







1-21-76	SEE ER-787	RT
DATE	REVISION RECORD	DR
2-8-74	SEE ER-684	FL

PS-2

N1 - LAMP NEON

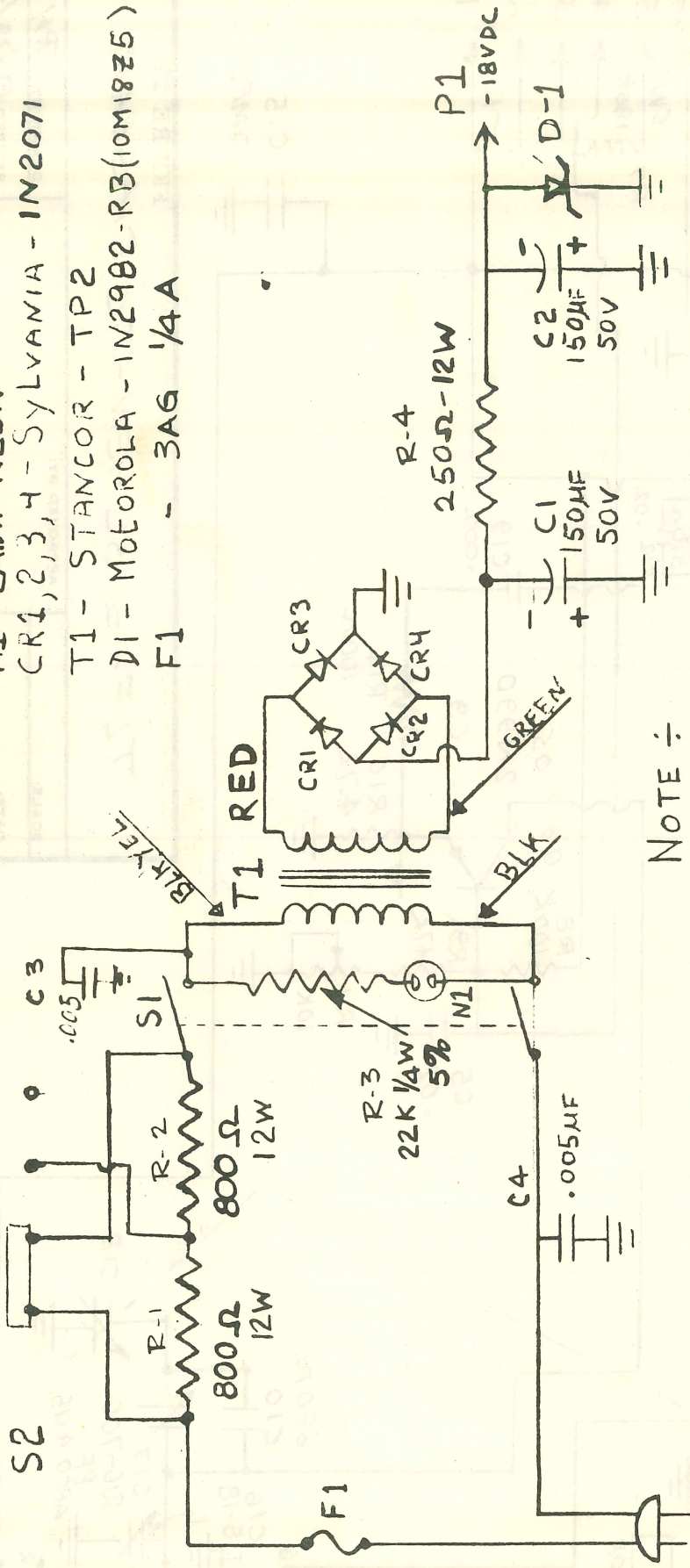
CR1, 2, 3, 4 - SYLVANIA - 1N2071

T1 - STANCOR - TP2

D1 - MOTOROLA - 1N2982-RB(10M18Z5)

F1 - 3AG 1/4A

VAC 95-128 128-170 170-250



NOTE ÷

1. FOR PICTORIAL WIRING DIAGRAM SEE 40270-C

AC. LINE

MASON ENGINEERING INC.  
1700 POST RD. FAIRFIELD, CONN.

FIGURE 22

SCALE:  
DATE: 9-12-64

APPROVED BY  
K J

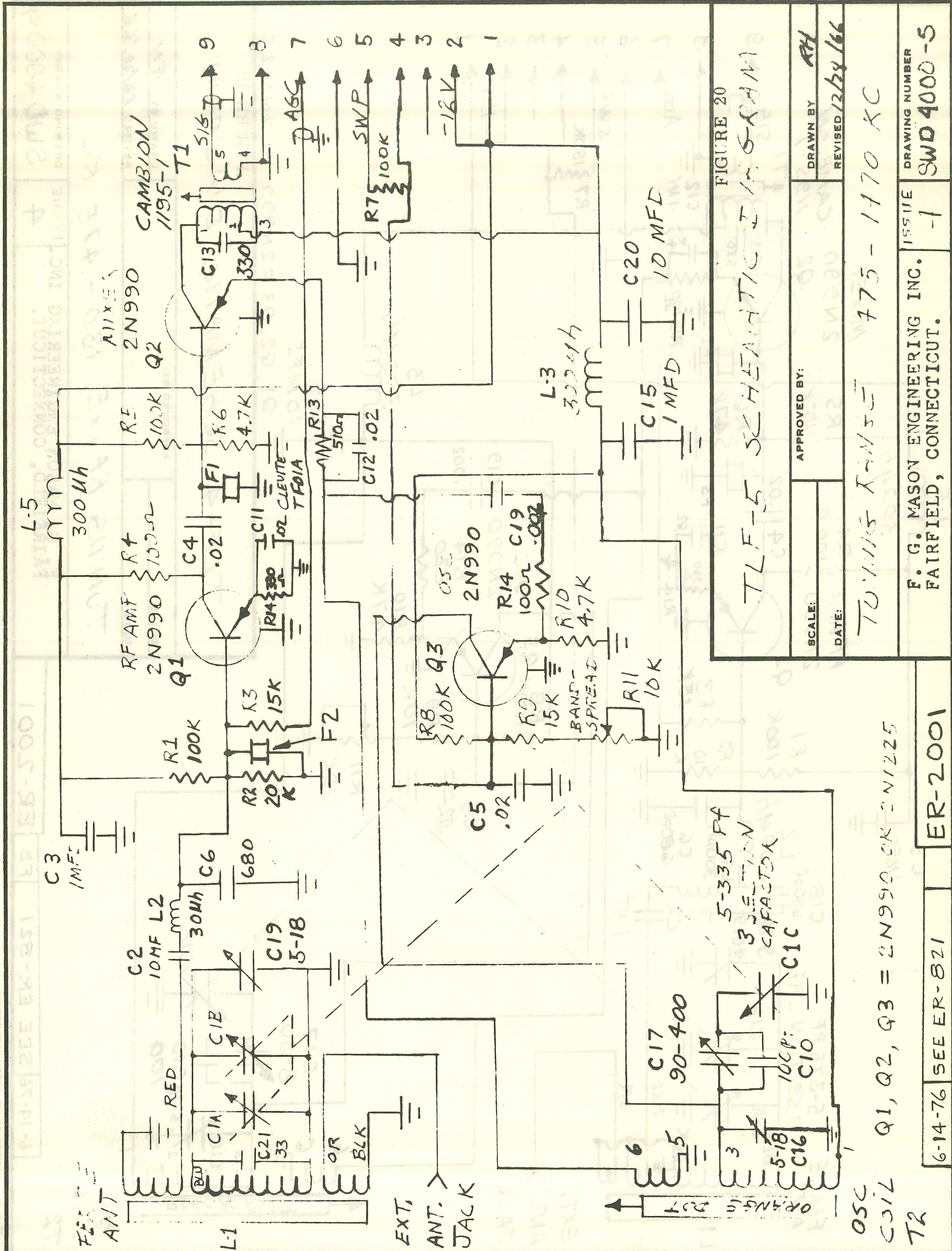
DRAWN BY  
J HAYES

POWER SUPPLY

SWD-4067-A

ISSUE  
3

ER-2001



APPROVED BY: \_\_\_\_\_  
 SCALE: \_\_\_\_\_  
 DATE: \_\_\_\_\_

DRAWN BY: **RH**  
 REVISED: **12/24/66**

**TUNING RANGE 475 - 1170 KC**

**F. G. MASON ENGINEERING INC.**  
 FAIRFIELD, CONNECTICUT.

**ISSUE -1**  
**DRAWING NUMBER SWD 4000-5**

**OSC COIL Q1, Q2, Q3 = 2N990 OK 2N1225**

**5-335 PF 3 SECTION CAPACITOR C16**

**ORANGE 251 T2**

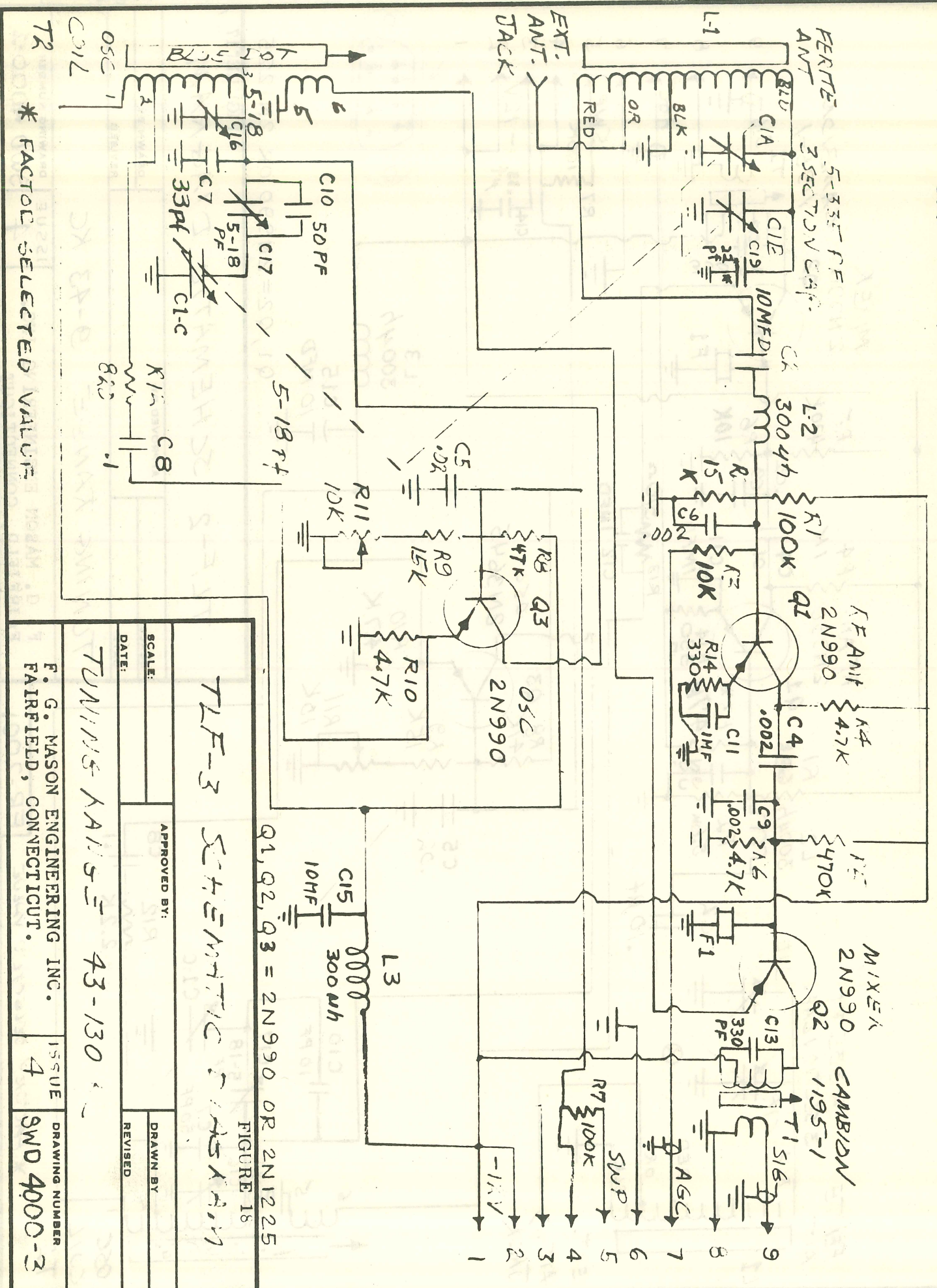
**6-14-76 SEE ER-821**

**ER-2001**

\* Ser. No. 304 on

6-14-76 SEE ER-821

FB



\* FACTOR SELECTED VALUE

TLF-3 SCHEMATIC DRAWING

FIGURE 18

Q1, Q2, Q3 = 2N990 OR 2N1225

SCALE: \_\_\_\_\_

DATE: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

DRAWN BY: \_\_\_\_\_

REVISED: \_\_\_\_\_

TUNING ANALYSIS 43-130

F. G. MASON ENGINEERING INC.

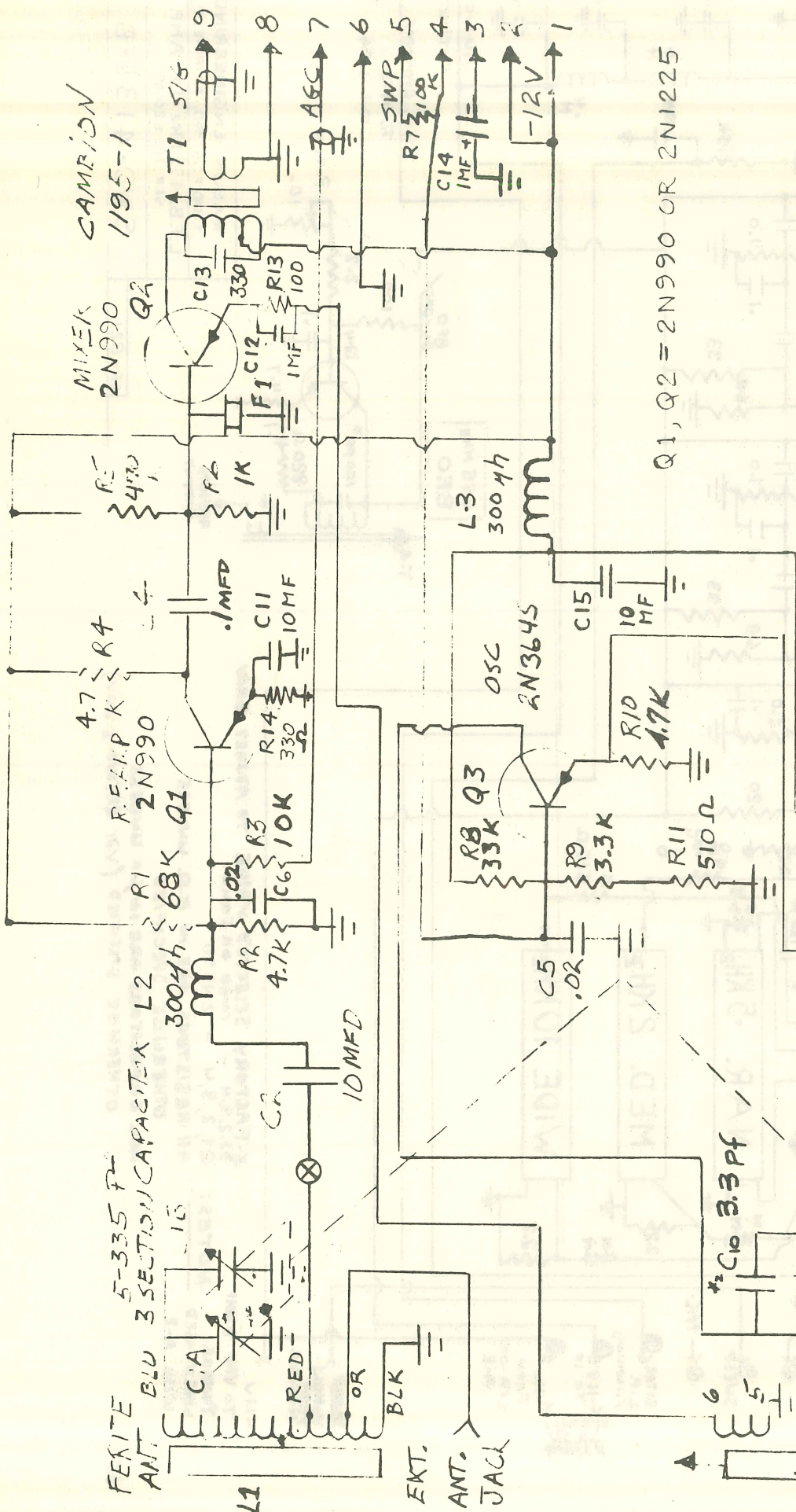
FAIRFIELD, CONNECTICUT.

ISSUE 4

DRAWING NUMBER SWD 4000-3

FE

6-14-76 SEE EF-821



Q1, Q2 = 2N990 OR 2N1225

FIG. 16

TLF-1 SCHEMATIC DRAWING

APPROVED BY:	DRAWN BY:
SCALE:	REVISED:
DATE:	
TUNING RANGE 2-9 KC	
F. G. MASON ENGINEERING INC. FAIRFIELD, CONNECTICUT.	DRAWING NUMBER SWD 4000-1

\* TRIMMERS REMOVED 1/16/67

ER-2001

T2 (5850)

MOUNTING DIAGRAM FOR B. N. C. ANTENNA ADAPTER  
F. G. MASON ENGINEERING, INC.  
FAIRFIELD, CONN.

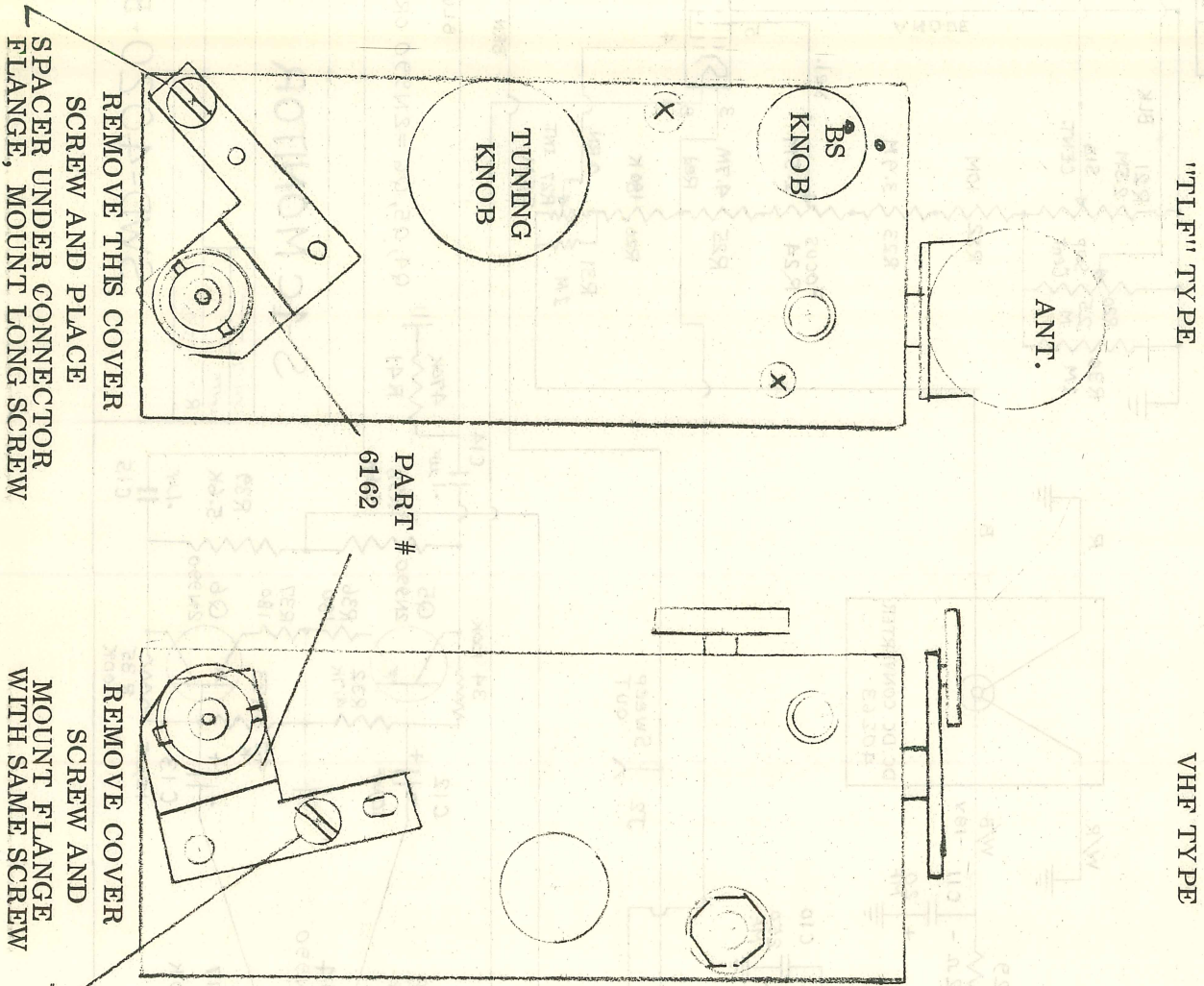
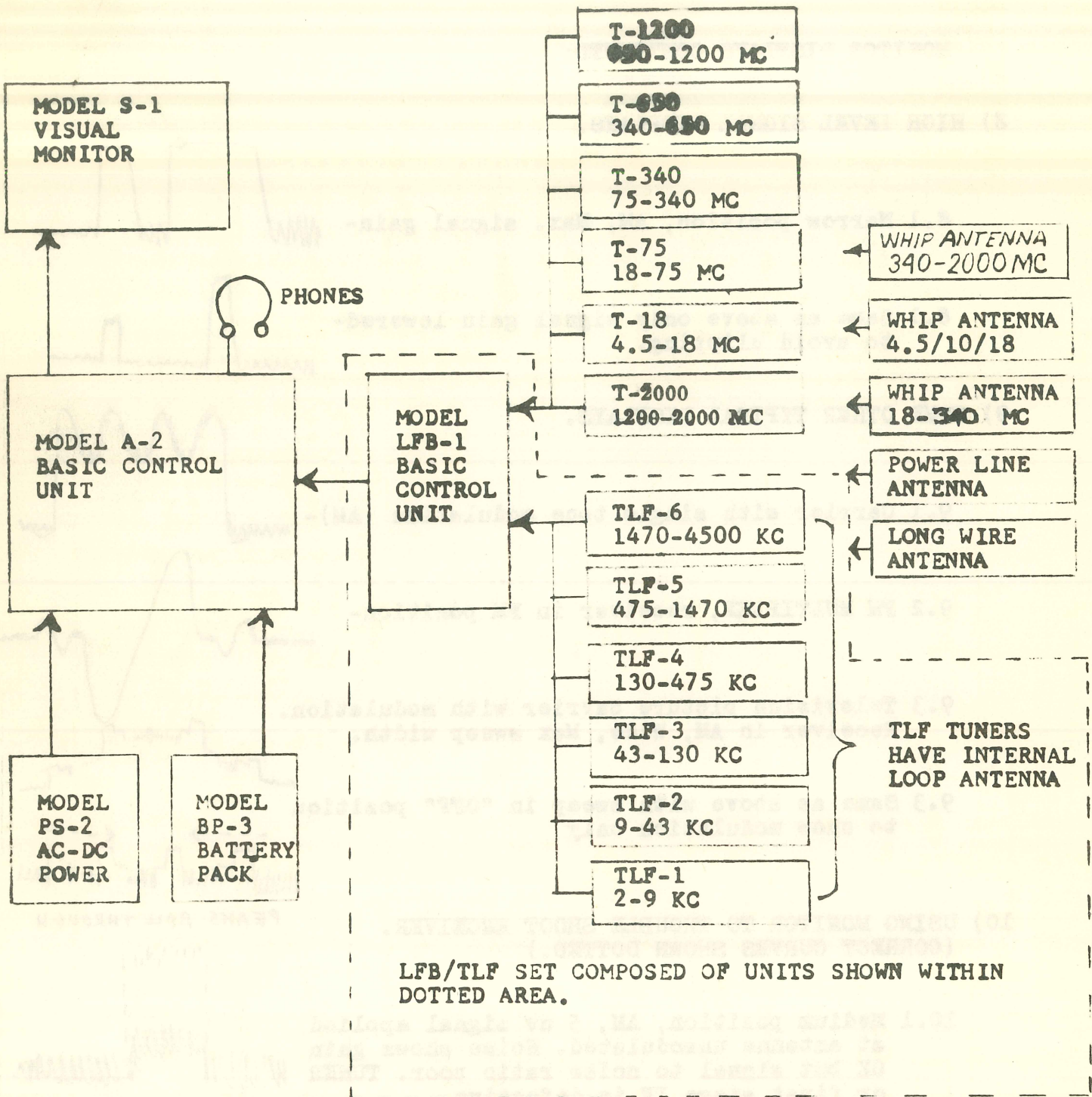


FIGURE 14





BLOCK DIAGRAM OF A-2 RECEIVER SYSTEM WITH LFB-1/TLF SET. THIS SYSTEM ACCEPTS ALL TUNERS WITHOUT REMOVAL OF LFB-1 BASIC CONTROL UNIT FROM THE A-2 BASIC CONTROL UNIT.

FIGURE 12

F.G. MASON ENGINEERING INC.  
FAIRFIELD, CONNECTICUT

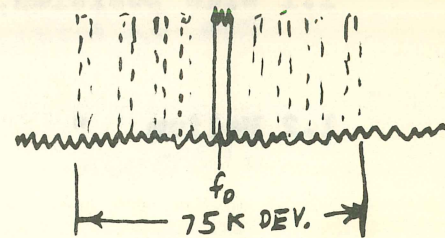
FIGURE 11B

MONITOR DISPLAYS CONTINUED:

4) DISPLAYS OF FREQUENCY MODULATED CARRIER.(75 Kc. Deviation)(F<sub>0</sub>150mc.)

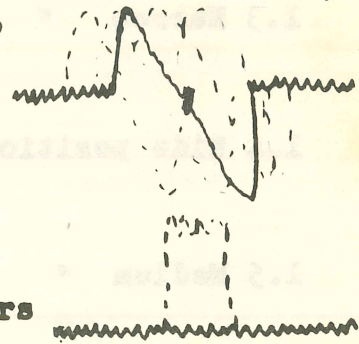
4.1 Narrow position, AM, sweep width approx. 150 kc.

4.2 Listening purposes, Medium position, sweep rate slow, 1/2 sweep width. (place center spot on crossover.)



5) DISPLAY OF KEYED CONTINUOUS WAVE SIGNAL.

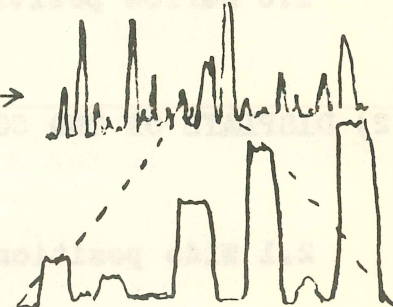
5.1 Narrow position, AM, 1/2 sweep width fast rate. Curve intermittently appears and disappears as keyed.



6) DISPLAYS OF CROWDED SIGNAL AREAS.

6.1 Narrow position, Max. sweep width, AM-

18 SIGNALS SHOWING

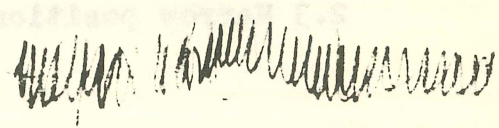


6.2 Center area of above signals expanded by lowering the sweep width.

EXPANDED TO SHOW ONLY 7 SIGNALS

7) DISPLAYS USING FILTER POSITION.(FILT.)

7.1 Wide position, AM, Max sweep width, low level incoming signal, sweep switch in "ON" position.

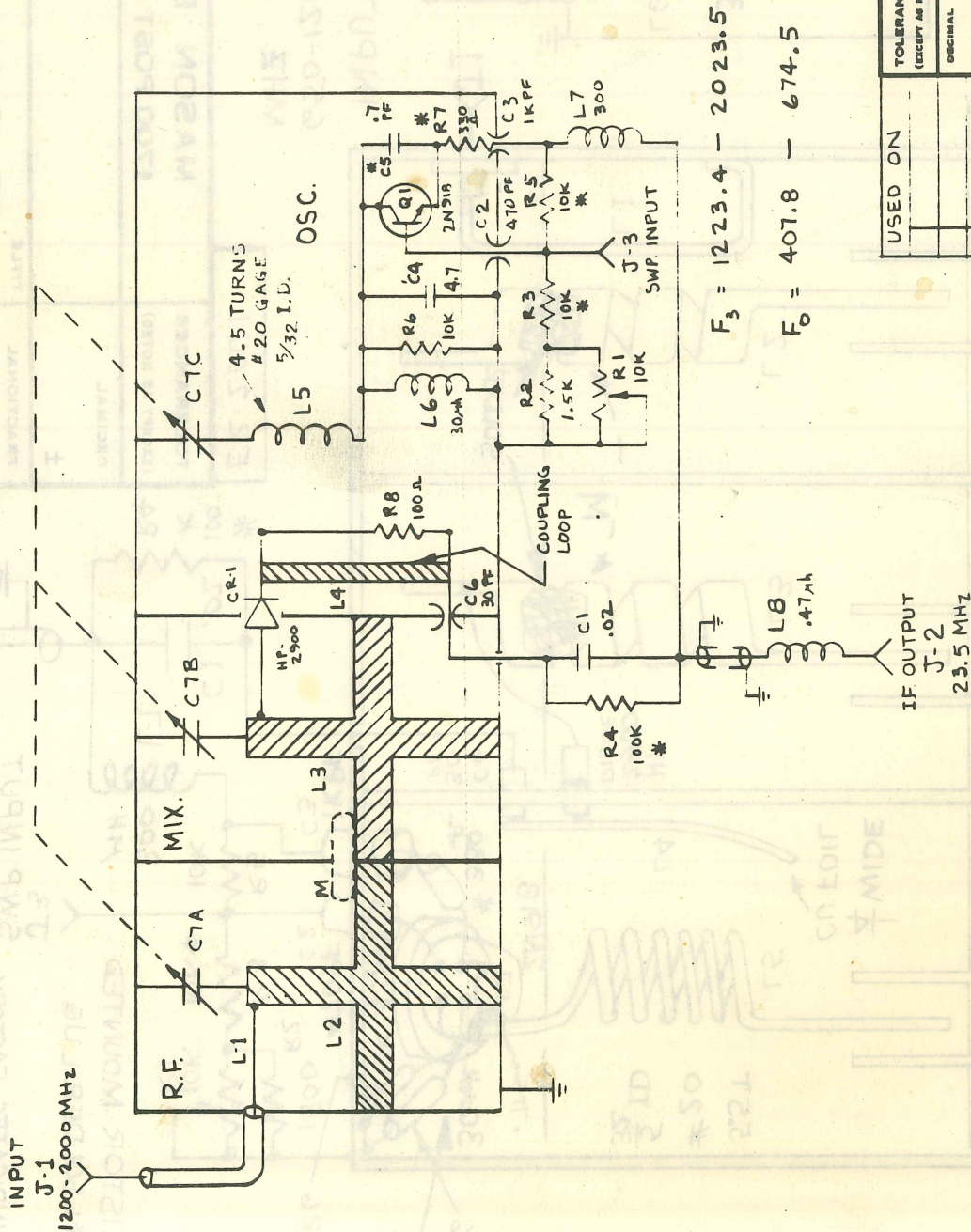


7.2 Same as above only sweep switch in "FILT" position.



98-LS-011 690

DATE	BY	REVISION	RECORD	AUTH.	DR.	CL.
		SEE ER 851				FB



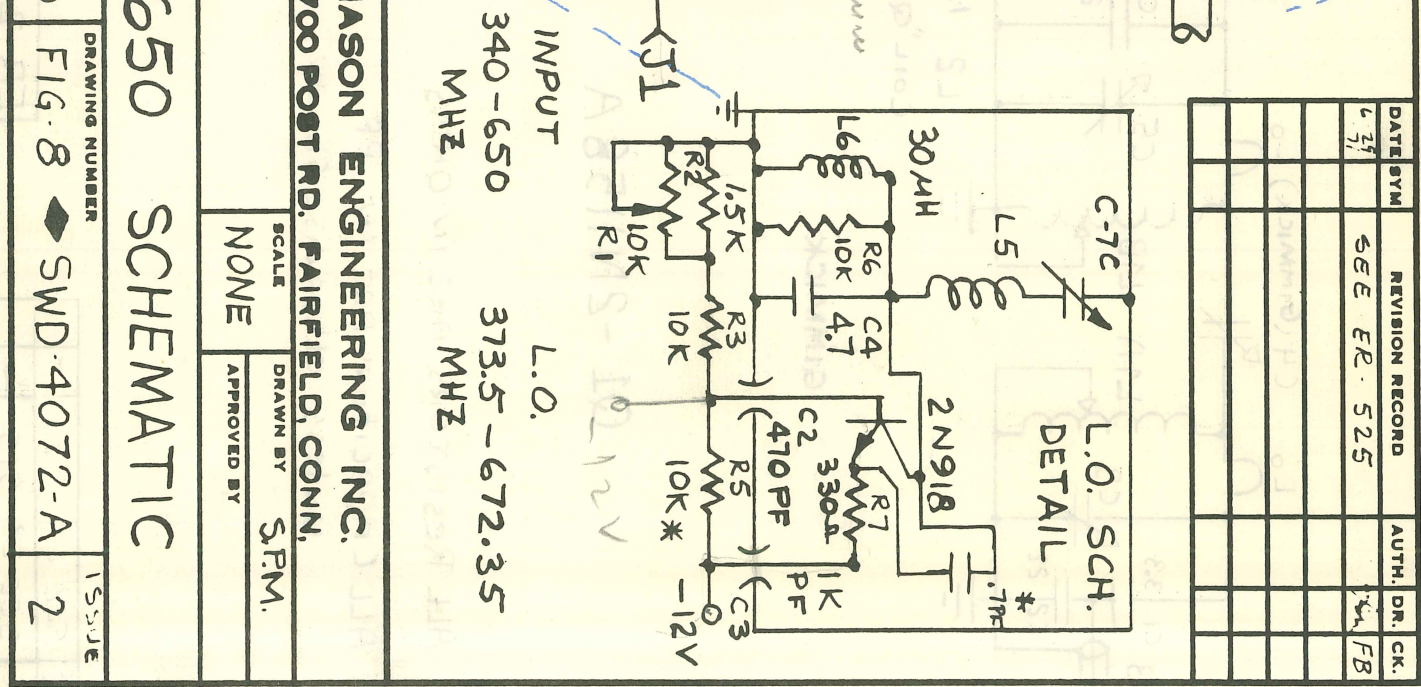
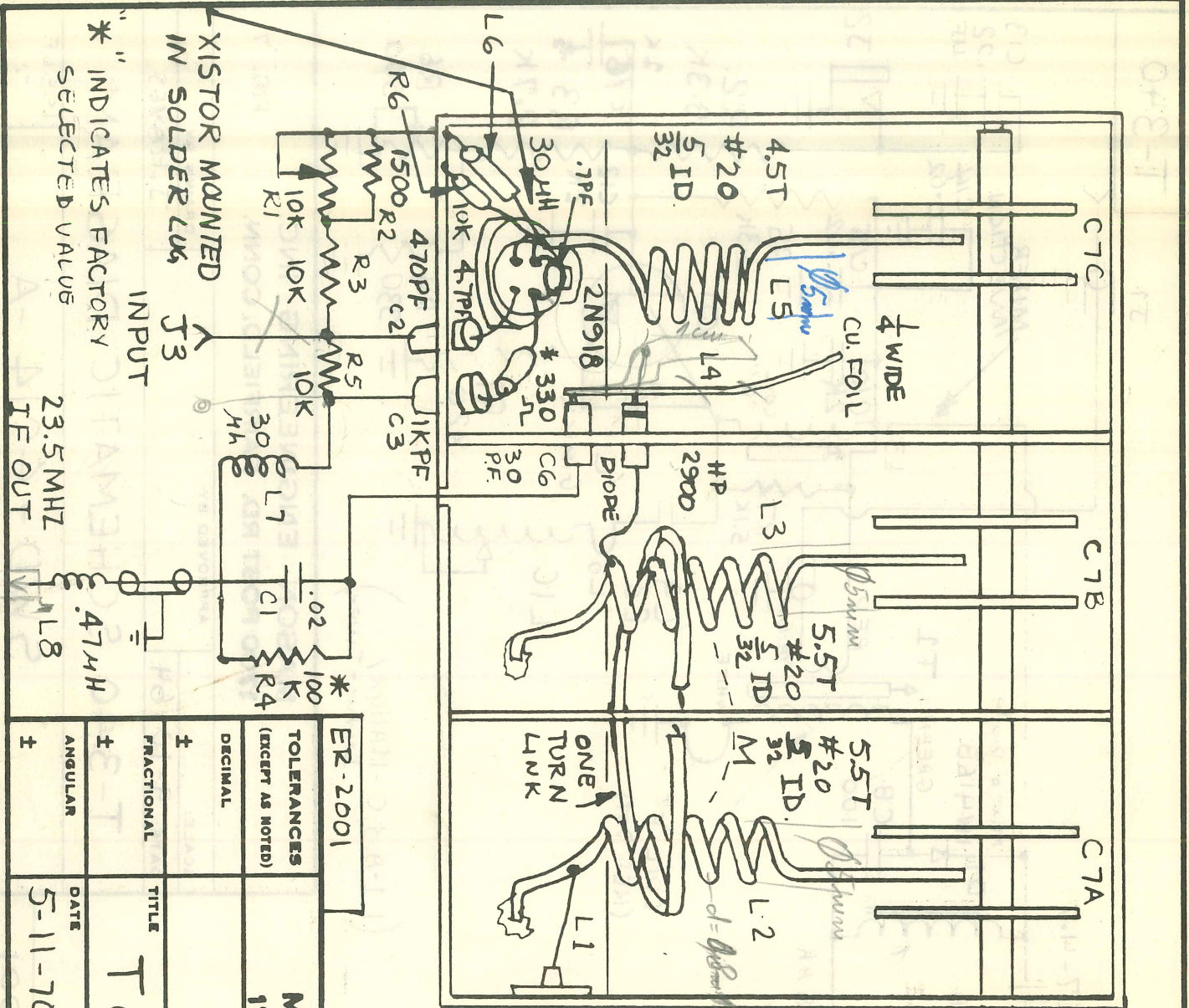
NOTE ÷  
1) "\*" INDICATES FACTORY  
SELECTED VALUE.

$F_3 = 1223.4 - 2023.5$   
 $F_0 = 407.8 - 674.5$

USED ON		TOLERANCES (EXCEPT AS NOTED)		SCALE		DRAWN BY		APPROVED BY	
DECIMAL	FRACTIONAL	ANGULAR	±	±	±	±	±	±	±

TITLE		DATE		DRAWING NUMBER		ISSUE	
SCHEMATIC WIRING DIAGRAM		9-16-70		SWD-4019-B		2	

FIG. 10  
MASON ENGINEERING INC.  
1700 POST RD. FAIRFIELD, CONN.  
ER-2001



DATE	SYM	REVISION RECORD	AUTH. DR.	CK.
6/3/71		SEE ER-525		FB

\* INDICATES FACTORY SELECTED VALUES

XISTOR MOUNTED IN SOLDER LUG

INPUT J3

23.5 MHZ IF OUT

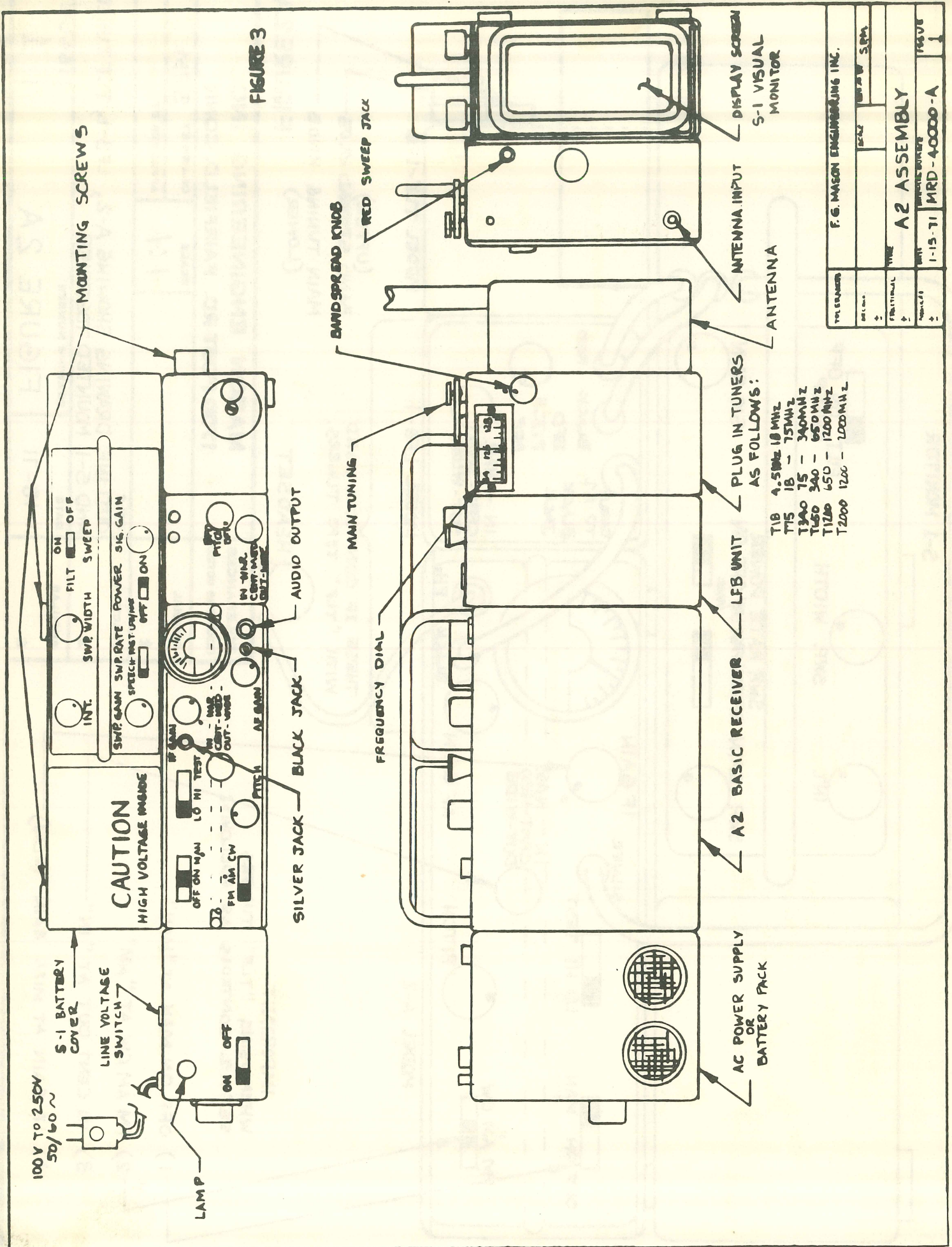
ER-2001	TOLERANCES (EXCEPT AS NOTED)	MASON ENGINEERING INC.	TITLE	DATE	DRAWING NUMBER	ISSUE
±	DECIMAL	1700 POST RD. FAIRFIELD, CONN.	T 650 SCHEMATIC	5-11-70	FIG. 8	2
±	FRACTIONAL				SWD-4072-A	
±	ANGULAR					
		SCALE NONE				
		DRAWN BY S.P.M.				
		APPROVED BY				

KOE ALBANY ENGINEERS STAMPAID FORM

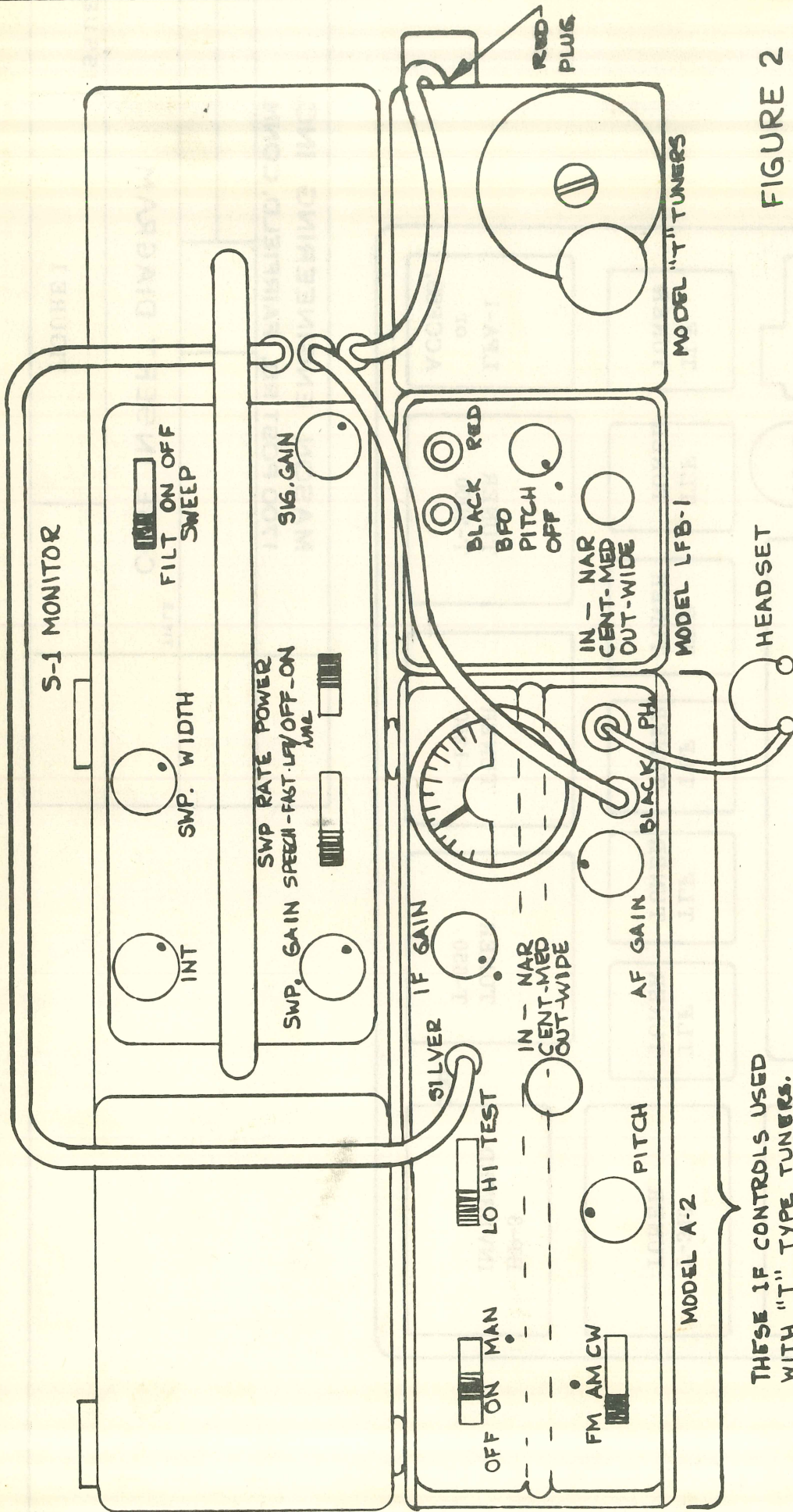
MADE IN U.S.A. 50010







F. G. MASON ENGINEERING INC.	
DESIGNED BY	SCALE
DRAWN BY	DATE
CHECKED BY	REVISED BY
<b>A2 ASSEMBLY</b>	
DATE	ISSUE
1-15-71	MIRD-40000-A



THESE IF CONTROLS USED WITH "T" TYPE TUNERS.

CONFIGURATION WHEN USING MODEL "T" TUNERS

FIGURE 2

TOLERANCES (EXCEPT AS NOTED)		MASON ENGINEERING INC. 1700 POST RD. FAIRFIELD, CONN.	
DECIMAL	±	SCALE	DRAWN BY S.P.M.
FRACTIONAL	±	1:1	APPROVED BY
ANGULAR	±	TITLE OUTLINE DRAWING SHOWING A-2, LFB-1, "T" TUNER, AND S-1 MOUNTED TOGETHER.	
		DATE	ISSUE
		1-19-71	1
		DRAWING NUMBER FIGURE 2	



**SECTION IX MAINTENANCE**

- 9.1 Should the LFB-1 Basic Control Unit or TLF series tuners become inoperative it is recommended that they be returned to the factory for repair. If only one tuner is exhibiting trouble only that tuner need be returned for repair, allowing the remainder of the system to be used.

- 3) Place Low-High-Test in Test position. "S" meter should read between 70 and 90. This procedure tests the condition of batteries. If meter does not indicate the correct voltage, batteries should be replaced. (When using external supplies, the test position indicates the condition of the supply).
- 4) Place Low-High-Test switch in Low position. (Do not leave in Test because this causes distortion and eliminates signal indication on the meter).
- 5) Plug headphones in jack on extreme right of basic unit.
- 6) Rotate AF gain knob until desired audio level is obtained.
- 7) Tune in signals using "S" meter as indication. If meter goes off scale, switch to High position to attenuate the signal reading.
- 8) If signal is unmodulated, turn BFO pitch control clockwise until desired tone is heard. (BFO control is located on LFB unit).
- 9) The S-1 visual monitor may be used as described in the operation manual. Plug the silver plug into the jack marked "Silver" on the LFA and insert the black and red plugs into their receptacles on the LFB.

### STORAGE

The LFA-LFB combination may be left bolted together for use as a separate receiver. In this case, it may be carried in the attache' case alongside the A2 main unit. It will be necessary to remove any tuner from the A2 and LFA-LFB and store the tuners in the pockets in the foam rubber insert.

### MAINTENANCE

#### Battery Replacement

- 1) Remove right hand cover (cover next to meter) by removal of three 8-32 screws and two 4-40 screws.
- 2) Tip unit to let batteries slide out.
- 3) Check each battery hole to ensure that the spring is still seated at the bottom.
- 4) Install new batteries with (+) side out in the holes marked with white.  
Use: Mallory TR133R  
Burgess H133R  
Eveready E133N  
(4.05 VDC Mercury Battery)

### 7.1.7 Power Line Pickup:

The power line antenna provided with the A-2 system can be used with TLF tuners in the same manner as described in Section II, 2.1, of the A-2 manual. Use bottom banana jack.

7.1.8 Some noise pickup may be experienced when using the AC power supply and tuning to the lower frequencies. It is recommended that the battery supply be used when this occurs.

## 7.2 Using Visual Monitor with TLF Tuner

### 7.2.1 Mounting:

Mount visual monitor in same manner as described in Section 2.3 with the exception of the black and red plugs. These are plugged into the corresponding "black" and "red" jacks of the LFB-1.

### 7.2.2 Operation:

Operation of the S-1 Visual Monitor with TLF tuners is the same as with any other tuners as described under section 2.3 in the A-2 manual, except below 25 KHz. Monitor must be demounted from basic unit to reduce monitor voltage converter radiation into tuner chassis and antenna.

## 7.3 Operation with components other than TLF Tuners.

### 7.3.1 Tuners:

All tuners other than TLF tuners are mounted on the right side of the LFB-1 unit in the same manner as when mounted to the A-2. When using "T" type tuners remove black plug on LFB-1 cable from A-2 jack.

### 7.3.2 Visual Monitor:

All operations same as described in Section 2.3. Note that the red plug from the monitor must be plugged into the tuner jack and black plug from monitor must be plugged into the A-2 black jack, not the LFB-1 when using "T" type tuners.

### 7.3.3 Other Components:

All other components may be used in their normal manner with the LFB-1/A-2 combination as described previously. This includes the PS-2 AC power supply, BP-3 external battery pack, earphones, antennas, and the A-2 itself.

**SECTION VII OPERATIONAL INSTRUCTIONS****7.1 TLF Series Tuners:**

**7.1.1** Select TLF tuner covering range desired and follow mounting instructions in Section 6. 2.

**7.1.2** \* Set A-2 controls as follows whenever using TLF tuners  
OFF-ON-MAN: to "MAN. "

\*IF Gain: Maximum counter clockwise (minimum gain).

WIDE-MED-NAR: To "NAR. "

\*FM-AM-CS: To AM.

See Figure 2

\*NOTE: A-2 units have yellow dots on the panel to indicate proper setting of controls for TLF operation.

**7.1.3** The AF gain control LO-HI-TEST switch is used normally as described in Section II of A-2 Manual. Other functions used are, OFF position of OFF-ON-MAN, silver jack, phone jack, and are described in Section II of the A-2 manual. Reduce audio gain at low frequencies to prevent feedback.

**7.1.4 LFB Controls:**

NAR-MED-WIDE )  
IN-CENT-OUT ) push in or pull out, to desired B. W.

With TLF-1 and TLF-2 tuners use MED and NAR bandwidths only.

NAR is 500 Hz

MED is 2 KHz

WIDE is 10 KHz

Note that if signal is modulated with speech, the NAR position will seriously limit the intelligibility of the speech.

**BFO-PITCH-OFF:** Use on carrier wave signals for providing beat tone. Turn c. c. w. for OFF position. Other positions to c. w. will provide pitch adjustment.

2 KHz to 4500 KHz, while the other operator covers the frequencies from 4.5 MHz to 2000 MHz. The SI monitor cannot be used with the LFB/TLF combination unless an LFA is also used. This use is discussed in Section VIII concerning the LFA.

The purpose of the LFB/TLF tuner set is to extend the frequency range of the A-2 Receiver System downward to 2 kilohertz. It is also a purpose of this equipment to provide radio frequency, tuned, direct, magnetic field, antennas from 2 KHz to 1500 KHz.

2.7 General Description

The LFB/TLF tuner set consists of seven components as follows:

1. LFB-1 Base Tuner is amplifier section

2. TLF-1 Tuner 2.5 KHz

3. TLF-2 Tuner 4 - 10 KHz

4. TLF-3 Tuner 10 - 100 KHz

5. TLF-4 Tuner 100 - 1000 KHz

6. TLF-5 Tuner 1000 - 1500 KHz

7. TLF-6 Tuner 1500 - 2000 KHz

The LFB-1 section will tune on to the 4-5 KHz range receiver and may be substituted at all times. The LFB-1 and TLF-1 combination will then receive all TLF and TLF-2 tuners. The TLF-2 provides the LFB-1 with cover and stabilizes the frequency use of auxiliary components.

The LFB/TLF set is designed to be used with the A-2 Receiver System. The LFB/TLF set is designed to be used with the A-2 Receiver System. The LFB/TLF set is designed to be used with the A-2 Receiver System. The LFB/TLF set is designed to be used with the A-2 Receiver System.

The LFB/TLF set is designed to be used with the A-2 Receiver System. The LFB/TLF set is designed to be used with the A-2 Receiver System. The LFB/TLF set is designed to be used with the A-2 Receiver System. The LFB/TLF set is designed to be used with the A-2 Receiver System.

is supplied to the tuner for sweeping the oscillator. The sweep voltage is shaped so as to give a bright spot in the center of the display. The bright spot indicates the point in the band to which the tuner is tuned. The signal amplifier increases the amplitude of the signal from the A-2 Receiver to a level sufficient to drive the cathode ray tube. The high voltage supply supplies the anode voltage for the cathode ray tube.

The low voltage supply supplies minus 18 volts DC to the transistor circuitry. This is not located in the S-1 Monitor but is the same power source used to power the A-2 Receiver.

### 3.3 Battery Replacement S-1 Monitor

- 1) Turn OFF unit and remove silver plug from A-2. This will eliminate the 1200 volts present on the batteries produced from the high voltage converter.
- 2) Remove two screws in battery cover. Battery cover is located on top of unit near INTENSITY and SWP GAIN controls.
- 3) Remove the two batteries from holders and replace with new ones observing polarity. The same batteries as listed under BATTERY REPLACEMENT - BATTERY PACK can be used.
- 4) Replace battery cover.

### 3.4 Replacement of Transistors - Basic Unit

- 1) Remove four screws in rear cover and remove cover.
- 2) Replace transistor. Use illustration located on inside of cover as a guide. NOTE: Small alignment tab on transistor must be in proper position.

### 3.5 Replacement of Fuses - AC Supply

- 1) Remove cover of AC supply.
- 2) Fuse is located in fuse clip in bottom section of power supply.

### 3.6 Other Components

It is highly recommended that any defective component that is not corrected by the above replacements, be sent directly to F. G. Mason Engineering, Inc. for repair and alignment.

- 6. Remove the tuner by pulling it away from the LFB-1. Prying the tuner off by pulling against the bottom edge is helpful in freeing the fastener. **DO NOT** use the antenna as a handle for removing the TLF tuners.



7. If you should find a signal on this tuner, it will be very apparent on the signal strength meter, or on the S1 visual display unit when the SIG. GAIN Control is in it's fully clockwise position.
8. Note that the movable antenna on the top of the tuner is directional and may be turned to "peak" the signal on the S meter. At null or minimum signal strength, the antenna axis will be pointing toward the signal source in most cases. Note also that touching the various controls with the hand will affect the signal indication.
9. Remove the tuner by pulling it away from the LFB-1. Prying the tuner off by pulling against the bottom edge is helpful in freeing the fastener. DO NOT use the antenna as a handle for removing the TLF tuners.

G. TLF-5 (475 to 1470 KHz)

1. Connect the TLF-5 Tuner to the right hand side of the A2. Align the blue plug and the snap fastener of the TLF-5 with the blue socket and hole of the LFB-1 and push together. Note that there is no holding bolt as there is on the high frequency tuners.
2. Set the Bandwidth Switch on the LFB-1 to out-wide. If there is interference between two stations very close to each other, put the Bandwidth switch to CENT. -MED.
3. The S1 Visual Display is suggested for use in this band. Place the controls as follows: (see Figure 2A):
  - a. SWP. Rate - SPEECH
  - b. Power - ON
  - c. SWEEP - FILT. ON
  - d. INT., SWP. WIDTH AND SWP. GAIN - fully clockwise
  - e. SIG. GAIN - as needed for full screen vertical display.

When a signal is found, the SWEEP may be turned off so that any audio on the signal may be identified.

4. Slowly tune from 475 to 1470. The TLF-5 covers the AM Broadcast band. An external antenna is not necessary.

3. If an external speaker is used, feedback to the TLF-2 may occur due to the low frequency range of this tuner.  
Plug the power line antenna to an AC outlet and the white jack on the bottom side of the TLF-4.
  4. Slowly tune from 9 to 43 KHz. Very seldom will any signal be found with this tuner, but a great deal of man-made and natural noise will be noted. Squawks, squeaks, squeals and impulse type electrical sounds will prevail. Some CW (Morse Code) may be found.
  5. If you should find a signal on this tuner, it will be very apparent on the signal strength meter. On the TLF-2 the visual display unit (S1) may not be usable and the signal strength meter will provide adequate indication.
  6. Note that the movable antenna on the top of the tuner is directional and may be turned to "peak" the signal on the S meter. At null or minimum signal strength, the antenna axis will be pointing toward the signal source in most cases. Note also that touching the various controls with the hand will affect the signal indication.
  7. Remove the tuner by pulling it away from the LFB-1. Prying the tuner off by pulling against the bottom edge is helpful in freeing the fastener. DO NOT use the antenna as a handle for removing the TLF tuners.
- E. TLF-3 (43 to 130 KHz)
1. Connect the TLF-3 Tuner to the right hand side of the A2. Align the blue plug and the snap fastener of the TLF-3 with the blue socket and hole of the LFB-1 and push together. Note that there is no holding bolt as there is on the high frequency tuners.
  2. Set the Bandwidth Switch on the LFB-1 to OUT-WIDE.
  3. If an external speaker is used, feedback to the TLF-1 may occur due to the low frequency range of this tuner. Plug the power line antenna to an AC outlet and the white jack on the bottom side of the TLF-4.
  4. Slowly tune from 43 to 130 KHz. Very seldom will any signal be found with this tuner, but a great deal of man-made and natural noise will be noted. Squawks, squeaks, squeals and impulse type electrical sound will prevail. Some CW (Morse Code) signals will be found. At about 100 KHz you may find navigational signals which have either an intermittent or constant tone.

## Use of TLF Set

## 1. Introduction

The TLF (Tuned Low Frequency) portion of the A2 System is used for covering the frequency band from 2 KHz to 4.5 MHz. Although it is certainly possible to build a normal radio transmitter in this frequency range, carrier current operation is more desirable.

When an eavesdropper utilizes the AC power lines which furnishes electrical service to a facility for transmission of information, he uses what is commonly termed a carrier current. This method uses a carrier frequency of from 20 KHz to 200 KHz. The circuitry for the transmitter is similar to that of any other radio transmitter, only the frequency is normally lower. This mode of transmission is very common in the use of so-called "wireless intercoms". The main advantage of this mode of eavesdropping is that the receiver may be placed at any location inside or outside of the building under surveillance. The receiver must, however, be placed on the same side of the power company's line transformer since the transformer will not pass the higher frequencies used for carrier current purposes. Thus a physical search for this type of device is limited to areas serviced by the same line transformer. The transmitters may be very small and are available disguised as wall outlets so that the transmitter is powered from the AC wires connected to the outlet through the normal building wiring.

## 2. Using the TLF Tuners

A. Setting of A2 Controls (note that all controls are positioned at the yellow dots for TLF use - see Fig. 2A) Connect the S2 and LFB-1 plugs as shown - THIS IS VERY IMPORTANT.

1. OFF-ON-MAN: MAN
2. LO-HI-TEST: LO
3. GAIN: FULLY Counterclockwise
4. FM-AM-CW: AM

B. Setting of S1 Controls (See Fig. 2A)

1. SWP Rate: LFB/NAR
2. SWEEP: FILT. ON
3. All other controls full clockwise;
4. See Figure 2A for the plug connections between the A2 and S1.

2. At the lower end of the band, from 890 MHz and down, you may encounter a UHF Television station. The TV signal of a station will appear in 2 parts. The audio signal will be an FM signal and may be received as any other FM signal would. The video or picture portion of the signal will be 4.5 MHz lower in frequency than the audio for that channel. The video is an AM signal which may be identified as a steady buzz. If the receiver is equipped with a visual display unit, it is possible to look at the video signal and the characteristic sync signals will be seen. The TV picture itself cannot be seen on a normal display unit. The TV channels are spaced 6 MHz apart.
3. Between 960 and 1215 MHz a radar signal may be found. Radar signals may be identified by its characteristic buzz. If a rotating antenna is involved at the radar station, the buzz will last for a second or two and be repeated every 15 to 30 seconds as the antenna makes a complete revolution.

#### C. Operation with the T650 Tuner

1. Replace the T1200 tuner with the T650 Tuner which covers 340 to 650 MHz, repeating all steps covered by the T2000.
2. Interesting signals start appearing especially from UHF Television and/or 2 way mobile radio (taxi, police, garbage trucks, etc.) around 450 to 470 MHz.

#### D. Operation with the T340 Tuner

1. Replace the T650 Tuner with the T340 tuner which covers 75 to 340 MHz, repeating all steps covered by the T2000, except the antenna mounting is different.
2. Connect the antenna marked 18-340 MHz to the side of the T340.
3. Tuning from 340 MHz down in frequency, the following bands will be encountered in most locations:
  - a. Television - 216 to 174 MHz
  - b. 2 way Mobile, telephone and paging - 152 to 173 MHz.
  - c. Amateur Radio - 148 to 144 MHz
  - d. U.S. Government - 144 to 132 MHz
  - e. Aircraft to Ground - 132 to 108 MHz
  - f. FM Broadcast - 108 to 88 MHz
  - g. Television - 88 to 75 MHz

commercial broadcast, and, of course, the topic of conversation can be used to identify the possible participants. Also, one should listen for familiar names, company references, addresses, product names, etc.

- b. Another technique is to note the signal level or signal strength of the unidentified transmission. If the signal is quite strong, it means that it is a legitimate transmission which for some reason has not been previously identified, (such as a new F. C. C. broadcast allocation or of a university station broadcasting at irregular hours, etc.) or a clandestine transmission with the bug located in the immediate vicinity. The local transmitter can be identified by watching for a change in its signal level (transmitting strength) as shown on the meter, as the A2 receiver is moved around the area. It may be necessary, if the signal level is high, to move the receiver to a different area of the building, such as down the corridor. If a variation in signal level is noted, it indicates that the clandestine transmitter is a relatively low power one, and is transmitting from the immediate area. Of course, moving the receiver to the area of highest signal level is a standard technique for locating the transmitter.
- c. Another useful method in identifying a clandestine transmission is to pin-point its frequency. Multiply that frequency times two and then tune the surveillance receiver to that new frequency, which is known as a harmonic of the broadcast frequency. Inexpensive and poorly built clandestine transmitters will normally transmit harmonics of their designed frequency. These harmonics are multiples of the design frequency. Legitimate broadcasters are required by the F. C. C. to use broadcast equipment especially designed to eliminate harmonic transmissions. Therefore, if a harmonic of an unidentified broadcast transmission is detected, this is an indication that it is an unauthorized or illegal transmission. The harmonic frequency may be two, three or four times the intended broadcast frequency. Another advantage to the surveillance receiver operator in using this technique is that the harmonics of clandestine transmissions are often in a frequency range that is free from heavy broadcast traffic and, therefore, are easier to identify. For instance, a clandestine transmitter broadcasting at 86 MHz, just below the FM broadcast band, could present harmonics at 172 MHz, 258 MHz, and 334 MHz. Traffic (or the number of legitimate broadcasts) from 200 to 350 MHz is less than those found in the F. M. band 88 to 108 MHz.

plug into jack near "S" meter on A-2 chassis. Insert silver plug into jack next to IF GAIN knob on A-2 chassis. (The jacks are marked to show the correct color plugs.)

15. Apply S-1 power by placing power switch in ON position. (A-2 receiver power switch must be in ON position when operating S-1 monitor.)
16. Always adjust INTENSITY control for minimum brightness required for comfortable viewing (using minimum brightness will conserve battery life considerably).
17. Adjust SWP. GAIN control until display fills viewing area (usually leave at full clockwise position).
18. Place SWEEP Switch in FILT. ON position, to extreme left position.
19. Adjust SWP. WIDTH to maximum clockwise position. In this position the largest portion of the spectrum will be viewed. In the crowded signal areas of the frequency spectrum, more detail can be observed with less sweep width. This is accomplished by adjusting the SWP. WIDTH control counterclockwise. Maximum sweep width is useful for signal seeking in areas of the spectrum that are not crowded with signals. After acquiring some experience in operating the S-1 monitor the operator can quickly determine the sweep width that is optimum. When the SWP. WIDTH control is in the maximum counterclockwise position the sweep width will be zero. The system will now accept only the one frequency to which it is tuned. The modulation of the signal can be viewed on the S-1 as well as heard.
20. Adjust SIG. GAIN control so that size of display is entirely within the screen. This may have to be readjusted as signal intensity varies.
21. Place SWP RATE switch in SPEECH position. In this position a bright indicating spot will appear in the center of the screen. When it is desired to listen to the modulation of a particular signal, center that signal on the spot by tuning the tuner. If the modulation of the signal must be heard clearly with no sweep noise, place SWEEP switch in OFF position. When viewing intermittent pulse modulation it may be advantageous to use a faster rate of sweep to reduce the possibility of missing the signal. The faster sweep rate can be obtained by placing the SWP RATE switch in the FAST position. When using the fast sweep rate it will be difficult to listen to the modulation. When listening, place desired signal in center of screen over bright spot and place SWP RATE switch in OFF position.

## 2.4 Specific Instructions for performing Electronic Countermeasures Sweeps.

This portion of the instruction manual is intended to assist the operator in performing sweeps. It should in no way be construed as the best of procedures and the on-the-job experience of the operator will guide him in modifying these suggestions.

### Preparation of Area

There are several preliminary things which should be kept in mind before a sweep is started. It should be assured that the busy-bodies who frequent industrial establishments are not apt to wander into the area. Not only are they likely to accidentally tip off any possible listener, but they are proficient in "chicken little, they're bugging the place!!!". What you don't need at this point is help.

Remove the phone from the hook, as this will activate any series connected devices. Even if they are hundreds of feet away, a sensitive receiver such as the A2 will pick them up. Keeping the phone off the hook may raise someones curiosity, so prepare an excuse for this.

Record the TV channels in your area, both VHF and UHF and you can use these frequencies to check the operation of Tuners T650 and T1200. The lack of signals in those regions even makes the Professional wonder if his receiver is working. Remember - there is seldom a signal on the T650, T1200 or T2000 bands. Provide an audio source to trigger any audio actuated devices.

#### A. Operation with T2000 Tuner

1. Any one of the six tuners is assembled to the basic unit by plugging it into the right hand end of the basic unit and tightening the thumbscrew. See Fig. 2. Make certain that the tuner is flush against the mounting surface and that the alignment screw is seated in the hole before tightening the thumbscrew. The external battery pack or AC power supply can be mounted by plugging into the left hand end of the basic unit and tightening the thumbscrew. See Fig. 2. Make certain that the chassis is flush against the mounting surface and the the alignment screw is in the hole before tightening the thumbscrew.
2. Plug the T2000 tuner into the right side of the A2. Tighten the thumbscrew on the right side of the T2000. It is preferable to start a sweeping operation with the highest frequency tuner and work down. This will allow the operator to find harmonics of any "bugs" which may be present. A harmonic is a multiple of the bug frequency and

- 2) For portable operation, mount S-1 on rear of A-2. Orient viewing screen so that it is on same end as tuner. Tighten the two thumbscrews.
- 3) If portable operation is not important the S-1 can be operated on a table or desk in any position. The connecting cables supplied are long enough to allow this method of operation.
- 4) Insert red plug into jack on surface of tuner near antenna. Insert black plug into jack near "S" meter on A-2 chassis. Insert aluminum plug into jack next to IF GAIN knob on A-2 chassis. (The jacks are marked to show the correct color plugs.)
- 5) Operate receiver as described in Section 2.1 and 2.2. Apply S-1 power by placing power switch in ON position. (A-2 receiver power switch must be in ON position when operating S-1 monitor.)
- 6) Always adjust INTENSITY control for minimum brightness required for comfortable viewing (using minimum brightness will conserve battery life considerably).
- 7) Adjust SWP. GAIN control until display fills viewing area.
- 8) Adjust SWP. CENTERING and SIG. CENTERING until display is centered in viewing area.
- 9) Adjust FOC. for clearest display.
- 10) Place SWEEP Switch in ON position.
- 11) Adjust SWP. WIDTH to maximum clockwise position. In this position the largest portion of the spectrum will be viewed. In the crowded signal areas of the frequency spectrum, more detail can be observed with less sweep width. This is accomplished by adjusting the SWP. WIDTH control counterclockwise. Maximum sweep width is useful for signal seeking in areas of the spectrum that are not crowded with signals. After acquiring some experience in operating the S-1 monitor the operator can quickly determine the sweep width that is optimum. When the SWP. WIDTH control is in the maximum counterclockwise position the sweep width will be zero. The system will now accept only the one frequency to which it is tuned. The modulation of the signal can be viewed on the S-1 as well as heard.
- 12) Place A-2 bandwidth switch in NAR position for frequencies of 4.5 MHz to 18 MHz and MED POSITION for 18 MHz to 2000 MHz.  
Other settings than these are useful for special conditions and will become apparent after some skill is acquired.



## SECTION II OPERATION OF RECEIVER

### 2.1 Assembly of Components to Basic Unit

Any one of the six tuners is assembled to the basic unit by plugging it into the right hand end of the basic unit and tightening the thumbscrew. See Fig. 2. Make certain that the tuner is flush against the mounting surface and that the alignment screw is seated in the hole before tightening the thumbscrew. The external battery pack or AC power supply can be mounted by plugging into the left hand end of the basic unit and tightening the thumbscrew. See Fig. 2. Make certain that the chassis is flush against the mounting surface and that the alignment screw is in the hole before tightening the thumbscrew.

The whip antenna is plugged into the right hand end of the tuner. See Fig. 2. The whip antenna with switch marked "4.5/10/18" is used with the T-18 tuner with switch in "4.5" position for 4.5 MHz to 10 MHz and "18" position for 10 MHz to 18 MHz. The whip antenna without switch is used from 18 to 340 MHz. The whip antenna with BNC connector is used from 340 to 2000 MHz. It should be noted that the loaded coil antenna with switch is a compromise between portability and full 1/4 or 1/2 wave length antennas. The power line antenna should be polarized for maximum signal.

### 2.2 Operation of A-2 Receiver

(To operate the receiver follow the steps listed below and refer to Fig. 2.)

- 1) Assemble the tuner with appropriate antenna, battery pack, or power supply - whichever units are to be used. Assembly instructions are given in paragraph 2.1.
- 2) Place OFF-ON-MAN switch in ON position. (If AC supply is being used place both power supply switch and ON-OFF-MAN switch in ON position.) See Step 18.
- 3) Place LO-HI-TEST switch in TEST position. Meter should indicate between 7.5 and 9.0. This procedure tests the condition of batteries or AC supply output. If the meter does not indicate the correct voltage, batteries should be replaced.
- 4) Place HI-LO-TEST switch in LO position. Do not leave on TEST.

- 1) A-2 Basic Receiver (containing internal batteries)
- 2) LFB-1 Adapter for using the low frequency TLF tuners with the A-2 basic unit.
- 3) TLF-1 Tuner covering 2 KHz to 9 KHz
- 4) TLF-2 Tuner covering 9 KHz to 43 KHz
- 5) TLF-3 Tuner covering 43 KHz to 130 KHz
- 6) TLF-4 Tuner covering 130 KHz to 475 KHz
- 7) TLF-5 Tuner covering 475 KHz to 1470 KHz
- 8) TLF-6 Tuner covering 1470 KHz to 4500 KHz
- 9) T-18 Tuner covering 4.5 MHz to 18 MHz
- 10) T-75 Tuner covering 18 MHz to 75 MHz
- 11) T-340 Tuner covering 75 MHz to 340 MHz
- 12) T-650 Tuner covering 340 MHz to 650 MHz
- 13) T-1200 Tuner covering 650 MHz to 1200 MHz
- 14) T-2000 Tuner covering 1200 MHz to 2000 MHz
- 15) BP-3 External Battery Pack (plugs into A-2)  
Provides 120 hours additional running time without S-1 Monitor, or 60 hours additional including the S-1 Monitor.
- 16) PS-2 AC Power Supply 95 to 250 volts 50/60 cycles input,  
-18 volts output regulated (required for AC operation only).  
(Plugs into A-2)
- 17) AC-1 Accessories:  

Headset, 3 whip antennas, carrying case with molded foam plastic insert, manual, screwdriver, powerline antenna, long wire antenna, BNC adapter.
- 18) S-1 Visual Monitor (provides scanned signal display)

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NOTE: The A2B differs from the A2 only in certain mechanical changes such as the connectors on the tuning units and the use of different types of transistors in some circuits. All operating and technical specifications are identical.

Due to the use of different connectors, the modules of the A2B are NOT interchangeable with those supplied with previous A2's. The change was made effective with serial number 621.

RADIO RECEIVER WITH SPECTRUM DISPLAY  
MODEL A-2B

F. G. MASON ENGINEERING, INC.  
FAIRFIELD, CONNECTICUT, U.S.A.

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