Maintenance Manual

VIRTUAL SITE 800 MHz (DTES-800 EDACS® SITE EXTENDER)

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ERICSSON

NOTICE!

This manual covers Ericsson and General Electric products manufactured and sold by Ericsson Inc.

NOTICE!

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

NOTICE!

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IMPORTANT SAFETY INFORMATION

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Ericsson, Inc. assumes no liability for the customer's failure to comply with these standards.

1. **SAVE THIS MANUAL** - It contains important safety and operating instructions.

2. Before using this equipment, please follow and adhere to all warnings, safety and operating instructions located on the product and in the manual.

3. **DO NOT** expose equipment to rain, snow or other type of moisture.

4. Care should be taken so objects do not fall or liquids do not spill into the equipment.

5. **DO NOT** expose equipment to extreme temperatures.

6. **DO NOT** use auxiliary equipment not recommended or sold by Ericsson, Inc. To do so may result in a risk of fire, electric shock or injury to persons.

7 **GROUND THE EQUIPMENT**-To minimize shock hazard, the equipment cabinet(s) must be connected to a good earth or building ground which eventually goes to earth.

   The equipment supplied is equipped with three-conductor AC power cords. These power cords must be plugged into approved three-contact electrical outlets with the grounding wires firmly connected to an electrical ground (safety ground) at the power outlet. The power cords must also meet International Electrotechnical Commission (IEC) safety standards.

8. To reduce risk of damage to electrical cords, pull by plug rather than cord when disconnecting a unit.

9. Make sure all power cords are located so they will not be stepped on, tripped over or otherwise subjected to damage or stress.

10. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, ensure:

    a. The pins on the plug of the extension cord are the same number, size, and shape as those of the plug on the power supply.

    b. The extension cord is properly wired, in good condition, and

    c. The wire size is large enough for the AC ampere rating of unit.

11. **DO NOT** operate equipment with damaged power cords or plugs - replace them immediately.

12. **DO NOT** operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

13. To reduce risk of electric shock, unplug unit from outlet before attempting any maintenance or cleaning.

14. Use only fuses of the correct type, voltage rating and current rating as specified in the parts list. Failure to do so can result in fire hazard.

15. **GROUNDING AND AC POWER CORD CONNECTION** - To reduce risk of electrical shock use only a properly grounded outlet. The system components are equipped with electric cords having an equipment grounding conductor and a grounding plug. Be sure all outlets are properly installed and grounded in accordance with all local codes and ordinances.

16. **DANGER** - Never alter the AC cord or plug. Plug into an outlet properly wired by a qualified electrician. Improper connection or loss of ground connection can result in risk of an electrical shock.

17 **ELECTROSTATIC DISCHARGE SENSITIVE COMPONENTS** - This station contains CMOS and other circuit components which may be damaged by electrostatic discharge. Proper precaution must be taken when handling circuit modules. As a minimum, grounded wrist straps should be used at all times when handling circuit modules.

TRANSLATOR SPECIFICATIONS

Frequency Range (No Retuning Required):	
800 MHz	
Low Split (To Host Site)	806 - 825 MHz
High Split (From Host Site)	851 - 870 MHz
Minimum Frequency Separation:	
Translator Input to Output	1.0 MHz
Sensitivity:	
Minimum Input Level	1.0 µV (-107 dBm)
Acceptable Frequency Displacement (Input Signal):	
From Nominal Center Frequency	+/- 2.5 kHz
Output Power:	2 to 17 Watts (Continuous Duty)
Current Drain (Typical per Translator):	
Standby	1.5 Amps
10 Watts Tx	4.5 Amps
17 Watts Tx	8.0 Amps
Frequency Stability:	
Internal TCXO	+/- 1.5 ppm
Output Frequency	Tracks Input Signal
Modulation Types:	Narrowband FM Voice & Data
Input/Output Impedance:	50 Ohms
Power Supply Voltage:	13.8 Vdc. +20 % -10%,
Negative Ground	
Dimensions:	102mm(w)x285mm(h)x280 mm(d)
Weight:	6.36 kg (14 lb.)
Environmental:	
Humidity Range	90% R.H. @ +50° C
Temperature Range	- 30° C to + 60° C

PC PROGRAMMING

Receive and Transmit Frequencies

INTRODUCTION

The Virtual Site is manufactured by Futurecom for Ericsson Inc to extend the coverage area of an existing EDACS® site. The Virtual Site receives and rebroadcasts signals from the host site to the user, and from the user to the host. In operation, the Virtual Site is transparent to the user, and the system function is identical whether accessing the Extender Site or the Host Site.

The Virtual Site supports all the benefits and features of a full EDACS system by rebroadcasting both analog and data signals. Additionally, the Virtual Site supports narrow-band FM voice and data systems.

Economic considerations make the Virtual Site appropriate in locations where there is excess system capacity, but insufficient RF coverage. The installation of a Virtual Site increases the operating efficiency of the existing EDACS infrastructure by reducing system operating costs, backhaul expenses such as land-line rentals, or microwave links required if full-featured sites are added.

EQUIPMENT DESCRIPTION

The Extender Site equipment required for a three channel host site system occupies one 7 foot high 19-inch rack, and contains the rebroadcasting units, called Translators, and the required combiners and splitters ready for connection to antennas. Two antennas are typically used; a high gain directional unit communicates with the existing fixed equipment (Host) , and a lower gain omni-directional antenna serves the user (Local).

The rack mounted equipment consists of the following:

- Two Transmit Combiners
- A Receiver Multicoupler
- A Receiver Splitter
- Two Duplexers
- A DC Power Distribution Panel
- Two Optional Three-channel RF Power Monitors
- Three High Split Translators
- Three Low Split Translators

The active devices use 13.8 Vdc power, and maximum peak current consumption is 30A; rms current draw depends on system traffic, and is near 20 A rms maximum. Standby current consumption is about 11 A which includes an operational Translator relaying the outbound Control Channel.

Provisions are made for remote operation of the Extender Site, and parameters such as DC Power, RF Power, and Antenna VSWR may be monitored from a central location. There is also provision for remote Reset and Disable.

Output Power

RF power output from the Translators is typically adjusted to yield maximum system efficiency. To maximize Extender Site coverage, the Translators on the Local side run near their maximum, at 15W. An exception can be made for the Translator carrying the normal outbound Control Channel; because it carries data in a robust format, this unit can operate at 10W. This ensures good channel fidelity since a higher SNR will exist for the working channels transmitting at 15W.

Typically the path loss to the Host Site will permit the local-to-host translators to be operated at 5W and still provide sufficient gain-fade margin. This arrangement yields maximum coverage and local-to-host signaling reliability with minimum DC current consumption.

Frequency Planning and Site IDs

The Translators use a double frequency conversion process, and operate either in the upper band split (Host to Local), or the lower band split (Local to Host). The frequency programming of the Translators and the choice of Tx-Rx frequency pairs requires an examination of the existing frequency plan. A number of factors must be considered.

First, in order to afford the users transparency to the existing equipment, the set of Translator output and input frequencies on the Local antenna side will usually duplicate that of another, more distant site. In this way, no additional programming of the users' equipment will be required, and the host site being "extended" will appear to the user equipment to be some other site within the EDACS system. Site ID numbers and other means by which user equipment can distinguish between signals of the same frequency and format but differing origins must match the frequencies to permit this site translation to occur. The Site ID of the Host Site can be deleted, or additional systems can be programmed into user equipment with Extender Site frequency sets and Host site IDs.

Second, due to the nature of the frequency changing process used in the Translators, there is a minimum frequency separation between input and output frequencies, typically 1 MHz. The same analysis dictates that the 1 MHz separation must also exist between any receive frequency and any other co-located transmit frequency due to the antenna duplexing and combing topology used.

Transmit / Receive Isolation

The Translators use an Automatic Gain Control circuit in the intermediate frequency amplifier chain. This AGC circuit generates an internal signal which indicates that the received signal is of sufficient intensity for retransmission. This internal signal then turns on the output amplifier stages of the translator so that the received signal can be transmitted. In this way, the threshold setting for the Carrier Activity Sensor then determines the minimum receive signal level. The threshold is typically set at -110 dBm, 0.7µV.

This threshold ensures that the desired input signal will exceed the external background noise, the internally generated noise, and the sideband noise at the Rx port that arrives there from the Tx port via the antennas. Maintaining adequate isolation between the transmit and receive ports on the Translators is necessary because excess transmit sideband noise may cause desense effects. This isolation is achieved by the use of adequate isolation between Host and Local antennas and by the filtering provided by the Tx combiner cavities. Typically, the transmit noise at the Receive frequency must be attenuated by about 75 dB. At a 1 MHz frequency separation, the Tx combiner provides 15 dB of attenuation; this means that the antenna isolation must provide the remaining 60 dB. The Tx - Rx isolation may be measured by sweeping across the frequency band of interest into one of the transmit combiners, through the duplexer to the antenna, and measuring the signal received by the other antenna through its duplexer and receiver multicoupler. The isolation provided by the antennas alone may be measured by sweeping from one antenna to the other.

At frequency separations larger than 1 MHz, the Tx combiner will afford more than 15 dB of isolation, and this will reduce the isolation requirement on the antenna design.

INSTALLATION

These instructions apply to Virtual Site Translators, and provide technicians with procedures for bench testing the Translator.

Translator adjustments are for input sensitivity and output power. There are no other adjustments. This section also provides instructions for programming the transmit and receive frequencies.

REFERENCE DRAWINGS:

System Racking Diagram	8H017C04
System Block Diagram	8D017B05
PTT Cable, Assembly	8H017B06
PTT Cable, Schematic	8D017B07
Power Panel, Assembly	8H017B05
Power Panel, Schematic	8D017B06

TEST EQUIPMENT REQUIRED:

Signal Generator: 800 - 900 MHz, -120 dBm to -20 dBm, FM modulation by 1 kHz at 3 kHz deviation.

Receiver: Marconi 2955 or equivalent IFR instrument

DC Power Supply: 13.8 V @ 10 A

Power Supply Lead

13 mm socket driver or nut driver

#0 Phillips screwdriver

If the transmit and receive frequencies require reprogramming, then the following equipment also is needed.

RS - 232 cable

Programming Box TQ 3210, Ericsson - GE

Programming Cable, Futurecom 7W004X05-02

PC, 286 or better, with Futurecom Software 6D017X01-01

OR, Toshiba 1200 laptop computer, with Futurecom Software 6D017X02-01

PROCEDURE

Setting the Transmit and Receive Frequencies.

1. Connect the RS 232 cable between an unused serial port on the PC and the programming box; the programming cable connects the programming box to the translator.
2. Apply DC power to the translator.
3. Set the toggle switch on the front of the translator to the DISable position.
4. Begin the program on the PC.

   a. Use the PORTS menu, and select the port to which the RS 232 cable is connected.

   b. Use the FILE menu, and create a NEW file with an appropriate name.

   c. At the prompt, enter the transmit and receive frequencies, and SAVE the file.

   d. Use the RADIO menu, and WRITE the new file named previously. The computer will indicate writing and verifying.
5. When complete, disconnect the cables to the translator.
6. Ensure that the frequencies correspond to the band split of the translator.

Verify the Input Sensitivity.

1. Connect the output of the translator to a receiver capable of withstanding the maximum translator output power of 20W.
2. Set the toggle on the front panel to the normal (down) position.
3. Apply an unmodulated signal at a level of -120 dBm to the Receive port of the translator at the Rx frequency.

   Verify the translator's output is OFF and the TX ON and RX LEDs are both be OFF.
4. Gradually increase the input signal level until the RX LED lights.
5. Verify the signal level is -110 dBm ±1 dB. This input level is the sensitivity of the translator.
6. If the sensitivity is out of specification, it may be adjusted by varying R21 in the Converter Box Assembly.

   a. Remove the two outer cast covers on the translator using the 13 mm nut driver.

b. Remove the 12 #0 Phillips screws which secure the gold-colored Converter Box cover so that R21, may be accessed.

c. Apply an input signal at the threshold level, -110 dBm.

d. Adjust R21 so that LED. D3 on the converter PCB lights.

e. Increase the input level from below the threshold value, say -115 dBm, to -105 dBm to verify that the signal is detected at -110 dBm.

f. When the sensitivity is correctly set, replace the Converter Box cover.

NOTE

There is approximately 3 dB of hysteresis in the detection at threshold.

Set the Output Power.

1. Apply a -100 dBm signal at the receive frequency to the receive port at a level of.
2. Monitor the output power of the translator using the Marconi receiver, or by some other suitable means.

NOTE

Ensure that the toggle switch on the front panel of the translator is set at the down position so that the output is enabled.

The output power may be varied by adjusting R111 on the transmit board. R111 is located beside the heat sink at the rear of the chassis on the same side as the gold-colored Converter box. A spring fitted shield must be removed to access R111. When the power is set correctly, replace the spring shields and the cast covers on the translator.

Verify Distortion Measurement.

1. Apply a -107 dBm (1µV) signal modulated with a 1 kHz tone at 3 kHz deviation to the receive port.
2. Using the Marconi receiver with an audio bandwidth of 300 Hz to 4 kHz, measure distortion. Distortion must be less than 10%.
3. Increase the input level to -87 dBm (10 µV). The measured distortion must be less than 5%.

REMOTE ALARM AND CONTROL INTERFACE

Refer to Table 1 and the following drawings for a description of the alarm and interface signals:

REFERENCE DRAWINGS:

Schematic, PTT Cable	8D017B07
Schematic, I / O Cable	8D017A01
Schematic, Local Control Panel PCB	8D017A06
Schematic, System / Logic PCB	8D017C08

Table 1 - Remote Alarm and Control Interface

SIGNAL NAME	LOCATION	FUNCTIONAL DESCRIPTION	ELECTRICAL DESCRIPTION
***Fail** *o/p*	J2 pin 1	This is known as *RST on the Logic PCB, and is the micro's Watchdog Timer signal. It indicates the status of the microcontroller's sanity.	Normally HI at 5V; LO indicates that the micro is being reset. Buffered output at U312 p10. Refer to schem. 8D017C08
Disable (Hook Sw.) *o/p & i/p*	J2 pin 3	Indicates status of front panel 'Disable' switch. If switch is set to enable output, this line may be used to remotely disable output.	Normally HI at 5V; LO indicates that the Disable switch is set to inhibit Translator RF output. Ground this line to disable RF output. Micro input, 5V / 4K7 pull up, 1K in series. Schem. 8D017C08
***Tx On** *o/p*	J2 pin 5	Indicates RF output status. Line is active if Rx is present and 'Disable' switch is set to enable RF output.	HI at 5V when Tx is OFF; LO at gnd when Tx is ON. Output Latch output at U309 pin 16, 'Spare 1'. Refer Schem. 8D017C08
SW A+ *o/p*	J2 pin 6	Indicates presence of DC power. Low source impedance.	13.8VDC when 13.8 V present. **Warning: Damage may result if more than 1A is drawn!**
***RST** *i/p*	J2 pin 7	Control input to permit remote Reset of microcontroller.	Active LO input. Emulates 'Power-on Reset' . 5V, 100R pull -up.
GND	J2 pin 21	Power supply common.	Common for all regulated and unregulated supplies.

TRANSLATOR FRONT PANEL INDICATORS AND CONTROLS

The translator, shown in Figure 1 has an indicator panel with a switch and five (5) LEDs, Input and output BNC connectors and a 37-pin "D" connector. The LEDs provide an external confirmation of translator operation.

PWR - The PWR LED indicates the internal power supplies are energized, and DC power is being supplied to the translator.

TX ON - The TX ON LED indicates the microcontroller has enabled the power amplifier on the Transmit PCB.

RCV - The RCV LED indicates the Converter is receiving a sufficiently strong input signal via the Receiver.

FAIL - The FAIL LED indicates the microcontroller is in RESET mode.

DIS - The DISable LED indicates the DIS toggle switch is preventing the microcontroller from issuing a DPTT command to the Transmit PCB. The switch is provided to disable the output for testing purposes.

J1/P1 - Routes control signals to the Translator's System/Logic Board and Control Panel PCB.

J2/P2 - Provides input power and remote sensing.

RX - The Rx IN (BNC) connector routes received signals to the Receiver PCB.

TX - The Tx OUT (BNC) connector routes output signals to the antenna via the Power Monitor and Transmitter Combiner.

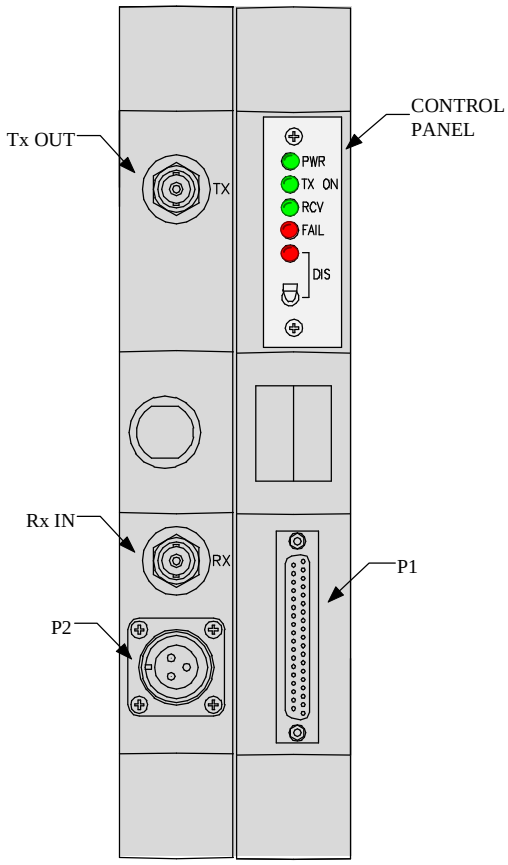


Figure 1 - Translator Front Panel Indicators

CIRCUIT ANALYSIS

GENERAL

The translator is a double frequency - conversion device. The input signal is received, and amplified before being applied to a double - balanced mixer. The oscillator frequency for this mixing process is chosen so the mixer output frequency is precisely 45.0125 MHz. This is the IF, or Intermediate Frequency. The IF signal is then filtered and amplified before being applied to a second double - balanced mixer. The frequency for the second oscillator is chosen so the mixer output is the required output frequency. This signal is applied to an RF power amplifier to provide the required output power.

The oscillator signals referred to above are both synthesized from a single reference oscillator. This has the advantage that small errors in the reference oscillator are virtually invisible since one local oscillator signal is used for down conversion, the other for up conversion and the errors cancel. This results in an overall frequency stability hundreds of times better than that of the reference.

The translator operates in the 800 MHz band at either a high or low frequency split. The high split Transmit and receive frequencies are between 851 - 870 MHz. The low split Transmit and receive frequencies are between 806 - 825 MHz.

The translator is virtually transparent to the incoming RF signal and will perform its function regardless of the modulation on that RF signal; the translator will shift the frequency of analog or data modulated signals with equal fidelity.

The frequency conversion does not provide a baseband audio signal in its processing of the received signal. This means that there is no receiver or transmitter per se; no adjustments for modulation level or limiting are required. Similarly there are no adjustments for audio level.

Three internal adjustments are made during final test; they set the output power, the threshold for the receive

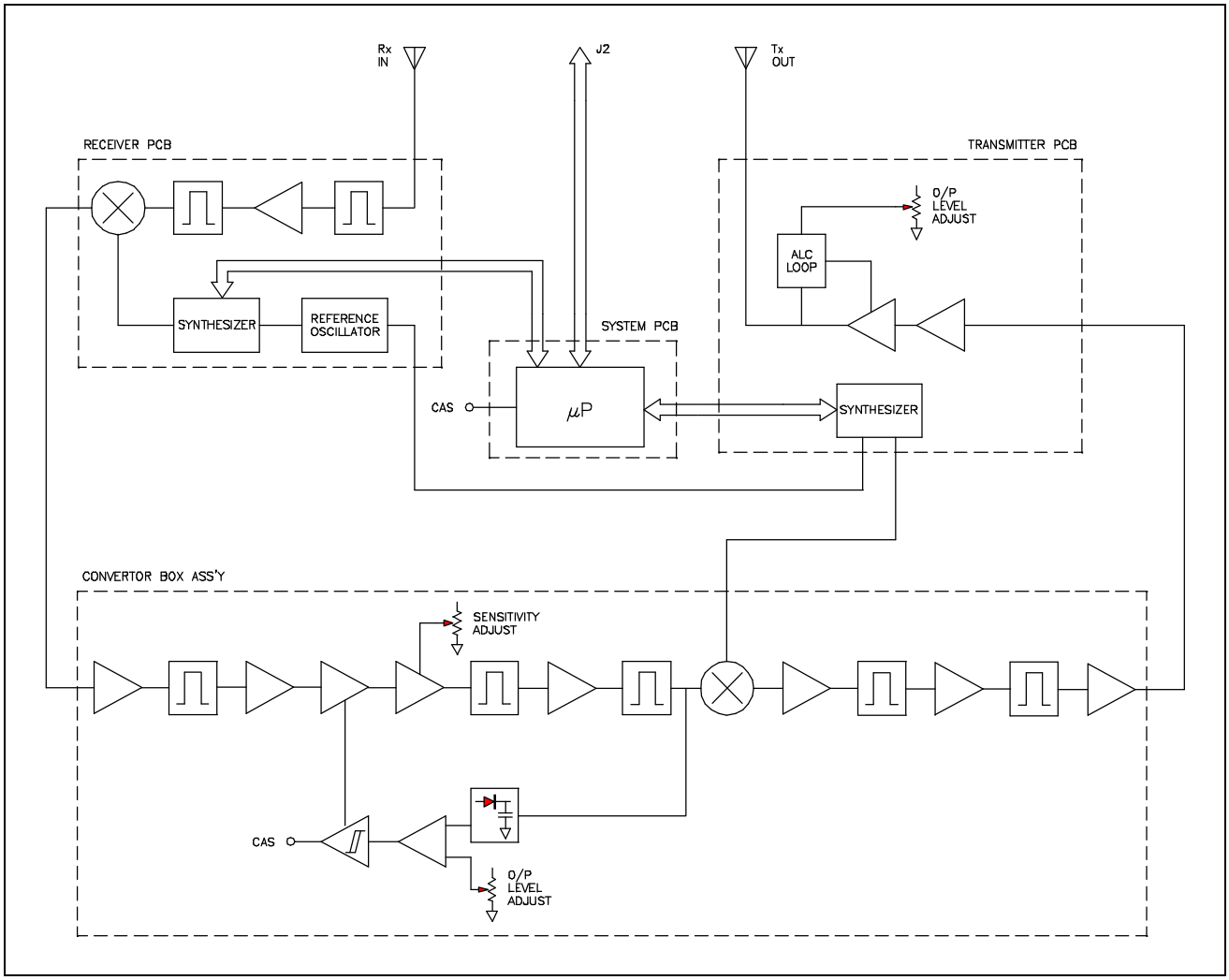


Figure 2 - Translator Block Diagram

signal level, and the reference oscillator frequency. There are no external user adjustments.

Since the presence of a receive signal enables the output stages, the front panel of the translator provides a switch for disabling the output during testing. This panel also provides a visual indication of DC power, and transmit and receive status. A multi - pin connector on the front of the unit is used to enter frequency information or to provide remote control and sensing.

RECEIVER PCB

The Receiver Board (Ericsson Part No. 19D902123G20) occupies two small bays within the translator chassis on the side with the LED panel. Its function is to take the received RF signal and convert it to the 45 MHz IF. The board also houses the 12.8 MHz temperature-compensated crystal-controlled reference oscillator (±1.5 ppm, -30°C to 60°C) and a frequency synthesizer to generate the injection signal for the down conversion.

The incoming RF signal is applied to the ceramic band pass filter Z401 via the Rx input cable and J401. The filter has a bandwidth of about 22 MHz, centered at the band mid-point, and with its twin Z402, provide RF selectivity. Between the two ceramic filters is an RF amplifier, Q401. This amp exhibits about 16 dB of gain, low noise and high dynamic range. The filtered amplified signal is applied to the double balanced mixer Z403; the mixer requires an injection level of +8 dBm from the synthesizer, and shows a conversion loss of about 6 dB. The overall conversion gain of the Receiver, from J401 to the IF output, is about 3 dB. The IF signal leaves the Receiver at this point and is routed to the Converter Box assembly for up-conversion to the final frequency.

The synthesizer generates a +8 dBm CW signal to serve as the mixer injection. For High band receivers, the mixer uses low side injection; for Low band receivers, the mixer uses high side injection. Since the same relationship holds for the up-conversion that takes place in the Converter Box, data polarity is preserved. For a detailed analysis of the synthesizer circuitry, see LBI 38841.

Similar synthesizer circuitry exists on the Transmit side. The Tx synthesizer has no reference oscillator of its own but uses the reference oscillator on the Receive side.

CONVERTER BOX ASSEMBLY

The Converter Box Assembly houses circuitry for amplifying the IF signal output from the Receiver PCB, and converts it to the desired output frequency. The Converter Box is located in the Transmit side of the translator. The PCB is enclosed in a sealed housing which isolates it electrically from the rest of the translator electronics.

The Converter Assembly also generates the Carrier Present signal which gates the DC supply to the final amplifier stages; this prevents received noise being transmitted in the absence of a coherent input signal. An **A**utomatic **G**ain **C**ontrol circuit ensures a constant output level and linear operation over an input level range of -110 dBm to -25 dBm.

This up-converter has 115 dB of conversion gain and very high requirements for internal stage-to-stage isolation. This isolation is achieved by using efficient power supply filtering, a continuous ground plane on the underside of the printed circuit board, and careful circuit layout.

The IF signal from the Receiver PCB enters the converter via J2 and is applied to U1, the first amplifier stage. This is a monolithic broadband amp with 18 dB of gain, and a 50 Ohm input and output impedance. The output of U1 is filtered by FL1, a four-pole piezoelectric bandpass filter with a 3 dB bandwidth of 15 kHz, a center frequency of 45.0125 MHz, and a 2 dB insertion loss. The filter is internally matched to the 50 Ohm source and load impedances. U2 is similar to U1.

C5, C6, and L3 match the output impedance of U2 to the high input impedance of U3. C14 and T1 match the output of U3 to 50 Ohms. U3 is an MC 1350, a 50 dB gain 45 MHz amplifier with up to 80 dB of gain reduction. The amount of gain is controlled by varying the DC voltage at U3 pin 5. This feature is used to perform AGC action.

AT1 is a 6 dB attenuator which isolates the previous high gain stage from the following 18 dB gain amplifiers, U4 and U5. The current supplied to U4 is adjustable via potentiometer R21 to adjust the gain from 5 to 18 dB. There is additional interstage filtering in FL2 which functions similar to FL1, described previously. C25 through C33, and L9 and L10 form an LC bandpass filter which attenuates harmonically related amplification products before the IF signal is delivered to the mixer Z1. The 6 dB pad AT2 at the input to the mixer provides a broadband termination at the IF mixer port.

FL1 and FL2 are the primary components shaping the transmitted passband. They ensure the translator exhibits the required selectivity, and limit the transmitted output spectrum to comply with regulatory requirements.

The mixer output at the transmit frequency is coupled to the first UHF amp U8 via C35. U8 is similar to the monolithic amps used in the IF strip, except it has 9 dB gain. FL3 is a 3 dB loss ceramic bandpass filter which reduces undesired mixer products; its bandwidth is 22 MHz, and passes the entire sub-band. FL4 is similar.

U9 and U10 are 7 dB gain blocks with higher maximum output level capabilities. They raise the signal level to its final value of approximately +3 dBm. The signal leaves the Converter assembly via J3 before application to the Transmit board which amplifies the signal to its final output level.

The Local Oscillator signal for the up-conversion injection originates on the Transmit board. It is delivered to the mixer via J1 and C34 at a level of approximately +8 dBm. Since the IF frequency is 45.0125 MHz, the local oscillator signal is 45.0125 MHz away from the output frequency. On high band converters, the injection is from the low side, and on low band converters high side injection is used.

The AGC loop is based on two ICs, U6 and U3. U6 is a low level AM video detector which is used to detect the IF level. U3, the variable gain AGC amp, was described above.

The detector output is a DC voltage directly proportional to the instantaneous signal level at the LC BP filter output, the detector pick-off point. This location was chosen because of the relative spectral purity of the IF signalat this point. The detector output is linear over a 30 dB range of input level, and can detect signals at much lower levels than a diode detector can.

The detector's output , at U6 pin 5, is compared in U7B to a reference voltage derived from the setting of potentiometer R10. This setting controls the output level of the converter, normally +3 dBm. An error voltage representing the difference between desired signal level and measured signal level is buffered and filtered by U7A before connection to the variable gain amplifier U3 at pin 5. This error voltage adjusts the gain of U3 so that the desired signal level at the detector input is maintained, and the error voltage is zero.

The transient response of the loop is determined by the loop gain (IF and DC), the IF bandwidth and the response lag of the detector IC. The response is controlled by the three RC time constants C16-R8, R5-C52, and R4-C9. These components were chosen to yield a minimum rise time consistent with stability concerns; overall loop response gives a CAS (Carrier Activity Sensor) response time of 1.5 ms at an input level of 1μV (-107 dBm). This is approximately one-tenth the time required by standard receiver-noise filter CAS circuits typically found in radio transceivers.

The AGC voltage which drives the variable-gain amp U3 also generates the logic signal indicating carrier presence. A low voltage on the AGC line indicates maximum gain within U3 and the absence of an input signal. When an input signal is received, the detector output at U6 pin 5 increases, the AGC voltage at U7A pin 1 increases, and the gain of U3 decreases to stabilize the output level. The output of U7A is also compared to the voltage reference provided by U7C. An AGC voltage greater than this reference indicates carrier presence and activates the LED D3 via the comparators U11A and U11B. The signal at TP2 leaves the converter box assembly in order to control the power amplifier in the Transmit PCB via the microprocessor on the System board.

A regulated 11 Vdc supply is provided by VR1, a low dropout variable output regulator. This regulator will deliver the required current for the module with an input/output differential as low as 0.6 volts. All of the ICs in the IF chain are operated from this supply. VR2 generates a 5V rail for the comparators so that they can interface with the logic circuits on the System board.

There are two jumpers on the Converter PCB which are used for test purposes. JP1 is associated with the AGC loop. In the Normal position, the error amplifier is connected to U3 so that gain will be automatically controlled; in the Test position, the AGC line is grounded through R3 and U3 operates at maximum gain. Typical operation is with JP1 in the Normal setting.

JP2 is associated with the CAS signal line. In the Normal position, the CAS signal gates the 11VDC supply line which powers the UHF amplifiers U8-U10 by controlling the bipolar transistor switch Q1-Q2. In this way, the converter output is reduced by about 60 dB in the absence of signal. However, with JP2 in the Test position, the UHF amplifiers are always on, and there is converter output regardless of the state of the CAS line. Since gating of the Translator output is accomplished by the microprocessor in this application, typical operation is with JP2 in the Test position.

Sensitivity is adjusted in the following way. Once the output level is set to +3 dBm by adjusting R10 using a large input signal, the input level is reduced to the desired threshold value, typically -110 dBm.. Then, the gain in the IF chain is set by adjusting R21 so that at this threshold value of input signal, the detector output and therefore the AGC voltage is high enough to exceed the reference voltage at U7C. This causes a transition in the CAS signal with the result that the PA is keyed and the signal is transmitted. At input levels below the threshold value, the AGC voltage is too low to cause a CAS transition and the PA remains off.

System considerations limit the sensitivity of the translator since a minimum isolation must exist between the transmit and receive ports of the translator. If the recommended transmitter combiners and associated filters are used, the translator will operate with a minimum of 70 dB of Rx-Tx antenna isolation. At larger separations between Tx and Rx frequencies, this minimum isolation between Tx and Rx antennas decreases to 50 dB. A more

detailed description of site requirements is found in Extender Site System Description.

TRANSMITTER PCB

The Transmitter PCB is housed on the Converter side of the Translator chassis. It contains circuitry to amplify the RF signal from the Converter at +3 dBm to its final value of 5W to 17W. A temperature compensated leveling loop ensures that the output power remains constant at any output frequency over the full operating temperature range of the Translator. There is also over-temperature protection circuitry to reduce the output power in the event of thermal overload.

The Transmitter PCB also contains a frequency synthesizer which generates the local oscillator signal required by the Converter. This synthesizer has no reference oscillator of its own, but uses the 12.8 MHz reference signal generated in the Receiver section.

The output of the Converter Box Assembly enters the Transmitter PCB at A102 pin 1 via a soldered coaxial connection on the underside of the PCB. A102 is a small PCB, perpendicularly mounted to the main board, which contains the Exciter, or pre-amplifier, for the final amplifier stage. It has 20 dB of gain, and a power output of 200 mW or 23 dBm. The RF signal leaves A102 from pin 3 and is applied directly to the power amplifier module U101. This PA has 20 dB of gain and a maximum power output of 20 W, or 43 dBm. The output of the PA module is connected by a short coax jumper (J102-J103) to a second harmonic low pass filter, a directional coupler and finally to the transmit port.

The directional coupler senses and detects the RF level, and compares this voltage to the Power Set voltage determined by the potentiometer R111. U103 compares these two voltages and uses the error to control bias on the series regulator formed by Q101, Q102. This regulator adjusts the supply voltage to the PA module U101 at pins 2, 3 and in this way controls output power.

The synthesizer on this board provides the LO injection signal for the up-conversion which takes place in the Converter Box. For a detailed circuit analysis of the synthesizer circuitry, see LBI 38849.

SYSTEM / LOGIC PCB

The System /Logic Board is the largest PCB in the translator and occupies about 3/4 of the area on the LED panel side of the chassis. This assembly communicates with a PC for frequency programming purposes and with the other PCB assemblies within the translator; it also permits remote monitoring and control of the translator. A visual inspection of the board indicates that this assembly has capabilities not required in this application, since portions of the PCB are not loaded with components.

The heart of the PCB is a 80C32 microcomputer that supervises the operation of the translator. Its main functions are to receive, store and load frequency information to the synthesizers, and to receive the CAS signal from the Converter Box in order to generate the PA Enable signal, or PTT. Associated circuitry includes an EPROM which stores the operating instructions for the micro, an EEPROM which stores the channel information, and three 8-bit latches with their decoder and buffers. A Watchdog Timer serves as the reset circuit.

U301 is the microcomputer, an eight-bit device with an external address and data bus. Crystal Y301 is used for the processor clock which runs at 11.0592 MHz. Bus lines AD0 through AD7 form a multiplexed data/address bus controlled by latch U305 which is used to hold the lower 8 bits of the address when ALE is low. The upper eight bits of address are A8 through A15.

The program for the microcontroller is contained in the EPROM U302, and is accessed when the *PSEN line is low.

U311 is a decoder IC which subdivides the memory in the microcomputer from 8000 to FFFF into 8 blocks; only two of these are used by the output latches U308 and U309. When *WR goes low, and the corresponding output line from U311 goes low, the latch CLK input transition causes the data from the microcontroller data bus to be read, latched and transferred to the output pins of the latch. If a microcontroller RESET occurs, each latch is reset so that all output pins are at a LOW level.

Output latch 1 U308 controls the synthesizer functions. Outputs Q5 (*S-CLK), and Q6 (*S-DATA) are used to output a stream of serial data to both the transmit and receive boards simultaneously. Outputs Q2 and Q3 provide *S-ENABLE outputs for the Tx and Rx boards respectively. These outputs, when LOW, latch frequency data into the respective synthesizer circuit. These signals can be found at J501 pins 9- 11 for the Receiver, and at J502 pins 9-11 for the Transmitter. They are active when the synthesizers are loaded after a RESET on power-up, if the Watchdog Timer times out, or if an out-of-lock condition is detected. If the TX or RX LOCK DET line from the synthesizer goes low indicating out-of-lock, then the synthesizers are re-loaded. A visual indication of this condition is provided by Q302 and LED D302 (Tx), or by Q301 and LED D301 (Rx); the LEDs are labeled ‘TX unlock’ and ‘RX unlock’.

Output latch 2 U309 provides transmit control in the following manner. The CAS signal output from the Converter Box is applied to the System/Logic PCB at TP 110, which is connected directly to the micro at U310 pin 9. Output Q2 from the latch when HI provides the DPTT

signal that keys the transmitter. Buffer 312-F inverts the high output from U309 for application to the Transmit board.

Frequency information is stored in EEPROM U304, a writable, non-volatile memory device. The memory is accessed via two serial control lines from the microcomputer. The memory power source is controlled by transistor Q303, such that power is removed whenever the microcontroller is in the RESET state, causing U304 to be reset as well. This does not affect the memory contents but ensures that the device remains off during the reset period of the micro. The EEPROM is written to using the same two serial lines when the translator is programmed for channel information.

The Reset Circuit consists of the watchdog timer U306 and associated circuitry. The timer is configured as a square wave oscillator with a period of about 150 ms, and its output at U306 pin 3 is connected to the micro RESET input at U301 pin 10. On power-up, the reset output from the regulator U403 remains LOW for 30 ms after the 5V output is within range, and then goes HI. While LOW, the timer U306 is disabled and the RST output is forced HI, which resets the micro. Capacitor C318 begins charging through resistors R315 and R315, and after 100 ms, its voltage exceeds the trigger voltage at the THRESHOLD input of the timer U306. When this happens, the DISCHARGE pin of U306 goes LOW, and C18 begins to discharge through R315. At the same time, the output of the timer and the RST line to the micro go LOW which permits the micro to begin operation.

If C18 continues to discharge, the TRIGGER input to the timer will be activated, the output of the timer will go HI, the micro will be reset, and the timing process will be

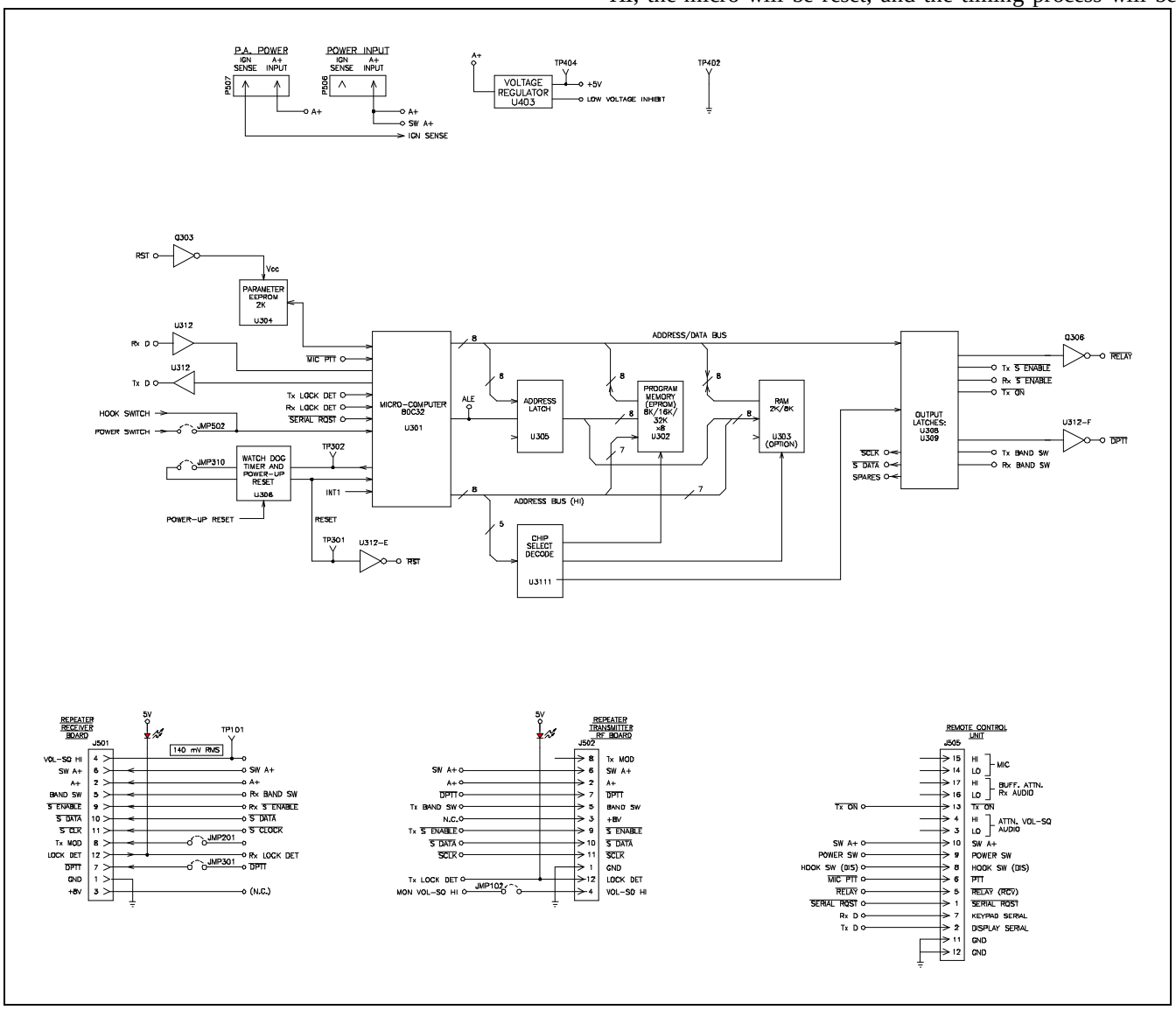


Figure 3 - System / Logic Board Block Diagram

repeated. The micro can prevent this repeating reset from occurring by delivering pulses to C317 from U301 pin 6. Q304 is pulsed ON, causing C318 to be recharged and thus delaying the reset. If the micro fails to issue these pulses due to some error in operation, then the watchdog timer will output a RST signal, and the microcontroller will be re-initialized.

If the 5V power supply drops below its normal range, regulator U403 will output a LOW from pin 2, forcing the watchdog timer to reset the microcontroller. This will prevent unreliable operation caused by loss of power.

Jumper JMP310, when removed, disables the watchdog timer; power-up reset is not affected. JMP 310 should be left in place for normal operation.

The microcontroller communicates with the programmer unit via the RXD and TXD lines. Buffers U312A-D isolate the micro from the external inputs. Static discharge protection is provided by D508-509, R508-509 and R513.

The microcontroller monitors the lock status of the frequency synthesizers on the Transmit and Receive boards via the TX LOCK DET and RX LOCK DET lines. If a LOCK DET line goes LOW, indicating an out-of-lock condition, the micro will reload the frequency information into the synthesizers. A visual indication on the PCB is provided by Q302 and LED. D302 for TX UNLOCK, and by Q301 and LED. D301 for RX UNLOCK. Both synthesizers must be locked before the DPTT signal can be sent from the microcontroller to the Transmit board to enable the output amplifier.

FRONT PANEL AND EXTERNAL CONNECTIONS

The translator Local Control Panel has a toggle switch and five (5) LEDs mounted on the PCB (7L0017A01). The LEDs provide external confirmation of translator operation. The signals which control the indicators are also available at the 37 pin D connector, J2, for remote sensing and control. The toggle switch SW1 allows a technician to disable the output for testing purposes.

The green power LED, **PWR**, (CR1) provides an indication that the internal power supplies are energized, and that DC power is being supplied to the translator. The LED. is driven from the internal 5V regulator on the System board, U403. For external DC power sensing, the internal A+ buss is available at J2 pin 6.

The green transmitting LED, **TX ON,** (CR2) is ON when the microcontroller enables the power amplifier on the Transmit PCB. The LED is driven from U311 pin 12 by the DPTT line. This signal is provided at J2 pin 5 so that an external RF power monitoring device has a command to measure power.

The green receiving LED, **RCV**, (CR3) is ON when an input signal of sufficient strength is being delivered to the Converter via the Receiver. It indicates that CAS is HI, and that the microcontroller can issue a DPTT command. The microcontroller will issue the DPTT command unless a fault condition exists, or if the toggle switch (SW1) is in the DISable position. The LED is driven from the *RELAY line at P505 pin 5 which is in turn connected to Q306 and the latch U308. This output changes state in response to a change in the CAS signal output from the Converter.

The red fail LED, **FAIL**; (CR4) indicates that the microcontroller is in RESET mode. The indicator is driven from U312 pin 10, a buffer in the Watchdog Timer circuit. This FAIL signal is also provided at J2 pin 1 for remote monitoring. A failure may be simulated by temporarily removing the program EPROM U302.

The red disable LED 5, **DIS**, (CR5) indicates that the toggle switch has prevented the microcontroller from issuing a DPTT command to the Transmit pcb. The toggle switch brings the HOOKSWITCH line low, and since the cathode of LED 5 is connected to HOOKSWITCH at P505 pin 8, the indicator is lit. Remote monitoring of the toggle is available at J2 pin 3.

The translator may be RESET from an external input at J2 pin 7; this point is connected to C318, part of the Watchdog Timer.

ALIGNMENT PROCEDURES

TRANSLATOR

Test Equipment Required:

DC Power Supply, 13.8 V, 10 A

Spectrum Analyzer

Signal Generator

Marconi Radio Test Set

Oscilloscope, 2 ch., 100 MHz storage

RF Power Meter

Procedure:

1. Load the required test frequencies into the synthesizers using programming software 6D017X0201 and programming cable 7W017A0501.
2. Set the reference oscillator frequency to 12.8 MHz ± 1 Hz. Connect the coaxial cable at U205 on the Transmitter Board to a frequency counter and adjust U204 on the Receiver board.
3. Apply an unmodulated signal at the input frequency at a level of -90 dBm to the input port. Enable the transmitter using the front panel switch and measure the output power. Adjust R111 on the transmitter board to set output power according to the chart below.

High Split	15W	15W	10W
Low Split	5W	5W	5W

4. The HB 10W unit is for the control channel. This set of six power levels forms a single site of three channels. For additional working channels, increase the number of HB 15W and LB 5W units to suit.
5. Put the press shields (qty. 4) in place on both the transmitter and receiver sections.
6. Set the input sensitivity. Apply an input signal at a level of -110 dBm, and adjust R21 on the converter PCB so that CAS is activated at -110 dBm. Replace the cover on the converter and
7. Verify the sensitivity setting.
8. Fill out the Translator Checklist, 8T017A05. A sample sheet is attached.
9. Measure the attack and release times using the test adapter, the oscilloscope, the signal generator and the Marconi. Use the Marconi as a down - converter and display its 10 MHz output on the oscilloscope; trigger the scope from the CAS test point on the test adapter. Use an input level of 1 µV (-107 dBm). By toggling the signal generator output, the attack time and release time can be measured by measuring the time between CAS transition and attack or release. Record these times on the Checklist in the appropriate area.
10. Toggle the switch on the test box; this applies a reset signal to the µP on the System board. The 'FAIL' LED on the Translator indicator should light. The LED on the test box should light which indicates operation of the 'FAIL' output data line. Both LEDs lit indicate correct operation of the RST input. Check the appropriate boxes on the Translator Checklist.
11. Attach the outer covers to the translator chassis. Verify sensitivity setting and distortion measurement.
12. Serialize the translator and affix the appropriate labels.
13. This completes the procedure.

CONVERTER

Test Equipment Required:

RF Signal Generator Marconi 2955A

45 MHz, -120 dBm to -20 dBm

Spectrum Analyzer HP 8560A

RF Signal Generator HP 8640B
800-900 MHz, +10 dBm

Oscilloscope, dual, 100 MHz, storage

DVM

DC Power Supply 0-15 Vdc, 1A

SMB to BNC coaxial adapters (qty. 3)

Procedure:

1. Turn the potentiometer R21 fully ccw. Put jumpers JP1 and JP2 in the position marked Test.
2. Connect the power supply to the converter, and check the current consumption. It should be between 200 and 400 mA @ 13.8 Vdc.
3. Using the Marconi, apply a signal at the IF frequency of 45 MHz at - 90 dBm to the port J2. Apply a LO signal to the Osc. In port J1 at a level of 8 dBm. Connect the spectrum analyzer to the output port J3; use a 100 kHz span, and a 1 kHz resolution bandwidth.

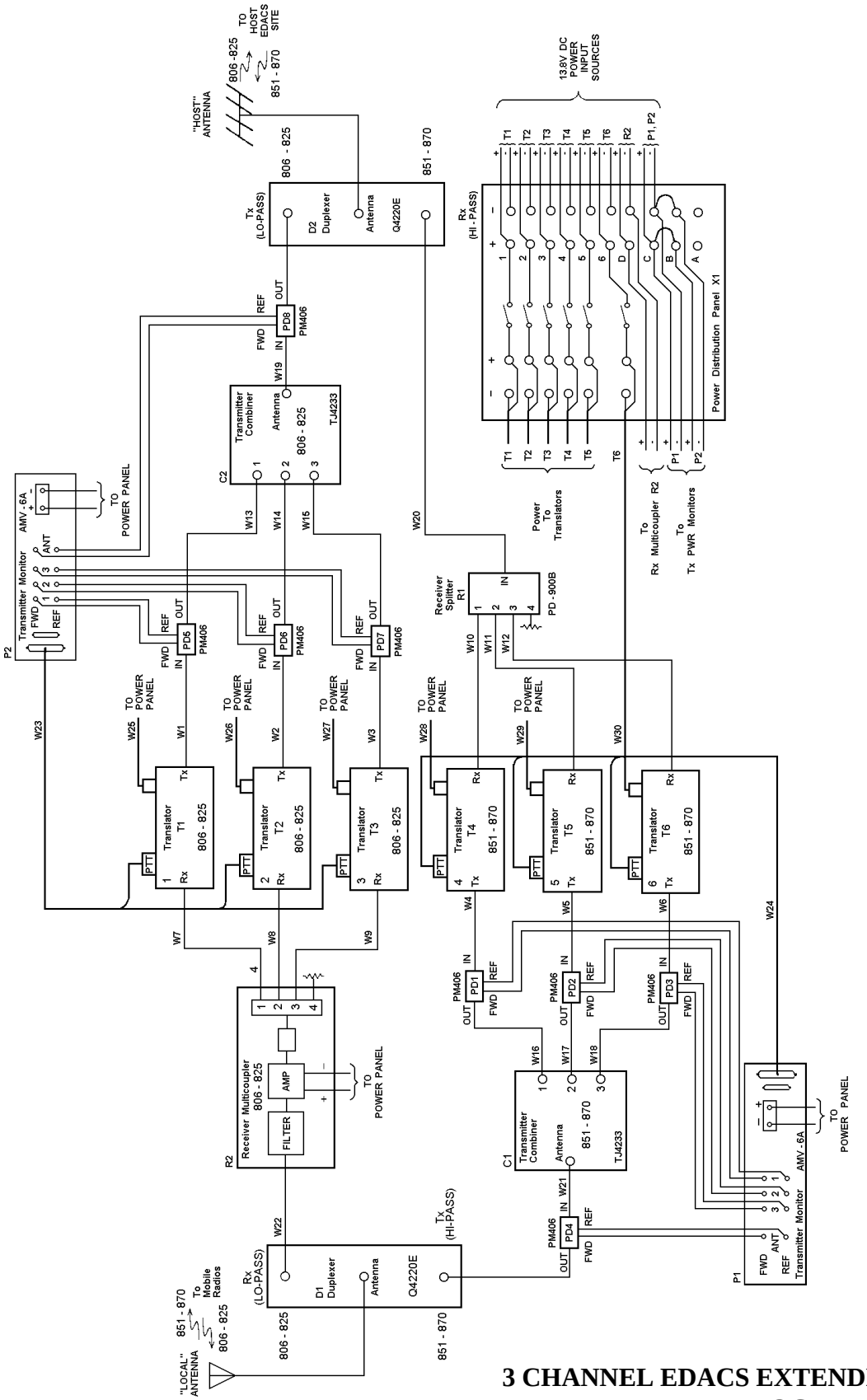
Use the following chart to choose LO and O/P frequencies.

Table 2 - LO and O/P Frequencies

Port / Function	High Band	Low Band
J1 / LO injection	816.0125 MHz	861.0125 MHz
J2 / IF input	45.0125 MHz	45.0125 MHz
J3 / RF output	861.000 MHz	816.000 MHz

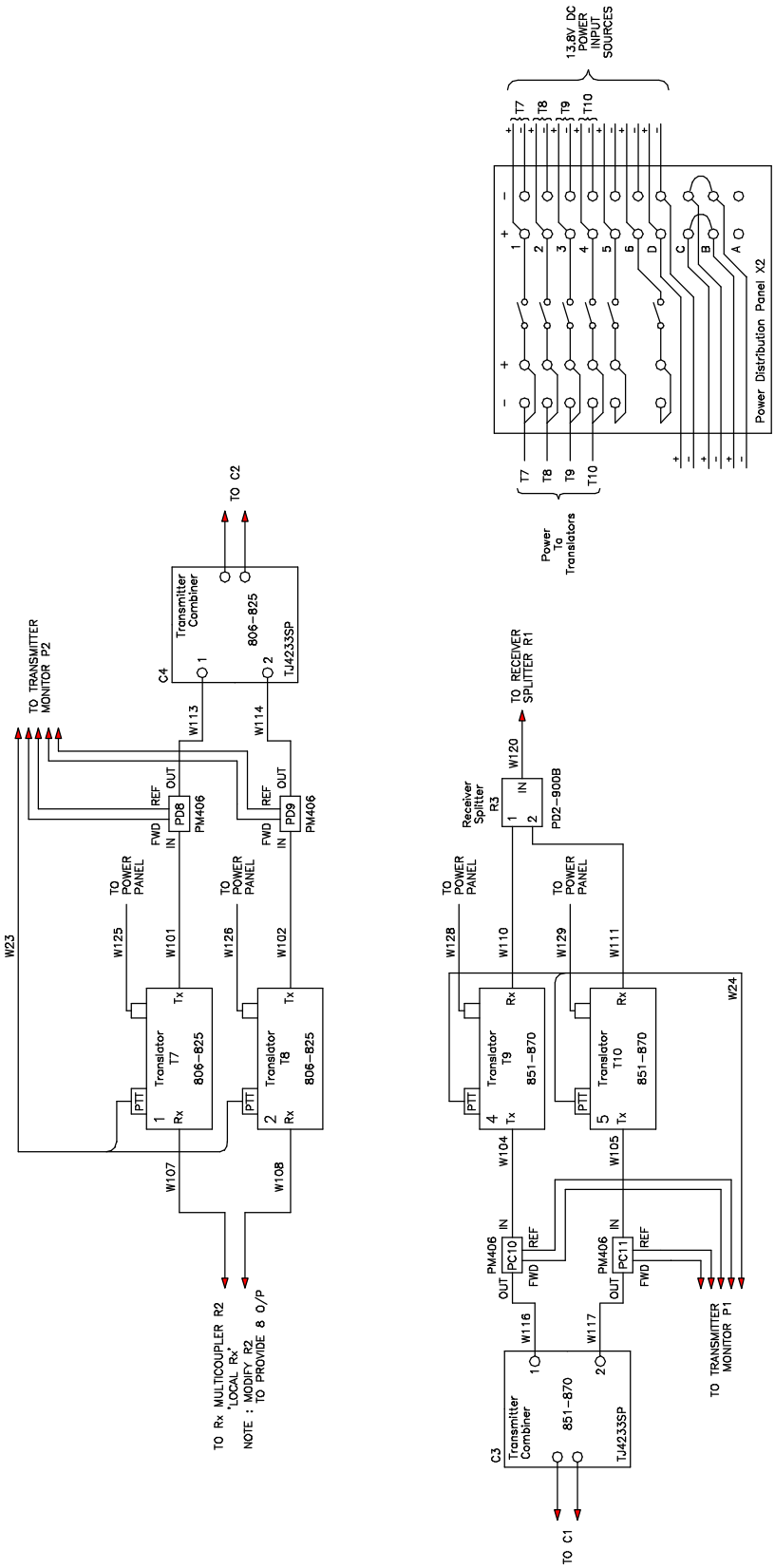
4. Align L2, T1, L9 and L10 to peak the output level. Ensure that the output level does not rise above 4 dBm since the amplifiers will saturate; reduce the output level by reducing the input level.
5. Align the detector circuit by monitoring U6 pin 5 with a DC voltmeter and tuning L6 for a maximum reading.
6. Set the output level. Put jumper JP1 in the **N**ormal position, and adjust R10 for an output level of 3 dBm. You may have to increase the input level to do this.
7. Set the input level now to -110 dBm, and adjust R21 so that the LED D3 just comes on.
8. Set the input level to -90 dBm. Monitor U7 pin 1 with a DC meter and re-tune L3 and T1 to give a maximum reading.
9. Readjust R10 and R21 if necessary to give an output level of +3 dBm, and an input sensitivity of -110 dBm.
10. Use nail polish and seal the ferrite cores and the potentiometer screws. Serialize the unit by placing a sticker on the converter, and by completing the converter checklist.
11. The timing measurements require the Marconi to be used as a demodulator; take the 10 MHz output from the rear of the Marconi and display it on the oscilloscope. The oscilloscope is used in storage mode; the CAS signal from the converter is displayed also, and used to trigger the sweep.

    With an input level of 1µV (-107 dBm) and JP2 in **T**est position, the instant at which the input signal is applied (or removed) can be seen on the oscilloscope. The time interval to be measured is that between the CAS transition and the appearance (or disappearance) of coherent output.
12. Place jumper JP1 in the **N**ormal position, and JP2 in **T**est position. Place the top cover on the converter and secure it with only two or three screws since sensitivity (R21) will be readjusted after the converter is installed in the translator chassis.
13. This completes the procedure.



3 CHANNEL EDACS EXTENDER SITE BLOCK DIAGRAM

(8D017B05, Sh. 1, Rev. 1)



2 CHANNEL EDACS EXPANSION BLOCK DIAGRAM

(8D017B05, Sh. 1, Rev. 1)

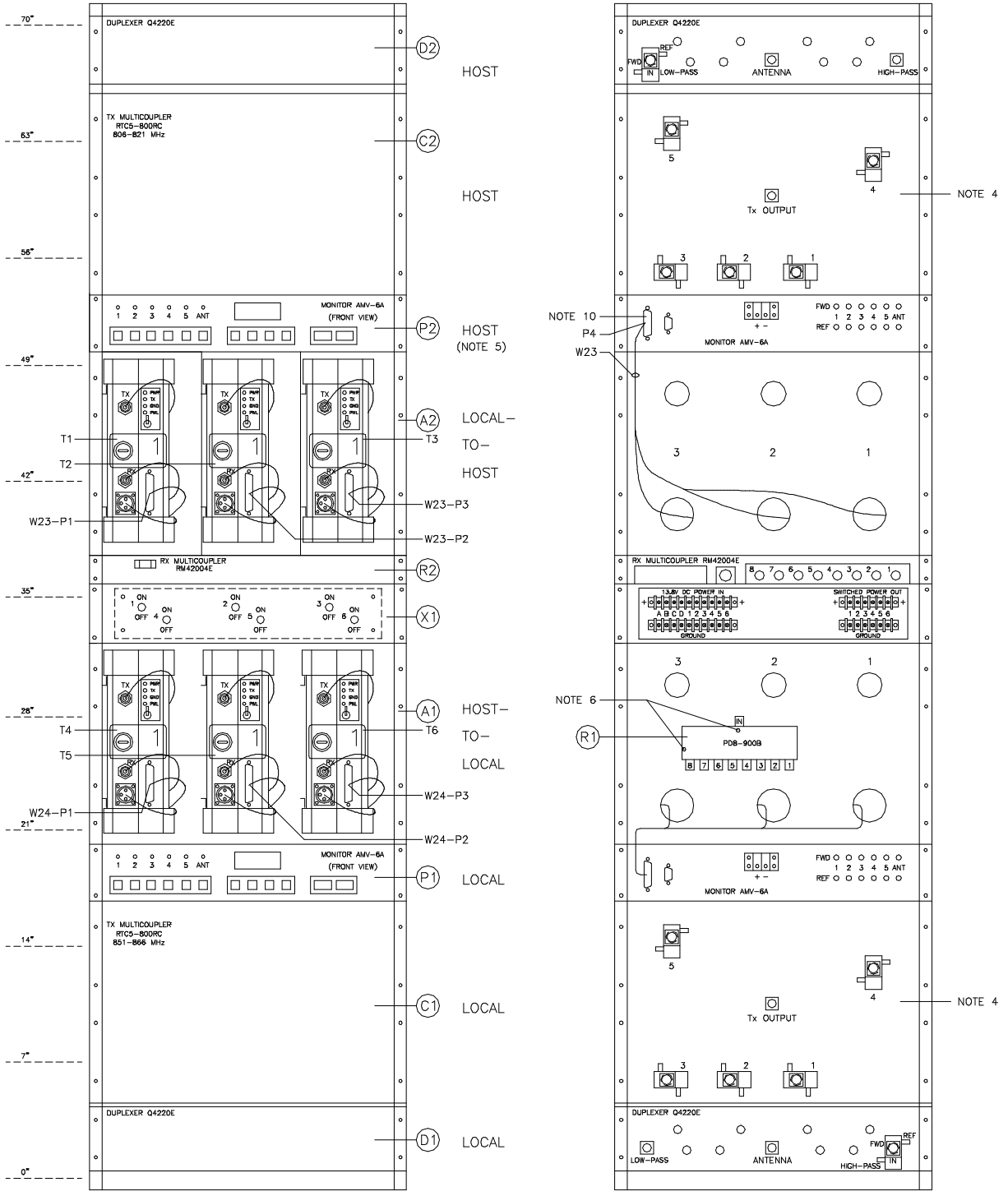
3 CHANNEL TRANSLATOR SYSTEM

7F017X02P1 - Complete 3-Ch EDACS Extender Site
7F017X02P2 - Complete 3-Ch EDACS Extender Site less TX Pwr Monitors

Rev. 5

SYMBOL	PART NUMBER	DESCRIPTION
		---------- ASSEMBLIES ----------
T1	7F017X01-02	Translator: "host" translator 806-825 Tx-Rx.
T2	7F017X01-02	Translator: "host" translator 806-825 Tx-Rx.
T3	7F017X01-02	Translator: "host" translator 806-825 Tx-Rx.
T4	7F017X01-01	Translator: "local" translator 851-870 Tx-Rx.
T5	7F017X01-01	Translator: "local" translator 851-870 Tx-Rx.
T6	7F017X01-01	Translator: "local" translator 851-870 Tx-Rx.
D1	Q4220E	Duplexer: "local" 806-825/851-870 (Sinclair), (used in P1 only).
D1	PD5134-18BK	Duplexer: "local"" 806-825/851-870 (Cell-Wave)" (used in P2 only).
D2	Q4220E	Duplexer: "host" 806-825/851-870 (Sinclair)" (used in P1 only).
D2	PD5134-18BK	Duplexer: "host"" 806-825/851-870 (Cell-Wave)" (used in P2 only).
C1	RTC5-800-RC/3D017X01	Tx Multicoupler/Combiner : "local" 851-870 (Sinclair).
C2	RTC5-800-RC/3D017X01	Tx Multicoupler/Combiner : "host" 806-825 (Sinclair).
R2	RM42008E	Receiver Coupler: "local", 806-825 (Sinclair) w/5 terminations.
R1	PD8-900B	Splitter: Passive Splitter, 4-way "host" (Sinclair) w/5 terminations.
P1	AMV-6A/3D017X02	Power Monitor: Panel, w/cables "local" 851-870 (Sinclair) (used in P1 only).
P2	AMV-6A/3D017X02	Power Monitor: Panel, w/cables "host" 806-825 (Sinclair) (used in P1 only).
X1	7P017X01-02	Power Panel: Dc Power Connect Panel w/ switches and fuses (used in P2 only).
X1	7P017X01-01	Power Panel: Dc Power Connect Panel w/ switches (used in P1 only).
	CT19R4A12F40S:3D017X03	Dc Power Supply: 13.5Vdc @ 40a output, 120V/1ph/60 hz input (Staticon) (used in P2 only).
	7F017X05-01	Power Supply Installation Kit and Pack with staticon(used in P2 only).
		---------- CABLES ----------
W1 thru W6	7W017X07-06	Coax Cable Assem.: BNC(m) to N(m) 205cm.
W7	7W017X07-07	Coax Cable Assem.: BNC(m) to BNC(m) 75cm (qty. G1=3, G2=1).
W8	7W017X07-08	Coax Cable Assem.: BNC(m) to BNC(m) 85cm (qty. G1=5, G2=1).
W9	7W017X07-09	Coax Cable Assem.: BNC(m) to BNC(m) 95cm (qty. G1=9, G2=1).
W10	7W017X07-05	Coax Cable Assem.: N(m) to BNC(m) 150cm (qty. G1=3, G2=2).
W11 and W12	7W017X07-04	Coax Cable Assem.: BNC(m) to N(m) 125cm (qty. G1=3, G2=2).
W13	7W017X07-10	Coax Cable Assem.: BNC(m) to BNC(m) 125cm (used in P1 only, qty. 2).
W14 and W15	7W017X07-11	Coax Cable Assem.: BNC(m) to BNC(m) 160cm (used in P1 only, qty. 2).
W16 thru W18	7W017X07-10	Coax Cable Assem.: BNC(m) to BNC(m) 125cm (used in P1 only, qty. 6).
W19	7W017X07-02	Coax Cable Assem.: N(m) to N(m) 160cm (qty. G1=1, G2=2).
W20	7W017X07-01	Coax Cable Assem.: N(m) to N(m) 80cm (qty. 2).
W21	7W017X07-02	Coax Cable Assem.: N(m) to N(m) 160cm (qty. G1=1, G2=2).
W22	7W017X07-03	Coax Cable Assem.: N(m) to BNC(m) 100cm (qty. 2).
W23 and W24	7W017X04-01	Cable Assembly: PTT Handling (used in P1 only, qty. 2).
W25 thru W30	7W004X07-03	Cable Assembly: DC Power Cable, Repeater (mil-style) (qty. 6).
		---------- MISCELLANEOUS ---------
1	2H017D01-01	Rack Panel: Triple-translator Mounting Panel (qty.2).
2	23118-RED	Wire: Red 18-ga (delco) (qty. 244 cm).
3	23118-BLACK	Wire: Black 18-ga (delco) (qty. 244 cm).
4	PV18-6R	Terminal: Ring Terminal, #6 / 18-22 ga (red) (panduit) (qty. 10).
5	PV12-6HDR	Terminal: Ring Terminal hd #6 / 12-16 ga (yel) (panduit) (qty. 12).
6	N80P13008C6	Screw: Phillips Pan head, 6-32 x 1/2 (qty. 14).
7	N414P13C6	Lockwasher Washer: #6 internal (qty. 14).
8	N210P13C13	Nut, hex: 6-32 (qty. 12).
9	BNC10-50T	Termination: 50-ohm BNC male (B&L).
10	T50R	Wire Tie: large 8" (qty. 15).
11	T18R	Wire Tie: small 4" (qty. 30).
12	GE85	Grommet Strip (Panduit) (qty. 90 cm) (per cm).
13	22CC50C0312	Clip: Plastic strain relief 3/8" qty. 4).
14	22CC50C0187	Clip: Plastic strain relief 3/16" (qty. 6).

SYMBOL	PART NUMBER	DESCRIPTION
15	385-262	Screw: Phillips Dr. pan head, Zn over steel, #12-24 x 1/2 (used in P1, qty. 52).
16	656-041	Washer: Flat, #12 flat x 0.050 thk, zn over steel" (used in P1, qty. 52).
17	MNF 1978U	Rack Assembly: Open Rack, 84 in. X 19 in w aluminum, pft/milstead (used in P2).



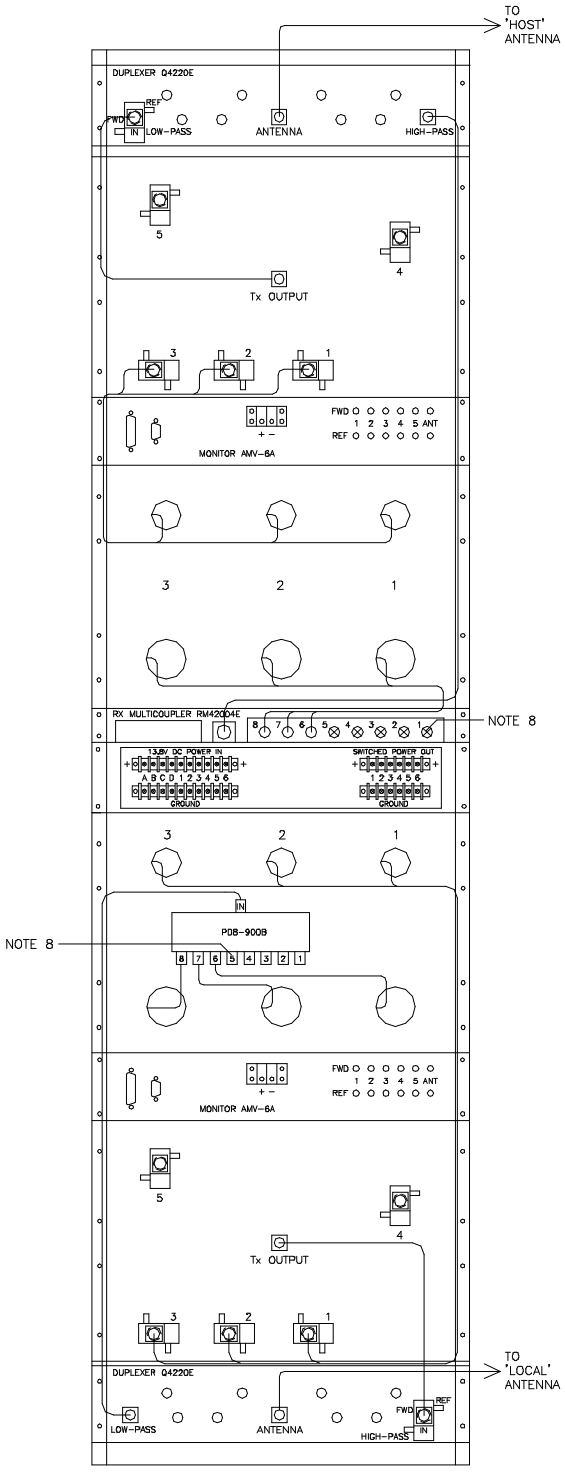
Ⓐ FRONT VIEW

Ⓑ REAR VIEW : INTERFACE CABLING

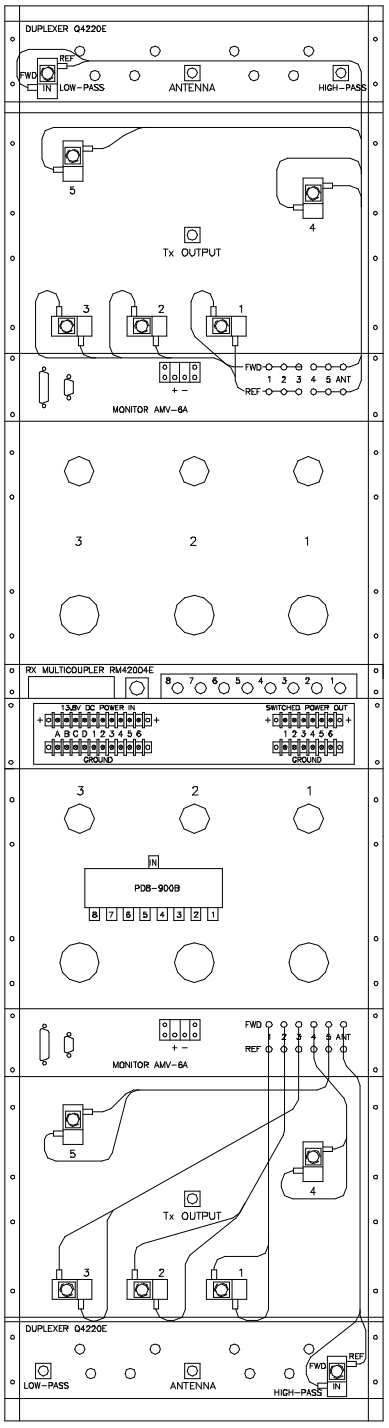
TRANSLATOR SYSTEM RACKING DIAGRAM

7F017X02G1 AND 7F017X02G2

(8H017C04, Sh. 1, Rev. 1)



Ⓒ REAR VIEW : RF CABLING

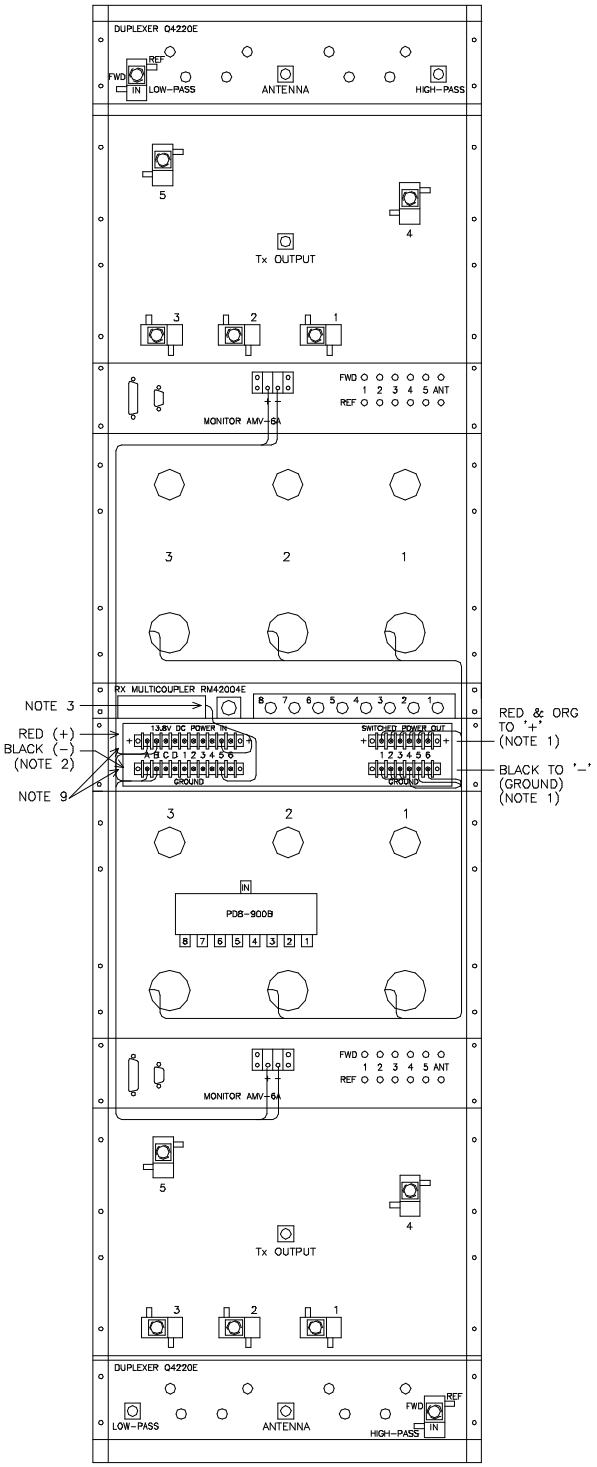


Ⓓ REAR VIEW : TX POWER MONITOR CABLING

TRANSLATOR SYSTEM RACKING DIAGRAM

7F017X02G1 AND 7F017X02G2

(8H017C04, Sh. 2, Rev. 1)



(E) REAR VIEW : DC POWER CABLING

NOTES:

1) Use terminals item 5 on wires for Translator DC Power cables. Join Red and Orange wires to one terminal.

2) Use terminals item 4 on all wire ends.

3) Wires attach to receiver amplifier, Black (ground) and Red (positive).

4) Rear views are shown with Transmit Combiner Dust Covers removed.

6) Mount PD 900B (item R1) using 2 screws (item 6) and lockwashers (item 7).

8) 50 ohm terminations required on unused outputs.

9) Connect source 13.8 VDC power to "13.8V POWER IN" (+) and "GROUND" (−) terminals to Terminal Blocks. Remove jumper bars if multiple power sources are used.

10) Connect external alarm monitoring equipment to cable connectors P4 of W23 and W24.

TRANSLATOR SYSTEM RACKING DIAGRAM

7F017X02G1 AND 7F017X02G2

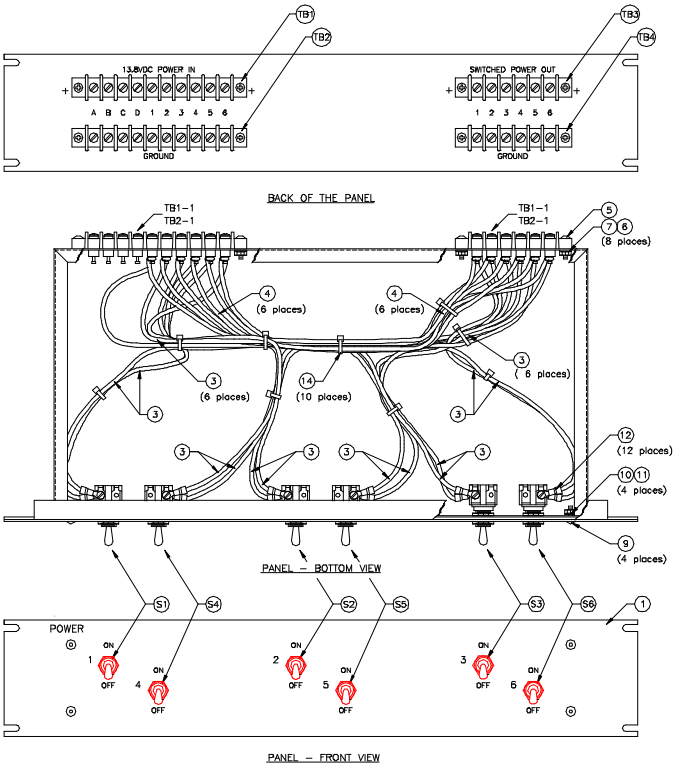
(8H017C04, Sh. 1 & Sh. 2, Rev. 1)

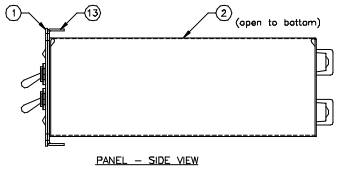
3 POWER DISTRIBUTION PANEL

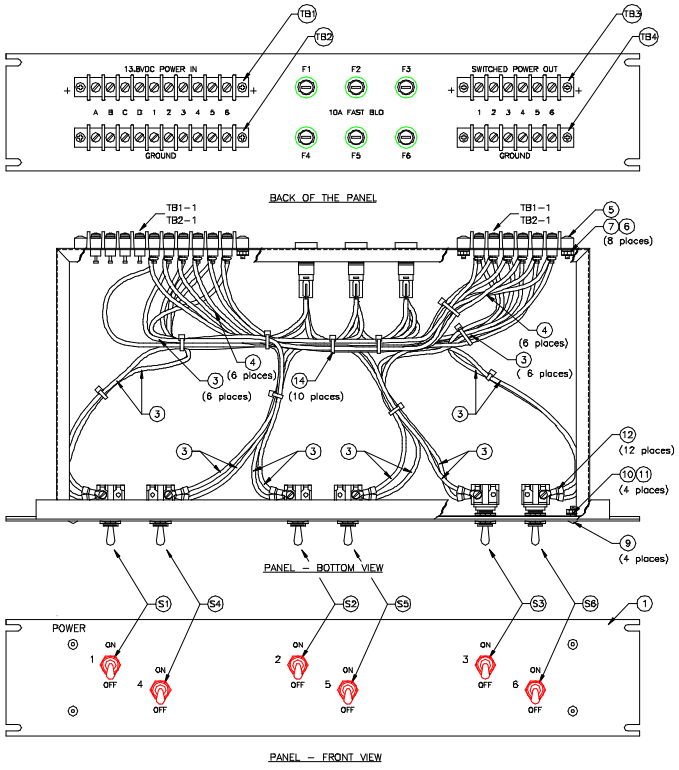
7P017X01P1 - Power Distribution Panel
7P017X01P2 - Power Distribution Panel w/Fuse Holder

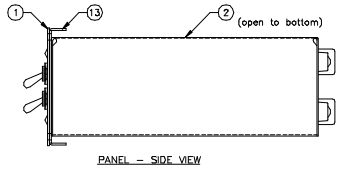
Rev. 7

SYMBOL	PART NUMBER	DESCRIPTION
1	PBFS-19-003-BK1	Panel: Rack 2-ru black (Hammond).
2	1441-28	Chassis: Steel 8 x 16 x 3 (Hammond).
TB1	GFTX-10	Terminal Block: 10-position (Curtis).
TB2	GFTX-10	Terminal Block: 10-position (Curtis).
TB3	GFTX-6	Terminal Block: 6-position (Curtis).
TB4	GFTX-6	Terminal Block: 6-position (Curtis).
S1	7320K3	Switch, toggle (Cutler-Hammer).
S2	7320K3	Switch, toggle (Cutler-Hammer).
S3	7320K3	Switch, toggle (Cutler-Hammer).
S4	7320K3	Switch, toggle (Cutler-Hammer).
S5	7320K3	Switch, toggle (Cutler-Hammer).
S6	7320K3	Switch, toggle (Cutler-Hammer).
3	2138-2	Wire: 14awg strnd 600v tew red (Delco) (qty P1=300, P2=400 cm).
4	2138-1	Wire: 14awg strnd 600v tew black (Delco) (qty. 100 cm).
5	428-048	Screw: 6-32 x 5/8 pan phil sstl (Spae-Naur) (qty. 8).
6	HN-2003	Nut: 6-32 hex sstl (Spae-Naur) (qty. 8).
7	W-2060	Washer: #6 int-tooth sstl (Spae-Naur) (qty. 8).
8	267-A42-10	Jumper: terminal block 10-position (Curtis) (Used in P2).
12	PV12-6HDR	Terminal ring: #6 12-16 yellow (Panduit) (qty.12).
9	MS-2403P-BLACK	Screw: 8-32 x 3/8 truss phil sstl black (Spae-Naur) (qty. 4).
10	HN-2004	Nut: 8-32 hex sstl (Spae-Naur) (qty. 4).
11	W-2025	Washer: #8 split sstl (Spae-Naur) (qty. 4).
14	T18R	Tie-Wrap: "tie-wrap 4"" black (Tyton)"(qty. P1=10, P2=20).
15	THT-5-428-10	Label: (brady) - marked with part number.
16	944001695	Label: (brady) - clear.
18	345-601	Fuseholder: Littlefuse; with solder tabs; for 1/4 x 1 1/4 fuses (Used in P2, qty. 6).
19	AGC - 10	Fuse: Bussmann; 10 a fast blo; 1/4 x 1 1/4 (Used in P2, qty. 6).

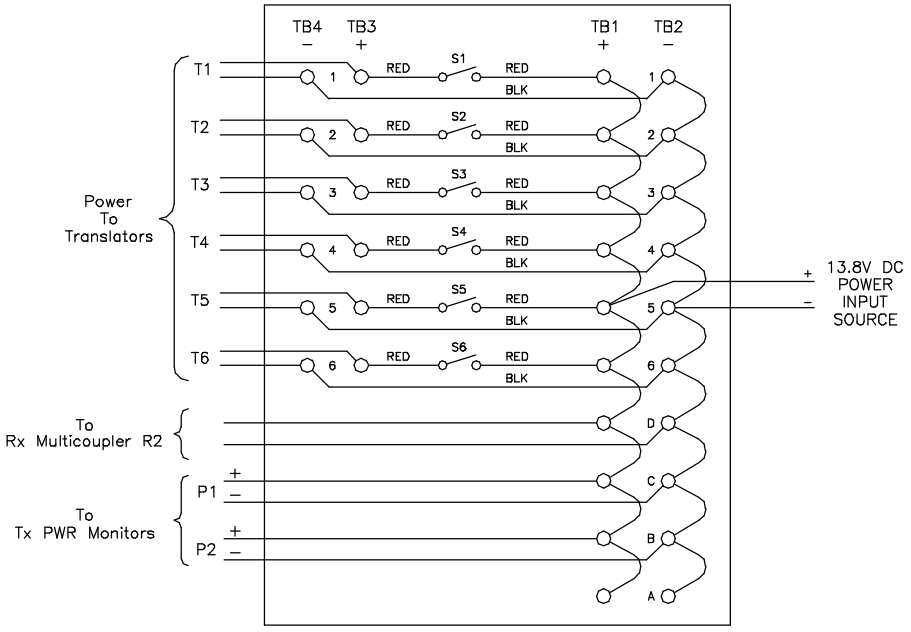




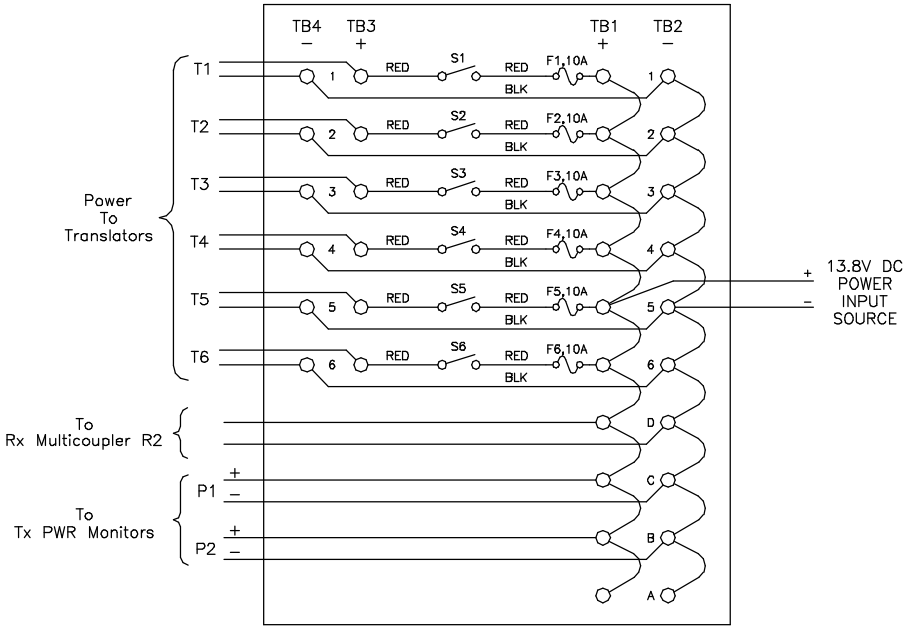




POWER DISTRIBUTION PANEL
7P017X01G1 AND 7P017X01G2
(8H017B05, Sh. 1, Rev. 1 and 8H017B05, Sh. 2, Rev. 1)



Group 1 : As Shown



Group 2 : As Shown

POWER DISTRIBUTION PANEL

7P017X01G1 AND 7P017X01G2

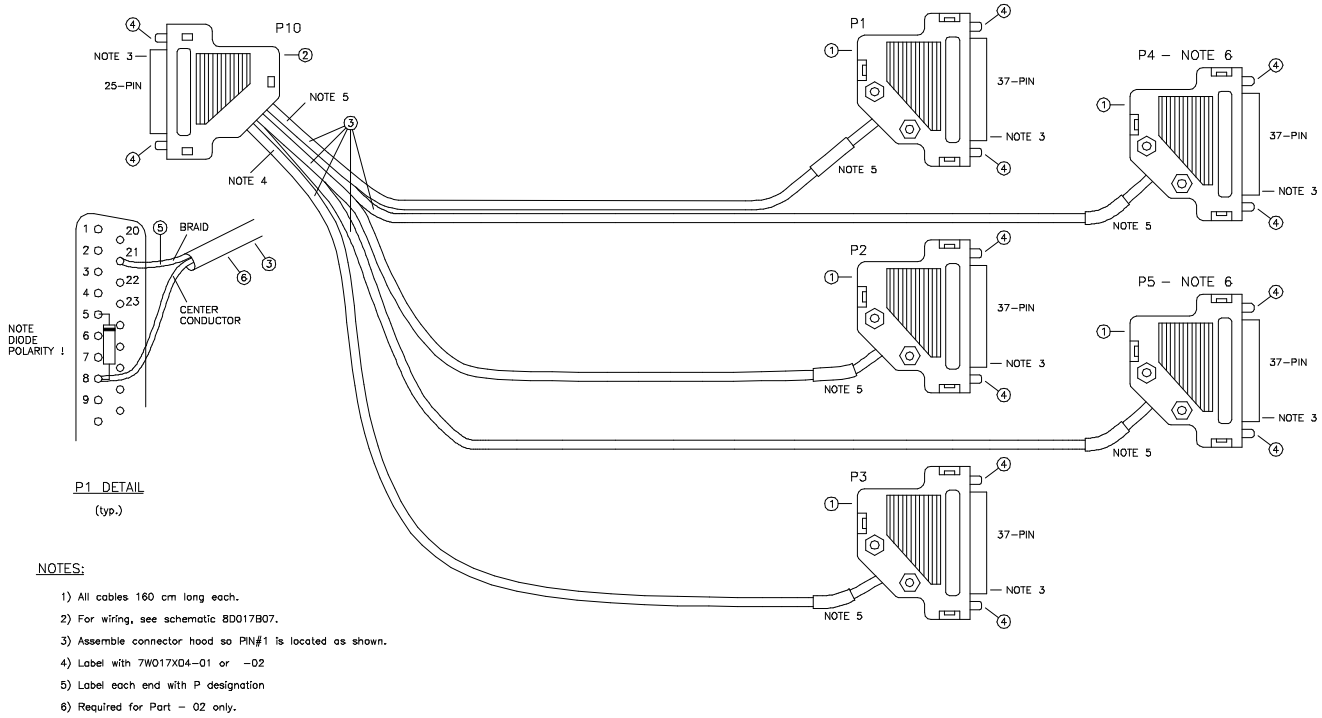
(8D017B06, Sh. 1, Rev. 2)

3 TRANSLATOR PTT CABLE ASSEMBLY

7W017X04P1 - PTT Cable Assy, 3 Channel
7W017X04P2 - PTT Cable Assy, 5 Channel
7W017X04P3 - PTT Cable Assy with Tails

Rev. 3

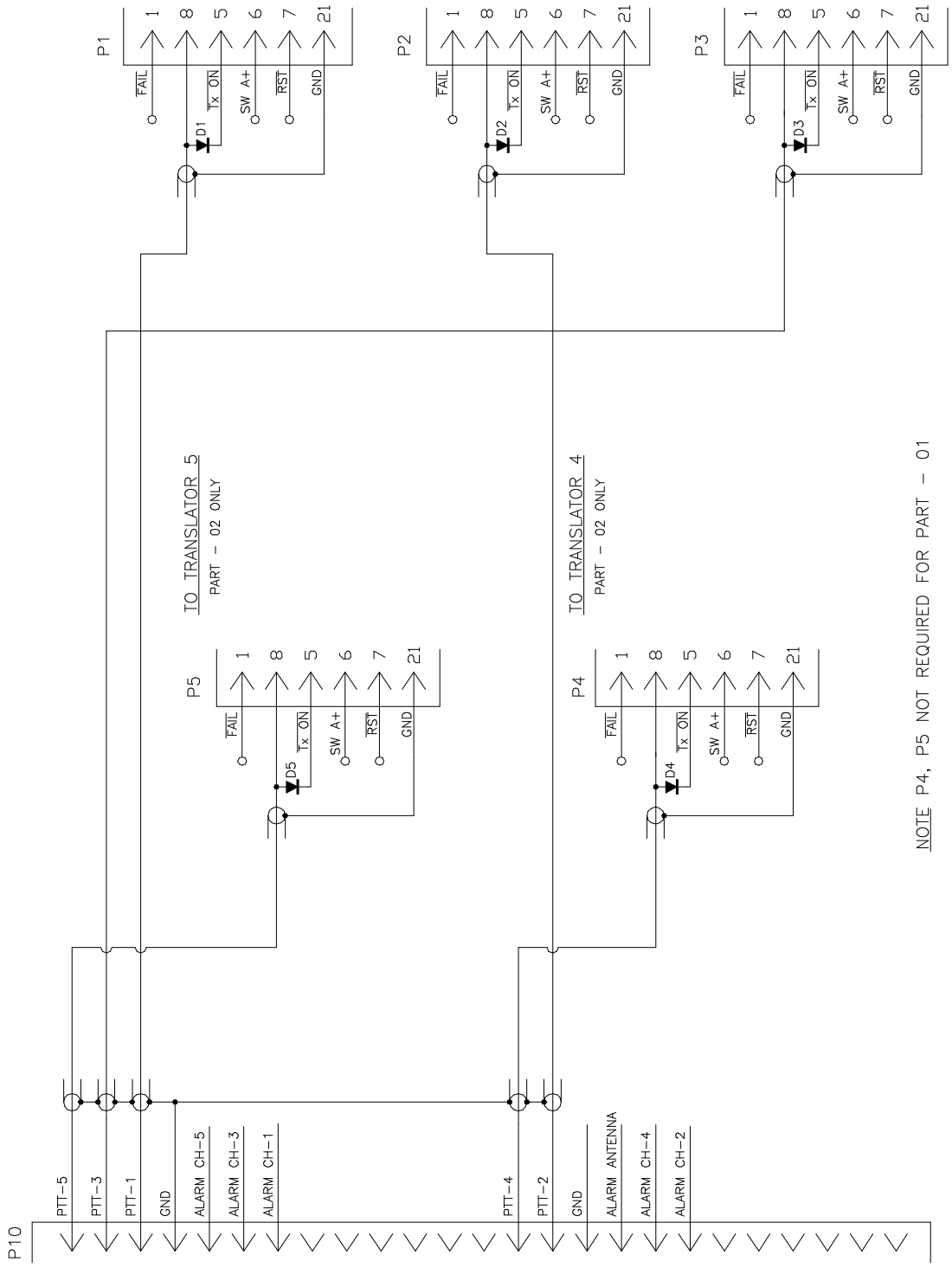
SYMBOL	PART NUMBER	DESCRIPTION
P1 thru P3	DC-37P	Connector: DC-37 male" (qty. P1=3, P2 & P3=5).
P10	DB-25P	Connector: DB-25 male.
1	C88231000	Hood: (Northern Technologies), includes retaining screws"(qty. P1=3, P2 & P3=5).
2	C88221000	Hood: (Northern Technologies), includes retaining screws.
3	9396	Cable: (Belden), 1-conductor shielded, (qty. P1=480, P2 & P3=800 cm).
	9504	Cable: (Belden), 4 twisted pairs, overall foil shield"(Used in P3, qty. 200 ft.).
	9506	Cable: (Belden), 6 twisted pairs, overall foil shield"(Used in P3, qty. 40 ft.).
5	FIT221-1/16	Tubing, heatshrink: 1/16 in. (Alpha) (qty. P1=10, P2 & P3=15 cm).
6	FIT221-3/16	Tubing, heatshrink: 3/16 in. (Alpha) (qty. P1=10, P2 & P3=15 cm).
D1 thru D3	1N4148	Diode: si, small signal (qty. P1=3, P2 & P3=5).
	1/2w, 500 OHM, LEADED	Resistor (Used in P3).



NOTES:

1) All cables 160 cm long each.
2) For wiring, see schematic 8D017B07.
3) Assemble connector hood so PIN#1 is located as shown.
4) Label with 7W017X04-01 or -02
5) Label each end with P designation
6) Required for Part – 02 only.

TRANSLATOR PTT CABLE ASSEMBLY
7W017X04G1 THRU 7W017X04G3
(8H017B06, Sh. 1, Rev. 2)

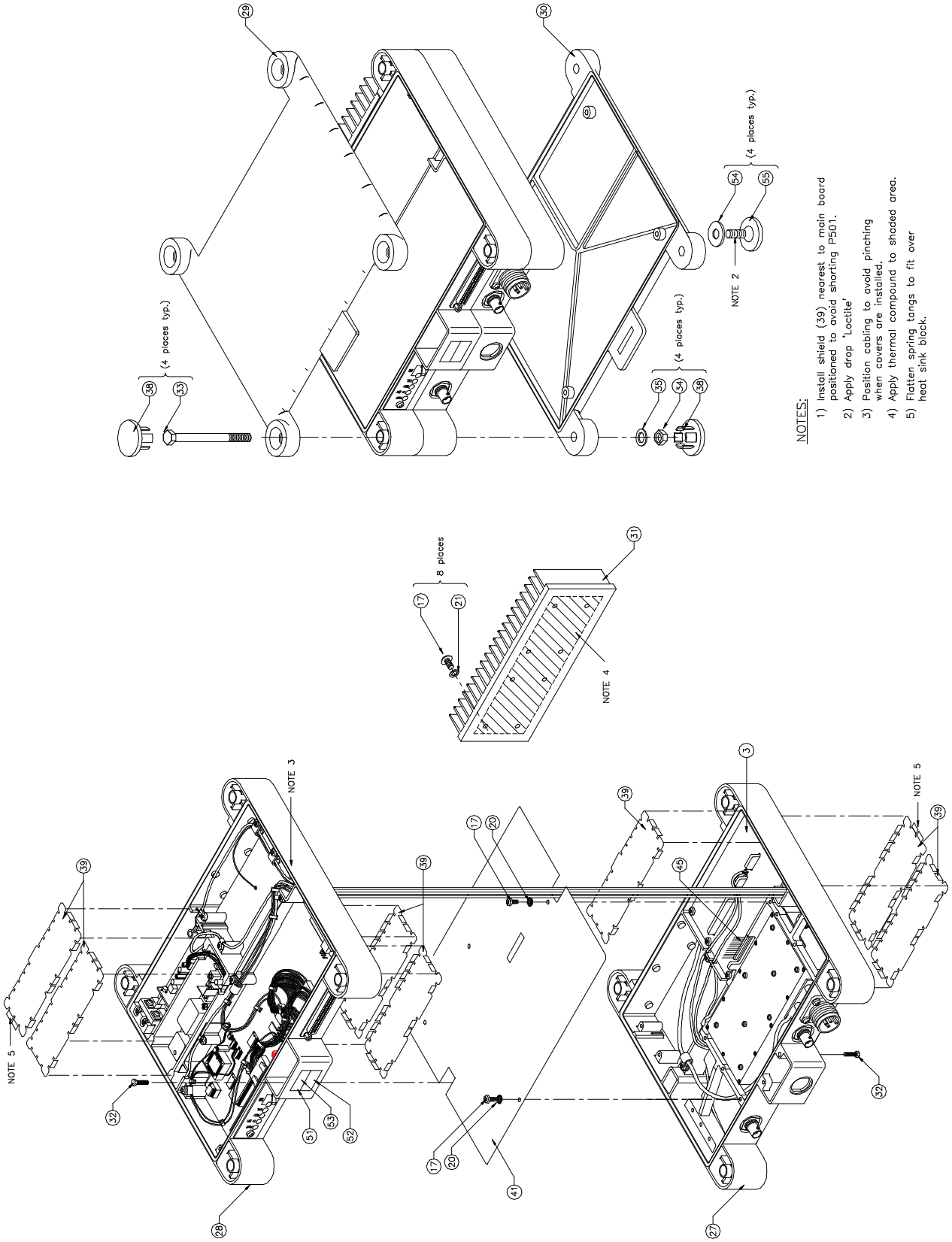


TRANSLATOR PTT CABLE ASSEMBLY
7W017X04G1 THRU 7W017X04G3
(8D017B07, Sh. 1, Rev. 2)

TRANSLATOR ASSEMBLY, 800 MHz

7F017X00P1 - High Split Translator, 851-870 MHz
7F017X00P2 - Low Split Translator, 805-825 MHz

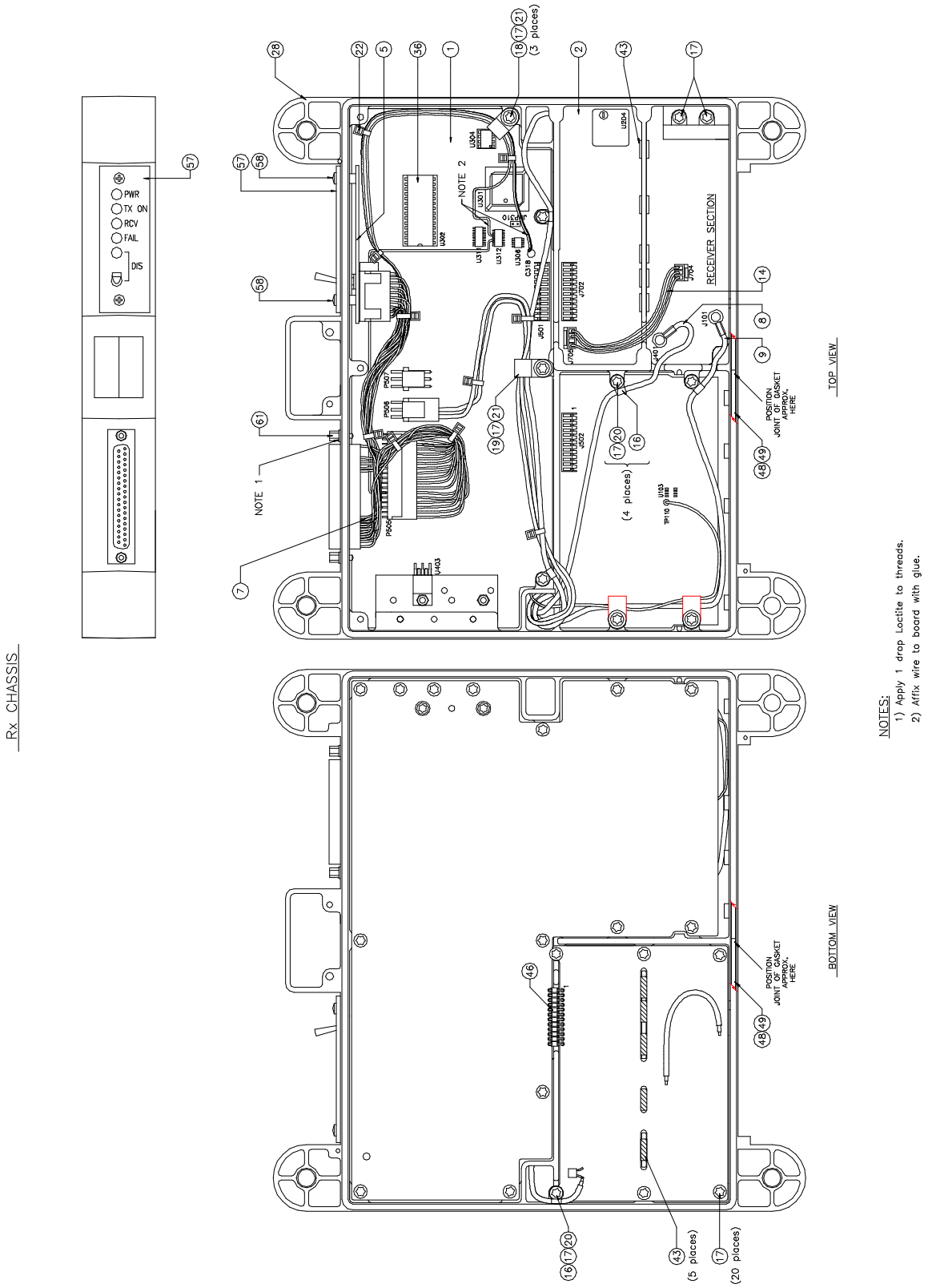
SYMBOL	PART NUMBER	DESCRIPTION
	6D017X01-202	Translator Programming Software PC use with PC - 286 or better.
	6D017X02-202	Translator Programming Software LT use withToshiba 1200 Laptop.
	7W004X05-02	Programming Cable: "use w/ PC programmer, TQ3310 & RS 232 cable"
1	7A004X01-03	System / Logic Board, Modified, see separate parts list.
2	7U017A01-01	Receiver PCB: High Band, Modified (Used in P1), see LBI-38841.
2	7U017A01-02	Receiver PCB: Low Band, Modified (Used in P2), see LBI-38841.
3	7U017A02-01	Transmitter PCB: High Band / Low Band, Modified, see LBI-38849.
4	7A017A01-01	Convertor Box Assembly: High Band (Used in P1), see separate parts list.
4	7A017A01-02	Convertor Box Assembly: Low Band (Used in P2), see separate parts list.
5	7L017A01-01	Control Panel PCB Assembly, see separate parts list.
6	7L017A03-01	Power Supply Filter PCB Assembly, see separate parts list.
7	7W017A01-01	Cable Harness Assembly I/O Cable.
8	7W017A03-01	Internal Coax Cable: RF input / Receiver input
9	7W017A03-02	Internal Coax Cable: Receiver output / Convertor Box IF input.
10	7W017A03-04	Internal Coax Cable: Transmitter output / RF output.
11	4202 - 051	Filter, Feedthrough: 12 - 32 (Tusonix).
12	W - 506	Washer, flat: #12" (Spae - Naur).
13	707 - 1014	Solder Lug: 1/4 int. star (Concord).
14	7W004A06-01	Cable Assembly: 3 conductor (Escod), J705 to J704 Receiver PCB.
15	7W017A04-01	Cable Assembly: PA Jumper (Broy) PA power, use on Tx PCB.
16	7318	Solder Lug (Spae - Naur); use with coax assemblies (qty. 10).
17	19A702381P508	Screw: Torx Drive M3.5x7 (qty. 52).
18	N2	Clip: 3/16 in. (Richco) (qty. 5).
19	CLN-1/4	Clip: 3/8 in. (Lenline) (qty. 3).
20	672-030ZP	Washer: M3.5 external star (Spae - Naur) (qty. 12).
21	657-006ZP	Washer: M3.5 flat (Spae - Naur) (qty.7).
22	T18R	Cable Tie: 4 in. (Tyton) (qty.12).
23	FIT 221-1/4	Heat Shrink Tubing: 1/4" dia (Alpha), use at convertor feedthrough terminals (qty. 3).
24	MS 3102E16-10P	Connector: 3 cond., DC Power (Bendix).
25	MS 2348P	Screw: 4-40 x1/2, bind.hd., Phillips, (Spae-Naur); use with item 24 (qty. 4).
26	668-004	Washer: #4 / 3mm, split lock, steel (Spae-Naur); use with Item 24 (qty. 4).
27	2H004D01-06	Main Casting Tx side.
28	2H004D01-07	Main Casting Rx side.
29	2H004D02-01	Top cover with locating holes.
30	2H004D02-04	Bottom Cover with locating holes.
31	194C5693P1	Heat Sink: 3 in. x 8 in. (R Theta).
32	330-018	Screw: M3.5x20 Hex Cap, zinc (qty. 2).
33	330-089	Screw: M8x90, steel (qty. 4).
34	156-016	Nut: M8, steel (qty. 4).
35	659-011	Washer: M8, flat (qty. 4).
36	4B017X01-03	Programmed EPROM/SaskTel Eff: 2/95.
	C27C256B20CV	"EPROM, empty"
37	19A70488P2	Coaxial Jumper: J102 - J103, Tx Assy.
38	245-155	Cap, plastic (qty. 8).
39	19C851442P2	Shield, Spring fit (Ericsson) (qty. 7).
41	2P004B02-01	Shield, Centre Plate.
43	19A705220P1	Ground Clip: “U” shape (Ericsson), use with Rx and Tx PCBs (qty. 10).
45	EW-12-14-G-S-680	Header: Straight 12 position (SamTec).
46	19B801359P5	Header: "U” shape 12 position (Ericsson).
48	4020-5020-0042	Gasket (Tech - Etch) (qty. 488 cm).
49		Gasket Adhesive.
51	THT-5-428-10	Label Model / SN (Brady).
52	THT-5-428-10	Label DOC (Brady).
53	944001695	Label Clear 25 x 30 mm (Brady).
54	654-010	Spacer: Nylon (Spae Naur) (qty.4).
55	19A702393P1	Screw: Flat hd, Torx Dr., (slide mt.) (qty. 4).
57	7D017B01-01	Dress Plate, Local Control Panel.
58	MS 2348P	Screw: 440x1/2, bind. head., st.st., Phillips dr., (Spae Naur) (qty. 2).
59	668-004	Washer: #4 / 3mm, split lock, st.st., (Spae Naur) (qty. 2).
61	205817-1	Screw: Lock Kit (Amp).



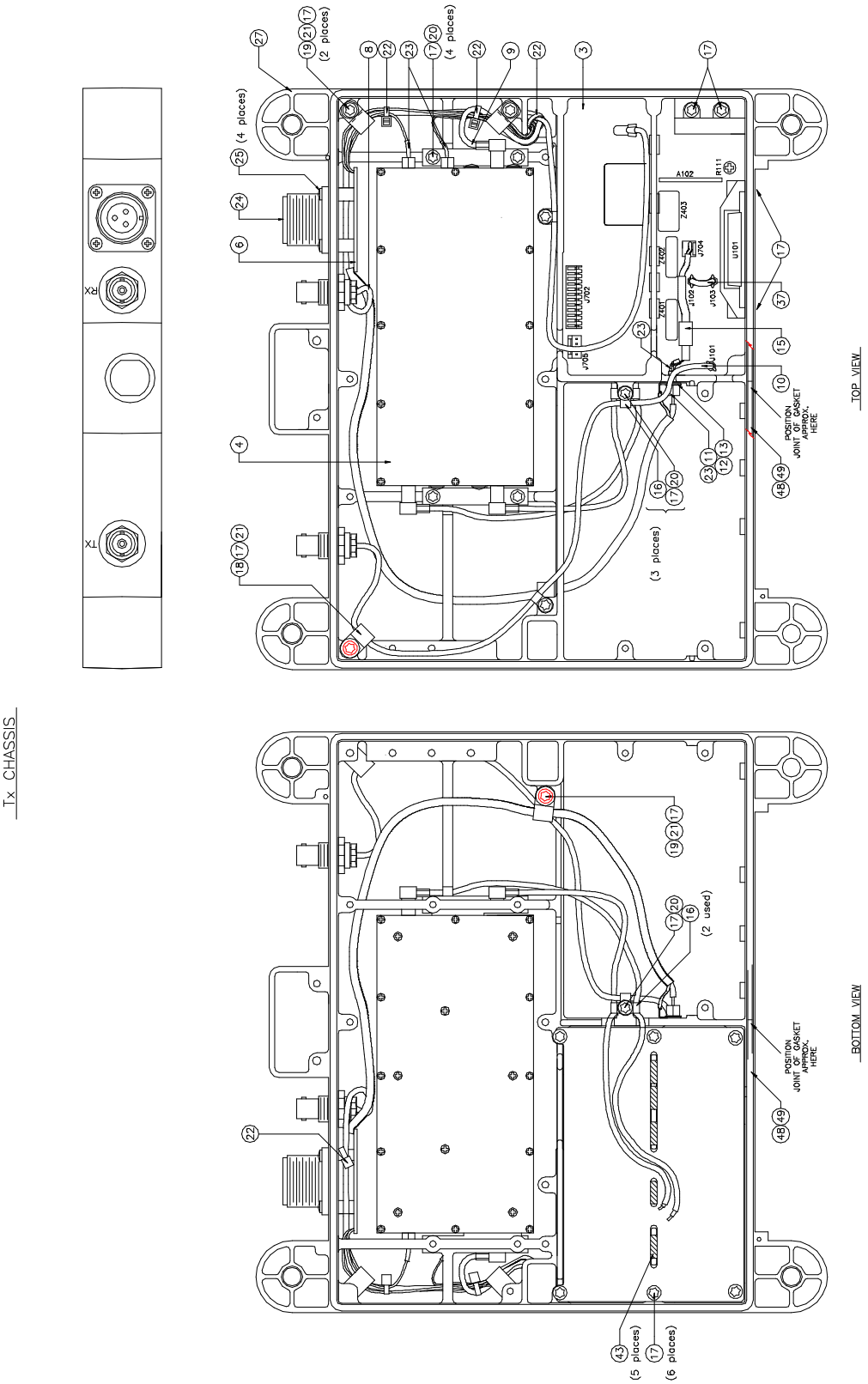
TRANSLATOR ASSEMBLY

7F017X00

(8H017C07, Sh. 1, Rev. 1)



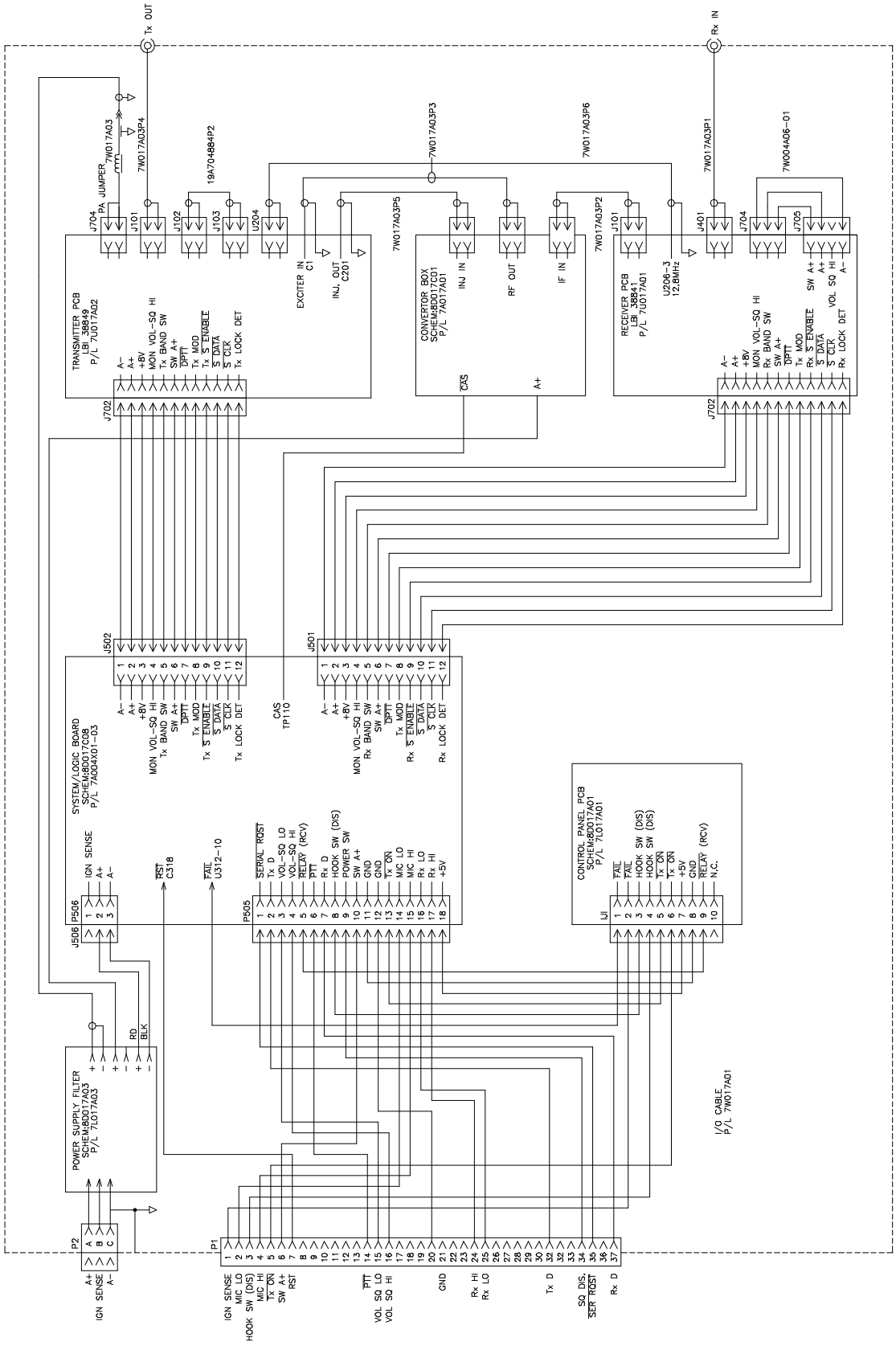
TRANSLATOR ASSEMBLY
7F017X00
(8H017C07, Sh. 2, Rev. 1)



TRANSLATOR ASSEMBLY

7F017X00

(8H017C07, Sh. 3, Rev. 1)



TRANSLATOR ASSEMBLY

7F017X00

(8D017C10, Sh. 1, Rev. 1)

CONVERTER BOX ASSEMBLY

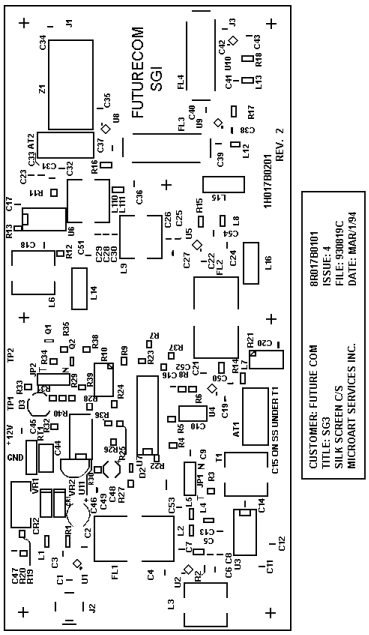
7A017A01-01 - High Band
7A017A01-02 - Low Band

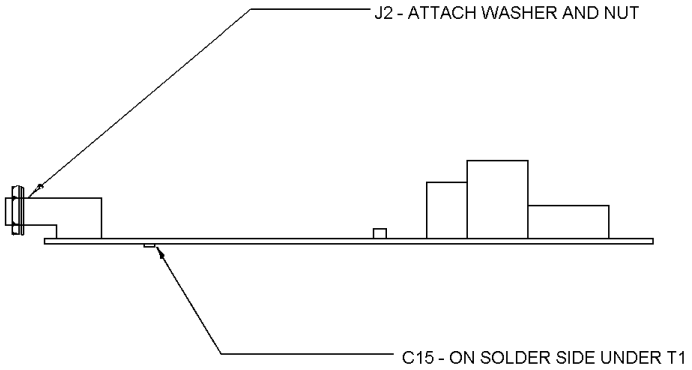
SYMBOL	PART NUMBER	DESCRIPTION
		---------- ASSEMBLIES ----------
		7L017A02P1 - PCB Ass'y Convertor, Hi Band (Used in -01).
		7L017A02P2 - PCB Ass'y Convertor, Lo Band" (Used in -02).
		---------- CAPACITORS ----------
C1 thru C4	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet).
C5	C0805C121J1GAC	Ceramic: 120 pF NPO 5% 50V 0805(Kemet).
C6	C0805C390K1RAC	Ceramic: 39pF NPO 5% 50V 0805 (Kemet).
C7 and C8	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet).
C9	C0805C102K1RAC	Ceramic: 1000pF X7R 10% 50V 0805 (Kemet).
C10	GMC43Z5U105M50NT	Ceramic: 1µF Z5U 20% 50V 1812 (Cal-Chip).
C11 thru C13	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet).
C14	GMC21CG6R8C50NT	Ceramic: 6.8pF COG 50V 0805 (Cal-Chip)
C15	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet)
C16	C0805C102K1RAC	Ceramic: 1000pF X7R 10% 50V 0805 (Kemet)
C17	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet)
C18	C0805C330J1GAC	Ceramic: 33pF NPO 5% 50V 0805 (Kemet)
C19 thru C24	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet).
C25	C0805C121J1GAC	Ceramic: 120pF NPO 5% 50V 0805 (Kemet)
C26	C0805C680J1RAC	Ceramic: 68pF NPO 5% 50V 0805 (Kemet)
C27	C0805C150J1RAC	Ceramic: 15pF NPO 5% 50 V 0805 (Kemet)
C28	C0805C121J1GAC	Ceramic: 120pF NPO 5% 50V 0805 (Kemet)
C29	C0805C470J1RAC	Ceramic: 47pF NPO 5% 50V 0805 (Kemet)
C30	C0805C121J1GAC	Ceramic: 120pF NPO 5% 50V 0805 (Kemet)
C31	C0805C150J1RAC	Ceramic: 15pF NPO 5% 50V 0805 (Kemet)
C32	C0805C680J1RAC	Ceramic: 68pF NPO 5% 50V 0805 (Kemet)
C33	C0805C121J1GAC	Ceramic: 120pF NPO 5% 50V 0805 (Kemet)
C34 and C35	C0805C101J1RAC	Ceramic: 100pF NPO 5% 50V 0805 (Kemet).
C36	C0805C222K1RAC	Ceramic: 2200pF X7R 10% 50V 0805 (Kemet)
C37	C0805C101J1RAC	Ceramic: 100pF NPO 5% 50V 0805 (Kemet)
C38	C0805C222K1RAC	Ceramic: 2200pF X7R 10% 50V 0805 (Kemet)
C39 and C40	C0805C101J1RAC	Ceramic: 100pF NPO 5% 50V 0805 (Kemet)
C41	C0805C222K1RAC	Ceramic: 2200pF X7R 10% 50V 0805 (Kemet)
C42 and C43	C0805C101J1RAC	Ceramic: 100pF NPO 5% 50V 0805 (Kemet)
C44	GMC43Z5U105M50NT	Ceramic: 1µF Z5U 20% 50V 1812 (Cal-Chip)
C45	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet)
C46	TAP476K016SCS	Capacitor Cap Tant 47µF 16V 0.1 (AVX).
C47 thru C51	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet).
C52	C1206C104K1RAC	Ceramic: 0.1µF X7R 10% 50V 1206 (Kemet)
C53 and C54	C0805C103K1RAC	Ceramic: 10n X7R 10% 50V 0805 (Kemet)
		---------- DIODES ----------
CR1 and CR2	1N4004	Diode Diode Leaded.
D2	BAV99LT1	Diode Diode SMT.
D3	HLMP1301	Diode Diode LED.
		---------- INDUCTORS ----------
L1 and L2	1008CS-472XKBC	Choke Choke RF 4µ7H Chip (CoilCraft)
L3	142-09J08S	Inductor Inductor Variable 9.5T Shielded (CoilCraft)
L4 and L5	1008CS-472XKBC	Choke Choke RF 4µ7H Chip (CoilCraft)
L6	142-08J08S	Inductor Inductor Variable 8.5T Shielded (CoilCraft)
L7 and L8	1008CS-472XKBC	Choke Choke RF 4µ7H Chip (CoilCraft)
L9 and L10	143-19J12S	Inductor Inductor Variable 19.5T Shielded (CoilCraft)

SYMBOL	PART NUMBER	DESCRIPTION
L11 thru L13	1008CS-151XKBC	Choke Choke RF 150nH Chip (CoilCraft)
L14 thru L16	2743007111	Ferrite Ferrite Bead (Fair-Rite)
		---------- RESISTORS ----------
R1 and R2	BCR1/8-391JT	Resistor: 390R 5% 1/8W 1206 (Beckman)
R3	BCR1/8-222JT	Resistor: 2K2 5% 1/8W 1206 (Beckman)
R4	BCR1/8-123JT	Resistor: 12K 5% 1/8W 1206 (Beckman)
R5	BCR1/8-202JT	Resistor: 2K0 5% 1/8W 1206 (Beckman)
R6	BCR1/8-103JT	Resistor: 10K 5% 1/8W 1206 (Beckman)
R7	BCR1/8-224JT	Resistor: 220K 5% 1/8W 1206 (Beckman)
R8	BCR1/8-105JT	Resistor: 1.0M 5% 1/8W 1206 (Beckman)
R9	BCR1/8-393JT	Resistor: 39K 5% 1/8W 1206 (Beckman)
R10	ST63Y502	Potentiometer Potentiometer 5K Multiturn Top-adj (Bourns)
R11	BCR1/8-681JT	Resistor: 680R 5% 1/8W 1206 (Beckman)
R12	BCR1/8-332JT	Resistor: 3K3 5% 1/8W 1206 (Beckman)
R13	BCR1/8-392JT	Resistor: 3K9 5% 1/8W 1206 (Beckman)
R14	BCR1/8-221JT	Resistor: 220R 5% 1/8W 1206 (Beckman)
R15	BCR1/8-391JT	Resistor: 390R 5% 1/8W 1206 (Beckman)
R16	BCR1/8-471JT	Resistor: 470R 5% 1/8W 1206 (Beckman)
R17 and R18	BCR1/8-201JT	Resistor: 200R 5% 1/8W 1206 (Beckman)
R19	CR32-3011-F-B1	Resistor: 3K01 1% 1/8W 1206 (Kyocera)
R20	CR32-2492-F-B1	Resistor: 24K9 1% 1/8W 1206 (Kyocera)
R21	ST63Y501	Potentiometer Potentiometer 500R Multi-turn Top adj.(Bourns)
R22	BCR1/8-103JT	Resistor: 10K 5% 1/8W 1206 (Beckman)
R23	BCR1/8-512JT	Resistor: 5K1 5% 1/8W 1206 (Beckman)
R24	BCR1/8-302JT	Resistor: 3K0 5% 1/8W 1206 (Beckman)
R25	BCR1/8-223JT	Resistor: 22K 5% 1/8W 1206 (Beckman)
R26	BCR1/8-104JT	Resistor: 100K 5% 1/8W 1206 (Beckman)
R27 and R28	BCR1/8-103JT	Resistor: 10K 5% 1/8W 1206 (Beckman)
R29	BCR1/8-105JT	Resistor: 1M0 5% 1/8W 1206 (Beckman)
R30 and R31	BCR1/8-472JT	Resistor: 4K7 5% 1/8W 1206 (Beckman)
R32	BCR1/8-105JT	Resistor: 1M0 5% 1/8W 1206 (Beckman)
R33	BCR1/8-202JT	Resistor: 2K0 5% 1/8W 1206 (Beckman)
R34	BCR1/8-473JT	Resistor: 47K 5% 1/8W 1206 (Beckman)
R35	BCR1/8-102JT	Resistor: 1K0 5% 1/8W 1206 (Beckman)
R36 and R37	BCR1/8-103JT	Resistor: 10K 5% 1/8W 1206 (Beckman)
R38	CR32-1101-F-B1	Resistor: 1.1K 1% 1/8W 1206 (Kyocera)
R39	CR32-1782-F-B1	Resistor: 17.8K 1% 1/8W 1206 (Kyocera)
R40	BCR1/8-472JT	Resistor: 4K7 5% 1/8W 1206 (Beckman)
		------ INTEGRATED CIRCUITS ----
U1 and U2	MAR1-SM	IC IC Amplifier (MiniCircuits)
U3	MC1350P	IC IC IF Amplifier (Motorola)
U4 and U5	MAR1-SM	IC IC Amplifier (MiniCircuits)
U6	MC1330AP	IC IC IF Detector (Motorola)
U7	LM148J	IC IC Quad Op-Amp (Motorola)
U8	MAR6-SM	IC IC Amplifier (MiniCircuits)
U9 and U10	MAR4-SM	IC IC Amplifier (MiniCircuits)
U11	LM393AN	IC IC Dual Comparator (Motorola)
Q1	MMBT4401	Transistor Transistor SMT NPN
Q2	MMB4403	Transistor Transistor SMT PNP
		----- VOLTAGE REGULATORS ----
VR1	LM2931CT	Voltage Regulator "Voltage Regulator, Adj.; install with enclosure"
VR2	MC78L05ACP	Voltage Regulator "Voltage Regulator, 5V"
		---------- FILTERS ----------
FL1 and FL2	19A705328P5	Filter Filter Bandpass 45.0125MHz (EGE/Toyocom)
FL3	DFC3R815P020BTD	Filter Filter Bandpass Cer Lo Split (Murata) (Used in P2)

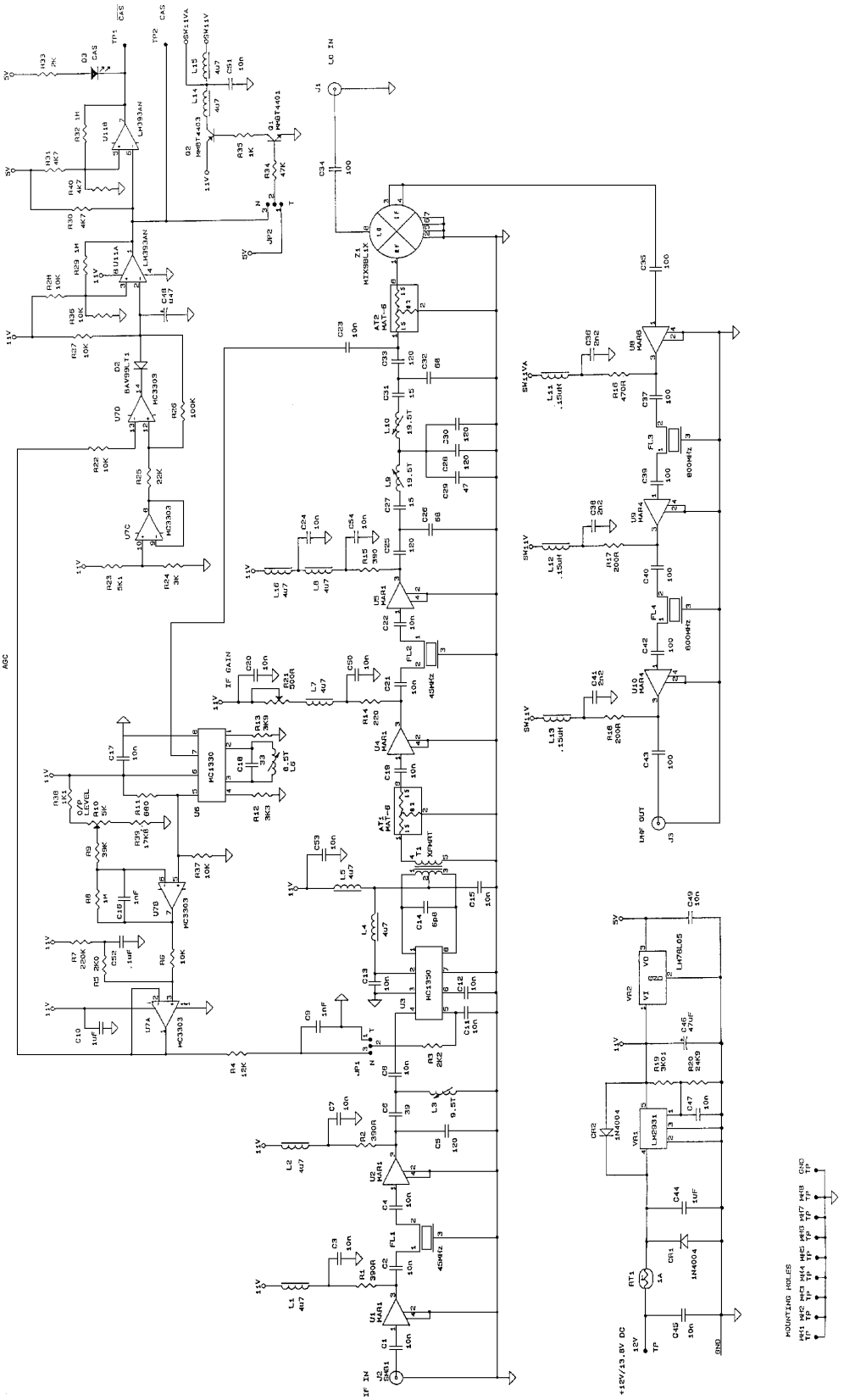
SYMBOL	PART NUMBER	DESCRIPTION
FL3	DFC3R861P020BTD	Filter Filter Bndps Cer Hi Splt 19A704888P1(Murata) (Used In P1)
FL4	DFC3R815P020BTD	Filter Filter Bandpass Cer Lo Split (Murata) (Used In P2)
FL4	DFC3R861P020BTD	Filter Filter Bndps Cer Hi Splt 19A704888P1(Murata) (Used In P1)
AT1 and AT2	MAT-6	Attenuator Attenuator 6dB 50 R (MiniCircuits)
Z1	SBL-1X	Mixer Double Balanced Mixer (MiniCircuits)
RT1	B59965-C160-A70	Thermistor, PTC (Siemens)
	8056	Wire Wire 32 AWG Beldsol (Belden);use with T1
	TKXN-T1247Y1	Transformer Transformer RF (Toko);use with T1
T1	8H017A05-01	Transformer, Modified (Futurecom)"
JMP1	90059-0009	Jumper Shunt 2-Pos (Molex)
	22-54-1403-B	Header Header 3-Pin (Molex)
JMP2	90059-0009	Jumper Shunt 2-Pos (Molex)
	22-54-1403-B	Header Header 3-Pin (Molex)
	3049-B-440-B-0	Standoff Standoff 4-40 x 3/8 x 1/4 x 1/16 (RAF) install after PCB ass'y is complete
J1	131-3701-346	Connector Connector SMB PCB mount Rt Angle(EF Johnson)
		---------- MISCELLANEOUS --------
	7Y017B01-01	Enclosure, Compac, Modified.
	R51230-138-0	Enclosure, Compac.
	4202-051	Filter, Feedthrough, 12 - 32 Tusonix (qty. 2).
	2P017A01-01	Bracket, Mounting, Convertor Box MJElvin(qty. 2).
	131-3701-406	Connector, SMB, Rear Mt. Bulkhd. Jack E. F. Johnson(qty. 2)
	8920-2	Wire, 22 AWG, Stranded, PVC, Red Belden(qty. 10)
	8920-10	"Wire, 22AWG, Stranded, PVC, Blk" Belden(qty. 10)
	707-1710	"Solder Lug, .190 dia." Concord(qty. 2)
	385-257	Screw "4-40x1/4 pan hd., Ph. dr.,stl zinc; "(qty. 13)
	42-SN	Washer "#4 ext. lock, stl zinc; use with VR1"(qty. 5)
		Thermal compound use with voltage regulator VR1
	3049-B-440-B-0	"Standoff, swage" 4-40X3/8lg.X1/4 holeX1/16 pnl; RAF(qty. 8)

Assembly Drawing 8B017C01 is not currently available





CONVERTER BOX ASSEMBLY
7A017A01
(8B017B02, Sh. 1, Rev. 2)



CONVERTER BOX ASSEMBLY

7A017A01

(8D017C01, Sh. 1, Rev. 4)

SYSTEM / LOGIC BOARD

7A004X01-P1 - Main Board Assembly, Complete
7A004X01-P2 - Main Board Assembly (MOH-version)
7A004X01-P3 - Main Board Assembly (Translator)

SYMBOL	PART NUMBER	DESCRIPTION
		---------- ASSEMBLIES ----------
9		**7A004X01P4 - SMT sub-assembly for -P1.** **7A004X01P5 - SMT sub-assembly (MOH) for -P2.** **7A004X01P6 - SMT sub-assembly (Translator) for -P3.**
		---------- CAPACITORS ----------
C101	C1206C683J1GAC	0.068 µF W5R 5% 25v (P4, P5).
C102 and C103	1206B333J9BB	0.033 µF 5% W5R 50v (P4, P5).
C104	C1206C683J1GAC	0.068 µF W5R 5% 25v (P4, P5).
C105 thru C107	1206B333J9BB	0.033 µF 5% W5R 50v (P4, P5).
C108	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4, P5).
C109	TAP1.0M35	1.0 µF 20% 35v (P1, P2).
C110	C0805C222K1RAC	2200 pF 10% W5R 50v (P4).
C111 thru C113	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4, P5).
C114	C0805C101J1GAC	100pF 5% NPO 50v (N/R)
C115	TAP10M16	10 µF 20% 16v (P1, P2).
C116	TAP1.0M35	1 µF 20% 35v (P1, P2).
C117	TAP10M16	10 µF 20% 16v (P1, P2).
C118	C0805C222K1RAC	2200 pF 10% W5R 50v (P4, P5).
C119	TAP10M16	10 µF 20% 16v (P1, P2).
C120	C0805C101J1GAC	100pF 5% NPO 50v (P4, P5).
C121	TAP10M16	10 µF 20% 16v (P1, P2).
C122	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4, P5).
C123 and C124	08052B102K9BB	1000 pF W5R 50v 10% (P4, P5).
C125	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4 P5).
C126	TAP1.0M35	1 µF 20% 35v (P1 P2).
C127	C0805C222K1RAC	2200 pF 10% W5R 50v (P4 P5).
C128	TAP2.2M35	2.2 µF 20% 35v (P1 P2)
C129 thru C133	C1206C683J1GAC	0.068 µF W5R 5% 25v (P4 P5).
C134	TAP10M16	10 µF 20% 16v (P1 P2).
C135	C0805C222K1RAC	2200 pF 10% W5R 50v (P4 P5).
C136 and C137	TAP10M16	10 µF 20% 16v (P1 P2).
C140	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4 P5).
C141 and C142	08052B102K9BB	1000 pF W5R 50v 10% (P4 P5).
C143	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4 P5).
C144	TAP1.0M35	1 µF 20% 35v (P1 P2).
C152	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4 P5).
C153 and C154	1206B333J9BB	0.033 µF 5% W5R 50v (P4 P5).
C201 and C202	TAP1.0M35	1 µF 20% 35v (P1 P2).
C203	08055A471JAT050M	470 pF 5% NPO 50v (P4 P5).
C204	08052B102K9BB	1000 pF W5R 50v 10% (P4 P5).
C205	1206X473J2	0.047µF W5R 5% 50v (P4 P5).
C206	037-56479	47 µF 20% 16v electrolytic (philips) (P1 P2).
C207	1206X473J2	0.047µF W5R 5% 50v (P4 P5).
C208	TAP10M16	10 µF 20% 16v (P1 P2).
C209	C0805C120K5GAC	12 pF 10% NPO 50v (P4 P5).
C210	TAP10M16	10 µF 20% 16v (P1 P2).
C211	C1206C683J1GAC	0.068 µF W5R 5% 50v (P4 P5).
C212	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4 P5).
C213	08055C682AT050M	6800 pF W5R 5% (P4 P5).
C214	TAP.22M35	0.22 µF 20% axial (P1 P2).
C215	08052B102K9BB	1000 pF W5R 50v 10% (P4 P5).
C216	TAP10M16	10 µF 20% 16v (P1 P2).
C217	TAP1.0M35	1 µF 20% 35v (P1 P2).
C218 thru C222	C1206C683J1GAC	0.068 µF W5R 5% 25v (P4 P5).
C223 and C224	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4 P5).
C225	TAP1.0M35	1 µF 20% 35v (P1 P2).
C301 thru C314	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4, P5, P6).
C315 and C316	C0805C270K5GAC	27pF 10% NPO 50v (P4, P5, P6).
C317	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4, P5, P6).
C318	TAP1.0M35	1 µF 20% 35v (P1, P2, P3).
C319	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4, P5, P6).
C401	TAP10M16	10 µF 20% 16v (P1 P2).
C402	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4 P5).

SYMBOL	PART NUMBER	DESCRIPTION
C403	SME25VB47R	47 µF 20% 25v electrolytic (ucc) (P1 P2).
C404	TAP10M25	10 µF 20% 25v (P1 P2).
C405	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4, P5, P6).
C406	TAP10M25	10 µF 20% 25v (P1 P2).
C407	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4 P5).
C408	C0805C101J1GAC	100pF 5% NPO 50v (P4 P5).
C409	TAP1.0M35	1 µF 20% 35v (P1 P2).
C410	TAP10M25	10 µF 20% 25v (P1 P2).
C411	CL21B103KBNCM	0.01 µF W5R 10% 50v (P4 P5).
C412	08055A471JAT050M	470 pF 5% NPO 50v (P4, P5, P6).
C413	08052B102K9BB	1000 pF W5R 50v 10% (P4 P5).
C414	08055A471JAT050M	470 pF 5% NPO 50v (P4 P5).
C415	TAP1.0M35	1 µF 20% 35v (P1 P2).
C416 and C417	C1206C104RAC/3371	0.1 µF 10% W5R 25v (P4, P5, P6).
C418	TAP47M6.3	47µF 20% 6.3v tantalum (itt) (P1, P2, P3).
C419	SME25VB101	100 µF 25v 20% vert (ucc) (P1, P2, P3).
C501 thru C522	08055A471JAT050M	470 pF 5% NPO 50v (P4, P5, P6).
C523 thru C536	08052B102K9BB	1000 pF W5R 50v 10% (P4, P5, P6).
C537 thru C560	08055A471JAT050M	470 pF 5% NPO 50v (P4 P5).
C561 and C562	C0805C101J1GAC	100pF 5% NPO 50v (P4, P5, P6).
C563 and C564	C0805C330J1GAC	33pF 5% NPO 50v (P4, P5, P6).
C565 thru C567	C0805C101J1GAC	100pF 5% NPO 50v (P4, P5, P6).
C568 thru C575	C0805C220J1GAC	22 pF 5% NPO 50v (P4, P5, P6).
C576 and C577	08055A471JAT050M	470 pF 5% NPO 50v (P4, P5, P6).
C578	C0805C101J1GAC	100pF 5% NPO 50v (P4, P5, P6).
C579 thru C586	C0805C330J1GAC	33pF 5% NPO 50v (P4, P5, P6).
C587 and C588	C0805C101J1GAC	100pF 5% NPO 50v (P4, P5, P6).
C589	C0805C330J1GAC	33pF 5% NPO 50v (P4, P5, P6).
		---------- DIODES ----------
D201	BAV99	Series Sot BAV99 (P4 P5).
D301 and D302	HLMP-1301	LED T1 red hlmp1301 (P1, P2, P3).
D303	BAV70	Common-cathode SOT BAV70 (P4, P5, P6).
D304	1N5248B	Zener 18v leaded (P1, P2, P3).
D401	BAW56	Common-anode SOT BAW56 (P4 P5).
D402	BAV99	Series SOT BAV99 (P4 P5).
D403	BAW56	Common-anode SOT BAW56 (P4 P5).
D404	BAV70	Common-cathode SOT BAV70 (P4 P5).
D405	MR751	Rectifier MR751 (P1, P2, P3).
D501 thru D510	BAV99	Series SOT BAV99 (P4 P5).
		---------- FUSES ----------
F401	251.003	Axial, 3-amp (P1, P2, P3).
		---------- CONNECTORS ----------
J501 and J502	22-17-2122	Connector, female 12-posn 4455-BC" (P1, P2, P3).
J503 and J504	15-44-3217	Receptacle 2x17 vert, molex (P1 P2).
JMP101 thru JMP309	BCR1/JP-JT	Jumper 0-ohm (P4, P5, P6).
JMP310 thru JMP502	22-54-1402	Plug, 2-pin gold (molex)" (P1, P2, P3).
P505	22-12-2184	Plug, 18 pos/90d molex" (P1, P2, P3).
P506 and P507	26-60-5030	Plug, 3 pos/90d molex" (P1, P2, P3).
		---------- TRANSISTORS ----------
Q101 and Q102	MMBT3904LT1	MMBT3904LT1 SOT (P4 P5).
Q301 thru Q304	MMBT4403L	MMBT4403 SOT (P4, P5, P6).
Q306 and Q401	2N4401	2N4401 TO-92 (P1, P2, P3).
Q402	MMBT4403L	MMBT4403 SOT (P4 P5).
Q403	MMBT3904LT1	MMBT3904LT1 SOT (P4 P5).
Q404	IRF9530	BUZ171/MTP12P06 TO-220 p-channel mosfet (P1 P2).

SYMBOL	PART NUMBER	DESCRIPTION
		---------- RESISTORS ----------
R101	19A704885P8	Network SIP: 3.32k etc (P1 P2).
R102	9C12063A8251FK RFT	Metal film: 1% 8250 ohm (P4 P5).
R103	9C12063A2152FK RT1R	Metal film: 1% 21.5k ohm (P4 P5).
R104 and R105	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R106	CR1206-2203JTR	Metal film: 5% 220k (P4 P5).
R107	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R108	BCR1/8-334JT	Metal film: 5% 330k (P4
R108	9C12063A6802JLR T1R	Metal film: 5% 68k P5).
R109	9C12063A4703JLH FT	Metal film: 5% 470k (P4 P5).
R110	CR1206-9102JTR	Metal film: 5% 91k (P4 P5).
R111	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R112	BCR1/8-124JT	Metal film: 5% 120k (P4 P5).
R113	9C12063A1211FK RFT	Metal film: 1% 1210 ohm (P4 P5).
R114	9C12063A2491FK RT1R	Metal film: 1% 2490 ohm (P4 P5).
R115	9C12063A4991FK RFT	Metal film: 1% 4990 ohm (P4 P5).
R116	19A704885P5	Network SIP: 160k etc RKM6C150 (P1 P2).
R117	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R118	BCR1/8-101JT	Metal film: 5% 100 ohm (P4 P5).
R119	CRCW1206-100-4709-JT	Metal film: 5% 47 ohms (P4 P5).
R120 thru R123	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R124	CRCW1206-100-4709-JT	Metal film: 5% 47 ohms (P4 P5).
R128	19A704885P7	Network SIP: 2.87k etc (P1 P2).
R129	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R130	9C12063A5601JLR T1R	Metal film: 5% 5600 ohms (P4 P5).
R132	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R133	9C12063A5602JLR T1R	Metal film: 5% 56k (P4 P5).
R134	CR1206-1502JTR	Metal film: 5% 15k (P4 P5).
R135	9C12063A6801JLH FT	Metal film: 5% 6800 (P4 P5).
R136	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R137	BCR1/8-334JT	Metal film: 5% 330k (P4 P5).
R138	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R139	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R140	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).

SYMBOL	PART NUMBER	DESCRIPTION
R141	BCR1/8-334JT	Metal film: 5% 330k (P4 P5).
R142	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4 P5).
R143 and R144	BCR1/8-473JT	Metal film: 5% 47k (P4 P5).
R145	19A704885P9	Network SIP: 11.8k etc (P1 P2).
R146	19A704885P10	Network SIP: 10.5k etc (P1 P2).
R147	RC3216J335CS	Metal film: 5% 3.3m (P4 P5).
R148	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R149	9C12063A5601JLR T1R	Metal film: 5% 5600 ohms (P4 P5).
R150 and R151	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4 P5).
R152	9C12063A4703JLH FT	Metal film: 5% 470k chip.
R153	CR32-154-J-B1	Metal film: 5% 150k chip.
R154	19A704885P7	Network SIP: 2.87k etc (P1 P2).
R155	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R156	9C12063A5601JLR T1R	Metal film: 5% 5600 ohms (P4 P5).
R158	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R159	9C12063A5602JLR T1R	Metal film: 5% 56k (P4 P5).
R160	CR1206-1502JTR	Metal film: 5% 15k (P4 P5).
R161	9C12063A6801JLH FT	Metal film: 5% 6800 (P4 P5).
R162	CR1206-1801JTR	Metal film: 5% 1800 ohms (P4 P5).
R163	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R164	BCR1/8-334JT	Metal film: 5% 330k (P4 P5).
R165	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R166	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R167	CR1206-1801JTR	Metal film: 5% 1800 ohms (P4 P5).
R169 and R170	03006-624-73-G10	Thermal sensing 1k (P4 P5).
R201	RC321J561CS	Metal film: 5% 560 ohms (P4 P5).
R202	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R203	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R204	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R205	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R206 thru R209	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R210	19A704885P6	Network SIP: 12k etc (P1 P2).
R211	9C12063A4642FK RFT	Metal film: 1% 46.4k ohm (P4 P5).
R212	9C12063A3242FK RFT	Metal film: 1% 32.4k ohm (P4 P5).
R213	9C12063A1242FK RFT	Metal film: 1% 12.4k (P4 P5).

SYMBOL	PART NUMBER	DESCRIPTION
R214	9C12063A4642FK RFT	Metal film: 1% 46.4k ohm (P4 P5).
R215 and R216	RC3216J274CS	Metal film: 5% 270k (P4 P5).
R217	CRCW1206-100-4709-JT	Metal film: 5% 47 ohms (P4 P5).
R218	BCR1/8-332JT	Metal film: 5% 3300 ohms (P4 P5).
R219	19A704885P9	Network SIP: 11.8k etc (P1 P2).
R220	19A704885P10	Network SIP: 10.5k etc (P1 P2).
R221	RC3216J105CS	Metal film: 5% 1m (P4 P5).
R222	19A704885P5	Network SIP: 160k etc RKM6C150 (P1 P2).
R223	BCR1/8-124JT	Metal film: 5% 120k (P4 P5).
R224	BCR1/8-473JT	Metal film: 5% 47k (P4 P5).0
R225	BCR1/8-332JT	Metal film: 5% 3300 ohms (P4 P5).
R226	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4 P5).
R227	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R228	RC3216J681CS	Metal film: 5% 680 ohm (P4 P5).
R302 and R304	RC321J561CS	Metal film: 5% 560 ohms (P4, P5, P6).
R305	9C12063A5601JLR T1R	Metal film: 5% 5600 ohms (P4, P5, P6).
R306	BCR1/8-332JT	Metal film: 5% 3300 (P4, P5, P6).
R307 thru R309	BCR1/8-103JT	Metal film: 5% 10k (P4, P5, P6).
R310 and R311	L10-1-C103	Network 9x10k 10-1-103 (P1 P2).
R312	BCR1/8-103JT	Metal film: 5% 10k (P4, P5, P6).
R313	BCR1/8-101JT	Metal film: 5% 100 ohms (P4, P5, P6).
R314 and R315	BCR1/8-473JT	Metal film: 5% 47k (P4, P5, P6).
R317	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4, P5, P6).
R318 and R319	BCR1/8-103JT	Metal film: 5% 10k (P4, P5, P6).
R401	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4 P5).
R402	RC321J561CS	Metal film: 5% 560 ohms (P4 P5).
R403	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R404	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R405	9C12063A5601JLR T1R	Metal film: 5% 5600 ohms (P4 P5).
R406	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).
R407 thru R409	BCR1/8-124JT	Metal film: 5% 120k (P4 P5).
R410	BCR1/8-104JT	Metal film: 5% 100k (P4 P5).

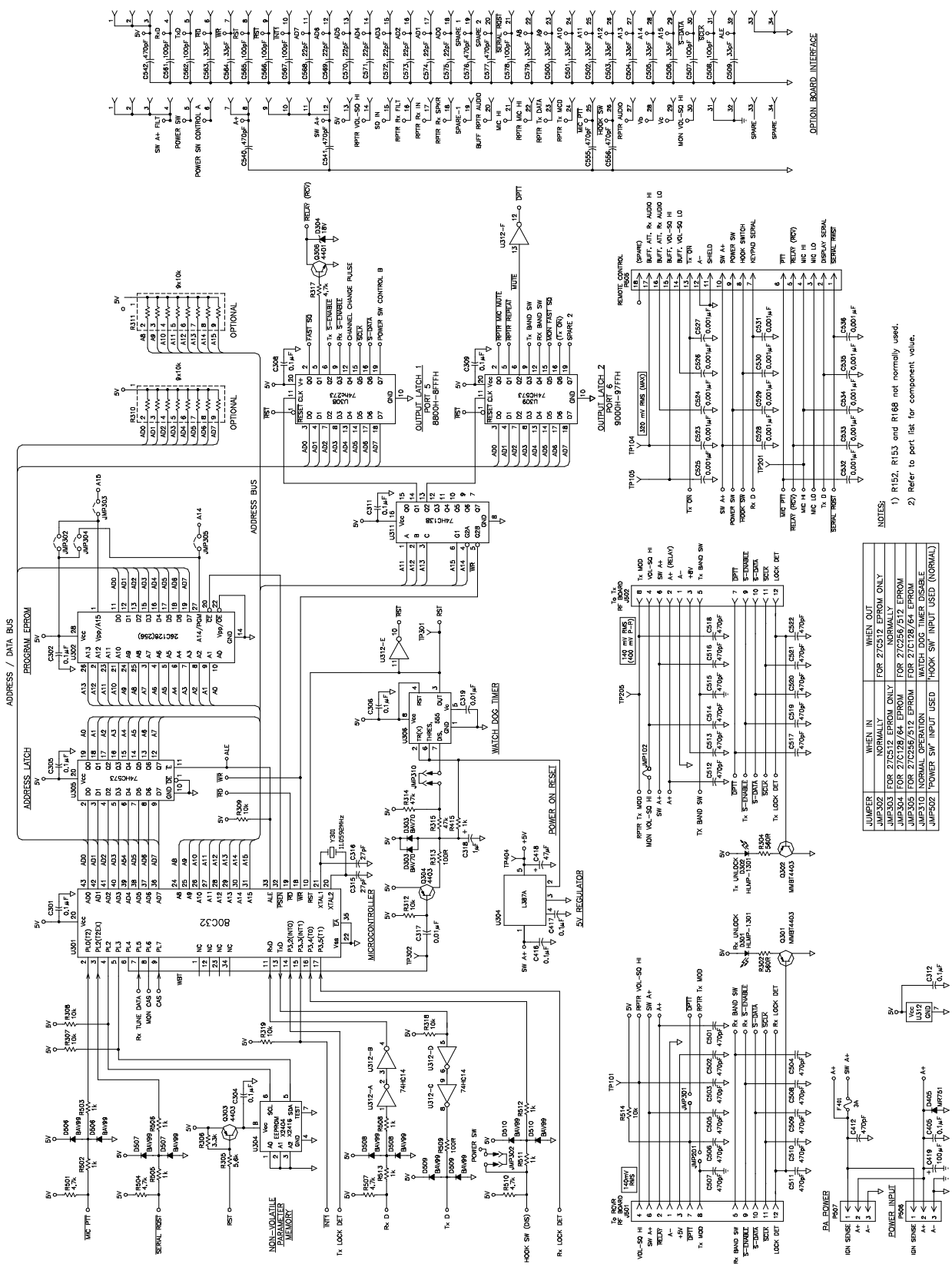
SYMBOL	PART NUMBER	DESCRIPTION
R411	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R412	BCR1/8-103JT	Metal film: 5% 10k (P4)
R413	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R414	BCR1/8-103JT	Metal film: 5% 10k (P4 P5).
R415	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4, P5, P6).
R416 and R417	BCR1/8-223JT	Metal film: 5% 22k (P4 P5).
R418	BCR1/JP-JT	Jumper 0-ohm (P4 P5).
R501	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4, P5, P6).
R502 and R503	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4, P5, P6).
R504	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4, P5, P6).
R505 and R506	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4, P5, P6).
R507	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4, P5, P6).
R508	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4, P5, P6).
R509	BCR1/8-101JT	Metal film: 5% 100 ohms (P4, P5, P6).
R510	BCR1/8-472JT	Metal film: 5% 4700 ohms (P4, P5, P6).
R511 thru R513	CR1206-1001JTR	Metal film: 5% 1000 ohms (P4, P5, P6).
R514	BCR1/8-103JT	Metal film: 5% 10k (P4, P5, P6).
		--------- POTENTIOMETERS --------
RV101 thru RV201	POT3321H-1-104	Trimpot 100k linear (Murata) (P1 P2).
		---------- TEST POINTS ----------
TP101 thru TP406		Pin Test Point
		------ INTEGRATED CIRCUITS -----
U101 and U102	MC3403D	Linear: MC3303D Quad Opamp 14-SOIC (P4 P5).
U103	LM393D	Linear: LM393D Dual Comp 8-SOIC (P4 P5).
U104 and U105	MC3403D	Linear: MC3303D Quad Opamp 14-SOIC (P4 P5).
U107	74HC4052D	Digital: 74HC4052 Switch SOIC Signetics (P4 P5).
U108	74HC4051D	Digital: 74HC4051 Switch SOIC Signetics (P4 P5).
U109	74HC4053D	Digital: 74HC4053 Switch SOIC Signetics (P4 P5).

SYMBOL	PART NUMBER	DESCRIPTION
U110	MC3458D	Linear: Dual Op-amp 8-SOIC (P4 P5).
U111	LM393D	Linear: LM393D Dual Comparator 8-SOIC (P4 P5).
U201 thru U203	MC3403D	Linear: MC3303D Quad Op-amp 14-SOIC (P4 P5).
U204	74HC4053D	Digital: 74HC4053 Switch SOIC Signetics (P4 P5).
U301	TN80C32	Microprocessor 80C32 ROMLESS 44-PLCC (P1, P2, P3).
U303	26C64ALP-10	RAM: 8kx8 120ns RAM SOIC (P4 P5).
U304	X24C04PI-3.5	integrated circuit serial x2404 - 40/+85 (P1, P2, P3).
U305	TC74HC573AFW	Digital: 74HC573 Octal Latch SOIC (P4, P5, P6).
U306	LMC555CM	Linear: CMOS 555 Timer 8-SOIC (P4, P5, P6).
U307 thru U310	TC74HC273AFW	Digital: Octal D flip-flop 74HC273 SOIC (P4 P5).
U311	TC74HC138AFN	Digital: 74HC138 Decoder SOIC (P4, P5, P6).
U312	TC74HC14AFN	Digital: 74HC14 HEX Buffer SOIC (P4, P5, P6).
U313	MC14504BCD	Digital: MC14504 Level Shifter SOIC (P4 P5).
U401	MC78L08ACP	Regulator: 78L08 8 v reg 5% (P1 P2).
U402	TC4013BFN	Digital 4013B Dual-D Flip-flop (P4 P5).
U403	L387A	Regulator: L387A 5-v reg TO-220 (P1, P2, P3).
		---------- SOCKETS ----------
XU301	821575-1	PLCC-44 pth (P1, P2, P3).
XU302	2-641267-3	28-pin (P1, P2, P3).
XU304	2-641260-3	8-pin (P1, P2, P3).
		---------- CRYSTALS ----------
Y301	ATS49-11.0592	11.0592 MHz at-51/low profile (P1, P2, P3).
30	CI-192-028	insulator crystal insulator pad (bivar) (P1, P2, P3) P1 P2 P3
		---------- MISCELLANEOUS ----------
19	233B7395P1	Plate, heatsink (P1, P2, P3).
20	19A702364P308	Screw: M3x.5x8 Torx (P1(3), P2(3), P3(2))
21	156-010	Nut: M3 Hex (P1(3), P2(3), P3(2)).
22	668-004	Lockwasher: M3 internal teeth (P1(3), P2(3), P3(2))
24	126-2	Heatsink compound, non-silicone, 2-oz jar.

SYMBOL	PART NUMBER	DESCRIPTION
26	90059-0009	Jumper, shorting, low-profile gold (molex) (P1(3), P2(3), P3(3)).
28	194C5696P1	Shield, pcb" (N/R)
29	194C5696P2	Shield MCU cover (N/R)

Assembly Diagram 8B017C04 is not currently available.

SYSTEM / LOGIC BOARD
7A0004X01
(8B017C04, Sh. 1, Rev.)



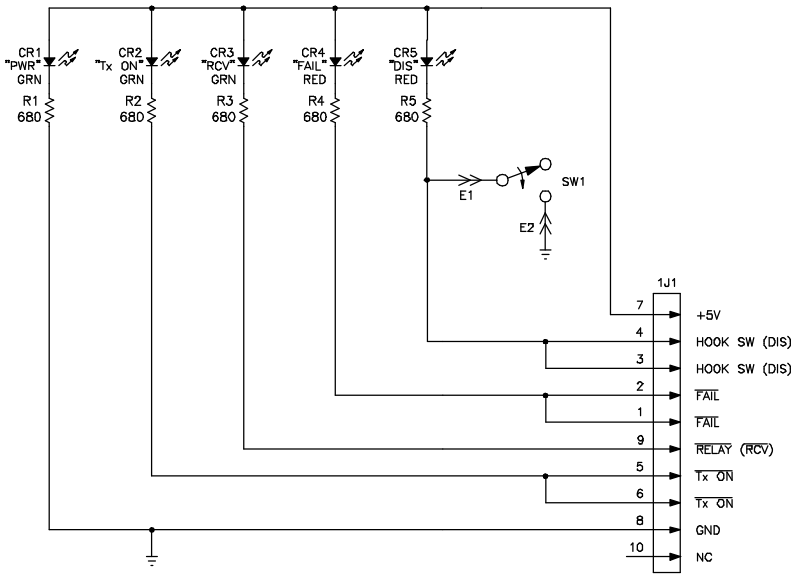
SYSTEM / LOGIC BOARD

7A0004X01

(8D017C08, Sh. 1, Rev. 1)

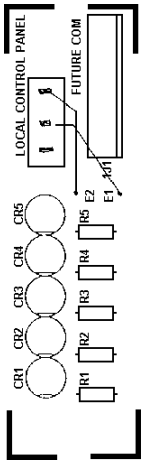
LOCAL CONTROL PANEL PCB
7L017A01P1

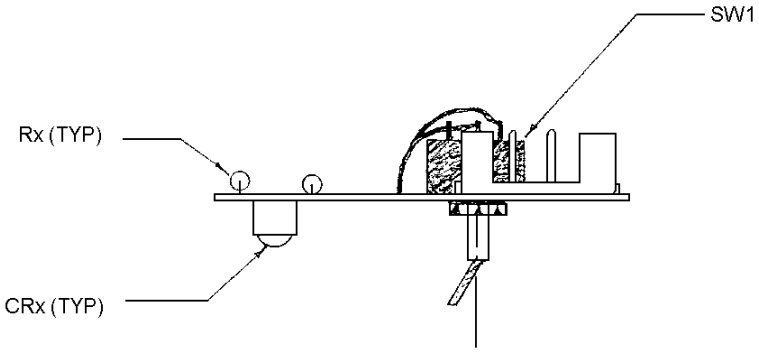
SYMBOL	PART NUMBER	DESCRIPTION
		---------- DIODES ----------
CR1 THRU CR3	5332H5	Led LED Green Standoff (IDI).
CR4 AND CR5	5332H1	Led LED Red Standoff (IDI).
		---------- RESISTORS ----------
R1 THRU R5	CR25-681J	Resistor Resistor 680R 5% 1/4W Leaded (Philips).
		---------- CONNECTORS ----------
1J1	22-27-2101	Header, 10-Pin (Molex).
		---------- SWITCHES ----------
SW1	A121P32Y5ZQ	Switch, SPDT (Cutler-Hammer).
		---------- MISCELLANEOUS ----------
2	3045-B-440-B-0	Standoff Standoff 4-40 x 1/8 x 1/4 od x 1/16 pnl (RAF) (qty.2)
2	3045-B-440-B-16	Standoff Standoff 4-40 x 1/8 x 1/4 od x 1/16 pnl (RAF) (alt)
3	2230-4	Wire Wire 24AWG Strnd 300V TR64 White (Delco) (qty. 5)



REF: ASSEMBLY DWG. 8B017B01
PART LIST : 7L017A01

LOCAL CONTROL PANEL
7L0017A01
(8D017A06, Sh. 1, Rev. 1)

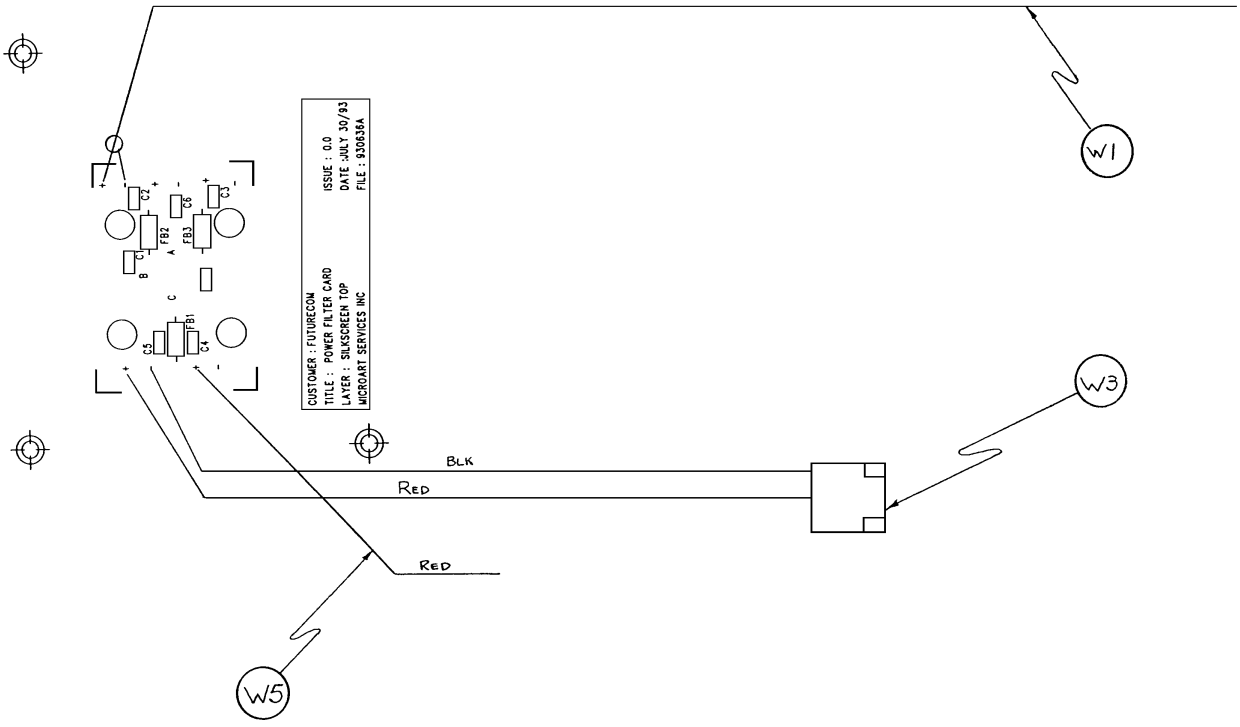




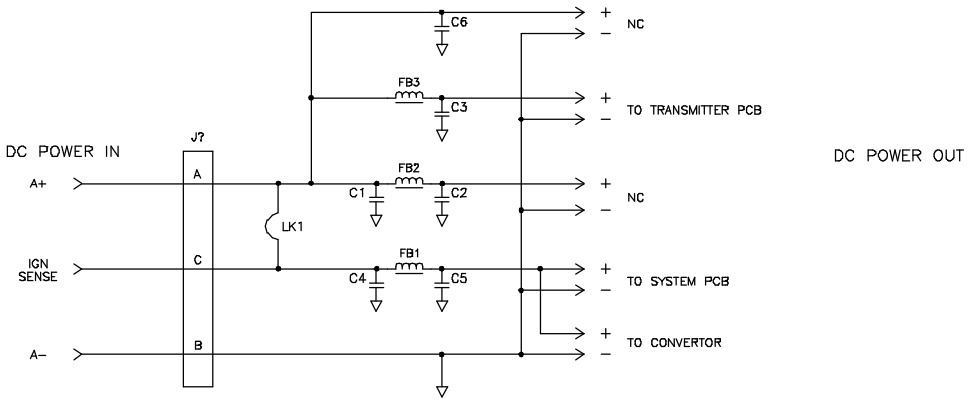
LOCAL CONTROL PANEL
7L0017A01
(8D017A06, Sh. 1, Rev. 1)

POWER SUPPLY FILTER PCB ASSEMBLY
7L017A03P1 - Sask-Tel
7L017A03P2 - Sask-Tel

SYMBOL	PART NUMBER	DESCRIPTION
		---------- FILTER CHOKES ----------
FB1	2743007111	Choke: RF Choke (Fair Rite) (used in P1).
FB2	2743007111	Choke: RF Choke (Fair Rite) (used in P1).
FB2	2943666671	Choke: RF Choke (Fair Rite) (used in P2).
FB3	2743007111	Choke: RF Choke (Fair Rite) (used in P1).
FB3	2943666671	Choke: RF Choke (Fair Rite) (used in P2).
1	3048-B-440-B-0	Standoff: 4-40 x 5/16 x 1/4 OD x 1/16 pnl (RAF) (qty. 4)
1	3048-B-440-B-16	Standoff: 4-40 x 5/16 x 1/4 OD x 1/16 pnl (RAF) (alt)
W1	2258-1	Cable, Coax: (Alpha) (used in P1, qty. 42 cm).
W3	7W017A02G1	Subassembly Internal Power Cable Sub-Asm (used in P1).
2	7W017A02G2	Subassembly Internal Power Cable Sub-Asm (used in P2).
W5	2238-2	Wire: 20AWG Strnd 300V TR64 Red (Delco) (used in P1, qty (8).
C1	12062R333J9CB1	Capacitor Cap 0.033 µF 5% 50V W5R 1206 (Philips).
C2	12062R333J9CB1	Capacitor Cap 0.033 µF 5% 50V W5R 1206 (Philips).
C3	12062R333J9CB1	Capacitor Cap 0.033 µF 5% 50V W5R 1206 (Philips) (used in G1). (used in P2).
C4	12062R333J9CB1	Capacitor Cap 0.033 µF 5% 50V W5R 1206 (Philips).
C5	12062R333J9CB1	Capacitor Cap 0.033 µF 5% 50V W5R 1206 (Philips) (used in P1).
C6	12062R333J9CB1	Capacitor Cap 0.033 µF 5% 50V W5R 1206 (Philips).

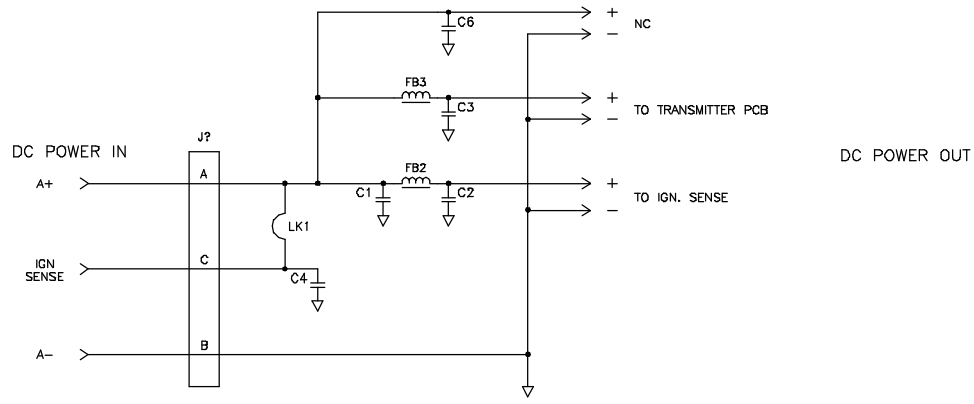


POWER SUPPLY FILTER ASSSEMBLY
7L0017A01
(8B017B03, Sh. 1, Rev. 0)



All capacitors 0.033μF, 50V
All ferrite beads FAIR-RITE 274300711
REF: P/L 7L017A03-01

PART 1 : AS SHOWN ABOVE



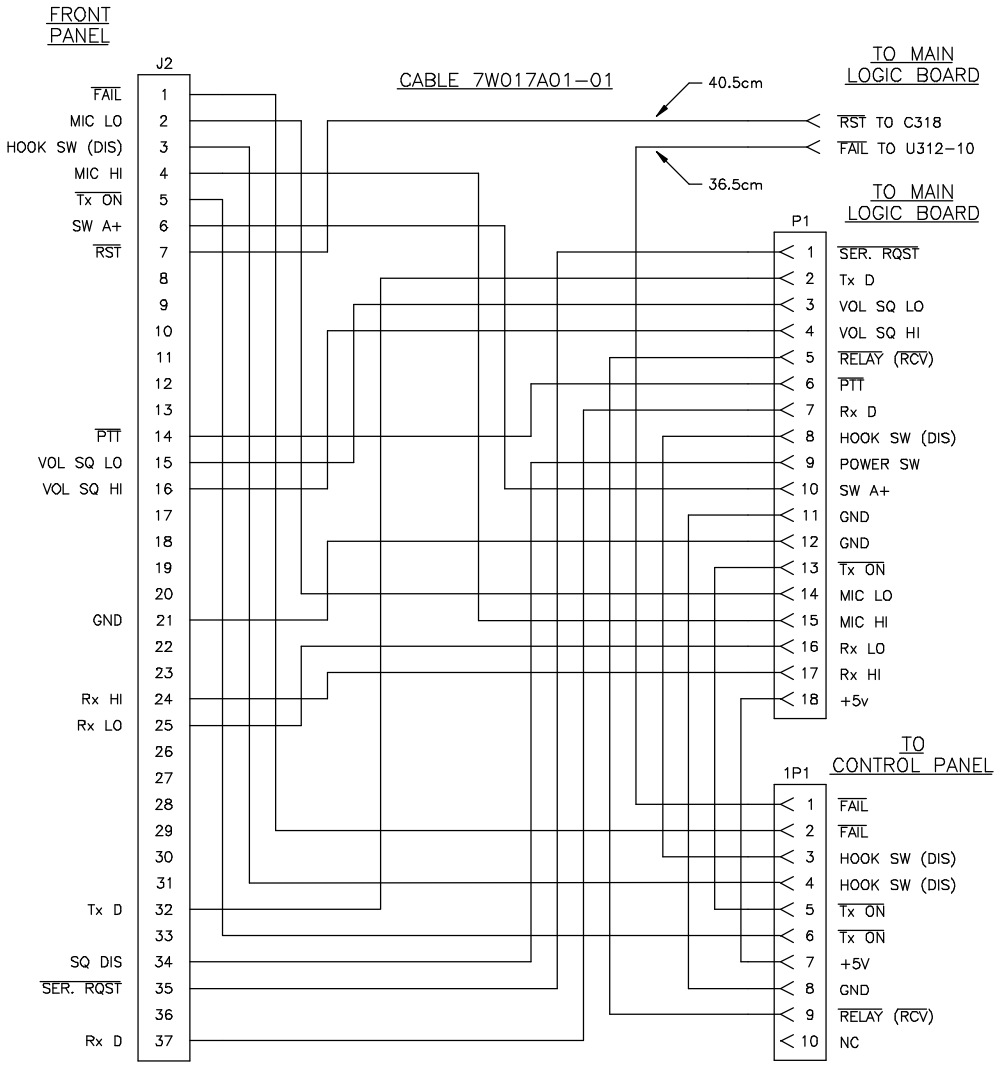
All capacitors 0.033μF, 50V
All ferrite beads FAIR-RITE 2943666671
REF: P/L 7L017A03-02

PART 2 : AS SHOWN ABOVE

POWER SUPPLY FILTER ASSSEMBLY
7L0017A01
(8D017A03, Sh. 1, Rev. 1)

INTERNAL I/O CABLE ASSEMBLY INTERNAL I/O CABLE ASSEMBLYParts List
7W017A01P1

SYMBOL	PART NUMBER	DESCRIPTION
		---------- CONNECTORS ----------
P505	22-01-3187	Connector Housing 18-Position (Molex).
1P1	22-01-3107	Connector Housing 10-Position (Molex).
J2	205209-1	Connector DC37 Female (Amp).
1	66504-3	Contact Terminal Crimp: 24-20 Female SelGold Chain (Amp) (qty. 7).
1	66504-9	Contact Terminal Crimp: 24-20 Female SelGold Loose (Amp) (alt)
2	08-55-0101	Contact Terminal Crimp: 30-22 SelGold Chain (Molex) (qty.27).
2	08-55-0102	Contact Terminal Crimp: 30-22 SelGold Loose (Molex) (alt).
3	2230-2	Wire: 24AWG Strnd 300V TR64 Red (Delco) (qty. 380).
4	3048-11	Wire: 28AWG Strnd 300V TR64 White/Black (Alpha) (qty. 40).
5	T18R	Tie-wrap: "Tie Wrap 4 in." Black (Tyton)" (qty. 4).



INTERNAL I/O CABLE ASSSEMBLY

7L0017A01

(8B017B03, Sh. 1, Rev. 1)

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