TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL

RADIO TRANSMITTER
(T-1373/TRQ-35(V))
MODEL TCS-4B
(NSN 5820-01-005-4248)

HEADQUARTERS, DEPARTMENT OF THE ARMY
15 JANUARY 1986

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

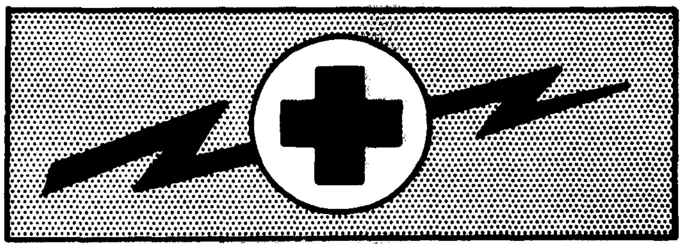
2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING



HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections or 115 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through the body.

Warning: Do not be misled by the term “low voltage.” Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Unless specifically directed by this manual, do not replace components or make adjustments inside the equipment with any power supply turned on. Under certain conditions, dangerous potentials may exist in the power supplies when the power control is in the off position. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION - FIRST AID

Each person engaged in electrical operations will be trained in first aid, partitularly in the technique of mouth to mouth resuscitation and closed chest heart massage. (FM 21-11).

The following warnings appear in this volume, and are repeated here for emphasis.

WARNING

A 3-wire (line, neutral, and safety qround) AC line power connection is required when operating the equipment. If a 3-wire safety grounded AC power receptacle is not available, a separate ground wire must be installed from the chassis ground to an earth ground. Without an adequate ground, the equipment chassis and frame will float to a dangerously high potential. (pages 2-2 and 3-2)

WARNING

In the performance of some maintenance procedures, it is necessary to have the equipment energized and dust covers removed. Extreme care must be exercised in making internal measurements or adjustments since potentially lethal voltages are present. (page 5-2)

WARNING

Use extreme care when making internal adjustments with power on. Potentially lethal voltages are present in the transmitter. (page 5-5)

WARNING

GASES GENERATED BY CHARGING BATTERIES

Extreme caution must be taken when making connections for the purpose of testing, charging, or repairing batteries that are charging or have been recently removed from charging. Such batteries probably will be gassing and the slightest spark, caused by a short circuit, can cause the battery to explode. Personnel working with these batteries are urged to wear a pair of tight fitting goggles ,or better still, the newer types of plastic mask which covers the entire face.

Open frames, cigarettes, radio transmitters, generating sets, open-cage electric motors, or any other type of equipment that may cause sparks, must be kept clear of the charging line.

WARNING

Lifting heavy equipment incorrectly can cause serious injury. Do not try to lift more than 35 pounds by yourself. Get a helper. Bend legs while lifting. Don't support heavy weight with your back.

FOREWORD

Different versions of the TCS-4B have been manufactured, are currently in use, and are described in this technical manual. Functionally and operationally, all versions are the same. The differences between versions are in parts selection, changes to circuit card assemblies, and the attendant changes to higher assembly part numbers. In most cases, two-way interchangeability is possible at the major component (unit) and module assembly level (paragraph 14).

Units and assemblies of the TCS-4B are differentiated either by serial number or part number. Early units and assemblies are serial numbered 400100 and before; later units and assemblies are serial numbered 400101 and on. In some later units, different part numbered assemblies are used.

Text paragraphs and figures are annotated to denote applicability to particular serial or part numbered units and assemblies. The same notation is reflected in the table of contents and list of illustrations. Absence of a restrictive notation means the text /illustration applies to all versions of the TCS-4B.

Technical Manual

No. 11-5820-918-13

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 January 1986

OPERATOR'S, ORGANIZATIONAL, AND DIRECT SUPPORT MAINTENANCE MANUAL

RADIO TRANSMITTER
MODEL TCS-4B
T-1373/TRQ-35(v)
(NSN 5820-01-005-4248)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN : AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007.

In either case, a reply will be furnished direct to you.

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SECTION 0

GENERAL

0-1. SCOPE. This manual covers Radio Transmitter T-1373/TRQ-35(V). The manual provides instructions for installation, operation, and maintenance for operator, organizational, and direct support repair personnel.

0-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS. Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

0-3. MAINTENANCE FORMS, RECORDS, AND REPORTS.

a. Report of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/ NAVMATINST 4355.73A/AFR 400-54/MCO 4430. 3F.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/ NAVSUPINST 4610.33C/AFR 75-18/MCO P461O. 19D/DLAR 4500.15.

0-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR). If your Radio Transmitter T-1373/TRQ-35(V) needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don’t like about your equipment. Let us know why you don’t like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007. We’ll send you a reply.

0-5. ADMINISTRATIVE STORAGE. Administrative Storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraph 2-22.

0-6. DESTRUCTION OF ARMY ELECTRONICS MATERIEL. Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This manual provides operating and service instructions for the TCS-4B transmitter. The information is presented in seven sections. Section 1 provides a brief description of the equipment and operating specifications. Unpacking instructions, site requirements, cabling data and installation instructions are included in Section 2. Section 3 provides information on operator controls and indicators and describes operating procedures. In Section 4 are functional descriptions of transmitter circuits. Section 5 describes preventive and corrective maintenance procedures for the transmitter and gives a performance verification checkout. Section 6 contains the wire lists for reference during maintenance. All oversize drawings, such as schematics, are grouped in the back of this manual as a foldout (FO) section.

1-3. GENERAL DESCRIPTION

1-4. The TCS-4B transmitter (figure 1-1) is one part of an HF Radio Sounder Set used for frequency management of HF circuits. It is used at one end of an HF radio circuit and transmits a CW signal which is swept in an upward linear ramp between 2-16 or 2-30 MHz in 4 minutes and 40 seconds. The RCS-4B radio receiver is a companion unit to the TCS-4B transmitter and is located at the other end of the circuit. When properly synchronized with a TCS-4B , the RCS-4B receives all radio energy emitted by the transmitter that ionospheric propagation permits. One RCS-4B can be synchronized with up to three TCS-4B transmitters.

1-5. A third part of the set is the Model RSS-4 Spectrum Monitor. The RSS-4 permits a frequency manager to know the occupancy of all 6 kHz channels in the 2-30 MHz band for the last 30 minutes. Thus, the TCS-4B/RCS-4B sounder system tells the frequency manager what band of frequencies will propagate over a given path, and the RSS-4 indicates which channels within the propagating band are free from interference.

1-6. The TCS-4B has up to 100 watts RF output power for transmission directly by a broadband antenna (required but not supplied). The TCS-4B signal can also be diplexed onto the same antenna employed for the user’s communication transmitter (up to 2.5 kW PEP) using the diplexer assembly that is part of the TCS-4B . In the diplexed mode, only 2 percent of the TCS-4B power (2 watts) is coupled onto the user’s antenna; the remaining power (along with about 2 percent of the communications transmitter power) goes to an internal dummy load. If the communications transmitter is used on the same circuit being sounded by the TCS-4B, then the propagation data obtained in the sounding accounts for all radiation characteristics of the user’s antenna.

1-7. The TCS-4B transmitter may be programmed to blank transmissions in up to sixteen bands, up to 60 kHz wide. The center blanking frequency of each band is programmed via front panel thumbwheel switches. Frequency blanking is usually not an important consideration when operating in a diplexed configuration because of the low radiated power. However, it is a useful feature to reduce potential interference effects on communications receivers co-located with the TCS-4B transmitter.

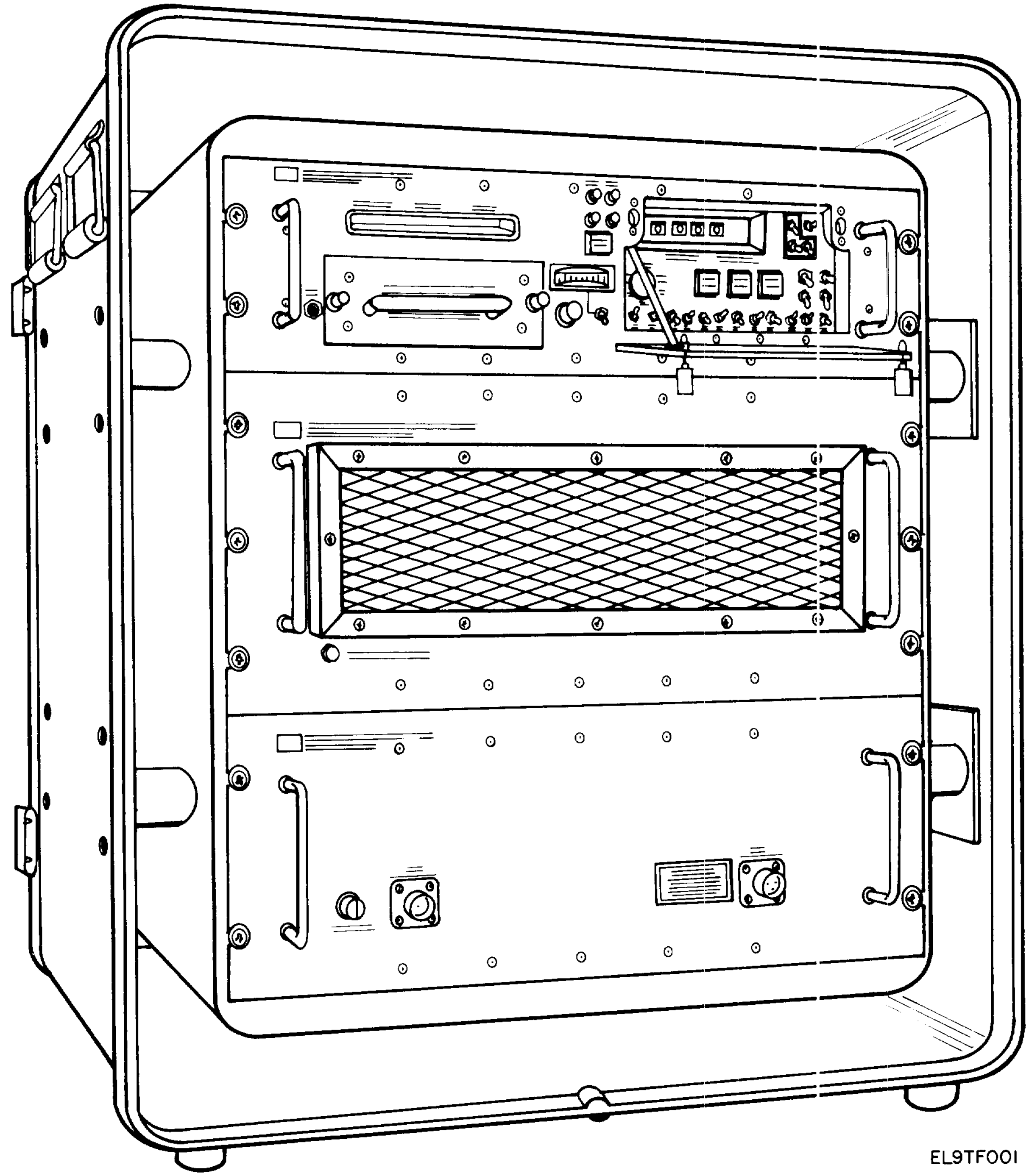


FIGURE 1-1. TCS - 4B Transmitter.

1-8. The transmitter consists of three modular units mounted in an environmentally protective case. The units are the 1024 transmit sweep generator (unit 1), the 5018 power amplifier (unit 2), and the 4011 filter/diplexer (unit 3).

1-9. **1024 TRANSMIT SWEEP GENERATOR.** This unit controls and generates the TCS-4B sweep-frequency signal. The sweep signal originates from a precision quartz oscillator frequency standard. From this source, a linearly upward frequency ramp is developed by means of decade counters which program a frequency synthesizer. The synthesizer uses a phase-locked loop technique to control a variable-frequency oscillator whose output is locked to the internal frequency standard. Since both transmitter and receiver use identical sweep generator circuits based on identical frequency standards, only synchronization of sweep start times is required to ensure reception of the sweeping signal. The necessary synchronization is performed at the beginning of operations and is fully explained in the receiver manual TM 11-5820-917-13. Once synchronization is accomplished, the transmitter and receiver clocks are essentially linked in time. To safeguard this link, a standby battery power supply is included in the transmit sweep generator unit. The standby battery supply is automatically switched on in the event of primary AC line failure and provides power for the frequency standard, timing circuit, and frequency blanker memory. A new battery supply will sustain timing and memory functions for approximately 24 hours. A front panel pushbutton switch initiates a test of the sweep generator, checking power supply voltages, proper synthesizer lock, and suitable battery voltage.

1-10. **5018 POWER AMPLIFIER.** The power amplifier receives approximately 1 mW (0 dBm) of signal power from the transmit sweep generator and linearly amplifies it to approximately 100 watts. The power amplifier uses four parallel transistor amplifiers whose outputs are combined to produce a near constant output (±3.0 dB max) over the entire operational frequency band (2-30 MHz). A 32 MHz low pass filter is incorporated into the power amplifier which effectively blocks all frequencies above 32 MHz. Other filtering circuits are included in the filter diplexer unit.

1-11. **4011 FILTER/DIPLEXER.** This unit contains the circuits necessary to perform sequential, half-octave, low-pass filtering of the TCS-4B signal as it progresses through the frequency sweep. The low-pass filtering attenuates harmonics 60 dB below the fundamental signal. In addition, the unit incorporates a 2.5 kW PEP (standard rating) diplexer, which, when selected, combines approximately 2 watts of TCS-4B RF output with the communications transmitter output. The balance of the TCS-4B power (98W) is absorbed in a 50 ohm dummy load mounted on the rear panel of the 4011. Filtering of the sweep frequency is achieved by detection of the frequency as the sweep progresses followed by sequential activation of each of eight half-octave filters (2-2.8 MHz, 2.8-4.0 MHZ, etc.). The 4011 unit also contains circuits for measuring the forward or reflected sweep frequency output power of the TCS-4B. The measured power is displayed on a meter on the 1024 front panel.

1-12. EQUIPMENT SUPPLIED

1-13. As supplied, the TCS-4B transmitter includes the following items:

a. Transmit Sweep Generator, Unit 1	P/N 1024-1000 or P/N 1024-1100
b. Power Amplifier, Unit 2	P/N 5018-1000
c. Filter/Diplexer, Unit 3	P/N 4011-1000 or 4011-1120

d. Environmental Shipping Container	P/N 6000-3110-2
e. Interconnecting Cables and Power Cable	Refer to table 2-1.

1-14. Different part numbered units (Units 1 and 3) may be included in a TCS-4B. As a complete unit, they are fully two-way interchangeable. With one exception, module assemblies within units are also two-way interchangeable. The different part numbered modules used in the units and their interchangeability are as follows:

UNIT 1	1024-1000		1024-1100
1. Sweep Synthesizer Assy	5030-1001	Interchangeable with	5030-1101
2. Standby Battery Supply Assy	6025-1008	NOT Interchangeable with	6025-1018
UNIT 3	4011-1000		4011-1120
3. Filter Set	4011-1004	Interchangeable with	4011-1104

1-15. EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-16. Proper operation of the TCS-4B transmitter requires use of a broadband HF antenna which is not supplied. No damage to the TCS-4B will result if a narrowband antenna is employed. However, the received signal power vs. frequency at the RCS-4B receiver may be so limited by the transmitter antenna radiation loss that an accurate picture of ionospheric propagation conditions may not be possible. All cables to connect the TCS-4B to the antenna must also be supplied. The TCS-4B employs a type HN connector for RF output. All connectors and adapters from the HN output to the user's antenna cable must be supplied. Test equipment for servicing and fault isolation of the TCS-4B are not supplied. Recommended items are listed in Section 5.

1-17. SPECIFICATIONS

1-18. Table 1-1 lists the technical specifications and tested performance characteristics of the TCS-4B transmitter.

1-19. RELATED PUBLICATIONS

1-20. Information in the following publications is relevant to operation and service of the transmitter.

Title	Number
Illustrated Parts Breakdown, TCS-4B Transmitter	TM 11-5820-918-23P
Operation and Maintenance Instructions RCS-4B Receiver	TM 11-5820-917-13

Table 1-1. TCS-4B Specifications and Characteristics

SPECIFICATIONS	
Frequency Range (Sweep Limits)	2-16 MHz and 2-30 MHz, selectable by front panel switch.
Output Waveform	Linear FM- Cw
Sweep Rates	50 kHz/sec in 2-16 MHz range. 100 kHz/sec in 2-30 MHz range. Selected automatically by frequency range switch.
Transmitting Times	Automatic sweep start at any of 12 times, spaced 5 minutes apart each hour; each time selectable as transmit or no transmit. Sweep to be manually initiated, terminated, or reset at any time.
Output Power	0.2 W and 2.0 W from diplexer, ±3 dB, selectable by front panel switch; 10 W or 100 W non-diplexed output, ±3 dB, selectable by front panel switch.
Diplexer Power Rating	2.5 kW PEP from communications transmitter, to a 50 ohm antenna with less than 2:1 VSWR
Diplexer Insertion loss	Less than 0.5 dB in 50 ohm line
Change in Long-Term Timing and Frequency	Less than 5 x 10^{-9}/24 hours After a 12 hour warmup.
Standby Power	24 hours, minimum, to maintain timing synchronization in a 23°C ambient temperature
Noise and Spurious (non-harmonic)	In conformance with MIL-STD-461A, paragraph 6.3.3 for diplexed output. Greater than 55 dB down from fundamental.
Harmonics	Greater than 60 dB down from fundamental
Sweep Linearity	Sufficient to obtain 100 microsecond or better time-delay resolution with -30 dB sidelobe level.
Primary Power	115/230 VAC ±10%; 47-440 Hz; 1500 watts
Temperature	0 to 50°C operating; -40 to 71°C non-operational and storage

Table 1-1. TCS-4B Specifications and Characteristics - Continued

Relative Humidity (non-condensing)	Up to 85% operating; up to 96% non-operating and storage
Physical Dimensions	See figure 2-2 for dimensions

SECTION 2

INSTALLATION

2-1. INTRODUCTION

2-2. This section contains instructions for installing the transmitter and for making all necessary cable interconnections before putting the system into use. Details on storage and reshipment are also included.

2-3. UNPACKING AND INSPECTION

2-4. The transmitter is shipped from the factory in a fully assembled condition within its environmentally protective case. For shipment, it is enclosed in a moisture resistant barrier material with dessicant and humidity indicator and packed in a wooden box. The gross weight of the transmitter in its shipping container is less than 425 lbs. When removed from the shipping container, the transmitter can be transported by forklift to its operating site. The shipping containers should be inspected for external damage, and if damage is evident, the carrier should be notified.

NOTE

The transmitter case is marked to indicate position for the fork lifts.

2-5. To unpack the TCS-4B, remove the top of the shipping container. Care should be exercised in removing nails and wood panels since the container is reusable. Roll the shipping container over so the top is on the bottom. Lift the container straight up off the TCS-4B. The transmitter (now upside down) should be rolled upright. Check all items against the packing list. The shipping container and associated packing material should be retained for possible use in reshipment or storage of the transmitter.

2-6. INSTALLATION REQUIREMENTS

2-7. GENERAL. The transmitter operates satisfactorily within temperature limits of O to 50°C and up to 85% relative humidity. For long term operational stability, the equipment should not be exposed to excessive shocks (exceeding 15 g’s), high dust levels, or extreme fluctuations in temperature. The 1024 and 5018 units of the transmitter have internally mounted cooling fans. The fan on the 1024 unit exhausts through a vent on the left side, and the fan on the 5018 unit exhausts through a grill on the rear panel. Adequate clearance must be allowed for the free flow of air to both units.

2-8. RACK MOUNTING. All units have front panels designed for standard 19-inch rack mounting. If rack mounted, the units should be adequately supported by either rack slides or weight supporting brackets mounted between the rack and the rear of the units. Refer to figure 2-1 for suggested mounting details.

2-9. BENCH MOUNTING. For bench mounting, the units may be mounted one above the other, or side by side, within the limits of the cable lengths supplied. When mounted one above the other, the three units require a suitable packing shim (approximately 1/2 inch thick) to maintain proper alignment of the front panels.

2-10. ENVIRONMENTAL CASE ENCLOSURE. The TCS-4B is supplied in an environmental case. This configuration is particularly suitable for shock or vibration prone environments. The container comes complete with four carrying handles for convenient local transportation. In addition, front and rear doors remove easily for access to equipment. The external dimensions and weight of the unit are shown in figure 2-2. Front and rear covers of environmental case must be removed to provide adequate ventilation when operating the TCS-4B.

2-11. POWER CONNECTION

2-12. LINE VOLTAGE. The TCS-4B transmitter may be operated from either 115 or 230 volt (±10%), 47 to 440 Hz power lines. A toggle switch mounted near the power supply, (refer to figure 2-4) of each of the three units comprising the transmitter permits easy conversion from either voltage. Access to the switch is obtained by removing each unit from the case and removing the top cover of the unit. In the 5018, the top subchassis plate (see fig. 2-3) must also be removed. The switch will be visible from the top and switch positions are marked 115 and 230. Figure 2-4 shows the switch location on the power amplifier unit and is typical for the other units.

WARNING

A three-wire (line, neutral, and safety ground) AC line power connection is required when operating the equipment. If a 3-wire safety grounded AC power receptacle is not available, a separate ground wire must be installed from the chassis ground to an earth ground. Without an adequate ground, the equipment chassis and frame will float to a dangerously high potential.

NOTE

Before connecting AC power to unit, be sure the correct fuse is installed as follows:

Unit	115V	230V	Type
1024	1 A	1/2 A	Normal Blow
5018	15 A	8 A	Slow Blow
4011	1 A	1/2 A	Normal Blow

Make sure toggle switch for each unit is in the correct position.

Table 2-1. Transmitter Interconnect Cables

Cable designation	BR cable part number	From	To	Remarks
W1	8120-4000-72	lJ2	3J3	Control of 4011 direct/diplex relay and 4011 RF power sensor output to 1024
W2	8120-5000-72	3J5	lJ1	1024 AC Power in from 4011
W3	8120-5001-48	3J4	2J4	5018 AC Power in from 4011
W4	8120-0201-120	AC Power	3J6	AC Line Power In
W5	8120-2002-48	2J3	3J2	5018 RF (100W) Output to 4011
W6	8120-2004-48	2J2	3J1	5018 RF (10W) Output to 4011
W7	8120-2004-48	lJ3	2J1	1024 RF Output to 5018 RF Input

Connection from the user's communications transmitter to the 4011 front panel is into J8 (Figure 2-5, bottom). TCS-4B output is from J7 to the antenna. J7 and J8 are type HN coaxial connectors. The mating cable should use an HN plug, such as UG-59 or equivalent.

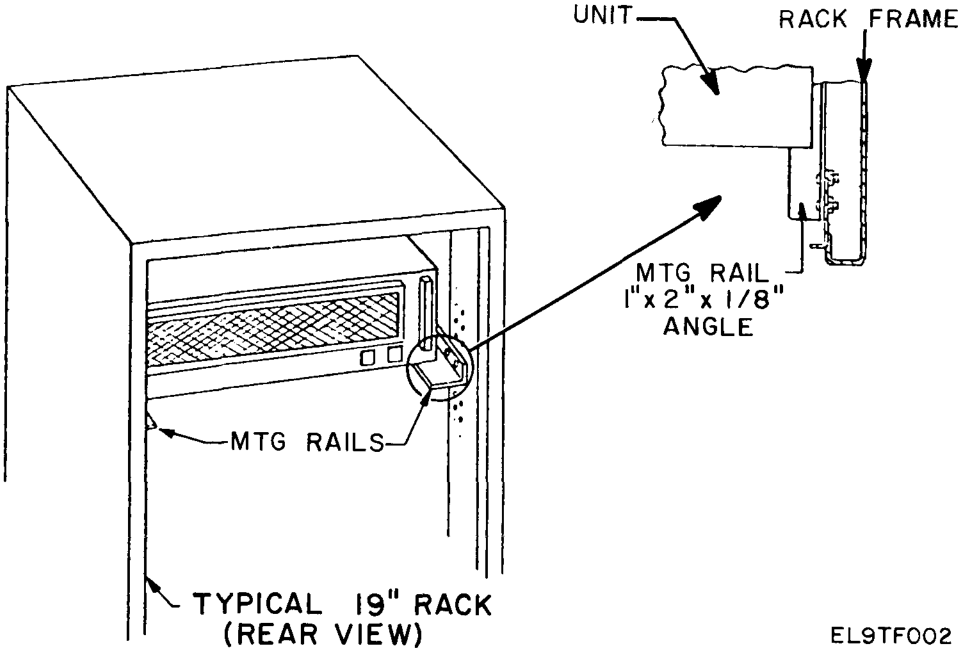
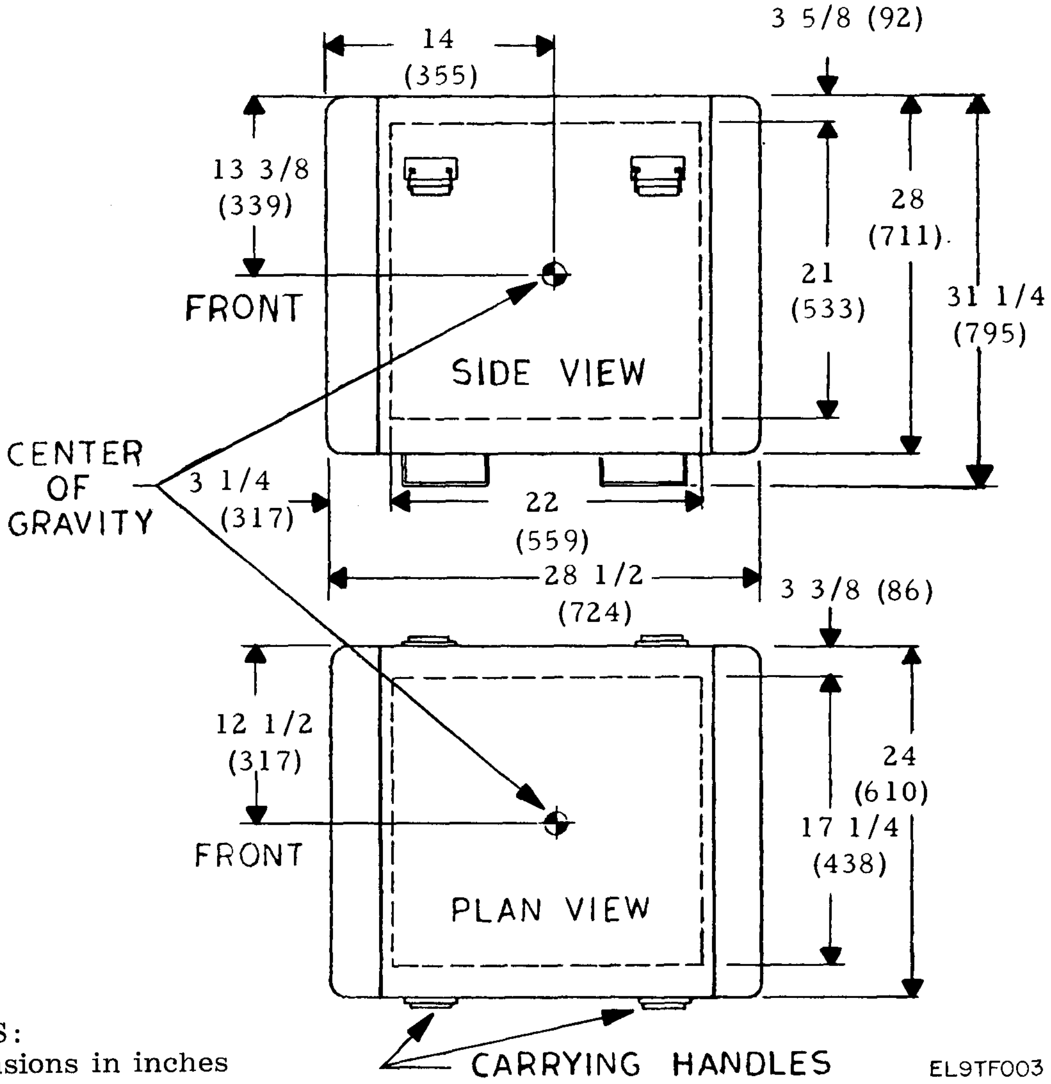


FIGURE 2-1. Rack Mounting for Transmitter Units.



DIMENSIONS:
All dimensions in inches
and (millimeters)

SHIPPING DIMENSIONS (with environmental case):

Width: 24.0 inches (610 mm)

Depth: 28.5 inches (724 mm)

Height: 31.2 inches (795 mm)

VOLUME: 12.37 cu. feet (0.35 cu. meter)

SHIPPING VOLUME: 26.45 cu. feet (0.75 cu. meter)

WEIGHT : 305 lbs (138.3 kg)

SHIPPING WEIGHT: 424 lbs (192.3 kg)

FIGURE 2-2. Transmitter Dimensions.

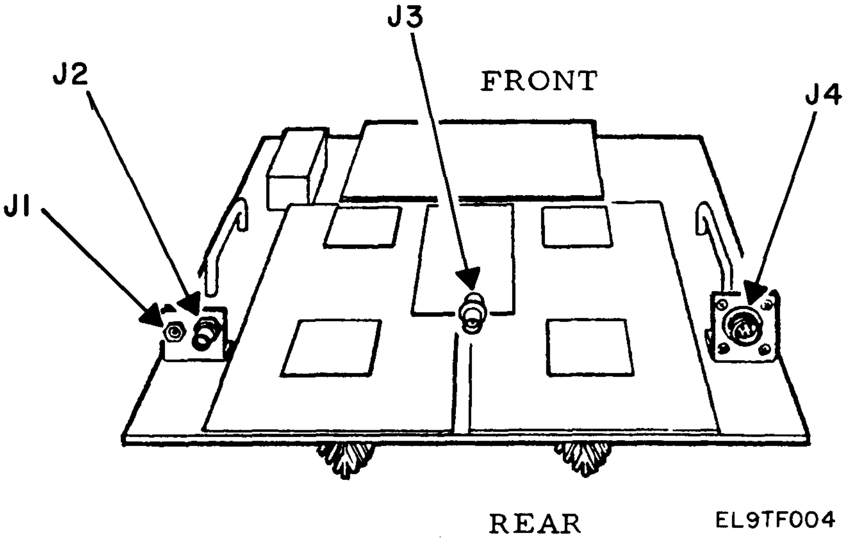


FIGURE 2-3. Upper 5018 Chassis Plate Showing Internal Cable Connectors (2A1) .

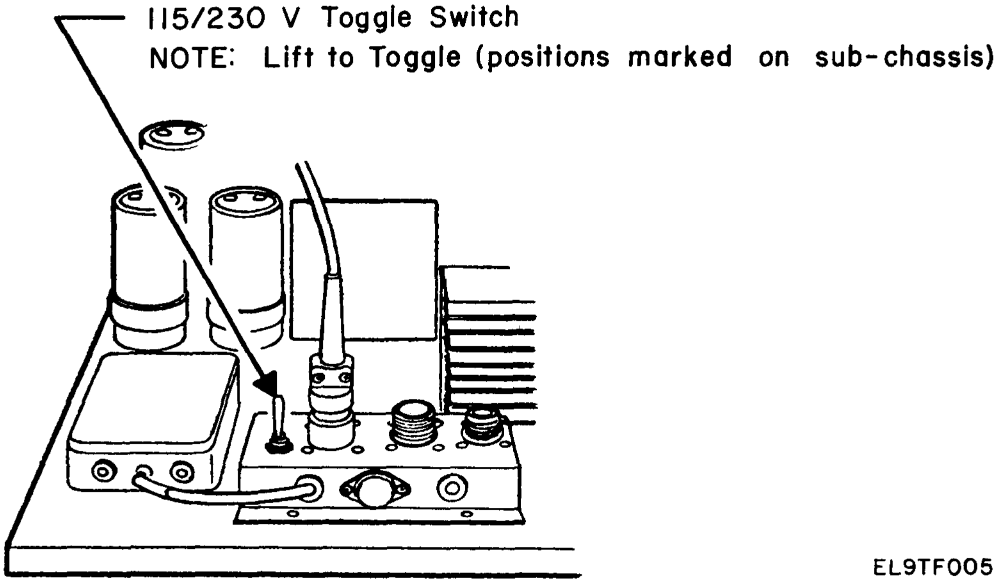


FIGURE 2-4. Power Supply (2A2) Line Voltage Switch,

2-13. POWER CABLE. The transmitter is provided with a detachable line cord (8 feet long) having a standard 15 ampere plug NEMA 5-15P (2 blades with round grounding pin) at the supply end. Exposed portions of the equipments are grounded through the round pin of the plug for safety. A non-grounded two blade receptacle should not be used without use of a grounding-type connector adapter.

2-14. CABLES AND CONNECTORS

2-15. A list of cables used with the transmitter is given in table 2-1. Connectors used are given in table 2-2. In addition, cable connections are illustrated in figure 2-5.

2-16. BATTERY INSTALLATION

2-17. Two different types of standby battery supplies are used in the TCS-4B. Some transmitters have a non-rechargeable battery supply (P/N 6025-1008) that uses standard D-cell batteries. Other transmitters have a rechargeable supply (P/N 6025-1018) that includes an integral charging circuit and uses sealed lead acid cells. Refer to either paragraph 2-18 or 2-19 as applicable.

2-18. NON-RECHARGEABLE BATTERY SUPPLY (P/N 6025-1008). The standard D-cell batteries may or may not be installed in the transmitter on arrival, depending on shipping destination and enroute climate, etc. With new batteries installed, the standby supply provides operating power for up to 24 hours (at 23°C). To install batteries, proceed as follows:

a. Loosen two captive thumbscrews at front of battery drawer on 1024 front panel.

b. Pull out battery drawer entirely.

c. Remove two screws at top of rear of container and slide battery cover out from rear.

d. If existing batteries are being replaced, pry center front contact spring back and remove center tube. Repeat for other two tubes.

e. Replace all batteries in + to - sequence and re-insert each tube according to polarity markings on base of container.

2-19. RECHARGEABLE BATTERY SUPPLY (P/N 6025-1018). The rechargeable battery supply is installed for shipment in a drawer located in the front panel of the 1024 unit. Since the battery supply may have discharged during shipment, battery power should not be relied on for the first 12 hours of operation. An internal charging circuit maintains a continuous charge on the battery supply when AC line power to the 1024 is on. After a 12 hour charge (with the 1024 turned on), the battery pack provides standby power for up to 24 hours (at 23°C). Refer to paragraph 3-15 and 3-16 for additional information.

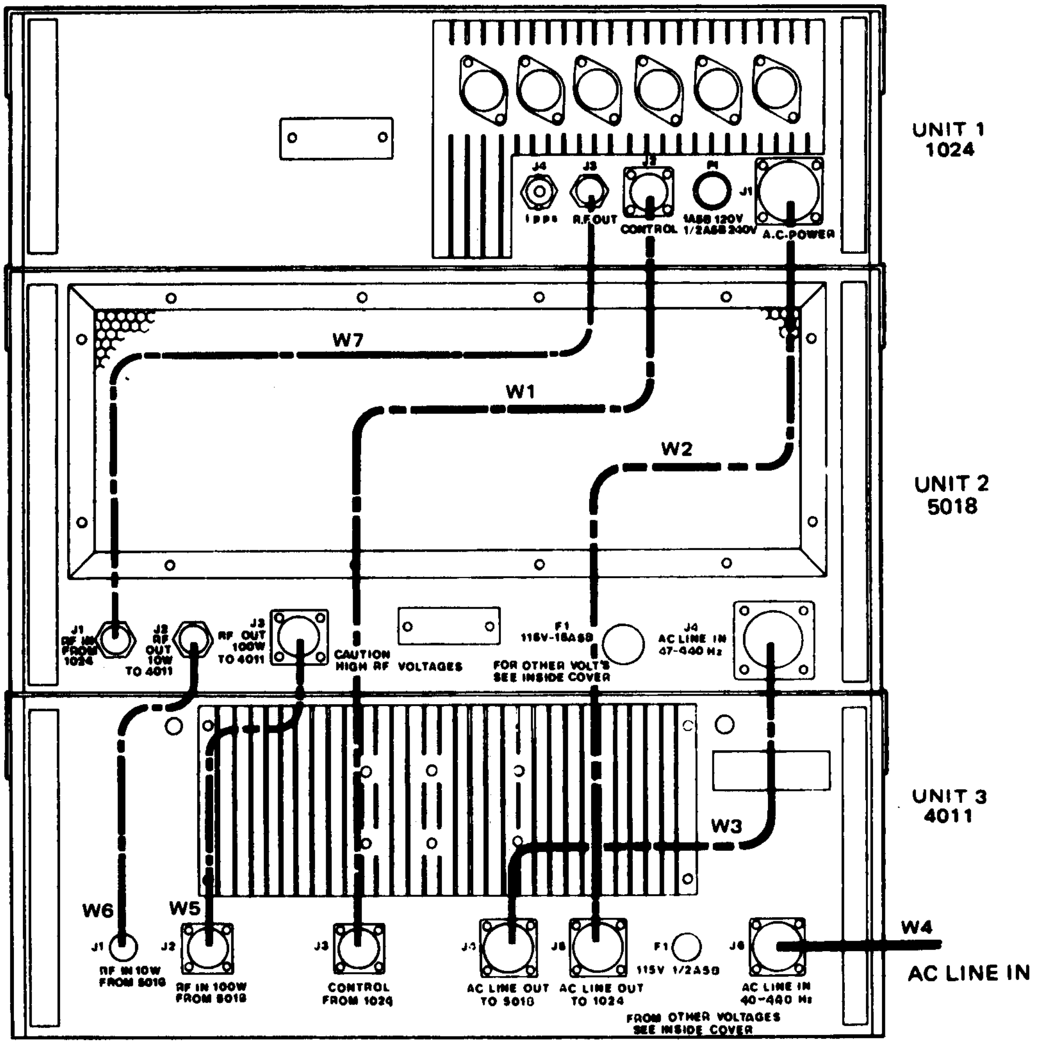
2-20. POST-INSTALLATION CHECKOUT

2-21. The electrical performance of the transmitter should be verified before being put into normal operation. The performance test described in Section 5 is performed as the post-installation checkout prior to operation.

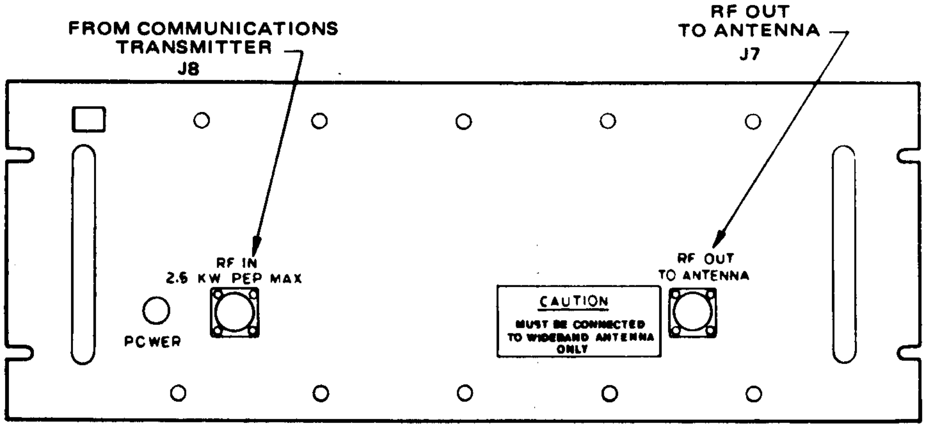
2-22. STORAGE AND RESHIPMENT

2-23. STORAGE. The maximum recommended storage environment should not exceed -40 to 71°C temperature or 96% humidity. For long term storage, repackaging of the equipment and sealing of the cables into moisture proof bags are recommended. For storage exceeding two days, the shutdown procedures of paragraph 3-15 or 3-16 should be followed.

2-24. RESHIPMENT. The environmental container offers sufficient protection for reshipment of the TCS-4B . The container has bottom rails to facilitate handling with a forklift. The front and rear covers should be in place when moving the unit and extreme care should be taken to avoid damage to the instrument.



REAR VIEW



FRONT - 4011 ONLY

FIGURE 2-5. Transmitter Cable Connections.

Table 2-2. Transmitter Connectors

Conn	Part no.	Name	Description
lJ1	MS3102A-16-10P	A.C. Power	3 Pin Power Receptacle
1J2	348-40E10-12S1	Control	12 Pin Receptacle
1J3	28JS 145-2	R.F. Out	Coaxial Connector, BNC, Jack, Female
1J4	28JS 145-2	1 PPS	Coaxial Connector, BNC, Jack, Female
2J1	28JS 145-2	R.F. In	Coaxial Connector, BNC, Jack, Female
2J2	28JS 145-2	R.F. Out 10W	Coaxial Connector, BNC, Jack Female
2J3	36000	R.F. Out 100 W	Coaxial Connector, 'N' Type
2J4	MS102A-16-1OP	A.C. Line In	3 Pin Power Receptacle
3J1 (F)	UG-61A/U	R.F. Out to Antenna	Coaxial Connector, 'HN' Type
3J2 (F)	UG-61A/U	R.F. In 2.5 kW	Coaxial Connector, 'HN' Type
3J1 (R)	28JS 145-2	R.F. In 10W	Coaxial Connector, BNC, Jack, Female
3J2 (R)	36000	R.F. In 100W	Coaxial Connector, ‘N' Type
3J3 (R)	348-40E10-12S1	Centrol	12 Pin Receptacle
3J4 (R)	MS3102A-16-10S	A. C. Line Out to 5018	3 Pin Power Receptacle
3J5 (R)	MS3102A-16-10S	A. C. Line Out to 1024	3 Pin Power Receptacle
3J6 (R)	MS3102A-16-10P	A.C. Line In	3 Pin Power Receptacle

NOTE : F = Front Panel, R = Rear Panel

SECTION 3

OPERATION

3-1. INTRODUCTION

3-2. This section provides the basic information required to operate the TCS-4B transmitter. The operating controls and indicators are illustrated, and the function of each control and indicator is described.

3-3. CONTROLS AND INDICATORS

3-4. The controls and indicators required to operate the transmitter are located on the front panel of the transmit sweep generator unit. Individual power on-off switches for control of primary power are located on the front panels of the 1024 and 4011. Operator controls consist of pushbutton switch-indicators and toggle, thumbwheel, or rotary switches. Controls and indicators are illustrated in figure 3-1. and functionally described in table 3-1.

3-5. OPERATING INSTRUCTIONS

3-6. GENERAL. The TCS-4B transmitter is normally operated in a fully automatic mode once the transmitter is initially set up and synchronized with an associated, remotely located TCS-4B receiver. Four modes of operation are available: continuous, manual, set, and programmer. Each mode has a particular purpose and provides different functions. A mode of operation can be selected or the mode changed while the transmitter is operating (frequency being swept) without affecting the frequency sweep or system time.

a. Continuous Mode. The continuous mode of operation is intended for use during service test of the transmitter. With the MODE switch in CONT position, the transmitter provides an output that is swept and recycled between the low of 2 MHz and the preset high of either 16 or 30 MHz. The path programmer MINUTES switch and the RESET, START, and STOP switches have no effect on transmitter operations in this mode. If the sweep is stopped, placing the MODE switch in CONT position starts the sweep.

b. Manual Mode. In manual mode, the frequency sweep is controlled by the START, STOP, and RESET switches. This mode is used to reset the frequency sweep at start up and to exercise manual control of transmitter frequency for maintenance purposes. When started, the frequency sweep will advance from 2.00 MHz to the preset high limit and reset to 2.00 MHz. If, during a frequency sweep, the STOP switch is activated, the sweep stops and the transmitter radiates at the fixed freuqency. System time is not affected by actuation of START, STOP, or RESET switches in manual mode; only the frequency sweep is controlled. The RF output of the transmitter is always on in MANUAL mode.

c. Set Mode. In set mode, the transmitter clock can be started, advanced, or reset to zero. Although the STOP switch is illuminated with the MODE switch in SET position, the stop function is not enabled. The path programmer MINUTES switches are active in the SET mode, and the frequency sweep will start automatically at each 5-minute interval that is enabled in the same way as described below for the programmer mode. The SET mode can be used for normal, automatic operation; however, since the START, RESET, and ADV TIMER switches are active in this mode, it is a better practice to operate in the programmer mode to prevent accidental reset of the system clock .

d. Programmer Mode. The programmer mode is typically used for normal, automatic operation after the transmitter and associated receiver are synchronized. In this mode, a sweep may be initiated at each 5-minute interval of the hour depending on the position selected for the programmer MINUTES switches. The START, STOP, RESET, and ADV TIMER switches are disabled in this mode. A transmitter frequency sweep is initiated for a particular 5-minute period if the corresponding programmer MINUTES switch is in Up (on) position. The sweep is inhibited for the 5-minute period when the MINUTES switch is in down (off) position. At the end of each clock hour (end of the 55th minute sweep interval), the cycle automatically repeats.

3-7. INITIAL CONTROL SETTINGS AND START-UP PROCEDURES. In preparation for normal operation of the transmitter, the following control settings are made and start-up procedures performed. Most of the operating controls are located behind the front panel door on the right side of the sweep generator unit. Perform the following procedures:

WARNING

Make sure that the TCS-4B frame is grounded by the three-wire, three-prong power cord or a separate ground strap before operating. If not grounded the TCS-4B frame and exterior panel could be at a potentially dangerous voltage level.

a. Make sure that the BAT switch is in OFF position. The only time that the BAT switch should be ON is when the transmitter is on and synchronized with the receiver, or to test for battery voltage.

b. Set DIRECT/DIPLEX switch to either position depending on the antenna coupling to be used: DIPLEX if the antenna is being shared with a communications transmitter, DIRECT if the antenna is dedicated to the TCS-4B transmitter. The DIRECT/DIPLEX switch is a locking-type toggle switch. The toggle lever must be pulled out to change position of the switch.

c. Connect antenna cable to 4011 front panel connector (RF Out to Antenna).

CAUTION

Ensure that correct connections to a communications transmitter from the 4011 front panel (RF IN) and from the 4011 front panel to the antenna (RF OUT) are made. Incorrect connections can cause severe damage to the TCS-4B.

d. Set the .1 PWR/FULL PWR switch to the desired power level. When in DIRECT operation, transmitter output power is nominally 10 watts with the switch in .1 PWR position; the output is nominally 100 watts with the switch in the FULL PWR position. In the DIPLEX operation the output power is nominally 0.2 watts in the .1 PWR position or 2.0 watts with the switch in the FULL PWR position. Normally for start up operation, the transmitter is operated in DIRECT, FULL PWR until synchronization is obtained with the receiver. The higher output power in this configuration makes the synchronizatoin procedure easier for the RCS-4B operator. Once proper synchronization is achieved, the transmitter power level and diplexer configuration may be changed to meet operational requirements.

e. Set UPPER FREQ switch to either 16 or 30 to agree with receiver.

f. Press front panel POWER pushbutton switches of 1024 and 4011 ON.

g. Turn off (down position) all PROGRAMMER MINUTES switches on 1024.

h. Place MODE switch in MAN position; then press RESET switch to set frequency sweep at the lower limit of 02.00 on the MHz frequency display.

i. Place MODE switch in SET position; then press RESET, then START, and RESET again to set system time at 00:00 on the MIN /SEC clock display.

j. If frequency blanker is not to be used, set BLKR PROG/RUN switch to PROG. If blanker is to be used, perform the following steps to set up the desired blanking frequencies in memory.

(1) Place BAT switch to ON position.

(2) Set BLKR PROG/RUN switch to PROG.

(3) Set the CHANNEL thumbwheel switch to 0 position. Sixteen storage channels "0" to "15" are available for establishing sixteen discrete blanking frequencies. If only a few blanking frequencies are to be used, any of the storage channels may be selected without regard to sequence.

(4) Set BLANKER FREQ thumbwheel switches to the desired center frequency. The set frequency represents the center of a 60 kHz band during which the transmitter output will be disabled.

NOTE

For transmitters prior to serial number 400100, the blanking band is 20 kHz wide (not 60 kHz).

(5) Prss BLKR STORE switch to enter the set BLANKER FREQ in memory.

(6) The stored frequency should be checked by pressing the BLKR DSPL (display) switch and observing the readout on the MHz frequency display.

(7) Advance CHANNEL thumbwheel switch to next available position.

(8) Repeat steps 4 through 7 to store up to 16 blanking frequencies. If fewer than 16 blanking frequencies are to be stored, program the unused channels to 00.00 MHz.

NOTE

In turning the transmitter power off and then on with the standby power supply off, the blanker frequency memory will store some random numbers. Therefore, it is always necessary to check all channels for the proper setting prior to operation following shutdown.

(9) Place BLKR PROG/RUN switch in RUN position.

k. Allow twenty-minute warm-up for the transmitter frequency standard to stablize.

l. The path programmer MINUTES switches should be set in coordination with the operator of the RCS-4B receiver. The RCS-4B may be operated with up to three different transmitters, but only one at a time. Thus, the MINUTES switches are provided to establish the times that a particular transmitter will be received. For example, transmitter 1 may be set to 00, 15, 30 and 45. Transmitter 2 set at 05, 20, 35 and 50 and transmitter 3 set at 10, 25, 40 and 55.

m. In coordination with the operator of the RCS-4B Receiver, synchronize the start of system time. The MODE switch should be in SET position and the START switch pressed at the desired second for sweep start. See the technical manual for the RCS-4B (T.O. 31R2-4-470-1) for further details on synchronization.

The ADV TIMER button can be used to set the transmitter quickly to real time (as determined from W WV or similar source). It may also be used to start the transmitter with a timing offset. This is done so that individual transmitters can be distinguished from each other. Follow these steps to begin a sweep with a timing offset:

(1) Determine how much time the start of the sweep is to be offset. For example, the offset is to be 2 minutes and 20 seconds.

(2) Establish the accurate real time by tuning to a time standard (WWV) or using digital watches to note the minutes and second.

(3) Carefully note when the watch or standard reaches 00 seconds of a minute. Note the minute (for example, 16 minutes past the hour).

(4) Count 20 seconds (for this example) on the watch. When it reaches 20 seconds press the START button. The timer display will now start on the 1024.

(5) Press the ADV TIMER button to set the minute counter on the display to the real time (from digital watch or WWV) minus two minutes (for this example). Thus, if it was 16 minutes passed the hour, the ADV TIMER button must be pressed to read 14 minutes on the display.

(6) The transmitter is now offset 2 minutes and 20 seconds after real time. This can be checked by comparing the display with WWV or the digital watch when the display reaches a minute mark.

o. Place BAT switch to ON position.

p. With the transmitter sweeping and the battery supply on, perform a transmitter self test by pressing TEST switch. Two functions are checked.

(1) In the system test, a go/no-go indication is provided for determining operation of the synthesizer and power supplies. If the SYST green indicator lamp lights, operation is correct. If the SYST red lamp lights, a malfunction is indicated. Refer to the maintenance procedures of Section 5 for instructions to correct fault.

(2) (Applicable to units with non-rechargeable battery supply, P/N 6025-1008 only). The condition of the standby battery supply is also checked when the TEST switch is actuated. If only the green BAT test lamp lights, the battery voltage is 23 volts or greater which is the acceptable condition. If both the green and red BAT lamps light, the condition of the battery is marginal but operational (voltage between 18 and 23 volts). If only the red BAT lamp lights, the battery voltage is 18 volts or lower, and the battery (18 alkaline D-cells) must be replaced.

(3) (Applicable to units with rechargeable battery supply, P/N 6025-1018 only). The condition of the battery supply and charging circuit is also checked when the TEST switch is activated. If only the green BAT lamp lights, the battery supply is satisfactory (not fully discharged) and the charging circuit is operating. If the red lamp or both red and green lamps light, the possible indications are: the BAT switch is OFF; the battery supply or charging circuit is malfunctioning; or the battery supply is fully discharged. To check the actual charge of the battery, refer to procedure in paragraph 5-26.

3-8. NORMAL OPERATION. During normal operation of the transmitter following performance of the start-up procedures, routine operator actions are performed in coordination with, and usually at the direction of the RCS-4B receiver operator. Typical operations are as follows:

a. With the sweep and clock started, place MODE switch in PROG position. The frequency sweep will advance from 2 MHz to the upper limit of either 16 or 30 MHz (as selected by the UPPER FREQ switch) in each five minute period of the hour. The individual five-minute periods are enabled or disabled by the path programmer MINUTES switches. If a particular MINUTES switch is down, disabling the transmitter sweep, the frequency display remains at 02.00 MHz and there is no transmitted signal for that 5-minute interval. The transmitter MIN/SEC clock continues to run.

b. A transmitter self-test can be performed at any time and has no effect on transmitter operation. Refer to step p, paragraph 3-7 above for description of self test procedure.

c. Proper forward and reflected power can be measured at any time. In DIPLEX with the FWD/REFL switch on the 1024 front panel in the FWD position, the needle should remain in the green zone; with the switch in the REFL position, the needle should remain below the red zone. In DIRECT mode, the measurement of forward and reflected power may vary considerably depending on the load impedance of the antenna. Meter readings inside and outside colored zones can be expected during normal opertion. As a general guide, if the forward power indication is in the green zone, and the reflected power indication is below the red zone, then the VSWR is less than

6:1. Any VSWR less than 10:1 is acceptable for chirpsounder use in typical applications. The TCS-4B cannot be damaged by any VSWR (from open circuit to dead short), but the quality of the received ionogram may be greatly reduced when using poorly matched antennas. It is desireable (but not absolutely necessary) to operate with antennas that match to within 4:1 VSWR over most of the frequency range of interest.

3-9. STANDBY POWER

3-10. In the event of a power loss, all displays will turn off. If battery power is on, the internal clock will continue to function and the blanker memory will be retained until primary power is restored or the batteries run down. The duration of battery life is dependent on ambient temperature. At 23°C, battery life will exceed 24 hours. At 0°C, battery life may be no longer than 8 hours. When primary power is restored after an interruption, the transmitter may generate a random out-of-sequence frequency sweep. When this sweep is completed and an automatic reset occurs, normal operation will commence on the next programmed 5-minute interval.

3-11. SHUTTING DOWN THE TRANSMITTER

3-12. If the transmitter RF output is to be turned off, but time synchronization maintained indefinitely, leave the 1024 AC power on, and shut off the 4011 (and 5018) power.

3-13. If all transmitter power is to be shut down, but time synchronization (temporarily) maintained, make sure that the BAT switch on the 1024 is ON.

3-14. If transmitter is to be shut down with loss of time synchronization, turn BAT switch OFF. Then, turn off power switches of the 1024 and the 4011.

3-15. For shutdown of more than two days, the following steps should be performed:

a. For transmitters with the non-rechargeable standby battery supply (P/N 6025-1008), turn BAT switch OFF, and then turn off the 1024 and 4011 power switches.

b. For transmitters with the rechargeable standby battery supply (P/N 6025-1018), perform these steps:

(1) Operate equipment from normal AC line power for 24 hours (minimum) to fully charge batteries. (Batteries must not be stored if discharged.)

(2) Turn on BAT switch on 1024 front panel.

(3) Turn off AC line power to TCS-4B.

(4) Press TEST switch on 1024 front panel and verify green BAT test indication.

(5) Remove battery supply from 1024 and momentarily press battery cutout pushbutton (S 1) through hole in battery box top cover.

(6) Reinstall battery supply in 1024 with AC line power off.

(7) Press TEST switch on 1024 front panel with AC line power off and BAT switch ON. Verify that BAT test lamps on front panel do NOT light.

(8) Turn off BAT switch.

(9) Secure equipment for shipping or storage.

CAUTION

Do not turn on AC line power to instrument at any time after the batteries are disconnected with battery box cutout pushbutton until equipment is ready for normal use. Applying AC line power to unit automatically reconnects batteries to battery charger circuit (even with front panel BAT switch off) and slowly discharges batteries when AC line power is removed. If AC line power is accidentally applied prior to storage, repeat procedure starting at step 2 above.

3-16. For long term storage (more than six months) of transmitters with the non-rechargeable standby battery supply, remove and store separately the D-cell batteries. For transmitters with the rechargeable battery supply, first, perform the procedure of paragraph 3-15, b above, then remove the complete battery drawer assembly from the 1024 and store separately to avoid damage from any possible battery cell leakage.

NOTE

Early versions of the rechargeable battery supply - part number 6025-1018, Revision A - did not include a battery cutout pushbutton switch (S1). Later versions - Revision B and on - include the cutout switch (S1) and a deep-discharge battery protection circuit that prevents battery damage if the battery supply is accidentally left on and allowed to discharge. The Revision A version of the battery supply may suffer permanent damage, and can not be recharged, if it is allowed to completely discharge or if it is stored for long periods without first being fully charged. Operating procedures for the Revision A version of the rechargeable battery supply are the same as for the non-rechargeable battery supply. However, the Revision A rechargeable battery supply should be stored only after it is fully charged. If difficulties or poor performance are encountered with the Revision A battery supply, contact BR Communications for assistance or repair.

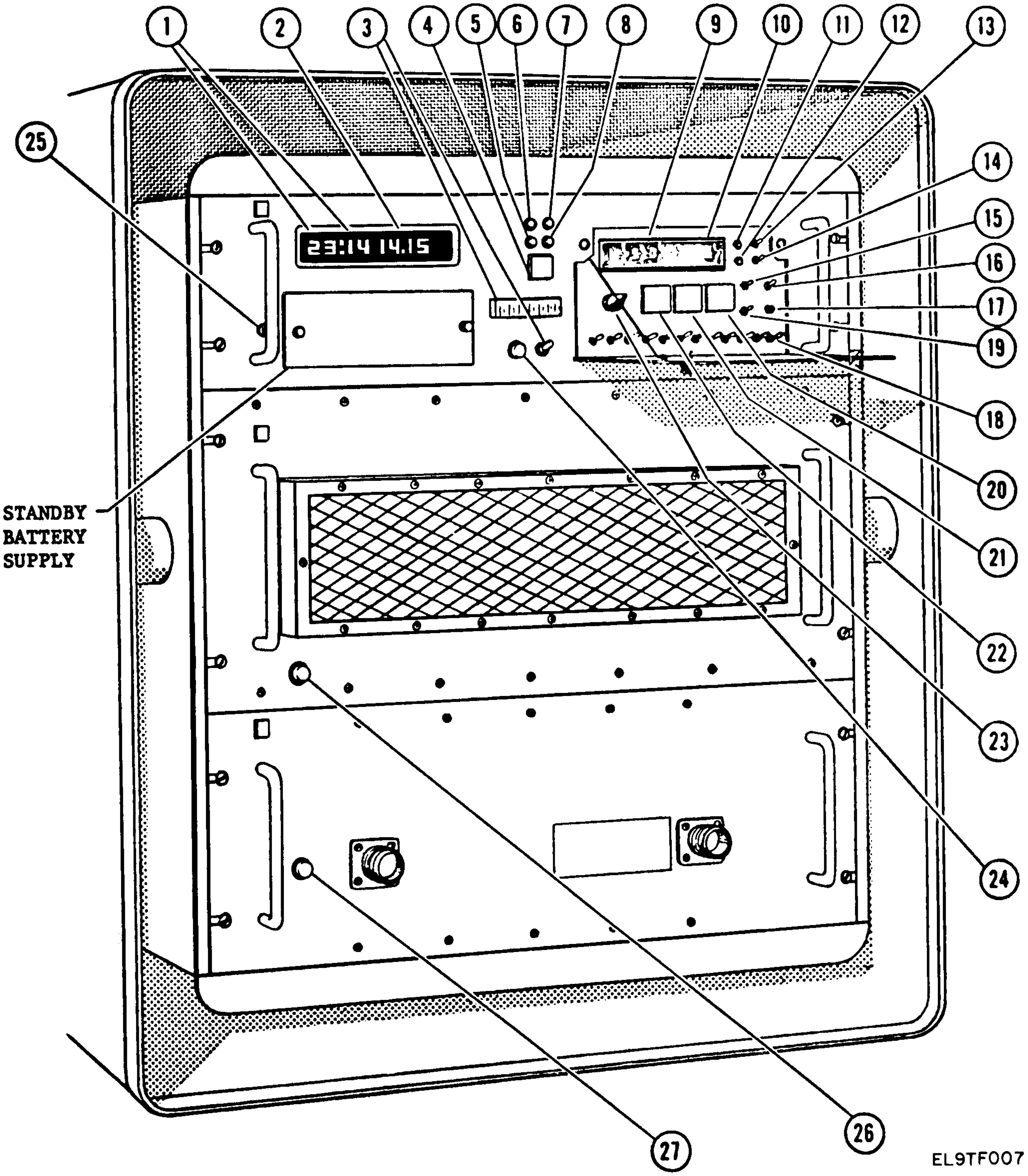


FIGURE 3-1. Controls and Indicators.

Table 3-1. Controls and Indicators

Figure reference	Control	Function
1.	Clock Display - MIN SEC	Provides numeric display of system time in minutes and seconds.
2.	Frequency Display - MHz	Provides numeric display of transmitted frequency truncated at 10 kHz; also provides readout of stored blanker frequencies when BLKR DSPL switch activated.
3.	Output Power Meter and FWD/ REFL Switch	Provides indication of forward or reflected power to/from diplexer or antenna. With switch in FWD position, meter reads forward output power of transmitter. Reading should be in green zone of meter. With switch in REFL position, meter reads reflected, or reverse, power. Reading should be below red zone of meter.

NOTE

When operating in DIRECT mode, considerable variation in needle position may occur due to antenna VSWR variations with frequency. Meter readings inside and outside colored zones can be expected durng normal operation. The transmitter will not be damaged by any VSWR.

4.	TEST Switch-indicator	When pressed during transmitter sweep, initiates both a transmitter functional test and a standby battery voltage test. Results of test are shown by indicators 5, 6, 7, and 8 below.
5.	SYST Indicator (Red)	Indicates (when lighted) a malfunction in one or more power supplies or improper synthesizer operation.
6.	SYST Indicator (Green)	Indicates (when lighted) both synthesizer and power supplies are functional (operational during button depression only).
7.	BAT Indicator (Green)	Two lamps indicate standby battery condition. Lamps are activated by circuitry that measures battery box terminal voltage. For the non-rechargeable battery supply (P/N 6025-1008), a test is performed with AC line power either on or off, battery switch (13) on, and TEST switch (4) pressed. For the rechargeable battery supply (P/N 6025-1018) , the AC line power must be off to conduct an accurate test. However, if the rechargeable battery supply is in a low charge condition, turning off AC line power can cause loss of synchronization. If operating in synchronization
	BAT Indicator (Red)	

Table 3-1. Controls and Indicators - Continued

Figure reference	Control	Function
		with a receiver, this test should be made with AC line power on. In this case for the rechargeable battery supply, the green BAT lamp should always light unless the supply is fully discharged or defective in which case the red/green or red lamps will light. (Refer to paragraphs 5-26 and 5-27 for test description). For the non-rechargeable supply, the following indications apply: ● Green ON only = Batteries good (voltage greater than 23V). ● Red and green ON together = Batteries weak but still operational - will need replacing soon. (Voltage between 18 and 23 volts). ● Red ON only = Battery condition unacceptable (voltage less than 18 volts); indicates very weak or dead batteries, or battery switch (13) is off. ● Red and green both OFF = This condition occurs only when the AC line power is off and the battery voltage is less than 14 volts indicating that the battery switch is off or the batteries are totally dead.
9.	BLANKER FREQ Switches	A four-segment thumbwheel switch for setting frequencies between 02.00 MHz and 29.99 MHz in memory to be used for blanking transmitter output. In conjunction with CHANNEL and STORE switches, up to 16 discrete frequencies can be placed in memory. During transmitter operation, memory is automatically interrogated and the RF output transmission is disabled for an interval of ± 30 kHz about the stored blanking center frequencies.

NOTE

For transmitter prior to serial number 400100, the blanking interval is ± 10 kHz.

10.	CHANNEL Switch	A single thumbwheel switch with digits 0 through 15 is used to select memory channel for storage of blanking frequencies or readout of stored frequencies. Channel selection is enabled only with PROG/RUN switch (item 14) in PROG position.

Table 3-1. Controls and Indicators - Continued

Figure reference	Control	Function
11.	BLKR STORE Pushbutton Switch	When actuated, causes the frequency set on BLANKER FREQ switches to be stored in memory channel selected by CHANNEL Switch. This switch is enabled only with PROG/RUN switch in PROG position.
12.	BLKR DSPL Pushbutton Switch	When actuated, enables readout on MHz frequency display of blanker frequency from memory of selected CHANNEL, providing PROG/RUN switch is in PROG position. If PROG/RUN switch is in RUN position, erroneous display of memory can occur.
13.	BAT ON/OFF Switch	On/Off control for battery circuit of timer auxiliary power supply.

NOTE

In all Operational modes, the BAT ON/OFF switch should be left on. When on, battery control of the timer becomes automatic in the event of a main AC line power failure.

Figure reference	Control	Function
14.	PROG/RUN Switch	A two-position toggle switch that controls the frequency blanking function. In PROG position, the blanker memory may be loaded or checked, and frequency blanking is disabled during a sweep. In RUN position, the memory frequency settings will automatically blank the transmitter output as described in 9 above.
15.	DIPLEX/DIRECT Switch	A two-position, locking-type toggle switch that selects the transmitter output connection. The toggle lever is spring-loaded to lock and must be pulled out to change switch positions. In DIPLEX position, TCS-4B output is passed through internal diplexer, and approximately 2% of output power reaches antenna. This mode used for diplexing TCS-4B sweep onto a communication transmitter signal. In DIRECT mode, TCS-4B output is connected directly to the antenna bypassing diplexer, and the communication transmitter input connection on 4011 unit is open circuited.
16.	UPPER FREQ 16/30 Switch	A two-position toggle switch that selects transmitter sweep range of either 2 to 16 or 2 to 30 MHz.

Table 3-1. Controls and Indicators - Continued

<table>
<tr><th>Figure reference</th><th>Control</th><th>Function</th></tr>
<tr><td colspan="3">NOTE
Changing position of UPPER FREQ switch during a frequency sweep may cause the transmitter to reset to 2 MHz until the next sweep start time. The position of this switch should only be changed when the sweep is stopped.</td></tr>
<tr><td>17.</td><td>ADV TIMER Pushbutton</td><td>When actuated, advances system time one minute. MODE switch must be in SET position.</td></tr>
<tr><td>18.</td><td>MINUTES Programmer Switches</td><td>12 toggle switches labeled 0 through 55 in five minute increments for control of sweep start during any hour period. These switches are active only when MODE switch is in SET or PROG position. When in up position, the transmitter sweep will start; with the switch in down position the sweep is disabled for the particular five-minute period.</td></tr>
<tr><td>19.</td><td>.1 PWR/FULL PWR Switch</td><td>A two-position toggle switch that selects either full power or 1/10th of full power for TCS-4B transmitter output to antenna.</td></tr>
<tr><td>20.</td><td>RESET Pushbutton Switch-indicator</td><td>When MODE switch is in MAN or SET position, switch lights to indicate reset function is enabled. When actuated in manual mode, resets frequency sweep to lower limit, 2.00 MHz. When actuated in set mode, resets system time to zero.</td></tr>
<tr><td>21.</td><td>STOP Pushbutton Switch-indicator</td><td>Stops sweep in manual mode. The switch lamp lights when MODE switch is in MAN position to indicate that switch function is enabled.</td></tr>
<tr><td colspan="3">NOTE
STOP switch is illuminated when in SET mode, but switch function is not enabled.</td></tr>
<tr><td>22.</td><td>START Pushbutton Switch-indicator</td><td>Starts sweep in manual mode; initiates system time in set mode. The switch lamp lights when MODE switch is in MAN or SET position to indicate that switch function is enabled.</td></tr>
</table>

Table 3-1. Controls and Indicators - Continued

Figure reference	Control	Function
23.	MODE Switch CONT, MAN, SET, and PROG Positions	Four-position rotary switch selects transmitter mode of operation: a. CONT : Enables continuous sweeping. b. MAN: Enables START, STOP, and RESET switches for manual sweep control. c. SET: Enables RESET and START switches for control of system clock. d. PROG: Enables automatic sweep start under control of the MINUTES programmer switches.
24.	POWER Pushbutton Switch-indicator	Power on/off pushbutton switch for 1024 unit. Green light indicates power on.
25.	STD ADJ Potentiometer	Provides fine adjustment of internal 5 MHz frequency standard. Each full turn of control will change frequency to compensate for 0.5 milliseconds of drift per 24 hours.
26.	POWER Indicator	Power indicator for 5018 unit. Green light indicates power on.
27.	POWER Pushbutton Switch-indicator	Power on /off pushbutton switch for 4011 unit. Green light indicates power on.

SECTION 4

THEORY OF OPERATION

4-1. INTRODUCTION

4-2. GENERAL. The TCS-4B Transmitter consists of three modular units mounted within an environmentally protective case. The physical arrangement of circuits within the units is functionally oriented. Unit 1, the 1024 Transmit Sweep Generator, contains the transmitter control circuits and provides a sweeping, low-level exciter signal to the power amplifier unit. Unit 2, the 5018 Power Amplifier, comprises the drive and output amplifier circuits that provide up to 100 watts output (50 dB gain) of the low-level RF sweep signal from the 1024 Transmit Sweep Generator. Unit 3, the 4011 Filter/Diplexer, contains the output low pass filters and antenna switching circuits. Each of the units is supplied with primary line voltage and contains regulated power supplies.

4-3. FUNCTIONAL DESCRIPTION. The TCS-4B Transmitter is a broadband, EM/CW, oblique sounder whose output is swept over a frequency band of 2 to 16 MHz, or 2 to 30 MHz, as selected by front panel control. The transmitter is tuned by a digital synthesizer which is synchronized with an associated RCS-4B Receiver. The synthesizer sweep rate is either 50 kHz/sec for 2-16 MHz range or 100 kHz/sec for 2-30 MHz range for a constant sweeping time of 280 seconds.

4-4. The transmitter with associated, remotely located receiver and spectrum monitor functions as an on-line test set for continuous channel measurement of path loss, time dispersion, noise, and interference over the 2 to 30 frequency range. The measurement function can be performed continuously and in parallel with transmissions of an operational communications transmitter/receiver system using a common antenna via the TCS-4B diplexer unit. The transmitter sweeps the complete band repeatedly at five-minute intervals or can be preprogrammed by front panel switches to skip any five-minute interval. With an actual transmission time of 4 minutes 40 seconds, 20 seconds in each interval are allowed as blank time to accommodate switching at the receiver which can be operating with up to three different transmitters, thus measuring three different propagation paths.

4-5. BLOCK DIAGRAM DESCRIPTION (figure 4-1)

4-6. TRANSMIT SWEEP GENERATOR. In the 1024, the timing and frequency synthesis functions originate from a crystal oscillator (oven stablized) in the frequency standard assembly 1A3. The output of the oscillator provides a stable frequency refernece for the sweep synthesizer assembly 1A1. The frequency reference signal is also supplied to the transmit logic assembly 1A2 where it is divided down to provide all system timing.

4-7. In the transmit logic assembly 1A2, the programmer circuit (1A2A 1) divides the 5 MHz reference signal down to 100 kHz for frequency counter timing and then down to precise one-second pulses to control the sweep generator clock. The programmer divides the clock time into 5-minute segments and, depending on the setting of front panel controls, sends a start-sweep pulse to the synthesizer every five minutes. The programmer circuit interprets nearly all front panel switch functions and sends the appropriate sweep start, stop, and reset commands to the synthesizer. The other circuit card in the transmit logic assembly is the frequency counter/blanker (1A2A2). This circuit counts the synthesizer output, and this count is sent to the numeric dis -

play (1A5). It also compares the counted frequency with a memory containing the center frequency of up to 16 bands that can be preset to blank the transmitter output. A blanking signal from the memory inhibits the synthesizer output and suspends the frequency counting by the filter set in the 4011 unit.

4-8. The sweep synthesizer assembly 1A1 generates a precision linear RF sweep signal between 42 and 56 or 42 and 70 MHz. This signal is converted down by a synthesized 40 MHz signal to yield the 2-16 or 2-30 MHz sweep output. Operator selection of 2-30 MHz causes the sweep output to change by 1 Hz every 10 microseconds (a 100 kHz/see rate). Selection of 2-16 MHz range cuts the sweep rate in half. Operator selection of full power output causes the sweep synthesizer to output a one milliwatt (0 dBm) signal level to the 5018 power amplifier. A 0.1 power selection cuts the synthesizer output power to 0.1 milliwatt.

4-9. As shown in figure 4-1, the 1024 also contains a numeric display assembly 1A5 that provides a digital display of output frequency and internal system clock time. A front panel power meter displays the measured forward or reverse power from a power detector in the 4011 filter/diplexer unit. A complete power supply operates the 1024 on 115 or 230 VAC input at 47-440 Hz. In the event of an AC line power failure, a standby power supply provides battery-powered 5-volts DC to sustain the programmer clock, the blanker frequency memory, and the 5 MHz frequency standard. The subpanel control assembly 1A6 provides the necessary circuits to operate the unit.

4-10. POWER AMPLIFIER. The 5018 power amplifier consists of two main assemblies secured to two thick aluminum plates. The upper assembly (2A1, figure FO-1) contains a low pass filter assembly (2A1A1) that attenuates spurious VHF signals on the sweep generator signal and a power amplfier assembly (2A1A2) that divides the input into two parts and amplifies each part to a maximum 10 watt level. One part is routed to the 4011 unit for filter decoding. The other part is divided into four equal RF drive signals. Each drive signal is amplified and then recombined into a maximum 100-watt output to the 4011 unit. The second assembly (2A2, figure FO-1) contains the power supplies that provide over 800 watts of regulated DC power to run the amplifier components.

4-11. FILTER/DIPLEXER (figure FO-2). The 4011 filter/diplexer also uses two large aluminum plates for assembly mounting. The upper section (assembly 3A1) contains the filter set (3A1A1) that provides eight half-octave low-pass filters to suppress harmonics of the power amplifier output to 60 dB below the fundamental. Selection of the appropriate filter is done by a filter decode assembly (3A2A2) on the lower section (assembly 3A2) that operates by counting the frequency of the 10 watt 5018 output. If output blanking occurs, frequency counting is temporarily suspended. The filtered sweep signal then passes through the power detector assembly (3A1A3) that drives the front panel power meter on the 1024.

4-12. The 4011 implements either of two modes of operation: direct output of the sweeping signal to the antenna or a diplexed output simultaneously containing approximately 98 percent of a communications transmitter signal (up to 2.5 kW PEP) and 2 percent of the sweeping signal. A front panel DIRECT/DIPLEX switch activates the relays that control these two modes. Selection of direct mode causes the two relays in the 4011 to route the sweeping signal to the 4011 output. Selection of diplex mode routes the sweeping signal to the diplexer assembly (3A1A2) where it is loosely coupled to the antenna output. The 98 percent of the sweeping signal not coupled to the antenna output (along with about 2 percent of the communications transmitter power) is

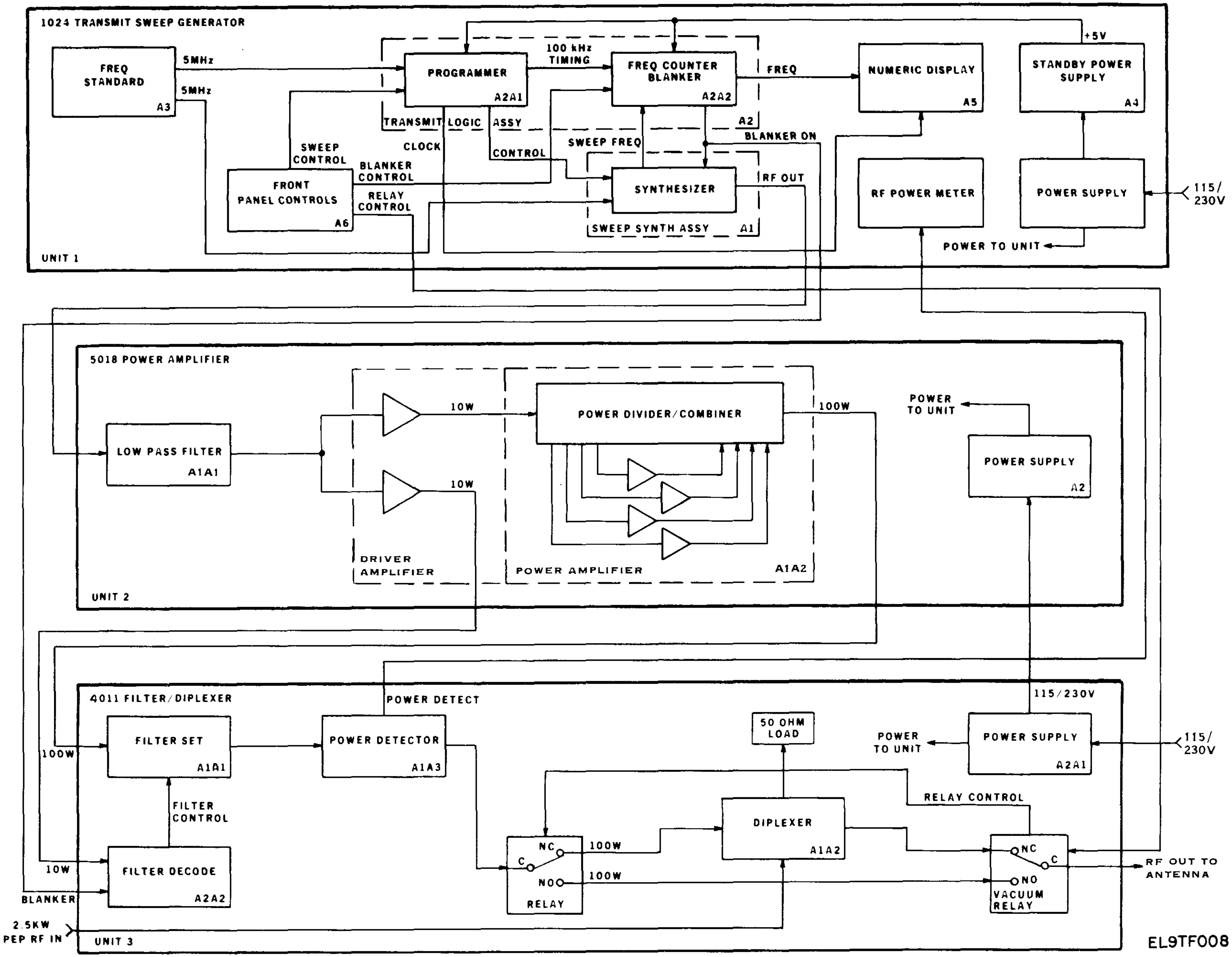


FIGURE 4-1. Transmitter Functional Block Diagram.

dissipated as heat in a 50-ohm load attached to the 4011 enclosure. A power supply (3A2A1) in the 4011 routes 115 or 230 VAC power to the 5018 and provides the necessary regulated DC power to run the 4011 assemblies. This power supply is part of the lower section (3A2) along with the filter decode assembly.

4-13. 1024 TRANSMIT SWEEP GENERATOR - UNIT 1

4-14. The transmit sweep generator (figure FO-1) consists of six principal assemblies: frequency standard (1A3) ; sweep synthesizer (1A1) ; transmit logic (1A2); numeric display (1A5); primary power supply (1A7); and battery power supply (1A4). The transmitter self-test circuits are part of assembly 1A2.

4-15. FREQUENCY STANDARD (figure FO-3) (S/N 400101 and on). The transmitter timing circuits are based on a 5 MHz standard supplied by a highly stable crystal oscillator. Contained in the frequency standard module are three assemblies. Assembly A1 is the crystal oscillator within a temperature controlled oven; A2 consists of amplifier and control circuits; and A3 is a switching regulator. The oscillator has an internal voltage regulator (about 9 volts) which appears at A1J1- 2. This voltage is used to trim the frequency (coarse and fine) by applying an adjustable DC bias to A1J1-1. Q1, Q2 and VR1 comprise a voltage regulator to power the unit during normal operation. If primary power fails, the battery supply on E15 is switched in by CR1. CR2 prevents the battery voltage from appearing on K1 during a primary power failure. This allows K1 to close after a few milliseconds delay and bypass CR1 thereby eliminating the power loss in CR1.

4-16. The switching regulator 1A3A3 (figure FO-4) provides +5 VDC power (+5VB) for all critical timing circuits of the transmitter. Regulation is controlled by regulator U1. Switching transistor Q1 and clamping diode CR 1 provide variable width drive pulses into storage inductor L1. L1-C2 provides the phase shift necessary for oscillation and determines the switching frequency. L2 and C3 form a ripple-reduction filter. The switching regulator has a 1.5 amp fuse on its input to prevent serious damage in case of a long-term short. Circuit damage from momentary shorts is protected by internal current limiting (R2).

4-17. SWEEP SYNTHESIZER (P/N 5030-1001 Only) (Refer to figures 4-2, FO-5, and FO-6). The sweep synthesizer consists of two circuit card assemblies: the microphage synthesizer, operating between 42 and 70 MHz, and the synthesizer converter, which offsets the microphage output by 40 MHz to produce the 2-30 MH sweep. In addition, the synthesizer module has two fixed frequency outputs, 5 and 40 MHz, used in the receiver, and a 2.1-3.5 MHz count output used by the frequency counter logic. Logic to control the frequency programming of the synthesizer RF sweep is contained on the converter assembly. This logic digitally increments the synthesizer frequency program every 20 microseconds to produce a linear frequency sweep. External control inputs to the synthesizer converter logic provide means to start, stop, reset, and blank the sweep and to select sweep limits and rates. Transmit blanking of the 2-30 MHz output is implemented by disabling the 40 MHz mixer conversion of the 42-70 MHz signal. All synthesis operations are based on an externally supplied 5 MHz standard.

4-18. The synthesizer module may be used without modification in either the receiver or transmitter. For TCS-4B applications, the 2-30 MHz output is used directly to drive the 5018 RF amplifier. For RCS-4B applications, the basic RF sweep is offset 200 kHz higher to produce a 42.2 -70.2 MHz receiver 1st L.O. from the microphage synthesizer and a 2.2- 30.2 MHz receiver calibration signal from the synthesizer converter. Selection of transmit or receive frequency formats is provided by a digital programming line in the unit wiring harness connecting to the sweep synthesizer assembly.

4-19. The sweep synthesizer uses a single digital phase-lock loop (PLL) design employing a fractional phase computation technique that provides a phase-continuous (coherent) output sweep with 2 Hz frequency resolution. The fractional phase computation technique is a hybrid approach that combines the operation of a conventional phase coherent, high frequency, low resolution, PLL synthesizer and a digitally controlled, low frequency, high resolution, direct phase computation waveform generator. The result is a PLL synthesizer capable of locking properly with a continuously changing programmed phase error within the loop. The programmed phase error capability of this hybrid loop extends the frequency resolution of the basic PLL by almost five decades.

4-20. The basic microphage synthesizer phase-lock loop (figure 4-2) consists of a voltage controlled oscillator (VCO) having a frequency range of 42 to 70 MHz, a loop amplifier/integrator, a phase detector, and a counter/divider/comparator string. This basic synthesis loop is capable of synthesizing any frequency between 42 and 70 MHz in 100 kHz steps as determined by the effective divide ratio in the divider between the VCO and the phase detector. That is, for the VCO to operate at 45.1 MHz, the divider must divide by 451 to achieve the required 100 kHz output for the phase detector. (The phase detector reference is 100 kHz.) Another way of considering this loop is to note that during the 10 microsecond period of the phase detector reference, the VCO must advance exactly 451 cycles (zero crossings) if the loop is to lock properly. To synthesize 45.15 MHz with this loop would imply 451 1/2 cycles of phase every 10 microseconds. By adding additional logic to the basic loop, the synthesizer can operate properly by processing for the integer (451) and fractional (1/2) cycle of phase information. For example, for the synthesizer to operate continuously at 42.123000 MHz, the phase (i.e., VCO zero crossings) must advance 421 whole cycles plus 23/100 fractional cycles every 10 microseconds. A phase computer computes both the exact whole number and fractional number of phase cycles of the programmed frequency occurring in a 10 microsecond period. The result of this phase computation is then added to the stored phase value from the previous 10 microsecond frame. For example, assume a continuous frequency of 42.123 MHz, and a phase register initially at zero. During the first 10 microsecond frame, the phase computer calculates 421.23 cycles of phase. For the second 10 microsecond frame, the VCO advances another 421.23 + 421.23 = 842.46 total cycles by the end of the second frame. Similarly, for the third frame, the phase is advanced to 842.46 + 421.23 = 1263.69, and so on.

4-21. The synthesis loop operates by comparing and changing the VCO output phase to equal that of the phase computer for both integer and fractional cycles. Integer cycles (e.g., 421) of VCO phase are controlled by conventional phase-lock loop techniques employing a high speed BCD counter and digital phase detector. The fractional remainder of VCO phase (e.g., 0. 23) is handled by the residue generator. The residue generator is digitally programmed waveform generator, controlled by the phase computer, that corrects the output of the loop phase detector for the remaining fractional cycle phase error occurring every 10 microseconds. It is this programmed, fractional cycle, phase error correction capability that allows the loop to operate to a much finer frequency resolution than can normally be expected from a conventional (integer

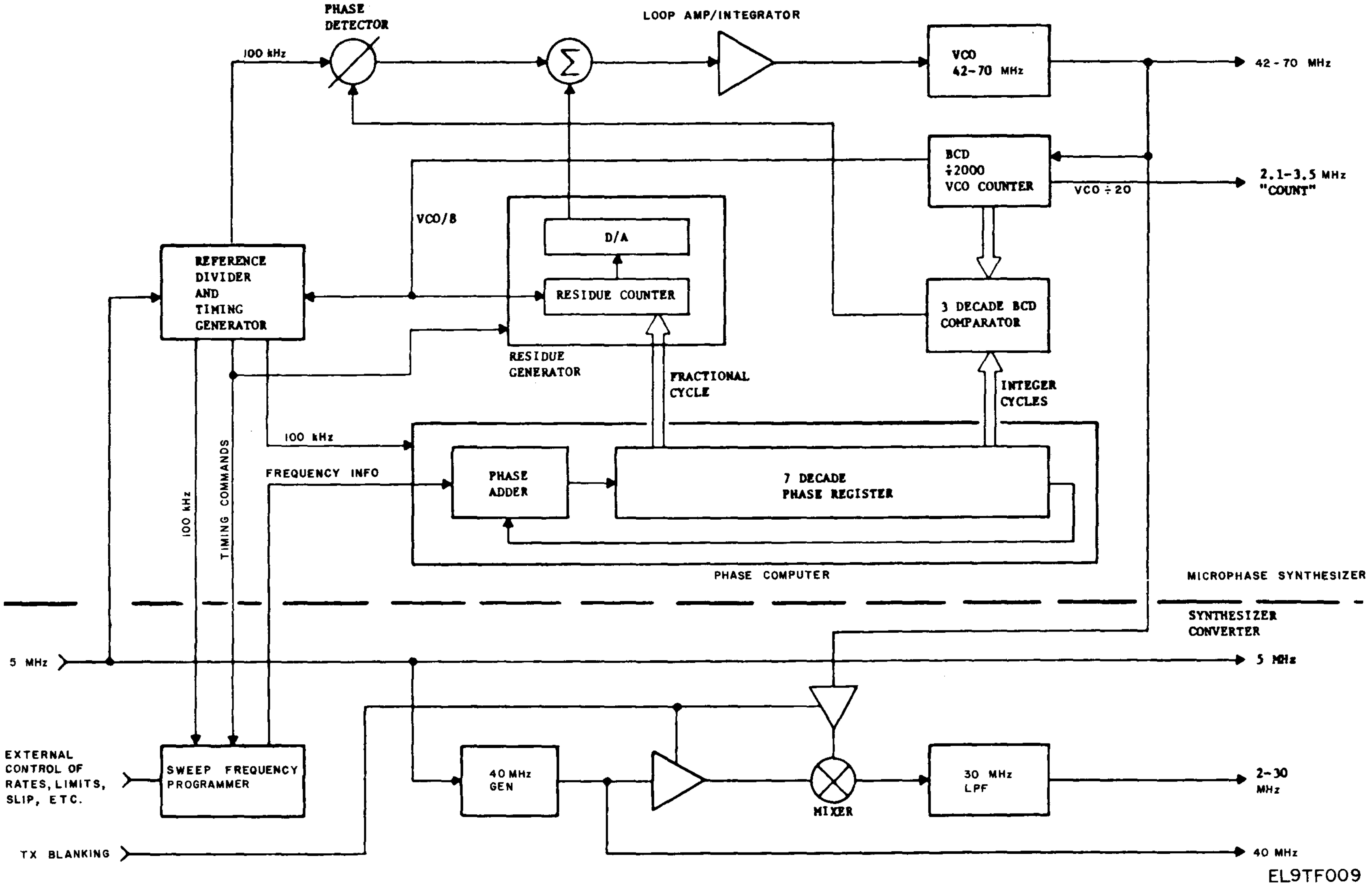


FIGURE 4-2. Sweep Synthesizer Functional Block Diagram (Part Number 5030-1001).

cycle) phase-lock loop. Thus, in this example, while the integer cycle BCD counter accumulates an additional 421 cycles every 10 microseconds, the residue generator corrects the phase detector by O, .23, .46, .69, etc. cycles every 10 microseconds to produce a VCO output frequency of 42.123 MHz or 23 kHz offset from an integer 100 kHz point. The ability of the residue generator to correct the loop is limited only by the accuracy of the residue correction waveform. In the sweep synthesizer assembly, this correction is made with sufficient accuracy to provide 2 Hz frequency resolution with spurious signals typically greater than 50 dB below the fundamental.

4.22. SWEEP SYNTHESIZER (Part Number 5030- 1101) (figure FO-13) (refer to figure 4-3). The sweep synthesizer 1A1 is a modular, digitally controlled, phase-locked-loop synthesizer that generates the linear RF sweep.

NOTE

> The synthesizer module is used interchangeably in both transmit (TCS-4B) and receive (RCS-4B) applications. A programming line in the instrument wire harness determines whether the synthesizer operates in the transmit or the receive mode.

The sweep synthesizer module has five RF outputs: (1) the 42-70 MHz first mixer L.O. injection for the receiver; (2) the 40 MHz second L.O. receiver injection; (3) a buffered 5 MHz from which the receiver third mixer L.O. injection is derived; (4) the 2.1- 3.5 MHz count output which is used by the frequency counter in the TCS-4B transmit logic, or RCS-4B receiver control logic to drive the front panel LED frequency display; and (5) the 2-30 MHz transmit sweep output which drives the TCS-4B RF power amplifier or the RCS-4B receiver calibrator circuits. The one RF input to the sweep synthesizer is the 5 MHz frequency standard signal from which all RF outputs are derived. The synthesizer digital inputs select parameters such as: sweep rate and limits; sweep start, stop and reset ; RF blanking; slip; auto sync and RF output power level. The module consists of three circuit card assemblies: synthesizer 1A1A1, down converter 1A1A2, and sweep programmer 1A1A3.

4.23. SYNTHESIZER (figures FO-7 and FO-8) (refer to figure 4-4). The 5053-2001 synthesizer circuit (1A1A1) is a digitally programmed, phase-locked-loop synthesizer capable of generating any frequency between 42 and 70 MHz to 1 Hz resolution. It consists of a 42-70 MHz VCO, a programmable divider (divide-by-N), a phase detector and loop amplifier, and control logic (phase register and timing generator). Figure 4-4 is a simplified diagram of the circuit. A detailed functional block diagram is in figure FO-7.

a. The output frequency of the VCO (and the synthesizer) is determined by electrically tuning the VCO with a control voltage from the loop amplifier. The loop amplifier produces this control voltage by integrating (smoothing) the phase-error signals generated by the phase detector. If there is no phase error, the output of the phase detector is zero and the loop amplifier will hold the VCO at its existing frequency. If there is a phase error the phase detector will drive the loop amplifier to change the VCO frequency until the error is corrected. The synthesizer uses the phase detector to compare the output of the divide-by-N counter with a fixed 100 kHz reference signal. If the phase or frequencies of these two signals do not match, the phase detector will drive the loop amplifier to adjust the VCO frequency until the divide -by-N output exactly matches the 100 kHz reference, thereby achieving phase lock. The VCO output frequency is always N times 100 kHz. There are N cycles of the VCO output for every one cycle of the 100 kHz reference. If N is an integer number, the VCO frequency will be an exact multiple of 100 kHz. However,

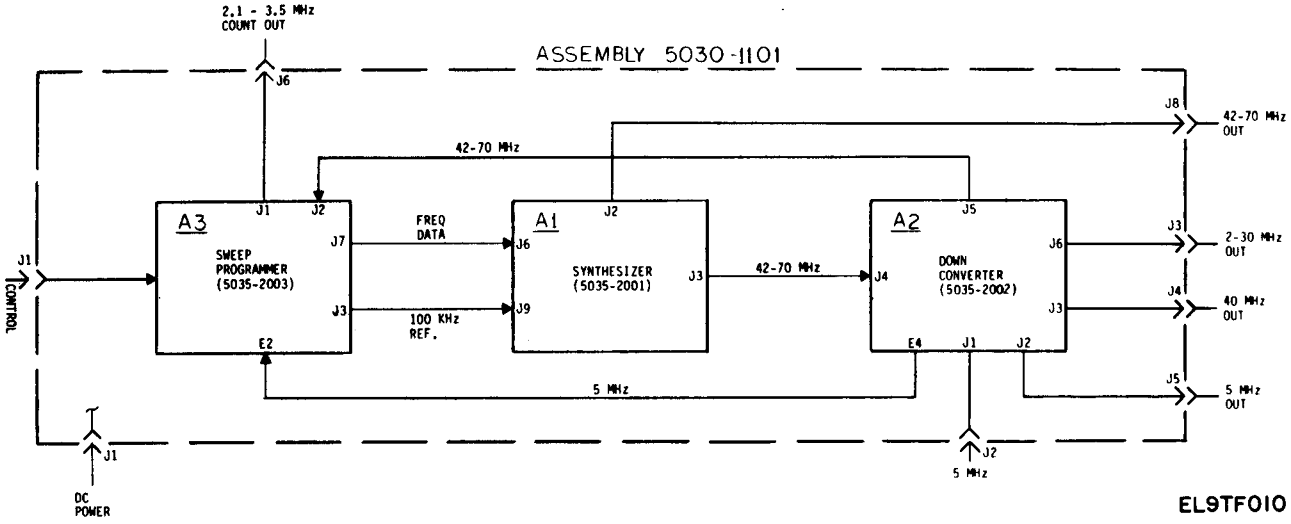


FIGURE 4-3. Sweep Synthesizer (1A1) Functional Block Diagram (Part Number 5030-1101).

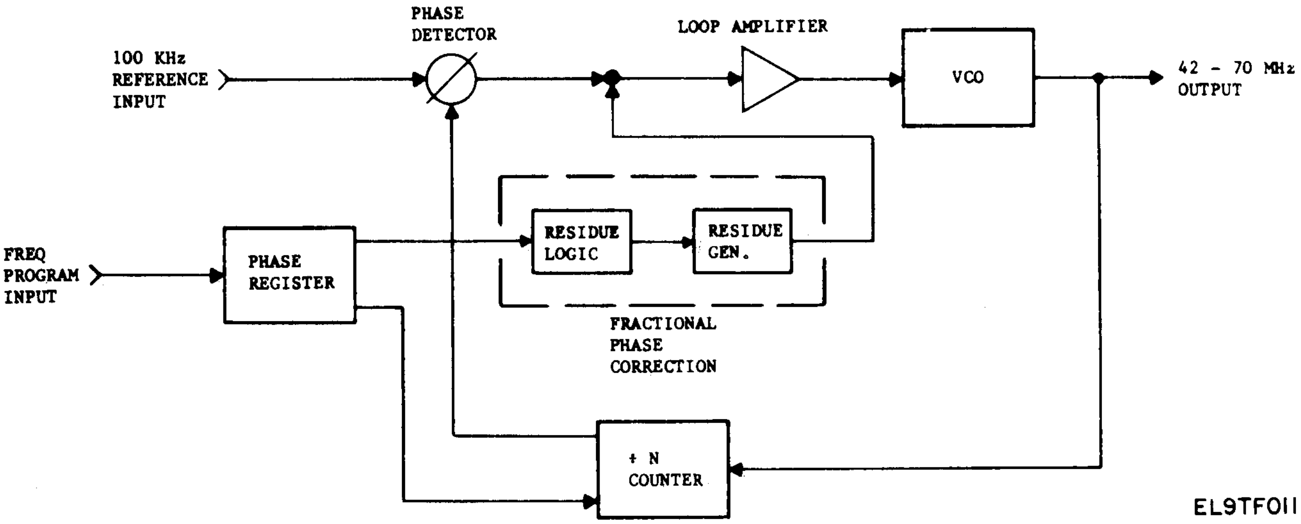


FIGURE 4-4. Simplified Block Diagram of Synthesizer CCA 1A1A1 (5035-2001 only).

if N is a number consisting of both integer and fractional components, intermediate frequencies between 100 kHz points may be synthesized. For example, to produce a 43.5 MHz output the divide-by-N counter must divide by 435. If an output of 43.501 MHz is desired, the required divide ratio is 435.01. The divide-by-N counter, however, is a 3 decade counter only capable of dividing by integer numbers between 400 and 700. To divide by 435.01 the phase register circuitry programs the divide-by-N to divide by 435 for 99% of the time and divide by 436 for the remaining 1%. The resulting average divide number is $\frac{(99x435)+(1x436)}{100}$=435.01.

b. Because the synthesizer basic timing reference is 100 kHz, the divide-by-N counter completes a count sequence (frame) every 10μs. In the above example the divide-by-N will count 435 VCO cycles (zero crossings) for ninety-nine 10μs frames and 436 cycles for one frame. The phase detector and loop amplfier will then try to drive the VCO to operate at 43.50 MHz for 990μs and at 43.60 MHz for 10μs. The resulting VCO output is a phase modulated signal with an average center frequency of 43.501 MHz with 1 kHz sidebands. The 1 kHz sidebands result from the jumps in VCO frequency occuring every one millisecond (990μ s+10μs = lms). The amplitude of the sidebands can be reduced by smoothing the jumps in frequency such that the VCO remains steady at the average frequency and does not follow the loop back and forth between the two programmed frequencies. However, to reduce the sidebands to an acceptable level (-50dBc) would require smoothing (slowing) the loop response to such an extend that the synthesizer would no longer be suitable for sweeps used in Chirpsounder applications. These sidebands may be cancelled however, using a fast loop and a fractional phase correction circuit operating in conjunction with the divide-by-N.

c. Since the average frequency of the VCO is correct, the average value (or dc component) of the VCO control voltage from the loop amplifier is correct. The undesired 1 kHz sidebands are produced by the sudden phase errors generated when the divide-by-N counter jumps between the two programmed integer divide numbers. This produces a small momentary change in the VCO control voltage which modulates the VCO frequency resulting in sidebands. The fractional phase correction circuit cancels the VCO modulation by injecting a compensating phase error correction signal into the loop amplifier to counteract the effect of the phase error jump when the divide-by-N skips from one divide ratio to another. The phase register keeps track of when to skip the divide-by-N from one divide ratio to the next and simultaneously programs the residue logic of the fractional phase correction circuits. The residue logic, in turn, drives the residue generator, which produces the residue fractional phase error correction signal. By careful alignment of the residue generator the synthesizer sidebands can be suppressed better than 50 dB below the fundamental output level. The divide-by-N counter consists of a VCO prescaler which typically divides the VCO output frequency by 2. The prescaler also contains a pulse skipper circuit that makes the divide-by- 2 circuit skip one extra VCO clock pulse each time a skip command is given. This effectively turns the prescaler into a divide-by-3 circuit during a skip command. The output of the VCO prescaler drives the VCO divider. The combination of the VCO divider and the VCO prescaler is capable of dividing by an integer number between 400 and 700. For example, to divide by 437, the VCO counter down counts 430 times and the VCO prescaler skips 7 extra VCO clocks during the count sequence, yielding a total count of 437. The phase register accepts binary-coded-decimal (BCD) frequency program data from the sweep programmer card. All 7 decades of BDC data are transferred serially on a decade by decade basis every 10µs. All timing signals needed by the synthesizer are produced by the timing generator circuit. The timing generator controls the timing of the transfer of frequency data input to the phase register and divide-by-N counter, and controls the timing of the fractional phase correction (residue) circuitry.

4-24. DOWN CONVERTER (figures FO-9 and FO-10). The 5035-2002 down converter circuit 1A1A2 generates additional synthesized signals derived from the 5 MHz frequency standard and the 40-70 MHz synthesizer output which are required for transmitter (or receiver) use. The primary function is to translate the 42-70 output of the synthesizer to a 2-30 MHz output for the transmit sweep. The 5 MHz input from the frequency standard is buffered by the down converter circuit and frequency multiplied to 40 MHz by the harmonic generator and 40 MHz bandpass filter. The 40 MHz is then mixed with an amplified 40-70 MHz signal from the synthesizer. The output produce of the mixer is the 2-30 MHz transmit sweep which is further amplified and filtered to produce a 0 dBm (one milliwatt) sine wave output. The down converter also features a gating circuit which turns off the 2-30 MHz output when it is not needed. Gating is used for blanking of the TCS-4B transmit sweep at selected frequencies.

4-25. SWEEP PROGRAMMER (figures FO-11 and FO-12). The 5035-2003 sweep programmer circuit 1A1A3 controls the frequency sweep by digitally programming the synthesizer to advance its output frequency in 1 Hz steps every 10 microseconds. The sweep programmer contains an 8 decade BCD counter that stores the programmed frequency data of the synthesizer. This is preset with the sweep starting frequency (low limit) of 2 MHz. When the sweep START command (from the sounder control logic) is received, a 100 kHz clock from the synthesizer is gated on to the 8 decade counter. The counter increments by one count on every pulse of the 100 kHz clock. This advances the preset count by one Hz every 10 µs resulting in a linear increase in the programmed frequency corresponding to a 100 kHz per second sweep rate. The sweep continues until it reaches 30 MHz when the upper limit detect circuit interrupts the 100 kHz clock thereby stopping the sweep and resetting the 8 decade counter back to the 2 MHz low limit. If a 2-16 sweep is selected the sweep programmer operates as described above except the upper limit detector is set to 16 MHz and the sweep clock is divided by 2 to 50 kHz.

a. The sweep programmer also contains slip circuits and clock gating circuits which increase or decrease by basic 100 kHz (or 50 kHz) sweep clock by 0.1, 1.0, or 5.0%. The resulting sligght changes in sweep rate allows the RCS-4B receiver sweep to be advanced or retarded relative to the TCS-4B transmit sweep for synchronization purposes. This slip circuitry is not used in TCS-4B applications. The blank control circuit drives RF gating circuits in the synthesizer down converter and the TCS-4B transmitter RF power amplifier output low pass filter set. When a blanking pulse is generated by the frequency counter/blanker (1A2A2), the sweep programmer blank control circuit determines the length of the blank interval. Earlier versions of the TCS-4B transmitter used a 20 kHz wide (±10 kHz) blanking interval while newer versions employ a 60 kHz interval.

b. The sweep programmer also contains two digital dividers; the 100 kHz reference generator, and the VCO divide-by-20 counter. The input to the 100 kHz reference generator is the 5 MHz standard which is digitally divided by 50 to produce 50 nan0-second wide pulses a 100 kHz rate. These pulses drive the synthesizer phase detector reference input. The VCO divide-by-20 counter takes the 42-70 MHz synthesizer output and divides it to the 2.1- 3.5 MHz count output for use by the frequency counter logic that, in turn, drives the LED displays.

4-26. **TRANSMIT LOGIC.** The transmit logic forms the digital control function for the transmitter and is composed of three principal circuits: a programmer for controlling the automatic sweep start function initiated by the front panel programmer switches, a frequency counter for driving the frequency readout display, and a frequency blanker for control and storage of transmitter blanking frequencies.

4-27. Programmer (figure FO-14) (S/N 400101 and on). This circuit (1A2A1) has a 60-minute clock and a five-minute interval decoder to perform the auto program start function. U 1 and U 3 form the control logic for the synthesizer commands: start, stop, reset, and end sweep blanking. The START and RESET switches are connected at U7-3 and U7-5. When the mode switch is in the SET position, these inputs exercise the clock run/reset latch (U25). The clock's time base is the 5 MHz signal from the frequency standard. U5 and U6 divide the 5 MHz by 50, to 100 kHz. U10, Ull, U12, U18, and U17 divide the 100 kHz down to 1 Hz. U 30 is the programmer clock "seconds" counter. Its carry output advances U24 which divides by six and is the 10's of seconds counter. U22 and U28 operate similarly for the minutes and tens of minutes. Counter dividers U18, U17, U30 and U24 are all reset and held at zero when the clock run/reset latch (U25) is in the reset state. Resetting the clock latch also triggers one-shot U31-10 providing a momentary reset pulse to counter dividers U28 and U22. The clock is manually advanced in integer minutes by the addition of advance timer pulses from U31-7 into U23-12. The clock circuit is powered from the +5VB supply which is supplied from the switching regulator (1A3A3) and battery backup when primary power is off. The five-minute interval decoding is done by U33 and U21 with 12 output lines that go to the subpanel program switches. One line out of the 12 goes low for approximately 500 microseconds at the beginning of its respective five-minute interval. If that particular interval switch is selected, an auto start pulse is generated.

4-28. The TEST switch activates the battery and circuit status lights by supplying +5VB to U26-14 and enables U20-4 and U20-10. It also supplies current to the base of Q3 which in turn saturates Q2. Q2 then supplies the battery voltage to the voltage divider network of R21, R23, and R22. This network, in conjunction with U26, yields the following battery condition light indications:

greater than 23 volts = green light
between 18 to 23 volts = red and green lights
less than 18 volts - red light

Circuit status is determined by U8 which measures the power supply voltages and the out-of-lock (OOL) flag from the synthesizer. The start, stop, and reset push-button lamps are driven by Q1 when they are active.

4-29. Frequency Counter (figure FO-15) (S/N 400101 and on). The frequency counter receives a "count" signal from the synthesizer which is related to the output frequency as follows:

$$\text{"count" frequency (MHz)} = \frac{f_o + 40}{20}$$

where f_o is the output frequency in MHz. This signal is buffered by U28-1 and presented to divider U9-13 which performs two functions. First, it acts as the gate for the counter; that is, this gate is enabled by U9-6 for 4 ms during each count cycle. When U9 is enabled (U9-11 and 12 high), the signal at U9-13 is divided by two at U9-9, and further divided by U23, U31, U39, and U47. Each counter divides by ten. At the conclusion of each 4 ms gate period, the count on these counters is strobed into U24, U32, U40, and U48, the outputs of which are delivered to U8, U14 through U16 and on to the LED display (frequency section). Basic timing for the counter is derived from a 100 kHz clock which is divided by U1 and U3 to 1 kHz. This 1 kHz is divided down to 125 Hz at U9-5. U10 and U33 form a circuit which makes the 125 Hz, 4 ms gate waveform slightly asymmetrical to avoid counter indecision when the synthesizer is stopped at exactly 2 MHz (when reset). One-shot U18 generates a nominal 10 microsecond latch/load pulse that strobes the new BCD frequency into the latches following the count period.

4-30. Frequency Blanker (figure FO-15) (S/N 400101 and on). The frequency blanker section provides storage and control for 16 discrete frequencies about which the RF output of the TCS-4B is gated off for ±30 kHz of sweep width. U11, U19, U35, and U43 are 64-bit (16 x 4) random access memories which store the desired blank frequencies. The frequency and channel (1 of 16) are entered by front panel thumbwheel switches. The RUN/PROG switch must be in the PROG position to enter frequencies. Entry is then made by pressing the STORE pushbutton switch. The contents of each channel are examined by pressing DISPLAY (only in PROG position) and observing the frequency readout of the LED display. Placing the RUN/PROG switch to the RUN position causes U4 to count instead of load and thereby cycles through all address codes of the memories every 4 milliseconds. The memories receive the frequency data in true BCD form and invert the data on their outputs. The output data must then be inverted to have “true” data again. The memories are powered by +5VB from the switching regulator which provides battery backup during primary power failure, preserving the contents of the memories.

4-31. The data from the memories is presented to a four decade comparator, comprising U21, U29, U37, and U45, U22, U30, U38, and U46 forms a counter identical with U23, U31, U39, and U47 except U22 is loaded with a preset count. This preset count number causes the compare pulse on U45-6 to be 30 kHz ahead of the true count frequency. This pulse then sets U34-5 high which starts the blanking process. U25 then shifts (6 shift pulses) this pulse down to pin 11 which terminates the blanking. The shift clock is generated by the synthesizer and is always equal to 10 kHz of sweep bandwidth regardless of sweep speed.

4-32. NUMERIC DISPLAY AND DRIVER (figure FO-16 and FO-17). The numeric display (figure FO-16) consists of two blocks of four digits. The first block (LED 1 thru 4) displays elapsed program time in minutes and seconds and has a fixed colon (CR1 and CR2) separating the minutes from the seconds. The second block (LED 5 thru 8) displays frequency in megahertz to two decimal places. The decimal point is permanent and is placed at the start of the third digit (activated by R65 to ground). The path digit (LED 9) is not used on the transmitter.

4-33. The LED display is driven by eight BCD to 7-segment decoder drivers (figure FO-17). The drivers accept positive true BCD time and frequency information from the 5-minute timer and frequency counter and translate the information to 7-segment negative true outputs for the common anode LED readouts.

4-34. PRIMARY POWER SUPPLY (figure FO-18). The primary power supply provides all the DC voltages used in the transmit sweep generator unit. Voltages provided are +12 VDC, -12 VDC, +24 VDC, +35 VDC, and multiple +5 VDC outputs, both regulated and unregulated. The three regulated +5 VDC outputs supply the logic voltage for both the synthesizer and the programmer circuits. The single +5 VDC unregulated output provides power for front panel indicators including the LED display. The +5 VDC regulated supplies are separated to isolate noise signals between circuits. The +12 VDC, -12 VDC supplies and the +24 VDC supply (all regulated) are used for the synthesizer logic. The unregulated +35 VDC supply is applied to the frequency standard module and the programmer test logic.

NOTE

> For units with a rechargeable battery supply (paragraph 4- 37), +35 VDC is also supplied to the battery charging circuit.

4-35. An internally mounted toggle switch is provided for switching between 120 and 240 VAC inputs. In addition, compensation for small increments of input line voltage variations can be made with jumpers on a terminal board mounted adjacent to the transformer primary.

4-36. STANDBY BATTERY SUPPLY (1A4) (P/N 6025-1008). The non-rechargeable battery consists of 18, 1.5-volt batteries. The supply (approx. 29 to 15 volts depending on battery condiditon) is used to drive the switching regulator and the crystal oscillator located in the frequency standard module 1A3 if the main power is interrupted. A test circuit, located on the programmer circuit card 1A2A1, measures the output voltage of the battery supply and yields the results necessary to drive the front panel indicators. (Refer to paragraph 5-26 for battery test conditions.) A5 amp fuse, located within the supply, provides protection for inadvertent shorts.

4-37. RECHARGEABLE STANDBY BATTERY SUPPLY (1A4) (P/N 6025-1018). The rechargeable battery supply (figure FO-19) is used to maintain timing synchronization, blanker frequency memory and the 5 MHz frequency standard in the event of power cut-off. The supply consists of 12 sealed lead/acid batteries, rated 2-volts each, and a voltage regulator circuit card. The supply is contained in a sliding drawer. Standby power of 28-volts DC is supplied to the 10245 MHz frequency standard and to a switching regulator which provides +5 volts DC to the programmer timers.

4-38. The regulator card, mounted in the battery box, receives unregulated +35 VDC input from the 1024 power supply. Voltage regulator U1 (figure FO-19) is set to output exactly 28.9 VDC by potentiometer R3. The resulting 28.9 volts at TP1 provides a precise terminal voltage (28.2 volts) for the batteries at the manufacturers recommended trickle charge rate of approximately five milliamps. The 6.8 ohm resistor, R4, limits the charging current to a safe value (400 mA max.) when the batteries are discharged. The 2-amp fuse, F2, prevents severe physical damage to the system wiring harness or battery box if an inadvertent short occurs on the 28 volt line. Fuse F1 protects the 1024 power supply from shorts in the battery charging circuit. Permanent damage to the batteries may occur if they are allowed to completely discharge to 0 volts. Relay coil (K1) and zener diode (VR1) sense the battery voltage. If the voltage drops below 19 volts, relay K1 drops out (opens) removing the battery load. Turning the AC line power to the 1024 back on automatically resets (closes) the relay and activates the battery charger circuit to recharge the batteries. Depressing switch S1 forces the relay to drop out when the batteries have normal charge and the AC line power is off. This allows the batteries to be disconnected from any load for long term storage. Refer to paragraph 3-16 for additional storage information.

4-39. 5018 POWER AMPLIFIER - UNIT 2

4-40. The power amplifier unit (figures FO-21 and FO-22) consists of the 100-watt amplifier assembly (2A1), the power supply assembly (2A2), and the enclosure assembly (2A3). The 100- watt amplifier assembly contains the 32 MHz low pass filter (2A1A1) and power amplifier subassemblies (2A1A2). The power supply assembly provides all the regulated DC power for the 100-watt amplifier assembly. The enclosure assembly (figure FO-22) contains the chassis and the rear panel subassembly (2A3A1).

4-41. 32 MHz LOW PASS FILTER (figure FO-21/1). Assembly 2A1A 1 is an LC low pass filter to attenuate frequencies above 32 MHz. This assembly receives the RF signal (2- 30 MHz) from the synthesizer and provides an output to the power amplifier.

4-42. POWER AMPLIFIER (figure FO-21). The power amplifier consists of a driver circuit (2A1A2A2), a four-way power splitter/combiner circuit (2A1A2A3) and four identical 30W power amplifier circuits (2A1A2A4-A7). The driver circuit consists of a class A linear preamplifier followed by two parallel class A push-pull driver amplifiers. The RF gain from the preamplifier input to each driver amplifier output is approximately +38 dB. The nominal full power input to the driver preamplifier from the 1024 is approximately 0 dBm. This yields an output power level for each driver of 5 to 10 watts (typically 7) when the TCS-4B output is 100 watts. Of the two 10-watt driver outputs, one is used as the input to the power splitter/combiner (figure FO-21/3), and the other is used to drive the filter decode module in the 4011 unit.

4-43. The 10-watt signal from the driver circuit is impedance-transformed and split by the power splitter to form four identical signals which feed the four 30-watt power amplifiers. Each 30- watt power amplifier (figure FO-21/4) consists of a two transistor class A push-pull, transformer coupled, broadband linear amplifier. Each output transistor (Q1 and Q2) is biased to 2.75 amps collector current (5.5 amps total) by integrated circuit bias regulator U1. Each of the four amplifiers has a gain of 14 dB and produces up to 30 watts at each of their respective outputs. The power combiner adds the four 30-watt signals to produce the final output of approximately 100 watts. The RF power is impedance transformed to 50 ohms and presented to the output connector J3.

CAUTION

> The amplifiers, splitters, combiners, and RF cables are carefully phase-matched to ensure proper division of RF power throughout the amplifier. Any change of coax cables connecting the power splitter/combiner could seriously degrade the amplifier performance.

4-44. 5018 POWER SUPPLY (figures FO-23 and FO-24) (S/N 400101 and on). This circuit accepts 115 or 230 VAC at 47-440 Hz and produces the following outputs:

a. 115 VAC, 60 Hz - three independent supplies for the rear panel-mounted cooling fans.

b. +27 VDC - five independent supplies for power amplifier circuits.

c. +5 VDC - one supply for the front panel power indicator lamp.

4-45. The AC line input from the rear panel is RF filtered by FL1 and presented to the primary of transformer T1 via an input voltage selector switch (SW1). The selector switch is factory wired to the 115/230-volt terminals of T1. Some variations of input voltages can be accommodated by changing transformer connection points as indicated by the values shown at the taps of transformer T1 primary. Also connected to the primary side of T1 are the AC-to-AC converters. These units are separately filtered and convert 107 VAC at 47-440 Hz to 115 VAC at 60 Hz. They provide constant cooling fan speed regardless of the input line frequency. The secondary winding of T1 supplies voltage to five full wave bridge rectifiers (CRl-CR5). These rectifiers supply 35 volts to the five voltage regulators (A1-A5). Each regulator is factory set to supply 27.2 ± .2 VDC to the 100-watt amplifier assembly (2A1). Regulators A1-A4 supply power to the four 30-watt amplifier circuits, and A5 supplies power to the driver circuit. A single 5-volt regulator (U4) supplies power to the front panel power-on lamp. Each 27 VDC regulator is connected to a thermostat on the 100-watt amplifier assembly. If the temperature on the amplifier assembly exceeds safe operating limits (215°F) , the thermostat contact opens. With the thermostat contacts open, regulators A1-A5 are disabled.

NOTE

The 100-watt amplifier assemblies (5018- 1001) (S/N 400100 and before) do not have the thermal protection and must be modified when used in 5018 amplifier units with S/N 400101 and above. Connector 2AlJ4, pin F must be connected to chassis ground. If this pin is not grounded, the 27 VDC regulators will be disabled due to the thermal shut-off feature.

4-46. 4011 FILTER/DIPLEXER - UNIT 3

4-47. The filter/diplexer (figure FO-2) consists of five main assemblies: filter set (3A1A1); filter decode (3A2A2); power detector (3A1A3); diplexer (3A1A2); and power Supply (3A2A1). The power detector is a 30-dB, high frequency, directional coupler/detector which provides output voltages related to the forward and reflected powers. These voltages are used to drive the 1024 front panel RF power meter. Included in the 4011 are two relays which together allow diplexed or non-diplexed (direct) operation (figure FO-2).

4-48. FILTER SET (figure FO-25) (S/N 400101 and on). The filter set consists of eight sequentially enabled, half-octave, low-pass filters which are used to attenuate harmonics generated by the 5018 power amplifier. The filters are located on two circuit cards (3A1A1A1 and 3A1A1A2) within the filter set. The filters are designated LPF1-LPF7 and LPF9; LPF8 is a switchable bypass circuit that feeds the RF signal directly to LPF9. Filters LPF1-4 are located on the A2 assembly and LPF5 thru LPF9 are on the A1 assembly. The RF signal enters at J1 and is connected to E10 and E12 on the A1 and A2 assemblies respectively. If the signal is between 2.0- 2.8 MHz, LPF1 is enabled. This is accomplished by enabling the input (CR10) and output (CR12) diode gates with forward biasing. This 5-volt bias is provided at E1 by the filter decode assembly. The remaining seven pairs of diode gates are reverse-biased by a -250-volt potential also provided by the filter decode. As the RF sweep signal passes 2.8 MHz, CR10 and CR12 in LPF1 are reverse-biased by -250 volts, thereby removing LPF1 from the RF circuit. Due to the permanent bias of -240 volts at E9, CR11 is now forward-biased, shunting to ground any RF that leaks through CR10. As the RF signal sweeps up to 30 MHz, LPF2 thru LPF8 are sequentially enabled in a similar manner. The tabulation below indicates the frequency range during which each circuit is enabled.

Frequency (MHz)	Filter
2.0- 2.8	LPF1
2.8- 4.0	LPF2
4.0- 5.8	LPF3
5.8- 8.0	LPF4
8.0- 11.0	LPF5
11.0- 16.0	LPF6
16.0- 23.0	LPF7
23.0 - 30.0	LPF8
2.0- 30.0	LPF9

As indicated in the table, LPF9 is in the RF path for all transmitted frequencies. This filter further attenuates any harmonic frequencies above 30 MHz not removed by the selected filter, LPF1- 8. When LPF8 is selected, the RF signal is fed directly to the LPF9. LPF8 contains no filtering elements and routes unfiltered RF to LPF9 which removes unwanted harmonics above 30 MHz.

4-49. FILTER DECODE (figure FO-27). Sequential switching for the filter set is provided by the filter decode circuit. This circuit determines the transmitted frequency and outputs +5 and -250 volts to bias the appropriate filters on and off. The filter decode circuit uses the 10- watt output from the drive portion of the power amplifier. The input, at J1, is divided by two (U2) and gated by U3. The internal 1 MHz reference oscillator (U24) is divided down to 250 Hz which is used to gate the RF (divided by two) at U3 and to produce counter preset-load-latch timing pulses. Circuits U12, U5, U6, U 13, and U19 count the gated RF. Following a gate period, the BCD count is delivered through latches U7, U20, and U26 to the decoder circuit which determines the particular half-octave filter to be enabled. The transistor circuits that follow the decoder are the filter drivers which provide the necessary high power bias for the filter set pin diode switches. The +6 and -270 volt supplies are used to power the filter drivers. When loaded into the filter set, the output levels of the drivers are approximately +5 and -250 volts.

NOTE

> The later serial numbered units (S/N 400101 and on) provide bias voltages of +5 and -250 as described. The earlier serial numbered units (S/N 400100 and before) used bias voltages of +5 and -270. Other than these outputs, the circuits are the same.

4-50. DIPLEXER (figure FO-28). The diplexer is essentially a high-power, directional coupler matched on both sides to 50 ohms. The two transformers (T1 and T2) are configured to couple -17 dB (2 watts) of the chirp transmit signal to the antenna with a communications transmitter straight through loss of only 0.4 dB. The coupler also provides the TCS-4B transmitter with 40 dB of isolation from a displexed communications transmitter. Capacitor C1 is used to block DC continuity to ground in the diplexer during communications transmitter tests for antenna sensing. The two watts of transmitter signal are added to the communications signal, and the balance (98 watts) is absorbed by the 50 ohm load resistor (attached to the rear panel). The 0.4 dB of loss on the communications transmitter line is also absorbed by the load resister.

4-51. 4011 POWER SUPPLY (figures FO-27 and FO-29). The power supply, along with components of the filter decode assembly, provides the 4011 unit with +5, +6, +26, -240, and -270 volts DC . In addition, the power supply provides power line switching for the 5018. Power to the 5018 unit is routed via a contactor (K1), having normally open contacts. The contactor coil is operated from the 4011 26 VDC line so the 4011 must be on before the 5018 can be turned on. This arrangement ensures that the 5018 will not delivery RF power to an inactive filter set.

4-52. As with all units in the transmitter, the 4011 has its own 230/115-volt selector switch. This is located after the line filter and power switch, and prior to the primary of T1. Some variations of input voltage can be compensated for by using different taps on T1. On the secondary side of T1, the -240 VEC bias voltage for the filter decode is developed by adding -270 volts and +30 VDC. The +5 and +6 VDC regulated voltages (figure FO-27/1),supply the TTL digital decode logic and the filter drivers respectively. Power to the 1024 is not switched by the 4011 unit; however, both units do use a common power input plug.

NOTE

> The later serial numbered units (S/N 400101 and on) develop the 240 VDC bias voltage using -270 and +30 volts as described. In earlier units (S/N 400100 and before), a bias voltage of -250 VDC is developed using -270 and +20 volts. Other than these value differences, the circuit is the same for all units.

4-53. FREQUENCY STANDARD (figure FO-30) (S/N 400100 and before). The transmitter timing circuits are based on a 5 MHz standard derived from a 10 MHz temperature controlled quartz crystal oscillator. Both the oscillator-amplifier and the oven controller portions of the oscillator require a stable 10 VDC input. This is provided by regulator U3 from the battery or Q102 regulated primary power source. An LC circuit comprising L1 and C10 further isolates the oscillator portion from switching transients. On the return side of the oven circuit, Q101 provides current limiting to safeguard against current surges during the initial oven heater warm-up period (approximately 5 minutes). The 10 MHz output of the oscillator is divided by flip-flop U2 down to 5 MHz (internal standard) and fanned out to buffer gates U1 for use by the timing circuits as independent 5 MHz, 50 ohm sources.

4-54. SWITCHING REGULATOR (figure FO-31) (S/N 400100 and before). This circuit regulates the +5-volt power input to the primary timing circuits of the receiver. The circuit is basically intended for regulation of the battery supply during a power failure. However, in normal operation, a line power derived source of 29 VDC (from CR4+, figure FO-32) is routed through the same circuit allowing unbroken interruption of power should a supply failure occur. The high efficiency (65%) circuit contained on this board uses a low current drain voltage regulator connected as an oscillator (U1) in which an inductor (L2) is used in the feedback loop as an energy storage device. By cent rolling oscillation, the inductor effects internal conduction of the regulator/oscillator, thereby controlling voltage. A 1.6A current limiter (Q4, Q5, and Q6) and a 6 volt, 5 watt, overvoltage protector (CR6 and CR10) are included as an integral part of the circuit. A related circuit senses the input line to determine if the battery voltage is less than 16.3 volts. This is achieved at U2 by comparing the received voltage to two zener diodes, the difference voltage thereby controlling Q7, which in turn controls turn-on of oscillator U1.

4-55. PROGRAMMER (figure FO-32) (S/N 400100 and before). A 5 MHz input from the synthesizer is gated into U6 and continues through a fixed divider chain ending in U29. The resultant frequencies are 100 kHz at TP2 and 1 Hz at TP1. A BCD down counter to drive the front panel digital clock is formed by U30 (1 second), U24 (10 seconds), U22 (1 minute), and U28 (10 minutes). A BCD group branching off the same down counter into U16 and U10 is used to decode five minute segments from the front panel switch scanner circuit formed by U26 and U20. Every five minutes the next programmer switch on the front panel is interrogated by this scanner. If a switch is closed (ON), a pulse is passed through the programmer switch contacts and into the PSC (Common) terminal which then clocks U14. U14 triggers a one-shot (U21) which sends an auto-start pulse back to the synthesizer at terminal AST. At the end of each sweep, U14 is cleared to reset the auto- start circuit and await another PSC pulse from the front panel switches. U1 and U2 form part of the network which interfaces the front panel switches with the internal logic. These are switch debounce flip flops to prevent spurious transients from being gated as pulses. U13, U3, and U9 form a decoder that determines which switches are enabled based on the position of the MODE switch. In the manual (MAN) mode position, the front panel switches for sweep START, STOP, and RESET are enabled. In the SET mode position, START and RESET are enabled. In the continuous and program modes, the three switches are disabled. Transistors Q1 through Q6 are lamp drivers to indicate which of the front panel switches are enabled. Two one- shots formed by U8 have pulsed outputs which are enabled when the advance timer or reset switches are actuated. Their function is to either advance the minutes decades or reset the digital clock.

4-56. TEST CIRCUIT (figure FO-32) (S/N 400100 and before). The test circuit provides a go/no-go check of all DC power supplies, the battery supply, and synthesizer phase locked loop. The test is made by pressing the front panel TEST pushbutton and interpreting the indicators mounted adjacent to the switch. The method of ANDing the inputs to indicate test status is shown on the schematic (FO-23). All the low voltage DC inputs are monitored, The +29 volt input comes from the switching regulator and effectively checks the +35 VDC unregulated supply. The input OOL (out of lock] comes from the synthesizer and is low if the phase locked loop is not locked. The LT input is not used on the transmitter. The output at U38-6 is low when all inputs are active. With U38-6 low and the test switch depressed, Q8 will conduct (+5 volts), and the system test green indicator will light. Under the same conditions with U38-6 high (one or more inputs inactive), Q7 will conduct, turning on the red lamp. Detection of battery condition by the front panel test lamps is indicated on the schematic, (figure FO-32). The test switch serves to enable transistors Q9 and Q10 which drive the battery indicator lamps. With the test switch actuated, the +5 VB enables U37 and also turns on Q12 which drives Q11 to saturation. The battery voltage is then sensed by the divider R46, R47, and R48. If the battery voltage is 22 volts or more, the divider biases Q10 on which supplies 5 volts to turn on the battery green indicator. If the battery voltage is between 17 and 22 volts, the divider (R46, R47, and R48) biases both Q9 and Q10 on which causes both red and green lamps to light. For battery voltages between 17 and 14 volts, Q9 is biased on the red lamp lights. Voltage below 14 volts is not sufficient to turn on either transistor and both indicator lamps remain off.

4-57. FREQUENCY COUNTER (figure FO-33) (S/N 400100 and before). A 2.11 - 3.60 MHz input from the synthesizer (1/20 of the synthesizer output before down conversion) goes to terminal XF1 and is gated for two milliseconds into a 4-decade counter (U4-U7) preloaded to 5980. The counters count up from 5980 the number of cycles in the two-millisecond period. (For example, 2.11 MHz yields 4200 cycles in two milliseconds which when added to 5980 yields 10200. The most significant digit (1) is discarded and a frequency readout of 2.00 MHz is displayed. The resultant transmit frequency is then latched for one counter cycle by latches U12-U15 and is then switched to the display drivers via 2-to-1 multiplexer U20-U23.

4-58. FREQUENCY BLANKER (figure FO-33) (S/N 400100 and before). The frequency blanker section provides the storage capability for 16 frequencies used to blank the transmitter output. The transmitter output is blanked for ±10 kHz about the stored frequency. U30, U31, and U32 are 64-bit, random access memories in which sixteen 4-bit BCD numbers may be stored. The frequency to be blanked and one of 16 possible memory channels are entered by front panel thumbwheel switches. Pressing the STORE switch with the RUN/PROG switch in the PROG (program) position enters the frequency into the selected channel location. Each channel location may be examined to determine what frequency is stored by pressing the DISPLAY switch. During operation, all 16 channels are sequentially addressed by U45 every 10 kHz step to the synthesizer output frequency. U9, U10, U17, U19, U25, U35, U36, and associated circuits form a 4-decade BCD subtracter which subtracts 10 kHz from the stored frequency and compares that result with the counter frequency (which is a 10 kHz behind the actual transmit frequency) in U8, U16, U24, and U34. If both frequencies are equal, a pulse (XBO) is sent to the synthesizer (U27 and U28, figure FO-5). The synthesizer then waits until the next 10 kHz increment and blanks the output for 20 kHz.

4-59. 5018 POWER SUPPLY (figure FO-34) (S/N 400100 and before). The power supply circuit accepts 115 or 230 VAC at 47-440 Hz and produces the following outputs:

a. 115 VAC 60 Hz - three independent supplies for the rear panel-mounted cooling fans;

b. +27 VDC - five independent supplies for driver and power amplifier circuits; and

c. +5 VDC - one supply for the front panel power indicator lamp.

The AC line input from the rear panel is RF filtered by FL1 and presented to the primary of transformer T1 via an input voltage selector switch (SW1) . The selector switch is factor wired to the 115/230-volt terminals of T1. Some variations of input voltages can be accommodated by changing transformer connection points as indicated by the values shown at the taps of transformer T1 primary. Also connected to the primary side of T1 are the AC-to-AC converters. These units are separately filtered and convert 107 VAC at 47-440 Hz to 115 VAC at 60 Hz. They provide constant cooling fan speed regardless of the input line frequency. The secondary winding of T1 supplies voltage to five full wave bridge rectifiers (CR1-CR5). These rectifiers supply 35 volts to the voltage regulators A1, A2, and A3. Regulators A1 and A3 supply four independent 27 VDC inputs to the power amplifier; and A2 supplies one 27 VDC input to the driver amplifier. A single output from A3 is also regulated by integrated circuit U4 to produce +5 volts for the front panel power-on lamp. Each of the five 27 VDC regulators is also connected to separate integrated circuit voltage regulators for current limiting and voltage control. The regulated output voltages are adjusted by potentiometers R33, R35, R31, and R37, while short-circuit, current-limiting potentiometers R2, R10, R18, R6, and R14 are factory set.

4-60. FILTER SET (figure FO-35) (S/N 400100 and before). The filter set comprises eight sequentially- enabled, half-octave, low -pass filters which are used to attentuate harmonics generated by the 5018 power amplifier. The eight half-octave filters cover a 2-30 MHz transmit frequency range and are individually enabled by the filter decode assembly as the sweep progresses. For example, a sweep beginning at 2 MHz enters at J1 (figure FO-35) and passes into filter FL1 whose input (CR1) and output (CR2) diode gates are enabled by forward biasing provided by the filter decode assembly. The remaining seven pairs of diode gates are reverse biased by a - 270-volt potential developed by the filter decode circuit. Note that C16 on schematic figure FO-35 is only included in the last filter. As the sweep passes through 2.8 MHz, the CR1 and CR2 gates are disabled by reverse biasing (- 270 volts at filter select input 1); thereby removing FL1 from the RF circuit (figure FO-26). At the same time, FL2 is enabled by switching its filter select input to +5 volts. Due to a permanent bias of -250 volts at the junction of R1 and R2, the +5 volt reverse biases CR1 and CR2 by 255 volts. This again causes a current flow such that CR3 and CR4 are forward biased. When the selection cycle has passed through FL- 7, a direct connection (RG - 58) is enabled, and only FL8 is in the RF path. This filter, which is at all times in the RF line, now acts solely as the last half-octave filter for 23-30 MHz. During the blank period between sweeps, FL8 is the only pass filter selected until the sweep restarts.

SECTION 5

MAINTENANCE

5-1. INTRODUCTION

5-2. This section provides maintenance and service information for the TCS-4B transmitter. Included are tables of recommended test equipment, a preventive maintenance schedule, corrective maintenance procedures, and performance verification data. An understanding of the theory of operation from Section 4 is required for troubleshooting and repairing the equipment.

5-3. TEST EQUIPMENT

5-4. Recommended test equipment for performance tests and troubleshooting is listed in table 5-1. Other test instruments may be used if their performance is equivalent to those listed. If a test measurement is made which is outside the acceptable range, operation of the test equipment should first be verified before assuming malfunction of the equipment under test.

Table 5-1. Test Equipment Required

Item	Recommended manufacturer and type
Oscilloscope	Tektronix 455 (or 465)
Frequency Counter	Hewlett Packard 5300B
Multimeter	Simpson 460
Termination, 2 watts	Microlab FXR TA - 5MN
Attenuator, 20 dB	Tektronix 011-0059-02
RF Wattmeter	Bird Electronic Corp. 6155
Spectrum Analyzer	Hewlett Packard 141T
with IF Section	Hewlett Packard 8552B
RF Section	Hewlett Packard 8553B
Power Supply (35VDC Lab type)	Lambda LL-903-0V, or Lambda LP-522-FM, or HP 6200B

5-5. PREVENTIVE MAINTENANCE

5-6. Table 5-2 provides a list of recommended preventive maintenance procedures. To assist in obtaining long-term trouble-free operation of the transmitter, the procedures should be adhered to as closely as possible. Marginal operation of any unit checked should be noted and carefully re-examined at the next maintenance period.

WARNING

In the performance of some maintenance procedures, it is necessary to have the equipment energized and dust covers removed. Extreme care must be exercised in making internal measurements or adjustments since potentially lethal voltages are present.

5-7. CORRECTIVE MAINTENANCE

5-8. The corrective maintenance data provided in this section consists of troubleshooting procedures and adjustment procedures. Parts requiring removal during relevant adjustment operations are described and illustrated as necessary. The recommended maintenance approach for the TCS-4B transmitter is repair by replacement of assemblies. Faulty assemblies are returned to the depot for repair to a part level.

5-9. TROUBLESHOOTING PROCEDURES. Table 5-3 provides a basic guide for troubleshooting the transmitter. The table is not intended to be all inclusive but rather to provide indications of what unit or assembly is defective. One approach to fault isolation is to derive all possible information from the function or malfunction of operating controls and indicators and then, through systematic analysis of test and measurement data, along with the troubleshooting guides, localize a fault to a module or assembly. The malfunction is verified and corrected by replacing the faulty assembly with a known good assembly. The performance test, paragraph 5-20, plus figures 5-5, 5-6, and 5-7 and schematics provide the measurement data that can be used for fault isolation.

NOTE

In order to perform troubleshooting and adjustment procedures, individual units must be removed from rack, and top access cover must be withdrawn, being careful to first disconnect interconnecting cables.

Table 5-2. Preventive Maintenance Schedule

Procedure	Schedule
1. Check frequency standard and adjust if necessary per procedure given in paragraph 5-15,	At installation and /or after equipment has been moved; thereafter as needed to correct for drift.
2. Check battery condition by performing self-test (refer to paragraph 3-7, step p); if necessary change batteries according to paragraph 2-17. The primary AC power should be on when performing this test.	At beginning of each shift
3. Check antenna RF output power efficiencies by switching power output FWD/REFL switch from FWD to REFL . Note meter readings for diplexed and non-diplexed modes. Refer to paragraph 3-8, step c.	At beginning and end of each shift.

Table 5-2. Preventive Maintenance Schedule - Continued

Procedure	Schedule
4. Check cooling fan efficiency on the 1024 and 5018 units. For the 5018 unit, movement of air should be easily detected about 12 in. (20cm) away from the rear panel fan which exhausts air from the unit. The 5018 inlets are filtered (the 1024 is not filtered). Remove and clean inlet filter if exhaust air flow is inadequate. Remove the 12 screws that hold the unit to the 5018 from panel and wash the filter with water, either spraying or submerging the unit. Dry thoroughly.	Weekly (daily if in dusty area)
5. Make check of RF power elements by determining power output of 4011 unit to be 50-150 watts during normal non-diplexed sweep operations. This is accomplished by performing RF power performance test (paragraph 5- 22) and frequency test (paragraph 5-23).	Monthly
6 Make visual inspection of all interconnecting cables and connectors at rear of units. Ensure that plugs are fully inserted and that no undue strain is being placed on cables.	Monthly and prior to new startup.
7. Remove top covers from all (three) units and make visual inspection of interiors. Ensure that all modules are properly seated and that no loose wires or signs of overheating exist.	Every 3 months
8. Make visual check of power heat sink located at rear of 4011 filter/diplexer unit. Note any discoloration or signs of excessive heating in surrounding hardware. The dummy load in this unit is designed to absorb 300 watts (maximum) of RF power in the diplexed mode.	Every 3 months
9. Check all low voltage DC power supplies per instructions given in the adjustment procedures, paragraphs 5-14, 5-19, 5-25, and 5-28.	Every 3 months
10. Check transmitter output spectral purity by performing harmonics/spurious response test (paragraph 5-30).	Every 3 months

Table 5-3. Troubleshooting Guide

Indication	Location/Cause
1. 1024 Main Power pushbutton does not illuminate	Main line disconnected; fuse F1 (1024) blown; transformer or lamp malfunction. Check position of switch S1, line selector. Overvoltage crowbar tripped.
2. 5018 Power indicator does not illuminate	Main line input disconnected; 4011 not on; fuse F1 (5018 or 4011) blown; contactor K1 (in 4011) malfunction; transformer (in 5018 or 4011) or lamp malfunction; malfunction in 5018 voltage regulators A3 or U4; overvoltage crowbar in 4011 tripped.
3 4011 Main Power pushbutton does not illuminate	Main line disconnected; fuse F1 (4011) blown; malfunction in FL1, T1, CR5, or lamp. Check position of switch S1, line selector. Overvoltage crowbar tripped.
4 No RF power indication.	Defective or disconnected coax cabling; defective meter; no output from 1024 unit, overheating in 5018 unit causes a thermal switch to cutoff amplifier bias voltage; defective 5018 RF amplifier or power supply; defective 4011 filter set, RF relays, power detector, or power supplies.
5. Low or incorrect RF power meter reading.	1024 not switched to full output; faulty 5018 power supply; defective meter movement; one or more 5018 RF power amplifiers faulty; defective input cables; faulty synthesizer in 1024; faulty 4011 filter set.
6. Amplifier overheating.	Defective fan; defective power supply; ambient air above specifications; obstructed fan intake or exhaust; diplex relay in direct mode with communications Tx on; faulty load resistor connection.
7. Numeric display stopped or incorrect.	If frequency: Problem is synthesizer frequency counter (1024) , or frequency standard, Press TEST pushbutton to check synthesizer. If time: Problem in programmer or frequency standard. Check 1A2A1, TP3 (see figure 5-5) (100 kHz).
8. Excessive RF power variation versus frequency sweep.	Faulty 4011 filter set, 4011 filter decode, or 5030 sweep synthesizer.

Table 5-3. Troubleshooting Guide - Continued

Indication	Location/Cause
9. System fault indicator lights red lamp.	Indicates in any of 1024 DC power supplies or fault synthesizer. Perform synthesizer and 1024 DC power supply performance tests. Refer to paragraphs 5-23, 5-24, and 5-31.
10. Battery fault indicator lights red lamp.	Refer to table 3-1 (Section 3) and replace batteries (or complete battery pack) if necessary.

5-10. OVERVOLTAGE PROTECTION. The 1024 and 4011 power supplies incorporate an overvoltage protection device, shown in figures FO-18 and FO-27. The overvoltage device accomplishes circuit protection by effectively short circuiting the output terminals of the power transformer when the trip voltage limit is exceeded. The over voltage device is connected across the 11 volt terminals and trips at 17 volts. When the trip voltage is exceeded, the input power fuse is normally blown. This condition should be noted when troubleshooting and line voltage checked before trying to turn on the transmitter.

5-11. OVERHEATING PROTECTION. Overheating conditions in the 5018 unit are sensed by a thermal cutoff switch, U1 (figure FO-21/1). This switch is located on the 5018 power amplifier RF assembly and activates when temperature exceeds 215°F (101°C) to disable the 27 VDC power supply to the amplifier.

5-12. ADJUSTMENT PROCEDURES

5-13. GENERAL. All initial adjustments to the transmitter are made at the factory before shipment. These procedures are provided for use following repair or as required during the performance verification test.

WARNING

> Use extreme care when making internal adjustments with power on. Potentially lethal voltages are present in the transmitter.

5-14. 1024 POWER SUPPLY ADJUSTMENT (S/N 400101 and on). The 1024 has only one power supply adjustment. This adjustment involves connecting of a low line tap for line voltage variations that are below acceptable limits. The 1024 operates satisfactorily when the main line power is between 110 and 125 volts (for 115V position of voltage select toggle switch) or 215 to 250 volts (for 230V position of toggle switch). (Refer to figure FO-18.) Use of the low line tap (220- 105) is only necessary if line voltages lower than 110V (or 215V) are expected. To make this adjustment, disconnect wire at TB1, pin 1 that goes to switch S1, and connect wire to TB1, pin 2 (figure FO-18).

5-15. FREQUENCY STANDARD ADJUSTMENT. Over long periods of time, the temperature-controlled quartz crystal in the frequency standard will show effects of precession (frequency change due to crystal aging). When the rate of precession in the receiver and transmitters is not equal, the effects of a difference will show up by vertical movement of a received path on the RCS-4B receiver CRT. Normally a path can be recentered on the receiver CRT by means of the receiver SLIP control. If the SLIP control is adjusted to recenter any single path more than once in eight hours, there is need to adjust the frequency standard on the transmitter. However, if all transmitter displays show drift on the CRT in the same direction, it is necessary to adjust the receiver frequency standard. (Refer to RCS-4B receiver manual.)

5-16. To make the transmitter frequency adjustment, the direction of drift on the RCS-4B receiver CRT must be determined. If the displayed path is moving downward, the 1024 front panel fine control (STD ADJ) should be turned counterclockwise. If the displayed path is moving upward, the control should be turned clockwise. (One full turn of the control changes the drift rate by approximately 0.5 milliseconds per 24 hours.) If the front panel control range is insufficient (total range is 20 turns end to end) to make the correction, it should be recentered, and the adjustment made on the coarse control located on the 1024 frequency standard 1A3 (figure 5-1). Adjust the coarse frequency control by turning it in directions opposite to that of the front panel fine adjust. If the display is drifting downward, turn the coarse adjustment clockwise. One turn of the coarse frequency adjustment will compensate for a drift of 100% of CRT height per 24 hours (5ms/24hrs) for a 2-30 MHz sweep, or 50% of CRT height for 2-16 MHz sweeps.

5-17. 5018 POWER SUPPLY ADJUSMENT (S/N 400101 and on). Variations in input line voltage can be accommodated by adjusting the positions of taps on the transformer primary. The adjustment is made on assembly 2A2 (figure FO-23) by unsoldering the standard 115/230 volt connections at pins 4 and 9 of T1 and moving higher or lower in voltage as required. With voltages less than 110 or 215 VAC , move connections on respective primaries to pins 3 and 8. With voltages greater than 120 or 250 VAC, move connections to pins 5 and 10.

5-18. 4011 POWER SUPPLY ADJUSTMENTS . The 4011 power supply provides DC voltages of +5, +6, +26, -240, -270 VDC. None of the voltages requires adjustment; however, they; should be periodically checked in accordance with the performing verification test (paragraph 5-29). Adjustment to accommodate low AC input voltages can be made (paragraph 5- 19).

5-19. AC INPUT ADJUSTMENT. Lower voltage variations from the standard 115 or 230 VAC input can be accommodated by changing connections to the line voltage switch. Upper limits of 120 or 240 VAC can be tolerated using the same factory wiring as for 115/230 volt. If the line voltage is closer to the alternative 105 or 220 volt, remove the AC switch bracket on assembly 3A2A1 (schematic figure FO-29) and remove existing gray and white wires from pins 1 and 3 respectively on the underside of the switch. Replace the 230 volt gray wire with the 220 volt gray/white wire (sorted from the transformer cable) and replace the 115 volt white wire with the 105 white/black wire. Insulate the exposed ends of the unused wires and secure wires to the cable bundle.

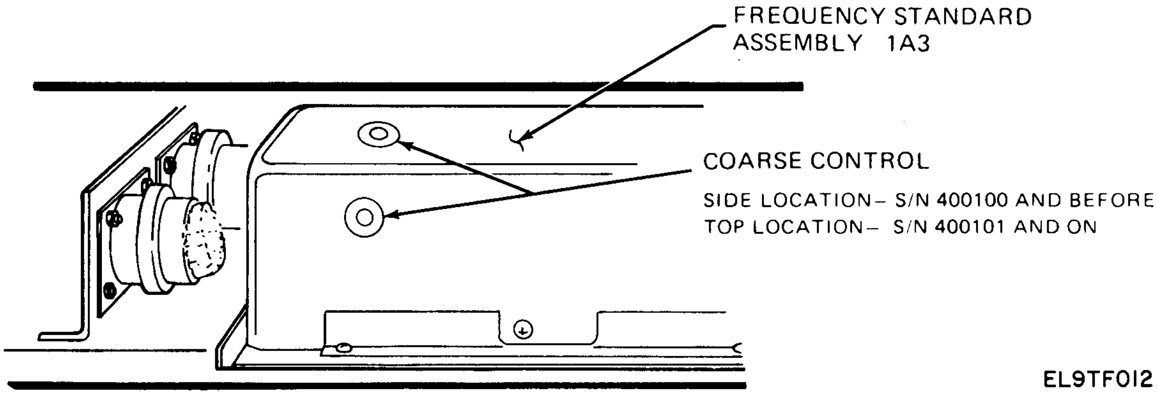


FIGURE 5-1. Frequency Standard Crystal Oscillator Adjustment.

5-20. PERFORMANCE TEST PROCEDURES

5-21. GENERAL. The following performance tests are designed to provde the most expedient method of checking overall transmitter operation within the limits for field maintenance. The order of performing the tests will depend entirely on the anticipated status of the equipment. If the equipment is suspected of being below specifications, then the complete test in the order presented should be performed. If the equipment is being tested only for an over-all check, the RF power test (paragraph 5-22) and frequency test (paragraph 5-23) should be performed first and any others as appropriate. The test equipment needed for the tests is listed in table 5-1.

5-22. RF POWER TEST. This test checks the RF power elements including the power amplifier (5018), and the filter set and filter decode (4011).

Switch the TCS-4B transmitter off, and disconnect the antenna from the 4011 (J7).

b. Set up the test equipment as shown in figure 5-2. The RF wattmeter is connetted to the 4011 RF out connector (J7) on the front panel.

c. On the 1024, the DIRECT/DIPLEX switch is placed in DIRECT , and the power output .1 PWR/FULL PWR switch is placed in FULL position, and the sweep limit set for 2-30 MHz.

d. Set the RF wattmeter to the 150 watt scale.

e. Turn on the 1024 and 4011.

f. With the 1024 MODE switch in MAN position, press RESET, then press START.

g. If the RF power equipment is functioning properly, the RF wattmeter should read greater than 50 and less than 150 watts throughout the frequency sweep.

h. Repeat step f with the .1 PWR/FULL PWR switch in the .1 PWR position. The RF wattmeter (50W scale) should be greater than 5 and less than 15 watts throughout the sweep.

i. If the RF output measured in steps g and h is only slightly out of specification (either too high or too low) but otherwise good, adjust the synthesizer output level as outlined in step k.

j. If there is not output or a very low output at any point during the sweep in the RF power test steps g and h, refer to the RF power troubleshooting diagram, figure 5-3.

k. To adjust the transmitter RF power level follow the procedure below in the order indicated:

(1) Connect equipment as shown in figure 5-2.

(2) Set the 1024 for DIRECT, 0.1 PWR operation (10 watt output).

(3) With the 1024 MODE switch in MAN position, press RESET. Transmitter output should be approximately 10 watts at 2 MHz (not sweeping).

(4) Remove 1024 top cover and adjust R49 on the synthesizer down converter card in the 5030-1101 module of the 1024 (1A1A2R49) for an RF output of 12 watts at 401-J7. Note that 1A1A2R49 and R50 are both accessible through a small hole in the cover of the synthesizer module, (top side of the upper module in the 1024) such that the synthesizer module does not have to be removed or opened for adjustment. R49 is the potentiometer closest to the center of the synthesizer module and R50 is towards the edge of the synthesizer module.

(5) Set the 1024 for DIRECT, FULL PWR operation (100 watt output).

(6) Adjust R50 on the synthesizer down converter card in the 5030-1101 module (1A1A2R50) for an RF output of 120 watts at 4011-J7.

(7) If adjustment of R49 and R50 cannot bring the transmitter to the required level, refer to figure 5-3.

1. Turn off power on 1024 and 4011 and replace cables removed in step a.

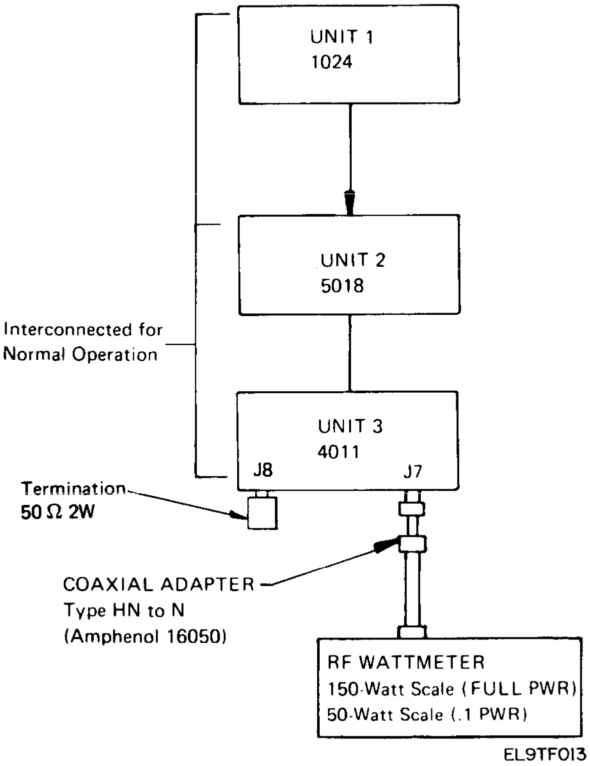


FIGURE 5-2. Power Amplifier Test Setup.

5-23. FREQUENCY TEST. This test checks the frequency sweep of the transmitter.

a. Switch the TCS-4B transmitter off and disconnect the antenna.

b. Set up the test equipment as shown in figure 5-4.

c. On the 1024, place DIRECT/DIPLEX switch in DIPLEX position and the power output .1 PWR/FULL PWR switch in .1 PWR position, and the sweep limits to 2-30 MHz.

CAUTION

This test must be performed with the DIRECT/DIPLEX switch in the DIPLEX position and the .lPWR/FULL PWR switch in the .1 PWR position. If these switch settings are not observed, severe damage to test equipment could occur.

d. Set the frequency counter to read frequencies from 2 to 30 MHz.

e. Turn on TCS-4B transmitter.

f. With the 1024 MODE switch in MAN position, press RESET, then press START. Before the 1024 frequency MHz display reaches 3.00, press STOP. Compare the 1024 frequency reading with the reading on the frequency counter. The readings should be equal.

g. Repeat the above procedure for frequencies between 15-16 and 29-30 MHz.

h. If readings in steps f and g between the 1024 frequency display and frequency counter do not agree, replace the 1024 transmit logic (1A2) or sweep synthesizer (1A1) module.

i. Turn off TCS-4B transmitter and replace cable removed in step a.

5-24. DC POWER SUPPLY TESTS. The following test is subdivided into checks on the three individual units comprising the transmitter. All voltages are labeled adjacent to the test points. Note that some DC voltages are proportional to the incoming line voltage. If the average line voltage differs substantially from 115 (or 230) VAC, refer to adjustment procedure for AC input compensation. If no adjustment is provided for an out-of-spec voltage, the unit is probably defective and should be returned to the depot for evaluation and repair.

5-25. 1024 (UNIT 1) POWER SUPPLY TEST.

a. Remove top cover, and release captive screws on both modules A1 and A2. Stack up modules for access to test points.

b. Use a multimeter to check the following voltages (figures 5-5 and 5-6).

(1) At test points +5V (A) and (B) measure 5 ± 0.25 VDC

(2) At test point +5V (C) measures 5 ± 0.75 VDC

(3) At test point -12V measure -12 ± 0.75 VDC

(4) At test point +12V measure +12 ± 0.75 VDC

(5) At test point +24V measure +24V ± 1.50 VDC

c. AC line ripple should be less than 10 mV peak-to-peak on regulated supplies and less than 1 volt peak-to-peak on the +5C supply.

5-26. STANDBY BATTERY SUPPLY TEST. Two different types of standby battery assemblies are used in the TCS-4B. Some transmitters have a non-rechargeable battery assembly (part number 6025-1008) that uses standard D-cell batteries. Other transmitters have a rechargeable battery assembly (part number 6025-1018) that includes an integral charging circuit and uses sealed lead acid cells. Conditions for testing the charge of the battery supply differ between the non-rechargeable and rechargeable assemblies. These different conditions are noted in steps a and b below. The test results as defined in step c apply to the test of non-rechargeable and rechargeable assemblies.

a. For the non-rechargeable battery assembly (P/N 6025-1008), a test may be conducted at any time during operation with AC line power on or off and the BAT switch on. Pressing the TEST pushbutton switch on the 1024 front panel initiates the test and the BAT lamps light to indicate the charge condition of the battery supply as described in step c below.

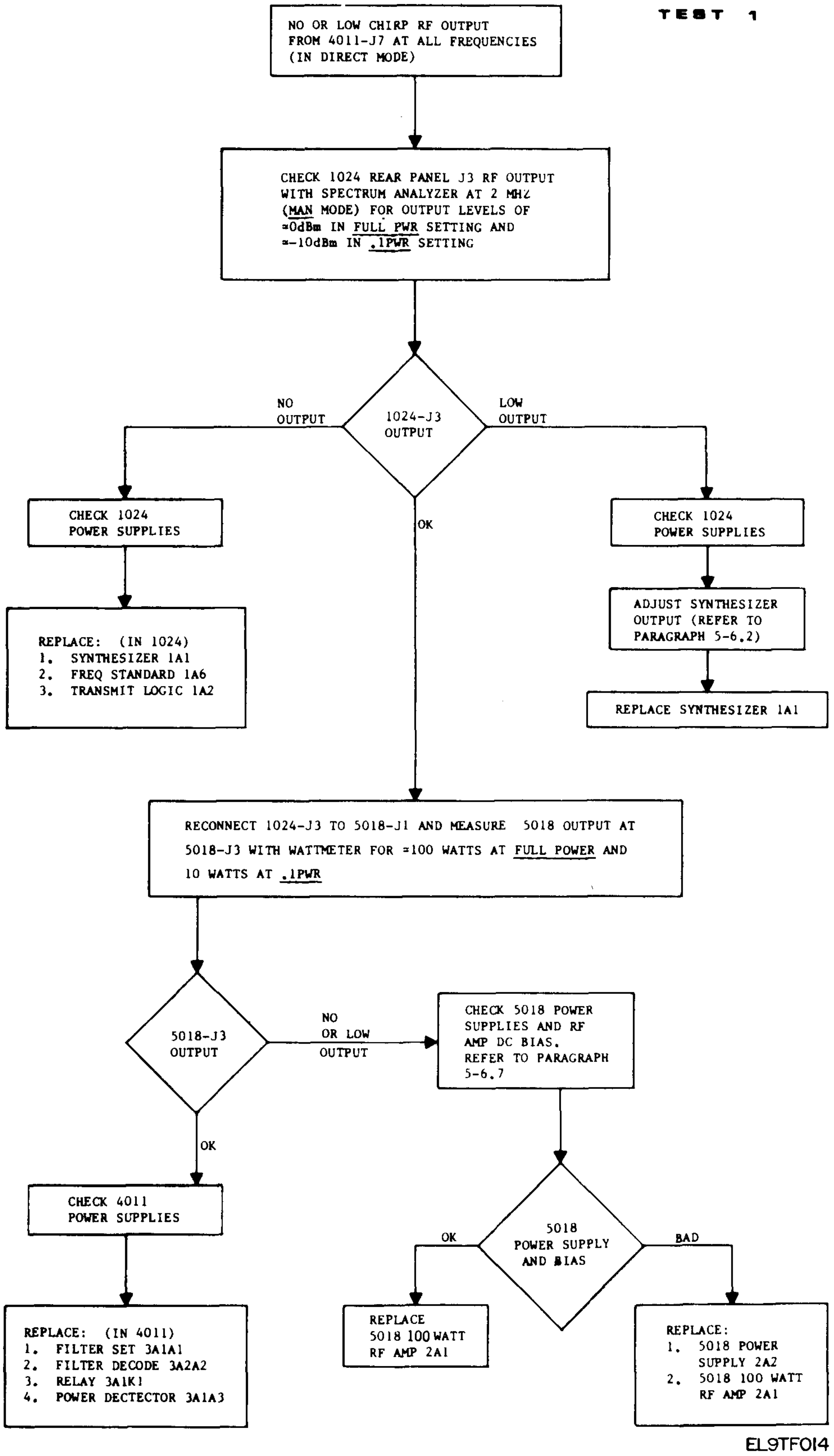


FIGURE 5-3. RF Power Troubleshooting (Sheet 1 of 2).

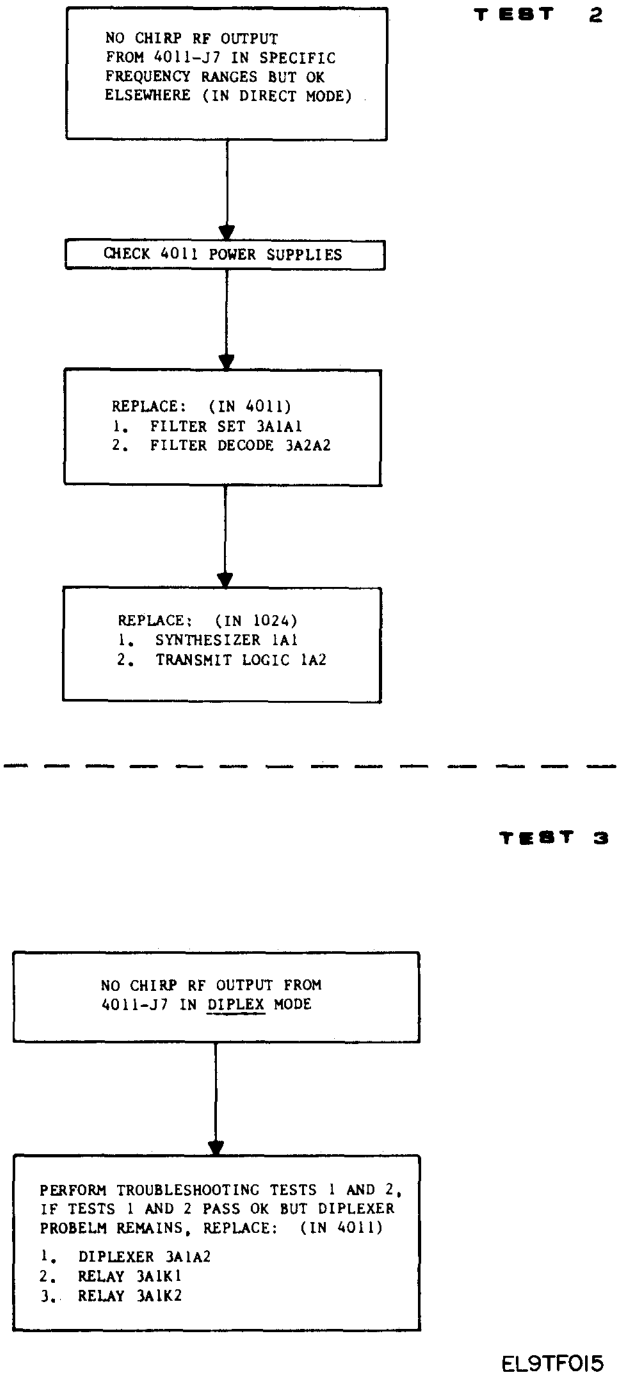


FIGURE 5-3. RF Power Troubleshooting (Sheet 2 of 2).

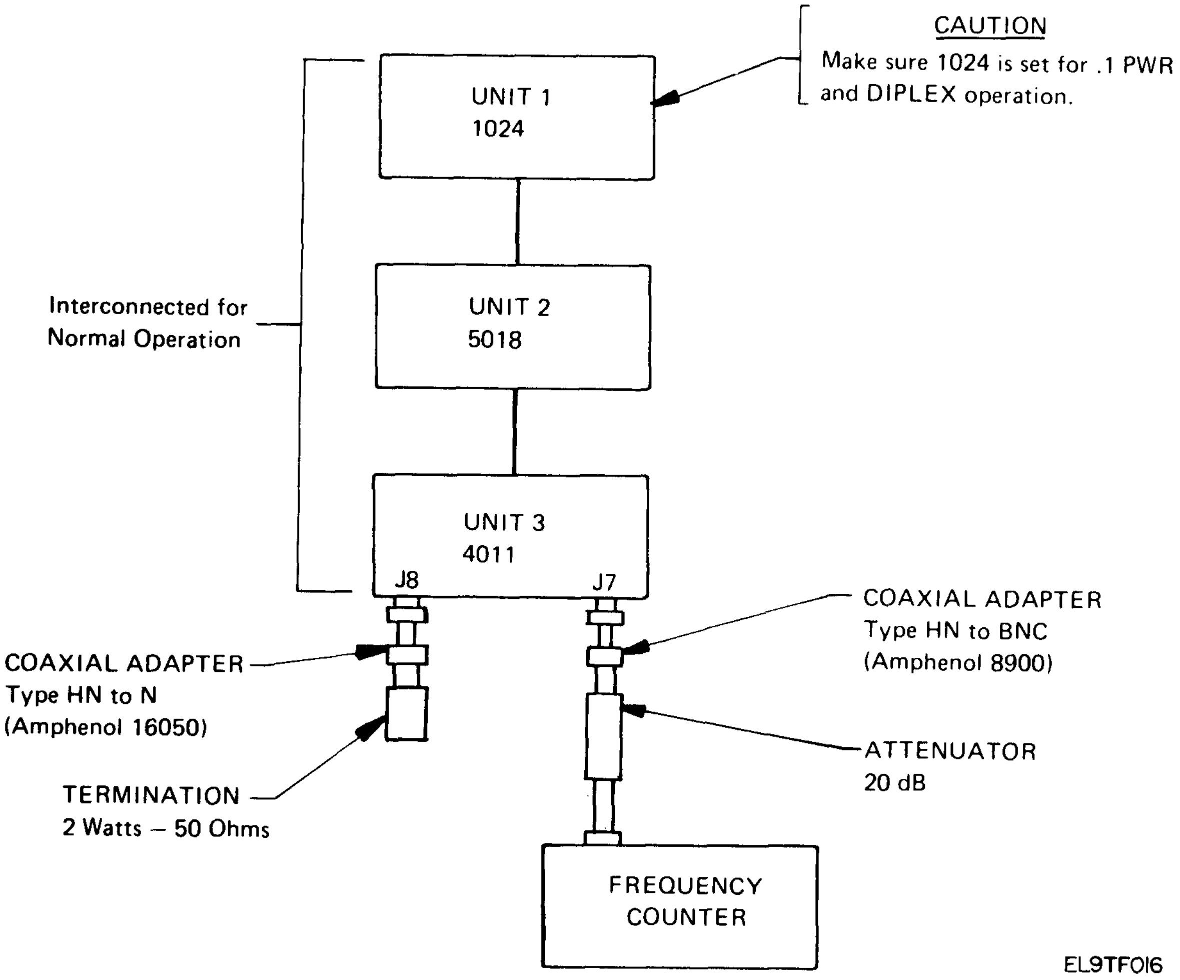


FIGURE 5-4. Frequency Test Setup.

b. For the rechargeable battery assembly (P/N 6025-1018), an accurate test of battery charge condition requires that AC line power is turned off. If the TEST switch is pressed with AC power on, the green BAT lamp should always light since the charging circuit, which is on when AC power is on, provides a 28 volt potential across the battery supply terminals. A red or red/green lamp indication may result if battery supply is very weak, fully discharged, or defective. A battery protection circuit in the rechargeable battery assembly automatically disconnects the supply if the battery voltage is below approximately 19 volts in which case neither BAT lamp would light during test and loss of synchronization occurs if AC power is off. For an accurate test of battery condition, press the TEST switch with AC power off and the BAT switch on and note the BAT lamp indications of step c.

c. The BAT lamp indications are as follows:

(1) Green BAT test lamp only lights:	Battery measures greater than 22 volts. Conditions are acceptable for operation on battery power.
(2) Green and red BAT test lamps both light:	Battery measures between 18 and 22 volts. Conditions are marginal for operation. Battery pack must be charged soon (if rechargeable type) or replaced (if non-rechargeable type).
(3) Red BAT test lamp only lights:	Battery measures less than 18 volts. Battery pack must be replaced or recharged; or BAT switch is off.

5-27. BATTERY CHARGER ADJUSTMENT (For Battery Assembly P/N 6025-1018).

The battery charger circuit, located inside the rechargeable battery box, automatically recharges depleted batteries and provides a floating trickle charge to maintain the batteries in a fully charged state during normal AC line power operation of the TCS-4B transmitter. Battery capacity and lifetime are dependent on the charging circuit output voltage. A charging voltage that is too high can damage the batteries, and too low a voltage does not maintain adequate charge in the battery cells. The battery charger circuit is set at the factory for a trickle charge voltage of +28.2 VDC which results in a 5 mA trickle charge current when connected to a fully charged battery pack. (This voltage will vary depending on the state of charge of the batteries). The battery charger circuit should not normally require readjustment. If adjustment is required due to replacement or aging of components, adjust as follows:

a. Remove battery pack (6025-1018) from the 1024 unit.

b. Remove top cover of battery pack.

c. Carefully connect a +35 VDC (±2V) external laboratory-type power supply to the battery charger circuit card inside the battery box. The positive (+) output lead of the power supply must connect to terminal E1 of the circuit card and the negative (-) output lead must connect to terminal E 2 (ground).

d. Connect the positive lead of a digital voltmeter to TP1 and the negative lead to E2 of the charger circuit card.

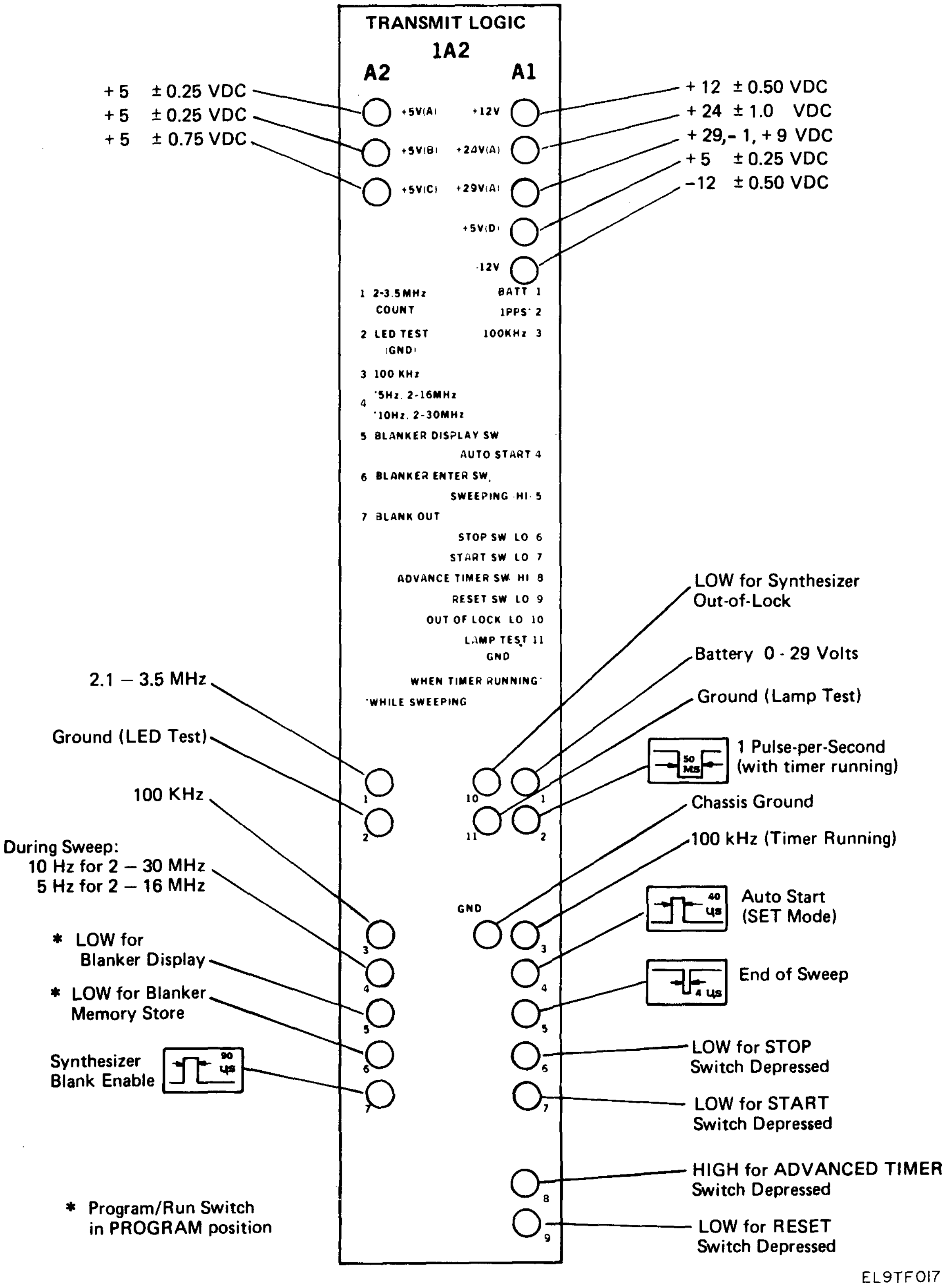


FIGURE 5-5. Test Point Verification for Transmit Logic Module 1A2 (S/N 400101 and on).

e. Turn on the +35 VDC supply and adjust potentiometer R3 on the card for a voltage of +28.9 VDC at TP1.

f. Move the voltmeter to terminal E4. Meter should read +28.2 VDC (± 0.lVDC) if the batteries are charging properly.

g. If the voltage at E4 is greater than +28.3 volts, check fuse F2 and switch S1 for continuity or replace battery pack.

h. If voltage at E4 is less than +28.1 volts, allow battery pack to charge for 24 hours, then repeat steps e and f. If E4 voltage is still low, replace battery pack.

i. Turn off +35 VDC supply, disconnect supply and DVM, and momentarily depress pushbutton switch S1 on the circuit card.

j. Replace battery box cover and reinsert battery drawer into 1024 front panel.

5-28. 5018 (UNIT 2) POWER SUPPLY TEST.

Remove 5018 top cover and locate connector 2A1J4 at left side of unit (from front). Refer to figure 2-3. Remove 5018 RF input from the 1024 by disconnecting the 5018 rear panel connector at J1.

b. Use a needle probe on a DC multimeter and check for a voltage reading of 27 ±1 VDC with less than 20 mV peak to peak AC ripple at connector terminals J4-A, J4-B, J4-C, J4-D, and J4-E. If voltages are approximately 7 volts instead of 27, the over temperature thermostat has activated.

c. Measure DC bias voltages on transistor emitters of RF driver amplifier (2A1A2A2) and on the four RF power amplifiers (2A1A2A4-A7) with DC voltmeter and verify or adjust as indicated below:

CAUTION

When making measurements described below, make sure RF input power is disconnected. Do not short transistor emitter resistors to ground with meter probe as this may damage the transistors.

Driver Amplifier 2A1A2A2:

Q1-E	0.8 ±0.2V DC
Q2-E	2.5 ±0.3V DC
Q3-E	1.7 ±0.2V DC
Q4-E	107 ±0.2V DC
Q5-E thru Q8-E	2.7 ±0.3V DC

Power Amplifiers 2A1A2A4 through 2A1A2A7

Q1-E Q2-E	2.8 ±0.2V DC (measure across 10 ohm 2 watt emitter resistors).	Both transistors should be about equal.

NOTE

Adjust the 2.8 volt bias by screwdriver adjust potentiometer R3 on bias regulator subassembly card mounted above each power amplifier card. If bias cannot be set or if Q1 and Q2 biases differ by more than ±.25 VDC, RF power amplifier is defective and should be replaced.

d. Replace covers and cables when finished.

5-29. 4011 (UNIT 3) POWER SUPPLY TEST

CAUTION

Disconnect 5018 power (3J4) to insure that there is no high power RF present.

a. Remove 4011 top cover. Remove eight screws securing chassis plate (4011- 1001) and remove chassis plate, disconnecting cables restricting chassis plate if module is to be removed.

b. Locate the following test points on module 3A2A2 (figure 5-8) and use a multimeter to check the voltages specified. Apply power to 4011.

(1) At test point +5A measure +5 ± 0.25 VDC

(2) At test point +6B measure +6 ± 0.25 VDC

(3) At test point +26V measure +26 ± 3 VDC

(4) At test point -250V measure -250 ± 25 VDC

(5) At test point -270V measure -270 ± 30 VDC

(6) AC ripple should be less than 10 mV peak-to-peak on regulated supplies and less than 10% of nominal DC amplitude on unregulated supplies.

NOTE

In test 3, 4, and 5 above, unregulated supplies are measured. Measurements will vary directly as a function of the input AC line voltage.

c. Remove power from the 4011.

d. Replace chassis plate (4011-1001) removed in step a.

e. Replace cover removed in step a and replace 4011 in rack. Insure interconnecting cables are properly installed.

5-30. HARMONICS/SPURIOUS RESPONSE TEST. This test measures the harmonics and spurious response (spurs) of the TCS-4B transmitter. The test is performed in two parts. An RF Power test (paragraph 5-22) should be performed prior to this test.

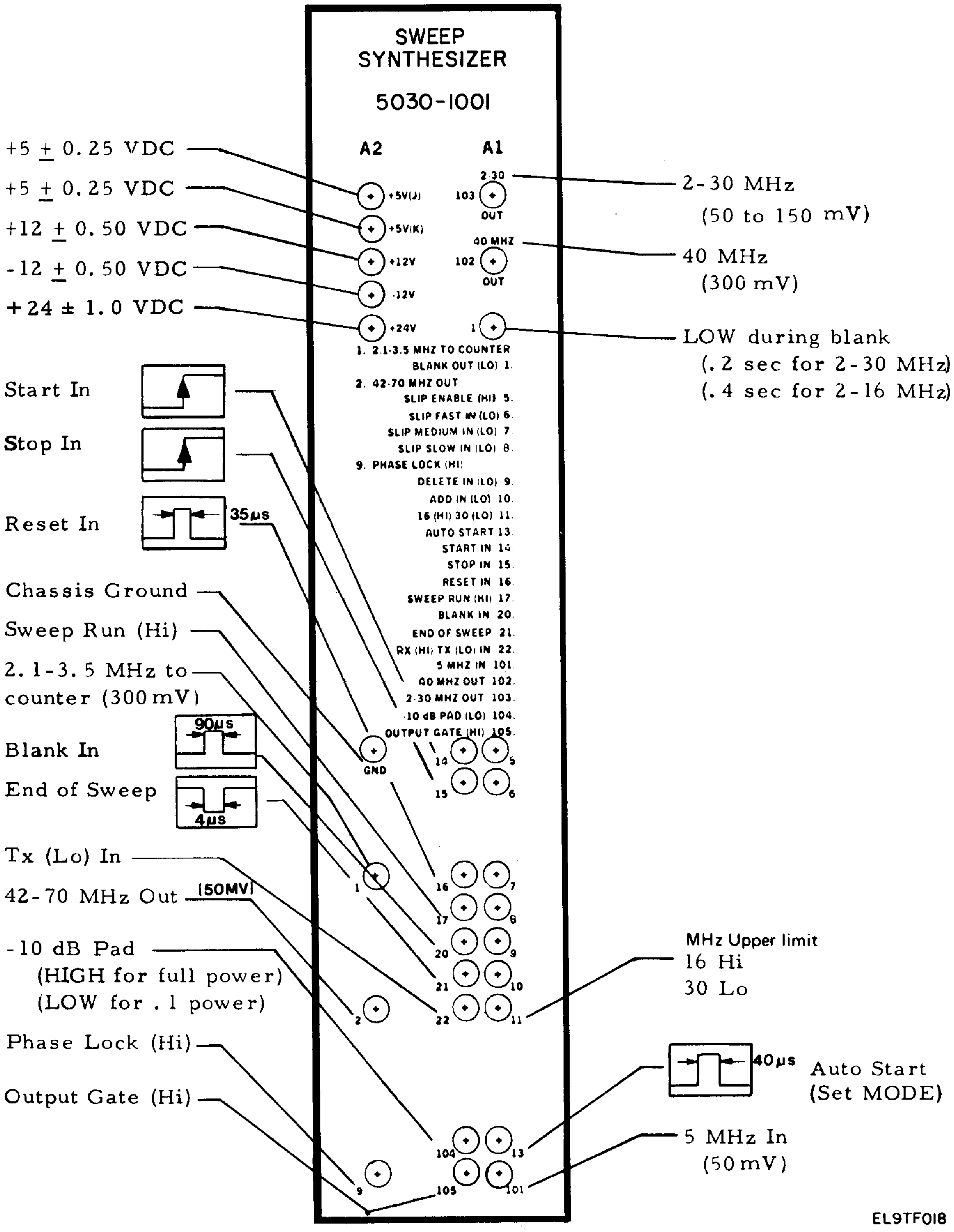


FIGURE 5-6. Test Point Verification for Synthesizer Module 1A1 (P/N 5030-1001 Only).

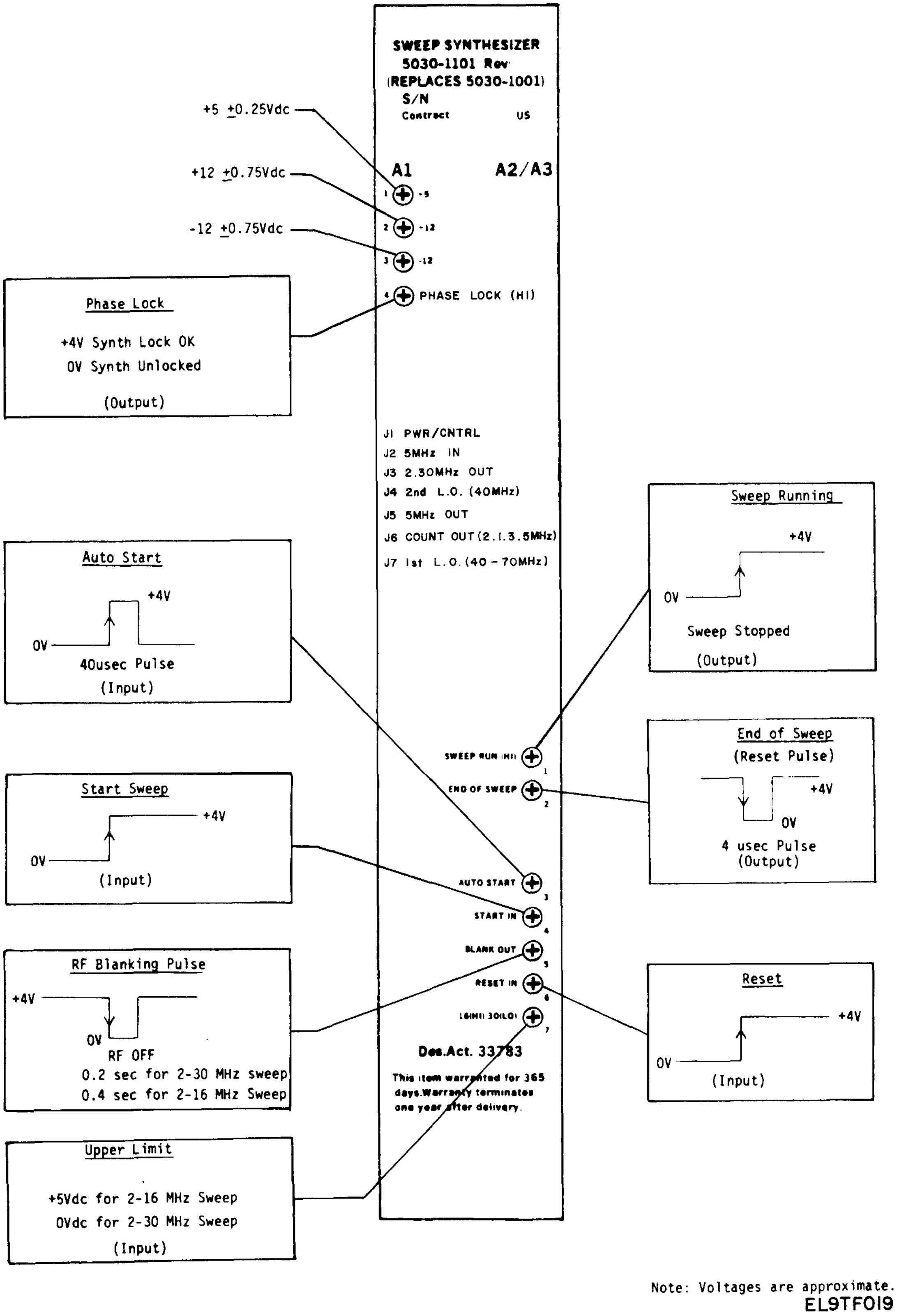
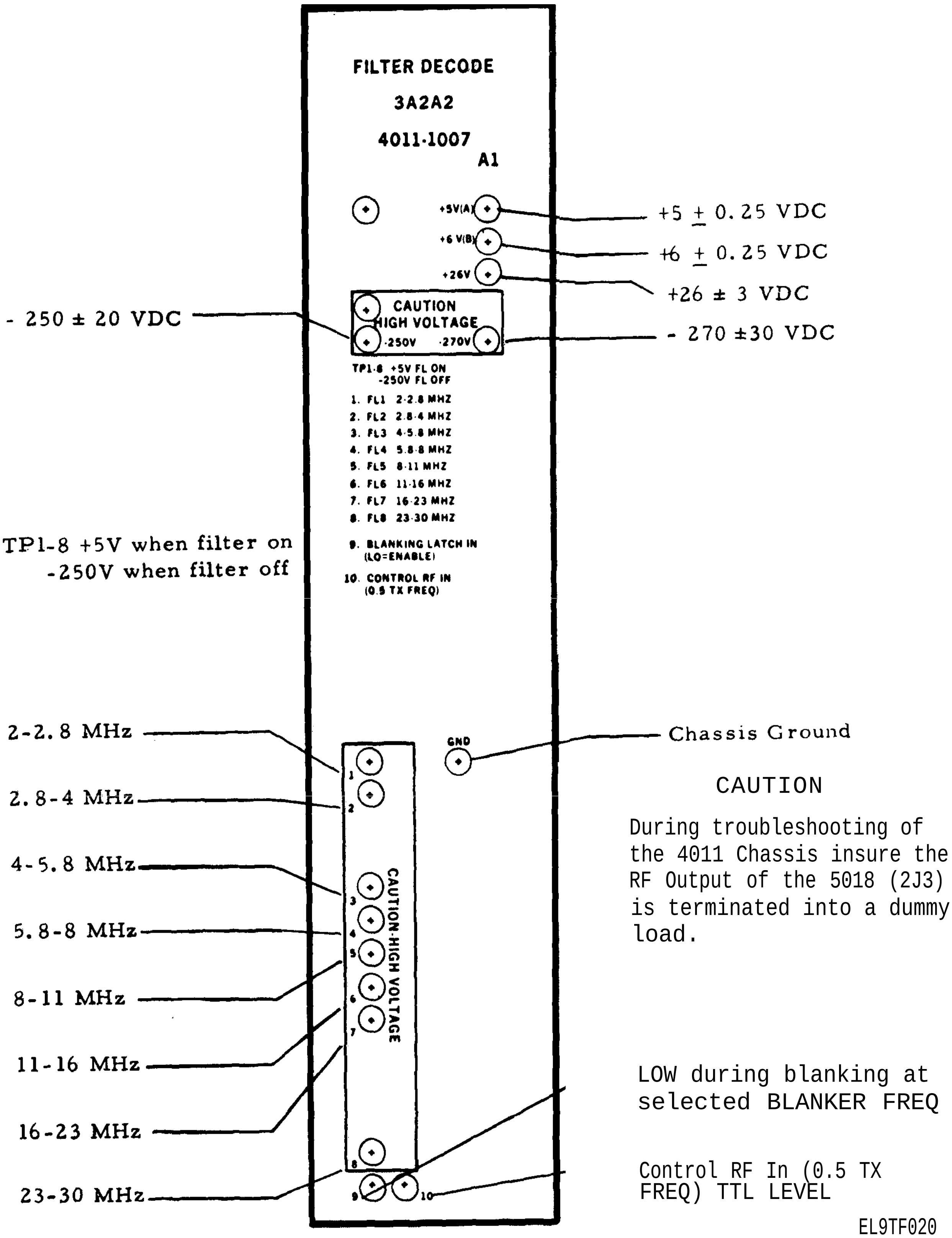


FIGURE 5-7. Test Point Verification for Synthesizer Module 1A1 (P/N 5030-1101 Only).



CAUTION

During troubleshooting of the 4011 Chassis insure the RF Output of the 5018 (2J3) is terminated into a dummy load.

FIGURE 5-8. Test Point Verification for Filter Decode Module 3A2A2.

5-31. WIDE BANDWIDTH MEASUREMENT. Perform this measurement in accordance with the following procedure:

a. Turn off the TCS-4B transmitter and disconnect the antenna.

b. On the 1024, place the DIRECT/DIPLEX switch in the DIPLEX position. Place the .1 PWR/FULL PWR switch in the .1 PWR position.

CAUTION

This test must be performed with the DIRECT/DIPLEX switch in the DIPLEX position and the .1 PWR/FULL PWR switch in the .1 PWR position. If these switch settings are not observed, severe damage to the test equipment will occur.

c. Set up the equipment as shown in figure 5-9. The spectrum analyzer should be set to 0-100 MHz scan-width range and a full scale sensitivity of 0 dBm with input attenuator set to 30 dB. Set the 1024 to 2-30 MHz range.

d. Turn on the TCS-4B transmitter. With the 1024 MODE switch in MAN position, press RESET, then press START. Throughout the sweep all harmonics should be at least 60 dB below the fundamental and all spurs should be at least 50 dB below the fundamental.

e. If harmonics are not at least 60 dB, and/or spurs not at least 50 dB below the fundamental, replace the 4011 filter set, 3A1A1 and/or filter decode 3A2A2. Repeat the measurement.

f. If harmonics and/or spurs persist, re-install original filter set or filter decode and replace the sweep synthesizer, 1A1, in the 1024. Repeat the measurement.

5-32. NARROW BANDWIDTH MEASUREMENT. Perform this measurement in accordance with the following procedure:

a. Repeat steps a and b of paragraph 5-31.

b. Make the following settings on the spectrum analyzer.

(1) Input Attenuator: 30 dB

(2) Bandwidth: 10 kHz

(3) Scan Width: 100 kHz/div.

(4) Scan Time: 10 ms/div.

(5) Video Filter: 10 kHz

(6) Range: 0-110 MHz

(7) Center Frequency: 2 MHz

c. Set up the equipment as shown in figure 5-9. Set the 1024 to the 2-30 MHz range.

d. With the 1024 MODE switch in MAN position, press RESET, then press START. During the sweep, manually sweep the spectrum analyzer to keep the TCS-4B Transmitter signal within the displayed 1 MHz wide range of the analyzier. All spurs and the phase noise floor around the fundamental should be at least 40 dB below the fundamental, except within ±50 kHz of the fundamental.

e. If any spurs, or the phase noise floor, are not at least 40 dB down, except within ±30 kHz, replace the sweep synthesizer, (1A1) in the 1024. Repeat the measurement after replacement of the sweep synthesizer.

f. If spurs and/or phase noise persist, re-install the original sweep synthesizer, and replace the frequency standard (1A3). Repeat the measurement after replacing the frequency standard.

5-33. FREQUENCY STANDARD CALIBRATION

5-34. CALIBRATION REQUIREMENTS. The TCS-4B internal frequency standard (1A3) may be calibrated to a known station standard by following the procedures outlined in paragraph 5-35. This procedure should only be used if the station standard is known to be accurate and of a stability (aging rate) better than 1 x 10^{-9}/day, such as a precision ovenized quartz crystal, cesium beam, or rubidium beam standard. The 1024 should be operated continuously (AC line power on) for a minimum of three days to allow the internal 5 MHz crystal oscillator to stabilize before calibrating.

5-35. CALIBRATION PROCEDURE.

a. Carefully remove the top cover of the 1024 sweep generator with the AC line power left on, after the 1024 has been running for at least three days.

b. Connect the 1024 rear panel jack J5 (5 MHz out BNC) to channel 2 of a dual channel oscilloscope.

c. Connect channel 1 of the scope to the station (either 1 or 5 MHz).

d. Set the scope for either ALTERNATE or CHOP sweep mode, triggering on channel 1 only; i.e. trigger scope on station standard only. Set scope time base to 0.1 us/div.

e. Adjust scope trigger level control to obtain a steady scope display of the station standard waveform (1 or 5 MHz) on channel 1.

f. The 5 MHz TCS-4B output from 1024-J5 on channel 2 of the scope should be a 5 MHz pulse stream about 4 volts peak-to-peak in amplitude that appears to drift or slide to the right or left relative to the house standard. The rate of drift is proportional to the frequency error of the 1024 crystal oscillator. If the error is large, the waveform on scope channel 2 will drift by so rapidly that the waveform will appear as a blur.

g. Center the 1024 front panel STD ADJ potentiometer by inserting a small blade screwdriver and turn the potentiometer 20 turns counterclockwise and then back 10 turns clockwise.

h. Adjust the 1024 frequency standard coarse adjust potentiometer in the frequency standard module (1A3) until the waveform on scope channel 2 appears to stand still or drift very slowly relative to channel 1. The coarse adjust potentiometer is accessible through a small hole in the frequency standard module cover.

i. An acceptable drift rate is no more than one cycle of the 1024 5 MHz waveform drifting off the scope screen every 30 seconds, assuming the scope time base is set to 0.1 us/division. The direction of drift (right or left) does not matter.

j. Wait 30 minutes and repeat steps h and i. Fine adjustment to correct minor drift may be made with the 1024 front panel STD ADJ potentiometer.

k. Wait 30 minutes and verify that drift rate remains acceptable. Make fine adjustment if necessary.

1. Replace 1024 top cover. Calibration is complete.

5-36. 1024 POWER SUPPLY ADJUSTMENTS (S/N 400100 and before). The 1024 has two power supply adjustments. One is to adjust the +5 volt standby power supply for the timing circuits and is designated +5V B. The other adjustment is for the AC input power in the event that the available line voltage is lower than the acceptable limits for nominal 115 or 230 VAC input.

WARNING

Use extreme care when making internal adjustments with power on. Potentially lethal voltages are present in the transmitter.

5-37. +5V B REGULATION. Measurement of the +5V B power is accomplished at the +5V B test point on the transmit logic module 1A2 (figure 5- 10). If adjustment of the +5V B supply is necessary, perform the following steps:

a. Remove four screws securing the frequency standard 1A3 to the chassis plate of the 1024.

b. Turn the assembly upside down to allow access to the +5V switching regulator 1A3A3.

c. Adjust +5V B at R7 on assembly 1A3A3 (figure FO-35).

5-38. AC INPUT ADJUSTMENT. This adjustment involves connection of a low-line tap to compensate for line voltage variations that are below acceptable limits. The 1024 operates satisfactorily when the main line input is between 110 and 125 volts (for 115V position of line voltage select toggle switch) or 215 to 250 volts (for 230V position). Use of the low-line tap (220 - 105) is only necessary if line voltages lower than 110V (or 215V) are expected. To make this adjustment,disconnect wire at TB1, pin 1 that goes to switch S1 (power), and connect wire to TB1, pin 2 (figure FO-34).

5-39. 5018 POWER SUPPLY ADJUSTMENT (S/N 400100 and before). The 5018 has six power supply adjustments, five controls to adjust the +27.1 volt regulators supplying the driver amplifier and individual power amplifier modules, and one for controlling main line AC deviations from the nominal 115 or 230 VAC standard.

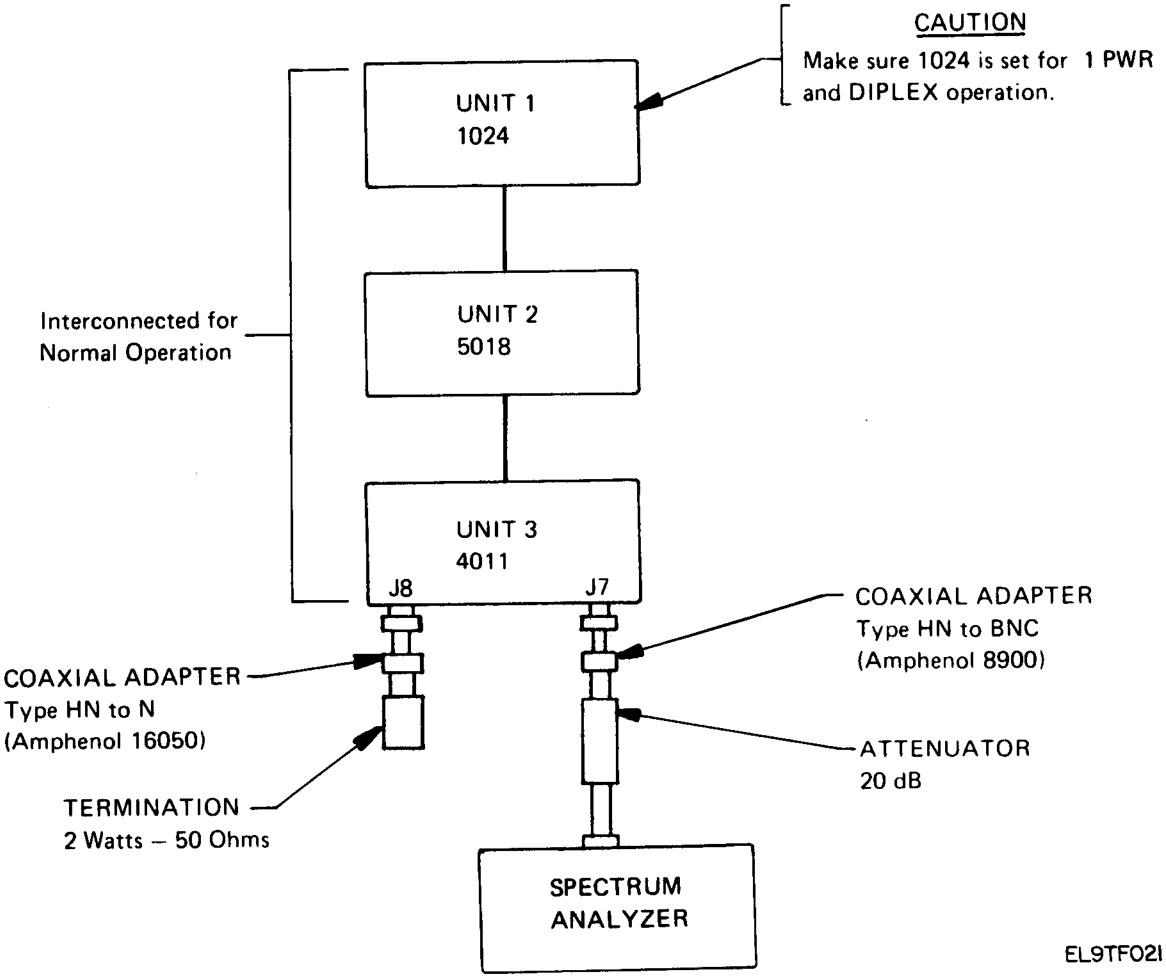


FIGURE 5-9. Harmonics /Spurious Response Test Set -Up.

5-40. +27.1 VDC REGULATORS. The five potentiometers for adjustment of the +27.1 VDC regulators are R31, R33, R35, R37, and R39, located on the power regulator assembly 2A2A4 (figure FO-34). R35 adjusts the driver amplifier supply. To measure 27.1 VDC ± 0.2, connect a voltmeter to 2A1J4 as follows: J4-B for R31; J4-A for R33; J4-E for R35; J4-C for R37; and J4-D for R39. If adjustment is required, perform the following steps:

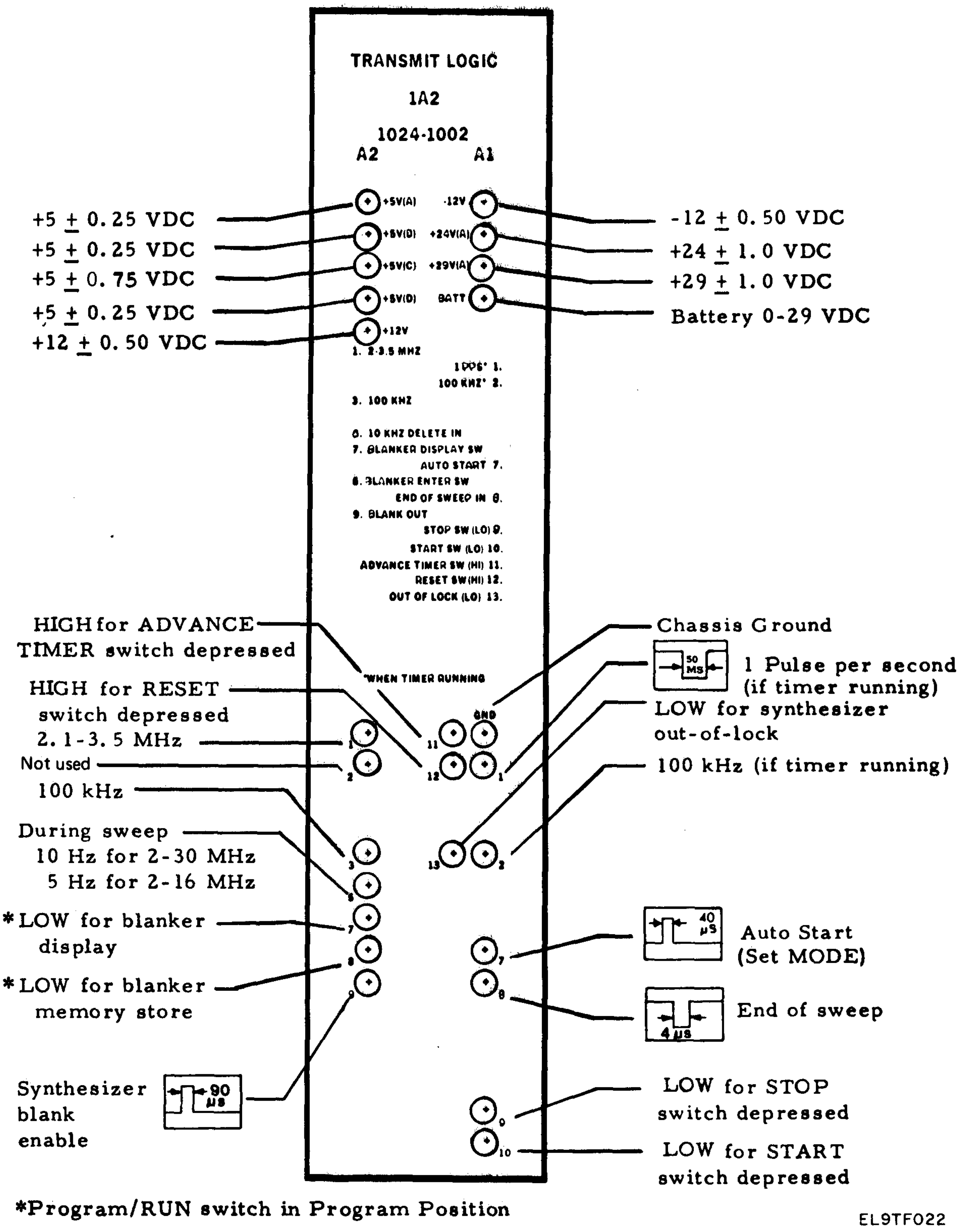
a. Disconnect connectors 2A1J1, J2, and J3.

b. Remove the ten screws securing the 2A1 assembly to the 5018 chassis, and lift out 2A1.

c. Connect a jumper between the 2A1 assembly and 5018 chassis.

d. Adjust potentiometers R31, R33, R35, R37, and R39 while measuring their respective voltages at 2A1J4.

5-41. AC INPUT ADJUSTMENT. Variations in line voltage can be accommodated by adjusting the position of taps on the transformer primary. The adjustment is made on assembly 2A2 (figure FO-34) by unsoldering the standard 115/230 volt connections at pins 4 and 9 of T1 and moving higher or lower in voltage as required. With voltages less than 110 or 215 volts anticipated, move connections on respective primary taps to pins 3 and 8. With voltages greater than 120 or 250 volts anticipated, move connections to pins 5 and 10.



*Program/RUN switch in Program Position

FIGURE 5-10. Test Point Verification for Transmit Logic 1A2 (S/N 400100 and before).

SECTION 6

WIRE LIST INDEX

6-1. WIRE LIST INDEX. Wire lists for the TCS-4B are compiled in this section and sequenced as indicated below:

NOTE

> Wiring for Sweep Synthesizer Assy (5030-1101) is diagramed in figure FO-6.7.

WIRE LIST INDEX - Cont

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
1	9		3J3		1J2			CONTROL (4011-1024)
2	8		3J5		1J1			POWER (4011-1024)
3	7		3J4		2J4			POWER (4011-5018)
4	10		3J6		POWER			POWER (4011)
5	11		3J2		2J3			100 W (4011-5018)
6	6		3J1		2J2			10 W (4011-5018)
7	6		2J1		1J3			RF (5018-1024)

NOTES:

SIZE A	CODE IDENT Nº 33783	DWG Nº WL 9126-1100	REV B
NEXT ASSY:	BR COMMUNICATIONS		SHEET 2 OF 2

TCS-4B Chirpsounder Transmitter (9126- 1100)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
			1A1J1		1A8P6			
			1A1J2		1A8P7			
			1A1J3		1A7A2P8			
			1A1J6		1A8P9			
			1A2J1		1A8P13			
			1A2J2		1A5P1			
			1A2J3		1A8P3			
			1A2J4		1A8P4			
			1A2J5		1A8P5			
			1A3J1		1A8P10			
			1A3J2		1A8P12			
			1A3J3		1A8P11			
			1A4J1		1A8P2			
			1A6P1		1A8J9			
			1A6P2		1A8J8			
			1A7A1P1		1A8J7			
			1A7A2J5		1A8P14			
			1A7A2J6		1A8P15			
			1A7A2J11		1A7P16			
			1A7A2P17		1A7J10			

SIZE	CODE IDENT Nº	DWG Nº	REV
A	33783	WL 1024-1000 and 1024-1100	A

SHEET 2 OF 2

1024 Sweep Generator - Unit 1 (1024-1000 and 1024-1100)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
1	8	0	J1	1	A1	E74		GNd
2	8	0	J1	2	A2	E29		GNd
3	8	2	J1	3	A2	E20		+5J
4	8	2	J1	4	A2	E21		+5K
5	8	3	J1	6	A2	E22		+12
6	8	6	J1	7	A2	E25		-12
7	8	4	J1	8	A2	E24		+24
8	8	0	J1	9	A2	E30		GNd
9	8	9	J1	10	A1	E75		GNd for TX Hi for RX
10	9	91	J1	11	A1	E66		SLF/Slip Fast
11	9	92	J1	12	A1	E65		SLM/Medium
12	9	93	J1	13	A1	E63		SLS/SLOW
13	9	94	J1	14	A1	E88		SSD/Becomes SSDA
14	9	95	J1	15	A1	E64		DEL/Delite
15	9	96	J1	16	A1	E67		ADD/Add
16	9	98	J1	17	A1	E76		ASD $\boxed{1}$ Auto Sync
17	9	0	J1	18	A1	E80		GNd $\boxed{1}$ Auto sync
18	9	908	J1	19	A1	E81		ASA $\boxed{1}$ Auto Sync
19	9	901	J1	20	A1	E78		Aux Latch In
20	9	903	J1	22	A1	E10		AST/Auto Start
21	9	904	J1	23	A1	E9		STR/Start
22	9	905	J1	24	A1	E8		STP/Stop
23	9	906	J1	25	A1	E7		RES/Reset

SIZE	CODE IDENT Nº	DWG Nº	REV
A	33783	WL 5030-1001	G

SHEET 2 OF 6

Sweep Synthesizer Assy (5030-1001) (Sheet 1 of 5)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
24	9	907	J1	26	A1	E6		SRS (HI FOR SWEEPING)
25	9	908	J1	27	A1	E84		E.O.S./END OF SWEEP
26	9	912	J1	28	A1	E82		BKI/BLANK IN
27	9	913	J1	29	A1	E91		BKO/BLANK OUT
28	9	914	J1	30	A1	E83		BKC/BLANK CLK
29	9	915	J1	31	A1	E105		GATE IN/END OF SWEEP BLANKING
30	9	916	J1	32	A2	E17		OOL/OUT OF LOCK
31	9	917	J1	33	A1	E6		SRS (HI FOR SWEEPING)
32	9	918	J1	34	A1	E6		SRS (HI FOR SWEEPING)
33	9	923	J1	35	A1	E6		SRS (HI FOR SWEEPING)
34	9	924	J1	36	A1	E103		PAD
35	9	925	J1	37	A1	E90		NEW BLANK (60 KHz B.W.)
36	9	925	A2	E13	A1	E56		SD"1" (TO SYNTH)
37	9	926	A2	E14	A1	E59		SD"2" (TO SYNTH)
38	9	927	A2	E15	A1	E60		SD"4" (TO SYNTH)
39	9	928	A2	E16	A1	E61		SD"8" (TO SYNTH)
40	9	90	A2	E12	A1	E62		CLK (FROM SYNTH)
41	9	91	A2	E3	A1	E38		T1
42	9	92	A2	E4	A1	E37		T2
43	9	93	A2	E5	A1	E36		T3
44	9	94	A2	E6	A1	E35		T4
45	9	95	A2	E7	A1	E87		T5
46	9	96	A2	E8	A1	E39		T6
47	9	97	A2	E9	A1	E85		T7
48	9	98	A2	E10	A1	E86		T8

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5030-1001	G

SHEET 3 OF 6

Sweep Synthesizer Assy (5030-1001) (Sheet 2 of 5)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
49	9	901	A1	E4	A1	E77		100 - AUX LATCH OUT
50	9	901	A1	E77	A1	E73		30 H - AUX LATCH OUT
51	9		A1	E1	A1	E2		JUMPER
52	9		A1	E2	A1	E72		JUMPER
53	9		A1	E89	A1	E107		JUMPER
54	9		A1	E69	A1	E74		JUMPER
55	13		J2		A1	P101		5MHz IN
56	11		J5		A1	P102		5MHz to REC
57	17		A2	P4	A1	P103		5MHz to SYNTH
58	12		J4		A1	P104		2nd L.O. to REC
59	19		J3		A1	P105		RF to 5018
60	18		A2	P2	A1	P106		42-70 to SYNTH
61	12		J7		A2	P1		1st L.O. to REC
62	20		J6		A2	P3		42-70 to PROG
			TEST POINTS					
63	24		A2	TP3	+5VJ			
64	24		A2	TP4	+5VK			
65	24		A2	TP5	+12V			
66	24		A2	TP6	-12V			
67	24		A2	TP7	+24V			
68	24		A2	TP1	1			COUNT 42-70
69	24		A2	TP2	2			1st L.O. 42-70
70	24		A2	TP9	9			LOCK
71	24		A1	TP101	101			5MHz IN
72	24		A1	TP102	102			40 MHz out

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5030-1001	G

SHEET 4 OF 5

Sweep Synthesizer Assy (5030-1001) (Sheet 3 of 5)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
73	24		A1	TP5	5			SSD
74	24		A1	TP1	1			BKO
75	24		A1	TP6	6			SLF
76	24		A1	TP7	7			SLM
77	24		A1	TP8	8			SLS
78	24		A1	TP9	9			DEL
79	24		A1	TP10	10			ADD
80	24		A1	TP11	11			UPPER LIMIT SELECT
81	24		A1	TP13	13			AST
82	24		A1	TP103	103			2-30 MHz OUT
83	24		A1	TP14	14			STR
84	24		A1	TP15	15			STP
85	24		A1	TP16	16			RES
86	24		A1	TP17	17			SRS
87	24		A1	TP20	20			BKI
88	24		A1	TP21	21			EOS
89	24		A1	TP22	22			TX
90	24		A1	TP104	104			PAD
91	24		A1	TP105	105			GATE
		JUMPERS						
92	9	9	A1	E75	A1	E106		JUMPER
93	9	91	A1	E79	A1	E92		JUMPER
94	8	4	A1	E104	A2	E24		+24V
95	8	2	A1	E14	A2	E21		+5V
96	8	2	A1	E14	A1	E58		+5V

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5030-1001	G

SHEET 5 OF 6

Sweep Synthesizer Assy (5030-1001) (Sheet 4 of 5)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
97	8	3	A2	E22	A2	E23		+12V
98	8	3	A1	E102	A2	E22		+12V
99	8	6	A2	E25	A2	E26		-12V
100	8	2	A1	E58	A1	E101		+5V
101	8	0	CASTING A2 SIDE	GND	A2	E29		GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5030-1001	G

SHEET 6 OF 6

Sweep Synthesizer Assy (5030-1001) (Sheet 5 of 5)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1.	35	93	A1P1	7	J1	1		GND
2.	35	95	A1P1	8	A2	E27		GND
3.	10	95	A2	E27	J1	2		GND
4.	35	5	A1P1	3	J1	3		+5VA
5.	35	7	A1P1	4	A2	E25		+5VA
6.	35	9	A1P1	5	J1	4		+5VB
7.	35	91	A1P1	6	A2	E26		+5VB
8.	35	0	A1P3	12	J1	5		+5VC
9.	35	8	A1P3	13	A2	E28		+5VC
10.	35	4	A1P1	15	J1	6		+5VD
11.	35	8	A1P1	13	J1	7		+12VA
12.	35	0	A1P1	12	J1	8		-12VA
13.	35	96	A1P1	9	J1	9		+24VA
14.	35	94	A1P1	10	J1	10		+35VC
15.	35	91	A1P3	6	J1	11		ST1; Start Switch
16.	35	95	A1P3	8	J1	13		SP1; Stop Switch
17.	35	9	A1P3	5	J1	16		RE2; Reset Switch
18.	35	7	A1P3	4	J1	17		CONT
19.	35	3	A1P3	2	J1	18		MAN
20.	35	5	A1P3	3	J1	19		SET
21.	35	93	A1P3	7	J1	20		PROG; AT 0
22.	35	1	A1P3	1	J1	21		AT 1
23.	35	96	A1P3	9	J1	22		AT 2
24.	35	92	A1P5	11	J1	23		STL; Start Lamp
25.	35	0	A1P5	12	J1	24		SPL; Stop Lamp

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J

SHEET 2 OF 8

Transmit Logic Assy (1024-1002) (Sheet 1 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
26.	35	8	A1P5	13	J1	25		REL; Reset Lamp
27.	36	9	A1P4	5	J1	26		1 PPS (Out)
28.	36	7	A1P4	4	J1	27		S.R.S.
29.	35	3	A1P1	2	J1	35		STR; START
30.	35	1	A1P1	1	J1	34		STP; Stop
31.	35	2	A1P1	16	J1	35		RES; RESET
32.	36	93	A1P4	7	J1	36		PSC (Comm.)
33.	36	1	A1P4	1	J1	37		P00 (0 Min)
34.	36	5	A1P4	3	J1	38		P05 (5 Min)
35.	36	3	A1P4	2	J1	39		P10 (10 Min)
36.	36	2	A1P4	16	J1	40		P15 (15 Min)
37.	36	4	A1P4	15	J1	41		P20 (20 Min)
38.	36	6	A1P4	14	J1	42		P25 (25 Min)
39.	36	8	A1P4	13	J1	43		P30 (30 Min)
40.	36	0	A1P4	12	J1	44		P35 (35 Min)
41.	36	92	A1P4	11	J1	45		P40 (40 Min)
42.	36	94	A1P4	10	J1	46		P45 (45 Min)
43.	36	96	A1P4	9	J1	47		P50 (50 Min)
44.	36	95	A1P4	8	J1	48		P55 (55 Min)
45.	36	91	A1P4	6	J1	50		AST (Auto Start to Synth)
46.	35	92	A1P1	11	J1	53		ESB (End of Sweep Blanking)
47.	36	5	A2P5	3	J1	54		BLANK (New)
48.	36	91	A2P5	6	J2	1		GND
49.	36	94	A2P5	10	J2	2		+5VC (Display Supply)
50.	35	5	A2P1	3	J2	3		Path 1

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J

SHEET 3 OF 8

Transmit Logic Assy (1024-1002) (Sheet 2 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
51.	35	7	A2P1	4	J2	4		Path 2
52.	35	3	A2P1	2	J2	5		Path Strobe
53.	35	2	A2P2	16	J2	6		4D1
54.	35	6	A2P2	14	J2	7		4D2
55.	35	8	A2P2	13	J2	8		4D4
56.	35	4	A2P2	15	J2	9		4D8
57.	35	1	A2P2	1	J2	10		5D1
58.	35	3	A2P2	2	J2	11		5D2
59.	35	7	A2P2	4	J2	12		5D4
60.	35	5	A2P2	3	J2	13		5D8
61.	35	0	A2P2	12	J2	14		6D1
62.	35	94	A2P2	10	J2	15		6D2
63.	35	96	A2P2	9	J2	16		6D4
64.	35	92	A2P2	11	J2	17		6D8
65.	35	9	A2P2	5	J2	18		7D1
66.	35	91	A2P2	6	J2	19		7D2
67.	35	93	A2P2	7	J2	20		7D4
68.	36	6	A1P6	14	J2	22		1 SEC 1
69.	36	8	A1P6	13	J2	23		1 SEC 2
70.	36	5	A1P6	3	J2	24		1 SEC 4
71.	36	91	A1P6	6	J2	25		1 SEC 8
72.	36	1	A1P6	1	J2	26		10 SEC 1
73.	36	3	A1P6	2	J2	27		10 SEC 2
74.	36	4	A1P6	15	J2	28		10 SEC 4

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J

SHEET 4 OF 8

Transmit Logic Assy (1024-1002) (Sheet 3 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
75.	36	9	A1P6	5	J2	29		10 SEC 8
76.	36	2	A1P6	16	J2	30		1 MIN 1
77.	36	94	A1P6	10	J2	31		1 MIN 2
78.	36	92	A1P6	11	J2	32		1 MIN 4
79.	36	0	A1P6	12	J2	33		1 MIN 8
80.	36	93	A1P6	7	J2	34		10 MIN 1
81.	36	95	A1P6	8	J2	35		10 MIN 2
82.	36	96	A1P6	9	J2	36		10 MIN 4
83.	36	7	A1P6	4	J2	37		10 MIN 4
84.	35	0	A2P1	12	J3	2		PROG/RUN
85.	36	6	A2P5	14	J3	3		BKI; XBO
86.	35	8	A2P1	13	J3	4		DM1 (Display Blank Freq)
87.	10	2	A2	E28	J3	5		+5VC (Display Supply)
88.	35	92	A2P1	11	J3	6		ME1; Store (Blank Freq)
89.	36	7	A2P5	4	J3	8		BKC
90.	35	96	A2P1	9	J3	9		CS1
91.	35	95	A2P1	8	J3	10		CS2
92.	35	94	A2P1	10	J3	11		CS4
93.	35	93	A2P1	7	J3	12		CS8
94.	36	3	A2P3	2	J3	13		4P1
95.	36	5	A2P3	3	J3	14		4P2
96.	36	7	A2P3	4	J3	15		4P4
97.	36	91	A2P3	6	J3	16		4P8
98.	36	9	A2P3	5	J3	17		5P1

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J

SHEET 5 OF 8

Transmit Logic Assy (1024-1002) (Sheet 4 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
99.	36	1	A2P3	1	J3	18		5P2
100.	36	95	A2P3	8	J3	19		5P4
101.	36	93	A2P3	7	J3	20		5P8
102.	36	92	A2P3	11	J3	21		6P1
103.	36	94	A2P3	10	J3	22		6P2
104.	36	0	A2P3	12	J3	23		6P4
105.	36	8	A2P3	13	J3	24		6P8
106.	36	6	A2P3	14	J3	25		7P1
107.	36	4	A2P3	15	J3	26		7P2
108.	35	6	A1P5	14	J3	29		BATT (ON)
109.	35	6	A1P1	14	J3	30		OOL
110.	35	94	A1P5	10	J3	31		Lamp Test
111.	35	1	A1P5	1	J3	32		Test Sw A; Test Enable
112.	35	96	A1P5	9	J3	33		BTG (Batt Test Grn)
113.	35	4	A1P5	15	J3	34		BTR (Batt Test Red)
114.	35	95	A1P5	8	J3	35		CTG (Sys Test Grn)
115.	35	93	A1P5	7	J3	36		CTR (Sys Test Red)
116.	10	90	A1	E3	A2	E24		100 kHz Jumper
117.	35/13	94	A1P7	10	Casting A1 Side	TP1		SW. BATT Voltage
118.	35/13	6	A1P7	14	Casting A1 Side	TP2		1 PPS.
119.	35/13	95	A1P7	8	Casting A1 Side	TP3		100 kHz
120.	35/13	4	A1P7	15	Casting A1 Side	TP4		AUTO START
121.	35/13	2	A1P7	16	Casting A1 Side	TP5		SRS, Sweeping (Hi)

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J
		SHEET 6 OF 8	

Transmit Logic Assy (1024-1002) (Sheet 5 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
122.	35/13	1	A1P7	1	Casting A1 Side	TP6		Stop in (Lo)
123.	35/13	0	A1P7	12	Casting A1 Side	TP7		Start in (Lo)
124.	35/13	8	A1P7	13	Casting A1 Side	TP8		ADV. TIMER (Hi)
125.	35/13	92	A1P7	11	Casting A1 Side	TP9		Reset in (Lo)
126.	35/13	91	A1P7	6	Casting A1 Side	TP10		Out of Lock (Lo)
127.	35/13	96	A1P7	9	Casting A1 Side	TP11		LAMP TEST (Gnd to Test)
128.	35/14	9	A1P7	5	Casting A1 Side	+12		D.C. Supply +12 Volts
129.	35/14	3	A1P7	2	Casting A1 Side	+24		D.C. Supply +24 Volts
130.	35/14	5	A1P7	3	Casting A1 Side	+29		D.C. Supply +29 Volts
131.	35/14	93	A1P7	7	Casting A1 Side	+5		D.C. Supply +5 Volts
132.	35/14	7	A1P7	4	Casting A1 Side	-12		D.C. Supply -12 Volts
133.	35/13	96	A2P6	9	Casting A2 Side	TP1		Count in 2-3.5 MHz
134.	35/13	9	A2P6	5	Casting A2 Side	TP2		LED Test (Gnd to Test)
135.	35/13	8	A2P6	13	Casting A2 Side	TP3		100 kHz
136.	35/13	94	A2P6	10	Casting A2 Side	TP4		5 Hz 2-16 MHz (when 10 Hz 2-30 MHz sweeping)
137.	35/13	92	A2P6	11	Casting A2 Side	TP5		DISPLY BLKR FREQ. SW.
138.	35/13	0	A2P6	12	Casting A2 Side	TP6		STORE BLK FREQ SW.
139.	35/13	93	A2P6	7	Casting A2 Side	TP7		BLNK OUT
140.	35/14	7	A2P6	4	Casting A2 Side	+5(A)		Supply, D.C. 5 Volts
141.	35/14	95	A2P6	8	Casting A2 Side	+5B		Supply, D.C. Standby +5 Volts
142.	35/14	91	A2P6	6	Casting A2 Side	+5(C)		Supply, D.C. Unregulated
143.	-		A1P1		A1J1			
144.	8		J5		A1J2			5 MHz from STRD
145.	-		A1P3		A1J3			
146.	-		A1P4		A1J4			

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J

SHEET 7 OF 8

Transmit Logic Assy (1024-1002) (Sheet 6 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
147.	-		A1P5		A1J5			
148.	-		A1P6		A1J6			
149.	-		A1P7		A1J7			
150.	-		A2P1		A2J1			
151.	-		A2P2		A2J2			
152.	-		A3P3		A2J3			
153.	8		J4		A2J4			Count from Synth
154.	-		A2P5		A2J5			
155.	-		A2P6		A2J6			
156	9	94	A1	E6	A2	E31		SRS
157	10/13	0	Casting A1 Side	GND	A1	E4		GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	J

SHEET 8 OF 8

Transmit Logic Assy (1024-1002) (Sheet 7 of 7) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	37	7	J1	5	A2	E15		BATT
2	37	7	J1	6	A2	E15		BATT
3	37	0	J1	1	A2	E16		GND
4	37	0	J1	2	A2	E13		Std Adjust Gnd
5	37	8	J1	3	A2	E17		+35VC
6	37	8	J1	4	A2	E17		+35VC
7	37	5	J1	7	A2	E12		+5VB
8	37	5	J1	8	A2	E12		+5VB
9	37	5	J1	9	A2	E12		+5VB
10	37	8	FL	2	A2	E12		+5VB
11	37	9	FL	1	A2	E1		
12	36		A1J1		A2J1			
13	38	91	A1J1	3	A2	E14		
14	38	92	A1J1	2	A2	E9		
15	38	93	A1J1	1	A2	E8		
16	38	94	A1J1	4	A2	E10		
17	38	95	J1	10	A2	E6		Std Adjust
18	38	8	J1	11	A2	E17		+29V Test/+35VC
19	37	5	J1	12	A2	E11		+8V
20	38	98	J3		A2	E3		
21	38	901	J5		A2	E5		
22	38	902	J4		A2	E4		
23	38	903	J2		A2	E2		
24	21	—	FL	1	FUSE	—		
25	21	—	FUSE	—	A3	E1		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1006	J

SHEET 2 OF 3

Frequency Standard Assy (6025-1006) (Sheet 1 of 2) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
26	37	8	FL	2	A3	E2		+5VB

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1006	J

SHEET 3 OF 3

Frequency Standard Assy (6025-1006) (Sheet 2 of 2) (S/N 400101 and on)

Battery Supply Assy (6025-1008)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
1	19	0	E1		P1	1	P1	2						GND
2		7	E4		P1	3								+35
3	30		P1	3	P1	4	P1	5						JUMPER
4			E2		E3									
5			P1	8	F1									FUSE
6			P1	3	F1									FUSE

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1008	B

SHEET 2 OF 2

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
1	22	2	BRKT 1	E1	BRKT 2	E1		
2	22	2	BRKT 1	E2	BRKT 1	E3		
3	22	2	BRKT 1	E4	BRKT 1	E5		
4	22	2	BRKT 1	E6	A1	E3		
5	22	2	BRKT 2	E2	BRKT 2	E3		
6	22	2	BRKT 2	E4	BRKT 2	E5		
7	22	2	BRKT 2	E6	BRKT 3	E6		
8	22	2	BRKT 3	E5	BRKT 3	E4		
9	22	2	BRKT 3	E3	BRKT 3	E2		
10	22	2	BRKT 3	E1	BRKT 4	E1		
11	22	2	BRKT 4	E2	BRKT 4	E3		
12	22	2	BRKT 4	E4	BRKT 4	E5		
13	22	0	BRKT 4	E6	A1	E5		
14	22	0	P1	2	A1	E2		
15	22	2	P1	7	A1	E1		
16	22	2	P1	4	A1	E4		
17	23		P1	2	P1	1		
18	23		P1	3	P1	4		
19	23		P1	4	P1	5		

NOTES:

NEXT ASSY:

SIZE A
CODE IDENT Nº 33783
DWG Nº WL 6025-1018
REV B
BR COMMUNICATIONS
SHEET 2 OF 2

Battery Supply (6025-1018)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	6	0	A2-GND		P1	1		
2	6	1	+5C		P1	2		
3	6	90	PATH 1		P1	3		
4	6	91	PATH 2		P1	4		
5	6	92	STROBE		P1	5		
6	6	93	10KHz	1	P1	6		FREQ-10KHz
7	6	94	10KHz	2	P1	7		4D1-8
8	6	95	10KHz	4	P1	8		
9	6	96	10KHz	8	P1	9		
10	6	97	100KHz	1	P1	10		100KHz
11	6	98	100KHz	2	P1	11		5D1-8
12	6	901	100KHz	4	P1	12		
13	6	902	100KHz	8	P1	13		
14	6	903	1MHz	1	P1	14		1MHz
15	6	904	1MHz	2	P1	15		6D1-8
16	6	905	1MHz	4	P1	16		
17	6	906	1MHz	8	P1	17		
18	6	907	10MHz	1	P1	18		10MHz
19	6	908	10MHz	2	P1	19		7D1-8
20	6	912	10MHz	4	P1	20		
21	6	913	LT		P1	21		LAMP TEST
22	6	914	1SEC	1	P1	22		TIME-SEC
23	6	915	1SEC	2	P1	23		
24	6	916	1SEC	4	P1	24		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1009	K

SHEET 2 OF 3

Numeric Display Assy (6025-1009) (Sheet 1 of 2)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
25	6	917	A2 1SEC	8	P1	25		
26	6	918	A2 10SEC	1	P1	26		TIME - 10 SEC
27	6	923	A2 10SEC	2	P1	27		
28	6	924	A2 10SEC	4	P1	28		
29	6	925	A2 10SEC	8	P1	29		
30	6	926	A2 1MIN	1	P1	30		1 MIN
31	6	927	A2 1MIN	2	P1	31		
32	6	928	A2 1MIN	4	P1	32		
33	6	90	A2 1MIN	8	P1	33		
34	6	91	A2 10MIN	1	P1	34		10 MIN
35	6	92	A2 10MIN	2	P1	35		
36	6	93	A2 10MIN	4	P1	36		
37	6	94	A2 10MIN	8	P1	37		
38	9	—	A1 +5		A2 +5 (feed through)			
39	9	—	A1 GND		A2 GND (feed through)			
40	6	0	10MHz	8	GND			
41	9	—	A1 GND	—	A1 E1			

SIZE A	CODE IDENT Nº 33783	DWG Nº WL6025-1009	REV K
			SHEET 3 OF 3

Numeric Display Assy (6025-1009) (Sheet 2 of 2)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	31		S1A	C	S1B	C		GND
1	31		S1B	C	S1C	C		GND
1	31		S1C	C	S1D	C		GND
1	31		S1D	C	S1E	C		GND
2	31		S2	WIPER	S1E	C		GND
3	31		S3	1	S4	1		GND
3	31		S4	1	S6	1		GND
4	31		S5	2	S1E	C		GND
5	31		S6	2	S1E	C		GND
6	31		S10	2	S10	3		GND
6	31		S10	3	S11	2		GND
6	31		S11	2	S11	3		GND
6	31		S11	3	S12	2		GND
6	31		S12	2	S12	3		GND
6	31		S12	3	S1E	C		GND
7	31		S10	1	S11	1		Lamp Return
7	31		S11	1	S12	1		Lamp Return
8	31		S8	2	S9	3		Lamp Return
8	31		S9	3	S9	5		Lamp Return
8	31		S9	5	S12	1		Lamp Return
9	31		S25	1	S1E	C		GND
--	24		S8	1	S8	2		C1 across S8-1 and S8-2
--	27		S9	1	S9	2		R1 across S9-1 and S9-2
--	28		S9	2	S9	3		R2 across S9-2 and S9-3
10	31		S13	2	S14	2		PSC

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1006	K

SHEET 2 OF 5

Subpanel Controls Assy (1024-1006) (Sheet 1 of 4)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
10	31		S14	2	S15	2		PSC
10	31		S15	2	S16	2		PSC
10	31		S16	2	S17	2		PSC
10	31		S17	2	S18	2		PSC
10	31		S18	2	S19	2		PSC
10	31		S19	2	S20	2		PSC
10	31		S20	2	S21	2		PSC
10	31		S21	2	S22	2		PSC
10	31		S22	2	S23	2		PSC
10	31		S23	2	S24	2		PSC
11	17	92	P1	1	S1A	$\bar{1}$		7P1
12	17	93	P1	2	S1A	$\bar{2}$		7P2
13	17	94	P1	3	S1A	$\bar{4}$		7P4
14	17	95	P1	4	S1A	$\bar{8}$		7P8
15	17	96	P1	5	S1B	$\bar{1}$		6P1
16	17	97	P1	6	S1B	$\bar{2}$		6P2
17	17	98	P1	7	S1B	$\bar{4}$		6P4
18	17	901	P1	8	S1B	$\bar{8}$		6P8
19	17	902	P1	9	S1C	$\bar{1}$		5P1
20	17	903	P1	10	S1C	$\bar{2}$		5P2
21	17	904	P1	11	S1C	$\bar{4}$		5P4
22	17	905	P1	12	S1C	$\bar{8}$		5P8
23	17	906	P1	13	S1D	$\bar{1}$		4P1
24	17	907	P1	14	S1D	$\bar{2}$		4P2
25	17	908	P1	15	S1D	$\bar{4}$		4P4

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1006	K

SHEET 3 OF 5

Subpanel Controls Assy (1024-1006) (Sheet 2 of 4)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
26	17	912	P1	16	S1D	$\overline{8}$		4P8
27	17	913	P1	17	S1E	1		CS1
28	17	914	P1	18	S1E	2		CS2
29	17	915	P1	19	S1E	4		CS4
30	17	916	P1	20	S1E	8		CS8
31	17	918	P1	22	S3	2		ME2
32	17	923	P1	23	S4	2		DM1
33	17	924	P1	24	S5	3		100 kHz (GND)
34	17	925	P1	25	S6	1		PROG/RUN
35	17	928	P1	26	S8	1		DIRECT (GND)
36	17	91	P1	27	S9	4		PAD
37	17	92	P1	28	S10	5		ST1
38	17	93	P1	29	S10	6		ST2
39	17	94	P1	30	S11	5		SP1
40	17	95	P1	31	S11	6		SP2
41	17	96	P1	32	S12	6		RE1
42	17	97	P1	33	S12	5		RE2
43	17	98	P1	34	S10	4		START LAMP
44	17	901	P1	35	S11	4		STOP LAMP
45	17	902	P1	36	S12	4		RESET LAMP
46	17	903	P1	37	S2	1		CONT
47	17	904	P1	38	S2	2		MAN
48	17	905	P1	39	S2	3		SET
49	17	906	P1	40	S2	4		PROG
50	17	907	P1	41	S25	3		AT1

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1006	K

SHEET 4 OF 5

Subpanel Controls Assy (1024-1006) (Sheet 3 of 4)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
51	17	908	P1	42	S25	2		AT2
52	17	912	P1	43	S13	2		PSC
53	17	913	P1	44	S13	1		P00
54	17	914	P1	45	S14	1		P05
55	17	915	P1	46	S15	1		P10
56	17	916	P1	47	S16	1		P15
57	17	917	P1	43	S17	1		P20
58	17	918	P1	49	S18	1		P25
59	17	923	P1	50	S19	1		P30
60	17	924	P1	51	S20	1		P35
61	17	925	P1	52	S21	1		P40
62	17	926	P1	53	S22	1		P45
63	17	927	P1	54	S23	1		P50
64	17	928	P1	55	S24	1		P55
65	32	0	P2	1	S1E	C		GND
66	32	0	P2	2	S10	1		Lamp Return
67	32	7	P2	3	S7	2		BATT
68	32	7	P2	4	S7	2		BATT
69	32	7	P2	5	S7	1		BATT (ON)
70	32	7	P2	6	S7	1		BATT (ON)
71	32	7	P2	7	S7	1		BATT (ON)
72	17	901	P2	8	S9	1		METER (-)
73	32	0	P2	37	S1E	C		GND
74	17	908	P1	21	S3	2		ME1

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1006	K

SHEET 5 OF 5

Subpanel Controls Assy (1024-1006) (Sheet 4 of 4)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	38	9	P16	9	FL1	1		Line - Hot $\boxed{1}$
1	38	0	P16	5	FL1	2		Line - Common $\boxed{1}$
1	38	Shield	---		FL1	GND LUG		GND Shield at FL1
2	38	9	FL1	3	S1	1		Line - Hot $\boxed{1}$
2	38	0	FL1	4	S1	2		Line - Common $\boxed{1}$
2	38	Shield	FL1	GND LUG	---			GND Shield at FL1
3	38	9	S1	3	TB1	IN 1		Line - Hot $\boxed{1}$
3	38	0	S1	4	TB1	IN 3		Line - Common $\boxed{1}$
3	38	Shield	---	--	TB1	IN 4		GND Shield at TB1
4	35	0	S1	6	TB1	OUT 4		GND
5	35	0	P16	6	TB1	OUT 4		GND
6	37	2	B1	+	S1	5		+5VC
7	36	--	S2	1	S2	4		240 - Hot $\boxed{1}$
8	36	--	S2	3	S2	6		115 - Hot $\boxed{1}$
9	36	--	S2	7	S2	10		220 - Hot $\boxed{1}$
10	36	--	S2	9	S2	12		105 - Hot $\boxed{1}$
11	36	--	S2	2	S2	5		115/240 - Hot $\boxed{1}$
12	36	--	S2	8	S2	11		105/220 - Hot $\boxed{1}$
13	35	8	J10	1	S2	1		240 - Hot $\boxed{1}$
14	35	8	J10	2	S2	10		220 - Hot $\boxed{1}$
15	35	9	J10	3	S2	3		115 - Hot $\boxed{1}$
16	35	9	J10	4	S2	12		105 - Hot $\boxed{1}$
17	35	0	J10	5	TB1	OUT 3		Line - Common $\boxed{1}$
18	35	9	S2	2	TB1	OUT 1		115/240 - Hot $\boxed{1}$
19	35	9	S2	11	TB1	OUT 2		105/220 - Hot $\boxed{1}$

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	F

SHEET 2 OF 3

Enclosure Assy (1024-1007) (Sheet 1 of 2) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
20	35	1	P16	7	S1	5		+5VC
21	37	6	B1	--	P16	8		-20VC

SIZE A	CODE IDENT NO 33783	DWG NO WL 1024-1007	REV F
		SHEET 3 OF 3	

Enclosure Assy (1024-1007) (Sheet 2 of 2) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	38	913	J9	1	P3	25		7P1
2	38	914	J9	2	P3	26		7P2
3	38	915	J9	3	P3	27		7P4
4	38	916	J9	4	P3	28		7P8
5	38	917	J9	5	P3	21		6P1
6	38	918	J9	6	P3	22		6P2
7	38	923	J9	7	P3	23		6P4
8	38	924	J9	8	P3	24		6P8
9	38	925	J9	9	P3	17		5P1
10	38	926	J9	10	P3	18		5P2
11	38	927	J9	11	P3	19		5P4
12	38	928	J9	12	P3	20		5P8
13	38	90	J9	13	P3	13		4P1
14	38	91	J9	14	P3	14		4P2
15	38	92	J9	15	P3	15		4P4
16	38	93	J9	16	P3	16		4P8
17	38	94	J9	17	P3	9		CS1
18	38	95	J9	18	P3	10		CS2
19	38	96	J9	19	P3	11		CS4
20	38	97	J9	20	P3	12		CS8
21	38	98	J9	21	P3	6		ME1
22	38	901	J9	22	P3	7		ME2
23	38	902	J9	23	P3	4		DM1
24	38	97	J9	24	P6	20		100 kHz (GND)
25	38	903	J9	25	P3	2		PROG/RUN No Wire to PCB

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1010	A

SHEET 2 OF 7

Harness Assy (1024-1010) (Sheet 1 of 6)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
26	37	0	J9	26	J2	2		DIRECT (GND)
27	38	905	J9	27	P6	36		PAD
28	38	906	J9	28	P13	11		ST1
29	38	907	J9	29	P13	12		ST2
30	38	908	J9	30	P13	13		SP1
31	38	912	J9	31	P13	14		SP2
32	38	913	J9	32	P13	15		RE1
33	38	914	J9	33	P13	16		RE2
34	38	925	J9	34	P13	23		STL
35	38	926	J9	35	P13	24		SPL
36	38	927	J9	36	P13	25		REL
37	38	915	J9	37	P13	17		CONT
38	38	916	J9	38	P13	18		MAN
39	38	917	J9	39	P13	19		SET
40	38	918	J9	40	P13	20		PROG
41	38	923	J9	41	P13	21		AT 1
42	38	924	J9	42	P13	22		AT 2
43	38	928	J9	43	P13	36		PSC
44	38	90	J9	44	P13	37		P00
45	38	91	J9	45	P13	38		P05
46	38	92	J9	46	P13	39		P10
47	38	93	J9	47	P13	40		P15
48	38	94	J9	48	P13	41		P20
49	38	95	J9	49	P13	42		P25
50	38	96	J9	50	P13	43		P30

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1010	A

SHEET 3 OF 7

Harness Assy (1024-1010) (Sheet 2 of 6)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
51	38	97	J9	51	P13	44		P35
52	38	98	J9	52	P13	45		P40
53	38	901	J9	53	P13	46		P45
54	38	902	J9	54	P13	47		P50
55	38	903	J9	55	P13	48		P55
56	37	7	J8	3	P2	3		BATT
57	37	7	J8	4	P2	3		BATT
58	37	7	J8	5	P10	5		BATT (ON)
59	37	7	J8	6	P10	6		BATT (ON)
60	37	7	J8	7	P3	29		BATT (ON)
61	38	901	J8	8	J7	11		METER (-)
62								
63	37	5	J7	2	P10	12		+8V
64	38	90	J7	3	J2	3		FORWARD PWR
65	38	91	J7	4	J2	4		REFLECTED PWR
66	38	904	J7	5	P3	32		TEST SW. A
67	38	905	J7	6	P3	33		BTG
68	38	906	J7	7	P3	34		BTR
69	38	907	J7	8	P3	35		CTG
70	38	908	J7	9	P3	36		CTR
71	38	90	J7	10	P10	10		STD ADJUST
72	38	918	J7	12	P13	55		TEST SW. B
73	38	0	J7	13	P10	2		STD ADJUST GND
74	38	5	J7	14	P10	9		+5 VB
75	37	0	P14	1	P6	1		GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1010	A

SHEET 4 OF 7

Harness Assy (1024-1010) (Sheet 3 of 6)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
76	37	0	P14	2	P6	2		GND
77	37	2	P14	3	P6	3		+5VJ
78	37	2	P14	4	P6	4		+5VK
79	37	3	P14	5	P6	6		+12VA
80	37	6	P14	6	P6	7		-12VA
81	37	4	P14	7	P6	8		+24VA
82	37	8	P14	8	P10	3		+35VC
83	37	8	P14	9	P10	4		+35VC
84	37	1	P14	10	P3	5		+5VC
85	37	0	P14	11	P10	1		GND
86	37	0	P14	12	P3	1		GND
87								
88								
89								
90	37	0	P15	1	P13	1		GND
91	37	0	P15	2	P13	2		GND
92	37	2	P15	3	P13	3		+5VA
93	37	2	P15	4	P13	6		+5VD
94	37	3	P15	5	P13	7		+12VA
95	37	6	P15	6	P13	8		-12VA
96	37	4	P15	7	P13	9		+24VA
97	37	8	P15	8	P13	10		+35VC
98	37	0	P15	9	J8	37		GND
99	37	1	P15	10	P13	5		+5VC
100	37	0	P15	11	J8	1		GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1010	

SHEET 5 OF 7

Harness Assy (1024-1010) (Sheet 4 of 6)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
101	37	0	P15	12	J8	2		Lamp Return
102	37	0	P15	13	J7	1		GND
103	37	0	P15	14	J2	5		GND
104								
105								
106								
107	38	91	J4		P13	26		1PPS
108	39		J3		P8			RF-2W
109	38	92	J2	1	P6	29		Latch; BKO
110								
111	37	5	P13	4	P10	8		+5VB
112	38	904	P13	27	P6	26		SRS
113	38	903	P13	33	P6	25		RES
114	38	902	P13	34	P6	24		STP
115	38	901	P13	35	P6	23		STR
116								
117	38	98	P13	50	P6	22		AST
118	38	905	P13	51	P6	27		EOS
119	38	906	P13	54	P6	37		BLANK (NEW)
120	38	912	P13	53	P6	31		ESB
121								
122	39		P12		P7			5 MHz
123	39		P11		P5			
124								
125								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1010	A

SHEET 6 OF 7

Harness Assy (1024-1010) (Sheet 5 of 6)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
126	39		P9		P4			2-3.5 MHz
127								
128	38	90	P6	9	P6	10		GND TX
129	38	906	P6	28	P3	3		BKI; XBO
130	38	907	P6	30	P3	8		BKC
131								
132	38	908	P6	32	P3	30		LOCK; OOL
133								
134	37	0	P2	1	E1			GND
135	36		P2	1	P2	2		GND
136	36		P2	3	P2	4		BATT

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1010	A

SHEET 7 OF 7

Harness Assy (1024-1010) (Sheet 6 of 6)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	39	--	E1		E2			LAMP RETURN
1		--	E2		E3			LAMP RETURN
1		--	E3		E4			LAMP RETURN
1		--	E4		S2	3		LAMP RETURN
2	38	9	S3	2	M1	+		FWD/REFL PWR
3	38	0	P1	1	E1			LAMP RETURN
4	38	5	P1	2	R1	3		STD ADJUST
5	38	90	P1	3	S3	1		FWD PWR
6	38	91	P1	4	S3	3		REFL PWR
7	38	92	P1	5	S2	6		TEST SW A
8	38	93	P1	6	DS2			BAT TEST GREEN
9	38	94	P1	7	DS4			BAT TEST RED
10	38	95	P1	8	DS1			SYST TEST GREEN
11	38	96	P1	9	DS3			SYST TEST RED
12	38	97	P1	10	R1	2		STD ADJUST WIPER
13	38	901	P1	11	M1	--		METER (-)
14	38	98	P1	12	S2	2		TEST SW B
15	38	0	P1	13	R1	1		STD ADJUST GND
16	38	5	P1	14	S2	5		+5VB
17	39	-	S2	2	S2	6		TEST SW A/TEST SW B

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1008	F

SHEET 2 OF 2

Front Panel Assy (1024-1008)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
	10		XU1	B	C6	+		
	10		XU1	C	C6	-		
	10		XU2	B	C7	+		
	10		XU2	C	C7	-		
	10		XU3	B	C8	+		
	10		XU3	C	C8	-		
	10		XU4	B	C9	+		
	10		XU4	C	C9	-		
	11		XU5	B	C10	+		
	11		XU5	C	C10	-		
	13		XU6	B	C11	+		
	13		XU6	C	C11	-		
	10		XU1	E	C12	+		
	10		XU1	C	C12	-		
	10		XU2	E	C13	+		
	10		XU2	C	C13	-		
	10		XU3	E	C14	+		
	10		XU3	C	C14	-		
	10		XU4	E	C15	+		
	10		XU4	C	C15	-		
	11		XU5	E	C16	-		
	11		XU5	B	C16	+		
	10		XU6	E	C17	+		
	10		XU6	C	C17	-		
		1	T1		CR1	A		Brown T1 Lead

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	E
		SHEET 2 OF 6	

Rear Panel Assy (1024-1009) (Sheet 1 of 5) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
		1	T1		CR1	$\overline{A}$		Brown T1 Lead
		2	T1		CR2	A		Red T1 Lead
		2	T1		CR2	$\overline{A}$		Red T1 Lead
		4	T1		A1	E7		Yellow T1 Lead
		4	T1		A1	E8		Yellow T1 Lead
		7	T1		A1	E9		Violet T1 Lead
		7	T1		A1	E10		Violet T1 Lead
		6	T1		A1	E11		Blue T1 Lead
		6	T1		A1	E12		Blue T1 Lead
		5	T1		E1			Green T1 Lead
1	47		XU1	B	XU2	B		+11VC (Unreg)
1	47		XU2	B	XU3	B		+11VC (Unreg)
2	47		XU1	C	XU2	C		GND
2	47		XU2	C	XU3	C		GND
3	47		XU4	C	XU6	C		GND
4	48	0	XU2	C	E1			GND
5	48	0	XU4	C	E1			GND
6	48	0	XU5	B	E1			GND
7	48	0	CR1	-	E1			GND
8	48	0	CR2	-	E1			GND
9	48	0	A1	E6	E1			GND
10	48	0	A1	E4	E1			GND
11	48	0	A1	E2	E1			GND
12	48	0	CR1	-	C1	-		GND
13	48	0	CR2	-	C2	-		GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	E

SHEET 3 OF 6

Rear Panel Assy (1024-1009) (Sheet 2 of 5) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
14	48	0	A1	E6	C3	-		GND
15	48	0	A1	E4	C4	+		GND
16	48	0	A1	E2	C5	-		GND
17	49	1	CR1	+	J11	7		+5VC (Unreg)
18	48	1	CR1	+	C1	+		+5VC (Unreg)
19	48	209	CR2	+	C2	+		+11VC (Unreg)
20	48	209	CR2	+	XU3	B		+11VC (Unreg)
21	48	31	A1	E5	C3	+		+20VC (Unreg)
22	48	31	A1	E5	XU4	B		+20VC (Unreg)
23	48	609	A1	E3	C4	-		-20VC (Unreg)
24	48	609	A1	E3	XU5	C		-20VC (Unreg)
25	49	6	A1	E3	J11	8		-20VC (Unreg)
26	48	8	A1	E1	C5	+		+35VC (Unreg)
27	49	8	A1	E1	XU6	B		+35VC (Unreg)
28	49	8	XU6	B	J6	8		+35VC (Unreg)
29	49	8	A1	E1	J5	8		+35VC (Unreg)
30	49	8	J5	8	J5	9		+35VC (Unreg)
31	49	4	XU6	E	J5	7		+24VA (Reg)
32	49	4	XU6	E	J6	7		+24VA (Reg)
33	49	6	XU5	E	J5	6		-12VA (Reg)
34	49	6	XU5	E	J6	6		-12VA (Reg)
35	49	3	XU4	E	J5	5		+12VA (Reg)
36	49	3	XU4	E	J6	5		+12VA (Reg)
37	49	2	XU3	E	J6	3		+5A (Reg)
38	49	2	XU2	E	J5	3		+5A (Reg)

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	E
		SHEET 4 OF 6	

Rear Panel Assy (1024-1009) (Sheet 3 of 5) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
39	49	2	XU2	E	J6	4		+5VA (Reg)
40	49	2	XU1	E	J5	4		+5VA (Reg)
41	49	0	E1		J5	1		GND
42	49	0	E1		J5	2		GND
43	49	0	E1		J5	11		GND
44	49	0	E1		J5	12		GND
45	49	0	E1		J6	1		GND
46	49	0	E1		J6	2		GND
47	49	0	E1		J6	9		GND
48	49	0	E1		J6	11		Lamp Return
49	49	0	E1		J6	12		GND
50	49	0	E1		J6	13		GND
51	49	0	E1		J6	14		GND
		8	T1		P17	1		240 - Hot $\boxed{2}$
		98	T1		P17	2		220 - Hot $\boxed{2}$
		9	T1		P17	3		115 - Hot $\boxed{2}$
		90	T1		P17	4		105 - Hot $\boxed{2}$
		0	T1		P17	5		Line In - Common $\boxed{2}$
52	48	9	J1	A	XF1	1		Line In - Hot $\boxed{2}$
53	50	9	XF1	2	J11	9		Line In - Hot $\boxed{2}$
53	50	0	J1	C	J11	5		Line In - Common $\boxed{2}$
54	48	5	J1	B	J11	6		GND
55	48	5	J1	B	E2			GND
56	49	1	CR1	+	J5	10		+5VC (Unreg)
57	49	1	CR1	+	J6	10		+5VC (Unreg)

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	E

SHEET 5 OF 6

Rear Panel Assy (1024-1009) (Sheet 4 of 5) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
58	49	2	CR2	+	U7	+	24	+11VC (Unreg) $\boxed{1}$
59	49	0	E1		U7	-	24	GND $\boxed{1}$

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	E

SHEET 6 OF 6

Rear Panel Assy (1024-1009) (Sheet 5 of 5) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	9	91	2P2	A	2P1	A	18"	27 VDC
2	9	209	2P2	B	2P1	B	18"	27 VDC
3	9	31	2P2	C	2P1	C	18"	27 VDC
4	9	41	2P2	D	2P1	D	18"	27 VDC
5	9	51	2P2	E	2P1	E	18"	27 VDC
6	9	61	2P2	F	2P1	F	18"	Thermostat Remote Shut Off
REF			2P1		2A2J3			DC Power from supply
REF			2P2		2A1J4			DC Power to Amp
REF			2A3A1J5		2A3P6			+5V to Front Panel Lamp
REF			2A3A1P1		2A1J1			RF IN
REF			2A3A1P2		2A1J2			RF OUT (10W)
REF			2A3A1P3		2A1J3			RF OUT (100W)
REF			2A3A1P4		2A2J1			AC Power IN
REF			2A3A1P5		2A2J2			AC Power To Fans

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1000	B

SHEET 2 OF 2

5018 Power Amplifier- Unit 2 (5018-1000)

Amplifier Assy (5018-1001)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
	$\boxed{1}$	2	A2A4	-	J4	A								+27VDC
	$\boxed{1}$	2	A2A5	-	J4	B								+27VDC
	$\boxed{1}$	2	A2A6	-	J4	C								+27VDC
	$\boxed{1}$	2	A2A7	-	J4	D								+27VDC
	$\boxed{1}$	-	A2A2	E1	J4	E								+27VDC
	16	9	U1	1	J4	F								Thermostat to J4
	16	0	U1	2	E1	-								GND to Thermostat
	15	-	J1	-	A1	J1								RF IN to Filter
	$\boxed{2}$	-	A1	J2	A2A2	E3								Filter to Driver
	$\boxed{2}$	-	A2A2	E4	J2	-								Driver 10W to Output
	$\boxed{2}$	-	A2A2	E2	A2A3	J1								Driver to Splitter
	17	0	A2A4A1R1	GND	A2A4R22	GND								
	17	0	A2A5A1R1	GND	A2A5R22	GND								
	17	0	A2A6A1R1	GND	A2A6R22	GND								
	17	0	A2A7A1R1	GND	A2A7R22	GND								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1001	B

SHEET 2 OF 2

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	29	9	FL1	1	J1	A		115/230 VAC-HOT
	29	0	FL1	2	J1	C		115/230 VAC-COMMON
	29	shield	FL1	5	J1	B		GND $\boxed{2}$
4	27	9	FL1	3	S1	9		$\boxed{1}$ 115/230 VAC-HOT
5	27	9	FL1	3	S1	12		$\boxed{1}$ 115/230 VAC-HOT
6	27	9	FL1	3	T1	4		$\boxed{1}$ 115/230 VAC-HOT
7	27	0	FL1	4	S1	6		$\boxed{1}$ 115/230 VAC-COMMON
8	27	0	FL1	4	S1	3		$\boxed{1}$ 115/230 VAC-COMMON
9	27	0	FL1	4	T1	6		$\boxed{1}$ 115/230 VAC-COMMON
10	27	9	FL2	1	T1	3		$\boxed{1}$ 107 VAC-HOT
11	27	9	FL3	1	T1	8		$\boxed{1}$ 107 VAC-HOT
12	51		S1	1	S1	4		
	51		S1	4	S1	7		
	51		S1	7	S1	10		
13	27	0	FL2	2	S1	2		$\boxed{1}$ 107 VAC-COMMON
14	27	0	FL2	2	S1	5		$\boxed{1}$ 107 VAC-COMMON
15	27	0	FL2	2	T1	1		$\boxed{1}$ 107 VAC-COMMON
16	27	9	T1	9	S1	8		$\boxed{1}$ 115 VAC-HOT
17	27	9	T1	9	S1	11		$\boxed{1}$ 115 VAC-HOT
18	30	clear	FL2	3	U1-INPUT	3		107 VAC-HOT
	30	0	FL2	4	U1-INPUT	4		107 VAC-COMMON
	30	shield			U1-GND			$\boxed{3}$ GND
19	30	clear	FL2	3	U2-INPUT	3		107 VAC-HOT

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	D

SHEET 2 OF 5

Power Supply Assy (5018-1002) (Sheet 1 of 4) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
19	30	0	FL2	4	U2-INPUT	4		107 VAC-COMMON
	30	shield			U2-GND			$\boxed{3}$ GND
20	27	0	FL3	2	T1	6		107 VAC-COMMON
21	30	clear	FL3	3	U3-Input	3		107 VAC-HOT
	30	0	FL3	4	U3-INPUT	4		107 VAC-COMMON
	30	shield			U3-GND			$\boxed{3}$ GND
22	30	clear	U1-OUTPUT	1	J2	A		107 VAC-HOT
	30	0	U1-OUTPUT	2	J2	B		107 VAC-COMMON
	30	shield			U1-GND			$\boxed{3}$ GND
23	30	clear	U2-OUTPUT	1	J2	C		107 VAC-HOT
	30	0	U2-OUTPUT	2	J2	D		107 VAC-COMMON
	30	shield			U2-GND			$\boxed{3}$ GND AT U2
24	30	clear	U3-OUTPUT	1	J2	E		107 VAC-HOT
	30	0	U3-OUTPUT	2	J2	F		107 VAC-COMMON
	30	shield			U3-GND			$\boxed{3}$ GND
25	27	709	T1	12	CR1	A		UNREG TO RECTIFIERS
26	27	709	T1	12	CR2	A		UNREG TO RECTIFIERS
27	27	709	T1	12	CR3	A		UNREG TO RECTIFIERS
28	27	709	T1	12	CR4	A		UNREG TO RECTIFIERS
29	27	709	T1	12	CR5	A		UNREG TO RECTIFIERS
30	27	609	T1	11	CR1	$\overline{A}$		UNREG TO RECTIFIERS
31	27	609	T1	11	CR2	$\overline{A}$		UNREG TO RECTIFIERS
32	27	609	T1	11	CR3	$\overline{A}$		UNREG TO RECTIFIERS
33	27	609	T1	11	CR4	$\overline{A}$		UNREG TO RECTIFIERS
34	27	609	T1	11	CR5	$\overline{A}$		UNREG TO RECTIFIERS

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	D

SHEET 3 OF 5

Power Supply Assy (5018-1002) (Sheet 2 of 4) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
35	27	91	CR1	+	C1	+	A1	E1						UNREG TO REGULATORS
36	27	0	CR1	-	C1	-	A1	E2						UNREG TO REGULATORS
37	27	21	CR2	+	C2	+	A2	E1						UNREG TO REGULATORS
38	27	0	CR2	-	C2	-	A2	E2						UNREG TO REGULATORS
39	27	31	CR3	+	C3	+	A3	E1						UNREG TO REGULATORS
40	27	0	CR3	-	C3	-	A3	E2						UNREG TO REGULATORS
41	27	41	CR4	+	C4	+	A4	E1						UNREG TO REGULATORS
42	27	0	CR4	-	C4	-	A4	E2						UNREG TO REGULATORS
43	27	51	CR5	+	C5	+	A5	E1						UNREG TO REGULATORS
44	27	0	CR5	-	C5	-	A5	E2						UNREG TO REGULATORS
45	27	0	A1	E3	E1									GND'S
46	27	0	A2	E3	E2									GND's
47	27	0	A3	E3	E3									GND'S
48	27	0	A4	E3	E4									GND'S
49	27	0	A5	E3	E5									GND'S
50	27	1	A1	E4	J3	A								27 VDC TO AMP
51	27	2	A2	E4	J3	B								27 VDC TO AMP

SIZE	CODE IDENT NO	DWG NO		REV
A	33783	WL	5018-1002	D

SHEET 4 OF 5

Power Supply Assy (5018-1002) (Sheet 3 of 4) (S/N 400101 and on)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
52	27	3	A3	E4	J3	C								27 VDC TO AMP
53	27	4	A4	E4	J3	D								27 VDC TO AMP
54	27	5	A5	E4	J3	E								27 VDC TO AMP
55	28	6	A5	E5	A4	E5	A3	E5	A2	E5	A1	E5		THERMAL CUT OUT
	28	6	A1	E5	J3	F								THERMAL CUT OUT
56	28	94	J3	D	U4	1	C6	+						UNREG DC TO +5 REG
57			C6		U4	3	C7		U4	2				
58	28	2	U4	2	J2	G								+5 TO POWER LAMP

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	D

SHEET 5 OF 5

Power Supply Assy (5018-1002) (Sheet 4 of 4) (S/N 400101 and on)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
1	17	2	P6	1	XDS1		6"	

SIZE	CODE IDENT Nº	DWG Nº	REV
A	33783	WL 5018-1003	D

SHEET 2 OF 2

Enclosure Assy (5018-1003)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	19		J1		P1		9"	RF IN FROM 1024
1	19		J2		P2		11"	RF OUT - 10W
2	18		J3		P3		13"	RF OUT - 100W
4	13	9	J4	A	XF1	1		$\boxed{1}$ 115/230 VAC-HOT
5	20	9	XF1	2	P4	A	16"	115/230 VAC-HOT
5	20	0	J4	C	P4	C		115/230 VAC-COMMON
5	20	shield	J4	B	P4	B		$\boxed{2}$ GND
			C1	1	E1			$\boxed{1}$ 107 VAC
			C1	2	E2			$\boxed{1}$ 107 VAC
			C2	1	E3			$\boxed{1}$ 107 VAC
			C2	2	E4			$\boxed{1}$ 107 VAC
			C3	1	E5			$\boxed{1}$ 107 VAC
			C3	2	E6			$\boxed{1}$ 107 VAC
6	13	5	B1	3	E1			$\boxed{1}$ 107 VAC
7	13	5	B2	3	E3			$\boxed{1}$ 107 VAC
8	13	5	B3	3	E5			$\boxed{1}$ 107 VAC
9	13	0	B1	2	E2			$\boxed{1}$ 107 VAC
10	13	0	B2	2	E4			$\boxed{1}$ 107 VAC
11	13	0	B3	2	E6			$\boxed{1}$ 107 VAC
12	21	clear	B1	1	P5	A	21"	107 VAC-HOT
12	21	0	B1	2	P5	B	21"	107 VAC-COMMON
12	21	shield	E7				21"	$\boxed{2}$ GND
13	21	clear	B2	1	P5	C	21"	107 VAC-HOT
13	21	0	B2	2	P5	D	21"	107 VAC-COMMON
13	21	shield	E8				21"	$\boxed{2}$ GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1004	E
		SHEET 2 OF 3	

Rear Panel Assy (5018-1004) (Sheet 1 of 2)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
14	21	clear	B3	1	P5	E	21"	107 VAC-HOT
14	21	0	B3	2	P5	F	21"	107 VAC-COMMON
14	21	shield	E9				21"	$\boxed{2}$ GND
15	32	2	J5		P5	G	16"	+5 VDC

SIZE	CODE IDENT Nº	DWG Nº	REV
A	33783	WL 5018-1004	E

SHEET 3 OF 3

Rear Panel Assy (5018-1004) (Sheet 2 of 2)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
			A1/A3					
1	16	91	E2				2'	
2	↓	92	E6				↓	
3	↓	93	E3				↓	
4	↓	94	E5				↓	
5	↓	95	E4				↓	
6	↓	96	E8				↓	
7	↓	97	E7				↓	
8	↓	98	E1				↓	
9								
10								
11								
12								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1005	A

SHEET 2 OF 2

Voltage Regulator (5018-1005)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
			A2					
1	17	91	E1				2'	
2	↓	92	E2				2'	
3								
4	17	93	E3				2'	
5	↓	94	E4				2'	
6								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1006	A

SHEET 2 OF 2

Voltage Regulator (5018-1006)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
			3A1A1J1		3A3A2P2			RF IN TO FILTER
			3A1A1J2		3A3A2P4			CONTROL TO FILTER
			3A1A2J2		3A3A1P2			COMM RF IN
			3A1P12		3A3R1			RF TO DUMMY LOAD
			3A1K2J1		3A3A1P1			RF TO ANT
			3A1K2J4		3A3A2P5			+26V, FORWARD/REFLECTED PWR
			3A2A1J1		3A3A2P8			AC LINE IN
			3A2A1J2		3A3A2P6			AC LINE OUT
			3A2A2J2		3A3A2P3			CONTROL TO DECODE
			3A2A2J3		3A3A2P1			RF TO DECODE
			3A3A1P3		3A3A2J9			AC PWR TO SWITCH

NOTES:

NEXT ASSY:

SIZE	CODE IDENT Nº	DWG Nº		REV
A	33783	WL	4011-1000 and 4011-1120	A

BR COMMUNICATIONS

SHEET 2 OF 2

4011 Filter Diplexer - Unit 3(4011-1000 and 4011-1120)

WIRE NO	ITEM NO	OLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	ENGTH	REMARKS
1	13	92	K1	E1	K2	E1		COIL CONNECT +26 VDC
2	13	90	K1	E2	K2	E2		COIL CONNECT RETURN
3	13	93	A3	C1	K2-J4	A		FORWARD POWER
4	13	94	A3	C2	K2-J4	D		REFLECTED POWER
5								
6								
7	14		P1		P7	21"		RF CHIRP TO K1
8	14		P2		P8	12"		RF CHIRP TO DIPLEXER
9	14		P3		P4	12"		RF CHIRP TO K2
10	15		P5		P9	12"		RF COMM TO K2
11	14		P10		P6	11"		RF CHIRP TO PWR DET.
12	14		P11		P12	18"		RF CHIRP TO LOAD

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1001 and 4011-1101	F

SHEET 2 OF 2

RF Coupling Assy (4011-1001 and 4011-1101)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	12	2	A1E1		P2	9	24"	+11 V CAP C1+
2	12	0	A1E2		P2	10	24"	C1-
3	12	012	A1E3		P2	11	24"	+20 V CAP C2+
4	12	0	A1E4		P2	12	24"	C2-
5	12	914	A1E6		P2	13	24"	-270 V CAP C3 $\boxed{1}$
6	12	0	A1E5		P2	14	24"	C3+ $\boxed{1}$
7	12	4	A1E7		P2	15	24"	+26 V CAP C4+
8	12	0	A1E8		P2	16	24"	C4-
9		2	A1T1		J3	1	6"	11 V AC *
10		2	A1T1		J3	2	6"	*
11		3	A1T1		J3	3	6"	20 V AC *
12		3	A1T1		J3	4	6"	*
13		4	A1T1		J3	5	6"	270 V AC $\boxed{1}$ *
14		4	A1T1		J3	6	6"	$\boxed{1}$ *
15		7	A1T1		J3	7	6"	26 V AC *
16		7	A1T1		J3	8	6"	*
17	12	92	P2	1	P1	1	10"	11 VAC
18	12	92	P2	2	P1	2	10"	11 VAC
19	12	98	P2	3	P1	3	10"	20 VAC
20	12	93	P2	4	P1	4	10"	20 VAC
21	12	4	P2	5	P1	5	10"	270 VAC $\boxed{1}$
22	12	4	P2	6	P1	6	10"	270 VAC $\boxed{1}$
23	12	97	P2	7	P1	7	10"	26 VAC
24	12	97	P2	8	P1	8	10"	26 VAC

* HOOKUP TO COLOR CODED TRANSFORMER LEADS

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1002	E

SHEET 2 OF 4

Filter/Diplexer Control Assy (4011-1002) (Sheet 1 of 3)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
25	13	9	A1K1	A1	A1J2	E	6"	LINE - HOT $\boxed{1}$
25	13	0	A1K1	B1	A1J2	F	6"	LINE - COMMON $\boxed{1}$
25	13	shield			A1E10		6"	GND TO LUG AT J2 $\boxed{2}$
26	14	0	A1K1	X2	A1E9		8"	GND
27	15	9	A1K1	A2	A1XF1	2	12"	LINE - HOT $\boxed{1}$
27	15	0	A1K1	B2	A1FL1	1	8"	LINE - COMMON $\boxed{1}$
28	15	9	A1XF1	1	A1J1	D	3"	LINE - HOT $\boxed{1}$
29	15	9	A1FL1	1	A1J1	A	3"	LINE - HOT $\boxed{1}$
30	13	9	A1FL1	2	A1J1	E	12"	LINE - HOT $\boxed{1}$
30	13	0	A1XF1	1	A1J1	C	12"	LINE - COMMON $\boxed{1}$
30	13	shield			A1E11		12"	GND TO LUG AT J1 $\boxed{2}$
31	13	0	A1FL1	3	A1J2	B	10"	LINE - COMMON $\boxed{1}$
31	13	9	A1FL1	4	A1J2	A	10"	LINE - HOT $\boxed{1}$
31		shield			A1E10		10"	$\boxed{2}$
33	15	9	A1S1	2	A1J2	C	7"	115V AC TO SWITCH $\boxed{1}$
34		3	A1T1		A1S1	1	14"	230 IN - HOT $\boxed{1}$ *
35		9	A1T1		A1S1	3	14"	115 IN - HOT $\boxed{1}$ *
36		0	A1T1		A1S1	10	14"	LINE COMMON $\boxed{1}$ *
37	15	0	A1S1	10	A1J2	D	7"	LINE COMMON $\boxed{1}$
38	15	5	A1J1	B	A1E11		3"	GND FOR LINE IN
39	15	5	A1J2	H	A1E10		3"	GND
40		5	A1T1		A1E9		—	XFRMR GND *
41	15	7	A1E7		P1	9	18"	+26V
42	15	7	J3	9	A1K1	X1	24"	+26V

* HOOKUP TO COLOR CODED TRANSFORMER LEADS

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1002	E

SHEET 3 OF 4

Filter/Diplexer Control Assy (4011-1002) (Sheet 2 of 3)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
42A	15	7	A1K1	X1	A1J2	G	6"	
43								
44								
45		98	A1T1		OPEN			SLEEVE LEAD, WILL REMAIN UNTERMINATED $\boxed{1}$
46		90	A1T1		OPEN			SLEEVE LEAD, WILL REMAIN UNTERMINATED $\boxed{1}$
47	14	2	A1E1		A1U1	+	24	C1 + $\boxed{3}$
48	14	0	A1E2		A1U1	-	24	C1 - $\boxed{3}$

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1002	E

SHEET 4 OF 4

Filter/Diplexer Control Assy (4011-1002) (Sheet 3 of 3)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
1	36	1	J2	1	A2	E1								Filter Select #1 +6 -240
2	36	2	J2	2	A2	E2								Filter Select #2
3	36	3	J2	3	A2	E3								Filter Select #3
4	36	4	J2	4	A2	E4								Filter Select #4
5	36	5	J2	5	A1	E5								Filter Select #5
6	36	6	J2	6	A1	E6								Filter Select #6
7	36	7	J2	7	A1	E7								Filter Select #7
8	36	8	J2	8	A1	E8								Filter Select #8
9	36	9	J2	9	A1	E9	A2	E9						-240V Bias
10	36	9	A1	E17	A1	E18	A1	E19	A1	E20				-240V Buss (Ref)
11	36	9	A2	E21	A2	E22	A2	A23	A2	E24				-240V Buss (Ref)
12	37	Bare	J3	Sig	A1	E14								RF Out (Ref)
13	A1 C20		J1	Sig	A1	C20	{C20 connects J1 to PCB}							RF In
14	36	φ	J2	10	A1	TP3	A2	TP3						Ground

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1004	G

SHEET 2 OF 2

Filter Set Assy (4011-1004) (S/N 400101 and on)

Filter Set Assy (4011-1104) (Sheets 1 of 2)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
1	36	1	J2	1	A2	E1								Filter Select #1 0 +6 -240
2	36	2	J2	2	A2	E2								Filter Select #2
3	36	3	J2	3	A2	E3								Filter Select #3
4	36	4	J2	4	A2	E4								Filter Select #4
5	36	5	J2	5	A1	E5								Filter Select #5
6	36	6	J2	6	A1	E6								Filter Select #6
7	36	7	J2	7	A1	E7								Filter Select #7
8	36	8	J2	8	A1	E8								Filter Select #8
9	36	9	J2	9	A1	E9	A2	E9						-240V Bias
10	36	9	A1	E17	A1	E18	A1	E19	A1	E20				-240V Buss (Ref)
11	36	9	A2	E21	A2	E22	A2	A23	A2	E24				-240V Buss (Ref)
12	37	Bare	J3	Sig	A1	E14								RF Out (Ref)
13	A1 C20		J1	Sig	A1	C20	(C20 connects J1 to PCB)							RF In
14	36	0	J2	10	A1	TP3	A2	TP3						GROUND
15	36	9	J3		A1	E1								GROUND
16	36	9	J1		A1	E11								GROUND
17	37		A3	E1	A1	E41								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1104	A

SHEET 2 OF

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
18	37		A3	E2	A1	E42								
19	37		A3	E3	A1	E40								
20	37		A3	E4	A1	E13								
21	37		A3	E5	A1	E44								
22	37		A3	E6	A1	E43								
23	37		A5	E1	A1	E37								
24	37		A5	E2	A1	E36								
25	37		A5	E3	A1	E10								
26	37		A5	E5	A1	E38								
27	37		A5	E6	A1	E39								
28	37		A4	E1	A2	E35								
29	37		A4	E2	A2	E38								
30	37		A4	E3	A2	E13								
31	37		A4	E5	A2	E42								
32	37		A4	E6	A2	E40								
33	37		A6	E1	A2	E37								
34	37		A6	E2	A2	E33								
35	37		A6	E4	A2	E12								
36	37		A6	E5	A2	E39								
37	37		A6	E6	A2	E41								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1104	A
		SHEET 3 OF	

Filter Set Assy (4011-1104) (Sheet 2 of 2)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	6	—	A1 J1	—	J3	—		RF IN FROM 5018
2	7	92	A1	E25	J1	1		11 VAC IN
3	7	92	A1	E26	J1	2		11 VAC IN
4	7	902	A1	E27	J1	9		TO FILTER CAP C1+
5	7	912	A1	E28	J1	10		TO FILTER CAP C1-
6	7	93	A1	E16	J1	3		20 VAC IN
7	7	93	A1	E17	J1	4		20 VAC IN
8	7	903	A1	E20	J1	11		TO FILTER CAP C2+
9	7	913	A1	E19	J1	12		TO FILTER CAP C2-
10	7	97	A1	E21	J1	5		$\boxed{1}$ 270 VAC IN
11	7	97	A1	E22	J1	6		$\boxed{1}$ 270 VAC IN
12	7	907	A1	E23	J1	13		$\boxed{1}$ TO FILTER CAP C3-
13	7	917	A1	E24	J1	14		$\boxed{1}$ TO FILTER CAP C3+
14	7	4	A1	E11	J1	7		26 VAC IN
15	7	4	A1	E12	J1	8		26 VAC IN
16	7	904	A1	E14	J1	15		TO FILTER CAP C4+
17	7	914	A1	E13	J1	16		TO FILTER CAP C4-
18	7	91	A1	E1	J2	1		$\boxed{1}$ FILTER SELECT #1 (2-2.8 MHz)
19	7	95	A1	E2	J2	2		$\boxed{1}$ FILTER SELECT #2 (2.8-4 MHz)
20	7	96	A1	E3	J2	3		$\boxed{1}$ FILTER SELECT #3 (4-5.8 MHz)
21	7	98	A1	E4	J2	4		$\boxed{1}$ FILTER SELECT #4 (5.3-8 MHz)
22	7	901	A1	E5	J2	5		$\boxed{1}$ FILTER SELECT #5 (8-11 MHz)
23	7	905	A1	E6	J2	6		$\boxed{1}$ FILTER SELECT #6 (11-16 MHz)
24	7	906	A1	E7	J2	7		$\boxed{1}$ FILTER SELECT #7 (16-23 MHz)
25	7	908	A1	E8	J2	8		$\boxed{1}$ FILTER SELECT #8 (<2, >23 MHz)

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1007	H
		SHEET 2 OF 4	

Filter Decode Assy (4011-1007) (Sheet 1 of 3)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
26	7	915	A1	E18	J2	9		-250 VDC
27	7	916	A1	E10	J2	10		RF ÷ 2 OUT
28	7	4	A1	E15	J2	11		+26VDC OUT
29	7	92	A1	E9	J2	12		LATCH -BKO
30	7	0	J2	13	J2	16		DIPLEX GND
31	7	90	J2	14	J2	17		FORWARD POWER
32	7	91	J2	15	J2	18		REFLECTED POWER
33	7	0	A1	E28	J2	19		GROUND FOR FILTERSET
34	7	0	A1	E24	J2	20		GROUND FOR DECODE P.C.B.
			TEST POINTS					
35	20		A1	TP1	1			FL1 2-2.8
36	20		A1	TP2	2			FL2 2.8-4
37	20		A1	TP3	3			FL3 4-5.8
38	20		A1	TP4	4			FL4 5.8-8
39	20		A1	TP5	5			FL5 8-11
40	20		A1	TP6	6			FL6 11-16
41	20		A1	TP7	7			FL7 16-23
42	20		A1	TP8	8			FL8 23-30
43	20		A1	TP9	9			LATCH IN
44	20		A1	TP10	10			1-15 MHz
45	20		A1	TP11	+6V(B)			+6V(B)
46	20		A1	TP12	+5V(A)			+5V(A)
47	7	6	A1	E18	-250V			-250V
48	7	6	A1	E15	+26V			+26V
49	7	6	A1	E23	-270V			-270V

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1007	H
			SHEET 3 OF 4

Filter Decode Assy (4011-1007) (Sheet 2 of 3)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
50	7	0	A1	E24	TEST POINT GND			GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1007	H
		SHEET 4 OF 4	

Filter Decode Assy (4011-1007) (Sheet 3 of 3)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	8		J7		P1		23"	RF OUTPUT
2	8		J8		P2		28"	RF INPUT
3	11	9	S1	1	P3	1	5"	LINE-HOT TO PWR SW $\boxed{1}$
	11	0	S1	2	P3	2	5"	LINE-COMMON TO PWR SW $\boxed{1}$
	11	shield	S1	6	P3		5"	$\boxed{2}$
4	11	9	S1	3	P3	3	5"	LINE-HOT FROM PWR SW $\boxed{1}$
	11	0	S1	4	P3	4	5"	LINE-COMMON FROM PWR SW $\boxed{1}$
	11	shield	S1	6	P3		5"	$\boxed{2}$
5	14	4	S1	5	P3	5	5"	+26 VDC
6	14	0	S1	6	P3	6	5"	GND (LAMP RETURN)

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1009	C

SHEET 2 OF 2

Front Panel Assy (4011-1009)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
1	21	9	J4	A	P6	E	10"	LINE - HOT TO 5018
1	21	0	J4	C	P6	F	10"	LINE - COMMON TO 5018
1	21	shield	E2		P6	H	10"	$\boxed{1}$ GND
2	21	9	J6	A	J5	A		LINE - HOT TO 1024
2	21	0	J6	C	J5	C		LINE - COMMON TO 1024
2	21	shield	E4		E1			$\boxed{1}$ GND
3	21	9	J6	A	P8	A	21"	LINE - HOT TO 4011
3	21	0	J6	C	P8	C	21"	LINE - COMMON TO 4011
3	21	shield	E4		P8	B	21"	$\boxed{1}$ GND
4	22	5	J6	B	E4			GND
5	22	5	J5	B	E1			GND
6	21	9	F1	1	P8	D	21"	LINE - HOT TO FUSE
6	21	0	F1	2	P8	E	21"	LINE - HOT FROM FUSE
6	21	shield	E1		P8	B	21"	$\boxed{1}$ GND
7	24		J1		P1		17"	RF IN
3	35		J2		P2		24"	RF IN
9	23	91	P3	1	P4	1	30"	$\boxed{2}$ FILTER SELECT #1
10	23	95	P3	2	P4	2	30"	FILTER SELECT #2
11	23	96	P3	3	P4	3	30"	FILTER SELECT #3
12	23	98	P3	4	P4	4	30"	FILTER SELECT #4
13	23	901	P3	5	P4	5	30"	FILTER SELECT #5
14	23	905	P3	6	P4	6	30"	FILTER SELECT #6
15	23	906	P3	7	P4	7	30"	FILTER SELECT #7
16	23	908	P3	8	P4	8	30"	FILTER SELECT #8
17	23	915	P3	9	P4	9	30"	$\boxed{2}$ -240 VDC

SIZE	CODE IDENT Nº	DWG Nº	REV
A	33783	WL 4011-1010	G

SHEET 2 OF 3

Rear Panel Assy (4011-1010) (Sheet 1 of 2)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
18	23	4	P3	11	P5	C	32"	+26 VDC
19	23	92	P3	12	J3	1	19"	LATCH - BKO
20	23	90	P3	13	P5	B	32"	DIPLEX GND
21	23	93	P3	14	P5	A	32"	FORWARD POWER
22	23	94	P3	15	P5	D	32"	REFLECTED POWER
23	23	0	P3	16	J3	2	19"	DIPLEX GND
24	23	90	P3	17	J3	3	19"	FORWARD POWER
25	23	91	P3	18	J3	4	19"	REFLECTED POWER
26	21	9	P6	A	J9	1	20"	LINE - HOT TO PWR SW
	21	0	P6	B	J9	2	20"	LINE - COMMON TO PWR SW
	21	Shiel	P6	H			20"	$\boxed{1}$ GND
27	21	9	P6	C	J9	3	20"	LINE - HOT FROM PWR SW
27	21	0	P6	D	J9	4	20"	LINE - COMMON FROM PWR SW
27	21	Shiel	P6	H			20"	$\boxed{1}$ GND
28	25	4	P6	G	J9	5	20"	+26 VDC
29	25	0	P6	H	J9	6	20"	GND (LAMP RETURN)
30	25	0	E3		J3	5		CHASSIS GND, 4011 to 1024
31	32		E3		E2			GND (JUMPER)
31	32		E2		E1			GND (JUMPER)
31	32		E1		E4			GND (JUMPER)
32	23	0	P3	19	P4	10		GND (FILTER SET)
33	23	0	P3	20	E3			GND (DECODE RETURN)
34	21	5	J4	B	E2			GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1010	G

SHEET 3 OF 3

Rear Panel Assy (4011-1010) (Sheet 2 of 2)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	10	0	A1 GND		J1	1		
2	↓	0	A2 GND		↓	2		
3	10	2	A1 +5VA/+5A		J1	3		
4		5	+5VB/+5B			4		
5		1	+5C			5		SEE WIRE #24a BELOW
6		2	+5D			6		USED IN TEST
7		3	+12VA			7		
8		6	-12VA			8		↓
9		4	+24VA			9		
10		8	+29VA			10		
11		90	ST1			11		START SW.
12		91	ST2			12		
13		92	SP1			13		STOP SW.
14		93	SP2			14		
15		94	RE1			15		RESET SW.
16		95	RE2			16		
17		96	CON			17		CONT. SW.
18		97	MAN			18		MANUAL SW.
19		98	SET			19		SET SW.
20		901	ATϕ			20		PROG. SW.
21		902	AT1			21		ADV. TIMER
22		903	AT2			22		
23		904	STL			23		START LAMP
24		905	↓ SPL		↓	24		STOP LAMP
24a	↓	1	A1+5C		A15VC			JUMPER

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL1024-1002	G

SHEET 2 OF 8

Transmit Logic Assy (1024-1002) (Sheet 1 of 7) (S/N 40010 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
25	10	906	A1 REL		J1	25		RESET LAMP
26	↓	907	↓ PPS		↓	26		TO REAR PANEL
27								
28	10	913	A1 SLF		J1	28		SLIP RATE - FAST
29		914	SLM			29		- MEDIUM
30		915	SLS			30		- SLOW
31		916	DEL			31		DELETE
32		917	ADD			32		ADD
33		918	RES			33		RESET
34		923	STR			34		
35		924	STR			35		
36		925	PSC			36		PROGRAMMER SW. COMMON
37		926	P00			37		TO SUBPANEL
38		927	P05			38		PROGRAMMER SW.
39		928	P10			39		
40		90	P15			40		
41		91	P20			41		
42		92	P25			42		
43		93	P30			43		
44		94	P35			44		
45		95	P40			45		
46		96	P45			46		
47		97	P50			47		
48		98	P55			48		
48a	↓	97	↓ 3		↓	55		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	G

SHEET 3 OF 8

Transmit Logic Assy (1024-1002) (Sheet 2 of 7) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
49	10	924	A1 CST		J1	49		
50		925	AST			50		AUX. START
51		926	EOS			51		END OF SWEEP
52		927	TVL		↓	52		T.V. LOAD
53		901	1S1		J2	22		TIME DECODE
54		902	1S2			23		TO DISPLAY
55		903	1S4			24		
56		904	1S8			25		
57		905	1051			26		
58		906	1052			27		
59		907	1054			28		
60		908	1058			29		
61		912	1M1			30		
62		913	1M2			31		
63		914	1M4			32		
64		915	1M8			33		
65		916	10M1			34		
66		917	10M2			35		
67		918	10M4			36		
68		923	10M8			37		
69		902	LT		↓	21		LAMP TEST DISPLAY
70		903	BATT		J3	29		FROM BATTERY SW.
71		904	OOL			30		OUT OF LOCK
72	↓	905	↓ LT		↓	31		LAMP TEST

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	G

SHEET 4 OF 8

Transmit Logic Assy (1024-1002) (Sheet 3 of 7) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
73	10	906	A1 2		J3	32		TEST SW.
74	↓	907	↓ BTG		↓	33		BATT TEST - GREEN
75	↓	908	↓ BTR		↓	34		- RED
76	↓	912	↓ CTG		↓	35		CIRCUIT - GREEN
77	↓	913	↓ CTR		↓	36		- RED
78	9		↓ IN		J5			5 MHz IN
	↓		↓ GND		SHIELD			
79	↓		J4		A2 XF1			RF IN
	↓		A1 GND		SHIELD			
80	16	0	↓ GND		A2 GND			
81	↓	2	↓ +5A		A2 5VA			
82	↓	5	↓ +5B		A2 5VB			
83	10	90	A2 XBO		J3	3		BLANK OUT
84	↓	91	↓ DM1		↓	4		BLANK DISPLAY SW.
85	↓	92	↓ ME1		↓	6		BLANKER STORE
	↓		↓		↓			
87	↓	94	↓ BCK		↓	8		10 KHz DECADE TURNOVER
88	↓	95	↓ CS1		↓	9		CHANNEL SEL. DECODE
89	↓	928	A1 ESB		J1	53		END OF SWEEP BLANKING
90	↓	96	A2 CS2		J3	10		CHANNEL SEL. DECODE
91	↓	97	↓ CS4		↓	11		
92	↓	98	↓ CS8		↓	12		
93	↓	901	↓ 4P1		↓	13		TO BLANKER FREQ.
94	↓	902	↓ 4P2		↓	14		THUMBWHEELS

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	G

SHEET 5 OF 8

Transmit Logic Assy (1024-1002) (Sheet 4 of 7) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
95	1C	903	A2 4P4		J3	15		
96		904	4P8			16		
97		905	5P1			17		
98		906	5P2			18		
99		907	5P4			19		
100		908	5P8			20		
101		912	6P1			21		
102		913	6P2			22		
103		914	6P4			23		
104		915	6P8			24		
105		916	7P1			25		
106		917	7P2			26		
107		918	7P4			27		
108		923	7P8		▼	28		
109		924	4D1		J2	6		TO FREQUENCY
110		925	4D2			7		DISPLAY LEDS
111		926	4D4			8		
112		927	4D8			9		
113		928	5D1			10		
114		90	5D2			11		
115		91	5D4			12		
116		92	5D8			13		
117		93	6D1			14		
118	▼	94	▼ 6D2		▼	15		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	G

SHEET 6 OF 8

Transmit Logic Assy (1024-1002) (Sheet 5 of 7) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
119	10	95	A2 6D4		J2	16		
120	↓	96	↓ 6D8		↓	17		
121	↓	97	↓ 7D1		↓	18		
122	↓	98	↓ 7D2		↓	19		
123	↓	901	↓ 7D4		↓	20		
124	↓	912	A1 FCC		A2 FCC			100 kHz
125	↓	916	BD		DM2			JUMPER ON BRD 1A2A2
	↓		↓					
127	↓	914	J2	1	J3	1		GND FOR DISPLAY
128	↓	915	↓	2	↓	5		+5C FOR DISPLAY

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1002	G

SHEET 7 OF 8

Transmit Logic Assy (1024- 1002) (Sheet 6 of 7) (S/N 400100 and before)

WIRE Nº	ITEM Nº	COLOR	FROM DEVICE	PIN Nº	TO DEVICE	PIN Nº	LENGTH	REMARKS
129	22		A1	TP1	CASTING A1	TP1		1PPS
130				TP2		TP2		100 KHz
131				TP4		TP4		RUN/STOP
132	↓			TP7		TP7		AUTO START
133	10	6		EOS		TP8		END OF SWEEP
134				SP1		TP9		STOP SWITCH
135				ST1		TP10		START SWITCH
136				AT1		TP11		ADVANCE TIMER SW.
137				RE1		TP12		RESET SWITCH
138				OOL		TP13		OUT OF LOCK
139				-12V		-12V		-12V
140				+24VA		+24V(A)		+24V(A)
141				+29VA		+24V(A)		+29V(A)
142			↓	BATT	↓	BATT		BATTERY
143	↓	↓	A2	XF1	CASTING A2	TP1		2-3.5 MHz
144				N/C		TP2		NO CONNECTION
145	22			TP3		TP3		100 KHz
146	↓			TP6		TP6		10 KHz DELETE IN
147	10	6		DM1		TP7		BLANKER DISPLAY SW.
148				ME1		TP8		BLANKER ENTER SW.
149			↓	XBO		TP9		BLANK OUT
150			A1	+5VA		+5VA		
151				+5VB		+5VB		
152				+5VC		+5VC		
153 154	↓	↓	↓	+5VD +12V	↓	+5VD +12V		

SIZE	CODE IDENT Nº	DWG Nº	REV
A	33783	WL 1024-1002	G

SHEET 8 OF 8

Transmit Logic Assy (1024-1002) (Sheet 7 of 7) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	18	0	A2	GND	J1	1		
2	↓	0	↓	GND	↓	2		
3	↓	8	↓	+35V	↓	3		
4	↓	8	↓	+35V	↓	4		
5	↓	7	↓	BATT	↓	5		
6	↓	7	↓	BATT	↓	6		
7	↓	5	FL2		↓	7		WIRE FROM 1AXA2 SIDE
8	↓	5	FL2		↓	8		
9	↓	5	FL2		↓	9		
10	↓	90	A2	EX	↓	10		FREQ ADD
11	↓	95	Q102	E	↓	11		29 V TEST
12	↓	5	FL2		↓	12		+5B TEST SW.
13	↓	5	A3	+5B	FL2			FEED THROUGH TERMINAL
14	↓	5	A2	+5B	↓			
15	↓	4	MIDDLE P.C. BOARD	SR	FL1			
16	↓	4	A3	VIN	↓			
17	↓	93	A2	BV	Q102	C		2N3055-COLLECTOR
18	↓	94	↓	CV	↓	B		BASE
19	↓	95	↓	EV	↓	E		EMITTER
20	↓	96	↓	CL	Q101	C		2N3054 COLLECTOR
21	↓	97	↓	BL	↓	B		BASE
22	↓	98	↓	EL	↓	E		EMITTER
23	↓	901	A1	1	A2	1		TWIST
24	↓	903	↓	4	↓	501 GND		TOGETHER

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1006	A

SHEET 2 OF 4

Frequency Standard Assy (6025-1006) (Sheet 1 of 3) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
25	18	902	A1	3	A2	3		
26		904		5		5		
27		905		6		6		
28		906		8		8		
29		0		9		GND		
30	↓	907		14		14		
31	18	908	↓	15	↓	CL		
32			R102		Q101	C		75Ω ACROSS
33			↓		↓	E		Q101 E & C.
34			R101		E1			120Ω FROM TERMINAL
35					Q102	B		E1 TO Q102-B
36			Q103	D		C		
37				G	↓	B		
38			↓	S	E1			
39	17		A2	501	1A3	J4		
40				GND	SHIELD			
41				502	1A3	J3		
42				GND	SHIELD			
43				503	1A3	J2		
44				GND	SHIELD			
45	↓			504	1A3	J5		
46	17		↓	GND	SHIELD			
47	18	901	A3	B2	Q2	B		
48	↓	903	↓	E2	↓	E		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1006	A
		SHEET 3 OF 4	

Frequency Standard Assy (6025-1006) (Sheet 2 of 3) (S/N 400100 and before

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
49	18	902	A3	B3	Q3	B		
50	↓	904	↓	E3	↓	E		
51	↓	905	↓	XC	↓	C		
52			Q2	C	Q3	C		BUS COLLECTORS TOGETHER
53	18	95	K1	1	Q102	E		
54			↓	2	K1	7		JUMPER
55	18	7	↓	7	A1	BAT		
56			↓	4	K1	5		JUMPER
57	18	4	↓	5	FL1			
58	18	0	↓	8	A1	GND		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 6025-1006	A

SHEET 4 OF 4

Frequency Standard Assy (6025-1006) (Sheet 3 of 3) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
1	24	9	FL1	1	XF1	2								
2	↓	0		2	J1	C								
3	27	9		3	S1	1								
		0	↓	4	↓	2								
		SHIELD	E1											GND SHIELD AT FL1
4		9	TB1	1	S1	3								
		0		3	↓	4								
	↓	SHIELD		4										GND SHIELD AT TB1
5	26	0	↓	4	S1	6								PILOT LIGHT
6	↓	1	C1	+	↓	5								+5 V UNREG
7	24	1	↓	+	CR1	+								*
8		209	C2	+	CR2	+								*
9		31	C3	+	CR3	+								*
10		609	C4	-	CR4	-								*
11		8	C5	+	CR5	+								*
12	↓	0	TB1	4			OPEN	**						

* WIRE EXISTS AS "OPEN" FROM REAR PANEL

** OPEN = NOT TERMINATED AT THIS TIME

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 2 OF 12

Enclosure Assy (1024-1007) (Sheet 1 of 11) (S/N 40100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
13	24	8	S2	1	S2	4	T1/8							*
14	↓	9	↓	3	↓	6	T1/9							*
15	↓	98	↓	7	↓	10	T1/98							*
16	↓	90	↓	9	↓	12	T1/90							*
17	↓	0	TB1	3	T1/0									*
18	↓	91	↓	1	S2	2	S2	5						
19	↓	92	↓	2	↓	8	↓	11						
20	↓	1	C1	+	J6	5								+5 V UNREG
21	↓	209	C2	+	XU3	B								+11 V UNREG
22	25		P2	1	P2	2								JUMPER
23	24	0	↓	1	TB1	4								
24	↓	7	↓	3	J6	11								BATT TO SUBPANEL
25	↓	7	↓	4	↓	11								
26	↓	31	C3	+	XU4	B								+20 V UNREG
27	↓	609	C4	-	XU5	C								-20 V UNREG
28	↓	8	C5	+	XU6	B								+35 V UNREG
	↓													

* WIRE EXISTS AS "OPEN" WIRE FROM REAR PANEL

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 3 OF 12

Enclosure Assy (1024-1007) (Sheet 4 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
29	26	8	C5	+	J6	8	J6	9						
30	↓	2	C1	+	B1	1								FAN
31	↓	6	C4	-	B1	2								↓
32	24	0	C1	-	E1									POWER SUPPLY GND
33	↓	↓	C2	-	↓									DO NOT DAISY-CHAIN
34	↓	↓	C3	-	↓									↓
35	↓	↓	C4	+	↓									↓
36	↓	↓	C5	-	↓									↓

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 4 OF 12

Enclosure Assy (1024-1007) (Sheet 3 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
37	26	0	J5	1	P6	1								GND
38		0		1		2								GND
39		2		2		3								+5A SYNTH
40		2		3		4								+5A "
41		3		4		5								+12 "
42		6		5		7								-12 "
43		4		6		8								+24 "
44		0	P15	1	P13	1								GND TO PROG
45		0		1		2								"
46		2		6		3								+5A
47		1		5		5								+5C
48		2	J5	2		6								+5D FOR TEST
49		3		4		7								+12 "
50		6		5		8								-12 "

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 5 OF 12

Enclosure Assy (1024-1007) (Sheet 4 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
51	26	4	J5	6	P13	9								+24 FOR TEST
52	↓	8	P15	8	↓	10								+35 "
53	↓	9	↓	2	P10	1								GND TO FREQ
54	↓	0	↓	2	↓	2								"
55	↓	8	↓	9	↓	3								+35 V
56	↓	8	↓	9	↓	4								"
57	↓	0	↓	3	TB1	4								GND TO BATT
58	↓	0	↓	4	P3	1								GND FOR 1A5 THRU 1A2
59	↓	1	↓	5	↓	5								+5C "
60	↓	0	↓	4	J8	1								GND -2 WIRES
61	↓	0	↓	4	↓	2								"
62	↓	0	↓	1	J7	1								"
63	↓	90	P6	9	P6	10								
64	↓	7	P3	29	J8	7								BATT TO TEST
65	↓	97	P6	20	J9	24								UFL

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 6 OF 12

Encolsure Assy (1024-1007) (Sheets 5 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
66	26	98	P6	22	P13	50								AST
67		901		23		35								STR
68		902		24		34								STP
69		903		25		33								RES
70		904		26		27								SRS
71		905		27	↓	51								EOS
72		906		28	P3	3								BKI/XBO
73		907		30		8								BKC
74		908		32	↓	30								OOL
75		912	↓	31	P13	53								ESB TO GATE IN
76		913	P3	25	J9	1								BLANKER DECODE
77		914		26		2								7P1-8
78		915		27		3								
79		916		28		4								
80	↓	917	↓	21	↓	5								6P1-8

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 7 OF 12

Enclosure Assy (1024-1007) (Sheet 6 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
81	26	918	P3	22	J9	6								
82		923		23		7								
83		924		24		8								BLANKER DECODE
84		925		17		9								SP1-8
85		926		18		10								
86		927		19		11								
87		928		20		12								
88		90		13		13								4P1-8
89		91		14		14								
90		92		15		15								
91		93		16		16								
92		94		9		17								CHANNEL SEL DECODE
93		95		10		18								
94		96		11		19								
95	↓	97	↓	12	↓	20								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 8 OF 12

Enclosure Assy (1024-1007) (Sheet 7 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
96	26	98	P3	6	J9	21								BLANKER STORE
97		901		7		22								SW ME1-2
98		902		4		23								DISP. BLANK DMI
99		903		2		25								DMI BLANK-OFF
100		905	P6	36		27								.2-2W SW
101		906	P13	11		28								ST1 STOP
102		907		12		29								ST2 SW
103		908		13		30								SP1 STOP
104		912		14		31								SP2 SW
105		913		15		32								RE1 RESET
106		914		16		33								RE2 SW
107		915		17		37								CONT SW
108		916		18		38								MANUAL
109		917		19		39								SET
110		918		20		40								PROG

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 9 OF 12

Enclosure Assy (1024-1007) (Sheet 8 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
111	26	923	P13	21	J9	41								ADV. TIMER AT1
112	↓	924	↓	22	↓	42								AT2
113	↓	925	↓	23	↓	34								START LAMP
114	↓	926	↓	24	↓	35								STOP "
115	↓	927	↓	25	↓	36								RESET "
116	↓	928	↓	36	↓	43								TIME SW PSC COMM.
117	↓	90	↓	37	↓	44								P$\phi\phi$ - TIME SW
118	↓	91	↓	38	↓	45								P05
119	↓	92	↓	39	↓	46								P10
120	↓	93	↓	40	↓	47								P15
121	↓	94	↓	41	↓	48								P20
122	↓	95	↓	42	↓	49								P25
123	↓	96	↓	43	↓	50								P30
124	↓	97	↓	44	↓	51								P35
125	↓	98	↓	45	↓	52								P40

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 10 OF 12

Enclosure Assy (1024-1007) (Sheet 9 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
126	26	901	P13	46	J9	53								P45
127	↓	902	↓	47	↓	54								P50
128	↓	903	↓	48	↓	55								P55
129	55	-	P7		P12								9"	5 MHz TO SYNTH
130	↓	-	P9		P4								↓	2-3.5 MHz TO COUNT
131	↓	-	P5		P11								↓	
132	26	904	P3	32	J7	5								TEST SW "TWO"
133	↓	905	↓	33	↓	6								BTG
134	↓	906	↓	34	↓	7								BTR
135	↓	907	↓	35	↓	8								CTG
136	↓	908	↓	36	↓	9								CTR
137	↓	918	P13	55	↓	12								TEST SW "THREE"
138	↓													
139	↓													
140	↓	7	P10	5	J8	5								BATT TO SUBPANEL

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 11 OF 12

Enclosure Assy (1024-1007) (Sheet 10 of 11) (S/N 400100 and beforse)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
141	26	7	P10	6	J8	6								BATT TO SUBPANEL
142		5		8	P13	4								+5B TO PROG
143		5		9	J7	2								+5B TO FRONT PAN.
144		90	↓	10	↓	10								STD ADJ.
145		91	J4	-	P13	26								PPS TO REAR PAN.
146		901	J8	8	J7	11								
147		7	P15	11	J8	3								BATT TO SUBPANEL
148		7	↓	11	↓	4								"
149		92	J2	1	P6	29								LATCH-BKO
150		0		2	J9	26								DIPLEX GND
151		90		3	J7	3								FORWARD POWER
152		91	↓	4	↓	4								REFLECTED POWER
153		7	P10	7	P3	29								CHASSIS GND FROM 1024 TO 4011
154	↓	0	J2	5	E1									CHASSIS GND FROM 1024 TO 4011

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1007	C

SHEET 12 OF 12

Enclosure Assy (1024-1007) (Sheet 11 of 11) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
1			XU1	B	C6	+								SMALL CAPS ACROSS
2			↓	C	↓	-								REGULATOR SOCKETS
3			XU2	B	C7	+								DO NOT SOLDER AT
4			↓	C	↓	-								THIS TIME
5			XU3	B	C8	+								
6			↓	C	↓	-								
7			XU4	B	C9	+								
8			↓	C	↓	-								
9			XU5	B	C10	+								
10			↓	C	↓	-								
11			XU6	B	C11	+								
12			↓	C	↓	-								
13			XU1	E	C12	+								
14			↓	C	↓	-								
15			XU2	E	C13	+								
16			↓	C	↓	-								

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	A

SHEET 2 OF 6

Rear Panel Assy (1024-1009) (Sheet 1 of 5) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
17			XU3	E	C14	+								
18			↓	C	↓	-								
19			XU4	E	C15	+								
20			↓	C	↓	-								
21			XU5	E	C16	-								
22			↓	B	↓	+								
23		1	T1		CR1	A								BROWN T1 LEAD **
24		1	T1		↓	$\overline{A}$								"
25		2	T1		CR2	A								RED T1 LEAD
26		2	T1		↓	$\overline{A}$								"
27		4	T1		CR3	A								YELLOW T1 LEAD
28		4	T1		↓	$\overline{A}$								"
29		7	T1		CR4	A								VIOLET T1 LEAD
30		7	T1		↓	$\overline{A}$								"
31		6	T1		CR5	A								BLUE T1 LEAD
32		6	T1		↓	$\overline{A}$								"

* OPEN - NOT TERMINATED AT THIS TIME ** - THERE ARE TWO COLOR CODED LEADS PER TRANSFORMER - CHOOSE ONE WIRE TO GO TO A, AND ONE TO A.

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	A

SHEET 3 OF 6

Rear Panel Assy (1024-1009) (Sheet 2 of 5) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
33		5	T1		E1									GREEN GND
34	26	0	E1		CR1	-								
35		↓	↓		CR2	-								
36		1	CR1	+			OPEN*						2'	+5C TO C1+
37		209	CR2	+			OPEN*						2'	TO C2+
38	↓	0	XU1	C			E1							
	27	↓	XU3	C	XU4	C	↓		XU6	C				
39	↓				XU1	B	XU2	B	XU3	B				+11 V UNREG
40														
41	26	0	CR3	-	E1									
42		31	↓	+			OPEN*						2'	TO C3+
43		0	CR4	+	E1									
44		609	↓	-			OPEN*						2'	TO C4-
45		0	CR5	-	E1									
46	↓	8	↓	+			OPEN*						2'	TO C5+
47			XU6	E	C17	+								

*OPEN = NOT TERMINATED

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	A

SHEET 4 OF 6

Rear Panel Assy (1024-1009) (Sheet 3 of 5) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
48	-	-	XU6	C	C17	-								
49	26	2	XU3	E	J6	6								
50	25	2	J6	6	↓	7								JUMPER
51	26	2	XU2	E	P14	2								
52	↓	2	XU1	E	↓	3								
53	↓	3	XU4	E	↓	4								
54	↓	6	XU5	E	↓	5								
55	↓	4	XU6	E	↓	6								
56														
57														
58														
59														
60	28	-	J3		P8								2'	R.F. TO 5018
61	29	90	J4				OPEN						2'	PPS
62	-	8	T1				↓							
63	-	98	T1				↓							

*OPEN = NOT TERMINATED AT THIS TIME

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	A

SHEET 5 OF 6

Rear Panel Assy (1024-1009) (Sheet 4 of 5) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	TO	PIN NO	TO	PIN NO	TO	PIN NO	LENGTH	REMARKS
64	-	9	T1				OPEN*							
65	-	90	T1				↓							
66	-	0	T1				↓							
67	26	0	XU2	C	E1									DO NOT DAISY-CHAIN
68	↓	↓	XU5	B	E1									↓
69	↓	9	J1	A	XF1	1								AC TO FUSE
70	↓	9	XF1	2			OPEN*						2'	TO FL1-1
71	↓	5	J1	B	E1									
72	↓	0	J1	C			OPEN*						2'	TO FL1-2
73	↓	↓	E1		P14	1								
74	↓	↓	↓		J6	1								
75	↓	↓	↓		↓	2								
76	↓	↓	↓		↓	3								
77	↓	↓	↓		↓	4								

*OPEN = NOT TERMINATED AT THIS TIME

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 1024-1009	A

SHEET 6 OF 6

Rear Panel Assy (1024-1009) (Sheet 5 of 5) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	29	9	FL1	1	J1	A		AC IN
		0	↓	2		C		
	↓	SHIELD	GND		↓	B		GND SHIELD
2	56	0	FL1	5	W1 SHIELD			
3	27	5		5	GND			
4		9		3	S1	9		
5		9		3	↓	12		
6		9		3	T1	4		
7		0		4	S1	6		
8		0		4	↓	3		
9		0	↓	4	T1	6		
10		9	FL2	1		3		
11	↓	9	FL3	1	↓	8		
12	51		S1	1	S1	4		
				4		7		
	↓			7		10		
13	27	0	FL2	2		2		
14		0		2	↓	5		
15		0	↓	2	T1	1		
16		9	T1	9	S1	8		
17	↓	9	↓	9	↓	11		
18	30	CLEAR	FL2	3	U1	1N		DO NOT SOLDER
		0	↓	4	↓	1N		↓
		SHIELD			GND			USE SLEEVING OVER DRAIN GND AT U1 WIRE
19	↓	CLEAR	FL2	3	U2	1N		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	C

SHEET 2 OF 7

Power Supply Assy (5018-1002) (Sheet 1 of 6) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
19	30	0	FL2	4	U2	1N		
	↓	SHIELD			GND			USE SLEEVING OVER DRAIN WIRE GND AT U2
20	27	0	FL3	2	T1	6		
21	30	CLEAR		3	U3	1N		
		0	↓	4	↓	1N		
		SHIELD			GND			USE SLEEVING OVER DRAIN WIRE GND AT U3
22		CLEAR	U1	OUT	J2	A		
		0	↓	OUT	↓	B		
		SHIELD			GND			USE SLEEVING OVER DRAIN WIRE GND AT U1
23		CLEAR	U2	OUT	J2	C		
		0	↓	OUT	↓	D		
		SHIELD			GND			USE SLEEVING OVER DRAIN WIRE GND AT U2
24		CLEAR	U3	OUT	J2	E		
		0	↓	OUT	↓	F		
	↓	SHIELD			GND			USE SLEEVING OVER DRAIN WIRE GND AT U3
25	27	709	T1	12	CR1	A		
26		709		12	CR2	A		
27		709		12	CR3	A		
28		709		12	CR4	A		
29		709		12	CR5	A		
30		609		11	CR1	$\bar{A}$		
31		609		11	CR2	$\bar{A}$		
32		609		11	CR3	$\bar{A}$		
33		609		11	CR4	$\bar{A}$		
34	↓	609	↓	11	CR5	$\bar{A}$		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	C
		SHEET 3 OF 7	

Power Supply Assy (5018-1002) (Sheet 2 of 6) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
35	27	0	CR1	-	E1			GND
36	↓	0	CR2	-	E2			
37		0	CR3	-	E3			

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	C

SHEET 4 OF 7

Power Supply Assy (5018-1002) (Sheet 3 of 6) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
38	27	0	CR4	-	E4			
39		0	CR5	-	E5			
40		91	CR1	+	C1	+		
		91	C1	+	A1	9		
41		31	CR2	+	C2	+		
		31	C2	+	A1	11		
42		91	CR3	+	C3	+		
		91	C3	+	A2	5		
43		91	CR4	+	C4	+		
		91	C4	+	A3	9		
44		31	CR5	+	C5	+		
		31	C5	+	A3	11		
45		0	C1	-	E1			GND
46		0	C2	-	E2			
47		0	C3	-	E3			
48		0	C4	-	E4			
49	↓	0	C5	-	E5			
50	28	91	A1	2	A4	1		
51		92		6		2		
52		93		3		3		
53		94		5		4		
54		95		4		5		
55		96		8		6		
56		97		7		7		
57	↓	98	↓	1	↓	8		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	C

SHEET 5 OF 7

Power Supply Assy (5018-1002) (Sheet 4 of 6) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
58	27	209	A1	10	J3	A		DC TO POWER AMP.
59	↓	41	↓	12	↓	B		
60	28	92	A2	2	A4	9		VOLTAGE REG.
61	27	209		2	J3	E		
62	28	91		1	A4	10		
63		94		4		11		
64		93	↓	3		12		
65		91	A3	2		13		
66		92		6		14		
67		93		3		15		
68		94		5		16		
69		95		4		17		
70		96		8		18		
71		97		7		19		
72	↓	98		1	↓	20		
73	27	209		10	J3	C		
74	↓	41	↓	12	↓	D		
75	28	91	J3	D	U4	1		
	↓	94	U4	1	C6	+		
76	-	-	C6	-	U4	3		
	-	-	U4	3	C7			
77	-	-	C7		U4	2		
78	28	2	U4	2	J2	G		+5 TO POWER LAMP
79	27	0	CR1	-	CR4	-		
80	↓	0	E1		E2			

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	C

SHEET 6 OF 7

Power Supply Assy (5018-1002) (Sheet 5 of 6) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
81	27	0	CR2	-	E5			
82	↓	0	CR3	-	CR5	-		
83	↓	0	E2	-	E3			

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 5018-1002	C

SHEET 7 OF 7

Power Supply Assy (5018-1002) (Sheet 6 of 6) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
1	25	1	J2	1	FL1	E8		
2		2		2	FL2	E8		
3		3		3	FL3	E8		
4		4		4	FL4	E8		
5		5		5	FL5	E8		
6		6		6	FL6	E8		
7		7		7	FL7	E8		
8		8		8	E2			
9		9	▼	9	E11			
10		91	CR1	A	FL1	E1		
11		92	CR3	A	FL2	E1		
12		93	CR5	A	FL3	E1		
13		94	CR7	A	FL4	E1		
14		95	CR9	A	FL5	E1		
15		96	CR11	A	FL6	E1		
16	▼	97	CR13	A	FL7	E1		
17	26	-	CR15	A	FL8	E8		
			SHIELD		FL8	E7		
18	25	-	J3		FL8	E5		

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1004	C

SHEET 2 OF 3

Filter Set Assy (4011-1004) (Sheet 1 of 2) (S/N 400100 and before)

WIRE NO	ITEM NO	COLOR	FROM DEVICE	PIN NO	TO DEVICE	PIN NO	LENGTH	REMARKS
19	25	901	CR2	A	FL1	E4		
20	↓	902	CR4	A	FL2	E4		
21	↓	903	CR6	A	FL3	E4		
22	↓	904	CR8	A	FL4	E4		
23	↓	905	CR10	A	FL5	E4		
24	↓	906	CR12	A	FL6	E4		
25	↓	907	CR14	A	FL7	E4		
26	26	-	CR16	A	FL8	E8		
			SHIELD		FL8	E7		
27								
28								
29								
32								
33								
34								
35	25	0	E6		FL8	E1		
36								
37	40	-	E4		E9			GND

SIZE	CODE IDENT NO	DWG NO	REV
A	33783	WL 4011-1004	C

SHEET 3 OF 3

Filter Set Assy (4011-1004) (Sheet 2 of 2) (S/N 400100 and before)

APPENDIX A

REFERENCES

DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
DA Pam 733-750	The Army Maintenance Management System.
TB SIG 291	Safety Measures to be Observed When Installing and Using Whip Antennas, Field Type, Masts, Towers, Antennas and Metal Poles That Are Used With Communications, Radar and Direction Finder Equipment.
TM 11-5820-884-13	Operator’s, Organizational and Direct Support Maintenance Manual for Spectrum Monitor Radio Receiver R-2093/TRQ-35(V) Model RSS-4 (NSN 5820-01-038-9119).
TM 11-5820-884-23P	Organizational and Direct Support Maintenance Repair Part and Special Tools List for Spectrum Monitor Radio Receiver R-2093/TRQ-35(V) Model RSS-4 (NSN 5820-01-038-911S}.
TM 11-5820-917-13	Operator’s, Organizational and Direct Support Maintenance Manual for Radio Receiver R-2081/TRQ-35(v) Model RCS-4B (NSN 5820-01-005-4247).
TM 11-5820-917-23P	Organizational and Direct Support Maintenance Repair Parts and Special Tools List for Radio Receiver R-2081/TRQ-35(V) Model RCS-4B (NSN 5820-01-005-4247).
TM 11-5820-918-23P	Organizational and Direct Support Maintenance Repair Parts and Special Tools List for Radio Transmitter T-1373/TRQ-35(V) Model TSC-4B (NSN 5820-01-005-4248).
TM 11-5985-371-12-HR	Hand Receipt Manual Covering Contents of Components of End Item (COEI) and Additional Authorization List (AAL) for Antenna AS-3577/GRC (NSN 5985-01-148-1778).
TM 11-5985-371-12&P	Operator’s and Organizational Maintenance Manual (Including Repair Parts and Special Tools List) for Antenna AS-3577/GRC (NSN 5985-01-148-1778).

TM 11-6625-3136-12	Operator's and Organizational Maintenance for Spectrum Analyzer AN/USM-489(V)1 (NSN 6625-01-079-9495).
TM 11-6625-3136-24P	Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List for Spectrum Analyzer AN/USM-489(V)1 (NSN 6625-01-079-9495).
TM 11-6625-3136-40	General Support Maintenance for Spectrum Analyzer AN/USM-489(V)1 (NSN 6625-01-079-9495).
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for the T-1373/TRQ-35(V). It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, agjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

B-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a “work time” figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the task within the listed maintenance function vary at different maintenance categories, appropriate “work time” figures will be shown for each category. The number of task-hours specified by the “work time” figure represents the average time required to restore an item (assembly, subassembly, component, module end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C- Operator/Crew

O- Organizational

F- Direct Support

H- General Support

D- Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (Sect. III)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

D-5. Remarks (Sect. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

(Next printed page is B-4)

SECTION II MAINTENANCE ALLOCATION CHART FOR

TRANSMITTER, RADIO T-1373/TRQ-35(V)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	TRANSMITTER, RADIO T-1373/TRQ-35(V)	Inspect		0.1				1	B
		Test			0.5			2,3,9	
		Repair			0.5			2	
		Adjust					0.5	2 thru 9	
01	TRANSMIT SWEEP GENERATOR P/N 1024-1000	Inspect		0.1				1	
		Test			0.7			2,3,9	
		Repair			0.5			2	
0101	SUBPANEL CONTROL ASSY P/N 1024-1006	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		
0102	TRANSMIT LOGIC ASSY P/N 1024-1002	Inspect			0.1				
		Test			0.5			3,9	
		Replace			0.4			2	
		Repair					4		A
0103	SWEEP SYNTHESIZER P/N 5030-1101	Inspect			0.1				
		Test			0.5			3,9	
		Replace			0.4			2	
		Repair					4		A
0104	FREQ STD ASSY P/N 6025-1006	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		A
0105	NUMERIC DISPLAY ASSY P/N 6025-1009	Inspect			0.1				
		Replace			0.4				
		Repair					4		A
0106	ENCLOSURE ASSY	Repair			0.5				C
02	POWER AMPLIFIER P/N 5018-1000	Inspect		0.1				1	
		Test			0.5			3	
		Repair			0.6			2	
0201	POWER SUPPLY ASSY P/N 5018-1002	Inspect			0.1			2	
		Replace			0.4			2	
		Repair						4	A
0202	AMPLIFIER ASSY P/N 5018-1001	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		A
0203	ENCLOSURE ASSY	Repair			0.5				C
03	FILTER/DIPLEXER ASSY P/N 4011-1000	Inspect		0.1				1	
		Test			0.5			3	
		Repair			0.6			2	
0301	RF COUPLING ASSY	Repair			0.5			2	
030301	DIPLEXER ASSY P/N 4011-1005	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		A
030102	FILTER SET ASSY P/N 4011-1004	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		A
030103	VACUUM RELAY P/N 4011-3042	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		A
030104	POWER DETECTOR ASSY P/N 4011-1006	Inspect			0.1				
		Replace			0.4			2	
		Repair					4		A
0302	FILTER/DIPLEXER CONTROL	Repair			0.5			2	

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SECTION II MAINTENANCE ALLOCATION CHART FOR

TRANSMITTER, RADIO T-1373/TRQ-35(V)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
030201	FILTER DECODE ASSY P/N 4011-1007	Inspect			0.1				
		Test			0.5			3,9	
		Replace			0.4			2	
		Repair					4		A
0303	ENCLOSURE ASSY P/N 4011-1003	Repair			0.6			2	C
04	CABLE ASSEMBLIES	Inspect			0.1				
		Repair			0.4			2	

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS FOR

TRANSMITTER, RADIO T-1373/TRQ-35(V)

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
2	F,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
3	F,D	MULTIMETER, DIGITAL AN/PSM-45	6625-01-139-2512	
4	D	TEST SET RF POWER AN/URM-120	6625-00-813-8430	
5	D	SPECTRUM ANALYZER IP-1216	6625-00-424-4370	
6	D	PLUG IN PL-1388/U OR	6625-00-431-9339	
7	D	PLUG IN PL-1399/U	6625-00-432-5055	
	D	SPECTRUM ANALYZER AN/USM-489(V)	6625-01-079-9495	
8	D	ELECTRONIC COUNTER AN/USM-459	6625-01-061-8928	
9	F,D	OSCILLOSCOPE OS-261C(V)1/U	6625-01-119-7314	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	ASSEMBLIES RETURNED TO THE AIR FORCE FOR REPAIR.
B	OPERATIONAL TEST USING BUILT IN TEST FUNCTION.
C	REPAIR BY REPLACEMENT OF CONNECTORS, LAMPS, FUSES, ETC.

APPENDIX C

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

C-1. Scope

This appendix lists integral components of and basic issue items for the T-1373/TRQ-35(V) to help you inventory items required for safe and efficient operation.

C-2. General

This Components of End Item List is divided into the following sections:

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the T-1373/TRQ-35(V) and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these items.

b. Section III. Basic Issue Items. Not applicable.

C-3. Explanation of Columns

a. Illustration. This column is divided as follows:

(1) Figure number. Indicates the figure number of the illustration on which the item is shown.

(2) Item number. The number used to identify item called out in the illustration.

b. National Stock Number. Indicates the National stock number assigned to the–item and which will be used for requisitioning.

c. Part Number. Indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. Following the part number, the Federal Supply Code for manufacturers (FSCM) is shown in parentheses.

d. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code. Not applicable.

g. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

h. Quantity. This column is left blank for use during an inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item at a later date; such as for shipment to another site.

(Next printed page is C-3)

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) LLUSTRATION		(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION		(4) LOCATION	(5) USABLE ON CODE	(6) QTY REQD	(7) QUANTITY	
(A) FIG NO.	(B) ITEM NO.		PART NUMBER	(FSCM)				RCVD	DATE
		5820-01-005-4248	RADIO TRANSMITTER						

DRSEL-MA Form 6010, (1 Mar 77) (Edition of 1 Jun 76 is obsolete) HISA-FM 545-77

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. Scope

This appendix lists additional items you are authorized for the support of the T-1373/TRQ-35(V).

D-2. General

This list identifies items that do not have to accompany the T-1373/TRQ-35(V) and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. Explanation of Listing

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you.

(Next printed page is D-2)

SECTION II **ADDITIONAL AUTHORIZATION LIST**

(l) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM	USABLE ON CODE	(3) JNIT OF ΛEAS	(4) QTY AUTH
5895-01-148-1778	ANTENNA AS-3577/GRC		EA	1
5820-01-005-4247	RADIO RECEIVER, R-208 1/TRQ-35(V)		EA	1
5820-01-038-9119	SPECTRUM MONITOR (RADIO RECEIVER), R-2 093/TRQ-35(V)		EA	1

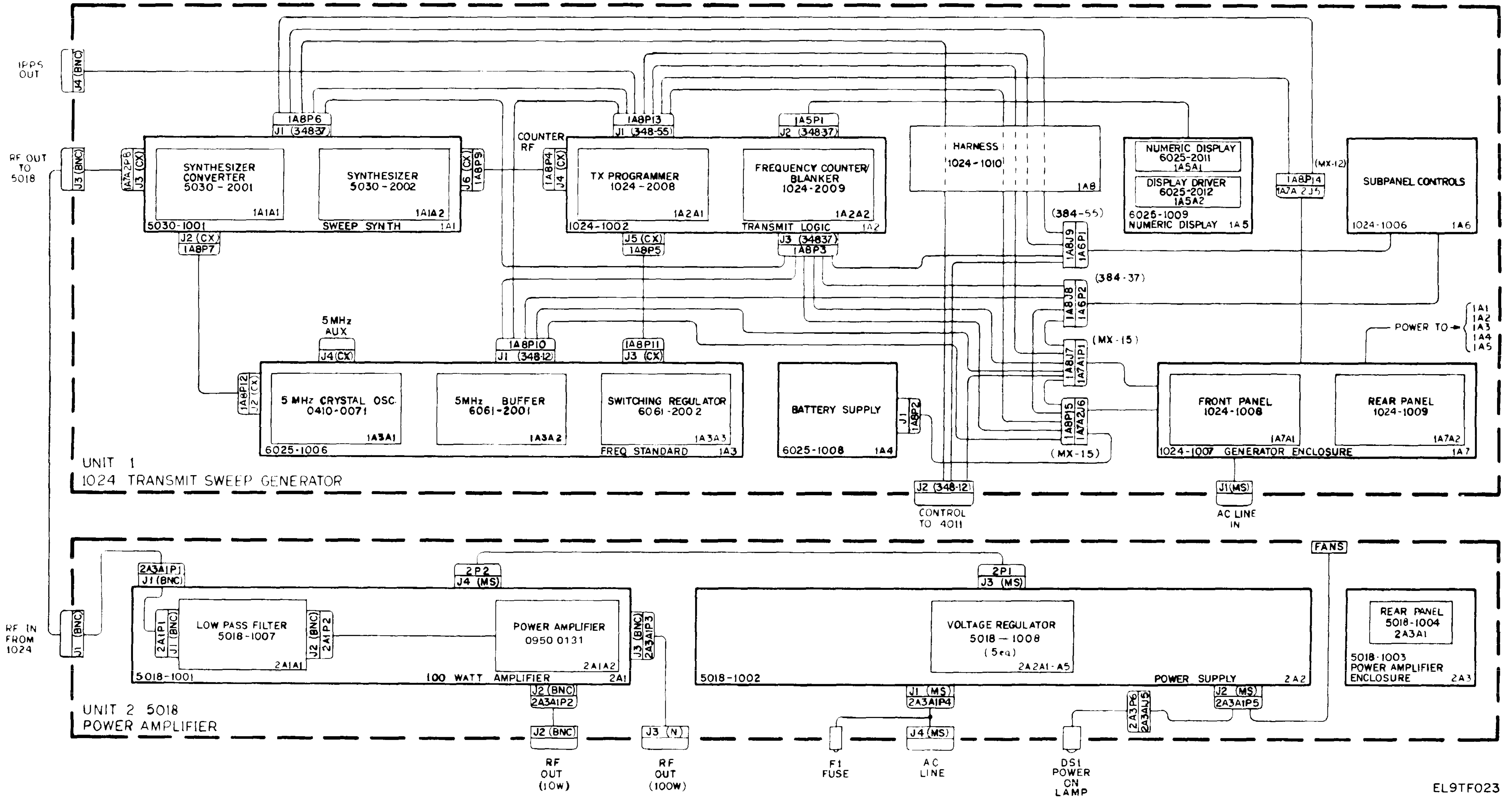


FIGURE FO-1. 1024 and 5018 Block Diagram (S/N 400101 and on) (Sheet 1 of 3).

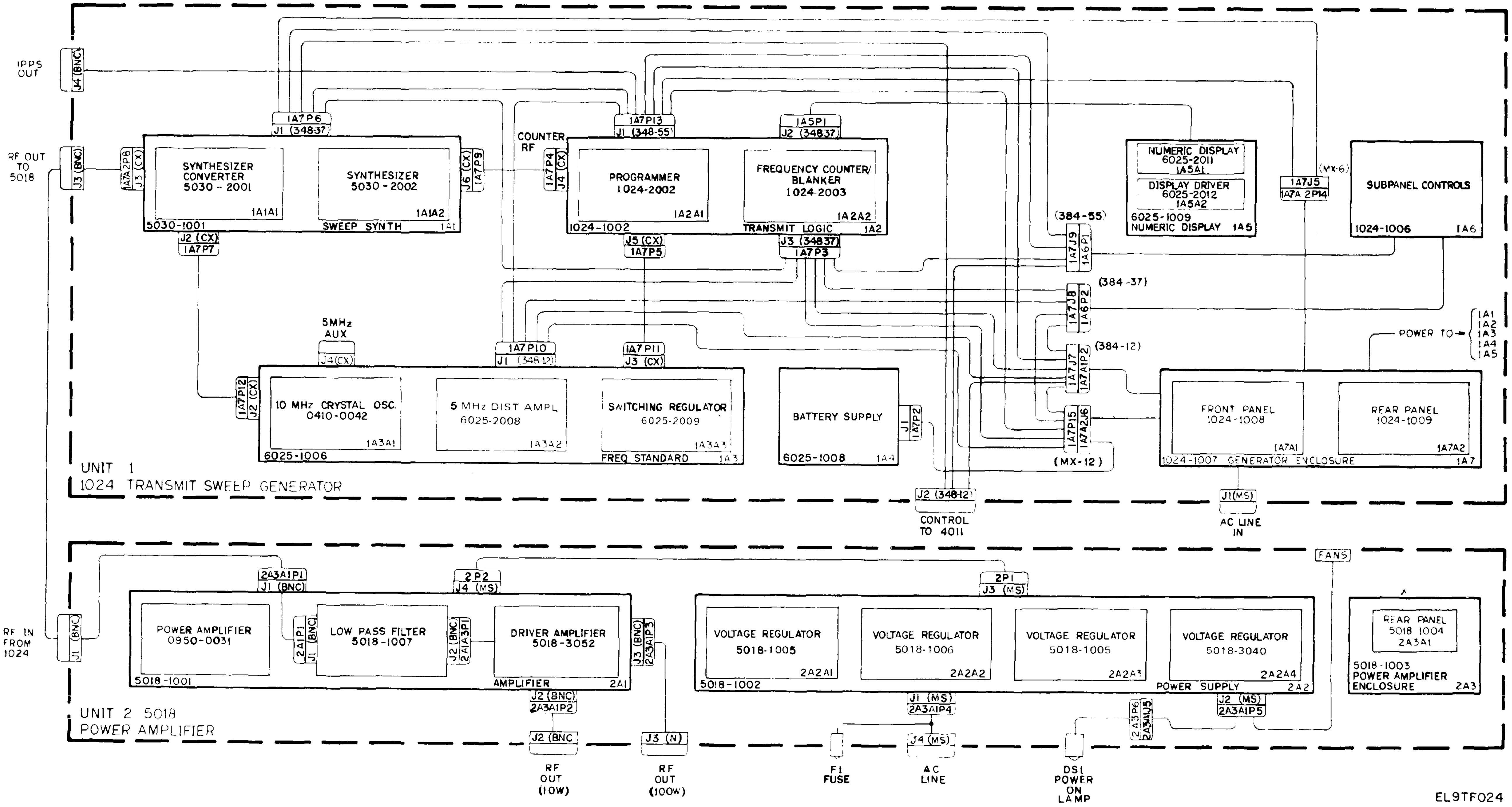


FIGURE FO-1. 1024 and 5018 Block Diagram (S/N 400100 and before) (Sheet 2 of 3).

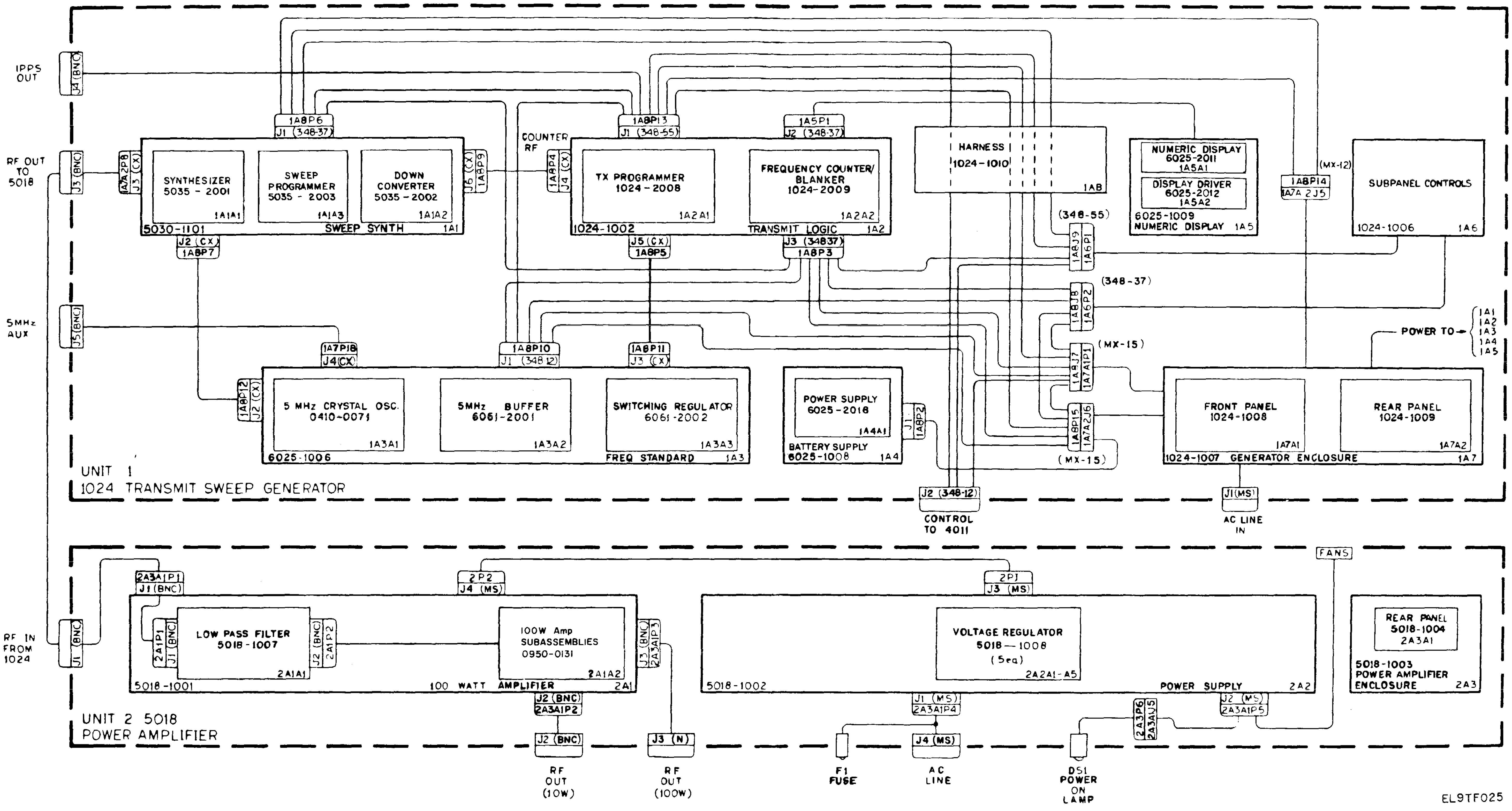


FIGURE FO-1. 1024 and 5018 Block Diagram (applicable to Units with Sweep Synthesizer P/N 5030-1101) (Sheet 3 of 3).

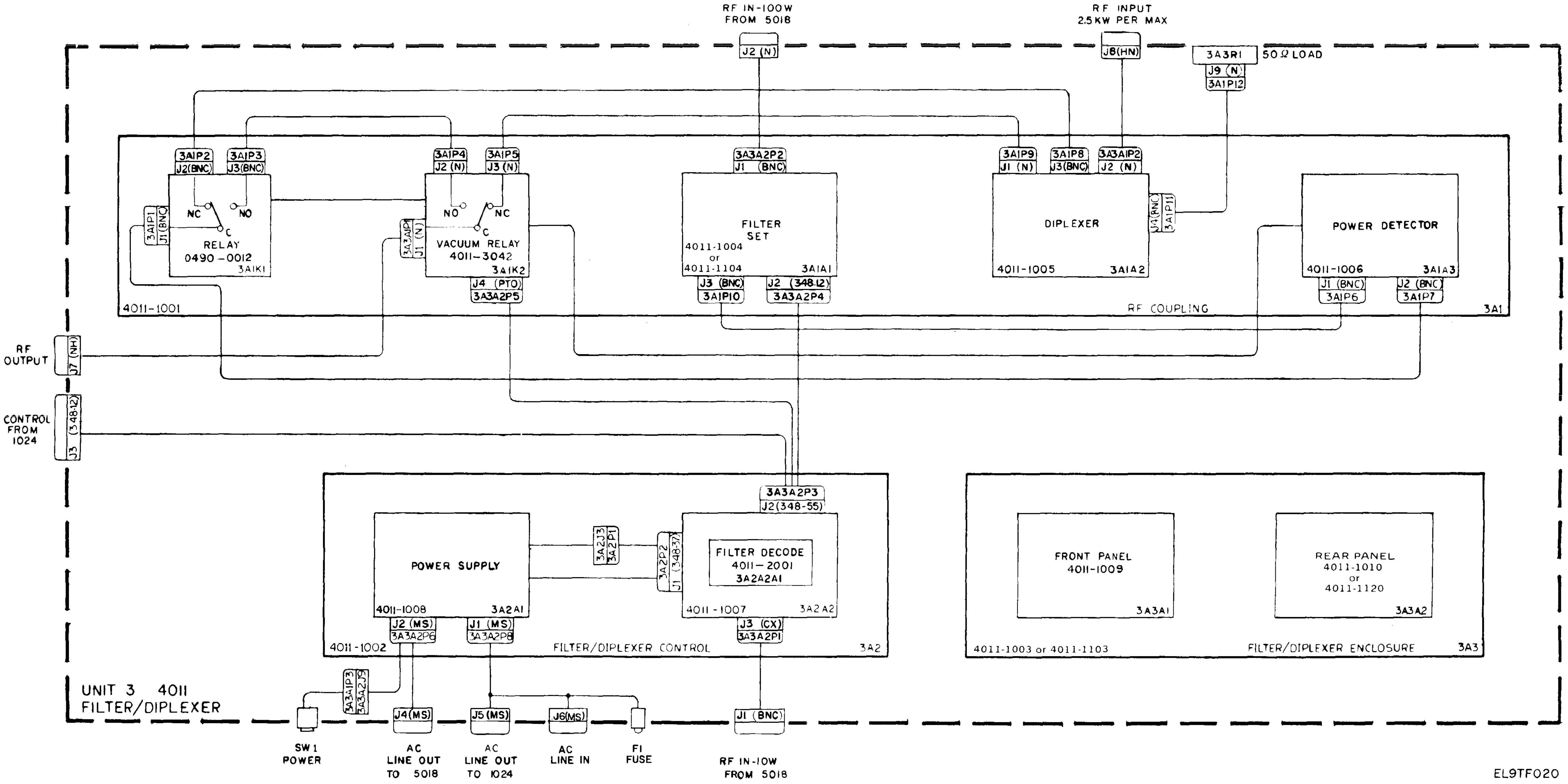
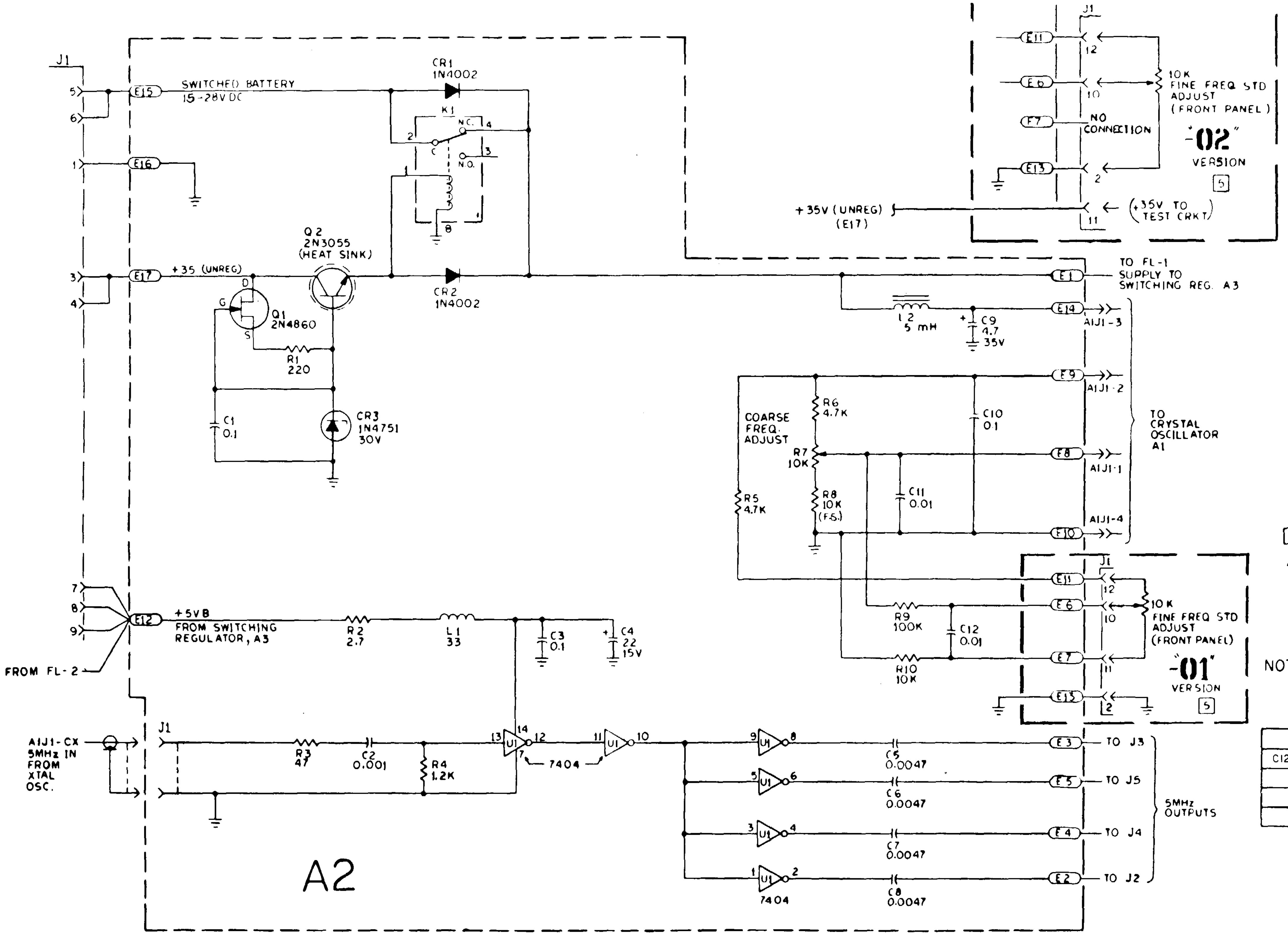


FIGURE FO-2. 4011 Block Diagram.



5 "-01" VERSION USED FOR 6061-1802 ONLY.
"-02" VERSION USED FOR 6025-1006 ONLY.

4. ALL INDUCTORS ARE IN MICROHENRYS.

3. ALL CAPACITORS ARE IN MICROFARADS.

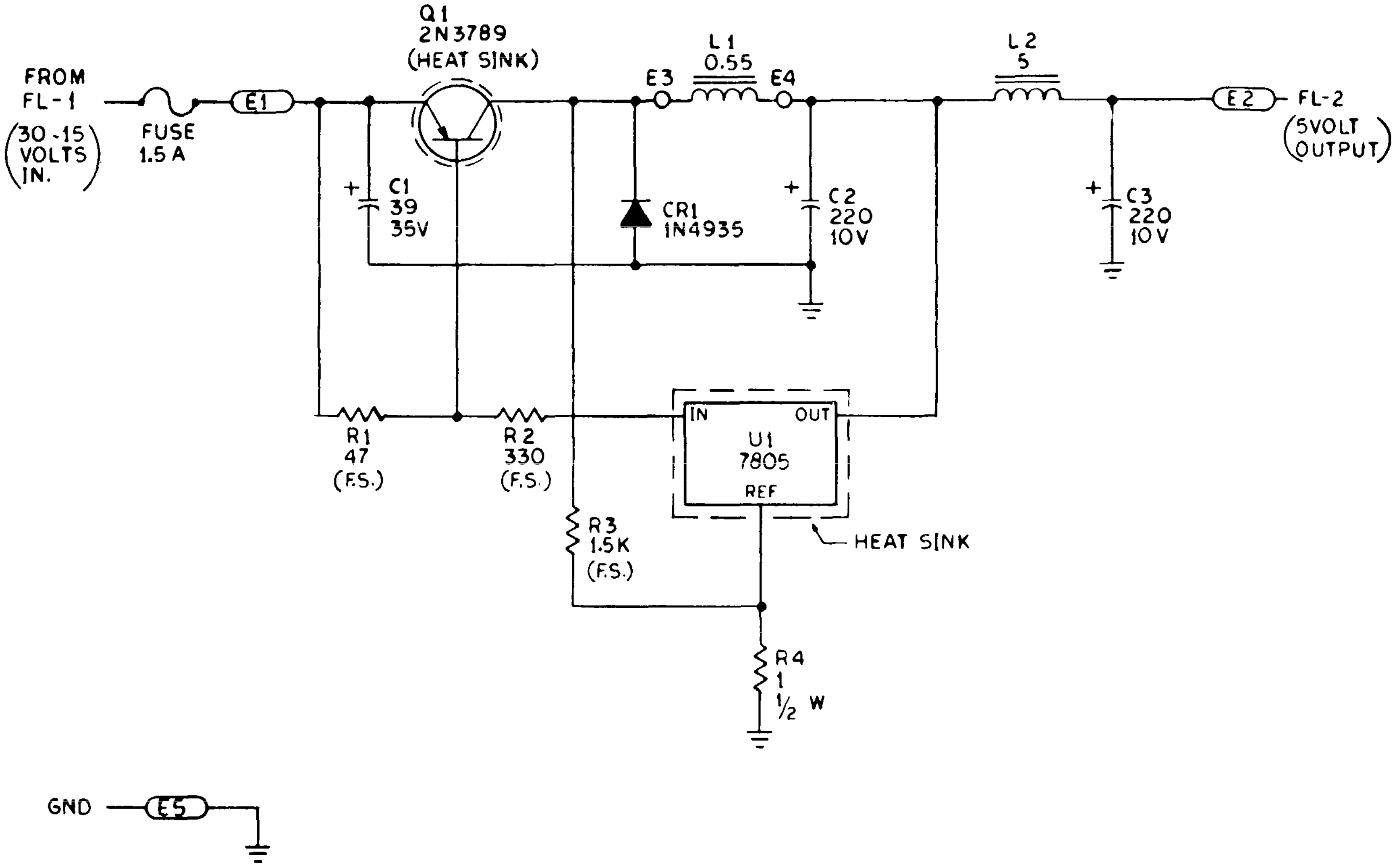
2. ALL RESISTORS ARE IN OHMS 1/4W ±5%.

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT, OR ASSY DESIGNATOR.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION								
C12	CR3	E17	J1	K1	L2	Q2	R10	U1
REF DESIGNATION NOT USED								

FIGURE FO-3. Schematic Diagram, 5 MHz Buffer (6061-2001) (S/N 400101 and on).



4. ALL INDUCTORS ARE IN MILLIHENRYS.

3. ALL CAPACITORS ARE IN MICROFARADS.

2. ALL RESISTORS ARE IN OHMS 1/4W ±5%.

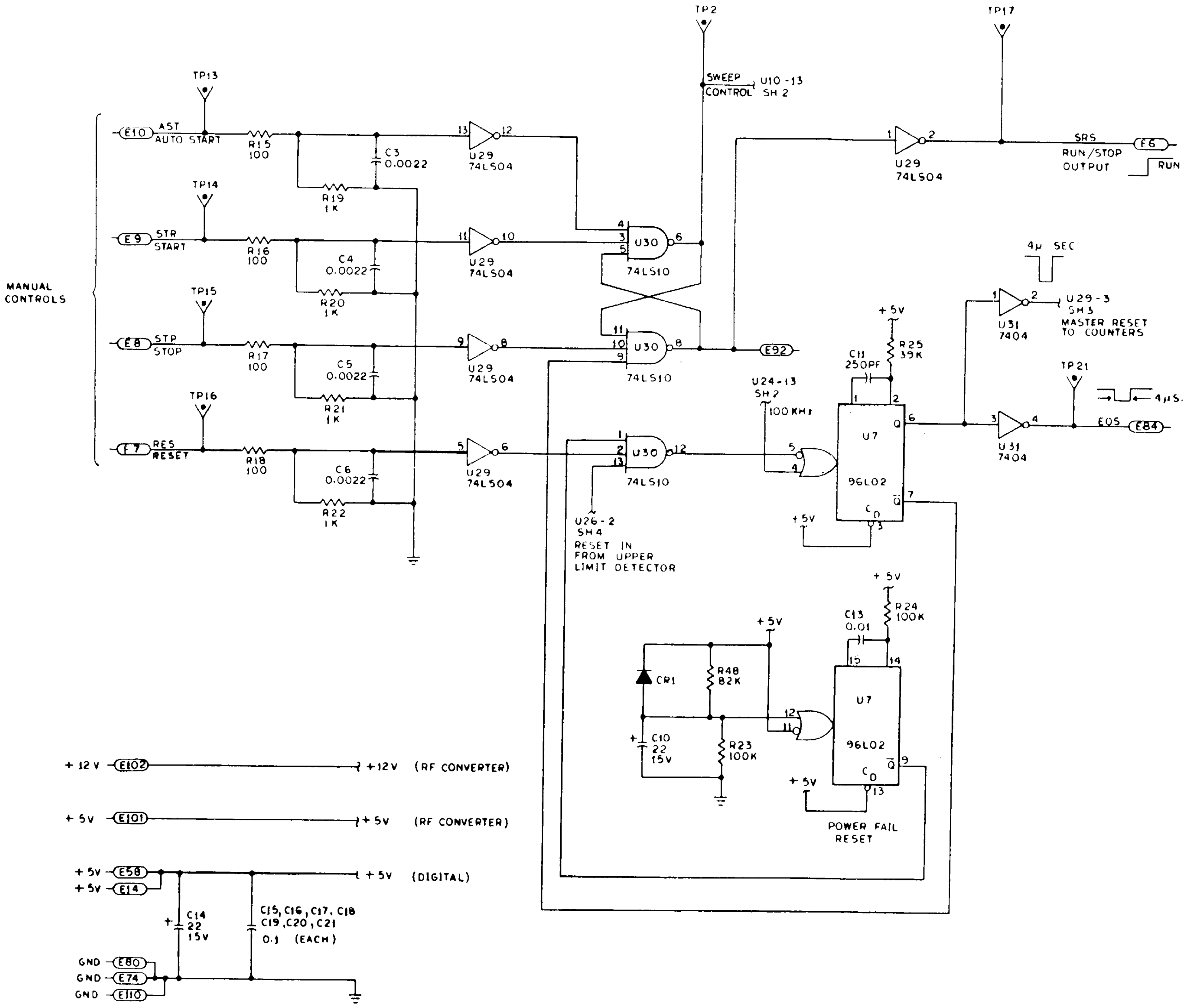
1. REFERENC DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATOR WITH UNIT, OR ASSY DESIGNATOR.

NOTES: UNLESS OTHERWISE SPECIFIED.

<table>
<tr><th colspan="8">HIGHEST REFERENCE DESIGNATION</th></tr>
<tr><td>C3</td><td>CR1</td><td>E5</td><td>L2</td><td>Q1</td><td>R4</td><td>U1</td><td></td></tr>
<tr><td colspan="8"></td></tr>
<tr><td colspan="8">REF DESIGNATION NOT USED</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

EL9TF028

FIGURE FO-4. Schematic Diagram, Switch Regulator (6061-2002) (S/N 400101 and on).



POWER DISTRIBUTTION		
DEVICE	+5V	GND
74LS(S)00	14	7
74(LS)04	14	7
74LS10	14	7
74LS20	14	7
74LS85	16	8
74LS112	16	8
74LS192	16	8
74LS257	16	8
96L02	16	8

⑥ WI THRU W22 JUMPERS INSTALLED AS SHOWN.

5. TI, T2 & T3 WATKINS JOHNSON BALANCED TRANSFORMERS BT 8.

4. ALL DIODES ARE IN 4148.

3. ALL CAPACITORS ARE IN MICROFARADS

2. ALL RESISTORS ARE IN OHMS 1/4W, ± 5 %.

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION									
C21 C164	CR14	E93 E110	J106 K101	L112 M101	Q105 1104	R60 R169	TP22 TP106	U42 U106	
REF DESIGNATION NOT USED									
C103 C137 C149						R96, R141 – R143 R153-164, R157	U41		

EL9TF029

FIGURE FO-5. Schematic Diagram, Synthesizer Converter (5030-2001) (Sheet 1 of 6).

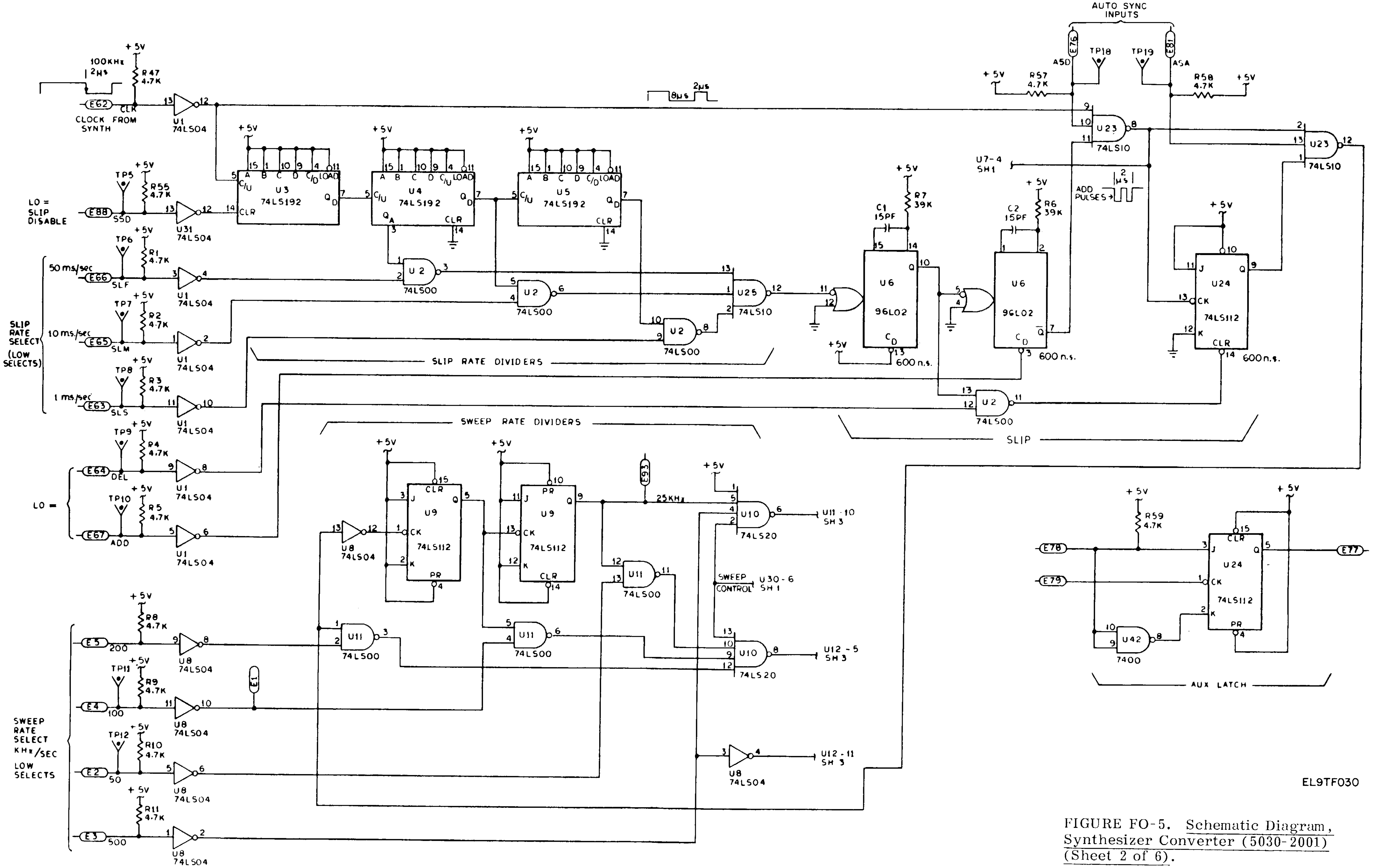
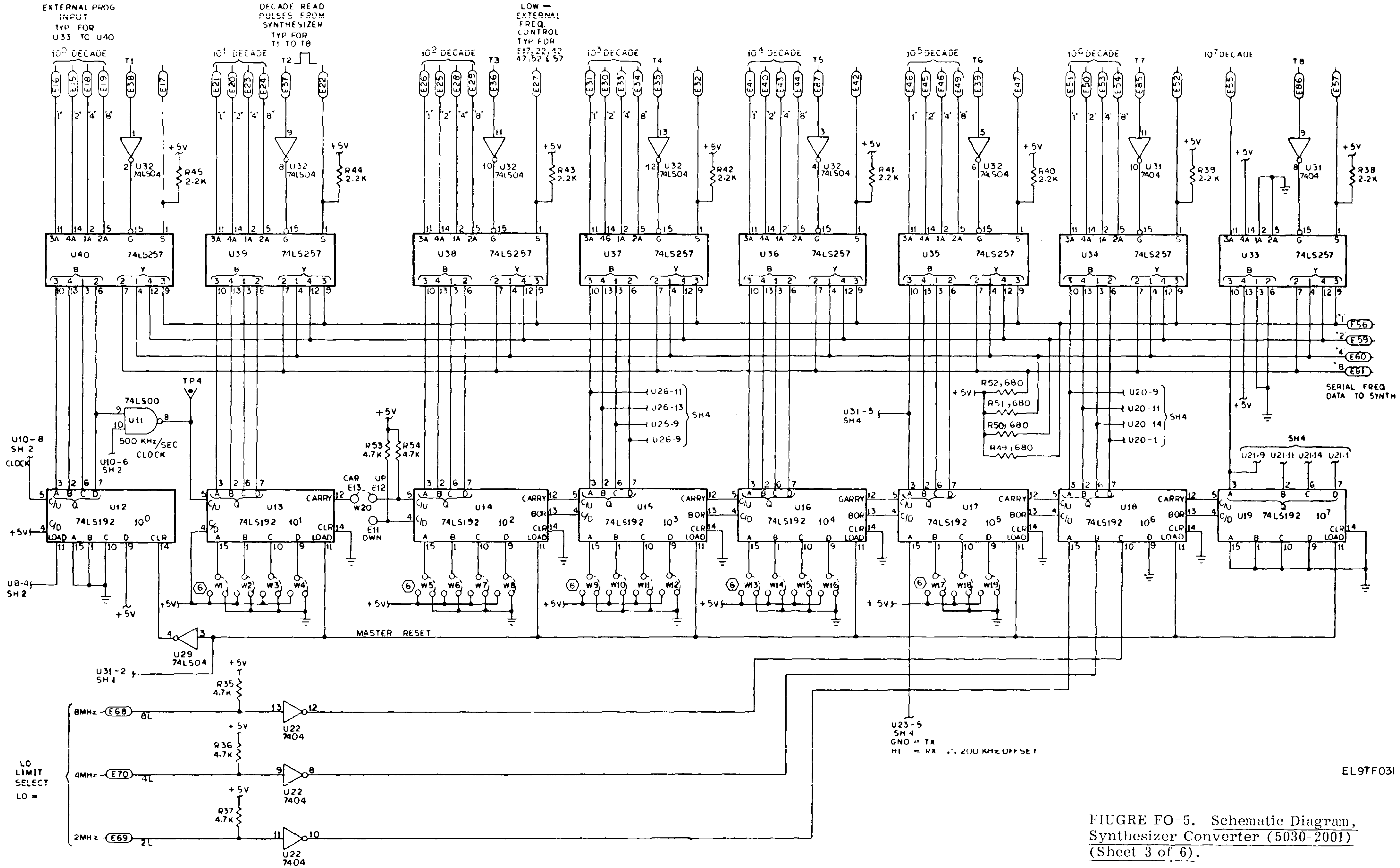


FIGURE FO-5. Schematic Diagram, Synthesizer Converter (5030-2001) (Sheet 2 of 6).



FIUGRE FO-5. Schematic Diagram, Synthesizer Converter (5030-2001) (Sheet 3 of 6).

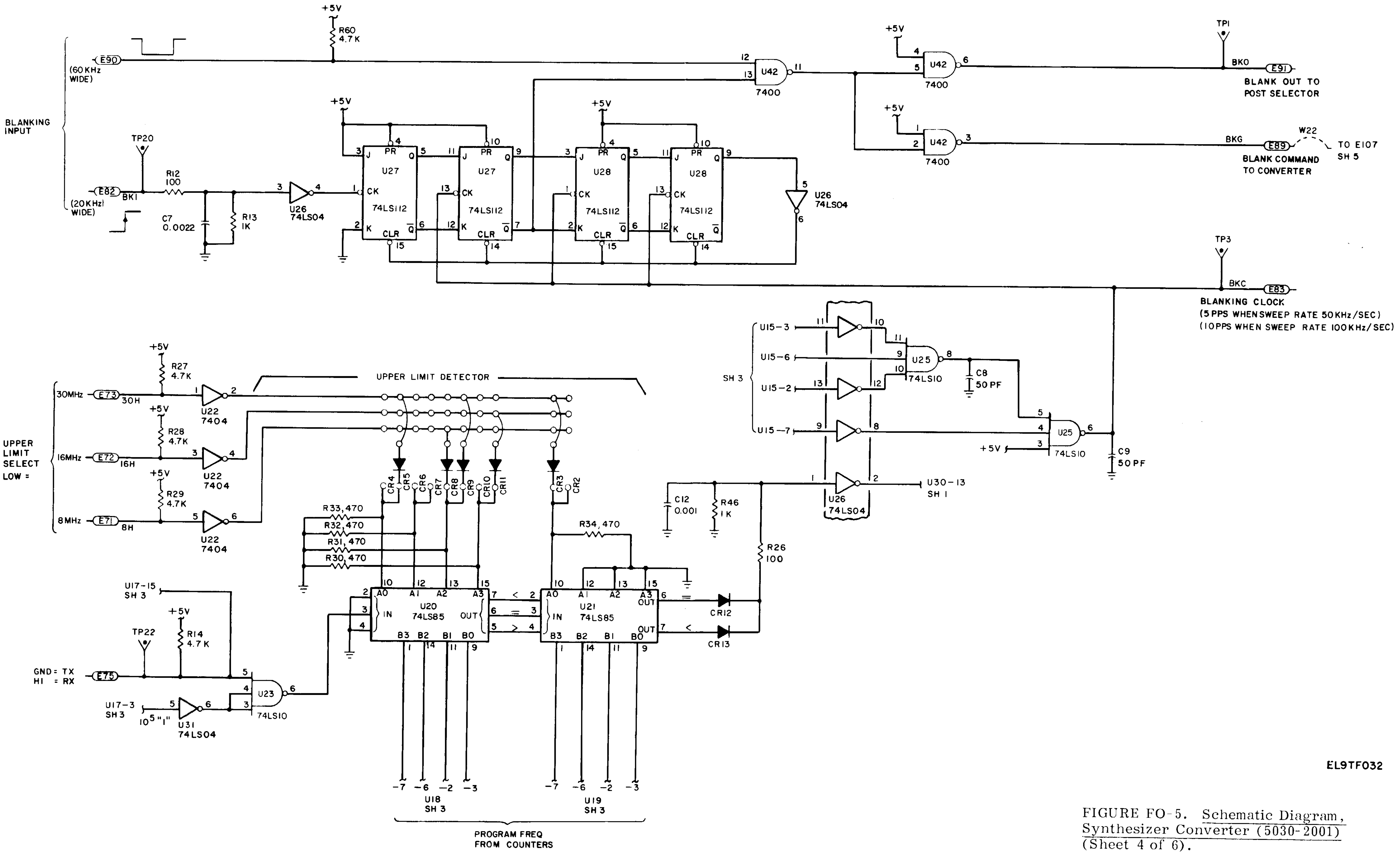


FIGURE FO-5. Schematic Diagram, Synthesizer Converter (5030-2001) (Sheet 4 of 6).

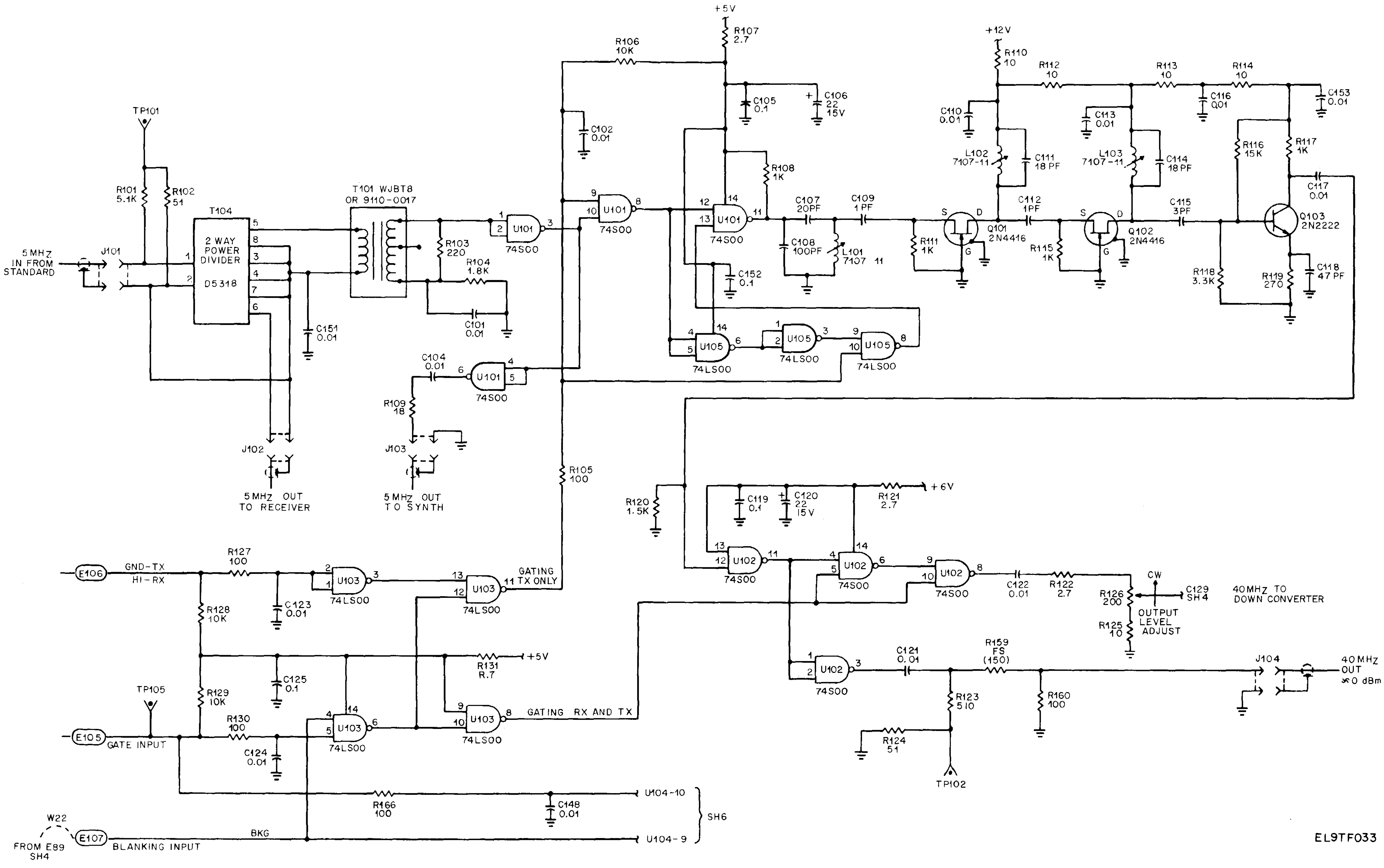


FIGURE FO-5. Schematic Diagram, Synthesizer Converter (5030-2001) (Sheet 5 of 6).

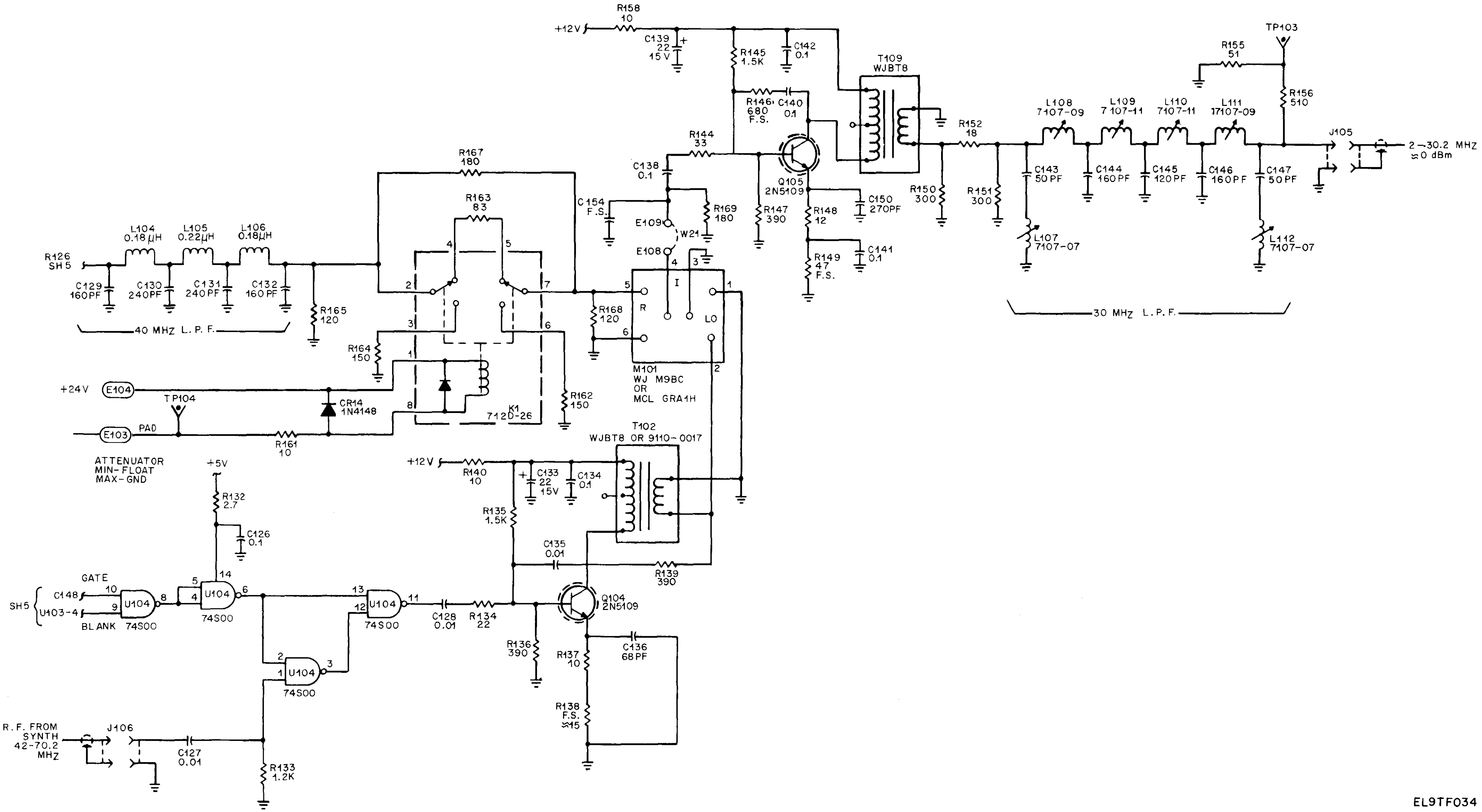
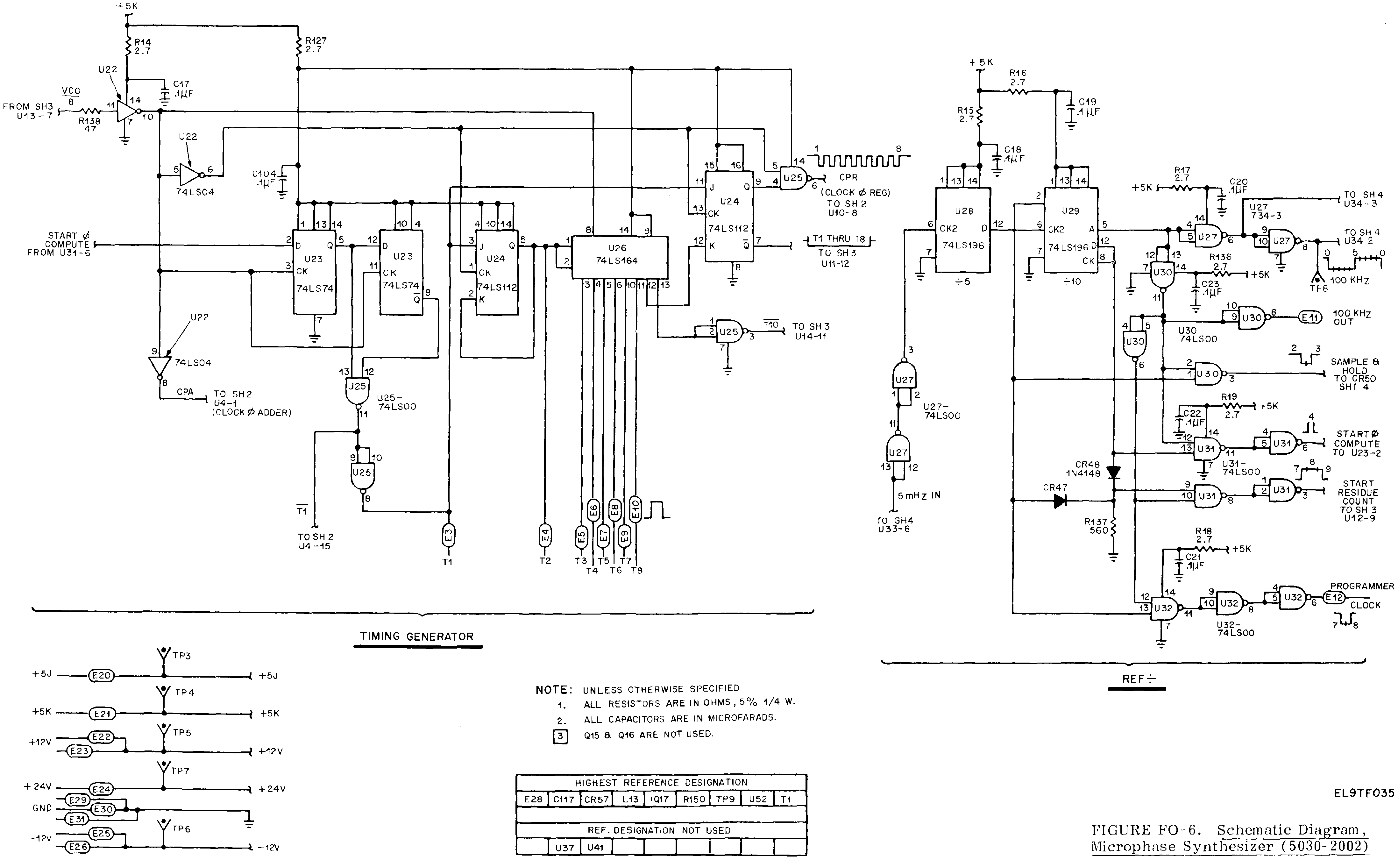


FIGURE FO-5. Schematic Diagram, Synthesizer Converter (5030-2001) (Sheet 6 of 6).



NOTE: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS, 5% 1/4 W.
2. ALL CAPACITORS ARE IN MICROFARADS.
[3] Q15 & Q16 ARE NOT USED.

HIGHEST REFERENCE DESIGNATION								
E28	C117	CR57	L13	Q17	R150	TP9	U52	T1
REF. DESIGNATION NOT USED								
	U37	U41						

FIGURE FO-6. Schematic Diagram, Microphase Synthesizer (5030-2002) (Sheet 1 of 5).

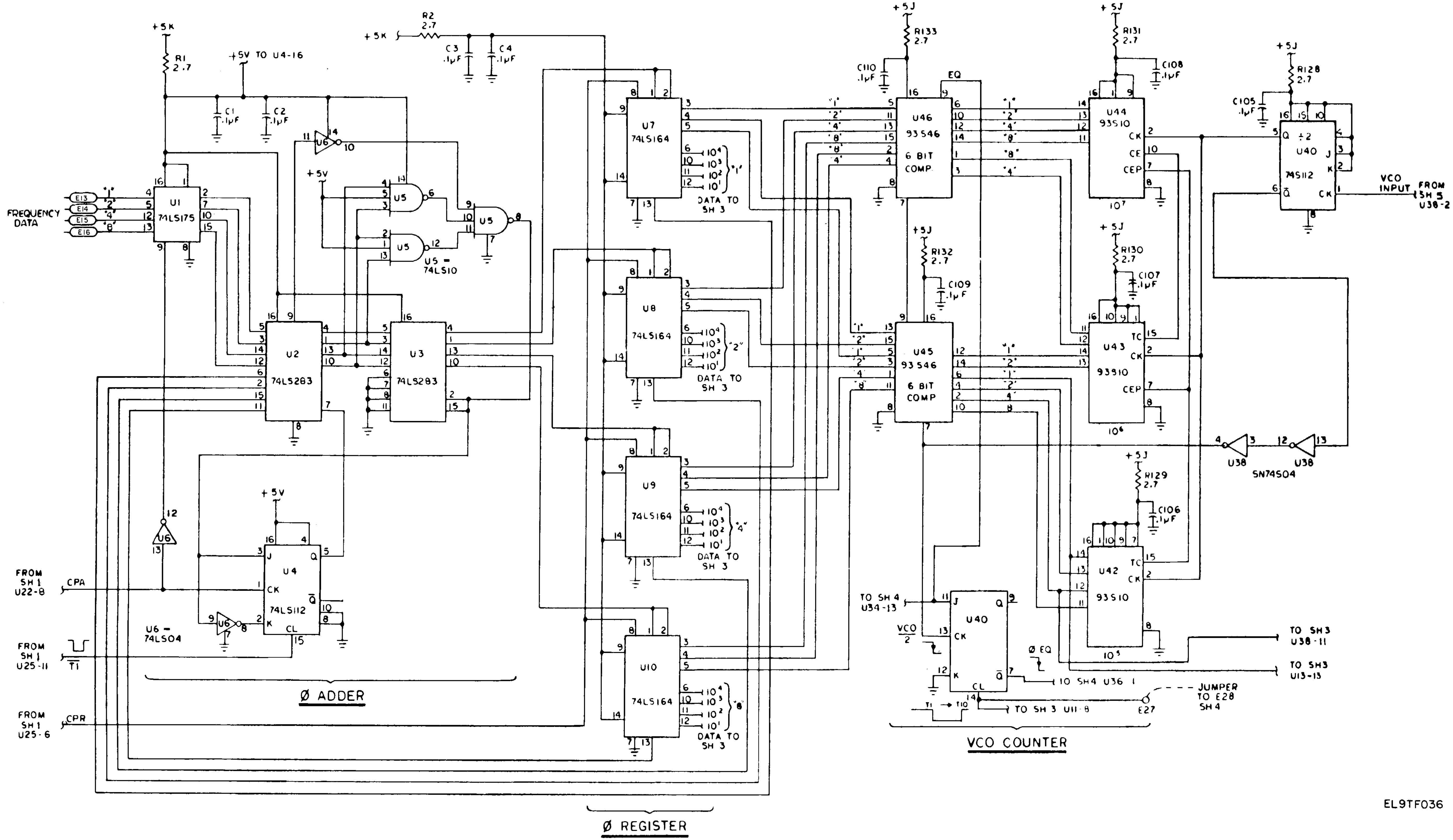
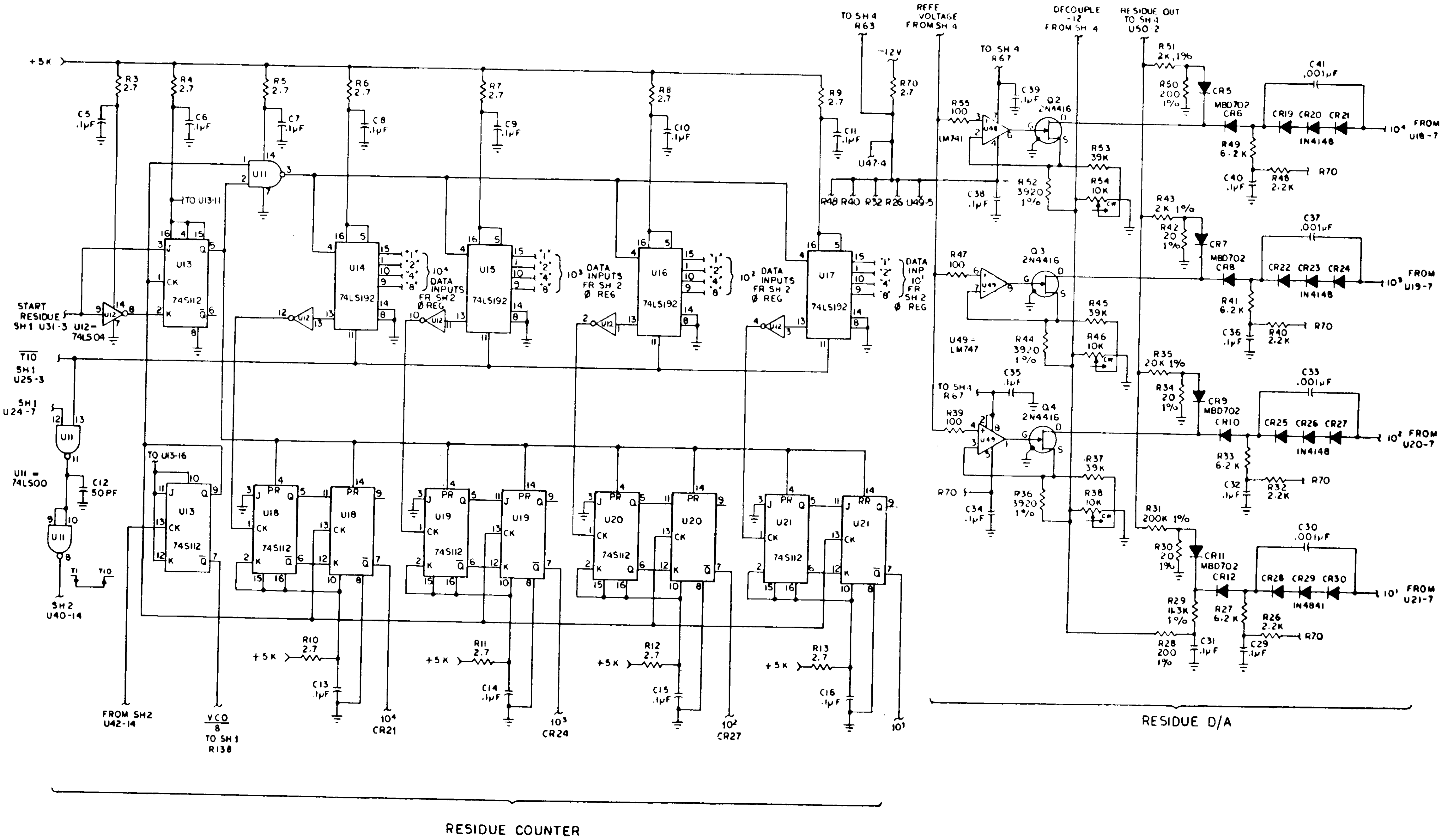
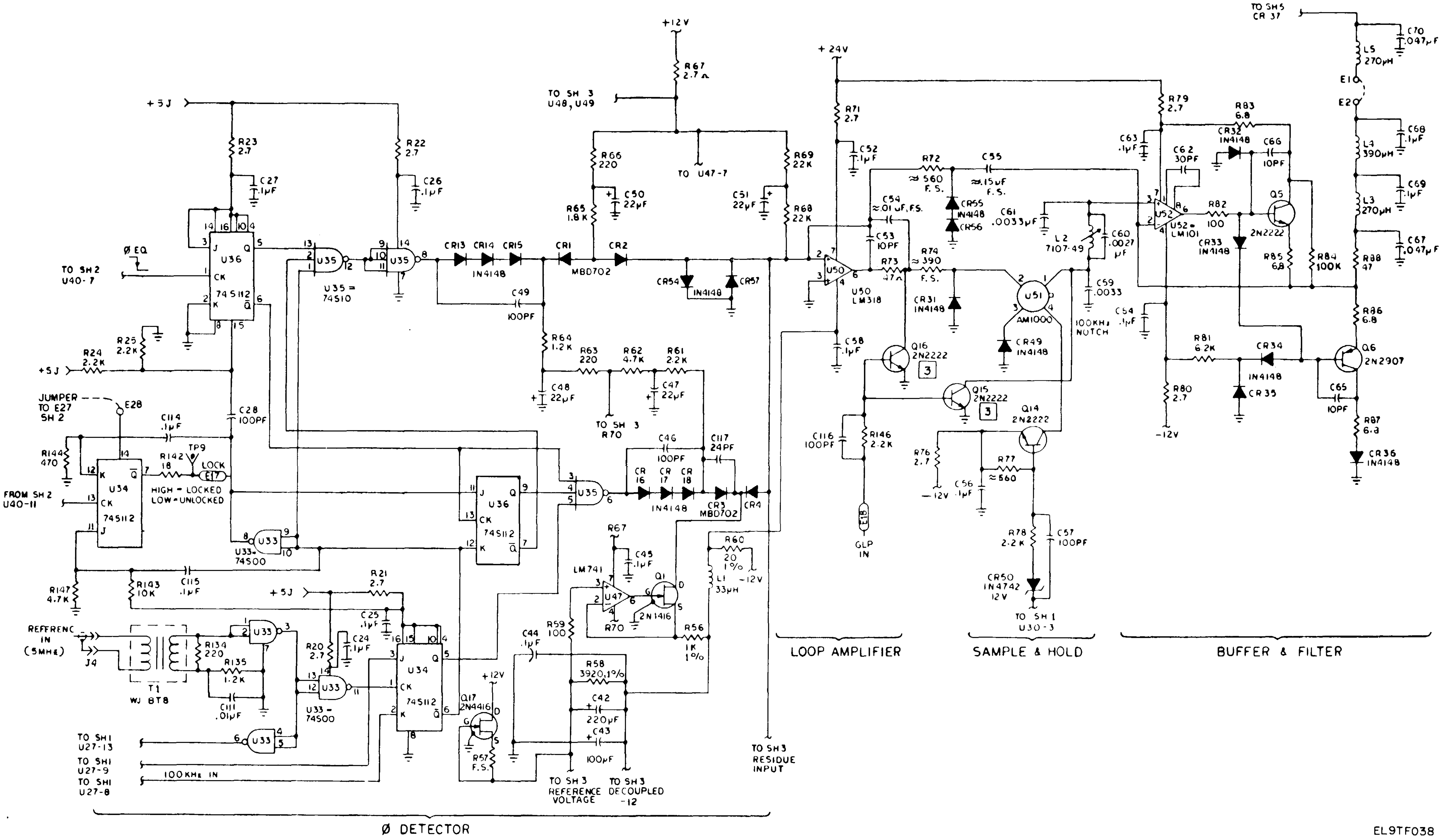


FIGURE FO-6. Schematic Diagram, Microphase Synthesizer (5030-2002) (Sheet 2 of 5).



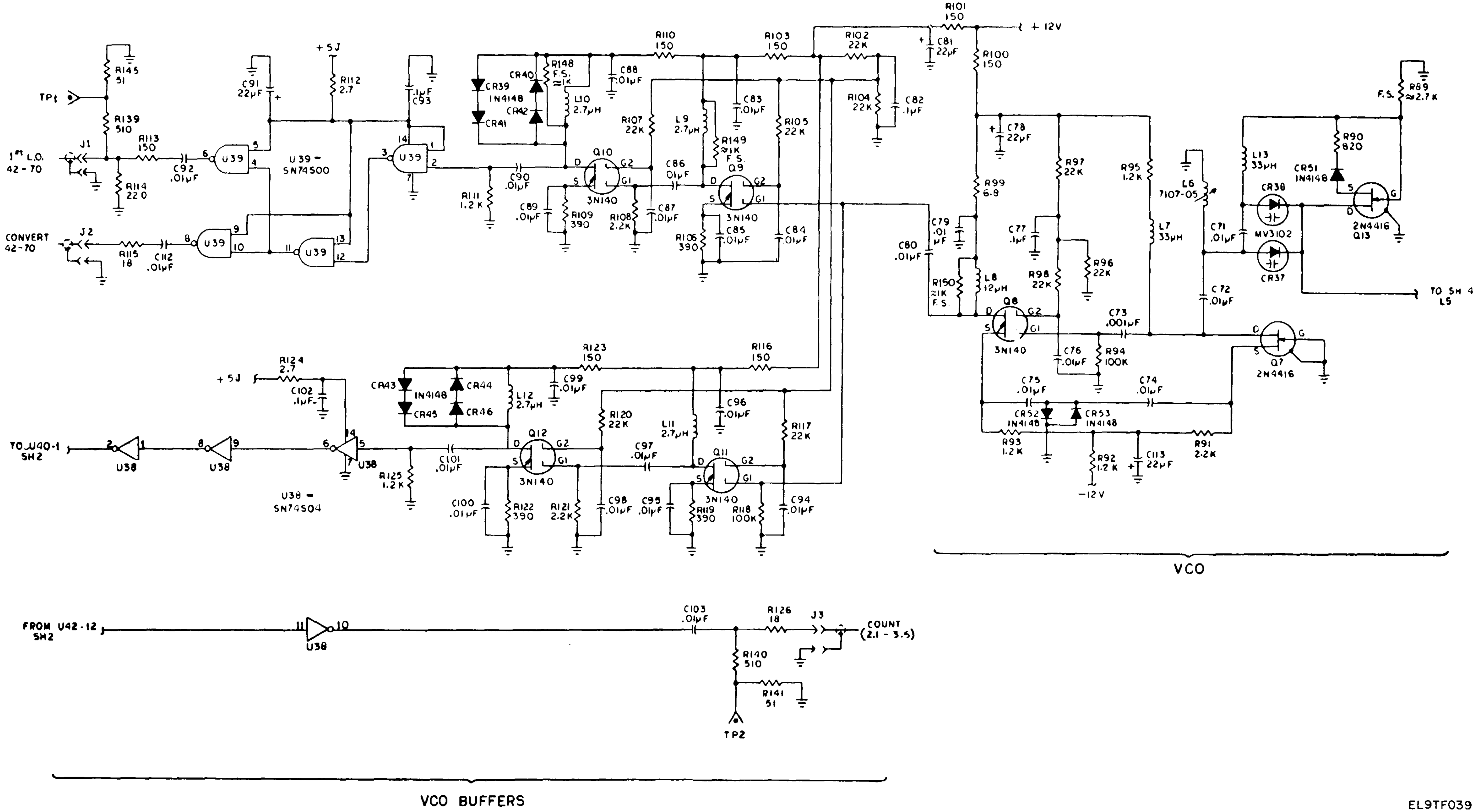
EL9TF037

FIGURE FO-6. Schematic Diagram, Microphase Synthesizer (5030-2002) (Sheet 2 of 5).



EL9TF038

FIGURE FO-6. Schematic Diagram, Microphase Synthesizer (5030-2002) (Sheet 4 of 5).



EL9TF039

FIGURE FO-6. Schematic Diagram, Microphase Synthesizer (5030-2002) (Sheet 5 of 5).

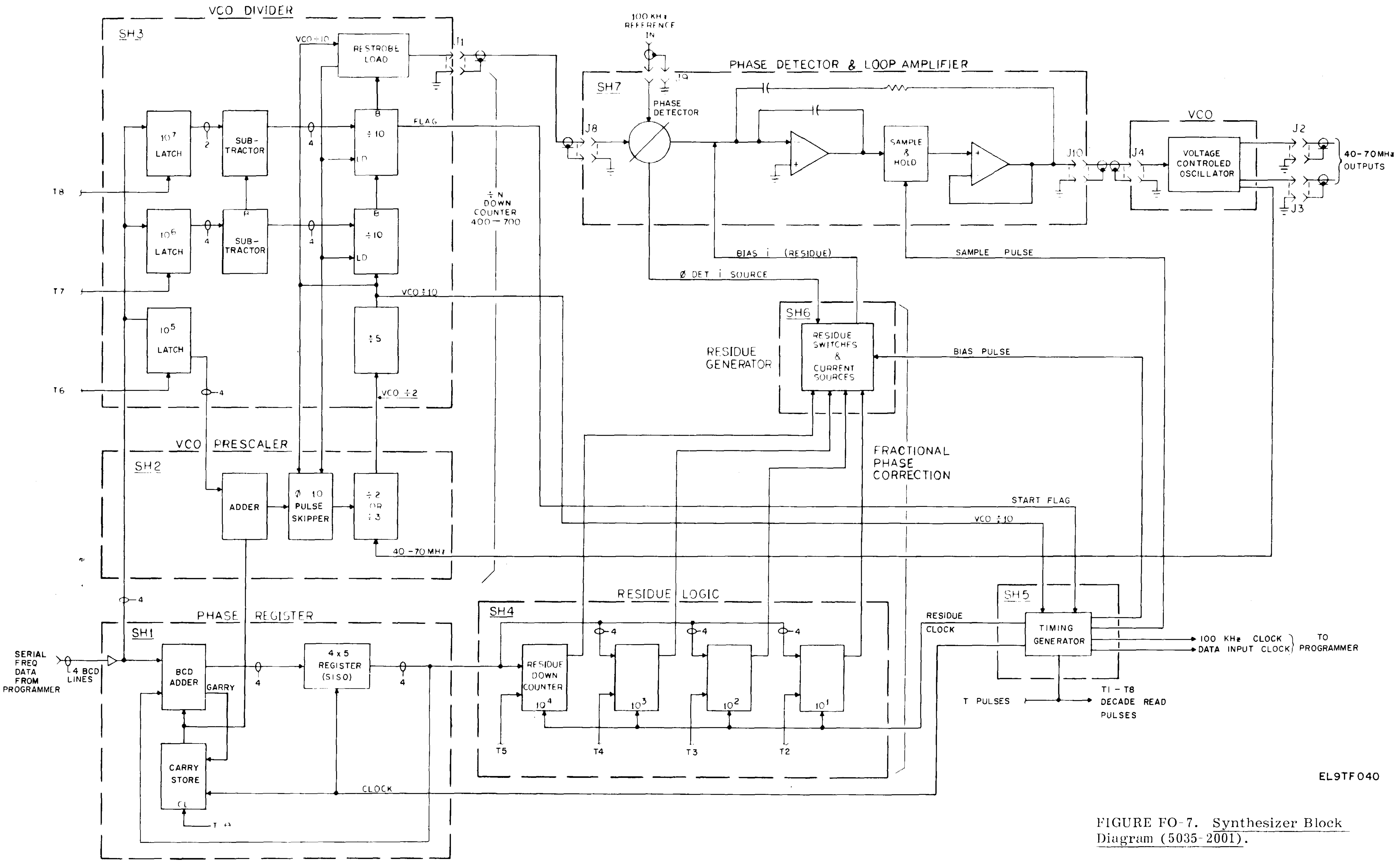
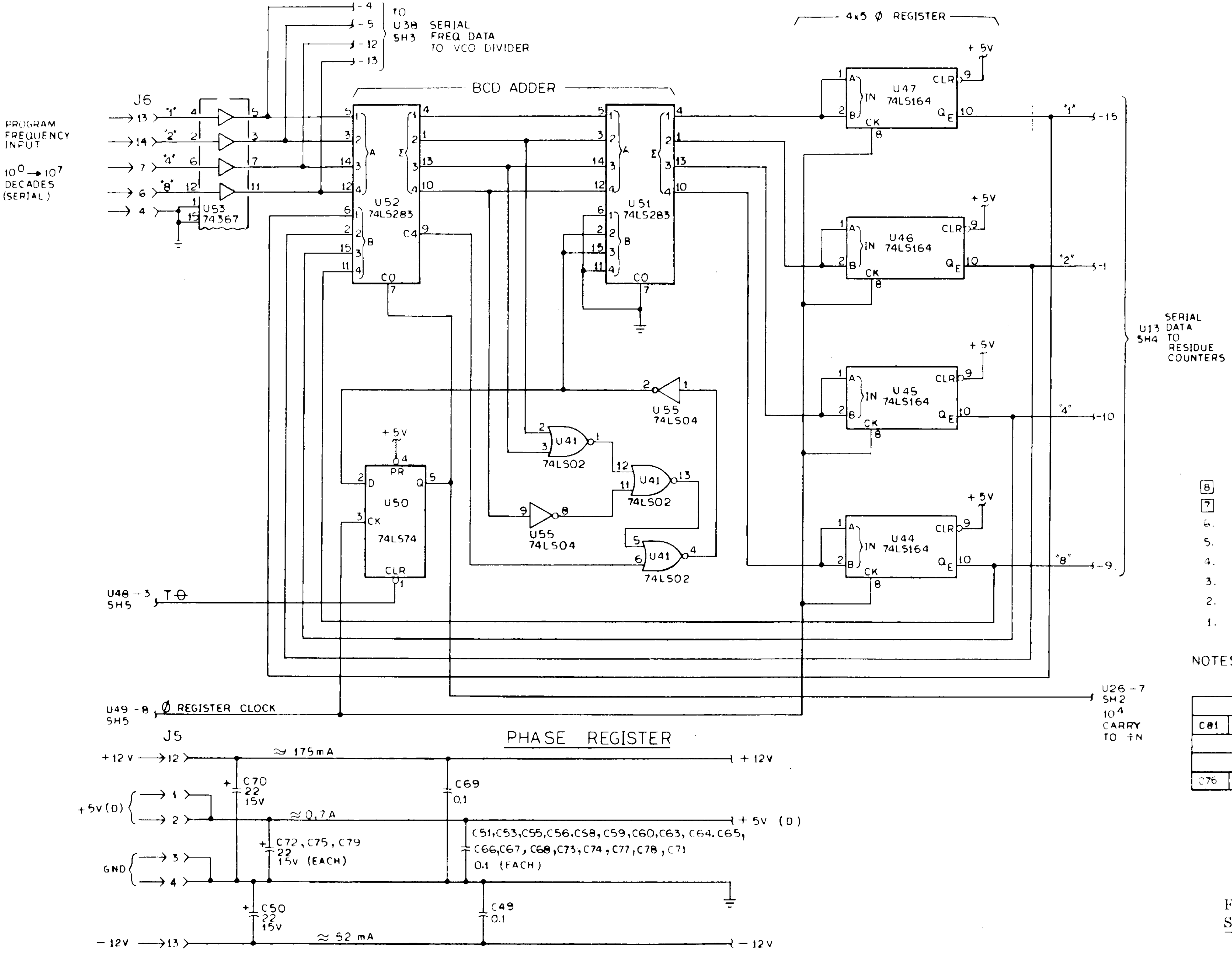


FIGURE FO-7. Synthesizer Block Diagram (5035-2001).



POWER DISTRIBUTION		
DEVICE	+5VD	GND
74(S) (LS) 00	14	7
74LS02	14	7
74 (S) (LS) 04	14	7
74 (S) (LS) 74	14	7
74 (S) (LS) 112	16	8
74LS164	14	7
74LS175	16	8
74 (S) (LS) 192	16	8
74 LS 283	16	8
74367	16	8

[8] U34 AND U39 ARE BR 5035-4801 PROMS.

[7] RESISTOR, DIP 14PIN BECKMAN 899-1-R 4.7K.

6. (XXX) INDICATES D.C. VOLTAGE.

5. +5V IS +5VD.

4. ALL INDUCTORS ARE IN MICROHENRYS.

3. ALL CAPACITORS ARE IN MICROFARADS.

2. ALL RESISTORS ARE IN OHMS 1/4W, 5%.

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION									
C81	D21	J10	L7	Q36	R123	RP1	U56	VR1	TP2
REF DESIGNATIONS NOT USED									
C76					R12				

EL9TF041

FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 1 of 8).

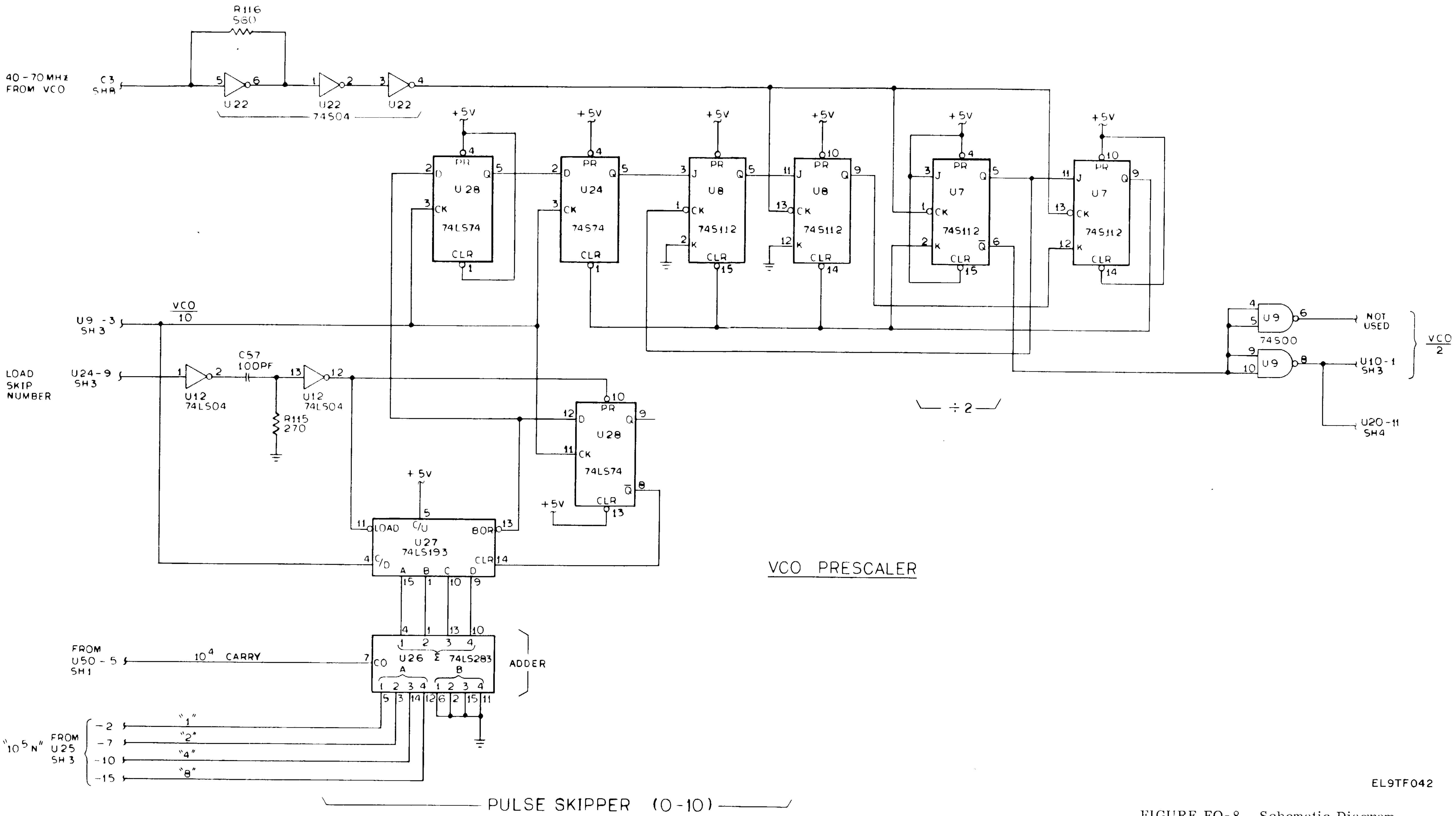


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 2 of 8).

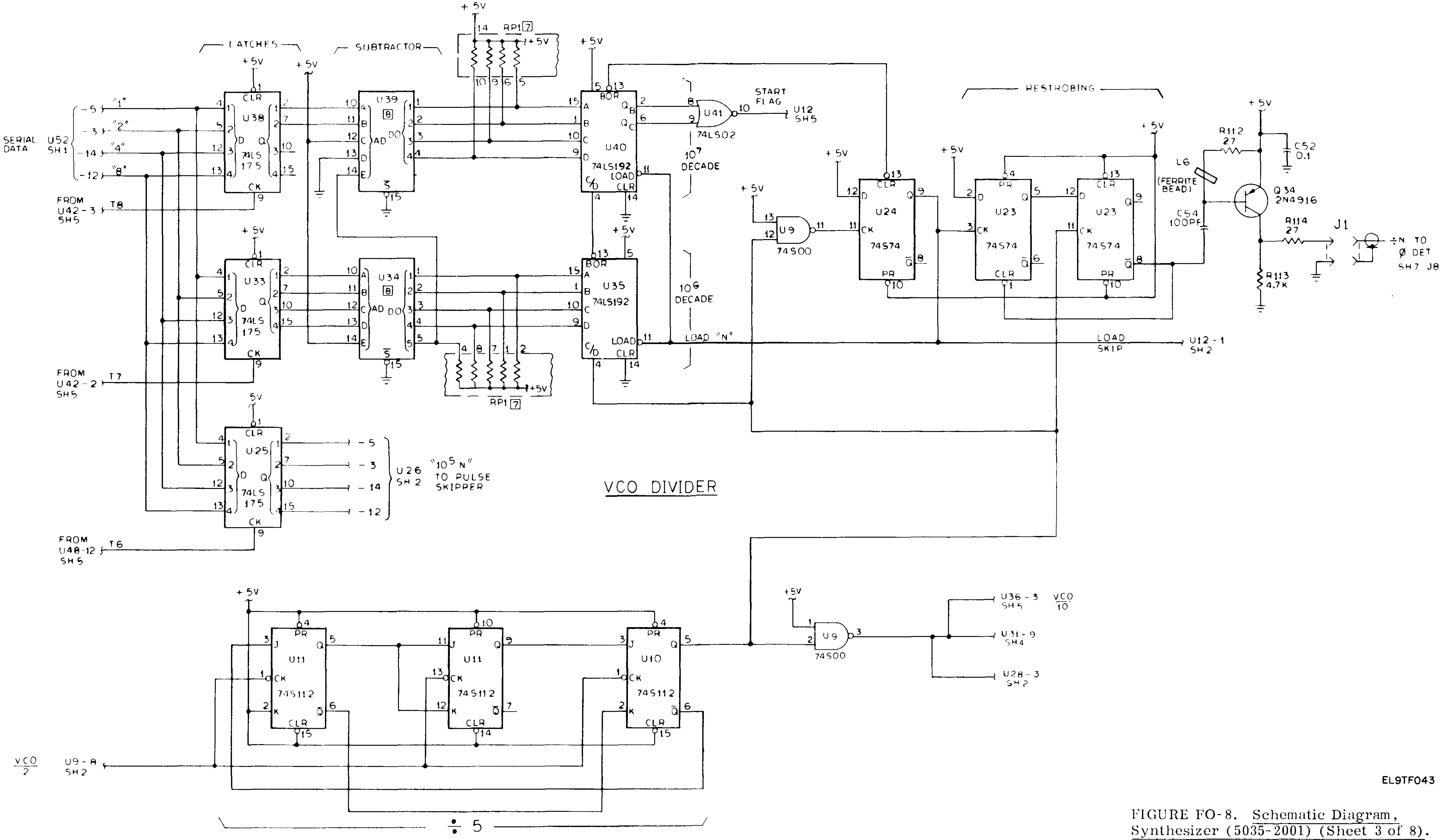


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 3 of 8).

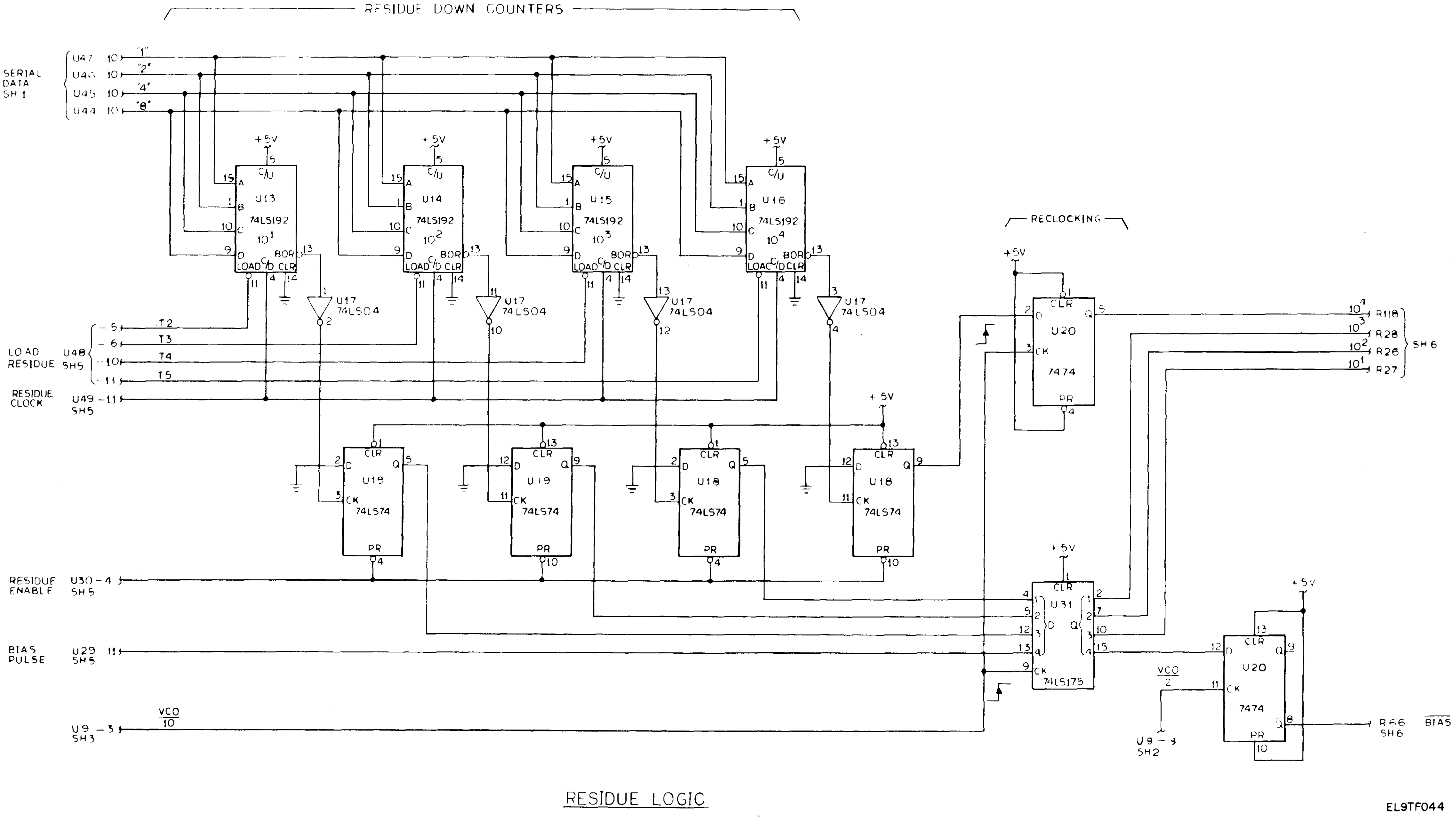


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 4 of 8).

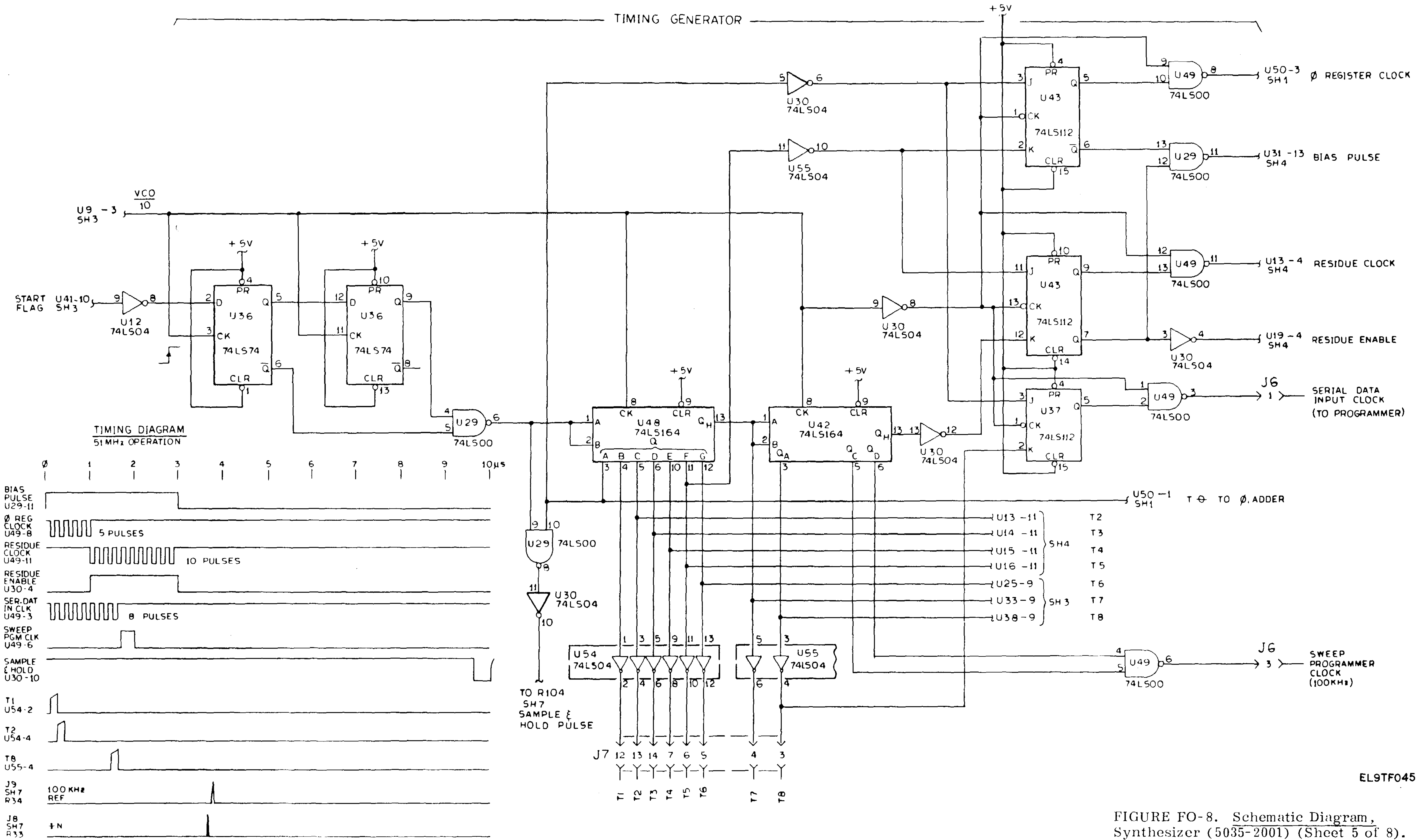


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 5 of 8).

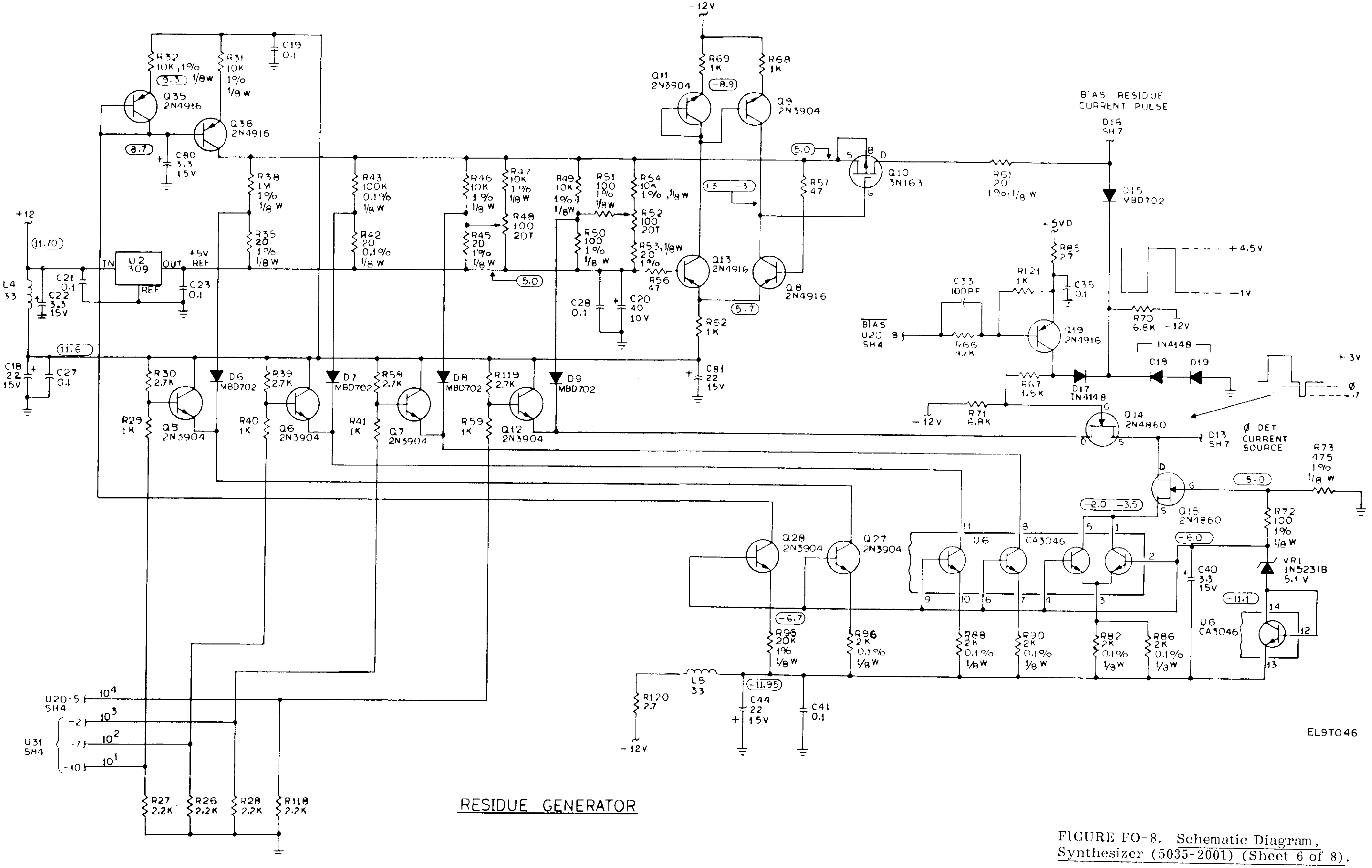


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 6 of 8).

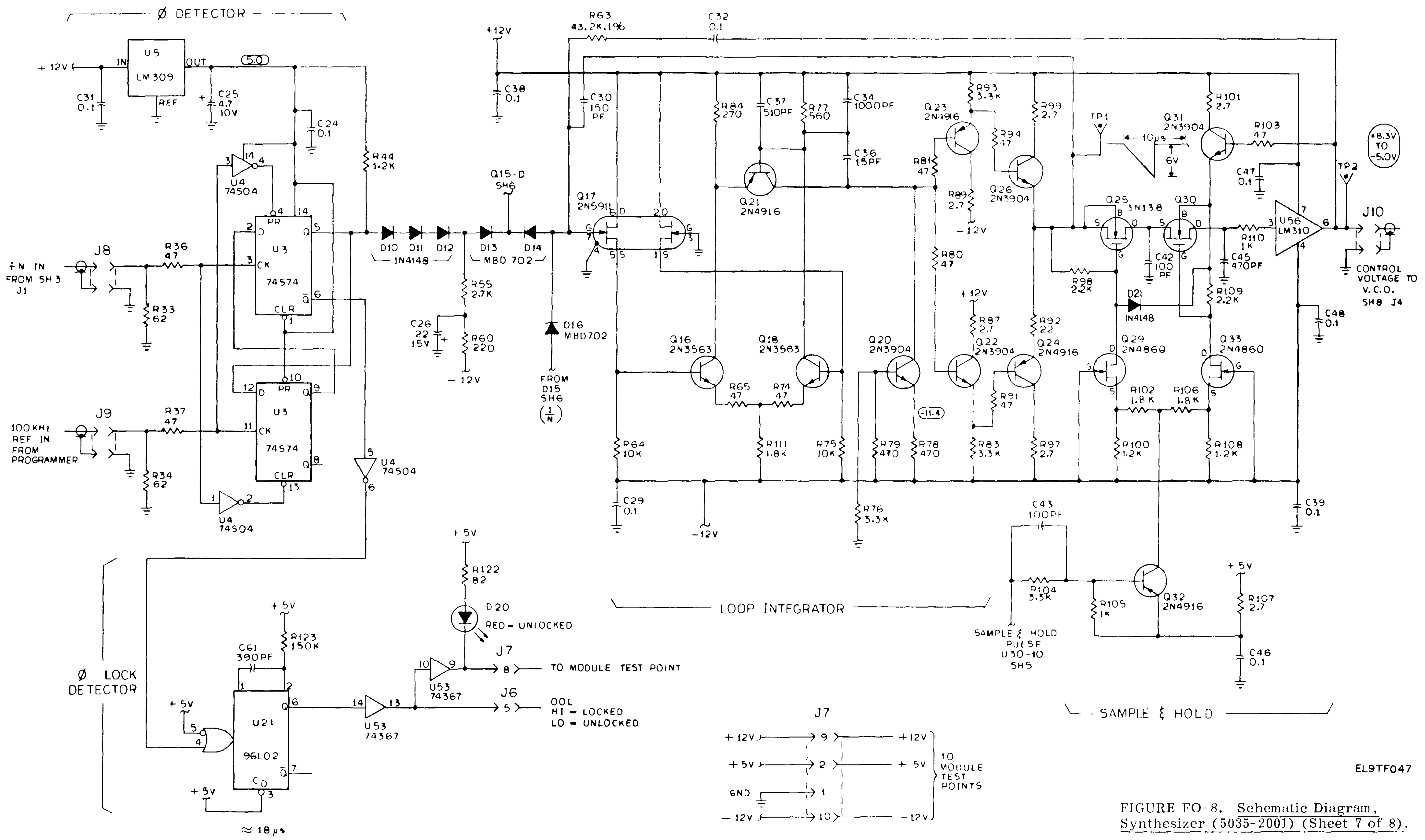


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 7 of 8).

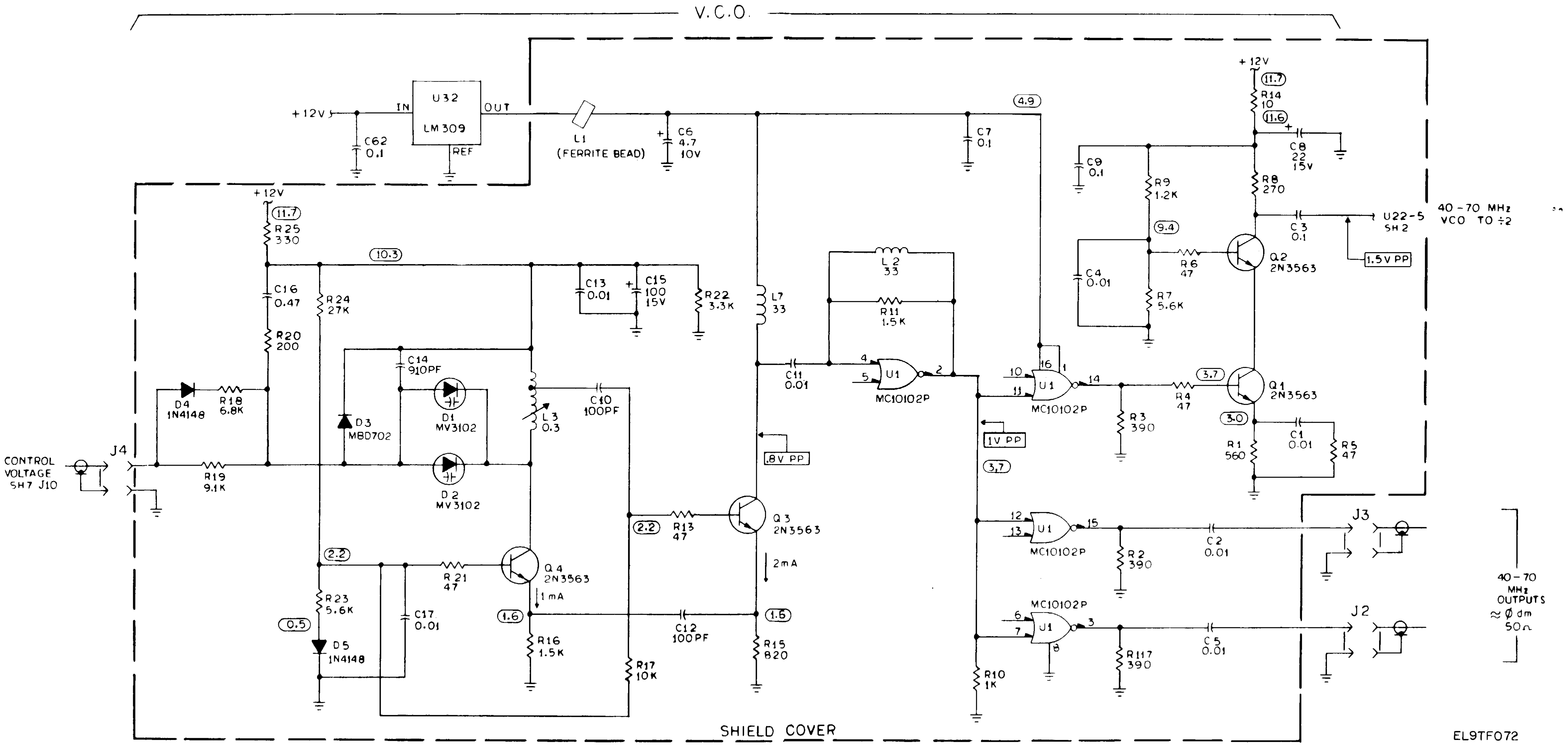


FIGURE FO-8. Schematic Diagram, Synthesizer (5035-2001) (Sheet 8 of 8).

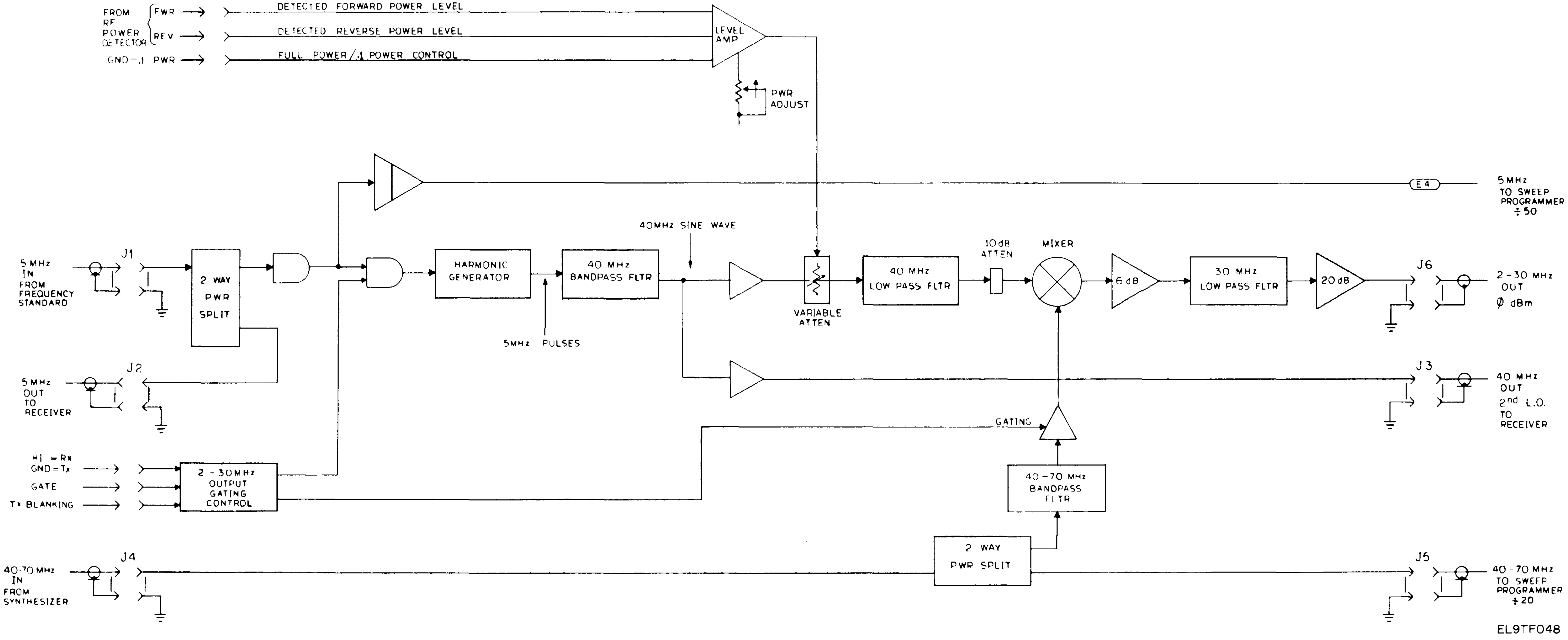
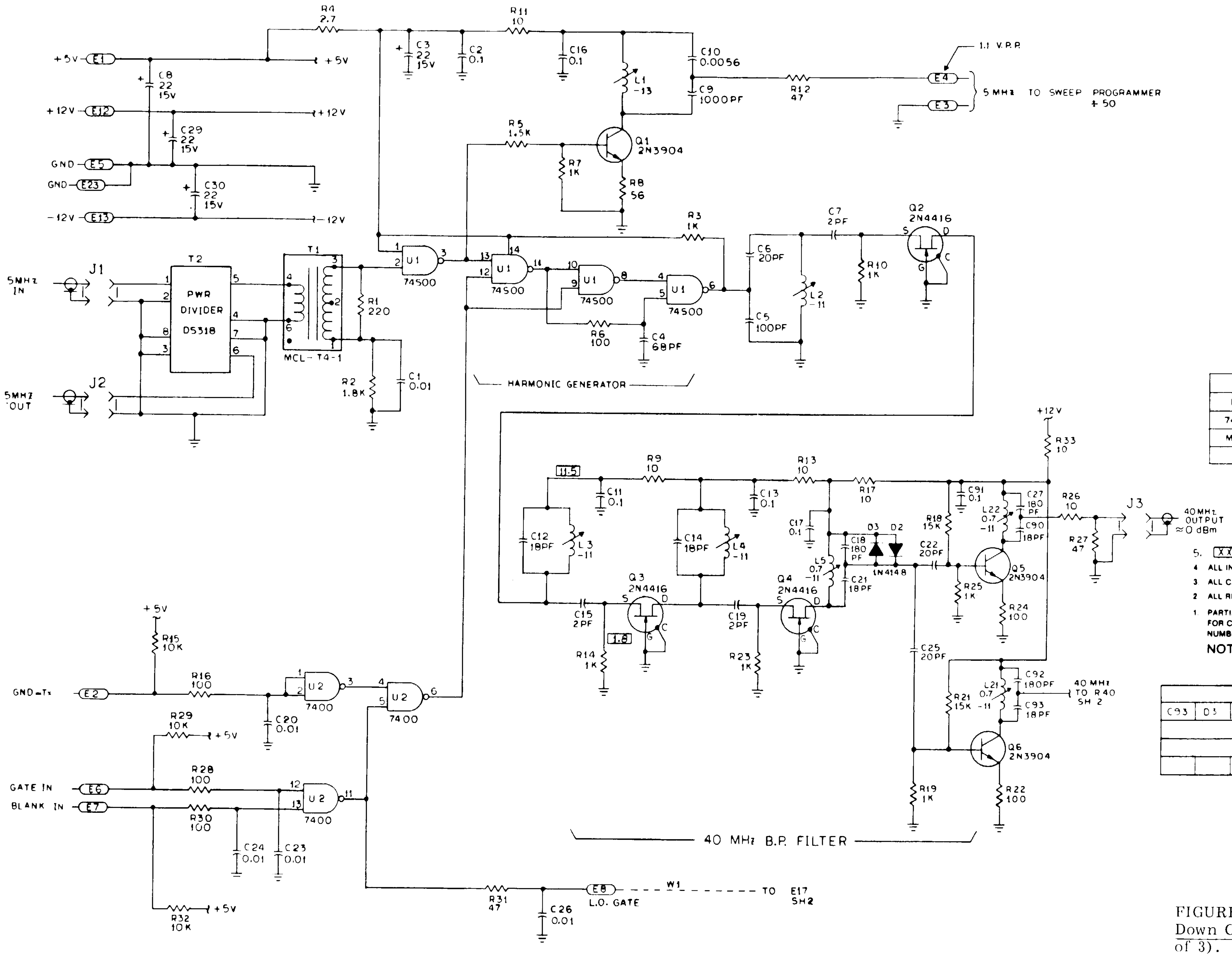


FIGURE FO-9. Down Converter Block Diagram (5035-2002).



POWER DISTRIBUTION		
DEVICE	+5V	GND
74 (S) 00	14	7
MC10102	16	8

5. XX NOMINAL D.C. VOLTAGE.

4 ALL INDUCTORS ARE IN MICROHENRYS

3 ALL CAPACITORS ARE IN MICROFARADS

2 ALL RESISTORS ARE IN OHMS, 1/4W, ±5%

1 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED

HIGHEST REFERENCE DESIGNATION									
C93	D3	E23	J6	L22	Q12	R97	T4	U3	MX1
REF DESIGNATION NOT USED									
						R20, 39,41,R45			

EL9TF049

FIGURE FO-10. Schematic Diagram, Down Converter (5035-2002) (Sheet 1 of 3).

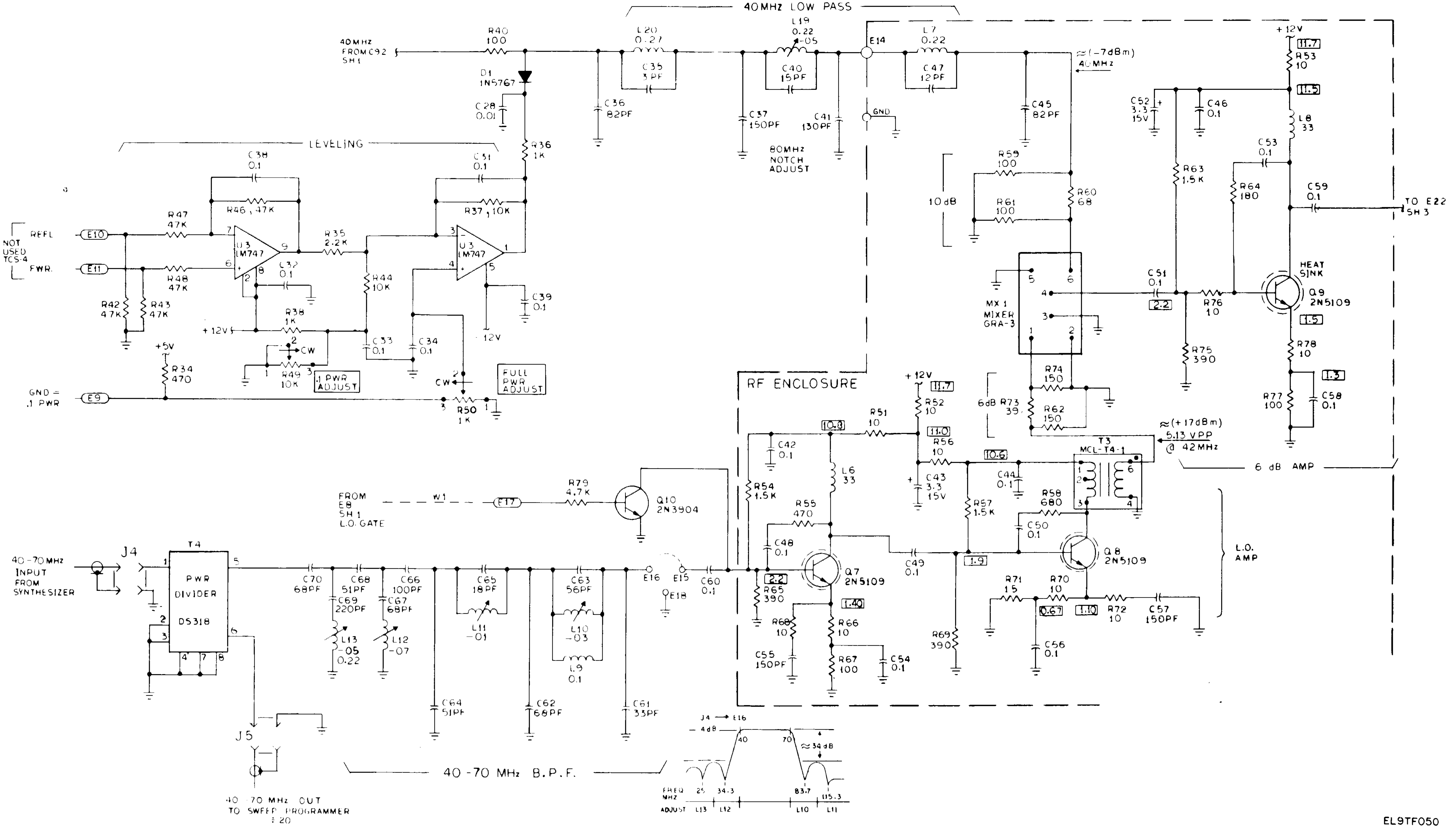
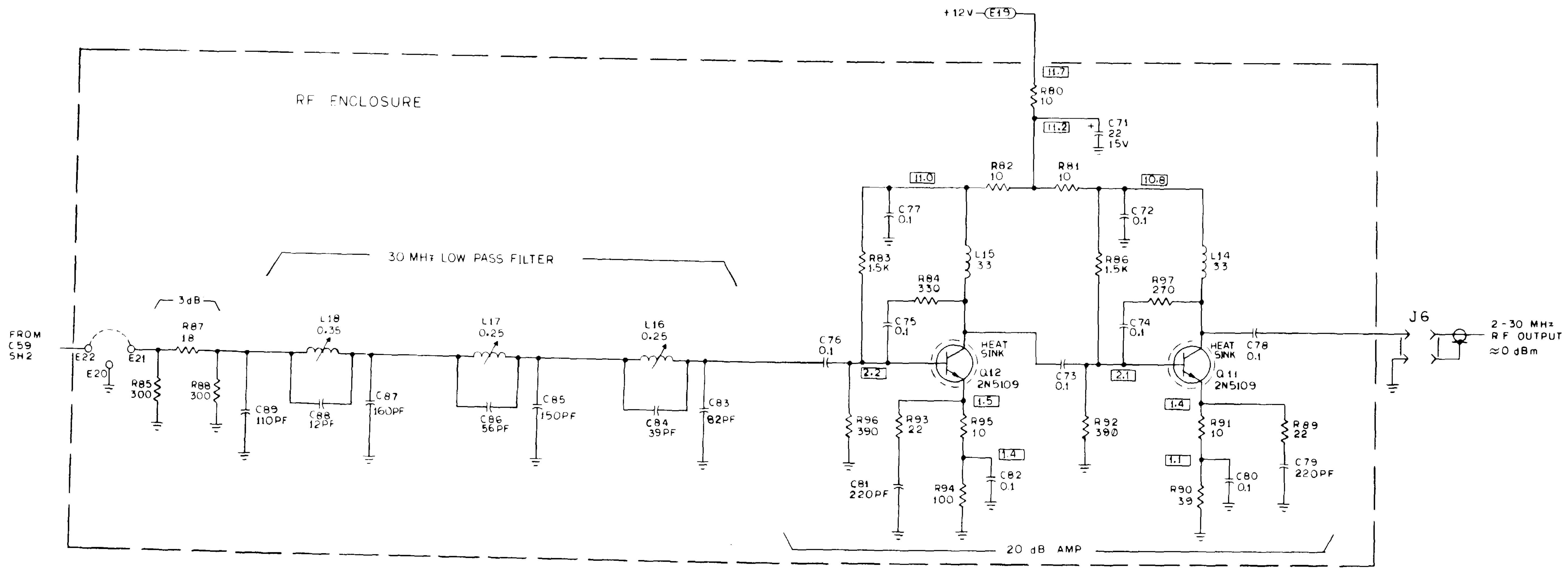
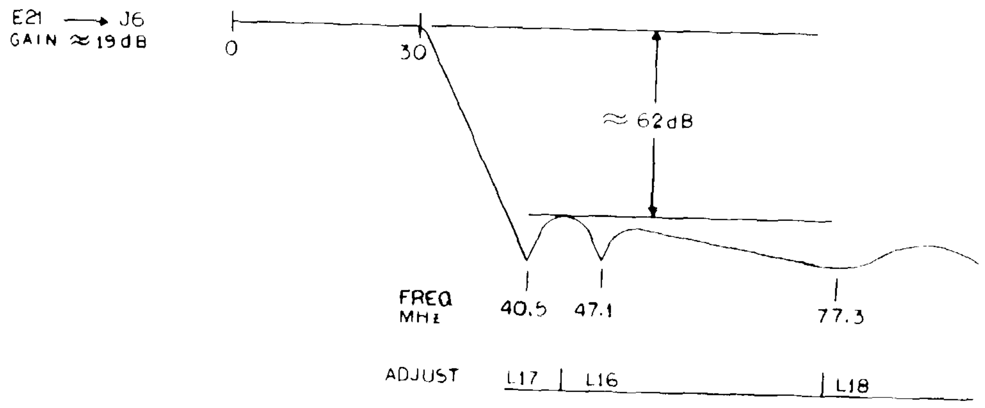


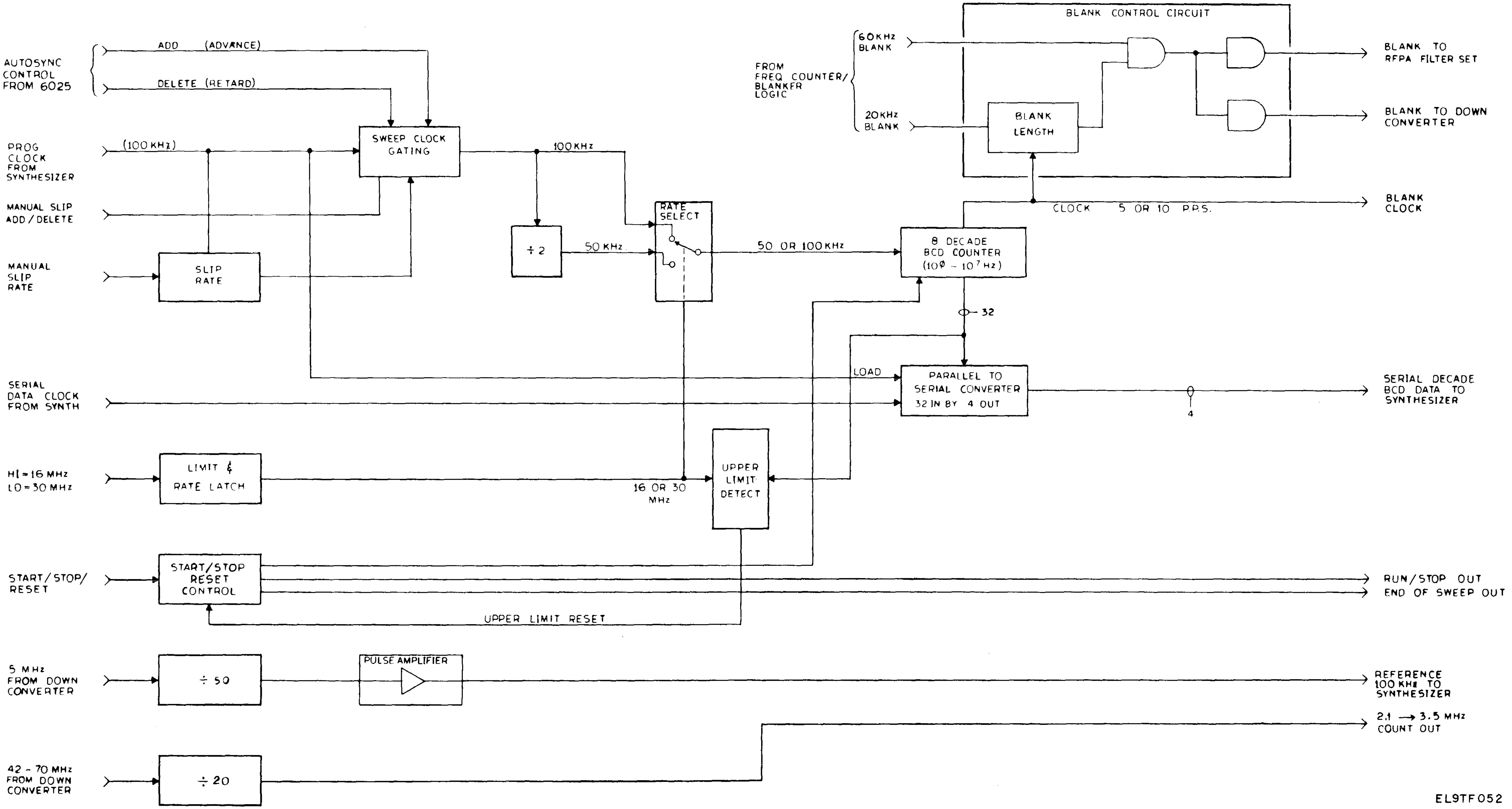
FIGURE FO-10. Schematic Diagram, Down Converter (5035-2002) (Sheet 2 of 3).





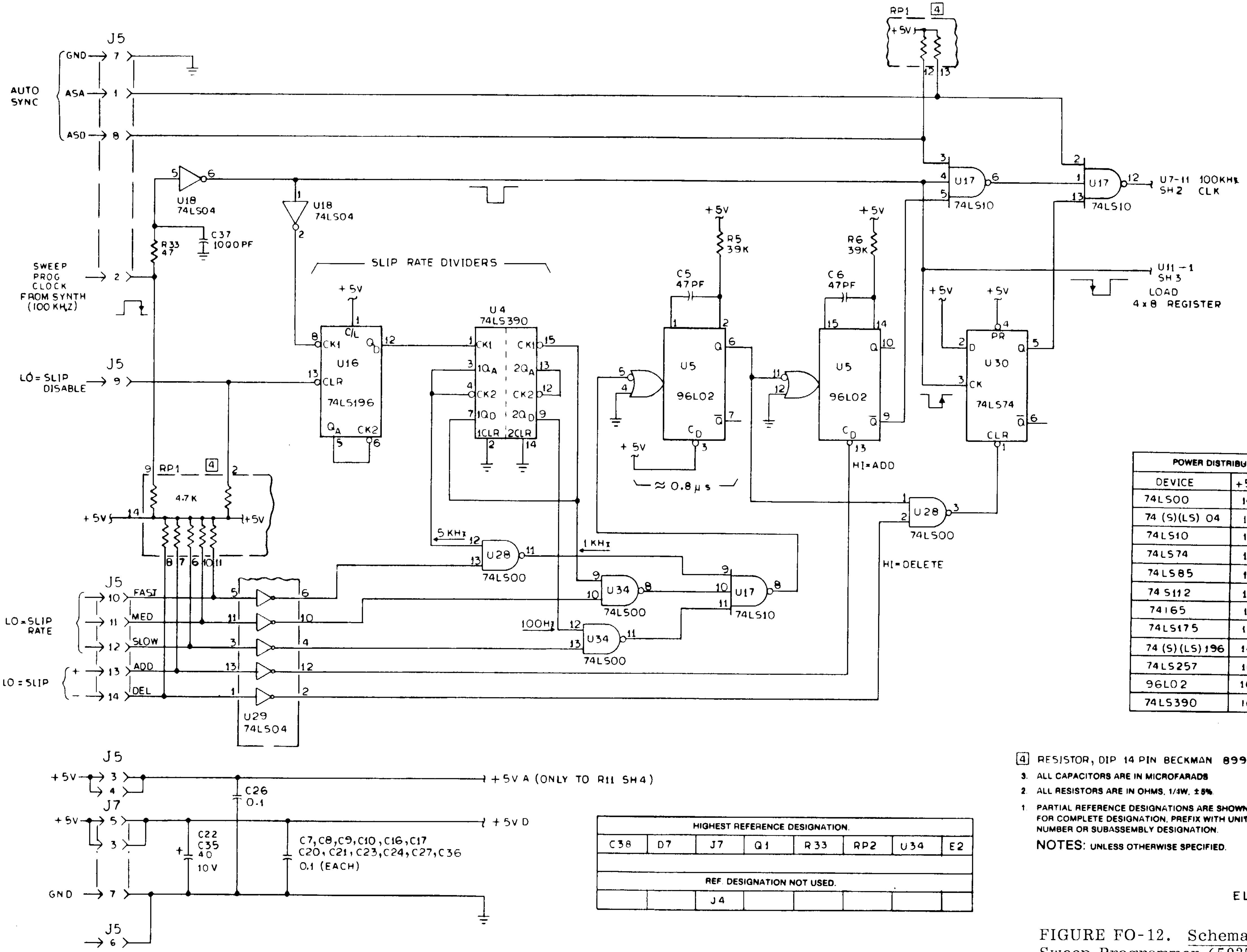
EL9TF051

FIGURE FO-10. Schematic Diagram, Down Converter (5035-2002) (Sheet 3 of 3).



EL9TF052

FIGURE FO-11. Sweep Programmer Block Diagram (5035-2003).



POWER DISTRIBUTION		
DEVICE	+5VD	GND
74LS00	14	7
74 (S)(LS) 04	14	7
74LS10	14	7
74LS74	14	7
74LS85	16	8
74S112	16	8
74165	16	8
74LS175	16	8
74 (S)(LS) 196	14	7
74LS257	16	8
96L02	16	8
74LS390	16	8

HIGHEST REFERENCE DESIGNATION							
C38	D7	J7	Q1	R33	RP2	U34	E2
REF. DESIGNATION NOT USED.							
		J4					

4 RESISTOR, DIP 14 PIN BECKMAN 899-1-R 4.7K.

3. ALL CAPACITORS ARE IN MICROFARADS

2. ALL RESISTORS ARE IN OHMS, 1/4W, ±5%

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

EL9TF053

FIGURE FO-12. Schematic Diagram, Sweep Programmer (5035-2003) (Sheet 1 of 4).

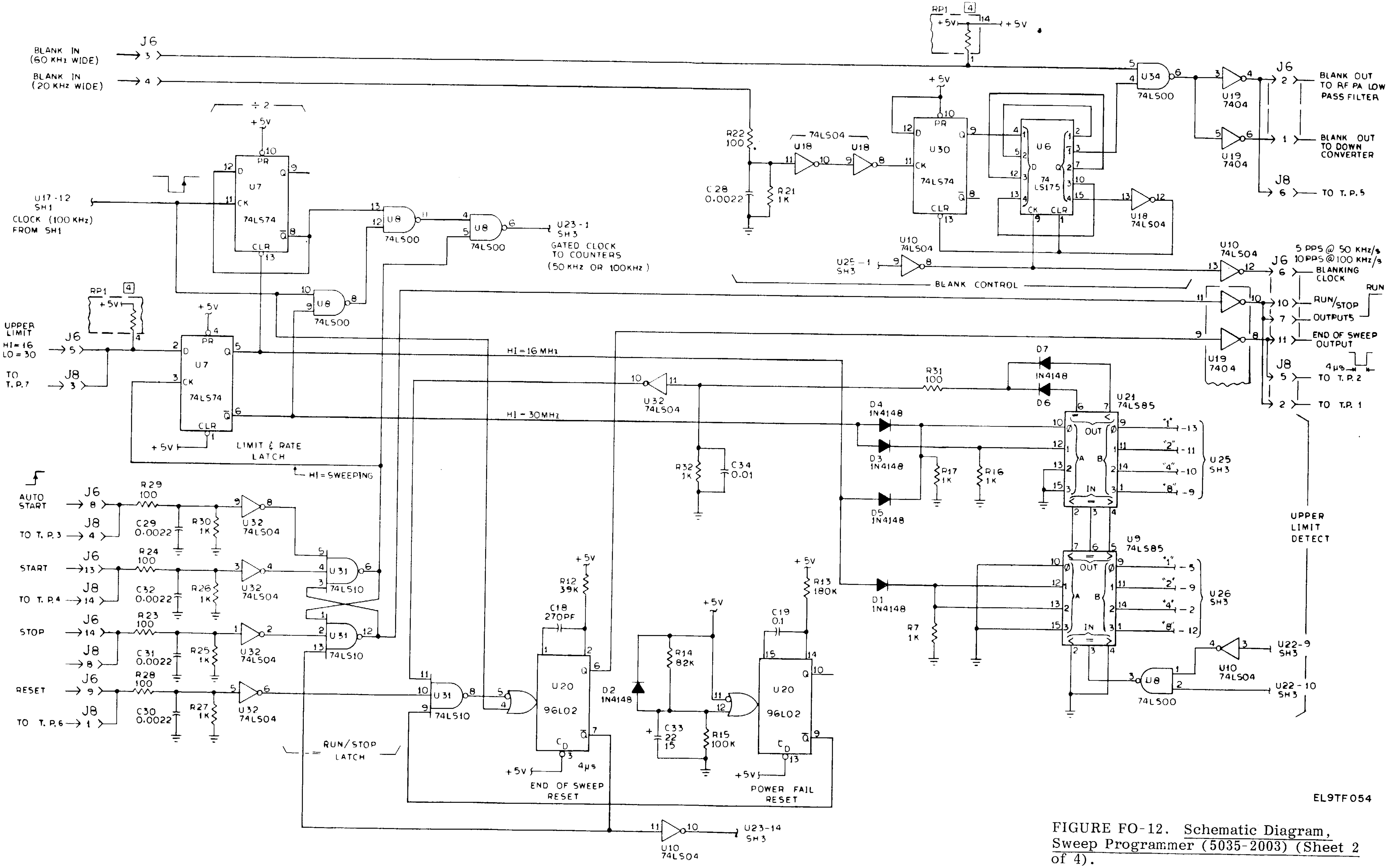


FIGURE FO-12. Schematic Diagram, Sweep Programmer (5035-2003) (Sheet 2 of 4).

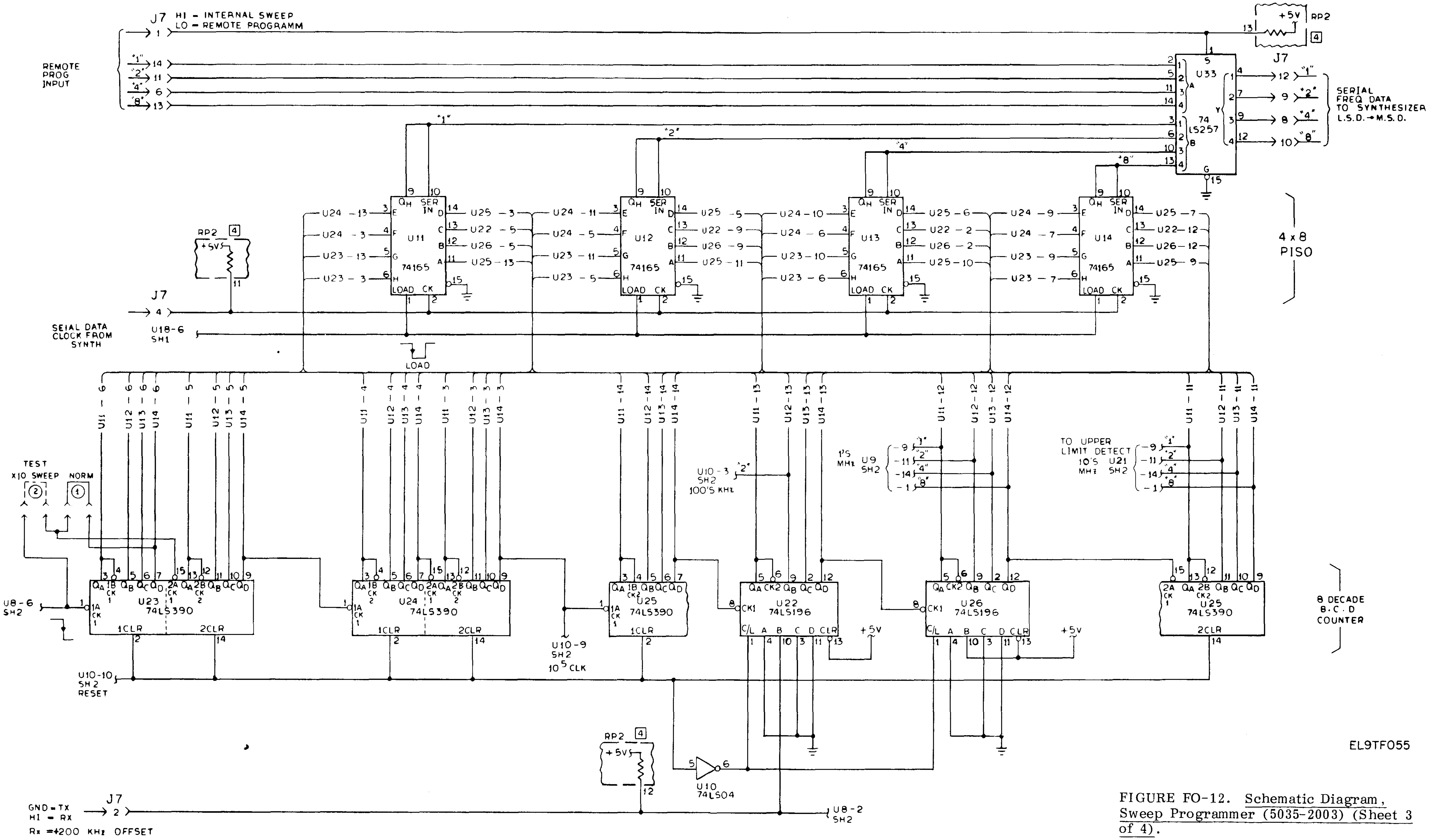


FIGURE FO-12. Schematic Diagram, Sweep Programmer (5035-2003) (Sheet 3 of 4).

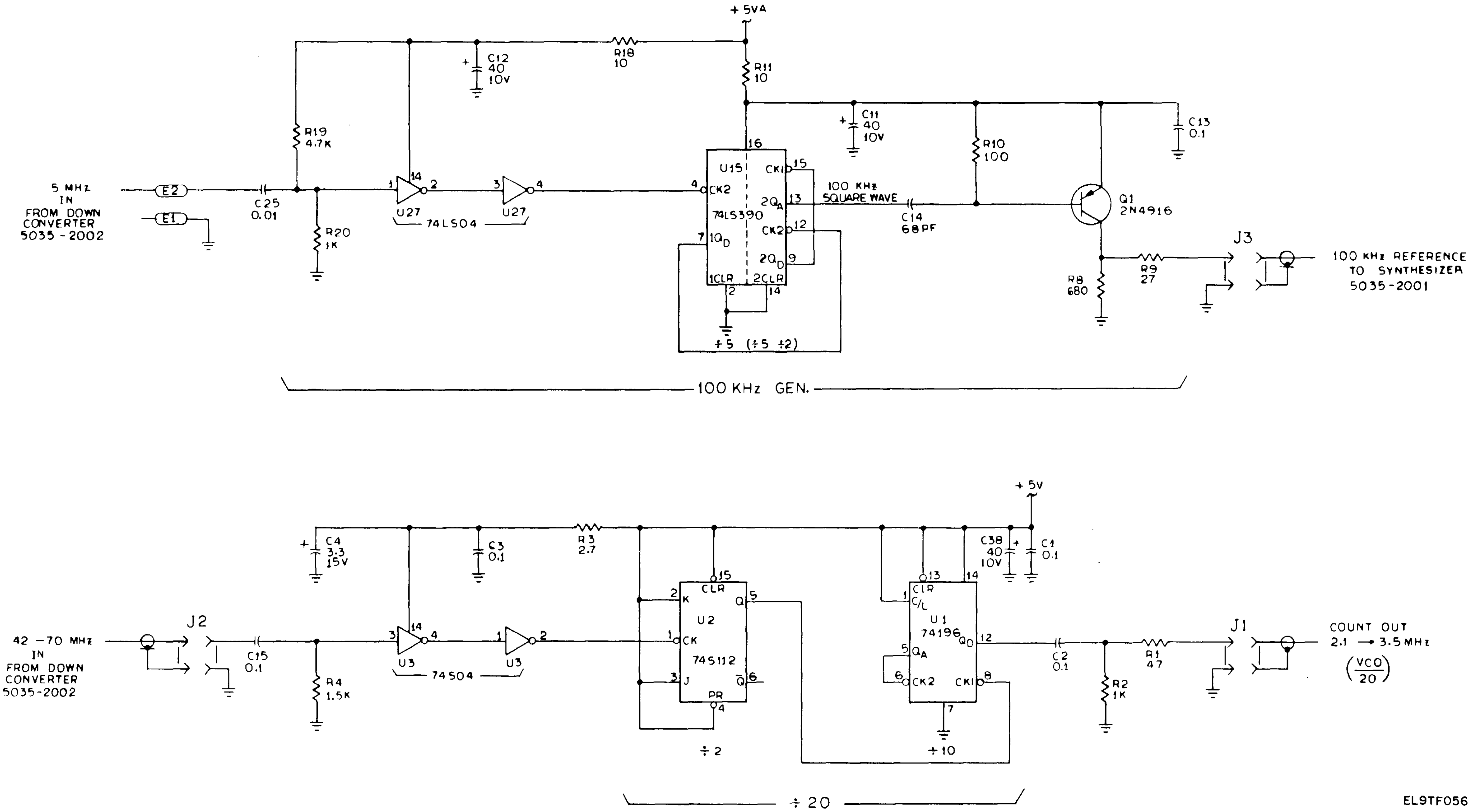


FIGURE FO-12. Schematic Diagram, Sweep Programmer (5035-2003) (Sheet 4 of 4).

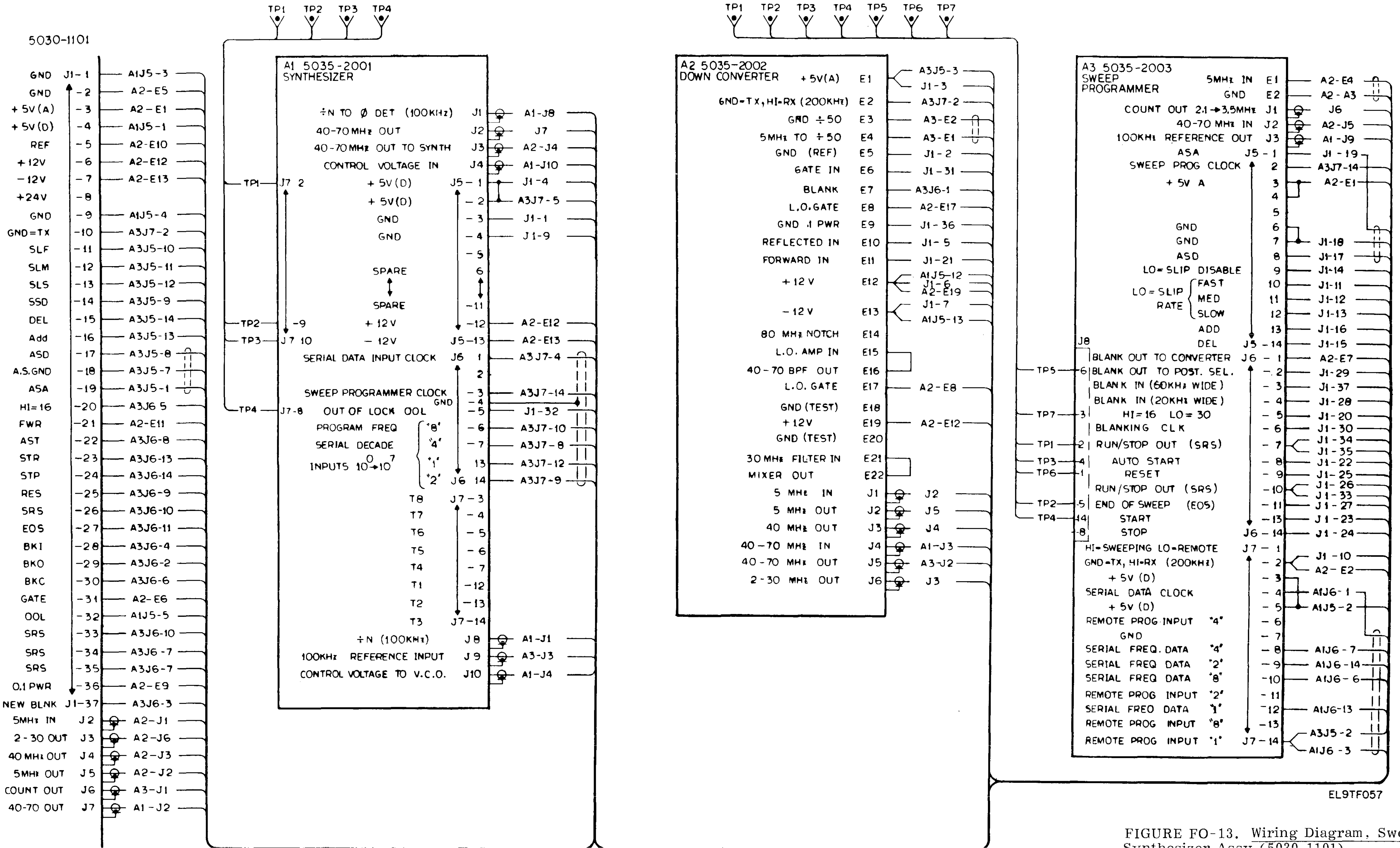
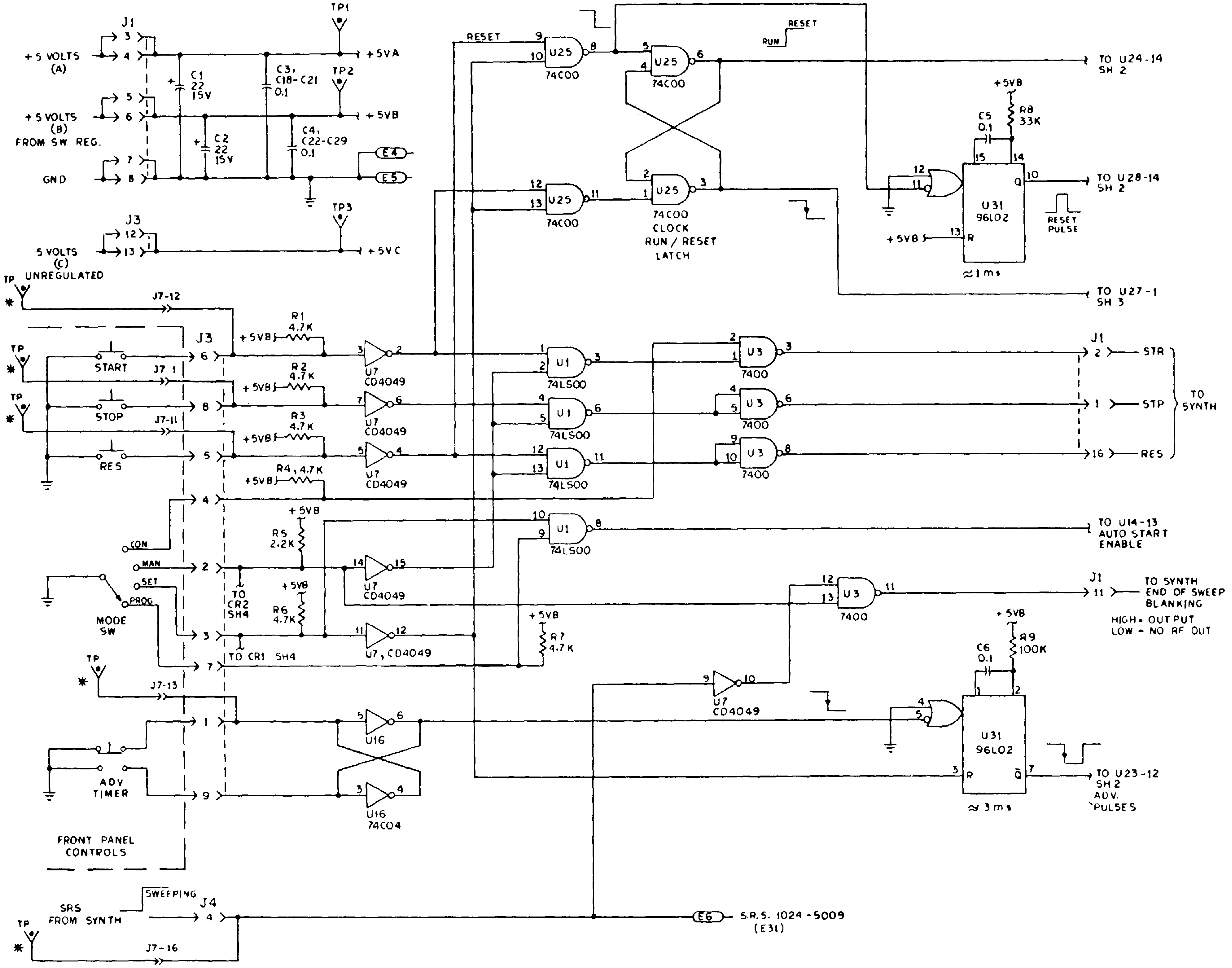
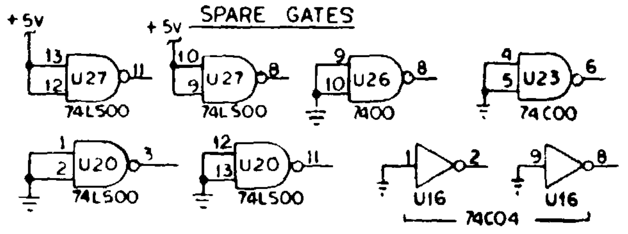


FIGURE FO-13. Wiring Diagram, Sweep Synthesizer Assy (5030-1101).



⑥ PIN 14 OF U12 IS TIED TO GROUND ON EARLY UNITS.

5. ✱ DENOTES CASTING TEST POINT.



POWER DISTRIBUTION				
REF DES	DEVICE	+5VA	+5VB	GND
U3, U9,(U20),(U27)	74(LS)00	14		7
U8	7430	14		7
U21	74159	24		12
U33	74LS42	16		8
(U1),(U4), U23. U25	74C(LS)00		14	7
U5, U6	74LS196		14	7
U16	74C04		14	7
U10, U11, U12, U17, U18, U22, U24, U28, U30	74C192		16	8
U29, U34, U36	CD4050		1	8
U26	7400	—	—	7
U7	CD4049		1	8

④ U10 11 12 17 18 22-30
PIN 15, 11, 10, 9, 4 & 1 ARE CONNECTED TO +5VB.

3. ALL CAPACITORS ARE IN MICROFARADS.

2. ALL RESISTORS ARE IN OHMS 1/4W, ±5%.

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT, OR ASSY DESIGNATOR.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION								
C29	CR9	F6	J7	Q7	R48	TP3	U36	
REF DESIGNATION NOT USED								
						U2,13,15 19,32,35		

EL9TF058

FIGURE FO-14. Schematic Diagram, Programmer (1024-2008) (S/N 400101 and on) (Sheet 1 of 4).

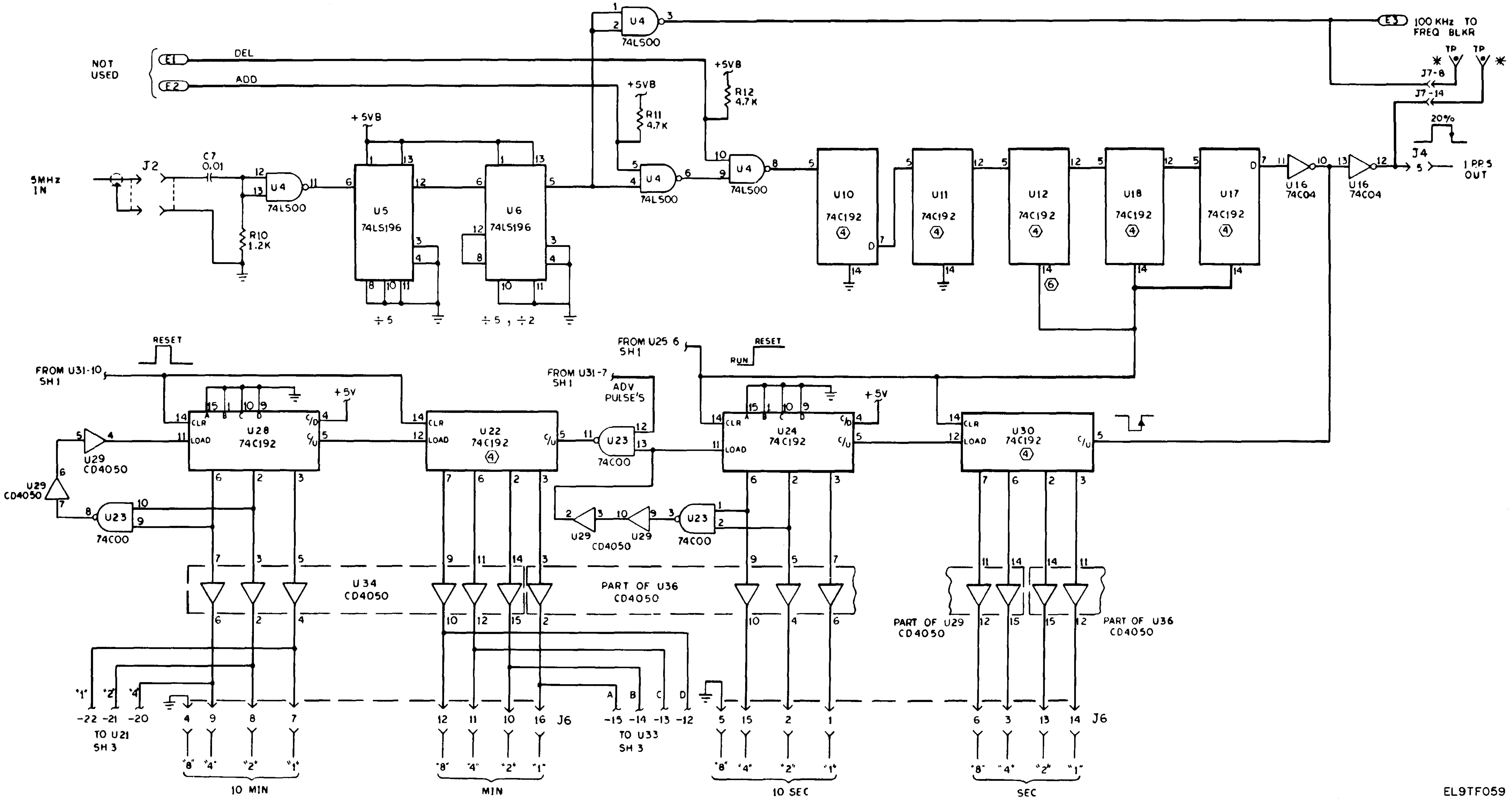


FIGURE FO-14. Schematic Diagram, Programmer (1024-2008) (S/N 400101 and on) (Sheet 2 of 4).

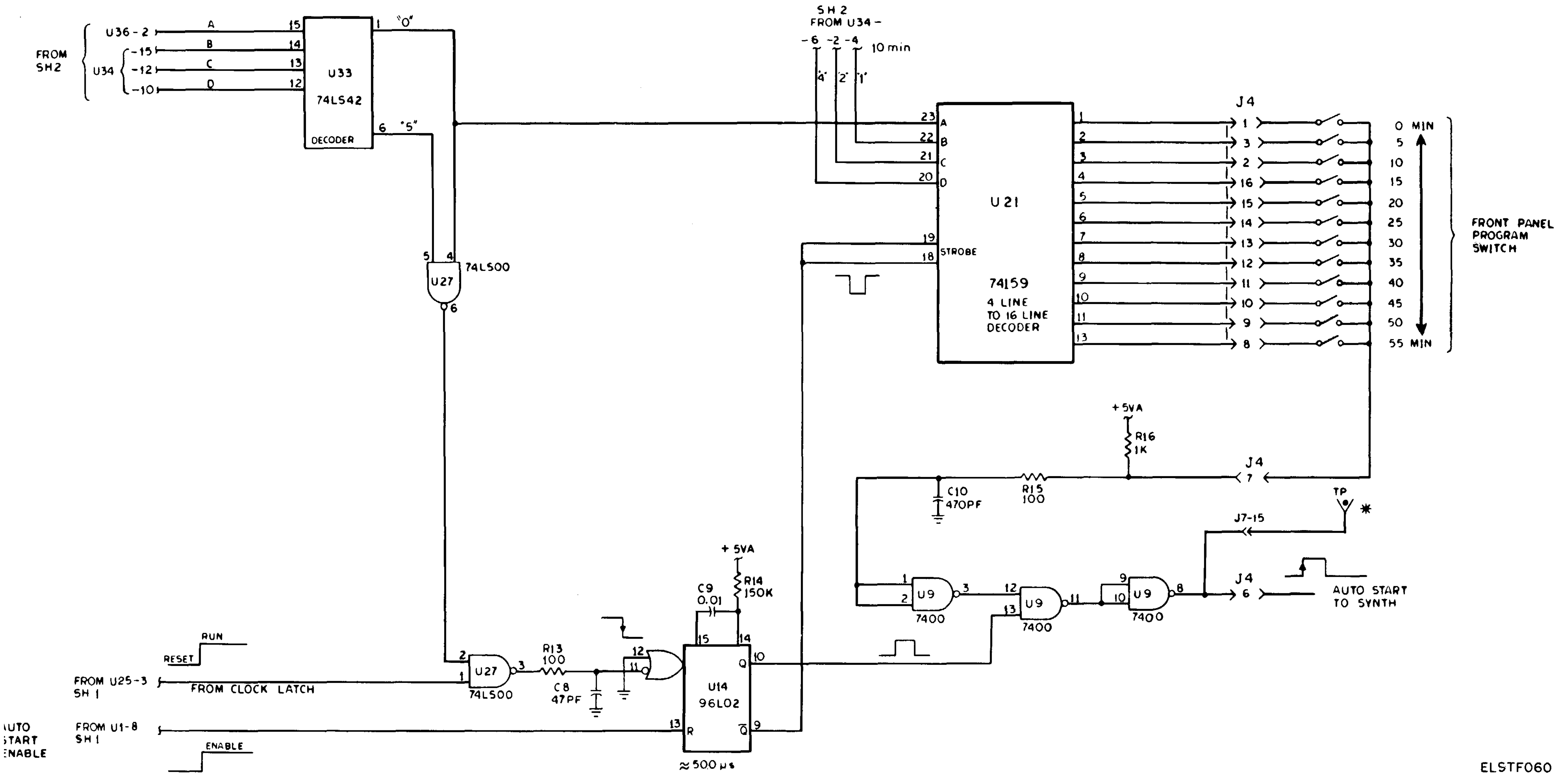


FIGURE FO-14. Schematic Diagram, Programmer (1024-2008) (S/N 400101 and on) (Sheet 3 of 4).

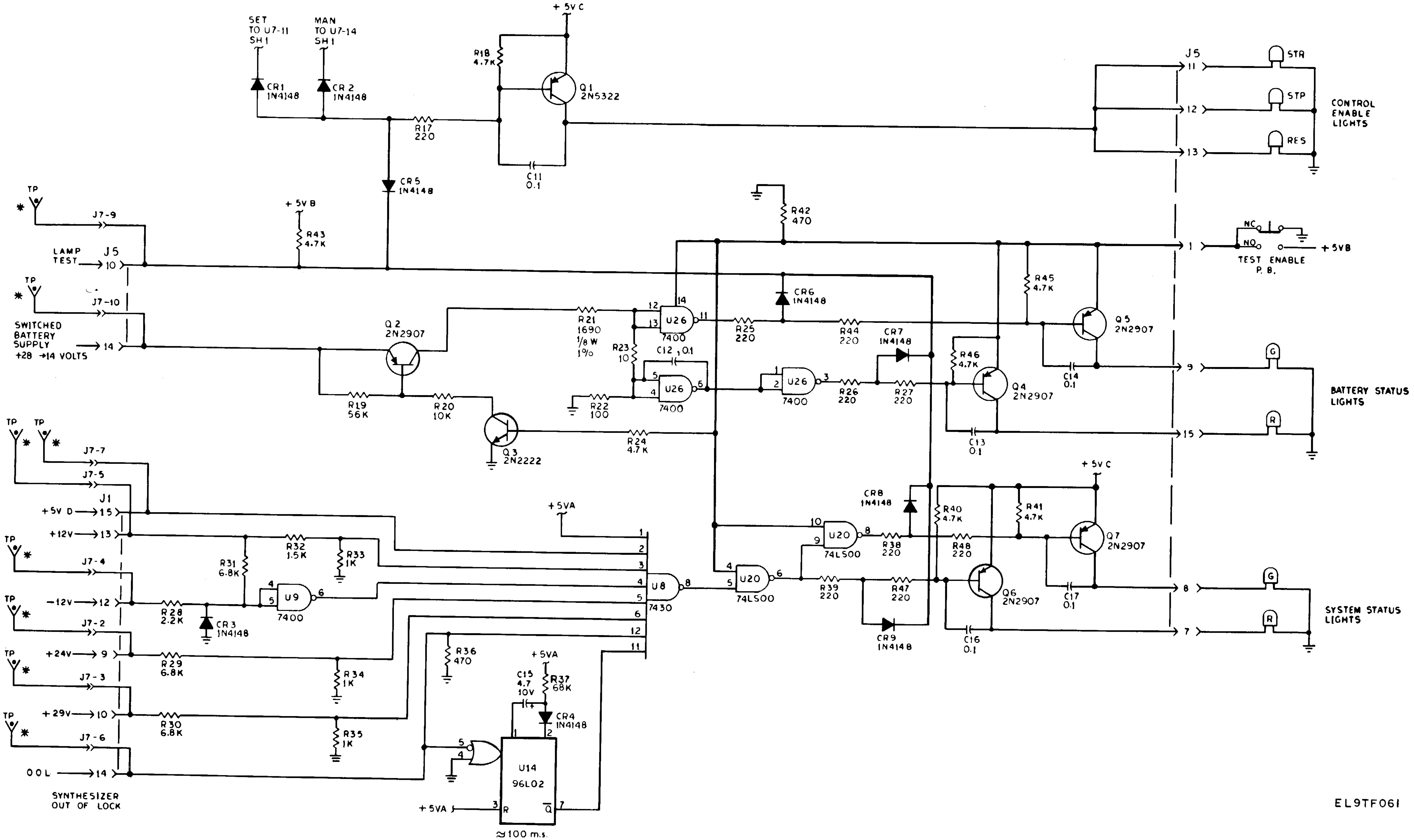
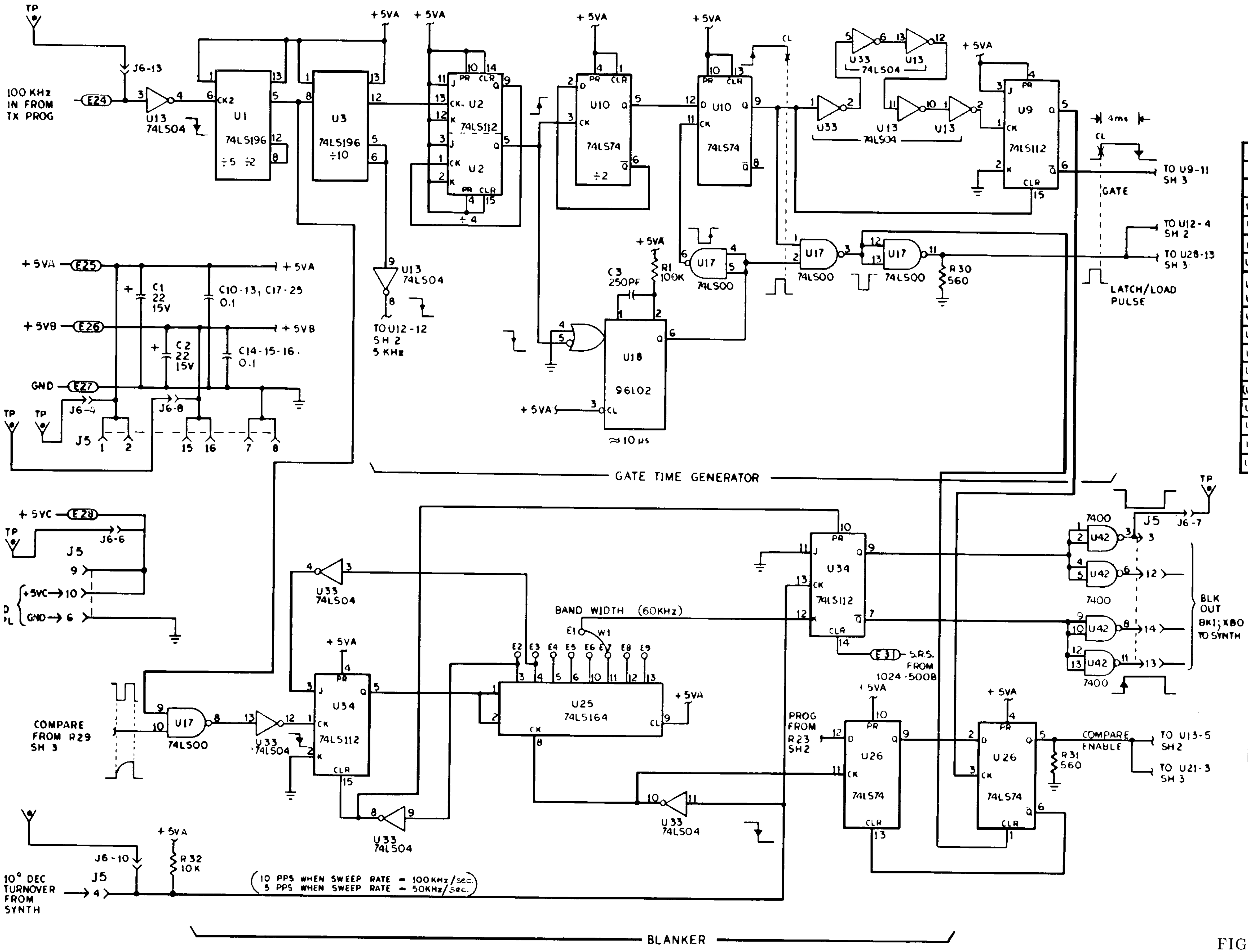
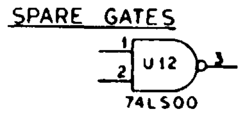


FIGURE FO-14. Schematic Diagram, Programmer (1024-2008) (S/N 400101 and on) (Sheet 4 of 4).





POWER DISTRIBUTION				
REF. DES.	DEVICE	+5VB	+5VA	GND
U11 U19 U35 U43	74C89	16		8
U4	74LS193	16		7
U12	74LS00	14		7
U13	74LS04	14		7
U1,U22,U23,U30,U31 U38,U39,U46,U47,U3	74LS196		14	7
U2,U9,U34	74LS112		16	8
U8,U14,U15,U16	74LS257		16	8
U10,U26	74LS74		14	7
U20,U28,U33,U36	74LS04		14	7
(U17), U42	74(LS)00		14	7
U18	96L02		16	8
U25	74LS164		14	7
U24,U32,U40,U48	74LS175		16	8
U21,U29,U37,U45	74LS85		16	8

3. ALL CAPACITORS ARE IN MICROPARADS.

2. ALL RESISTORS ARE IN OHMS 1/4W, 5%.

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT, OR ASSY DESIGNATOR.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION						
C25		E31	J6	R32	W6	U48
REF. DESIGNATION NOT USED						
C4,C5 C26			U5,6,7,27 41,44	R2-R4		

EL9TF062

FIGURE FO-15. Schematic Diagram, Frequency Counter/Blanker (1024-2009) (S/N 400101 and on) (Sheet 1 of 3).

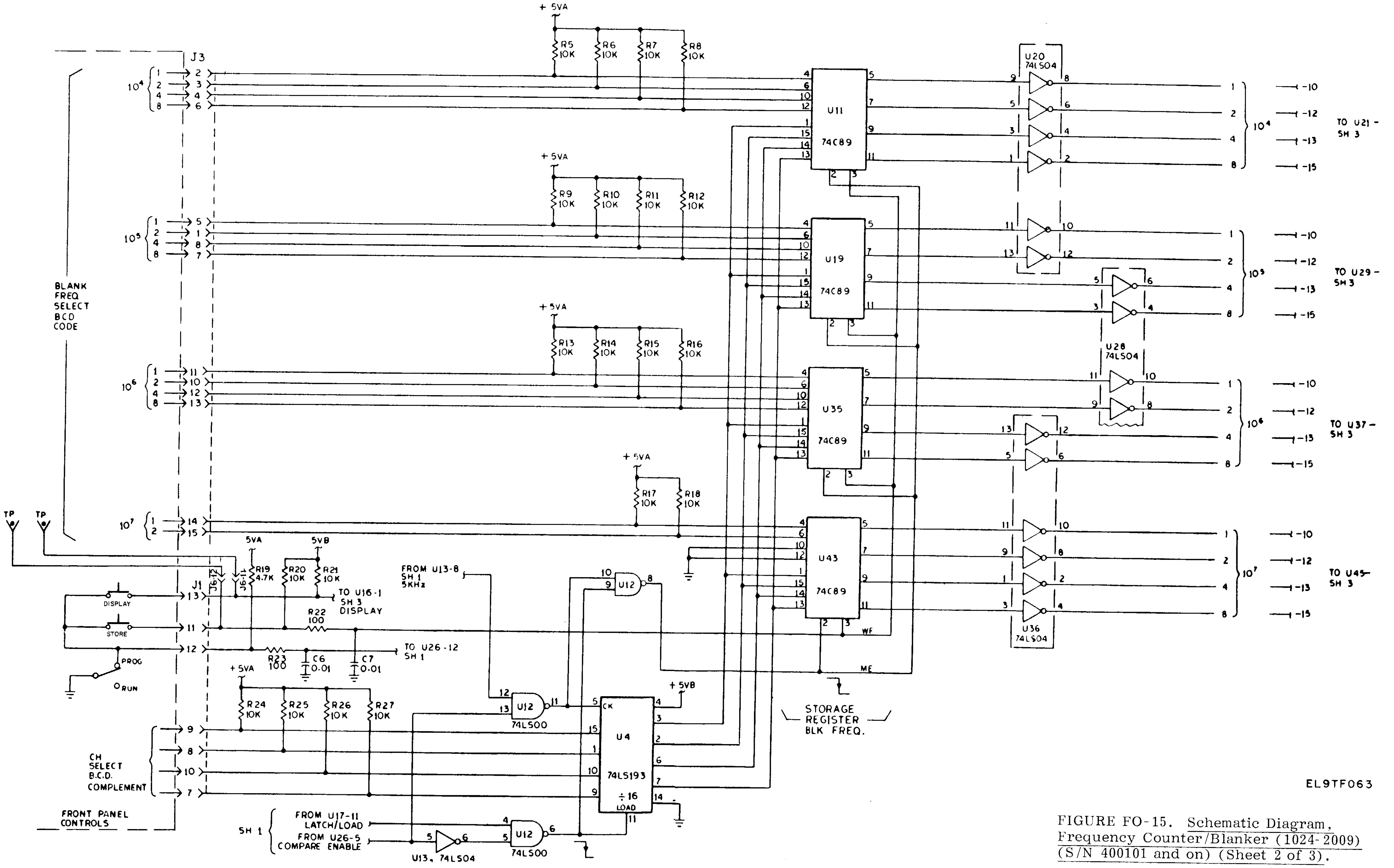


FIGURE FO-15. Schematic Diagram, Frequency Counter/Blanker (1024-2009) (S/N 400101 and on) (Sheet 2 of 3).

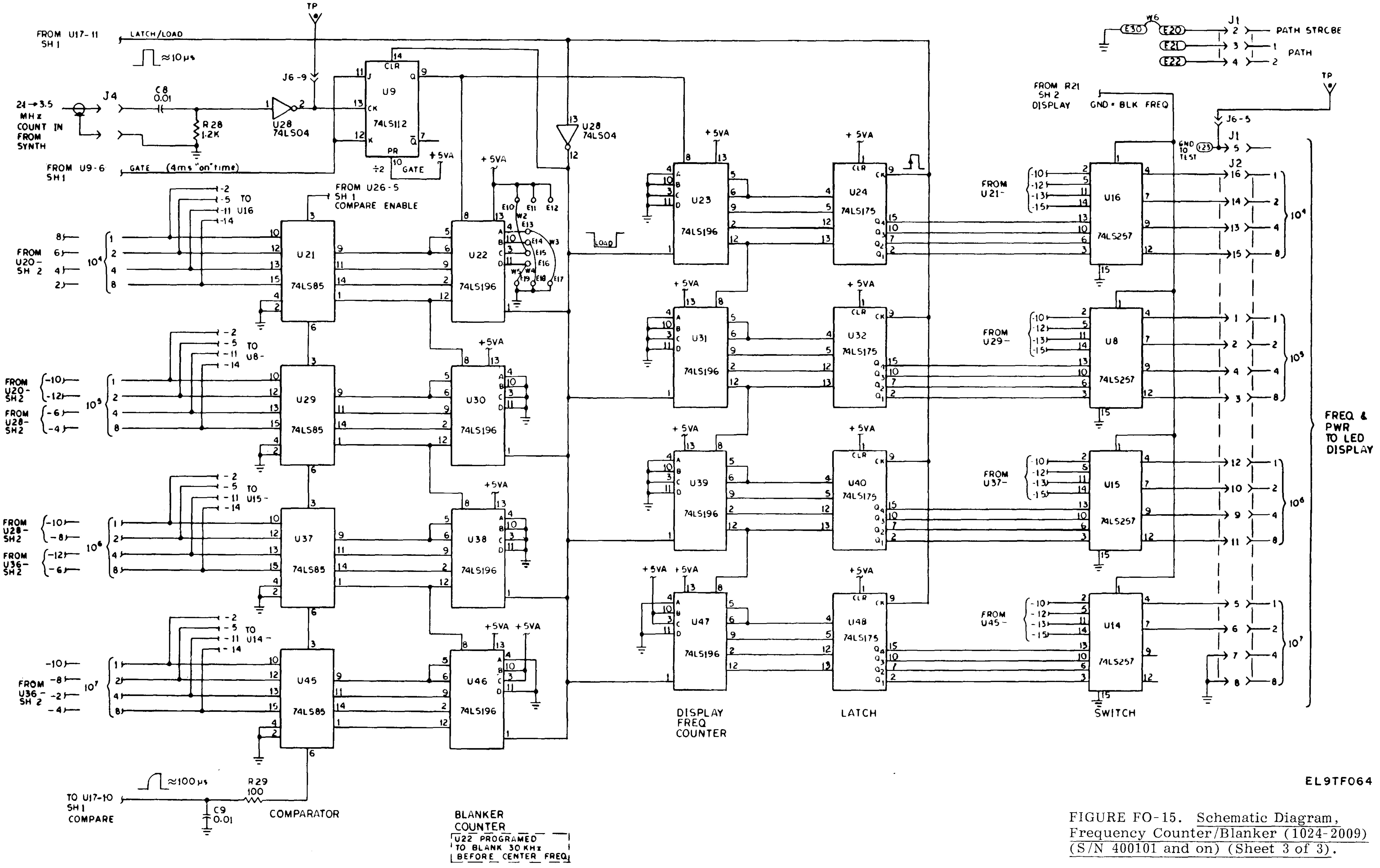
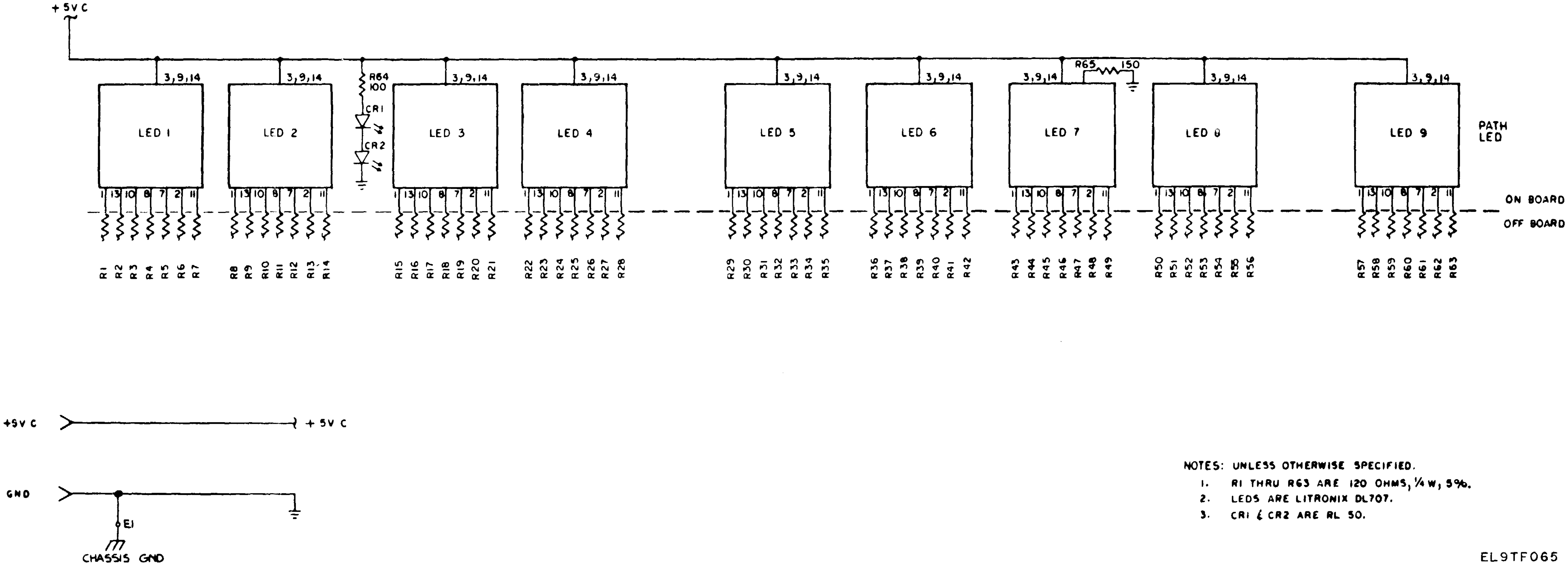


FIGURE FO-15. Schematic Diagram, Frequency Counter/Blanker (1024-2009) (S/N 400101 and on) (Sheet 3 of 3).

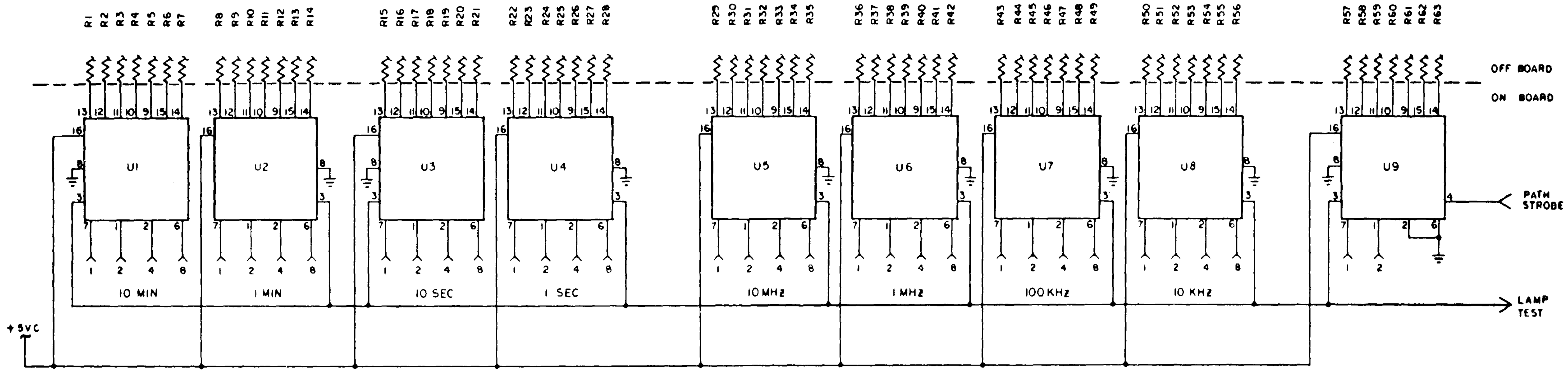


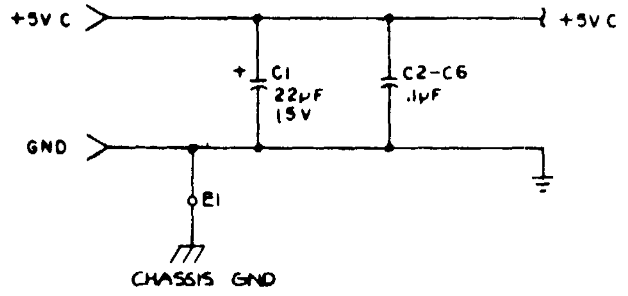
NOTES: UNLESS OTHERWISE SPECIFIED.

1. R1 THRU R63 ARE 120 OHMS, 1/4 W, 5%.
2. LEDS ARE LITRONIX DL707.
3. CR1 & CR2 ARE RL 50.

EL9TF065

FIGURE FO-16. Schematic Diagram, Numeric Display (6025-2011).



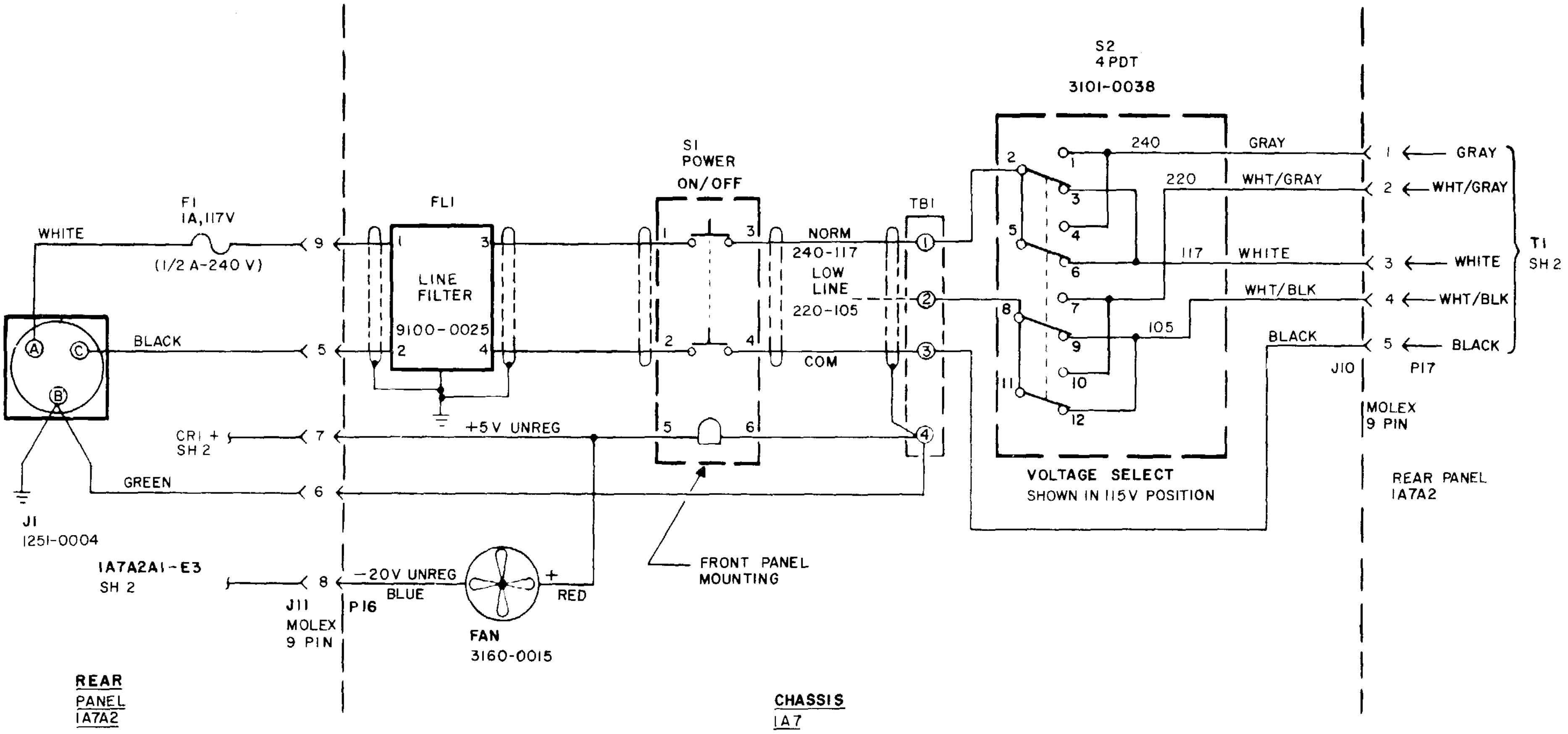


NOTES: UNLESS OTHERWISE SPECIFIED.

1. R1 THRU R63 ARE 120 OHMS, 1/4 W, 5%.
2. U1 THRU U8 ARE 7447'S.

EL9TF066

FIGURE FO-17. Schematic Diagram, Display Driver (6025-2012).



⑥ U7, LAMBDA L-20-OV-15 OVERVOLTAGE PROTECTOR.

5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX (WITH UNIT NUMBER OR SUBASSY DESIGNATION.

4. U5 REQUIRES CASE INSULATING COVER.

3. U1 TO U6 REGULATORS MOUNTED ON REAR PANEL HEAT SINK.

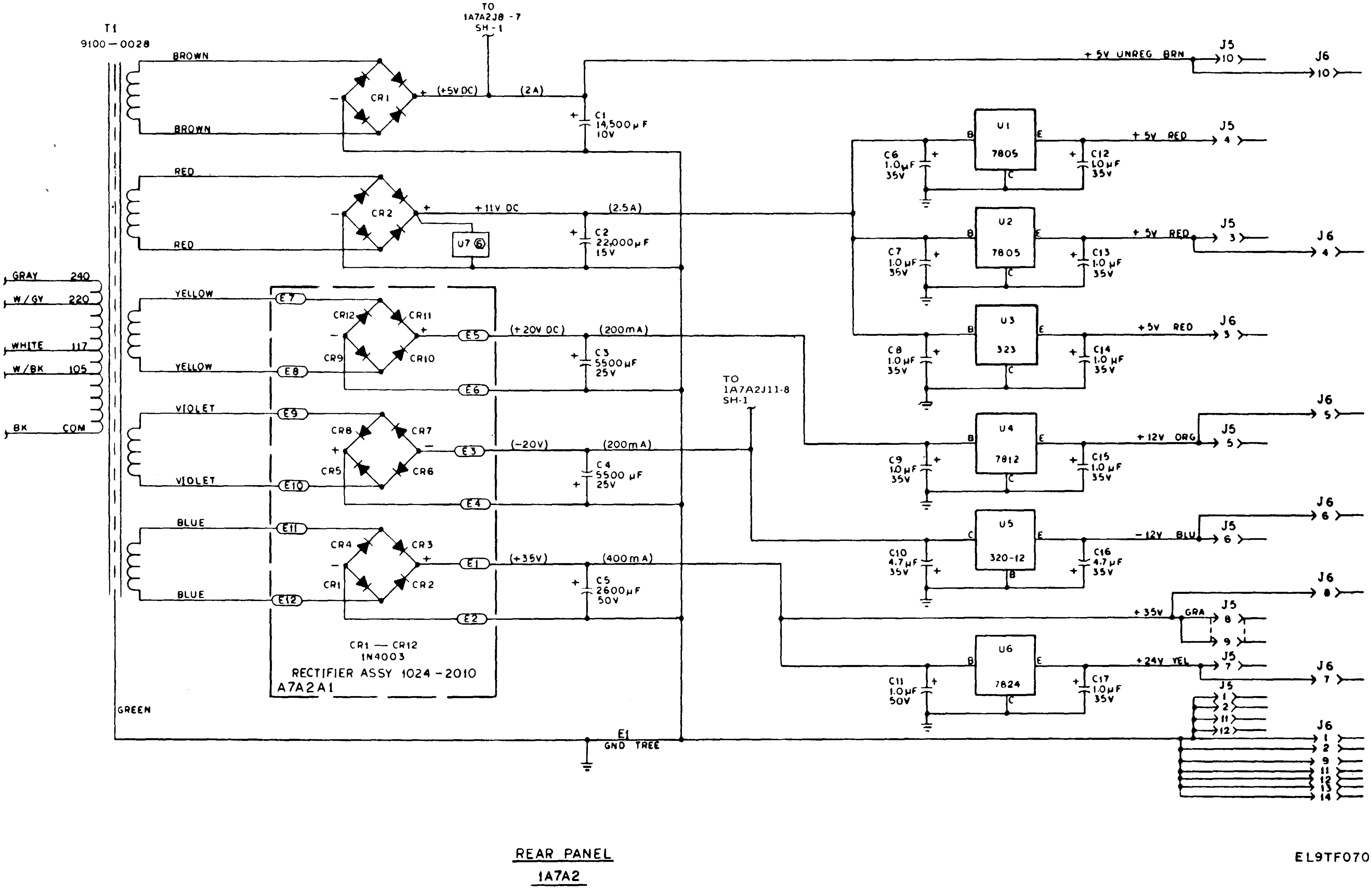
2. CR1 AND CR2 ARE 1910-0009.

1. CURRENTS AND VOLTAGES ARE NOMINAL FULL LOAD VALUES.

NOTES:

EL9TF069

FIGURE FO-18. Schematic Diagram, 1024 Power Supply (1024-1007) (Sheet 1 of 2).



EL9TF070

FIGURE FO-18. Schematic Diagram, 1024 Power Supply (1024-1007) (Sheet 2 of 2).

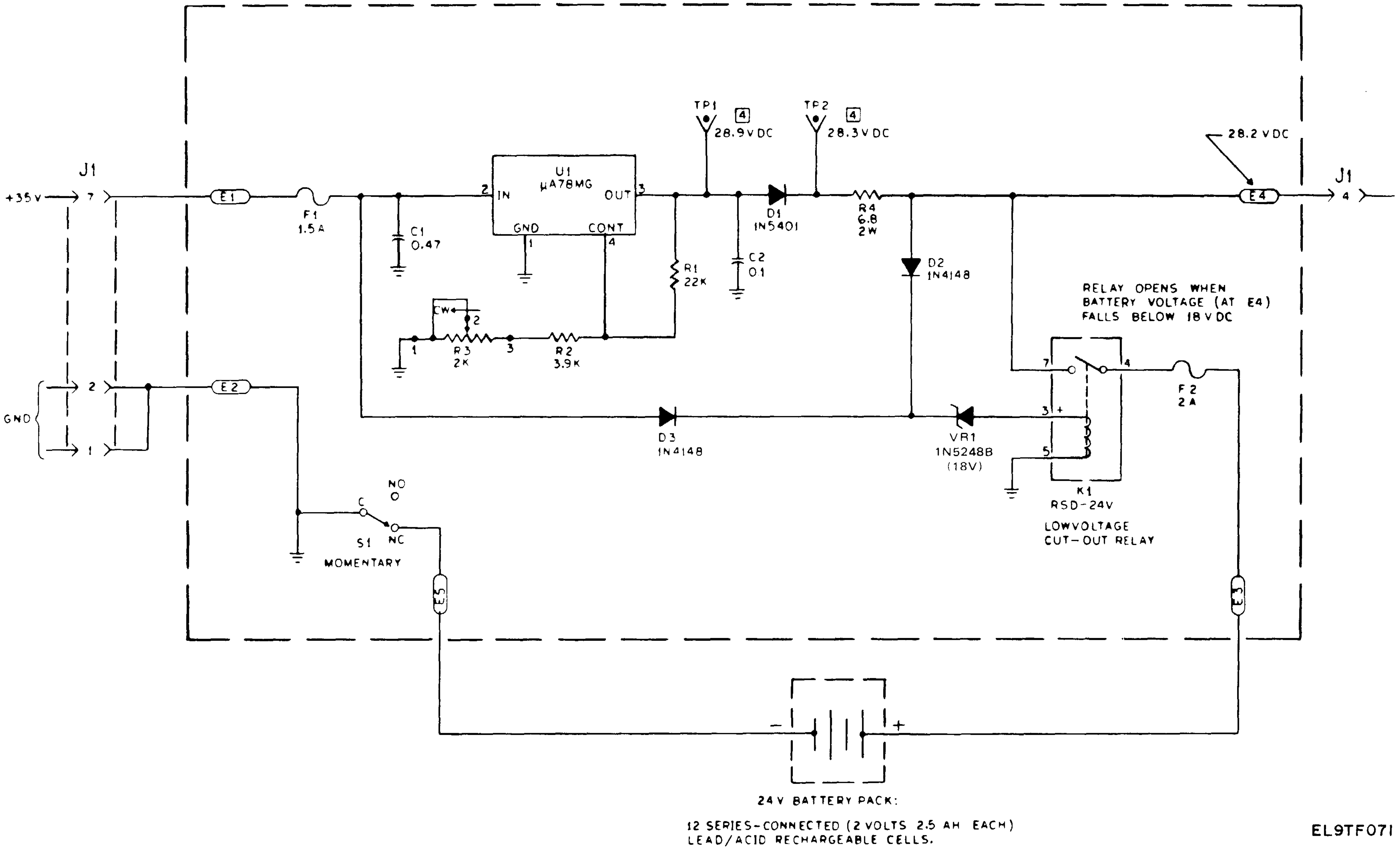
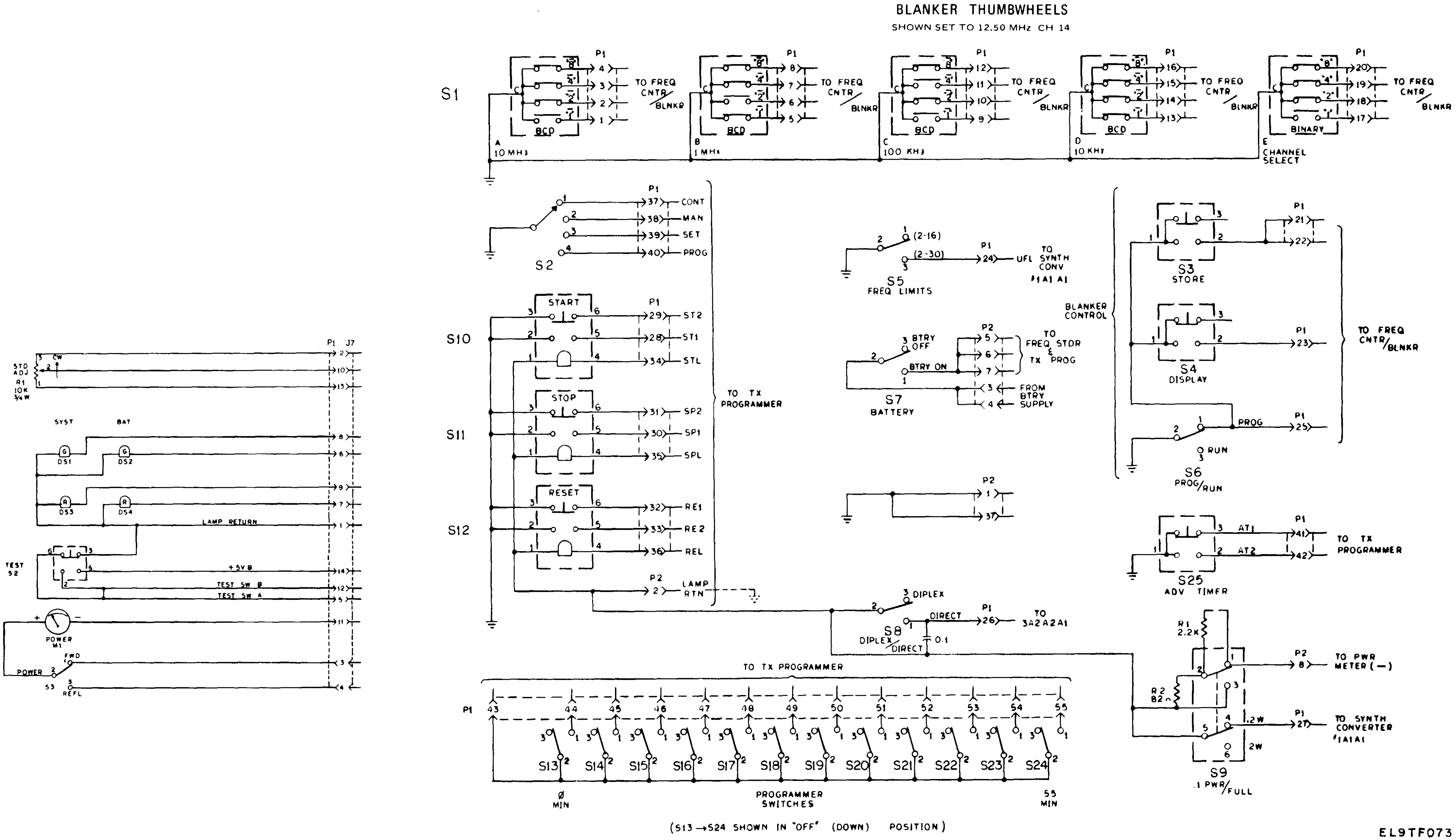


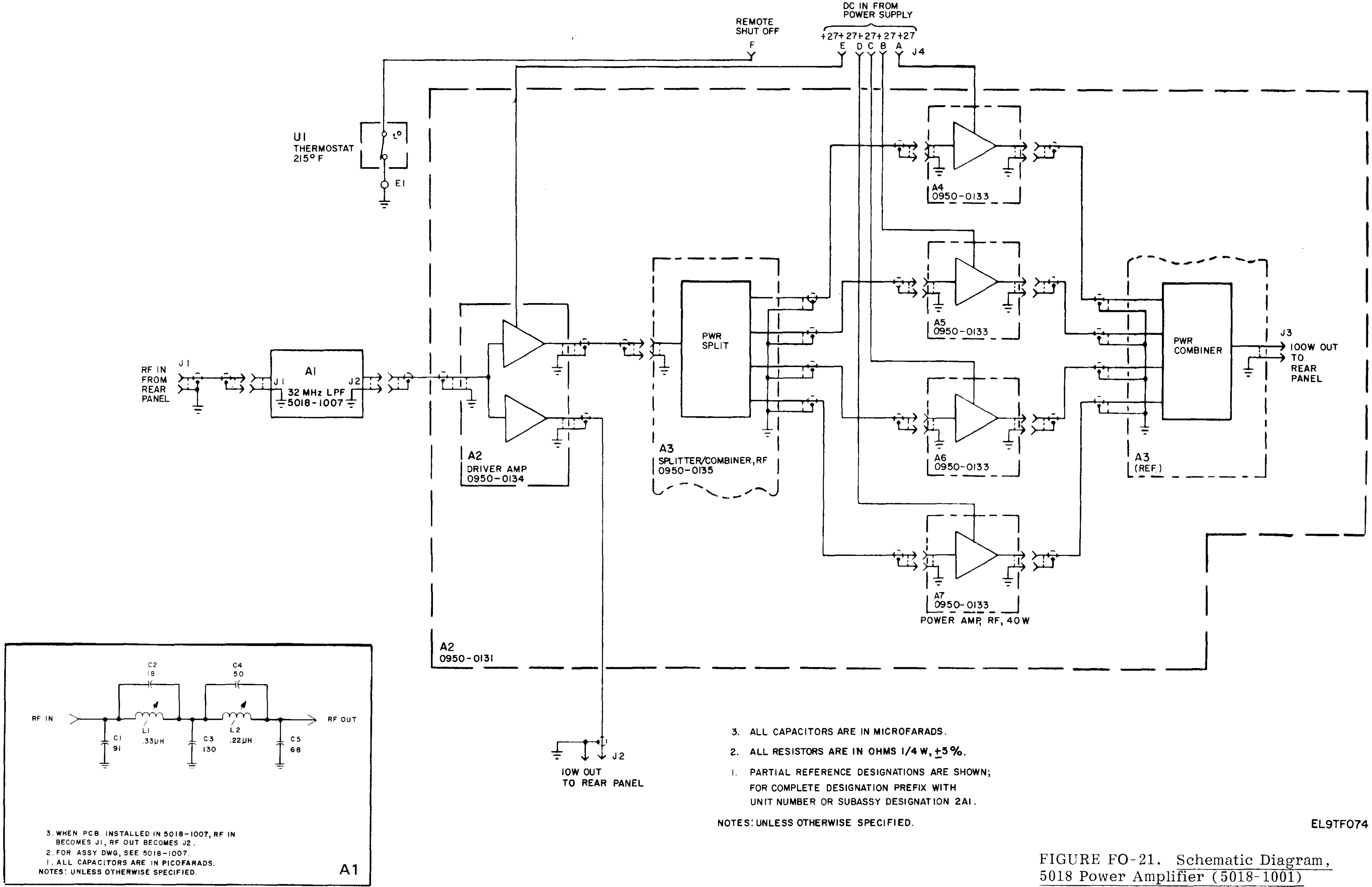
FIGURE FO-19. Schematic Diagram, Rechargeable Battery Supply (6025-1018).



EL9TF073

FREQ CNTR/BLNKR — 1A2A2
TX PROGRAMMER — 1A2A1

FIGURE FO-20. Schematic Diagram, 1024 Panel Controls.



3. ALL CAPACITORS ARE IN MICROFARADS.

2. ALL RESISTORS ARE IN OHMS 1/4 W, ±5%.

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION 2A1.

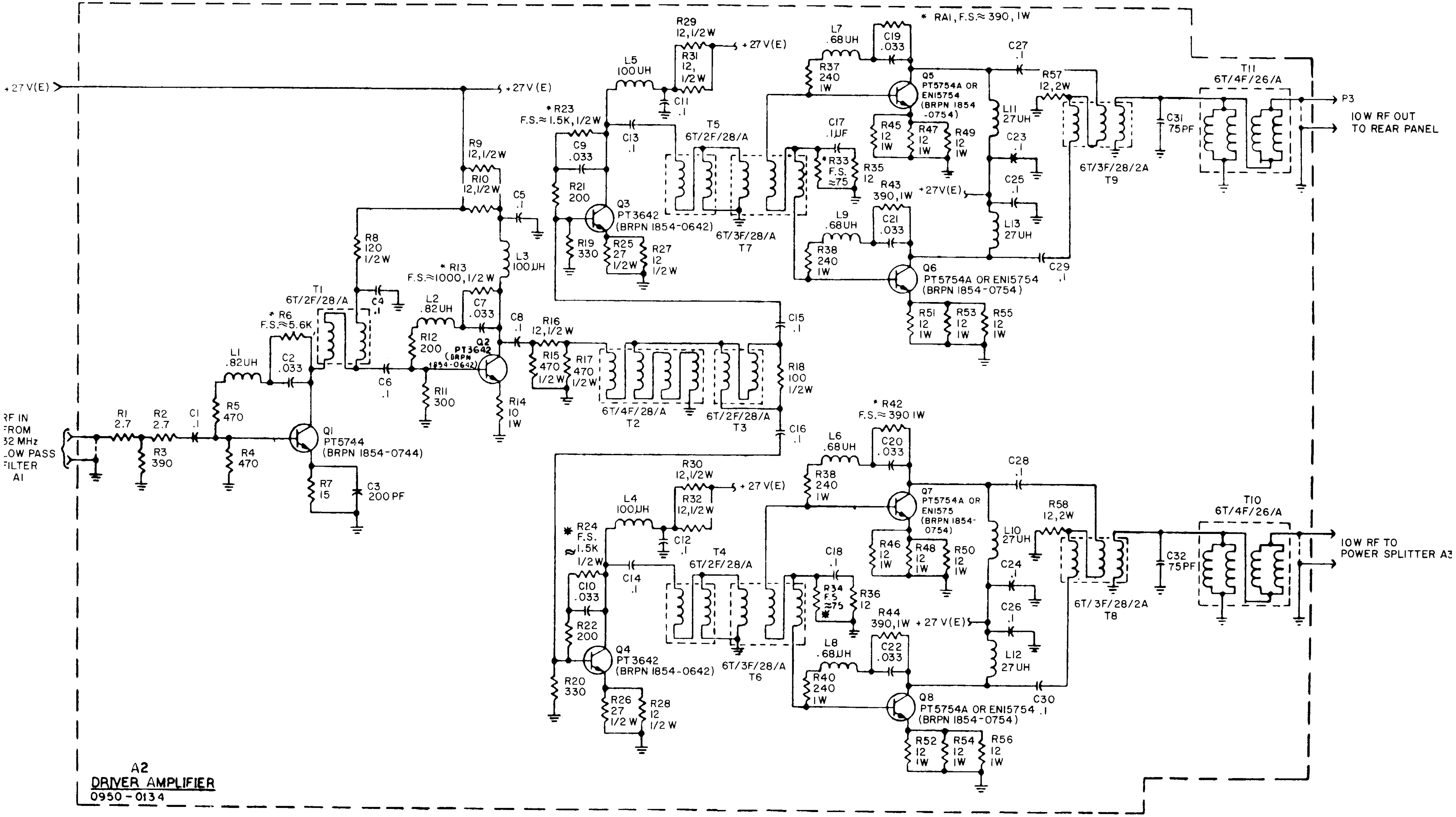
NOTES: UNLESS OTHERWISE SPECIFIED.

3. WHEN PCB INSTALLED IN 5018-1007, RF IN BECOMES J1, RF OUT BECOMES J2.
2. FOR ASSY DWG, SEE 5018-1007.
1. ALL CAPACITORS ARE IN PICOFARADS.
NOTES: UNLESS OTHERWISE SPECIFIED.

A1

EL9TF074

FIGURE FO-21. Schematic Diagram, 5018 Power Amplifier (5018-1001) (Sheet 1 of 4).



* FACTORY SELECT RESISTOR VALUE RANGES

R6	2700 - 6800
R13	820 - 1200
R23, R24	1200 - 2000
R33, R34	68 - 82
R41, R42	330 - 390

EL9TF075

FIGURE FO-21. Schematic Diagram, 5018 Power Amplifier (5018-1001) (Sheet 2 of 4).

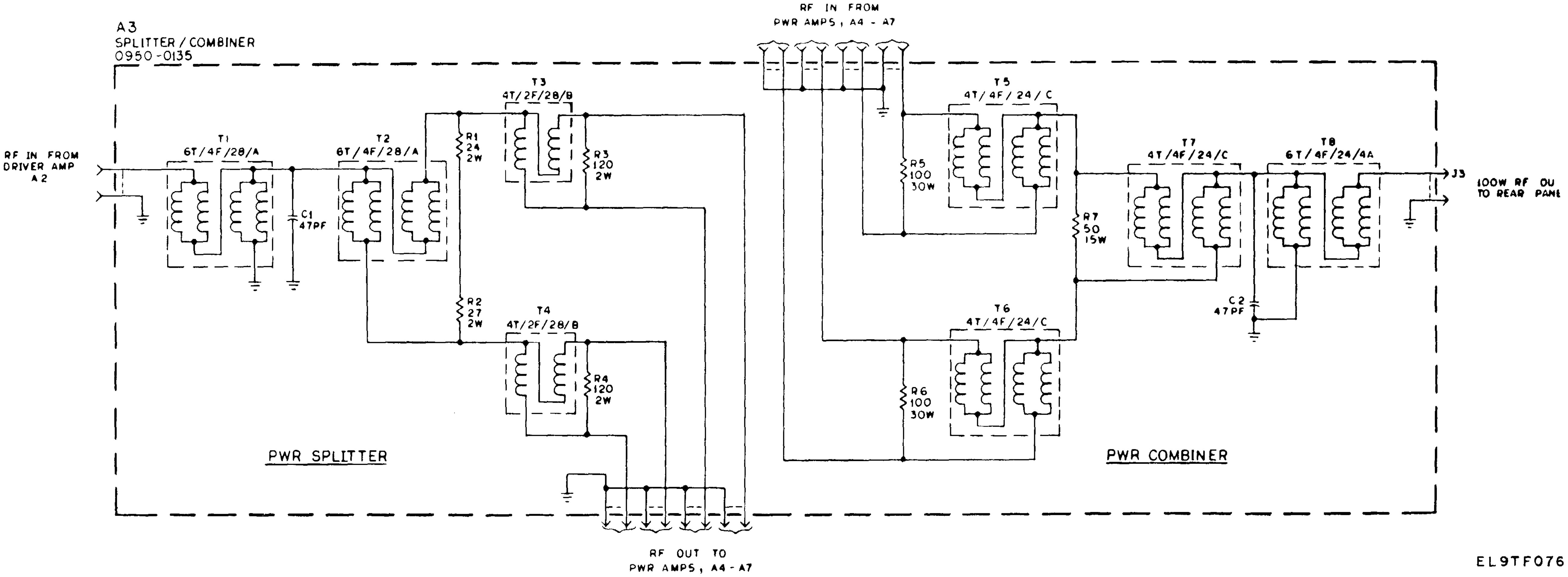


FIGURE FO-21. Schematic Diagram, 5018 Power Amplifier (5018-1001) (Sheet 3 of 4).

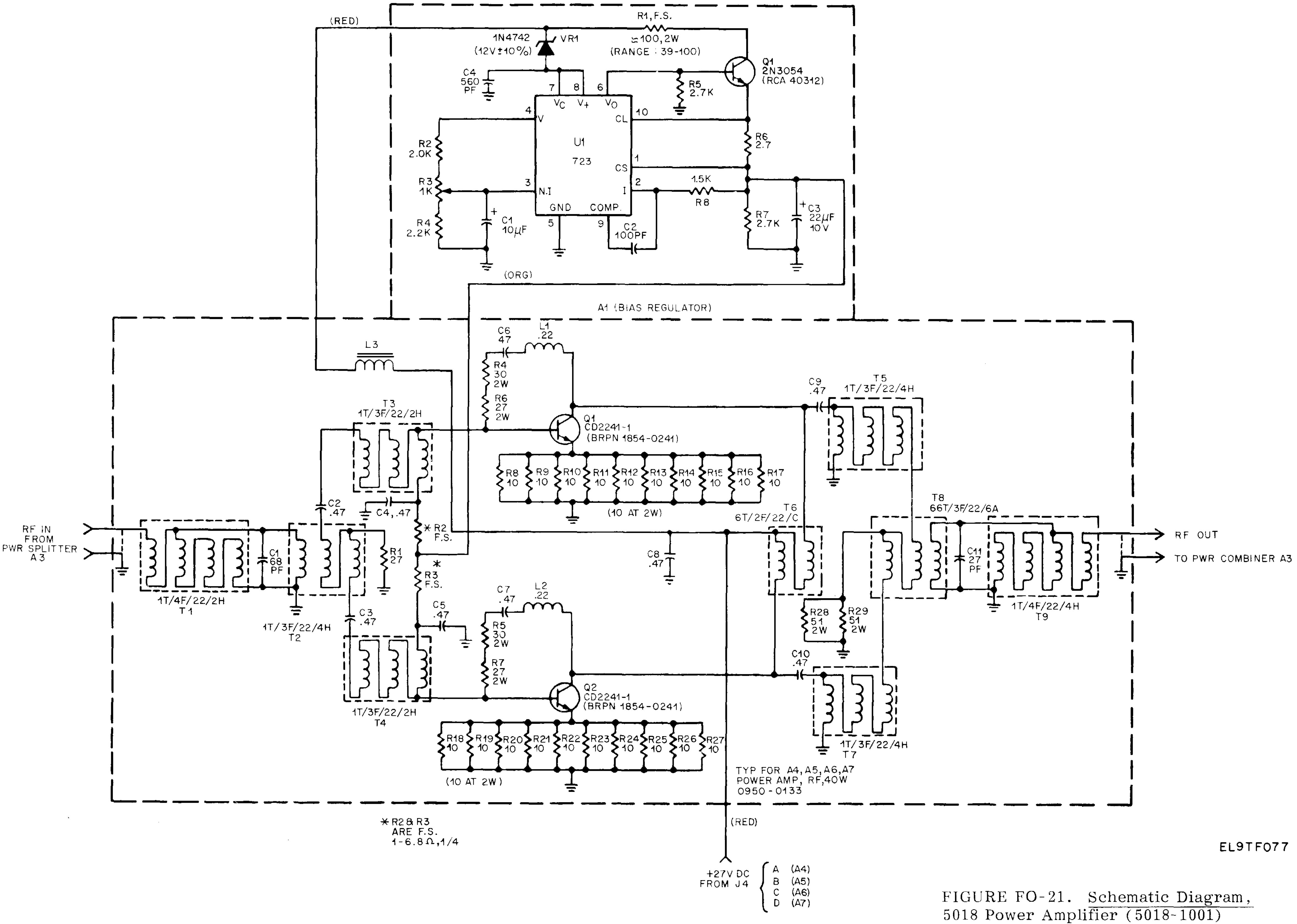
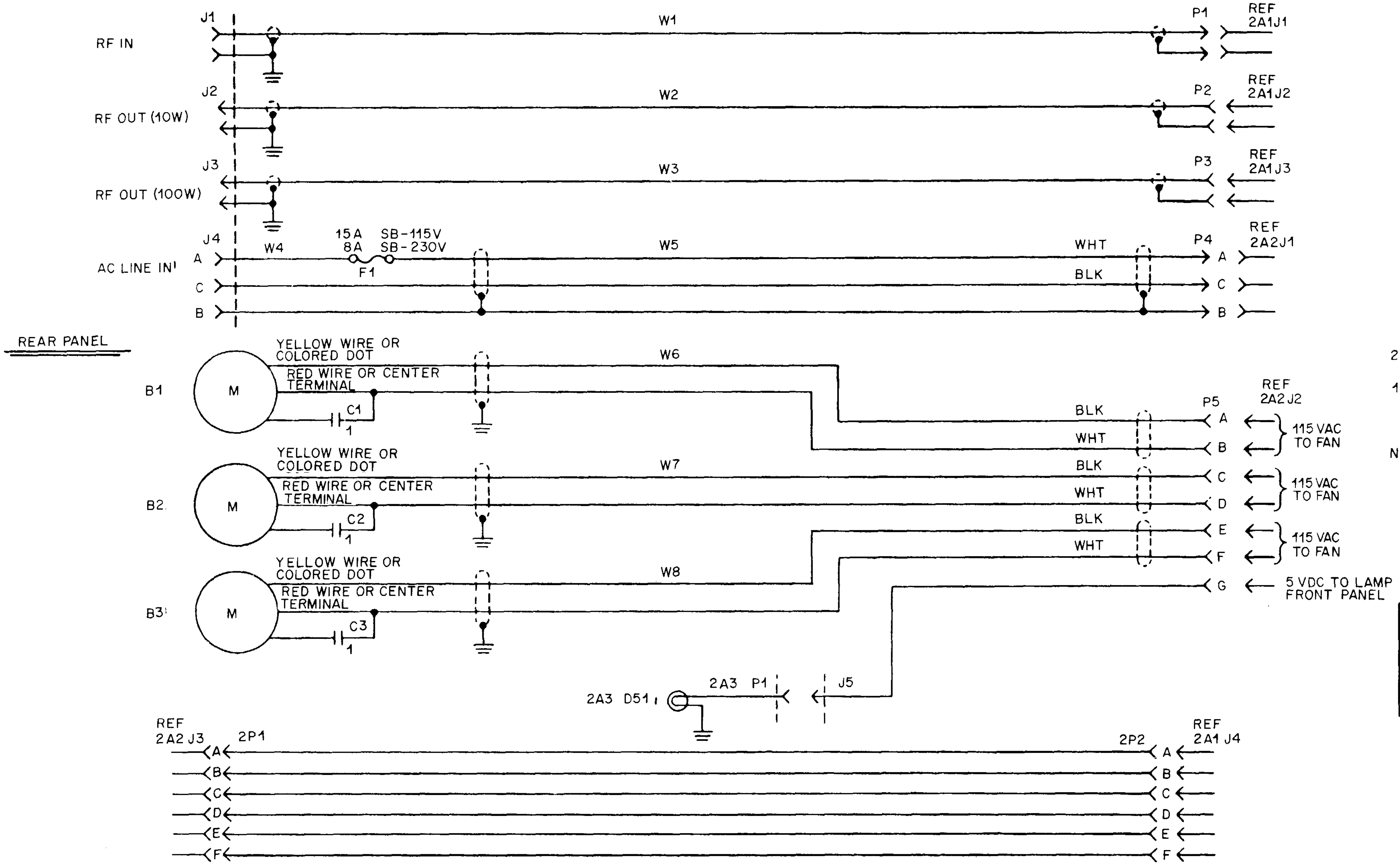


FIGURE FO-21. Schematic Diagram, 5018 Power Amplifier (5018-1001) (Sheet 4 of 4).



2. ALL CAPACITORS ARE IN MICROFARADS

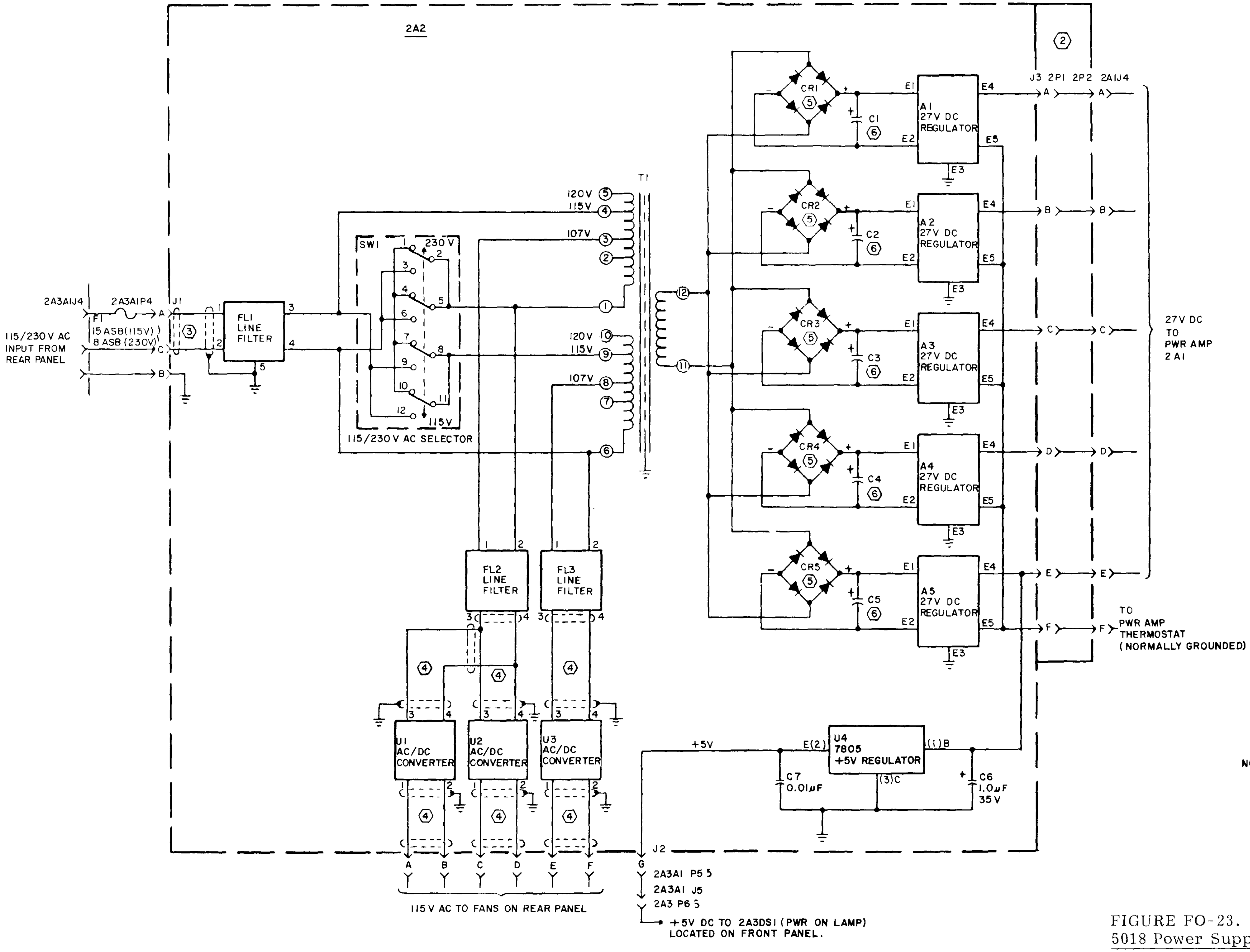
1. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATOR WITH UNIT OR ASS'Y DESIGNATOR 2A3A1

NOTES: UNLESS OTHERWISE SPECIFIED

HIGHEST REFERENCE DESIGNATION						
C3	D51	F1	B3	P5	J5	W8
REF. DESIGNATION NOT USED						

EL9TF078

FIGURE FO-22. Schematic Diagram, Amplifier Enclosure (5018-1003).



⑥ C1 TO C5 ARE 12000 uF, 40V.

⑤ CR1 TO CR5 ARE MDA990-3.

④ WIRE BELDEN #8762 OR EQUIV.

③ WIRE BELDEN #9952 OR EQUIV.

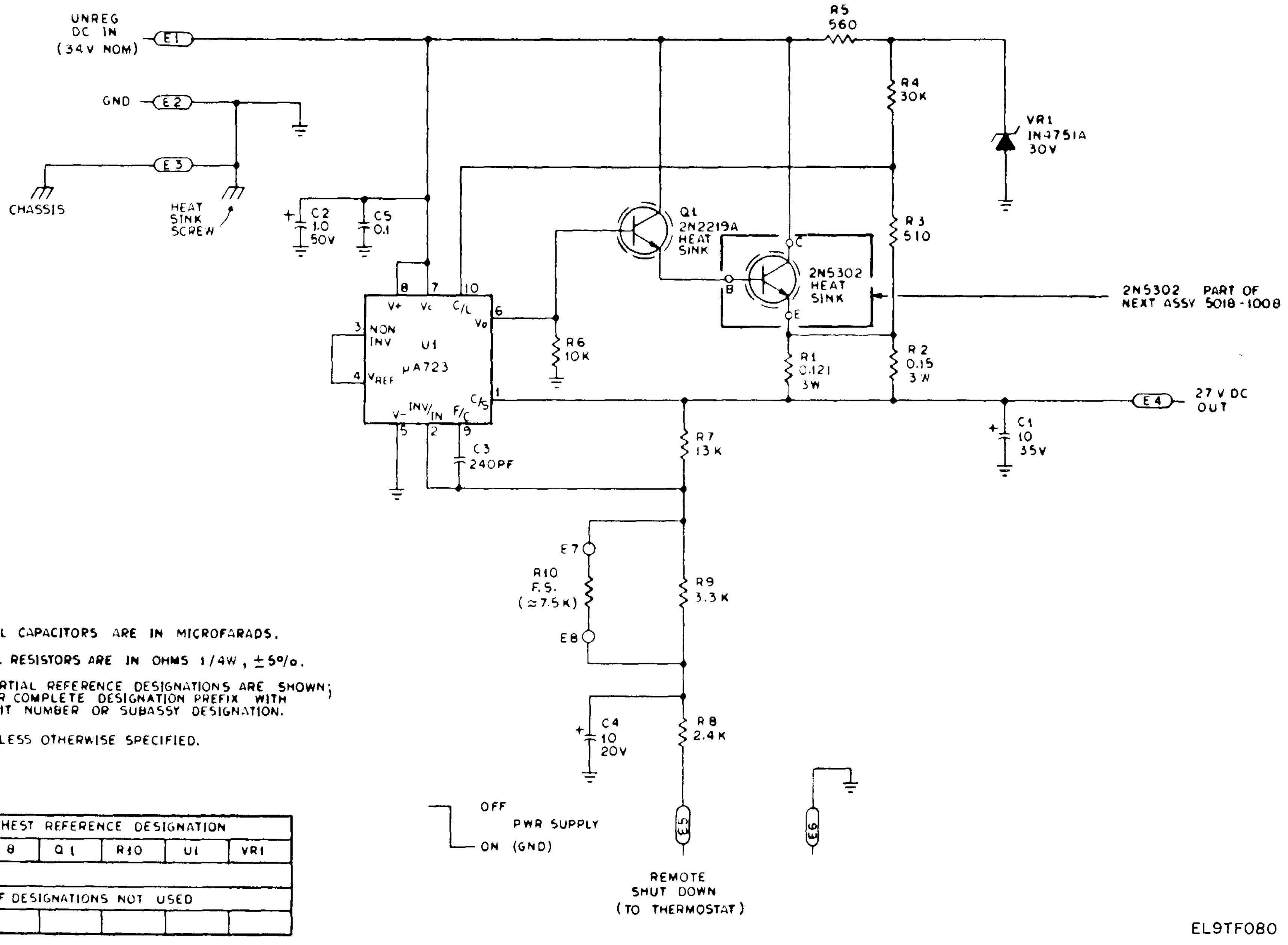
② REFER WL 5018-1000.

1. FOR ASSY DWG. SEE 5018-1002.

NOTES:

EL9TF079

FIGURE FO-23. Schematic Diagram, 5018 Power Supply (5018-1002).



3. ALL CAPACITORS ARE IN MICROFARADS.

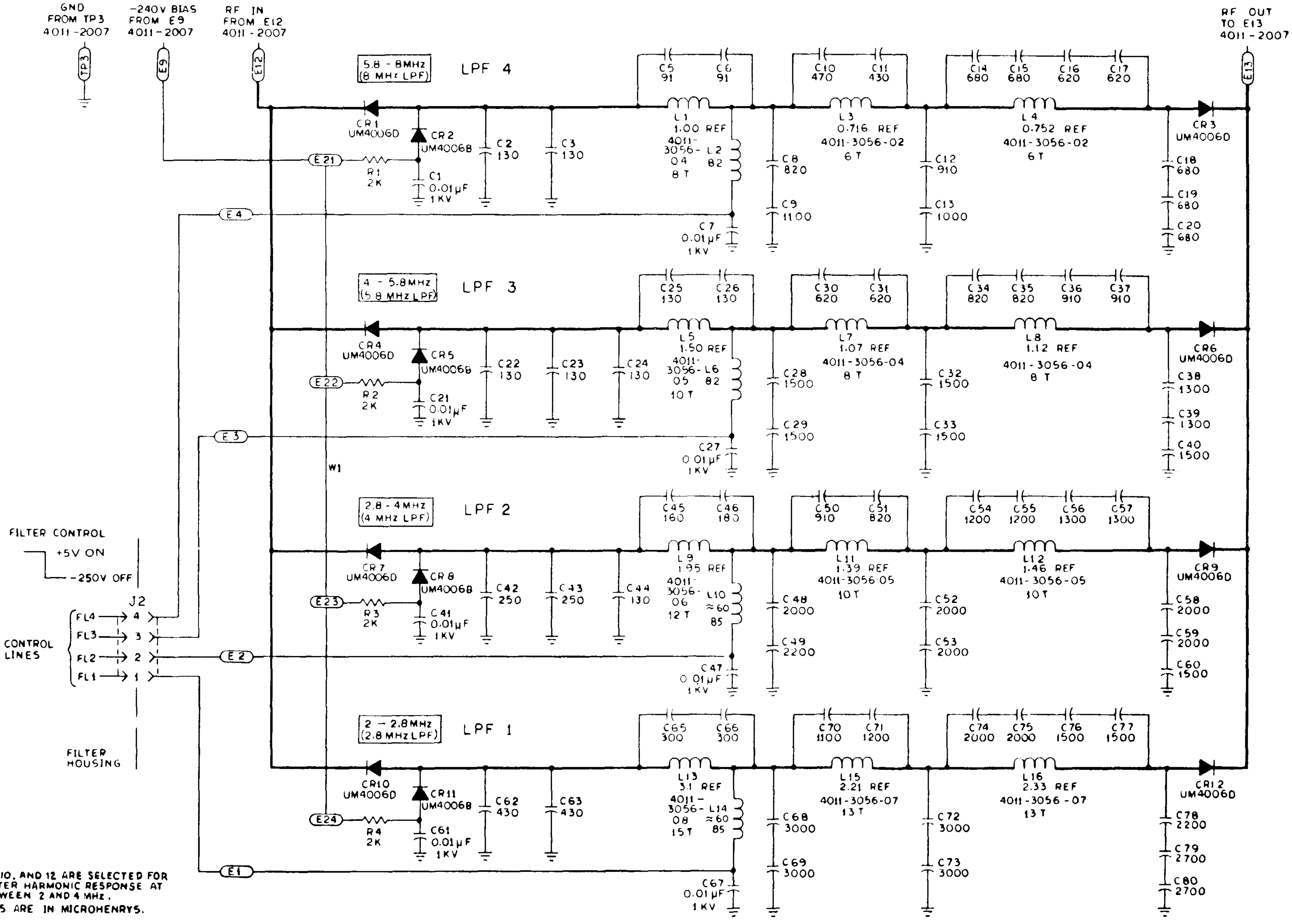
2. ALL RESISTORS ARE IN OHMS 1/4W, ±5%.

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION					
C5	E8	Q1	R10	U1	VR1
REF DESIGNATIONS NOT USED					

FIGURE FO-24. Schematic Diagram, 27 VDC Regulator for 5018 Power Supply (5018-1008).



5. DIODES CR7, 8, 10, AND 12 ARE SELECTED FOR -60 dB OR BETTER HARMONIC RESPONSE AT 120 WATTS, BETWEEN 2 AND 4 MHz.

4. ALL INDUCTORS ARE IN MICROHENRYS.

3. ALL CAPACITORS ARE IN PICOFARADS.

2. ALL RESISTORS ARE IN OHMS 1/4W, ±5%.

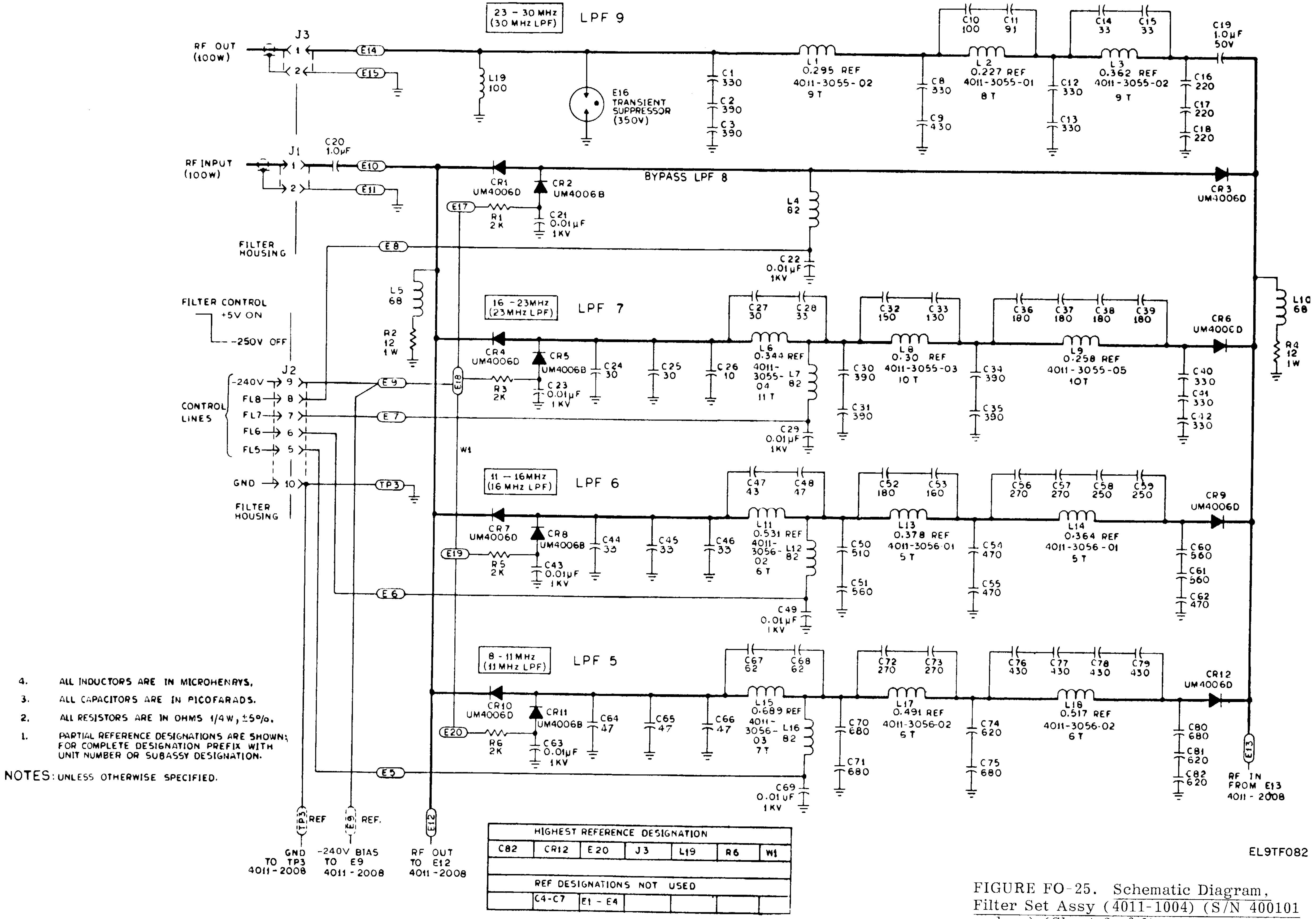
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION						
C80	CR12	P24	J2	L16	R4	W1
REF DESIGNATIONS NOT USED						
C4, C64		E5 - E8, E10 E11, E14 - E20	J1			

EL9TF081

FIGURE FO-25. Schematic Diagram, Filter Set Assy (4011-1004) (S/N 400101 and on) (Sheet 1 of 2).

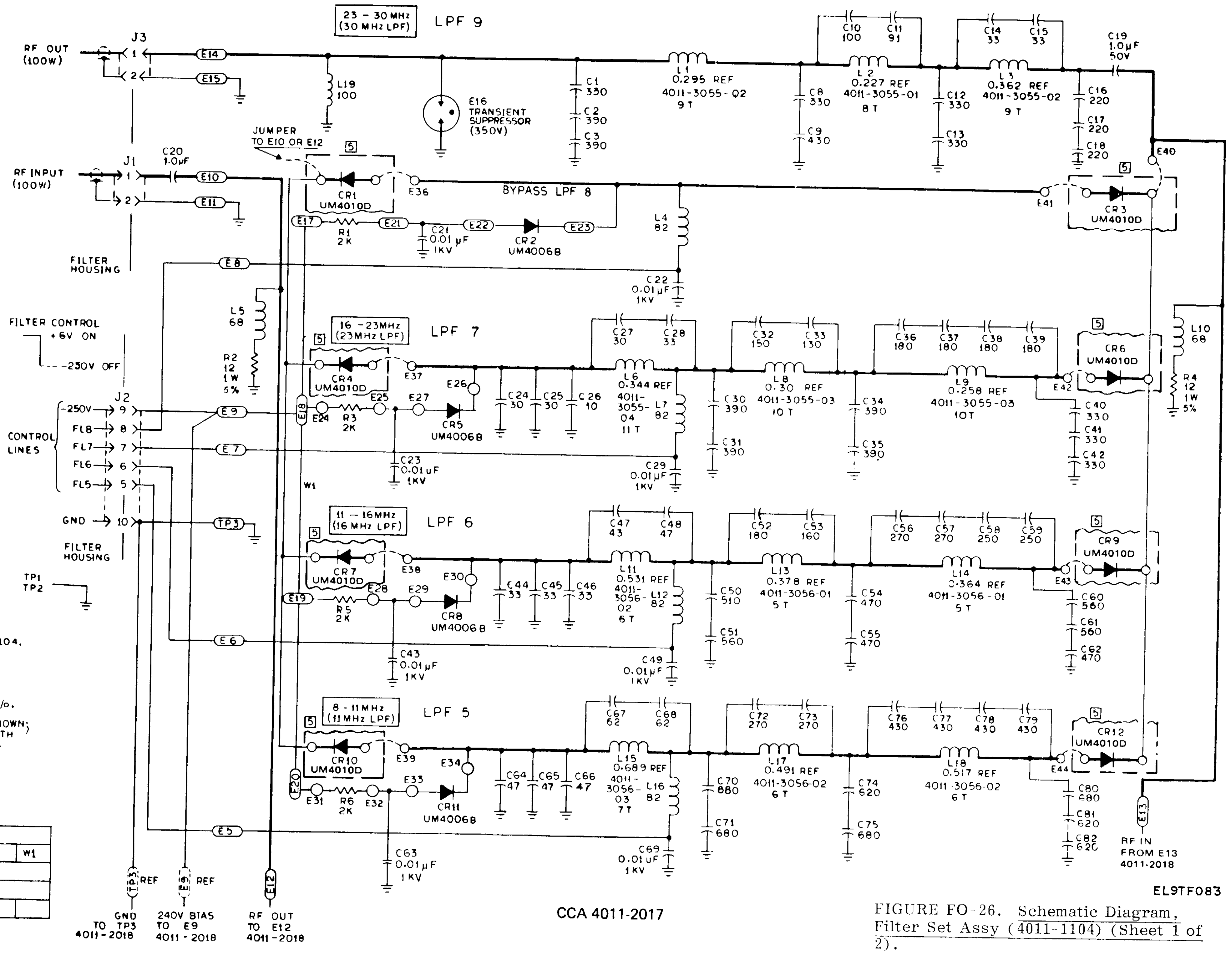


4. ALL INDUCTORS ARE IN MICROHENRYS.
3. ALL CAPACITORS ARE IN PICOFARADS.
2. ALL RESISTORS ARE IN OHMS 1/4W, ±5%.
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION						
C82	CR12	E20	J3	L19	R6	W1
REF DESIGNATIONS NOT USED						
	C4-C7	E1 - E4				

FIGURE FO-25. Schematic Diagram, Filter Set Assy (4011-1004) (S/N 400101 and on) (Sheet 2 of 2).



5 COMPONENTS ON NEXT ASSY 4011-1104.

4. ALL INDUCTORS ARE IN MICROHENRYS.

3. ALL CAPACITORS ARE IN PICOFARADS.

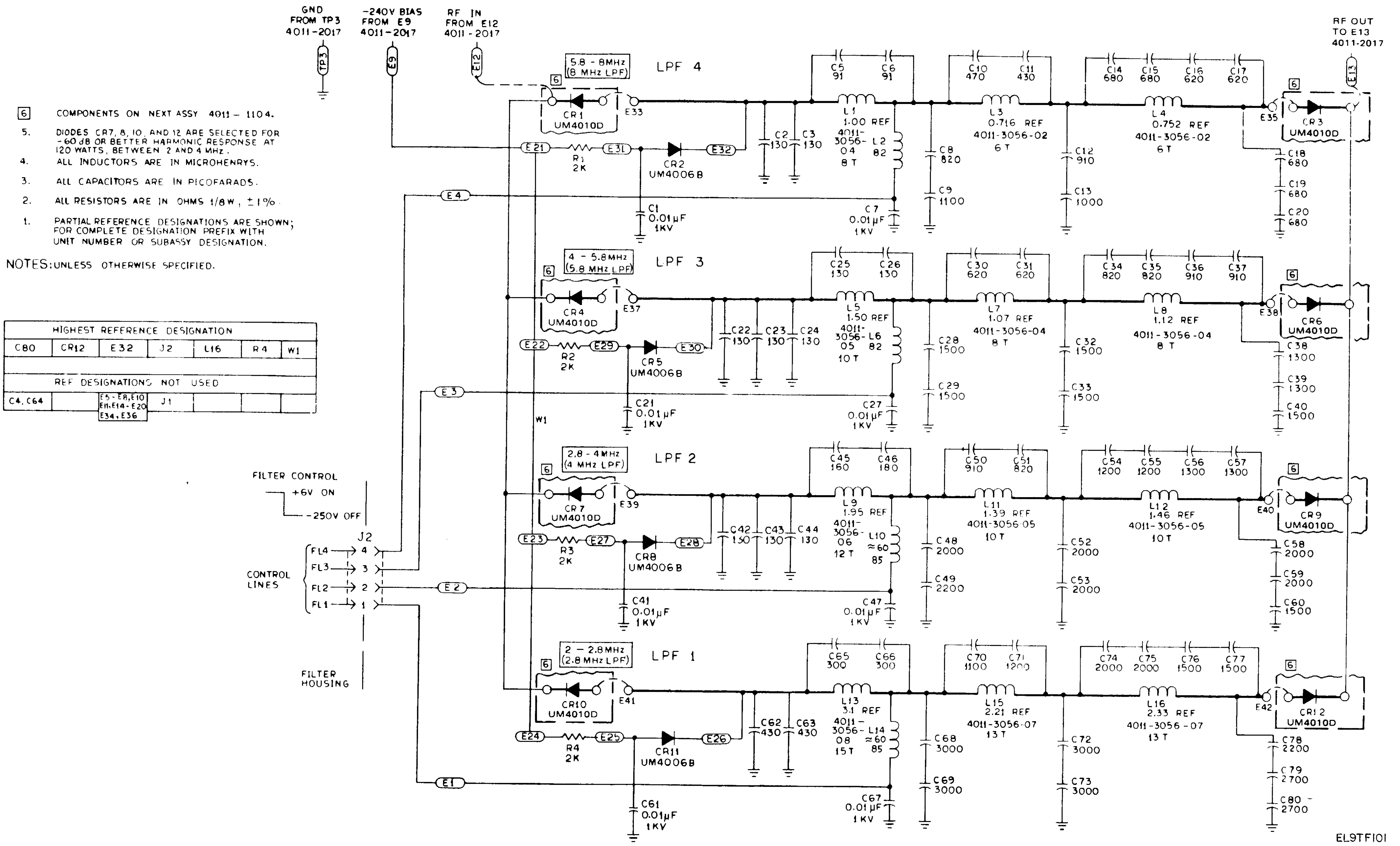
2. ALL RESISTORS ARE IN OHMS 1/8W, ±1%.

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION						
C82	CR12	E44	J3	L19	R6	W1
REF DESIGNATIONS NOT USED						
C4-C7		E1 - E4				

FIGURE FO-26. Schematic Diagram, Filter Set Assy (4011-1104) (Sheet 1 of 2).



6 COMPONENTS ON NEXT ASSY 4011 - 1104.

5. DIODES CR7, 8, 10, AND 12 ARE SELECTED FOR -60 dB OR BETTER HARMONIC RESPONSE AT 120 WATTS, BETWEEN 2 AND 4 MHz.

4. ALL INDUCTORS ARE IN MICROHENRYS.

3. ALL CAPACITORS ARE IN PICOFARADS.

2. ALL RESISTORS ARE IN OHMS 1/8W, ±1%.

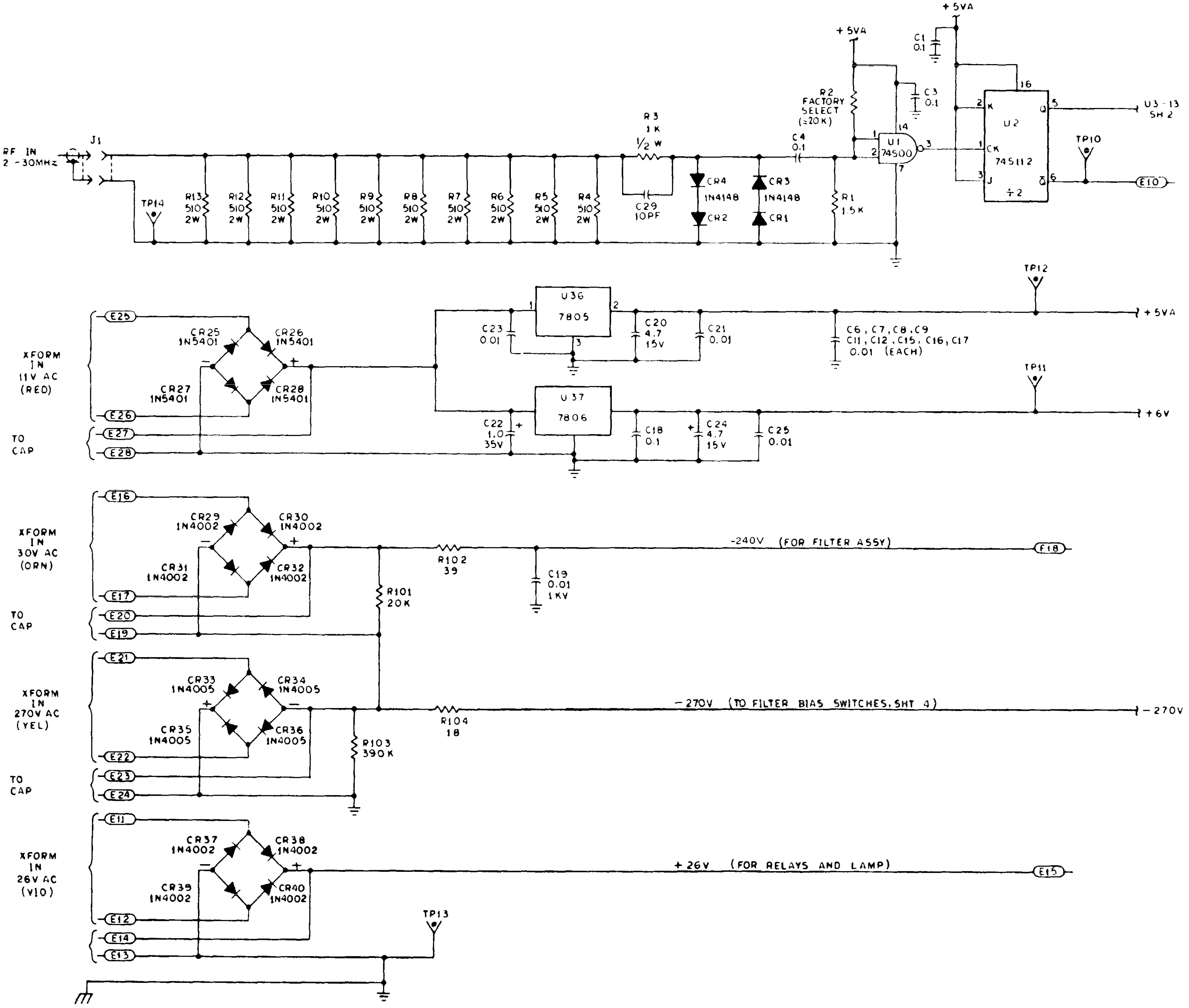
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION						
C80	CR12	E32	J2	L16	R4	W1
REF DESIGNATIONS NOT USED						
C4, C64		E5 - E8, E10 E11, E14 - E20 E34, E36	J1			

CCA 4011-2018

FIGURE FO-26. Schematic Diagram, Filter Set Assy (4011-1104) (Sheet 2 of 2).



POWER DISTRIBUTION		
DEVICE	+5V	GND
74(LS)(S)00	14	7
74LS04	14	7
74LS10	14	7
74LS20	14	7
7430	14	7
74LS42	16	8
74LS112	16	8
74LS175	16	8
74LS196	14	7
CD4007	14	7
96L02	16	8

3. ALL CAPACITORS ARE IN MICROFARADS.

2. ALL RESISTORS ARE IN OHMS 1/4 W, ±5%.

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSY DESIGNATION.

NOTES: UNLESS OTHERWISE SPECIFIED.

HIGHEST REFERENCE DESIGNATION							
C30	CR40	E28	Q32	R105	TP14	U37	W10
REF DESIGNATION NOT USED							
	CR5, CR6 CR7, CR5			R100			

EL9TF085

FIGURE FO-27. Schematic Diagram, Filter Decode Assy (4011-1007) (Sheet 1 of 4).

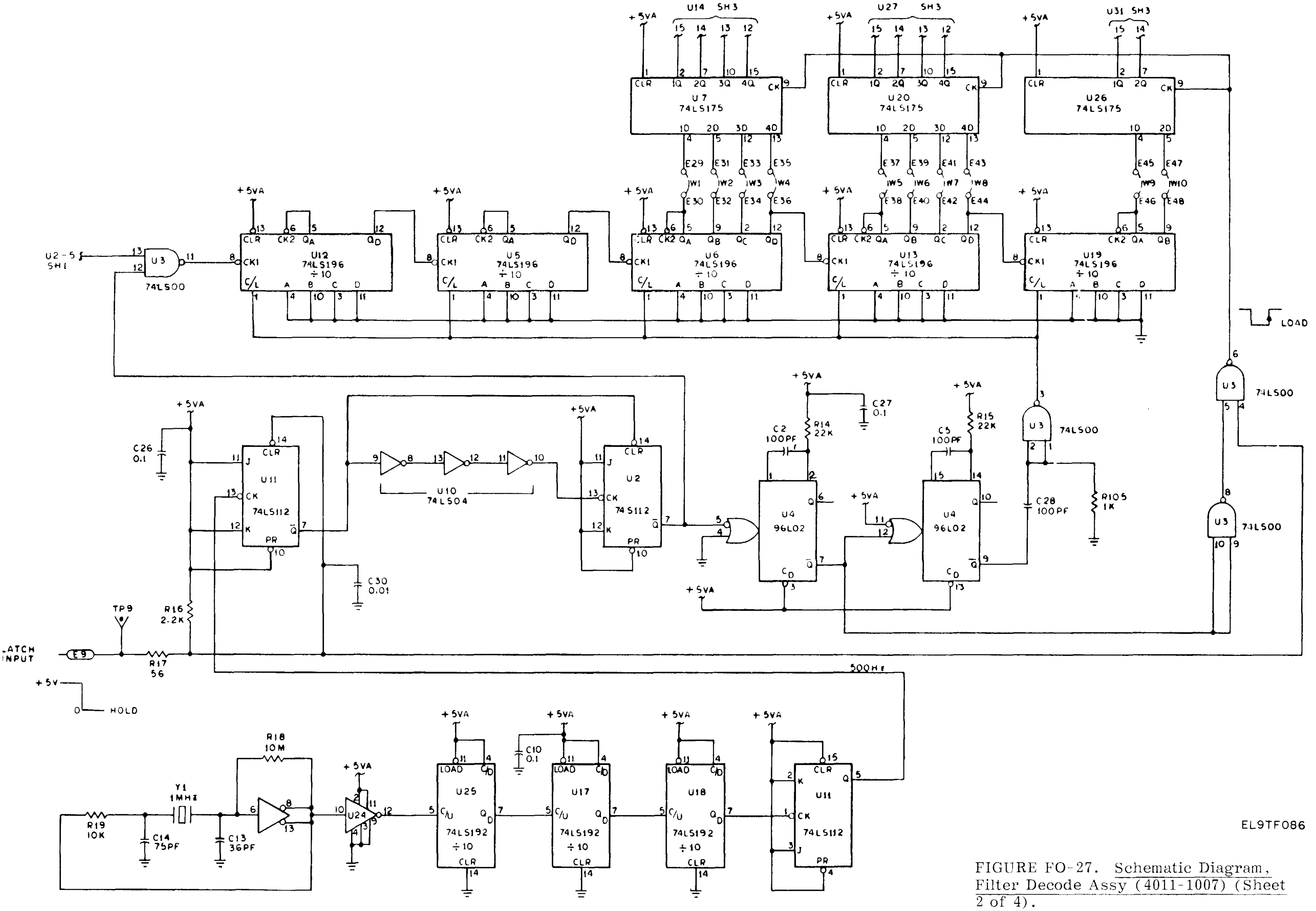


FIGURE FO-27. Schematic Diagram, Filter Decode Assy (4011-1007) (Sheet 2 of 4).

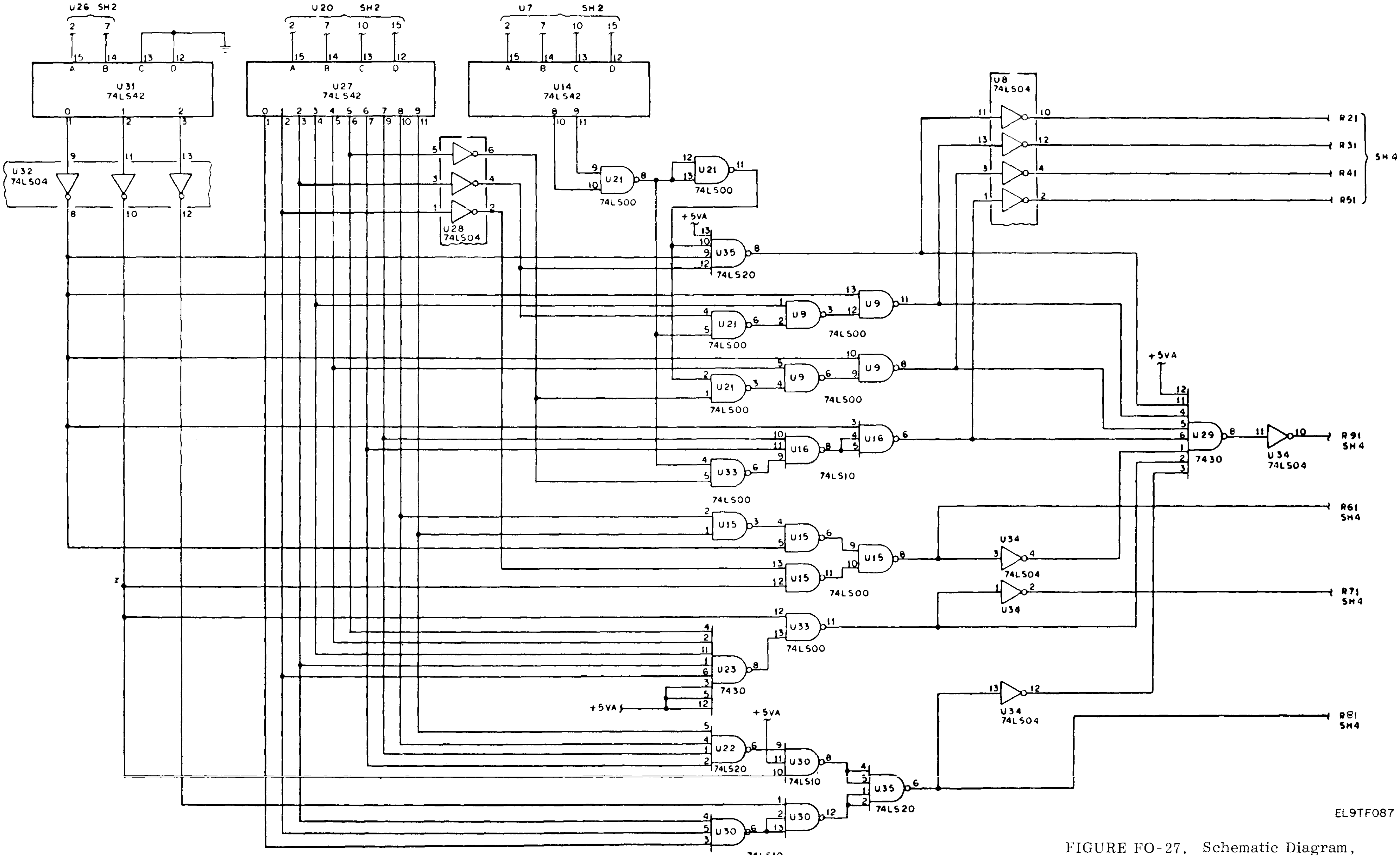


FIGURE FO-27. Schematic Diagram, Filter Decode Assy (4011-1007) (Sheet 3 of 4).

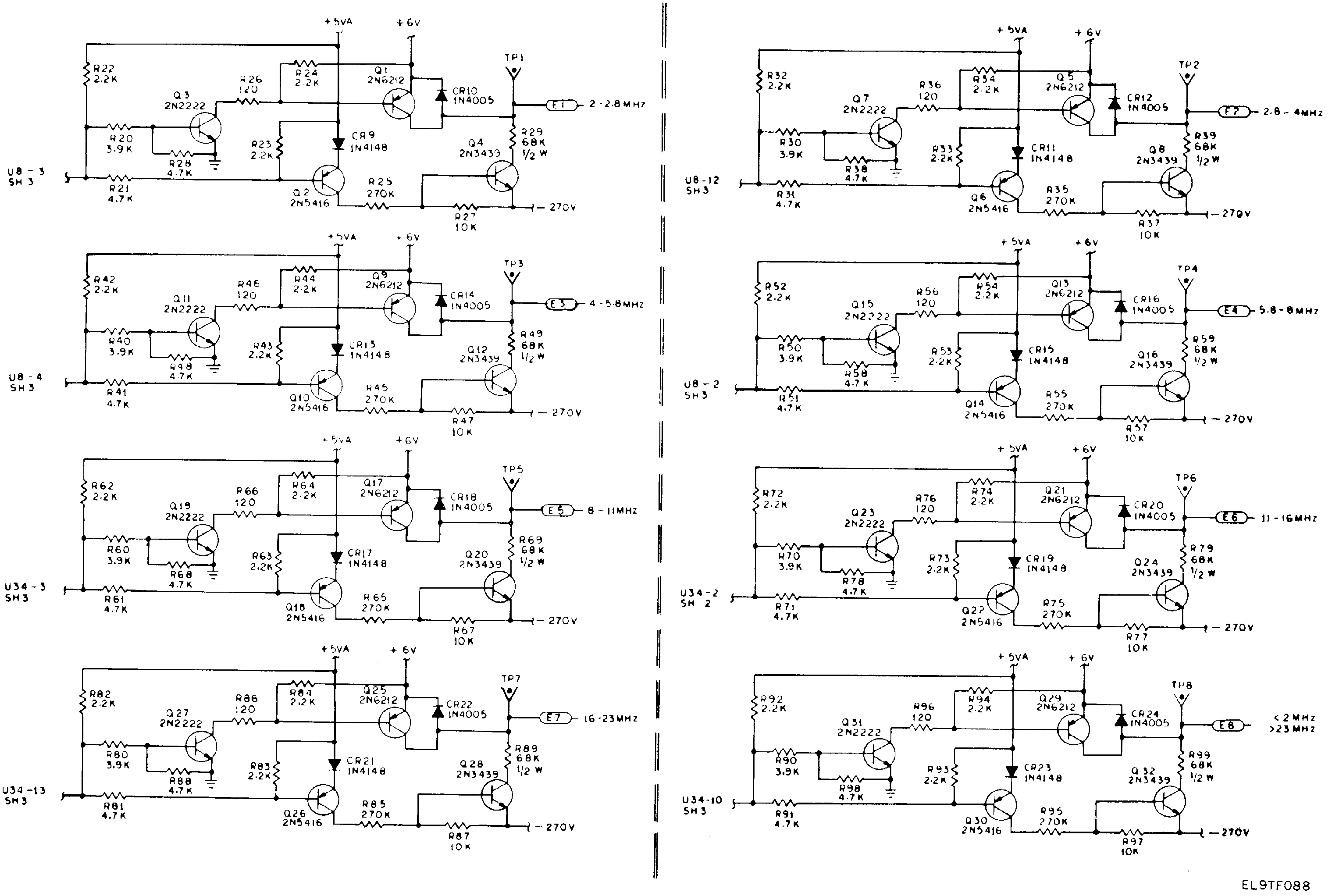


FIGURE FO-27. Schematic Diagram, Filter Decode Assy (4011-1007) (Sheet 4 of 4).

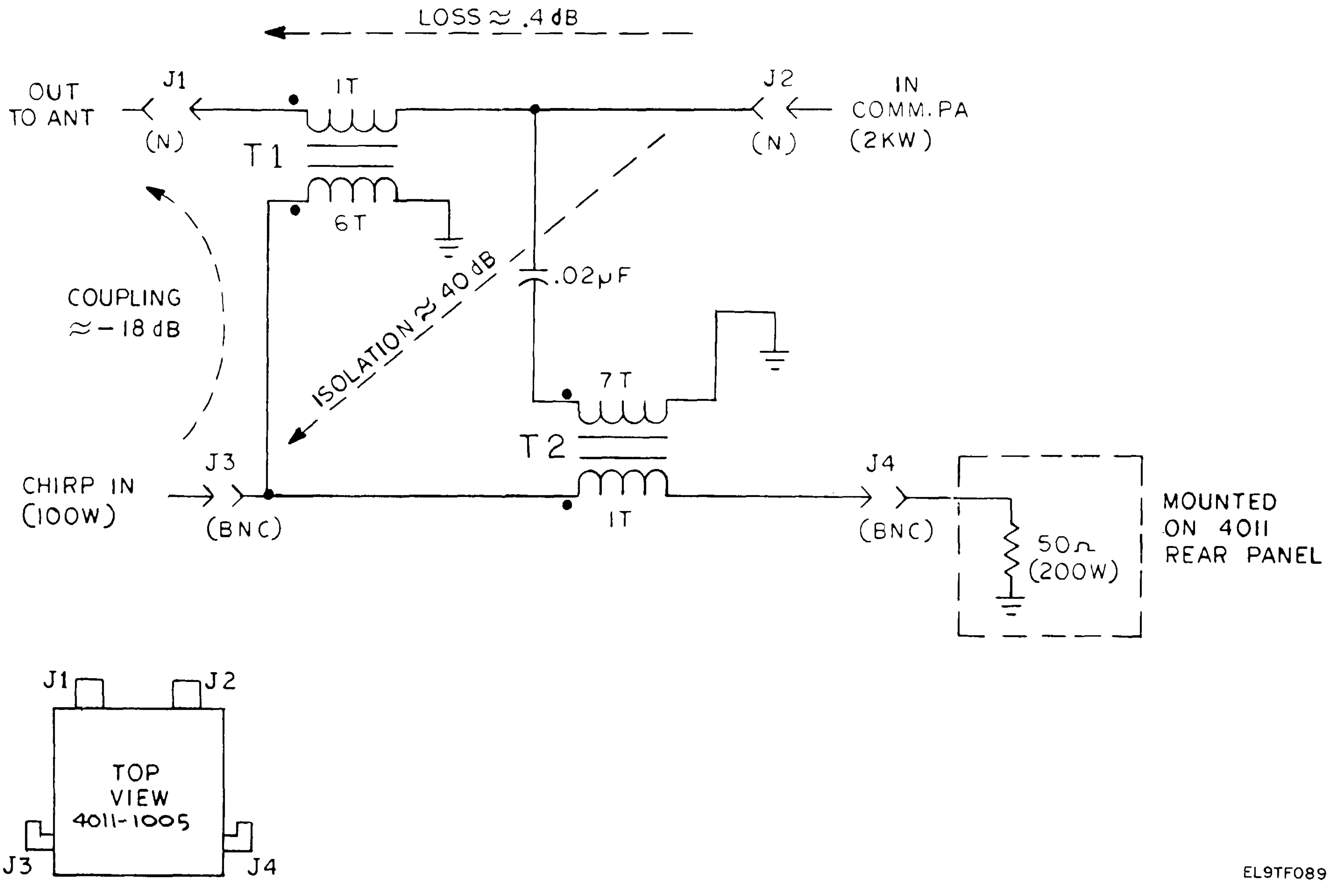
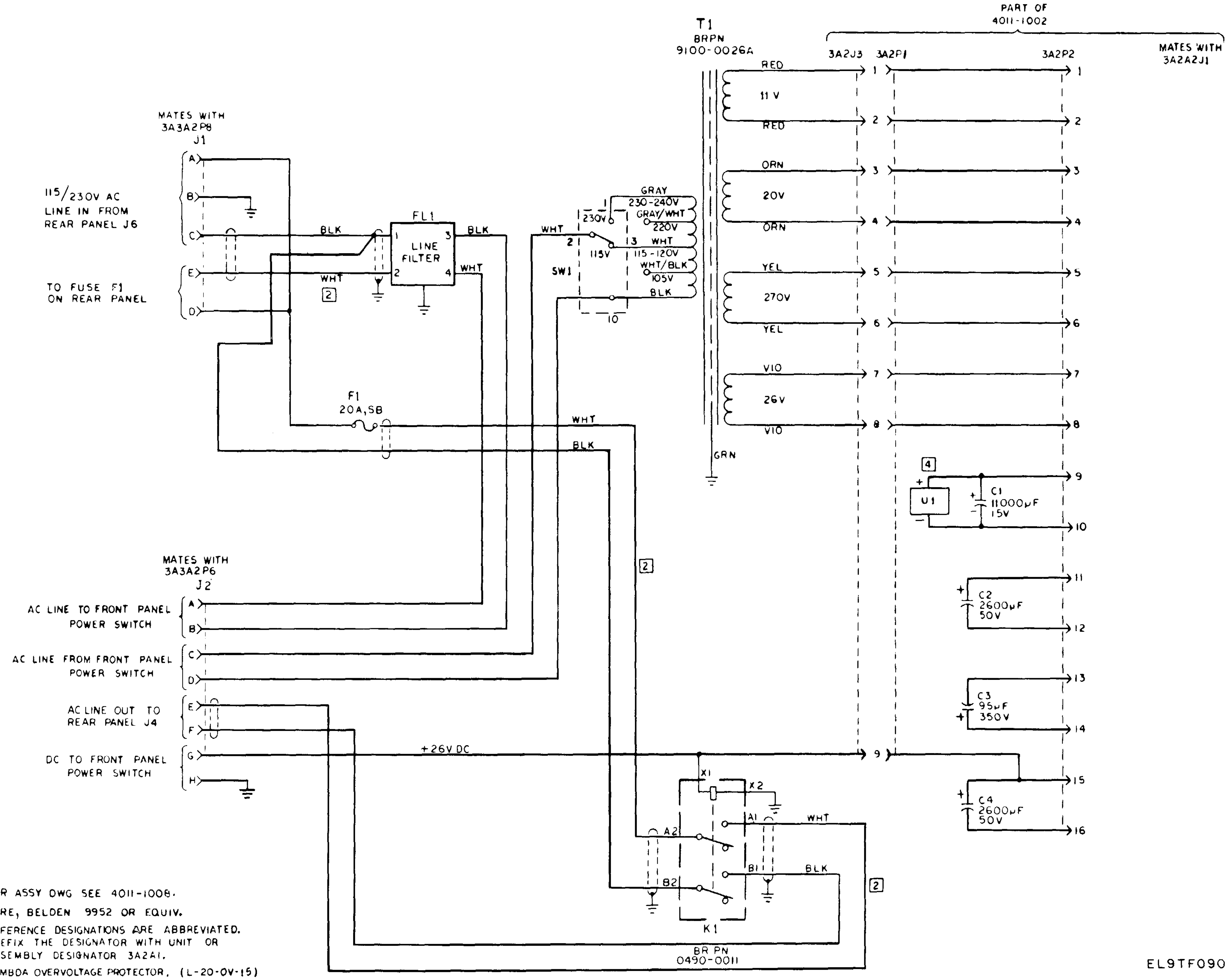


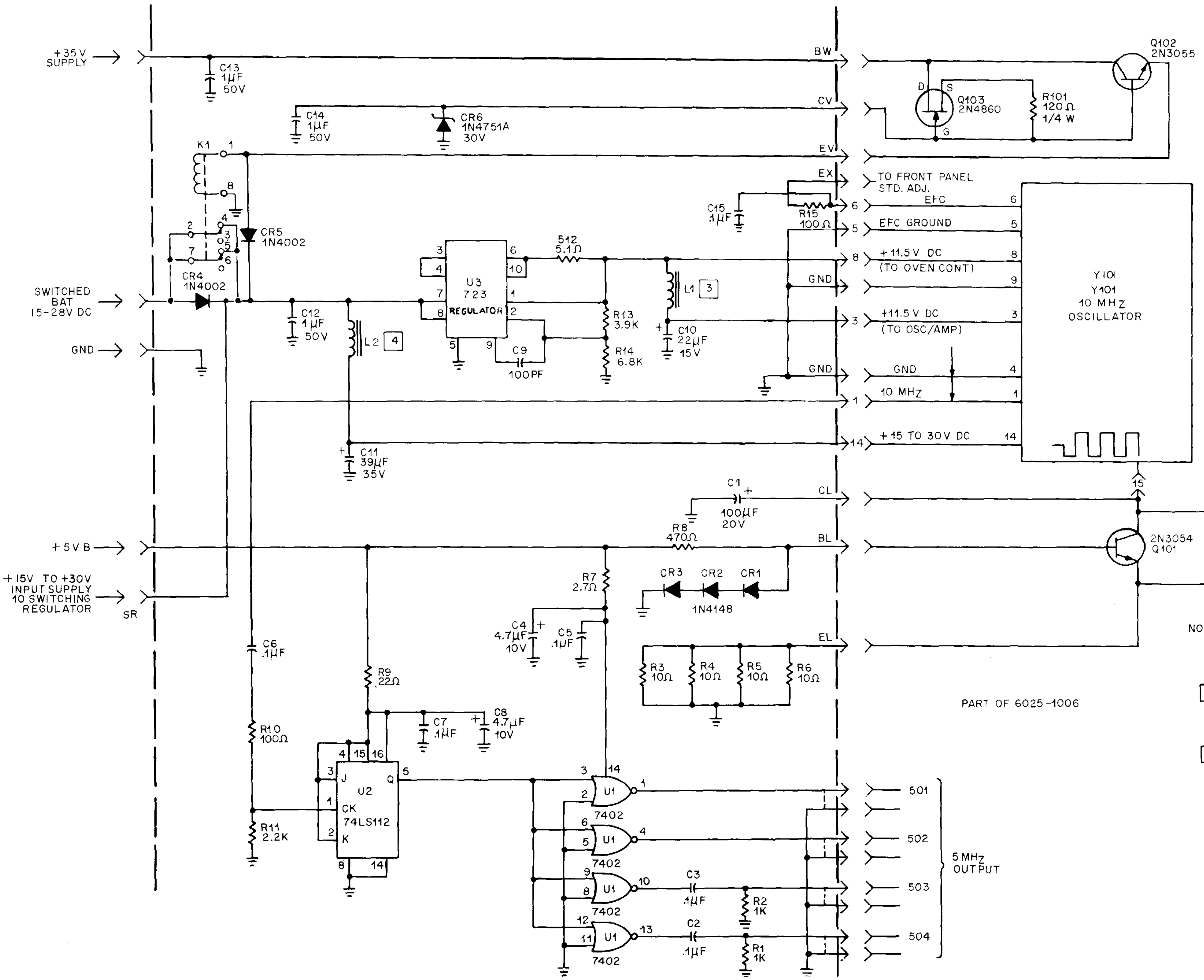
FIGURE FO-28. Schematic Diagram, Diplexer, Toroid Assy (4011-1005).



NOTES:

1. FOR ASSY DWG SEE 4011-1008.
2. (boxed) WIRE, BELDEN 9952 OR EQUIV.
3. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT OR ASSEMBLY DESIGNATOR 3A2A1.
4. (boxed) LAMBDA OVERVOLTAGE PROTECTOR, (L-20-OV-15)

FIGURE FO-29. Schematic Diagram, 4011 Power Supply (4011-1008).



HIGHEST REFERENCE DESIGNATION						
C15	CR6	L2	Q–	R15	U3	K1
REF DESIGNATION NOT USED						

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS ±5%, 1/4 W, CARBON CDMR
2. ALL CAPACITORS ARE IN MICROFARADS.

L1=6025-3063

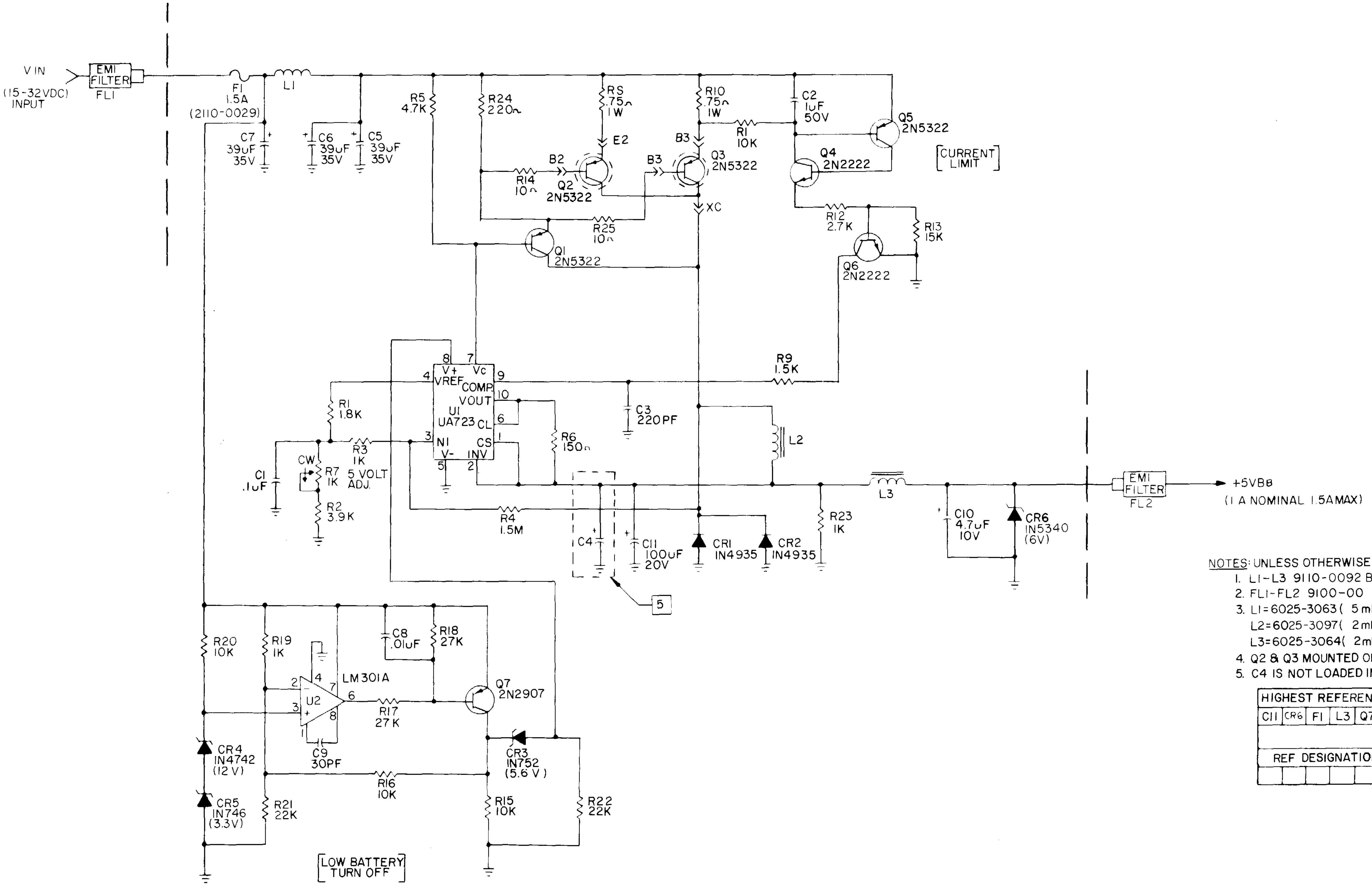
3 (70 TURNS #22 WIRE ON 9110-0092 BOBBIN 9110-0091 CORE)

L2=6025-3064

4 (40 TURNS #20 WIRE ON 9110-0092 BOBBIN 9110-0091 CORE)

EL9TF091

FIGURE FO-30. Schematic Diagram, 5 MHz Distributive Amplifier (6025-2008) (S/N 400100 and before).

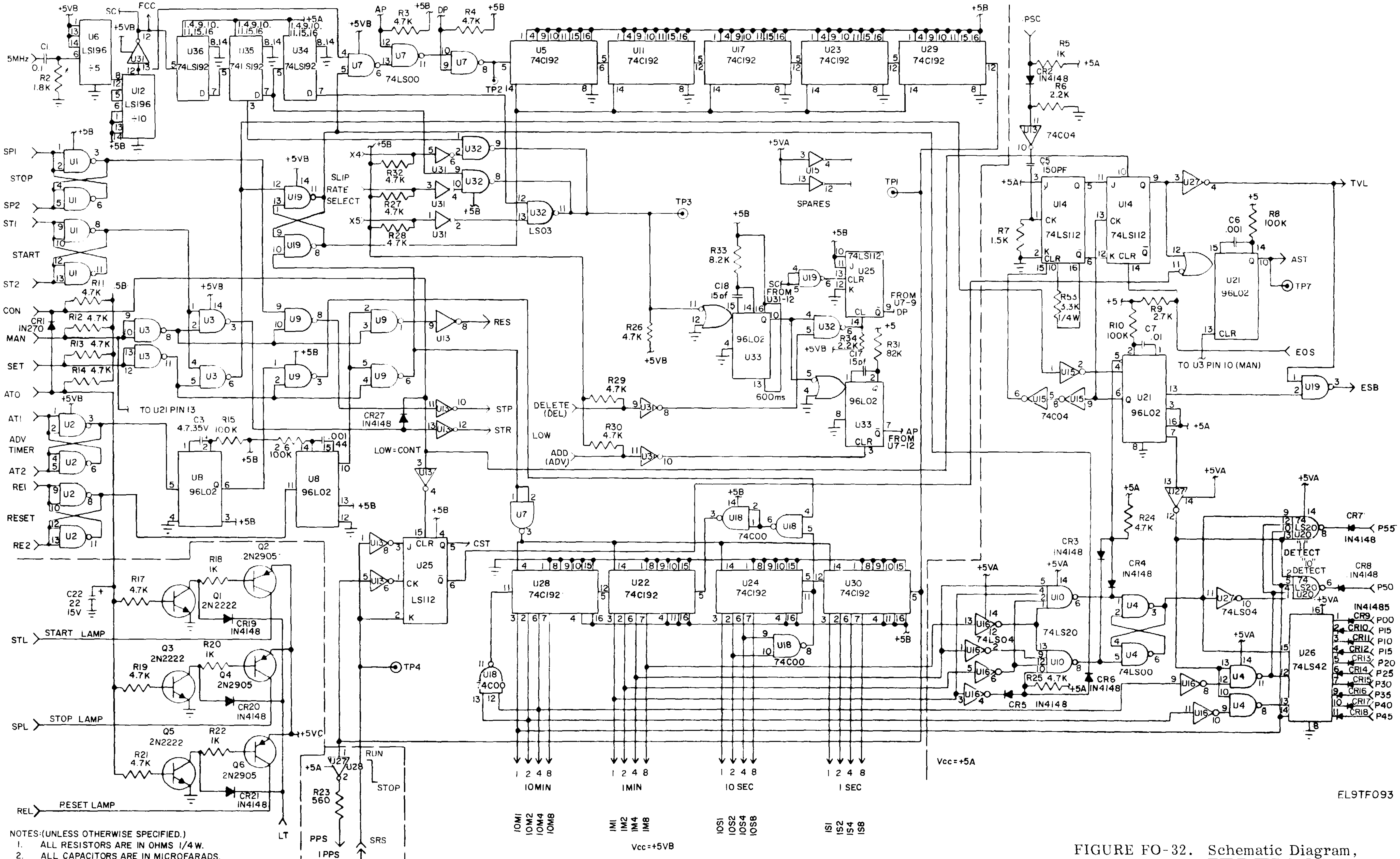


NOTES: UNLESS OTHERWISE SPECIFIED
1. L1-L3 9110-0092 BOBBIN, 9110-0091 CORE.
2. FL1-FL2 9100-00 2.
3. L1=6025-3063 (5mHy, 70TURNS)
L2=6025-3097 (2mHy, 40TURNS)
L3=6025-3064 (2mHy, 40TURNS)
4. Q2 & Q3 MOUNTED OFF BOARD ON CHASSIS.
5. C4 IS NOT LOADED IN ASSY 6025-2009

HIGHEST REFERENCE DESIGNATION								
C11	CR6	F1	L3	Q7	R25	U2		
REF DESIGNATION NOT USED								

EL9TF092

FIGURE FO-31. Schematic Diagram, Switch Regulator (6025-2009) (S/N 400100 and before).



NOTES:(UNLESS OTHERWISE SPECIFIED.)
1. ALL RESISTORS ARE IN OHMS 1/4W.
2. ALL CAPACITORS ARE IN MICROFARADS.

HIGHEST REFERENCE DESIGNATION				
C22	CR27	Q12	R58	U40

REF DESIGNATION NOT USED			
C2			R1 R54-57

FIGURE FO-32. Schematic Diagram, Programmer (1024-2002) (S/N 400100 and before) (Sheet 1 of 2).

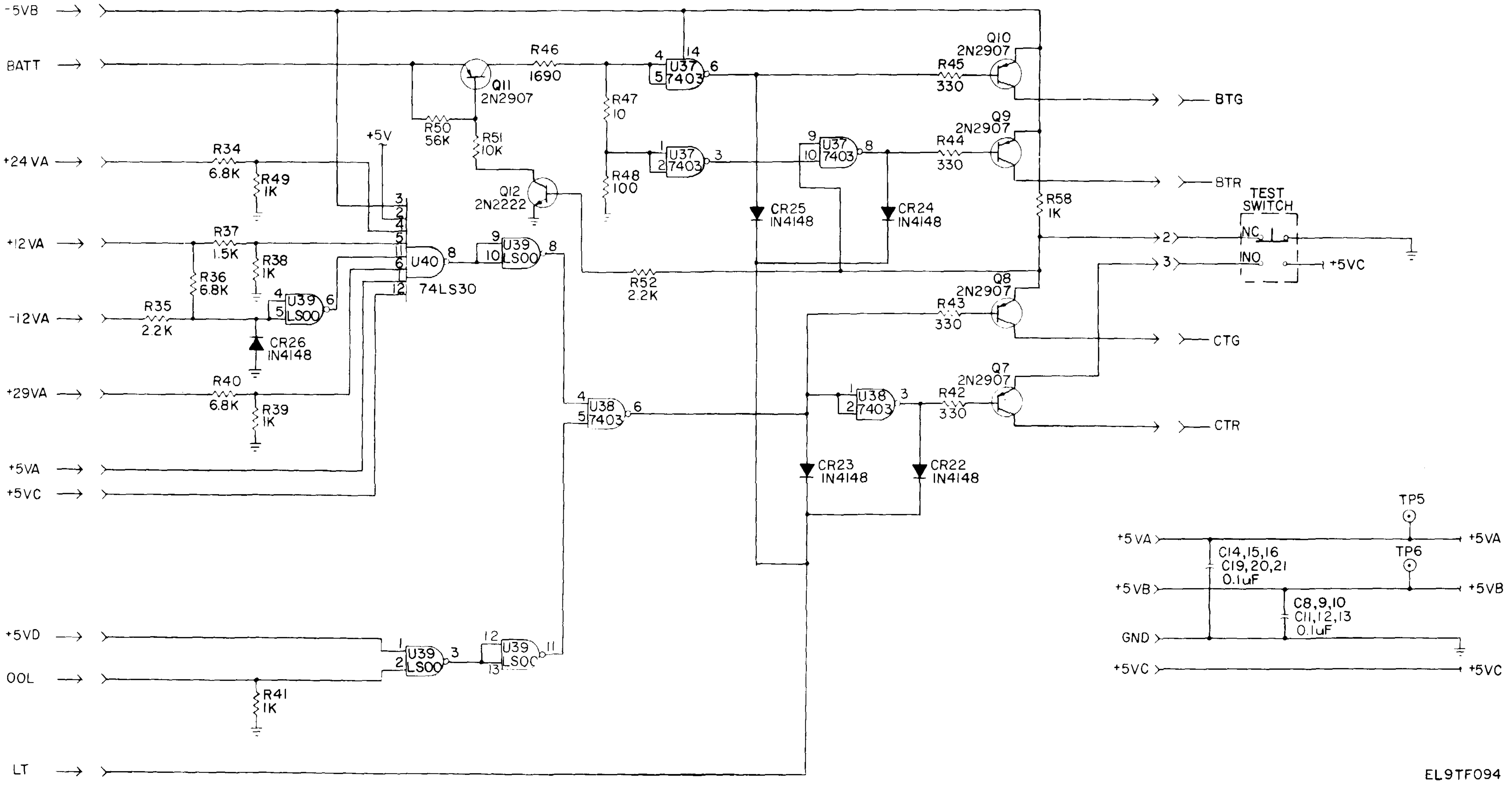


FIGURE FO-32. Schematic Diagram, Programmer (1024-2002) (S/N 400100 and before) (Sheet 2 of 2).

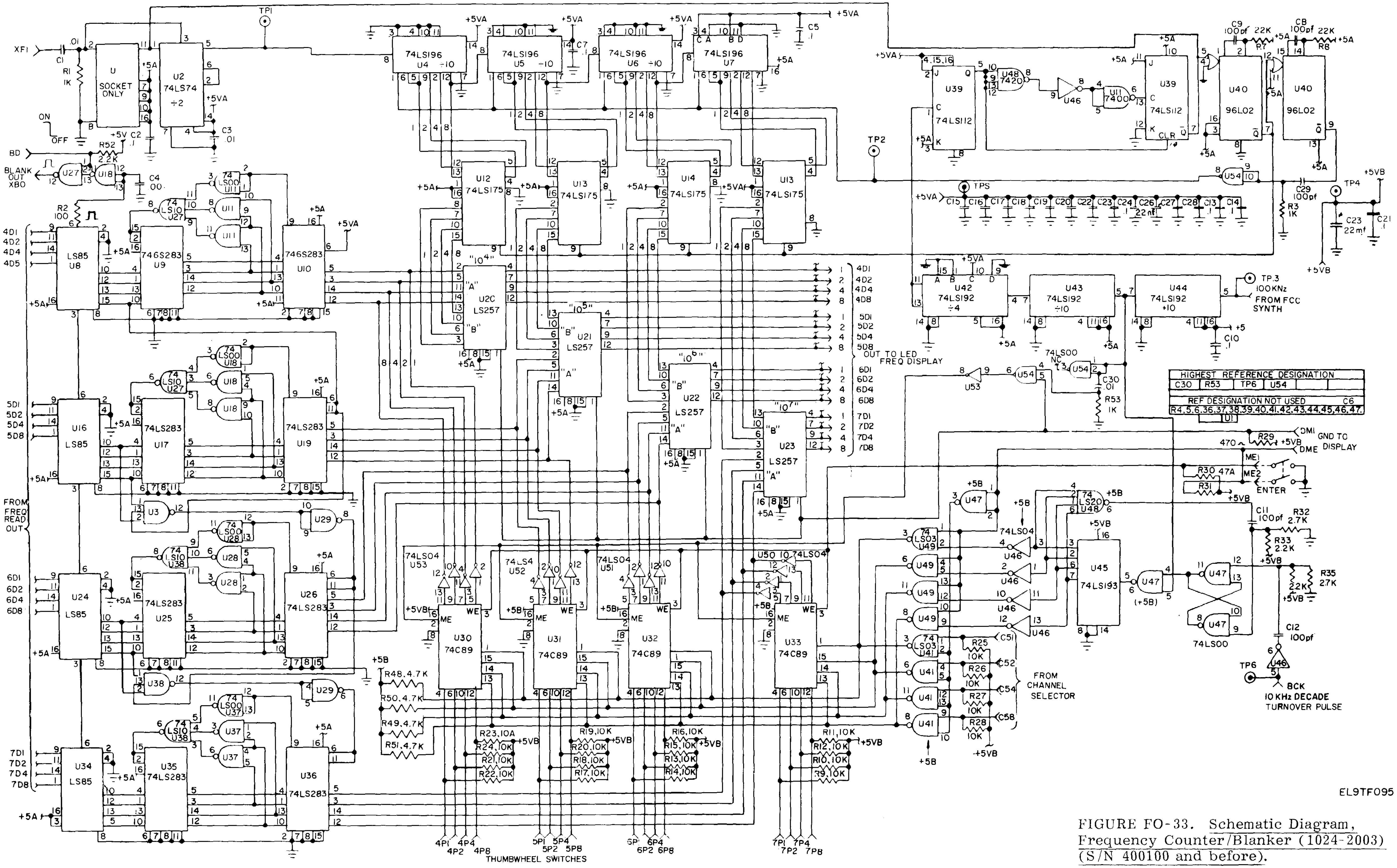
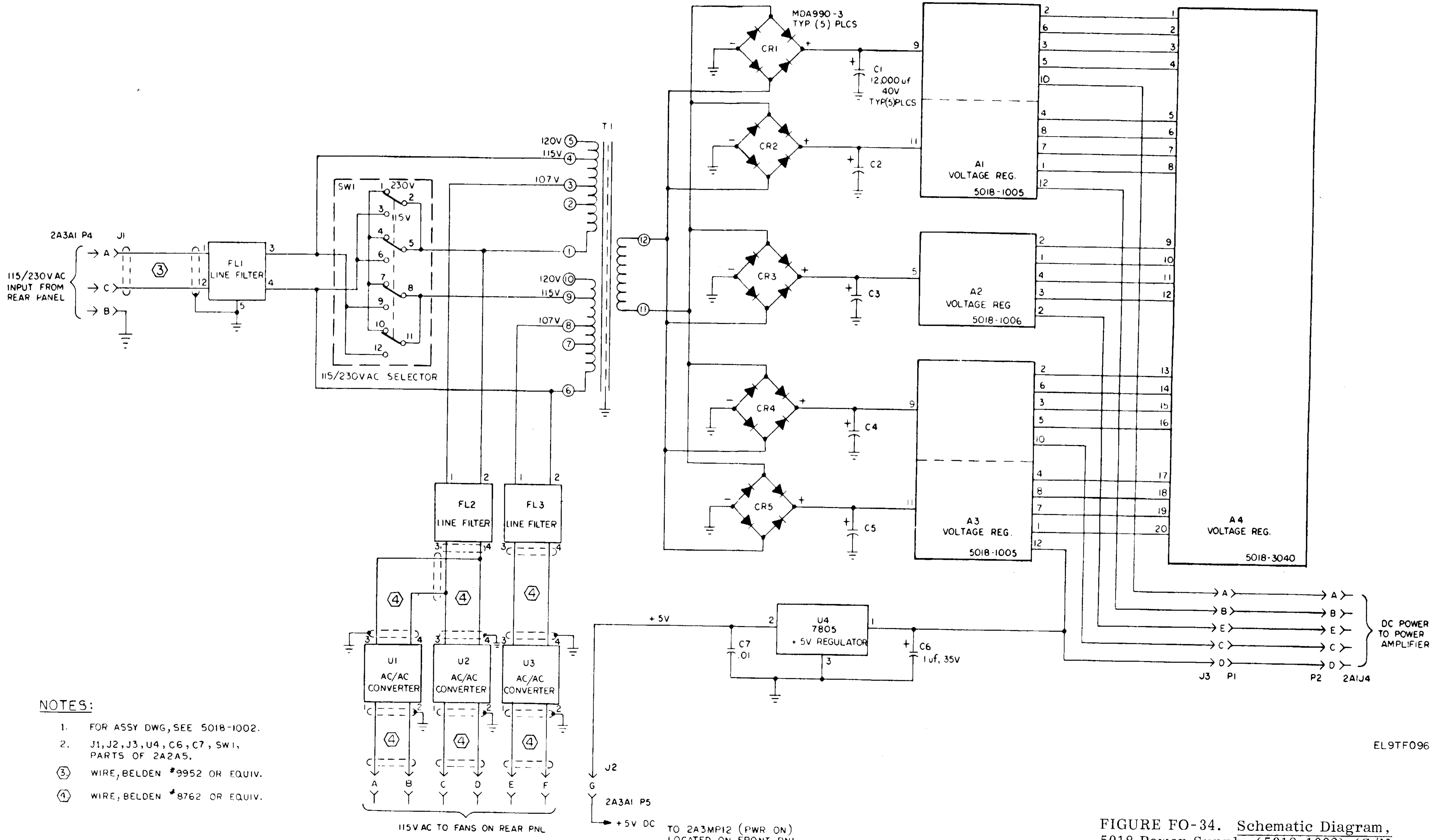


FIGURE FO-33. Schematic Diagram, Frequency Counter/Blanker (1024-2003) (S/N 400100 and before).



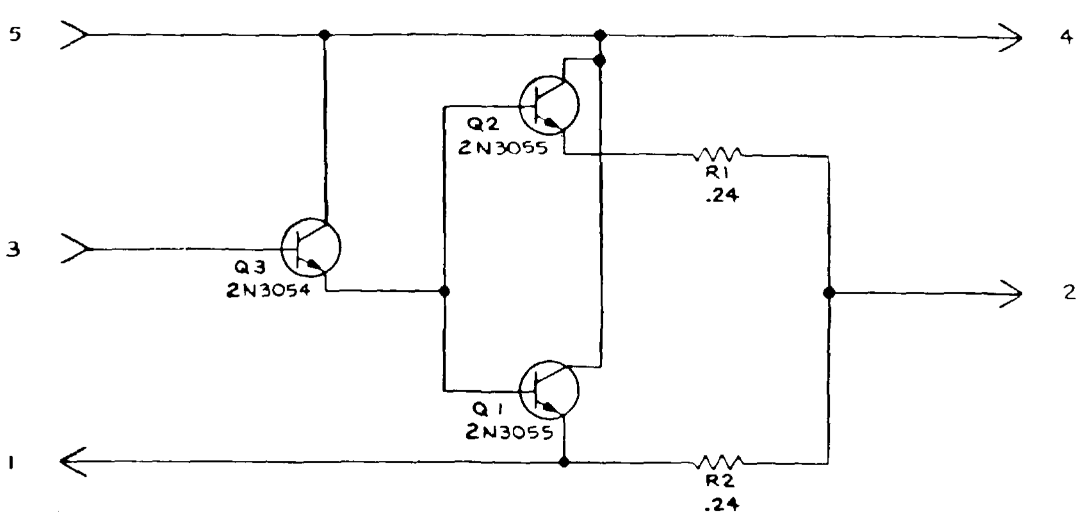
NOTES:

1. FOR ASSY DWG, SEE 5018-1002.
2. J1, J2, J3, U4, C6, C7, SW1, PARTS OF 2A2A5.

③ WIRE, BELDEN #9952 OR EQUIV.

④ WIRE, BELDEN #8762 OR EQUIV.

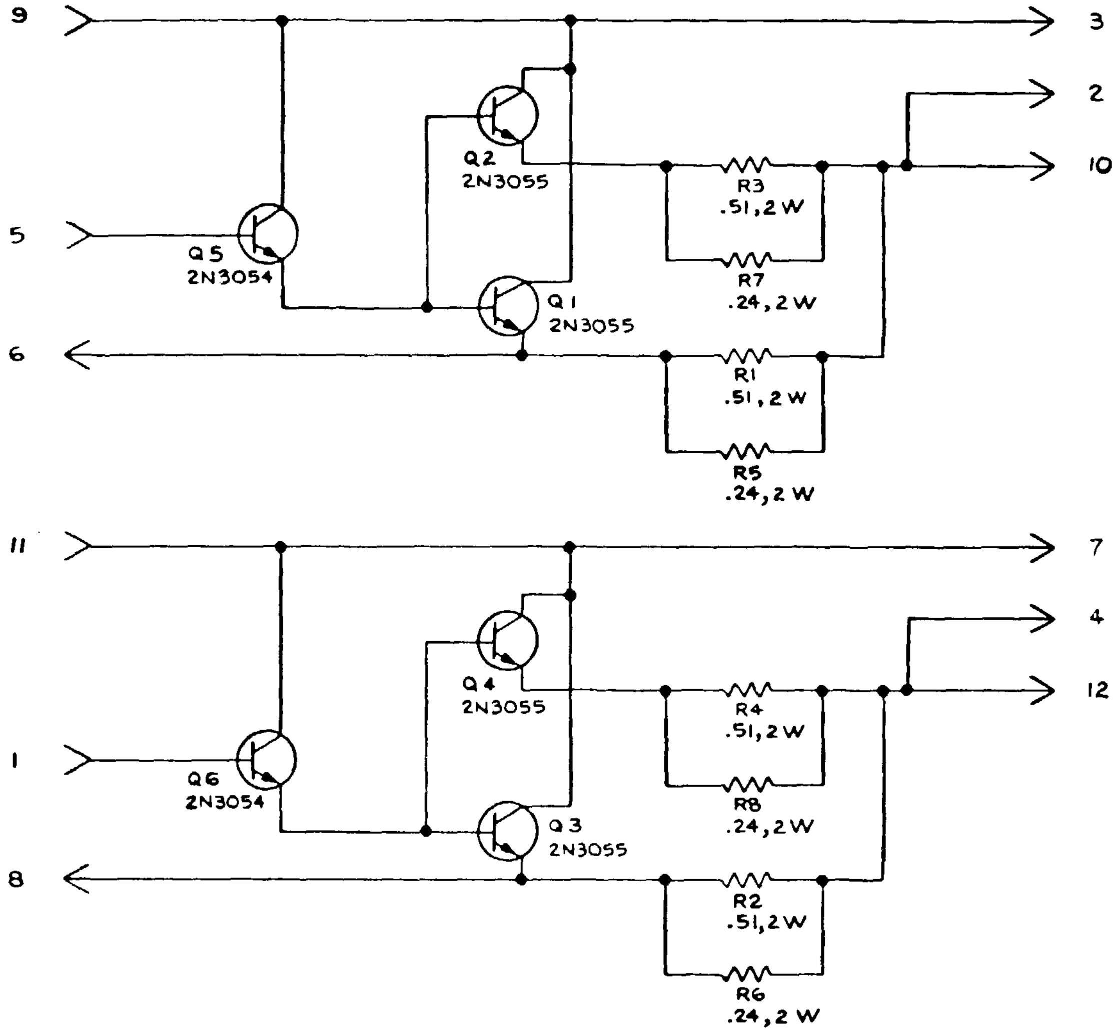
FIGURE FO-34. Schematic Diagram, 5018 Power Supply (5018-1002) (S/N 400100 and before) (Sheet 1 of 3).



HIGHEST REF DESIGNATION	
Q3	R2
REF DESIGNATION NOT USED	

4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT OR ASSEMBLY DESIGNATOR 2A2A2.
3. FOR TERMINAL LOCATIONS, SEE 5018-1006.
2. FOR ASSEMBLY DWG, SEE 5018-1006.
1. ALL RESISTORS ARE IN OHMS, ±5%, 2 W CARBON COMPOSITION.

NOTES: UNLESS OTHERWISE SPECIFIED.



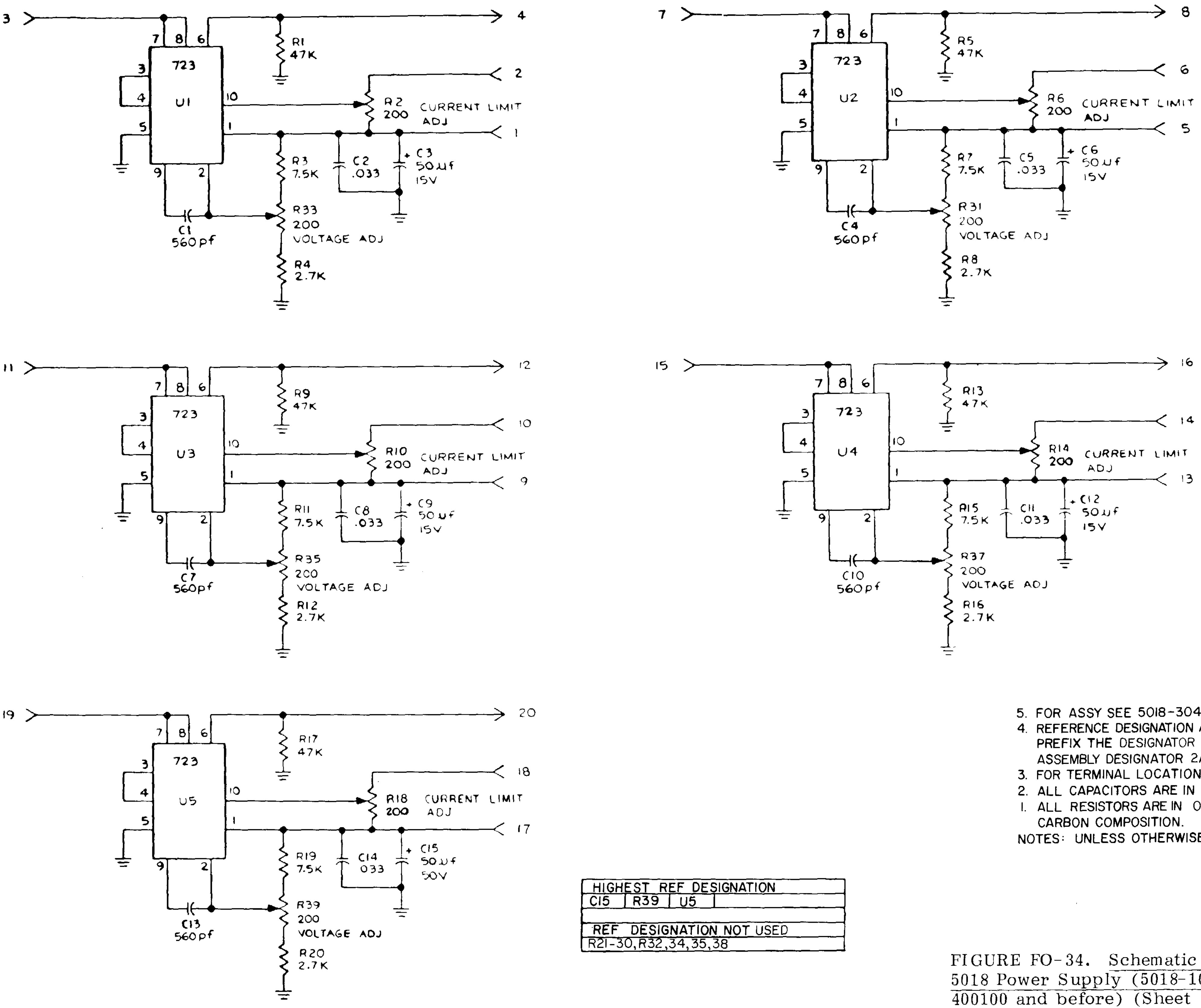
HIGHEST REF DESIGNATION	
Q6	R6
REF DESIGNATION NOT USED	

4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT OR ASSEMBLY DESIGNATOR 2A2A1, 2A2A3.
3. FOR TERMINAL LOCATIONS, SEE 5018-1005.
2. FOR ASSEMBLY DWG, SEE 5018-1005.
1. ALL RESISTORS ARE IN OHMS, ±5%, 1/4 W CARBON COMPOSITION.

NOTES: UNLESS OTHERWISE SPECIFIED

EL9TF097

FIGURE FO-34. Schematic Diagram, 5018 Power Supply (5018-1002) (S/N 400100 and before) (Sheet 2 of 3).



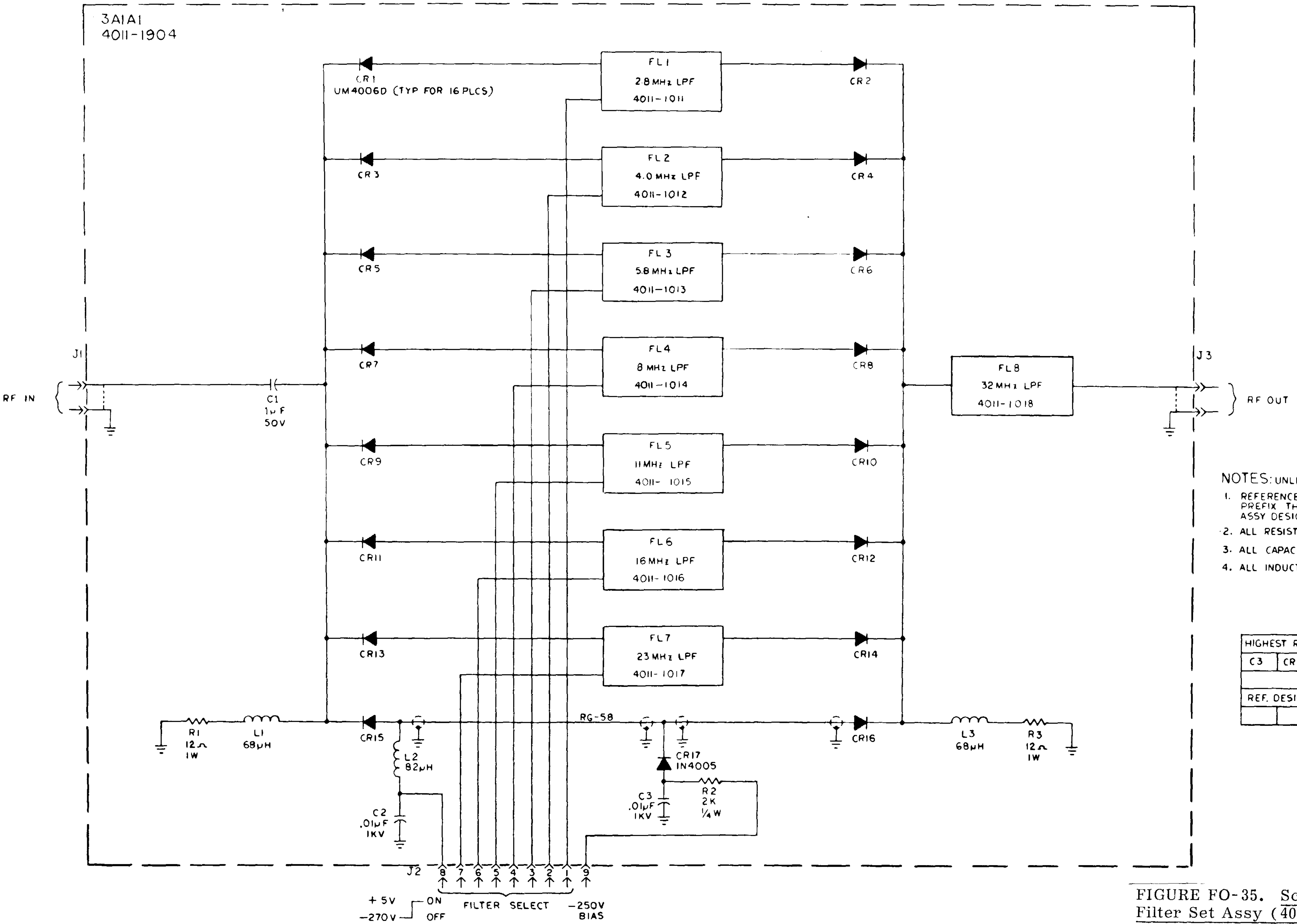
5. FOR ASSY SEE 5018-3040.
4. REFERENCE DESIGNATION ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT OR ASSEMBLY DESIGNATOR 2A2A4.
3. FOR TERMINAL LOCATIONS, SEE 5018-1002.
2. ALL CAPACITORS ARE IN MICROFARADS.
1. ALL RESISTORS ARE IN OHMS, 5%, 1/4 W CARBON COMPOSITION.

NOTES: UNLESS OTHERWISE SPECIFIED

HIGHEST REF DESIGNATION		
C15	R39	U5
REF DESIGNATION NOT USED		
R21-30,R32,34,35,38		

EL9TF098

FIGURE FO-34. Schematic Diagram, 5018 Power Supply (5018-1002) (S/N 400100 and before) (Sheet 3 of 3).



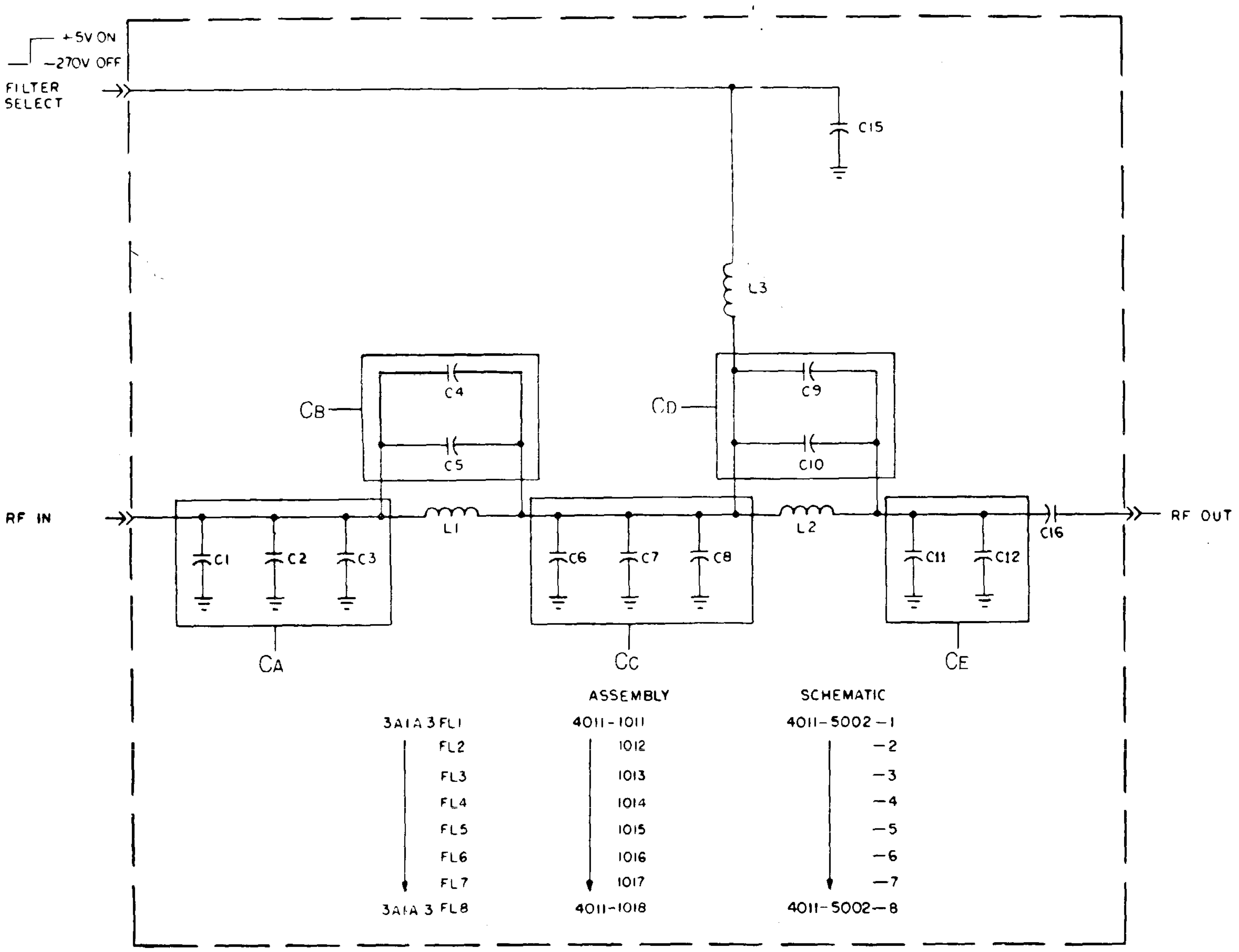
NOTES: UNLESS OTHERWISE SPECIFIED.

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT OR ASSY DESIGNATOR 3A1A1.
2. ALL RESISTORS ARE IN OHMS 1/4W ±5%.
3. ALL CAPACITORS ARE IN MICROFARADS.
4. ALL INDUCTORS ARE IN MICROHENRYS.

HIGHEST REFERENCE DESIGNATION					
C3	CR17	FL8	J3	L3	R3
REF. DESIGNATION NOT USED					

EL9TF099

FIGURE FO-35. Schematic Diagram, Filter Set Assy (4011-1001) (S/N 400100 and before) (Sheet 1 of 2).



	ASSEMBLY	SCHEMATIC
3A1A3FL1	4011-1011	4011-5002-1
FL2	1012	-2
FL3	1013	-3
FL4	1014	-4
FL5	1015	-5
FL6	1016	-6
FL7	1017	-7
3A1A3 FL8	4011-1018	4011-5002-8

	FREQ:	2.8 MHz	4.0 MHz	5.8 MHz	8 MHz	11 MHz	16 MHz	23 MHz	32 MHz
	CAP GROUP	-1	-2	-3	-4	-5	-6	-7	-8
CA	C1	430	470	270	270	130	100	75	100
	C2	430	390	270	250	150	100	68	—
	C3	430	—	—	—	—	—	—	—
CB	C4	100	75	50	36	24	18	12	9
	C5	100	75	47	43	27	18	12	9
CC	C6	620	430	300	200	150	100	110	75
	C7	620	430	300	200	150	100	110	82
	C8	560	390	270	220	150	110		—
CD	C9	300	220	150	110	75	50	39	27
	C10	300	240	130	110	75	56	36	24
CE	C11	510	330	200	220	110	75	56	39
	C12	510	430	220	200	100	75	51	36
	C15	.01µf, 1KV							—
	C16	—	—	—	—	—	—	—	1µF 50V
	L1	27 TURN 3.38	20 TURN 2.36	16TURN 1.63	12 TURN 1.18	10 TURN .837	8 TURN .591	7 TURN .420	6 TURN .296
	L2	22 TURN 2.47	15 TURN 1.73	12 TURN 1.19	10 TURN .864	9 TURN .617	7 TURN .432	6 TURN .307	5 TURN .216
	L3	82µH							—

	2.8MHz	4.0MHz	5.8MHz	8 MHz	11 MHz	5 MHz	23 MHz	32 MHz
	-1	-2	-3	-4	-5	-6	-7	-8
CA	1290 ± 15	960 ± 12	551 ± 6	518 ± 6	283 ± 3	200 ± 2	142 ± 2	100 ± 1
CB	204 ± 5	154 ± 3	98 ±2	79 ±2	51 ±1	36 ±1	25.4 ±0.5	17.8 ±0.5
CC	1795 ± 20	1256 ± 12	866 ± 8	628 ± 6	445 ± 4	314 ± 3	223 ± 2	157 ± 5
CD	609 ± 6	465 ± 5	294 ± 3	213 ± 2	151 ±2	107 ± 1	75.8 ± 1	53 ±1
CE	1010 ± 12	760 ± 8	417 ± 4	419 ± 5	214 ± 2	151 ±2	107 ± 1	76 ±1

NOTES: (UNLESS OTHERWISE SPECIFIED)

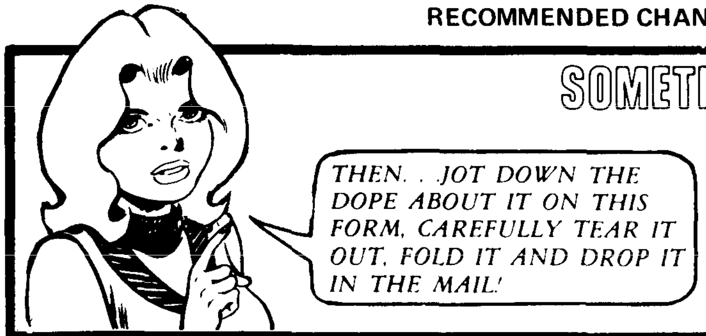
1. ALL CAPACITORS ARE IN PICOFARADS, INDUCTORS IN MICROHENRIES.
2. C1 THRU C12 AND L1 & L2 FACTORY SELECTED, NOMINAL VALUES ARE SHOWN.
3. C1 THRU C12 ARE MICA TYPE, 500V.
4. C15 IS CERAMIC TYPE.
5. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATOR WITH UNIT OR ASSY DESIGNATOR 3A1A1.

HIGHEST REFERENCE DESIGNATIONS					
C16		L3			
REF DESIGNATION NOT USED					
C13 C14					

EL9TF100.

FIGURE FO-35. Schematic Diagram, Filter Set Assy (4011-1001) (S/N 400100 and before) (Sheet 2 of 2).

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703-5007

DATE SENT
10 July 1975

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PRC-76

BE EXACT. . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		FO3		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

TEAR ALONG PERFORATED LINE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE
SSG I. M. DeSpiritof

DA FORM 1 JUL 79 2028-2

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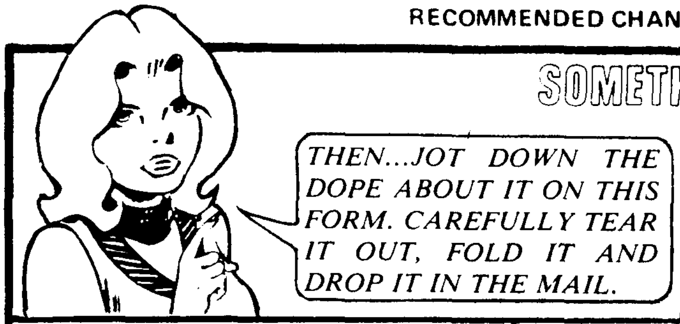

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DATE SENT

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TM 11-5820-918-13	15 Jan 1986	RADIO TRANSMITTER T-1373/TRQ-35(V)

BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

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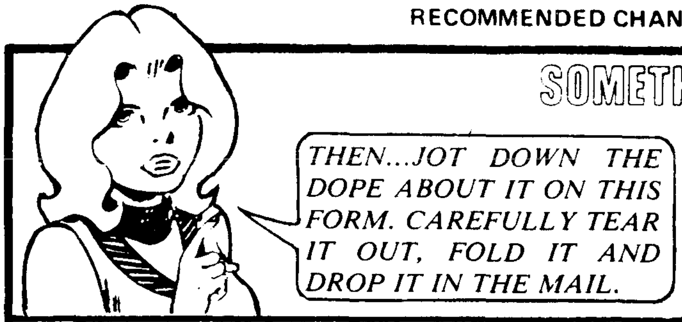

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5820-918-13	15 Jan 1986	RADIO TRANSMITTER T-1373/TRQ-35(V)

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

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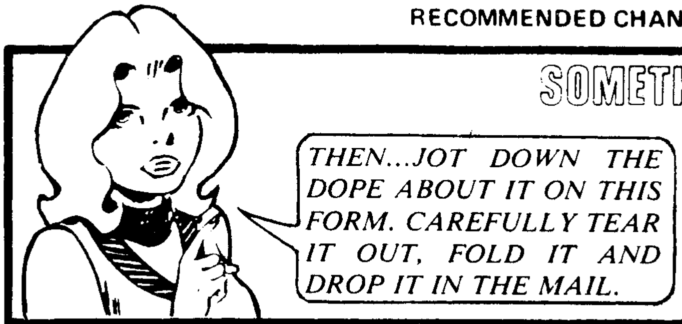

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