Table B-1: PnMask I and PnMask Q Values for PilotPn

14–Chip Delay				
Pilot PN	**I**	**Q**	**I**	**Q**
	(Dec.)		**(Hex.)**	
401	5850	23074	16DA	5A22
402	5552	20250	15B0	4F1A
403	12589	14629	312D	3925
404	23008	29175	59E0	71F7
405	27636	13943	6BF4	3677
406	17600	11072	44C0	2B40
407	17000	29492	4268	7334
408	21913	5719	5599	1657
409	30320	7347	7670	1CB3
410	28240	12156	6E50	2F7C
411	7260	25623	1C5C	6417
412	17906	27725	45F2	6C4D
413	5882	28870	16FA	70C6
414	22080	31478	5640	7AF6
415	12183	28530	2F97	6F72
416	23082	24834	5A2A	6102
417	17435	9075	441B	2373
418	18527	32265	485F	7E09
419	31902	3175	7C9E	0C67
420	18783	17434	495F	441A
421	20027	12178	4E3B	2F92
422	7982	25613	1F2E	640D
423	20587	31692	506B	7BCC
424	10004	25384	2714	6328
425	13459	18908	3493	49DC
426	13383	25816	3447	64D8
427	28930	4661	7102	1235
428	4860	31115	12FC	798B
429	13108	7691	3334	1E0B
430	24161	1311	5E61	051F
431	20067	16471	4E63	4057
432	2667	15771	0A6B	3D9B
433	13372	16112	343C	3EF0
434	28743	21062	7047	5246
435	24489	29690	5FA9	73FA
436	249	10141	00F9	279D
437	19960	19014	4DF8	4A46
438	29682	22141	73F2	567D
439	31101	11852	797D	2E4C
440	27148	26404	6A0C	6724
441	26706	30663	6852	77C7
442	5148	32524	141C	7F0C
443	4216	28644	1078	6FE4
444	5762	10228	1682	27F4
445	245	23536	00F5	5BF0
446	21882	18045	557A	467D
447	3763	25441	0EB3	6361
448	206	27066	00CE	69BA
449	28798	13740	707E	35AC
450	32402	13815	7E92	35F7

B

Table B-1: PnMask I and PnMask Q Values for PilotPn

14–Chip Delay				
Pilot PN	**I**	**Q**	**I**	**Q**
	(Dec.)		**(Hex.)**	
451	13463	3684	3497	0E64
452	15417	23715	3C39	5CA3
453	23101	15314	5A3D	3BD2
454	14957	32469	3A6D	7ED5
455	23429	9816	5B85	2658
456	12990	4444	32BE	115C
457	12421	5664	3085	1620
458	28875	7358	70CB	1CBE
459	4009	27264	0FA9	6A80
460	1872	28128	0750	6DE0
461	15203	30168	3B63	75D8
462	30109	29971	759D	7513
463	24001	3409	5DC1	0D51
464	4862	16910	12FE	420E
465	14091	20739	370B	5103
466	6702	10191	1A2E	27CF
467	3067	12819	0BFB	3213
468	28643	19295	6FE3	4B5F
469	21379	10072	5383	2758
470	20276	15191	4F34	3B57
471	25337	27748	62F9	6C64
472	19683	720	4CE3	02D0
473	10147	29799	27A3	7467
474	16791	27640	4197	6BF8
475	17359	263	43CF	0107
476	13248	24734	33C0	609E
477	22740	16615	58D4	40E7
478	13095	20378	3327	4F9A
479	10345	25116	2869	621C
480	30342	19669	7686	4CD5
481	27866	14656	6CDA	3940
482	9559	27151	2557	6A0F
483	8808	28728	2268	7038
484	12744	25092	31C8	6204
485	11618	22601	2D62	5849
486	27162	2471	6A1A	09A7
487	17899	25309	45EB	62DD
488	29745	15358	7431	3BFE
489	31892	17739	7C94	454B
490	23964	12643	5D9C	3163
491	23562	32730	5C0A	7FDA
492	2964	19122	0B94	4AB2
493	18208	16870	4720	41E6
494	15028	10787	3AB4	2A23
495	21901	18400	558D	47E0
496	24566	20295	5FF6	4F47
497	18994	1937	4A32	0791
498	13608	17963	3528	462B
499	27492	7438	6B64	1D0E
500	11706	12938	2DBA	328A

Table B-1: PnMask I and PnMask Q Values for PilotPn

14–Chip Delay				
Pilot PN	**I**	**Q**	**I**	**Q**
	(Dec.)		**(Hex.)**	
501	14301	19272	37DD	4B48
502	23380	29989	5B54	7525
503	11338	8526	2C4A	214E
504	2995	18139	0BB3	46DB
505	23390	3247	5B5E	0CAF
506	14473	28919	3889	70F7
507	6530	7292	1982	1C7C
508	20452	20740	4FE4	5104
509	12226	27994	2FC2	6D5A
510	1058	2224	0422	08B0
511	12026	6827	2EFA	1AAB

Notes

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MOTOROLA

C

Appendix C

FRU Optimization/ATP Test Matrix

FRU Optimization/ATP Test Matrix

Usage & Background

Periodic maintenance of a site may also may mandate re–optimization of specific portions of the site. An outline of some basic guidelines is included in the following tables.

NOTE	Re–optimization steps listed for any assembly detailed in the tables below must be performed *anytime* an RF cable associated with it is replaced.

C

BTS Frame

Table C-1: When RF Optimization is required on the BTS	
Item Replaced	**Optimize:**
C–CCP Shelf	All sector TX and RX paths to all Combined CDMA Channel Processor (C–CCP) shelves.
Multicoupler/ Preselector Card	The three or six affected sector RX paths for the C–CCP shelf in the BTS frames.
BBX board	RX and TX paths of the affected C–CCP shelf / BBX board.
CIO Card	All RX and TX paths of the affected CDMA carrier.
Any LPA Module	The affected sector TX path.
LPA Backplane	The affected sector TX path.
LPA Filter	The affected sector TX path.

Ancillary Frame

Item Replaced	**Optimize:**
Directional Coupler	All affected sector RX and TX paths to all BTS frame shelves.
Site filter	All affected RX sector paths in all shelves in all BTS frames.
Any RFDS component or TSU.	The RFDS calibration RX & TX paths (MONFWD/GENFWD).

Inter-frame Cabling

Optimization must be performed after the replacement of any RF cabling between BTS frames.

Table C-2: When to Optimize Inter−frame Cabling	
Item Replaced	**Optimize:**
Ancillary frame to BTS frame (RX) cables	The affected sector/antenna RX paths.
BTS frame to ancillary frame (TX) cables	The affected sector/antenna TX paths.

Detailed Optimization/ATP Test Matrix

Table C-3 outlines in more detail the tests that would need to be performed if one of the BTS components were to fail and be replaced. It is also assumes that all modules are placed OOS–ROM via the LMF until full redundancy of all applicable modules is implemented.

The following guidelines should also be noted when using this table.

NOTE	Not every procedure required to bring the site back on line is indicated in Table C-3. It is meant to be used as a guideline ONLY. The table assumes that the user is familiar enough with the BTS Optimization/ATP procedure to understand which test equipment set ups, calibrations, and BTS site preparation will be required before performing the Table # procedures referenced.

Various passive BTS components (such as the TX and RX directional couplers, Preselector IO, CIO; etc.) only call for a TX or RX calibration audit to be performed in lieu of a full path calibration. If the RX or TX path calibration audit fails, the entire RF path calibration will need to be repeated. If the RF path calibration fails, further troubleshooting is warranted.

Whenever any C–CCP BACKPLANE is replaced, it is assumed that only power to the C–CCP shelf being replaced is turned off via the breaker supplying that shelf.

Whenever any DISTRIBUTION BACKPLANE is replaced it is assumed that the power to the entire RFM frame is removed and the Preselector I/O is replaced. The modem frame should be brought up as if it were a new installation.

NOTE	If any significant change in signal level results from any component being replaced in the RX or TX signal flow paths, it would be identified by re–running the RX and TX calibration audit command.

When the CIO is replaced, the C–CCP shelf remains powered up. The BBX boards may need to be removed, then re–installed into their original slots, and re–downloaded (code and BLO data). RX and TX calibration audits should then be performed.

Table C-3: SC 4812T BTS Optimization and ATP Test Matrix

Doc Tbl #	page	Description	Directional Coupler (RX)	Directional Coupler (TX)	RX Filter	RX Cables	TX Cables	MPC/EMPC	CIO	C–CCP Backplane	BBX	MCC	CSM	LFR/HSO	GPS	GLI	LPA Trunking Backplane	LPA	LPA Bandpass Filter	Power Supply Modules	Switch Card	RFDS
Table 2-1	2-3	Initial Boards/Modules Install, Prelimnary Operations, CDF Site Equipage; etc.	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●**	●	●
Table 2-2 Table 2-5	2-6 2-14	DC Power Pre-Test Physical Inspect			●					●												
Table 2-7	2-15	Initial Power-up								●							●	●		●**		●
Table 3-11	3-34	Ping the Processors								●	●	●	●			●					●	
Table 3-13	3-38	Download/Enable MGLIs								●						●						●
Table 3-13	3-38	Download/Enable GLIs								●						●						●
Table 3-14	3-39	Download CSMs								●			●		●							●
Table 3-14	3-39	Download MCCs								●			●		●							●
Table 3-14	3-39	Download BBXs								●	●											●
Table 3-16	3-41	Enable CSMs								●			●									
Table 3-17	3-42	Enable MCCs								●		●										
Table 3-20	3-49	GPS Initialization / Verification								●			●		●							
Table 3-21	3-53	LFR Initialization / Verification								●				●								
Table 3-22	3-55	HSO Initialization/Verification								●				●								

● Required

** Replace power converters one card at a time so that power to the C–CCP or LPA shelf is not lost. If power to the C–CCP shelf is lost, all cards in the shelf must be downloaded again.

C

Table C-3: SC 4812T BTS Optimization and ATP Test Matrix

Doc Tbl #	page	Description	Directional Coupler (RX)	Directional Coupler (TX)	RX Filter	RX Cables	TX Cables	MPC/EMPC	CIO	C–CCP Backplane	BBX	MCC	CSM	LFR/HSO	GPS	GLI	LPA Trunking Backplane	LPA	LPA Bandpass Filter	Power Supply Modules	Switch Card	RFDS
Table 3-37	3-92	TX Path Calibration	4	4			4		1	1	4					*	3	3	4		7	
Table 3-38	3-94	Download Offsets to BBX	4	4						1	4					*						
Table 3-39	3-96	TX Path Calibration Audit	4	4			4		1	1	4					*	3	3	4		7	
Table 3-48	3-107	RFDS Path Calibration Procedure (see Note †)	6	6		5	4		1	1	6					*	3	3	4			6
†		RFDS Path Calibration should be performed at initial BTS installation AND after replacement of the RFDS FRU. RFDS Path Calibration is NOT required for other FRU replacement but may be used as an additional fault isolation tool.																				
Table 4-1	4-9	Spectral Purity TX Mask ATP	4	4						1	4					*	*	*	*		*	
Table 4-1	4-9	Waveform Quality (rho) ATP	4	4				*		1	4		*		*	*	*	*	*		*	
Table 4-1	4-9	Pilot Time Offset ATP	4	4				*		1	4		*		*	*	*	*	*		*	
Table 4-1	4-9	Code Domain Power / Noise Floor	4	4						1	4	8	8	8	8	*	*	*	*			
Table 4-1	4-9	FER Test	5	5	5		5	2	2	2	5	8	8	8	8	*					7	

* Perform if necessary for additional fault isolation, repair assurance, or site certification.

1 Perform on all carrier and sector TX paths to the C–CCP cage.

2 Perform on all carrier and sector RX paths to the C–CCP cage.

3 Perform on all primary and redundant TX paths of the affected carrier.

4 Perform on the affected carrier and sector TX paths. (BBXR replacement affects all carrier and sector TX paths.)

5 Perform on the affected carrier and sector RX paths. (BBXR replacement affects all carrier and sector RX paths.)

6 Perform on all RF paths of the affected carrier and sector (RFDS replacement affects all carriers.)

7 Perform with redundant BBX for all sectors on all carriers.

8 Verify performance by performing on one sector of one carrier only.

C

Notes

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Appendix D

D

BBX Gain Set Point vs. BTS Output

BBX Gain Set Point vs. BTS Output Considerations

Usage & Background

Table D-1 outlines the relationship between the *total* of all code domain channel element gain settings (digital root sum of the squares) and the BBX Gain Set Point between 33.0 dBm and 44.0 dBm. The resultant RF output (as measured at the top of the BTS in dBm) is shown in the table. The table assumes that the BBX Bay Level Offset (BLO) values have been calculated.

As an illustration, consider a BBX keyed up to produce a CDMA carrier with only the Pilot channel (no MCCs forward link enabled). Pilot gain is set to 262. In this case, the BBX Gain Set Point is shown to correlate exactly to the actual RF output anywhere in the 33 to 44 dBm output range. (This is the level used to calibrate the BTS).

D

Table D-1: BBX Gain Set Point vs. Actual BTS Output (in dBm)												
dBm▶ Gain▼	44	43	42	41	40	39	38	37	36	35	34	33
541	–	–	–	–	–	–	–	43.3	42.3	41.3	40.3	39.3
533	–	–	–	–	–	–	–	43.2	42.2	41.2	40.2	39.2
525	–	–	–	–	–	–	44	43	42	41	40	39
517	–	–	–	–	–	–	43.9	42.9	41.9	40.9	39.9	38.9
509	–	–	–	–	–	–	43.8	42.8	41.8	40.8	39.8	38.8
501	–	–	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6
493	–	–	–	–	–	–	43.5	42.5	41.5	40.5	39.5	38.5
485	–	–	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4
477	–	–	–	–	–	–	43.2	42.2	41.2	40.2	39.2	38.2
469	–	–	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1
461	–	–	–	–	–	43.9	42.9	41.9	40.9	39.9	38.9	37.9
453	–	–	–	–	–	43.8	42.8	41.8	40.8	39.8	38.8	37.8
445	–	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6	37.6
437	–	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4	37.4
429	–	–	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3
421	–	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1
413	–	–	–	–	44	43	42	41	40	39	38	37
405	–	–	–	–	43.8	42.8	41.8	40.8	39.8	38.8	37.8	36.8
397	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6	37.6	36.6
389	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4

dBm► Gain▼	44	43	42	41	40	39	38	37	36	35	34	33
381	–	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3
374	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1	36.1
366	–	–	–	43.9	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9
358	–	–	–	43.7	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7
350	–	–	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5
342	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3	35.3
334	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1	36.1	35.1
326	–	–	43.9	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9	34.9
318	–	–	43.7	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7	34.7
310	–	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5
302	–	–	43.2	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2
294	–	44	43	42	41	40	39	38	37	36	35	34
286	–	43.8	42.8	41.8	40.8	39.8	38.8	37.8	36.8	35.8	34.8	33.8
278	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5	33.5
270	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3	35.3	34.3	33.3
262	44	43	42	41	40	39	38	37	36	35	34	33
254	43.7	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7	34.7	33.7	–
246	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4	35.4	34.4	33.4	–
238	43.2	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2	33.2	–
230	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9	34.9	33.9	–	–
222	42.6	41.6	40.6	39.6	38.6	37.6	36.6	35.6	34.6	33.6	–	–
214	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2	33.2	–	–

Table D-1: BBX Gain Set Point vs. Actual BTS Output (in dBm)

D

Notes

D

Appendix E

CDMA Operating Frequency

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E
■

Operating Frequency – North American PCS Bands

Introduction

Programming of each of the BTS BBX synthesizers is performed by the BTS GLIs via the CHI bus. This programming data determines the transmit and receive transceiver operating frequencies (channels) for each BBX.

1900 MHz PCS Channels

Figure E-1 shows the valid channels for the North American PCS 1900 MHz frequency spectrum. There are 10 CDMA wireline or non–wireline band channels used in a CDMA system (unique per customer operating system).

Figure E-1: North American PCS 1900 MHz Frequency Spectrum
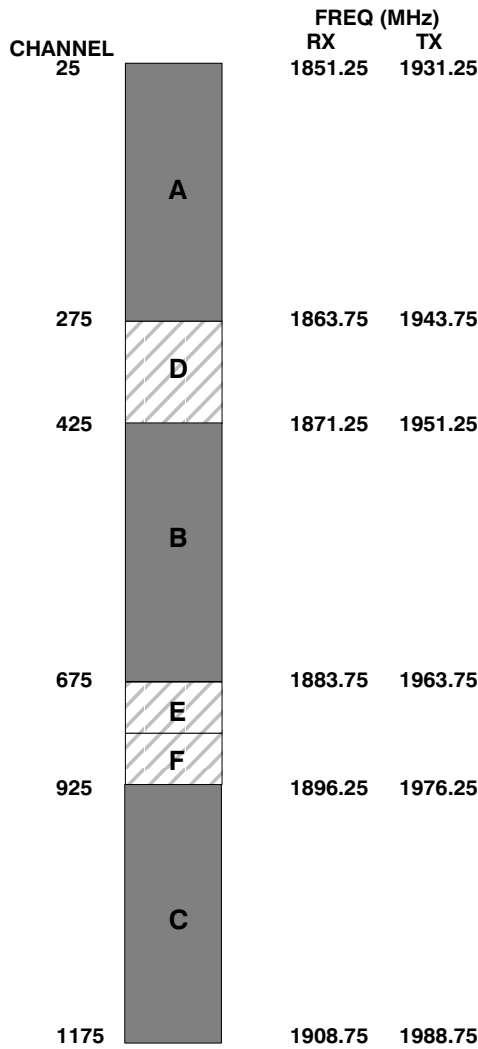
Calculating 1900 MHz Center Frequencies

Table E-1 shows selected 1900 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- TX = 1930 + 0.05 * Channel#
  Example: Channel 262
  TX = 1930 + 0.05*262 = 1943.10 MHz

- RX = TX – 80
  Example: Channel 262
  RX = 1943.10 – 80 = 1863.10 MHz

Actual frequencies used depend on customer CDMA system frequency plan.

Each CDMA channel requires a 1.77 MHz frequency segment. The actual CDMA carrier is 1.23 MHz wide, with a 0.27 MHz guard band on both sides of the carrier.

Minimum frequency separation required between any CDMA carrier and the nearest NAMPS/AMPS carrier is 900 kHz (center-to-center).

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Channel Number		**Transmit Frequency (MHz)**	**Receive Frequency (MHz)**
Decimal	**Hex**	**Center Frequency**	**Center Frequency**
25	0019	1931.25	1851.25
50	0032	1932.50	1852.50
75	004B	1933.75	1853.75
100	0064	1935.00	1855.00
125	007D	1936.25	1856.25
150	0096	1937.50	1857.50
175	00AF	1938.75	1858.75
200	00C8	1940.00	1860.00
225	00E1	1941.25	1861.25
250	00FA	1942.50	1862.50
275	0113	1943.75	1863.75
300	012C	1945.00	1865.00
325	0145	1946.25	1866.25
350	015E	1947.50	1867.50
375	0177	1948.75	1868.75
400	0190	1950.00	1870.00
425	01A9	1951.25	1871.25
450	01C2	1952.50	1872.50
475	01DB	1953.75	1873.75
500	01F4	1955.00	1875.00
525	020D	1956.25	1876.25
550	0226	1957.50	1877.50
575	023F	1958.75	1878.75

Table E-1: 1900 MHz TX and RX Frequency vs. Channel

Table E-1: 1900 MHz TX and RX Frequency vs. Channel			
Channel Number		**Transmit Frequency (MHz)**	**Receive Frequency (MHz)**
Decimal	**Hex**	**Center Frequency**	**Center Frequency**
600	0258	1960.00	1880.00
625	0271	1961.25	1881.25
650	028A	1962.50	1882.50
675	02A3	1963.75	1883.75
700	02BC	1965.00	1885.00
725	02D5	1966.25	1886.25
750	02EE	1967.50	1887.50
775	0307	1968.75	1888.75
800	0320	1970.00	1890.00
825	0339	1971.25	1891.25
850	0352	1972.50	1892.50
875	036B	1973.75	1893.75
900	0384	1975.00	1895.00
925	039D	1976.25	1896.25
950	03B6	1977.50	1897.50
975	03CF	1978.75	1898.75
1000	03E8	1980.00	1900.00
1025	0401	1981.25	1901.25
1050	041A	1982.50	1902.50
1075	0433	1983.75	1903.75
1100	044C	1985.00	1905.00
1125	0465	1986.25	1906.25
1150	047E	1987.50	1807.50
1175	0497	1988.75	1908.75

E

800 MHz CDMA Channels

Figure E-2 shows the valid channels for the North American cellular telephone frequency spectrum. There are 10 CDMA wireline or non–wireline band channels used in a CDMA system (unique per customer operating system).

Figure E-2: North American Cellular Telephone System Frequency Spectrum
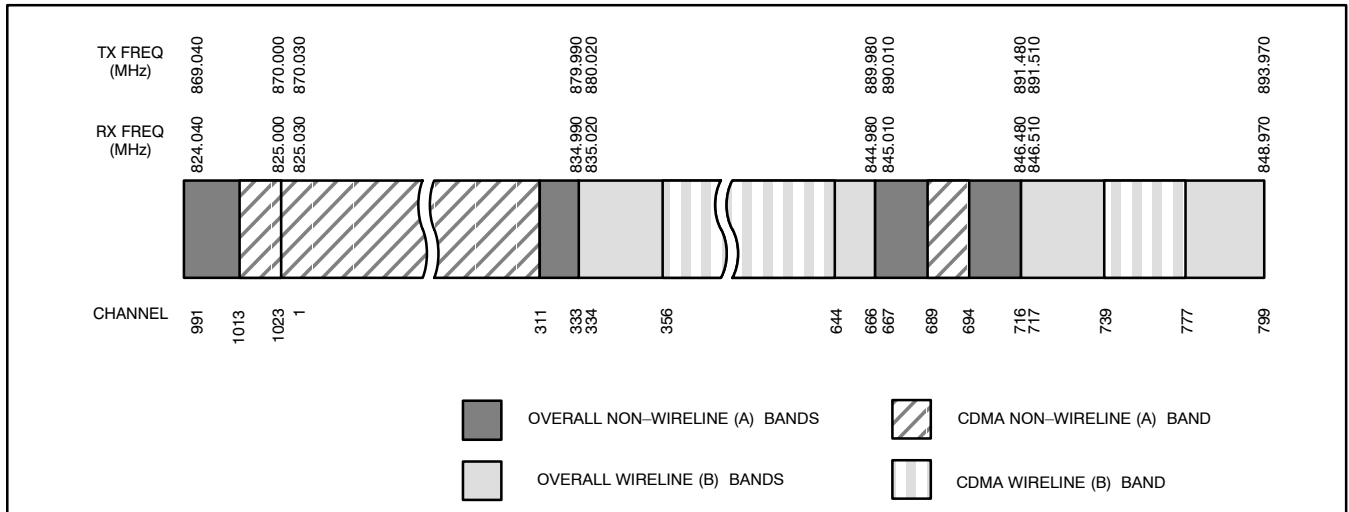
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Calculating 800 MHz Center Frequencies

Table E-2 shows selected 800 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- Channels 1–777
  TX = 870 + 0.03 * Channel#
  Example: Channel 262
  TX = 870 + 0.03*262 = 877.86 MHz

- Channels 1013–1023
  TX = 870 + 0.03 * (Channel# – 1023)
  Example: Channel 1015
  TX = 870 +0.03 *(1015 – 1023) = 869.76 MHz

- RX = TX – 45 MHz
  Example: Channel 262
  RX = 877.86 –45 = 832.86 MHz

Table E-2: 800 MHz TX and RX Frequency vs. Channel			
Channel Number **Decimal Hex**		**Transmit Frequency (MHz)** **Center Frequency**	**Receive Frequency (MHz)** **Center Frequency**
1	0001	870.0300	825.0300
25	0019	870.7500	825.7500
50	0032	871.5000	826.5000

Table E-2: 800 MHz TX and RX Frequency vs. Channel			
Channel Number		**Transmit Frequency (MHz)**	**Receive Frequency (MHz)**
Decimal	**Hex**	**Center Frequency**	**Center Frequency**
75	004B	872.2500	827.2500
100	0064	873.0000	828.0000
125	007D	873.7500	828.7500
150	0096	874.5000	829.5000
175	00AF	875.2500	830.2500
200	00C8	876.0000	831.0000
225	00E1	876.7500	831.7500
250	00FA	877.5000	832.5000
275	0113	878.2500	833.2500
300	012C	879.0000	834.0000
325	0145	879.7500	834.7500
350	015E	880.5000	835.5000
375	0177	881.2500	836.2500
400	0190	882.0000	837.0000
425	01A9	882.7500	837.7500
450	01C2	883.5000	838.5000
475	01DB	884.2500	839.2500
500	01F4	885.0000	840.0000
525	020D	885.7500	840.7500
550	0226	886.5000	841.5000
575	023F	887.2500	842.2500
600	0258	888.0000	843.0000
625	0271	888.7500	843.7500
650	028A	889.5000	844.5000
675	02A3	890.2500	845.2500
700	02BC	891.0000	846.0000
725	02D5	891.7500	846.7500
750	02EE	892.5000	847.5000
775	0307	893.2500	848.2500
NOTE			
Channel numbers 778 through 1012 are not used.			
1013	03F5	869.7000	824.7000
1023	03FF	870.0000	825.0000

E

Operating Frequency – Korean Bands

1700 MHz PCS Channels

Figure E-3 shows the valid channels for the 1700 MHz PCS frequency spectrum. The CDMA channels are spaced in increments of 25 (25, 50, 75, . . . 575) across the CDMA band.

Figure E-3: 1700 MHz PCS Frequency Spectrum
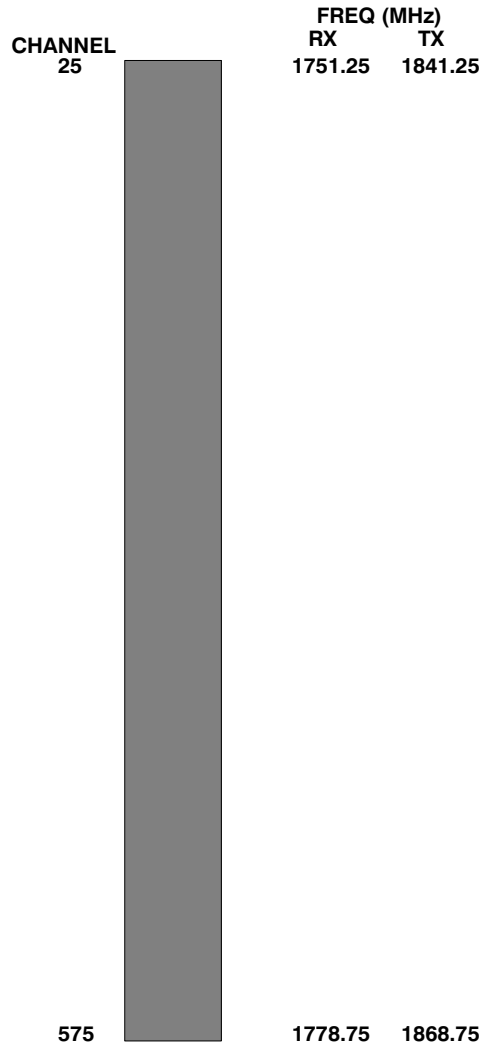
Calculating 1700 MHz Center Frequencies

Center frequency for channels may be calculated as follows:

Direction	Formula	Example
TX	1840 + (0.05 * Channel#)	Channel: 1840 + (0.05 + 25) = 1841.25
RX	1750 + (0.05 * Channel#)	Channel: 1750 + (0.05 + 25) = 1751.25

– Actual frequencies used depend on customer CDMA system frequency plan.

– Each CDMA channel requires a 1.77 MHz frequency segment. The actual CDMA carrier is 1.23 MHz wide, with a 0.27 MHz guard band on both sides of the carrier

– Minimum frequency separation required between any CDMA carrier and the nearest NAMPS/AMPS carrier is 900 kHz (center to center).

Table E-3: 1700 MHz TX and RX Frequency vs. Channel (Korean Bands)			
Channel Number		**Transmit Frequency (MHz)**	**Receive Frequency (MHz)**
Decimal	**Hex**	**Center Frequency**	**Center Frequency**
25	0019	1841.25	1751.25
50	0032	1842.50	1752.50
75	004B	1843.75	1753.75
100	0064	1845.00	1755.00
125	007D	1846.25	1756.25
150	0096	1847.50	1757.50
175	00AF	1848.75	1758.75
200	00C8	1850.00	1760.00
225	00E1	1851.25	1761.25
250	00FA	1852.50	1762.50
275	0113	1853.75	1763.75
300	012C	1855.00	1765.00
325	0145	1856.25	1766.25
350	015E	1857.50	1767.50
375	0177	1858.75	1768.75
400	0190	1860.00	1770.00
425	01A9	1861.25	1771.25
450	01C2	1862.50	1772.50
475	01DB	1863.75	1773.75
500	01F4	1865.00	1775.00
525	020D	1866.25	1776.25
550	0226	1867.50	1777.50
575	023F	1868.75	1778.75

E

Appendix F

Test Equipment Preparation

F

Test Equipment Preparation

Purpose

This appendix provides information on pre−testing set−up for the following test equipment items (not required for the Cybertest test set):

- Agilent E7495A test equipment setup
- Agilent E4406A transmitter test set
- Agilent E4432B signal generator
- Advantest R3267 spectrum analyzer
- Advantest R3562 signal generator
- Agilent 8935 analyzer (formerly HP 8935)
- HP 8921 with PCS interface analyzer
- Advantest R3465 analyzer
- Motorola CyberTest
- HP 437 power meter
- Gigatronics 8541C power meter
- GPIB adapter

Pre−testing set−up information covered includes verification and setting GPIB addresses, inter−unit cabling, connectivity testing, pre−test control settings, and equipment calibration for items which are not calibrated with the **Calibrate Test Equipment** function of the LMF.

The following procedures cover verification and changing GPIB addresses for the various items of CDMA test equipment supported by the LMF.

F

Agilent R7495A Test Equipment Setup

This test equipment requires a warm-up period of at least 30 minutes before BTS testing or calibration begins.

Using the Agilent E7495A with the LMF

The Agilent E7495A does not require the use of the 19MHz frequency reference; if connected, it will be ignored. The Even Sec SYNC connection is required.

The Agilent E7495A signal generator is only calibrated down to –80db. In order to achieve accurate FER testing, be sure the RX setup includes at least 40db of attenuation. This will ensure the signal generator will output sufficient power to operate in the calibrated range.

Set the IP Address as described in Table F-1.

✔	Step	Action
Table F-1: Set IP Address on Agilent E7495A test set		
	1	Use the **System Button > Controls >IPAdmin** to set an IP address on the E7495A as **128.0.0.49**, and Netmask to **255.255.255.128**.

Connections

It is recommended that you use a hub with BNC and RJ–45 connections. [Suggested models: Netgear model EN104 (4 port) or EN108 (8 port). Do NOT use model numbers ending with "TP"; those have no BNC connectors.]

The LMF will connect to the hub which in turn is connected to the BTS and to the Agilent E7495A.

Agilent E7495A to Hub – This is an Ethernet cable, RJ–45 to RJ–45.

LMF to Hub – Use one of the following cables to connect the LMF to the Hub:

- Ethernet cable, RJ–45 to RJ–45 (be sure that the LAN card is set for either AUTO or to use the RJ–45 only).
- Coax cable between LAN card and Hub. (Use a "T" on the hub and connect a cable between the other end of the "T" and the BTS LAN connection).

Hub to BTS – Use BNC "T" connector on the hub. [If your hub doesn't have BNC ports, use a BNC to UTP adapter.]

F

Detecting Test Equipment

Check that no other equipment is connected to the LMF. Agilent equipment must be connected to the LAN to detect it. Then perform the procedures described in Table F-2.

✔	Step	Action
Table F-2: Detecting Agilent E7495A Test Equipment		
	1	Click the **Tools** Menu.
	2	Choose **Options**.
	3	Check **Agilent E7495A** option in non–GPIB Test Equipment and enter its IP number.
	4	Click **Apply** and wait a moment.
	5	Click **Dismiss**.

Power Sensor Calibration

Table F-3 describes the E7495A Power Sensor Calibration.

✔	Step	Action
Table F-3: E7495A Power Sensor Calibration		
	1	Display the power meter screen.
	2	Zero the power meter. Make sure you are connected as shown in Figure F-1. – Press the Zero softkey. – Press the Continue softkey.
	3	Calibrate the power meter: – Press Ref CF. – Enter the reference cal factor, reading it off the label on the power sensor head. – Press Calibrate. – Connect the power sensor (see Figure F-2). – Press Continue. – Press Cal Factor. – Enter the cal factor from the label on the power sensor head. Select a cal factor that's within the operating frequency of the base station.

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Figure F-1: Agilent E7495A Pre–Power Sensor Calibration connection
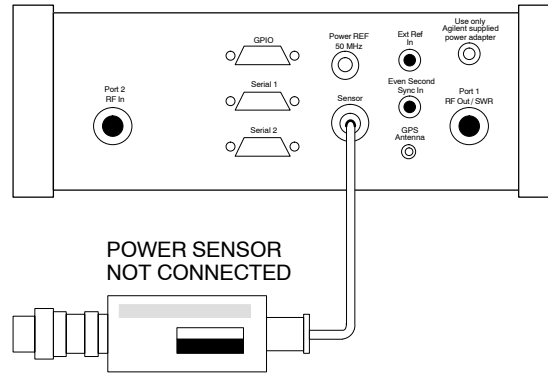
Figure F-2: Agilent E7495A Power Sensor Calibration connection
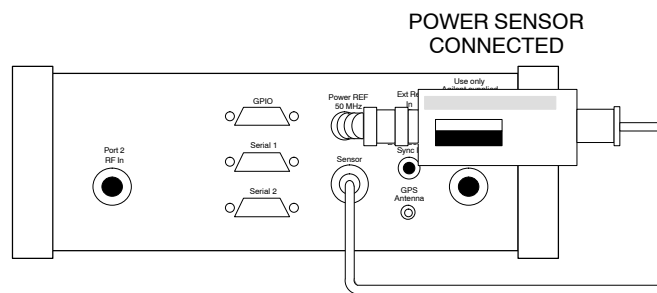
Cable Calibration

Follow the directions in the WinLMF program to calibrate cables.

– Calibrate the short cable (see Figure 3-15 on page 3-64) and two 10 dB pads to get a base line and then calibrate the TX and RX setup. Since you need at least 40 dB of loss when doing the FER test, the setup for RX is the same as TX.

ATP Setup

TX Path Calibration setup is shown in Test Equipment Setup (see Figure 3-18 on page 3-67).

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Verifying and Setting GPIB Address

Agilent E4406A Transmitter Tester GPIB Address

Refer to Figure F-3 and follow the procedure in Table F-4 to verify and, if necessary, change the Agilent E4406A GPIB address.

Figure F-3: Setting Agilent E4406A GPIB Address

ti-CDMA-WP-00085-v01-ildoc-ftw
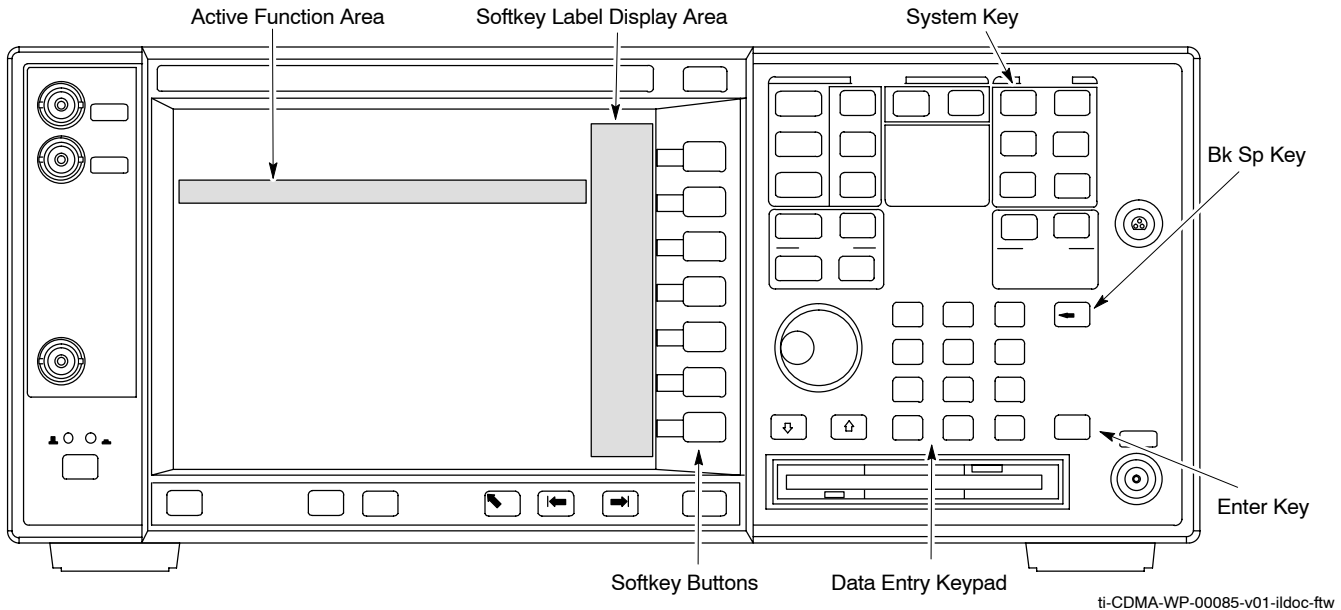
Table F-4: Verify and Change Agilent E4406A GPIB Address	
Step	**Action**
1	In the **SYSTEM** section of the instrument front panel, press the **System** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **Config I/O** softkey button to the right of the instrument screen. – The softkey labels will change. – The current instrument GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **18**, perform the following to change it:
3a	Press the GPIB Address softkey button. In the on–screen Active Function Area, **GPIB Address** will be displayed followed by the current GPIB address.
3b	On front panel Data Entry keypad, enter the communications system analyzer GPIB address of **18**. – The **GPIB Address** label will change to **Enter**. – Characters typed with the keypad will replace the current GPIB address in the Active Function Area. **NOTE** To correct an entry, press **Bk Sp** key to delete one character at a time.
3c	Press the **Enter** softkey button or the keypad **Enter** key to set the new GPIB address. – The **Config I/O** softkey labels will reappear. – The new GPIB address will be displayed under the **GPIB Address** softkey label.

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Agilent E4432B Signal Generator GPIB Address

Refer to Figure F-4 and follow the procedure in Table F-5 to verify and, if necessary, change the Agilent E4432B GPIB address.

Figure F-4: Setting Agilent E4432B GPIB Address
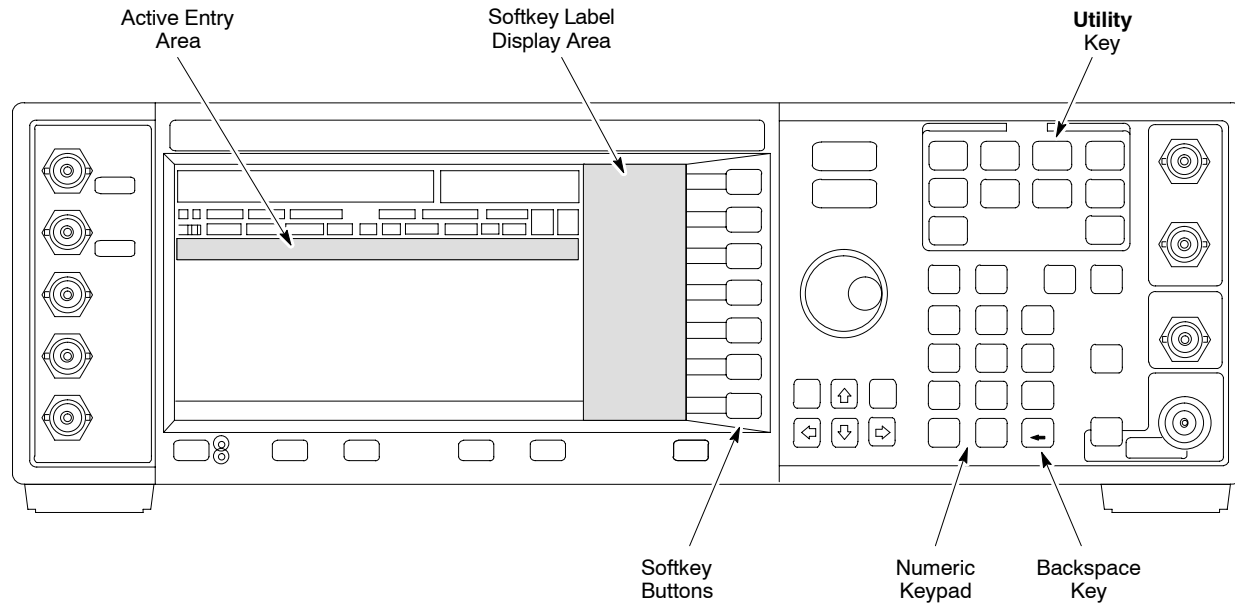
Table F-5: Verify and Change Agilent E4432B GPIB Address	
Step	**Action**
1	In the **MENUS** section of the instrument front panel, press the **Utility** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **GPIB/RS232** softkey button to the right of the instrument screen. – The softkey labels will change. – The current instrument GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **1**, perform the following to change it:
3a	Press the **GPIB Address** softkey button. – The **GPIB Address** label and current GPIB address will change to boldface. – In the on–screen Active Entry Area, **Address:** will be displayed followed by the current GPIB address.
3b	On the front panel Numeric keypad, enter the signal generator GPIB address of **1**. – The **GPIB Address** label will change to **Enter**. – Characters typed on the keypad will replace the current GPIB address in the Active Entry display. **NOTE** To correct an entry, press the backspace key at the lower right of the keypad to delete one character at a time.
3c	Press the **Enter** softkey button to set the new GPIB address. – The new GPIB address will be displayed under the **GPIB Address** softkey label.

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Advantest R3267 Spectrum Analyzer GPIB Address

Refer to Figure F-5 and perform the procedure in Table F-6 to verify and, if necessary, change the Advantest R3267 spectrum analyzer GPIB address.

Figure F-5: Setting Advantest R3267 GPIB Address
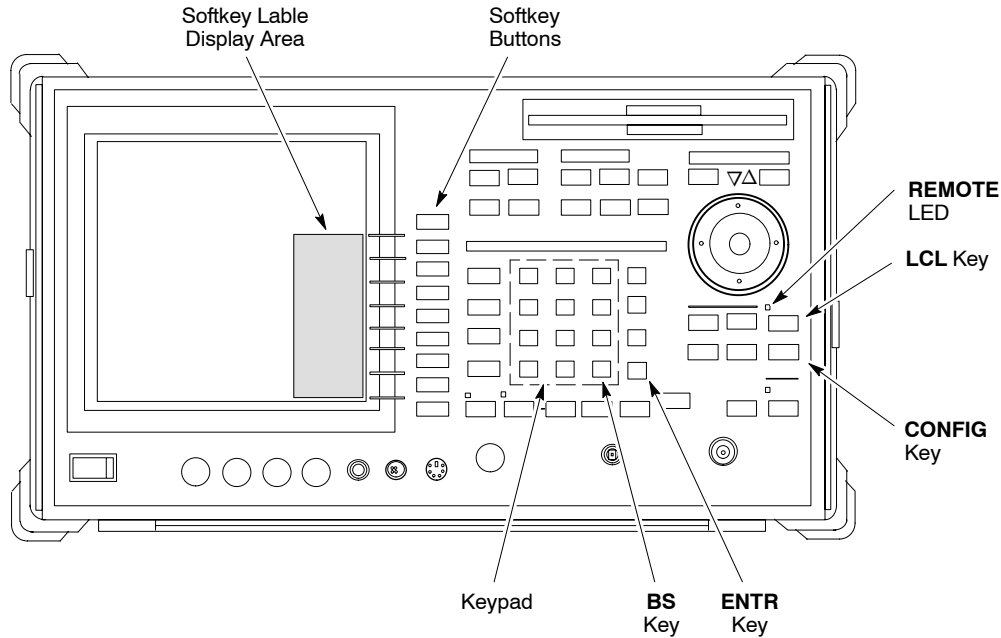
Table F-6: Verify and Change Advantest R3267 GPIB Address	
Step	**Action**
1	If the **REMOTE** LED is lighted, press the **LCL** key. – The LED extinguishes.
2	Press the **CONFIG** key. – **CONFIG** softkey labels will appear in the softkey label display area of the instrument display. – The current GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **18**, perform the following to change it:
3a	Press the **GPIB Address** softkey. A **GPIB Address** entry window will open in the instrument display showing the current GPIB address.
3b	Enter **18** on the keypad in the **ENTRY** section of the instrument front panel. – Characters typed on the keypad will replace the address displayed in the **GPIB Address** entry window. **NOTE** To correct an entry, press the **BS** (backspace) key at the lower right of the keypad to delete one character at a time.
3c	Press the **ENTR** key to the lower right of the keypad to set the new GPIB address. – The **GPIB Address** entry window closes. – The new address is displayed in the bottom portion of the **GPIB Address** softkey label.

Advantest R3562 Signal Generator GPIB Address

Set the **GP–IB ADDRESS** switch on the rear of the Advantest R3562 signal generator to address **1** as shown in Figure F-6.

Figure F-6: Advantest R3562 GPIB Address Switch Setting
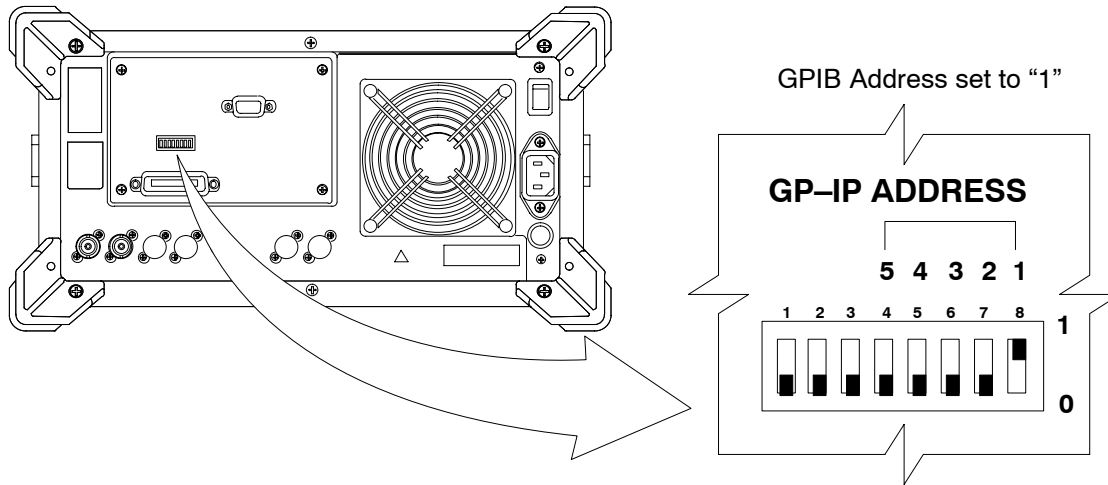
Agilent 8935 Series E6380 (formerly HP 8935) Test Set GPIB Address

Refer to Figure F-7 and follow the procedure in Table F-7 to verify and, if necessary, change the Agilent 8935 GPIB address.

Figure F-7: Agilent 8935 Test Set

FW00885
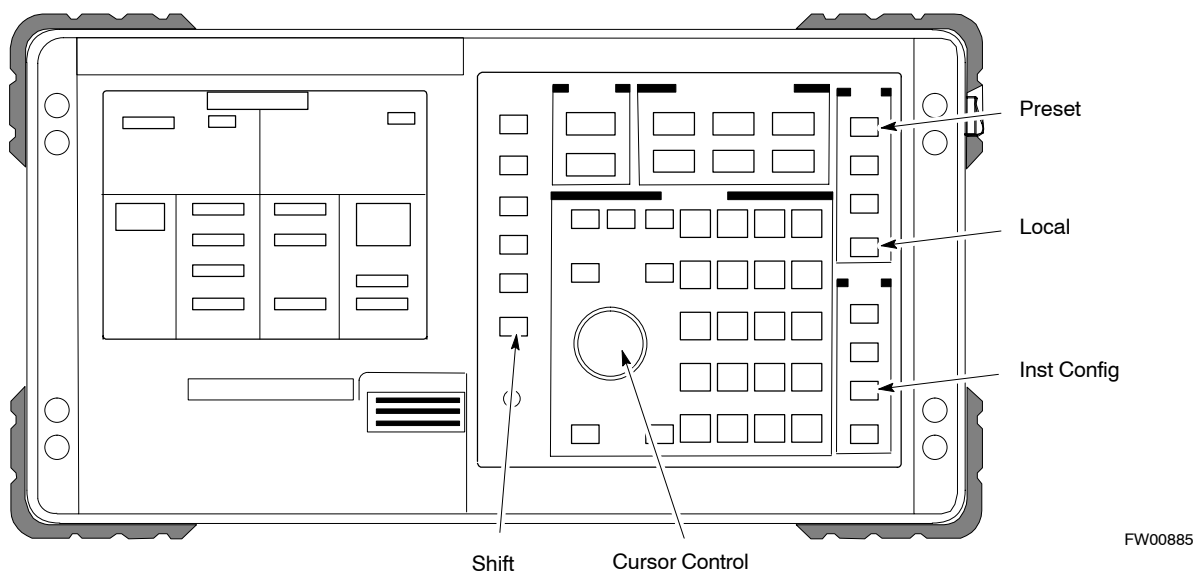
NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table F-7: Verify and/or Change Agilent 8935 (formerly HP 8935) GPIB Address	
Step	**Action**
1	**NOTE**
	The HP I/O configuration MUST be set to **Talk & Listen,** or *no* device on the GPIB will be accessible. (Consult test equipment OEM documentation for additional information as required.)
	To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the Agilent 8935.
	– The current HP–IB address is displayed at the top of the screen.
	NOTE
	HP–IB is the same as GPIB.
2	If the current GPIB address is not set to **18**, perform the following to change it:
2a	– Press **Shift** and **Inst Config**.
2b	– Turn the **Cursor Control** knob to move the cursor to the **HP–IB Adrs** field.
2c	– Press the **Cursor Control** knob to select the field.
2d	– Turn the **Cursor Control** knob as required to change the address to **18**.
2e	– Press the **Cursor Control** knob to set the address.
3	Press **Preset** to return to normal operation.

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Hewlett Packard HP8921A and HP83236A/B GPIB Address

Refer to Figure F-8 and follow the procedure in Table F-8 to verify and, if necessary, change the HP 8921A HP 83236A GPIB addresses.

Figure F-8: HP 8921A and HP 83236A/B
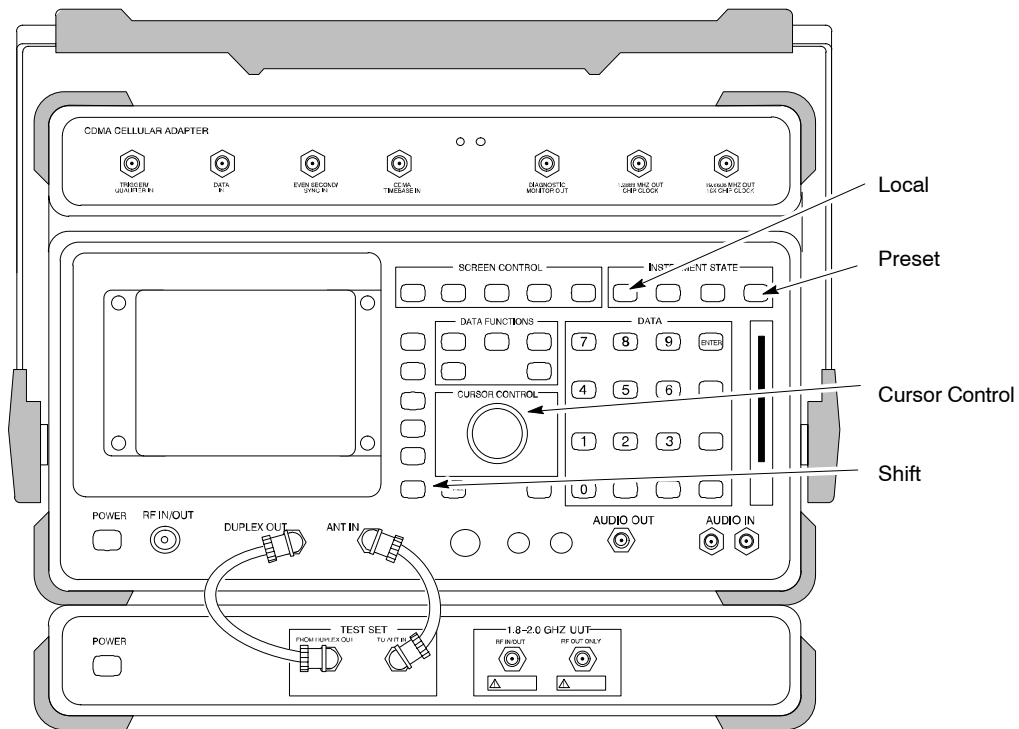
NOTE	This procedure assumes that the test equipment is set up and ready for testing.

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Table F-8: Verify and/or Change HP 8921A and HP 83236A GPIB Addresses	
Step	**Action**
1	To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the HP 8921A. – The current HP–IB address is displayed at the top of the screen. **NOTE** HP–IB is the same as GPIB.
2	If the current HP–IB address is not set to **18**, perform the following to change it:
2a	– Turn the **Cursor Control** knob to move the cursor to **More** and press the knob to select the field.
2b	– Turn the **Cursor Control** knob to move the cursor to **I/O Config** and press the knob to select the field.
2c	– Turn the **Cursor Control** knob to move the cursor to **Adrs** and press the knob to select the field.
2d	– Turn the **Cursor Control** knob to change the HP–IB address to **18** and press the knob to set the address.
2e	– Press **Shift** and **Preset** to return to normal operation.
3	To set the HP 83236A (or B) PCS Interface GPIB address=**19**, set the DIP switches as follows: – A1=1, A2=1, A3=0, A4=0, A5=1, HP–IB/Ser = 1

Advantest R3465 Communications Test Set GPIB Address

Refer to Figure F-9 and follow the procedure in Table F-9 to verify and, if necessary, change the GPIB address for the Advantest R3465.

Figure F-9: R3465 Communications Test Set

REF FW00337
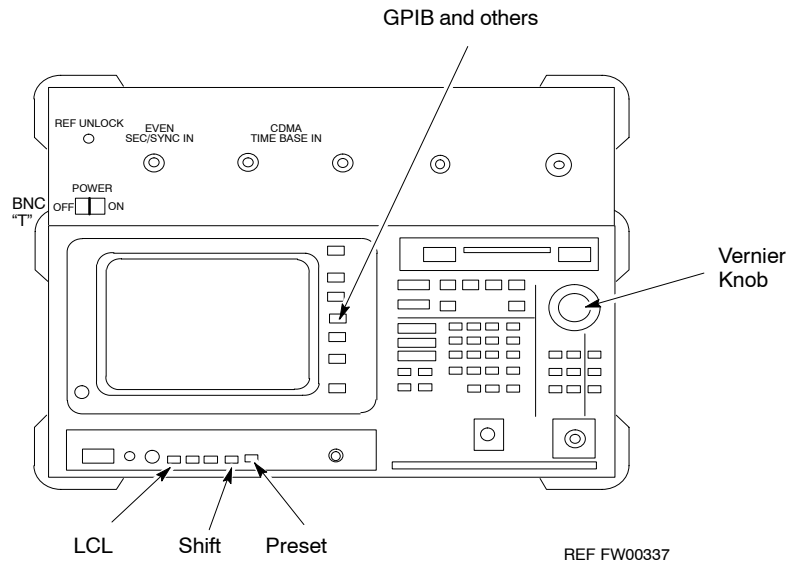
| NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table F-9: Verify and/or Change Advantest R3465 GPIB Address	
Step	**Action**
1	To verify that the GPIB address is set correctly, perform the following:
1a	– Press **SHIFT** then **PRESET**.
1b	– Press **LCL**.
1c	– Press the **GPIB and Others** CRT menu key to view the current address.
2	If the current GPIB address is not set to **18**, perform the following to change it:
2a	– Turn the vernier knob as required to select **18**.
2b	– Press the vernier knob to set the address.
3	To return to normal operation, press **Shift** and **Preset**.

Motorola CyberTest GPIB Address

Follow the steps in Table F-10 to verify and, if necessary, change the GPIB address on the Motorola CyberTest. Changing the GPIB address requires the following items:

- Motorola CyberTest communications analyzer.

- Computer running Windows 3.1/Windows 95.

- Motorola CyberTAME software program "TAME".

- Parallel printer port cable (shipped with CyberTest).

NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table F-10: Verify and/or Change Motorola CyberTest GPIB Address	
Step	**Action**
1	On the LMF desktop, locate the CyberTAME icon. Double click on the icon to run the CyberTAME application.
2	In the CyberTAME window taskbar, under **Special,** select **IEEE.488.2.**
3	CyberTAME software will query the CyberTest Analyzer for its current GPIB address. It then will open the IEEE 488.2 dialog box. If the current GPIB address is not **18**, perform the following procedure to change it:
3a	– Use the up or down increment arrows or double–click in the field and type the number to set the address to **18**.
3b	– Click on the **OK** button. — The new address will be written to the CyberTest through the parallel port and saved.
4	Verify that the address has been set by repeating steps 2 and 3. – The new address should now appear in the IEEE 488.2 dialog box Address field.

F

HP 437 Power Meter GPIB Address

Refer to Figure F-10 and follow the steps in Table F-11 to verify and, if necessary, change the HP 437 GPIB address.

Figure F-10: HP 437 Power Meter
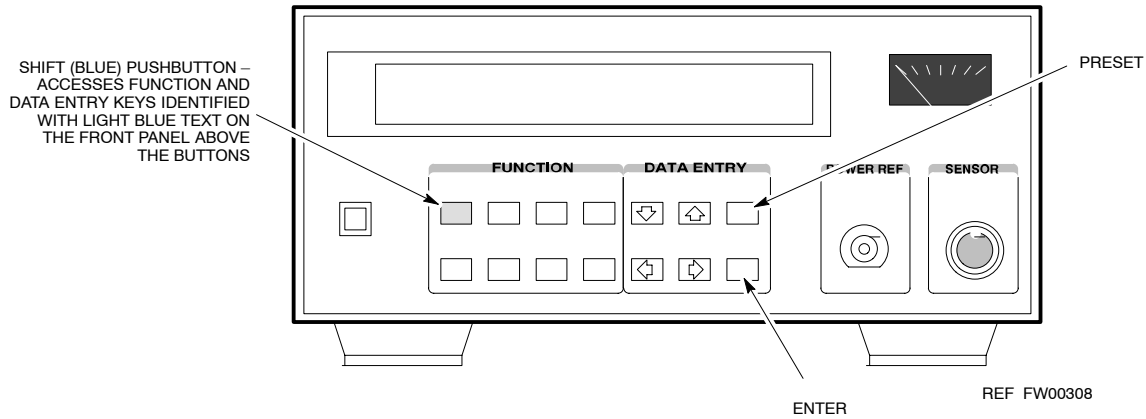
SHIFT (BLUE) PUSHBUTTON –
ACCESSES FUNCTION AND
DATA ENTRY KEYS IDENTIFIED
WITH LIGHT BLUE TEXT ON
THE FRONT PANEL ABOVE
THE BUTTONS

FUNCTION   DATA ENTRY   POWER REF   SENSOR

PRESET

ENTER

REF FW00308

NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table F-11: Verify and/or Change HP 437 Power Meter GPIB Address	
Step	**Action**
1	Press **Shift** and **PRESET**.
2	Use the ▲ arrow key to navigate to HP–IB ADRS and press **ENTER**. The HP–IB address is displayed. **NOTE** HP–IB is the same as GPIB.
3	If the current GPIB address is not set to **13**, perform the following to change it: – Use the ▲ ▼ arrow keys to change the HP–IB ADRS to **13**. – Press **ENTER** to set the address.
4	Press **Shift** and **ENTER** to return to a standard configuration.

F

Gigatronics 8541C Power Meter GPIB Address

Refer to Figure F-11 and follow the steps in Table F-12 to verify and, if necessary, change the Gigatronics 8541C power meter GPIB address.

Figure F-11: Gigatronics 8541C Power Meter Detail
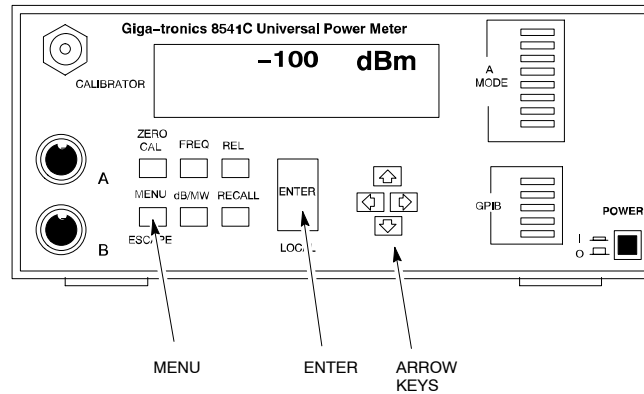
REF FW00564

NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Step	**Action**
	Table F-12: Verify and/or Change Gigatronics 8541C Power Meter GPIB Address
1	**! CAUTION** Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration. Press **MENU**.
2	Use the ⬇ arrow key to select **CONFIG MENU** and press **ENTER**.
3	Use the ⬇ arrow key to select **GPIB** and press **ENTER**. The current **Mode** and GPIB **Address** are displayed.
4	If the **Mode** is not set to **8541C**, perform the following to change it: Use the ◀ ▶ arrow keys as required to select **MODE**. Use the ⬇⬆ arrow keys as required to set **MODE** to **8541C**.
5	If the GPIB address is not set to **13**, perform the following to change it: Use the ▶ arrow key to select **ADDRESS**. Use the ⬇⬆ arrow keys as required to set the GPIB address to **13**.
6	Press **ENTER** to return to normal operation.

F

RS232 GPIB Interface Adapter

Be sure that the RS–232 GPIB interface adapter DIP switches are set as shown in Figure F-12.

Figure F-12: RS232 GPIB Interface Adapter
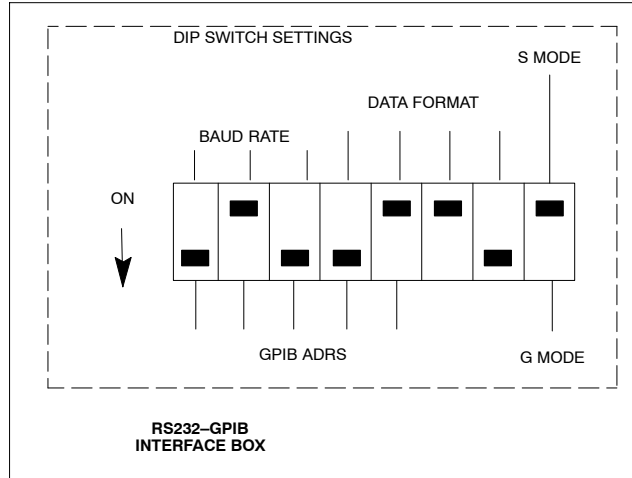
Test Equipment Set-up

Purpose

This section covers other test equipment and peripherals not covered in Chapter 3. Procedures for the manual testing are covered here, along with procedures to calibrate the TX and RX cables using the signal generator and spectrum analyzer.

Equipment Warm up

NOTE	Warm-up BTS equipment for a minimum of *60 minutes* prior to performing the BTS optimization procedure. This assures BTS site stability and contributes to optimization accuracy. (Time spent running initial power-up, hardware/ firmware audit, and BTS download counts as warm-up time.)

CAUTION	If any piece of test equipment (i.e., test cable, RF adapter) has been replaced, re-calibration must be performed. Failure to do so could introduce measurement errors, resulting in incorrect measurements and degradation to system performance.

NOTE	Calibration of the communications test set (or equivalent test equipment) ***must be*** performed at the site before calibrating the overall test set. Calibrate the test equipment *after* it has been allowed to warm-up and stabilize for a *minimum of 60 minutes*.

Prerequisites

Prior to performing any of these procedures, all preparations for preparing the LMF, updating LMF files, and any other pre-calibration procedures, as stated in Chapter 3, must have been completed.

F

HP8921A System Connectivity Test

Follow the steps in Table F-13 to verify that the connections between the PCS Interface and the HP8921A are correct, and cables are intact. The software also performs basic functionality checks of each instrument.

NOTE	Disconnect other GPIB devices, especially system controllers, from the system before running the connectivity software.

Table F-13: System Connectivity	
Step	**Action**
	NOTE – Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Insert HP 83236A Manual Control/System card into memory card slot.
2	Press the **[PRESET]** pushbutton.
3	Press the Screen Control **[TESTS]** pushbutton to display the "Tests" Main Menu screen.
4	Position the cursor at **Select Procedure Location** and select by pressing the cursor control knob. In the Choices selection box, select **Card.**
5	Position the cursor at **Select Procedure Filename** and select by pressing the cursor control knob. In the Choices selection box, select **SYS_CONN**.
6	Position the cursor at **RUN TEST** and select it. The software will prompt you through the connectivity setup.
7	When the test is complete, position the cursor on **STOP TEST** and select it; *OR* press the **[K5]** pushbutton.
8	To return to the main menu, press the **[K5]** pushbutton.

F

Manual Cable Calibration using HP8921 with HP PCS Interface (HP83236)

> **NOTE**
>
> This calibration method *must be executed with great care.* Some losses are measured close to the minimum limit of the power meter sensor (–30 dBm).

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- Test equipment to be calibrated has been connected correctly for cable calibration.
- Test equipment has been selected and calibrated.

Refer to Figure F-13 for location of the components on the PCS Interface and Communications Test Set.

Test Equipment Set-up

Perform the procedure in Table F-14 to calibrate the test equipment using the HP8921 Cellular Communications Analyzer equipped with the HP83236 PCS Interface.

Step	Action
	Table F-14: Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)
	NOTE Verify that GPIB controller is turned off.
1	Insert HP 83236A Manual Control System card into memory card slot (see Figure F-13).
2	Press the **Preset** pushbutton.
3	Under **Screen Controls**, press the **TESTS** pushbutton to display the **TESTS** (Main Menu) screen.
4	Position the cursor at **Select Procedure Location** and select it. In the Choices selection box, select **CARD.**
5	Position the cursor at **Select Procedure Filename** and select it. In the Choices selection box, select **MANUAL**.
6	Position the cursor at **RUN TEST** and select it. HP must be in Control Mode **Select YES.**
7	If using **HP 83236A:** Set channel number=*<chan#>*: – Position cursor at **Channel Number** and select it. – Enter the *chan#* using the numeric keypad; press **[Enter]** and the screen will go blank. – When the screen reappears, the *chan#* will be displayed on the channel number line. If using **HP 83236B:** Set channel frequency: – Position cursor at **Frequency Band** and press **Enter**. – Select **User Defined Frequency**. – Go **Back to Previous Menu**. – Position the cursor to **83236** generator frequency and enter actual RX frequency. – Position the cursor to **83236** analyzer frequency and enter actual TX frequency.
8	Set RF Generator level: – Position the cursor at **RF Generator Level** and select it. – Enter **–10** using the numeric keypad; press [**Enter**] and the screen will go blank. – When the screen reappears, the value –10 dBm will be displayed on the RF Generator Level line.

F

	Table F-14: Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)
Step	**Action**
9	Set the user fixed Attenuation Setting to **0 dBm:** – Position cursor at **Analyzer Attenuation** and select it – Position cursor at **User Fixed Atten Settings** and select it. – Enter 0 (zero) using the numeric keypad and press [**Enter**].
10	Select **Back to Previous Menu**.
11	Record the HP83236 Generator Frequency Level: Record the HP83236**B** Generator Frequency Level: – Position cursor at **Show Frequency and Level Details** and select it. – Under HP83236 Frequencies and Levels, record the Generator Level. – Under HP83236**B** Frequencies and Levels, record the Generator Frequency Level (1850 – 1910 MHz for 1.9 GHz or 1750 – 1780 for 1.7 GHz). – Position cursor at **Prev Menu** and select it.
12	Click on **Pause for Manual Measurement**.
13	Connect the power sensor directly to the *RF OUT ONLY* port of the PCS Interface.
14	On the HP8921A, under **To Screen,** select **CDMA GEN**.
15	Move the cursor to the **Amplitude** field and click on the Amplitude value.
16	Increase the Amplitude value until the power meter reads **0 dBm ±0.2 dB**. **NOTE** The Amplitude value can be increased coarsely until 0 dBM is reached; then fine tune the amplitude by adjusting the **Increment Set** to 0.1 dBm and targeting in on 0 dBm.
17	Disconnect the power sensor from the *RF OUT ONLY* port of the PCS Interface. **NOTE** The Power Meter sensor's lower limit is –30 dBm. Thus, only components having losses ≤30 dB should be measured using this method. **For further accuracy, always re-zero the power meter before connecting the power sensor to the component being calibrated. After connecting the power sensor to the component, record the calibrated loss immediately.**

18	Disconnect all components in the test setup and calibrate each one separately by connecting each component, one-at-a-time, between the *RF OUT ONLY PORT* and the power sensor (see Figure F-13, Setups A, B, or C). Record the calibrated loss value displayed on the power meter.
	• Example: (A) Test Cable(s) = –1.4 dB
	                (B) 20 dB Attenuator = –20.1 dB
	                (B) Directional Coupler = –29.8 dB

19	After all components are calibrated, reassemble all components together and calculate the total test setup loss by adding up all the individual losses: • Example: Total test setup loss = –1.4 –29.8 –20.1 = –51.3 dB. This calculated value will be used in the next series of tests.
20	Under **Screen Controls** press the **TESTS** button to display the **TESTS** (Main Menu) screen.
21	Select **Continue** (K2).
22	Select **RF Generator Level** and set to –119 dBm.

F

Step	Action
Table F-14: Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)	
23	Click on **Pause for Manual Measurement**.
24	Verify the HP8921A Communication Analyzer/83203A CDMA interface setup is as follows (fields not indicated remain at default): • Verify the GPIB (HP–IB) address: – under **To Screen,** select **More** – select **IO CONFIG** – Set HP–IB Adrs to **18** – set Mode to **Talk&Lstn** • Verify the HP8921A is displaying frequency (instead of RF channel) – Press the blue **[SHIFT]** button, then press the Screen Control **[DUPLEX]** button; this switches to the **CONFIG** (CONFIGURE) screen. – Use the cursor control to set RF Display to **Freq**
25	Refer to Table 3-31 for assistance in manually setting the cable loss values into the LMF.

F

Figure F-13: Calibrating Test Setup Components

MEMORY
CARD
SLOT

POWER
SENSOR

(A)

POWER
SENSOR

(A)

(B)

(B)

20 dB / 20 WATT
ATTENUATOR

POWER
SENSOR

(C)

POWER
SENSOR

(C)

150 W
NON–RADIATING
RF LOAD

30 dB
DIRECTIONAL
COUPLER
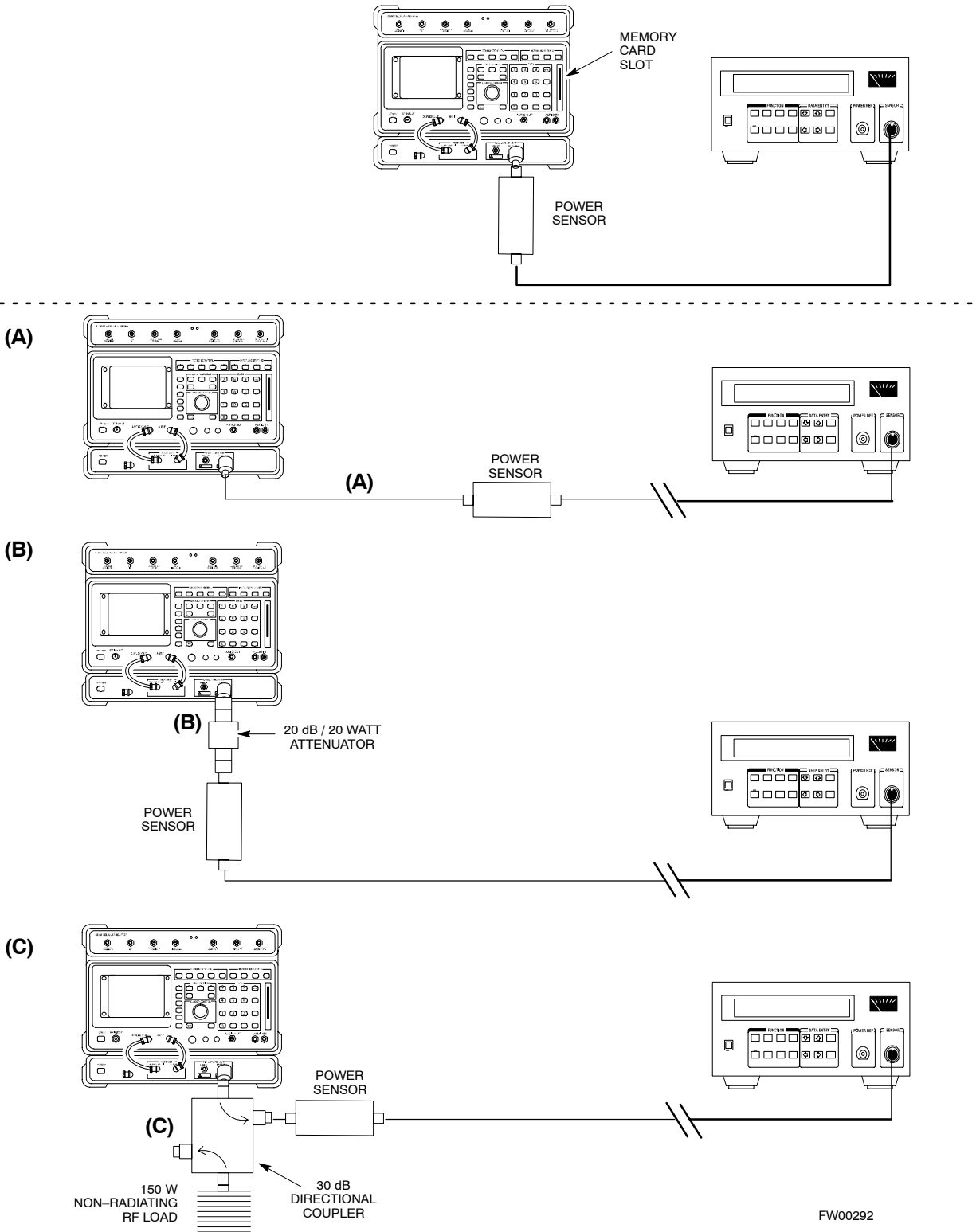
FW00292

HP PCS Interface Test Equipment Setup for Manual Testing

Follow the procedure in Table F-15 to setup the HP PCS Interface Box for manual testing.

✔	Step	Action
Table F-15: HP PCS Interface Test Equipment Setup for Manual Testing		
		NOTE Verify GPIB controller is turned off.
	1	Insert HP83236B Manual Control/System card into the memory card slot.
	2	Under **Screen Controls**, press the **[TESTS]** push-button to display the **TESTS** (Main Menu) screen.
	3	Position the cursor at **Select Procedure Location** and select. In the Choices selection box, select **CARD.**
	4	Position the cursor at **Select Procedure Filename** and select. In the Choices selection box, select **MANUAL**.
	5	Position the cursor at **RUN TEST** and select OR press the **K1** push-button.
	6	Set channel number=*<chan#>*: – Position cursor at **Channel Number** and select. – Enter the *chan#* using the numeric keypad and then press **[Enter]** (the screen will blank). – When the screen reappears, the *chan#* will be displayed on the channel number line.
	7	**NOTE** If using a TMPC with Tower Top Amplifier (TTA) skip Step 7. • Set RF Generator level= –119 dBm + Cal factor Example: –119 dBm + 2 dB = –117 dBm • Continue with Step 9 (skip Step 8).
	8	Set RF Generator level= –116 dBm + Cal factor. Example: –116 dBm + 2 dB = –114 dBm
	9	Set the user fixed Attenuation Setting to **0 dB**: – Position cursor at **RF Generator Level** and select. – Position cursor at **User Fixed Atten Settings** and select. – Enter 0 (zero) using the numeric keypad and press **[Enter].**
	10	Select **Back to Previous Menu.**
	11	Select **Quit,** then select **Yes.**

F

Calibrating Test Cable Setup using Advantest R3465

NOTE	Be sure the GPIB Interface is OFF for this procedure.

Perform the procedure in Table F-16 to calibrate the test cable setup using the Advantest R3465. Advantest R3465 Manual Test setup and calibration must be performed at both the TX and RX frequencies.

Table F-16: Procedure for Calibrating Test Cable Setup Using Advantest R3465	
Step	**Action**
	NOTE – This procedure can only be performed *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Press the **SHIFT** and the **PRESET** keys located below the display.
2	Press the **ADVANCE** key in the MEASUREMENT area of the control panel**.**
3	Select the **CDMA Sig** CRT menu key.
4	Select the **Setup** CRT menu key.
5	Using the vernier knob and the cursor keys set the following parameters: **NOTE** Fields not listed remain at default. **Generator Mode:** SIGNAL **Link:** FORWARD **Level Unit:** dBm **CalCorrection:** ON **Level Offset:** OFF
6	Select the **return** CRT menu key.
7	Press **FREQ** key in the ENTRY area.
8	Set the frequency to the desired value using the keypad entry keys.
9	Verify that the **Mod** CRT menu key is highlighting OFF; if not, press the **Mod** key to toggle it OFF.
10	Verify that the **Output** CRT menu key is highlighting OFF; if not, press the **Output** key to toggle it OFF.
11	Press the **LEVEL** key in the ENTRY area.
12	Set the LEVEL to **0 dBm** using the key pad entry keys.
13	Zero power meter. Next connect the power sensor directly to the "RF OUT" port on the R3561L CDMA Test Source Unit.
14	Press the **Output** CRT menu key to toggle Output to ON.
15	Record the power meter reading _____
16	Disconnect the power meter sensor from the R3561L RF OUT jack.

F

Table F-16: Procedure for Calibrating Test Cable Setup Using Advantest R3465	
Step	**Action**

17	**NOTE**
	The Power Meter sensor lower limit is –30 dBm. Thus, only components having losses ≤ 30 dB should be measured using this method. **For best accuracy, always re–zero the power meter before connecting the power sensor to the component being calibrated. Then, after connecting the power sensor to the component, record the calibrated loss immediately.**
	
	Disconnect all components in the the test setup and calibrate each one separately. Connect each component one–at–a–time between the "RF OUT" port and the power sensor (see Figure F-14, "Setups A, B, and C"). Record the calibrated loss value displayed on the power meter for each connection.
	
	Example: (A) 1st Test Cable = –0.5 dB
	                (B) 2nd Test Cable = –1.4 dB
	                (C) 20 dB Attenuator = –20.1 dB
	                (D) 30 dB Directional Coupler = –29.8 dB

18	Press the **Output** CRT menu key to toggle Output OFF.
19	Calculate the total test setup loss by adding up all the individual losses: Example: Total test setup loss = 0.5 + 1.4 + 20.1 + 29.8 = 51.8 dB This calculated value will be used in the next series of tests.
20	Press the **FREQ** key in the ENTRY area.
21	Using the keypad entry keys, set the test frequency to the RX frequency.
22	Repeat steps 9 through 19 for the RX frequency.
23	Refer to Table 3-31 for assistance in manually setting the cable loss values into the LMF.

F

Figure F-14: Cable Calibration using Advantest R3465

RF OUT

POWER
SENSOR

(A) & (B)

POWER
SENSOR

F

20 DB / 2 WATT
ATTENUATOR

(C)

POWER
SENSOR

(C)

POWER
SENSOR

(D)

FW00320

30 DB
DIRECTIONAL
COUPLER

100 W
NON–RADIATING
RF LOAD
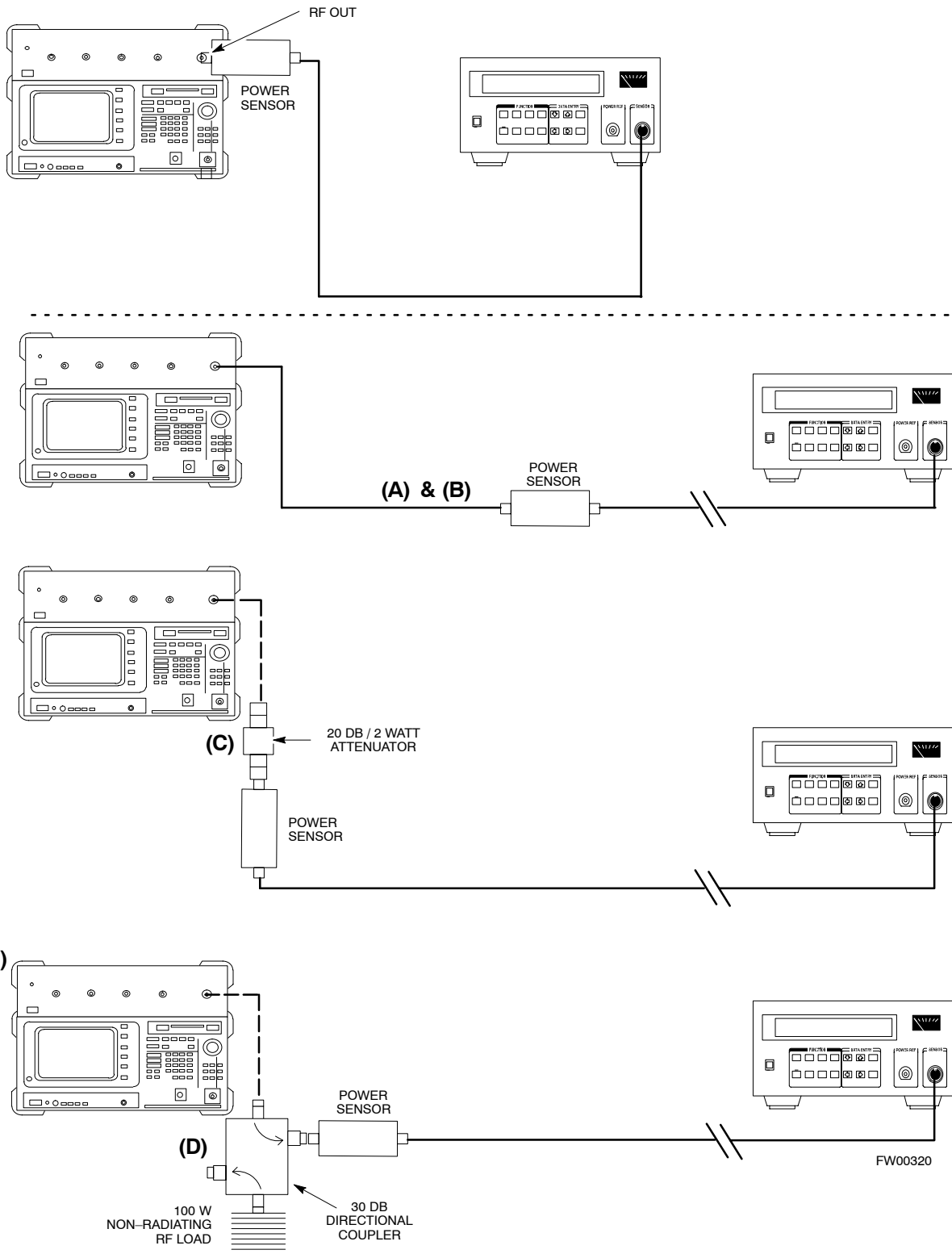
Agilent E4406A Transmitter Tester Self-alignment (Calibration)

The Agilent E4406A requires pre–calibration actions or calibration verification that are not supported by the LMF. Follow the procedure in Table F-17 and refer to Figure F-15 to perform the Agilent E4406A self–alignment (calibration).

Step	Action
	Table F-17: Agilent E4406A Self–alignment (Calibration)
1	In the **SYSTEM** section of the instrument front panel, press the **System** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **Alignments** softkey button to the right of the instrument screen. – The softkey labels will change.
3	Press the **Align All Now** softkey button. – All other instrument functions will be suspended during the alignment. – The display will change to show progress and results of the alignments performed. – The alignment will take less than one minute.

Figure F-15: Agilent E4406A Self–alignment
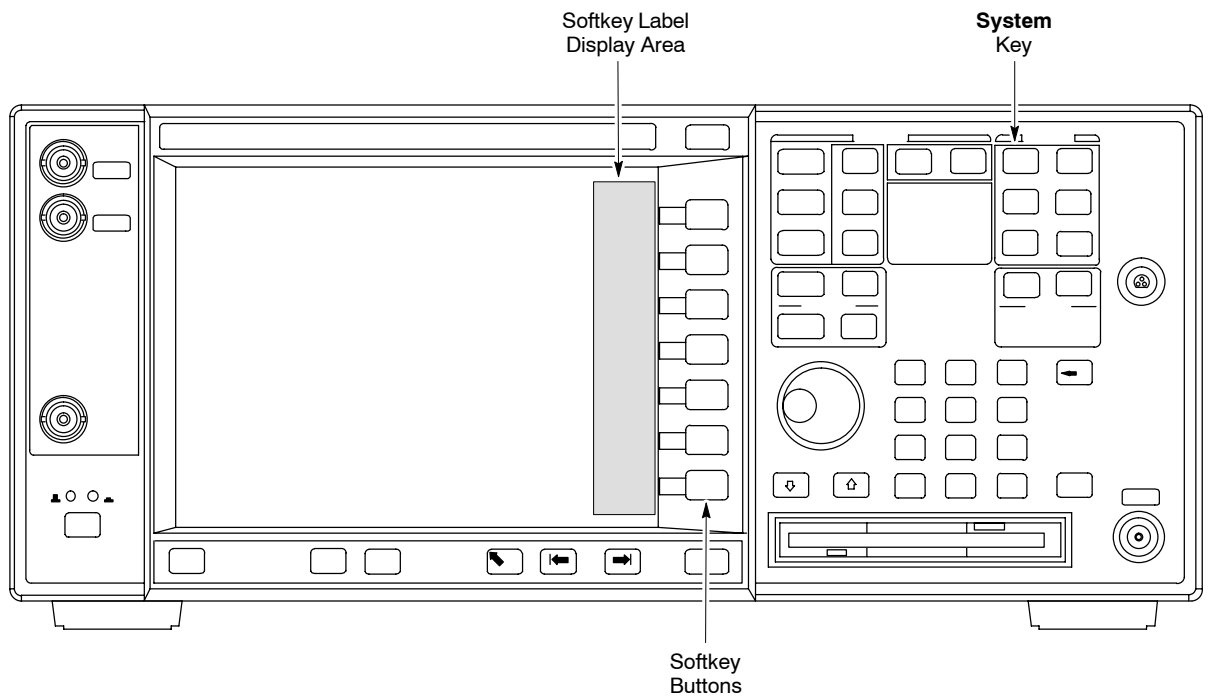
ti-CDMA-WP-00080-v01-ildoc-ftw

Notes

F

Appendix G

Download ROM Code

G

Download ROM Code

Download ROM Code

ROM code can be downloaded to a device that is in any state. After the download is started, the device being downloaded changes to OOS_ROM (blue) and remains OOS_ROM (blue). The same R–level RAM code must then be downloaded to the device. This procedure includes steps for both the ROM code download and the RAM code download.

ROM code files cannot be selected automatically. The ROM code file must be selected manually. Follow the procedure in Table G-1 to download ROM code.

Prerequisite

- ROM and RAM code files exist for the device to be downloaded.

CAUTION	The R–level of the ROM code to be downloaded must be the same as the R–level of the ROM code for other devices in the BTS. Code must not be mixed in a BTS. This procedure should only be used to upgrade replacement devices for a BTS and it should not be used to upgrade all devices in a BTS. If a BTS is to be upgraded from one R–level to another, the optimization and ATP procedures must first be performed with the BTS in the original configuration. The upgrade should then be done by the CBSC.

Table G-1: Download ROM Code	
Step	**Action**
1	Click on the device to be downloaded. **NOTE** More than one device of the *same* type can be selected for download by either clicking on each one to be downloaded or from the BTS menu bar **Select** pull–down menu, select the *device* item that applies. Where: *device* = the type of device to be loaded (BBX, CSM, GLI, MCC)
2	Click on the **Device** menu.
3	Click on the **Status** menu item. A status report window appears.
4	Make a note of the number in the **HW Bin Type** column. **NOTE** "HW Bin Type" is the Hardware Binary Type for the device. This code is used as the last four digits in the filename of a device's binary ROM code file. Using this part of the filename, the ROM code file can be matched to the device in which it is to be loaded.
5	Click on the **OK** button to dismiss the status report window.
	NOTE ROM code is automatically selected for download from the `<x>:\<lmf home directory>\version folder>\<code folder>` specified by the NextLoad property in the `bts–#.cdf` file. To check the value of the NextLoad property, click on **Util > Examine > Display** Nextload. A pop–up message will show the value of the NextLoad.

G

Step	Action
	Table G-1: Download ROM Code
6	From the BTS menu bar **Device** pull–down menus, select **Download > ROM**.
	– If the file matching the Hardware Binary Type of the device is found in the code folder, a status report shows the result of the download. Proceed to Step 12.
	– If a file selection window appears, select the ROM code file manually.
7	Double–click on the version folder that contains the desired ROM code file.
8	Double–click on the **Code** folder.
	A list of ROM and RAM code files is displayed.
	! CAUTION
	A ROM code file having the correct hardware binary type (HW Bin Type) needs to be chosen. The hardware binary type (last four digits in the file name) was determined in step 4. Unpredictable results can happen and the device may be damaged (may have to be replaced) if a ROM code file with wrong binary type is downloaded.
9	Choose a ROM code file having the correct hardware binary type (HW Bin Type). The hardware binary type (last four digits in the file name) was determined in step 4.
10	Click on the ROM code file that matches the device type and HW Bin Type (e.g., bbx_rom.bin.0604 for a BBX having a HW Bin Type of 0604).
	The file should be highlighted.
11	Click on the **Load** button.
	A status report window displays the result of the download.
	NOTE
	If the ROM load failed for some devices, load them *individually* by clicking on one device, perform steps 6 through 11 for it, and repeat the process for each remaining device.
12	Click on the **Ok** button to close the status report window.
13	Click on the **Util** menu.
14	Select the **Tools** menu item.
15	Click on the **Update NextLoad>CDMA** menu item.
16	Select the version number of the folder that was used for the ROM code download.
17	Click on the **Save** button.
	A pop–up message indicates that the CDF file has been updated.
18	Click on the **OK** button to dismiss the pop–up message.
19	Click on the device that was downloaded with ROM code.
20	Click on the **Device** menu.
21	Click on the **Download Code** menu item to download RAM code.
	A status report window displays the result of the download.
	NOTE
	Data is automatically downloaded to GLI devices when the RAM code is downloaded. Use the Download Data procedure to download data to other device types after they have been upgraded.
22	Click on the **Ok** button to close the status report window.
	The downloaded device should be OOS_RAM (yellow) unless it is a GLI in which case it should be INS (green).

G

<table>
<tr><td colspan="2" align="center">Table G-1: Download ROM Code</td></tr>
</table>

Step	Action
23	Click on the device that was downloaded.
24	Click on the **Device** menu.
25	Click on the **Status** menu item. Verify that the status report window displays the correct ROM and RAM version numbers.
26	Click on the **Ok** button to close the status report window.

G

MOTOROLA

Appendix H

In–Service Calibration

H

Introduction

Purpose

This procedure is a guide to expanding your system with multiple carriers while the system remains in service. This procedure also allows you to perform on site maintenance (replace defective boards and recalibrate) while the remainder of the site stays in service.

Motorola recommends that you perform this procedure during a maintenance window.

This procedure cannot be performed on BTSs with 4−to−1 combiners. The procedure can only be performed on one side of the BTS at one time. That is, LPAs 1, 2 ,3, 7, 8, 9 (feed antennas 1, 2, 3) can be calibrated while LPAs 6, 7, 8, 10, 11, 12 (feed antennas 4, 5, 6) remain in service and vice versa.

Equipment Warm up

NOTE	Calibration of the communications test set (or equivalent test equipment) ***must be*** performed at the site before calibrating the overall test set. Calibrate the test equipment *after* it has been allowed to warm-up and stabilize for a *minimum of 60 minutes*.

CAUTION	If any piece of test equipment (i.e., test cable, RF adapter) has been replaced, re-calibration must be performed. Failure to do so could introduce measurement errors, causing incorrect measurements and degradation to system performance.

H

Power Delta Calibration

Power Delta Calibration Introduction

The In–service calibration procedure has several differences from a normal calibration procedure. One of these is the use of a spectrum analyzer instead of a power meter to measure power. Power meters are broadband measurement devices and cannot be used to measure power during In–service Calibration since other carriers are operating. A spectrum analyzer can be used because it measures power at a given frequency. However, measuring power using a spectrum analyzer is less accurate than using a power meter. Therefore, you must compensate for the difference (delta) between the power meter and the spectrum analyzer.

HP8921A Power Delta Calibration

Use the HP8921A Spectrum Analyzer to measure power during In–Service Calibration for 800 MHz systems. After the offset value has been calculated, add it to the TX cable loss value.

Follow the procedure in Table H-1 to perform the HP8921A Power Delta Calibration procedure.

NOTE	This procedure requires two HP8921As.

Table H-1: HP8921A Power Delta Calibration Procedure	
Step	**Action**
	NOTE Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Connect a short RF cable between the HP8921A **Duplex Out** port and the HP437B power sensor (see Figure H-1).
2	Set the HP8921A signal source as follows: – Measure mode to **CDMA Generator** – Frequency to the CDMA Calibration target frequency – CW RF Path to **IQ** – Output Port to **Dupl** – Data Source to **Random** – Amplitude to **0 dBm**
3	Measure and record the power value reading on the HP437B Power Meter.
4	Record the Power Meter reading as result **A** _____.
5	Turn off the source HP8921A signal output, and disconnect the HP437B. **NOTE** Leave the settings on the source HP8921A for convenience in the following steps.
6	Connect the short RF cable between the source HP8921A **Duplex Out** port and the measuring HP8921A **RF–IN** port (see Figure H-2).

H

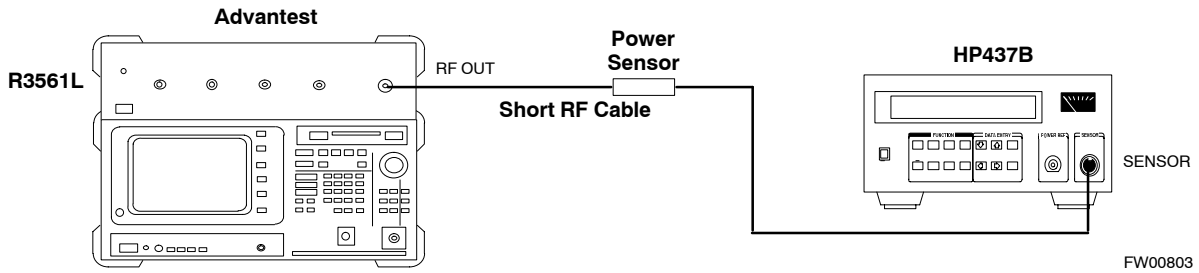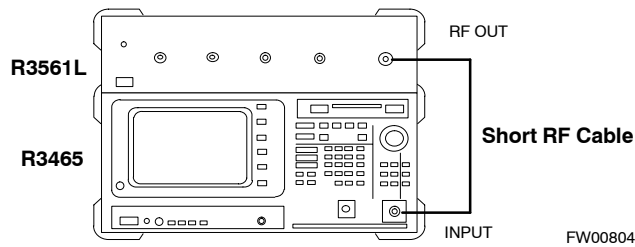| **Table H-1:** HP8921A Power Delta Calibration Procedure	
Step	**Action**
7	Ensure that the source HP8921A settings are the same as in Step 2.
8	Set the measuring HP8921A as follows: – Measure mode to **CDMA Anl** – Frequency to the CDMA calibration target frequency – Input Attenuation to **0 dB** – Input port to **RF–IN** – Gain to **Auto** – Analyzer Direction to **Fwd**
9	Turn on the source HP8921A signal output.
10	Measure and record the channel power reading on the measuring HP8921A as result **B** _____.
11	Turn off the source HP8921A signal output and disconnect the equipment.

12	Compute the delta between HP437B and HP8921A using the following formula:
	        Delta = A – B
	        Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm
	        Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm
	These examples are included to show the mathematics and do not represent actual readings.
	
	NOTE
	Add this delta value to the **TX Cable Loss** value during In–Service Calibration (see Step 4 in Table H-5).

Figure H-1: Delta Calibration Setup – HP8921A to HP437B
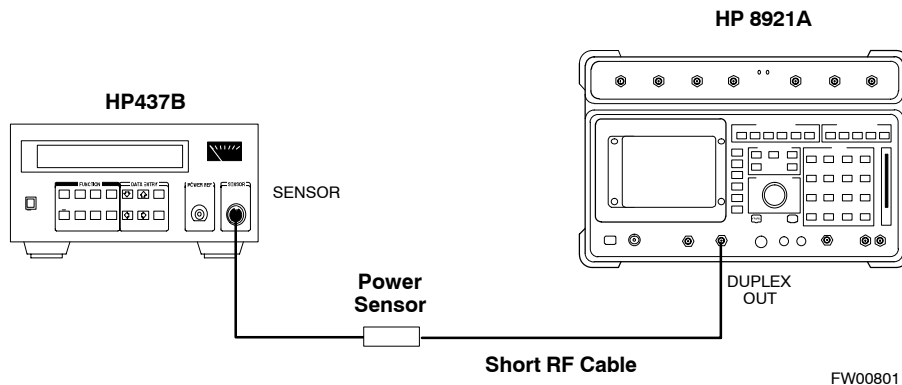
H

Figure H-2: Delta Calibration Setup – HP8921A to HP8921A
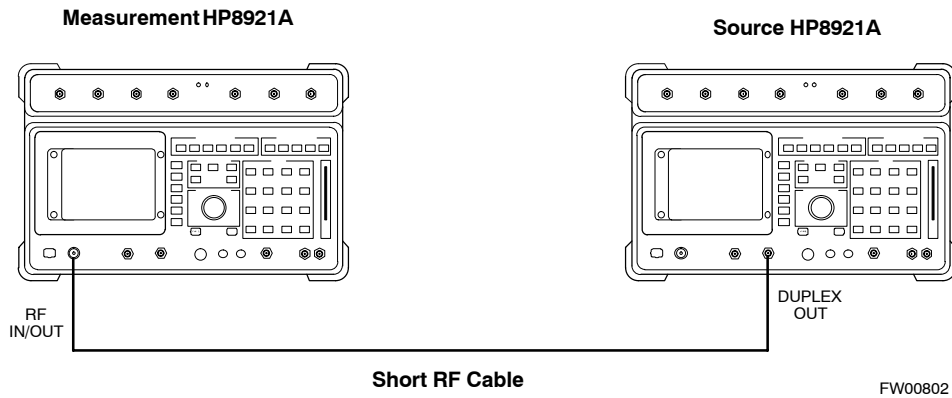
Advantest R3465 Power Delta Calibration

Follow the procedure in Table H-2 to perform the Advantest R3465 Power Delta Calibration procedure.

Step	Action
	Table H-2: Advantest Power Delta Calibration Procedure

Step	Action
	NOTE Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
On the Advantest R3465:	
1	Press the **SHIF**T and the **PRESET** keys located below the CRT display.
2	Press the **ADVANCE** key in the Measurement area of the control panel.
3	Press the **CDMA Si**g CRT menu key.
4	Press the **FREQ** key in the Entry area of the control panel.
5	Set the frequency to the desired value using the keypad entry keys.
6	Press the **LEVEL** key in the Entry area of the control panel.
7	Set the **LEVEL** to **0 dBm** using the keypad entry keys.
8	Verify the **Mod** CRT menu key is highlighting **OFF**, if not press the **Mod** key to toggle it **OFF**.
9	Verify the **Output** CRT menu key is highlighting **OFF**. If not, press the **Output** key to toggle it **OFF**.
On the HP 437 Power Meter:	
10	Zero the Power Meter prior to connecting the power sensor to the RF cable from the signal generator.
	NOTE For best accuracy, always re–zero the power meter before connecting the power sensor to the component being calibrated.
11	Connect the RF cable from the R3561L CDMA Test Source Unit **RF OUT** port to the power sensor (see Figure H-3).
12	Press the **Output** CRT menu key to toggle the Output to **ON**.

Step	Action
	Table H-2: Advantest Power Delta Calibration Procedure
13	Record the Power Meter reading as result **A** _____.
14	Press the Output **CRT** menu key to toggle the Output to **OFF**.
15	Connect the RF cable from the R3561L CDMA Test Source Unit **RF OUT** port to the Spectrum Analyzer **INPUT** Port (see Figure H-4).
16	Press the **Output** CRT menu key to change the Output to **ON**.
17	Press the **CW** key in the Measurement area of the control panel.
18	Press the **LEVEL** key in the Entry area of the control panel.
19	Set the REF LEVEL to **10 dBm** using the keypad entry keys.
20	Press the **dB/div** CRT menu key.
21	Press the **10 dB/div** CRT menu key.
22	Press the **FREQ** key in Entry area of the control panel.
23	Set the frequency to the desired value using the keypad entry keys.
24	Press the **more 1/2** CRT menu key.
25	Press the **Preselector** CRT menu key to highlight **3.0G**.
26	Press the **FORMAT** key in the Display Control area of the control panel.
27	Press the **TRACE** CRT menu key.
28	Press the **AVG A** CRT menu key.
29	Set AVG to **20** using keypad entry keys.
30	Press the **return** CRT menu key.
31	Press the **SPAN** key in the Entry area of the control panel.
32	Press the **Zero Span** CRT menu key.
33	Press the **BW** key in the Entry area of the control panel.
34	Press the **RBW** CRT menu key to highlight **MNL**.
35	Set **RBW** to **30 kHz** using keypad entry keys.
36	Press the **VBW** CRT menu key to highlight **MNL**.
37	Set **VBW** to **1 MHz** using keypad entry keys.
38	Press the Marker **ON** key in the Display Control area of the control panel.
39	Record the Marker Level reading as result **B** _____.

H

Table H-2: Advantest Power Delta Calibration Procedure	
Step	**Action**
40	Calculate the **Power Calibration Delta** value. The delta value is the power meter measurement minus the Advantest measurement. Delta = A – B Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm These examples are included to show the mathematics and do not represent actual readings. **NOTE** Add this delta value to the **TX Cable Loss** value during In–Service Calibration (see Step 4 in Table H-5).

Figure H-3: Delta Calibration Setup – R3561L to HP437B

Figure H-4: Delta Calibration Setup – R3561L to R3465

H

HP8935 Power Delta Calibration

Follow the procedure in Table H-3 to perform the HP8935 Power Delta Calibration procedure.

Step	Action
Table H-3: HP8935 Power Delta Calibration Procedure	
	NOTE Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Connect a short RF cable between the HP8935 **Duplex Out** port and the HP437B power sensor (see Figure H-5).

2	Set the HP8935 signal source as follows:
	  – Measure mode to **CDMA Gen**
	  – Frequency to the CDMA Calibration target frequency
	  – CW RF Path to **IQ**
	  – Output Port to **Dupl**
	  – Data Source to **Random**
	  – Amplitude to **0 dBm**

3	Measure and record the power value reading on the HP437B Power Meter.
4	Record the Power Meter reading as result **A** _____ .
5	Turn off the source HP8935 signal output, and disconnect the HP437B. **NOTE** Leave the settings on the source HP8935 for convenience in the following steps.
6	Connect the short RF cable between the source HP8935 **Duplex Out** port and the **RF–IN/OUT** port (see Figure H-6).
7	Ensure that the source HP8935 settings are the same as in Step 2.

8	Set the measuring HP8935 as follows:
	  – Measure mode to **CDMA Anl**
	  – Frequency to the CDMA calibration target frequency
	  – Input Attenuation to **0 dB**
	  – Input port to **RF–IN**
	  – Gain to **Auto**
	  – Anl Dir to **Fwd**

9	Turn on the source HP8935 signal output.
10	Set the Chn Pwr Cal to **Calibrate** and select to calibrate.
11	Measure and record the channel power reading on the measuring HP8935 as result **B** _____ .
12	Turn off the source HP8935 signal output and disconnect the equipment.

H

	Table H-3: HP8935 Power Delta Calibration Procedure
Step	**Action**

13	Calculate the **Power Calibration Delta** value. The delta value is the power meter measurement minus the Advantest measurement.
	
	      Delta = A – B
	      Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm
	      Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm
	
	These examples are included to show the mathematics and do not represent actual readings.
	
	NOTE
	Add this delta value to the **TX Cable Loss** value during In–Service Calibration (see Step 4 in Table H-5).

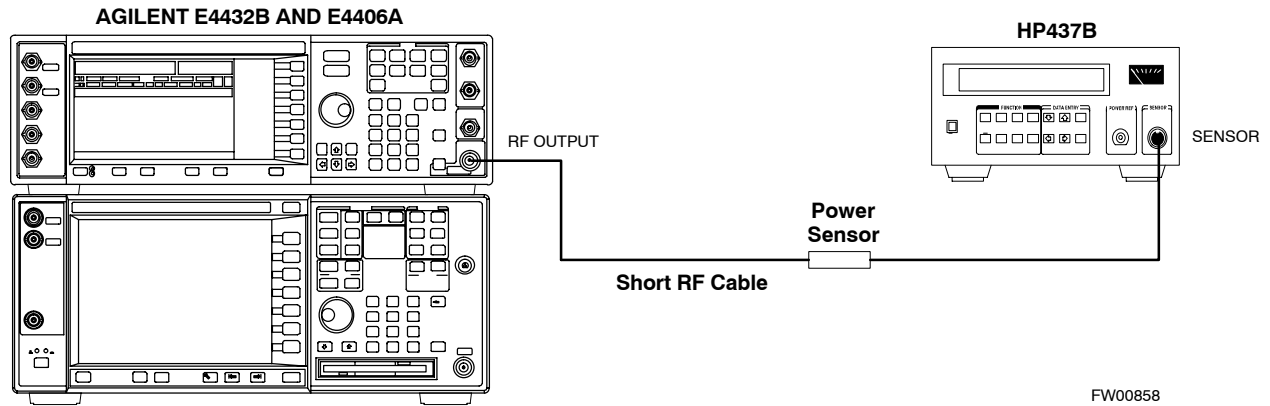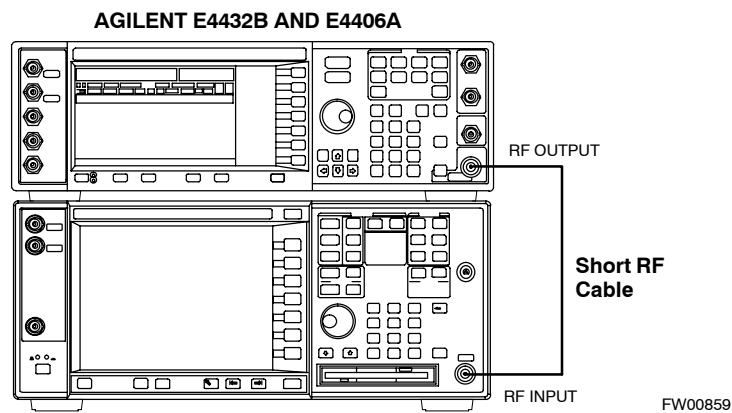**Figure H-5:** Delta Calibration Setup – HP8935 to HP437B
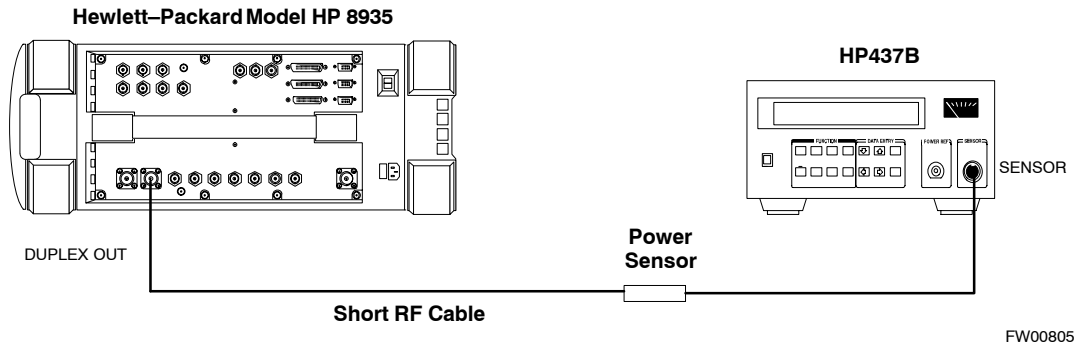
Figure H-6: Delta Calibration Setup – HP8935 to HP8935
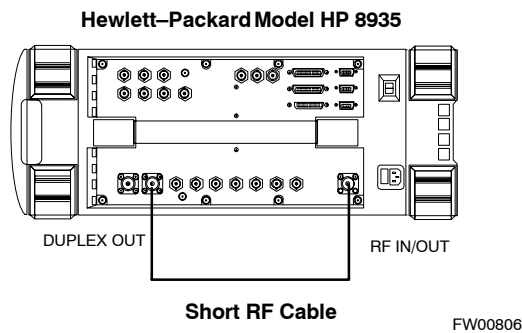
Agilent E4406A Power Delta Calibration

The Agilent E4406A transmitter tester and E4432B signal generator test equipment combination can be used for ISC of IS–2000 CDMA 1X as well as IS–95A/B operation modes. The power delta calibration is performed on the E4406A, but the E4432B is required to generate the reference signal used to calculate the power delta offset. After the offset value has been calculated, add it to the TX cable loss value in the LMF.

Follow the procedure in Table H-4 to perform the Agilent E4406A Power Delta Calibration procedure.

Step	Action
Table H-4: Agilent E4406A Power Delta Calibration Procedure
	NOTE Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes.* After it is warmed up and stabilized, calibrate the test equipment as described in the "Test Set Calibration" section of the Optimization/Calibration chapter in the *SC 4812T Optimization/ATP manual.*
1	Zero the Power Meter prior to connecting the power sensor to the RF cable from the signal generator.
	NOTE For best accuracy, always re–zero the power meter before connecting the power sensor to the component being calibrated.
2	Connect a short RF cable from the E4432B **RF OUTPUT** connector the HP437 power meter power sensor (see Figure H-7).
3	Set the E4432B signal generator as follows: – Press **Preset** to exit any modes for which the signal generator is configured. – Press **Frequency** and enter the *frequency* of the channel to be calibrated using the numeric keypad. – Using the soft keys to the right of the screen, select the frequency range to be measured (for example, **MHz**). – Press **Amplitude** and, using the numeric keypad, set signal amplitude to **0** (zero). – Using the soft keys, set the measurement type to **dBm**.
4	On the E4432B, press **RF On/Off** to toggle the RF output to **RF ON**. – Note that the RF On/Off status in the screen display changes.
5	Measure and record the value reading on the HP437 power meter as result **A**_____.
6	On the E4432B, press **RF On/Off** to toggle the RF output to **RF OFF**. – Note that the RF On/Off status in the screen display changes.
7	Disconnect the short RF cable from the HP437 power meter power sensor, and connect it to the **RF INPUT** connector on the E4406A transmitter tester (see Figure H-8).

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Table H-4: Agilent E4406A Power Delta Calibration Procedure	
Step	**Action**
8	**NOTE** Do not change the frequency and amplitude settings on the E4432B when performing the following steps. Set the E4406A as follows: – Press **Preset** to exit any modes for which the transmitter tester is configured. – Press **MODE** and, using the soft keys to the right of the screen, select **cdmaOne**. – Press **MEASURE** and, using the soft keys, select **spectrum**. – Press **Frequency** and, using the soft keys, select **Center Frequency**. – Using the numeric keypad. enter the *frequency* of the channel to be calibrated. – Using the soft keys, select the frequency range to be measured (for example, **MHz**). – Press Input/Output and, using the soft keys, select **Input Atten**. – Using the numeric keypad, set **Input Atten** to **0** (zero) and, using the soft keys, select **dB**. – Using the soft keys, select **External Atten** and then select **Mobile**. – Using the numeric keypad, set **Mobile** to **0** (zero) and, using the soft keys, select **dB**. – Using the soft keys, select **Base**. – Using the numeric keypad, set **Base** to **0** (zero) and, using the soft keys, select **dB**. – Press **MEASURE** and, using the soft keys, select **Channel Power**.
9	On the E4432B signal generator, press **RF On/Off** to toggle the RF output to **RF ON**. – Note that the RF On/Off status in the screen display changes.
10	Read the measured Channel Power from the E4406A screen display and record it as result **B**_____.
11	On the E4432B, press **RF On/Off** to toggle the RF output to **RF OFF**. – Note that the RF On/Off status in the screen display changes.

12	Calculate the **Power Calibration Delta** value. The delta value is the power meter measurement minus the Agilent measurement.
	
	       Delta = A – B
	       Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm
	       Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm
	
	These examples are included to show the mathematics and do not represent actual readings.
	
	NOTE
	Add this delta value to the **TX Cable Loss** value during In–Service Calibration (see step 4 in Table H-5).

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Figure H-7: Delta Calibration Setup – Agilent E4432B to HP437

AGILENT E4432B AND E4406A

HP437B

RF OUTPUT

SENSOR

Power
Sensor

Short RF Cable

FW00858

Figure H-8: Delta Calibration Setup – Agilent E4432B to Agilent E4406A

AGILENT E4432B AND E4406A

RF OUTPUT

Short RF
Cable

RF INPUT

FW00859

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In–Service Calibration

CAUTION	This feature does NOT have fault tolerance at this time. The system has no safe–guards to stop you from doing something that will take the BTS out of service. If possible, perform this procedure during a maintenance window.
	Follow the procedures in this section precisely, otherwise the entire BTS will most likely go OUT OF SERVICE.
	At the CBSC, only perform operations on expansion hardware when it is in the OOS_MANUAL state.
	The operator must be trained in the LMF operation prior to performing this procedure.

Prerequisites

- Expansion hardware has been added in the CBSC database, and the CDF file has been generated.

- The expansion devices have been inserted into the C–CCP cage and are in the OOS_MANUAL state at the CBSC.

- The site specific cdf (with the expansion hardware) and cal files have been loaded onto the LMF.

- The LMF has the same code and dds files as the CBSC to download.

CAUTION	Do not download code or data to any cards other than those you are working on. Downloading code or data to other cards will take the site OUT OF SERVICE.
	The code file version numbers must match the version numbers on the other cards in the frame. If the numbers do not match, the site may go OUT OF SERVICE.
	The BTS–#.cdf, CBSC–#.cdf, and CAL files for this BTS must have come from the CBSC.

- Test equipment has been configured per Figure H-9 and Figure H-10.

- An RFDS (or at a minimum a directional coupler), whose loss is already known, must be in line to perform the in–service calibration.

- Test equipment has been calibrated after 1 hour warm up.

- A short RF cable and two BNC–N adapters are available to perform Cable Calibration.

- The Power Delta Calibration has been performed (see Table H-1, Table H-2, or Table H-3).

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Figure H-9: Optimization/ATP Test Setup Using RFDS
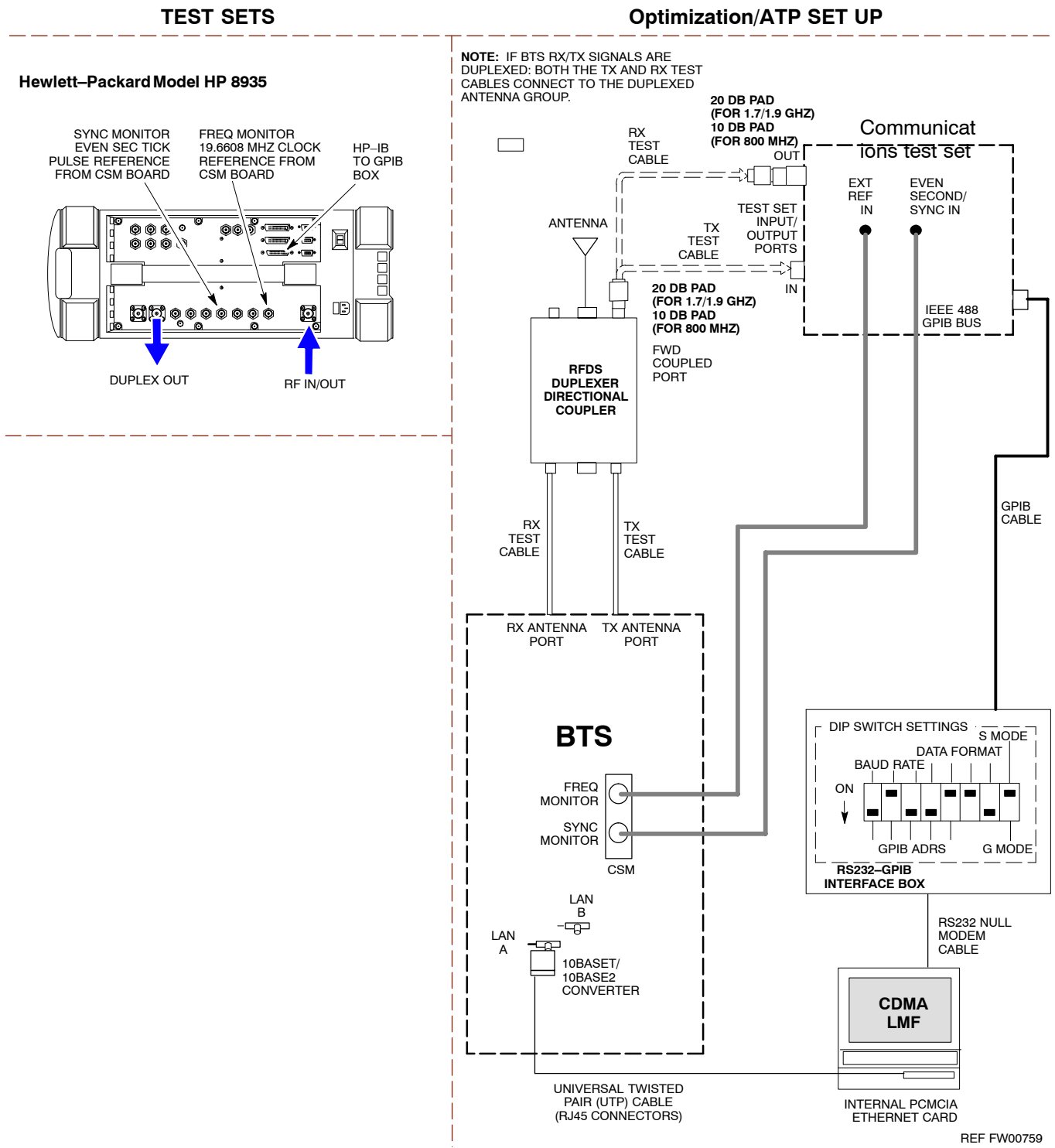
Figure H-10: IS–95 A/B/C Optimization/ATP Test Setup Using RFDS
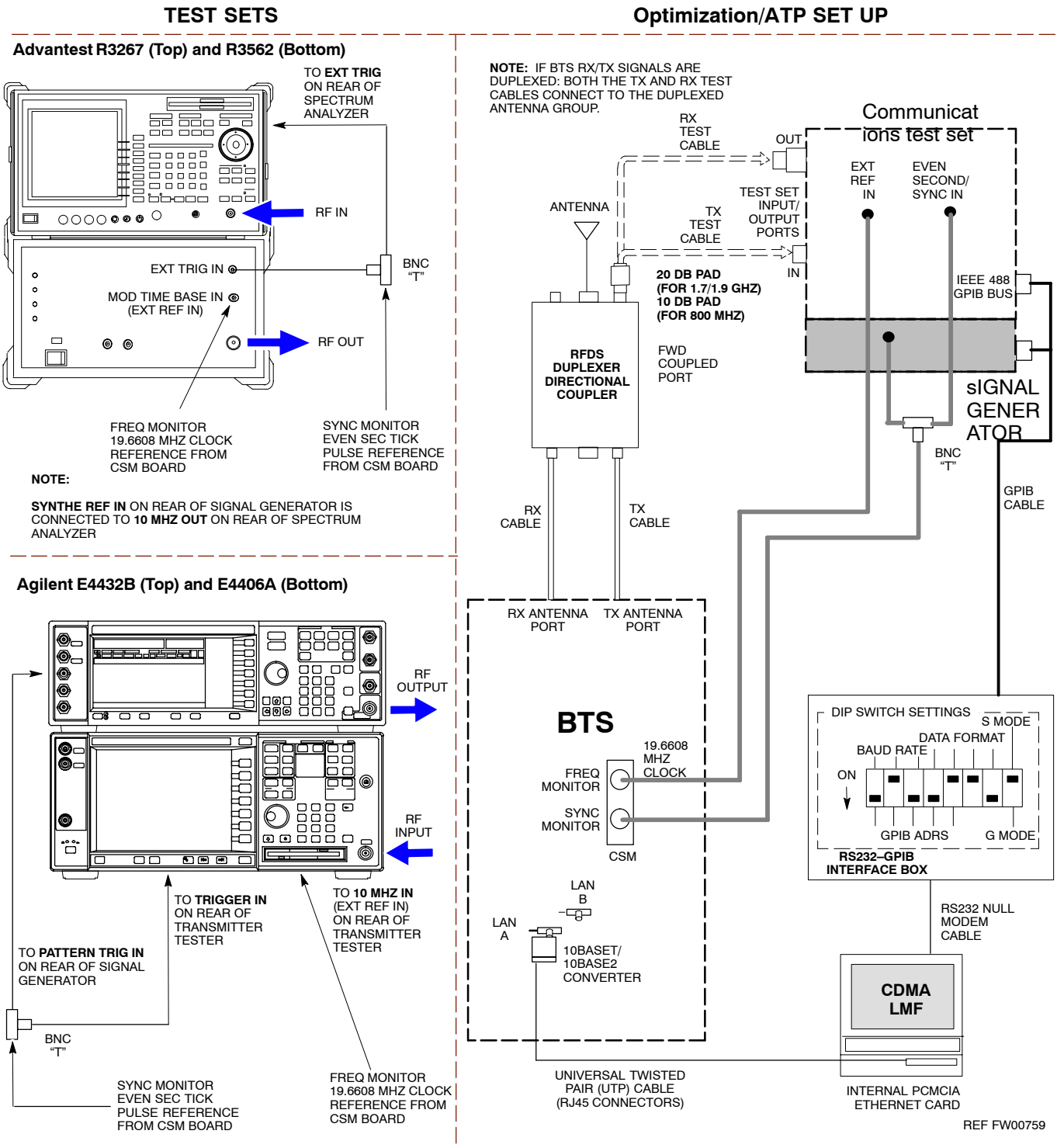
Follow the procedure in Table H-5 to perform the In–Service Calibration.

Table H-5: In–Service Calibration	
Step	**Action**
	NOTE Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Set up the LMF for In–Service Calibration: – Start the LMF by double–clicking the LMF icon on the Windows desktop. – Click **Tools>Options** from the menu bar at the login screen. – Check the applicable spectrum analyzer check box and the signal generator check box on the **Test Equipment** tab. Ensure that the GPIB address is **18** for the CDMA analyzer and **1** for the signal generator. – Uncheck any other other equipment that is selected. – Click the **Apply** button. – Select the **BTS Options** tab in the LMF Option window. – Check the **In–Service Calibration** check box. – Click the **Apply** button. – Click the **Dismiss** button to close the LMF Option window.
2	Login to the target BTS: – Select the target BTS icon. – Click the **Login** button at the login screen.
3	Measure the Cable Loss using the Cable Calibration function: – Click **Util>Cable Calibration** from the menu bar at the main window. – Set the desired channel(s) and select **TX and RX CABLE CAL** at the cable calibration pop up window. – Click the **OK** button to perform cable calibration. – Follow the on–screen instructions to complete the cable loss measurement. **NOTE** – The measured value is input automatically to the cable loss file. – To view the cable loss file, click **Util>Examine>Cable Loss>TX** or **RX**.
4	Add the spectrum analyzer power delta to the **Cable Loss**. – To view the cable loss file, click **Util>Examine>Cable Loss>TX** or **RX**. – Add the value computed in Table H-1, Table H-2, or Table H-3 to the TX Cable Loss. **NOTE** Be sure to include the sign of the value. The following examples are included to show the mathematics and do not represent actual readings: – Example: 5.65 dBm + 0.55 dBm = 6.20 dBm – Example: 5.65 dBm + (–0.29 dBm) = 5.36 dBm – Example: –5.65 dBm + 0.55 dBm = –5.10 dBm – Example: –5.65 dBm + (–0.29 dBm) = –5.94 dBm

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Table H-5: In−Service Calibration	
Step	**Action**
5	Input the Coupler Loss for the TX and RX tests: – Click **Util>Edit>Coupler Loss>TX** or **RX** from the menu bar at the main window. – Input the appropriate coupler loss for the target carrier(s) by referring to the information taken at the time of BTS installation. – Click the **Save** button. – Click the **Dismiss** button to close the window. – To view the coupler loss file, click **Util>Examine>Coupler Loss>TX** or **RX**.
6	Have the CBSC operator put the redundant BBX OOS_MANUAL.
7	**! CAUTION** Be sure to download OOS devices only. Loading in−service devices takes them OUT OF SERVICE and can result in dropped calls. The code file version numbers must match the version numbers on the other cards in the frame. If the numbers do not match, the site may go OUT OF SERVICE. **NOTE** Be sure to include the redundant BBX in steps 7, 8, and 9. Download code and data to the target devices: – Click **Tools>Update NextLoad>CDMA** to set the code version that will be downloaded. – Select the BTS(s) you need, check the appropriate code version in the pop up window, and click the **Save** button to close. – Select the target BBX(s) on the C–CCP cage picture. – Click **Device>Download>Code/Data** to start downloading code. – Select the target BBX(s) on the C–CCP cage picture. – Click **Device>Download>Data** to start downloading data.

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	Table H-5: In–Service Calibration
Step	**Action**
8	**! CAUTION** Perform the In–service Calibration procedure on OOS devices only. Select the desired test: – Select the target BBX(s) on the C–CCP cage picture. – Click **Tests>**[desired test] from the menu bar at the main window. – Select the target carrier and confirm the channel number in the pop up window. – Leave the **Verify BLO** check box checked. – From the **Test Pattern** pick list, select a test pattern. – Click the **OK** button to start calibration. – Follow the on–screen instructions, except, do not connect to the BTS antenna port, connect to the directional coupler (fwd) port associated with the on screen prompt antenna port. **NOTE** • Selecting **Pilot** (default) performs tests using a pilot signal only. • Selecting **Standard** performs tests using pilot, synch, paging and six traffic channels. This requires an MCC to be selected. • Selecting **CDFPilot** performs tests using a pilot signal, however, the gain for the channel elements is specified in the CDF file. • Selecting **CDF** performs tests using pilot, synch, paging and six traffic channels, however, the gain for the channel elements is specified in the CDF file.
9	Save the result and download the BLO data to the target BBX(s): – Click the **Save Result** button on the result screen. The window closes automatically.
10	Logout from the BTS and close the LMF session: – Click **BTS>Logout** to close the BTS connection. – Close the LMF window.
11	Restore the new "bts–*.cal" file to the CBSC.
12	Enable the target device(s) from the CBSC.

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Appendix I

VSWR

Transmit & Receive Antenna VSWR

Purpose

The following procedures will verify that the Voltage Standing Wave Ratio (VSWR) of all antennas and associated feed lines fall within acceptable limits. The tests will be performed on all antennas in a sequential manner (i.e., ANT 1, then ANT 2) until all antennas/feedlines have been verified.

These procedures should be performed periodically by measuring each respective antenna's VSWR (reflected power) to verify that the antenna system is within acceptable limits. This will ensure continued peak system performance.

The antenna VSWR will be calculated at the CDMA carrier frequency assigned to each antenna. Record and verify that they meet the test specification of less than or equal to 1.5:1.

NOTE	Motorola recommends that the installer be familiar with the following procedure in its entirety before beginning the actual procedure. Ensure that the entire site is currently not in service.
	This test is used to test RX antennas by substituting RX frequencies for TX frequencies.

Study the site engineering documents and perform the following tests only after **first** verifying that the RF cabling configuration required to interconnect the BTS frames and antennas meet requirements called out in the *BTS Installation Manual.*

Test equipment

The following pieces of test equipment will be required to perform this test:

- LMF

- Directional coupler

- Communications test set

WARNING	Prior to performing antenna tests, insure that no CDMA BBX channels are keyed. Failure to do so could result in personal injury or serious equipment damage.

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Equipment Setup – HP Test Set

Follow the procedure in Table I-1 to set up test equipment required to measure and calculate the VSWR for each antenna.

Step	Action	HP TEST SET
	Table I-1: VSWR Measurement Procedure – HP Test Set	
1	*If you have not already done so*, refer to the procedure in Table 3-5 on page 3-17 to set up test equipment & interface the LMF computer to the BTS.	
2	*For manual VSWR testing,* using external directional coupler, refer to Figure I-1 (1700/1900 MHz) or Figure I-2 (800 MHz). – Connect the communications test set RF OUT ONLY port to the INPUT port of the directional coupler. – Connect the RF IN/OUT port of the communication test set to the reverse (RVS) port on the directional coupler. *Terminate the forward port with a 50 ohm load.* – Install the antenna feed line to the output port on the directional coupler.	
	NOTE Manual Communications Analyzer test setup (fields not indicated remain at default): • Set screen to **RF GEN**. – For 1900 MHz systems, set the **RF Gen Freq** to center frequency of actual CDMA carrier between 1930–1990 MHz for TX and 1850–1910 MHz for RX. For 800 MHz systems, set the **RF Gen Freq** to center frequency of actual CDMA carrier between 869–894 MHz for TX and 824–849 MHz for RX. For 1700 MHz systems, set the **RF Gen Freq** to center frequency of actual CDMA carrier between 1840–1870 MHz for TX and 1750–1780 MHz for RX. – Set Amplitude to **–30 dBm**. – Set Output Port to **RF OUT**. – Set AFGen1 & AFGen2 to **OFF**.	
3	Remove the antenna feed line and install an "RF short" onto the directional coupler output port.	
	NOTE Set–up communication test set as follows (fields not indicated remain at default): • Set screen to **SPEC ANL**. – Under Controls, set input port to **ANT**. – Set Ref Level to **–40 dBm**. – Under Controls, select **Main**, select **Auxiliary**. – Under Controls, select **AVG**. Set Avg = **20**.	
4	– Record the reference level on the communications analyzer and *Note as P_S for reference*. – Replace the short with the antenna feedline. Record the reference level on the communications analyzer and *Note for as P_A reference*. – Record the difference of the two readings in dB.	

Step	Action	HP TEST SET
	Table I-1: VSWR Measurement Procedure – HP Test Set	
5	Calculate the VSWR per the equation shown to the right. *Where:* $R_{L(dB)} = P_{A(dBm)} - P_{S(dBm)}$ $P_A =$ Power reflected from antenna $P_S =$ Power reflected from short A calculated value of –13.98 dB equates to VSWR of better than **1.5:1**.	$VSWR = \left[\dfrac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}}\right]$
6	If the readings indicate a potential problem, verify the physical integrity of all cables (including any in–line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.	
7	Repeat steps 2 through 6 for all remaining TX sectors/antennas.	
8	Repeat steps 2 through 6 for all remaining RX sectors/antennas.	

Figure I-1: Manual VSWR Test Setup Using HP8921 Test Set (1700/1900 MHz)
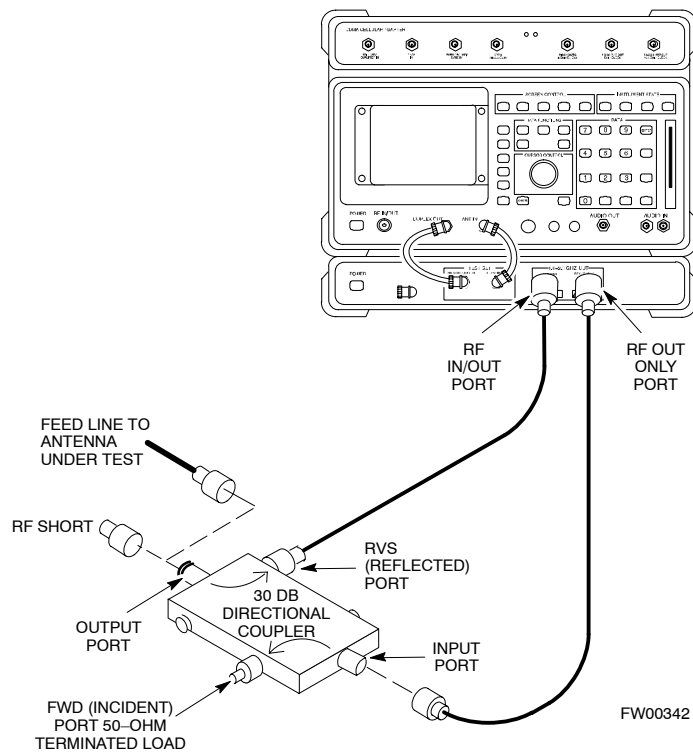
Figure I-2: Manual VSWR Test Setup Using HP8921 Test Set (800 MHz)
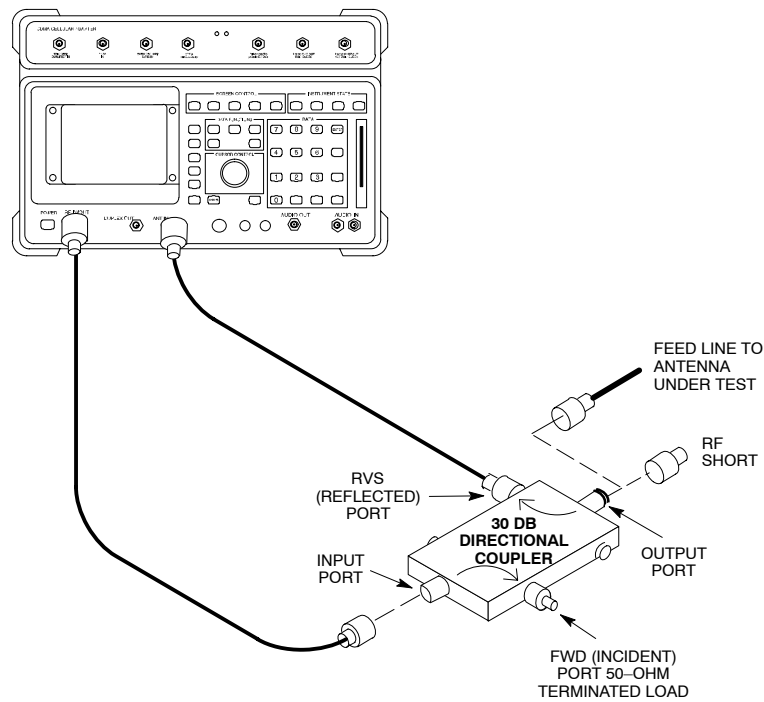
FW00343

Equipment Setup – Advantest Test Set

Follow the steps in Table I-2 to set up test equipment required to measure and calculate the VSWR for each antenna.

	Table I-2: VSWR Measurement Procedure – Advantest Test Set	
Step	**Action**	**ADVANTEST**
1	*If you have not already done so,* refer to the procedure in Table 3-5 on page 3-17 to set up test equipment and interface the LMF computer to the BTS.	
2	*For manual VSWR testing* using external directional coupler, refer to Figure I-3. – Connect the communications test set RF OUT port to the input port of the directional coupler. – Connect the INPUT port of the communication test set to the forward port on the directional coupler. *Terminate the forward port with a 50 Ohm load.* – Connect the RF short to the directional coupler output port.	

Table I-2: VSWR Measurement Procedure – Advantest Test Set		
Step	**Action**	**ADVANTEST**

3	Preform the following to instruct the calibrated test set to generate a CDMA RF carrier (RVL call) with all zero longcode at the assigned RX frequency at –10 dBm:
	
	• Push the **ADVANCE** Measurement key.
	• Push the **CDMA Sig** CRT menu key.
	• Push the **FREQ** Entry key:
	  – For 1900 MHz systems, set **RF Gen Freq** to center frequency of actual CDMA carrier between 1930–1990 MHz for TX and 1850–1910 MHz for RX.
	  – For 800 MHz systems, set **RF Gen Freq** to center frequency of actual CDMA carrier between 869–894 MHz for TX and 824–849 MHz for RX.
	  – For 1700 MHz systems, set **RF Gen Freq** to center frequency of actual CDMA carrier between 1840–1870 MHz for TX and 1750–1780 MHz for RX.
	• Push the **LEVEL** Entry key; set to **0 dBm** (by entering **0** and pushing the **–dBm** key).
	• Verify that **ON** is active in the **Output** CRT menu key.
	• Verify that **OFF** is active in the **Mod** CRT menu key.
	• Push the **CW** Measurement key.
	• Push the **FREQ** Entry key.
	  – Push the **more 1/2** CRT menu key.
	  – Set **Preselect** CRT menu key to **3.0G.**
	• Push the **Transient** Measurement key.
	  – Push the **Tx Power** CRT menu key.
	  – Push the LEVEL entry key (set to 7 dBm by entering 7 and pushing the the dBm key).
	  – Set **Avg Times** CRT menu key to **ON**. Set to **20** (by entering **20** and pushing the **Hz** ENTER key).
	• Push the **REPEAT** Start key to take the measurement.	

4	Record the Burst Power display on the communications analyzer and *Note as P$_S$ for reference.*	
5	Install the antenna feedline to the output port of the directional coupler.	
6	• Push the **Auto Level Set** CRT menu key. • Push the **REPEAT** Start key to take the measurement.	
7	Record the Burst Power on the communications analyzer and *Note as P$_A$ level for reference*. Record the difference of the two readings in dBm.	

8	Calculate the VSWR per the equation shown to the right.
	Where:
	   $R_{L(dB)} =$ $P_{A(dBm)} - P_{S(dBm)}$
	      $P_A =$ Power reflected from antenna
	      $P_S =$ Power reflected from short
	A calculated value of –13.98 dB equates to VSWR of better than **1.5:1**.
		$$VSWR = \left(\frac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}} \right)$$

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	Table I-2: VSWR Measurement Procedure – Advantest Test Set	
Step	**Action**	**ADVANTEST**
9	If the readings indicate a potential problem, verify the physical integrity of all cables (including any in–line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.	
10	Repeat steps 2 through 9 for all remaining TX sectors/antennas.	
11	Repeat steps 2 through 9 for all remaining RX sectors/antennas.	

Figure I-3: Manual VSWR Test Setup Using Advantest R3465

Notes
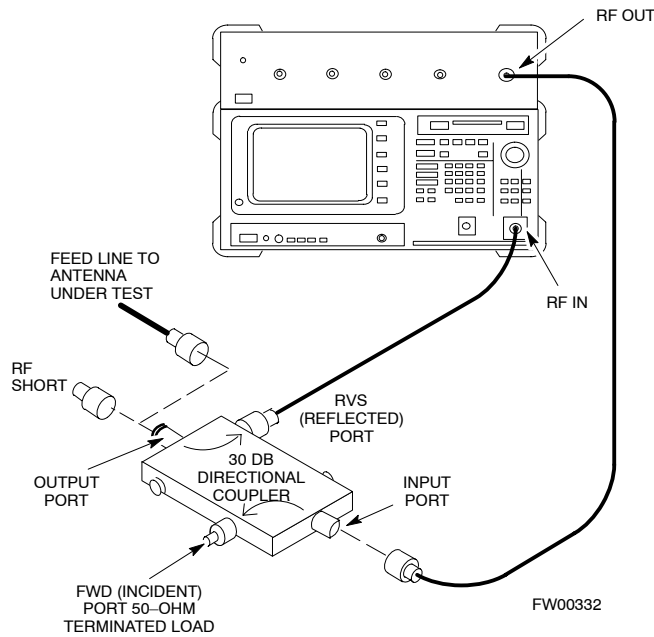
Appendix J

Packet Backhaul Configuration

J

BTS Router Initial Configuration

Overview

This appendix contains information and operations related to loading an MWR 1941 BTS router with the minimum standard (*canned*) configuration necessary for network communications. Once the router is communicating on the network, the full, site-specific, operational configuration can be downloaded to the router over the network. This appendix includes sections on:

- Terminal Setup

- Downloading canned BTS router configuration files

- Verifying IOS canned version of CF memory card

- Replacing installed BTS router CF memory card IOS version

- Verify and upgrade rommon version

- Recovery from BTS router boot to rommon

- Entering or changing router FE interface IP address

- Preparation for site turn–over

Terminal Setup

General

This section provides the procedures to configure and save a terminal session for communicating with the MWR 1941 BTS router. Terminal settings are the same as those used for BTS card and module Man–Machine Interface (MMI) communication sessions. The procedures are for a Pentium® processor–based computer operating with either *Windows* 98 Second Edition (SE) or *Windows* 2000.

Using the LMF computer

LMF computer platforms can be used for communicating with the routers, and the MMI terminal connection created for BTS card/module optimization actions will operate with the BTS routers. See the "Establishing a BTS Router Communication Session" section of this appendix for additional interface hardware required for BTS router communication.

Terminal Settings

Follow the procedure in Table J-1 to create a named HyperTerminal connection for BTS router interface and generate a *Windows* desktop shortcut for it.

NOTE	There are differences between *Windows* 2000 and *Windows* 98 in the menus and screens used for creating a HyperTerminal connection. In the following procedure, items applicable to:
	● *Windows* 2000 will be identified with *Win2000*
	● *Windows* 98 will be identified with *Win98*

Table J-1: Establish HyperTerminal Connection	
Step	**Action**
1	From the *Windows* Start menu, select **Programs > Accessories**
2	Perform one of the following:
	● For *Win2000*, select **Hyperterminal** and then click on **HyperTerminal**
	● For *Win98*, select **Communications**, double click the **Hyperterminal** folder, and then double click on the **Hypertrm.exe** icon in the window which opens.
	NOTE
	● If a **Location Information Window** appears, enter the required information, then click on the **Close** button. (This is required the first time a HyperTerminal connection is configured, even if a modem is not to be used.)
	● If a **You need to install a modem.....** message appears, click on **NO**.
3	When the **Connection Description** box opens:
	– Type a name for the connection being defined (for example, BTSRTR Session, MMI) in the **Name:** window,
	– Highlight any icon preferred for the named connection in the **Icon:** chooser window, and
	– Click **OK**.

J

	Table J-1: Establish HyperTerminal Connection
Step	**Action**
4	From the **Connect using:** pick list in the **Connect To** box displayed, select the RS–232 port to be used for the connection (e.g., **COM1** or **COM2** – *Win2000* or **Direct to Com 1** or **Direct to Com 2** – *Win98*), and click **OK**.
5	In the **Port Settings** tab of the **COM# Properties** window displayed, configure the RS–232 port settings as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
6	Click **OK**.
7	With the HyperTerminal window still open and the connection running, select: **File > Properties**
8	Click the **Settings** tab, click the arrow in the **Emulation** window, and select **VT100** from the dropdown list.
9	Click the **ASCII Setup** button, uncheck all boxes in the ASCII Setup window which appears, and click **OK**.
10	Click **OK** for the connection Properties box.
11	Save the defined connection by selecting: **File > Save**
12	Close the HyperTerminal window by selecting: **File > Exit**
13	Click the **Yes** button to disconnect when prompted.
14	Perform one of the following: • If the **Hyperterminal** folder window is still open (*Win98*), proceed to step 16, or • From the Windows Start menu, select **Programs > Accessories**
15	Perform one of the following: • For *Win2000*, select **Hyperterminal** and release any pressed mouse buttons. • For *Win98*, select **Communications** and double click the **Hyperterminal** folder.
16	Highlight the newly–created connection icon by moving the cursor over it (*Win2000*) or clicking on it (*Win98*).
17	*Right click and drag* the highlighted connection icon to the *Windows* desktop and release the right mouse button.
18	From the popup menu displayed, select **Create Shortcut(s) Here**.

J

Table J-1: Establish HyperTerminal Connection	
Step	**Action**
19	If desired, reposition the shortcut icon for the new connection by dragging it to another location on the *Windows* desktop. **NOTE** The shortcut icon can now be double−clicked to open a BTS router or BTS card/module MMI HyperTerminal session without the need to negotiate multiple menu levels.

BTS Router Serial Communication

For those procedures which require serial communication with BTS routers, follow the procedures in Table J-2 to initiate the communication session. This procedure calls out the LMF computer platform, but any VT100−equivalent terminal or computer equipped with terminal emulation software and a hardware serial connector may be used.

Required Items

The following items are required to perform the verification:

- LMF computer platform or equivalent (see *this manual* for requirements)

- Eight−conductor (four−pair, *un*shielded twisted pair is acceptable) *rollover* cable, two 8−contact modular plugs (see Figure J-1 for cable wiring requirements)

- Adapter, DB−9 plug−to−8−contact modular plug, Global Computer Supplies C4717 or equivalent (see Figure J-2 for adapter wiring requirements)

Figure J-1: Wiring Diagram, BTS Router Communication Rollover Cable
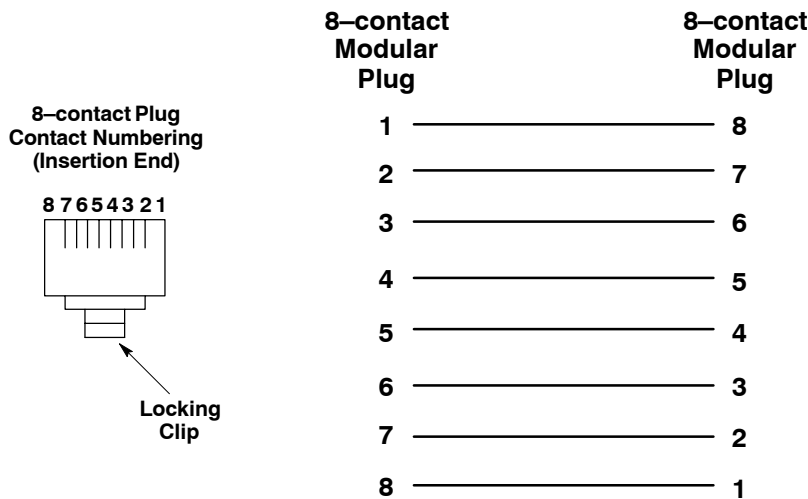
Figure J-2: Wiring Diagram, DB–9 Plug–to–8–contact Modular Plug Adapter
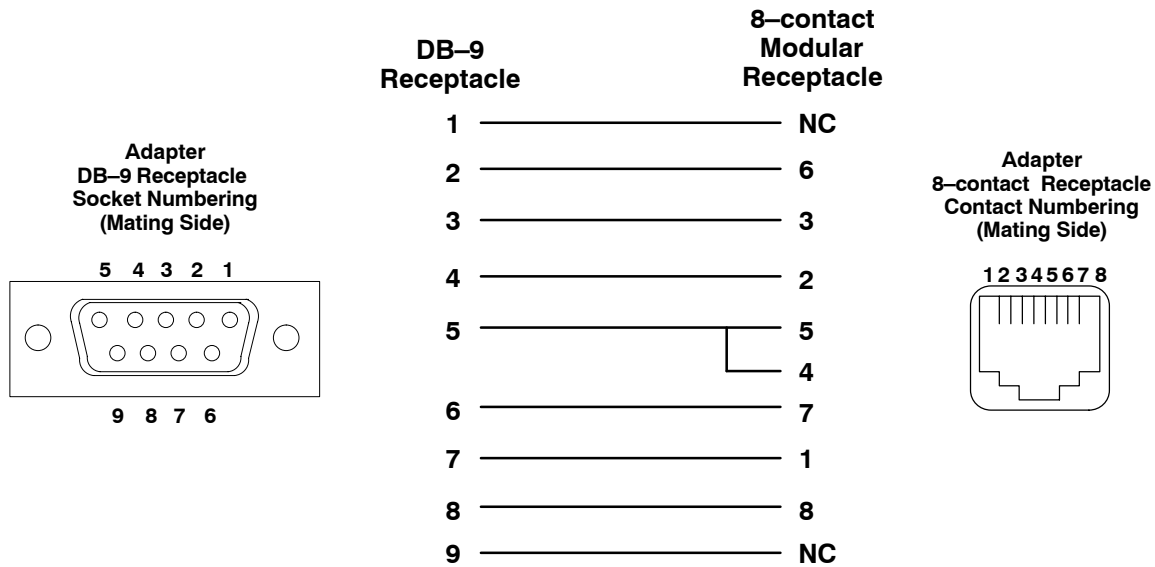
Table J-2: Establishing BTS Router Serial Communication	
Step	**Action**
1	If it has not been done, start the computer and allow it to complete boot–up.
2	If a named HyperTerminal connection for BTS router serial communication or BTS card/module MMI communication has not been created on the LMF computer, create one as described in Table J-1 in the "Terminal Set–up" section of this appendix.
3	Connect the computer to the BTS router as shown in Figure J-3.
4	Start the named HyperTerminal connection for BTS router communication sessions by double clicking on its *Windows* desktop shortcut. **NOTE** If a *Windows* desktop shortcut was not created for the communication session, access the connection from the *Windows* Start menu by selecting: **Programs > Accessories > Hyperterminal > HyperTerminal > *<Named HyperTerminal Connection (for example, BTSRTR)>***
5	Once the connection window opens, establish communication with the BTS router by pressing the computer **Enter** key until the prompt identified in the applicable procedure is obtained.

Figure J-3: LMF Computer Connections to BTS Router

ROLLOVER
CABLE

To BTS router
CONSOLE
receptacle

DB9−TO−RJ48C
ADAPTER

**LMF COMPUTER
OR EQUIVALENT**

COM1
OR
COM2

OPTOATP0001−0
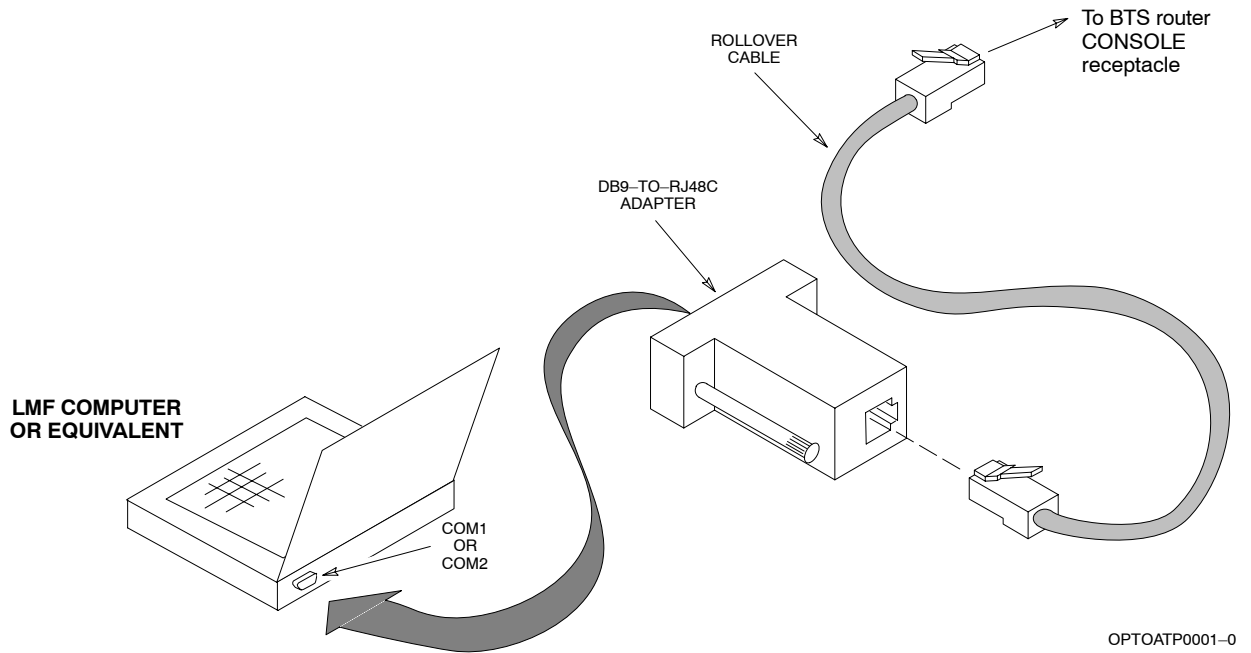
Downloading Minimum Canned BTS Router Configuration Files

Downloading Overview

After they are generated on the OMC–R, the BTS router canned configuration files must be transferred to another computer platform from which they can be installed into the BTS routers. A number of procedures may be used to move the canned configuration files from the OMC–R to a platform from which they can be loaded into the routers. Some alternatives are:

1. If a floppy diskette drive is available at the OMC–R, such as the one for UNO workstations, the configuration files can be transferred to an LMF computer or similar machine using the CDF file transfer procedure in the Preparing the LMF section of *this manual*. Directories identified in Table J-3 must be used rather than those in the CDF file transfer procedure.

2. If a *Windows*–based server connection is available in the operator's network and it can provide an FTP or telnet connection to the OMC–R, files may be transferred by either the FTP or telnet methods.

3. If a dial–up connection is available for accessing the OMC–R, an FTP or telnet session may be possible to transfer files to the computer used to load the CF memory cards.

The procedure provided in this section covers FTP transfer using a *Windows*–based server in the operator's network. Coordinate with the local network administrator to determine the method and procedure to use on a specific network.

Prerequisites

The following must be obtained from the local network administrator before performing the canned configuration file FTP procedure in Table J-3:

- User ID and password to log onto the OMC–R

- Name of the sub–directory where the specific BTS router group canned configuration files to be downloaded were created

FTP File Transfer from the OMC–R

This procedure uses the *Windows*–based LMF computer platform to download BTS router canned configuration files from the OMC–R. Follow the procedure in Table J-3.

Table J-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R	
Step	**Action**
1	If it has not been done, create a directory on the LMF computer where the BTS router canned configuration files will be stored.
2	If it has not been done, obtain the OMC–R logon user ID and password from the local network administrator.

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Table J-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R

Step	Action
3	Connect the LMF computer to the local network and log on.
	NOTE This procedure uses the command line FTP client supplied with *Windows* 98, Second Edition (*Win98 SE*) and *Windows* 2000 (*Win2K*); however, any commercially available FTP client application can be used. Follow the manufacturer's instructions for operation of an alternative application.
4	Open a command line (MS DOS) window by clicking on **Start > Programs > Command Prompt**.

5	When the command line window opens, change to the directory where the canned configuration files will be stored on the LMF computer by entering:
	
	   cd *pathname*
	
	Where *pathname* = the path to the required directory.
	
	A response similar to the following will be displayed:
	
	`C:\> cd Can_Cfg`
	`C:\Can_Cfg>`

6	Check the contents of the directory by entering the following:
	
	   dir
	
	A response similar to the following will be displayed:
	
	<pre>C:\Can_Cfg>dir
	 Volume in drive C is MAIN
	 Volume Serial Number is F2AA–1721
	
	 Directory of C:\Can_Cfg>
	
	08/22/2002 03:46p <DIR> .
	08/22/2002 03:46p <DIR> ..
	08/22/2002 03:46p 2,223 btsrtr_canned.blue
	08/22/2002 03:47p 2,223 btsrtr_canned.red
	            2 File(s) 4,644 bytes
	            2 Dir(s) 2,556,045,312 bytes free
	
	C:\Can_Cfg></pre>

7	If either or both of the following files are found in the directory, delete them or move them to another directory: • `btsrtr_config.blue` • `btsrtr_config.red`

8	Begin the FTP session by entering the following:
	
	   ftp *hostname*
	
	Where *hostname* = the OMC–R hostname or IP address.
	
	A response similar to the following will be displayed:
	
	<pre>C:\Can_Cfg> ftp OMCR–1
	C:\Can_Cfg>
	Connected to OMCR–1.
	220 OMCR–1 FTP server (SunOS 5.6) ready.
	User (OMCR–1:(none)):</pre>

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Table J-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R	
Step	**Action**
9	Enter the User ID and password when prompted, pressing the **Enter** key after each. A response similar to the following will be displayed: ``` User (OMCR–1:(none)): scadm 331 Password required for scadm. Password: 230 User scadm logged in. ftp> ```

10	Change to the directory where the BTS router canned configuration file sub–directories are created and verify the present working directory by entering the following, pressing the **Enter** key after each:
	
	    cd /home/scadm/btsrtr_canned_configs
	
	    pwd
	
	A response similar to the following will be displayed:
	
	``
	ftp> cd /home/scadm/btsrtr_canned_configs
	240 CWD command successful.
	ftp> pwd
	245 "/home/scadm/btsrtr_canned_configs" is current directory.
	``

11	Enter the **ls** command to list the contents of the directory and be sure the specific canned configuration directory name provided by the administrator exists. A response similar to the following will be displayed: ``` ftp> ls 200 PORT command successful. 150 ASCII data connection for /bin/ls (10.182.29.117,80) (0 bytes). Mon_Jul_2_01:55:07_CDT_2002 Wed_Jul_24_09:35:41_CDT_2002 Tue_Aug_04_10:35:22_CDT_2002 226 ASCII Transfer complete. ftp: 30 bytes received in 0.02Seconds 1.50Kbytes/sec. ftp> ``` **NOTE** Directory names where canned configuration files are located will consist of the *weekday_month_day_time_year* when the canned configuration files were created on the OMC–R.

12	Change to the directory specified for the BTS router group to be configured and list the directory contents by entering the following, pressing the **Enter** key after each command:
	
	    cd *weekday_month_day_time_year*
	
	    ls
	
	A response similar to the following will be displayed:
	
	``
	ftp> cd Wed_Jul_24_09:35:41_CDT_2002
	250 CWD command successful.
	ftp> ls
	200 PORT command successful.
	150 ASCII data connection for /bin/ls (10.182.29.117,80) (0 bytes).
	btsrtr_canned.blue
	btsrtr_canned.red
	226 ASCII Transfer complete.
	ftp: 39 bytes received in 0.05Seconds 0.78Kbytes/sec.
	ftp>
	``

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Table J-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R

Step	Action

13	Change to the binary transfer mode and, if desired, turn on hash mark printing for transfer progress by entering the following, pressing the **Enter** key after each command:
	
	    bin
	
	    hash
	
	A response similar to the following will be displayed:
	
	<pre>ftp> bin
	200 Type set to I.
	ftp> hash
	Hash mark printing On ftp: (2048 bytes/hash mark) .
	ftp></pre>
	NOTE
	
	With *Win98 SE*, turning on hash mark printing can slow down file transfer in certain circumstances, but the canned configuration files are quite small (approximately 2.5 KB) so there should be little noticeable effect.

14	Download the BTS router canned configuration files to the LMF computer by performing the following:

14a	– Enter the following to download the first canned configuration file:
	
	    get btsrtr_canned.blue
	
	A response similar to the following will be displayed:
	
	<pre>ftp> get btsrtr_canned.blue
	200 PORT command successful.
	150 Binary data connection for btsrtr_canned.blue (10.182.29.117,80) (2223 bytes).
	#
	226 Binary Transfer complete.
	ftp: 2223 bytes received in 0.59Seconds 3.76Kbytes/sec.
	ftp></pre>

14b	– Enter the following to download the second BTS router canned configuration file:
	
	    get btsrtr_canned.red
	
	A response similar to the following will be displayed:
	
	<pre>ftp> get btsrtr_canned.red
	200 PORT command successful.
	150 Binary data connection for btsrtr_canned.red (10.182.29.117,80) (2223 bytes).
	#
	226 Binary Transfer complete.
	ftp: 2223 bytes received in 0.59Seconds 3.76Kbytes/sec.
	ftp></pre>

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Step	Action
	Table J-3: BTS Router Canned Configuration File FTP Transfer from the OMC−R
15	Before terminating the FTP session, open *Windows* Explorer and view the contents of the directory where the canned configuration files are to be stored to be sure the files are present. Perform the following:
15a	– Click **Start > Programs > Windows Explorer**.
15b	– In the left–hand pane of *Windows* Explorer, perform one of the following depending on the LMF computer operating system: — *Win98 SE*: If necessary, expand the directory display for the drive where the canned configuration file storage directory is located by clicking on the **+** next to the drive icon. — *Win2K*: Expand the user profile and directory display for the drive where the canned configuration file storage directory is located by clicking on the **+** next to each icon, respectively.
15c	– Expand any sub–directories as required to display the directory folder where the canned configuration files are to be stored.
15d	– Click on the directory folder icon where the canned configuration files are to be stored.
15e	– In the *right*–hand pane, verify that the files `btsrtr_canned.blue` and `btsrtr_canned.red` appear.
15f	– If the files appear, proceed to step 16.
15g	– If the files do not appear, repeat step 14, its sub–steps, step 15 and its sub–steps.

16	Close *Windows* Explorer, and, in the command line window, enter the **bye** command to terminate the FTP session. A response similar to the following will be displayed:
	
	`ftp> bye`
	`221 Goodbye.`
	`C:\Can_Cfg>`

17	Close the command line window by entering the **exit** command.
18	BTS router canned configuration files are now ready for transfer to a BTS router.

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Verifying IOS Canned Version of the CF Memory Card

Overview

This section covers the procedures and commands required to verify the IOS version loaded on BTS router CF memory cards and copy standard canned configuration files to the routers. Because of the set–up required and the length of some of the procedures, Motorola recommends performing the actions covered in this section at a central location to prepare the BTS routers for installation prior to the site visit.

IOS Version Verification and File Sequence Position

Version verification – The IOS version loaded on the BTS router CF memory card should be verified as the version required for operation on the network where the routers will be installed. If the loaded IOS version is not correct, it can be replaced with a different version. There are several methods available to accomplish version verification. These depend on the equipment and software applications the user selects to use in installing the canned configuration files in the BTS routers. Appropriate verification procedures are included in each of the two canned configuration installation methods covered in this section. Methods to change the loaded IOS version are provided in the Change BTS Router IOS Version section of this appendix and are referenced at the appropriate places in the canned configuration installation methods.

File sequence position – During initialization, the MWR 1941 router will first search the `startup–config` file for a boot system command line telling it in what directory and file to find the boot loader. If this line is not found, the router will default to attempting to boot from the first file in its flash memory. Flash memory for the MWR 1941 is the CF memory card (software identifier **slot0:**). The canned configuration files used for BTS router installation do not contain a boot system command line because of the need to maintain flexibility for IOS version changes. Because of this, it is critical that *the IOS file is the first file listed on the CF memory card*. The canned configuration installation procedures contain steps to assure that this is the case, and, if it is not, provide guidance to correct the condition. It is important to remember that, if the router boots and displays a `rommon 1 >` prompt, the IOS file is missing, out of sequence, has a corrupted flash memory image or the `startup–config` file contains a boot system line which specifies a missing or incorrect IOS pathname/filename.

Canned Configuration File Installation

Filename and installation location requirements – The canned configuration files for the BTS routers must be copied to the CF memory card. The filename of the file on the CF memory card *must* be `canned–config`. Canned configuration file location and filename requirements are a result of Mobile Wireless Center (MWC) actions during the process of switching a BTS from packet to circuit mode. In this process, the MWC will query the BTS routers' slot0: directory for a file named `canned–config`. A missing or mis–named file will cause problems with execution of the mode–switching process.

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Installation Methods – The `startup–config` configuration file used by the BTS router during initialization is stored in NVRAM. This is a memory device internal to the router and is separate from the CF memory card. To install the canned configuration file so the router will use it during boot–up, the file must be copied into the `startup–config` file in NVRAM. There are two methods available to accomplish this:

1. Using a tftp server application to copy the canned configuration file from the *Windows*–based LMF computer to the CF memory card installed in a router, and then copying it to the `startup–config` file in the router's NVRAM

2. Using a CF memory card reader to copy the canned configuration file to a CF memory card, and then, once the CF memory card is installed in the router, using a HyperTerminal communication session to copy the file from the CF memory card to the `startup–config` file in the router's NVRAM

Comparison of methods – Preparation for using the tftp server application method is extensive and requires setting up simultaneous serial and FE communication sessions with the router. This method offers the advantage of being able to verify IOS file sequence position immediately and supporting direct file transfers between the router and LMF computer without removing the CF memory card. As an alternative, using a CF memory card reader to copy the canned configuration file to a CF memory card, and from there to the `startup–config` file requires very little set–up. With this method, the IOS file sequence position can only be verified once the CF memory card is installed in the router, and any file transfers between the router and LMF computer require physically moving the CF memory card between the router and card reader.

Procedures to use each method – Using the tftp server application to copy the canned configuration file to a CF memory card is covered in the Method 1 subsection. Performing the transfer process with a card reader is covered in the Method 2 subsection. The applicable procedures for verifying the loaded IOS version and file sequence position are included in each method.

File operations using a CF memory card reader – Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router* using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*–based computer using a card reader could result in unpredictable BTS router operation.

CAUTION	Do not format BTS router CF memory cards using a *Windows*–based computer. Only format CF memory cards in a BTS router.

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Method 1: Using a TFTP Server to Load to CF Memory Card

Required Equipment and Software

The following items are required to perform this procedure:

- A *Windows*−based computer which meets the requirements of the LMF computer platform as specified in *this manual*.
- One of the following operating systems for the *Windows*−based computer:
  - *Windows* 2000
  - *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION	BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

- One of the following for the *Windows*−based computer:
  - Internal 10/100baseT Network Interface Card (NIC)
  - PCMCIA 10/100baseT NIC
- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8−contact modular plugs, in one of the following lengths, as determined necessary:
  - 0.3 m (11.8 in) (Motorola pn 3088643C07)
  - 0.6 m (23.6 in)(Motorola pn 3088643C13)
  - 1.0 m (39.4 in) (Motorola pn 3088643C15)
  - 2.1 m (84 in) (Motorola pn 3088643C08)
  - 3.0 m (120 in) (Motorola pn 3088643C09)
- Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix
- DB−9 plug−to−8−contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix
- A tftp server software application (refer to the Setting Up the TFTP Server − Procedure in *Cellular System Administration − CDMA OnLine Documentation*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application
- A copy of the MWR 1941 router IOS version required for the network where the routers are to be installed (contact the network administrator or the Motorola account team for information on obtaining the required MWR 1941 IOS version)
- A +27 Vdc power supply to power the BTS router during configuration file operations

Required Materials

The following material is required to perform this method:

- Marking material to identify the BTS router and CF memory card with the installed configuration (blue or red)

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Required Publications

The following publications are required to perform procedures in this section:

- *this manual*
- *Cellular System Administration – CDMA OnLine Documentation*
- *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

Preparation for Canned Configuration File TFTP Transfer to CF Memory Card

Preparation for a canned configuration file tftp transfer consists of the following activities:

1. Setting the LMF computer NIC IP address
2. Creating a directory (folder) on the LMF computer to be used for all tftp file transfers
3. Installing the tftp server application on the LMF computer, and setting the tftp server application root directory to the directory created in 2, above
4. Connecting the LMF computer to the BTS router for both HyperTerminal (serial) and Ethernet communication
5. BTS router power–up and initial configuration for Ethernet communication

The following procedures are used to accomplish all of these preparatory actions.

Set LMF computer NIC TCP/IP address and create the default TFTP directory – Follow the procedure in Table J-4 to set the NIC IP address.

NOTE	**IMPORTANT!** If the IP address for the LAN connection on an LMF computer is being changed to support tftp downloads to a BTS router, the BTS 10base–2 LAN IP address and subnet mask for the NIC must be restored before the LMF can log into a BTS to perform an optimization or ATP.

NOTE	There are differences between *Windows* 2000 and *Windows* 98 in the menus and screens used for setting or changing a NIC connection. In the following procedure, items applicable to:*Windows* 2000 will be identified with *Win2000Windows* 98 will be identified with *Win98*

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Step	Action
Table J-4: Set LMF Computer NIC IP Address and Create a Default TFTP Directory	
1	Start the computer.
2	Login and allow the computer to boot to the desktop.
3	Depending on the installed operating system, from the *Windows* Start menu, select one of the following: • *Win2000*: **Settings > Network and Dial–up Connections** • *Win98*: **Settings > Control Panel** and double–click **Network**.
4	Perform one of the following as applicable for the installed operating system: • For *Win2000*, in the list of displayed connections, locate the Local Area Network connection for the NIC to be used for BTS router Ethernet communication. • For *Win98*, in the **Configuration** tab of the **Network** dialog box, locate the TCP/IP connection for the installed NIC. – If **TCP/IP** does not appear in the displayed list of installed network components, refer to the operating system documentation and install TCP/IP.
5	Perform one of the following as applicable for the installed operating system: • For *Win2000*, highlight the connection for the NIC and right click the highlighted connection, and select **Properties** from the pop–up menu. • For *Win98*: – Highlight the TCP/IP NIC connection in the displayed list of installed network components. – Click the **Properties** button. – Skip to step 8.
6	For *Win2000* , in the **Local Area Connection Properties** dialog box which appears, if Internet Protocol (TCP/IP) is not showing in the *Components checked are used by this connection:* listbox, refer to the operating system documentation and install TCP/IP.
7	For *Win2000*, if the checkbox next to the Internet Protocol (TCP/IP) entry is not checked, click in the box to check it.
8	Perform one of the following: • *Win2000*: Highlight the Internet Protocol (TCP/IP) entry, and click on the **Properties** button below the *Components checked are used by this connection:* listbox. • *Win98*: From the tabs displayed in the **TCP/IP Properties** dialog box which opens, select the **IP Address** tab if it is not at the front.

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Step	Action
Table J-4: Set LMF Computer NIC IP Address and Create a Default TFTP Directory
9	In the **Internet Protocol (TCP/IP) Properties** dialog box which appears (*Win2000*) or the **IP Address** tab of the **TCP/IP Properties** dialog box (*Win98*), perform the following:
9a	– If a black dot is not showing in the the radio button circle next to **Use the following IP address:** (*Win2000*) or **Specify an IP address** (*Win98*), click on the radio button. — A black dot will appear in the circle.
9b	– If using an LMF computer, record the IP address and subnet mask used for LMF–BTS communication so they can be re–entered when tftp transfer activities for the BTS router are completed.
9c	– Enter **100.100.100.1** in the **IP address:** box.
9d	– Enter **255.255.255.252** in the **Subnet mask:** box.
10	Click the **OK** button for the **Internet Protocol (TCP/IP) Properties** dialog box (*Win2000*) or the **TCP/IP Properties** box (*Win98*).
11	Click the **OK** button for the **Local Area Connection Properties** box (*Win2000*) or the **Network** box (*Win98*).
12	In *Win98*, click **File > Close** to close the **Control Panel** window.
13	Click **Start > Programs > Windows Explorer** to open *Windows* Explorer.
14	If the default tftp directory will be the same directory in which the files downloaded from the OMC–R are stored, proceed to step 22.
15	In the *left*–hand pane of *Windows* Explorer, locate the icon for the drive where the default tftp directory is to be created.
16	Highlight the drive icon and click **Files > New > Folder**.
17	While observing the new folder icon in the *right*–hand pane, type the name for the folder (for example, *tftp_files*), and press the **Enter** key.
18	In *Windows* Explorer, locate the directory where the canned configuration files downloaded from the OMC–R are stored.
19	In the *left*–hand pane, highlight the directory where the files are stored.
20	Scroll the *left*–hand pane until the newly–created default tftp directory is visible.
21	In the *right*–hand pane, highlight the canned configuration files and drag them to the default tftp directory.
22	In the *left*–hand pane, click on the default tftp directory, and verify that the canned configuration files appear in the *right*–hand pane.
23	Load a copy of the required BTS router IOS version into the default tftp directory using FTP, internet download, or media such as a Zip disk (file size is over 7 MB).
24	Click **Files > Close** to close *Windows* Explorer.

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Install and configure tftp server application

To obtain, install, and configure the Cisco or PumpKIN tftp software applications, refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation* For other tftp server applications, install and configure the application according to the manufacturer's instructions.

NOTE	**Important:** When entering the name of the tftp server root directory while configuring the tftp server application, be sure to use the name of the directory identified in Table J-4, step 14, or created in Table J-4, step 17, above.

Connect the LMF computer to the BTS router

Connect the LMF computer to the BTS router by following the procedure in Table J-5 and referring to Figure J-4..

Figure J-4: LMF Computer TFTP Connections to BTS Router

BTSRTR0025

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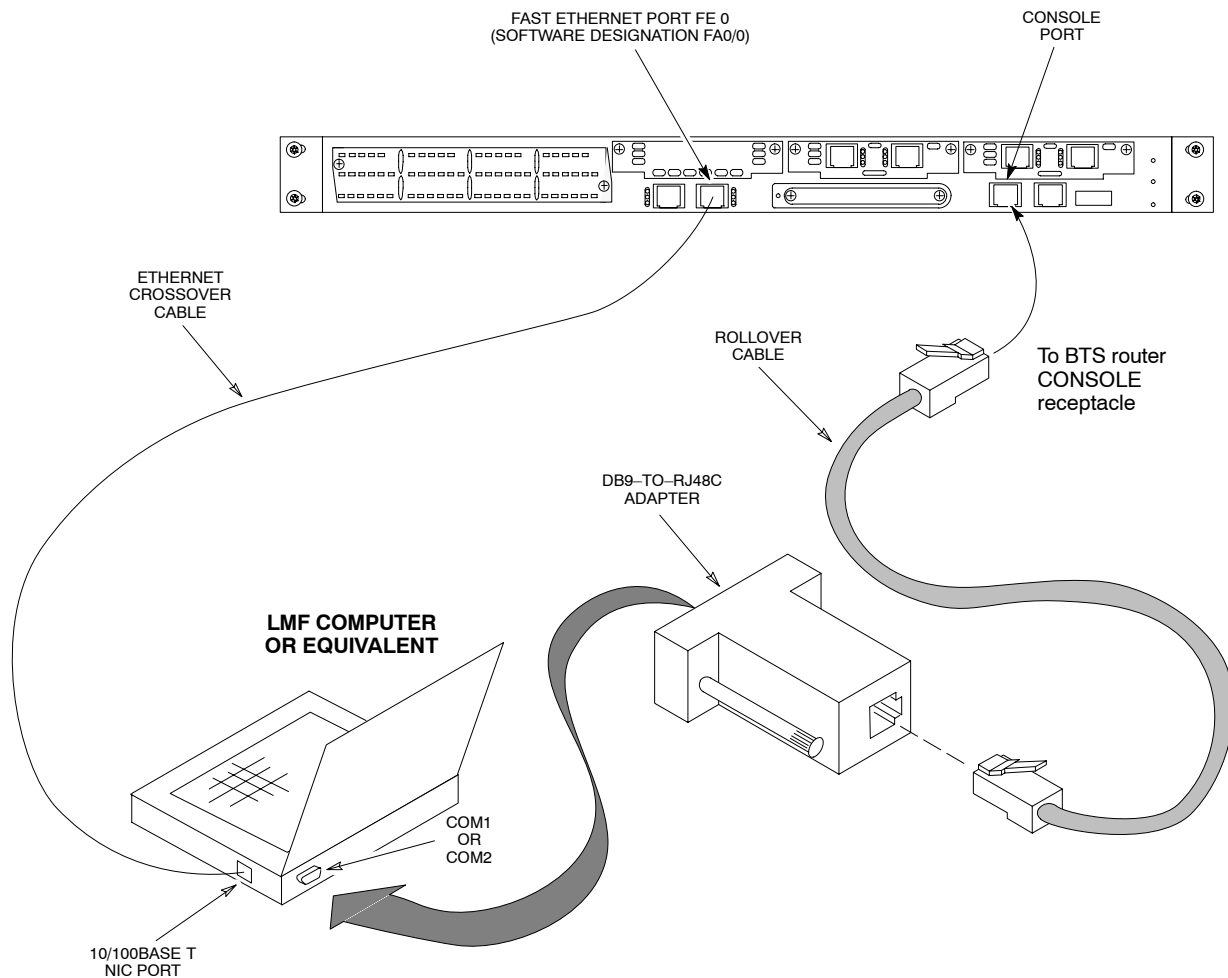
Table J-5: Connecting the LMF Computer to the BTS Router for TFTP File Transfer	
Step	**Action**
1	If the BTS router has not been connected to a power source, be sure the +27 Vdc power source is not on, and connect it to the router.
2	Connect the LMF computer to the BTS router as shown in Figure J-4, referring to the list of required equipment in this section as required.
3	If the LMF computer has not been started, turn it on, login, and allow it to boot to the desktop.
4	Refer to the procedure in Table J-2 of this appendix, and start a HyperTerminal communication session for the BTS router.
5	Start the tftp server application as specified for the software (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation* or the manufacturer's instructions).

BTS router power–up and initial configuration for Ethernet communication

Follow the procedure in Table J-6 to apply power to the router and set an initial configuration for Ethernet communication.

• The required version of the IOS is loaded on the CF memory card

• The CF memory card is installed in the BTS router

Table J-6: BTS Router Power–up and Initial Ethernet Configuration	
Step	**Action**
	* IMPORTANT This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	Be sure a CF memory card loaded with the Cisco IOS is installed in the BTS router (refer to the BTS Router Card and Module Replacement section of the *1X SC 4812T BTS FRU Guide* 68P09258A64 for instructions to access the CF memory card slot).
2	*** IMPORTANT** In this step *do not touch the computer keyboard until the router completes the boot process*. The router will buffer any keystrokes made during the boot process and interpret them as commands to be executed immediately following boot completion. Apply power to the router and allow it to complete boot–up.
3	If a message similar to the following, is displayed, press the **Enter** key and proceed to step 5: `Press RETURN to get started!`

	Table J-6: BTS Router Power−up and Initial Ethernet Configuration	
Step	**Action**	

4	If a message similar to the following, is displayed type **no** and press the **Enter** key:
	
	``Basic management setup configures only enough connectivity
	for management of the system, extended setup will ask you
	to configure each interface on the system
	
	Would you like to enter basic management setup? [yes/no]:```
	A response similar to the following will be displayed:
	
	``Would you like to enter basic management setup? [yes/no]: no
	
	Cisco Internetwork Operating System Software
	IOS (tm) 1941 Software (MWR1941−I−M), Version 12.2(20020127:101239
	Copyright (c) 1986−2002 by cisco Systems, Inc.
	Compiled Sun 27−Jan−02 06:08 by walrobin
	
	Router>```	

5	At the `Router>` *user* EXEC mode prompt, enter the following to access the *privileged* EXEC mode: **enable** A response similar to the following will be displayed: ```Router>enable Router#```	
6	At the `Router#` *privileged* EXEC mode prompt, enter the following to access the *configure submode*: **conf**igure **te**rminal A response similar to the following will be displayed: ```Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#``` The router is now in the *global configuration* mode and ready to accept configuration changes entered from the keyboard.	

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Table J-6: BTS Router Power–up and Initial Ethernet Configuration	
Step	**Action**
| 7 | At the global configuration mode prompt, type each of the following commands, pressing the **Enter** key after each command:<br><br>**hostname  btsrtr1**<br>**int**erface **fa0/0**<br>**ip  address  100.100.100.2  255.255.255.252**<br>**speed  100**<br>**duplex  full**<br>**no  shutdown**<br>**line  con  0**<br>**exec–timeout  0  0**<br>**no  login**<br>**line  vty  0  4**<br>**no login**<br><br>Responses similar to the following will be displayed:<br><br>```
Router(config)#hostname BTSRTR1
BTSRTR1(config)#interface fa0/0
BTSRTR1(config–if)#ip address 100.100.100.2 255.255.255.252
BTSRTR1(config–if)#speed 100
BTSRTR1(config–if)#duplex full
BTSRTR1(config–if)#no shutdown
BTSRTR1(config–if)#line con 0
BTSRTR1(config–line)#exec–timeout 0 0
BTSRTR1(config–line)#no login
BTSRTR1(config–line)#line vty 0 4
BTSRTR1(config–line)#no login
BTSRTR1(config–line)#
``` |
| 8 | Once the correct parameters have been set, return to the privileged EXEC mode prompt by holding down the **Ctrl** key and pressing **z** (**Ctrl+z**). A response similar to the following will be displayed:<br><br>```
BTSRTR1(config–line)# ^z
01:11:27: %SYS–5–CONFIG_I: Configured from console by console
BTSRTR1#
```<br><br>**NOTE**<br>Entering **exit** twice, pressing the **Enter** key after each entry, will also complete the configuration process and return the router to the privileged EXEC mode. |
| 9 | Verify  port FE 0 (fa0/0) is configured with the correct IP address by entering the following:<br><br>**sh**ow **ip int**erface **br**ief<br><br>A response similar to the following will be displayed:<br><br>```
BTSRTR1#sh ip int br
Interface       IP Address   OK?  Method  Status                  Protocol
FastEthernet0/0 100.100.100.2 YES  manual  up                      up
Serial0:0       unassigned   YES  unset   administratively down   down
FastEthernet0/1 unassigned   YES  unset   administratively down   down
Serial1:0       unassigned   YES  unset   administratively down   down

BTSRTR1#
``` |
| 10 | The router is now configured for Ethernet communication on FE 0, and the canned configuration file can be transferred by tftp. Proceed to Table J-7. |

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Verifying IOS Version and Canned Configuration File TFTP Transfer to the BTS Router

Prerequisites – The following is required prior to performing this procedure:

- A copy of the required MWR 1941 router IOS version file is installed in the default tftp directory (transfer the file to the LMF computer using FTP, internet download, or media such as a Zip disk; file size is approximately 7–8 MB)

IOS verification and canned configuration file transfer – Follow the procedure in Table J-7 to verify the loaded IOS version and transfer the canned configuration files from the LMF computer to the BTS router CF memory card.

NOTE	**IMPORTANT:** MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.

NOTE	This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.

Table J-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
CAUTION If personal firewall and/or intrusion detection software such as Black ICE is running on the LMF computer, shut it down before performing this procedure. If this is not done, the tftp transfer process will not operate.	
1	On the LMF computer, if it has not been done, start the tftp server according to the manufacturer's directions (refer to the Setting Up the TFTP Server – Procedure in the *Cellular System Administration – CDMA OnLine Documentation*). *** IMPORTANT** MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.
2	If a HyperTerminal communication session with the BTS router is not running, start one following the procedure in Table J-2.
3	In the HyperTerminal window, the router must be in the *privileged* EXEC mode, as indicated by a number sign at the end of the prompt: `BTSRTR1#`
4	Be sure the Ethernet crossover cable is connected between the LMF computer NIC port and the BTS router FE 0 port (see Figure J-4).

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Table J-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
5	Begin verification that the CF memory card contains the correct version of the Cisco IOS by entering the following:

    dir slot0:

A response similar to the following will be displayed:

```
BTSRTR1#dir slot0:
Directory of slot0:/

  1  –rw–  7051976   Mar 01 1993 00:11:34  mwr1941–i–mz.122–8.MC2a.bin

31932416 bytes total (24879104 bytes free)
BTSRTR1#
```

NOTE

1. The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting.

2. If slot0: is included in the command, be sure to include the colon (**:**) after **slot0** when typing the command.

3. The IOS filename will be similar to the following:

    mwr1941–i–mz.122–8.MC2a.bin

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Table J-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
6	Direct the router to show the version information by entering the following: **sh**ow **ver**sion A response similar to the following will be displayed: ``` BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941−I−M), Version 12.2(8)MC2a, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1) TAC Support: http://www.cisco.com/tac Copyright (c) 1986−2002 by cisco Systems, Inc. Compiled Mon 05−Aug−02 11:07 by nmasa Image text−base: 0x60008940, data−base: 0x60B54000 ROM: System Bootstrap, Version 12.2(20020113:235343) [sbose−wilma 109], DEVELOPMENT SOFTWARE ROM: 1941 Software (MWR1941−I−M), Version 12.2(8)MC2a, EARLY DEPLOYMENT RELEASE SOFT- WARE (fc1) Router uptime is 1 minute System returned to ROM by power−on System image file is "slot0:mwr1941−i−mz.122−8.MC2a.bin" cisco mwr1941 (R7000) processor (revision 0.1) with 121856K/18432K bytes of memory. Processor board ID JMX0611K5TS R7000 CPU at 240Mhz, Implementation 39, Rev 3.3, 256KB L2 Cache Bridging software. X.25 software, Version 3.0.0. Primary Rate ISDN software, Version 1.1. Toaster processor tmc is running. 2 FastEthernet/IEEE 802.3 interface(s) 2 Serial network interface(s) 2 Channelized T1/PRI port(s) DRAM configuration is 64 bits wide with parity disabled. 55K bytes of non−volatile configuration memory. 31360K bytes of ATA Slot0 CompactFlash (Read/Write) Configuration register is 0x101 BTSRTR1# ```
7	Compare the IOS filename returned in step 5 and the second line of the version information in step 6. Note the correspondence between the filename and IOS version information.
8	If the IOS filename from the CF memory card returned in step 5 is different than the filename of the required IOS version loaded in the LMF computer default tftp directory, perform the procedure in Table J-13 to load the required version, and then return to step 9, below.

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Table J-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	

Step	Action
	CAUTION The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.
9	If the IOS version is correct and there is more than one file loaded on the CF memory card, be sure the *IOS file is the first file listed* in the directory content display. If it is not, perform the following:
9a	– Backup all files on the CF memory card to the LMF computer default tftp directory by performing steps 3 through 10 of Table J-13.
9b	– Perform steps 25 through 29 of Table J-13, as applicable.
9c	– Type the following to delete a possible boot system line in the startup–config file, pressing the **Enter** key after the command and at each prompt to confirm the filename and deletion operation: **del nvram:startup–config** A response similar to the following will be displayed: ``` BTSRTR1#del nvram:startup−config Delete filename [startup−config]? Delete nvram:startup−config? [confirm] [OK] BTSRTR1# ``` **NOTE** Be sure to include the colon (**:**) after **nvram** when typing the command.

9d	– Verify the startup–config file size has been reduced to a minimum by entering the following:
	
	     dir nvram:
	
	A response similar to the following will be displayed:
	
	``
	Router#dir nvram:
	Directory of nvram:/
	
	   53 −rw− 5 <no date> startup−config
	   54 −−−− 5 <no date> private−config
	
	57336 bytes total (57274 bytes free)
	BTSRTR1#
	``

10	At the *privileged* EXEC mode prompt, enter the following: **copy tftp:btsrtr_canned.***color* **slot0:canned–config** Where *color* = **blue** or **red**, as applicable. A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned−config Address or name of remote host []? ```

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Table J-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

Step	Action
11	At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC: **100.100.100.1** A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned–config Address or name of remote host []? 100.100.100.1 Destination filename [canned–config]? ```
12	At the prompt for the destination filename, press the **Enter** key. A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned–config Address or name of remote host []? 100.100.100.1 Destination filename [canned–config]? Loading btsrtr_canned.blue from 100.100.100.1 (via Ethernet0/0): ! [OK – 2457/4096 bytes] 2457 bytes copied in 84.724 secs (29 bytes/sec) BTSRTR1# ```
13	Verify that the canned configuration file is saved on the CF memory card by entering **dir** command. A response similar to the following will be displayed: ``` Directory of slot0:/ 1 –rw– 7051976 Mar 01 1993 00:11:34 mwr1941–i–mz.122–8.MC2a.bin 2 –rw– 2457 Mar 01 1993 00:14:48 canned–config 31932416 bytes total (24877983 bytes free) BTSRTR1# ```
14	To allow the BTS router to boot using the canned configuration, enter the following: **copy canned–config start**up–config A response similar to the following will be displayed: ``` BTSRTR1#copy canned–config start Destination filename [startup–config]? ```
15	When prompted for the destination file name, press the **Enter** key. A response similar to the following will be displayed: ``` BTSRTR1#copy canned–config start Destination filename [startup–config]? 2457 bytes copied in 3.52 secs BTSRTR1# ```
16	Display and note the file size of startup–config by entering the following: **dir nvram:** A response similar to the following will be displayed: ``` Directory of nvram:/ 26 –rw– 2457 <no date> startup–config 27 –––– 5 <no date> private–config 29688 bytes total (24774 bytes free) BTSRTR1# ```

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Table J-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
17	Scroll the HyperTerminal window back to the slot0: directory display obtained in step 13, above.
18	Compare the file size of startup–config to the canned configuration file to verify the copy operation. File sizes should be the same.
19	If desired, the contents of the startup–config file may be verified against the file listings at the end of this appendix for the blue or red canned configuration, as applicable, by entering the following: **sh**ow **start**up–config **NOTE** Pressing the space bar at the MORE prompt will scroll another screen–full of data. Pressing the Enter key will scroll the screen one line at a time.

20	Verify the router will boot properly on the IOS and revised startup–config files by entering the following:
	
	    reload
	
	A response similar to the following will be displayed:
	
	`BTSRTR1#reload`
	
	`System configuration has been modified. Save? [yes/no]: n`
	`Proceed with reload? [confirm]`

21	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
22	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
23	Verify the router reboots without displaying the rommon 1 > prompt or error messages related to port configurations. If the router boots to the rommon prompt, proceed to the Recovery from BTS Router Boot to rommon section of this appendix.
24	Using the tagging materials, tag the router to clearly identify the installed configuration (blue (BTSRTR1) or red (BTSRTR2)).
25	Remove the CF memory from the router following the procedure in the *1X SC 4812T BTS FRU Guide* , mark the installed configuration (blue or red) on the card label, and install the card in the router following the procedure in the FRU Guide.
26	If an additional router must have the canned configuration installed, perform the following:
26a	– Disconnect the cabling from the BTS router.
26b	– Remove power from the router and disconnect it from the power supply.
26c	– Repeat the procedures in Table J-5, Table J-6, and this table (Table J-7) using the additional router.
27	If no additional routers must be configured, perform steps 26a and 26b.
28	On the LMF computer, shut down the tftp server application and exit the HyperTerminal session.
29	If no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table J-4, step 9b. **CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

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Method 2: Using a CF Memory Card Reader to Load CF Memory Card

Required Equipment and Software

The following items are required to perform this procedure:

- A *Windows*–based computer which meets the requirements of the LMF computer platform as specified in *this manual*.
- One of the following operating systems for the *Windows*–based computer:
  - *Windows* 2000
  - *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION	BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

- Compact Flash memory card *reader* device and software driver for the operating system installed on the LMF computer

CAUTION	Card readers for other non–volatile, solid–state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. Do not attempt to use a card reader intended for another type of memory device.

- Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix
- DB–9 plug–to–8–contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix
- A copy of the MWR 1941 router IOS version required for the network where the routers are to be installed (contact the network administrator and the Motorola account team for information on obtaining the required MWR 1941 IOS version)
- A +27 Vdc power supply to power the BTS router during configuration file operations

Required Materials

The following material is required to perform this method:

- Tagging and marking material to identify the BTS router and CF memory card with the installed configuration (blue or red)

Required Publications

The following publications are required to perform procedures in this section:

- *Cellular System Administration – CDMA OnLine Documentation*
- *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

File Operations Using a CF Memory Card Reader

Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router*

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using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*–based computer using a card reader could result in unpredictable BTS router operation.

CAUTION	Do not format BTS router CF memory cards using a *Windows*–based computer. Only format CF memory cards in a BTS router.

Verifying IOS Version and Loading BTS Router Canned Configuration File to CF Memory Card Using a CF Memory Card Reader

The process of transferring a canned configuration file to a BTS router using a CF memory card reader consists of the following activities:

1. Transfer the canned configuration file to the router's CF memory card using a CF memory card reader

2. Copy the file from the CF memory card to the router's `startup–config` file

The following procedures are used to accomplish these actions.

Prerequisites

The following is required prior to performing this procedure:

- A copy of the required MWR 1941 router IOS version file is installed in the default tftp directory (transfer the file to the LMF computer using FTP, internet download, or media such as a Zip disk; file size is approximately 7–8 MB)

Verifying IOS version and transferring canned configuration file to the router's CF memory card

NOTE	**IMPORTANT:** MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.

Transfer canned configuration files from the LMF computer to a BTS router CF memory card by following the procedure in Table J-8.

Table J-8: Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader	
Step	**Action**
* IMPORTANT	This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	If it has not been done, install a CF memory card loaded with the IOS in the BTS router by following the procedure in the *1X SC 4812T BTS FRU Guide* . *** IMPORTANT** MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.

Table J-8: Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader

Step	Action
2	Connect the LMF computer to the BTS router and start a HyperTerminal communication session with the router by following the procedure in Table J-2.
3	If it has not been done, be sure the +27 Vdc power supply output is **OFF**, and connect the BTS router to the +27 Vdc power supply.
4	*** IMPORTANT** In this step *do not touch the computer keyboard until the router completes the boot process*. The router will buffer any keystrokes made during the boot process and interpret them as commands to be executed immediately following boot completion. Apply power to the router and allow it to complete boot–up.
5	If a message similar to the following, is displayed, press the **Enter** key and proceed to step 7: `Press RETURN to get started!`

6	If a message similar to the following, is displayed type **no** and press the **Enter** key:
	
	`Basic management setup configures only enough connectivity`
	`for management of the system, extended setup will ask you`
	`to configure each interface on the system`
	
	`Would you like to enter basic management setup? [yes/no]:`
	A response similar to the following will be displayed:
	
	`Would you like to enter basic management setup? [yes/no]: no`
	
	`Cisco Internetwork Operating System Software`
	`IOS (tm) 1941 Software (MWR1941—I—M), Version 12.2(20020127:101239`
	`Copyright (c) 1986—2002 by cisco Systems, Inc.`
	`Compiled Sun 27—Jan—02 06:08 by walrobin`
	
	`Router>`

7	**CAUTION** Use only a card reader specifically designed for CF memory cards to perform this procedure. Card readers for other non–volatile, solid–state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. If it has not been done, follow the CF memory card reader manufacturer's instructions to load the CF memory card driver application for the operating system being used onto the LMF computer.
8	Connect the CF memory card reader to the LMF computer following the card reader manufacturer's instructions.
9	Remove the CF memory card from the BTS router by following the procedure in the *1X SC 4812T BTS FRU Guide*
10	Insert the CF memory card into the card reader as specified by the card reader manufacturer's instructions.
11	On the LMF computer, click **Start > Programs > Windows Explorer** to open *Windows* Explorer.

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Step	Action
	Table J-8: Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader
12	**NOTE**
	The CF memory card reader will appear as a disk drive in *Windows* Explorer with a disk drive letter and icon.
	Scroll the *left*–hand pane of *Windows* Explorer to locate the icon for the CF memory card.
13	Verify that the CF memory card contains the required version of the IOS by performing the following:
13a	– In the left–hand pane of *Windows*Explorer, highlight the CF memory card icon.
13b	– In the right–hand pane, note the IOS filename loaded on the card, and record it.
	NOTE
	The IOS filename will be similar to **mwr1941–i–mz.122–8.MC2a.bin**.
14	Scroll the *left*–hand pane of *Windows* Explorer to locate the icon for the directory where the canned configuration files downloaded from the OMC–R and required IOS version are stored.
15	In the *left*–hand pane, highlight the directory where the files are stored.
16	In the the *right*–hand pane, locate the filename of the required IOS version and compare it to the filename recorded in step 13b, above.
17	If filenames are different, proceed to Table J-11 to replace the IOS on the CF memory card and return to step 18, below.
18	In the *right*–hand pane, highlight the canned configuration file to be transferred to the CF memory card and drag it to the CF memory card disk drive icon.
19	Verify the canned configuration file has been copied to the CF memory card by clicking on the CF memory card disk drive icon in the *left*–hand pane, and verifying that the canned configuration file appears in the in the *right*–hand pane.
	NOTE
	Do not be concerned if the canned configuration file appears before the IOS file in the file sequence displayed by *Windows* Explorer. The position of the IOS file in the sequence of files on the CF memory card can not be verified until the CF memory card is installed in the BTS router.
20	With the CF memory card disk drive icon still selected, change the name of the canned configuration file on the card to **canned–config** by doing the following:
20a	– In the *right*–hand pane of *Windows* Explorer, click on the canned configuration filename.
	— The filename will be highlighted.
20b	– Wait approximately two seconds, and then click on the canned configuration file filename again.
	— A hair–line rectangle will appear around the highlighted filename.
20c	– After the rectangle appears around the highlighted filename, type the following:
	canned–config
20d	– Press the **Enter** key or click on the canned configuration file *icon*.
	— The rectangle around the canned configuration filename will disappear and the filename will remain highlighted.
21	Click **Files > Close** to close *Windows* Explorer.

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Table J-8: Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader	
Step	**Action**
22	Remove the CF memory card with the IOS version and canned configuration file from the card reader, and mark the card label with the canned configuration (blue or red) copied to it.
23	Install the CF memory card in the BTS router by following the procedure in the *1X SC 4812T BTS FRU Guide* .
24	Proceed to Table J-9 to copy the canned configuration from the CF memory card to the BTS router's startup−config file.

Copy Canned Configuration File from the CF Memory Card to the BTS Router's Startup Configuration and verify IOS file sequence

To allow the BTS router to automatically boot using the canned configuration, the configuration must be copied to the the router's startup−config file in NVRAM. Follow the procedure in Table J-9 to accomplish this.

Table J-9: Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File Position	
Step	**Action**
* IMPORTANT This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.	
1	If it has not been done, install the CF memory card with the canned configuration and required IOS version in the BTS router by following the procedure in the *1X SC 4812T BTS FRU Guide* .
2	At this point, the router should be powered up and displaying the Router> prompt in the HyperTerminal window of the LMF computer communication session. If it is not, perform steps 1 through 6 of Table J-8.

3	At the Router> *user* EXEC mode prompt, enter the following to access the *privileged* EXEC mode:
	enable
	A response similar to the following will be displayed:
	
	`Router>enable`
	`Router#`

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Step	Action
	Table J-9: Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File Position
4	**NOTE**
	The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting.
	Display the directory listing of the CF memory card by entering the following:
	dir
	A response similar to the following will be displayed:
	``` Router#dir slot0: Directory of slot0:/ 1 −rw− 7051976 Sep 23 2002 07:24:18 mwr1941−i−mz.122−8.MC2a.bin 2 −rw− 2212 Mar 01 1993 00:14:48 canned−config 31932416 bytes total (24885606 bytes free) Router# ```
5	Be sure the *IOS file is the first file listed* in the directory content display. If it is not, perform the procedure in Table J-12, and then return to step 6, below.
6	Copy the canned configuration to the BTS router's startup configuration file by entering the following:
	copy slot0:canned−config startup−config
	A response similar to the following will be displayed:
	``` Router#copy slot0:canned−config start Destination filename [startup−config]? ```
7	When prompted for the destination file name, press the **Enter** key. A response similar to the following will be displayed:
	``` Router#copy slot0:canned−config start Destination filename [startup−config]? 2218 bytes copied in 3.52 secs Router1# ```
8	Check the file size of the startup−config to verify the copy operation by entering the following:
	dir nvram:
	A response similar to the following will be displayed:
	``` Directory of nvram:/ 26 −rw− 2218 <no date> startup−config 27 −−−− 5 <no date> private−config 29688 bytes total (25247 bytes free) Router# ```
	NOTE
	Be sure to include the colon (**:**) after **nvram** when typing the command.

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Step	Action
	Table J-9: Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File Position
9	If desired, the contents of the startup–config file may be verified against the file listings at the end of this appendix for the blue or red canned configuration, as applicable, by entering the following: **show start**up–config **NOTE** Pressing the space bar at the MORE prompt will scroll another screen–full of data. Pressing the Enter key will scroll the screen one line at a time.

10	Verify the router will boot properly on the IOS and revised startup–config files by entering the following:
	
	    reload
	
	A response similar to the following will be displayed:
	
	`Router#reload`
	
	`System configuration has been modified. Save? [yes/no]: n`
	`Proceed with reload? [confirm]`

11	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
12	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
13	Verify the router reboots without displaying the rommon 1 > prompt or error messages related to port configurations. If the router boots to the rommon prompt, proceed to the Recovery from BTS Router Boot to rommon section of this appendix.
14	Using the tagging materials, tag the router to clearly identify the installed configuration (blue (BTSRTR1) or red (BTSRTR2)).
15	If an additional router must have the canned configuration installed, perform the following:
15a	– Disconnect the cabling for the HyperTerminal communications session from the BTS router, and minimize the HyperTerminal window on the LMF computer.
15b	– Remove power from the router and disconnect it from the power supply.
15c	– Repeat the procedures in Table J-8 and this table (Table J-9) using the additional router.
16	If no additional routers must be configured, perform steps 15a and 15b.
17	On the LMF computer, exit the HyperTerminal session.

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Replacing Installed BTS Router CF Memory Card IOS Version

Background

BTS routers are supplied with CF memory cards pre–loaded with a version of the IOS. Prior to installing the routers in a BTS, the loaded IOS version should be verified as being the one required for the network. It is critical to also verify that the IOS file is the *first file on the CF memory card*. If another file precedes the IOS file, the BTS router will not boot properly and will not function in the network.

Equipment and Software Required for Verification Methods

The following items are required to perform this procedure:

- A *Windows*–based computer which meets the requirements of the LMF computer platform as specified in Chapter 3 of this manual:

- One of the following operating systems for the *Windows*–based computer:

  – *Windows* 2000

  – *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION	BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

- Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix

- DB–9 plug–to–8–contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix

- A copy of the MWR 1941 router IOS version required for the network where the routers are to be installed

NOTE	Contact the network administrator or the Motorola Account Team for assistance in determining and obtaining a copy of the required IOS version.

- The MWR 1941 will accept a voltage from –60 Vdc to + 60 Vdc during configuration and file operations

Required Publications

The following publication is required to perform procedures in this section:

- *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

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Method 1: Replacement of Installed Router CF Card IOS Data

Description

This procedure covers using an LMF computer equipped with a tftp server application to perform the following activities:

1. Verify the IOS version loaded on a CF memory card and running on a BTS router

2. Replace the IOS version installed in a BTS router

3. Ensure the IOS file *is the first file on the CF memory card*

Additional required equipment/software

For this method, the following software application is required in addition to the common items required for both methods:

- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8–contact modular plugs, in one of the following lengths, as determined necessary:
  – 0.3 m (11.8 in) (Motorola pn 3088643C07)
  – 0.6 m (23.6 in)(Motorola pn 3088643C13)
  – 1.0 m (39.4 in) (Motorola pn 3088643C15)
  – 2.1 m (84 in) (Motorola pn 3088643C08)
  – 3.0 m (120 in) (Motorola pn 3088643C09)

- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation*) such as:
  – Cisco tftp server
  – PumpKIN tftp server
  – Any other equivalent tftp server application

Prerequisites

The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for tftp file transfer and are operating as they would be after performing the procedures in Table J-4, Table J-5, Table J-6, and steps 1 through 8 of Table J-7

- A copy of the required IOS version is loaded into the tftp default directory of the LMF computer

Replacing installed IOS version and verifying file sequence position

Follow the procedure in Table J-10 to replace the installed IOS version using the tftp server application, and ensure the IOS file is first in the stored file sequence on the CF memory card.

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Table J-10: Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position	
Step	**Action**
	* IMPORTANT This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in Table J-4, Table J-5, Table J-6, and steps 1 through 8 of Table J-7. If necessary, perform these procedures now.

2	**NOTE**
	The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting.
	
	Identify the filename of the currently loaded IOS which must be replaced by entering **dir** command. A response similar to the following will be displayed:
	
	<pre>BTSRTR1#dir
	Directory of slot0:/
	
	    1 −rw− 7051844 Sep 23 2002 07:15:08 mwr1941−i−mz.07022002.bin
	    2 −rw− 2212 Mar 01 1993 00:11:00 canned−config
	
	31932416 bytes total (24878360 bytes free)
	BTSRTR1#</pre>

3	Begin to backup the currently installed version of the router's IOS to the LMF computer's default tftp directory by entering the following:
	
	    copy *old_IOS_filename* **tftp:**
	
	Where *old_IOS_filename* = the filename of the IOS currently loaded on the BTS router CF memory card.
	
	A response similar to the following will be displayed:
	
	<pre>BTSRTR1#copy mwr1941−i−mz.07022002.bin tftp:
	Address or name of remote host []?</pre>

4	At the remote host prompt, enter the following:
	
	    100.100.100.1
	
	A response similar to the following will be displayed:
	
	<pre>Address or name of remote host []? 100.100.100.1
	Destination filename [mwr1941−i−mz.07022002.bin]?</pre>

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Table J-10: Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position	
Step	**Action**

5	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected:
	
	 ```Address or name of remote host []? 100.100.100.1```
	```Destination filename [mwr1941−i−mz.07022002.bin]?```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!!```
	```7051844 bytes copied in 109.92 secs (64697 bytes/sec)```
	```BTSRTR1#```

6	If additional files are stored on the CF memory card, begin backing them up to the LMF computer's default tftp directory by entering the following:
	
	     copy *additional_filename* **tftp:**
	
	 Where *additional_filename* = the filename of an additional file loaded on the BTS router CF memory card.
	
	 A response similar to the following will be displayed:
	
	 ```BTSRTR1#copy canned−config tftp:```
	```Address or name of remote host [100.100.100.1]?```

7	If the default IP address displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer. A response similar to the following will be displayed if the default filename is selected:
	
	 ```Address or name of remote host [100.100.100.1]?```
	```Source filename [canned−config]?```

8	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected:
	
	 ```Source filename [canned−config]?```
	```Destination filename [canned−config]?```

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Table J-10: Using a TFTP Server Application for Replacing Loaded
IOS Version and Verifying File Sequence Position

Step	Action
9	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed: ``` Destination filename [canned−config]? ! [OK − 2212/4096 bytes] 2212 bytes copied in 0.152 secs BTSRTR1# ```
10	If more files are stored on the CF memory card, repeat steps 6 through 9 until all files have been backed up to the LMF computer.
11	Delete *all* files from the CF memory card by entering the following command: **format slot0:** A response similar to the following will be displayed: ``` BTSRTR1#format slot0: Format operation may take a while. Continue? [confirm] ```
12	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: ``` Format operation may take a while. Continue? [confirm] Format operation will destroy all data in "slot0:". Continue? [confirm] ```
13	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: ``` Format operation will destroy all data in "slot0:". Continue? [confirm] Format: Drive communication & 1st Sector Write OK... Writing Monlib sectors... .... Monlib write complete . Format: All system sectors written. OK... Format: Total sectors in formatted partition: 62560 Format: Total bytes in formatted partition: 32030720 Format: Operation completed successfully. Format of slot0 complete BTSRTR1# ```
14	Verify all files have been deleted from the CF memory card by entering the **dir** command. A response similar to the following will be displayed: ``` Directory of slot0:/ No files in directory 31932416 bytes total (31932416 bytes free) BTSRTR1# ```

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	Table J-10: Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position
Step	**Action**
15	Begin to copy the required version of the IOS from the LMF computer to the BTS router by entering the following: **copy tftp:***new_IOS_filename* **slot0:** Where *new_IOS_filename* = the filename of the required IOS for the BTS router. A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:mwr1941−i−mz.122−8.MC2a.bin slot0: Address or name of remote host [100.100.100.1]? ```
16	If the default IP address displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer. A response similar to the following will be displayed if the default filename is selected: ``` Address or name of remote host [100.100.100.1]? Source filename [mwr1941−i−mz.122−8.MC2a.bin]? ```
17	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: ``` Source filename [mwr1941−i−mz.122−8.MC2a.bin]? Destination filename [mwr1941−i−mz.122−8.MC2a.bin]? ```
18	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: ``` Destination filename [mwr1941−i−mz.122−8.MC2a.bin]? Accessing tftp://100.100.100.1/mwr1941−i−mz.122−8.MC2a.bin... Loading mwr1941−i−mz.122−8.MC2a.bin from 100.100.100.1 (via FastEthernet0/0): !!!! Loading mwr1941−i−mz.122−8.MC2a.bin from 100.100.100.1 (via FastEthernet0/0): !!! !!! !!! !!! !!! !!! !!! !!! !!! !!! !!! !!! !!! !!! !!! !! [OK − 7051976/14103552 bytes] 7051976 bytes copied in 145.108 secs (48634 bytes/sec) BTSRTR1# ```

Table J-10: Using a TFTP Server Application for Replacing Loaded
IOS Version and Verifying File Sequence Position

Step	Action
19	Display the CF memory card directory to verify that the new IOS file is there by entering the **dir** command. A response similar to the following will be displayed: ``` BTSRTR1#dir Directory of slot0:/ 1 —rw— 7051976 Sep 23 2002 07:25:36 mwr1941—i—mz.122—8.MC2a.bin 31932416 bytes total (24880440 bytes free) BTSRTR1# ```
20	If any additional files previously stored on the CF memory card are to be copied to the card, perform the following: **copy tftp:***filename* **slot0:** Where *filename* = the filename of the file to be copied to the CF memory card A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:canned—config slot0: Address or name of remote host [100.100.100.1]? ```
21	If the default IP address displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer. A response similar to the following will be displayed if the default IP address is selected: ``` Address or name of remote host [100.100.100.1]? Destination filename [canned—config]? ```
22	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: ``` Destination filename [canned—config]? Accessing tftp://100.100.100.1/canned—config... Loading basic_config from 100.100.100.1 (via FastEthernet0/0): ! [OK — 2212/4096 bytes] 2212 bytes copied in 0.152 secs BTSRTR1# ```
23	After the additional file is copied to the CF memory card, display the CF memory card directory by entering the **dir** command. A response similar to the following will be displayed: ``` BTSRTR1#dir Directory of slot0:/ 1 —rw— 7051976 Sep 23 2002 07:24:18 mwr1941—i—mz.122—8.MC2a.bin 2 —rw— 2212 Mar 01 1993 00:09:06 canned—config ```
24	The IOS file *must be the first file listed* for the BTS router to boot properly. If it is, proceed to step 29.

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Step	Action
	Table J-10: Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position
	CAUTION The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.
25	If another file is listed before the IOS file, delete the file by performing steps 11 through 13 and display the directory of the CF memory card as described in step 23 to be sure the file is deleted.
26	Copy the file from the LMF computer to the CF memory card again by performing steps 20 through 23.
27	If the file is again listed before the IOS file in the CF memory card directory display, format the CF memory card by performing steps 11 through 14 of this table.
28	Copy the IOS file and any other required file to the formatted CF memory card by performing steps 15 through 24.
29	If additional files are to be transferred to the CF memory card, perform steps 20 through 24 for each one.
30	After making sure the IOS file *is the first file on the CF memory card*, restart the BTS router with the new IOS version by entering the following: **reload** A response similar to the following will be displayed: ``` BTSRTR1#reload System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm] ```
31	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
32	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
33	Once the router has completed rebooting, change to the privileged EXEC mode and confirm the booted IOS version is correct by entering the following: **sh**ow **ver**sion A response similar to the following partial example will be displayed: ``` BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941−I−M), Version 12.2(8)MC2a, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1) . . . BTSRTR1# ```
34	Verify the version number displayed in the second line of the version information is the correct IOS version.
35	If this procedure was entered from step 8 of Table J-7, return to Table J-7, step 9.

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Step	Action
	Table J-10: Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position
36	If no other BTS router file operations or configuration actions are required, perform the following:
36a	– Remove power from the router and disconnect it from the power supply.
36b	– Disconnect all other cabling from the BTS router.
36c	– On the LMF computer, exit the HyperTerminal communications session.
37	If no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table J-4, step 9b. **CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

Method 2: Using a CF Memory Card Reader for Replacement of Installed IOS Version and Changing File Sequence Position

This subsection contains the file replacement and file sequence manipulation procedures to use when transferring files with a CF memory card reader.

Replace IOS Version Installed on the CF Memory Card

Description – This procedure covers using an LMF computer equipped with a CF memory card reader to perform the following activities:

1. Verify the IOS version loaded on a CF memory card and running on a BTS router
2. Replace the IOS version installed in a BTS router
3. Ensure the IOS file *is the first file on the CF memory card*

Additional required equipment/software – For this method, the following equipment item and associated software is required in addition to the common items required for both methods:

• Compact Flash memory card *reader* device and software driver for the operating system installed on the LMF computer

CAUTION	Card readers for other non–volatile, solid–state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. Do not attempt to use a card reader intended for another type of memory device.

Prerequisites – The following are required prior to performing this procedure:

• The LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in steps 1 through 8 of Table J-8

• A copy of the required IOS version is loaded into the desired directory of the LMF computer

File operations using a CF memory card reader – Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router* using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*–based computer using a card reader could result in unpredictable BTS router operation.

CAUTION	Do not format BTS router CF memory cards using a *Windows*–based computer. Only format CF memory cards in a BTS router.

Replacing installed IOS version – Follow the procedure in Table J-11 to replace the installed IOS version using a CF memory card reader and to ensure the IOS file is first in the stored file sequence on the CF memory card.

Table J-11: Using a CF Memory Card Reader for Replacing Loaded IOS Version and Verifying File Sequence Position	
Step	**Action**
* IMPORTANT		

* IMPORTANT

This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.

Step	Action
1	This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in steps 1 through 17 of Table J-8. If necessary, perform these procedures now.
2	With the CF memory card in the CF memory card reader and the card reader icon highlighted in the left–hand pane of *Windows* Explorer, perform the following to delete the IOS file from the card:
2a	– In the right–hand pane of *Windows* Explorer, highlight the IOS file to be removed.
2b	– Right–click and select **Delete** from the popup menu.
3	**CAUTION** When performing the following step and its associated substeps, files should be moved to and from the CF memory card one by one to reduce the potential for disrupting the the CF memory card file sequence. Do not attempt to move multiple files by highlighting and dragging and dropping all of them at one time. If there are more files on the CF memory card which must be retained, perform the following:
3a	– Scroll the left–hand pane of *Windows* Explorer to locate the LMF computer directory where the required IOS version and canned configuration files are stored.
3b	– In the right–hand pane, highlight the additional file on the CF memory card which is to be retained.
3c	– While holding down the **Ctrl** key on the LMF computer, drag and drop the highlighted file into the directory in the left–hand pane where the required IOS and canned config files are stored.
3d	– If additional files loaded on the CF memory card must be retained, repeat steps 3b and 3c for each file until all files have been moved from the CF memory card to the directory on the LMF computer.

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	Table J-11: Using a CF Memory Card Reader for Replacing Loaded IOS Version and Verifying File Sequence Position
Step	**Action**
4	When all files on the CF memory card have been deleted or moved, as applicable, highlight the directory in the left–hand pane where the required IOS version and canned configuration files are stored.
5	Verify that all files from the CF memory card which must be retained were moved to the directory by checking the filenames in the right–hand pane.
6	Scroll the left–hand pane of *Windows* Explorer to locate the CF memory card reader icon.
7	In the right–hand pane, highlight the icon for the required version of the IOS.
8	Drag and drop the IOS icon to the CF memory card reader icon to copy it to the CF memory card.
9	If an additional file in the LMF computer directory must be *moved* to the CF memory card, perform the following:
9a	– In the right–hand pane, highlight *one* additional file which is to be *moved* to the CF memory card.
9b	– While holding down the **Ctrl** key on the LMF computer, drag and drop the highlighted file into the CF memory card reader directory in the left–hand pane.
9c	– If additional files in the directory must be placed on the CF memory card, repeat steps 9a and 9b for each file until all files have been moved *one at a time* from the LMF computer to the CF memory card.
10	In the left–hand pane, highlight the CF memory card reader icon.
11	Verify that all required files were moved to the CF memory card by checking the filenames in the right–hand pane.
12	Scroll the left–hand pane of *Windows* Explorer to locate the LMF computer directory where the required IOS version and canned configuration files are stored.
13	Highlight the directory in the left–hand pane.
14	If this procedure was entered from step 17 of Table J-8, return to Table J-8, step 18.
15	If no other file transfer activities between the LMF computer and CF memory card are required at this time, click **Files > Close** to close *Windows* Explorer.
16	Remove the CF memory card from the card reader and install it in the BTS router by following the procedure in the *1X SC 4812T BTS FRU Guide* .
17	At this point, the router should be powered up and displaying the user EXEC prompt in the HyperTerminal window of the LMF computer communication session. If it is not, perform steps 1 through 6 of Table J-8.

18	At the `Router>` *user* EXEC mode prompt, enter the following to access the *privileged* EXEC mode:
	    enable
	
	A response similar to the following will be displayed:
	
	`Router>enable`
	`Router#`

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Table J-11: Using a CF Memory Card Reader for Replacing
Loaded IOS Version and Verifying File Sequence Position

Step	Action
	NOTE The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting.

19	Display the directory listing of the CF memory card by entering the following:
	    dir
	
	A response similar to the following will be displayed:
	
	<pre>Router#dir slot0:
	Directory of slot0:/
	
	    1 –rw– 7051976 Sep 23 2002 07:24:18 mwr1941–i–mz.122–8.MC2a.bin
	    2 –rw– 2212 Mar 01 1993 00:14:48 canned–config
	
	31932416 bytes total (24885606 bytes free)
	Router#</pre>

20	**CAUTION** The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically. Be sure the *IOS file is the first file listed* in the directory content display. If it is not, perform the procedure in Table J-12, and then return to step 21, below.

21	Verify the router will boot properly on the IOS and revised startup–config files by entering the following:
	    reload
	
	A response similar to the following will be displayed:
	
	<pre>Router#reload
	
	System configuration has been modified. Save? [yes/no]: n
	Proceed with reload? [confirm]</pre>

22	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
23	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
24	Verify the router reboots without displaying the `rommon 1 >` prompt or error messages related to port configurations.
25	If no other BTS router file operations or configuration actions are required, perform the following:
25a	– Remove power from the router and disconnect it from the power supply.
25b	– Disconnect all cabling from the BTS router.
25c	– On the LMF computer, exit the HyperTerminal communications session.

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Change CF Memory Card File Sequence to Place IOS File First on the Card

This procedure covers using an LMF computer equipped with a CF memory card reader to perform the following activities:

1. Change the sequence of files on a CF memory card to place the IOS version file first

2. Formatting the CF memory card, if necessary, to achieve the required file sequence positioning of the IOS version file

Prerequisites

The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in Table J-8 and steps 1 through 5 of Table J-9

- Copies of the required IOS version and canned configuration files are loaded into the desired directory of the LMF computer

Optional equipment/software

If they are available, the following items may be used to change the CF memory card file sequence once the card is installed in the BTS router:

- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8–contact modular plugs, in one of the following lengths, as determined necessary:
  - 0.3 m (11.8 in) (Motorola pn 3088643C07)
  - 0.6 m (23.6 in)(Motorola pn 3088643C13)
  - 1.0 m (39.4 in) (Motorola pn 3088643C15)
  - 2.1 m (84 in) (Motorola pn 3088643C08)
  - 3.0 m (120 in) (Motorola pn 3088643C09)

- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration − CDMA OnLine Documentation*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application

Changing CF memory card file sequence

Follow the procedure in Table J-12 to place the installed IOS version file first in the stored file sequence on the CF memory card.

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Table J-12: Use CF Memory Card Reader to Place IOS File First in CF Memory Card File Sequence	
Step	**Action**
	CAUTION The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.
1	This procedure assumes that the LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in Table J-8 and steps 1 through 5 of Table J-9. If necessary, perform these procedures now.

2	**NOTE**
	The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting.
	
	With the CF memory card still installed in the router, display a CF memory card directory listing if one is not showing by entering the **dir** command. A response similar to the following will be displayed:
	
	```Router#dir slot0:```
	```Directory of slot0:/```
	
	``` 2 −rw− 2212 Mar 01 1993 00:14:48 canned−config```
	``` 1 −rw− 7051976 Sep 23 2002 07:24:18 mwr1941−i−mz.122−8.MC2a.bin```
	
	```31932416 bytes total (24878228 bytes free)```
	```Router#```

3	Verify that the IOS file is *not* the first file on the CF memory card.
4	If a tftp server application is *not* available on the LMF computer, skip to step 23.
5	If a tftp server *is* available on the LMF computer, connect the Ethernet *crossover* cable as shown in Figure J-4.
6	If it has not been done, configure the LMF computer NIC as directed in Table J-4.

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Table J-12: Use CF Memory Card Reader to Place IOS File
First in CF Memory Card File Sequence

Step	Action
7	Configure FE port FE 0 (fa0/0) by performing the following:

7a	− At the `Router>` *user* EXEC mode prompt, enter the following to access the *privileged* EXEC mode:
	
	  enable
	
	A response similar to the following will be displayed:
	
	```Router>enable```
	```Router#```

7b	− At the `Router#` *privileged* EXEC mode prompt, enter the following to access the *configure submode*:
	
	  configure **t**erminal
	
	A response similar to the following will be displayed:
	
	```Router#conf t```
	```Enter configuration commands, one per line. End with CNTL/Z.```
	```Router(config)#```

7c	− At the global configuration mode prompt, type each of the following commands, pressing the **Enter** key after each command:
	
	hostname btsrtr1
	interface **fa0/0**
	ip address 100.100.100.2 255.255.255.252
	speed 100
	duplex full
	no shutdown
	line con 0
	exec−timeout 0 0
	no login
	line vty 0 4
	no login
	
	Responses similar to the following will be displayed:
	
	```Router(config)#hostname BTSRTR1```
	```BTSRTR1(config)#interface fa0/0```
	```BTSRTR1(config−if)#ip address 100.100.100.2 255.255.255.252```
	```BTSRTR1(config−if)#speed 100```
	```BTSRTR1(config−if)#duplex full```
	```BTSRTR1(config−if)#no shutdown```
	```BTSRTR1(config−if)#line con 0```
	```BTSRTR1(config−line)#exec−timeout 0 0```
	```BTSRTR1(config−line)#no login```
	```BTSRTR1(config−line)#line vty 0 4```
	```BTSRTR1(config−line)#no login```
	```BTSRTR1(config−line)#```

7d	− Once the correct parameters have been set, return to the privileged EXEC mode prompt by holding down the **Ctrl** key and pressing **z** (**Ctrl+z**). A response similar to the following will be displayed:
	
	```BTSRTR1(config−line)# ^z```
	```01:11:27: %SYS−5−CONFIG_I: Configured from console by console```
	```BTSRTR1#```

Table J-12: Use CF Memory Card Reader to Place IOS File
First in CF Memory Card File Sequence

Step	Action
7e	– Verify port FE 0 (fa0/0) is configured with the correct IP address by entering the following: **sh**ow **ip int**erface **br**ief A response similar to the following will be displayed: ``` BTSRTR1#sh ip int br Interface IP Address OK? Method Status Protocol FastEthernet0/0 100.100.100.2 YES manual up up Serial0:0 unassigned YES unset administratively down down FastEthernet0/1 unassigned YES unset administratively down down Serial1:0 unassigned YES unset administratively down down BTSRTR1# ```
8	Be sure the required IOS file and canned configuration file for the BTS router are located in the tftp server root directory (refer to Table J-4, step 14 or step 17, as applicable)
9	Delete files from the CF memory card by entering the **del** *filename* command. A response similar to the following will be displayed: ``` Router#del canned–config Delete filename [canned–config]? ```
10	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: ``` Delete filename [canned–config]? Delete slot0:canned–config? [confirm] ```
11	Press the **Enter** key to confirm the deletion. A response similar to the following will be displayed if the default filename is selected: ``` Delete filename [canned–config]? Delete slot0:canned–config? [confirm] Router# ```
12	Confirm the file deletion by entering the **dir** command. A response similar to the following will be displayed: ``` Router#dir Directory of slot0:/ 1 –rw– 7051976 Sep 23 2002 07:24:18 mwr1941–i–mz.122–8.MC2a.bin 31932416 bytes total (24887818 bytes free) Router# ```
13	Repeat steps 9 through 12 for each file until *all* files have been deleted from the CF memory card.

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Table J-12: Use CF Memory Card Reader to Place IOS File
First in CF Memory Card File Sequence

Step	Action

14	Use the tftp server to copy the IOS file from the LMF computer to the CF memory card by enteringthe following:
	
	    copy tftp:_IOS_filename_ **slot0:**
	
	Where _IOS_filenamer_ = required IOS version filename in the LMF computer tftp server root directory.
	
	A response similar to the following will be displayed:
	
	```BTSRTR1#copy tftp:mwr1941−i−mz.122−8.MC2a.bin slot0:```
	```Address or name of remote host []?```

15	At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC:
	
	    100.100.100.1
	
	A response similar to the following will be displayed:
	
	```BTSRTR1#copy tftp:mwr1941−i−mz.122−8.MC2a.bin slot0:```
	```Address or name of remote host []? 100.100.100.1```
	```Destination filename [mwr1941−i−mz.122−8.MC2a.bin]?```

16	At the prompt for the destination filename, press the **Enter** key. A response similar to the following will be displayed:
	
	```BTSRTR1#copy tftp:mwr1941−i−mz.122−8.MC2a.bin slot0:```
	```Address or name of remote host []? 100.100.100.1```
	```Destination filename [mwr1941−i−mz.122−8.MC2a.bin]?```
	```Accessing tftp://100.100.100.1/mwr1941−i−mz.122−8.MC2a.bin...```
	```Loading mwr1941−i−mz.122−8.MC2a.bin from 100.100.100.1 (via FastEthernet0/0): !!!!```
	```Loading mwr1941−i−mz.122−8.MC2a.bin from 100.100.100.1 (via FastEthernet0/0):```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```!!```
	```[OK − 7051976/14103552 bytes]```
	
	```7051976 bytes copied in 145.108 secs (48634 bytes/sec)```

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Table J-12: Use CF Memory Card Reader to Place IOS File First in CF Memory Card File Sequence	
Step	**Action**
17	Display the directory of the CF memory card to confirm the IOS file transfer by entering the **dir** command. A response similar to the following will be displayed: ``` Router#dir Directory of slot0:/ 1 −rw− 7051976 Sep 23 2002 07:24:18 mwr1941−i−mz.122−8.MC2a.bin 31932416 bytes total (248880440 bytes free) Router# ```
18	Copy the canned configuration file to the CF memory card by entering the following: **copy tftp:btsrtr_canned.***color* **slot0:canned−config** Where *color* = **blue** or **red**, as applicable. A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned−config Address or name of remote host [100.100.100.1]? ```
19	If the default IP address for the LMF computer displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address. A response similar to the following will be displayed if the default filename is accepted: ``` Destination filename [canned−config]? 2212 bytes copied in 0.208 secs Router# ```
20	At the prompt for the destination filename, press the **Enter** key. A response similar to the following will be displayed: ``` BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned−config Address or name of remote host []? 100.100.100.1 Destination filename [canned−config]? Loading btsrtr_canned.blue from 100.100.100.1 (via Ethernet0/0): ! [OK − 2457/4096 bytes] 2457 bytes copied in 84.724 secs (29 bytes/sec) BTSRTR1# ```

21	Determine if the IOS file is now the first file displayed in the directory listing by entering the **dir** command. A response similar to the following will be displayed:
	
	``
	Router#dir
	Directory of slot0:/
	
	    1 −rw− 7051976 Mar 01 1993 00:14:48 mwr1941−i−mz.122−8.MC2a.bin
	    2 −rw− 2212 Sep 23 2002 07:24:18 canned−config
	
	31932416 bytes total (24878228 bytes free)
	Router#
	``

22	If the IOS file is the first file displayed, as shown in step 21, above, proceed to step 30.

<div align="right">. . . continued on next page</div>

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Step	Action
	Table J-12: Use CF Memory Card Reader to Place IOS File First in CF Memory Card File Sequence
23	If the IOS *is not* the first file displayed, as shown in step 2, above, format the CF memory card by entering the following: **format slot0:** A response similar to the following will be displayed: ``` BTSRTR1#format slot0: Format operation may take a while. Continue? [confirm] ```
24	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: ``` Format operation may take a while. Continue? [confirm] Format operation will destroy all data in "slot0:". Continue? [confirm] ```
25	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: ``` Format operation will destroy all data in "slot0:". Continue? [confirm] Format: Drive communication & 1st Sector Write OK... Writing Monlib sectors.. .... Monlib write complete . Format: All system sectors written. OK... Format: Total sectors in formatted partition: 62560 Format: Total bytes in formatted partition: 32030720 Format: Operation completed successfully. Format of slot0 complete BTSRTR1# ```
26	If a tftp server *is* available on the LMF computer, repeat steps 14 through 22 to transfer the IOS and canned configuration files to the CF memory card.
27	Once the format operation is completed, remove the CF memory card from the router following the procedure in the *1X SC 4812T BTS FRU Guide* , insert it in the card reader connected to the LMF computer, and copy the IOS file to the card by performing step 4 and steps 6 through 11 of Table J-11, as required.
28	Remove the CF memory card from the card reader and install it in the router following the procedure in the BTS FRU Guide.
29	Be sure that the IOS file is now the first file displayed in the directory listing by entering the **dir** command. A response similar to the following will be displayed: ``` Router#dir Directory of slot0:/ 1 −rw− 7051976 Sep 23 2002 07:24:18 mwr1941−i−mz.122−8.MC2a.bin 2 −rw− 2212 Mar 01 1993 00:14:48 canned−config 31932416 bytes total (24885606 bytes free) Router# ```
30	If this procedure was entered from step 5 of Table J-9, return to Table J-9, step 6.

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Table J-12: Use CF Memory Card Reader to Place IOS File
First in CF Memory Card File Sequence

Step	Action
31	If this procedure was entered from step 20 of Table J-11, return to Table J-11, step 21.
32	If no other BTS router file operations or configuration actions are required, perform the following:
32a	– Remove power from the router and disconnect it from the power supply.
32b	– Disconnect all cabling from the BTS router.
32c	– On the LMF computer, exit the HyperTerminal communications session.
33	If a tftp server was used in this procedure and no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table J-4, step 9b. **CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

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Verify and Upgrade rommon Version

Introduction

BTS routers are supplied pre–loaded with a version of the ROM monitor (rommon) low–level operating system. Along with the IOS version, the loaded rommon version should be verified as being the one required for the network. Procedures in this section are used to verify the loaded rommon version, and, if necessary, change it to the required version. Methods are provided for using either a tftp server or CF memory card reader to transfer the required rommon version to a BTS router's CF memory card.

Equipment and Software Required for Verification

The following items are required to perform rommon verification:

* A *Windows*–based computer which meets the requirements of the LMF computer platform as specified in *this manual*.

* One of the following operating systems for the *Windows*–based computer:

  – *Windows* 2000

  – *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION	BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

* Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix

* DB–9 plug–to–8–contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix

* A copy of the MWR 1941 router rommon version required for the network where the routers are to be installed

NOTE	Contact the network administrator or the Motorola Account Team for assistance in determining and obtaining a copy of the required rommon version.

* A +27 Vdc power supply to power the BTS router during configuration file operations

Required Publications

The following publication is required to perform procedures in this section:

* *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

Method 1: In–Router Verification and Replacement of Installed rommon Version

Description

This procedure covers using an LMF computer equipped with a tftp server application to perform the following activities:

1. Verify the rommon version loaded and running on a BTS router

2. Replace the rommon version installed in a BTS router

Additional required equipment/software

For this method, the following equipment and software application is required in addition to the common items required for both methods:

- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8–contact modular plugs, in one of the following lengths, as determined necessary:

  – 0.3 m (11.8 in) (Motorola pn 3088643C07)

  – 0.6 m (23.6 in)(Motorola pn 3088643C13)

  – 1.0 m (39.4 in) (Motorola pn 3088643C15)

  – 2.1 m (84 in) (Motorola pn 3088643C08)

  – 3.0 m (120 in) (Motorola pn 3088643C09)

- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation*) such as:

  – Cisco tftp server

  – PumpKIN tftp server

  – Any other equivalent tftp server application

Prerequisites

The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for tftp file transfer and are operating as they would be after performing the procedures in Table J-4, Table J-5, Table J-6, and steps 1 through 8 of Table J-7

- A copy of the required rommon version is loaded into the tftp default directory of the LMF computer

Verifying and replacing installed rommon version

Follow the procedure in Table J-13 to verify and, if necessary, replace the installed rommon version using the tftp server application.

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Table J-13: Verify and Replace Installed rommon Version Using a tftp Server	
Step	**Action**
* IMPORTANT This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.	
1	This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in Table J-4, Table J-5, Table J-6, and steps 1 through 4 of Table J-7. If necessary, perform these procedures now.

2	Determine the currently installed rommon version by entering the following at the router *privileged* EXEC mode prompt:
	
	    show **ver**sion
	
	A response similar to the following will be displayed:
	
	`BTSRTR1#sh ver`
	`Cisco Internetwork Operating System Software`
	`IOS (tm) 1941 Software (MWR1941–I–M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE`
	`SOFTWARE (fc3)`
	`TAC Support: http://www.cisco.com/tac`
	`Copyright (c) 1986–2002 by cisco Systems, Inc.`
	`Compiled Mon 05–Aug–02 11:07 by nmasa`
	`Image text–base: 0x60008940, data–base: 0x60B54000`
	
	`ROM: System Bootstrap, Version 12.2(20020113:235343) [sbose–wilma 109], DEVELOPMENT`
	`SOFTWARE`
	`ROM: 1941 Software (MWR1941–I–M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE SOFT-`
	`WARE (fc3)`
	
	`Router uptime is 1 minute`
	`System returned to ROM by power–on`
	`System image file is "slot0:mwr1941–i–mz.122–8.MC2b.bin"`
	
	`cisco mwr1941 (R7000) processor (revision 0.1) with 121856K/18432K bytes of memory.`
	`Processor board ID JMX0611K5TS`
	`R7000 CPU at 240Mhz, Implementation 39, Rev 3.3, 256KB L2 Cache`
	`Bridging software.`
	`X.25 software, Version 3.0.0.`
	`Primary Rate ISDN software, Version 1.1.`
	`Toaster processor tmc is running.`
	`2 FastEthernet/IEEE 802.3 interface(s)`
	`2 Serial network interface(s)`
	`2 Channelized T1/PRI port(s)`
	`DRAM configuration is 64 bits wide with parity disabled.`
	`55K bytes of non–volatile configuration memory.`
	`31360K bytes of ATA Slot0 CompactFlash (Read/Write)`
	
	`Configuration register is 0x101`
	
	`BTSRTR1#`

3	To determine the currently installed rommon version, examine the ROM: System Bootstrap line in the response.

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Table J-13: Verify and Replace Installed rommon Version Using a tftp Server

Step	Action
4	Compare the installed rommon version information with the filename of the rommon version required for the network. **NOTE** 1. Rommon filename format is similar to the following: **MWR1941_RM2.srec.122–8r.MC3.bin** 2. The rommon filename reflects the version number of the software (122–8r.MC3).
5	If the installed version is the one required for the network skip to step 26.

6	If the installed rommon version is not the one required for the network, backup the current BTS router configuration to the LMF computer by entering the following:
	
	    copy nvram:startup–config **tftp**
	
	A response similar to the following will be displayed:
	
	`BTSRTR1#copy nvram:start tftp`
	`Address or name of remote host []?`
	
	NOTE
	Be sure to include the colon (**:**) after **nvram** when typing the command.

7	At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC:
	
	    100.100.100.1
	
	A response similar to the following will be displayed:
	
	`BTSRTR1#copy copy nvram:start tftp`
	`Address or name of remote host []? 100.100.100.1`
	`Source filename [startup–config]?`

8	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected:
	
	`Source filename [startup–config]?`
	`Destination filename [startup–config]?`

9	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed:
	
	`Destination filename [startup–config]?`
	`!`
	`[OK − 2212/4096 bytes]`
	
	`2212 bytes copied in 0.152 secs`
	`BTSRTR1#`

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Table J-13: Verify and Replace Installed rommon Version Using a tftp Server	
Step	**Action**

10	**NOTE**
	
	The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting.
	
	Determine the amount of memory available (bytes free) on the CF memory card by entering the **dir** command. A response similar to the following will be displayed:
	
	<pre>BTSRTR1#dir
	Directory of slot0:/
	
	    1 –rw– 7051976 Sep 23 2002 07:24:18 mwr1941–i–mz.122–8.MC2b.bin
	    2 –rw– 2212 Mar 01 1993 00:14:48 canned–config
	
	31932416 bytes total (24885606 bytes free)
	Router#</pre>

11	Be sure there is at least 1 MB (1048580) of free memory. **NOTE** A rommon version file requires approximately 0.7 MB.

12	Begin to copy the required version of the rommon file from the LMF computer to the BTS router by entering the following:
	
	    copy tftp:*new_rommon_filename* **slot0:**
	
	Where *new_rommon_filename* = the filename of the required rommon version for the BTS router.
	
	A response similar to the following will be displayed:
	
	<pre>BTSRTR1#copy tftp:MWR1941_RM2.srec.122–8r.MC3.bin slot0:
	Address or name of remote host [100.100.100.1]?</pre>

13	If the default IP address displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer. A response similar to the following will be displayed if the default filename is selected:
	
	<pre>Address or name of remote host [100.100.100.1]?
	Source filename [MWR1941_RM2.srec.122–8r.MC3.bin]?</pre>

14	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected:
	
	<pre>Source filename [MWR1941_RM2.srec.122–8r.MC3.bin]?
	Destination filename [MWR1941_RM2.srec.122–8r.MC3.bin]?</pre>

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	Table J-13: Verify and Replace Installed rommon Version Using a tftp Server
Step	**Action**
15	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: ```Destination filename [MWR1941_RM2.srec.122−8r.MC3.bin]?\nAccessing tftp://100.100.100.1/MWR1941_RM2.srec.122−8r.MC3.bin...\nLoading MWR1941_RM2.srec.122−8r.MC3.bin from 100.100.100.1 (via FastEthernet0/0): !!!!\nLoading MWR1941_RM2.srec.122−8r.MC3.bin from 100.100.100.1 (via FastEthernet0/0):\n!!!\n!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!\n[OK − 614306/14103552 bytes]\n\n614306 bytes copied in 13.059 secs (48634 bytes/sec)\nBTSRTR1#```
16	Display the CF memory card directory to verify that the new rommon version file is there by entering the **dir** command. A response similar to the following will be displayed: ```BTSRTR1#dir\nDirectory of slot0:/\n\n 1 −rw− 7051976 Sep 23 2002 07:25:36 mwr1941−i−mz.122−8.MC2b.bin\n 2 −rw− 2212 Mar 01 1993 00:09:06 canned−config\n 3 −rw− 614306 Dec 13 2002 14:59:36 MWR1941_RM2.srec.122−8r.MC3.bin\n\n31932416 bytes total (24263922 bytes free)\nBTSRTR1#```
17	Replace the existing rommon version with the new one copied to the CF memory card by entering the following: **upgrade rom−monitor file slot0:MWR1941_RM2.srec.122−8r.MC3** A response similar to the following will be displayed: ```BTSRTR1#This command will reload the router. Continue?[yes/no]```
18	When prompted to continue, enter **yes** and press the **Enter** key. A response similar to the following will be displayed: ```BTSRTR1#This command will reload the router. Continue?[yes/no] yes\nROMMON image upgrade in progress\nErasing boot flash\neeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee\nProgramming boot flash pppp\nNow reloading```
19	When the router has completed initialization, change to the router *privileged* EXEC mode by entering the following: **enable** A response similar to the following will be displayed: ```BTSRTR1>enable\nBTSRTR1#```

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Table J-13: Verify and Replace Installed rommon Version Using a tftp Server	
Step	**Action**
20	Verify the router has initialized with the new rommon version by entering the following: **sh**ow **ver**sion A response similar to the following partial response will be displayed: ``` BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941–I–M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE SOFTWARE (fc3) TAC Support: http://www.cisco.com/tac Copyright (c) 1986–2002 by cisco Systems, Inc. Compiled Mon 05–Aug–02 11:07 by nmasa Image text–base: 0x60008940, data–base: 0x60B54000 ROM: System Bootstrap, Version 12.2(8r)MC3 RELEASE SOFTWARE (fc1) ```
21	Compare the version displayed in the response ROM: System Bootstrap line to the filename of the new rommon version file copied to the CF memory card.
22	If the router successfully rebooted with the new rommon version, the rommon file can be deleted from the CF memory card by entering the following: **del**ete **slot0:***new_rommon_filename* Where *new_rommon_filename* = the filename of the required rommon version copied to the CF memory card in steps 12 through 15, above. A response similar to the following will be displayed: ``` BTSRTR1#del slot0:MWR1941_RM2.srec.122–8r.MC3.bin Delete filename [MWR1941_RM2.srec.122–8r.MC3.bin]? ```
23	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: ``` Delete filename [MWR1941_RM2.srec.122–8r.MC3.bin]? Delete slot0:MWR1941_RM2.srec.122–8r.MC3.bin? [confirm] ```
24	Press the **Enter** key to confirm the deletion. A response similar to the following will be displayed if the default filename is selected: ``` Delete filename [MWR1941_RM2.srec.122–8r.MC3.bin]? Delete slot0:MWR1941_RM2.srec.122–8r.MC3.bin? [confirm] BTSRTR1# ```
	CAUTION In this step, *do not delete the IOS and* canned–config *files* from the CF memory card. The BTS router must have these files on the card to properly boot or switch between packet and circuit mode.
25	If additional unnecessary files, such as a backup of the startup–config file, are also on the CF memory card, delete them by repeating steps 22 through 24 for each file.
26	If no other BTS router file operations or configuration actions are required, perform the following:
26a	– Remove power from the router and disconnect it from the power supply.
26b	– Disconnect all cabling from the BTS router.
26c	– On the LMF computer, exit the HyperTerminal communications session.

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Table J-13: Verify and Replace Installed rommon Version Using a tftp Server	
Step	**Action**
27	If no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table J-4, step 9b. **CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

Method 2: Verification and Replacement of Installed rommon Version Using a CF Memory Card Reader

Description

This procedure covers using an LMF computer equipped with a CF memory card reader to perform the following activities:

1. Verify the rommon version loaded and running on a BTS router

2. Replace the rommon version installed in a BTS router

Additional required equipment/software

For this method, the following equipment item and associated software is required in addition to the common items required for both methods:

• CF memory card *reader* device and software driver for the operating system installed on the LMF computer

CAUTION	Card readers for other non–volatile, solid–state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. Do not attempt to use a card reader intended for another type of memory device.

Prerequisites

The following are required prior to performing this procedure:

• The LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in steps 1 through 8 of Table J-8

• A copy of the required rommon version is loaded into the desired directory of the LMF computer

File operations using a CF memory card reader

Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router* using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*–based computer using a card reader could result in unpredictable BTS router operation.

CAUTION	Do not format BTS router CF memory cards using a *Windows*–based computer. Only format CF memory cards in a BTS router.

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Verifying and replacing installed rommon version

Follow the procedure in Table J-14 to verify and, if necessary replace the installed rommon version using a CF memory card reader.

Step	Action
Table J-14: Verify and Replace Installed rommon Version Using a CF Memory Card Reader

Step	Action
	* IMPORTANT This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in steps 1 through 8 of Table J-8. If necessary, perform these procedures now.

2	Determine the currently installed rommon version by entering the following at the router *privileged* EXEC mode prompt:
	
	 show **ver**sion
	
	 A response similar to the following will be displayed:
	
	 <pre>BTSRTR1#sh ver
	Cisco Internetwork Operating System Software
	IOS (tm) 1941 Software (MWR1941—I—M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE
	SOFTWARE (fc3)
	TAC Support: http://www.cisco.com/tac
	Copyright (c) 1986—2002 by cisco Systems, Inc.
	Compiled Mon 05—Aug—02 11:07 by nmasa
	Image text—base: 0x60008940, data—base: 0x60B54000
	
	ROM: System Bootstrap, Version 12.2(20020113:235343) [sbose—wilma 109], DEVELOPMENT
	SOFTWARE
	ROM: 1941 Software (MWR1941—I—M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE SOFT-
	WARE (fc3)
	
	Router uptime is 1 minute
	System returned to ROM by power—on
	System image file is "slot0:mwr1941—i—mz.122—8.MC2b.bin"
	
	cisco mwr1941 (R7000) processor (revision 0.1) with 121856K/18432K bytes of memory.
	Processor board ID JMX0611K5TS
	R7000 CPU at 240Mhz, Implementation 39, Rev 3.3, 256KB L2 Cache
	Bridging software.
	X.25 software, Version 3.0.0.
	Primary Rate ISDN software, Version 1.1.
	Toaster processor tmc is running.
	2 FastEthernet/IEEE 802.3 interface(s)
	2 Serial network interface(s)
	2 Channelized T1/PRI port(s)
	DRAM configuration is 64 bits wide with parity disabled.
	55K bytes of non—volatile configuration memory.
	31360K bytes of ATA Slot0 CompactFlash (Read/Write)
	
	Configuration register is 0x101
	
	BTSRTR1#</pre>

3	To determine the currently installed rommon version, examine the ROM: System Bootstrap line in the response.

Step	Action
	Table J-14: Verify and Replace Installed rommon Version Using a CF Memory Card Reader
4	Compare the installed rommon version information with the filename of the rommon version required for the network. **NOTE** 1. Rommon filename format is similar to the following: **MWR1941_RM2.srec.122–8r.MC3.bin** 2. The rommon filename reflects the version number of the software (122–8r.MC3).
5	If the installed version is the one required for the network skip to step 25.
6	**NOTE** The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting. If the installed rommon version is not the one required for the network, determine the amount of memory available (bytes free) on the CF memory card by entering the following: **dir** A response similar to the following will be displayed: ``` BTSRTR1#dir Directory of slot0:/ 1 −rw− 7051976 Sep 23 2002 07:24:18 mwr1941−i−mz.122−8.MC2b.bin 2 −rw− 2212 Mar 01 1993 00:14:48 canned−config 31932416 bytes total (24885606 bytes free) Router# ```
7	Be sure there is at least 1 MB (1048580) of free memory. **NOTE** A rommon version file requires approximately 0.7 MB, and space must also be available for a backup of the router's startup−config file.
8	Create a backup of the current BTS router configuration on the CF memory card by entering the following: **copy nvram:start**up–config **slot:0** A response similar to the following will be displayed: ``` BTSRTR1#copy nvram:startup−config slot0: Destination filename [startup−config]? ```
9	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed: ``` Destination filename [startup−config]? 2212 bytes copied in 4.96 secs (553 bytes/sec) BTSRTR1# ```
10	Remove the CF memory card from the router by following the procedure in the *1X SC 4812T BTS FRU Guide* .

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Step	Action
Table J-14: Verify and Replace Installed rommon Version Using a CF Memory Card Reader

Step	Action
11	Insert the CF memory card into the card reader as specified by the card reader manufacturer's instructions.
12	On the LMF computer, click **Start > Programs > Windows Explorer** to open *Windows* Explorer.
13	**NOTE** The CF memory card reader will appear as a disk drive in *Windows* Explorer with a disk drive letter and icon. Scroll the *left*–hand pane of *Windows* Explorer to locate the icon for the CF memory card.
14	In the *left*–hand pane of *Windows*Explorer, highlight the CF memory card icon.
15	In the *right*–hand pane, verify the files displayed in step 6, above, appear.
16	Scroll the *left*–hand pane of *Windows* Explorer to locate the icon for the directory where the required rommon version file is stored.
17	In the *right*–hand pane, highlight the startup–config file on the CF memory card, note its file size, and drag it to the icon for the directory where the required rommon version file is stored. **NOTE** After highlighting the startup–config file in the right–hand pane, it may be necessary to scroll the *left*–hand pane to see the directory icon where the required rommon version file is stored before dragging the file.
18	In the *left*–hand pane, highlight the directory where the required rommon version file is stored.
19	In the *right*–hand pane, verify the startup–config file is in the directory and the file size is the same as the original on the CF memory card.
20	In the *right*–hand pane, highlight the required rommon version file to be transferred to the CF memory card and drag it to the CF memory card disk drive icon. **NOTE** After highlighting the rommon version file in the right–hand pane, it may be necessary to scroll the *left*–hand pane to see the CF memory card disk drive icon before dragging the file.
21	Verify the rommon version file has been copied to the CF memory card by clicking on the CF memory card disk drive icon in the *left*–hand pane, and being sure that the rommon version file appears in the in the *right*–hand pane.
22	Click **Files > Close** to close *Windows* Explorer.
23	Remove the CF memory card with the rommon version file from the card reader.
24	Install the CF memory card in the BTS router by following the procedure in the *1X SC 4812T BTS FRU Guide* .
25	Proceed to **Replace installed rommon version**, below.

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Recovery From BTS Router Boot to rommon

Introduction

ROM monitor boot conditions

Under certain circumstances the BTS router will initialize with the ROM monitor (rommon) operating system rather than the IOS. These circumstances include:

- IOS file is missing from the CF memory card

- IOS file is not the first file on the CF memory card

- IOS file image on the CF memory card is corrupted

- Startup–config file contains an outdated boot system line specifying an IOS file which has been replaced with an updated version

- Startup–config file contains boot system line with typographical error(s) in the IOS filename

Description

Router operation on rommon is signalled by the display of the `rommon # >` prompt, where # is a number which increments each time a command is issued. Rommon is a low–level operating system which provides limited capabilities for router testing and troubleshooting operations, but does not support any operations on files beyond viewing directory contents or booting from a specified file. As a result, files can not be copied or deleted when the router is operating on rommon.

Recovery methods

Two recovery methods are included in this section. The first is the simplest and requires that a valid, uncorrupted IOS version is installed on the CF memory card. The second method requires additional equipment and must be used in instances such as when an IOS file is not installed on the CF memory card or the installed IOS image is corrupted.

Simple Recovery from Boot to rommon

Requirements

Unless it is certain, that the IOS image on the CF memory card is corrupted, this method should always be the first attempted to recover the router from a rommon initialization. This method does not require any additional equipment beyond the items necessary to load canned configuration files into the BTS router. To be effective, this method does require that a valid, uncorrupted IOS image file is installed on the router's CF memory card.

Recovery

Follow the procedure in Table J-15 to attempt a simple recovery from a BTS router rommon initialization.

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Table J-15: Simple Recovery from BTS Router rommon Boot	
Step	**Action**
	* IMPORTANT This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	This procedure assumes the LMF computer is set up and connected to the BTS router with an active HyperTerminal communication session. If it is not, follow the procedure in Table J-2 to establish a HyperTerminal communication session.

2	With the rommon 1 > prompt displayed in the HyperTerminal window, enter the following to identify the IOS file on the CF memory card:
	
	   dir slot0:
	
	A response similar to the following will be displayed:
	
	`rommon 1 > dir slot0:`
	
	`program load complete, entry point: 0x80008000, size: 0xb2a0`
	
	`Directory of slot0:`
	
	`2      2212      —rw—      canned—config`
	
	`3      7051976   —rw—      mwr1941—i—mz.122—8.MC2a.bin`
	
	`rommon 2 >`

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	Table J-15: Simple Recovery from BTS Router rommon Boot
Step	**Action**

3	Note the IOS filename, and enter the following to begin recovery to an IOS boot:
	
	    boot slot0:*IOS_filename*
	
	Where *IOS_filename* = the filename of the IOS noted in step 2, above.
	
	A successful IOS re–boot operation will result in display of a response which begins and ends similar to the following:
	
	`rommon 2 > boot slot0:mwr1941–i–mz.122–8.MC2a.bin`
	
	`program load complete, entry point: 0x80008000, size: 0xb2a0`
	
	`program load complete, entry point: 0x80008000, size: 0x6b99ac`
	
	`Self decompressing the image :`
	`################################################################ [OK]`
	
	`Smart Init is enabled`
	
	`smart init is sizing iomem`
	
	`   ID            MEMORY_REQ               TYPE`
	
	`00031A         0X005F3C00 MWR1941 Mainboard`
	
	`               0X000F3BB0 public buffer pools`
	
	`               0X00211000 public particle pools`
	
	`TOTAL:         0X008F87B0`
	`.`
	`.`
	`.`
	`Press RETURN to get started!`

4	If the router successfully reboots with the IOS, proceed to step 7.
5	If the router does not reboot with the IOS, perform the following:
5a	– Scroll the HyperTerminal display down until the directory display from step 2, above, is visible.
5b	– Compare the IOS filename from the directory display with the filename entered in performing step 3, above.
5c	– If the filename was typed incorrectly, repeat step 3, using care to type the filename correctly.
6	If the router does not reboot with the IOS after typing the filename correctly, proceed to Table J-16 and perform the extended recovery procedure.

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Table J-15: Simple Recovery from BTS Router rommon Boot	
Step	**Action**
	CAUTION The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.
7	After a successful reboot with IOS, perform the following to correct the cause of the boot to rommon:
7a	– Enter the **dir slot0:** command to display the CF memory card directory, and, if the IOS file *is not* the first file listed, perform the procedure in Table J-10, steps 25 through 32, or Table J-12, as applicable, to correct the situation.

7b	– If the IOS file *is* the first file, enter the following command to display the contents of the startup–config file:
	show **start**up–config
	
	A response which begins similar to the following will be displayed:
	
	``
	BTSRTR1#sh start
	Using 1589 out of 57336 bytes
	!
	version 12.2
	service timestamps debug uptime
	service timestamps log uptime
	no service password—encryption
	!
	hostname BTSRTR1
	!
	boot system slot0:mwr1941—i—mz.07132002.bin
	no logging console
	!
	username cisco password 0 cisco
	!
	redundancy
	  mode y—cable
	    standalone
	!
	``

7c	– If the file listing contains a "boot system" line, examine it for the correct IOS filename.
7d	– If the boot system slot0: filename is incorrect, enter the following, using care to type the filename correctly: **boot system slot0:***IOS_filename* Where *IOS_filename* = the filename of the IOS noted in step 2, above.
7e	– Replace the boot system line in the startup–config file with the line entered in step 7d, above, by entering the following: **copy run**ing–config **start**up–config

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\begin{center}**Table J-15:** Simple Recovery from BTS Router rommon Boot\end{center}	
Step	**Action**

7f	– Verify the correct IOS filename is now included in the listing by entering the following:
	
	    show **start**up–config
	
	A response which begins similar to the following will be displayed:
	
	``
	BTSRTR1#sh start
	Using 1589 out of 57336 bytes
	!
	version 12.2
	service timestamps debug uptime
	service timestamps log uptime
	no service password–encryption
	!
	hostname BTSRTR1
	!
	boot system slot0:mwr1941–i–mz.122–8.MC2a.bin
	no logging console
	!
	username cisco password 0 cisco
	!
	redundancy
	  mode y–cable
	    standalone
	!
	``

7g	– If the filename is correctly written, enter the following to determine if the router will reboot to IOS: **reload** A response similar to the following will be displayed: ``` BTSRTR1#reload System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm] ```
8	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
9	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
10	After a successful reboot with IOS, proceed with other BTS router activities or remove power from the router and disconnect it
11	If the router still will not successfully boot with IOS, proceed to Table J-16 and perform the extended recovery procedure.

Extended Recovery from Boot to rommon

Requirements

If rommon boot recovery attempts fail using the simple recovery method, this method must be used to reboot a BTS router which has initialized with rommon. This method requires additional equipment beyond the items necessary to load canned configuration files into the BTS router. Extended recovery requires formatting the CF memory card from the rommon–initialized router and reloading the reformatted CF memory card with the required IOS version.

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Additional equipment required

An additional, formatted, 32 MB CF memory card with the required version of the IOS installed is required in addition to the equipment and software required for BTS router canned configuration installation. This card may be:

- A *spare* CF memory card which is loaded with the required IOS version

- A CF memory card from an additional BTS router which is loaded with the required IOS version

Recovery

Follow the procedure in Table J-15 to perform an extended recovery from a BTS router rommon initialization.

	Table J-16: Extended Recovery from BTS Router rommon Boot
Step	**Action**
1	This procedure assumes the BTS router is powered and operating on rommon with the LMF computer set up and connected to the router with an active HyperTerminal communication session. If it is not, follow the procedure in Table J-2 to establish a HyperTerminal communication session.
2	Remove the CF memory card from the BTS router following the procedure in the *1X SC 4812T BTS FRU Guide* .
3	Install the additional CF memory card in the router following the procedure in the BTS FRU Guide.

4	Enter the following to obtain the filename of the IOS version loaded on the CF memory card:
	
	   dir slot0:
	
	A response similar to the following will be displayed:
	
	`rommon 1 > dir slot0:`
	
	`program load complete, entry point: 0x80008000, size: 0xb2a0`
	
	`Directory of slot0:`
	
	`1      7051976   —rw—     mwr1941—i—mz.122—8.MC2a.bin`
	
	`rommon 2 >`

5	Note the exact filename displayed for the IOS version.

Table J-16: Extended Recovery from BTS Router rommon Boot

Step	Action

6	Enter the following to initialize the router with the IOS on the additional CF memory card:
	
	    boot slot0:*IOS_filename*
	
	Where *IOS_filename* = the filename of the IOS noted in step 5, above.
	
	A successful IOS re–boot operation will result in display of a response which begins and ends similar to the following:
	
	<pre>rommon 2 > boot slot0:mwr1941–i–mz.122–8.MC2a.bin
	
	program load complete, entry point: 0x80008000, size: 0xb2a0
	
	program load complete, entry point: 0x80008000, size: 0x6b99ac
	
	Self decompressing the image :
	## [OK]
	
	Smart Init is enabled
	
	smart init is sizing iomem
	
	  ID MEMORY_REQ TYPE
	
	00031A 0X005F3C00 MWR1941 Mainboard
	
	              0X000F3BB0 public buffer pools
	
	              0X00211000 public particle pools
	
	TOTAL: 0X008F87B0
	.
	.
	.
	
	        ──── System Configuration Dialog ────
	
	Would you like to enter the initial configuration dialog? [yes/no]: n</pre>

7	If the router prompts with a question to enter the initial dialog as shown in step 6, above, type **no** and press the **Enter** key to obtain the user EXEC mode prompt.
8	If the router prompts with `Press RETURN to get started!`, press the **Enter** key to obtain the user EXEC mode prompt.

9	At the user EXEC mode prompt, enter the following to access the privileged EXEC mode:
	
	    enable
	
	A response similar to the following will be displayed:
	
	<pre>Router> enable
	Router#</pre>

10	Remove the additional CF memory card from the BTS router following the procedure in the *1X SC 4812T BTS FRU Guide* .
11	Install the *original* CF memory card in the router following the procedure in the BTS FRU Guide.

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Table J-16: Extended Recovery from BTS Router rommon Boot

Step	Action
12	Format the *original* CF memory card by entering the following: **format slot0:** A response similar to the following will be displayed: ``` Router#format slot0: Format operation may take a while. Continue? [confirm] ```
13	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: ``` Format operation may take a while. Continue? [confirm] Format operation will destroy all data in "slot0:". Continue? [confirm] ```
14	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: ``` Format operation will destroy all data in "slot0:". Continue? [confirm] Format: Drive communication & 1st Sector Write OK... Writing Monlib sectors.. .... Monlib write complete . Format: All system sectors written. OK... Format: Total sectors in formatted partition: 62560 Format: Total bytes in formatted partition: 32030720 Format: Operation completed successfully. Format of slot0 complete Router# ```
15	Copy the required IOS version to the formatted original CF memory card by performing *one* of the following: • Use the LMF computer and a tftp server following the procedure in Table J-10 • Use the LMF computer and a CF memory card reader following the procedure in Table J-11
16	If applicable, perform IOS initialization troubleshooting as described in Table J-15, steps 7 through 10.

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Entering or Changing Router FE Interface IP Address

It may be necessary to enter or change the IP addresses and/or operating parameters for BTS router FE interfaces FE 0 and FE1 without making other changes in the router configuration files. Procedures in this section cover these operations.

Prerequisites

The following must be accomplished before entering or changing BTS router FE port IP addresses and/or operating parameters:

- The user has read and understands the content of *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78−13983−01*

- BTS routers must have the required version of the IOS saved on their installed CF memory card

- BTS routers must have power applied, be operating without alarms other than span alarms, and have completed boot–up to the user EXEC mode prompt (BTSRTR−*bts#*−1−1>)

- The BTS router privileged EXEC mode password has been obtained from the network administrator

Entering or Changing FE Interface IP Addresses

To enter or change FE interface IP addresses, follow the procedure in Table J-17.

Step	Action
\<td colspan> **Table J-17:** Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters	

Step	Action
* IMPORTANT	

Table J-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters

Step	Action
* **IMPORTANT**	
This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78−13983−01*. Have this publication available for reference while performing this procedure.	
1	Obtain the correct IP addresses and subnet masks for the BTS router FE interfaces from the network administrator.
2	If a HyperTerminal connection for BTS card/module MMI or BTS router (BTSRTR) communication has not been created, create one as described in Table J-1 of this appendix.
3	Connect the LMF computer to the BTS router, and start a communication session as described in Table J-2 in this appendix.

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Table J-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters

Step	Action
4	**NOTE** Examples in this procedure show prompts for BTSRTR–*bts#*–1–1 and BTSRTR–*bts#*–1–2, but the procedure can be used for any router in any BTS router group or a router running the canned configuration file (BTSRTR1 or BTSRTR2). At the BTSRTR–*bts#*–1–1> user EXEC mode prompt, enter the following to access the privileged EXEC mode: **enable** A response similar to the following will be displayed: ``` BTSRTR–bts#–1–1> enable Password: ```
5	Enter the privileged EXEC mode password. A response similar to the following will be displayed: ``` BTSRTR–bts#–1–1> enable Password: BTSRTR–bts#–1–1# ```
6	At the BTSRTR–*bts#*–1–1# privileged EXEC mode prompt, display the FE interface IP addresses by typing: **sh**ow **ip int**erface **brief** A response similar to the following will be displayed: ``` BTSRTR–bts#–1–1# show ip interface brief Interface IP Address OK? Method Status Protocol FastEthernet0/0 192.168.146.1 YES NVRAM up up Serial0:0 unassigned YES unset administratively down down FastEthernet0/1 unassigned YES unset administratively down down Serial1:0 unassigned YES unset administratively down down BTSRTR–bts#–1–1# ```
7	For a FastEthernet0/0 (fa0/0) or FastEthernet0/1(fa0/1) interface which does not have a correct or an assigned IP address, enter the following at the router prompt to access the global configuration mode: **conf**igure **t**erminal A response similar to the following will be displayed: ``` BTSRTR–bts#–1–1# conf t Enter configuration commands, one per line. End with CNTL/Z. BTSRTR–bts#–1–1(config)# ```

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Table J-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters	
Step	**Action**

8	At the global configure mode prompt, enter the following to access the configure interface submode for the interface requiring IP address assignment/change:
	
	    interface **fa**stethernet*interface#*
	
	Where *interface#* = 0/0 or 0/1, as applicable.
	
	A response similar to the following will be displayed:
	
	`BTSRTR−bts#−1−1(config)#  int fa0/1`
	
	`BTSRTR−bts#−1−1(config−if)#`

9	At the configure interface submode prompt, assign or change the interface IP address by entering:
	
	    ip address *IP_addr subnet_mask*
	
	Where:
	IP_addr = the required IP address for the interface; for example, 192.168.147.1
	subnet_mask = the required subnet mask for the interface; for example, 255.255.255.0
	
	A response similar to the following will be displayed:
	
	`BTSRTR−bts#−1−1(config−if)#  ip address  192.168.147.1  255.255.255.0`
	
	`BTSRTR−bts#−1−1(config−if)#`

10	To complete configuration of the interface, enter the following parameter settings, one at a time, pressing **Enter** after each:
	
	    duplex full
	    speed 100
	    keepalive 1
	    no shutdown

11	Return to the global configuration mode by entering the **exit** command. A response similar to the following will be displayed:
	
	`BTSRTR−bts#−1−1(config−if)#  exit`
	
	`BTSRTR−bts#−1−1(config)#`

12	If the IP address and/or parameters for the *other* FE interface on the router must be assigned or changed at this time, repeat steps 8 through 11 for the other FE interface.

13	Once the correct parameters have been set for all FE interfaces, return to the privileged EXEC mode prompt by holding down the **Ctrl** key and pressing **z** (**Ctrl +z**). A response similar to the following will be displayed:
	
	`BTSRTR−bts#−1−1(config−if)#  ^z`
	`01:11:27: %SYS−5−CONFIG_I: Configured from console by console`
	`BTSRTR−bts#−1−1#`
	
	NOTE
	
	Entering **exit** twice, pressing the **Enter** key after each entry, will also complete the interface configuration and return the router to the privileged EXEC mode.

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Table J-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters

Step	Action

14	Save the interface configuration changes to the startup configuration file on the CF memory card by entering the following:
	
	copy running–config **start**up–config
	
	A response similar to the following will be displayed:
	
	`BTSRTR–`*bts*`#–1–1#  copy run start`
	`BTSRTR–`*bts*`#–1–1#  Destination filename [startup–config]?`

15	Press **Enter**. A response similar to the following will be displayed:
	
	`BTSRTR–`*bts*`#–1–1#  copy run start`
	`BTSRTR–`*bts*`#–1–1#  Destination filename [startup–config]?`
	`Building configuration...`
	`!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!![OK]`
	`BTSRTR–`*bts*`#–1–1#`

16	If all FE IP address entries/changes for the router are complete, enter the following to return the router to user EXEC mode:
	
	disable
	
	A response similar to the following will be displayed:
	
	`BTSRTR–`*bts*`#–1–1#  disable`
	`BTSRTR–`*bts*`#–1–1>`

17	If no other router requires the FE interfaces to be assigned/changed, proceed to step 20.
18	If FE interfaces on another router must be assigned/changed, disconnect the 8–contact modular plug from the current router CONSOLE port and connect it to the CONSOLE port of the other router.
19	Press the **Enter** key, and when the router user EXEC mode prompt appears repeat steps 3 through 16 for the other router.
20	When the router is in user EXEC mode, close the HyperTerminal session and disconnect the LMF computer and additional components from the BTS router.

J

BTS Router Canned Configuration File

This section presents listings of the *blue* and *red* router canned configuration file contents for the MWR 1941 BTS routers. The *blue* router is the primary router on the BTS LAN subnet 192.168.146.0, and the *red* router is the primary on BTS LAN subnet 192.168.147.0. The canned configuration files allow communication with the BTS routers for both on–site FE cabling connectivity verification and for downloading the routers from the network with the full, site–specific operational configuration.

Obtaining the Latest Configuration File Content

The files included here are *for example only*. The correct canned configuration file content for each BTS router should be generated at the OMC–R using the */screl/active/bin/gen_btsrtr_canned_config.ksh* script.

Configuration File Examples

Examples of both configuration files are provided in the following subsections.

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"Blue" BTS Router Canned Configuration

```
! Canned Config file for BTSRTR1

version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname BTSRTR1
!
no logging console
!
!
ip subnet-zero
ip classless
ip pim bidir-enable
!
disable-eadi

!
redundancy
  mode y-cable
     standby use-interface Loopback101 health
     standby use-interface Loopback102 revertive
     standby use-interface Multilink1 backhaul

interface loopback 101
  description  BTSRTR health loopback
  no ip address

interface loopback 102
  description  BTSRTR revertive loopback
  no ip address
!
! configure 1 DS0 for BTSRTRLINK
!
controller T1 0/0
  description  1st span on BTSRTR
  framing esf
  linecode b8zs
  cablelength short 133
  clock source line
  channel-group 0 timeslots 1-24 speed 64

! MLPPP bundle with BTSRTRLINK.
! This performs IPCP with RPM when BTSRTR is rebooted
interface Multilink 1
  ip address negotiated
  no ip route-cache
  no cdp enable
  ppp multilink
  multilink-group 1
  no shutdown
!
! Setup Serial Interface for PPP and IPCP, no MLPPP at this time
!
interface Serial0/0:0
  no ip address
  encapsulation ppp
  keepalive 1
  ppp multilink
  multilink-group 1
  no shutdown

!
```

```
! Setup Ethernet Interfaces and HSRP between them
!
interface FastEthernet0/0
  ip address 192.168.146.1 255.255.255.0
  keepalive 1
  speed 100
  full−duplex
  standby 1 timers 1 3
  standby 1 preempt
  standby 1 priority 100
  standby 1 ip 192.168.146.3
  standby 1 name one
  standby 1 track Fa0/1 10
  standby 1 track Multilink1 10
  ! Track the MWR 1941 health interface
  standby 1 track Loopback101 10
  ! Track the MWR 1941 revertive (compensation) interface
  standby 1 track Loopback102 5
  no shutdown
!
interface FastEthernet0/1
  ip address 192.168.147.1 255.255.255.0
  keepalive 1
  speed 100
  full−duplex
  standby 2 timers 1 3
  standby 2 preempt
  standby 2 priority 100
  standby 2 ip 192.168.147.3
  standby 2 name two
  standby 2 track Fa0/0 10
  standby 2 track Multilink1 10
  ! Track the MWR 1941 health interface
  standby 2 track Loopback101 10
  ! Track the MWR 1941 revertive (compensation) interface
  standby 2 track Loopback102 5
  no shutdown

!
! Set a default route to RPM thru BTSRTRLINK
!
ip route 0.0.0.0 0.0.0.0 Multilink 1
!


line con 0
 exec−timeout 15 0
 password cisco
line aux 0
 login
 password cisco
line vty 0 4
 login
 password cisco

end
```

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"Red" BTS Router Canned Configuration

```
! Canned Config file for BTSRTR2

version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password—encryption
!
hostname BTSRTR2
!
no logging console
!
!
ip subnet—zero
ip classless
ip pim bidir—enable
!
disable—eadi

!
redundancy
  mode y—cable
    standby use—interface Loopback101 health
    standby use—interface Loopback102 revertive
    standby use—interface Multilink1 backhaul

interface loopback 101
  description  BTSRTR health loopback
  no ip address

interface loopback 102
  description  BTSRTR revertive loopback
  no ip address
!
! configure 1 DS0 for BTSRTRLINK
!
controller T1 0/0
  description  1st span on BTSRTR
  framing esf
  linecode b8zs
  cablelength short 133
  clock source line
  channel—group 0 timeslots 1—24 speed 64

! MLPPP bundle with BTSRTRLINK.
! This performs IPCP with RPM when BTSRTR is rebooted
interface Multilink 1
  ip address negotiated
  no ip route—cache
  no cdp enable
  ppp multilink
  multilink—group 1
  no shutdown
!
! Setup Serial Interface for PPP and IPCP, no MLPPP at this time
!
interface Serial0/0:0
  no ip address
  encapsulation ppp
  keepalive 1
  ppp multilink
  multilink—group 1
  no shutdown
!
```

J

```
! Setup Ethernet Interfaces and HSRP between them
!
interface FastEthernet0/0
  ip address 192.168.146.2 255.255.255.0
  keepalive 1
  speed 100
  full−duplex
  standby 1 timers 1 3
  standby 1 preempt
  standby 1 priority 100
  standby 1 ip 192.168.146.3
  standby 1 name one
  standby 1 track Fa0/1 10
  standby 1 track Multilink1 10
  ! Track the MWR 1941 health interface
  standby 1 track Loopback101 10
  ! Track the MWR 1941 revertive (compensation) interface
  standby 1 track Loopback102 5
  no shutdown
!
interface FastEthernet0/1
  ip address 192.168.147.2 255.255.255.0
  keepalive 1
  speed 100
  full−duplex
  standby 2 timers 1 3
  standby 2 preempt
  standby 2 priority 100
  standby 2 ip 192.168.147.3
  standby 2 name two
  standby 2 track Fa0/0 10
  standby 2 track Multilink1 10
  ! Track the MWR 1941 health interface
  standby 2 track Loopback101 10
  ! Track the MWR 1941 revertive (compensation) interface
  standby 2 track Loopback102 5
  no shutdown

!
! Set a default route to RPM thru BTSRTRLINK
!
ip route 0.0.0.0 0.0.0.0 Multilink 1
!


line con 0
 exec−timeout 15 0
 password cisco
line aux 0
 login
 password cisco
line vty 0 4
 login
 password cisco

end
```

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Preparation for Site Turn–over

Prepare the BTS site for turn–over to the control of the OMC–R by performing the procedures in Table J-18 and Table J-19.

Step	Action
Table J-18: Prepare for Site Turn–over
Step	**Action**
1	After disconnecting it from the BTS router, shut down the LMF computer.
2	If any additional external support equipment was used during the installation process, shut it down, disconnect it from the frame.
3	Account for all tools used and parts removed from the frame during the installation, being sure none were left inside the frame.
4	Visually inspect the frame for any foreign objects left inside, and remove any discovered.
5	Visually inspect all cable connections, ensuring they are connected as required for normal BTS operation.
6	Be sure all internal frame cables are routed and secured to prevent damage to them when the frame doors are closed.
7	Be sure all external frame and BTS router cables are routed and secured so they will not interfere with normal maintenance and operational activities at the site.
8	Be sure the BTS routers are powered up and not reporting alarms other than span alarms.

Returning the Site to OMC–R Control

Follow the procedure in Table J-19 to return the site to OMC–R control.

Step	Action
Table J-19: Returning the Site to Operational Control
Step	**Action**
1	Contact the OMC–R, and notify the operator the installation is complete. Request notification from the operator when the routers have been downloaded with the full site–specific configurations and are verified as functioning normally.
2	When notified router operation has been verified and the OMC–R can assume control of the site, perform the following:
2a	– On any frames which were opened, close and secure the cabinet doors.
2b	– Verify no alarm conditions are being reported to the OMC–R with the frame doors closed.
2c	– Prepare all equipment, tools, and parts removed from the frame for transport from the site.

What to Do Next

The installation of the Packet Backhaul option is complete. When the site is secured, there are no further actions to perform at the BTS site.

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Technical
Information

1X SC™ 4812T BTS Optimization/ATP

Software Release R2.16.3.x

800 and 1900 Mhz

CDMA

1X SC ™ 4812T BTS Optimization/ATP

SOFTWARE RELEASE X.X.X
800 and 1900 Mhz
CDMA

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TAB and SHEET SIZE/QUANTITY

7X9 _____   8.5x11 _____   11x17 _____   Sheets = (Total Pages) / 2

1st Level Tabs _____   2nd Level Tabs _____

NON–STANDARD SPECIFICATIONS

☐ Tape Bound   ☐ Corner Stitch

Other: Meet with manager to determine the deliverable.

SPECIAL INSTRUCTIONS