QUAD FM 3
TUNER
Service Data

Contents

CIRCUIT DESCRIPTION

The FM3 is built on two printed circuit boards. One carries the power supplies and stereo decoder, while the other carries RF, IF and discriminator together with tuning indicator and noise sensing circuits.

RF Board (M12327) QF3RF3A

The aerial signal is fed via the tuned circuit L1 C2 to one gate of the RF amplifier TR1 (a dual gate MOS FET device with integral protection) and thence via L2 C11 to the mixer TR2. The local oscillator signal provided by TR3 operating in the earthed collector mode, is injected into the second gate of the mixer via L3a which is inductively coupled to L3b.
The IF output from the mixer TR2 is applied via a tuned matching transformer IFT1 to the multi element ceramic filter F1 the output of which feeds IC1.
IC1 contains the IF amplifier and limiter, and provides with L6 a quadrature discriminator. At pin 6 of IC1 there appears both the recovered audio and a d.c. voltage from the discriminator. After passing through an emitter-follower TR6 the audio passes through the low pass filter L7 C31 C32 to the decoder, and the d.c. voltage is used to drive the tuning indicator circuit TRs 7, 9, 10, 11, 12, 13, which also provides an output via R34 and R35 to operate the muting circuit in the stereo decoder. The pre-set control RV2 is used, as part of the alignment procedure, to set the tuning indicators to equal brilliance when correctly tuned to an incoming signal.
High frequency noise components of the audio signal are selected by L4, amplified by TR4 and TR5, and detected by D1. The resultant d.c. activates the muting circuit via TR8, and so mutes the audio output in the presence of weak, noisy signals. The gain of the noise amplifier may be varied by RV1 thus pre-setting the noise level (threshold) at which the muting operates.

Stereo Decoder (M12307) QF3DE1A

The audio signal is passed via the muting circuit TR100 to IC100 and TR101. IC100 is a phase locked loop stereo decoder which produces left and right outputs on pins 4 and 5 and a beacon output at pin 6, in the presence of a 19 kHz pilot tone. The left and right signals pass through active filters (TR106 and 107) to the output DIN socket. An undecoded, i.e. mono, signal is supplied by TR101.
De-emphasis is performed by C108, C110 and C111.

Power Supply

The RF board draws 80 mA from the +14 volt supply and 50 mA from the −14 volt supply.

ALIGNMENT

General

There are two methods of alignment in this supplement relating to two different test equipment arrangements.
To achieve the specified performance the applicable alignment procedure should be followed closely. Alignment should not be attempted without the specified test equipment.

ALIGNMENT PROCEDURE – 1

Equipment required

1 10.7 MHz wobbulator with a maximum output of 100mV rms.
2 Oscilloscope with a maximum Y sensitivity of 10mV/cm and D.C. coupled Y amplifier.
3 VHF signal generator covering the range 88–108MHz, with AM and FM modulation facilities and an attenuator accurate at signal levels of 2μV. (e.g. the Radiometer MS27).
4 Stereo signal generator with both multiplexed audio and multiplex RF outputs (e.g. the Radiometer SMG1).
5 Harmonic distortion meter or 19KHz notch filter.
6 Detector probe (a suitable circuit is shown in fig. 1).

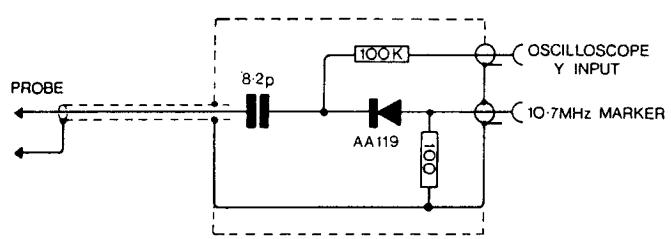


Fig. 1 Suggested Circuit of Detector Probe

HT Voltage adjustment

From serial number 5885 onwards no HT voltage adjustment is provided. On earlier models positive and negative supplies were adjusted to 14 volts by means of RV102 and RV104 respectively.

IF Alignment—before serial no. 10,000

Connect the detector probe to test point D, inject a wobbulated 10.7MHz signal at test point C, and observe the probe output on the oscilloscope. Throughout the following procedure progressively reduce the wobbulator output as necessary to maintain an

oscilloscope display amplitude of approximately 50mV peak to peak.
If a 10.7 MHz crystal oscillator is available it may be injected at the appropriate probe terminals to provide a marker. Adjust both cores of IFT1 simultaneously for a maximum response.
Adjust the core of L5 for maximum response.
Make small adjustments to IFT1 and L5 cores as necessary to obtain the response shown in fig. 2.
Remove detector probe from test point D and transfer oscilloscope input lead to point B (Pink interconnecting lead). Adjust core of discriminator coil L6 for maximum slope of the centre portion of the discriminator characteristic.
Transfer probe to test point A and unsolder the filter input pin (pin 1). This is necessary since the response at this point (fig. 5) is dominated by the filter input impedance. It should be noted that the peak response at this point does not correspond with the filter centre frequency.
The response at test point A with filter removed is shown in Fig. 4 and should show no signs of double humping. If it does it will be necessary to replace IFT1.

IF Alignment—serial no. 10,000 onwards
Connect an oscilloscope to Test Point Q (pin 13 of CA3089), and inject a wobbulated 10.7MHz signal at test point P. Adjust the core of IFT1 for maximum amplitude at test point Q. Fine adjustment of the core will then enable the maximum width of the flat top to be obtained as shown in fig. 2, with a minimum of generator output.
Transfer oscilloscope lead to test point R and adjust core of L6 for maximum slope of the linear centre portion of the discriminator characteristic.

IF responses: As a rough check of performance after completing the IF alignment, increase the input signal to obtain the amplitude shown in fig 4, when the amplitudes shown in figs 2, 3, and 5 should also be obtained.

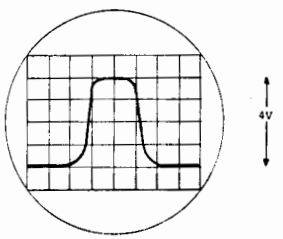


Fig. 2 Response at output of IC1 (Test point D)

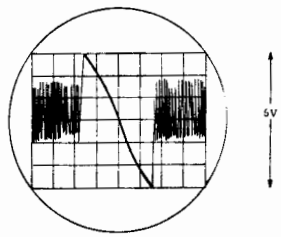


Fig. 3 Discriminator response (Test point B)

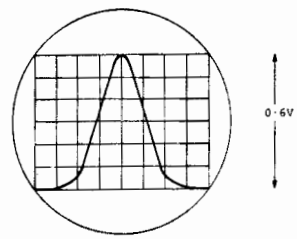


Fig. 4 Response at test point A, with filter removed

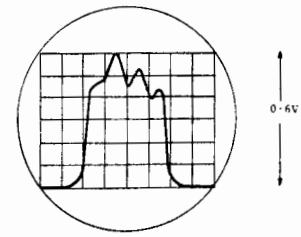


Fig. 5 Response at test point A, with filter present

RF Circuit Alignment—before serial no. 10,000
After completing IF alignment remove wobbulator input but leave detector probe at test point A.
Connect the RF generator to the aerial socket and inject a 300μV, 75% amplitude modulated signal at 90MHz. Preset the cores of L1, L2, L3 level with the tops of the formers, and the trimming capacitors C1, C9, C20 approximately three threads out. Check that pointer travel is symmetrical about end scale markings, and that pointer is fixed to string. (If necessary secure with spot of Durofix or similar adhesive)
Set the tuner to 90MHz and adjust the cores of L3, L2, L1 in that order for maximum amplitude of oscilloscope display. If the front end of the tuner is badly misaligned it may be necessary temporarily to increase the generator output slightly. Caution should be exercised since it is possible to align to a spurious response if too high an input level is used. It should be possible to obtain about 10mV peak to peak at the probe output for an RF input of 300μV or less. Necessity to apply an input signal greater than 1mV should be treated as a fault condition.
Retune generator and tuner to 104MHz and adjust C20, C9 and C1 in that order for maximum response.
Repeat adjustment of cores and trimmers until no further improvement is possible.
Remove probe, resolder filter pin 1 and connect oscilloscope to test point B, together with valve voltmeter. Inject 2μV 90MHz 30% FM at aerial socket.
Retune tuner to 90MHz observing the oscilloscope. The correct tuning point occurs with noise just showing in equal amounts on positive and negative peaks of the audio output.
Make small adjustments to the core of L6 to obtain maximum audio output level as observed on the voltmeter. Set RV2 for equal brilliance of the tuning lamps.

RF Circuit Alignment—serial no. 10,000 onwards
Since a demodulated output is available at test point Q, no detector probe is required with these sets unless a fault is suspected prior to the CA3089. When setting the gain at 90MHz, L3 should be adjusted so that when looking into the top of the tuner, its core is at the uppermost tuning point. RF circuit alignment then follows the procedures outlined above as for earlier models.

Adjustment of Noise sensing coil L4
Adjustment of this core should be unnecessary unless it is not possible to mute signals below 100μV.
If alignment is necessary, connect a suitable amplifier to the audio output socket and the FM generator to the aerial socket.
Unscrew the core of L4 until level with top of can.
Inject an FM signal of 10μV and advance the mute control to the point just prior to muting. Screw the core of L4 in until muting occurs. Increase the signal level until the tuner comes out of muting and re-adjust L4. Repeat adjustments of L4 progressively

increasing signal level until no further improvements are possible.
This completes the RF board alignment with the exception of L7 which must be aligned in conjunction with the decoder.

Decoder—before serial no. 5885
Remove the pink inter-board lead from the decoder and inject a 19KHz pilot tone at a level of 30mV from the multiplex generator.
Connect the valve voltmeter by means of unscreened cable, to the tap on L101. Adjust the core of L101 for maximum output. L102 and L103 are aligned in a similar manner with the valve voltmeter connected to their respective taps.
Connect the distortion meter input to the output socket Pin 5 and tune the distortion meter to 19KHz. Observe the distortion meter output on the oscilloscope which will show the residual 38KHz switching components together with smaller quantities of harmonics. Adjust the core of L104 for minimum display amplitude. Similarly connect the distortion meter to Pin 3 and adjust L105.
With the distortion meter still connected to Pin 3, apply a stereo signal modulated with 1KHz on right channel only and adjust RV101 for minimum crosstalk. Slight adjustments of L101 in conjunction with RV101 should now enable the crosstalk to be reduced to a small second harmonic component. Remove the multiplex input and reconnect the pink interconnecting lead. Inject at the aerial an FM stereo signal carrying right channel modulation at 1KHz.
Again observing the distortion meter output adjust the core of L7 for minimum crosstalk.
As a check on these last three separation adjustments apply 10KHz right channel modulation and measure crosstalk which should be better than −30dB.

Decoder—serial no. 5885 onwards
The decoder now fitted uses a phase-locked loop integrated circuit providing improved stereo separation and lower distortion. The only adjustment provided is RV100 which sets the free run frequency of the oscillator contained within IC100. For this adjustment either connect a digital frequency meter to test point S (pin 10 of IC100) where the 19KHz square waveform appears, or if an accurate 19KHz source is available, such as the pilot tone from a stereo generator, connect this to the X amplifier of an oscilloscope, test point S to the Y amplifier, and use the resultant Lissajous figure. It will be found advantageous to remove the audio input to the decoder by muting the set, for this adjustment only.
With a distortion meter connected to the output socket pin 3, apply an FM stereo signal carrying pilot tone only to the aerial socket. Tune the distortion meter to remove the 19KHz from the output signal so enabling crosstalk to be measured when applying a 1KHz signal on the Right channel only. The core of L7 is then adjusted for minimum crosstalk. Alternatively this adjustment may be performed with comparable accuracy by listening to the output.

Alignment Procedure – 2

Using the following Test Equipment:

SOUND TECHNOLOGY 1000 (ST1000)
SOUND TECHNOLOGY 120FM (ST120FM)
DUAL BEAM OSCILLOSCOPE
AC MICROVOLTMETER 10Hz–10KHz

Alignment is in three parts: RF stage, discriminator stage and decoder stage.

Part 1

(a)

Connections
ST1000 – HORIZ to Y1
– RF OUT to TUNER aerial input
TEST POINT Q (pin 13 of IC1) to Y2 via a clip lead.
Clip the output from ST120FM to TUNER aerial input via 47Ω resistor
AC volts to TUNER

Controls
SCOPE TIMEBASE to XY
Y1 5v/cm DC COUPLED
Y2 0.2v/cm DC COUPLED
ST1000: FUNCTION—DUAL SWEEP
SWEEP WIDTH—700 to 800KHz (overload)
RF LEVEL—30μV
INPUT—MONO

Tune tuner and ST1000 to 90MHz. It would be found advantageous at this point to set the cores of L1 and L2 so that they are approximately flush with the top of the coil former. L3 may now be adjusted in order to locate IF response. L2 and L1 respectively should then be adjusted for maximum gain as in Fig. 6. By adjusting IFT1 optimum shape and gain may be

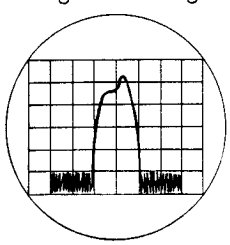


Fig. 6

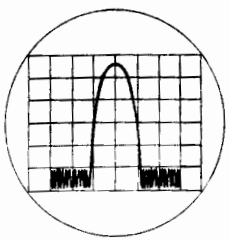


Fig. 7

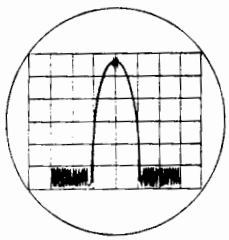


Fig. 8

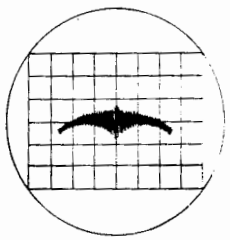


Fig. 9

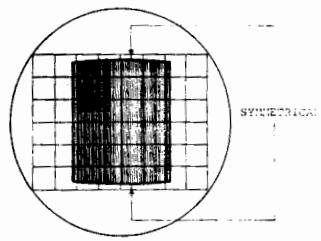


Fig. 10

achieved as in fig. 7. Switch on 90MHz marker and adjust L3 so that the marker centres on the peak of the IF response trace as shown in fig. 8. 90MHz marker may now be switched off.

(b) Tune tuner and ST1000 to 106MHz. Adjust C17 until a response appears. Adjust C10 and C1 respectively for maximum gain. Switch on 106MHz marker and adjust C17 till marker is centered on peak of IF response. Turn off 106MHz marker.

(c) Procedure (a) should again be carried out, followed by (b) and so on until the alignment is correct, and gain is optimum at both frequencies.

(d) With ST1000 Tuner and marker at 90MHz, reduce ST1000 sweep width to 200KHz and confirm the marker is centred accurately as in fig. 9. Marker may then be switched off.

Part 2

When aligning discriminator it is essential that the tuner and ST1000 are both tuned to exactly the same frequency, normally 90MHz is used.

(a) *Connections*
ST1000 HORIZ to Y1
ST1000 VERT to Y2
TEST POINT R (pink link wire) to ST1000 RCVR via cliplead
TUNER RIGHT CHANNEL OUTPUT to VOLTMETER INPUT

Controls
Y1—5v/cm DC COUPLED
Y2—0.5v/cm DC COUPLED
ST1000: FUNCTION—DUAL SWEEP
SWEEP WIDTH—200kHz
RF LEVEL—1000μV
VOLTMETER—500mV

It may be necessary to decrease Y2 sensitivity to 1v/cm. Adjust L6 to give symmetrical display as in fig. 10. Adjust RV2 in order to obtain equal brightness of both tuning lamps.

(b) *Controls*
ST1000: FUNCTION—MONAURAL
INPUT—MONO
OSC. LEVEL—75%
Adjust RV3 to obtain 250mV rms audio output. Check level is the same for left channel and mono outputs.

(c) Signal to noise check.
Controls
ST1000: RF LEVEL—4μV
FUNCTION—CW
The output level should drop by 40dB. By increasing the RF level to 40μV the output level should fall by a further 30dB

Part 3

(a) *Connections*
ST1000 19KHz to Y1
TEST POINT S (pin 10 of IC100) to Y2 via clip lead
TUNER RIGHT CHANNEL OUTPUT to VOLTMETER INPUT

Controls
SCOPE: Y1—2v/cm
Y2—2v/cm
TIMEBASE—10μS/cm
TRIGGER—Y1
ST1000: FUNCTION—STEREO
OSC LEVEL—MINIMUM
RF LEVEL—1000μV
PILOT LEVEL—MINIMUM

Adjust RV100 to obtain a triggered 19KHz signal on Y2 which is comparable with Y1 trace.

(b) Increase PILOT LEVEL on ST1000 and confirm that 19KHz signals lock and stereo lamp illuminates at 3 to 5% pilot level.

(c) Set PILOT LEVEL to 9%.

(d) *Reconnect*
Y2 to VOLTMETER OUTPUT via clip lead
Y1 TO TUNER LEFT CHANNEL OUTPUT

Controls
ST1000: INPUT—LEFT
OSC LEVEL—100%
VOLTMETER—5mV
SCOPE: Y1—0.2v/cm
Y2—0.2v/cm
TIMEBASE—0.2mS/cm
TRIGGER—Y1

Adjust L7 for minimum crosstalk signal in right channel, (less than 3mV). Having checked left to right crosstalk check right to left by connecting TUNER LEFT CHANNEL OUTPUT to VOLTMETER INPUT, and TUNER RIGHT CHANNEL OUTPUT to SCOPE Y1. Switch ST1000 INPUT to RIGHT.
Alignment is now complete but certain checks still have to be made.

1. *Mono Output*
Mono output level should be checked by connecting TUNER MONO OUTPUT to VOLTMETER INPUT and switching ST1000–INPUT to L + R. The mono output level should be approximately 330mV at 100% modulation. Switch ST1000–INPUT to L − R and confirm that mono output level is less than 5mV.
2. *Muting Function*
ST1000 INPUT–L + R. With the muting control on the tuner turned to maximum reduce RF level on ST1000 to 200μV and adjust L4 so that the tuner just mutes.

MODIFICATIONS

RF Board

From Serial No. 540 onwards

1. New L6 coil coded yellow.
2. L5—modified* and mounted with colour spot to R16.
3. MR4, MR5 removed and replaced by 4K7 resistors.
4. C11 removed.
5. R32 removed.
6. C32 changed from 33pF to 18pF.
7. R12 changed from 680Ω to 1K.
8. R21 changed to 2K2.
9. C34 changed to 47pF.
10. C47 0.047μF added.

From Serial No. 1500 onwards

Issue 4 printed circuit board M12248

1. R37 added.
2. L5 unmodified* as pre 540.
3. R32 restored (see parts list re value).

* Modification to coil L5 comprised cutting off the unused centre legs to permit re-orientation.

The following modifications have been made at various stages in production from serial no. 3000 onwards.

1. Panel lamp series resistor changed from 10Ω to 68Ω to improve lamp life.
2. Tr4 changed from 40244 to BFX44 or BF357K.
3. C13 and C15 changed to 100pF—a modification which results in improved background noise.
4. C26 changed from 3.3pF to 4.7pF consequent upon change of Tr4 to BF357K.
5. Tr1 may be 3N201.
6. Tr2 may be 3N205.
7. Tr10 and 11 may be MPSA12.

M12248 Issue 6 Printed Circuit Board

1. Tuning gang changed from Wingrove and Rogers CG80 to DAU 338/30—N.B. these gangs are not interchangeable and when ordering spares note should be made of the tuning scale fitted. With Wingrove and Rogers gangs the Legend MHz appears centrally and with DAU gangs it is at the right end of the scale.
2. Chassis changed from issue 6 to issue 7.
3. Tuning drive changed.
4. Scale changed from B12233 to B12297 (see above).
5. Variable Resistor RV3 added.
6. R38 10K added.
7. Oscillator configuration altered resulting in:
   (a) L3 changed from 2 terminal to 3 terminal.
   (b) C25 changed from 0.002μF to 0.001μF.
   (c) C18 changed from 20pF to 18pF.

8. Cores of L1, L2, L3 changed from 2 Neosid 900 and 1 Neosid 910 (L3) to 3 type 900.
9. L4 and L7 changed from G.B. Stock No. 750G to Toko type CAN 1980BX Stock No. L1980BX.
10. C7 changed from 15pF to 13pF.

M12248 Issue 7 Printed Board
As issue 6 except tuning gang is Wingrove and Rogers CG80, scale is B12233, C7 is 15pF and C18 is 20pF. Metalwork and tuning drive is as issue 4.

M12248 Issue 8 Printed Board
As issue 6 except Tr10 and Tr11 are each changed from 1 2N5306 to 2 BC109B or BC184K. Other modifications as follows:

1. R2 changes from 10M to 1M.
2. R19 changes from 3K3 to 2K7.
3. C10–1000pF added.
4. C36 changed from 0.64μF to 0.68μF.

M12327 Issue 1 Printed Board. Serial No. 10,000 onwards
IC1, IC2, Tr3 are removed and replaced by CA3089E as shown on relevant circuit diagram. If necessary the audio output from this board may be increased by modifying as issue 2 and setting RV3 for 100mV rms output at 22.5KHz deviation.

M12327 Issue 2 Printed Circuit Board
Link between pins 7 and 10 of CA3089E removed and pins 6 and 7 linked instead. R29 and R31 changed to 22K. This board was also redrilled to accommodate Jackson type C21 gang from Serial No. 18900.

M12327 Issue 3 Printed Circuit Board
Drilling changed to accommodate Toko filter SFJ10.7 MA2.

1. 120Ω Resistor added between IFT1 and F1.
2. C8 changed from 13pF to 15pF.
3. C15 changed from 16pF to 18pF.
4. C20 changed from 3.3pF to 4.7pF.
5. Tr3 changed from BF357K to BF200.
6. Tr4–13 inc. changed from BC109B to BC184K.

Decoder

From Serial No. 540 onwards
R103 removed.
C105 changed to 0.015μF.
L102 modified.
R126 changed to 180Ω.

From Serial No. 900 onwards
R101 changed to 150Ω.

M12247 Issue 2 Printed Board

1. L101–5 changed from G.B. Stock No. 750G to Toko type CAN1980BX Stock No. L1980BX. These are not interchangeable.
2. C105 changed from 0.015 to 0.01μF.
3. Diode type IS920 added between pin 2 of IC101 and black interboard lead. (Anode of diode to pin 2.) This reduces background noise when set is muted.
4. *Alternative transistors*
   Tr101—BC143 changed to BC461 or BC303.
   Tr102—BC184K or BC109C.
   Tr103—BC154 or BC214C.
   Tr105—BC184K, BC109C or E5270.
   IC101—MC1305P or SN76105

M12307 Issue 3 Printed Board

from Serial No. 5885 onwards

1. IC101 changed to MC1310P or SN76115.
2. No Coils.
3. Power supply altered to eliminate HT setting pots.

The following changes have been made at various stages in production from Serial No. 5885 onwards:

1. RV100 changed from 5K to 10K.
2. C113 may be 680μF.
3. R115 changed from 18K to 15K.
4. *Alternative transistors*
   Early tuners used type 40673 for both Tr1 and Tr2. For replacements use type 40822 for Tr1 and 40823 or 3N205 or 3SK70 for Tr2.

Stock numbers for the above listed parts may be found under circuit diagrams. These parts may be alternatives for original parts no longer available.

Filter coding
Two versions of the ceramic filter have been used and can be interchanged providing the necessary alignment adjustments are made. The original type CFP10.7MA has a black body and is colour coded to indicate centre frequencies as follows:

Green 10.62 ± .03MHz
Blue 10.66 ± .03MHz
Red 10.70 ± .03MHz

White 10.74 ± .03MHz
Yellow 10.78 ± .03MHz

The later types SFG10.7MA (chromium plated body) and SFJ10.7MA2 (plastic coated body) are colour coded:

Black 10.64 ± .035MHz
Red 10.70 ± .035MHz
White 10.76 ± .035MHz

Blue 10.67 ± .035MHz
Orange 10.73 ± .035MHz

Note that types CFP and SFG carry the colour code spot at their input end but type SFJ carries it at its output end. The lead-out wires of SFJ are in line but may be bent to fit without redrilling board for service replacement.

INSTRUCTIONS FOR REPLACING DRIVE CORD
See Fig. 11A for tuners fitted with Wingrove & Rogers tuning capacitors or Fig. 11B for tuners with Dau or Jackson tuning capacitors.
Use nylon braided glass cored cord such as Finlayson size 20. Ensure that it does not come into contact with lubricant on pulley spindles.
Remove front panel (4 screws) and tuning drum (2 grub screws). For tuners with Wingrove & Rogers capacitors take 16 inches (40 cm) OR for those with DAU capacitors take 26 inches (66 cm) of cord, knot one end and trim, then thread through hole (2). Take another length of cord, 30 inches (76 cm) long for Wingrove & Rogers OR 12 inches (30 cm) for Dau, knot one end and trim, then thread through hole (6) to outer edge of tuning drum (1) and through hole (7).
Turn tuning capacitor to fully closed position and replace tuning drum in position shown in Fig. 6. Lay the shorter length of cord around drum one turn in clockwise direction to pulley 3 for Wingrove & Rogers OR in anticlockwise direction for Dau, towards pulley (5). Attach free end of cord to spring (4), so that spring is approximately ¼" from pulley (5). Remove surplus cord and loop free end of spring temporarily to pulley (5) spindle.
Take the other length of cord, and lay around tuning drum, 2½ turns in anticlockwise direction for Wingrove & Rogers OR 1½ turns in clockwise direction for Dau, to capstan (8), then 2 turns around capstan in clockwise direction to pulley (9), and around pulleys (10) and (5). Attach cord to free end of spring extending spring about 25% and remove surplus cord.
Replace front panel, then with tuning capacitor fully closed, replace pointer (11) so that it lies at tuning knob end of scale line

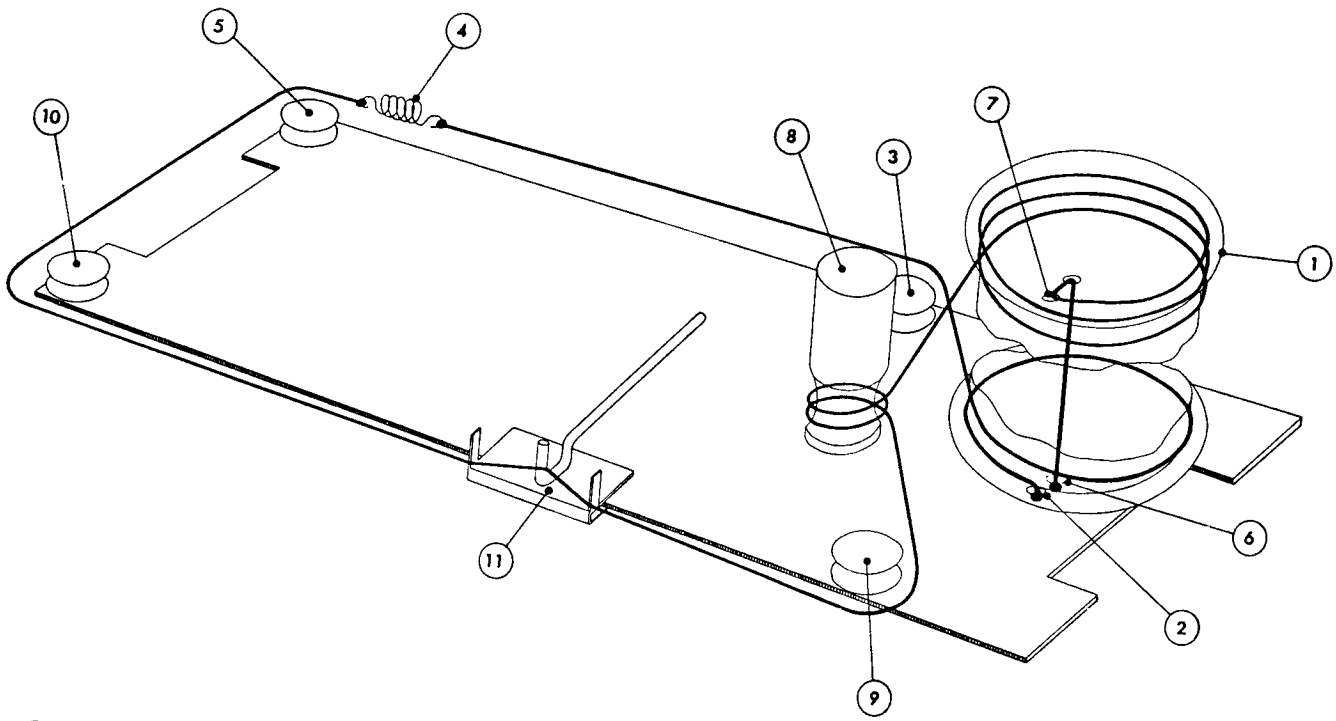


Fig. 11A

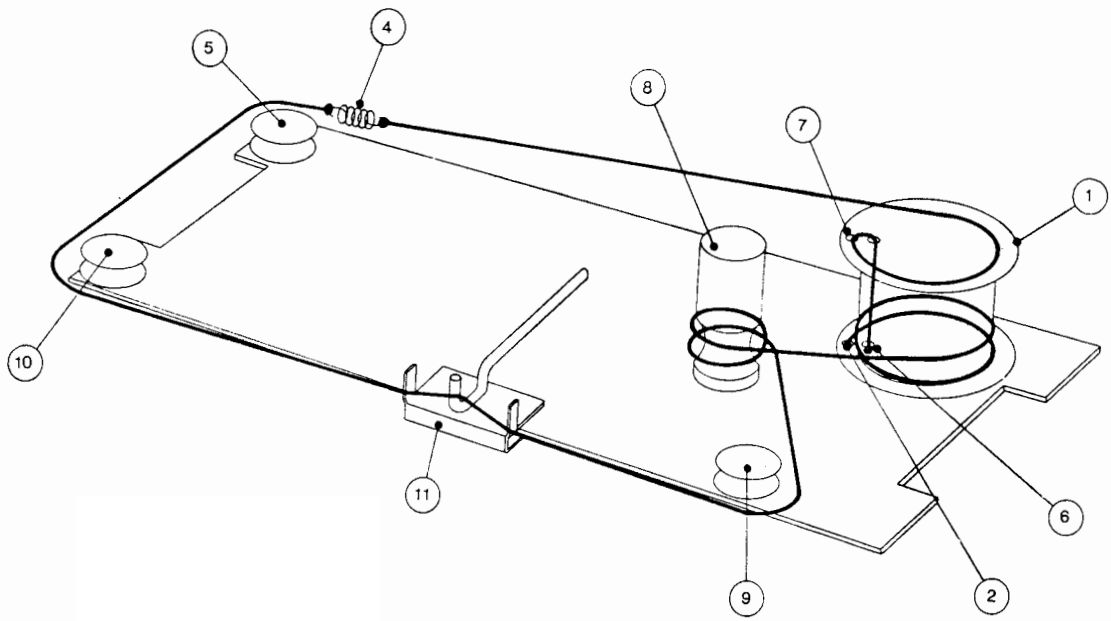


Fig. 11B

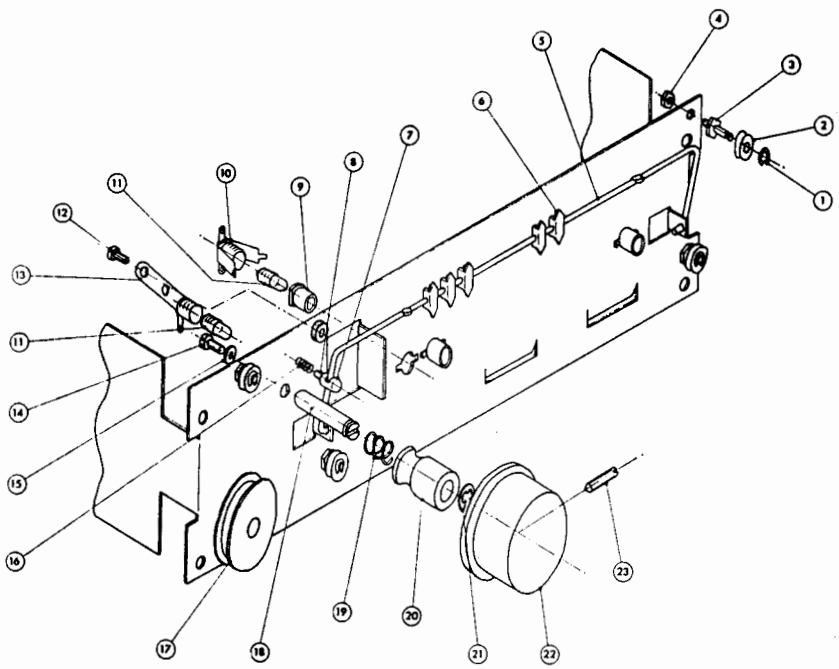


Fig. 12

No.	*Description*	*Stock No.*
1	Circlip	FF1916A
2	Pulley	M11007B
3	Pulley Spindle	M12208A
4	6BA Nut	TB6FHPA
5	Station Marker Support	M12193M
6	Station Marker	M12199A
7	Tappet	M12234A
8	6BA Grub Screw	TB603JC
9	Bush	FF72760
10	Lampholder	PBLSS14
11	Bulb	BB14VLA
12	6BA Screw	TB604DA
13	Lampholder	PBLSS14
14	4BA Screw	TB405DA
15	Friction Washer	TDB4NLF
16	Tappet Spring	N12833A
17	Tuning Drum	M12198A
18	Support	M12168B
19	Capstan Spring	N31275A
20	Capstan	M12168C
21	Circlip	FF5133A
22	Knob	M12168P
23	4BA Grub Screw	TB403JC

COMPONENTS LIST

Assembly QF3DE1A FM3 Decoder Board

Part No.	Description
C1N00MI	Capacitor 1nF 20 RT12K1NOMS
C470PJL	Capacitor 470p 5 AP160
C470PMI	Capacitor 470p 20 RT12FM470PMS
C680PMI	Capacitor 680p 20 RT12K1680MS
DBC214C	Transistor BC214C
DE5270X	Transistor E5270
DZ15VAA	Zener diode BZY88C15V
R10K0J1	Resistor 10K 5 050
R15K0J1	Resistor 15K 5 050
R1K00J1	Resistor 1K 5 050
R1M00J1	Resistor 1M 5 050
R220RJ1	Resistor 220 5 050
R22K0J1	Resistor 22K 5 050
R33K0J1	Resistor 33K 5 050
R390RK1	Resistor 390 10 050
R3K30J1	Resistor 3K3 5 050
R47K0J1	Resistor 47K 5 050
R4K70J1	Resistor 4K7 5 050
R5K60J1	Resistor 5K6 5 050
RP10K0B	Potentiometer Type HN10 10K
C100NJS	Capacitor 100nF 5 250V B32561
C10N0EI	Capacitor 10nF RT17K310N0ES
C10N0JS	Capacitor 10nF 5 160V B32561
C1K0USI	Capacitor 1000u 25V – 20 + 50
C220NKS	Capacitor 220nF10 250V B32561
C220UZE	Capacitor 220u 16V EK
C470NJS	Capacitor 470nF 5 100V B32561
C47N0JS	Capacitor 47nF 5 250V B32561
C680NKT	Capacitor 680nF 35VC TANT
C680UTM	Capacitor 680u 40V – 10 + 50
DBC142X	Transistor BC142
DBC461X	Transistor BC461
DW02XXX	Bridge rectifier W02
PS05DNB	Socket 5-pin DIN angle panel
RT299DD	Thermistor E299DD
D1310PA	INT CCT MC1310P

Assembly QF3REST FM3 Miscellaneous components

Part No.	Description
AFCOL12	Screw-on Buffer Collinson 1/2
ETNY20A	Cord white nylon size 20
FF72760	Friction Bush FT 72760-01
I12307A	PCB FM3 Decoder
LBF14AA	Coil former type 1050/2/F14
LF3MNSA	Transf FM3 AC SUPPLY
M11936B	Guide long drwg A11936
M11991P	33/FM3 Cover AC48
M12164A	FM3 Chassis
M12166A	FM3 Screening bracket
M12168P	FM3 Knob AC83
M12173P	FM3 Front panel
M12194A	FM3 Plastic rear panel
M12199A	FM3 Station markers
M12297A	FM3 Tuner scale
NHS5FAA	Heatsink type 5F
PP1828A	Plug aerial 1828 cable 2 wire
PPL734A	Plug coaxial aerial L734/P/AL
PSP430S	Socket 3 pin AC cable P430/SE

Assembly QF3RF3A FM3 RF Board

Part No.	Description
C100PGM	Capacitor 100pF 2
C100PMI	Capacitor 100pF N3000
C15P0KA	Capacitor 15p 10 N220/APD
C18P0GF	Capacitor 18pF 2
C1N00SI	Capacitor 1n CD06K301NO
C22N0ZL	Capacitor 22nF Lemplac CP10P
C2N20JF	Capacitor 2.2nF 5 160V Poly
C330PMI	Capacitor 330p RT10K1330PMS
C33P0JI	Cap 33p 5 RT12TH33POJS
C47N0ZL	Capacitor 47nF 63V CP12P
C4P70CI	Capacitor 4.7pF NPO
C680NKT	Capacitor 680nF 35VC Tant
C68P0MI	Cap 68p 20 RT17UJ68POKS
DAA119X	Diode AA119

Assembly QF3RF3A FM3 RF Board continued

Part No.	Description
R10K0J1	Resistor 10K 5 050
R120RK1	Resistor 120 10 050
R150KJ1	Resistor 150K 5 050
R15K0J1	Resistor 15K 5 050
R1K00J1	Resistor 1K 5 050
R1M00J1	Resistor 1M 5 050
R22K0J1	Resistor 22K 5 050
R270RK1	Resistor 270 10 050
R2K70J1	Resistor 2K7 5 050
R330RJ1	Resistor 330 5 050
R33K0J1	Resistor 33K 5 050
R3K90J1	Resistor 3K9 5 050
R47K0J1	Resistor 47K 5 050
R4K70J1	Resistor 4K7 5 050
R56K0K1	Resistor 56K 10 050
R68R0K1	Resistor 68 10 050
RP10K0B	Potentiometer type HN10 10K
RV20K0A	Potentiometer type HN10 20K
D3089EX	INT CCT CA3089E
I12327A	PCB FM3 RF M12327 ISS 2
C10N0KK	Capacitor 10nF 10 160V KT1807
CV6P0TA	Capacitor trimmer 1.4–6pF
D3N205X	Transistor 3N 205
D40822X	Transistor 40822
DBF200X	Transistor BF200
DBC184X	Transistor BC184K
L12202A	Coil FM3 L1, L2 GB 6623
L12203A	Coil FM3 L3B GB 6624
L1506AA	Coil Kals 1506A
L1980BX	Coil Toko 1980BX
L586HMA	Coil Kacs K 586HM
LB7201A	Coil former type 720/1
LB900AA	Core 4 × 10 × 0.5 ref 900
LSC1022	Choke RF 22UH SC10
LSFJ10A	Filter SFJ 10.7 MA2Z
M12235A	FM3 Screen AC89
R120RK1	Resistor 120 10 050
CV14PGA	Cap var C21 5560/3/14.5 mod

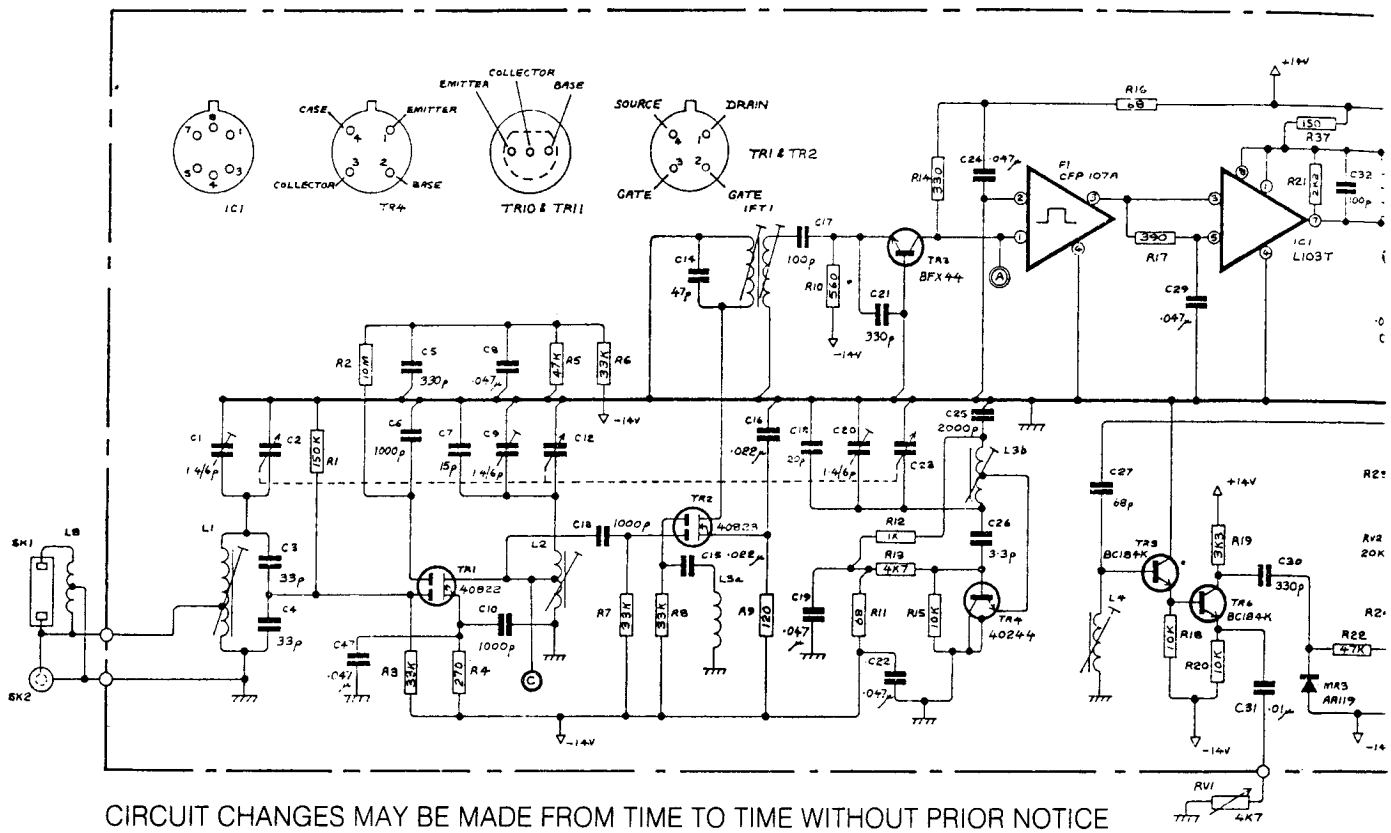
Assembly QF3CH6A FM3 Chassis

Part No.	Description
BB14VLA	Lamp 14V .04A 5mm LES type 690
PBLSS02	Lampholder type LSS02
PBLSS14	Lampholder LSS14
FF1916A	Circlip 1916/17/00
FF5133A	Circlip Salter type 5133-18
FF70080	Friction bush 70080-01
FFR114A	Push-on fix HPR114 3/B
M11007B	Pulleys brass A11007-2 ISS 3
M12168B	FM3 Spindle supp. A12168-3 ISS4
M12168C	FM3 Capstan AC84
M12193M	FM3 Station mkr support AC86
M12198A	FM3 Tuning drum
M12208A	FM3 Pulley spindle AC88
M12234A	FM3 Tappet AC91
N12833A	Spring 12833 FM3 tappet
N31275A	Spring 31275 FM3 capstan
N511AAA	Spring 511 FM3 cord
M12228A	FM3 Pointer AC90

Assembly QF3RP5A FM3 Rear Plate

Part No.	Description
PPP4290	Plug P429 AC panel black
PS2153A	SKT Coax aerial panel RA2153
PS2881A	SKT 2 Wire aerial 2881 panel
RV4K70A	Potentiometer type MP 4K7
SF3MVSA	Switch FM3 AC volts select.
UMA10DA	Fuse 20mm 100mA delay 5704
I12187A	PCB FM3 AC supply M12187 ISS 3
M12165A	FM3 Rearplate AC81
M12197A	FM3 Plastic AC supply plate
PP05DNA	Plug 5-pin DIN cable
QU2001C	Cable AC US 2-pin moulded 1m N

FM3 BEFORE SERIAL NUMBER 5885



CIRCUIT CHANGES MAY BE MADE FROM TIME TO TIME WITHOUT PRIOR NOTICE

STOCK NUMBERS LISTED ARE FOR REPLACEMENT PARTS AND MAY BE EQUIVALENTS FOR ORIGINAL PA
WHERE CAPACITORS FORM AN INTEGRAL PART OF A COIL, THE COMPLETE COIL SHOULD BE ORDEF

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R1	150K	±10%		ISKRA UPM ¼W	R150KJ1
R2	10M	±10%		ISKRA UPM ¼W	R10MOJ1
R3	33K	±10%		ISKRA UPM ¼W	R33K0J1
R4	270	±10%		ISKRA UPM ¼W	R270RJ1
R5	47K	±10%		ISKRA UPM ¼W	R47K0J1
R6	33K	±10%		ISKRA UPM ¼W	R33K0J1
R7	33K	±10%		ISKRA UPM ¼W	R33K0J1
R8	33K	±10%		ISKRA UPM ¼W	R33K0J1
R9	120	±10%		ISKRA UPM ¼W	R120RJ1
R10	560	±10%		ISKRA UPM ¼W	R560RJ1
R11	68	±10%		ISKRA UPM ¼W	R68R0J1
R12	1K	±10%		ISKRA UPM ¼W	R1K00J1
R13	4K7	±10%		ISKRA UPM ¼W	R4K70J1
R14	330	±10%		ISKRA UPM ¼W	R330RJ1
R15	10K	±10%		ISKRA UPM ¼W	R10K0J1
R16	68	±10%		ISKRA UPM ¼W	R68R0J1
R17	390	±10%		ISKRA UPM ¼W	R390RJ1
R18	10K	±10%		ISKRA UPM ¼W	R10K0J1
R19	3K3	±10%		ISKRA UPM ¼W	R3K30J1
R20	10K	±10%		ISKRA UPM ¼W	R10K0J1
R21	2K2	±5%		ISKRA UPM ¼W	R2K20J1
R22	47K	±10%		ISKRA UPM ¼W	R47K0J1
R23	22K	±10%		ISKRA UPM ¼W	R22K0J1
R24	47K	±10%		ISKRA UPM ¼W	R47K0J1
R25	68	±10%		ISKRA UPM ¼W	R68R0J1
R26	1M	±10%		ISKRA UPM ¼W	R1M00J1
R27	150K	±10%		ISKRA UPM ¼W	R150KJ1
R28	10K	±10%		ISKRA UPM ¼W	R10K0J1
R29	150K	±10%		ISKRA UPM ¼W	R150KJ1
R30	10K	±10%		ISKRA UPM ¼W	R10K0J1
R31	150K	±10%		ISKRA UPM ¼W	R150KJ1
R32	SELECTED ON TEST TO MATCH IC2 15K TO 100K				
R33	1K	±10%		ISKRA UPM ¼W	R1K00J1
R34	10	±10%		ISKRA UPM ¼W	R10R0J1
R35	4K7	±10%		ISKRA UPM ¼W	R4K70J1
R36	4K7	±10%		ISKRA UPM ¼W	R4K70J1
R37	150	±10%		ISKRA UPM ¼W	R150RJ1
R101	150	±10%		ISKRA UPM ¼W	R150RJ1
R102	470	±5%		ISKRA UPM ¼W	R470RJ1
R104	2K2	±5%		ISKRA UPM ¼W	R2K20J1
R105	33K	±10%		ISKRA UPM ¼W	R33K0J1
R106	10K	±10%		ISKRA UPM ¼W	R10K0J1

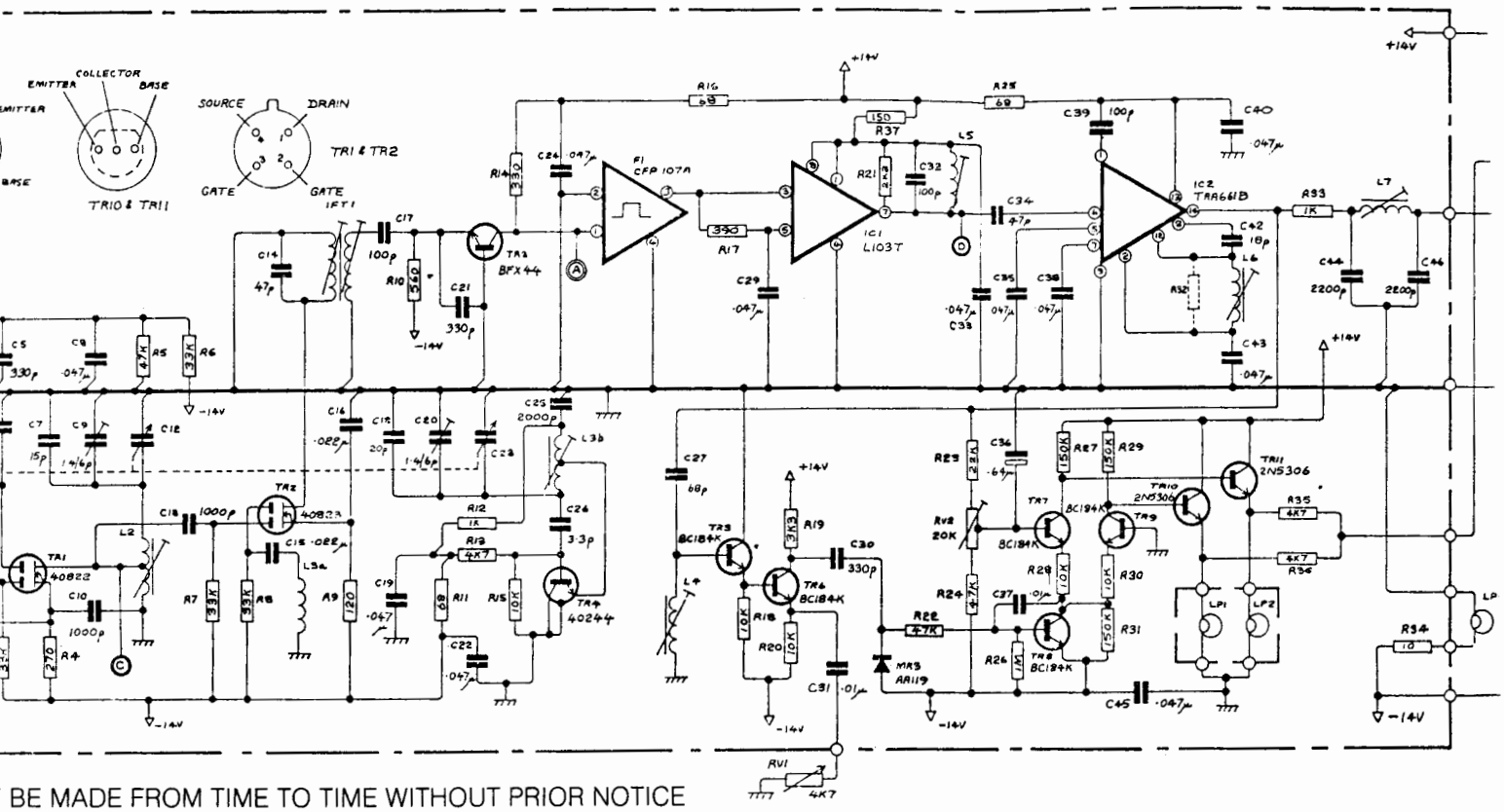
NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R107	10K	±10%		ISKRA UPM ¼W	R10K0J1
R108	3K3	±10%		ISKRA UPM ¼W	R3K30J1
R109	10K	±10%		ISKRA UPM ¼W	R10K0J1
R110	4K7	±10%		ISKRA UPM ¼W	R4K70J1
R111	3K3	±10%		ISKRA UPM ¼W	R3K30J1
R112	270	±10%		ISKRA UPM ¼W	R270RJ1
R113				MULLARD E299OD 220	
R114	3K3	±10%		ISKRA UPM ¼W	R3K30J1
R115	3K3	±10%		ISKRA UPM ¼W	R3K30J1
R116	3K9	±2%		ISKRA UPM ¼W	R3K90G1
R117	3K9	±2%		ISKRA UPM ¼W	R3K90G1
R118	100K	±2%		ISKRA UPM ¼W	R100KG1
R119	100K	±2%		ISKRA UPM ¼W	R100KG1
R120	1K	±10%		ISKRA UPM ¼W	R1K00J1
R121	1K	±10%		ISKRA UPM ¼W	R1K00J1
R122	150K	±10%		ISKRA UPM ¼W	R150KJ1
R123	4K7	±10%		ISKRA UPM ¼W	R4K70J1
R124	150K	±10%		ISKRA UPM ¼W	R150KJ1
R125	150K	±10%		ISKRA UPM ¼W	R150KJ1
R126	180	±10%		ISKRA UPM ¼W	R180RJ1
C1	1.4/6p			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C2				WINGROVE AND ROGERS CG80 DRG A12175	
C3	33p	±5%		ERIE APD N330	C33P0J
C4	33p	±5%		ERIE APD N330	C33P0J
C5	330p	±20%		ERIE APD	C330PMI
C6	1000P	-20 +80%		ERIE TYPE 861	C1K0PMI
C7	15P	±5%		ERIE APD	C15P0KA
C8	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C9	1.4/6P			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C10	1000P	-20 +80%		ERIE TYPE 861	C1K0PMI
C12				WINGROVE AND ROGERS CG80 DRG A12175	
C13	1000P	-20 +80%		ERIE TYPE 861	C1K0PMI
C14	47P	±2%		INTEK	
C15	0.022µ	-20 +80%		LEMCO LEMPLAC 12P	C22N0ZL
C16	0.022µ	-20 +80%		LEMCO LEMPLAC 12P	C22N0ZL
C17	100p	±2%		INTEK	
C18	20p	±2%		ERIE APD N330	C20P0KI
C19	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C20	1.4/6P			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C21	330p	±20%		ERIE APD	C330PMI
C22	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C23				WINGROVE AND ROGERS CG80 DRG A12175	

NO	VALUE	TOL	VOL	REFERENCE
C24	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C25	2000P			HUNTS BD18
C26	3.3p			ERIE APD
C27	68p			ERIE
C29	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C30	330µ	±20%		ERIE APD
C31	0.01µ		160V	TCC PMX : OR EROFOL 3
C32	100p	±2%		IN L5
C33	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C34	47p			LEMCO 7 x 4mm
C35	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C36	0.64µ			MULLARD C246 AS H064
C37	0.01µ			TCC PMX : OR EROFOL 3
C38	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C39	100p			ERIE APD
C40	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C42	18p	±5%		ERIE APD N330
C43	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C44	2200p	±5%	125	SUFLEX
C45	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C46	2200p	±5%	125	SUFLEX
C47	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C101	0.68µ		35V	UNION CARBIDE KR68E3
C102	0.22µ		250V	MULLARD C280 AE A220
C103	0.22µ		250V	MULLARD C280 AE A220
C104	0.01µ	±5%	160V	WIMA FKS
C105	0.15µ			ITT PMA
C106	0.047µ		250V	TCC PMX 3 OR EROFOL 30
C107	2700p	±5%	160V	WIMA FKS
C108	0.64µ			MULLARD C426 AS H064
C109	0.01µ	±5%	160V	WIMA FKS
C110	1000µ		25V	ERIE 21 105 04-0102-0A-0
C111	1000µ	±5%	25V	ERIE 21 105 04-0102-0A-0
C112	0.01µ	±5%	160V	WIMA FKS
C113	300µ		10V	CALLINS SPC9-3
C114	2700p	±5%	160V	WIMA FKS
C115	2700p	±5%	160V	WIMA FKS
C116	0.64µ			MULLARD C426 AS H064
C117	0.64µ			MULLARD C426 AS H064
C118	0.64µ			MULLARD C426 AS H064
C119	0.01µ			ERIE BPD

FM3 CIRCUIT DIAGRAM 1

R
D

UMBER 5885



BE MADE FROM TIME TO TIME WITHOUT PRIOR NOTICE

D ARE FOR REPLACEMENT PARTS AND MAY BE EQUIVALENTS FOR ORIGINAL PARTS NO LONGER AVAILABLE.
ORM AN INTEGRAL PART OF A COIL, THE COMPLETE COIL SHOULD BE ORDERED. COMPONENTS WITHOUT STOCK NUMBE

	STOCK NO.
	R150KJ1
	R10M0J1
	R33K0J1
	R270RJ1
	R47K0J1
	R33K0J1
	R33K0J1
	R33K0J1
	R120RJ1
	R560RJ1
	R68R0J1
	R1K00J1
	R4K70J1
	R330RJ1
	R10K0J1
	R68R0J1
	R390RJ1
	R10K0J1
	R3K30J1
	R10K0J1
	R2K20J1
	R47K0J1
	R22K0J1
	R47K0J1
	R68R0J1
	R1M00J1
	R150KJ1
	R10K0J1
	R150KJ1
	R10K0J1
	R150KJ1
	R1K00J1
	R10R0J1
	R4K70J1
	R150RJ1
	R150RJ1
	R470RJ1
	R3K30J1
	R33K0J1
	R10K0J1

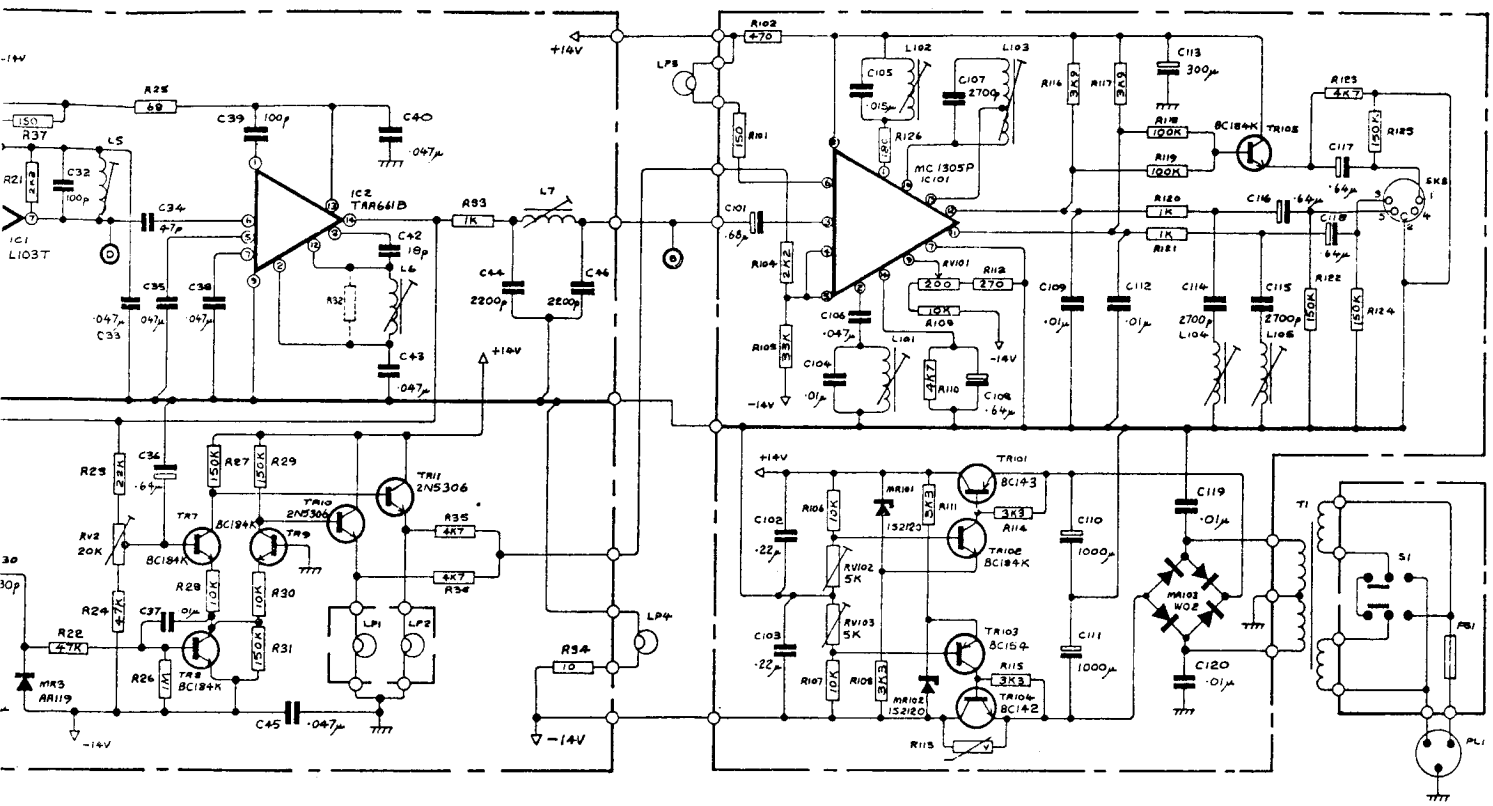
NO.	VALUE	TOL.	VOL	REFERENCE	STOCK NO.
R107	10K	±10%		ISKRA UPM 1/4W	R10K0J1
R108	3K3	±10%		ISKRA UPM 1/4W	R3K30J1
R109	10K	±10%		ISKRA UPM 1/4W	R10K0J1
R110	4K7	±10%		ISKRA UPM 1/4W	R4K70J1
R111	3K3	±10%		ISKRA UPM 1/4W	R3K30J1
R112	270	±10%		ISKRA UPM 1/4W	R270RJ1
R113				MULLARD E299DD/220	
R114	3K3	±10%		ISKRA UPM 1/4W	R3K30J1
R115	3K3	±10%		ISKRA UPM 1/4W	R3K30J1
R116	3K9	±2%		ISKRA UPM 1/4W	R3K90G1
R117	3K9	±2%		ISKRA UPM 1/4W	R3K90G1
R118	100K	±2%		ISKRA UPM 1/4W	R100KG1
R119	100K	±2%		ISKRA UPM 1/4W	R100KG1
R120	1K	±10%		ISKRA UPM 1/4W	R1K00J1
R121	1K	±10%		ISKRA UPM 1/4W	R1K00J1
R122	150K	±10%		ISKRA UPM 1/4W	R150KJ1
R123	4K7	±10%		ISKRA UPM 1/4W	R4K70J1
R124	150K	±10%		ISKRA UPM 1/4W	R150KJ1
R125	150K	±10%		ISKRA UPM 1/4W	R150KJ1
R126	180	±10%		ISKRA UPM 1/4W	R180RJ1
C1	1.4/6p			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C2				WINGROVE AND ROGERS CG80 DRG. A12175	
C3	33p	±5%		ERIE APD N330	C33P0J
C4	33p	±5%		ERIE APD N330	C33P0J
C5	330p	±20%		ERIE APD	C330PMI
C6	1000P	-20 +80%		ERIE TYPE 861	C1K0PMI
C7	15P	±5%		ERIE APD	C15P0KA
C8	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C9	1.4/6P			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C10	1000P	-20 +80%		ERIE TYPE 861	C1K0PMI
C12				WINGROVE AND ROGERS CG80 DRG. A12175	
C13	1000P	-20 +80%		ERIE TYPE 861	C1K0PMI
C14	47P	±2%		INTEFT	
C15	0.022μ	-20 +80%		LEMCO LEMPLAC 10P	C22N0ZL
C16	0.022μ	-20 +80%		LEMCO LEMPLAC 10P	C22N0ZL
C17	100μ	±2%		INTEFT	
C18	20μ	±10%		ERIE APD N330	C20P0KI
C19	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C20	1.4/6P			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C21	330p	±20%		ERIE APD	C330PMI
C22	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C23				WINGROVE AND ROGERS CG80 DRG. A12175	

NO.	VALUE	TOL.	VOL	REFERENCE	STOCK NO.
C24	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C25	2000P			HUNTS BO18	C2N20MX
C26	3.3p			ERIE APD	C3P30C1
C27	68p			ERIE	C68P0MI
C29	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C30	330p	±20%		ERIE APD	C330PMI
C31	0.01μ		160V	TCC PMX1 OR EROFOL 30KT 1807-310/1	CU010KK
C32	100p	±2%		IN 5	
C33	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C34	47p			LEMCO 7 x 4mm	C47P0JL
C35	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C36	0.64μ			MULLARD C246 AS H064	C680NKT
C37	0.01μ			TCC PMX1 OR EROFOL 30KT 1807-310/1	CU010KT
C38	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C39	100p			ERIE APD	C100PGM
C40	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C42	18p	±5%		ERIE APD N330	C18P0GF
C43	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C44	2200p	±5%	125	SUFLEX	C2K2PJF
C45	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C46	2200p	±5%	125	SUFLEX	C2K2PJF
C47	0.047μ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C101	0.68μ		35V	UNION CARBIDE KR68E35	C680NKT
C102	0.22μ		250V	MULLARD C280 AE A220K	C220NKM
C103	0.22μ		250V	MULLARD C280 AE A220K	C220NKM
C104	0.01μ	±5%	160V	WIMA FKS	CU010JS
C105	0.15μ			ITT PMA	
C106	0.047μ		250V	TCC PMX 3 OREROFOL 30 KT 1807-347 1	C47N0JS
C107	0.01μ	±5%	160V	WIMA FKS	
C108	0.64μ			MULLARD C426 AS H064	C680NKT
C109	0.01μ	±5%	160V	WIMA FKS	CU010JS
C110	1000μ		25V	ERIE 21105-104-0102-0A-0250	C1K0USI
C111	1000μ	±5%	25V	ERIE 21105-104-0102-0A-0250	C1K0USI
C112	0.01μ	±5%	160V	WIMA FKS	CU010JS
C113	300μ		10V	CALLINS SPC9-3/1	C470UZE
C114	1000p	±5%	160V	WIMA FKS	
C115	2700p	±5%	160V	WIMA FKS	
C116	0.64μ			MULLARD C426 AS H064	C680NKT
C117	0.64μ			MULLARD C426 AS H064	C680NKT
C118	0.64μ			MULLARD C426 AS H064	C680NKT
C119	0.01μ			ERIE BPD	CU010EI

NO.	VALUE	TOL.	VOL	REFERENCE
C120	0.01μ			ERIE BPD
RV1	4K7			PLESSEY TYPE MP 404-8-02852
RV2	20K			MORGANITE TYPE 62H OR PIHE
RV101	200			MORGANITE TYPE 62H OR PIHE
RV102	5K			MORGANITE TYPE 62H OR PIHE
RV103	5K			MORGANITE TYPE 62H OR PIHE
TR1				RCA 40822
TR2				RCA 40823
TR3				MULLARD BFX44
TR4				RCA 40244
TR5				TEXAS INSTRUMENTS BC184K
TR6				TEXAS INSTRUMENTS BC184K
TR7				TEXAS INSTRUMENTS BC184K
TR8				TEXAS INSTRUMENTS BC184K
TR9				TEXAS INSTRUMENTS BC184K
TR10				GE 2N5306
TR11				GE 2N5306
TR101				BC143
TR102				TEXAS INSTRUMENTS BC184K
TR103				BC154 OR TIBC214
TR104				BC142
TR105				TEXAS INSTRUMENTS BC184K
MR3				MULLARD AA119
MR101				TEXAS INSTRUMENTS IS2120
MR102				TEXAS INSTRUMENTS IS2120
MR103				GENERAL INSTRUMENTS W02
IC1				SGS L103T
IC2				SGS TA66*B
IC101				MOTOROLA MC 305P ORTI SN76

FM3 CIRCUIT DIAGRAM 1

RF BOARD M12248 ISS. 4
DECODER BOARD M12247 ISS. 1



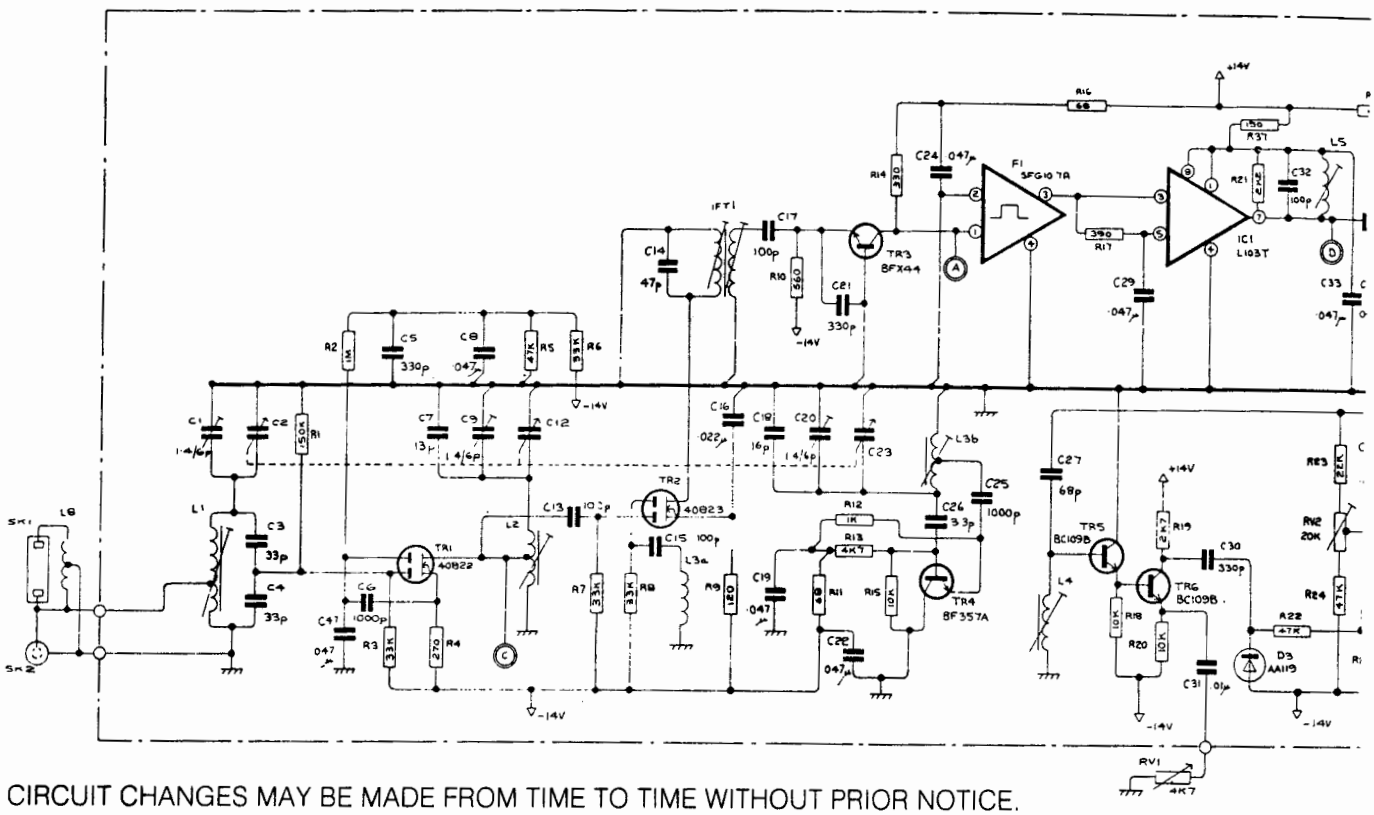
GINAL PARTS NO LONGER AVAILABLE.
E ORDERED. COMPONENTS WITHOUT STOCK NUMBERS ARE NO LONGER AVAILABLE.

ENCE	STOCK NO.
D LEMPLAC 12P	CU047ZL
6 BD18	C2N20MX
PD	C3P30CI
	C68P0MI
D LEMPLAC 12P	CU047ZL
PD	C330PMI
MX 1 OR EROFOL 30KT 1807-310/1	CU010KK
D LEMPLAC 12P	CU047ZL
7 x 4mm	C47P0JL
D LEMPLAC 12P	CU047ZL
RD C246 AS H064	C680NKT
A1 OR EROFOL 30KT 1807-310/1	CU010KT
LEMPLAC 12P	CU047ZL
PD	C100PGM
D LEMPLAC 12P	CU047ZL
PD N330	C18P0GF
D LEMPLAC 12P	CU047ZL
X	C2K2PJF
D LEMPLAC 12P	CU047ZL
X	C2K2PJF
D LEMPLAC 12P	CU047ZL
CARBIDE KR68E35	C680NKT
RD C280/AE A220K	C220NKM
RD C280/AE A220K	C220NKM
KS	CU010JS
A	
MX 3 OREROFOL 30 KT1807-347/1	C47N0JS
KS	
RD C426 AS H064	C680NKT
KS	CU010JS
105-104-0102-0A-0250	C1K0USI
105-104-0102-0A-0250	C1K0USI
KS	CU010JS
S SPC9-3.1	C470UZE
KS	
KS	
RD C426 AS H064	C680NKT
RD C426 AS H064	C680NKT
RD C426 AS H064	C680NKT
D	CU010EI

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
C120	0.01µ			ERIE 3PD	CU010EI
RV1	4K7			PLESSEY TYPE MP 404 8 02852	RV4K70A
RV2	20K			MORGANITE TYPE 62H OR PIHER PT 10V	RV20K0A
RV101	200			MORGANITE TYPE 62H OR PIHER PT 10V	RP200RA
RV102	5K			MORGANITE TYPE 62H OR PIHER PT 10V	RP5K00B
RV103	5K			MORGANITE TYPE 62H OR PIHER PT 10V	RP5K00B
TR1				RCA 40822	D40822X
TR2				RCA 40823	D3N205X
TR3				MULLARD BFX44	DOFX44X
TR4				RCA 40244	DBF357K
TR5				TEXAS INSTRUMENTS BC184K	DBC184X
TR6				TEXAS INSTRUMENTS BC184K	DBC184X
TR7				TEXAS INSTRUMENTS BC184K	DBC184X
TR8				TEXAS INSTRUMENTS BC184K	DBC184X
TR9				TEXAS INSTRUMENTS BC184K	DBC184X
TR10				GE 2N5306	D2N5306
TR11				GE 2N5306	D2N5306
TR101				BC143	DBC461X
TR102				TEXAS INSTRUMENTS BC184K	DBC184X
TR103				BC154 OR TIBC214	DBC214C
TR104				BC142	DBC142X
TR105				TEXAS INSTRUMENTS BC184K	DBC184X
MR3				MULLARD AA119	DAA119X
MR101				TEXAS INSTRUMENTS IS2120	DZ12VAA
MR102				TEXAS INSTRUMENTS IS2120	DZ12VAA
MR103				GENERAL INSTRUMENTS W02	DW02XXX
IC1				SGS L103T	DL103TI
IC2				SGS TA661B	D661BXX
IC101				MOTOROLA MC1305P ORTI SN76105	D1310PA

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
F1				MURATA CFP 107A92	LSFJ10A
L1				ACOUSTICAL DRG A12202	L12202A
L2				ACOUSTICAL DRG A12202	L12202A
L3				ACOUSTICAL DRG A12203 ISS1	L12203A
L4				ACOUSTICAL DRG B12158 ISS2	
L5				ACOUSTICAL DRG A12207 ISS2	
L6				ACOUSTICAL DRG A12276 ISS2	
L7				ACOUSTICAL DRG B12158 ISS2	
L8				ACOUSTICAL DRG A12225	L12225A
L101				ACOUSTICAL DRG B12158 ISS2	
L102				ACOUSTICAL DRG B12158 ISS2	
L103				ACOUSTICAL DRG B12158 ISS2	
L104				ACOUSTICAL DRG B12158 ISS2	
L105				ACOUSTICAL DRG B12158 ISS2	
IFT1				ACOUSTICAL DRG A12205 ISS3	
T1				DAGNALL T2760	LF3MNSA
LP1				VITALITY 690 14V 0.04A	BB14VLA
LP2				VITALITY 690 14V 0.04A	BB14VLA
LP3				VITALITY 690 14V 0.04A	BB14VLA
LP4				VITALITY 690 14V 0.04A	BB14VLA
FS1				100MAANTISURGE (20 x 5MM)	UMA10DA

RF BOARD M12248 ISS. 4
DECODER BOARD M12247 ISS. 1



CIRCUIT CHANGES MAY BE MADE FROM TIME TO TIME WITHOUT PRIOR NOTICE.

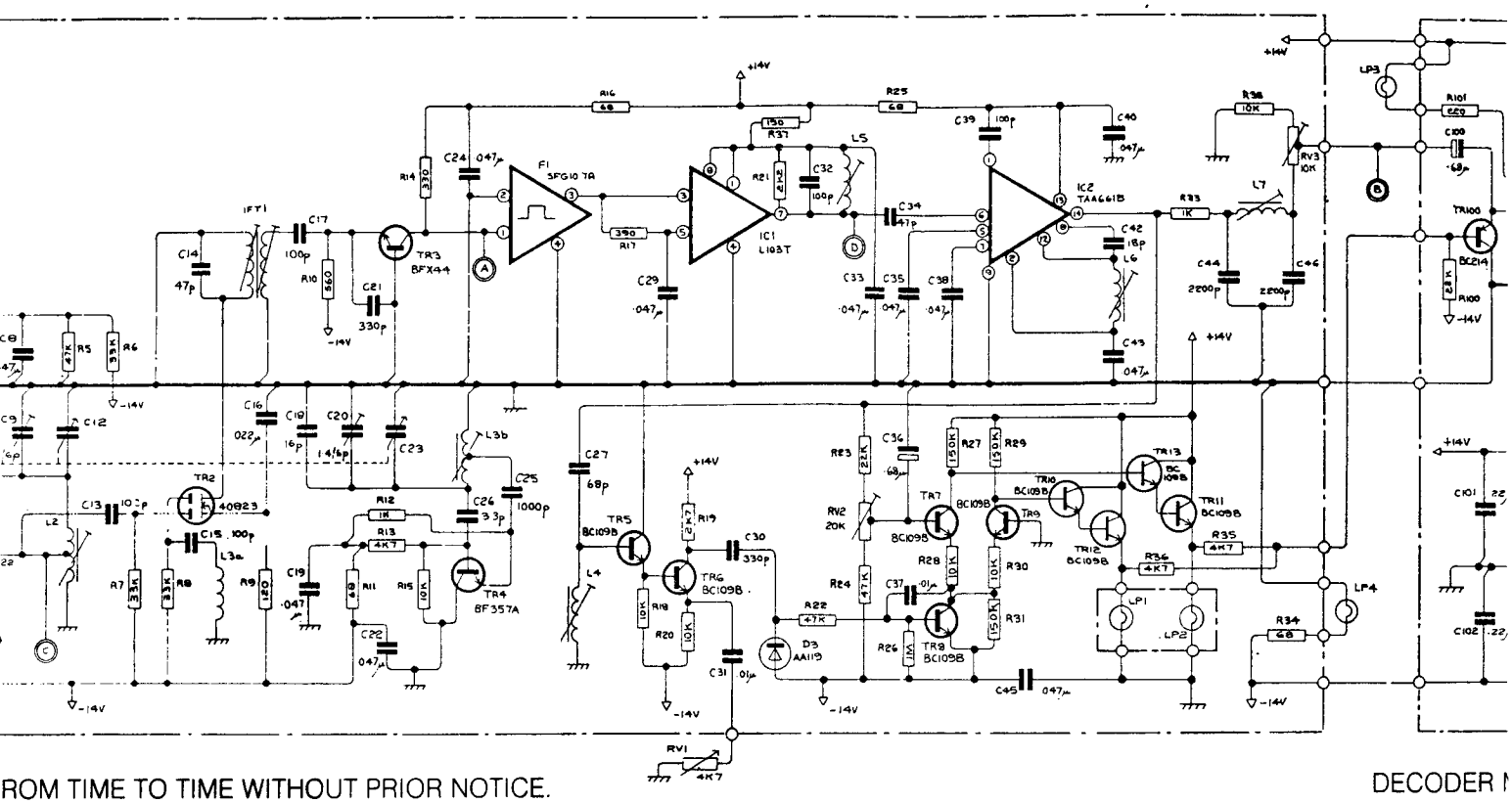
STOCK NUMBERS LISTED ARE FOR REPLACEMENT PARTS AND MAY BE EQUIVALENTS FOR ORIGINAL PARTS N
WHERE CAPACITORS FORM AN INTEGRAL PART OF A COIL, THE COMPLETE COIL SHOULD BE ORDERED. CC

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R1	150K	±10%		ISKRA UPM 050	R150KJ1
R2	1M	±10%		ISKRA UPM 050	R1M00J1
R3	33K	±10%		ISKRA UPM 050	R33K0J1
R4	270	±10%		ISKRA UPM 050	R270RJ1
R5	47K	±10%		ISKRA UPM 050	R47K0J1
R6	33K	±10%		ISKRA UPM 050	R33K0J1
R7	33K	±10%		ISKRA UPM 050	R33K0J1
R8	33K	±10%		ISKRA UPM 050	R33K0J1
R9	120	±10%		ISKRA UPM 050	R120RJ1
R10	560	±10%		ISKRA UPM 050	R560RJ1
R11	68	±10%		ISKRA UPM 050	R68R0J1
R12	1K	±10%		ISKRA UPM 050	R1K00J1
R13	4K7	±10%		ISKRA UPM 050	R4K70J1
R14	330	±10%		ISKRA UPM 050	R330RJ1
R15	10K	±10%		ISKRA UPM 050	R10K0J1
R16	68	±10%		ISKRA UPM 050	R68R0J1
R17	390	±10%		ISKRA UPM 050	R390RJ1
R18	10K	±10%		ISKRA UPM 050	R10K0J1
R19	2K7	±10%		ISKRA UPM 050	R2K70J1
R20	10K	±10%		ISKRA UPM 050	R10K0J1
R21	2K2	±10%		ISKRA UPM 050	R2K20J1
R22	47K	±10%		ISKRA UPM 050	R47K0J1
R23	22K	±10%		ISKRA UPM 050	R22K0J1
R24	47K	±10%		ISKRA UPM 050	R47K0J1
R25	68	±10%		ISKRA UPM 050	R68R0J1
R26	1M	±10%		ISKRA UPM 050	R1M00J1
R27	150K	±10%		ISKRA UPM 050	R150KJ1
R28	10K	±10%		ISKRA UPM 050	R10K0J1
R29	150K	±10%		ISKRA UPM 050	R150KJ1
R30	10K	±10%		ISKRA UPM 050	R10K0J1
R31	150K	±10%		ISKRA UPM 050	R150KJ1
R33	1K	±10%		ISKRA UPM 050	R1K00J1
R34	68	±10%		ISKRA UPM 050	R68R0J1
R35	4K7	±10%		ISKRA UPM 050	R4K70J1
R36	4K7	±10%		ISKRA UPM 050	R4K70J1
R37	150	±10%		ISKRA UPM 050	R150RJ1
R38	10K	±10%		ISKRA UPM 050	R10K0J1
R100	22K	±10%		ISKRA UPM 050	R22K0J1
R101	220	±10%		ISKRA UPM 050	R220RJ1
R102	47K	±10%		ISKRA UPM 050	R47K0J1
R103	3K3	±10%		ISKRA UPM 050	R3K30J1

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R104	390	±10%		ISKRA UPM 050	R390RJ1
R105	4K7	±5%		ISKRA UPM 050	R47K0J1
R106	3K3	±10%		ISKRA UPM 050	R3K30J1
R107	6K8	±5%		ISKRA UPM 050	R6K80J1
R108	18K	±5%		ISKRA UPM 050	R18K0J1
R109	3K3	±10%		ISKRA UPM 050	R3K30J1
R110				MULLARD E299DD/220	RT299DD
R111	18K	±5%		ISKRA UPM 050	R18K0J1
R112	4K7	±5%		ISKRA UPM 050	R4K70J1
R113	4K7	±5%		ISKRA UPM 050	R4K70J1
R114	1M	±10%		ISKRA UPM 050	R1M00J1
R115	10K	±10%		ISKRA UPM 050	R10K0J1
R116	10K	±10%		ISKRA UPM 050	R10K0J1
R117	10K	±10%		ISKRA UPM 050	R10K0J1
R118	10K	±10%		ISKRA UPM 050	R10K0J1
R119	10K	±10%		ISKRA UPM 050	R10K0J1
R120	10K	±10%		ISKRA UPM 050	R10K0J1
R121	1K	±10%		ISKRA UPM 050	R1K00J1
R122	1K	±10%		ISKRA UPM 050	R1K00J1
R123	4K7	±5%		ISKRA UPM 050	R4K70J1
R124	4K7	±5%		ISKRA UPM 050	R4K70J1
R125	1M	±10%		ISKRA UPM 050	R1M00J1
R126	1M	±10%		ISKRA UPM 050	R1M00J1
R127	3K3	±10%		ISKRA UPM 050	R3K30J1
R128	220	±10%		ISKRA UPM 050	R220RJ1
C1	1.4/6P			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C2				DAU 338/30	CV14PGA
C3	33p	±5%		ERIE APD N330	C33P0JI
C4	33p	±5%		ERIE APD N330	C33P0JI
C5	330p	±20%		ERIE APD	C330PMI
C6	1000p	-20 +80%		ERIE 861	C1K0PMI
C7	13p	±5%		ERIE APD N330	C13P0JL
C8	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C9	1.4/6p			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C12				DAU 338/30	CV14PGA
C13	100p			ERIE AD	C100PGM
C14	47p	±2%		INTEFT 1	
C15	100p			ERIE A D	C100PGM
C16	0.022µ	-20 +80%		LEMCO LEMPLAC 10P	C22N0ZL
C17	100p	±2%		INTEFT 1	
C18	16p	±5%		ERIE APD N220	C16P0JI

NO	VALUE	TOL	VOL	REFERENCE
C19	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C20	1.4/6P			STEATITE R TRIKO 112
C21	330p	±20%		ERIE APD
C22	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C23				DAU 338 30
C24	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C25	1000p	-20 +80%		ERIE 86*
C26	3.3p	±0.25p		ERIE APD NPO
C27	68p	±10%		ERIE 8D
C29	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C30	330p	±20%		ERIE APD
C31	0.01µ		160V	EROFOL 30KT 1807-3*
C32	100p	±2%		*NL5
C33	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C34	47p			LEMCO 7 x 4MM
C35	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C36	0.68µ		35V	UNION CARBIDE KR66
C37	0.01µ			EROFOL 30KT 1807-3*
C38	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C39	100p			ERIE APD
C40	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C42	18p	±5%		ERIE APD N750
C43	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C44	2200p	±5%	160V	SUFLEX H515 160
C45	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C46	2200p	±5%	160V	SUFLEX H515 160
C47	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C100	0.68µ		35V	UNION CARBIDE KR66
C101	0.22µ	±5%	100V	SIEMENS MKM B3254
C102	0.22µ	±5%	100V	SIEMENS MKM B3254
C103	0.68µ		35V	UNION CARBIDE KR66
C104	0.68µ		35V	UNION CARBIDE KR66
C105	0.22µ	±5%	100V	SIEMENS MKM B3254
C106	0.47µ	±5%	100V	SIEMENS MKM B3254
C107	0.047µ	±5%	250V	SIEMENS MKM B3254
C108	0.01µ	±5%	250V	SIEMENS MKM B3254
C109	0.22µ	±5%	100V	SIEMENS MKM B3254
C110	0.01µ	±5%	250V	SIEMENS MKM B3254
C111	0.01µ	±5%	250V	SIEMENS MKM B3254

FM3 CIRCUIT DIAGRAM 2



ROM TIME TO TIME WITHOUT PRIOR NOTICE.

DECODER M

EPLACEMENT PARTS AND MAY BE EQUIVALENTS FOR ORIGINAL PARTS NO LONGER AVAILABLE.
EGRAL PART OF A COIL, THE COMPLETE COIL SHOULD BE ORDERED. COMPONENTS WITHOUT STOCK NUMBERS ARE NO L

TOCK O
50KJ1
M00J1
33K0J1
270RJ1
47K0J1
33K0J1
33K0J1
33K0J1
120RJ1
560RJ1
68R0J1
K00J1
50RJ1
0K0J1
68R0J1
390RJ1
0K0J1
2K70J1
0K0J1
2K20J1
47K0J1
22K0J1
27K0J1
68R0J1
M00J1
50KJ1
0K0J1
50KJ1
K00J1
68R0J1
K70J1
K70J1
50RJ1
0K0J1
2K0J1
20RJ1
47K0J1
30J1

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R104	390	±10%		ISKRA UPM 050	R390RJ1
R105	4K7	±5%		ISKRA UPM 050	R47K0J1
R106	3K3	±10%		ISKRA UPM 050	R3K30J1
R107	6K8	±5%		ISKRA UPM 050	R6K80J1
R108	18K	±5%		ISKRA UPM 050	R18K0J1
R109	3K3	±10%		ISKRA UPM 050	R3K30J1
R110				MULLARD E299DD/220	RT299DD
R111	18K	±5%		ISKRA UPM 050	R18K0J1
R112	4K7	±5%		ISKRA UPM 050	R4K70J1
R113	4K7	±5%		ISKRA UPM 050	R4K70J1
R114	1M	±10%		ISKRA UPM 050	R1M00J1
R115	10K	±10%		ISKRA UPM 050	R10K0J1
R116	10K	±10%		ISKRA UPM 050	R10K0J1
R117	10K	±10%		ISKRA UPM 050	R10K0J1
R118	10K	±10%		ISKRA UPM 050	R10K0J1
R119	10K	±10%		ISKRA UPM 050	R10K0J1
R120	10K	±10%		ISKRA UPM 050	R10K0J1
R121	1K	±10%		ISKRA UPM 050	R1K00J1
R122	1K	±10%		ISKRA UPM 050	R1K00J1
R123	4K7	±5%		ISKRA UPM 050	R4K70J1
R124	4K7	±5%		ISKRA UPM 050	R4K70J1
R125	1M	±10%		ISKRA UPM 050	R1M00J1
R126	1M	±10%		ISKRA UPM 050	R1M00J1
R127	3K3	±10%		ISKRA UPM 050	R3K30J1
R128	220	±10%		ISKRA UPM 050	R220RJ1
C1	1 4/6P			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C2				DAU 338/30	CV14PGA
C3	33p	±5%		ERIE APD N330	C33P0J1
C4	33p	±5%		ERIE APD N330	C33P0J1
C5	330p	±20%		ERIE APD	C330PMI
C6	1000p	-20 +80%		ERIE 861	C1K0PMI
C7	13p	±5%		ERIE APD N330	C13P0J1
C8	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C9	1 4/6p			STEATITE R-TRIKO 112-06-SD	CV6P0TA
C12				DAU 338/30	CV14PGA
C13	100p			ERIE AD	C100PGM
C14	47p	±2%		IN I.F.T.1	
C15	100p			ERIE A.D	C100PGM
C16	0 022µ	-20 +80%		LEMCO LEMPLAC 10P	C22N0J1
C17	100p	±2%		IN I.F.T.1	
C18	16p	±5%		ERIE APD N220	C16P0J1

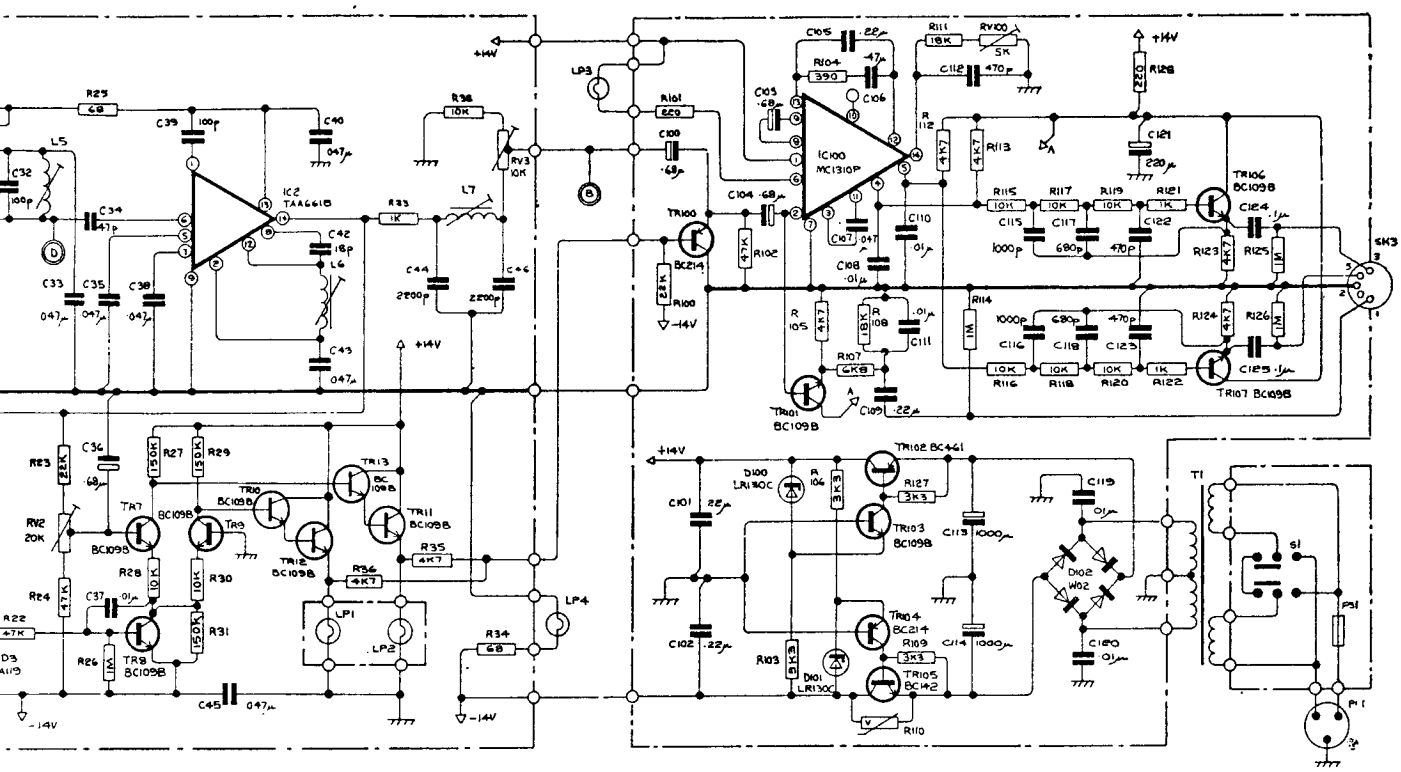
NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
C19	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C20	1 4/6P			STEATITE R TRIKO 112-06-SD	CV6P0TA
C21	330p	±20%		ERIE APD	C330PMI
C22	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C23				DAU 338/30	CV14PGA
C24	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C25	1000p	-20 +80%		ERIE 861	C1K0PMI
C26	3 3p	±0 25p		ERIE APD NPO	C3P30CI
C27	68p	±10%		ERIE BD	C68P0MI
C29	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C30	330p	±20%		ERIE APD	C330PMI
C31	0 01µ		160V	EROFOL 30KT 1807-310/1	CU010KK
C32	100p	±2%		1N L5	
C33	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C34	47p			LEMCO 7 x 4MM	C47P0JL
C35	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C36	0 68µ		35V	UNION CARBIDE KR68E35	C680NKT
C37	0 01µ			EROFOL 30KT 1807-310/1	CU010KT
C38	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C39	100p			ERIE APD	C100PGM
C40	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C42	18p	±5%		ERIE APD N750	C18P0GF
C43	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C44	2200p	±5%	160V	SUFLEX H5*5*160	C2K2PJF
C45	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C46	2200p	±5%	160V	SUFLEX H5*5*160	C2K2PJF
C47	0 047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C100	0 68µ		35V	UNION CARBIDE KR68E35	C680NKT
C101	0 22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C102	0 22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C103	0 68µ		35V	UNION CARBIDE KR68E35	C680NKT
C104	0 68µ		35V	UNION CARBIDE KR68E35	C680NKT
C105	0 22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C106	0 47µ	±5%	100V	SIEMENS MKM B32541	CU470JS
C107	0 047µ	±5%	250V	SIEMENS MKM B32541	CU047JS
C108	0 01µ	±5%	250V	SIEMENS MKM B32541	CU010JS
C109	0 22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C110	0 01µ	±5%	250V	SIEMENS MKM B32541	CU010JS
C111	0 01µ	±5%	250V	SIEMENS MKM B32541	CU010JS

NO	VALUE	TOL	VOL	REFERENCE
C112	470p	±5%	160V	
C113	1000µ		25V	ERIE 21*05-104-0102-0A-0250
C114	1000µ		25V	ERIE 21*05-104-0102-0A-0250
C115	1000p	±20%		ERIE APD Hi-K
C116	1000p	±20%		ERIE APD Hi-K
C117	680p	±20%		ERIE APD Hi-K
C118	680p	±20%		ERIE APD Hi-K
C119	0 01µ	±25%		ERIE BPD Hi-K
C120	0 01µ	±25%		ERIE BPD Hi-K
C121	220µ		16V	EROLEK 220/16
C122	470p	±20%		ERIE APD Hi-K
C123	470p	±20%		ERIE APD Hi-K
C124	0 1µ	±5%	250V	SIEMENS MKM B32541
C125	0 1µ	±5%	250V	SIEMENS MKM B32541
RV1	4K7			PLESSEY MP 404-8-02852
RV2	20K			PIHER PT10V
RV3	10K			PIHER PT10V
RV100	5K			PIHER PT10V
TR1				RCA 40822
TR2				RCA 40823
TR3				BFX 44
TR4				BF 357K
TR5				BC 109B OR BC 184K
TR6				BC 109B OR BC 184K
TR7				BC 109B OR BC 184K
TR8				BC 109B OR BC 184K
TR9				BC 109B OR BC 184K
TR10				BC 109B OR BC 184K
TR11				BC 109B OR BC 184K
TR12				BC 109B OR BC 184K
TR13				BC 109B OR BC 184K
TR100				BC214
TR101				BC 109B
TR102				BC461
TR103				BC109B
TR104				BC214
TR105				BC142
TR106				BC109B
TR107				BC109B

FM3 CIRCUIT DIAGRAM 2

RF BOARD M12248 ISS. 8
DECODER BOARD M12307 ISS. 3

FM3 FROM SERIAL NUMBER 5885 TO 10,000



DECODER M12307 HAS PHASE LOCKED LOOP DECODER

ARTS NO LONGER AVAILABLE.
RED. COMPONENTS WITHOUT STOCK NUMBERS ARE NO LONGER AVAILABLE.

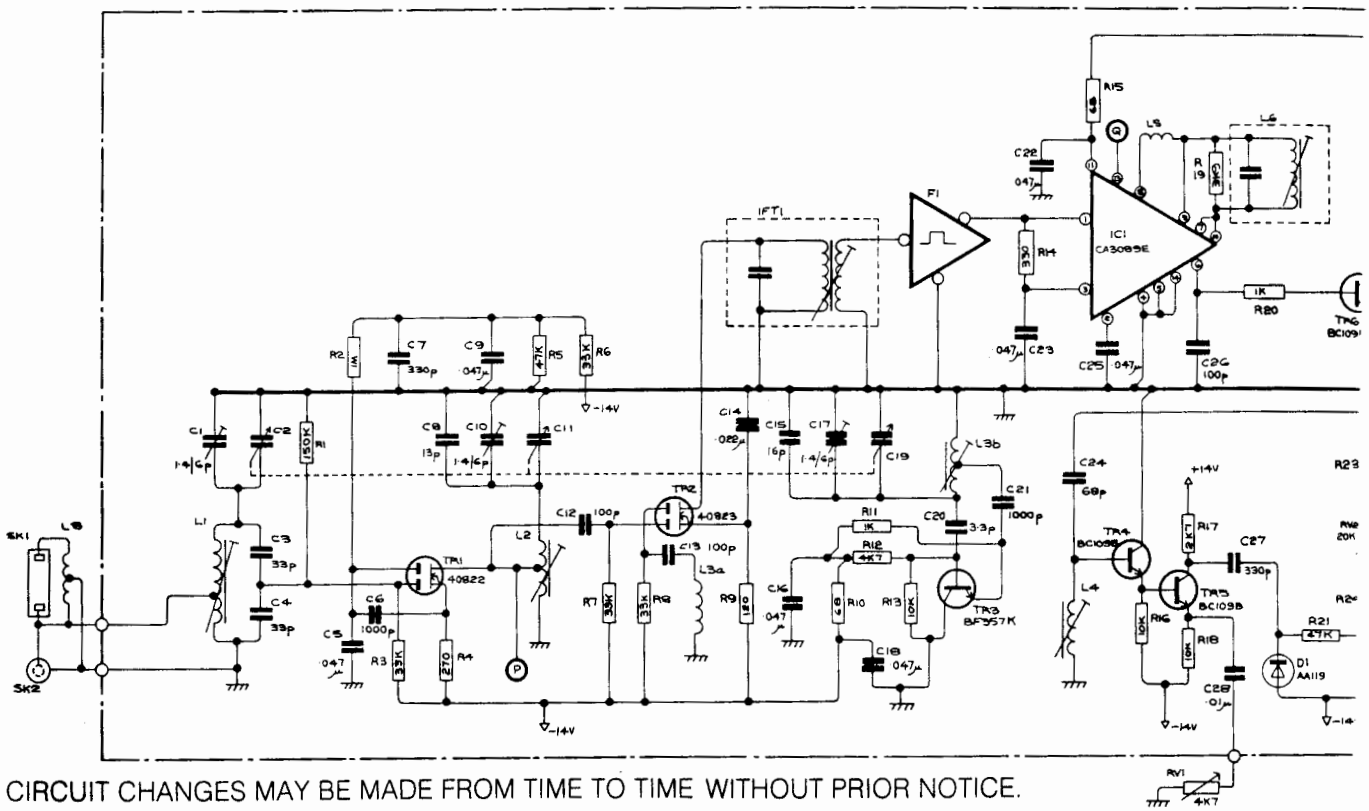
ENCE	STOCK NO
LEMPLAC 12P	CU047ZL
TE R TRIKO 112-06-SD	CV6P0TA
PD	C330PMI
LEMPLAC 12P	CU047ZL
8.30	CV14PGA
LEMPLAC 12P	CU047ZL
	C1K0PMI
PD NPO	C3P30CI
	C68P0MI
LEMPLAC 12P	CU047ZL
PD	C330PMI
L 30KT 1807-310/1	CU010KK
LEMPLAC 12P	CU047ZL
7 x 4MM	C47P0JL
LEMPLAC 12P	CU047ZL
CARBIDE KR68E35	C680NKT
L 30KT 1807-310-1	CU010KT
LEMPLAC 12P	CU047ZL
PD	C100PGM
LEMPLAC 12P	CU047ZL
PD N750	C18P0GF
LEMPLAC 12P	CU047ZL
+515 160	C2K2PJF
LEMPLAC 12P	CU047ZL
+515 160	C2K2PJF
LEMPLAC 12P	CU047ZL
CARBIDE KR68E35	C680NKT
S MKM B32541	C220NKS
S MKM B32541	C220NKS
CARBIDE KR68E35	C680NKT
CARBIDE KR68E35	C680NKT
S MKM B32541	C220NKS
S MKM B32541	CU470JS
S MKM B32541	CU047JS
S MKM B32541	CU010JS
S MKM B32541	C220NKS
S MKM B32541	CU010JS
S MKM B32541	CU010JS

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
C112	470p	±5%	160V		C470PJL
C113	1000µ		25V	ERIE [illegible] 05-104-0102-0A-0250	C1K0USI
C114	1000µ		25V	ERIE [illegible] 05-104-0102-0A-0250	C1K0USI
C115	1000p	±20%		ERIE APD Hi-K	C1K0PMI
C116	1000µ	±20%		ERIE APD Hi-K	C1K0PMI
C117	680p	±20%		ERIE APD Hi-K	C680PMI
C118	680p	±20%		ERIE APD Hi-K	C680PMI
C119	0.01µ	±25%		ERIE BPD Hi-K	CU010EI
C120	0.01µ	±25%		ERIE BPD Hi-K	CU010EI
C121	220µ		16V	ERO EK 220 16	C220UZE
C122	470p	±20%		ERIE APD Hi-K	C470PMI
C123	470p	±20%		ERIE APD Hi-K	C470PMI
C124	0.1µ	±5%	250V	SIEMENS MKM B32541	CU100JS
C125	0.1µ	±5%	250V	SIEMENS MKM B32541	CU100JS
RV1	4K7			PLESSEY MP 404/8/02852	RV4K70A
RV2	20K			PIHER PT10V	RV20K0A
RV3	10K			PIHER PT10V	RP10K0B
RV100	5K			PIHER PT10V	RP5K00B
TR1				RCA 40822	D40822X
TR2				RCA 40823	D3N205X
TR3				BFX 44	DDFX44X
TR4				BF 357K	DBF200X
TR5				BC109B OR BC184K	DBC184X
TR6				BC109B OR BC184K	DBC184X
TR7				BC109B OR BC184K	DBC184X
TR8				BC109B OR BC184K	DBC184X
TR9				BC109B OR BC184K	DBC184X
TR10				BC109B OR BC184K	DBC184X
TR11				BC109B OR BC184K	DBC184X
TR12				BC109B OR BC184K	DBC184X
TR13				BC109B OR BC184K	DBC184X
TR100				BC214	DBC214C
TR101				BC109B	DE5270X
TR102				BC461	DBC461X
TR103				BC109B	DE5270X
TR104				BC214	DBC214C
TR105				BC142	DBC142X
TR106				BC109B	DE5270X
TR107				BC109B	DE5270X

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
D3				MULLARD AA119	DAA119X
D100				AEI LR130C	DZ15VAA
D101				AEI LR130C	DZ15VAA
D102				GENERAL INSTRUMENTS W02	DW02XXX
IC1				SGS T03T	DL103TI
IC2				SGS TAA661B	D661BXX
IC100				MOTOROLA MC1310P OR TI SN 76115N	D1310PA
F1				MURATA SFG 10.7 MA	LSFJ10A
L1				ACOUST. DRG. A12202 ISS 1. GB 6623	L12202A
L2				ACOUST. DRG. A12202 ISS 1. GB 6623	L12202A
L3				ACOUST. DRG. A12203 ISS 2. GB 6624	L12203A
L4				TOKO CAN 1980-BX	L1980BX
L5				ACOUST. DRG. A12207 ISS 2. GB 6693	
L6				ACOUST. DRG. A12276 ISS 1. GB 6847	
L7				TOKO CAN 1980-BX	L1980BX
L8				ACOUST. DRG. A12225	L12225A
FT1				ACOUST. DRG. A12205 ISS 3. GB 6589	
T1				DAGNAL T2760	LF3MNSA
LP1				VITALITY 690 14V 0.04A	BB14VLA
LP2				VITALITY 690 14V 0.04A	BB14VLA
LP3				VITALITY 690 14V 0.04A	BB14VLA
LP4				VITALITY 690 14V 0.04A	BB14VLA
FS1				100mA ANTI-SURGE (20 x 5mm)	UMA100A

RF BOARD M12248 ISS. 8
DECODER BOARD M12307 ISS. 3

FM3 FROM SERIAL NUMBER 10,000



CIRCUIT CHANGES MAY BE MADE FROM TIME TO TIME WITHOUT PRIOR NOTICE.

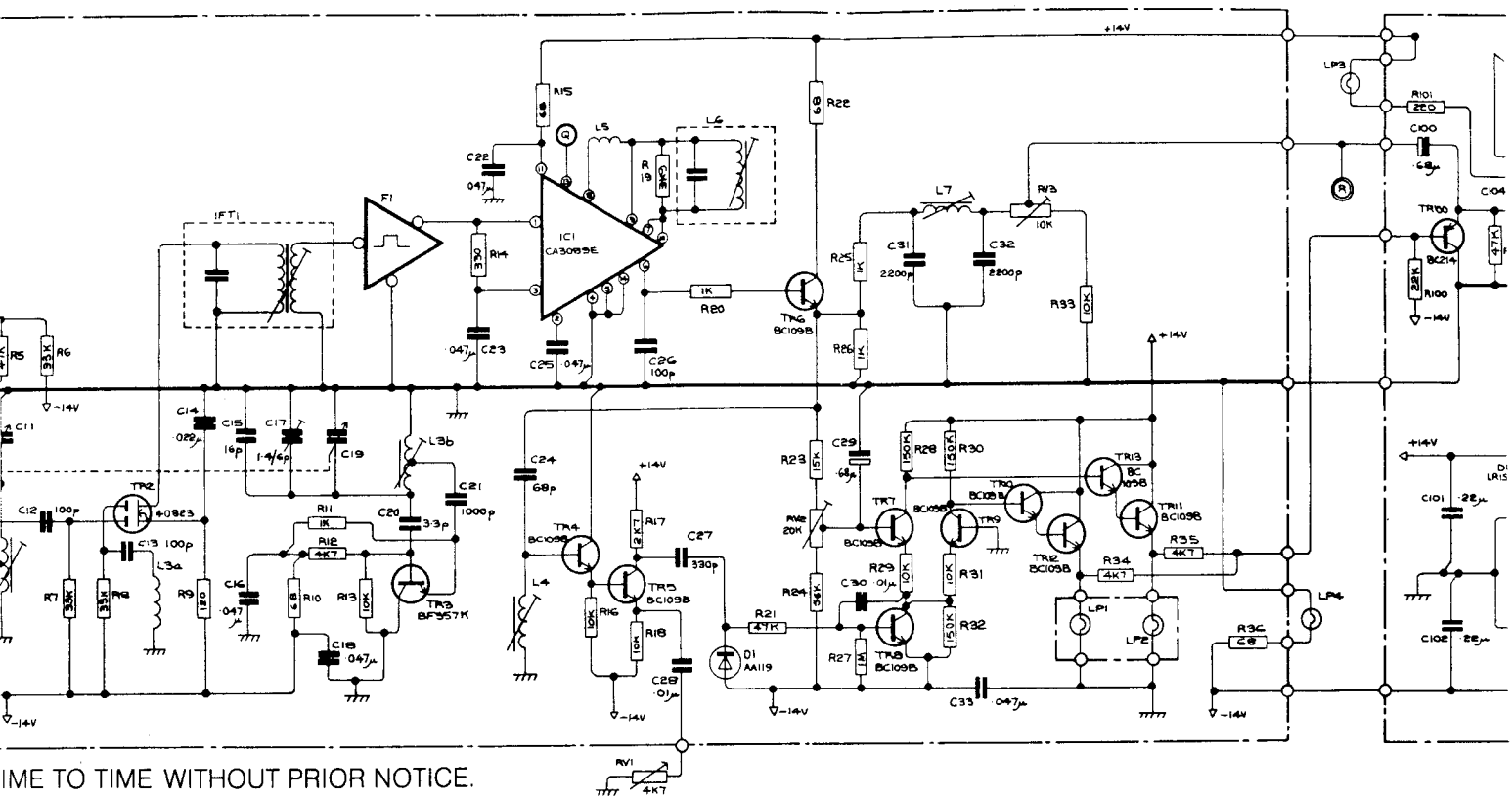
STOCK NUMBERS LISTED ARE FOR REPLACEMENT PARTS AND MAY BE EQUIVALENTS FOR ORIGINAL PARTS N

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R1	150K	±10%		ISKRA UPM 050	R150KJ1
R2	1M	±10%		ISKRA UPM 050	R1M00J1
R3	33K	±10%		ISKRA UPM 050	R33K0J1
R4	270	±10%		ISKRA UPM 050	R270RJ1
R5	47K	±10%		ISKRA UPM 050	R47K0J1
R6	33K	±10%		ISKRA UPM 050	R33K0J1
R7	33K	±10%		ISKRA UPM 050	R33K0J1
R8	33K	±10%		ISKRA UPM 050	R33K0J1
R9	120	±10%		ISKRA UPM 050	R120RJ1
R10	68	±10%		ISKRA UPM 050	R68R0J1
R11	1K	±10%		ISKRA UPM 050	R1K00J1
R12	4K7	±10%		ISKRA UPM 050	R4K70J1
R13	10K	±10%		ISKRA UPM 050	R10K0J1
R14	330	±10%		ISKRA UPM 050	R330RJ1
R15	68	±10%		ISKRA UPM 050	R68R0J1
R16	10K	±10%		ISKRA UPM 050	R10K0J1
R17	2K7	±10%		ISKRA UPM 050	R2K70J1
R18	10K	±10%		ISKRA UPM 050	R10K0J1
R19	3K9	±10%		ISKRA UPM 050	R3K90J1
R20	1K	±10%		ISKRA UPM 050	R1K00J1
R21	47K	±10%		ISKRA UPM 050	R47K0J1
R22	68	±10%		ISKRA UPM 050	R68R0J1
R23	15K	±10%		ISKRA UPM 050	R15K0J1
R24	56K	±10%		ISKRA UPM 050	R56K0J1
R25	1K	±10%		ISKRA UPM 050	R1K00J1
R26	1K	±10%		ISKRA UPM 050	R1K00J1
R27	1M	±10%		ISKRA UPM 050	R1M00J1
R28	150K	±10%		ISKRA UPM 050	R150KJ1
R29	10K	±10%		ISKRA UPM 050	R10K0J1
R30	150K	±10%		ISKRA UPM 050	R150KJ1
R31	10K	±10%		ISKRA UPM 050	R10K0J1
R32	150K	±10%		ISKRA UPM 050	R150KJ1
R33	10K	±10%		ISKRA UPM 050	R10K0J1
R34	4K7	±10%		ISKRA UPM 050	R4K70J1
R35	4K7	±10%		ISKRA UPM 050	R4K70J1
R36	68	±10%		ISKRA UPM 050	R68R0J1
R100	22K	±10%		ISKRA UPM 050	R22K0J1
R101	220	±10%		ISKRA UPM 050	R220RJ1
R102	47K	±10%		ISKRA UPM 050	R47K0J1
R103	3K3	±10%		ISKRA UPM 050	R3K30J1

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R104	390	±10%		ISKRA UPM 050	R390RJ1
R105	4K7	±5%		ISKRA UPM 050	R4K70J1
R106	3K3	±10%		ISKRA UPM 050	R3K30J1
R107	6K8	±5%		ISKRA UPM 050	R6K80J1
R108	18K	±5%		ISKRA UPM 050	R18K0J1
R109	3K3	±10%		ISKRA UPM 050	R3K30J1
R110				MULLARD E299DD 220	RT299DD
R111	15K	±10%		ISKRA UPM 050	R15K0K1
R112	4K7	±5%		ISKRA UPM 050	R4K70J1
R113	4K7	±5%		ISKRA UPM 050	R4K70J1
R114	1M	±10%		ISKRA UPM 050	R1M00J1
R115	10K	±10%		ISKRA UPM 050	R10K0J1
R116	10K	±10%		ISKRA UPM 050	R10K0J1
R117	10K	±10%		ISKRA UPM 050	R10K0J1
R118	10K	±10%		ISKRA UPM 050	R10K0J1
R119	10K	±10%		ISKRA UPM 050	R10K0J1
R120	10K	±10%		ISKRA UPM 050	R10K0J1
R121	1K	±10%		ISKRA UPM 050	R1K00J1
R122	1K	±10%		ISKRA UPM 050	R1K00J1
R123	4K7	±5%		ISKRA UPM 050	R4K70J1
R124	4K7	±5%		ISKRA UPM 050	R4K70J1
R125	1M	±10%		ISKRA UPM 050	R1M00J1
R126	1M	±10%		ISKRA UPM 050	R1M00J1
R127	3K3	±10%		ISKRA UPM 050	R3K30J1
R128	220	±10%		ISKRA UPM 050	R220RJ1
C1	1.4/6P			STEATITE R.TRIKO 112-06-3D	CV6P0TA
C2				DAU 338/30	CV14PGA
C3	33p	±5%		ERIE APD N330	C33P0JI
C4	33p	±5%		ERIE APD N330	C33P0JI
C5	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C6	1000p	-20 +80%		ERIE 861	C1K0PMI
C7	330p	±20%		ERIE APD	C330PMI
C8	13p	±5%		ERIE APD N330	C13P0JL
C9	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C10	1.4/6P			STEATITE R.TRIKO 112-06-3D	CV6P0TA
C11				DAU 338/30	CV14PGA
C12	100p	±20%		ERIE 861	C100PGM
C13	100p	±20%		ERIE 861	C100PGM
C14	0.022µ	-20 +80%		LEMCO LEMPLAC 12P	CU022ZL
C15	16p	±5%		ERIE APD N220	C16P0JI
C16	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C17	1.4/6 µ			STEATITE R.TRIKO 112-06-3D	CV6P0TA
C18	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL

NO	VALUE	TOL	VOL	REFERENCE
C19				DAU 338/30
C20	3.3p	±1/4P		ERIE APD NPO
C21	1000p	-20 +80%		ERIE 861
C22	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C23	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C24	68p	±10%		ERIE 9D
C25	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C26	100p	±20%		ERIE AP
C27	330p	±20%		ERIE APD
C28	0.01µ		160V	EROFOL 30KT1807-310
C29	0.68µ		35V	UNION CARBIDE KR68
C30	0.01µ		160V	EROFOL 30KT1807-31(
C31	2200p	±5%	160V	SUFLEX H515/160
C32	2200p	±5%	160V	SUFLEX H515/160
C33	0.047µ	-20 +80%		LEMCO LEMPLAC 12P
C100	0.68µ		35V	UNION CARBIDE KR68
C101	0.22µ	±5%	100V	SIEMENS MKM B3254'
C102	0.22µ	±5%	100V	SIEMENS MKM B3254'
C103	0.68µ		35V	UNION CARBIDE KR68
C104	0.68µ		35V	UNION CARBIDE KR68
C105	0.22µ	±5%	100V	SIEMENS MKM B3254'
C106	0.47µ	±5%	100V	SIEMENS MKM B3254'
C107	0.047µ	±5%	250V	SIEMENS MKM B3254'
C108	0.01µ	±5%	250V	SIEMENS MKM B3254'
C109	0.22µ	±5%	100V	SIEMENS MKM B3254'
C110	0.01µ	±5%	250V	SIEMENS MKM B3254'
C111	0.01µ	±5%	250V	SIEMENS MKM B3254'
C112	470p	±5%	160V	LEMCO 7.160
C113	1000µ		25V	ERIE 21105-104-0102-(
C114	1000µ		25V	ERIE 21105-104-0102-(
C115	1000p	±20%		ERIE APD Hi-K
C116	1000p	±20%		ERIE APD Hi-K
C117	680p	±20%		ERIE APD Hi-K
C118	680p	±20%		ERIE APD Hi-K
C119	0.01µ	±25%		ERIE BPD Hi-K
C120	0.01µ	±25%		ERIE BPD Hi-K
C121	220µ		16V	ERO EK220 16
C122	470p	±20%		ERIE APD Hi-K

FM3 CIRCUIT DIAGRAM 3



IME TO TIME WITHOUT PRIOR NOTICE.

EMENT PARTS AND MAY BE EQUIVALENTS FOR ORIGINAL PARTS NO LONGER AVAILABLE.

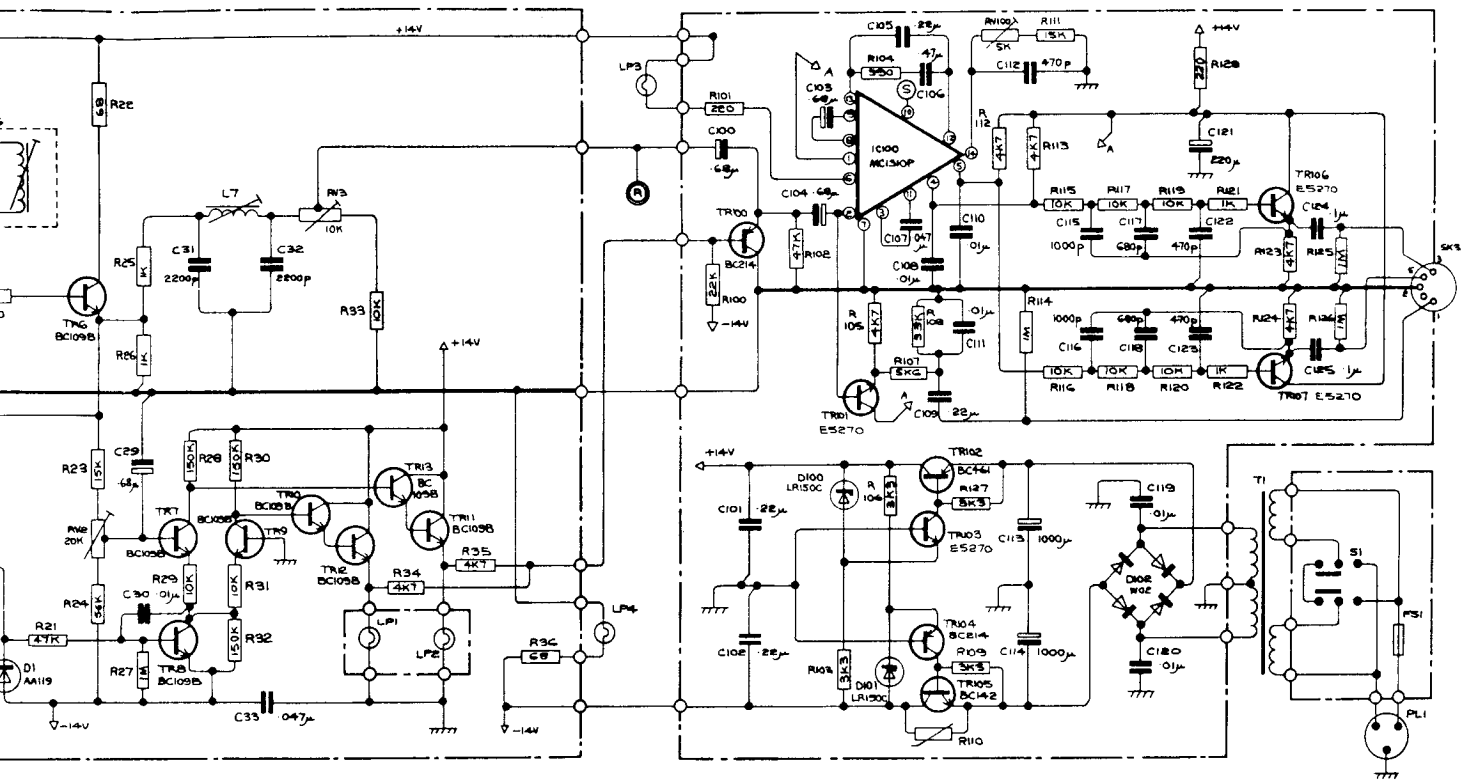
NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
R104	390	±10%		ISKRA UPM 050	R390RJ1
R105	4K7	±5%		ISKRA UPM 050	R4K70J1
R106	3K3	±10%		ISKRA UPM 050	R3K30J1
R107	6K8	±5%		ISKRA UPM 050	R6K80J1
R108	18K	±5%		ISKRA UPM 050	R18K0J1
R109	3K3	±10%		ISKRA UPM 050	R3K30J1
R110				MULLARD E299DD 220	RT299DD
R111	15K	±10%		ISKRA UPM 050	R15K0K1
R112	4K7	±5%		ISKRA UPM 050	R4K70J1
R113	4K7	±5%		ISKRA UPM 050	R4K70J1
R114	1M	±10%		ISKRA UPM 050	R1M00J1
R115	10K	±10%		ISKRA UPM 050	R10K0J1
R116	10K	±10%		ISKRA UPM 050	R10K0J1
R117	10K	±10%		ISKRA UPM 050	R10K0J1
R118	10K	±10%		ISKRA UPM 050	R10K0J1
R119	10K	±10%		ISKRA UPM 050	R10K0J1
R120	10K	±10%		ISKRA UPM 050	R10K0J1
R121	1K	±10%		ISKRA UPM 050	R1K00J1
R122	1K	±10%		ISKRA UPM 050	R1K00J1
R123	4K7	±5%		ISKRA UPM 050	R4K70J1
R124	4K7	±5%		ISKRA UPM 050	R4K70J1
R125	1M	±10%		ISKRA UPM 050	R1M00J1
R126	1M	±10%		ISKRA UPM 050	R1M00J1
R127	3K3	±10%		ISKRA UPM 050	R3K30J1
R128	220	±10%		ISKRA UPM 050	R220RJ1
T1	1.4/6P			STEATITE R-TRIKO 1.12-06-3D	CV6P0TA
T2				DAU 338/30	CV14PGA
C3	33p	±5%		ERIE APD N330	C33P0JI
C4	33p	±5%		ERIE APD N330	C33P0JI
C5	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C6	1000p	-20 +80%		ERIE 86'	C1K0PMI
C7	330p	±20%		ERIE APD	C330PMI
C8	33p	±5%		ERIE APD N330	C33P0JL
C9	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C10	1.4/6P			STEATITE R-TRIKO 1.12-06-3D	CV6P0TA
C11				DAU 338/30	CV14PGA
C12	100p	±20%		ERIE 86'	C100PGM
C13	100p	±20%		ERIE 86'	C100PGM
C14	0.022µ	-20 +80%		LEMCO LEMPLAC 10P	CU022ZL
C15	16p	±5%		ERIE APD N220	C16P0JI
C16	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C17	1.4.6p			STEATITE R-TRIKO 1.12-06-3D	CV6P0TA
C18	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
C19				DAU 338/30	CV14PGA
C20	3.3p	±1/4P		ERIE APD NPO	C3P30CI
C21	1000p	-20 +80%		ERIE 86'	C1K0PMI
C22	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C23	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C24	68p	±10%		ERIE BD	C68P0MI
C25	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C26	100p	±20%		ERIE AP	C100PMI
C27	330p	±20%		ERIE APD	C330PMI
C28	0.01µ		160V	EROFOL 30KT1807-310/1	CU010KK
C29	0.68µ		35V	UNION CARBIDE KR68E35	C680NKT
C30	0.01µ		160V	EROFOL 30KT1807-310/1	CU010KK
C31	2200p	±5%	160V	SUFLEX H515/160	C2K2PJF
C32	2200p	±5%	160V	SUFLEX H515/160	C2K2PJF
C33	0.047µ	-20 +80%		LEMCO LEMPLAC 12P	CU047ZL
C100	0.68µ		35V	UNION CARBIDE KR68E35	C680NKT
C101	0.22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C102	0.22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C103	0.68µ		35V	UNION CARBIDE KR68E35	C680NKT
C104	0.68µ		35V	UNION CARBIDE KR68E35	C680NKT
C105	0.22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C106	0.47µ	±5%	100V	SIEMENS MKM B32541	CU470JS
C107	0.047µ	±5%	250V	SIEMENS MKM B32541	CU047JS
C108	0.01µ	±5%	250V	SIEMENS MKM B32541	CU010JS
C109	0.22µ	±5%	100V	SIEMENS MKM B32541	C220NKS
C110	0.01µ	±5%	250V	SIEMENS MKM B32541	CU010JS
C111	0.01µ	±5%	250V	SIEMENS MKM B32541	CU010JS
C112	470p	±5%	160V	LEMCO 7 160	C470PJL
C113	1000µ		25V	ERIE 21105-104-0102-0A-0250	C1K0USI
C114	1000µ		25V	ERIE 21105-104-0102-0A-0250	C1K0USI
C115	1000p	±20%		ERIE APD Hi-K	C1K0PMI
C116	1000p	±20%		ERIE APD Hi-K	C1K0PMI
C117	680p	±20%		ERIE APD Hi-K	C680PMI
C118	680p	±20%		ERIE APD Hi-K	C680PMI
C119	0.01µ	±25%		ERIE BPD Hi-K	CU010EI
C120	0.01µ	±25%		ERIE BPD Hi-K	CU010EI
C121	220µ		16V	ERO EK220 16	C220UZE
C122	470p	±20%		ERIE APD Hi-K	C470PMI

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
C123	470p	±20%		ERIE APD Hi-K	C470PMI
C124	0.1µ	±5%	250V	SIEMENS MKM B32541	CU100JS
C125	0.1µ	±5%	250V	SIEMENS MKM B32541	CU100JS
RV1	4K7	±20%		PLESSY MPC 404/8/02852 004 LIN 1/4W	RV4K70A
RV2	20K			PIHER PT10V	RV20K0A
RV3	10K			PIHER PT10V	RP10K0B
RV100	5K			PIHER PT10V	RP5K00B
TR1				RCA 40822	D40822X
TR2				RCA 40823 OR 3N205	D3N205X
TR3				BF357K OR BF200	DBF200X
TR4				BC109B OR BC184K	DBC184X
TR5				BC109B OR BC184K	DBC184X
TR6				BC109B OR BC184K	DBC184X
TR7				BC109B OR BC184K	DBC184X
TR8				BC109B OR BC184K	DBC184X
TR9				BC109B OR BC184K	DBC184X
TR10				BC109B OR BC184K	DBC184X
TR11				BC109B OR BC184K	DBC184X
TR12				BC109B OR BC184K	DBC184X
TR13				BC109B OR BC184K	DBC184X
TR100				BC214	DBC214C
TR101				E5270	DE5270X
TR102				BC461	DBC461X
TR103				E5270	DE5270X
TR104				BC214	DBC214C
TR105				BC142	DBC142X
TR106				E5270	DE5270X
TR107				E5270	DE5270X

FM3 CIRCUIT DIAGRAM 3

RF BOARD M12327 ISS. 1
DECODER BOARD M12307 ISS. 3



ARTS NO LONGER AVAILABLE.

NCE	STOCK NO
30	CV14PGA
D NPO	C3P30CI
	C1K0PMI
EMPLAC 12P	CU047ZL
EMPLAC 12P	CU047ZL
	C68P0MI
EMPLAC 12P	CU047ZL
	C100PMI
	C330PMI
30KT 807-310/1	CU010KK
ARBIDE KR68E35	C680NKT
30KT 807-310/1	CU010KK
515/160	C2K2PJF
515/160	C2K2PJF
EMPLAC 12P	CU047ZL
ARBIDE KR68E35	C680NKT
MKM B32541	C220NKS
MKM B32541	C220NKS
ARBIDE KR68E35	C680NKT
ARBIDE KR68E35	C680NKT
MKM B32541	C220NKS
MKM B32541	CU470JS
MKM B32541	CU047JS
MKM B32541	CU010JS
MKM B32541	C220NKS
MKM B32541	CU010JS
MKM B32541	CU010JS
160	C470PJL
05-104-0102-0A-0250	C1K0USI
05-104-0102-0A-0250	C1K0USI
Hi-K	C1K0PMI
Hi-K	C1K0PMI
Hi-K	C680PMI
Hi-K	C680PMI
Hi-K	CU010EI
Hi-K	CU010EI
0.16	C220UZE
Hi-K	C470PMI

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
C123	470p	±20%		ERIE 2PD Hi-K	C470PMI
C124	0.1µ	±5%	250V	SIEMENS MKM B32541	CU100JS
C125	0.1µ	±5%	250V	SIEMENS MKM B32541	CU100JS
RV1	4K7	±20%		PLESSEY MPC 404/8 02852 004 LIN 1/4W	RV4K70A
RV2	20K			PIHER PT10V	RV20K0A
RV3	10K			PIHER PT10V	RP10K0B
RV100	5K			PIHER PT10V	RP5K00B
TR1				RCA 40822	D40822X
TR2				RCA 40823 OR 3N205	D3N205X
TR3				BF357A OR BF200	DBF200X
TR4				BC109B OR BC184K	DBC184X
TR5				BC109B OR BC184K	DBC184X
TR6				BC109B OR BC184K	DBC184X
TR7				BC109B OR BC184K	DBC184X
TR8				BC109B OR BC184K	DBC184X
TR9				BC109B OR BC184K	DBC184X
TR10				BC109B OR BC184K	DBC184X
TR11				BC109B OR BC184K	DBC184X
TR12				BC109B OR BC184K	DBC184X
TR13				BC109B OR BC184K	DBC184X
TR100				BC214	DBC214C
TR101				E5270	DE5270X
TR102				BC461	DBC461X
TR103				E5270	DE5270X
TR104				BC214	DBC214C
TR105				BC142	DBC142X
TR106				E5270	DE5270X
TR107				E5270	DE5270X

NO	VALUE	TOL	VOL	REFERENCE	STOCK NO
D1				MULLARD AA119	DAA119X
D100				AEI LR150C	DZ15VAA
D101				AEI LR150C	DZ15VAA
D102				GENERAL INSTRUMENTS W02	DW02XXX
IC1				RCA3089E	D3089EX
IC100				MOTOROLA MC1310P OR TI76115N	D1310PA
F1				MURATA SFG 10.7MA	LSFJ10A
L1				ACOUSTICAL DRG A 12202 ISS 1 G B 6623	L12202A
L2				ACOUSTICAL DRG A 12202 ISS 1 G B 6623	L12202A
L3				ACOUSTICAL DRG A 12203 ISS 2 G B 6624	L12203A
L4				TOKO CAN 1980BX	L1980BX
L5	22µH			SIGMA SC10 OR PAINTON C11 58/10 0013/10	LSC1022
L6				TOKO KAC S-K586 HM	L586HMA
L7				TOKO CAN 1980 BX	L1980BX
L8				ACOUSTICAL DRG A 12225	L12225A
IFT1				TOKO KAL 1506A	L1506AA
T1				DAGNAL T2760	LF3MNSA
LP1				VITALITY 690 14V 0.04A	BB14VLA
LP2				VITALITY 690 14V 0.04A	BB14VLA
LP3				VITALITY 690 14V 0.04A	BB14VLA
LP4				VITALITY 690 14V 0.04A	BB14VLA
FS1				100mA ANTISURGE (20 x 5mm)	UMA10DA

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