OPERATOR'S MANUAL

FOR

WJ 9040 SRM105

SITE REFERENCE MODULE

WATKINS-JOHNSON COMPANY
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GAITHERSBURG, MARYLAND 20878

7/84

WARNING

This equipment employs dangerous voltages which may be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

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CHAPTER I

GENERAL INFORMATION

1.1 INTRODUCTION

The WJ 9040 SRM105 Site Reference Module is an optional plug-in unit which can be installed in the WJ 9040 EFR100 Equipment Frame.

1.2 EQUIPMENT PURPOSE, CAPABILITIES AND FEATURES

The SRM105 contains a 50 MHz temperature-compensated crystal oscillator which can be locked to a 1 or 5 MHz site reference via a female SMA connector. This site reference permits the locking of all the interconnected equipment, test equipment, computer, etc. to one master clock. The SRM105 provides four 50 MHz outputs through SMA female connectors that supply the necessary synthesizer reference frequency for WJ 9040 System receivers and tuners. The module can also be operated in an unlocked mode when a site reference is unavailable. All module operation modes are selected via an internal dip switch. **Table 1-1** lists the specifications for the SRM105.

Table 1-1. WJ 9040 SRM105 Site Reference Module Specifications

Reference Input Frequency	1 MHz or 5 MHz through SMA female connector
Reference Input Level	TTL or sine wave (-3 dBm to +10 dBm)
Number of Outputs	Four, SMA female
Output Frequency and Level	50 MHz sine wave, 0 dBm to +5 dBm
Output Frequency Stability	Depends on site reference (±1 ppm in unlocked mode)
Output Phase Noise	-140 dBc/Hz at 10 kHz carrier offset
Operation Temperature Range	0° C to +50° C
Operation Power	2W supplied by WJ 9040 EFR100
Size	3.5 inches high, 4.5 inches wide and 1 inch deep
Weight	1 lb. approximately

1.3 COMPLEMENT EQUIPMENT AND ACCESSORIES

The plug-in SRM105 is installed in the rear accessory module position of the WJ 9040 EFR100 Equipment Frame. Therefore, the WJ 9040 EFR100 Equipment Frame and the EPS100 Series Power Supply are required equipment.

CHAPTER II

INSTALLATION

2.1 UNPACKING AND INSPECTION

Examine the shipping carton for damage prior to unpacking the equipment. If the carton appears to be damaged, have the carrier's agent present when the equipment is unpacked. If this is not possible, retain all packaging material and shipping containers for the carrier's inspection to verify damage to the equipment after unpacking. Also verify that the equipment shipped corresponds to the packing slip. Contact the Watkins-Johnson Company, CEI Division, or your Watkins-Johnson representative for any discrepancies or shortages.

The unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. It is, therefore, ready for use upon receipt. After uncrating and checking contents against the packing slip, visually inspect all exterior surfaces for dents and scratches. If external damage is visible, remove the dust covers and inspect the internal components for apparent damage. Then check the internal cables for loose connections, and plug-in items such as printed wiring boards, which may have been loosened from their receptacles.

2.2 REPACKING

If the WJ 9040 SRM105 must be prepared for reshipment, the packaging methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or at least provide guidance for the repackaging effort. Conditions during storage and shipment should be limited as follows:

Maximum humidity: 95% (no condensation)

Temperature range: -30°C to 85°C

2.3 INSTALLATION PROCEDURES

The SRM105 Frequency Reference Module is a plug-in unit installed in the rear accessory module position, opposite the power supply, of the WJ 9040 EFR100 Equipment Frame.

Connector A1J1 of the SRM105 mates with its counterpart, A1J11, on the equipment frame. Two screws on the bottom of the SRM105 secure it to the equipment frame. Four SRM105 outputs, J1 through J4, are fastened by coaxial cable to the 50 MHz reference frequency input of the WJ 9040 System receivers and tuners. One SRM105 can provide the 50 MHz reference frequency for up to four receivers or tuners. The respective length of each coaxial cable will dictate which position each is connected to. Reference input J5 (1 or 5 MHz) is connected by coaxial cable to an external crystal or, at site, to the master clock of a computer.

Access to the rear panel is essential for making or changing input and output connections. **Table 2-1** lists the connectors associated with the SRM105 Frequency Reference Module.

Table 2-1. SRM105 Site Reference Module Connectors

Ref Desig	Description	Connection
J1	50 MHz Reference Out	Reference input connection on WJ-862X-X Receiver
J2	50 MHz Reference Out	Reference input connection on WJ-862X-X Receiver
J3	50 MHz Reference Out	Reference input connection on WJ-862X-X Receiver
J4	50 MHz Reference Out	Reference input connection on WJ-862X-X Receiver
J5	1 or 5 MHz Reference In	Site reference
	Power In	J11 EFR100 Equip. Frame

The internal dip switch selects the locked or unlocked operational mode and the 1 or 5 MHz site reference frequency. The dip switch is set before shipping according to customer-selected specifications and can be changed on site. A Phillips head screwdriver is required to access the dip switch. **Table 2-2** lists the appropriate settings for the dip switch.

Table 2-2. Dip Switch Settings

Condition	Dip Switch (S1)	
	C1	C2
Unlocked	X	1
1 MHz	1	2
5 MHz	2	2

CHAPTER III

OPERATION

3.1 GENERAL

Access to or control of the SRM105 Site Reference Module is not required by the operator. If a flashing POWER ON indicator on the receiver or tuner is observed, the operator must verify that the connection from the SRM105 to the unit in use is secure.

CHAPTER IV

OPERATOR MAINTENANCE

4.1 PREVENTIVE MAINTENANCE

Operator preventive maintenance consists of visual inspection and cleaning.

4.2 VISUAL INSPECTION

Visual inspection of the WJ 9040 SRM105 Site Reference Module should be performed on a routine basis. The inspection should be performed thoroughly to uncover existing or potential component malfunctions. At a minimum, the following items should be checked.

- Inspect equipment covers and front panel for condition of finish and panel markings.
- Inspect for dents, punctures, or warped areas.
- Inspect quarter-turn fasteners and receptacles.
- Inspect external surfaces for loose or missing screws or washers.
- Inspect receptacles for conditions of pins, contacts, and mountings.
- Inspect internal components for signs of deterioration, discoloration, or charring. Check for melted insulation and damaged, cracked, or broken components.
- Inspect printed circuit boards for damaged tracks, loose connections, corrosion, or other signs of deterioration.
- Inspect PC connectors, interface connectors, and chassis wiring for excessive wear, looseness, misalignment, corrosion, or other signs of deterioration.

4.3 CLEANING

Cleaning should be performed on a regular basis. Complete removal of dust, grease, and other contamination is of prime importance in maintaining the reliability and useful life of the SRM105 Site Reference Module. At a minimum, the following cleaning procedure should be performed:

CAUTION

Avoid the use of chemical cleaning agents containing benzene, toluene, zylene, acetone, or similar solvents. These chemicals may damage the plastics used in this receiver.

a. Exterior - Dust off the cabinet with a soft cloth. Dust the front panel controls with a small soft-bristled paint brush. Dirt clinging to the cabinet may be removed with a clean, lint-free cloth dampened with a mild detergent and water solution. Avoid using abrasive cleaners. They will scratch the front panel.

b. Interior - Dust in the interior of the unit should be removed before it builds up enough to cause arcing and short circuits during periods of high humidity. Dust is best removed by dry, low-pressure air. Dirt clinging to surfaces may be removed with a soft-bristled paint brush or a clean, lint-free cloth dampened with a mild detergent and water solution. Use a cotton-tipped applicator for cleaning narrow spaces and on the circuit boards.

c. Switch Contacts - When maintenance is necessary due to accumulated dirt and dust on the contacts, observe the following precautions: Clean the switch contacts with isopropyl alcohol or a mild detergent solution. Avoid cleaning solutions containing benzene, acetone, or similar solvents.

4.4 ADDITIONAL MAINTENANCE

Refer to **Chapter II** and **Chapter III** for additional maintenance information.

CHAPTER V

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules) and parts. An example of the unit numbering method follows:

Subassembly Designation A1	R1 Class and No. of Item
Identify from right to left as:	First (1) resistor (R) of first (1) subassembly (A)

Components which are an integral part of the main chassis have no subassembly designation.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on schematics in parentheses within the figure titles.

5.3 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment. When ordering replacement parts from the Watkins-Johnson Company, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in **paragraph 5.4** and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semi-conductors become available, it is the policy of Watkins-Johnson to incorporate them in proprietary products. For this reason some transistors, diodes, and integrated circuits installed in the equipment may not agree with those specified in the parts list and schematic diagrams of this manual. However, the semi-conductors designated in the manual may be substituted in every case with satisfactory results.

5.4 LIST OF MANUFACTURERS

The List of Manufacturers that follows is listed numerically by the manufacturer's Federal Supply Code or "Code Ident" as it appears in the parts list.

CODE	NAME AND ADDRESS	ZIP
04713	MOTOROLA INC SEMICOND PROD DIV PHOENIX,ARIZONA	850
07263	FAIRCHILD SEMICOND DIV MT VIEW,CALIFORNIA	9404
09021	AIRCO ELECTRONICS BRADFORD,PENNSYLVANIA	1670
14632	WATKINS-JOHNSON CO CEI DIV G-BURG ,MARYLAND	2037
15542	MINI-CIRCUITS LABORATORIES BROOKLYN,NEW YORK	1122
18324	SIGNETICS CORP SUNNYVALE,CALIFORNIA	9408
26805	OMNI SPECTRA INC MICROWAVE CONNECTOR DIV WALTHAM,MASS	0215
51642	CENTRE ENGINEERING INC STATE COLLEGE,PENNSYLVANIA	168(
52648	PLESSY SEMICONDUCTORS IRVINE,CALIFORNIA	9271
56289	SPRAGUE ELECTRIC CO NORTH ADAMS,MASSACHUSETTS	0124
71279	CAMBRIDGE THERMIONIC CORP CAMBRIDGE,MASSACHUSETTS	0213
71468	ITT CANNON DIV OF ITT CORP FOUNTAIN VALLEY,CALIFORNIA	9270
72982	ERIE TECHNOLOGICAL PRODUCTS INC ERIE,PENNSYLVANIA	1651
77820	BENDIX CORP ELECTRICAL COMPONENTS DIV SIDNEY,NEW YORK	1383
80131	ELECTRONIC INDUSTRIES ASSOCIATION WASHINGTON,DC	2000
81073	GRAYHILL INC LA GRANGE,ILLINOIS	6052
81349	MILITARY SPECIFICATIONS	
99800	DELEVAN ELECTRONICS DIV AMERICAN PRECISION IND AURORA,NEW YORK	1405

TYPE NUMBER 9040 SRM105 REVISION A SCHEMATIC 470829

TITLE - 1MHZ,5MHZ SITE REFERENCE MODULE

REF DESIG	DESCRIPTION	QTY/ EQPT	PART NUMBER	CODE IDENT	REF ASSY
A1	1MHZ,5MHZ SITE REFERENCE PW ASSY	1	371063-1(SEP PL)	14632	
J1	CONN/RECEP/SMA SMA STRAIGHT BULKHEAD	5	2058-0000	26805	
J2	S/A J1				
J3	S/A J1				
J4	S/A J1				
J5	S/A J1				

TYPE NUMBER 371063-1 REVISION A SCHEMATIC 470829

TITLE - 1MHZ,5MHZ SITE REFERENCE PW ASSY

REF DESIG	DESCRIPTION	QTY/ EQPT	PART NUMBER	CODE IDENT	REF ASSY
CR1	DIODE ZENER 5.1V SILICON	1	1N751A	80131	
C1	CAP/CER/DISC .1UF 20PCT 100V	6	8131M100-651-104M	72982	
C2	S/A C1				
C3	CAP/CER/DISC 0.47UF 20PCT 100V	4	8131M100-651-474M	72982	
C4	S/A C3				
C5	S/A C1				
C6	CAP/ELEC/TANT 1UF 20PCT 35V	2	196D105X0035HE3	56289	
C7	S/A C1				
C8	CAP/CER/MONO 6.8PF PORM .5PF 100V	1	8101-100-COHO-689D	72982	
C9	S/A C1				
C10	CAP/ELEC/TANT 4.7UF 20PCT 35V	4	196D475X0035JE3	56289	
C11	CAP/CER/DISC 1000PF 5PCT 100V	2	8121-100-C0GO-102J	72982	
C12	S/A C3				
C13	S/A C1				
C14	S/A C10				
C15	CAP/CER/MONO 180PF P OR M 2 PCT 100V NPO	7	150-100-NPO-181G	51642	

TYPE NUMBER 371063-1 REVISION A SCHEMATIC 470829

TITLE - 1MHZ,5MHZ SITE REFERENCE PW ASSY

REF DESIG	DESCRIPTION	QTY/ EQPT	PART NUMBER	CODE IDENT	REF ASSY
C16	CAP/CER/DISC 10PF PORM 0.5PF 100V NPO	1	8101-100-C0G0-100D	72982	
C17	S/A C15				
C18	S/A C15				
C19	CAP/CER/MONO 62PF P OR M 2PCT 100V NPO	2	150-100-NP0-620G	51642	
C20	S/A C19				
C21	S/A C15				
C22	S/A C15				
C23	S/A C15				
C24	S/A C15				
C25	S/A C10				
C26	S/A C10				
C27	CAP/CER/MONO 100PF P OR M 2 PCT 100V NPO	1	200-100-NP0-101G	51642	
C28	S/A C11				
C29	S/A C3				
C30	CAP CER DISC 4700 PF 5 PCT 100 V NPO	1	8131-100-CDG0-472J	72982	
C31	S/A C6				

TYPE NUMBER 371063-1 REVISION A SCHEMATIC 470929

TITLE - 1MHZ,5MHZ SITE REFERENCE PW ASSY

REF DESIG	DESCRIPTION	QTY/ EQPT	PART NUMBER	CODE IDENT	REF ASSY
E1-E5	TERMINAL/FORKED .062 MATL THKNS X .156 HIGH .046 X .094DP GROOVE SILVER PLATE	5	140-1941-02-01	71279	
J1	CONN/MULTIPIN CONN 25 PINS RIGHT ANGLE PRINTED CIRCUIT MTG	1	DB25PC	71468	
L1	COIL/FIXED 2.2UH 10PCT	1	1025-28 (75084-4)	99800	
L2	COIL/FIXED 0.82UH 10PCT	1	1537-10 (18130-7)	99800	
L3	COIL/FIXED/MOLD 10UH	1	1025-44 (75084-12)	99800	
L4	COIL/FIXED/MOLD .18UH 10PCT	1	1025-02 (75083-4)	99800	
Q1	TRANSISTOR HIGH SPEED SW SAT NPN SIL JEDEC TO-92	1	2N3904	80131	
R1	PC BD LAMINATE TEFLON	1	E601/2C8 1OZ2SIDE		
R2	RES/FIXED/FILM 27K 5PCT 0.125W	1	CF1/8-27K/J	09021	
R3	RES/FIXED/FILM 1.0K 5PCT 0.125W	1	CF1/8-1.0K/J	09021	
R4	RES/FIXED/FILM 15K 5PCT 0.125W	1	CF1/8-15K/J	09021	
R5	RES/FIXED/FILM 68K 5PCT 0.125W	1	CF1/8-68K/J	09021	

TYPE NUMBER 371063-1 REVISION A SCHEMATIC 470829

TITLE - 1MHZ,5MHZ SITE REFERENCE PW ASSY

REF DESIG	DESCRIPTION	QTY/ EQPT	PART NUMBER	CODE IDENT	REF ASSY
R6	RES/FIXED/FILM 10K 5PCT 0.125W	1	CF1/8-10K/J	09021	
R7	RES/FIXED/FILM 4.7K 5PCT 0.125W	1	CF1/8-4.7K/J	09021	
R8	RES/FIXED/FILM 3.3K 5PCT 0.125W	1	CF1/8-3.3K/J	09021	
R9	RES/FIXED/FILM 39K 5PCT 0.125W	1	CF1/8-39K/J	09021	
R10	RES/FIXED/FILM 820 OHMS 5PCT .25W	1	CF1/4-820 OHMS/J	09021	
R11	RES/FIXED/FILM 470 OHMS 5PCT 0.125W	4	CF1/8-470 OHMS/J	09021	
R12	RES/FIXED/FILM 6.8 OHMS 5PCT 0.125W	2	CF1/8-6.8 OHMS/J	09021	
R13	S/A R11				
R14	RES/FIXED/COMPD 220 OHM 5 PCT 1W	1	RCR32G221JS	81349	
R15	S/A R11				
R16	S/A R12				
R17	S/A R11				
R18	RES/FIXED/FILM 12.7K 1PCT 0.10W	1	RN55C1272F	81349	
R19	RES/FIXED/FILM 5.6 OHMS 5PCT .25W	1	CF1/4-5.6 OHMS/J	09021	
R20	CONN/RECEP	1	JTP02RE12-22S	77820	
R21	RES/FIXED/FILM 12.1K 1PCT 0.10W	1	RN55C1212F	81349	

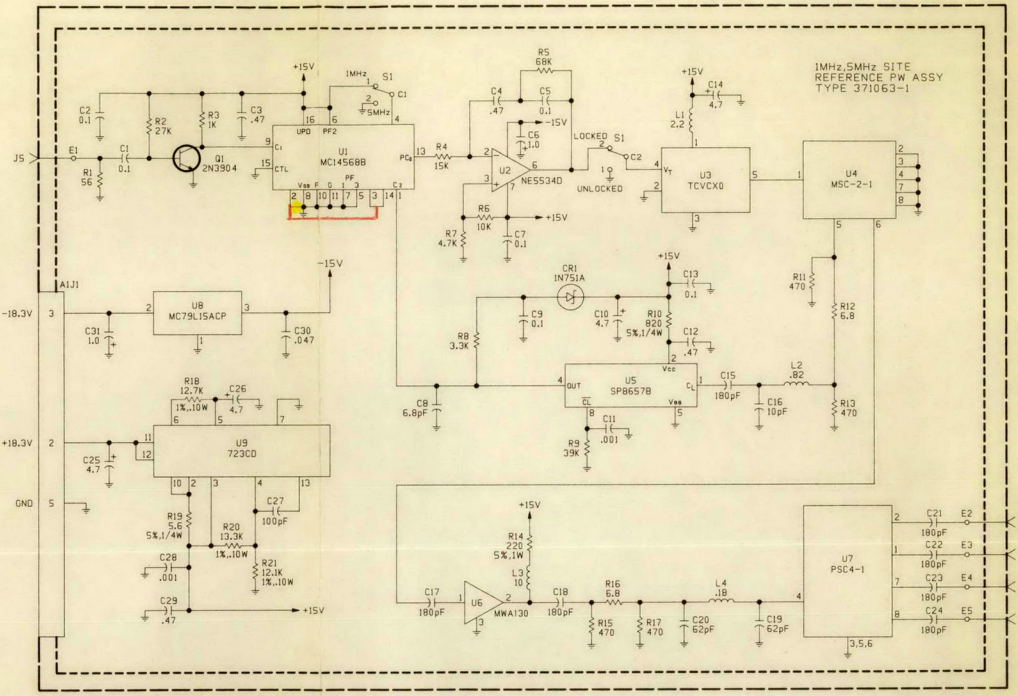
TYPE NUMBER 371063-1 REVISION A SCHEMATIC 470829

TITLE - 1MHZ,5MHZ SITE REFERENCE PW ASSY

REF DESIG	DESCRIPTION	QTY/ EQPT	PART NUMBER	CODE IDENT	REF ASSY
S1	SWITCH/DIP-C 2 SEC SPDT	1	763C02	81073	
U1	IC PHASE COMPARATOR AND PROGRAMMABLE COUNTER DIVIDE-BY-N 4 BIT BINARCOUNTERO	1	MC14568BCP	04713	
U2	IC	1	NE5534D	18324	
U3	OSCILLATOR TEMPERATURE CONTROLLED VOLTAGE CONTROLLED CRYSTAL OSCILLATOR	1	92174	14632	
U4	POWER SPLITTER/COMBINER 100KHZ-450MHZ	1	MSC-2-1	15542	
U5	IC 200 MHZ DIVIDE 20 PRESCALOR LOW POWER (50MW)	1	SP8657B	52648	
U6	AMPLIFIER RF 0.1-400MHZ TO 39 WIDEBAND	1	MWA130	04713	
U7	DIVIDER DIVIDER/POWER 4 WAY 100 KHZ-200 MHZ	1	PSC-4-1	15542	
U8	VOLTAGE RGLTR NEG 15V 5PCT 100MA TO 92 CASE	1	MC79L15ACP	04713	
U9	IC VOLTAGE REGULATOR +15V	1	723CD	07263	

CHAPTER VI

SCHEMATIC DIAGRAMS



NOTE:
1. R15,16 & 17 ARE FACTORY SELECTED.

Figure 6-1. Type WJ 9040 SRM105 1 MHz, 5 MHz Site Reference Module Main Chassis, Schematic Diagram 470829