip (which should be retracted). The antenna tuning should always be rechecked if a change is made from one aerial arrangement to another.

An earth terminal is provided for use in circumstances where advantageous.

Accessories: *(Provided with each set)*

1. Earphone plug (grey)
2. External power supply plug (grey)
3. Earth plug (black banana plug)
4. External aerial plug (red banana plug)
5. World Radio and TV handbook *(in which will be found the frequencies of practically all known transmitting stations throughout the world and a host of other useful information for the enthusiast).*
6. Log cards (5 in flip-up holder on top of set and 10 spares) on which can be logged identities, frequencies, time of day and time of year for instance, of stations which are of particular interest to you. On account of the high setting accuracy of the set, this will enable you to return to a previously heard transmission with the certainty of hearing it if the conditions are suitable.

Guarantee card – do not forget to complete fully and send off as indicated.

SPECIFICATIONS

Frequency Coverage	:	500 KHz to 30 MHz continuous.
Frequency Scale Accuracy	:	Within 5 KHz at all frequencies.
Resetting Accuracy	:	Within 1 KHz at all frequencies.
Modes of Reception	:	A.M., L.S.B., U.S.B., and C.W.
Selectivity	:	6 KHz overall RF on A.M. 3 KHz overall RF on S.S.B. and C.W.
Audio Output	:	0.5 watt (150 Hz to 3 KHz) External phone socket provided (8 ohm min.)
Frequency Stability	:	Will hold an A.M. transmission in tune indefinitely. Will hold an S.S.B. transmission on pitch for long periods of time.
Sensitivity	:	Antenna circuit thermal noise audible at all frequencies.
Image Rejection	:	50 dB on all movable image channels. 60 dB and better on immovable.
Antenna	:	Self contained whip antenna. External open wire socket and earth.
Power Supply	:	6 type "D" (1.5v) dry cells (9 volts) External power socket provided for 6 to 12 volts with internal regulation.
Current Consumption	:	20 mA quiescent.
Weight	:	4.14 Kg. (Including batteries) (9 lbs. 2 ozs.)
Dimensions	:	292 (w) x 190 (h) x 98 (d) mm. (11½" x 7½" x 3⅞")

NOTES FOR THE ENTHUSIAST

1. On AM the selectivity is switched to 6KHz total (3KHz Audio) which gives optimum separation of stations without loss of intelligibility.
2. When the Mode Switch is switched to S.S.B. this provides a 3 KHz band pass, (i.e. half the foregoing) switches the detector circuits for S.B. detection, and switches on the B.F.O. (beat frequency oscillator.) This oscillator is fixed in frequency on one edge of the bandpass and on switching from L.S.B. to U.S.B. it is transferred to the other edge of the bandpass.
3. The operation of the S.S.B. clarifier as a fine tuning control on A.M. has the effect of displacing the main frequency calibration by $1\frac{1}{2}$ KHz (3KHz overall). This displacement is insufficient to be readily observed and can be ignored in AM tuning. The control can best be operated, for fine tuning, in conjunction with the heterodyne note as follows:

Switch temporarily to the U.S.B. (also marked T) position, where a strong whistle or tone will be heard. If this tone is reduced to zero frequency, more or less, by means of the KHz dial or the clarifier, the station will be accurately centered. This is so because the U.S.B. mode places the B.F.O. at the centre of the A.M. bandpass, the S.S.B. bandpass being located within one half of the A.M. bandpass. The L.S.B. mode must not be used in this manner as this will place the A.M. carrier on one edge of the A.M. bandpass.

4. In practice the MHz dial should be set roughly to indicate the MHz portion of the frequency required. Subsequently it may be adjusted slightly in order to strengthen the reception. It may also be adjusted to eliminate certain types of interference due to image channel effects. This displacement shifts the images until they cannot be heard, without affecting the main tuning. This is an advantage of a multiple heterodyne design over a conventional heterodyne design where such an image effect cannot be shifted. An image effect is usually heard as a whistle on the required station which varies in pitch as the receiver is tuned. A whistle which does not vary in this way is usually due to other causes such as an adjacent station. Ensure that any interference encountered cannot be eliminated by slight adjustment of this dial.

5. Having tuned the station on the MHz and KHz dial the antenna control should be peaked up to give maximum signal on the signal strength meter which is provided for this purpose. Alternatively this may be done by ear, particularly on a weak station where the optimum antenna tuning is easily heard. A strong station may not change much audibly with antenna tuning, but should nevertheless be peaked up accurately on the meter, otherwise optimum reception will be lost should it weaken or fade deeply. The meter is provided for this purpose although also useful for comparing alternative transmissions etc.

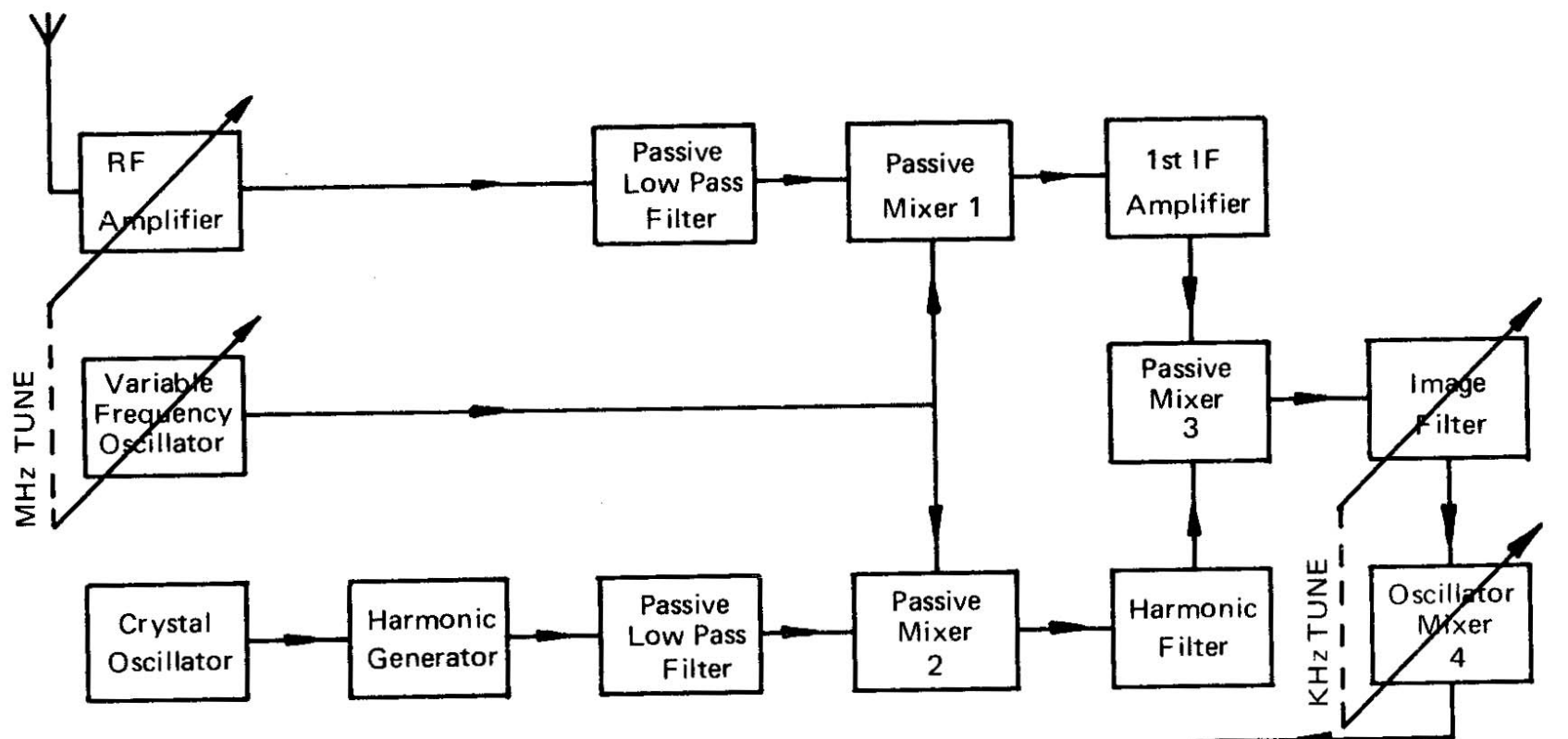
When searching generally over a limited band e.g. an amateur band or particular broadcast band, the aerial tuning may be peaked up on any station in the band, or simply on the noise, and ignored until a station is located for protracted listening, when a final touch up may be made. This procedure is very effective over most of the coverage of the receiver, but at lower frequencies and the medium wave frequencies particularly accurate antenna tuning is usually called for.

Reception of Time Signals and Calibration or adjustment of Dial Scales

Radio time signals from observatories and similar institutes are continuously receivable in most parts of the world. The majority of signals of interest are transmitted on exact multiples of 1 MHz (most often 5 MHz, 10 MHz, 15 MHz and 20 MHz). This receiver's internal crystal produces continuous unmodulated signals at each exact multiple of 1 MHz (as can be observed by setting the KHz dial to 000 or 1000 on each MHz band) which will beat with the time transmissions.

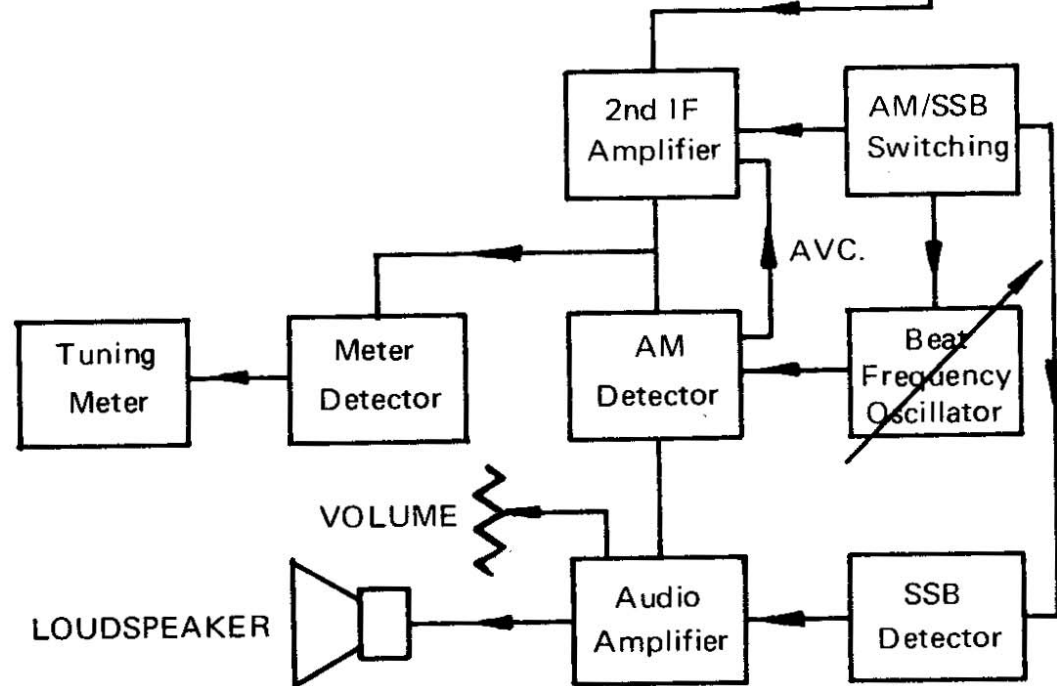
This is strictly a shortcoming of this type of crystal controlled receiver which cannot be completely eliminated without making it unduly expensive for its intended use. However, the time signals, unless they are very weak, can usually be satisfactorily received on these whole number MHz, as the precision of the internal crystal is sufficient to produce only low level inaudible beats with the time transmissions.

This low frequency beat which can often be observed on the signal strength meter serves to check the internal crystal, and internal adjustment in the receiver is provided for setting this crystal accurately. These 1 MHz marks are also useful to check the accuracy of the KHz dial and are perhaps best observed with the aerial down and U.S.B. mode in use to centre the tuning exactly to zero beat.

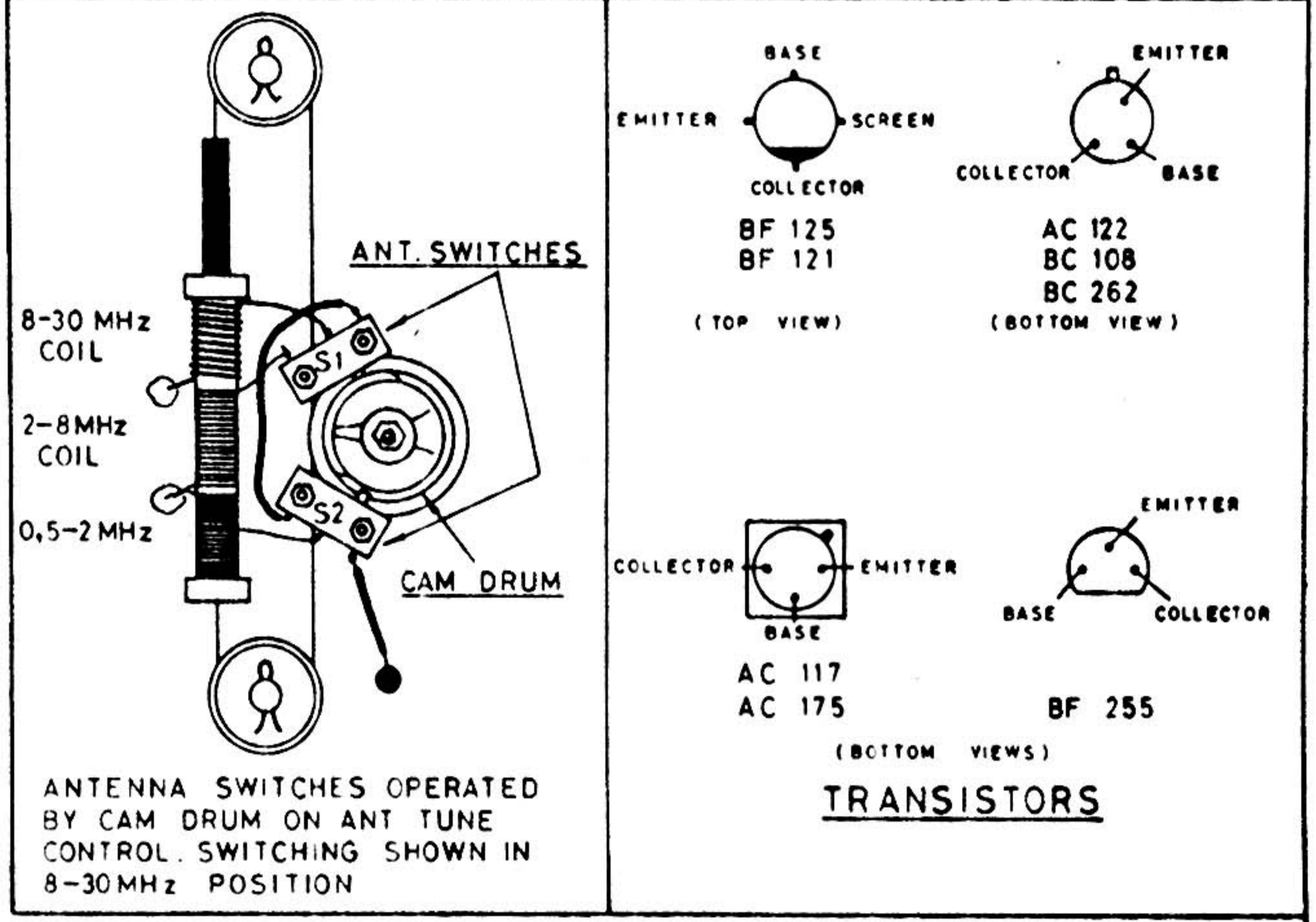
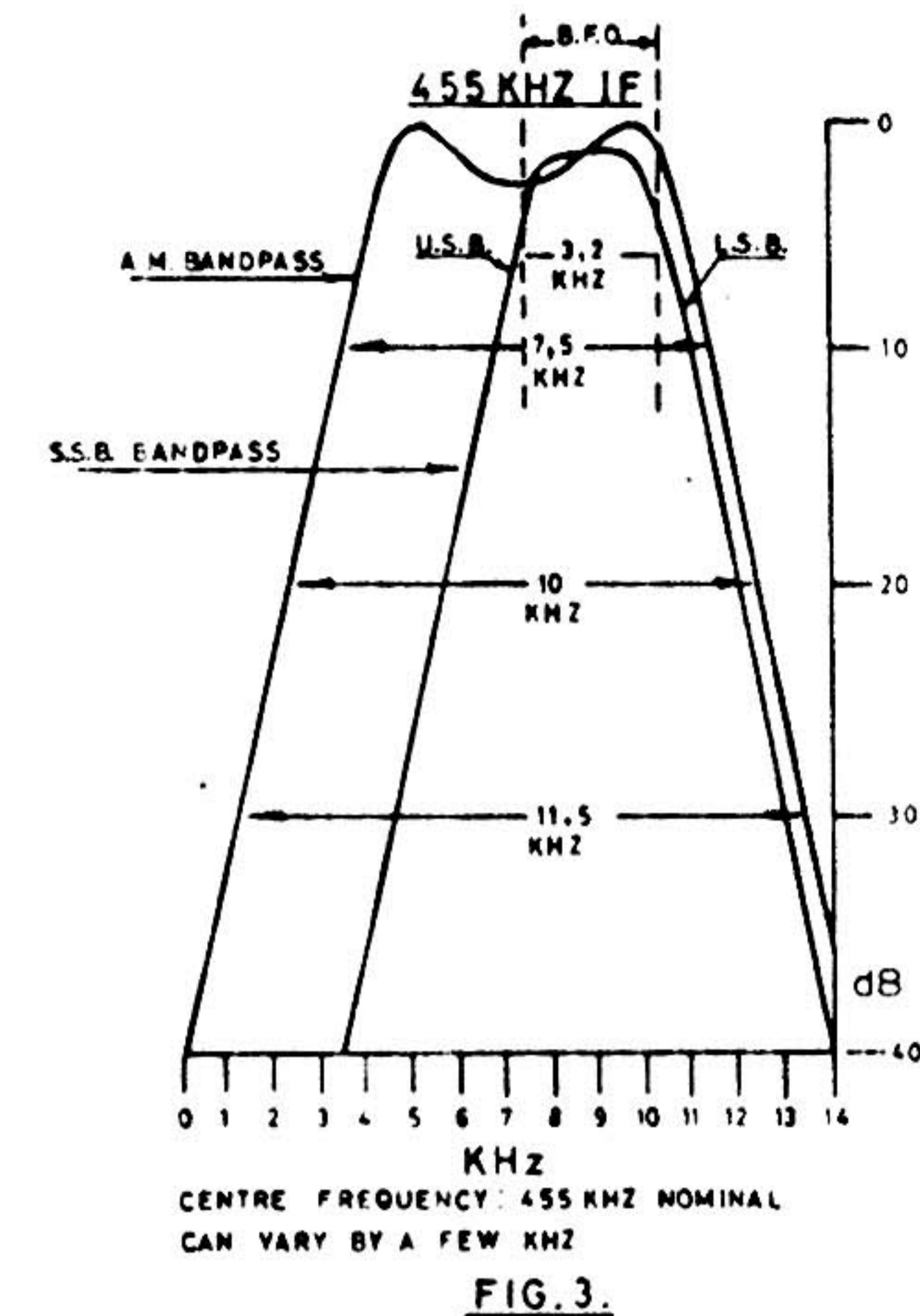
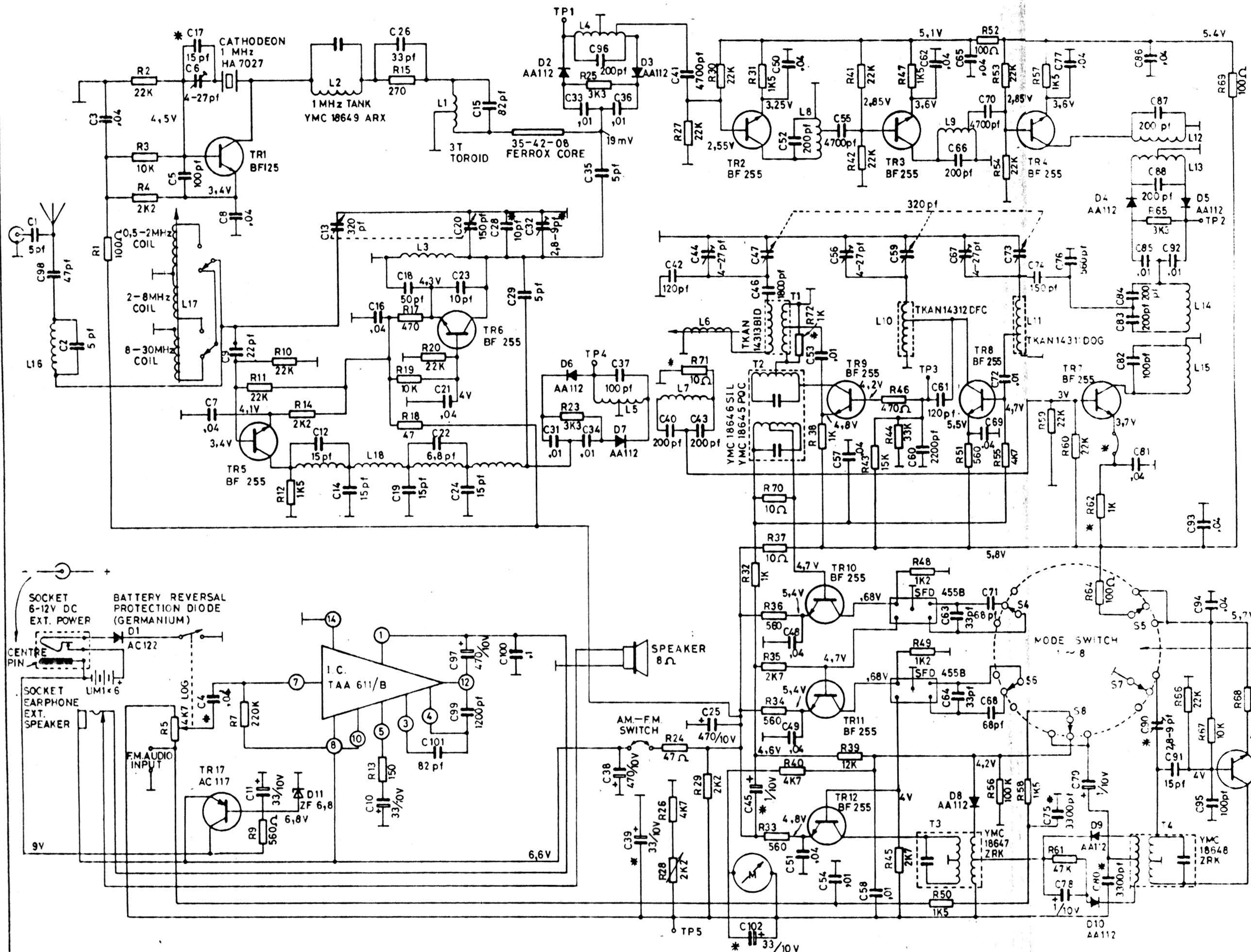


BLOCK DIAGRAM

XCR - 30
PORTABLE



1	2	3	6	7	8	9	12	13	14	15	16	19	21	23	27	29	32	34	36	38	40	41	43	44	45	46	48	49	52	54	56	58	60	61	63	65	67	69	71	73	75	76	78	80	81	84	85	88	90	92	93
98				5	17	4		10	16	18	20	101	22	24	15	28	31	33	35	37	39	42	25		47	50	51	53	55	57	59	62	64	66	68	70	72	74	77	79	82	83	85	87	89	91	94	95			
R			1	2	3	4		10	11	12	14		13	19			23	25				26	27	29	30	31	32	34	36	38	39	41	43	44	47	48	50	51	52	53	55	57	60	61	64	65	66	68			
			5				7	9			15	16	20				24	28	70	71		33	35	37	72	40	42	45	46	49																		67	69		



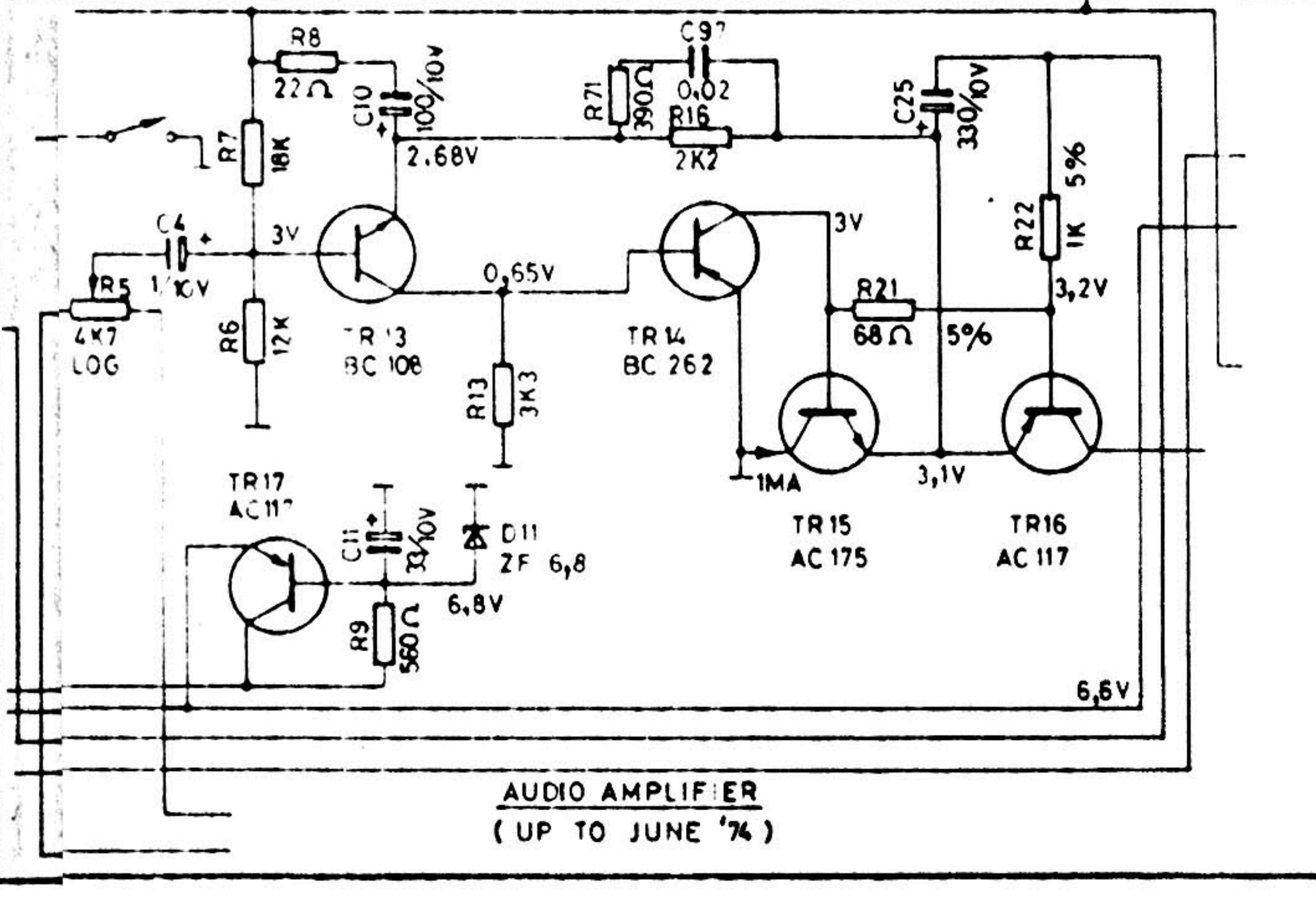
DIODES		* MODIFICATIONS	
D1 AC 122	PROTECTION DIODE	1. C75 - C80	2200 pF SERIAL N°s 0001 TO 0100 ONLY
D2, D3 AA 112	MATCHED PAIR(BALANCED MIXER N°1)	2. C90	2.5 TO 6 pF SERIAL N°s 0001 TO 1100 ONLY
D4 D5 AA 112	MATCHED PAIR(BALANCED MIXER N°3)	3. C32	7-35 pF (AND C28 NOT FITTED) ON EARLY MODELS
D6 D7 AA 112	MATCHED PAIR(BALANCED MIXER N°2)	4. VALUE OF R40 ON EARLIER MODELS:-	a) 1K5 WITH METER TYPE KISHO Y04 600
			b) 3K9 WITH METER TYPE TOYO MUSSEN V81
		5. C17	ADJUSTING CAPACITOR

NOTES

VOLTAGES SHOWN ON THIS DIAGRAM CAN VARY DEPENDING ON THE ACTUAL ZENER DIODE AND RESISTOR TOLERANCES, AND ARE NEGATIVE WITH RESPECT TO CHASSIS.

ALL CAPACITOR VALUES ARE SHOWN IN μ F (MICROFARAD) EXCEPT THOSE INDICATED pF (PICOFARAD)

EVERY EFFORT IS MADE TO KEEP THIS DIAGRAM UP TO DATE—BUT THE RIGHT IS RESERVED TO USE DIFFERENT COMPONENTS OR AMEND THE CIRCUIT WITHOUT NOTICE.



*** MODIFICATIONS (FROM DECEMBER 1974)**

- C4 FROM 1 μ F TO 0,04 μ F
- R71 10 Ω RESISTOR FROM JUNCTION OF L7/C43 TO POSITIVE CHASSIS
- C39 FROM 470 μ F/10V TO 33 μ F/10V
- R72 1K RESISTOR FROM TAP OF L2 TO POSITIVE CHASSIS
- ADDITION OF C102 33 μ F/10V CAPACITOR ACROSS THE METER
- R62 2K2 Ω NOW BECOMES 1K Ω
- R63 100 Ω NOW BECOMES A WIRE LINK
- C45 33 μ F/10V NOW BECOMES 1 μ F/10V
- C50 AND C62 NOW PLACED UNDER THE CIRCUIT BOARD AND NOT ON THE COMPONENT SIDE

UNIT	PROJECTION	MODIFICATION	DATE
TOLERANCES 1 - 10.4 MATERIAL			
UNLESS OTHERWISE INDICATED 1.0 - 10.2			
INDICATED 1.00 - 10.1			
DRAWN S. F. H.	DATE 14-6-74	TITLE	DRG. NO.
TRACED	DATE	CIRCUIT DIAGRAM MKII	7470
MECH APPR. [Signature]	DATE 31-7-74	MODEL	SCALE
TEST [Signature]	DATE 31-7-74	BARLOW WADLEY XR 800 C	

BARLOWS TELEVISION COMPANY NEW GERMANY NATAL